

CATALOG &  
TECHNICAL  
GUIDE

# SOLID ROUND TOOLING



**Niagara Cutter**  
A SECO TOOLS COMPANY



# YOUR SOLID TOOLING & TECHNOLOGY EXPERTS

## A TEST FOR OURSELVES & A PROMISE TO OUR CUSTOMERS

Niagara Cutter understands product consistency, quality, and maximum levels of performance are paramount to our customers. These fundamentals begin in our dedicated R&D, Engineering, and test facilities. The knowledge gained through these resources serve as a framework to educate not only ourselves, but also allow us to assist our customers in becoming competent and practical experts. Extensive product development and educational initiatives support Niagara Cutter's continuous achievement in exceeding industry expectations. Always striving for excellence and embracing the needs of our customer guarantee that the promise we make is the promise we keep... to provide the highest value cutting tools in the world.

**INNOVATION | TECHNOLOGY | QUALITY | SERVICE**



**Niagara Cutter**  
A SECO TOOLS COMPANY

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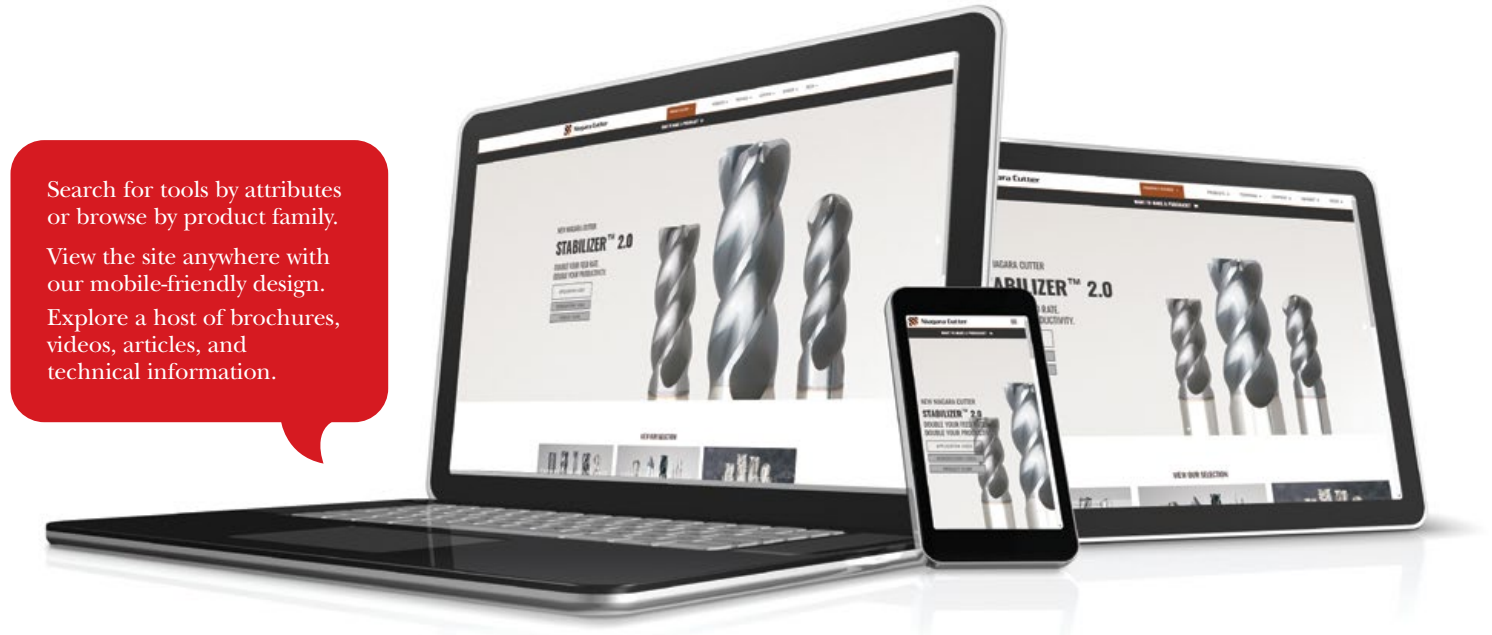
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<p><b>Arkansas Mill Supply Co.</b> Phone number: 870-534-6540 Address: 701 Commerce Rd City: Pine Bluff State: AR Zip: 71601 <a href="http://www.arkansasmill.com">www.arkansasmill.com</a></p>	
<p><b>C.C.A. Inc.</b> Phone number: 317-783-6681 Address: 1225 Brookville Way City: Indianapolis State: IN Zip: 46239 <a href="http://www.ccaabola.com">www.ccaabola.com</a></p>	





## APPLICATION ENGINEERING

At Niagara Cutter, we are dedicated to a process of constant improvement and take pride in our record of significant innovation and industry advancements.

Our truly innovative and comprehensive systems approach to world-class products starts with listening and learning. Then, between initial concept and final product there is application engineering, prototype development, exhaustive product testing and critical analysis before culminating in a product that does not just perform, but outperforms that which previously existed.



## MANUFACTURING TECHNOLOGY

Niagara Cutter continues to invest heavily in automated processes, but in the final analysis these machines are only as capable as their programming and maintenance allows. The final products are only as consistent as the parameters set by Niagara's machinists. It is in these areas where no machine can match the human contribution.

Niagara Cutter aggressively pursues continuous improvement in its automated operations and its people. Therefore, the perfect operation between man and machine at Niagara Cutter results in a company that is far greater than the sum of its parts in achieving consistency and accuracy.



## PRODUCTS - HIGH PERFORMANCE CUTTING TOOL SOLUTIONS

Niagara Cutter offers many product styles, including end mills, thread mills, drills, and special cutting tools to customer blueprints. With multiple material substrates (cobalt, tungsten carbide), tool geometries and thin film coatings, we provide a complete product range to meet your cutting tool requirements.

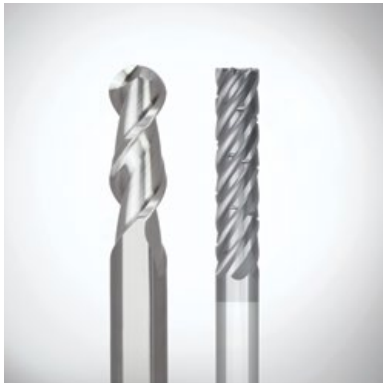
Our job is not just to produce premium cutting tools, but to produce premium cutting tools specific to your application and for absolute optimum performance. We do this by asking the critical questions and quickly responding with the most effective solution.



## **HIGH PERFORMANCE STABILIZER™ 2.0 SERIES** - Page 18

The Stabilizer 2.0 family of end mills raises the bar in high performance milling by incorporating a patented continuously varying asymmetrical geometry which helps create a smooth chatter free milling condition. This configuration, along with a specially engineered flute shape, allow for feed rates twice that of the previous Stabilizer.

The ST430.2 series of end mills are specifically designed for machining steels, alloy steels, copper alloys and cast iron. The ST440.2 HT series of end mills are specifically designed for machining ISO-S materials such as stainless steel, steels over 42 Rc, titanium and Inconel. These end mills also feature an AlTiN coating that offers high heat resistance and superior abrasion resistance to maximize tool life.



## **ELITE A & S SERIES** - Page 43

Our Elite series of end mills feature specific geometries for ferrous or nonferrous materials, available in 0.125 - 1.25" diameters.

The new S638, S738 and S938 multi flute end mills are designed for Optimized and Peripheral Roughing and Finishing applications in Stainless Steel, Titanium and high temperature alloys.

The A series is designed for aluminum and non ferrous materials and is available with two or three flutes in a variety of configurations. The S series provides high performance machining in steel, stainless steel and high temperature alloys with three, five, six, seven and nine flutes.



## **HIGH FEED & MOLD & DIE** - Page 110

The mold & die range offers geometries for hard milling of steels up to 62Rc.

The SN200R, SN400R and SN500R cover a broad range of applications and materials. These end mills direct radial cutting pressure up into spindle for increased metal removal rates in deep pockets and long reach applications.

The MZN410R and MZN510R are designed to maximize productivity in hardened steels and superalloys. These end mills feature optimized substrate, geometry and coating to offer superior performance and process reliability.



## **CVD DIAMOND** - Page 128

Diamond is the material of choice for machining abrasive non-ferrous metals, ceramics, and composites. The unique hardness of the Diamond coating makes it more resistant to abrasive wear than any other cutting tool material. In addition, high chemical stability and the resulting low affinity to non-ferrous materials as well as the low coefficient of friction helps retard the formation of built-up edges.

CVD Diamond coating offers a new level of wear protection and performance. DiamondPlus™ coating combines micro and nano-crystalline diamond coatings into one super hard layer.



## **GENERAL PURPOSE C SERIES** - Page 158

The C series end mills with two, three, or four flutes are available in square, corner radius or ball end, uncoated or with TiAlN as standard. This broad range of end mills is typical for job shop environments where one tool can handle a variety of applications.



## **MICRO** - Page 215

For the manufacturing of small components, Niagara Cutter has developed a range of miniature end mills. The Micro range delivers precision technology and quality in micro decimal diameters. These miniature end mills are available in square end and ball end geometries with two and four flutes. All tools are 1/8" shank, 1-1/2" overall length.



## **CHAMFER MILLS** - Page 226

Chamfer mills are available to produce either a 60° or 90° chamfer. Both styles are available with two or four flutes.



## **COBALT** - Page 237

General purpose M42 cobalt roughers and finishers are available in a wide variety of sizes in both center cutting and non center cutting geometries.

The VFP geometry is designed specifically for high metal removal rates in stainless steel and titanium alloys.

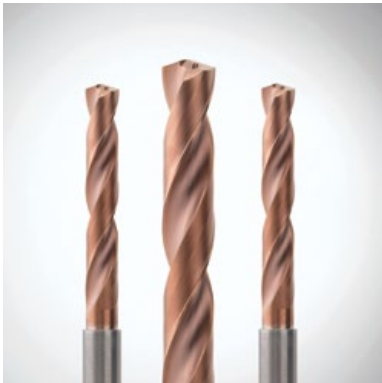
Our EXCEL end mills are a revolutionary solution that combines superior geometry, high grade cobalt substrate and wear resistant PVD coatings to handle difficult milling applications.



## **THREAD MILLS** - Page 291

Thread milling is a versatile and cost effective solution, especially if you are machining a variety of parts and materials on the same machine. Niagara Cutter offers a broad range of solid carbide thread mills to meet your requirements.

One thread mill can produce, regardless of diameter, thread forms of the same pitch. Thread forms produced can be internal or external, right-hand or left-hand. Plus, milled threads produce excellent form, finish, and dimensional accuracy, even in difficult to machine materials.

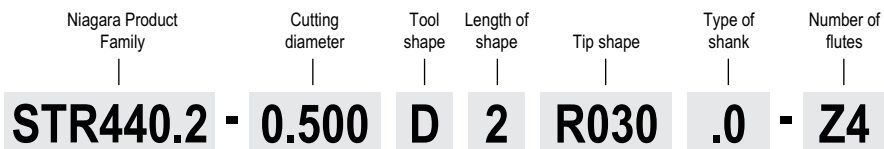


## **UNIVERSAL DRILL** - Page 301

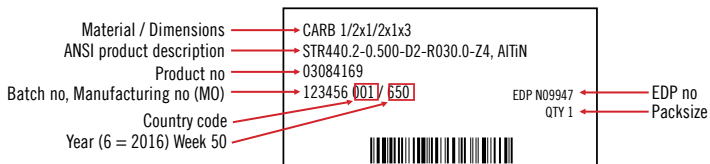
Niagara Universal solid carbide drills offer performance and value for holemaking applications across all industry segments.

Niagara Universal drills feature advanced coating technology and optimized geometries for specialized applications that focus on hole quality, high-volume production and achieving the lowest cost per hole. The new Universal Drill line adds to the Niagara Cutter family by bringing versatility and reduced inventory costs to low and medium batch production.

## END MILL PRODUCT CODE KEY



### PRODUCT LABEL



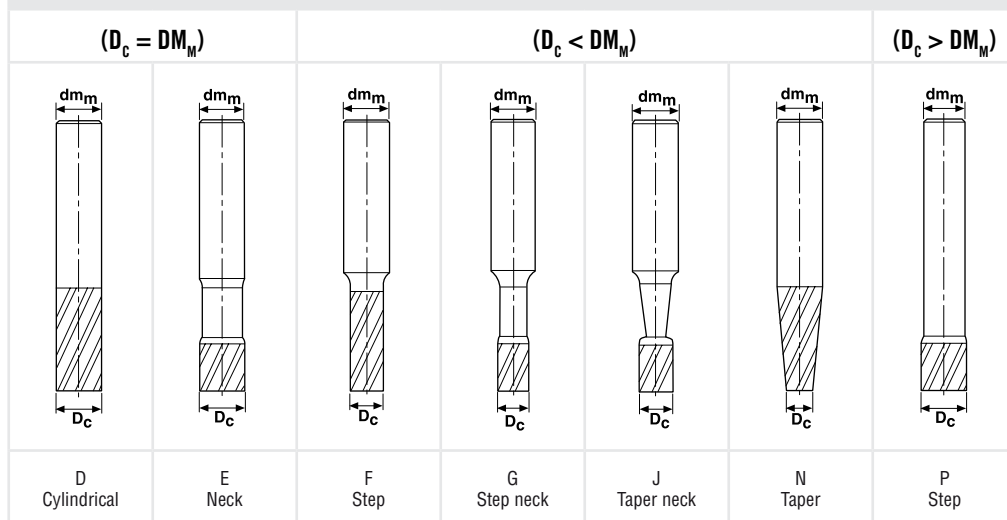
### PRODUCT RANGE

Example:  
 ST = STABILIZER  
 For all products, see catalog.

### CUTTING DIAMETER

Metric = 3 digit code (in case of 4 digit code: xx.xx mm)  
 Imperial = a decimal followed by a 3 digit code  
 For example: (050 = metric, 5 mm)  
 (.500 = imperial, 1/2 inch)

### TOOL SHAPE



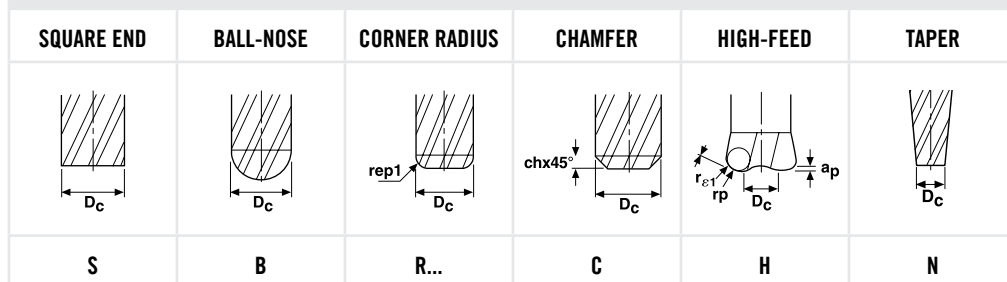
### LENGTH OF SHAPE

- STUB = 1
- S = 2
- M = 3
- L = 4
- LR1 = 5
- LR2 = 6
- LR3 = 7
- LR4 = 8
- LR5 = 9

### TYPE OF SHANK

Indicates the shank types that are available.  
 .0 = Cylindrical  
 .3 = Weldon  
 .5 = Whistle Notch  
 .9 = Safe-Lock

### TIP SHAPE



Size of radius for convex and concave radius tipped products

.000 = For metric products the tip shape is shown by a three-digit figure.  
 By dividing this figure by 100 you will get the actual corner radius size in millimeters.

.000 = For inch products the tip shape is shown by a dot, followed by a three-digit figure.  
 This figure actually shows the size of the corner radius in inch (e.g. R.100 would indicate a radius of 0.100 Inch).

### NUMBER OF FLUTES

This figure indicates the number of flutes in the cutter.  
 For example:  
 Z2 = 2 flutes, Z6 = 6 flutes

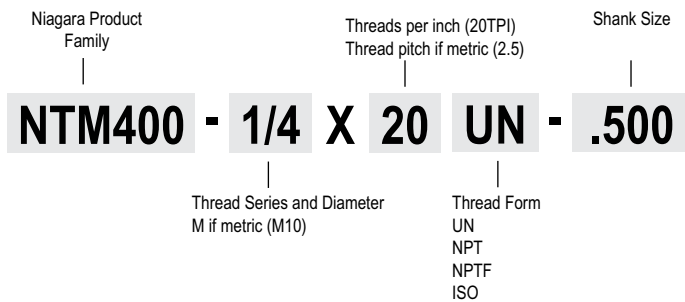
### COATING

### DESCRIPTION

AICrN	AICrN
AITiN	AITiN
CVDDIA	Diamond CVD
TiAIN	TiAIN
TiCN	TiCN
TiN	TiN
	Uncoated



## THREAD MILLING PRODUCT CODE KEY



### FORMULA








$a_e$  = Width of cut/radial depth of cut  
 $a_p$  = Depth of cut/axial depth of cut  
 $f$  = Feed per revolution  
 $f_z$  = Feed per tooth  
 $n$  = Rev/min RPM  
 $v_c$  = Surface footage/min  
 $v_f$  = Table travel (in/min)  
 $z_n$  = Number of teeth

## SYMBOL KEY

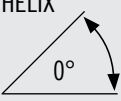
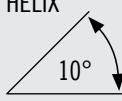


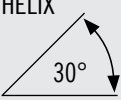
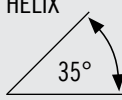


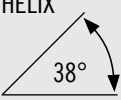
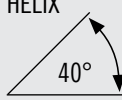


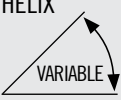
### TOOL MATERIAL - SUBSTRATE

SOLID CARBIDE	PREMIUM PARTICLE METAL 8.5% COBALT	M42 8% COBALT
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### TOOL END SHAPE

SQUARE END 	BALL END 	CHAMFER  60°	CHAMFER  90°
CHAMFER  45°	RADIUS 	HIGH FEED 	



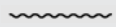

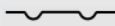
### HELIX ANGLE

HELIX  0°	HELIX  10°	HELIX  15°	HELIX  20°
HELIX  30°	HELIX  35°	HELIX  36°	HELIX  37°
HELIX  38°	HELIX  40°	HELIX  45°	HELIX  60°
HELIX  VARIABLE			

### END TEETH

CENTER CUTTING	NON CENTER CUTTING
----------------	--------------------

### ROUGHING PROFILES

CHIPBREAKER 	COARSE PITCH 	FINE PITCH 	TRUNCATED 
CHIPSPLITTER 			

## SECO MATERIAL GROUP (SMG)

### STEEL, FERRITIC AND MARTENSITIC STAINLESS STEEL

ISO	SMG NO.	REPRESENTATIVE MATERIAL	DESCRIPTION	BHN	kc <sub>1.1</sub> x 1000 lbf/in <sup>2</sup>	m <sub>c</sub>
P	1	1010	Very soft carbon steels Purely ferritic steels	< 135	196	0.21
	2	1140	Free-cutting steels	120 < 210	218	0.22
	3	1045	Structural steels. Ordinary carbon steels with low to medium carbon content (<0,5%C)	135 < 165	218	0.25
	4	4140	Carbon steels with high carbon content (>0,5%C) Medium hard steels for toughening. Ordinary low-alloy steels Ferritic and martensitic stainless steels	165 < 210	247	0.24
	5	4340	Normal tool steels Harder steels for toughening Martensitic stainless steels	210 < 270	276	0.24
	6	D2	Difficult tool steels High-alloy steels with high hardness Martensitic stainless steels	270 < 360	290	0.24
H	7	A128 Grade A	Difficult high-strength steels with 42 to 56 HRC hardness Hardened steels from material group 3-6 Martensitic stainless steels	> 360	421	0.22

### FREE-CUTTING, AUSTENITIC AND DUPLEX STAINLESS STEEL

M	8	304	Easy-cutting stainless steels Free-cutting stainless steels Calcium-treated stainless steels		254	0.22
	9	316	Moderately difficult stainless steels Austenitic and duplex stainless steels		276	0.2
	10	310	Difficult stainless steels Austenitic and duplex stainless steels		297	0.2
	11	330	Very difficult stainless steels Austenitic and duplex stainless steels		312	0.2

### CAST IRON

K	12	60-40-18	Medium hard cast iron Grey cast iron		167	0.22
	13	A536 80-55-06	Low-alloy cast iron Malleable cast iron Nodular cast iron		178	0.25
	14	A536 100-70-03	Moderately difficult alloy cast iron Moderately difficult malleable cast iron Nodular cast iron		196	0.28
	15	A536 120-90-02	Difficult high-alloy cast iron Difficult malleable cast iron Nodular cast iron		213	0.3

### OTHER MATERIALS

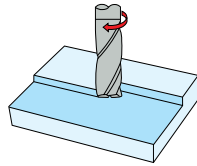
N	16	A380	Aluminum alloys: Low Si		101	0.25
	17	B390.0	Aluminum alloys: High Si		101	0.27
	18	CA937	Copper alloys			
S	19	Discalloy	Fe-based superalloys			
	20	Stellite 21	Co-based superalloys		377	0.24
	21	Inconel 718 (bar, forge, ring)	Ni-based superalloys		479	0.24
	22	Ti 6Al-4V (annealed)	Titanium alloys		210	0.23

k<sub>1.1</sub>-values with 0 degree effective cutting rake angle. For other rake angles, reduce the k<sub>1.1</sub>-value by 1% for every degree increase in the cutting rake angle and vice versa. Keep in mind that the BHN-value is only an aid in the selection of the material group when the material has been worked by rolling, drawing, heat treatment or other methods that increase the strength of the material.

## BASIC MILLING OPERATIONS

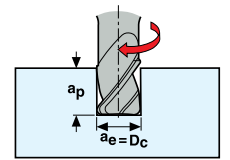
### FACE MILLING

Operation where the tool is in engagement with less than 180° arc of contact.  
 Tool engagement:  
 Small  $a_p$  and large  $a_e$ .



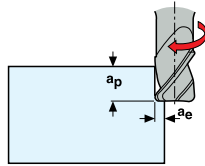
### SLOT MILLING

Operation where the full diameter is in engagement,  $a_e$  is equal to  $D_c$  and  $a_p$  up to 1½ times  $D_c$  depending on the machining strategy in use.



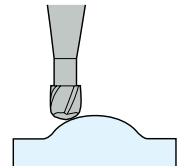
### SIDE MILLING

Operation where the side of the tool is in engagement,  $a_p$  is large and  $a_e$  is small.



### COPY MILLING

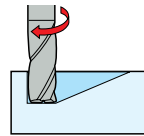
Operation where the radius is in engagement.  $a_p$  and  $a_e$  are both small.



## ADVANCED MILLING OPERATIONS

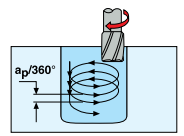
### RAMPING

Opening up a pocket by making a Z axis at an angle.



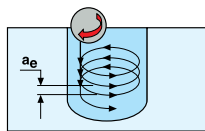
### HELICAL INTERPOLATION RAMPING

Opening a pocket by making a circular movement with the tool slightly less than 2 x D while ramping in Z axis.



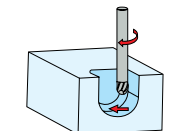
### TROCHOIDAL

Opening a slot by using side milling, making a partial circular movement in X- or Y-axis. (changing slot milling into side milling).



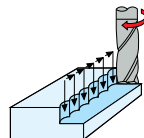
### PUSH-PULL

Machining a 3D form by making a down and up copying movement following the profile of the form.



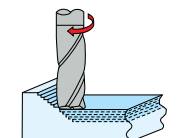
### PLUNGE MILLING

Opening up a deep slot by using drilling (Z) axis.



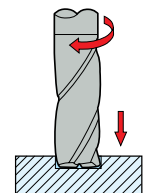
### Z-LEVELING

Machining a surface by making a small drilling or ramping in Z axis then opening the pocket with X and Y movements.



### DRILLING

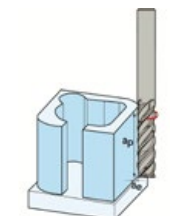
Making a hole with movement in Z axis.

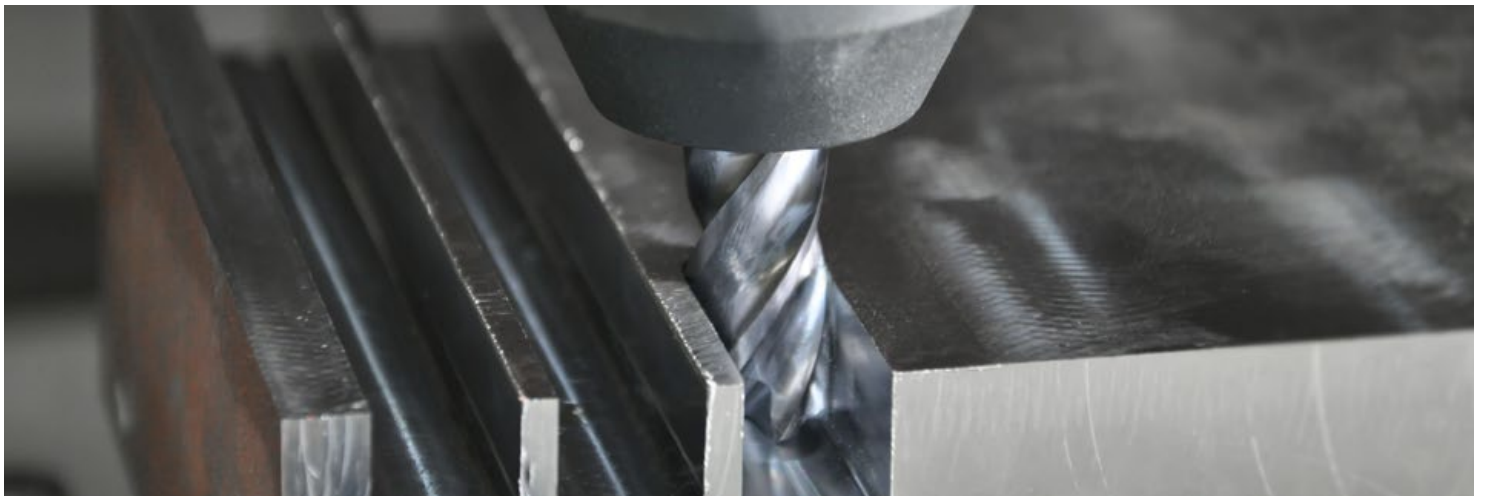


### OPTIMIZED ROUGHING

Well defined tool paths with constant arc of contact for reliable roughing of simple & complex shapes.

The large axial depths ( $a_p$ ) & small radial depths ( $a_e$ ) of cut combined with high feeds per tooth ( $f_z$ ) and cutting speeds ( $V_c$ ) results in high productivity.





## DOUBLE YOUR FEED RATE AND YOUR PRODUCTIVITY

# STABILIZER™ 2.0

The Stabilizer 2.0 family of end mills raises the bar in high performance milling by incorporating a patented continuously varying asymmetrical geometry which helps create a smooth chatter free milling condition. This configuration, along with a specially engineered flute shape, allow for feed rates twice that of the previous Stabilizer.

### PRODUCT OVERVIEW

- Solid carbide high performance tools excel in slot and side milling
- Double the feed rates compared to previous Stabilizer
- Longer tool life than previous tool types even when applied at 2x the feed rates
- Continuous variable asymmetrical geometry for smooth, chatter free cutting
- Wide application area covered, from steel to exotic materials

### YOUR NIAGARA CUTTER BENEFIT

- Reduced cycle times with higher metal removal rates
- Minimized harmonics
- High heat and abrasion resistance
- Smooth chatter free cutting
- Long and predictable tool life
- Consistent performance in all applications
- AlTiN coating for high heat and abrasion resistance

### RANGE OVERVIEW

- Diameters 1/8"- 1" and 3mm - 25mm
- 1 x D, 2 x D and 3 x D length versions available
- Corner radius and ball nose necked versions with 2 x D flute length and 3 x D reach

#### TECHNICAL SPECIFICATIONS

Diameter range:	ø1/8" - ø1", 3mm-25 mm
# flutes:	4
Helix angle:	Variable (offered in 430 and 440 series)
Rake angle:	Variable (based on series)
Relief:	Variable (based on series and diameter)
Flute Diameter	
Tolerance:	+0.000 / - .002"
Shank Diameter	
Tolerance:	-0.001 / -.0004
Corner Radius	
Tolerance:	+ / -.001
Unequal Index:	Yes
Edge preparation:	Yes
Coating:	AlTiN

#### PREFERRED MATERIAL GROUPS (430 SERIES)

steel < 450 N/mm <sup>2</sup>
450 < 700 N/mm <sup>2</sup>
700 < 1200 N/mm <sup>2</sup>
Cast Iron
Copper Alloys

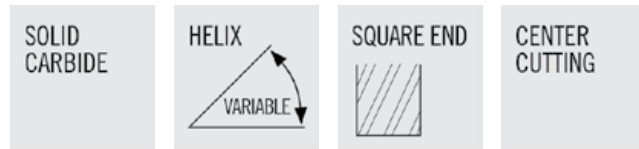
#### PREFERRED MATERIAL GROUPS (440 SERIES)

Stainless steel
Fe based super alloys
CO-based super alloys
Ni-based super alloys
Titanium alloys

### INDUSTRY TARGETS

- General Machining
- Aerospace
- Medical

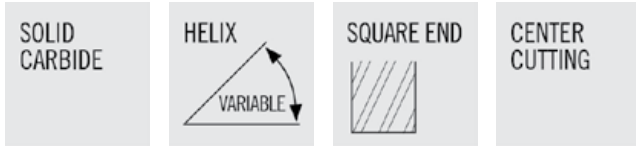
## STABILIZER™ 2.0-ST5430.2



- US Patent # 6,991,409
- Eccentric Primary Relief
- Continuous Varying Asymmetrical Flute Geometry
- Weldon flat on shank sizes 3/8" and larger (optional)
- Ideal for profiling and slotting in steels, alloy steels, copper alloys, and cast iron
- Cutting Data - Page 35
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N09696	STS430.2-0.125-D1-S.0-Z4	1/8	1/8	1/8	1-1/2	4	ALTIN	CYLINDRICAL
N09697	STS430.2-0.125-D2-S.0-Z4	1/8	1/8	1/4	1-1/2	4	ALTIN	CYLINDRICAL
N09698	STS430.2-0.125-D3-S.0-Z4	1/8	1/8	3/8	1-1/2	4	ALTIN	CYLINDRICAL
N09699	STS430.2-0.156-F1-S.0-Z4	5/32	3/16	5/32	2	4	ALTIN	CYLINDRICAL
N09702	STS430.2-0.156-F2-S.0-Z4	5/32	3/16	5/16	2	4	ALTIN	CYLINDRICAL
N09703	STS430.2-0.156-F3-S.0-Z4	5/32	3/16	15/32	2	4	ALTIN	CYLINDRICAL
N09704	STS430.2-0.188-D1-S.0-Z4	3/16	3/16	3/16	2	4	ALTIN	CYLINDRICAL
N09705	STS430.2-0.188-D2-S.0-Z4	3/16	3/16	3/8	2	4	ALTIN	CYLINDRICAL
N09706	STS430.2-0.188-D3-S.0-Z4	3/16	3/16	9/16	2	4	ALTIN	CYLINDRICAL
N09707	STS430.2-0.219-F1-S.0-Z4	7/32	1/4	7/32	2	4	ALTIN	CYLINDRICAL
N09708	STS430.2-0.219-F2-S.0-Z4	7/32	1/4	7/16	2-1/2	4	ALTIN	CYLINDRICAL
N09709	STS430.2-0.219-F3-S.0-Z4	7/32	1/4	21/32	2-1/2	4	ALTIN	CYLINDRICAL
N09712	STS430.2-0.250-D1-S.0-Z4	1/4	1/4	1/4	2	4	ALTIN	CYLINDRICAL
N09713	STS430.2-0.250-D2-S.0-Z4	1/4	1/4	1/2	2-1/2	4	ALTIN	CYLINDRICAL
N09714	STS430.2-0.250-D3-S.0-Z4	1/4	1/4	3/4	2-1/2	4	ALTIN	CYLINDRICAL
N09715	STS430.2-0.281-F1-S.0-Z4	9/32	5/16	9/32	2	4	ALTIN	CYLINDRICAL
N09716	STS430.2-0.281-F2-S.0-Z4	9/32	5/16	9/16	2-1/2	4	ALTIN	CYLINDRICAL
N09717	STS430.2-0.281-F3-S.0-Z4	9/32	5/16	27/32	2-1/2	4	ALTIN	CYLINDRICAL
N09718	STS430.2-0.313-D1-S.0-Z4	5/16	5/16	5/16	2	4	ALTIN	CYLINDRICAL
N09719	STS430.2-0.313-D2-S.0-Z4	5/16	5/16	5/8	2-1/2	4	ALTIN	CYLINDRICAL
N09722	STS430.2-0.313-D3-S.0-Z4	5/16	5/16	15/16	2-1/2	4	ALTIN	CYLINDRICAL
N09723	STS430.2-0.375-D1-S.0-Z4	3/8	3/8	3/8	2	4	ALTIN	CYLINDRICAL
N09724	STS430.2-0.375-D1-S.3-Z4	3/8	3/8	3/8	2	4	ALTIN	WELDON
N09725	STS430.2-0.375-D2-S.0-Z4	3/8	3/8	3/4	2-1/2	4	ALTIN	CYLINDRICAL
N09726	STS430.2-0.375-D2-S.3-Z4	3/8	3/8	3/4	2-1/2	4	ALTIN	WELDON
N09727	STS430.2-0.375-D3-S.0-Z4	3/8	3/8	1-1/8	3	4	ALTIN	CYLINDRICAL
N09728	STS430.2-0.375-D3-S.3-Z4	3/8	3/8	1-1/8	3	4	ALTIN	WELDON
N09729	STS430.2-0.438-D1-S.0-Z4	7/16	7/16	7/16	2-3/4	4	ALTIN	CYLINDRICAL
N09732	STS430.2-0.438-D1-S.3-Z4	7/16	7/16	7/16	2-3/4	4	ALTIN	WELDON
N09733	STS430.2-0.438-D2-S.0-Z4	7/16	7/16	7/8	2-3/4	4	ALTIN	CYLINDRICAL
N09734	STS430.2-0.438-D2-S.3-Z4	7/16	7/16	7/8	2-3/4	4	ALTIN	WELDON
N09735	STS430.2-0.438-D3-S.0-Z4	7/16	7/16	1-5/16	4	4	ALTIN	CYLINDRICAL
N09736	STS430.2-0.438-D3-S.3-Z4	7/16	7/16	1-5/16	4	4	ALTIN	WELDON

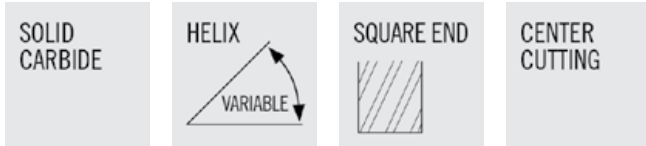
## STABILIZER™ 2.0-STS430.2 (CON'T)



- US Patent # 6,991,409
- Eccentric Primary Relief
- Continuous Varying Asymmetrical Flute Geometry
- Ideal for profiling and slotting in steels, alloy steels, copper alloys, and cast iron
- Cutting Data - Page 35
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N09737	STS430.2-0.500-D1-S.0-Z4	1/2	1/2	1/2	2-1/2	4	ALTIN	CYLINDRICAL
N09738	STS430.2-0.500-D1-S.3-Z4	1/2	1/2	1/2	2-1/2	4	ALTIN	WELDON
N09739	STS430.2-0.500-D2-S.0-Z4	1/2	1/2	1	3	4	ALTIN	CYLINDRICAL
N09742	STS430.2-0.500-D2-S.3-Z4	1/2	1/2	1	3	4	ALTIN	WELDON
N09743	STS430.2-0.500-D3-S.0-Z4	1/2	1/2	1-1/4	3	4	ALTIN	CYLINDRICAL
N09744	STS430.2-0.500-D3-S.3-Z4	1/2	1/2	1-1/4	3	4	ALTIN	WELDON
N09745	STS430.2-0.500-D4-S.0-Z4	1/2	1/2	1-1/2	4	4	ALTIN	CYLINDRICAL
N09746	STS430.2-0.500-D4-S.3-Z4	1/2	1/2	1-1/2	4	4	ALTIN	WELDON
N09747	STS430.2-0.625-D1-S.0-Z4	5/8	5/8	5/8	3	4	ALTIN	CYLINDRICAL
N09748	STS430.2-0.625-D1-S.3-Z4	5/8	5/8	5/8	3	4	ALTIN	WELDON
N09749	STS430.2-0.625-D2-S.0-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	CYLINDRICAL
N09752	STS430.2-0.625-D2-S.3-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	WELDON
N09753	STS430.2-0.625-D3-S.0-Z4	5/8	5/8	1-7/8	4	4	ALTIN	CYLINDRICAL
N09754	STS430.2-0.625-D3-S.3-Z4	5/8	5/8	1-7/8	4	4	ALTIN	WELDON
N09755	STS430.2-0.750-D1-S.0-Z4	3/4	3/4	3/4	3	4	ALTIN	CYLINDRICAL
N09756	STS430.2-0.750-D1-S.3-Z4	3/4	3/4	3/4	3	4	ALTIN	WELDON
N09757	STS430.2-0.750-D2-S.0-Z4	3/4	3/4	1-1/2	4	4	ALTIN	CYLINDRICAL
N09758	STS430.2-0.750-D2-S.3-Z4	3/4	3/4	1-1/2	4	4	ALTIN	WELDON
N09759	STS430.2-0.750-D3-S.0-Z4	3/4	3/4	2-1/4	5	4	ALTIN	CYLINDRICAL
N09762	STS430.2-0.750-D3-S.3-Z4	3/4	3/4	2-1/4	5	4	ALTIN	WELDON
N09763	STS430.2-0.875-D1-S.0-Z4	7/8	7/8	7/8	4	4	ALTIN	CYLINDRICAL
N09764	STS430.2-0.875-D1-S.3-Z4	7/8	7/8	7/8	4	4	ALTIN	WELDON
N09765	STS430.2-0.875-D2-S.0-Z4	7/8	7/8	1-3/4	4	4	ALTIN	CYLINDRICAL
N09766	STS430.2-0.875-D2-S.3-Z4	7/8	7/8	1-3/4	4	4	ALTIN	WELDON
N09767	STS430.2-0.875-D3-S.0-Z4	7/8	7/8	2-5/8	5	4	ALTIN	CYLINDRICAL
N09768	STS430.2-0.875-D3-S.3-Z4	7/8	7/8	2-5/8	5	4	ALTIN	WELDON
N09769	STS430.2-1.000-D1-S.0-Z4	1	1	1	4	4	ALTIN	CYLINDRICAL
N09772	STS430.2-1.000-D1-S.3-Z4	1	1	1	4	4	ALTIN	WELDON
N09773	STS430.2-1.000-D2-S.0-Z4	1	1	2	5	4	ALTIN	CYLINDRICAL
N09774	STS430.2-1.000-D2-S.3-Z4	1	1	2	5	4	ALTIN	WELDON
N09775	STS430.2-1.000-D3-S.0-Z4	1	1	3	6	4	ALTIN	CYLINDRICAL
N09776	STS430.2-1.000-D3-S.3-Z4	1	1	3	6	4	ALTIN	WELDON

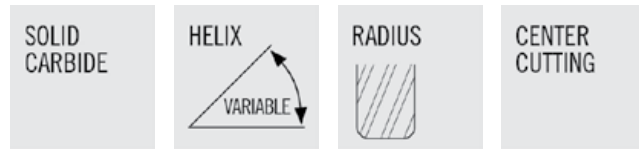
## STABILIZER™ 2.0-STS430M.2



- US Patent # 6,991,409
- Eccentric Primary Relief
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- Cutting Data - Page 36
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N09538	STS430M.2-030-F2-S.0-Z4	3MM	6MM	6MM	58MM	4	ALTIN	CYLINDRICAL
N09539	STS430M.2-030-F3-S.0-Z4	3MM	6MM	9MM	58MM	4	ALTIN	CYLINDRICAL
N09542	STS430M.2-040-F2-S.0-Z4	4MM	6MM	8MM	58MM	4	ALTIN	CYLINDRICAL
N09543	STS430M.2-040-F3-S.0-Z4	4MM	6MM	12MM	58MM	4	ALTIN	CYLINDRICAL
N09544	STS430M.2-050-F2-S.0-Z4	5MM	6MM	10MM	58MM	4	ALTIN	CYLINDRICAL
N09545	STS430M.2-050-F3-S.0-Z4	5MM	6MM	15MM	58MM	4	ALTIN	CYLINDRICAL
N09546	STS430M.2-060-D2-S.0-Z4	6MM	6MM	12MM	58MM	4	ALTIN	CYLINDRICAL
N09547	STS430M.2-060-D3-S.0-Z4	6MM	6MM	18MM	58MM	4	ALTIN	CYLINDRICAL
N09548	STS430M.2-080-D2-S.0-Z4	8MM	8MM	16MM	64MM	4	ALTIN	CYLINDRICAL
N09549	STS430M.2-080-D3-S.0-Z4	8MM	8MM	24MM	64MM	4	ALTIN	CYLINDRICAL
N09552	STS430M.2-100-D2-S.0-Z4	10MM	10MM	20MM	73MM	4	ALTIN	CYLINDRICAL
N09553	STS430M.2-100-D3-S.0-Z4	10MM	10MM	30MM	73MM	4	ALTIN	CYLINDRICAL
N09554	STS430M.2-120-D2-S.0-Z4	12MM	12MM	24MM	84MM	4	ALTIN	CYLINDRICAL
N09555	STS430M.2-120-D3-S.0-Z4	12MM	12MM	36MM	84MM	4	ALTIN	CYLINDRICAL
N09556	STS430M.2-160-D2-S.0-Z4	16MM	16MM	32MM	93MM	4	ALTIN	CYLINDRICAL
N09557	STS430M.2-160-D3-S.0-Z4	16MM	16MM	48MM	93MM	4	ALTIN	CYLINDRICAL
N09558	STS430M.2-200-D2-S.0-Z4	20MM	20MM	40MM	105MM	4	ALTIN	CYLINDRICAL
N09559	STS430M.2-200-D3-S.0-Z4	20MM	20MM	60MM	125MM	4	ALTIN	CYLINDRICAL
N09562	STS430M.2-250-D2-S.0-Z4	25MM	25MM	50MM	115MM	4	ALTIN	CYLINDRICAL
N09563	STS430M.2-250-D3-S.0-Z4	25MM	25MM	75MM	147MM	4	ALTIN	CYLINDRICAL

## STABILIZER™ 2.0-STR430.2



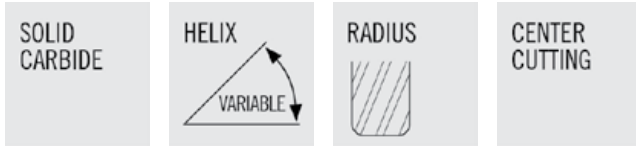
- US Patent # 6,991,409
- Eccentric Primary Relief
- Continuous Varying Asymmetrical Flute Geometry
- Ideal for profiling and slotting in steels, alloy steels, copper alloys, and cast iron

- Cutting Data - Page 35
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N09777	STR430.2-0.125-D1-R010.0-Z4	1/8	1/8	1/8	1-1/2	4	ALTIN	0.010	CYLINDRICAL
N09778	STR430.2-0.125-D2-R010.0-Z4	1/8	1/8	1/4	1-1/2	4	ALTIN	0.010	CYLINDRICAL
N09779	STR430.2-0.125-D3-R010.0-Z4	1/8	1/8	3/8	1-1/2	4	ALTIN	0.010	CYLINDRICAL
N09782	STR430.2-0.156-F1-R010.0-Z4	5/32	3/16	5/32	2	4	ALTIN	0.010	CYLINDRICAL
N09783	STR430.2-0.156-F2-R010.0-Z4	5/32	3/16	5/16	2	4	ALTIN	0.010	CYLINDRICAL
N09784	STR430.2-0.156-F3-R010.0-Z4	5/32	3/16	15/32	2	4	ALTIN	0.010	CYLINDRICAL
N09785	STR430.2-0.188-D1-R010.0-Z4	3/16	3/16	3/16	2	4	ALTIN	0.010	CYLINDRICAL
N09786	STR430.2-0.188-D2-R010.0-Z4	3/16	3/16	3/8	2	4	ALTIN	0.010	CYLINDRICAL
N09787	STR430.2-0.188-D3-R010.0-Z4	3/16	3/16	9/16	2	4	ALTIN	0.010	CYLINDRICAL
N09788	STR430.2-0.219-F1-R020.0-Z4	7/32	1/4	7/32	2	4	ALTIN	0.020	CYLINDRICAL
N09789	STR430.2-0.219-F2-R020.0-Z4	7/32	1/4	7/16	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09792	STR430.2-0.219-F3-R020.0-Z4	7/32	1/4	21/32	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09793	STR430.2-0.250-D1-R020.0-Z4	1/4	1/4	1/4	2	4	ALTIN	0.020	CYLINDRICAL
N09794	STR430.2-0.250-D2-R020.0-Z4	1/4	1/4	1/2	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09795	STR430.2-0.250-D3-R020.0-Z4	1/4	1/4	3/4	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09796	STR430.2-0.281-F1-R020.0-Z4	9/32	5/16	9/32	2	4	ALTIN	0.020	CYLINDRICAL
N09797	STR430.2-0.281-F2-R020.0-Z4	9/32	5/16	9/16	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09798	STR430.2-0.281-F3-R020.0-Z4	9/32	5/16	27/32	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09799	STR430.2-0.313-D1-R020.0-Z4	5/16	5/16	5/16	2	4	ALTIN	0.020	CYLINDRICAL
N09802	STR430.2-0.313-D2-R020.0-Z4	5/16	5/16	5/8	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09803	STR430.2-0.313-D3-R020.0-Z4	5/16	5/16	15/16	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09804	STR430.2-0.375-D1-R020.0-Z4	3/8	3/8	3/8	2	4	ALTIN	0.020	CYLINDRICAL
N09805	STR430.2-0.375-D1-R020.3-Z4	3/8	3/8	3/8	2	4	ALTIN	0.020	WELDON
N09806	STR430.2-0.375-D2-R020.0-Z4	3/8	3/8	3/4	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09807	STR430.2-0.375-D2-R020.3-Z4	3/8	3/8	3/4	2-1/2	4	ALTIN	0.020	WELDON
N09808	STR430.2-0.375-D3-R020.0-Z4	3/8	3/8	1-1/8	3	4	ALTIN	0.020	CYLINDRICAL
N09809	STR430.2-0.375-D3-R020.3-Z4	3/8	3/8	1-1/8	3	4	ALTIN	0.020	WELDON
N09812	STR430.2-0.438-F1-R020.0-Z4	7/16	7/16	7/16	2-3/4	4	ALTIN	0.020	CYLINDRICAL
N09813	STR430.2-0.438-F1-R020.3-Z4	7/16	7/16	7/16	2-3/4	4	ALTIN	0.020	WELDON
N09814	STR430.2-0.438-F2-R020.0-Z4	7/16	7/16	7/8	2-3/4	4	ALTIN	0.020	CYLINDRICAL
N09815	STR430.2-0.438-F2-R020.3-Z4	7/16	7/16	7/8	2-3/4	4	ALTIN	0.020	WELDON
N09816	STR430.2-0.438-F3-R020.0-Z4	7/16	7/16	1-5/16	4	4	ALTIN	0.020	CYLINDRICAL



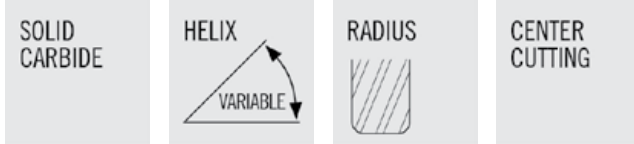
## STABILIZER™ 2.0-STR430.2 (CON'T)



- US Patent # 6,991,409
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- Cutting Data - Page 35
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ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N09817	STR430.2-0.438-F3-R020.3-Z4	7/16	7/16	1-5/16	4	4	ALTIN	0.020	WELDON
N09818	STR430.2-0.500-D1-R030.0-Z4	1/2	1/2	1/2	2-1/2	4	ALTIN	0.030	CYLINDRICAL
N09819	STR430.2-0.500-D1-R030.3-Z4	1/2	1/2	1/2	2-1/2	4	ALTIN	0.030	WELDON
N09844	STR430.2-0.500-D2-R030.0-Z4	1/2	1/2	1	3	4	ALTIN	0.030	CYLINDRICAL
N09845	STR430.2-0.500-D2-R030.3-Z4	1/2	1/2	1	3	4	ALTIN	0.030	WELDON
N09846	STR430.2-0.500-D3-R030.0-Z4	1/2	1/2	1-1/4	3	4	ALTIN	0.030	CYLINDRICAL
N09847	STR430.2-0.500-D3-R030.3-Z4	1/2	1/2	1-1/4	3	4	ALTIN	0.030	WELDON
N09848	STR430.2-0.500-D4-R030.0-Z4	1/2	1/2	1-1/2	4	4	ALTIN	0.030	CYLINDRICAL
N09849	STR430.2-0.500-D4-R030.3-Z4	1/2	1/2	1-1/2	4	4	ALTIN	0.030	WELDON
N09852	STR430.2-0.625-D1-R030.0-Z4	5/8	5/8	5/8	3	4	ALTIN	0.030	CYLINDRICAL
N09853	STR430.2-0.625-D1-R030.3-Z4	5/8	5/8	5/8	3	4	ALTIN	0.030	WELDON
N09854	STR430.2-0.625-D2-R030.0-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	0.030	CYLINDRICAL
N09855	STR430.2-0.625-D2-R030.3-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	0.030	WELDON
N09856	STR430.2-0.625-D3-R030.0-Z4	5/8	5/8	1-7/8	4	4	ALTIN	0.030	CYLINDRICAL
N09857	STR430.2-0.625-D3-R030.3-Z4	5/8	5/8	1-7/8	4	4	ALTIN	0.030	WELDON
N09858	STR430.2-0.750-D1-R030.0-Z4	3/4	3/4	3/4	3	4	ALTIN	0.030	CYLINDRICAL
N09859	STR430.2-0.750-D1-R030.3-Z4	3/4	3/4	3/4	3	4	ALTIN	0.030	WELDON
N09862	STR430.2-0.750-D2-R030.0-Z4	3/4	3/4	1-1/2	4	4	ALTIN	0.030	CYLINDRICAL
N09863	STR430.2-0.750-D2-R030.3-Z4	3/4	3/4	1-1/2	4	4	ALTIN	0.030	WELDON
N09864	STR430.2-0.750-D3-R030.0-Z4	3/4	3/4	2-1/4	5	4	ALTIN	0.030	CYLINDRICAL
N09865	STR430.2-0.750-D3-R030.3-Z4	3/4	3/4	2-1/4	5	4	ALTIN	0.030	WELDON
N09866	STR430.2-0.875-D1-R030.0-Z4	7/8	7/8	7/8	4	4	ALTIN	0.030	CYLINDRICAL
N09867	STR430.2-0.875-D1-R030.3-Z4	7/8	7/8	7/8	4	4	ALTIN	0.030	WELDON
N09868	STR430.2-0.875-D2-R030.0-Z4	7/8	7/8	1-3/4	4	4	ALTIN	0.030	CYLINDRICAL
N09869	STR430.2-0.875-D2-R030.3-Z4	7/8	7/8	1-3/4	4	4	ALTIN	0.030	WELDON
N09872	STR430.2-0.875-D3-R030.0-Z4	7/8	7/8	2-5/8	5	4	ALTIN	0.030	CYLINDRICAL
N09873	STR430.2-0.875-D3-R030.3-Z4	7/8	7/8	2-5/8	5	4	ALTIN	0.030	WELDON
N09874	STR430.2-1.000-D1-R030.0-Z4	1	1	1	4	4	ALTIN	0.030	CYLINDRICAL
N09875	STR430.2-1.000-D1-R030.3-Z4	1	1	1	4	4	ALTIN	0.030	WELDON
N09876	STR430.2-1.000-D2-R030.0-Z4	1	1	2	5	4	ALTIN	0.030	CYLINDRICAL
N09877	STR430.2-1.000-D2-R030.3-Z4	1	1	2	5	4	ALTIN	0.030	WELDON
N09878	STR430.2-1.000-D3-R030.0-Z4	1	1	3	6	4	ALTIN	0.030	CYLINDRICAL
N09879	STR430.2-1.000-D3-R030.3-Z4	1	1	3	6	4	ALTIN	0.030	WELDON

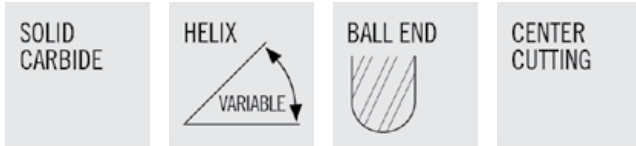
## STABILIZER™ 2.0-STR430M.2



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- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N09564	STR430M.2-030-F2-R025.0-Z4	3MM	6MM	6MM	58MM	4	ALTIN	0.25MM	CYLINDRICAL
N09565	STR430M.2-030-F3-R025.0-Z4	3MM	6MM	9MM	58MM	4	ALTIN	0.25MM	CYLINDRICAL
N09566	STR430M.2-040-F2-R025.0-Z4	4MM	6MM	8MM	58MM	4	ALTIN	0.25MM	CYLINDRICAL
N09567	STR430M.2-040-F3-R025.0-Z4	4MM	6MM	12MM	58MM	4	ALTIN	0.25MM	CYLINDRICAL
N09568	STR430M.2-050-F2-R025.0-Z4	5MM	6MM	10MM	58MM	4	ALTIN	0.25MM	CYLINDRICAL
N09569	STR430M.2-050-F3-R025.0-Z4	5MM	6MM	15MM	58MM	4	ALTIN	0.25MM	CYLINDRICAL
N09582	STR430M.2-060-D2-R050.0-Z4	6MM	6MM	12MM	58MM	4	ALTIN	0.50MM	CYLINDRICAL
N09583	STR430M.2-060-D3-R050.0-Z4	6MM	6MM	18MM	58MM	4	ALTIN	0.50MM	CYLINDRICAL
N09584	STR430M.2-080-D2-R050.0-Z4	8MM	8MM	16MM	64MM	4	ALTIN	0.50MM	CYLINDRICAL
N09585	STR430M.2-080-D3-R050.0-Z4	8MM	8MM	24MM	64MM	4	ALTIN	0.50MM	CYLINDRICAL
N09586	STR430M.2-100-D2-R050.0-Z4	10MM	10MM	20MM	73MM	4	ALTIN	0.50MM	CYLINDRICAL
N09587	STR430M.2-100-D3-R050.0-Z4	10MM	10MM	30MM	73MM	4	ALTIN	0.50MM	CYLINDRICAL
N09588	STR430M.2-120-D2-R075.0-Z4	12MM	12MM	24MM	84MM	4	ALTIN	0.75MM	CYLINDRICAL
N09589	STR430M.2-120-D3-R075.0-Z4	12MM	12MM	36MM	84MM	4	ALTIN	0.75MM	CYLINDRICAL
N09602	STR430M.2-160-D2-R075.0-Z4	16MM	16MM	32MM	93MM	4	ALTIN	0.75MM	CYLINDRICAL
N09603	STR430M.2-160-D3-R075.0-Z4	16MM	16MM	48MM	93MM	4	ALTIN	0.75MM	CYLINDRICAL
N09604	STR430M.2-200-D2-R075.0-Z4	20MM	20MM	40MM	105MM	4	ALTIN	0.75MM	CYLINDRICAL
N09605	STR430M.2-200-D3-R075.0-Z4	20MM	20MM	60MM	125MM	4	ALTIN	0.75MM	CYLINDRICAL
N09606	STR430M.2-250-D2-R075.0-Z4	25MM	25MM	50MM	115MM	4	ALTIN	0.75MM	CYLINDRICAL
N09607	STR430M.2-250-D3-R075.0-Z4	25MM	25MM	75MM	147MM	4	ALTIN	0.75MM	CYLINDRICAL

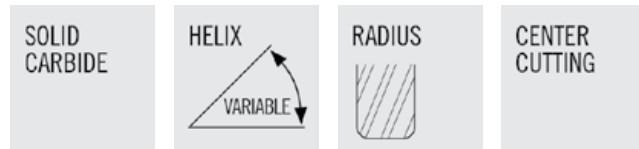
## STABILIZER™ 2.0-STB430.2 & STB430M.2



- US Patent # 6,991,409
- Eccentric Primary Relief
- Continuous Varying Asymmetrical Flute Geometry
- Ideal for profiling and slotting in steels, alloy steels, copper alloys, and cast iron
- Cutting Data STB430.2 - Page 35
- Tolerance Specs STB430.2- Page 335
- Cutting Data STB430M.2 - Page 36
- Tolerance Specs STB430M.2- Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
<b>INCH - STB430.2</b>								
N09369	STB430.2-0.125-D2-B.0-Z4	1/8	1/8	1/4	1-1/2	4	ALTIN	CYLINDRICAL
N09373	STB430.2-0.188-D2-B.0-Z4	3/16	3/16	3/8	2	4	ALTIN	CYLINDRICAL
N09383	STB430.2-0.250-D2-B.0-Z4	1/4	1/4	1/2	2-1/2	4	ALTIN	CYLINDRICAL
N09386	STB430.2-0.313-D2-B.0-Z4	5/16	5/16	5/8	2-1/2	4	ALTIN	CYLINDRICAL
N09387	STB430.2-0.375-D2-B.0-Z4	3/8	3/8	3/4	2-1/2	4	ALTIN	CYLINDRICAL
N09389	STB430.2-0.375-D2-B.3-Z4	3/8	3/8	3/4	2-1/2	4	ALTIN	WELDON
N09393	STB430.2-0.438-D2-B.0-Z4	7/16	7/16	7/8	2-3/4	4	ALTIN	CYLINDRICAL
N09396	STB430.2-0.438-D2-B.3-Z4	7/16	7/16	7/8	2-3/4	4	ALTIN	WELDON
N09397	STB430.2-0.500-D2-B.0-Z4	1/2	1/2	1	3	4	ALTIN	CYLINDRICAL
N09398	STB430.2-0.500-D2-B.3-Z4	1/2	1/2	1	3	4	ALTIN	WELDON
N09399	STB430.2-0.625-D2-B.0-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	CYLINDRICAL
N09402	STB430.2-0.625-D2-B.3-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	WELDON
N09403	STB430.2-0.750-D2-B.0-Z4	3/4	3/4	1-1/2	4	4	ALTIN	CYLINDRICAL
N09404	STB430.2-0.750-D2-B.3-Z4	3/4	3/4	1-1/2	4	4	ALTIN	WELDON
N09405	STB430.2-1.000-D2-B.0-Z4	1	1	2	5	4	ALTIN	CYLINDRICAL
N09406	STB430.2-1.000-D2-B.3-Z4	1	1	2	5	4	ALTIN	WELDON
<b>METRIC - STB430M.2</b>								
N09608	STB430M.2-030-F2-B.0-Z4	3MM	6MM	6MM	58MM	4	ALTIN	CYLINDRICAL
N09609	STB430M.2-030-F3-B.0-Z4	3MM	6MM	9MM	58MM	4	ALTIN	CYLINDRICAL
N09612	STB430M.2-040-F2-B.0-Z4	4MM	6MM	8MM	58MM	4	ALTIN	CYLINDRICAL
N09613	STB430M.2-040-F3-B.0-Z4	4MM	6MM	12MM	58MM	4	ALTIN	CYLINDRICAL
N09614	STB430M.2-050-F2-B.0-Z4	5MM	6MM	10MM	58MM	4	ALTIN	CYLINDRICAL
N09615	STB430M.2-050-F3-B.0-Z4	5MM	6MM	15MM	58MM	4	ALTIN	CYLINDRICAL
N09616	STB430M.2-060-D2-B.0-Z4	6MM	6MM	12MM	58MM	4	ALTIN	CYLINDRICAL
N09617	STB430M.2-060-D3-B.0-Z4	6MM	6MM	18MM	58MM	4	ALTIN	CYLINDRICAL
N09618	STB430M.2-080-D2-B.0-Z4	8MM	8MM	16MM	64MM	4	ALTIN	CYLINDRICAL
N09622	STB430M.2-080-D3-B.0-Z4	8MM	8MM	24MM	64MM	4	ALTIN	CYLINDRICAL
N09623	STB430M.2-100-D2-B.0-Z4	10MM	10MM	20MM	73MM	4	ALTIN	CYLINDRICAL
N09624	STB430M.2-100-D3-B.0-Z4	10MM	10MM	30MM	73MM	4	ALTIN	CYLINDRICAL
N09626	STB430M.2-120-D2-B.0-Z4	12MM	12MM	24MM	84MM	4	ALTIN	CYLINDRICAL
N09627	STB430M.2-120-D3-B.0-Z4	12MM	12MM	36MM	84MM	4	ALTIN	CYLINDRICAL
N09628	STB430M.2-160-D2-B.0-Z4	16MM	16MM	32MM	93MM	4	ALTIN	CYLINDRICAL
N09631	STB430M.2-160-D3-B.0-Z4	16MM	16MM	48MM	93MM	4	ALTIN	CYLINDRICAL
N09632	STB430M.2-200-D2-B.0-Z4	20MM	20MM	40MM	105MM	4	ALTIN	CYLINDRICAL
N09633	STB430M.2-200-D3-B.0-Z4	20MM	20MM	60MM	125MM	4	ALTIN	CYLINDRICAL
N09634	STB430M.2-250-D2-B.0-Z4	25MM	25MM	50MM	115MM	4	ALTIN	CYLINDRICAL
N09635	STB430M.2-250-D3-B.0-Z4	25MM	25MM	75MM	147MM	4	ALTIN	CYLINDRICAL

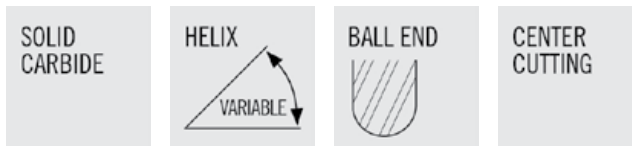
## STABILIZER™ 2.0-STRN430.2



- US Patent # 6,991,409
- Eccentric Primary Relief
- Continuous Varying Asymmetrical Flute Geometry
- Ideal for profiling and slotting in steels, alloy steels, copper alloys, and cast iron
- Cutting Data - Page 37
- Tolerance Specs - Page 335

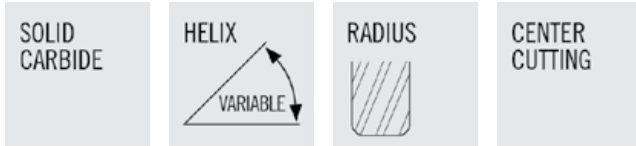
ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	RADIUS	SHANK TYPE
N09447	STRN430.2-0.250-E2-R020.0-Z4	1/4	1/4	1/2	2-1/2	.240	3/4	4	ALTIN	0.020	CYLINDRICAL
N09448	STRN430.2-0.313-E2-R020.0-Z4	5/16	5/16	5/8	3	.300	15/16	4	ALTIN	0.020	CYLINDRICAL
N09449	STRN430.2-0.375-E2-R020.0-Z4	3/8	3/8	3/4	3	.360	1-1/8	4	ALTIN	0.020	CYLINDRICAL
N09456	STRN430.2-0.375-E2-R020.3-Z4	3/8	3/8	3/4	3	.360	1-1/8	4	ALTIN	0.020	WELDON
N09457	STRN430.2-0.438-E2-R020.0-Z4	7/16	7/16	7/8	4	.420	1-5/16	4	ALTIN	0.020	CYLINDRICAL
N09462	STRN430.2-0.438-E2-R020.3-Z4	7/16	7/16	7/8	4	.420	1-5/16	4	ALTIN	0.020	WELDON
N09463	STRN430.2-0.500-E2-R030.0-Z4	1/2	1/2	1	3	.480	1-1/2	4	ALTIN	0.030	CYLINDRICAL
N09464	STRN430.2-0.500-E2-R030.3-Z4	1/2	1/2	1	3	.480	1-1/2	4	ALTIN	0.030	WELDON
N09465	STRN430.2-0.625-E2-R030.0-Z4	5/8	5/8	1-1/4	3-1/2	.600	1-7/8	4	ALTIN	0.030	CYLINDRICAL
N09466	STRN430.2-0.625-E2-R030.3-Z4	5/8	5/8	1-1/4	3-1/2	.600	1-7/8	4	ALTIN	0.030	WELDON
N09467	STRN430.2-0.750-E2-R030.0-Z4	3/4	3/4	1-1/2	4	.720	2-1/4	4	ALTIN	0.030	CYLINDRICAL
N09468	STRN430.2-0.750-E2-R030.3-Z4	3/4	3/4	1-1/2	4	.720	2-1/4	4	ALTIN	0.030	WELDON
N09469	STRN430.2-1.000-E2-R030.0-Z4	1	1	2	5	.960	3	4	ALTIN	0.030	CYLINDRICAL
N09472	STRN430.2-1.000-E2-R030.3-Z4	1	1	2	5	.960	3	4	ALTIN	0.030	WELDON

## STABILIZER™ 2.0-STBN430.2



ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	SHANK TYPE
N09473	STBN430.2-0.250-E2-B.0-Z4	1/4	1/4	1/2	2-1/2	.240	3/4	4	ALTIN	CYLINDRICAL
N09474	STBN430.2-0.313-E2-B.0-Z4	5/16	5/16	5/8	3	.300	15/16	4	ALTIN	CYLINDRICAL
N09475	STBN430.2-0.375-E2-B.0-Z4	3/8	3/8	3/4	3	.360	1-1/8	4	ALTIN	CYLINDRICAL
N09476	STBN430.2-0.375-E2-B.3-Z4	3/8	3/8	3/4	3	.360	1-1/8	4	ALTIN	WELDON
N09477	STBN430.2-0.438-E2-B.0-Z4	7/16	7/16	7/8	4	.420	1-5/16	4	ALTIN	CYLINDRICAL
N09478	STBN430.2-0.438-E2-B.3-Z4	7/16	7/16	7/8	4	.420	1-5/16	4	ALTIN	WELDON
N09479	STBN430.2-0.500-E2-B.0-Z4	1/2	1/2	1	3	.480	1-1/2	4	ALTIN	CYLINDRICAL
N09493	STBN430.2-0.500-E2-B.3-Z4	1/2	1/2	1	3	.480	1-1/2	4	ALTIN	WELDON
N09494	STBN430.2-0.625-E2-B.0-Z4	5/8	5/8	1-1/4	3-1/2	.600	1-7/8	4	ALTIN	CYLINDRICAL
N09495	STBN430.2-0.625-E2-B.3-Z4	5/8	5/8	1-1/4	3-1/2	.600	1-7/8	4	ALTIN	WELDON
N09496	STBN430.2-0.750-E2-B.0-Z4	3/4	3/4	1-1/2	4	.720	2-1/4	4	ALTIN	CYLINDRICAL
N09497	STBN430.2-0.750-E2-B.3-Z4	3/4	3/4	1-1/2	4	.720	2-1/4	4	ALTIN	WELDON
N09499	STBN430.2-1.000-E2-B.0-Z4	1	1	2	5	.960	3	4	ALTIN	CYLINDRICAL
N09502	STBN430.2-1.000-E2-B.3-Z4	1	1	2	5	.960	3	4	ALTIN	WELDON

## STABILIZER™ 2.0-STR440.2

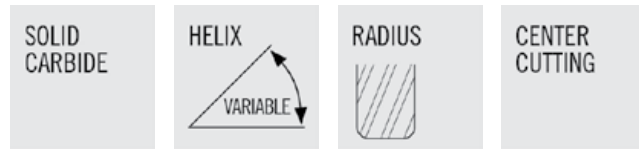


- US Patent # 6,991,409
- Eccentric Primary Relief
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- Ideal for profiling and slotting in stainless steels, steels over 42 Rc, titanium, and inconel

- Cutting Data - Page 38
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N09882	STR440.2-0.125-D1-R010.0-Z4	1/8	1/8	1/8	1-1/2	4	ALTIN	0.010	CYLINDRICAL
N09883	STR440.2-0.125-D2-R010.0-Z4	1/8	1/8	1/4	1-1/2	4	ALTIN	0.010	CYLINDRICAL
N09884	STR440.2-0.125-D3-R010.0-Z4	1/8	1/8	3/8	1-1/2	4	ALTIN	0.010	CYLINDRICAL
N09885	STR440.2-0.156-D1-R010.0-Z4	5/32	3/16	5/32	2	4	ALTIN	0.010	CYLINDRICAL
N09886	STR440.2-0.156-F2-R010.0-Z4	5/32	3/16	5/16	2	4	ALTIN	0.010	CYLINDRICAL
N09887	STR440.2-0.156-F3-R010.0-Z4	5/32	3/16	15/32	2	4	ALTIN	0.010	CYLINDRICAL
N09888	STR440.2-0.188-D1-R010.0-Z4	3/16	3/16	3/16	2	4	ALTIN	0.010	CYLINDRICAL
N09889	STR440.2-0.188-D2-R010.0-Z4	3/16	3/16	3/8	2	4	ALTIN	0.010	CYLINDRICAL
N09892	STR440.2-0.188-D3-R010.0-Z4	3/16	3/16	9/16	2	4	ALTIN	0.010	CYLINDRICAL
N09893	STR440.2-0.219-F1-R020.0-Z4	7/32	1/4	7/32	2	4	ALTIN	0.020	CYLINDRICAL
N09894	STR440.2-0.219-F2-R020.0-Z4	7/32	1/4	7/16	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09895	STR440.2-0.219-F3-R020.0-Z4	7/32	1/4	21/32	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09896	STR440.2-0.250-D1-R020.0-Z4	1/4	1/4	1/4	2	4	ALTIN	0.020	CYLINDRICAL
N09897	STR440.2-0.250-D2-R020.0-Z4	1/4	1/4	1/2	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09898	STR440.2-0.250-D3-R020.0-Z4	1/4	1/4	3/4	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09899	STR440.2-0.281-F1-R020.0-Z4	9/32	5/16	9/32	2	4	ALTIN	0.020	CYLINDRICAL
N09902	STR440.2-0.281-F2-R020.0-Z4	9/32	5/16	9/16	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09903	STR440.2-0.281-F3-R020.0-Z4	9/32	5/16	27/32	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09904	STR440.2-0.313-D1-R020.0-Z4	5/16	5/16	5/16	2	4	ALTIN	0.020	CYLINDRICAL
N09905	STR440.2-0.313-D2-R020.0-Z4	5/16	5/16	5/8	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09906	STR440.2-0.313-D3-R020.0-Z4	5/16	5/16	15/16	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09907	STR440.2-0.375-D1-R020.0-Z4	3/8	3/8	3/8	2	4	ALTIN	0.020	CYLINDRICAL
N09908	STR440.2-0.375-D1-R020.3-Z4	3/8	3/8	3/8	2	4	ALTIN	0.020	WELDON
N09909	STR440.2-0.375-D2-R020.0-Z4	3/8	3/8	3/4	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N09912	STR440.2-0.375-D2-R020.3-Z4	3/8	3/8	3/4	2-1/2	4	ALTIN	0.020	WELDON
N09913	STR440.2-0.375-D3-R020.0-Z4	3/8	3/8	1-1/8	3	4	ALTIN	0.020	CYLINDRICAL
N09914	STR440.2-0.375-D3-R020.3-Z4	3/8	3/8	1-1/8	3	4	ALTIN	0.020	WELDON
N09915	STR440.2-0.438-D1-R020.0-Z4	7/16	7/16	7/16	2-3/4	4	ALTIN	0.020	CYLINDRICAL
N09916	STR440.2-0.438-D1-R020.3-Z4	7/16	7/16	7/16	2-3/4	4	ALTIN	0.020	WELDON
N09917	STR440.2-0.438-D2-R020.0-Z4	7/16	7/16	7/8	2-3/4	4	ALTIN	0.020	CYLINDRICAL
N09919	STR440.2-0.438-D2-R020.3-Z4	7/16	7/16	7/8	2-3/4	4	ALTIN	0.020	WELDON
N09934	STR440.2-0.438-D3-R020.0-Z4	7/16	7/16	1-5/16	4	4	ALTIN	0.020	CYLINDRICAL
N09935	STR440.2-0.438-D3-R020.3-Z4	7/16	7/16	1-5/16	4	4	ALTIN	0.020	WELDON
N09939	STR440.2-0.500-D1-R030.0-Z4	1/2	1/2	1/2	2-1/2	4	ALTIN	0.030	CYLINDRICAL
N09942	STR440.2-0.500-D1-R030.3-Z4	1/2	1/2	1/2	2-1/2	4	ALTIN	0.030	WELDON
N09943	STR440.2-0.500-D1-R060.0-Z4	1/2	1/2	1/2	2-1/2	4	ALTIN	0.060	CYLINDRICAL

## STABILIZER™ 2.0-STR440.2 (CON'T)

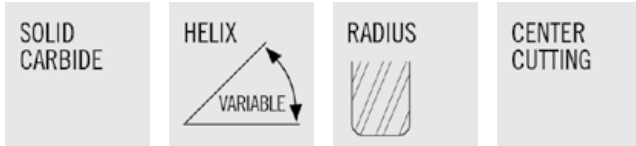


- US Patent # 6,991,409
- Eccentric Primary Relief
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- Cutting Data - Page 38
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N09944	STR440.2-0.500-D1-R060.3-Z4	1/2	1/2	1/2	2-1/2	4	ALTIN	0.060	WELDON
N09945	STR440.2-0.500-D1-R120.0-Z4	1/2	1/2	1/2	2-1/2	4	ALTIN	0.120	CYLINDRICAL
N09946	STR440.2-0.500-D1-R120.3-Z4	1/2	1/2	1/2	2-1/2	4	ALTIN	0.120	WELDON
N09947	STR440.2-0.500-D2-R030.0-Z4	1/2	1/2	1	3	4	ALTIN	0.030	CYLINDRICAL
N09948	STR440.2-0.500-D2-R030.3-Z4	1/2	1/2	1	3	4	ALTIN	0.030	WELDON
N09949	STR440.2-0.500-D3-R030.0-Z4	1/2	1/2	1-1/4	3	4	ALTIN	0.030	CYLINDRICAL
N09952	STR440.2-0.500-D3-R030.3-Z4	1/2	1/2	1-1/4	3	4	ALTIN	0.030	WELDON
N09953	STR440.2-0.500-D2-R060.0-Z4	1/2	1/2	1	3	4	ALTIN	0.060	CYLINDRICAL
N09954	STR440.2-0.500-D2-R060.3-Z4	1/2	1/2	1	3	4	ALTIN	0.060	WELDON
N09955	STR440.2-0.500-D2-R120.0-Z4	1/2	1/2	1	3	4	ALTIN	0.120	CYLINDRICAL
N09956	STR440.2-0.500-D2-R120.3-Z4	1/2	1/2	1	3	4	ALTIN	0.120	WELDON
N09957	STR440.2-0.500-D4-R030.0-Z4	1/2	1/2	1-1/2	4	4	ALTIN	0.030	CYLINDRICAL
N09958	STR440.2-0.500-D4-R030.3-Z4	1/2	1/2	1-1/2	4	4	ALTIN	0.030	WELDON
N09959	STR440.2-0.500-D3-R060.0-Z4	1/2	1/2	1-1/2	4	4	ALTIN	0.060	CYLINDRICAL
N09962	STR440.2-0.500-D3-R060.3-Z4	1/2	1/2	1-1/2	4	4	ALTIN	0.060	WELDON
N09963	STR440.2-0.500-D3-R120.0-Z4	1/2	1/2	1-1/2	4	4	ALTIN	0.120	CYLINDRICAL
N09964	STR440.2-0.500-D3-R120.3-Z4	1/2	1/2	1-1/2	4	4	ALTIN	0.120	WELDON
N09965	STR440.2-0.625-D1-R030.0-Z4	5/8	5/8	5/8	3	4	ALTIN	0.030	CYLINDRICAL
N09966	STR440.2-0.625-D1-R030.3-Z4	5/8	5/8	5/8	3	4	ALTIN	0.030	WELDON
N09967	STR440.2-0.625-D1-R060.0-Z4	5/8	5/8	5/8	3	4	ALTIN	0.060	CYLINDRICAL
N09968	STR440.2-0.625-D1-R060.3-Z4	5/8	5/8	5/8	3	4	ALTIN	0.060	WELDON
N09969	STR440.2-0.625-D1-R120.0-Z4	5/8	5/8	5/8	3	4	ALTIN	0.120	CYLINDRICAL
N09972	STR440.2-0.625-D1-R120.3-Z4	5/8	5/8	5/8	3	4	ALTIN	0.120	WELDON
N09973	STR440.2-0.625-D2-R030.0-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	0.030	CYLINDRICAL
N09974	STR440.2-0.625-D2-R030.3-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	0.030	WELDON
N09975	STR440.2-0.625-D2-R060.0-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	0.060	CYLINDRICAL
N09976	STR440.2-0.625-D2-R060.3-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	0.060	WELDON
N09977	STR440.2-0.625-D2-R120.0-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	0.120	CYLINDRICAL
N09978	STR440.2-0.625-D2-R120.3-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	0.120	WELDON
N09979	STR440.2-0.625-D3-R030.0-Z4	5/8	5/8	1-7/8	4	4	ALTIN	0.030	CYLINDRICAL
N09982	STR440.2-0.625-D3-R030.3-Z4	5/8	5/8	1-7/8	4	4	ALTIN	0.030	WELDON
N09983	STR440.2-0.625-D3-R060.0-Z4	5/8	5/8	1-7/8	4	4	ALTIN	0.060	CYLINDRICAL
N09984	STR440.2-0.625-D3-R060.3-Z4	5/8	5/8	1-7/8	4	4	ALTIN	0.060	WELDON
N00328	STR440.2-0.625-D3-R120.0-Z4	5/8	5/8	1-7/8	4	4	ALTIN	0.120	CYLINDRICAL
N00329	STR440.2-0.625-D3-R120.3-Z4	5/8	5/8	1-7/8	4	4	ALTIN	0.120	WELDON
N00332	STR440.2-0.750-D1-R030.0-Z4	3/4	3/4	3/4	3	4	ALTIN	0.030	CYLINDRICAL

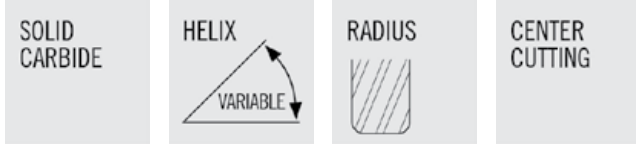
## STABILIZER™ 2.0-STR440.2 (CON'T)



- US Patent # 6,991,409
- Eccentric Primary Relief
- Continuous Varying Asymmetrical Flute Geometry
- Ideal for profiling and slotting in stainless steels, steels over 42 Rc, titanium, and inconel
- Cutting Data - Page 38
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N00333	STR440.2-0.750-D1-R030.3-Z4	3/4	3/4	3/4	3	4	ALTIN	0.030	WELDON
N00334	STR440.2-0.750-D1-R060.0-Z4	3/4	3/4	3/4	3	4	ALTIN	0.060	CYLINDRICAL
N00335	STR440.2-0.750-D1-R060.3-Z4	3/4	3/4	3/4	3	4	ALTIN	0.060	WELDON
N00336	STR440.2-0.750-D1-R120.0-Z4	3/4	3/4	3/4	3	4	ALTIN	0.120	CYLINDRICAL
N00337	STR440.2-0.750-D1-R120.3-Z4	3/4	3/4	3/4	4	4	ALTIN	0.120	WELDON
N00338	STR440.2-0.750-D2-R030.0-Z4	3/4	3/4	1-1/2	4	4	ALTIN	0.030	CYLINDRICAL
N00339	STR440.2-0.750-D2-R030.3-Z4	3/4	3/4	1-1/2	4	4	ALTIN	0.030	WELDON
N00342	STR440.2-0.750-D2-R060.0-Z4	3/4	3/4	1-1/2	4	4	ALTIN	0.060	CYLINDRICAL
N00343	STR440.2-0.750-D2-R060.3-Z4	3/4	3/4	1-1/2	4	4	ALTIN	0.060	WELDON
N00344	STR440.2-0.750-D2-R120.0-Z4	3/4	3/4	1-1/2	4	4	ALTIN	0.120	CYLINDRICAL
N00345	STR440.2-0.750-D2-R120.3-Z4	3/4	3/4	1-1/2	4	4	ALTIN	0.120	WELDON
N00346	STR440.2-0.750-D3-R030.0-Z4	3/4	3/4	2-1/4	5	4	ALTIN	0.030	CYLINDRICAL
N00347	STR440.2-0.750-D3-R030.3-Z4	3/4	3/4	2-1/4	5	4	ALTIN	0.030	WELDON
N00348	STR440.2-0.750-D3-R060.0-Z4	3/4	3/4	2-1/4	5	4	ALTIN	0.060	CYLINDRICAL
N00349	STR440.2-0.750-D3-R060.3-Z4	3/4	3/4	2-1/4	5	4	ALTIN	0.060	WELDON
N00352	STR440.2-0.750-D3-R120.0-Z4	3/4	3/4	2-1/4	5	4	ALTIN	0.120	CYLINDRICAL
N00353	STR440.2-0.750-D3-R120.3-Z4	3/4	3/4	2-1/4	5	4	ALTIN	0.120	WELDON
N00354	STR440.2-1.000-D1-R030.0-Z4	1	1	1	4	4	ALTIN	0.030	CYLINDRICAL
N00355	STR440.2-1.000-D1-R030.3-Z4	1	1	1	4	4	ALTIN	0.030	WELDON
N09327	STR440.2-1.000-D1-R060.0-Z4	1	1	1	4	4	ALTIN	0.060	CYLINDRICAL
N09329	STR440.2-1.000-D1-R060.3-Z4	1	1	1	4	4	ALTIN	0.060	WELDON
N09333	STR440.2-1.000-D1-R120.0-Z4	1	1	1	4	4	ALTIN	0.120	CYLINDRICAL
N09336	STR440.2-1.000-D1-R120.3-Z4	1	1	1	4	4	ALTIN	0.120	WELDON
N09337	STR440.2-1.000-D2-R030.0-Z4	1	1	2	5	4	ALTIN	0.030	CYLINDRICAL
N09339	STR440.2-1.000-D2-R030.3-Z4	1	1	2	5	4	ALTIN	0.030	WELDON
N09343	STR440.2-1.000-D2-R060.0-Z4	1	1	2	5	4	ALTIN	0.060	CYLINDRICAL
N09346	STR440.2-1.000-D2-R060.3-Z4	1	1	2	5	4	ALTIN	0.060	WELDON
N09347	STR440.2-1.000-D2-R120.0-Z4	1	1	2	5	4	ALTIN	0.120	CYLINDRICAL
N09349	STR440.2-1.000-D2-R120.3-Z4	1	1	2	5	4	ALTIN	0.120	WELDON
N09356	STR440.2-1.000-D3-R030.0-Z4	1	1	3	6	4	ALTIN	0.030	CYLINDRICAL
N09357	STR440.2-1.000-D3-R030.3-Z4	1	1	3	6	4	ALTIN	0.030	WELDON
N09359	STR440.2-1.000-D3-R060.0-Z4	1	1	3	6	4	ALTIN	0.060	CYLINDRICAL
N09363	STR440.2-1.000-D3-R060.3-Z4	1	1	3	6	4	ALTIN	0.060	WELDON
N09366	STR440.2-1.000-D3-R120.0-Z4	1	1	3	6	4	ALTIN	0.120	CYLINDRICAL
N09367	STR440.2-1.000-D3-R120.3-Z4	1	1	3	6	4	ALTIN	0.120	WELDON

## STABILIZER™ 2.0-STR440M.2

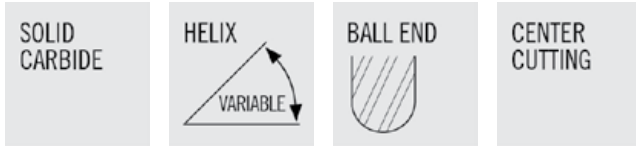


- US Patent # 6,991,409
- Eccentric Primary Relief
- Continuous Varying Asymmetrical Flute Geometry
- Ideal for profiling and slotting in stainless steels, steels over 42 Rc, titanium, and inconel
- Cutting Data - Page 39
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N09636	STR440M.2-030-F2-R025.0-Z4	3MM	6MM	6MM	58MM	4	ALTIN	0.25MM	CYLINDRICAL
N09637	STR440M.2-030-F3-R025.0-Z4	3MM	6MM	9MM	58MM	4	ALTIN	0.25MM	CYLINDRICAL
N09645	STR440M.2-040-F2-R025.0-Z4	4MM	6MM	8MM	58MM	4	ALTIN	0.25MM	CYLINDRICAL
N09646	STR440M.2-040-F3-R025.0-Z4	4MM	6MM	12MM	58MM	4	ALTIN	0.25MM	CYLINDRICAL
N09647	STR440M.2-050-F2-R025.0-Z4	5MM	6MM	10MM	58MM	4	ALTIN	0.25MM	CYLINDRICAL
N09648	STR440M.2-050-F3-R025.0-Z4	5MM	6MM	15MM	58MM	4	ALTIN	0.25MM	CYLINDRICAL
N09649	STR440M.2-060-D2-R050.0-Z4	6MM	6MM	12MM	58MM	4	ALTIN	0.50MM	CYLINDRICAL
N09650	STR440M.2-060-D3-R050.0-Z4	6MM	6MM	18MM	58MM	4	ALTIN	0.50MM	CYLINDRICAL
N09651	STR440M.2-080-D2-R050.0-Z4	8MM	8MM	16MM	64MM	4	ALTIN	0.50MM	CYLINDRICAL
N09652	STR440M.2-080-D3-R050.0-Z4	8MM	8MM	24MM	64MM	4	ALTIN	0.50MM	CYLINDRICAL
N09653	STR440M.2-100-D2-R050.0-Z4	10MM	10MM	20MM	73MM	4	ALTIN	0.50MM	CYLINDRICAL
N09654	STR440M.2-100-D3-R050.0-Z4	10MM	10MM	30MM	73MM	4	ALTIN	0.50MM	CYLINDRICAL
N09655	STR440M.2-120-D2-R075.0-Z4	12MM	12MM	24MM	84MM	4	ALTIN	0.75MM	CYLINDRICAL
N09665	STR440M.2-120-D3-R075.0-Z4	12MM	12MM	36MM	84MM	4	ALTIN	0.75MM	CYLINDRICAL
N09667	STR440M.2-160-D2-R075.0-Z4	16MM	16MM	32MM	93MM	4	ALTIN	0.75MM	CYLINDRICAL
N09668	STR440M.2-160-D3-R075.0-Z4	16MM	16MM	48MM	93MM	4	ALTIN	0.75MM	CYLINDRICAL
N09670	STR440M.2-200-D2-R075.0-Z4	20MM	20MM	40MM	105MM	4	ALTIN	0.75MM	CYLINDRICAL
N09671	STR440M.2-200-D3-R075.0-Z4	20MM	20MM	60MM	125MM	4	ALTIN	0.75MM	CYLINDRICAL
N09672	STR440M.2-250-D2-R075.0-Z4	25MM	25MM	50MM	115MM	4	ALTIN	0.75MM	CYLINDRICAL
N09673	STR440M.2-250-D3-R075.0-Z4	25MM	25MM	75MM	147MM	4	ALTIN	0.75MM	CYLINDRICAL



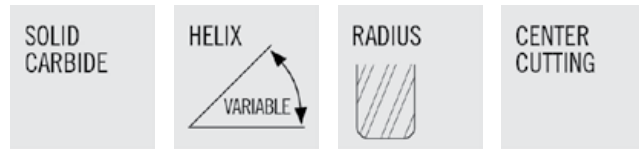
## STABILIZER™ 2.0-STB440.2 & STB440M.2



- US Patent # 6,991,409
- Eccentric Primary Relief
- Continuous Varying Asymmetrical Flute Geometry
- Ideal for profiling and slotting in stainless steels, steels over 42 Rc, titanium, and inconel
- Cutting Data STB440.2 - Page 38
- Tolerance Specs STB440.2 - Page 335
- Cutting Data STB440M.2 - Page 39
- Tolerance Specs STB440M.2 - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
<b>INCH - STB440.2</b>								
N09407	STB440.2-0.125-D2-B.0-Z4	1/8	1/8	1/4	1-1/2	4	ALTIN	CYLINDRICAL
N09408	STB440.2-0.188-D2-B.0-Z4	3/16	3/16	3/8	2	4	ALTIN	CYLINDRICAL
N09409	STB440.2-0.250-D2-B.0-Z4	1/4	1/4	1/2	2-1/2	4	ALTIN	CYLINDRICAL
N09422	STB440.2-0.313-D2-B.0-Z4	5/16	5/16	5/8	2-1/2	4	ALTIN	CYLINDRICAL
N09423	STB440.2-0.375-D2-B.0-Z4	3/8	3/8	3/4	2-1/2	4	ALTIN	CYLINDRICAL
N09426	STB440.2-0.375-D2-B.3-Z4	3/8	3/8	3/4	2-1/2	4	ALTIN	WELDON
N09427	STB440.2-0.438-D2-B.0-Z4	7/16	7/16	7/8	2-3/4	4	ALTIN	CYLINDRICAL
N09428	STB440.2-0.438-D2-B.3-Z4	7/16	7/16	7/8	2-3/4	4	ALTIN	WELDON
N09429	STB440.2-0.500-D2-B.0-Z4	1/2	1/2	1	3	4	ALTIN	CYLINDRICAL
N09432	STB440.2-0.500-D2-B.3-Z4	1/2	1/2	1	3	4	ALTIN	WELDON
N09433	STB440.2-0.625-D2-B.0-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	CYLINDRICAL
N09442	STB440.2-0.625-D2-B.3-Z4	5/8	5/8	1-1/4	3-1/2	4	ALTIN	WELDON
N09443	STB440.2-0.750-D2-B.0-Z4	3/4	3/4	1-1/2	4	4	ALTIN	CYLINDRICAL
N09444	STB440.2-0.750-D2-B.3-Z4	3/4	3/4	1-1/2	4	4	ALTIN	WELDON
N09445	STB440.2-1.000-D2-B.0-Z4	1	1	2	5	4	ALTIN	CYLINDRICAL
N09446	STB440.2-1.000-D2-B.3-Z4	1	1	2	5	4	ALTIN	WELDON
<b>METRIC - STB440M.2</b>								
N09674	STB440M.2-030-F2-B.0-Z4	3MM	6MM	6MM	58MM	4	ALTIN	CYLINDRICAL
N09675	STB440M.2-030-F3-B.0-Z4	3MM	6MM	9MM	58MM	4	ALTIN	CYLINDRICAL
N09676	STB440M.2-040-F2-B.0-Z4	4MM	6MM	8MM	58MM	4	ALTIN	CYLINDRICAL
N09677	STB440M.2-040-F3-B.0-Z4	4MM	6MM	12MM	58MM	4	ALTIN	CYLINDRICAL
N09679	STB440M.2-050-F2-B.0-Z4	5MM	6MM	10MM	58MM	4	ALTIN	CYLINDRICAL
N09680	STB440M.2-050-F3-B.0-Z4	5MM	6MM	15MM	58MM	4	ALTIN	CYLINDRICAL
N09682	STB440M.2-060-D2-B.0-Z4	6MM	6MM	12MM	58MM	4	ALTIN	CYLINDRICAL
N09683	STB440M.2-060-D3-B.0-Z4	6MM	6MM	18MM	58MM	4	ALTIN	CYLINDRICAL
N09684	STB440M.2-080-D2-B.0-Z4	8MM	8MM	16MM	64MM	4	ALTIN	CYLINDRICAL
N09685	STB440M.2-080-D3-B.0-Z4	8MM	8MM	24MM	64MM	4	ALTIN	CYLINDRICAL
N09686	STB440M.2-100-D2-B.0-Z4	10MM	10MM	20MM	73MM	4	ALTIN	CYLINDRICAL
N09687	STB440M.2-100-D3-B.0-Z4	10MM	10MM	30MM	73MM	4	ALTIN	CYLINDRICAL
N09688	STB440M.2-120-D2-B.0-Z4	12MM	12MM	24MM	84MM	4	ALTIN	CYLINDRICAL
N09689	STB440M.2-120-D3-B.0-Z4	12MM	12MM	36MM	84MM	4	ALTIN	CYLINDRICAL
N09690	STB440M.2-160-D2-B.0-Z4	16MM	16MM	32MM	93MM	4	ALTIN	CYLINDRICAL
N09691	STB440M.2-160-D3-B.0-Z4	16MM	16MM	48MM	93MM	4	ALTIN	CYLINDRICAL
N09692	STB440M.2-200-D2-B.0-Z4	20MM	20MM	40MM	105MM	4	ALTIN	CYLINDRICAL
N09693	STB440M.2-200-D3-B.0-Z4	20MM	20MM	60MM	125MM	4	ALTIN	CYLINDRICAL
N09694	STB440M.2-250-D2-B.0-Z4	25MM	25MM	50MM	115MM	4	ALTIN	CYLINDRICAL
N09695	STB440M.2-250-D3-B.0-Z4	25MM	25MM	75MM	147MM	4	ALTIN	CYLINDRICAL

## STABILIZER™ 2.0-STRN440.2

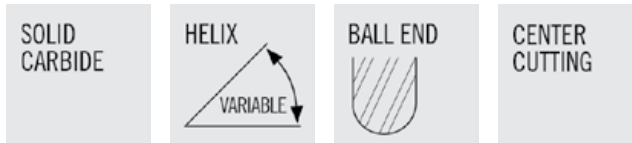


- US Patent # 6,991,409
- Eccentric Primary Relief
- Continuous Varying Asymmetrical Flute Geometry
- Ideal for profiling and slotting in stainless steels, steels over 42 Rc, titanium, and inconel

- Cutting Data STRN440.2 - Page 40
- Tolerance Specs STRN440.2 - Page 335
- Cutting Data STBN440.2 - Page 40
- Tolerance Specs STBN440.2 - Page 335

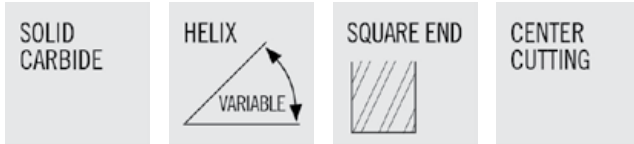
ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	RADIUS	SHANK TYPE
N09503	STRN440.2-0.250-E2-R020.0-Z4	1/4	1/4	1/2	2-1/2	.240	3/4	4	ALTIN	0.020	CYLINDRICAL
N09504	STRN440.2-0.313-E2-R020.0-Z4	5/16	5/16	5/8	3	.300	15/16	4	ALTIN	0.020	CYLINDRICAL
N09505	STRN440.2-0.375-E2-R020.0-Z4	3/8	3/8	3/4	3	.360	1-1/8	4	ALTIN	0.020	CYLINDRICAL
N09506	STRN440.2-0.375-E2-R020.3-Z4	3/8	3/8	3/4	3	.360	1-1/8	4	ALTIN	0.020	WELDON
N09507	STRN440.2-0.438-E2-R020.0-Z4	7/16	7/16	7/8	4	.420	1-5/16	4	ALTIN	0.020	CYLINDRICAL
N09508	STRN440.2-0.438-E2-R020.3-Z4	7/16	7/16	7/8	4	.420	1-5/16	4	ALTIN	0.020	WELDON
N09509	STRN440.2-0.500-E2-R030.0-Z4	1/2	1/2	1	3	.480	1-1/2	4	ALTIN	0.030	CYLINDRICAL
N09512	STRN440.2-0.500-E2-R030.3-Z4	1/2	1/2	1	3	.480	1-1/2	4	ALTIN	0.030	WELDON
N09513	STRN440.2-0.625-E2-R030.0-Z4	5/8	5/8	1-1/4	3-1/2	.600	1-7/8	4	ALTIN	0.030	CYLINDRICAL
N09515	STRN440.2-0.625-E2-R030.3-Z4	5/8	5/8	1-1/4	3-1/2	.600	1-7/8	4	ALTIN	0.030	WELDON
N09516	STRN440.2-0.750-E2-R030.0-Z4	3/4	3/4	1-1/2	4	.720	2-1/4	4	ALTIN	0.030	CYLINDRICAL
N09517	STRN440.2-0.750-E2-R030.3-Z4	3/4	3/4	1-1/2	4	.720	2-1/4	4	ALTIN	0.030	WELDON
N09518	STRN440.2-1.000-E2-R030.0-Z4	1	1	2	5	.960	3	4	ALTIN	0.030	CYLINDRICAL
N09519	STRN440.2-1.000-E2-R030.3-Z4	1	1	2	5	.960	3	4	ALTIN	0.030	WELDON

## STABILIZER™ 2.0-STBN440.2



ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIAM	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	SHANK TYPE
N09522	STBN440.2-0.250-E2-B.0-Z4	1/4	1/4	1/2	2-1/2	.240	3/4	4	ALTIN	CYLINDRICAL
N09523	STBN440.2-0.313-E2-B.0-Z4	5/16	5/16	5/8	3	.300	15/16	4	ALTIN	CYLINDRICAL
N09524	STBN440.2-0.375-E2-B.0-Z4	3/8	3/8	3/4	3	.360	1-1/8	4	ALTIN	CYLINDRICAL
N09525	STBN440.2-0.375-E2-B.3-Z4	3/8	3/8	3/4	3	.360	1-1/8	4	ALTIN	WELDON
N09526	STBN440.2-0.438-E2-B.0-Z4	7/16	7/16	7/8	4	.420	1-5/16	4	ALTIN	CYLINDRICAL
N09527	STBN440.2-0.438-E2-B.3-Z4	7/16	7/16	7/8	4	.420	1-5/16	4	ALTIN	WELDON
N09528	STBN440.2-0.500-E2-B.0-Z4	1/2	1/2	1	3	.480	1-1/2	4	ALTIN	CYLINDRICAL
N09529	STBN440.2-0.500-E2-B.3-Z4	1/2	1/2	1	3	.480	1-1/2	4	ALTIN	WELDON
N09532	STBN440.2-0.625-E2-B.0-Z4	5/8	5/8	1-1/4	3-1/2	.600	1-7/8	4	ALTIN	CYLINDRICAL
N09533	STBN440.2-0.625-E2-B.3-Z4	5/8	5/8	1-1/4	3-1/2	.600	1-7/8	4	ALTIN	WELDON
N09534	STBN440.2-0.750-E2-B.0-Z4	3/4	3/4	1-1/2	4	.720	2-1/4	4	ALTIN	CYLINDRICAL
N09535	STBN440.2-0.750-E2-B.3-Z4	3/4	3/4	1-1/2	4	.720	2-1/4	4	ALTIN	WELDON
N09536	STBN440.2-1.000-E2-B.0-Z4	1	1	2	5	.960	3	4	ALTIN	CYLINDRICAL
N09537	STBN440.2-1.000-E2-B.3-Z4	1	1	2	5	.960	3	4	ALTIN	WELDON

## STABILIZER™-STS540 & STS540M

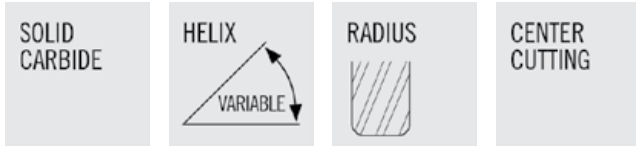


- Asymmetrical cutting edges
- US Patent # 6,991,409
- Ideal for profiling, high speed and trochoidal milling, stainless, titanium, high temperature alloys, carbon, alloy and tool steels
- Max RDOC 50%
- Full Eccentric Relief

- Cutting Data STS540 - Page 41
- Tolerance Specs STS540 - Page 335
- Cutting Data STS540M - Page 42
- Tolerance Specs STS540M - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
<b>INCH - STS540</b>								
N68625	STS540-0.250-D3-S.0-Z5	1/4	1/4	3/4	2-1/2	5	ALCRN	CYLINDRICAL
N68626	STS540-0.313-D2-S.0-Z5	5/16	5/16	3/4	2-1/2	5	ALCRN	CYLINDRICAL
N68627	STS540-0.375-D2-S.0-Z5	3/8	3/8	7/8	2-1/2	5	ALCRN	CYLINDRICAL
N68628	STS540-0.500-D3-S.0-Z5	1/2	1/2	1-1/4	3	5	ALCRN	CYLINDRICAL
N68629	STS540-0.625-D2-S.0-Z5	5/8	5/8	1-1/4	3-1/2	5	ALCRN	CYLINDRICAL
N68630	STS540-0.750-D2-S.0-Z5	3/4	3/4	1-1/2	4	5	ALCRN	CYLINDRICAL
<b>METRIC - STS540M</b>								
N68699	STS540M-060-D2-S.0-Z5	6MM	6MM	12MM	58MM	5	ALTIN	CYLINDRICAL
N68700	STS540M-080-D2-S.0-Z5	8MM	8MM	16MM	64MM	5	ALTIN	CYLINDRICAL
N68701	STS540M-100-D2-S.0-Z5	10MM	10MM	20MM	73MM	5	ALTIN	CYLINDRICAL
N68702	STS540M-120-D2-S.0-Z5	12MM	12MM	24MM	84MM	5	ALTIN	CYLINDRICAL

## STABILIZER™-STR540 & STR540M



- Asymmetrical flute geometry
- US Patent # 6,991,409
- Ideal for profiling, high speed and trochoidal milling, stainless, titanium, high temperature alloys, carbon, alloy and tool steels
- Max RDOC 50%
- Full Eccentric Relief

- Cutting Data STR540 - Page 41
- Tolerance Specs STR540 - Page 335
- Cutting Data STR540M - Page 42
- Tolerance Specs STR540M - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
<b>INCH - STR540</b>									
N68632	STR540-0.250-D3-R015.0-Z5	1/4	1/4	3/4	2-1/2	5	ALCRN	0.015	CYLINDRICAL
N68639	STR540-0.250-D3-R030.0-Z5	1/4	1/4	3/4	2-1/2	5	ALCRN	0.030	CYLINDRICAL
N68646	STR540-0.250-D3-R045.0-Z5	1/4	1/4	3/4	2-1/2	5	ALCRN	0.045	CYLINDRICAL
N68633	STR540-0.313-D2-R015.0-Z5	5/16	5/16	3/4	2-1/2	5	ALCRN	0.015	CYLINDRICAL
N68634	STR540-0.375-D2-R015.0-Z5	3/8	3/8	7/8	2-1/2	5	ALCRN	0.015	CYLINDRICAL
N68641	STR540-0.375-D2-R030.0-Z5	3/8	3/8	7/8	2-1/2	5	ALCRN	0.030	CYLINDRICAL
N68648	STR540-0.375-D2-R045.0-Z5	3/8	3/8	7/8	2-1/2	5	ALCRN	0.045	CYLINDRICAL
N68635	STR540-0.500-D3-R015.0-Z5	1/2	1/2	1-1/4	3	5	ALCRN	0.015	CYLINDRICAL
N68642	STR540-0.500-D3-R030.0-Z5	1/2	1/2	1-1/4	3	5	ALCRN	0.030	CYLINDRICAL
N68649	STR540-0.500-D3-R045.0-Z5	1/2	1/2	1-1/4	3	5	ALCRN	0.045	CYLINDRICAL
N68653	STR540-0.500-D3-R060.0-Z5	1/2	1/2	1-1/4	3	5	ALCRN	0.060	CYLINDRICAL
N68657	STR540-0.500-D3-R090.0-Z5	1/2	1/2	1-1/4	3	5	ALCRN	0.090	CYLINDRICAL
N68661	STR540-0.500-D3-R125.0-Z5	1/2	1/2	1-1/4	3	5	ALCRN	0.125	CYLINDRICAL
N68636	STR540-0.625-D2-R015.0-Z5	5/8	5/8	1-1/4	3-1/2	5	ALCRN	0.015	CYLINDRICAL
N68643	STR540-0.625-D2-R030.0-Z5	5/8	5/8	1-1/4	3-1/2	5	ALCRN	0.030	CYLINDRICAL
N68650	STR540-0.625-D2-R045.0-Z5	5/8	5/8	1-1/4	3-1/2	5	ALCRN	0.045	CYLINDRICAL
N68654	STR540-0.625-D2-R060.0-Z5	5/8	5/8	1-1/4	3-1/2	5	ALCRN	0.060	CYLINDRICAL
N68658	STR540-0.625-D2-R090.0-Z5	5/8	5/8	1-1/4	3-1/2	5	ALCRN	0.090	CYLINDRICAL
N68662	STR540-0.625-D2-R125.0-Z5	5/8	5/8	1-1/4	3-1/2	5	ALCRN	0.125	CYLINDRICAL
N68644	STR540-0.750-D2-R030.0-Z5	3/4	3/4	1-1/2	4	5	ALCRN	0.030	CYLINDRICAL
N68655	STR540-0.750-D2-R060.0-Z5	3/4	3/4	1-1/2	4	5	ALCRN	0.060	CYLINDRICAL
N68659	STR540-0.750-D2-R090.0-Z5	3/4	3/4	1-1/2	4	5	ALCRN	0.090	CYLINDRICAL
N68663	STR540-0.750-D2-R125.0-Z5	3/4	3/4	1-1/2	4	5	ALCRN	0.125	CYLINDRICAL
N68638	STR540-1.000-D2-R015.0-Z5	1	1	1-3/4	4	5	ALCRN	0.015	CYLINDRICAL
N68645	STR540-1.000-D2-R030.0-Z5	1	1	1-3/4	4	5	ALCRN	0.030	CYLINDRICAL
N68656	STR540-1.000-D2-R060.0-Z5	1	1	1-3/4	4	5	ALCRN	0.060	CYLINDRICAL
<b>METRIC - STR540M</b>									
N68717	STR540M-060-D2-R050.0-Z5	6MM	6MM	12MM	58MM	5	ALTIN	0.50MM	CYLINDRICAL
N68718	STR540M-080-D2-R050.0-Z5	8MM	8MM	16MM	64MM	5	ALTIN	0.50MM	CYLINDRICAL
N68719	STR540M-100-D2-R050.0-Z5	10MM	10MM	20MM	73MM	5	ALTIN	0.50MM	CYLINDRICAL
N68720	STR540M-120-D2-R075.0-Z5	12MM	12MM	24MM	84MM	5	ALTIN	0.75MM	CYLINDRICAL
N68722	STR540M-160-D2-R075.0-Z5	16MM	16MM	32MM	93MM	5	ALTIN	0.75MM	CYLINDRICAL

## STS430.2, STR430.2, STB430.2 - SLOTTING - INCH - START VALUES

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)	SLOTTING														
					Zn = 4														
					1/8	5/32	3/16	7/32	1/4	9/32	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	
P	E 1-2	1.00	1.00	425	n [min-1]	12988	10390	8659	7422	6494	5772	5195	4329	3711	3247	2598	2165	1855	1624
					fz [in]	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020	0.0024	0.0028	0.0032	0.0039	0.0047	0.0055	0.0063
	E 3-4	1.00	1.00	400	n [min-1]	12224	9779	8149	6985	6112	5433	4890	4075	3493	3056	2445	2037	1746	1528
					fz [in]	0.0007	0.0009	0.0011	0.0012	0.0014	0.0016	0.0018	0.0021	0.0025	0.0029	0.0036	0.0043	0.0050	0.0057
	E 5-6	1.00	1.00	350	n [min-1]	10696	8557	7131	6112	5348	4754	4278	3565	3056	2674	2139	1783	1528	1337
					fz [in]	0.0006	0.0008	0.0009	0.0011	0.0013	0.0014	0.0016	0.0019	0.0022	0.0025	0.0031	0.0038	0.0044	0.0050
K	E 12-13	1.00	1.00	350	n [min-1]	10696	8557	7131	6112	5348	4754	4278	3565	3056	2674	2139	1783	1528	1337
					fz [in]	0.0007	0.0009	0.0010	0.0012	0.0014	0.0015	0.0017	0.0021	0.0024	0.0028	0.0034	0.0041	0.0048	0.0055
	E 14-15	1.00	1.00	325	n [min-1]	9932	7946	6621	5675	4966	4414	3973	3311	2838	2483	1986	1655	1419	1242
					fz [in]	0.0006	0.0007	0.0008	0.0010	0.0011	0.0013	0.0014	0.0017	0.0020	0.0023	0.0028	0.0034	0.0039	0.0045
	N 18	1.00	1.00	500	n [min-1]	15280	12224	10187	8731	7640	6791	6112	5093	4366	3820	3056	2547	2183	1910
					fz [in]	0.0005	0.0006	0.0008	0.0009	0.0010	0.0011	0.0013	0.0015	0.0018	0.0020	0.0025	0.0030	0.0035	0.0040
N 18	1.00	1.00	400	n [min-1]	15280	12224	10187	8731	7640	6791	6112	5093	4366	3820	3056	2547	2183	1910	
				fz [in]	0.0005	0.0006	0.0008	0.0009	0.0010	0.0011	0.0013	0.0015	0.0018	0.0020	0.0025	0.0030	0.0035	0.0040	

## STS430.2, STR430.2, STB430.2 - SIDE MILLING/ROUGHING - INCH - START VALUES

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)	SIDE MILLING ROUGHING														
					Zn = 4														
					1/8	5/32	3/16	7/32	1/4	9/32	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	
P	E 1-2	1.50	0.25	425	n [min-1]	12988	10390	8659	7422	6494	5772	5195	4329	3711	3247	2598	2165	1855	1624
					fz [in]	0.0009	0.0011	0.0013	0.0015	0.0018	0.0020	0.0022	0.0026	0.0031	0.0035	0.0044	0.0053	0.0061	0.0070
	E 3-4	1.50	0.25	400	n [min-1]	12224	9779	8149	6985	6112	5433	4890	4075	3493	3056	2445	2037	1746	1528
					fz [in]	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018	0.0020	0.0024	0.0028	0.0032	0.0040	0.0048	0.0056	0.0064
	E 5-6	1.00	0.25	350	n [min-1]	10696	8557	7131	6112	5348	4754	4278	3565	3056	2674	2139	1783	1528	1337
					fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019	0.0023	0.0026	0.0030	0.0038	0.0045	0.0053	0.0060
K	E 12-13	1.50	0.25	350	n [min-1]	10696	8557	7131	6112	5348	4754	4278	3565	3056	2674	2139	1783	1528	1337
					fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019	0.0023	0.0026	0.0030	0.0038	0.0045	0.0053	0.0060
	E 14-15	1.00	0.25	325	n [min-1]	9932	7946	6621	5675	4966	4414	3973	3311	2838	2483	1986	1655	1419	1242
					fz [in]	0.0006	0.0008	0.0009	0.0011	0.0013	0.0014	0.0016	0.0019	0.0022	0.0025	0.0031	0.0038	0.0044	0.0050
	N 18	1.50	0.25	500	n [min-1]	15280	12224	10187	8731	7640	6791	6112	5093	4366	3820	3056	2547	2183	1910
					fz [in]	0.0006	0.0007	0.0008	0.0010	0.0011	0.0012	0.0014	0.0017	0.0019	0.0022	0.0028	0.0033	0.0039	0.0044
N 18	1.50	0.25	400	n [min-1]	15280	12224	10187	8731	7640	6791	6112	5093	4366	3820	3056	2547	2183	1910	
				fz [in]	0.0006	0.0007	0.0008	0.0010	0.0011	0.0012	0.0014	0.0017	0.0019	0.0022	0.0028	0.0033	0.0039	0.0044	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## STS430M.2, STR430M.2, STB430M.2 - SLOTTING - METRIC - START VALUES

ISO GROUP	SMG	$a_p \times D_c$ (max)	$a_e \times D_c$ (max)	$v_c$ (sf/min)	SLOTTING											
					$Z_n = 4$											
					3	4	5	6	8	10	12	14	16	20	25	
P	E 1-2	1.00	1.00	425	n [min-1]	13790	10350	8280	6900	5170	4140	3450	2960	2590	2070	1660
					fz [in]	0.0007	0.0010	0.0012	0.0015	0.0020	0.0025	0.0030	0.0035	0.0040	0.0050	0.0062
					vf [in/min]	41.0	41.1	41.1	41.1	41.0	41.1	41.1	41.1	41.1	41.1	41.1
	E 3-4	1.00	1.00	400	n [min-1]	12940	9710	7770	6470	4850	3880	3240	2770	2430	1940	1550
					fz [in]	0.0007	0.0009	0.0011	0.0013	0.0018	0.0022	0.0027	0.0031	0.0036	0.0045	0.0056
					vf [in/min]	34.8	34.9	34.9	34.8	34.8	34.8	34.9	34.8	34.9	34.8	34.9
	E 5-6	1.00	1.00	350	n [min-1]	11350	8510	6810	5680	4260	3410	2840	2430	2130	1700	1360
					fz [in]	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024	0.0028	0.0031	0.0039	0.0049
					vf [in/min]	26.8	26.8	26.8	26.8	26.8	26.9	26.8	26.8	26.8	26.8	26.8
K	E 12-13	1.00	1.00	350	n [min-1]	11350	8510	6810	5680	4260	3410	2840	2430	2130	1700	1360
					fz [in]	0.0006	0.0009	0.0011	0.0013	0.0017	0.0022	0.0026	0.0030	0.0035	0.0043	0.0054
					vf [in/min]	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.4
	E 14-15	1.00	1.00	325	n [min-1]	10500	7880	6300	5250	3940	3150	2630	2250	1970	1580	1260
					fz [in]	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035	0.0044
					vf [in/min]	22.3	22.3	22.3	22.3	22.3	22.3	22.4	22.3	22.3	22.4	22.3
N	18	1.00	1.00	500	n [min-1]	16130	12100	9680	8060	6050	4840	4030	3460	3020	2420	1940
					fz [in]	0.0005	0.0006	0.0008	0.0009	0.0013	0.0016	0.0019	0.0022	0.0025	0.0031	0.0039
				400 - 600	vf [in/min]	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.4	30.5	30.6

## STS430M.2, STR430M.2, STB430M.2 - SIDE MILLING/ROUGHING - METRIC - START VALUES

ISO GROUP	SMG	$a_p \times D_c$ (max)	$a_e \times D_c$ (max)	$v_c$ (sf/min)	SIDE MILLING ROUGHING											
					$Z_n = 4$											
					3	4	5	6	8	10	12	14	16	20	25	
P	E 1-2	1.50	0.25	425	n [min-1]	13790	10350	8280	6900	5170	4140	3450	2960	2590	2070	1660
					fz [in]	0.0008	0.0011	0.0014	0.0017	0.0022	0.0028	0.0033	0.0039	0.0044	0.0055	0.0069
					vf [in/min]	45.6	45.6	45.6	45.6	45.6	45.6	45.7	45.7	45.7	45.7	45.7
	E 3-4	1.50	0.25	400	n [min-1]	12940	9710	7770	6470	4850	3880	3240	2770	2430	1940	1550
					fz [in]	0.0008	0.0010	0.0013	0.0015	0.0020	0.0025	0.0030	0.0035	0.0040	0.0050	0.0063
					vf [in/min]	39.1	39.1	39.2	39.1	39.1	39.1	39.2	39.1	39.2	39.1	39.2
	E 5-6	1.00	0.25	350	n [min-1]	11350	8510	6810	5680	4260	3410	2840	2430	2130	1700	1360
					fz [in]	0.0007	0.0009	0.0012	0.0014	0.0019	0.0024	0.0028	0.0033	0.0038	0.0047	0.0059
					vf [in/min]	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.1	32.2	32.1
K	E 12-13	1.50	0.25	350	n [min-1]	11350	8510	6810	5680	4260	3410	2840	2430	2130	1700	1360
					fz [in]	0.0007	0.0009	0.0012	0.0014	0.0019	0.0024	0.0028	0.0033	0.0038	0.0047	0.0059
					vf [in/min]	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.1	32.2	32.1	32.1
	E 14-15	1.00	0.25	325	n [min-1]	10500	7880	6300	5250	3940	3150	2630	2250	1970	1580	1260
					fz [in]	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024	0.0028	0.0031	0.0039	0.0049
					vf [in/min]	24.8	24.8	24.8	24.8	24.8	24.8	24.9	24.8	24.8	24.9	24.8
N	18	1.50	0.25	500	n [min-1]	16130	12100	9680	8060	6050	4840	4030	3460	3020	2420	1940
					fz [in]	0.0005	0.0007	0.0009	0.0010	0.0014	0.0017	0.0021	0.0024	0.0028	0.0035	0.0043
				400 - 600	vf [in/min]	33.5	33.5	33.5	33.5	33.5	33.5	33.5	33.6	33.5	33.5	33.6

SMG = Seco Material Group  
 n [min-1] = RPM  
 $v_c$  (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 $a_p/D_c$  = % of diameter  
 $v_f$  [in/min] = Feed rate  
 $a_e/D_c$  = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## STRN430.2, STBN430.2 - SLOTTING - INCH - START VALUES

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	SLOTTING									
				v <sub>c</sub> (sf / min)	Zn = 4								
					1/4	5/16	3/8	7/16	1/2	5/8	3/4	1	
P	E 1 - 2	0.50	1.00	425	n [min-1]	6494	5195	4329	3711	3247	2598	2165	1624
					fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0019	0.0023	0.0030
	E 3 - 4	0.50	1.00	400	vf [in/min]	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5
					n [min-1]	6112	4890	4075	3493	3056	2445	2037	1528
	E 5 - 6	0.50	1.00	350	fz [in]	0.0006	0.0008	0.0009	0.0011	0.0013	0.0016	0.0019	0.0025
					vf [in/min]	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
K	E 12 - 13	0.50	1.00	350	n [min-1]	5348	4278	3565	3056	2674	2139	1783	1337
					fz [in]	0.0010	0.0013	0.0015	0.0018	0.0020	0.0025	0.0030	0.0040
	E 14 - 15	0.50	1.00	325	vf [in/min]	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4
					n [min-1]	4966	3973	3311	2838	2483	1986	1655	1242
	E 14 - 15	0.50	1.00	285	fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0019	0.0023	0.0030
					vf [in/min]	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
N	18	0.50	1.00	500	n [min-1]	7640	6112	5093	4366	3820	3056	2547	1910
					fz [in]	0.0006	0.0008	0.0009	0.0011	0.0013	0.0016	0.0019	0.0025
N	18	0.50	1.00	400	vf [in/min]	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1

## STRN430.2, STBN430.2 - SIDE MILLING ROUGHING - INCH - START VALUES

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	SIDE MILLING ROUGHING									
				v <sub>c</sub> (sf / min)	Zn = 4								
					1/4	5/16	3/8	7/16	1/2	5/8	3/4	1	
P	E 1 - 2	1.00	0.25	425	n [min-1]	6494	5195	4329	3711	3247	2598	2165	1624
					fz [in]	0.0009	0.0011	0.0013	0.0015	0.0018	0.0022	0.0026	0.0035
	E 3 - 4	1.00	0.25	400	vf [in/min]	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7
					n [min-1]	6112	4890	4075	3493	3056	2445	2037	1528
	E 5 - 6	1.00	0.25	350	fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0019	0.0023	0.0030
					vf [in/min]	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3
K	E 12 - 13	1.00	0.25	350	n [min-1]	5348	4278	3565	3056	2674	2139	1783	1337
					fz [in]	0.0011	0.0014	0.0017	0.0020	0.0023	0.0028	0.0034	0.0045
	E 14 - 15	1.00	0.25	280	vf [in/min]	24.1	24.1	24.1	24.1	24.1	24.1	24.1	24.1
					n [min-1]	4966	3973	3311	2838	2483	1986	1655	1242
	E 14 - 15	1.00	0.25	285	fz [in]	0.0009	0.0011	0.0013	0.0015	0.0018	0.0022	0.0026	0.0035
					vf [in/min]	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4
N	18	1.00	0.25	500	n [min-1]	7640	6112	5093	4366	3820	3056	2547	1910
					fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0019	0.0023	0.0030
N	18	1.00	0.25	400	vf [in/min]	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## STR440.2 - STB440.2 - SLOTTING - INCH - START VALUES

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)	SLOTTING															
					Zn = 4															
					1/8	5/32	3/16	7/32	1/4	9/32	5/16	3/8	7/16	1/2	5/8	3/4	1			
M	E 8 - 9	1.00	1.00	370	n [min-1]	11307	9046	7538	6461	5654	5025	4523	3769	3231	2827	2261	1885	1413		
					fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019	0.0023	0.0026	0.0030	0.0038	0.0045	0.0060		
					vf [in/min]	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9
	E 10 - 11	1.00	1.00	300	n [min-1]	9168	7334	6112	5239	4584	4075	3667	3056	2619	2292	1834	1528	1146		
					fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019	0.0023	0.0026	0.0030	0.0038	0.0045	0.0060		
					vf [in/min]	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
S	E 19	1.00	1.00	90	n [min-1]	2750	2200	1834	1572	1375	1222	1100	917	786	688	550	458	344		
					fz [in]	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.0010	0.0012	0.0014	0.0016	0.0020	0.0024	0.0032		
				70 - 110	vf [in/min]	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
				E 20	1.00	1.00	90	n [min-1]	2750	2200	1834	1572	1375	1222	1100	917	786	688	550	458
	fz [in]	0.0004	0.0005					0.0006	0.0007	0.0008	0.0009	0.0010	0.0012	0.0014	0.0016	0.0020	0.0024	0.0032		
	E 21	1.00	1.00	90	n [min-1]	2750	2200	1834	1572	1375	1222	1100	917	786	688	550	458	344		
					fz [in]	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.0010	0.0012	0.0014	0.0016	0.0020	0.0024	0.0032		
	E 22	1.00	1.00	185	n [min-1]	5654	4523	3769	3231	2827	2513	2261	1885	1615	1413	1131	942	707		
					fz [in]	0.0006	0.0008	0.0009	0.0011	0.0013	0.0014	0.0016	0.0019	0.0022	0.0025	0.0031	0.0038	0.0050		
					165 - 205	vf [in/min]	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	

## STR440.2 - STB440.2 - SIDE MILLING/ROUGHING - INCH - START VALUES

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)	SIDE MILLING ROUGHING														
					Zn = 4														
					1/8	5/32	3/16	7/32	1/4	9/32	5/16	3/8	7/16	1/2	5/8	3/4	1		
H	E 7	1.00	0.15	150	n [min-1]	4584	3667	3056	2619	2292	2037	1834	1528	1310	1146	917	764	573	
					fz [in]	0.0003	0.0004	0.0004	0.0005	0.0006	0.0006	0.0007	0.0009	0.0010	0.0012	0.0014	0.0017	0.0023	
					120 - 180	vf [in/min]	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
M	E 8 - 9	1.00	0.25	370	n [min-1]	11307	9046	7538	6461	5654	5025	4523	3769	3231	2827	2261	1885	1413	
					fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019	0.0023	0.0026	0.0030	0.0038	0.0045	0.0060	
				270 - 470	vf [in/min]	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9
	E 10 - 11	1.00	0.25	300	n [min-1]	9168	7334	6112	5239	4584	4075	3667	3056	2619	2292	1834	1528	1146	
					fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019	0.0023	0.0026	0.0030	0.0038	0.0045	0.0060	
				250 - 350	vf [in/min]	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
S	E 19	1.00	0.15	90	n [min-1]	2750	2200	1834	1572	1375	1222	1100	917	786	688	550	458	344	
					fz [in]	0.0005	0.0006	0.0008	0.0009	0.0010	0.0011	0.0013	0.0015	0.0018	0.0020	0.0025	0.0030	0.0040	
				70 - 110	vf [in/min]	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
				E 20	1.00	0.15	90	n [min-1]	2750	2200	1834	1572	1375	1222	1100	917	786	688	550
	fz [in]	0.0005	0.0006					0.0008	0.0009	0.0010	0.0011	0.0013	0.0015	0.0018	0.0020	0.0025	0.0030	0.0040	
	E 21	1.00	0.15	90	n [min-1]	2750	2200	1834	1572	1375	1222	1100	917	786	688	550	458	344	
					fz [in]	0.0005	0.0006	0.0008	0.0009	0.0010	0.0011	0.0013	0.0015	0.0018	0.0020	0.0025	0.0030	0.0040	
	E 22	1.00	0.25	185	n [min-1]	5654	4523	3769	3231	2827	2513	2261	1885	1615	1413	1131	942	707	
					fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019	0.0023	0.0026	0.0030	0.0038	0.0045	0.0060	
					165 - 205	vf [in/min]	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## STR440M.2 - STB440M.2 - SLOTTING - METRIC - START VALUES

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	SLOTTING												
				v <sub>c</sub> (sf / min)		Zn = 4										
						3	4	5	6	8	10	12	14	16	20	25
M	E 8 - 9	1.00	1.00	370	n [min-1]	11990	8990	7190	5990	4500	3600	3000	2570	2250	1800	1440
				fz [in]	0.0007	0.0009	0.0012	0.0014	0.0019	0.0024	0.0028	0.0033	0.0038	0.0047	0.0059	
	270 - 470	vf [in/min]	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0
	E 10 - 11	1.00	1.00	300	n [min-1]	9660	7240	5790	4830	3620	2900	2410	2070	1810	1450	1160
fz [in]				0.0007	0.0009	0.0012	0.0014	0.0019	0.0024	0.0028	0.0033	0.0038	0.0047	0.0059		
S	E 19	1.00	1.00	90	n [min-1]	2860	2150	1720	1430	1070	860	720	610	540	430	340
				fz [in]	0.0004	0.0005	0.0006	0.0008	0.0010	0.0013	0.0015	0.0018	0.0020	0.0025	0.0031	
	70 - 110	vf [in/min]	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.4	4.3	4.4	4.3	4.3		
	E 20	1.00	1.00	90	n [min-1]	2860	2150	1720	1430	1070	860	720	610	540	430	340
				fz [in]	0.0004	0.0005	0.0006	0.0008	0.0010	0.0013	0.0015	0.0018	0.0020	0.0025	0.0031	
	70 - 110	vf [in/min]	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.4	4.3	4.4	4.3	4.3		
	E 21	1.00	1.00	90	n [min-1]	2860	2150	1720	1430	1070	860	720	610	540	430	340
				fz [in]	0.0004	0.0005	0.0006	0.0008	0.0010	0.0013	0.0015	0.0018	0.0020	0.0025	0.0031	
	70 - 110	vf [in/min]	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.4	4.3	4.4	4.3	4.3		
	E 22	1.00	1.00	185	n [min-1]	5940	4460	3570	2970	2230	1780	1490	1270	1110	890	710
				fz [in]	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024	0.0028	0.0031	0.0039	0.0049	
	165 - 205	vf [in/min]	14.0	14.0	14.1	14.0	14.0	14.0	14.0	14.1	14.0	14.0	14.0	14.0	14.0	

## STR440M.2 - STB440M.2 - SIDE MILLING/ROUGHING - METRIC - START VALUES

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	SIDE MILLING ROUGHING												
				v <sub>c</sub> (sf / min)		Zn = 4										
						3	4	5	6	8	10	12	14	16	20	25
H	E 7	1.00	0.15	150	n [min-1]	4880	3660	2930	2440	1830	1460	1220	1050	920	730	590
				fz [in]	0.0003	0.0004	0.0005	0.0005	0.0007	0.0009	0.0011	0.0013	0.0014	0.0018	0.0023	
M	E 8 - 9	1.00	0.25	370	n [min-1]	11990	8990	7190	5990	4500	3600	3000	2570	2250	1800	1440
				fz [in]	0.0007	0.0009	0.0012	0.0014	0.0019	0.0024	0.0028	0.0033	0.0038	0.0047	0.0059	
	270 - 470	vf [in/min]	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	
	E 10 - 11	1.00	0.25	300	n [min-1]	9660	7240	5790	4830	3620	2900	2410	2070	1810	1450	1160
fz [in]				0.0007	0.0009	0.0012	0.0014	0.0019	0.0024	0.0028	0.0033	0.0038	0.0047	0.0059		
250 - 350	vf [in/min]	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.3	27.4	27.4	27.4	27.4			
S	E 19	1.00	0.15	90	n [min-1]	2860	2150	1720	1430	1070	860	720	610	540	430	340
				fz [in]	0.0005	0.0006	0.0008	0.0009	0.0013	0.0016	0.0019	0.0022	0.0025	0.0031	0.0039	
	70 - 110	vf [in/min]	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
	E 20	1.00	0.15	90	n [min-1]	2860	2150	1720	1430	1070	860	720	610	540	430	340
				fz [in]	0.0005	0.0006	0.0008	0.0009	0.0013	0.0016	0.0019	0.0022	0.0025	0.0031	0.0039	
	70 - 110	vf [in/min]	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4		
	E 21	1.00	0.15	90	n [min-1]	2860	2150	1720	1430	1070	860	720	610	540	430	340
				fz [in]	0.0005	0.0006	0.0008	0.0009	0.0013	0.0016	0.0019	0.0022	0.0025	0.0031	0.0039	
70 - 110	vf [in/min]	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4			
E 22	1.00	0.25	185	n [min-1]	5940	4460	3570	2970	2230	1780	1490	1270	1110	890	710	
			fz [in]	0.0007	0.0009	0.0012	0.0014	0.0019	0.0024	0.0028	0.0033	0.0038	0.0047	0.0059		
165 - 205	vf [in/min]	16.8	16.9	16.9	16.8	16.9	16.8	16.9	16.8	16.9	16.8	16.8	16.8	16.8		

SMG = Seco Material Group  
n [min-1] = RPM  
v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
a<sub>p</sub>/D<sub>c</sub> = % of diameter  
vf [in/min] = Feed rate  
a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
All cutting data are start values. All cutting data is in inch values.  
Please reference the Workpiece Material Classification chart located on page 15.

## STRN440.2 - STBN440.2 - SLOTTING - INCH - START VALUES

ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)	SLOTTING								
					Zn = 4								
					1/4	5/16	3/8	7/16	1/2	5/8	3/4	1	
M	E 8 - 9	0.50	1.00	370	n [min-1]	5654	4523	3769	3231	2827	2261	1885	1413
					fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0019	0.0023	0.0030
				340 - 400	vf [in/min]	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
	E 10 - 11	0.50	1.00	300	n [min-1]	4584	3667	3056	2619	2292	1834	1528	1146
					fz [in]	0.0008	0.0009	0.0011	0.0013	0.0015	0.0019	0.0023	0.0030
				270 - 330	vf [in/min]	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
S	E 19	0.50	1.00	90	n [min-1]	1375	1100	917	786	688	550	458	344
					fz [in]	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.0011	0.0015
	E 20	0.50	1.00	90	n [min-1]	1375	1100	917	786	688	550	458	344
					fz [in]	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.0011	0.0015
	E 21	0.50	1.00	90	n [min-1]	1375	1100	917	786	688	550	458	344
					fz [in]	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	0.0011	0.0015
	E 22	0.50	1.00	185	n [min-1]	2827	2261	1885	1615	1413	1131	942	707
					fz [in]	0.0006	0.0008	0.0009	0.0011	0.0012	0.0015	0.0018	0.0024
				165 - 205	vf [in/min]	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8

## STRN440.2 - STBN440.2 - SIDE MILLING/ROUGHING - INCH - START VALUES

ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)	SIDE MILLING ROUGHING								
					Zn = 4								
					1/4	5/16	3/8	7/16	1/2	5/8	3/4	1	
H	E 7	1.00	0.15	150	n [min-1]	2292	1834	1528	1310	1146	917	764	573
					fz [in]	0.0003	0.0004	0.0005	0.0006	0.0006	0.0008	0.0010	0.0013
				120 - 180	vf [in/min]	2.93	2.9	2.9	2.9	2.9	2.9	2.9	2.9
M	E 8 - 9	1.00	0.25	370	n [min-1]	5654	4523	3769	3231	2827	2261	1885	1413
					fz [in]	0.0008	0.0010	0.0012	0.0014	0.0016	0.0020	0.0024	0.0032
				340 - 400	vf [in/min]	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1
	E 10 - 11	1.00	0.25	300	n [min-1]	4584	3667	3056	2619	2292	1834	1528	1146
					fz [in]	0.0008	0.0010	0.0012	0.0014	0.0016	0.0020	0.0024	0.0032
				270 - 330	vf [in/min]	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
S	E 19	1.00	0.15	90	n [min-1]	1375	1100	917	786	688	550	458	344
					fz [in]	0.0005	0.0006	0.0008	0.0009	0.0010	0.0013	0.0015	0.0020
	E 20	1.00	0.15	90	n [min-1]	1375	1100	917	786	688	550	458	344
					fz [in]	0.0005	0.0006	0.0008	0.0009	0.0010	0.0013	0.0015	0.0020
	E 21	1.00	0.15	90	n [min-1]	1375	1100	917	786	688	550	458	344
					fz [in]	0.0005	0.0006	0.0008	0.0009	0.0010	0.0013	0.0015	0.0020
	E 22	1.00	0.25	185	n [min-1]	2827	2261	1885	1615	1413	1131	942	707
					fz [in]	0.0007	0.0008	0.0010	0.0011	0.0013	0.0016	0.0020	0.0026
				165 - 205	vf [in/min]	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## STS540 / STR540 - START VALUES

SIDE MILLING - ROUGHING														
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	V <sub>c</sub> (sf / min)		Z <sub>n</sub> = 5								
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1	
P	E 1 - 2	1.00	0.30	500	n (rev/min)	30560	15280	7640	5093	3820	3056	2547	1910	
					f <sub>z</sub> (in)	0.0003	0.0006	0.0012	0.0018	0.0024	0.0030	0.0036	0.0048	
	E 3 - 4	1.00	0.30	400	v <sub>f</sub> (mm/min)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
					n (rev/min)	24448	12224	6112	4075	3056	2445	2037	1528	
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	
					v <sub>f</sub> (mm/min)	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	
E 5 - 6	1.00	0.20	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764		
				f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024		
				v <sub>f</sub> (mm/min)	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
				v <sub>f</sub> (mm/min)	150	-	250							
H	M / A / D 7a (48>52HRC)	1.00	0.10	80	n (rev/min)	4890	2445	1222	815	611	489	407	306	
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0016	
					v <sub>f</sub> (mm/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	
M	E 8 - 9	1.00	0.20	380	n (rev/min)	23226	11613	5806	3871	2903	2323	1935	1452	
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	
	E 10 - 11	1.00	0.15	275	v <sub>f</sub> (mm/min)	23.2	21.8	21.8	21.8	21.8	21.8	21.8	21.8	
					n (rev/min)	16808	8404	4202	2801	2101	1681	1401	1051	
K	E 12 - 13	1.00	0.50	500	f <sub>z</sub> (in)	0.0004	0.0007	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	
					v <sub>f</sub> (mm/min)	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5	
	E 12 - 13	1.00	0.30	215	n (rev/min)	13141	6570	3285	2190	1643	1314	1095	821	
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	
					v <sub>f</sub> (mm/min)	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	
					v <sub>f</sub> (mm/min)	165	-	265						
S	E 19	1.00	0.20	100	n (rev/min)	6112	3056	1528	1019	764	611	509	382	
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	
					v <sub>f</sub> (mm/min)	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	
	E 20	1.00	0.20	100	n (rev/min)	6112	3056	1528	1019	764	611	509	382	
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	
					v <sub>f</sub> (mm/min)	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	
	E 21	1.00	0.20	100	n (rev/min)	6112	3056	1528	1019	764	611	509	382	
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	
					v <sub>f</sub> (mm/min)	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	
	E 22	1.00	0.20	170	n (rev/min)	10390	5195	2598	1732	1299	1039	866	649	
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	
					v <sub>f</sub> (mm/min)	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	

SMG = Seco Material Group  
 n [min-1] = RPM  
 V<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

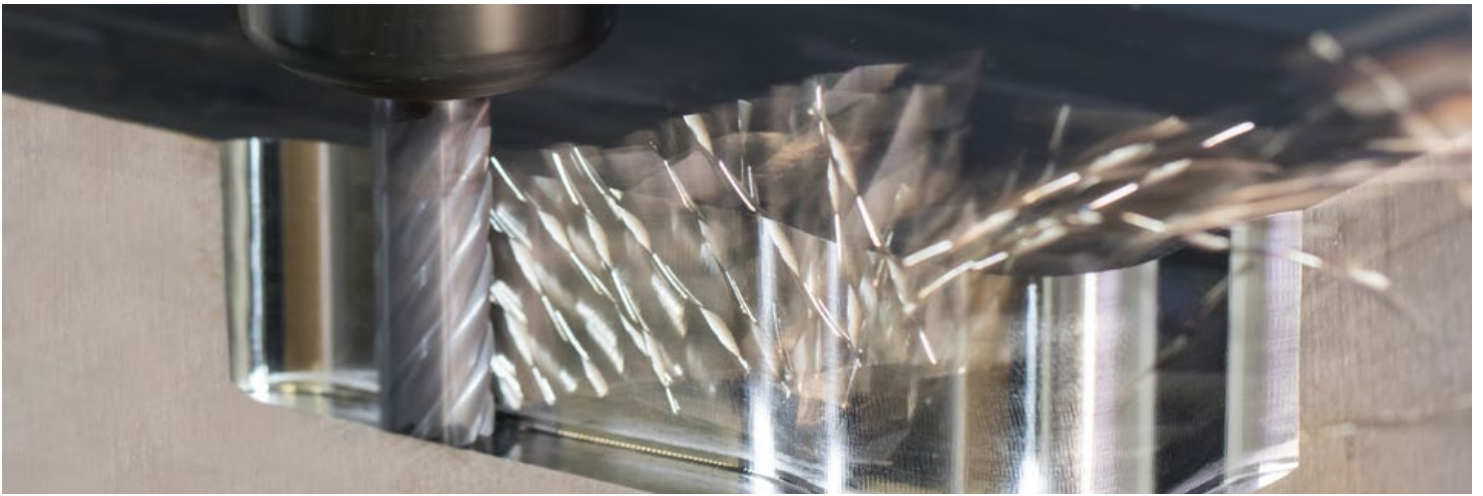
## STS540M / STR540M - START VALUES

SIDE MILLING - ROUGHING												
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (m / min)	Z <sub>n</sub> = 5							
					4	6	8	10	12	14	16	
P	E 1 - 2	1.00	0.30	152	n (rev/min)	12100	8060	6050	4840	4030	3460	3020
					f <sub>z</sub> (mm)	0.019	0.029	0.038	0.048	0.058	0.067	0.077
				137 - 168	v <sub>f</sub> (mm/min)	1162	1161	1162	1162	1161	1163	1160
	E 3 - 4	1.00	0.30	122	n (rev/min)	9710	6470	4850	3880	3240	2770	2430
					f <sub>z</sub> (mm)	0.012	0.018	0.024	0.030	0.036	0.042	0.048
				107 - 137	v <sub>f</sub> (mm/min)	583	582	582	582	583	582	583
	E 5 - 6	1.00	0.20	61	n (rev/min)	4850	3240	2430	1940	1620	1390	1210
					f <sub>z</sub> (mm)	0.010	0.014	0.019	0.024	0.029	0.034	0.038
				46 - 76	v <sub>f</sub> (mm/min)	233	233	233	233	233	234	232
H	M / A / D 7 <sub>a</sub> (48>52HRC)	1.00	0.10	24	n (rev/min)	1910	1270	950	760	640	550	480
					f <sub>z</sub> (mm)	0.006	0.010	0.013	0.016	0.019	0.022	0.026
				18 - 30	v <sub>f</sub> (mm/min)	61	61	61	61	61	62	61
M	E 8 - 9	1.00	0.20	116	n (rev/min)	9230	6150	4620	3690	3080	2640	2310
					f <sub>z</sub> (mm)	0.013	0.018	0.024	0.030	0.036	0.042	0.048
				101 - 131	v <sub>f</sub> (mm/min)	591	554	554	554	554	554	554
	E 10 - 11	1.00	0.15	84	n (rev/min)	6680	4460	3340	2670	2230	1910	1670
					f <sub>z</sub> (mm)	0.012	0.018	0.024	0.030	0.036	0.042	0.048
				69 - 99	v <sub>f</sub> (mm/min)	401	401	401	401	401	401	401
K	E 12 - 13	1.00	0.50	152	n (rev/min)	12100	8060	6050	4840	4030	3460	3020
					f <sub>z</sub> (mm)	0.022	0.034	0.045	0.056	0.067	0.078	0.090
				137 - 168	v <sub>f</sub> (mm/min)	1355	1354	1355	1355	1354	1356	1353
	E 12 - 13	1.00	0.30	66	n (rev/min)	5250	3500	2630	2100	1750	1500	1310
					f <sub>z</sub> (mm)	0.012	0.018	0.024	0.030	0.036	0.042	0.048
				50 - 81	v <sub>f</sub> (mm/min)	315	315	316	315	315	315	314
S	E 19	1.00	0.10	30	n (rev/min)	2390	1590	1190	950	800	680	600
					f <sub>z</sub> (mm)	0.012	0.018	0.024	0.030	0.036	0.042	0.048
				24 - 37	v <sub>f</sub> (mm/min)	143	143	143	143	144	143	144
				E 20	1.00	0.10	30	n (rev/min)	2390	1590	1190	950
	f <sub>z</sub> (mm)	0.012	0.018					0.024	0.030	0.036	0.042	0.048
	24 - 37	v <sub>f</sub> (mm/min)	143				143	143	143	144	143	144
	E 21	1.00	0.10				30	n (rev/min)	2390	1590	1190	950
				f <sub>z</sub> (mm)	0.012	0.018		0.024	0.030	0.036	0.042	0.048
				24 - 37	v <sub>f</sub> (mm/min)	143	143	143	143	144	143	144
				E 22	1.00	0.20	52	n (rev/min)	4140	2760	2070	1660
	f <sub>z</sub> (mm)	0.012	0.018					0.024	0.030	0.036	0.042	0.048
	37 - 67	v <sub>f</sub> (mm/min)	248				248	248	249	248	248	247

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## A NEW LEVEL OF PERFORMANCE

# MULTI FLUTE

The Niagara Cutter™ Multi Flute family of products takes Optimized Roughing to a new level of performance. Reducing cycle times, increasing throughput and extending tool life has never been easier. This product series now offers smaller diameters down to 1/8", necked versions with extended reaches, and even a new ball nose option for those demanding 3D applications that require optimal performance and tool life. The most unique addition to the Multi Flute family of products is a new advanced chip splitter design which takes chip control to a whole new level. This advanced design allows for unsurpassed chip control in applications requiring depths of cut up to 3 times the diameter of the tool. Thanks to the introduction of over 80 new tools, this extensive product range is not only proving itself to the world of manufacturing it is also mastering its own game in the art of Optimized Roughing.

### RANGE OVERVIEW

#### S638/S638R - Square & Radius

- 2 and 2.5 x D flute length (0.125" - 1.00")
- Cylindrical shank, dead sharp and radius (0.010", 0.015", 0.030", 0.060", 0.090", 0.120" & 0.190")

#### SN638/SN638R - Necked Series

- 2 x D flute length and 4 x D reach length (0.375" - 1.000")
- Cylindrical shank, standard aerospace radii (0.015", 0.030", 0.060", 0.120" & 0.250")

#### SB638/SBN638 - Ball Nose Series

- 1 and approx 2.5 x D flute length (0.250" - 1.000")
- Necked version - 1 x D flute length and 3 x D reach length
- Cylindrical shank

#### S738/S738R/S938/S938R - Chamfer & Radius

- 1.5, 2.5 and 4 x D flute length (0.250" - 0.500")
- Cylindrical shank, chamfer and radius (0.015", 0.030" & 0.060")

#### SCS638/SCS638R, SCS738R, SCS938R - Chipsplitter Design

- Approx. 3.2 x D flute length
- Cylindrical shank (0.250" - 1.000")

MATERIAL GROUPS
steel < 450 N/mm <sup>2</sup>
450 < 700 N/mm <sup>2</sup>
700 < 1200 N/mm <sup>2</sup>
Stainless steel
Cast Iron
Fe based super alloys
CO-based super alloys
Ni-based super alloys
Titanium alloys

### KEY BENEFITS

- Increased chip evacuation in deep pocket applications
- AlTiN coating increases tool life
- Smoother cutting for an improved surface finish
- High heat abrasion resistance
- Stronger cutting edge

# 6 TIPS OPTIMIZED ROUGHING

Optimized Roughing can be highly effective for machining part features such as pockets with challenging corners as well as any straight walls two times the diameter of your end mill and require long axial depths of cuts. This strategy enables you to machine pockets three to four times faster than conventional methods while also dramatically extending the life of your tools. Achieving the best possible results with today's Optimized Roughing strategy does require adhering to a few specific guidelines.

## 1. CHOOSE AN APPROPRIATE STEPOVER

Optimized Roughing typically employs end mills with 5- to 9-flutes. End mills with fewer flutes have more space for chip formation, thus can utilize larger step-overs. Although the step-over of tools with fewer flutes can be higher, the traverse rate of the tool will decrease because of the fewer flutes. Therefore, a balance must be struck where the optimum step-over and feed rate are utilized for each type of tool. The cutting data in this brochure has been specified based on extensive testing and experience and should serve as a good starting point for your application.

## 2. USE STRONG, SECURE TOOLHOLDERS & FIXTURING

High-precision holders are crucial when Optimized Roughing to achieve maximum tool life. Run-out needs to be kept to less than 0.0004" to maximize tool life. This type of precision can be achieved by most shrink fit holders, milling chucks, high precision collet chucks and select manufacturer's end mill holders. A precise holder ensures the accuracy of the process, whereas a less secure holder will cause undesirable levels of vibration while Optimized Roughing at high feed rates.

## 3. MAKE SURE YOUR MACHINE IS CAPABLE OF PERFORMING

Machine tools used for Optimized Roughing not only need to be able to achieve extremely high feed rates, but also need to be able to process thousands of lines of code in a matter of seconds. This requires advanced look-ahead capabilities and processing systems found in newer machine tools. Rigidity throughout the machine tool from the spindle bearings all the way through to the ball screws ensures smooth cutting, consistent tool life and unsurpassed part quality.

## 4. CHOOSE A SUITABLE PROGRAMMING METHOD

It is nearly impossible to program an Optimized Roughing strategy manually. Many companies provide state-of-the-art programming software. Careful consideration must be made when choosing the right software or software add on. Not all software is created equal. For example, a programming software designed only for complex 3D high speed milling may not be able to perform the complex radial moves inside of tight corners to maintain a consistent angle of engagement. This is one of the many keys to successful Optimized Roughing strategies.

## 5. SELECT THE RIGHT DEPTH OF CUT

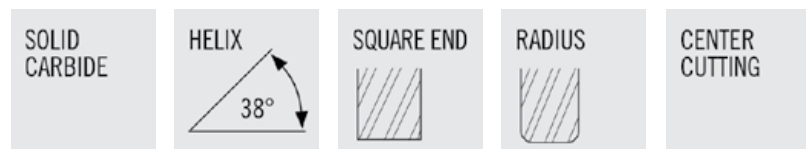
Take advantage of the full flute length of the tool selected for the specific application. Maximizing depth of cuts above 2 times the diameter of the tool is common when Optimized Roughing. Smaller radial step-overs make such depths of the cut possible. A larger step-over would increase the amount of heat in the cut, which in-turn will have a negative effect on tool life and performance. Therefore, rpm and feed rates must be reduced. A cut that is too deep, over 3 x D for instance, can create cutting pressures greater than what the tool can bear and possibly cause deflection. In this circumstance, chip splitters can minimize radial cutting pressure reducing deflection and aiding in chip control.

## 6. FOLLOW RECOMMENDED CUTTING PARAMETERS

After meticulous research and years of firsthand experience, we have developed specific recommended cutting parameters. Always to be used as a starting point, cutting data is optimized per tool design, specifications and material groups. Modifications can be made depending on the application.



## MULTI FLUTE-S638 & S638R

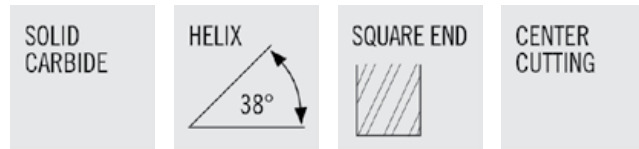


- Eccentric O.D. relief creating a stronger cutting edge
  - Variable indexing to reduce harmonics providing smoother cutting and improved surface finish
  - Designed for peripheral roughing and finishing for stainless steel, titanium, and high temperature alloys
  - Excellent in high speed milling and optimized roughing techniques
  - Designed for increased radial depths as compared to the S738 and S938
  - High performance with minimal deflection
- Cutting Data - Page 53-55
  - Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N15378	S638-0.125-F3-S.0-Z6	1/8	1/4	5/16	2	6	ALTIN	-	CYLINDRICAL
N15379	S638R-0.125-F3-R010.0-Z6	1/8	1/4	5/16	2	6	ALTIN	0.010	CYLINDRICAL
N15380	S638-0.188-F3-S.0-Z6	3/16	1/4	1/2	2	6	ALTIN	-	CYLINDRICAL
N15381	S638R-0.188-F3-R010.0-Z6	3/16	1/4	1/2	2	6	ALTIN	0.010	CYLINDRICAL
N15382	S638-0.250-D3-S.0-Z6	1/4	1/4	5/8	2	6	ALTIN	-	CYLINDRICAL
N15383	S638R-0.250-D3-R015.0-Z6	1/4	1/4	5/8	2	6	ALTIN	0.015	CYLINDRICAL
N15384	S638R-0.250-D3-R030.0-Z6	1/4	1/4	5/8	2	6	ALTIN	0.030	CYLINDRICAL
N15388	S638-0.313-D2-S.0-Z6	5/16	5/16	3/4	2	6	ALTIN	-	CYLINDRICAL
N15389	S638R-0.313-D2-R015.0-Z6	5/16	5/16	3/4	2	6	ALTIN	0.015	CYLINDRICAL
N15390	S638R-0.313-D2-R030.0-Z6	5/16	5/16	3/4	2	6	ALTIN	0.030	CYLINDRICAL
N00524	S638-0.375-D1-S.0-Z6	3/8	3/8	1	2-1/2	6	ALTIN	-	CYLINDRICAL
N00455	S638R-0.375-D1-R015.0-Z6	3/8	3/8	1	2-1/2	6	ALTIN	0.015	CYLINDRICAL
N00456	S638R-0.375-D1-R030.0-Z6	3/8	3/8	1	2-1/2	6	ALTIN	0.030	CYLINDRICAL
N00457	S638-0.500-D1-S.0-Z6	1/2	1/2	1-1/4	3	6	ALTIN	-	CYLINDRICAL
N00458	S638R-0.500-D1-R015.0-Z6	1/2	1/2	1-1/4	3	6	ALTIN	0.015	CYLINDRICAL
N00459	S638R-0.500-D1-R030.0-Z6	1/2	1/2	1-1/4	3	6	ALTIN	0.030	CYLINDRICAL
N00462	S638R-0.500-D1-R060.0-Z6	1/2	1/2	1-1/4	3	6	ALTIN	0.060	CYLINDRICAL
N00463	S638R-0.500-D1-R090.0-Z6	1/2	1/2	1-1/4	3	6	ALTIN	0.090	CYLINDRICAL
N00464	S638R-0.500-D1-R120.0-Z6	1/2	1/2	1-1/4	3	6	ALTIN	0.120	CYLINDRICAL
N00465	S638-0.625-D1-S.0-Z6	5/8	5/8	1-5/8	3-1/2	6	ALTIN	-	CYLINDRICAL
N00466	S638R-0.625-D1-R015.0-Z6	5/8	5/8	1-5/8	3-1/2	6	ALTIN	0.015	CYLINDRICAL
N00467	S638R-0.625-D1-R030.0-Z6	5/8	5/8	1-5/8	3-1/2	6	ALTIN	0.030	CYLINDRICAL
N00468	S638R-0.625-D1-R060.0-Z6	5/8	5/8	1-5/8	3-1/2	6	ALTIN	0.060	CYLINDRICAL
N00469	S638R-0.625-D1-R090.0-Z6	5/8	5/8	1-5/8	3-1/2	6	ALTIN	0.090	CYLINDRICAL
N00472	S638R-0.625-D1-R120.0-Z6	5/8	5/8	1-5/8	3-1/2	6	ALTIN	0.120	CYLINDRICAL
N00473	S638-0.750-D1-S.0-Z6	3/4	3/4	1-3/4	4	6	ALTIN	-	CYLINDRICAL
N00474	S638R-0.750-D1-R030.0-Z6	3/4	3/4	1-3/4	4	6	ALTIN	0.030	CYLINDRICAL
N00475	S638R-0.750-D1-R060.0-Z6	3/4	3/4	1-3/4	4	6	ALTIN	0.060	CYLINDRICAL
N00476	S638R-0.750-D1-R090.0-Z6	3/4	3/4	1-3/4	4	6	ALTIN	0.090	CYLINDRICAL
N00477	S638R-0.750-D1-R120.0-Z6	3/4	3/4	1-3/4	4	6	ALTIN	0.120	CYLINDRICAL
N00478	S638R-0.750-D1-R190.0-Z6	3/4	3/4	1-3/4	4	6	ALTIN	0.190	CYLINDRICAL
N00479	S638-1.000-D1-S.0-Z6	1	1	2	5	6	ALTIN	-	CYLINDRICAL
N00482	S638R-1.000-D1-R030.0-Z6	1	1	2	5	6	ALTIN	0.030	CYLINDRICAL
N00483	S638R-1.000-D1-R060.0-Z6	1	1	2	5	6	ALTIN	0.060	CYLINDRICAL
N00484	S638R-1.000-D1-R090.0-Z6	1	1	2	5	6	ALTIN	0.090	CYLINDRICAL
N00485	S638R-1.000-D1-R120.0-Z6	1	1	2	5	6	ALTIN	0.120	CYLINDRICAL
N00486	S638R-1.000-D1-R190.0-Z6	1	1	2	5	6	ALTIN	0.190	CYLINDRICAL
N00487	S638R-1.000-D1-R250.0-Z6	1	1	2	5	6	ALTIN	0.250	CYLINDRICAL

DISCOUNT CODE D43

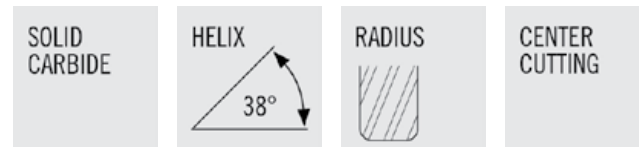
## MULTI FLUTE-SN638



- Eccentric O.D. relief creating a stronger cutting edge
- Variable indexing to reduce harmonics providing smoother cutting and improved surface finish
- Designed for peripheral roughing and finishing for stainless steel, titanium, and high temperature alloys
- Excellent in high speed milling and optimized roughing techniques
- High performance with minimal deflection
- Cutting Data - Page 53-55
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	SHANK TYPE
N15397	SN638-0.375-E3-S.0-Z6	3/8	3/8	1	3	.360	1-1/2	6	ALTIN	CYLINDRICAL
N15406	SN638-0.500-E2-S.0-Z6	1/2	1/2	1-1/8	4	.480	2	6	ALTIN	CYLINDRICAL
N15418	SN638-0.625-E2-S.0-Z6	5/8	5/8	1-3/8	5	.600	2-1/2	6	ALTIN	CYLINDRICAL
N15430	SN638-0.750-E2-S.0-Z6	3/4	3/4	1-3/4	6	.720	3	6	ALTIN	CYLINDRICAL

## MULTI FLUTE-SN638R



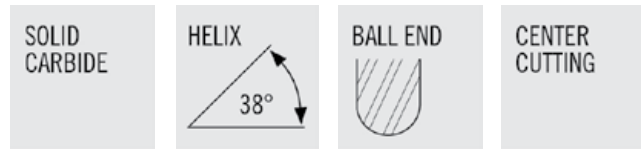
- Eccentric O.D. relief creating a stronger cutting edge
- Variable indexing to reduce harmonics providing smoother cutting and improved surface finish
- Designed for peripheral roughing and finishing for stainless steel, titanium, and high temperature alloys
- Excellent in high speed milling and optimized roughing techniques
- High performance with minimal deflection
- Cutting Data - Page 53-55
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	RADIUS	SHANK TYPE
N15398	SN638R-0.375-E3-R015.0-Z6	3/8	3/8	1	3	.360	1-1/2	6	ALTIN	0.015	CYLINDRICAL
N15399	SN638R-0.375-E3-R030.0-Z6	3/8	3/8	1	3	.360	1-1/2	6	ALTIN	0.030	CYLINDRICAL
N15407	SN638R-0.500-E2-R030.0-Z6	1/2	1/2	1-1/8	4	.480	2	6	ALTIN	0.030	CYLINDRICAL
N15408	SN638R-0.500-E2-R060.0-Z6	1/2	1/2	1-1/8	4	.480	2	6	ALTIN	0.060	CYLINDRICAL
N15409	SN638R-0.500-E2-R120.0-Z6	1/2	1/2	1-1/8	4	.480	2	6	ALTIN	0.120	CYLINDRICAL
N15419	SN638R-0.625-E2-R015.0-Z6	5/8	5/8	1-3/8	5	.600	2-1/2	6	ALTIN	0.015	CYLINDRICAL
N15420	SN638R-0.625-E2-R030.0-Z6	5/8	5/8	1-3/8	5	.600	2-1/2	6	ALTIN	0.030	CYLINDRICAL
N15421	SN638R-0.625-E2-R060.0-Z6	5/8	5/8	1-3/8	5	.600	2-1/2	6	ALTIN	0.060	CYLINDRICAL
N15431	SN638R-0.750-E2-R030.0-Z6	3/4	3/4	1-3/4	6	.720	3	6	ALTIN	0.030	CYLINDRICAL
N15432	SN638R-0.750-E2-R060.0-Z6	3/4	3/4	1-3/4	6	.720	3	6	ALTIN	0.060	CYLINDRICAL
N15433	SN638R-0.750-E2-R120.0-Z6	3/4	3/4	1-3/4	6	.720	3	6	ALTIN	0.120	CYLINDRICAL
N15441	SN638R-1.000-E2-R030.0-Z6	1	1	2-1/4	7	.960	4-1/8	6	ALTIN	0.030	CYLINDRICAL
N15442	SN638R-1.000-E2-R060.0-Z6	1	1	2-1/4	7	.960	4-1/8	6	ALTIN	0.060	CYLINDRICAL
N15443	SN638R-1.000-E2-R090.0-Z6	1	1	2-1/4	7	.960	4-1/8	6	ALTIN	0.090	CYLINDRICAL
N15444	SN638R-1.000-E2-R120.0-Z6	1	1	2-1/4	7	.960	4-1/8	6	ALTIN	0.120	CYLINDRICAL
N15445	SN638R-1.000-E2-R250.0-Z6	1	1	2-1/4	7	.960	4-1/8	6	ALTIN	0.250	CYLINDRICAL

DISCOUNT CODE D43



**MULTI FLUTE-SB638**

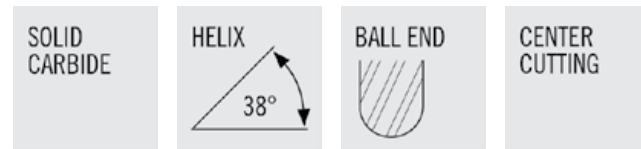


- Eccentric O.D. relief creating a stronger cutting edge
- Variable indexing to reduce harmonics providing smoother cutting and improved surface finish
- Designed for peripheral roughing and finishing for stainless steel, titanium, and high temperature alloys
- Excellent in high speed milling and optimized roughing techniques
- High performance with minimal deflection

- Cutting Data - Page 53-57
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N15385	SB638-0.250-D1-B.0-Z6	1/4	1/4	1/4	2	6	ALTIN	CYLINDRICAL
N15386	SB638-0.250-D3-B.0-Z6	1/4	1/4	5/8	2	6	ALTIN	CYLINDRICAL
N15391	SB638-0.313-D1-B.0-Z6	5/16	5/16	5/16	2	6	ALTIN	CYLINDRICAL
N15392	SB638-0.313-D2-B.0-Z6	5/16	5/16	3/4	2	6	ALTIN	CYLINDRICAL
N15394	SB638-0.375-D1-B.0-Z6	3/8	3/8	3/8	2	6	ALTIN	CYLINDRICAL
N15395	SB638-0.375-D3-B.0-Z6	3/8	3/8	1	2-1/2	6	ALTIN	CYLINDRICAL
N15403	SB638-0.500-D1-B.0-Z6	1/2	1/2	1/2	2-1/2	6	ALTIN	CYLINDRICAL
N15404	SB638-0.500-D3-B.0-Z6	1/2	1/2	1-1/4	3	6	ALTIN	CYLINDRICAL
N15415	SB638-0.625-D1-B.0-Z6	5/8	5/8	5/8	3	6	ALTIN	CYLINDRICAL
N15416	SB638-0.625-D3-B.0-Z6	5/8	5/8	1-5/8	4	6	ALTIN	CYLINDRICAL
N15427	SB638-0.750-D1-B.0-Z6	3/4	3/4	3/4	3	6	ALTIN	CYLINDRICAL
N15428	SB638-0.750-D2-B.0-Z6	3/4	3/4	1-3/4	4	6	ALTIN	CYLINDRICAL
N15438	SB638-1.000-D1-B.0-Z6	1	1	1	4	6	ALTIN	CYLINDRICAL
N15439	SB638-1.000-D2-B.0-Z6	1	1	2	5	6	ALTIN	CYLINDRICAL

**MULTI FLUTE-SBN638**



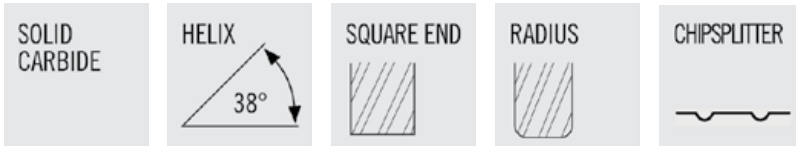
- Eccentric O.D. relief creating a stronger cutting edge
- Variable indexing to reduce harmonics providing smoother cutting and improved surface finish
- Designed for peripheral roughing and finishing for stainless steel, titanium, and high temperature alloys
- Excellent in high speed milling and optimized roughing techniques
- High performance with minimal deflection

- Cutting Data - Page 53-57
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	SHANK TYPE
N15387	SBN638-0.250-E1-B.0-Z6	1/4	1/4	1/4	2	.240	3/4	6	ALTIN	CYLINDRICAL
N15393	SBN638-0.313-E1-B.0-Z6	5/16	5/16	5/16	2-1/2	.300	1	6	ALTIN	CYLINDRICAL
N15396	SBN638-0.375-E1-B.0-Z6	3/8	3/8	3/8	2-1/2	.360	1-1/4	6	ALTIN	CYLINDRICAL
N15405	SBN638-0.500-E1-B.0-Z6	1/2	1/2	1/2	3	.480	1-1/2	6	ALTIN	CYLINDRICAL
N15417	SBN638-0.625-E1-B.0-Z6	5/8	5/8	5/8	4	.600	1-7/8	6	ALTIN	CYLINDRICAL
N15429	SBN638-0.750-E1-B.0-Z6	3/4	3/4	3/4	5	.720	2-1/4	6	ALTIN	CYLINDRICAL
N15440	SBN638-1.000-E1-B.0-Z6	1	1	1	6	.960	3	6	ALTIN	CYLINDRICAL

DISCOUNT CODE D43

**MULTI FLUTE-SCS638 & SCS638R**

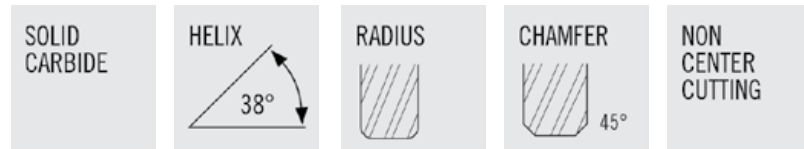


- Eccentric O.D. relief creating a stronger cutting edge
- Variable indexing to reduce harmonics providing smoother cutting and improved surface finish
- Designed for peripheral roughing and finishing for stainless steel, titanium, and high temperature alloys
- Excellent in high speed milling and optimized roughing techniques
- Designed for increased radial depths as compared to the SCS738 and SCS938
- High performance with minimal deflection
- Advanced chip splitter design for increased chip control and management

- Cutting Data - Page 58
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N15400	SCS638-0.375-D3-S.0-Z6	3/8	3/8	1-1/4	3	6	ALTIN	-	CYLINDRICAL
N15401	SCS638R-0.375-D3-R015.0-Z6	3/8	3/8	1-1/4	3	6	ALTIN	0.015	CYLINDRICAL
N15402	SCS638R-0.375-D3-R030.0-Z6	3/8	3/8	1-1/4	3	6	ALTIN	0.030	CYLINDRICAL
N15410	SCS638-0.500-D3-S.0-Z6	1/2	1/2	1-5/8	4	6	ALTIN	-	CYLINDRICAL
N15411	SCS638R-0.500-D3-R015.0-Z6	1/2	1/2	1-5/8	4	6	ALTIN	0.015	CYLINDRICAL
N15412	SCS638R-0.500-D3-R030.0-Z6	1/2	1/2	1-5/8	4	6	ALTIN	0.030	CYLINDRICAL
N15413	SCS638R-0.500-D3-R060.0-Z6	1/2	1/2	1-5/8	4	6	ALTIN	0.060	CYLINDRICAL
N15414	SCS638R-0.500-D3-R120.0-Z6	1/2	1/2	1-5/8	4	6	ALTIN	0.120	CYLINDRICAL
N15422	SCS638-0.625-D3-S.0-Z6	5/8	5/8	2	4	6	ALTIN	-	CYLINDRICAL
N15423	SCS638R-0.625-D3-R015.0-Z6	5/8	5/8	2	4	6	ALTIN	0.015	CYLINDRICAL
N15424	SCS638R-0.625-D3-R030.0-Z6	5/8	5/8	2	4	6	ALTIN	0.030	CYLINDRICAL
N15425	SCS638R-0.625-D3-R060.0-Z6	5/8	5/8	2	4	6	ALTIN	0.060	CYLINDRICAL
N15426	SCS638R-0.625-D3-R120.0-Z6	5/8	5/8	2	4	6	ALTIN	0.120	CYLINDRICAL
N15434	SCS638-0.750-D3-S.0-Z6	3/4	3/4	2-1/2	5	6	ALTIN	-	CYLINDRICAL
N15435	SCS638R-0.750-D3-R030.0-Z6	3/4	3/4	2-1/2	5	6	ALTIN	0.030	CYLINDRICAL
N15436	SCS638R-0.750-D3-R060.0-Z6	3/4	3/4	2-1/2	5	6	ALTIN	0.060	CYLINDRICAL
N15437	SCS638R-0.750-D3-R120.0-Z6	3/4	3/4	2-1/2	5	6	ALTIN	0.120	CYLINDRICAL
N15446	SCS638R-1.000-D3-R030.0-Z6	1	1	3-1/8	6	6	ALTIN	0.030	CYLINDRICAL
N15447	SCS638R-1.000-D3-R120.0-Z6	1	1	3-1/8	6	6	ALTIN	0.120	CYLINDRICAL
N15448	SCS638R-1.000-D3-R250.0-Z6	1	1	3-1/8	6	6	ALTIN	0.250	CYLINDRICAL

# MULTI FLUTE-S738 & S738R



- Eccentric O.D. relief creating a stronger cutting edge
- Variable indexing to reduce harmonics providing smoother cutting and improved surface finish
- Designed for peripheral roughing and finishing for stainless steel, titanium, and high temperature alloys
- Excellent in high speed milling and optimized roughing techniques
- High performance with minimal deflection
- Cutting Data - Page 59-60
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	CHAMFER	SHANK TYPE
N58244	S738-0.250-D2-C003.0-Z7	1/4	1/4	3/8	2	7	ALTIN	-	0.003	CYLINDRICAL
N58245	S738R-0.250-D2-R015.0-Z7	1/4	1/4	3/8	2	7	ALTIN	0.015	-	CYLINDRICAL
N58246	S738R-0.250-D2-R030.0-Z7	1/4	1/4	3/8	2	7	ALTIN	0.030	-	CYLINDRICAL
N58247	S738-0.250-D3-C003.0-Z7	1/4	1/4	3/4	2-1/2	7	ALTIN	-	0.003	CYLINDRICAL
N58248	S738R-0.250-D3-R015.0-Z7	1/4	1/4	3/4	2-1/2	7	ALTIN	0.015	-	CYLINDRICAL
N58249	S738R-0.250-D3-R030.0-Z7	1/4	1/4	3/4	2-1/2	7	ALTIN	0.030	-	CYLINDRICAL
N58250	S738-0.250-D5-C003.0-Z7	1/4	1/4	1-1/4	3	7	ALTIN	-	0.003	CYLINDRICAL
N58251	S738R-0.250-D5-R015.0-Z7	1/4	1/4	1-1/4	3	7	ALTIN	0.015	-	CYLINDRICAL
N58252	S738R-0.250-D5-R030.0-Z7	1/4	1/4	1-1/4	3	7	ALTIN	0.030	-	CYLINDRICAL
N58253	S738-0.375-D1-C005.0-Z7	3/8	3/8	1/2	2-1/2	7	ALTIN	-	0.005	CYLINDRICAL
N58254	S738R-0.375-D1-R015.0-Z7	3/8	3/8	1/2	2-1/2	7	ALTIN	0.015	-	CYLINDRICAL
N58255	S738R-0.375-D1-R030.0-Z7	3/8	3/8	1/2	2-1/2	7	ALTIN	0.030	-	CYLINDRICAL
N58256	S738-0.375-D3-C005.0-Z7	3/8	3/8	1	3	7	ALTIN	-	0.005	CYLINDRICAL
N58257	S738R-0.375-D3-R015.0-Z7	3/8	3/8	1	3	7	ALTIN	0.015	-	CYLINDRICAL
N58258	S738R-0.375-D3-R030.0-Z7	3/8	3/8	1	3	7	ALTIN	0.030	-	CYLINDRICAL
N58259	S738-0.375-D4-C005.0-Z7	3/8	3/8	1-1/2	3-1/2	7	ALTIN	-	0.005	CYLINDRICAL
N58260	S738R-0.375-D4-R015.0-Z7	3/8	3/8	1-1/2	3-1/2	7	ALTIN	0.015	-	CYLINDRICAL
N58261	S738R-0.375-D4-R030.0-Z7	3/8	3/8	1-1/2	3-1/2	7	ALTIN	0.030	-	CYLINDRICAL
N58262	S738-0.500-D2-C006.0-Z7	1/2	1/2	3/4	3	7	ALTIN	-	0.006	CYLINDRICAL
N58263	S738R-0.500-D2-R015.0-Z7	1/2	1/2	3/4	3	7	ALTIN	0.015	-	CYLINDRICAL
N58264	S738R-0.500-D2-R030.0-Z7	1/2	1/2	3/4	3	7	ALTIN	0.030	-	CYLINDRICAL
N58265	S738R-0.500-D2-R060.0-Z7	1/2	1/2	3/4	3	7	ALTIN	0.060	-	CYLINDRICAL
N58266	S738-0.500-D3-C006.0-Z7	1/2	1/2	1-1/4	3	7	ALTIN	-	0.006	CYLINDRICAL
N58267	S738R-0.500-D3-R015.0-Z7	1/2	1/2	1-1/4	3	7	ALTIN	0.015	-	CYLINDRICAL
N58268	S738R-0.500-D3-R030.0-Z7	1/2	1/2	1-1/4	3	7	ALTIN	0.030	-	CYLINDRICAL
N58269	S738R-0.500-D3-R060.0-Z7	1/2	1/2	1-1/4	3	7	ALTIN	0.060	-	CYLINDRICAL
N58270	S738-0.500-D4-C006.0-Z7	1/2	1/2	2	4	7	ALTIN	-	0.006	CYLINDRICAL
N58271	S738R-0.500-D4-R015.0-Z7	1/2	1/2	2	4	7	ALTIN	0.015	-	CYLINDRICAL
N58272	S738R-0.500-D4-R030.0-Z7	1/2	1/2	2	4	7	ALTIN	0.030	-	CYLINDRICAL
N58273	S738R-0.500-D4-R060.0-Z7	1/2	1/2	2	4	7	ALTIN	0.060	-	CYLINDRICAL

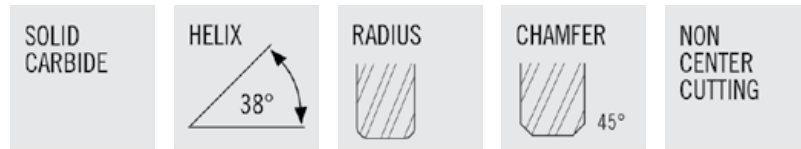
**MULTI FLUTE-SCS738R**



- Eccentric O.D. relief creating a stronger cutting edge
- Variable indexing to reduce harmonics providing smoother cutting and improved surface finish
- Designed for peripheral roughing and finishing for stainless steel, titanium, and high temperature alloys
- Excellent in high speed milling and optimized roughing techniques
- High performance with minimal deflection
- Advanced chip splitter design for increased chip control and management
- Cutting Data - Page 61
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N15449	SCS738R-0.250-D3-R015.0-Z7	1/4	1/4	3/4	2-1/2	7	ALTIN	0.015	CYLINDRICAL
N15450	SCS738R-0.250-D5-R015.0-Z7	1/4	1/4	1-1/4	3	7	ALTIN	0.015	CYLINDRICAL
N15451	SCS738R-0.375-D3-R015.0-Z7	3/8	3/8	1	3	7	ALTIN	0.015	CYLINDRICAL
N15452	SCS738R-0.375-D4-R015.0-Z7	3/8	3/8	1-1/2	3-1/2	7	ALTIN	0.015	CYLINDRICAL
N15453	SCS738R-0.500-D3-R030.0-Z7	1/2	1/2	1-1/4	3	7	ALTIN	0.030	CYLINDRICAL
N15454	SCS738R-0.500-D4-R030.0-Z7	1/2	1/2	2	4	7	ALTIN	0.030	CYLINDRICAL

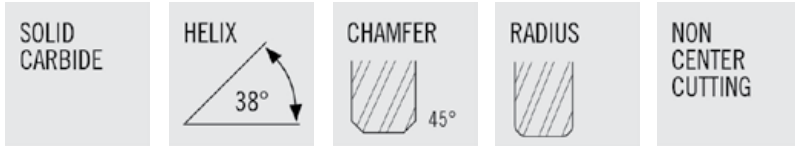
## MULTI FLUTE-S938 & S938R



- Eccentric O.D. relief creating a stronger cutting edge
- Variable indexing to reduce harmonics providing smoother cutting and improved surface finish
- Designed for peripheral roughing and finishing for stainless steel, titanium, and high temperature alloys
- Excellent in high speed milling and optimized roughing techniques
- High performance with minimal deflection
- Cutting Data - Page 59-60
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	CHAMFER	SHANK TYPE
N58274	S938-0.625-D1-C008.0-Z9	5/8	5/8	3/4	3	9	ALTIN	-	0.008	CYLINDRICAL
N58275	S938R-0.625-D1-R030.0-Z9	5/8	5/8	3/4	3	9	ALTIN	0.030	-	CYLINDRICAL
N58276	S938R-0.625-D1-R060.0-Z9	5/8	5/8	3/4	3	9	ALTIN	0.060	-	CYLINDRICAL
N58277	S938R-0.625-D1-R090.0-Z9	5/8	5/8	3/4	3	9	ALTIN	0.090	-	CYLINDRICAL
N58278	S938R-0.625-D1-R120.0-Z9	5/8	5/8	3/4	3	9	ALTIN	0.120	-	CYLINDRICAL
N58279	S938-0.625-D3-C008.0-Z9	5/8	5/8	1-5/8	4	9	ALTIN	-	0.008	CYLINDRICAL
N58280	S938R-0.625-D3-R030.0-Z9	5/8	5/8	1-5/8	4	9	ALTIN	0.030	-	CYLINDRICAL
N58281	S938R-0.625-D3-R060.0-Z9	5/8	5/8	1-5/8	4	9	ALTIN	0.060	-	CYLINDRICAL
N58282	S938R-0.625-D3-R090.0-Z9	5/8	5/8	1-5/8	4	9	ALTIN	0.090	-	CYLINDRICAL
N58283	S938R-0.625-D3-R120.0-Z9	5/8	5/8	1-5/8	4	9	ALTIN	0.120	-	CYLINDRICAL
N58284	S938-0.625-D4-C008.0-Z9	5/8	5/8	2-1/2	5	9	ALTIN	-	0.008	CYLINDRICAL
N58285	S938R-0.625-D4-R030.0-Z9	5/8	5/8	2-1/2	5	9	ALTIN	0.030	-	CYLINDRICAL
N58286	S938R-0.625-D4-R060.0-Z9	5/8	5/8	2-1/2	5	9	ALTIN	0.060	-	CYLINDRICAL
N58287	S938R-0.625-D4-R090.0-Z9	5/8	5/8	2-1/2	5	9	ALTIN	0.090	-	CYLINDRICAL
N58288	S938R-0.625-D4-R120.0-Z9	5/8	5/8	2-1/2	5	9	ALTIN	0.120	-	CYLINDRICAL
N58289	S938-0.750-D2-C010.0-Z9	3/4	3/4	1-5/8	4	9	ALTIN	-	0.010	CYLINDRICAL
N58290	S938R-0.750-D2-R030.0-Z9	3/4	3/4	1-5/8	4	9	ALTIN	0.030	-	CYLINDRICAL
N58291	S938R-0.750-D2-R060.0-Z9	3/4	3/4	1-5/8	4	9	ALTIN	0.060	-	CYLINDRICAL
N58292	S938R-0.750-D2-R090.0-Z9	3/4	3/4	1-5/8	4	9	ALTIN	0.090	-	CYLINDRICAL
N58293	S938R-0.750-D2-R120.0-Z9	3/4	3/4	1-5/8	4	9	ALTIN	0.120	-	CYLINDRICAL
N58294	S938-0.750-D3-C010.0-Z9	3/4	3/4	2-1/4	5	9	ALTIN	-	0.010	CYLINDRICAL
N58295	S938R-0.750-D3-R030.0-Z9	3/4	3/4	2-1/4	5	9	ALTIN	0.030	-	CYLINDRICAL
N58296	S938R-0.750-D3-R060.0-Z9	3/4	3/4	2-1/4	5	9	ALTIN	0.060	-	CYLINDRICAL
N58297	S938R-0.750-D3-R090.0-Z9	3/4	3/4	2-1/4	5	9	ALTIN	0.090	-	CYLINDRICAL
N58298	S938R-0.750-D3-R120.0-Z9	3/4	3/4	2-1/4	5	9	ALTIN	0.120	-	CYLINDRICAL
N58299	S938-0.750-D4-C010.0-Z9	3/4	3/4	3-1/4	6	9	ALTIN	-	0.010	CYLINDRICAL
N58300	S938R-0.750-D4-R030.0-Z9	3/4	3/4	3-1/4	6	9	ALTIN	0.030	-	CYLINDRICAL
N58301	S938R-0.750-D4-R060.0-Z9	3/4	3/4	3-1/4	6	9	ALTIN	0.060	-	CYLINDRICAL
N58302	S938R-0.750-D4-R090.0-Z9	3/4	3/4	3-1/4	6	9	ALTIN	0.090	-	CYLINDRICAL
N58303	S938R-0.750-D4-R120.0-Z9	3/4	3/4	3-1/4	6	9	ALTIN	0.120	-	CYLINDRICAL
N58304	S938-1.000-D2-C012.0-Z9	1	1	2	5	9	ALTIN	-	0.012	CYLINDRICAL
N58305	S938R-1.000-D2-R030.0-Z9	1	1	2	5	9	ALTIN	0.030	-	CYLINDRICAL
N58306	S938R-1.000-D2-R060.0-Z9	1	1	2	5	9	ALTIN	0.060	-	CYLINDRICAL

## MULTI FLUTE-S938 & S938R (CONT'D)



- Eccentric O.D. relief creating a stronger cutting edge
- Variable indexing to reduce harmonics providing smoother cutting and improved surface finish
- Designed for peripheral roughing and finishing for stainless steel, titanium, and high temperature alloys
- Excellent in high speed milling and optimized roughing techniques
- High performance with minimal deflection
- Cutting Data - Page 59-60
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	CHAMFER	SHANK TYPE
N58307	S938R-1.000-D2-R090.0-Z9	1	1	2	5	9	ALTIN	0.090	-	CYLINDRICAL
N58308	S938R-1.000-D2-R120.0-Z9	1	1	2	5	9	ALTIN	0.120	-	CYLINDRICAL
N58309	S938-1.000-D3-C012.0-Z9	1	1	3-1/4	6	9	ALTIN	-	0.012	CYLINDRICAL
N58310	S938R-1.000-D3-R030.0-Z9	1	1	3-1/4	6	9	ALTIN	0.030	-	CYLINDRICAL
N58311	S938R-1.000-D3-R060.0-Z9	1	1	3-1/4	6	9	ALTIN	0.060	-	CYLINDRICAL
N58312	S938R-1.000-D3-R090.0-Z9	1	1	3-1/4	6	9	ALTIN	0.090	-	CYLINDRICAL
N58313	S938R-1.000-D3-R120.0-Z9	1	1	3-1/4	6	9	ALTIN	0.120	-	CYLINDRICAL
N58314	S938-1.000-D4-C012.0-Z9	1	1	4-1/8	7	9	ALTIN	-	0.012	CYLINDRICAL
N58315	S938R-1.000-D4-R030.0-Z9	1	1	4-1/8	7	9	ALTIN	0.030	-	CYLINDRICAL
N58316	S938R-1.000-D4-R060.0-Z9	1	1	4-1/8	7	9	ALTIN	0.060	-	CYLINDRICAL
N58317	S938R-1.000-D4-R090.0-Z9	1	1	4-1/8	7	9	ALTIN	0.090	-	CYLINDRICAL
N58318	S938R-1.000-D4-R120.0-Z9	1	1	4-1/8	7	9	ALTIN	0.120	-	CYLINDRICAL

## MULTI FLUTE-SCS938R



- Eccentric O.D. relief creating a stronger cutting edge
- Variable indexing to reduce harmonics providing smoother cutting and improved surface finish
- Designed for peripheral roughing and finishing for stainless steel, titanium, and high temperature alloys
- Excellent in high speed milling and optimized roughing techniques
- High performance with minimal deflection
- Advanced chip splitter design for increased chip control and management
- Cutting Data - Page 61
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N15455	SCS938R-0.625-D3-R030.0-Z9	5/8	5/8	1-5/8	4	9	ALTIN	0.030	CYLINDRICAL
N15456	SCS938R-0.625-D4-R030.0-Z9	5/8	5/8	2-1/2	5	9	ALTIN	0.030	CYLINDRICAL
N15457	SCS938R-0.750-D3-R030.0-Z9	3/4	3/4	2-1/4	5	9	ALTIN	0.030	CYLINDRICAL
N15458	SCS938R-0.750-D4-R030.0-Z9	3/4	3/4	3-1/4	6	9	ALTIN	0.030	CYLINDRICAL
N15459	SCS938R-1.000-D3-R030.0-Z9	1	1	3-1/4	6	9	ALTIN	0.030	CYLINDRICAL
N15460	SCS938R-1.000-D4-R030.0-Z9	1	1	4-1/8	7	9	ALTIN	0.030	CYLINDRICAL

DISCOUNT CODE D43

## S638 / S638R / SB638 / SBN638 - START VALUES

SIDE MILLING - ROUGHING														
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	V <sub>C</sub> (sf / min)		Z <sub>n</sub> = 6								
						1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
P	E 1 - 2	2.00	0.12	700	n [min-1]	21392	14261	10696	8557	7131	5348	4278	3565	2674
						fz [in]	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040	0.0050	0.0060
				525	-	875	vf [in/min]	128	128	128	128	128	128	128
	E 3 - 4	2.00	0.12	645	n [min-1]	19711	13141	9856	7884	6570	4928	3942	3285	2464
						fz [in]	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040	0.0050	0.0060
				484	-	806	vf [in/min]	118	118	118	118	118	118	118
	E 5 - 6	2.00	0.10	525	n [min-1]	16044	10696	8022	6418	5348	4011	3209	2674	2006
						fz [in]	0.0008	0.0012	0.0016	0.0020	0.0024	0.0033	0.0041	0.0049
				394	-	656	vf [in/min]	78	78	78	78	78	78	78
M	E 8 - 9	2.00	0.12	600	n [min-1]	18336	12224	9168	7334	6112	4584	3667	3056	2292
						fz [in]	0.0009	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056
	450	-	750	vf [in/min]	103	103	103	103	103	103	103	103	103	
	E 10 - 11	2.00	0.10	565	n [min-1]	17266	11511	8633	6907	5755	4317	3453	2878	2158
fz [in]						0.0008	0.0012	0.0016	0.0020	0.0024	0.0033	0.0041	0.0049	0.0065
K	E 12 - 13	2.00	0.10	495	n [min-1]	15127	10085	7564	6051	5042	3782	3025	2521	1891
						fz [in]	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053
				371	-	619	vf [in/min]	79	79	79	79	79	79	79
	E 14 - 15	2.00	0.10	430	n [min-1]	13141	8761	6570	5256	4380	3285	2628	2190	1643
						fz [in]	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038
				323	-	538	vf [in/min]	49	49	49	49	49	49	49
S	E 19	2.00	0.07	150	n [min-1]	4584	3056	2292	1834	1528	1146	917	764	573
						fz [in]	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038
				113	-	188	vf [in/min]	17	17	17	17	17	17	17
	E 20	2.00	0.06	120	n [min-1]	3667	2445	1834	1467	1222	917	733	611	458
						fz [in]	0.0006	0.0008	0.0011	0.0014	0.0017	0.0023	0.0028	0.0034
				90	-	150	vf [in/min]	12	12	12	12	12	12	12
	E 21	2.00	0.06	100	n [min-1]	3056	2037	1528	1222	1019	764	611	509	382
						fz [in]	0.0006	0.0008	0.0011	0.0014	0.0017	0.0023	0.0028	0.0034
E 22	2.00	0.10	270	n [min-1]	8251	5501	4126	3300	2750	2063	1650	1375	1031	
					fz [in]	0.0008	0.0012	0.0016	0.0020	0.0024	0.0033	0.0041	0.0049	0.0065
			203	-	338	vf [in/min]	40	40	40	40	40	40	40	40

**NOTE: Optimized roughing is an excellent strategy for achieving quality parts and extending tool life, but requires use of the right equipment and cutting parameters. If you are having problems implementing the approach or want to learn more about how to use the strategy to process a part, contact the Technical Support Team at 1-800-TEC-TEAM (1-800-832-8326).**

SMG = Seco Material Group  
 n [min-1] = RPM  
 V<sub>C</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## SN638 / SN638R - START VALUES

SIDE MILLING - ROUGHING												
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 6					
							3/8	1/2	5/8	3/4	1	
P	E 1 - 2	2.00	0.08	700			n [min-1]	7131	5348	4278	3565	2674
							fz [in]	0.0030	0.0040	0.0050	0.0060	0.0080
				525 - 875			vf [in/min]	128	128	128	128	128
	E 3 - 4	2.00	0.08	645			n [min-1]	6570	4928	3942	3285	2464
							fz [in]	0.0030	0.0040	0.0050	0.0060	0.0080
				484 - 806			vf [in/min]	118	118	118	118	118
	E 5 - 6	2.00	0.07	525			n [min-1]	5348	4011	3209	2674	2006
							fz [in]	0.0024	0.0033	0.0041	0.0049	0.0065
				394 - 656			vf [in/min]	78	78	78	78	78
M	E 8 - 9	2.00	0.08	600			n [min-1]	6112	4584	3667	3056	2292
							fz [in]	0.0028	0.0038	0.0047	0.0056	0.0075
	E 10 - 11	2.00	0.07	565			n [min-1]	5755	4317	3453	2878	2158
							fz [in]	0.0024	0.0033	0.0041	0.0049	0.0065
424 - 706			vf [in/min]	84	84	84	84	84				
K	E 12 - 13	2.00	0.07	495			n [min-1]	5042	3782	3025	2521	1891
							fz [in]	0.0026	0.0035	0.0044	0.0053	0.0070
	371 - 619			vf [in/min]	79	79	79	79	79			
	E 14 - 15	2.00	0.07	430			n [min-1]	4380	3285	2628	2190	1643
fz [in]							0.0019	0.0025	0.0031	0.0038	0.0050	
323 - 538			vf [in/min]	49	49	49	49	49				
S	E 19	2.00	0.05	150			n [min-1]	1528	1146	917	764	573
							fz [in]	0.0019	0.0025	0.0031	0.0038	0.0050
	113 - 188			vf [in/min]	17	17	17	17	17			
	E 20	2.00	0.04	120			n [min-1]	1222	917	733	611	458
							fz [in]	0.0017	0.0023	0.0029	0.0035	0.0046
	90 - 150			vf [in/min]	13	13	13	13	13			
	E 21	2.00	0.04	100			n [min-1]	1019	764	611	509	382
							fz [in]	0.0017	0.0023	0.0029	0.0035	0.0046
75 - 125			vf [in/min]	11	11	11	11	11				
E 22	2.00	0.07	270			n [min-1]	2750	2063	1650	1375	1031	
						fz [in]	0.0024	0.0033	0.0041	0.0049	0.0065	
203 - 338			vf [in/min]	40	40	40	40	40				

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## S638 / S638R / SN638 / SN638R / SB638 / SBN638 - START VALUES

SIDE MILLING - FINISHING																
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 6									
							1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	
P	E 1 - 2	2.00	0.02	805			n [min-1]	24601	16401	12300	9840	8200	6150	4920	4100	3075
							fz [in]	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
				604 - 1006			vf [in/min]	92	92	92	92	92	92	92	92	92
	E 3 - 4	2.00	0.02	742			n [min-1]	22676	15117	11338	9070	7559	5669	4535	3779	2834
							fz [in]	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
				557 - 928			vf [in/min]	85	85	85	85	85	85	85	85	85
	E 5 - 6	2.00	0.02	604			n [min-1]	18458	12305	9229	7383	6153	4615	3692	3076	2307
							fz [in]	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
				453 - 755			vf [in/min]	69	69	69	69	69	69	69	69	69
M	E 8 - 9	2.00	0.02	690			n [min-1]	21086	14058	10543	8435	7029	5272	4217	3514	2636
							fz [in]	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
				518 - 863			vf [in/min]	79	79	79	79	79	79	79	79	79
	E 10 - 11	2.00	0.02	650			n [min-1]	19864	13243	9932	7946	6621	4966	3973	3311	2483
							fz [in]	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
				488 - 813			vf [in/min]	74	74	74	74	74	74	74	74	74
K	E 12 - 13	2.00	0.02	569			n [min-1]	17389	11592	8694	6955	5796	4347	3478	2898	2174
							fz [in]	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
				427 - 711			vf [in/min]	65	65	65	65	65	65	65	65	65
	E 14 - 15	2.00	0.02	495			n [min-1]	15127	10085	7564	6051	5042	3782	3025	2521	1891
							fz [in]	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020	0.0025	0.0030	0.0040
				371 - 619			vf [in/min]	45	45	45	45	45	45	45	45	45
S	E 19	2.00	0.02	173			n [min-1]	5287	3525	2643	2115	1762	1322	1057	881	661
							fz [in]	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020	0.0025	0.0030	0.0040
				130 - 216			vf [in/min]	16	16	16	16	16	16	16	16	16
	E 20	2.00	0.02	138			n [min-1]	4217	2812	2109	1687	1406	1054	843	703	527
							fz [in]	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020	0.0025	0.0030	0.0040
				104 - 173			vf [in/min]	13	13	13	13	13	13	13	13	13
	E 21	2.00	0.02	115			n [min-1]	3514	2343	1757	1406	1171	879	703	586	439
							fz [in]	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020	0.0025	0.0030	0.0040
				86 - 144			vf [in/min]	11	11	11	11	11	11	11	11	11
	E 22	2.00	0.02	311			n [min-1]	9504	6336	4752	3802	3168	2376	1901	1584	1188
							fz [in]	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
				233 - 389			vf [in/min]	36	36	36	36	36	36	36	36	36

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## SB638 / SBN638 - START VALUES

### COPY MILLING - ROUGHING

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 6							
						1/4	5/16	3/8	1/2	5/8	3/4	1	
P	E 1 - 2	0.05	0.05	950		n [min-1]	14516	11613	9677	7258	5806	4839	3629
						fz [in]	0.0033	0.0041	0.0049	0.0065	0.0081	0.0098	0.0130
				713 - 1188	vf [in/min]	283	283	283	283	283	283	283	
	E 3 - 4	0.05	0.05	820		n [min-1]	12530	10024	8353	6265	5012	4177	3132
						fz [in]	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120
				615 - 1025	vf [in/min]	226	226	226	226	226	226	226	
	E 5 - 6	0.04	0.04	705		n [min-1]	10772	8618	7182	5386	4309	3591	2693
						fz [in]	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120
				529 - 881	vf [in/min]	194	194	194	194	194	194	194	
M	E 8 - 9	0.05	0.05	360		n [min-1]	5501	4401	3667	2750	2200	1834	1375
						fz [in]	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120
				270 - 450	vf [in/min]	99	99	99	99	99	99	99	
	E 10 - 11	0.04	0.04	230		n [min-1]	3514	2812	2343	1757	1406	1171	879
						fz [in]	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120
				173 - 288	vf [in/min]	63	63	63	63	63	63	63	
K	E 12 - 13	0.05	0.05	900		n [min-1]	13752	11002	9168	6876	5501	4584	3438
						fz [in]	0.0028	0.0034	0.0041	0.0055	0.0069	0.0083	0.0110
				675 - 1125	vf [in/min]	227	227	227	227	227	227	227	
	E 14 - 15	0.05	0.05	740		n [min-1]	11307	9046	7538	5654	4523	3769	2827
						fz [in]	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100
				555 - 925	vf [in/min]	170	170	170	170	170	170	170	
S	E 19	0.045	0.045	295		n [min-1]	4508	3606	3005	2254	1803	1503	1127
						fz [in]	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100
				221 - 369	vf [in/min]	68	68	68	68	68	68	68	
	E 20	0.04	0.04	295		n [min-1]	4508	3606	3005	2254	1803	1503	1127
						fz [in]	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100
				221 - 369	vf [in/min]	68	68	68	68	68	68	68	
	E 21	0.035	0.035	145		n [min-1]	2216	1772	1477	1108	886	739	554
						fz [in]	0.0020	0.0025	0.0030	0.0040	0.0050	0.0060	0.0080
				109 - 181	vf [in/min]	27	27	27	27	27	27	27	
	E 22	0.05	0.05	295		n [min-1]	4508	3606	3005	2254	1803	1503	1127
fz [in]						0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	
221 - 369				vf [in/min]	68	68	68	68	68	68	68		

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## SB638 / SBN638 - START VALUES

COPY MILLING - FINISHING														
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 6							
							1/4	5/16	3/8	1/2	5/8	3/4	1	
P	E 1 - 2	0.02	0.02	1045			n [min-1]	15968	12774	10645	7984	6387	5323	3992
							fz [in]	0.0026	0.0033	0.0039	0.0052	0.0065	0.0078	0.0104
				784	-	1306	vf [in/min]	249	249	249	249	249	249	249
	E 3 - 4	0.02	0.02	900			n [min-1]	13752	11002	9168	6876	5501	4584	3438
							fz [in]	0.0024	0.0030	0.0036	0.0048	0.0060	0.0072	0.0096
				675	-	1125	vf [in/min]	198	198	198	198	198	198	198
	E 5 - 6	0.02	0.02	775			n [min-1]	11842	9474	7895	5921	4737	3947	2961
							fz [in]	0.0024	0.0030	0.0036	0.0048	0.0060	0.0072	0.0096
				581	-	969	vf [in/min]	171	171	171	171	171	171	171
M	E 8 - 9	0.02	0.02	395			n [min-1]	6036	4828	4024	3018	2414	2012	1509
							fz [in]	0.0024	0.0030	0.0036	0.0048	0.0060	0.0072	0.0096
	296	-	494	vf [in/min]	87	87	87	87	87	87	87	87		
	E 10 - 11	0.02	0.02	250			n [min-1]	3820	3056	2547	1910	1528	1273	955
							fz [in]	0.0024	0.0030	0.0036	0.0048	0.0060	0.0072	0.0096
188	-	313	vf [in/min]	55	55	55	55	55	55	55	55			
K	E 12 - 13	0.02	0.02	990			n [min-1]	15127	12102	10085	7564	6051	5042	3782
							fz [in]	0.0022	0.0028	0.0033	0.0044	0.0055	0.0066	0.0088
	743	-	1238	vf [in/min]	200	200	200	200	200	200	200	200		
	E 14 - 15	0.02	0.02	815			n [min-1]	12453	9963	8302	6227	4981	4151	3113
fz [in]							0.0020	0.0025	0.0030	0.0040	0.0050	0.0060	0.0080	
611	-	1019	vf [in/min]	149	149	149	149	149	149	149	149	149		
S	E 19	0.02	0.02	325			n [min-1]	4966	3973	3311	2483	1986	1655	1242
							fz [in]	0.0020	0.0025	0.0030	0.0040	0.0050	0.0060	0.0080
	244	-	406	vf [in/min]	60	60	60	60	60	60	60	60		
	E 20	0.02	0.02	325			n [min-1]	4966	3973	3311	2483	1986	1655	1242
							fz [in]	0.0020	0.0025	0.0030	0.0040	0.0050	0.0060	0.0080
	244	-	406	vf [in/min]	60	60	60	60	60	60	60	60		
	E 21	0.02	0.02	160			n [min-1]	2445	1956	1630	1222	978	815	611
							fz [in]	0.0016	0.0020	0.0024	0.0032	0.0040	0.0048	0.0064
	120	-	200	vf [in/min]	23	23	23	23	23	23	23	23		
	E 22	0.02	0.02	325			n [min-1]	4966	3973	3311	2483	1986	1655	1242
fz [in]							0.0020	0.0025	0.0030	0.0040	0.0050	0.0060	0.0080	
244	-	406	vf [in/min]	60	60	60	60	60	60	60	60			

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## SCS638 / SCS638R - CHIP SPLITTERS - START VALUES

SIDE MILLING - SEMI ROUGHING											
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 6					
						3/8	1/2	5/8	3/4	1	
P	E 1 - 2	3.00	0.08	700	n [min-1]	7131	5348	4278	3565	2674	
					fz [in]	0.0030	0.0040	0.0050	0.0060	0.0080	
					vf [in/min]	128	128	128	128	128	
	E 3 - 4	3.00	0.08	645	n [min-1]	6570	4928	3942	3285	2464	
					fz [in]	0.0030	0.0040	0.0050	0.0060	0.0080	
					vf [in/min]	118	118	118	118	118	
	E 5 - 6	3.00	0.07	525	n [min-1]	5348	4011	3209	2674	2006	
					fz [in]	0.0024	0.0033	0.0041	0.0049	0.0065	
					vf [in/min]	78	78	78	78	78	
M	E 8 - 9	3.00	0.08	600	n [min-1]	6112	4584	3667	3056	2292	
					fz [in]	0.0028	0.0038	0.0047	0.0056	0.0075	
	E 10 - 11	3.00	0.07	565	n [min-1]	5755	4317	3453	2878	2158	
					fz [in]	0.0024	0.0033	0.0041	0.0049	0.0065	
	K	E 12 - 13	3.00	0.07	495	n [min-1]	5042	3782	3025	2521	1891
						fz [in]	0.0026	0.0035	0.0044	0.0053	0.0070
E 14 - 15		3.00	0.07	430	n [min-1]	4380	3285	2628	2190	1643	
					fz [in]	0.0019	0.0025	0.0031	0.0038	0.0050	
S		E 19	3.00	0.05	150	n [min-1]	1528	1146	917	764	573
						fz [in]	0.0019	0.0025	0.0031	0.0038	0.0050
	E 20	3.00	0.04	120	n [min-1]	1222	917	733	611	458	
					fz [in]	0.0017	0.0023	0.0029	0.0035	0.0046	
	E 21	3.00	0.04	100	n [min-1]	1019	764	611	509	382	
					fz [in]	0.0017	0.0023	0.0029	0.0035	0.0046	
E 22	3.00	0.07	270	n [min-1]	2750	2063	1650	1375	1031		
				fz [in]	0.0024	0.0033	0.0041	0.0049	0.0065		

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## S738 / S738R / S938 / S938R - START VALUES

SIDE MILLING - ROUGHING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Zn=7			Zn=9			
							1/4	3/8	1/2	5/8	3/4	1	
P	E 1 - 2	2.0	0.07	800			n [rev/min]	12224	8149	6112	4890	4075	3056
				600 - 1000			fz [in]	0.0025	0.0038	0.0050	0.0063	0.0075	0.0100
				740			vf [in/min]	214	214	214	275	275	275
	E 3 - 4	2.0	0.07	740			n [rev/min]	11307	7538	5654	4523	3769	2827
				555 - 925			fz [in]	0.0025	0.0038	0.0050	0.0063	0.0075	0.0100
				605			vf [in/min]	198	198	198	254	254	254
	E 5 - 6	2.0	0.06	605			n [rev/min]	9244	6163	4622	3698	3081	2311
				454 - 756			fz [in]	0.0020	0.0030	0.0040	0.0050	0.0060	0.0080
				680			vf [in/min]	129	129	129	166	166	166
M	E 8 - 9	2.0	0.07	680			n [rev/min]	10390	6927	5195	4156	3463	2598
				510 - 850			fz [in]	0.0020	0.0030	0.0040	0.0056	0.0068	0.0090
	E 10 - 11	2.0	0.06	630			n [rev/min]	9626	6418	4813	3851	3209	2407
				473 - 788			fz [in]	0.0018	0.0026	0.0035	0.0050	0.0060	0.0080
K	E 12 - 13	2.0	0.07	550			n [rev/min]	8404	5603	4202	3362	2801	2101
				413 - 688			fz [in]	0.0020	0.0030	0.0040	0.0050	0.0060	0.0080
	E 14 - 15	2.0	0.06	490			n [rev/min]	7487	4991	3744	2995	2496	1872
				368 - 613			fz [in]	0.0018	0.0026	0.0035	0.0044	0.0053	0.0070
S	E 19	2.0	0.04	170			n [rev/min]	2598	1732	1299	1039	866	649
				128 - 213			fz [in]	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060
				135			vf [in/min]	27	27	27	35	35	35
	E 20	2.0	0.04	135			n [rev/min]	2063	1375	1031	825	688	516
				101 - 169			fz [in]	0.0014	0.0021	0.0028	0.0034	0.0041	0.0055
				115			vf [in/min]	20	20	20	26	26	26
	E 21	2.0	0.04	115			n [rev/min]	1757	1171	879	703	586	439
				86 - 144			fz [in]	0.0014	0.0021	0.0028	0.0034	0.0041	0.0055
				310			vf [in/min]	17	17	17	22	22	22
E 22	2.0	0.06	310			n [rev/min]	4737	3158	2368	1895	1579	1184	
			233 - 388			fz [in]	0.0015	0.0023	0.0030	0.0041	0.0049	0.0065	
							vf [in/min]	50	50	50	69	69	69

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## S738 / S738R / S938 / S938R - START VALUES

SIDE MILLING - FINISHING											
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Zn=7			Zn=9		
						1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	2.00	0.02	920	n [min-1]	14058	9372	7029	5623	4686	3514
					fz [in]	0.0013	0.0019	0.0025	0.0031	0.0038	0.0050
				690 - 1150	vf [in/min]	123	123	123	158	158	158
	E 3 - 4	2.00	0.02	851	n [min-1]	13003	8669	6502	5201	4334	3251
					fz [in]	0.0013	0.0019	0.0025	0.0031	0.0038	0.0050
				638 - 1064	vf [in/min]	114	114	114	146	146	146
	E 5 - 6	2.00	0.02	696	n [min-1]	10635	7090	5317	4254	3545	2659
					fz [in]	0.0013	0.0019	0.0025	0.0031	0.0038	0.0050
				522 - 870	vf [in/min]	93	93	93	120	120	120
M	E 8 - 9	2.00	0.02	782	n [min-1]	11949	7966	5974	4780	3983	2987
					fz [in]	0.0013	0.0019	0.0025	0.0031	0.0038	0.0050
	587 - 978	vf [in/min]	105	105	105	134	134	134			
	E 10 - 11	2.00	0.02	725	n [min-1]	11078	7385	5539	4431	3693	2770
fz [in]					0.0013	0.0019	0.0025	0.0031	0.0038	0.0050	
544 - 906	vf [in/min]	97	97	97	125	125	125				
K	E 12 - 13	2.00	0.02	633	n [min-1]	9672	6448	4836	3869	3224	2418
					fz [in]	0.0013	0.0019	0.0025	0.0031	0.0038	0.0050
	475 - 791	vf [in/min]	85	85	85	109	109	109			
	E 14 - 15	2.00	0.02	564	n [min-1]	8618	5745	4309	3447	2873	2154
fz [in]					0.0010	0.0015	0.0020	0.0025	0.0030	0.0040	
423 - 705	vf [in/min]	60	60	60	78	78	78				
S	E 19	2.00	0.02	196	n [min-1]	2995	1997	1497	1198	998	749
					fz [in]	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040
	147 - 245	vf [in/min]	21	21	21	27	27	27			
	E 20	2.00	0.02	155	n [min-1]	2368	1579	1184	947	789	592
					fz [in]	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040
	116 - 194	vf [in/min]	17	17	17	21	21	21			
	E 21	2.00	0.02	132	n [min-1]	2017	1345	1008	807	672	504
					fz [in]	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040
	99 - 165	vf [in/min]	14	14	14	18	18	18			
	E 22	2.00	0.02	357	n [min-1]	5455	3637	2727	2182	1818	1364
fz [in]					0.0013	0.0019	0.0025	0.0031	0.0038	0.0050	
268 - 446	vf [in/min]	48	48	48	61	61	61				

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## SCS738R / SCS938R - CHIP SPLITTERS - START VALUES

SIDE MILLING - SEMI ROUGHING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Zn=7			Zn=9			
							1/4	3/8	1/2	5/8	3/4	1	
P	E 1 - 2	3.00	0.05	800			n [min-1]	12224	8149	6112	4890	4075	3056
							fz [in]	0.0025	0.0038	0.0050	0.0063	0.0075	0.0100
				600 - 1000			vf [in/min]	214	214	214	275	275	275
	E 3 - 4	3.00	0.05	740			n [min-1]	11307	7538	5654	4523	3769	2827
							fz [in]	0.0025	0.0038	0.0050	0.0063	0.0075	0.0100
				555 - 925			vf [in/min]	198	198	198	254	254	254
	E 5 - 6	3.00	0.04	605			n [min-1]	9244	6163	4622	3698	3081	2311
							fz [in]	0.0020	0.0030	0.0040	0.0050	0.0060	0.0080
				454 - 756			vf [in/min]	129	129	129	166	166	166
M	E 8 - 9	3.00	0.05	680			n [min-1]	10390	6927	5195	4156	3463	2598
							fz [in]	0.0020	0.0030	0.0040	0.0056	0.0068	0.0090
	510 - 850			vf [in/min]	145	145	145	210	210	210			
	E 10 - 11	3.00	0.04	630			n [min-1]	9626	6418	4813	3851	3209	2407
fz [in]							0.0018	0.0026	0.0035	0.0050	0.0060	0.0080	
473 - 788			vf [in/min]	118	118	118	173	173	173				
K	E 12 - 13	3.00	0.05	550			n [min-1]	8404	5603	4202	3362	2801	2101
							fz [in]	0.0020	0.0030	0.0040	0.0050	0.0060	0.0080
	413 - 688			vf [in/min]	118	118	118	151	151	151			
	E 14 - 15	3.00	0.04	490			n [min-1]	7487	4991	3744	2995	2496	1872
fz [in]							0.0018	0.0026	0.0035	0.0044	0.0053	0.0070	
368 - 613			vf [in/min]	92	92	92	118	118	118				
S	E 19	3.00	0.03	170			n [min-1]	2598	1732	1299	1039	866	649
							fz [in]	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060
	128 - 213			vf [in/min]	27	27	27	35	35	35			
	E 20	3.00	0.03	135			n [min-1]	2063	1375	1031	825	688	516
							fz [in]	0.0014	0.0021	0.0028	0.0034	0.0041	0.0055
	101 - 169			vf [in/min]	20	20	20	26	26	26			
	E 21	3.00	0.03	115			n [min-1]	1757	1171	879	703	586	439
							fz [in]	0.0014	0.0021	0.0028	0.0034	0.0041	0.0055
	86 - 144			vf [in/min]	17	17	17	22	22	22			
	E 22	3.00	0.04	310			n [min-1]	4737	3158	2368	1895	1579	1184
fz [in]							0.0015	0.0023	0.0030	0.0041	0.0049	0.0065	
233 - 388			vf [in/min]	50	50	50	69	69	69				

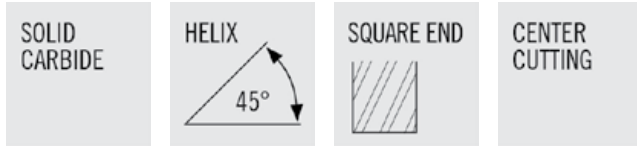
**NOTE: Optimized roughing is an excellent strategy for achieving quality parts and extending tool life, but requires use of the right equipment and cutting parameters. If you are having problems implementing the approach or want to learn more about how to use the strategy to process a part, contact the Technical Support Team at 1-800-TEC-TEAM (1-800-832-8326).**

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## A245

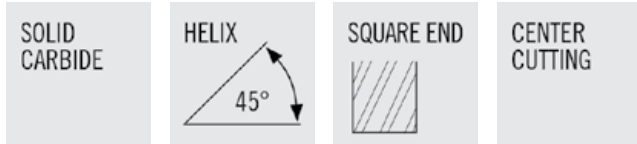


- Cylindrical land to eliminate chatter
- Form ground flute shape
- Eccentric primary relief
- Ideal for slotting in aluminum and non-ferrous materials
- Cutting Data - Page 79
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N61350	A245-0.125-D2-S.0-Z2	1/8	1/8	1/4	1-1/2	2	UNCOATED	CYLINDRICAL
N61442	A245-0.125-D2-S.0-Z2	1/8	1/8	1/4	1-1/2	2	TICN	CYLINDRICAL
N61351	A245-0.125-D3-S.0-Z2	1/8	1/8	3/8	1-1/2	2	UNCOATED	CYLINDRICAL
N61443	A245-0.125-D3-S.0-Z2	1/8	1/8	3/8	1-1/2	2	TICN	CYLINDRICAL
N61352	A245-0.156-F2-S.0-Z2	5/32	3/16	5/16	2	2	UNCOATED	CYLINDRICAL
N61444	A245-0.156-F2-S.0-Z2	5/32	3/16	5/16	2	2	TICN	CYLINDRICAL
N61353	A245-0.156-F3-S.0-Z2	5/32	3/16	1/2	2	2	UNCOATED	CYLINDRICAL
N61445	A245-0.156-F3-S.0-Z2	5/32	3/16	1/2	2	2	TICN	CYLINDRICAL
N61354	A245-0.188-D2-S.0-Z2	3/16	3/16	5/16	2	2	UNCOATED	CYLINDRICAL
N61446	A245-0.188-D2-S.0-Z2	3/16	3/16	5/16	2	2	TICN	CYLINDRICAL
N61355	A245-0.188-D3-S.0-Z2	3/16	3/16	9/16	2	2	UNCOATED	CYLINDRICAL
N61447	A245-0.188-D3-S.0-Z2	3/16	3/16	9/16	2	2	TICN	CYLINDRICAL
N61357	A245-0.219-F3-S.0-Z2	7/32	1/4	3/4	2-1/2	2	UNCOATED	CYLINDRICAL
N61449	A245-0.219-F3-S.0-Z2	7/32	1/4	3/4	2-1/2	2	TICN	CYLINDRICAL
N61358	A245-0.250-D2-S.0-Z2	1/4	1/4	3/8	2-1/2	2	UNCOATED	CYLINDRICAL
N61450	A245-0.250-D2-S.0-Z2	1/4	1/4	3/8	2-1/2	2	TICN	CYLINDRICAL
N61359	A245-0.250-D3-S.0-Z2	1/4	1/4	3/4	2-1/2	2	UNCOATED	CYLINDRICAL
N61451	A245-0.250-D3-S.0-Z2	1/4	1/4	3/4	2-1/2	2	TICN	CYLINDRICAL
N61360	A245-0.250-D5-S.0-Z2	1/4	1/4	1-1/4	4	2	UNCOATED	CYLINDRICAL
N61452	A245-0.250-D5-S.0-Z2	1/4	1/4	1-1/4	4	2	TICN	CYLINDRICAL
N61363	A245-0.313-D1-S.0-Z2	5/16	5/16	7/16	2-1/2	2	UNCOATED	CYLINDRICAL
N61455	A245-0.313-D1-S.0-Z2	5/16	5/16	7/16	2-1/2	2	TICN	CYLINDRICAL
N61364	A245-0.313-D3-S.0-Z2	5/16	5/16	13/16	2-1/2	2	UNCOATED	CYLINDRICAL
N61456	A245-0.313-D3-S.0-Z2	5/16	5/16	13/16	2-1/2	2	TICN	CYLINDRICAL
N61365	A245-0.313-D4-S.0-Z2	5/16	5/16	1-1/4	3-1/2	2	UNCOATED	CYLINDRICAL
N61457	A245-0.313-D4-S.0-Z2	5/16	5/16	1-1/4	3-1/2	2	TICN	CYLINDRICAL
N61369	A245-0.375-D1-S.0-Z2	3/8	3/8	1/2	2-1/2	2	UNCOATED	CYLINDRICAL
N61461	A245-0.375-D1-S.0-Z2	3/8	3/8	1/2	2-1/2	2	TICN	CYLINDRICAL
N61370	A245-0.375-D3-S.0-Z2	3/8	3/8	1	2-1/2	2	UNCOATED	CYLINDRICAL
N61462	A245-0.375-D3-S.0-Z2	3/8	3/8	1	2-1/2	2	TICN	CYLINDRICAL
N61371	A245-0.375-D4-S.0-Z2	3/8	3/8	1-1/2	4	2	UNCOATED	CYLINDRICAL
N61463	A245-0.375-D4-S.0-Z2	3/8	3/8	1-1/2	4	2	TICN	CYLINDRICAL
N61378	A245-0.500-D1-S.0-Z2	1/2	1/2	5/8	3	2	UNCOATED	CYLINDRICAL



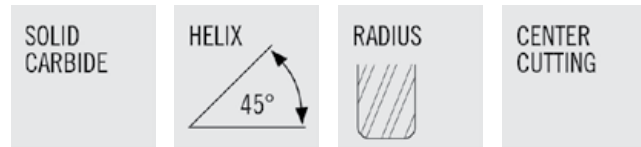
## A245 (CON'T)



- Cylindrical land to eliminate chatter
- Form ground flute shape
- Eccentric primary relief
- Ideal for slotting in aluminum and non-ferrous materials
- Cutting Data - Page 79
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N61470	A245-0.500-D1-S.0-Z2	1/2	1/2	5/8	3	2	TICN	CYLINDRICAL
N61379	A245-0.500-D3-S.0-Z2	1/2	1/2	1-1/4	3	2	UNCOATED	CYLINDRICAL
N61471	A245-0.500-D3-S.0-Z2	1/2	1/2	1-1/4	3	2	TICN	CYLINDRICAL
N61380	A245-0.500-D4-S.0-Z2	1/2	1/2	2	4	2	UNCOATED	CYLINDRICAL
N61472	A245-0.500-D4-S.0-Z2	1/2	1/2	2	4	2	TICN	CYLINDRICAL
N61381	A245-0.500-D6-S.0-Z2	1/2	1/2	3-1/8	6	2	UNCOATED	CYLINDRICAL
N61473	A245-0.500-D6-S.0-Z2	1/2	1/2	3-1/8	6	2	TICN	CYLINDRICAL
N61382	A245-0.625-D1-S.0-Z2	5/8	5/8	3/4	3	2	UNCOATED	CYLINDRICAL
N61474	A245-0.625-D1-S.0-Z2	5/8	5/8	3/4	3	2	TICN	CYLINDRICAL
N61383	A245-0.625-D3-S.0-Z2	5/8	5/8	1-5/8	3-1/2	2	UNCOATED	CYLINDRICAL
N61475	A245-0.625-D3-S.0-Z2	5/8	5/8	1-5/8	3-1/2	2	TICN	CYLINDRICAL
N61384	A245-0.625-D4-S.0-Z2	5/8	5/8	2-1/2	5	2	UNCOATED	CYLINDRICAL
N61476	A245-0.625-D4-S.0-Z2	5/8	5/8	2-1/2	5	2	TICN	CYLINDRICAL
N61385	A245-0.625-D6-S.0-Z2	5/8	5/8	3-3/4	6	2	UNCOATED	CYLINDRICAL
N61477	A245-0.625-D6-S.0-Z2	5/8	5/8	3-3/4	6	2	TICN	CYLINDRICAL
N61386	A245-0.750-D1-S.0-Z2	3/4	3/4	1	3	2	UNCOATED	CYLINDRICAL
N61478	A245-0.750-D1-S.0-Z2	3/4	3/4	1	3	2	TICN	CYLINDRICAL
N61387	A245-0.750-D2-S.0-Z2	3/4	3/4	1-5/8	4	2	UNCOATED	CYLINDRICAL
N61479	A245-0.750-D2-S.0-Z2	3/4	3/4	1-5/8	4	2	TICN	CYLINDRICAL
N61388	A245-0.750-D3-S.0-Z2	3/4	3/4	2-1/4	5	2	UNCOATED	CYLINDRICAL
N61480	A245-0.750-D3-S.0-Z2	3/4	3/4	2-1/4	5	2	TICN	CYLINDRICAL
N61389	A245-0.750-D4-S.0-Z2	3/4	3/4	3-1/4	6	2	UNCOATED	CYLINDRICAL
N61481	A245-0.750-D4-S.0-Z2	3/4	3/4	3-1/4	6	2	TICN	CYLINDRICAL
N61390	A245-0.750-D5-S.0-Z2	3/4	3/4	4	6-1/2	2	UNCOATED	CYLINDRICAL
N61482	A245-0.750-D5-S.0-Z2	3/4	3/4	4	6-1/2	2	TICN	CYLINDRICAL
N61391	A245-1.000-D1-S.0-Z2	1	1	1-1/4	4	2	UNCOATED	CYLINDRICAL
N61483	A245-1.000-D1-S.0-Z2	1	1	1-1/4	4	2	TICN	CYLINDRICAL
N61392	A245-1.000-D2-S.0-Z2	1	1	2	5	2	UNCOATED	CYLINDRICAL
N61484	A245-1.000-D2-S.0-Z2	1	1	2	5	2	TICN	CYLINDRICAL
N61394	A245-1.000-D4-S.0-Z2	1	1	3-1/4	6	2	UNCOATED	CYLINDRICAL
N61486	A245-1.000-D4-S.0-Z2	1	1	3-1/4	6	2	TICN	CYLINDRICAL
N61395	A245-1.000-D5-S.0-Z2	1	1	4-1/8	7	2	UNCOATED	CYLINDRICAL
N61487	A245-1.000-D5-S.0-Z2	1	1	4-1/8	7	2	TICN	CYLINDRICAL

## A245R



- Cylindrical land to eliminate chatter
- Form ground flute shape
- Eccentric primary relief
- Ideal for aluminum and non-ferrous materials
- Cutting Data - Page 79
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N90645	A245R-0.375-D3-R010.0-Z2	3/8	3/8	1	2-1/2	2	TICN	0.010	CYLINDRICAL
N90646	A245R-0.375-D3-R020.0-Z2	3/8	3/8	1	2-1/2	2	TICN	0.020	CYLINDRICAL
N90648	A245R-0.375-D3-R030.0-Z2	3/8	3/8	1	2-1/2	2	TICN	0.030	CYLINDRICAL
N90650	A245R-0.375-D3-R060.0-Z2	3/8	3/8	1	2-1/2	2	TICN	0.060	CYLINDRICAL
N90678	A245R-0.500-D3-R010.0-Z2	1/2	1/2	1-1/4	3	2	TICN	0.010	CYLINDRICAL
N90679	A245R-0.500-D3-R020.0-Z2	1/2	1/2	1-1/4	3	2	TICN	0.020	CYLINDRICAL
N90680	A245R-0.500-D3-R030.0-Z2	1/2	1/2	1-1/4	3	2	TICN	0.030	CYLINDRICAL
N90682	A245R-0.500-D3-R060.0-Z2	1/2	1/2	1-1/4	3	2	TICN	0.060	CYLINDRICAL
N90683	A245R-0.500-D3-R090.0-Z2	1/2	1/2	1-1/4	3	2	TICN	0.090	CYLINDRICAL
N90684	A245R-0.500-D3-R125.0-Z2	1/2	1/2	1-1/4	3	2	TICN	0.125	CYLINDRICAL
N90685	A245R-0.500-D4-R010.0-Z2	1/2	1/2	2	4	2	TICN	0.010	CYLINDRICAL
N90686	A245R-0.500-D4-R020.0-Z2	1/2	1/2	2	4	2	TICN	0.020	CYLINDRICAL
N90687	A245R-0.500-D4-R030.0-Z2	1/2	1/2	2	4	2	TICN	0.030	CYLINDRICAL
N90689	A245R-0.500-D4-R060.0-Z2	1/2	1/2	2	4	2	TICN	0.060	CYLINDRICAL
N90690	A245R-0.500-D4-R090.0-Z2	1/2	1/2	2	4	2	TICN	0.090	CYLINDRICAL
N90691	A245R-0.500-D4-R125.0-Z2	1/2	1/2	2	4	2	TICN	0.125	CYLINDRICAL
N90721	A245R-0.750-D3-R010.0-Z2	3/4	3/4	2-1/4	5	2	TICN	0.010	CYLINDRICAL
N90722	A245R-0.750-D3-R020.0-Z2	3/4	3/4	2-1/4	5	2	TICN	0.020	CYLINDRICAL
N90723	A245R-0.750-D3-R030.0-Z2	3/4	3/4	2-1/4	5	2	TICN	0.030	CYLINDRICAL
N90725	A245R-0.750-D3-R060.0-Z2	3/4	3/4	2-1/4	5	2	TICN	0.060	CYLINDRICAL
N90726	A245R-0.750-D3-R090.0-Z2	3/4	3/4	2-1/4	5	2	TICN	0.090	CYLINDRICAL
N90727	A245R-0.750-D3-R125.0-Z2	3/4	3/4	2-1/4	5	2	TICN	0.125	CYLINDRICAL
N90729	A245R-0.750-D5-R010.0-Z2	3/4	3/4	4	6-1/2	2	TICN	0.010	CYLINDRICAL
N90730	A245R-0.750-D5-R020.0-Z2	3/4	3/4	4	6-1/2	2	TICN	0.020	CYLINDRICAL
N90731	A245R-0.750-D5-R030.0-Z2	3/4	3/4	4	6-1/2	2	TICN	0.030	CYLINDRICAL
N90733	A245R-0.750-D5-R060.0-Z2	3/4	3/4	4	6-1/2	2	TICN	0.060	CYLINDRICAL
N90734	A245R-0.750-D5-R090.0-Z2	3/4	3/4	4	6-1/2	2	TICN	0.090	CYLINDRICAL
N90735	A245R-0.750-D5-R125.0-Z2	3/4	3/4	4	6-1/2	2	TICN	0.125	CYLINDRICAL

## AB245

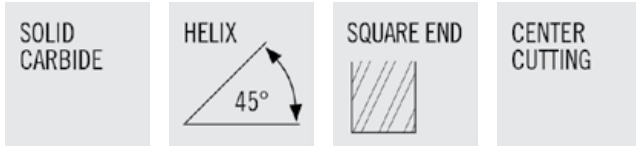
SOLID CARBIDE			CENTER CUTTING
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- Cylindrical land to eliminate chatter
- Form ground flute shape
- Eccentric primary relief
- Ideal for aluminum and non-ferrous materials
- Cutting Data - Page 79
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N66070	AB245-0.250-D2-B.0-Z2	1/4	1/4	3/8	2-1/2	2	UNCOATED	CYLINDRICAL
N66102	AB245-0.250-D2-B.0-Z2	1/4	1/4	3/8	2-1/2	2	TICN	CYLINDRICAL
N66071	AB245-0.250-D3-B.0-Z2	1/4	1/4	3/4	2-1/2	2	UNCOATED	CYLINDRICAL
N66103	AB245-0.250-D3-B.0-Z2	1/4	1/4	3/4	2-1/2	2	TICN	CYLINDRICAL
N66073	AB245-0.313-D3-B.0-Z2	5/16	5/16	13/16	2-1/2	2	UNCOATED	CYLINDRICAL
N66105	AB245-0.313-D3-B.0-Z2	5/16	5/16	13/16	2-1/2	2	TICN	CYLINDRICAL
N66074	AB245-0.375-D1-B.0-Z2	3/8	3/8	1/2	2-1/2	2	UNCOATED	CYLINDRICAL
N66106	AB245-0.375-D1-B.0-Z2	3/8	3/8	1/2	2-1/2	2	TICN	CYLINDRICAL
N66075	AB245-0.375-D3-B.0-Z2	3/8	3/8	1	2-1/2	2	UNCOATED	CYLINDRICAL
N66107	AB245-0.375-D3-B.0-Z2	3/8	3/8	1	2-1/2	2	TICN	CYLINDRICAL
N66078	AB245-0.500-D1-B.0-Z2	1/2	1/2	5/8	3	2	UNCOATED	CYLINDRICAL
N66110	AB245-0.500-D1-B.0-Z2	1/2	1/2	5/8	3	2	TICN	CYLINDRICAL
N66079	AB245-0.500-D3-B.0-Z2	1/2	1/2	1-1/4	3	2	UNCOATED	CYLINDRICAL
N66111	AB245-0.500-D3-B.0-Z2	1/2	1/2	1-1/4	3	2	TICN	CYLINDRICAL
N66083	AB245-0.750-D2-B.0-Z2	3/4	3/4	1-5/8	4	2	UNCOATED	CYLINDRICAL
N66115	AB245-0.750-D2-B.0-Z2	3/4	3/4	1-5/8	4	2	TICN	CYLINDRICAL
N66084	AB245-1.000-D1-B.0-Z2	1	1	1-1/4	4	2	UNCOATED	CYLINDRICAL
N66116	AB245-1.000-D1-B.0-Z2	1	1	1-1/4	4	2	TICN	CYLINDRICAL
N66085	AB245-1.000-D2-B.0-Z2	1	1	2	5	2	UNCOATED	CYLINDRICAL
N66117	AB245-1.000-D2-B.0-Z2	1	1	2	5	2	TICN	CYLINDRICAL

# AN245

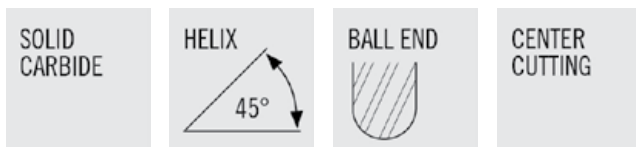


- Cylindrical land to eliminate chatter
- Form ground flute shape
- Eccentric primary relief
- Designed for aluminum and non-ferrous materials

- Cutting Data - Page 79
- Tolerance Specs - Page 335

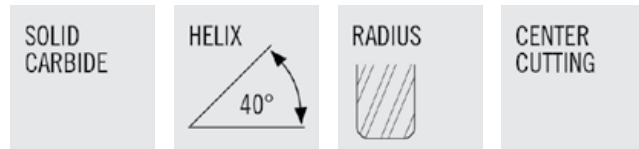
ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	SHANK TYPE
N57993	AN245-0.375-E5-S.0-Z2	3/8	3/8	1/2	4	.360	2-1/8	2	TICN	CYLINDRICAL
N57996	AN245-0.500-E7-S.0-Z2	1/2	1/2	5/8	4	.480	2-1/8	2	TICN	CYLINDRICAL
N57998	AN245-0.500-E8-S.0-Z2	1/2	1/2	5/8	8	.480	6	2	TICN	CYLINDRICAL
N57999	AN245-0.500-E10-S.0-Z2	1/2	1/2	3/4	6	.480	4	2	TICN	CYLINDRICAL
N57997	AN245-0.500-E9-S.0-Z2	1/2	1/2	3/4	6	.480	3-3/8	2	TICN	CYLINDRICAL
N58001	AN245-0.625-E7-S.0-Z2	5/8	5/8	3/4	5	.600	2-3/8	2	TICN	CYLINDRICAL
N58006	AN245-0.750-E9-S.0-Z2	3/4	3/4	1	5	.720	2-1/2	2	TICN	CYLINDRICAL
N58009	AN245-0.750-E11-S.0-Z2	3/4	3/4	1	6	.720	4	2	TICN	CYLINDRICAL
N58010	AN245-0.750-E12-S.0-Z2	3/4	3/4	1	8	.720	6	2	TICN	CYLINDRICAL

# ANB245



ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	SHANK TYPE
N58028	ANB245-0.375-E2-B.0-Z2	3/8	3/8	3/4	4	.360	2-1/8	2	UNCOATED	CYLINDRICAL
N58033	ANB245-0.375-E2-B.0-Z2	3/8	3/8	3/4	4	.360	2-1/8	2	TICN	CYLINDRICAL
N58029	ANB245-0.500-E2-B.0-Z2	1/2	1/2	1	6	.480	4-1/8	2	UNCOATED	CYLINDRICAL
N58034	ANB245-0.500-E2-B.0-Z2	1/2	1/2	1	6	.480	4-1/8	2	TICN	CYLINDRICAL
N58030	ANB245-0.625-E2-B.0-Z2	5/8	5/8	1-1/4	6	.600	4	2	UNCOATED	CYLINDRICAL
N58035	ANB245-0.625-E2-B.0-Z2	5/8	5/8	1-1/4	6	.600	4	2	TICN	CYLINDRICAL

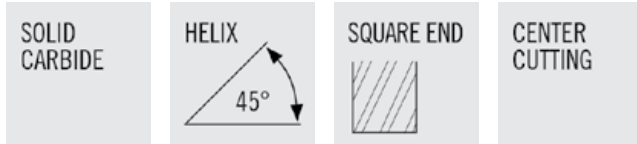
## AN340



- Cylindrical land to eliminate chatter
- Form ground flute shape
- Eccentric primary relief
- Ideal for high volume material removal in aluminum and non-ferrous materials
- With corner radius for strength
- Wiper flat to improve floor finish on the workpiece
- Cutting Data - Page 80
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	RADIUS	SHANK TYPE
N57881	AN340-0.188-E1-R010.0-Z3	3/16	3/16	1/4	2	.178	9/16	3	UNCOATED	0.010	CYLINDRICAL
N57910	AN340-0.188-E1-R010.0-Z3	3/16	3/16	1/4	2	.178	9/16	3	TICN	0.010	CYLINDRICAL
N57882	AN340-0.188-E2-R010.0-Z3	3/16	3/16	1/4	3	.178	1-9/16	3	UNCOATED	0.010	CYLINDRICAL
N57911	AN340-0.188-E2-R010.0-Z3	3/16	3/16	1/4	3	.178	1-9/16	3	TICN	0.010	CYLINDRICAL
N57884	AN340-0.250-E1-R010.0-Z3	1/4	1/4	5/16	2-1/2	.240	3/4	3	UNCOATED	0.010	CYLINDRICAL
N57913	AN340-0.250-E1-R010.0-Z3	1/4	1/4	5/16	2-1/2	.240	3/4	3	TICN	0.010	CYLINDRICAL
N57885	AN340-0.250-E2-R010.0-Z3	1/4	1/4	5/16	3-1/4	.240	1-3/4	3	UNCOATED	0.010	CYLINDRICAL
N57914	AN340-0.250-E2-R010.0-Z3	1/4	1/4	5/16	3-1/4	.240	1-3/4	3	TICN	0.010	CYLINDRICAL
N57888	AN340-0.375-E1-R015.0-Z3	3/8	3/8	1/2	2-1/2	.360	7/8	3	UNCOATED	0.015	CYLINDRICAL
N57917	AN340-0.375-E1-R015.0-Z3	3/8	3/8	1/2	2-1/2	.360	7/8	3	TICN	0.015	CYLINDRICAL
N57889	AN340-0.375-E2-R015.0-Z3	3/8	3/8	1/2	3	.360	1-3/8	3	UNCOATED	0.015	CYLINDRICAL
N57918	AN340-0.375-E2-R015.0-Z3	3/8	3/8	1/2	3	.360	1-3/8	3	TICN	0.015	CYLINDRICAL
N57890	AN340-0.375-E3-R015.0-Z3	3/8	3/8	1/2	4	.360	2-3/8	3	UNCOATED	0.015	CYLINDRICAL
N57919	AN340-0.375-E3-R015.0-Z3	3/8	3/8	1/2	4	.360	2-3/8	3	TICN	0.015	CYLINDRICAL
N57893	AN340-0.500-E1-R020.0-Z3	1/2	1/2	5/8	3	.480	1-1/8	3	UNCOATED	0.020	CYLINDRICAL
N57922	AN340-0.500-E1-R020.0-Z3	1/2	1/2	5/8	3	.480	1-1/8	3	TICN	0.020	CYLINDRICAL
N57894	AN340-0.500-E2-R020.0-Z3	1/2	1/2	5/8	4	.480	2-1/8	3	UNCOATED	0.020	CYLINDRICAL
N57923	AN340-0.500-E2-R020.0-Z3	1/2	1/2	5/8	4	.480	2-1/8	3	TICN	0.020	CYLINDRICAL
N57895	AN340-0.500-E3-R020.0-Z3	1/2	1/2	5/8	5	.480	3-1/8	3	UNCOATED	0.020	CYLINDRICAL
N57924	AN340-0.500-E3-R020.0-Z3	1/2	1/2	5/8	5	.480	3-1/8	3	TICN	0.020	CYLINDRICAL
N57897	AN340-0.625-E1-R025.0-Z3	5/8	5/8	3/4	3-1/2	.600	1-1/2	3	UNCOATED	0.025	CYLINDRICAL
N57926	AN340-0.625-E1-R025.0-Z3	5/8	5/8	3/4	3-1/2	.600	1-1/2	3	TICN	0.025	CYLINDRICAL
N57901	AN340-0.750-E1-R030.0-Z3	3/4	3/4	1	4	.720	1-7/8	3	UNCOATED	0.030	CYLINDRICAL
N57930	AN340-0.750-E1-R030.0-Z3	3/4	3/4	1	4	.720	1-7/8	3	TICN	0.030	CYLINDRICAL
N57902	AN340-0.750-E2-R030.0-Z3	3/4	3/4	1	5	.720	2-7/8	3	UNCOATED	0.030	CYLINDRICAL
N57931	AN340-0.750-E2-R030.0-Z3	3/4	3/4	1	5	.720	2-7/8	3	TICN	0.030	CYLINDRICAL
N57903	AN340-0.750-E3-R030.0-Z3	3/4	3/4	1	6	.720	3-7/8	3	UNCOATED	0.030	CYLINDRICAL
N57932	AN340-0.750-E3-R030.0-Z3	3/4	3/4	1	6	.720	3-7/8	3	TICN	0.030	CYLINDRICAL
N57906	AN340-1.000-E1-R040.0-Z3	1	1	1-1/4	4	.960	1-5/8	3	UNCOATED	0.040	CYLINDRICAL
N57935	AN340-1.000-E1-R040.0-Z3	1	1	1-1/4	4	.960	1-5/8	3	TICN	0.040	CYLINDRICAL

## A345

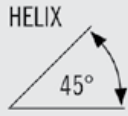


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- Cutting Data - Page 80
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N61534	A345-0.125-D2-S.0-Z3	1/8	1/8	1/4	1-1/2	3	UNCOATED	CYLINDRICAL
N61626	A345-0.125-D2-S.0-Z3	1/8	1/8	1/4	1-1/2	3	TICN	CYLINDRICAL
N61535	A345-0.125-D3-S.0-Z3	1/8	1/8	3/8	1-1/2	3	UNCOATED	CYLINDRICAL
N61627	A345-0.125-D3-S.0-Z3	1/8	1/8	3/8	1-1/2	3	TICN	CYLINDRICAL
N61536	A345-0.156-F2-S.0-Z3	5/32	3/16	5/16	2	3	UNCOATED	CYLINDRICAL
N61628	A345-0.156-F2-S.0-Z3	5/32	3/16	5/16	2	3	TICN	CYLINDRICAL
N61537	A345-0.156-F3-S.0-Z3	5/32	3/16	1/2	2	3	UNCOATED	CYLINDRICAL
N61629	A345-0.156-F3-S.0-Z3	5/32	3/16	1/2	2	3	TICN	CYLINDRICAL
N61538	A345-0.188-D2-S.0-Z3	3/16	3/16	5/16	2	3	UNCOATED	CYLINDRICAL
N61630	A345-0.188-D2-S.0-Z3	3/16	3/16	5/16	2	3	TICN	CYLINDRICAL
N61539	A345-0.188-D3-S.0-Z3	3/16	3/16	9/16	2	3	UNCOATED	CYLINDRICAL
N61631	A345-0.188-D3-S.0-Z3	3/16	3/16	9/16	2	3	TICN	CYLINDRICAL
N61541	A345-0.219-F3-S.0-Z3	7/32	1/4	3/4	2-1/2	3	UNCOATED	CYLINDRICAL
N61633	A345-0.219-F3-S.0-Z3	7/32	1/4	3/4	2-1/2	3	TICN	CYLINDRICAL
N61542	A345-0.250-D2-S.0-Z3	1/4	1/4	3/8	2-1/2	3	UNCOATED	CYLINDRICAL
N61634	A345-0.250-D2-S.0-Z3	1/4	1/4	3/8	2-1/2	3	TICN	CYLINDRICAL
N61543	A345-0.250-D3-S.0-Z3	1/4	1/4	3/4	2-1/2	3	UNCOATED	CYLINDRICAL
N61635	A345-0.250-D3-S.0-Z3	1/4	1/4	3/4	2-1/2	3	TICN	CYLINDRICAL
N61544	A345-0.250-D5-S.0-Z3	1/4	1/4	1-1/4	4	3	UNCOATED	CYLINDRICAL
N61636	A345-0.250-D5-S.0-Z3	1/4	1/4	1-1/4	4	3	TICN	CYLINDRICAL
N61547	A345-0.313-D1-S.0-Z3	5/16	5/16	7/16	2-1/2	3	UNCOATED	CYLINDRICAL
N61639	A345-0.313-D1-S.0-Z3	5/16	5/16	7/16	2-1/2	3	TICN	CYLINDRICAL
N61548	A345-0.313-D3-S.0-Z3	5/16	5/16	13/16	2-1/2	3	UNCOATED	CYLINDRICAL
N61640	A345-0.313-D3-S.0-Z3	5/16	5/16	13/16	2-1/2	3	TICN	CYLINDRICAL
N61549	A345-0.313-D4-S.0-Z3	5/16	5/16	1-1/4	3-1/2	3	UNCOATED	CYLINDRICAL
N61641	A345-0.313-D4-S.0-Z3	5/16	5/16	1-1/4	3-1/2	3	TICN	CYLINDRICAL
N61550	A345-0.313-D7-S.0-Z3	5/16	5/16	2-1/4	4	3	UNCOATED	CYLINDRICAL
N61642	A345-0.313-D7-S.0-Z3	5/16	5/16	2-1/4	4	3	TICN	CYLINDRICAL
N61553	A345-0.375-D1-S.0-Z3	3/8	3/8	1/2	2-1/2	3	UNCOATED	CYLINDRICAL
N61645	A345-0.375-D1-S.0-Z3	3/8	3/8	1/2	2-1/2	3	TICN	CYLINDRICAL
N61554	A345-0.375-D3-S.0-Z3	3/8	3/8	1	2-1/2	3	UNCOATED	CYLINDRICAL
N61646	A345-0.375-D3-S.0-Z3	3/8	3/8	1	2-1/2	3	TICN	CYLINDRICAL
N61555	A345-0.375-D4-S.0-Z3	3/8	3/8	1-1/2	4	3	UNCOATED	CYLINDRICAL
N61647	A345-0.375-D4-S.0-Z3	3/8	3/8	1-1/2	4	3	TICN	CYLINDRICAL
N61559	A345-0.438-D2-S.0-Z3	7/16	7/16	1	2-3/4	3	UNCOATED	CYLINDRICAL
N61651	A345-0.438-D2-S.0-Z3	7/16	7/16	1	2-3/4	3	TICN	CYLINDRICAL

## A345 (CON'T)

SOLID  
CARBIDE



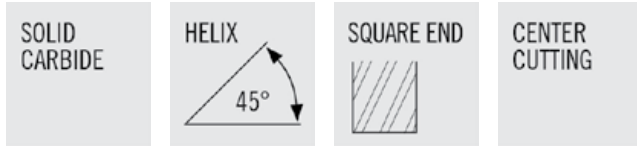
CENTER  
CUTTING



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- Cutting Data - Page 80
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N61562	A345-0.500-D1-S.0-Z3	1/2	1/2	5/8	3	3	UNCOATED	CYLINDRICAL
N61654	A345-0.500-D1-S.0-Z3	1/2	1/2	5/8	3	3	TICN	CYLINDRICAL
N61563	A345-0.500-D3-S.0-Z3	1/2	1/2	1-1/4	3	3	UNCOATED	CYLINDRICAL
N61655	A345-0.500-D3-S.0-Z3	1/2	1/2	1-1/4	3	3	TICN	CYLINDRICAL
N61564	A345-0.500-D4-S.0-Z3	1/2	1/2	2	4	3	UNCOATED	CYLINDRICAL
N61656	A345-0.500-D4-S.0-Z3	1/2	1/2	2	4	3	TICN	CYLINDRICAL
N61565	A345-0.500-D6-S.0-Z3	1/2	1/2	3-1/8	6	3	UNCOATED	CYLINDRICAL
N61657	A345-0.500-D6-S.0-Z3	1/2	1/2	3-1/8	6	3	TICN	CYLINDRICAL
N61566	A345-0.625-D1-S.0-Z3	5/8	5/8	3/4	3	3	UNCOATED	CYLINDRICAL
N61658	A345-0.625-D1-S.0-Z3	5/8	5/8	3/4	3	3	TICN	CYLINDRICAL
N61567	A345-0.625-D3-S.0-Z3	5/8	5/8	1-5/8	3-1/2	3	UNCOATED	CYLINDRICAL
N61659	A345-0.625-D3-S.0-Z3	5/8	5/8	1-5/8	3-1/2	3	TICN	CYLINDRICAL
N61568	A345-0.625-D4-S.0-Z3	5/8	5/8	2-1/2	5	3	UNCOATED	CYLINDRICAL
N61660	A345-0.625-D4-S.0-Z3	5/8	5/8	2-1/2	5	3	TICN	CYLINDRICAL
N61569	A345-0.625-D6-S.0-Z3	5/8	5/8	3-3/4	6	3	UNCOATED	CYLINDRICAL
N61661	A345-0.625-D6-S.0-Z3	5/8	5/8	3-3/4	6	3	TICN	CYLINDRICAL
N61570	A345-0.750-D1-S.0-Z3	3/4	3/4	1	3	3	UNCOATED	CYLINDRICAL
N61662	A345-0.750-D1-S.0-Z3	3/4	3/4	1	3	3	TICN	CYLINDRICAL
N61571	A345-0.750-D2-S.0-Z3	3/4	3/4	1-5/8	4	3	UNCOATED	CYLINDRICAL
N61663	A345-0.750-D2-S.0-Z3	3/4	3/4	1-5/8	4	3	TICN	CYLINDRICAL
N61572	A345-0.750-D3-S.0-Z3	3/4	3/4	2-1/4	5	3	UNCOATED	CYLINDRICAL
N61664	A345-0.750-D3-S.0-Z3	3/4	3/4	2-1/4	5	3	TICN	CYLINDRICAL
N61573	A345-0.750-D4-S.0-Z3	3/4	3/4	3-1/4	6	3	UNCOATED	CYLINDRICAL
N61665	A345-0.750-D4-S.0-Z3	3/4	3/4	3-1/4	6	3	TICN	CYLINDRICAL
N61574	A345-0.750-D5-S.0-Z3	3/4	3/4	4	6-1/2	3	UNCOATED	CYLINDRICAL
N61666	A345-0.750-D5-S.0-Z3	3/4	3/4	4	6-1/2	3	TICN	CYLINDRICAL
N61575	A345-1.000-D1-S.0-Z3	1	1	1-1/4	4	3	UNCOATED	CYLINDRICAL
N61667	A345-1.000-D1-S.0-Z3	1	1	1-1/4	4	3	TICN	CYLINDRICAL
N61576	A345-1.000-D2-S.0-Z3	1	1	2	5	3	UNCOATED	CYLINDRICAL
N61668	A345-1.000-D2-S.0-Z3	1	1	2	5	3	TICN	CYLINDRICAL
N61577	A345-1.000-D3-S.0-Z3	1	1	2-5/8	6	3	UNCOATED	CYLINDRICAL
N61669	A345-1.000-D3-S.0-Z3	1	1	2-5/8	6	3	TICN	CYLINDRICAL
N61578	A345-1.000-D4-S.0-Z3	1	1	3-1/4	6	3	UNCOATED	CYLINDRICAL
N61670	A345-1.000-D4-S.0-Z3	1	1	3-1/4	6	3	TICN	CYLINDRICAL
N61579	A345-1.000-D5-S.0-Z3	1	1	4-1/8	7	3	UNCOATED	CYLINDRICAL
N61671	A345-1.000-D5-S.0-Z3	1	1	4-1/8	7	3	TICN	CYLINDRICAL

## A345M

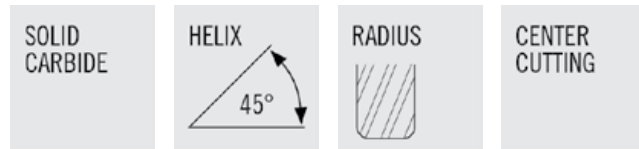


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- Cutting Data - Page 82
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N47812	A345M-030-D4-S.0-Z3	3MM	3MM	12MM	38MM	3	TICN	CYLINDRICAL
N47816	A345M-040-D3-S.0-Z3	4MM	4MM	12MM	50MM	3	TICN	CYLINDRICAL
N47818	A345M-050-D3-S.0-Z3	5MM	5MM	14MM	50MM	3	TICN	CYLINDRICAL
N47822	A345M-060-D3-S.0-Z3	6MM	6MM	16MM	58MM	3	TICN	CYLINDRICAL
N47826	A345M-080-D2-S.0-Z3	8MM	8MM	20MM	64MM	3	TICN	CYLINDRICAL
N47830	A345M-100-D2-S.0-Z3	10MM	10MM	22MM	73MM	3	TICN	CYLINDRICAL
N47834	A345M-120-D3-S.0-Z3	12MM	12MM	32MM	84MM	3	TICN	CYLINDRICAL
N47838	A345M-140-D2-S.0-Z3	14MM	14MM	32MM	83MM	3	TICN	CYLINDRICAL
N47842	A345M-160-D2-S.0-Z3	16MM	16MM	36MM	89MM	3	TICN	CYLINDRICAL
N47850	A345M-200-D3-S.0-Z3	20MM	20MM	50MM	104MM	3	TICN	CYLINDRICAL
N47854	A345M-250-D3-S.0-Z3	25MM	25MM	60MM	140MM	3	TICN	CYLINDRICAL



## A345R

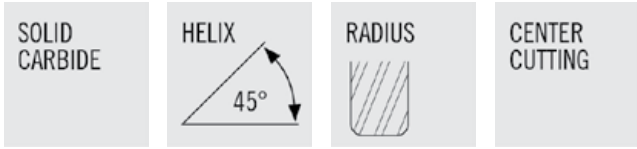


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- Cutting Data - Page 80
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N90753	A345R-0.125-D3-R010.0-Z3	1/8	1/8	3/8	1-1/2	3	TICN	0.010	CYLINDRICAL
N90755	A345R-0.125-D3-R020.0-Z3	1/8	1/8	3/8	1-1/2	3	TICN	0.020	CYLINDRICAL
N90756	A345R-0.125-D3-R030.0-Z3	1/8	1/8	3/8	1-1/2	3	TICN	0.030	CYLINDRICAL
N90757	A345R-0.156-F3-R010.0-Z3	5/32	3/16	1/2	2	3	TICN	0.010	CYLINDRICAL
N90759	A345R-0.156-F3-R020.0-Z3	5/32	3/16	1/2	2	3	TICN	0.020	CYLINDRICAL
N90760	A345R-0.156-F3-R030.0-Z3	5/32	3/16	1/2	2	3	TICN	0.030	CYLINDRICAL
N90761	A345R-0.188-D3-R010.0-Z3	3/16	3/16	9/16	2	3	TICN	0.010	CYLINDRICAL
N90763	A345R-0.188-D3-R020.0-Z3	3/16	3/16	9/16	2	3	TICN	0.020	CYLINDRICAL
N90764	A345R-0.188-D3-R030.0-Z3	3/16	3/16	9/16	2	3	TICN	0.030	CYLINDRICAL
N90765	A345R-0.219-F3-R010.0-Z3	7/32	1/4	3/4	2-1/2	3	TICN	0.010	CYLINDRICAL
N90767	A345R-0.219-F3-R020.0-Z3	7/32	1/4	3/4	2-1/2	3	TICN	0.020	CYLINDRICAL
N90768	A345R-0.219-F3-R030.0-Z3	7/32	1/4	3/4	2-1/2	3	TICN	0.030	CYLINDRICAL
N90769	A345R-0.250-D3-R010.0-Z3	1/4	1/4	3/4	2-1/2	3	TICN	0.010	CYLINDRICAL
N90775	A345R-0.250-D3-R020.0-Z3	1/4	1/4	3/4	2-1/2	3	TICN	0.020	CYLINDRICAL
N90776	A345R-0.250-D3-R030.0-Z3	1/4	1/4	3/4	2-1/2	3	TICN	0.030	CYLINDRICAL
N90777	A345R-0.250-D3-R045.0-Z3	1/4	1/4	3/4	2-1/2	3	TICN	0.045	CYLINDRICAL
N90778	A345R-0.250-D3-R060.0-Z3	1/4	1/4	3/4	2-1/2	3	TICN	0.060	CYLINDRICAL
N90785	A345R-0.313-D3-R010.0-Z3	5/16	5/16	13/16	2-1/2	3	TICN	0.010	CYLINDRICAL
N90787	A345R-0.313-D3-R020.0-Z3	5/16	5/16	13/16	2-1/2	3	TICN	0.020	CYLINDRICAL
N90788	A345R-0.313-D3-R030.0-Z3	5/16	5/16	13/16	2-1/2	3	TICN	0.030	CYLINDRICAL
N90789	A345R-0.313-D3-R045.0-Z3	5/16	5/16	13/16	2-1/2	3	TICN	0.045	CYLINDRICAL
N90790	A345R-0.313-D3-R060.0-Z3	5/16	5/16	13/16	2-1/2	3	TICN	0.060	CYLINDRICAL
N90803	A345R-0.375-D3-R010.0-Z3	3/8	3/8	1	2-1/2	3	TICN	0.010	CYLINDRICAL
N90805	A345R-0.375-D3-R020.0-Z3	3/8	3/8	1	2-1/2	3	TICN	0.020	CYLINDRICAL
N90806	A345R-0.375-D3-R030.0-Z3	3/8	3/8	1	2-1/2	3	TICN	0.030	CYLINDRICAL
N90807	A345R-0.375-D3-R045.0-Z3	3/8	3/8	1	2-1/2	3	TICN	0.045	CYLINDRICAL
N90808	A345R-0.375-D3-R060.0-Z3	3/8	3/8	1	2-1/2	3	TICN	0.060	CYLINDRICAL
N90815	A345R-0.438-D2-R010.0-Z3	7/16	7/16	1	2-3/4	3	TICN	0.010	CYLINDRICAL
N90817	A345R-0.438-D2-R020.0-Z3	7/16	7/16	1	2-3/4	3	TICN	0.020	CYLINDRICAL
N90818	A345R-0.438-D2-R030.0-Z3	7/16	7/16	1	2-3/4	3	TICN	0.030	CYLINDRICAL
N90819	A345R-0.438-D2-R045.0-Z3	7/16	7/16	1	2-3/4	3	TICN	0.045	CYLINDRICAL
N90820	A345R-0.438-D2-R060.0-Z3	7/16	7/16	1	2-3/4	3	TICN	0.060	CYLINDRICAL
N90821	A345R-0.438-D2-R090.0-Z3	7/16	7/16	1	2-3/4	3	TICN	0.090	CYLINDRICAL
N90822	A345R-0.438-D2-R125.0-Z3	7/16	7/16	1	2-3/4	3	TICN	0.125	CYLINDRICAL
N90831	A345R-0.500-D1-R010.0-Z3	1/2	1/2	5/8	3	3	TICN	0.010	CYLINDRICAL

## A345R (CON'T)

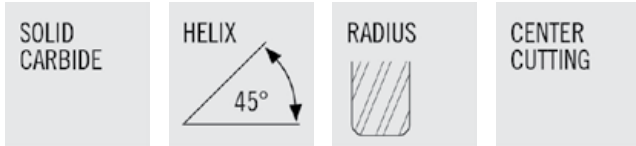


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- Cutting Data - Page 80
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N90833	A345R-0.500-D1-R020.0-Z3	1/2	1/2	5/8	3	3	TICN	0.020	CYLINDRICAL
N90834	A345R-0.500-D1-R030.0-Z3	1/2	1/2	5/8	3	3	TICN	0.030	CYLINDRICAL
N90835	A345R-0.500-D1-R045.0-Z3	1/2	1/2	5/8	3	3	TICN	0.045	CYLINDRICAL
N90836	A345R-0.500-D1-R060.0-Z3	1/2	1/2	5/8	3	3	TICN	0.060	CYLINDRICAL
N90837	A345R-0.500-D1-R090.0-Z3	1/2	1/2	5/8	3	3	TICN	0.090	CYLINDRICAL
N90838	A345R-0.500-D1-R125.0-Z3	1/2	1/2	5/8	3	3	TICN	0.125	CYLINDRICAL
N90839	A345R-0.500-D3-R010.0-Z3	1/2	1/2	1-1/4	3	3	TICN	0.010	CYLINDRICAL
N90841	A345R-0.500-D3-R020.0-Z3	1/2	1/2	1-1/4	3	3	TICN	0.020	CYLINDRICAL
N90842	A345R-0.500-D3-R030.0-Z3	1/2	1/2	1-1/4	3	3	TICN	0.030	CYLINDRICAL
N90843	A345R-0.500-D3-R045.0-Z3	1/2	1/2	1-1/4	3	3	TICN	0.045	CYLINDRICAL
N90844	A345R-0.500-D3-R060.0-Z3	1/2	1/2	1-1/4	3	3	TICN	0.060	CYLINDRICAL
N90847	A345R-0.500-D3-R090.0-Z3	1/2	1/2	1-1/4	3	3	TICN	0.090	CYLINDRICAL
N90848	A345R-0.500-D3-R125.0-Z3	1/2	1/2	1-1/4	3	3	TICN	0.125	CYLINDRICAL
N90849	A345R-0.500-D4-R010.0-Z3	1/2	1/2	2	4	3	TICN	0.010	CYLINDRICAL
N90851	A345R-0.500-D4-R020.0-Z3	1/2	1/2	2	4	3	TICN	0.020	CYLINDRICAL
N90852	A345R-0.500-D4-R030.0-Z3	1/2	1/2	2	4	3	TICN	0.030	CYLINDRICAL
N90853	A345R-0.500-D4-R045.0-Z3	1/2	1/2	2	4	3	TICN	0.045	CYLINDRICAL
N90854	A345R-0.500-D4-R060.0-Z3	1/2	1/2	2	4	3	TICN	0.060	CYLINDRICAL
N90855	A345R-0.500-D4-R090.0-Z3	1/2	1/2	2	4	3	TICN	0.090	CYLINDRICAL
N90856	A345R-0.500-D4-R125.0-Z3	1/2	1/2	2	4	3	TICN	0.125	CYLINDRICAL
N90865	A345R-0.625-D3-R010.0-Z3	5/8	5/8	1-5/8	3-1/2	3	TICN	0.010	CYLINDRICAL
N90867	A345R-0.625-D3-R020.0-Z3	5/8	5/8	1-5/8	3-1/2	3	TICN	0.020	CYLINDRICAL
N90868	A345R-0.625-D3-R030.0-Z3	5/8	5/8	1-5/8	3-1/2	3	TICN	0.030	CYLINDRICAL
N90869	A345R-0.625-D3-R045.0-Z3	5/8	5/8	1-5/8	3-1/2	3	TICN	0.045	CYLINDRICAL
N90870	A345R-0.625-D3-R060.0-Z3	5/8	5/8	1-5/8	3-1/2	3	TICN	0.060	CYLINDRICAL
N90871	A345R-0.625-D3-R090.0-Z3	5/8	5/8	1-5/8	3-1/2	3	TICN	0.090	CYLINDRICAL
N90872	A345R-0.625-D3-R125.0-Z3	5/8	5/8	1-5/8	3-1/2	3	TICN	0.125	CYLINDRICAL
N90881	A345R-0.750-D1-R010.0-Z3	3/4	3/4	1	3	3	TICN	0.010	CYLINDRICAL
N90883	A345R-0.750-D1-R020.0-Z3	3/4	3/4	1	3	3	TICN	0.020	CYLINDRICAL
N90884	A345R-0.750-D1-R030.0-Z3	3/4	3/4	1	3	3	TICN	0.030	CYLINDRICAL
N90885	A345R-0.750-D1-R045.0-Z3	3/4	3/4	1	3	3	TICN	0.045	CYLINDRICAL
N90886	A345R-0.750-D1-R060.0-Z3	3/4	3/4	1	3	3	TICN	0.060	CYLINDRICAL
N90887	A345R-0.750-D1-R090.0-Z3	3/4	3/4	1	3	3	TICN	0.090	CYLINDRICAL
N90888	A345R-0.750-D1-R125.0-Z3	3/4	3/4	1	3	3	TICN	0.125	CYLINDRICAL

DISCOUNT CODE D43

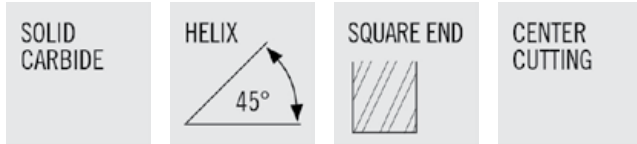
## A345R (CON'T)



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- Cutting Data - Page 80
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N90889	A345R-0.750-D1-R190.0-Z3	3/4	3/4	1	3	3	TICN	0.190	CYLINDRICAL
N90890	A345R-0.750-D3-R010.0-Z3	3/4	3/4	2-1/4	5	3	TICN	0.010	CYLINDRICAL
N90892	A345R-0.750-D3-R020.0-Z3	3/4	3/4	2-1/4	5	3	TICN	0.020	CYLINDRICAL
N90893	A345R-0.750-D3-R030.0-Z3	3/4	3/4	2-1/4	5	3	TICN	0.030	CYLINDRICAL
N90894	A345R-0.750-D3-R045.0-Z3	3/4	3/4	2-1/4	5	3	TICN	0.045	CYLINDRICAL
N90895	A345R-0.750-D3-R060.0-Z3	3/4	3/4	2-1/4	5	3	TICN	0.060	CYLINDRICAL
N90896	A345R-0.750-D3-R090.0-Z3	3/4	3/4	2-1/4	5	3	TICN	0.090	CYLINDRICAL
N90897	A345R-0.750-D3-R125.0-Z3	3/4	3/4	2-1/4	5	3	TICN	0.125	CYLINDRICAL
N90899	A345R-0.750-D3-R190.0-Z3	3/4	3/4	2-1/4	5	3	TICN	0.190	CYLINDRICAL
N90900	A345R-0.750-D5-R010.0-Z3	3/4	3/4	4	6-1/2	3	TICN	0.010	CYLINDRICAL
N90902	A345R-0.750-D5-R020.0-Z3	3/4	3/4	4	6-1/2	3	TICN	0.020	CYLINDRICAL
N90903	A345R-0.750-D5-R030.0-Z3	3/4	3/4	4	6-1/2	3	TICN	0.030	CYLINDRICAL
N90904	A345R-0.750-D5-R045.0-Z3	3/4	3/4	4	6-1/2	3	TICN	0.045	CYLINDRICAL
N90905	A345R-0.750-D5-R060.0-Z3	3/4	3/4	4	6-1/2	3	TICN	0.060	CYLINDRICAL
N90906	A345R-0.750-D5-R090.0-Z3	3/4	3/4	4	6-1/2	3	TICN	0.090	CYLINDRICAL
N90907	A345R-0.750-D5-R125.0-Z3	3/4	3/4	4	6-1/2	3	TICN	0.125	CYLINDRICAL
N90534	A345R-0.750-D5-R190.0-Z3	3/4	3/4	4	6-1/2	3	TICN	0.190	CYLINDRICAL
N90909	A345R-1.000-D3-R010.0-Z3	1	1	2-5/8	6	3	TICN	0.010	CYLINDRICAL
N90911	A345R-1.000-D3-R020.0-Z3	1	1	2-5/8	6	3	TICN	0.020	CYLINDRICAL
N90912	A345R-1.000-D3-R030.0-Z3	1	1	2-5/8	6	3	TICN	0.030	CYLINDRICAL
N90913	A345R-1.000-D3-R045.0-Z3	1	1	2-5/8	6	3	TICN	0.045	CYLINDRICAL
N90914	A345R-1.000-D3-R060.0-Z3	1	1	2-5/8	6	3	TICN	0.060	CYLINDRICAL
N90915	A345R-1.000-D3-R090.0-Z3	1	1	2-5/8	6	3	TICN	0.090	CYLINDRICAL
N90916	A345R-1.000-D3-R125.0-Z3	1	1	2-5/8	6	3	TICN	0.125	CYLINDRICAL
N90917	A345R-1.000-D3-R190.0-Z3	1	1	2-5/8	6	3	TICN	0.190	CYLINDRICAL

## AN345

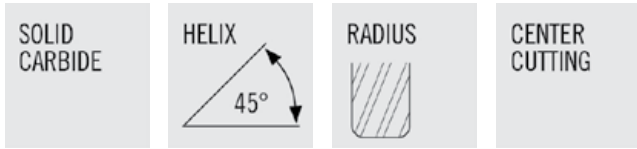


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- Cutting Data - Page 81
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	SHANK TYPE
N18597	AN345-0.250-E2-S.0-Z3	1/4	1/4	3/8	4	.240	2-1/8	3	UNCOATED	CYLINDRICAL
N57938	AN345-0.250-E3-S.0-Z3	1/4	1/4	1/2	3	.240	1	3	UNCOATED	CYLINDRICAL
N57939	AN345-0.250-E4-S.0-Z3	1/4	1/4	1/2	4	.240	1-1/2	3	UNCOATED	CYLINDRICAL
N18598	AN345-0.313-E1-S.0-Z3	5/16	5/16	7/16	4	.300	2-1/8	3	UNCOATED	CYLINDRICAL
N18599	AN345-0.375-E1-S.0-Z3	3/8	3/8	3/8	2-1/2	.360	1-1/8	3	UNCOATED	CYLINDRICAL
N18600	AN345-0.375-E2-S.0-Z3	3/8	3/8	1/2	4	.360	2-1/8	3	UNCOATED	CYLINDRICAL
N18601	AN345-0.375-E3-S.0-Z3	3/8	3/8	1/2	6	.360	4-1/8	3	UNCOATED	CYLINDRICAL
N57940	AN345-0.375-E4-S.0-Z3	3/8	3/8	3/4	4	.360	2	3	UNCOATED	CYLINDRICAL
N57941	AN345-0.375-E5-S.0-Z3	3/8	3/8	3/4	5	.360	3	3	UNCOATED	CYLINDRICAL
N18603	AN345-0.500-E2-S.0-Z3	1/2	1/2	5/8	4	.480	2-1/8	3	UNCOATED	CYLINDRICAL
N57942	AN345-0.500-E4-S.0-Z3	1/2	1/2	5/8	5	.480	3	3	UNCOATED	CYLINDRICAL
N18604	AN345-0.500-E3-S.0-Z3	1/2	1/2	5/8	6	.480	4-1/8	3	UNCOATED	CYLINDRICAL
N18606	AN345-0.625-E2-S.0-Z3	5/8	5/8	3/4	6	.600	4	3	UNCOATED	CYLINDRICAL
N18609	AN345-0.750-E3-S.0-Z3	3/4	3/4	1	6	.720	3-1/2	3	UNCOATED	CYLINDRICAL
N18610	AN345-0.750-E4-S.0-Z3	3/4	3/4	1	7	.720	4-1/8	3	UNCOATED	CYLINDRICAL
N18612	AN345-1.000-E2-S.0-Z3	1	1	1-1/4	6	.960	3-1/2	3	UNCOATED	CYLINDRICAL

## AN345R




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- Cutting Data - Page 81
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ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	RADIUS	SHANK TYPE
N90288	AN345R-0.250-E2-R010.0-Z3	1/4	1/4	3/8	4	.240	2-1/8	3	TICN	0.010	CYLINDRICAL
N90255	AN345R-0.250-E2-R020.0-Z3	1/4	1/4	3/8	4	.240	2-1/8	3	TICN	0.020	CYLINDRICAL
N90289	AN345R-0.250-E2-R030.0-Z3	1/4	1/4	3/8	4	.240	2-1/8	3	TICN	0.030	CYLINDRICAL
N90290	AN345R-0.250-E2-R045.0-Z3	1/4	1/4	3/8	4	.240	2-1/8	3	TICN	0.045	CYLINDRICAL
N90291	AN345R-0.250-E2-R060.0-Z3	1/4	1/4	3/8	4	.240	2-1/8	3	TICN	0.060	CYLINDRICAL
N90489	AN345R-0.250-E3-R010.0-Z3	1/4	1/4	1/2	3	.240	1	3	TICN	0.010	CYLINDRICAL
N90279	AN345R-0.250-E3-R020.0-Z3	1/4	1/4	1/2	3	.240	1	3	TICN	0.020	CYLINDRICAL
N90490	AN345R-0.250-E3-R030.0-Z3	1/4	1/4	1/2	3	.240	1	3	TICN	0.030	CYLINDRICAL
N90491	AN345R-0.250-E3-R045.0-Z3	1/4	1/4	1/2	3	.240	1	3	TICN	0.045	CYLINDRICAL
N90492	AN345R-0.250-E3-R060.0-Z3	1/4	1/4	1/2	3	.240	1	3	TICN	0.060	CYLINDRICAL
N90497	AN345R-0.250-E4-R010.0-Z3	1/4	1/4	1/2	4	.240	1-1/2	3	TICN	0.010	CYLINDRICAL
N90281	AN345R-0.250-E4-R020.0-Z3	1/4	1/4	1/2	4	.240	1-1/2	3	TICN	0.020	CYLINDRICAL
N90498	AN345R-0.250-E4-R030.0-Z3	1/4	1/4	1/2	4	.240	1-1/2	3	TICN	0.030	CYLINDRICAL
N90499	AN345R-0.250-E4-R045.0-Z3	1/4	1/4	1/2	4	.240	1-1/2	3	TICN	0.045	CYLINDRICAL
N90500	AN345R-0.250-E4-R060.0-Z3	1/4	1/4	1/2	4	.240	1-1/2	3	TICN	0.060	CYLINDRICAL
N90262	AN345R-0.313-E1-R020.0-Z3	5/16	5/16	7/16	4	.300	2-1/8	3	TICN	0.020	CYLINDRICAL
N90292	AN345R-0.313-E1-R010.0-Z3	5/16	5/16	7/16	4	.300	2-1/8	3	TICN	0.010	CYLINDRICAL
N90293	AN345R-0.313-E1-R030.0-Z3	5/16	5/16	7/16	4	.300	2-1/8	3	TICN	0.030	CYLINDRICAL
N90294	AN345R-0.313-E1-R045.0-Z3	5/16	5/16	7/16	4	.300	2-1/8	3	TICN	0.045	CYLINDRICAL
N90295	AN345R-0.313-E1-R060.0-Z3	5/16	5/16	7/16	4	.300	2-1/8	3	TICN	0.060	CYLINDRICAL
N90296	AN345R-0.375-E1-R010.0-Z3	3/8	3/8	3/8	2-1/2	.360	1-1/8	3	TICN	0.010	CYLINDRICAL
N90263	AN345R-0.375-E1-R020.0-Z3	3/8	3/8	3/8	2-1/2	.360	1-1/8	3	TICN	0.020	CYLINDRICAL
N90297	AN345R-0.375-E1-R030.0-Z3	3/8	3/8	3/8	2-1/2	.360	1-1/8	3	TICN	0.030	CYLINDRICAL
N90298	AN345R-0.375-E1-R045.0-Z3	3/8	3/8	3/8	2-1/2	.360	1-1/8	3	TICN	0.045	CYLINDRICAL
N90299	AN345R-0.375-E1-R060.0-Z3	3/8	3/8	3/8	2-1/2	.360	1-1/8	3	TICN	0.060	CYLINDRICAL
N90301	AN345R-0.375-E2-R010.0-Z3	3/8	3/8	1/2	4	.360	2-1/8	3	TICN	0.010	CYLINDRICAL
N90265	AN345R-0.375-E2-R020.0-Z3	3/8	3/8	1/2	4	.360	2-1/8	3	TICN	0.020	CYLINDRICAL
N90302	AN345R-0.375-E2-R030.0-Z3	3/8	3/8	1/2	4	.360	2-1/8	3	TICN	0.030	CYLINDRICAL
N90303	AN345R-0.375-E2-R045.0-Z3	3/8	3/8	1/2	4	.360	2-1/8	3	TICN	0.045	CYLINDRICAL
N90306	AN345R-0.375-E2-R060.0-Z3	3/8	3/8	1/2	4	.360	2-1/8	3	TICN	0.060	CYLINDRICAL
N90307	AN345R-0.375-E3-R010.0-Z3	3/8	3/8	1/2	6	.360	4-1/8	3	TICN	0.010	CYLINDRICAL
N90266	AN345R-0.375-E3-R020.0-Z3	3/8	3/8	1/2	6	.360	4-1/8	3	TICN	0.020	CYLINDRICAL
N90308	AN345R-0.375-E3-R030.0-Z3	3/8	3/8	1/2	6	.360	4-1/8	3	TICN	0.030	CYLINDRICAL

# AN345R (CONT'D)

SOLID  
CARBIDE



HELIX  
45°



RADIUS

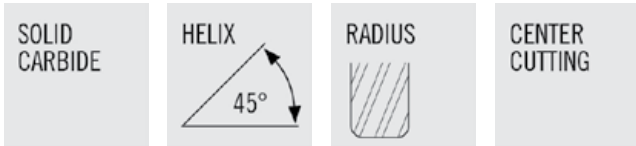
CENTER  
CUTTING



- Cylindrical land to eliminate chatter
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N90309	AN345R-0.375-E3-R045.0-Z3	3/8	3/8	1/2	6	.360	4-1/8	3	TICN	0.045	CYLINDRICAL
N90310	AN345R-0.375-E3-R060.0-Z3	3/8	3/8	1/2	6	.360	4-1/8	3	TICN	0.060	CYLINDRICAL
N90501	AN345R-0.375-E4-R010.0-Z3	3/8	3/8	3/4	4	.360	2	3	TICN	0.010	CYLINDRICAL
N90282	AN345R-0.375-E4-R020.0-Z3	3/8	3/8	3/4	4	.360	2	3	TICN	0.020	CYLINDRICAL
N90506	AN345R-0.375-E4-R030.0-Z3	3/8	3/8	3/4	4	.360	2	3	TICN	0.030	CYLINDRICAL
N90510	AN345R-0.375-E4-R045.0-Z3	3/8	3/8	3/4	4	.360	2	3	TICN	0.045	CYLINDRICAL
N90514	AN345R-0.375-E4-R060.0-Z3	3/8	3/8	3/4	4	.360	2	3	TICN	0.060	CYLINDRICAL
N90515	AN345R-0.375-E5-R010.0-Z3	3/8	3/8	3/4	5	.360	3	3	TICN	0.010	CYLINDRICAL
N90283	AN345R-0.375-E5-R020.0-Z3	3/8	3/8	3/4	5	.360	3	3	TICN	0.020	CYLINDRICAL
N90516	AN345R-0.375-E5-R030.0-Z3	3/8	3/8	3/4	5	.360	3	3	TICN	0.030	CYLINDRICAL
N90517	AN345R-0.375-E5-R045.0-Z3	3/8	3/8	3/4	5	.360	3	3	TICN	0.045	CYLINDRICAL
N90518	AN345R-0.375-E5-R060.0-Z3	3/8	3/8	3/4	5	.360	3	3	TICN	0.060	CYLINDRICAL
N90341	AN345R-0.500-E2-R010.0-Z3	1/2	1/2	5/8	4	.480	2-1/8	3	TICN	0.010	CYLINDRICAL
N90268	AN345R-0.500-E2-R020.0-Z3	1/2	1/2	5/8	4	.480	2-1/8	3	TICN	0.020	CYLINDRICAL
N90342	AN345R-0.500-E2-R030.0-Z3	1/2	1/2	5/8	4	.480	2-1/8	3	TICN	0.030	CYLINDRICAL
N90343	AN345R-0.500-E2-R045.0-Z3	1/2	1/2	5/8	4	.480	2-1/8	3	TICN	0.045	CYLINDRICAL
N90344	AN345R-0.500-E2-R060.0-Z3	1/2	1/2	5/8	4	.480	2-1/8	3	TICN	0.060	CYLINDRICAL
N90346	AN345R-0.500-E2-R090.0-Z3	1/2	1/2	5/8	4	.480	2-1/8	3	TICN	0.090	CYLINDRICAL
N90347	AN345R-0.500-E2-R125.0-Z3	1/2	1/2	5/8	4	.480	2-1/8	3	TICN	0.125	CYLINDRICAL
N90519	AN345R-0.500-E3-R010.0-Z3	1/2	1/2	5/8	5	.480	3	3	TICN	0.010	CYLINDRICAL
N90286	AN345R-0.500-E3-R020.0-Z3	1/2	1/2	5/8	5	.480	3	3	TICN	0.020	CYLINDRICAL
N90520	AN345R-0.500-E3-R030.0-Z3	1/2	1/2	5/8	5	.480	3	3	TICN	0.030	CYLINDRICAL
N90521	AN345R-0.500-E3-R045.0-Z3	1/2	1/2	5/8	5	.480	3	3	TICN	0.045	CYLINDRICAL
N90522	AN345R-0.500-E3-R060.0-Z3	1/2	1/2	5/8	5	.480	3	3	TICN	0.060	CYLINDRICAL
N90523	AN345R-0.500-E3-R090.0-Z3	1/2	1/2	5/8	5	.480	3	3	TICN	0.090	CYLINDRICAL
N90524	AN345R-0.500-E3-R125.0-Z3	1/2	1/2	5/8	5	.480	3	3	TICN	0.125	CYLINDRICAL
N90348	AN345R-0.500-E4-R010.0-Z3	1/2	1/2	5/8	6	.480	4-1/8	3	TICN	0.010	CYLINDRICAL
N90269	AN345R-0.500-E4-R020.0-Z3	1/2	1/2	5/8	6	.480	4-1/8	3	TICN	0.020	CYLINDRICAL
N90350	AN345R-0.500-E4-R030.0-Z3	1/2	1/2	5/8	6	.480	4-1/8	3	TICN	0.030	CYLINDRICAL
N90351	AN345R-0.500-E4-R045.0-Z3	1/2	1/2	5/8	6	.480	4-1/8	3	TICN	0.045	CYLINDRICAL
N90352	AN345R-0.500-E4-R060.0-Z3	1/2	1/2	5/8	6	.480	4-1/8	3	TICN	0.060	CYLINDRICAL
N90353	AN345R-0.500-E4-R090.0-Z3	1/2	1/2	5/8	6	.480	4-1/8	3	TICN	0.090	CYLINDRICAL
N90354	AN345R-0.500-E4-R125.0-Z3	1/2	1/2	5/8	6	.480	4-1/8	3	TICN	0.125	CYLINDRICAL

**AN345R (CONT'D)**



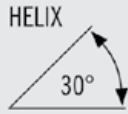
- Cylindrical land to eliminate chatter
- Form ground flute shape
- Eccentric primary relief
- Ideal for slotting, pocketing and long reach peripheral milling in aluminum
- Wiper flat to improve floor finish on the work piece
- Open end tooth gashing design to permit increased chip evacuation

- Cutting Data - Page 81
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	RADIUS	SHANK TYPE
N90361	AN345R-0.625-E2-R010.0-Z3	5/8	5/8	3/4	6	.600	4	3	TICN	0.010	CYLINDRICAL
N90271	AN345R-0.625-E2-R020.0-Z3	5/8	5/8	3/4	6	.600	4	3	TICN	0.020	CYLINDRICAL
N90362	AN345R-0.625-E2-R030.0-Z3	5/8	5/8	3/4	6	.600	4	3	TICN	0.030	CYLINDRICAL
N90363	AN345R-0.625-E2-R045.0-Z3	5/8	5/8	3/4	6	.600	4	3	TICN	0.045	CYLINDRICAL
N90364	AN345R-0.625-E2-R060.0-Z3	5/8	5/8	3/4	6	.600	4	3	TICN	0.060	CYLINDRICAL
N90365	AN345R-0.625-E2-R090.0-Z3	5/8	5/8	3/4	6	.600	4	3	TICN	0.090	CYLINDRICAL
N90366	AN345R-0.625-E2-R125.0-Z3	5/8	5/8	3/4	6	.600	4	3	TICN	0.125	CYLINDRICAL
N90380	AN345R-0.750-E3-R010.0-Z3	3/4	3/4	1	6	.720	3-1/2	3	TICN	0.010	CYLINDRICAL
N90274	AN345R-0.750-E3-R020.0-Z3	3/4	3/4	1	6	.720	3-1/2	3	TICN	0.020	CYLINDRICAL
N90382	AN345R-0.750-E3-R030.0-Z3	3/4	3/4	1	6	.720	3-1/2	3	TICN	0.030	CYLINDRICAL
N90383	AN345R-0.750-E3-R045.0-Z3	3/4	3/4	1	6	.720	3-1/2	3	TICN	0.045	CYLINDRICAL
N90384	AN345R-0.750-E3-R060.0-Z3	3/4	3/4	1	6	.720	3-1/2	3	TICN	0.060	CYLINDRICAL
N90385	AN345R-0.750-E3-R090.0-Z3	3/4	3/4	1	6	.720	3-1/2	3	TICN	0.090	CYLINDRICAL
N90386	AN345R-0.750-E3-R125.0-Z3	3/4	3/4	1	6	.720	3-1/2	3	TICN	0.125	CYLINDRICAL
N90399	AN345R-1.000-E2-R010.0-Z3	1	1	1-1/4	6	.960	3-1/2	3	TICN	0.010	CYLINDRICAL
N90277	AN345R-1.000-E2-R020.0-Z3	1	1	1-1/4	6	.960	3-1/2	3	TICN	0.020	CYLINDRICAL
N90401	AN345R-1.000-E2-R030.0-Z3	1	1	1-1/4	6	.960	3-1/2	3	TICN	0.030	CYLINDRICAL
N90402	AN345R-1.000-E2-R045.0-Z3	1	1	1-1/4	6	.960	3-1/2	3	TICN	0.045	CYLINDRICAL
N90403	AN345R-1.000-E2-R060.0-Z3	1	1	1-1/4	6	.960	3-1/2	3	TICN	0.060	CYLINDRICAL
N90404	AN345R-1.000-E2-R090.0-Z3	1	1	1-1/4	6	.960	3-1/2	3	TICN	0.090	CYLINDRICAL
N90441	AN345R-1.000-E2-R125.0-Z3	1	1	1-1/4	6	.960	3-1/2	3	TICN	0.125	CYLINDRICAL

## AR330

SOLID  
CARBIDE



CENTER  
CUTTING

COARSE  
PITCH




- Form ground flute shape
- Ideal for aluminum and non-ferrous materials
- Reduced radial pressure
- Cutting Data - Page 81
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER	SHANK TYPE
N76195	AR330-0.250-D3-C020.0-Z3	1/4	1/4	3/4	2-1/2	3	UNCOATED	0.020	CYLINDRICAL
N76227	AR330-0.250-D3-C020.0-Z3	1/4	1/4	3/4	2-1/2	3	TICN	0.020	CYLINDRICAL
N76198	AR330-0.375-D1-C020.0-Z3	3/8	3/8	1/2	2	3	UNCOATED	0.020	CYLINDRICAL
N76230	AR330-0.375-D1-C020.0-Z3	3/8	3/8	1/2	2	3	TICN	0.020	CYLINDRICAL
N76199	AR330-0.375-D3-C020.0-Z3	3/8	3/8	1	2-1/2	3	UNCOATED	0.020	CYLINDRICAL
N76231	AR330-0.375-D3-C020.0-Z3	3/8	3/8	1	2-1/2	3	TICN	0.020	CYLINDRICAL
N76203	AR330-0.500-D3-C025.0-Z3	1/2	1/2	1-1/4	3	3	UNCOATED	0.025	CYLINDRICAL
N76235	AR330-0.500-D3-C025.0-Z3	1/2	1/2	1-1/4	3	3	TICN	0.025	CYLINDRICAL
N76205	AR330-0.625-D3-C025.0-Z3	5/8	5/8	1-5/8	3-1/2	3	UNCOATED	0.025	CYLINDRICAL
N76237	AR330-0.625-D3-C025.0-Z3	5/8	5/8	1-5/8	3-1/2	3	TICN	0.025	CYLINDRICAL
N76206	AR330-0.750-D1-C025.0-Z3	3/4	3/4	1	3	3	UNCOATED	0.025	CYLINDRICAL
N76238	AR330-0.750-D1-C025.0-Z3	3/4	3/4	1	3	3	TICN	0.025	CYLINDRICAL
N76207	AR330-0.750-D2-C025.0-Z3	3/4	3/4	1-5/8	4	3	UNCOATED	0.025	CYLINDRICAL
N76239	AR330-0.750-D2-C025.0-Z3	3/4	3/4	1-5/8	4	3	TICN	0.025	CYLINDRICAL
N76209	AR330-1.000-D2-C025.0-Z3	1	1	2	5	3	UNCOATED	0.025	CYLINDRICAL
N76241	AR330-1.000-D2-C025.0-Z3	1	1	2	5	3	TICN	0.025	CYLINDRICAL



# CUTTING DATA - ELITE A SERIES HIGH PERFORMANCE

## A245 / A245R / AB245 - START VALUES

SLOTTING												
ISO GROUP	SMG	a <sub>D</sub> x D <sub>c</sub> (max)	a <sub>E</sub> x D <sub>c</sub> (max)	V <sub>C</sub> (sf / min)	Z <sub>n</sub> = 2							
					1/8	1/4	3/8	1/2	5/8	3/4	1	
N	E 16	1.0	1.00	1000	n (rev/min)	30560	15280	10187	7640	6112	5093	3820
					f <sub>Z</sub> (in)	0.0012	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096
				700 - 1300	V <sub>f</sub> (in/min)	73.3	73.3	73.3	73.3	73.3	73.3	73.3
	E 17	1.0	1.00	800	n (rev/min)	24448	12224	8149	6112	4890	4075	3056
					f <sub>Z</sub> (in)	0.0010	0.0019	0.0029	0.0038	0.0048	0.0058	0.0077
				500 - 1100	V <sub>f</sub> (in/min)	46.9	46.9	46.9	46.9	46.9	46.9	46.9

SIDE MILLING - ROUGHING												
N	E 16	2.0	0.50	1000	n (rev/min)	30560	15280	10187	7640	6112	5093	3820
					f <sub>Z</sub> (in)	0.0015	0.0030	0.0045	0.0060	0.0075	0.0090	0.0120
				700 - 1300	V <sub>f</sub> (in/min)	91.7	91.7	91.7	91.7	91.7	91.7	91.7
	E 17	1.5	0.50	800	n (rev/min)	24448	12224	8149	6112	4890	4075	3056
					f <sub>Z</sub> (in)	0.0012	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096
				500 - 1100	V <sub>f</sub> (in/min)	58.7	58.7	58.7	58.7	58.7	58.7	58.7

## AN245 / ANB245 - START VALUES

SLOTTING												
ISO GROUP	SMG	a <sub>D</sub> x D <sub>c</sub> (max)	a <sub>E</sub> x D <sub>c</sub> (max)	V <sub>C</sub> (sf / min)	Z <sub>n</sub> = 2							
					1/8	1/4	3/8	1/2	5/8	3/4	1	
N	E 16	1.00	1.00	800	n (rev/min)	24448	12224	8149	6112	4890	4075	3056
					f <sub>Z</sub> (in)	0.0010	0.0019	0.0029	0.0039	0.0048	0.0058	0.0077
				500 - 1100	V <sub>f</sub> (in/min)	47.1	47.1	47.1	47.1	47.1	47.1	47.1
	E 17	1.00	1.00	640	n (rev/min)	19558	9779	6519	4890	3912	3260	2445
					f <sub>Z</sub> (in)	0.0008	0.0015	0.0023	0.0031	0.0038	0.0046	0.0061
				340 - 940	V <sub>f</sub> (in/min)	29.8	29.8	29.8	29.8	29.8	29.8	29.8

SIDE MILLING - ROUGHING												
N	E 16	2.00	0.50	800	n (rev/min)	24448	12224	8149	6112	4890	4075	3056
					f <sub>Z</sub> (in)	0.0012	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096
				500 - 1100	V <sub>f</sub> (in/min)	58.7	58.7	58.7	58.7	58.7	58.7	58.7
	E 17	1.50	0.50	640	n (rev/min)	19558	9779	6519	4890	3912	3260	2445
					f <sub>Z</sub> (in)	0.0010	0.0019	0.0029	0.0039	0.0048	0.0058	0.0077
				340 - 940	V <sub>f</sub> (in/min)	37.6	37.6	37.6	37.6	37.6	37.6	37.6

SMG = Seco Material Group  
 n [min-1] = RPM  
 V<sub>C</sub> (sf/min) = Surface feet/min

f<sub>Z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## AN340 - START VALUES

SLOTTING												
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)	Z <sub>n</sub> = 3							
					1/8	1/4	3/8	1/2	5/8	3/4	1	
N	E 16	1.0	1.00	1200	n (rev/min)	36672	18336	12224	9168	7334	6112	4584
					f <sub>z</sub> (in)	0.0019	0.0038	0.0056	0.0075	0.0094	0.0113	0.0150
				900 - 1500	v <sub>f</sub> (in/min)	206.3	206.3	206.3	206.3	206.3	206.3	206.3
	E 17	1.0	1.00	1000	n (rev/min)	30560	15280	10187	7640	6112	5093	3820
					f <sub>z</sub> (in)	0.0019	0.0038	0.0056	0.0075	0.0094	0.0113	0.0150
				700 - 1300	v <sub>f</sub> (in/min)	171.9	171.9	171.9	171.9	171.9	171.9	171.9

SIDE MILLING - ROUGHING												
N	E 16	1.0	0.25	1200	n (rev/min)	36672	18336	12224	9168	7334	6112	4584
					f <sub>z</sub> (in)	0.0028	0.0056	0.0084	0.0113	0.0141	0.0169	0.0225
				900 - 1500	v <sub>f</sub> (in/min)	309.4	309.4	309.4	309.4	309.4	309.4	309.4
	E 17	1.0	0.25	1000	n (rev/min)	30560	15280	10187	7640	6112	5093	3820
					f <sub>z</sub> (in)	0.0028	0.0056	0.0084	0.0113	0.0141	0.0169	0.0225
				700 - 1300	v <sub>f</sub> (in/min)	257.9	257.9	257.9	257.9	257.9	257.9	257.9

## A345 / A345R - START VALUES

SLOTTING												
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)	Z <sub>n</sub> = 3							
					1/8	1/4	3/8	1/2	5/8	3/4	1	
N	E / M / A 16	0.5	1.00	1000	n (rev/min)	30560	15280	10187	7640	6112	5093	3820
					f <sub>z</sub> (in)	0.0012	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096
				700 - 1300	v <sub>f</sub> (in/min)	110.0	110.0	110.0	110.0	110.0	110.0	110.0
	E / M / A 17	0.5	1.00	800	n (rev/min)	24448	12224	8149	6112	4890	4075	3056
					f <sub>z</sub> (in)	0.0010	0.0019	0.0029	0.0038	0.0048	0.0058	0.0077
				500 - 1100	v <sub>f</sub> (in/min)	70.4	70.4	70.4	70.4	70.4	70.4	70.4

SIDE MILLING - ROUGHING												
N	E / M / A 16	2.0	0.40	1000	n (rev/min)	30560	15280	10187	7640	6112	5093	3820
					f <sub>z</sub> (in)	0.0015	0.0030	0.0045	0.0060	0.0075	0.0090	0.0120
				700 - 1300	v <sub>f</sub> (in/min)	137.5	137.5	137.5	137.5	137.5	137.5	137.5
	E / M / A 17	1.5	0.40	800	n (rev/min)	24448	12224	8149	6112	4890	4075	3056
					f <sub>z</sub> (in)	0.0012	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096
				500 - 1100	v <sub>f</sub> (in/min)	88.0	88.0	88.0	88.0	88.0	88.0	88.0

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## AN345 / AN345R - START VALUES

SLOTTING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3							
						1/8	1/4	3/8	1/2	5/8	3/4	1	
N	E 16	0.5	1.00	800		n (rev/min)	24448	12224	8149	6112	4890	4075	3056
						f <sub>z</sub> (in)	0.0010	0.0019	0.0029	0.0039	0.0048	0.0058	0.0077
				500	-	1100	v <sub>f</sub> (in/min)	70.6	70.6	70.6	70.6	70.6	70.6
	E 17	0.5	1.00	640		n (rev/min)	19558	9779	6519	4890	3912	3260	2445
						f <sub>z</sub> (in)	0.0008	0.0015	0.0023	0.0031	0.0038	0.0046	0.0061
				340	-	940	v <sub>f</sub> (in/min)	44.7	44.7	44.7	44.7	44.7	44.7

SIDE MILLING - ROUGHING													
N	E 16	2.0	0.40	800		n (rev/min)	24448	12224	8149	6112	4890	4075	3056
						f <sub>z</sub> (in)	0.0012	0.0024	0.0036	0.0048	0.0060	0.0072	0.0096
				500	-	1100	v <sub>f</sub> (in/min)	88.0	88.0	88.0	88.0	88.0	88.0
	E 17	1.5	0.40	640		n (rev/min)	19558	9779	6519	4890	3912	3260	2445
						f <sub>z</sub> (in)	0.0010	0.0019	0.0029	0.0039	0.0048	0.0058	0.0077
				340	-	940	v <sub>f</sub> (in/min)	56.5	56.5	56.5	56.5	56.5	56.5

## AR330 - START VALUES

SLOTTING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3							
						1/8	1/4	3/8	1/2	5/8	3/4	1	
N	E 16	1.00	1.00	800		n (rev/min)	24448	12224	8149	6112	4890	4075	3056
						f <sub>z</sub> (in)	0.0008	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060
				500	-	1100	v <sub>f</sub> (in/min)	55.0	55.0	55.0	55.0	55.0	55.0
	E 17	1.00	1.00	800		n (rev/min)	24448	12224	8149	6112	4890	4075	3056
						f <sub>z</sub> (in)	0.0008	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060
				500	-	1100	v <sub>f</sub> (in/min)	55.0	55.0	55.0	55.0	55.0	55.0

SIDE MILLING - ROUGHING													
N	E 16	1.00	0.25	1100		n (rev/min)	33616	16808	11205	8404	6723	5603	4202
						f <sub>z</sub> (in)	0.0011	0.0021	0.0032	0.0042	0.0053	0.0063	0.0084
				800	-	1400	v <sub>f</sub> (in/min)	105.9	105.9	105.9	105.9	105.9	105.9
	E 17	1.00	0.25	1100		n (rev/min)	33616	16808	11205	8404	6723	5603	4202
						f <sub>z</sub> (in)	0.0011	0.0021	0.0032	0.0042	0.0053	0.0063	0.0084
				800	-	1400	v <sub>f</sub> (in/min)	105.9	105.9	105.9	105.9	105.9	105.9

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## A345M - START VALUES

SLOTTING																		
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3												
						3	4	5	6	8	10	12	14	16	20	25		
N	E 16	0.5	1.00	1000	-	1300	n (min-1)	32343	24257	19406	16171	12129	9703	8086	6931	6064	4851	3881
							fz (in)	0.0011	0.0015	0.0019	0.0023	0.0030	0.0038	0.0045	0.0053	0.0060	0.0076	0.0094
							vf (in/min)	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0
	E 17	0.5	1.00	800	-	1100	n (min-1)	25874	19406	15524	12937	9703	7762	6469	5544	4851	3881	3105
							fz (in)	0.0009	0.0012	0.0015	0.0018	0.0024	0.0030	0.0036	0.0042	0.0049	0.0061	0.0076
							vf (in/min)	70.6	70.6	70.6	70.6	70.6	70.6	70.6	70.6	70.6	70.6	70.6

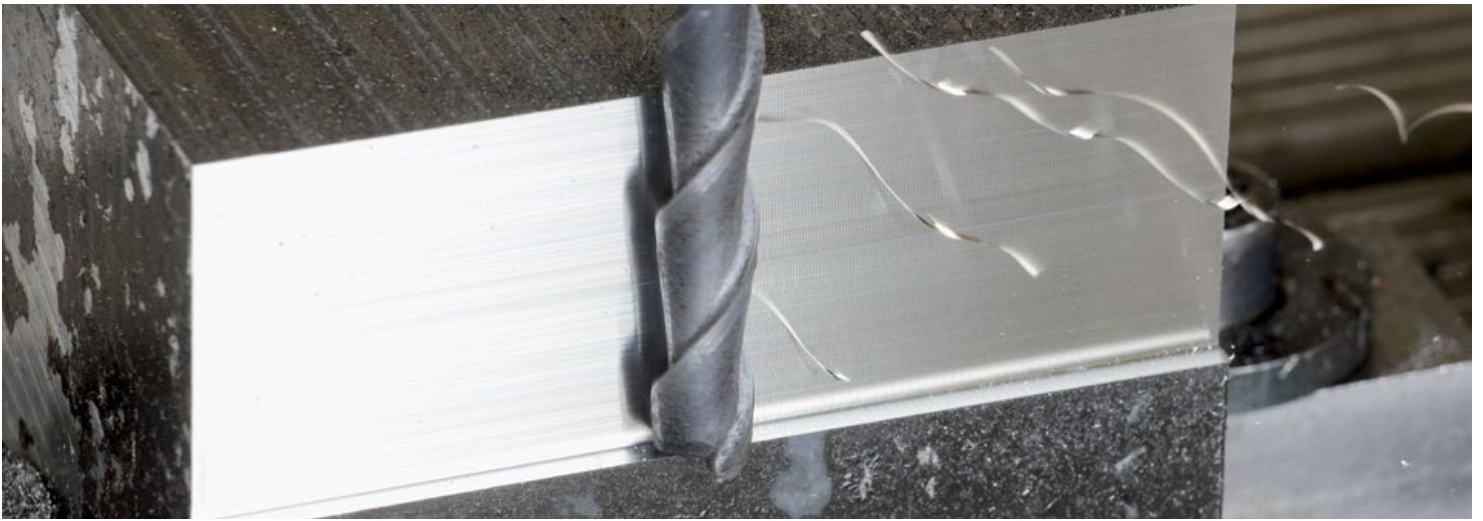
  

SIDE MILLING - ROUGHING																		
N	E 16	2.0	0.40	1000	-	1300	n (min-1)	32343	24257	19406	16171	12129	9703	8086	6931	6064	4851	3881
							fz (in)	0.0014	0.0019	0.0024	0.0028	0.0038	0.0047	0.0057	0.0066	0.0076	0.0094	0.0118
							vf (in/min)	137.5	137.5	137.5	137.5	137.5	137.5	137.5	137.5	137.5	137.5	137.5
	E 17	1.5	0.40	800	-	1100	n (min-1)	25874	19406	15524	12937	9703	7762	6469	5544	4851	3881	3105
							fz (in)	0.0011	0.0015	0.0019	0.0023	0.0030	0.0038	0.0045	0.0053	0.0060	0.0076	0.0094
							vf (in/min)	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## SOLID CARBIDE LONG FLUTE END MILL FOR ONE PASS FINISHING

# NS240R LONG FLUTE FINISHER

The Niagara NS240R long flute finisher is a geometry for optimized performance in general machining. The NS240R allows one pass machining in square shoulder milling applications, thus reducing cycle time. These end mills are designed especially to produce high tolerance straight walls in deep pockets and to provide excellent surface quality.

The Niagara long flute finishers are offered with a 5xD depth of cut as standard, ranging in diameters from 1/4" to 1 1/4" with various radii available.

The NS240R is effective in most materials but excels in stainless steel and titanium. A typical application for this end mill is in the manufacture of aerospace structural parts made from titanium and aluminum.

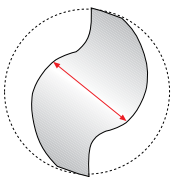
### PRODUCT OVERVIEW

- NS240R stabilized edge design gives improved surface quality
- Increased core diameter for more stability
- Defined back taper from cutting length to compensate tool deflection
- Polished AlTiN coating gives increased tool life

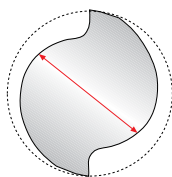
### YOUR NIAGARA CUTTER BENEFIT

- Optimized finishing
- Vibration free machining
- High surface quality
- Correct workpiece dimensions in a single pass
- High process stability
- Aerospace corner radii available on some diameters

### INCREASED CORE DIAMETER



Typical two flute core diameter

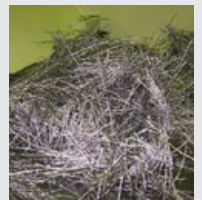
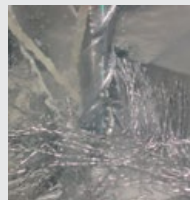


NS240R core diameter

The enlarged core diameter provides better cutter stability and less tool deflection during machining.

### NS240R APPLICATION EXAMPLE

Material	Titanium	
Spindle	BT50	
Cutter	NS240R	
Diameter	1 1/4"	
Cutting data	$v_c$	165 sf/min
	$n$	497 rev/min
	$f_z$	.012"
	$v_f$	12 ipm
	$a_e$	.012"
	$a_p$	5.5"
	$h_m$	.0011"
	$Q$	.50 in <sup>3</sup> /min
	Ra	0.51 $\mu$ m



### COMMON APPLICATION AREAS

- Aerospace: wing parts, body and floor panels, engine casings, brackets

## NS240R

SOLID  
CARBIDE



RADIUS



CENTER  
CUTTING

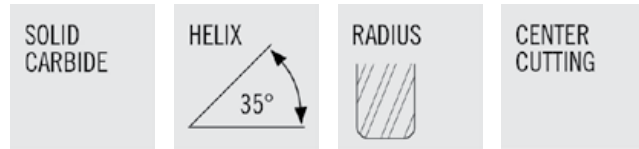


- Rigid design to minimize tool deflection
- Designed for peripheral finish milling of aerospace parts requiring long axial engagement in materials such as titanium, stainless steels, and super alloys.
- Cutting Data - Page 97
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N00291	NS240R-0.250-D1-R010.0-Z2	1/4	1/4	1-1/4	3	2	ALTIN	0.010	CYLINDRICAL
N00292	NS240R-0.313-D1-R010.0-Z2	5/16	5/16	1-1/2	3-1/2	2	ALTIN	0.010	CYLINDRICAL
N00293	NS240R-0.375-D1-R010.0-Z2	3/8	3/8	1-7/8	4	2	ALTIN	0.010	CYLINDRICAL
N00294	NS240R-0.500-D1-R010.0-Z2	1/2	1/2	2-1/2	5	2	ALTIN	0.010	CYLINDRICAL
N00295	NS240R-0.625-D1-R015.0-Z2	5/8	5/8	3-1/8	6	2	ALTIN	0.015	CYLINDRICAL
N00296	NS240R-0.750-D1-R015.0-Z2	3/4	3/4	3-3/4	7	2	ALTIN	0.015	CYLINDRICAL
N00297	NS240R-0.750-D1-R120.0-Z2	3/4	3/4	3-3/4	7	2	ALTIN	0.120	CYLINDRICAL
N00298	NS240R-0.750-D1-R250.0-Z2	3/4	3/4	3-3/4	7	2	ALTIN	0.250	CYLINDRICAL
N00299	NS240R-1.000-D1-R015.0-Z2	1	1	5	8	2	ALTIN	0.015	CYLINDRICAL
N00300	NS240R-1.000-D1-R120.0-Z2	1	1	5	8	2	ALTIN	0.120	CYLINDRICAL
N00301	NS240R-1.000-D1-R250.0-Z2	1	1	5	8	2	ALTIN	0.250	CYLINDRICAL
N00302	NS240R-1.250-D1-R015.0-Z2	1-1/4	1-1/4	6-1/4	9-1/2	2	ALTIN	0.015	CYLINDRICAL
N00303	NS240R-1.250-D1-R120.0-Z2	1-1/4	1-1/4	6-1/4	9-1/2	2	ALTIN	0.120	CYLINDRICAL
N00304	NS240R-1.250-D1-R250.0-Z2	1-1/4	1-1/4	6-1/4	9-1/2	2	ALTIN	0.250	CYLINDRICAL

**DUE TO THE LONG AXIAL ENGAGEMENT THE LENGTH OF CHIP CAN BE DIFFICULT TO EVACUATE. GOOD COOLANT VOLUME, VELOCITY, AND DIRECTION IS REQUIRED TO FLUSH THE LONG CHIPS AWAY FROM THE CUTTING ZONE TO AVOID RE-CUTTING OF CHIPS.**

## S335

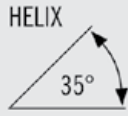


- Ideal for slotting in steel, stainless steel, titanium, and high temperature alloys
- Large area for chip evacuation
- Cutting Data - Page 98-99
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N61802	S335-0.125-D2-R010.0-Z3	1/8	1/8	1/4	1-1/2	3	ALTIN	0.010	CYLINDRICAL
N61803	S335-0.125-D4-R010.0-Z3	1/8	1/8	1/2	1-1/2	3	ALTIN	0.010	CYLINDRICAL
N61804	S335-0.156-F2-R010.0-Z3	5/32	3/16	5/16	2	3	ALTIN	0.010	CYLINDRICAL
N61805	S335-0.156-F4-R010.0-Z3	5/32	3/16	9/16	2	3	ALTIN	0.010	CYLINDRICAL
N61806	S335-0.188-D2-R010.0-Z3	3/16	3/16	5/16	2	3	ALTIN	0.010	CYLINDRICAL
N61807	S335-0.188-D3-R010.0-Z3	3/16	3/16	9/16	2	3	ALTIN	0.010	CYLINDRICAL
N61808	S335-0.219-F2-R020.0-Z3	7/32	1/4	3/8	2	3	ALTIN	0.020	CYLINDRICAL
N61809	S335-0.219-F3-R020.0-Z3	7/32	1/4	3/4	2-1/2	3	ALTIN	0.020	CYLINDRICAL
N61810	S335-0.250-D2-R020.0-Z3	1/4	1/4	3/8	2	3	ALTIN	0.020	CYLINDRICAL
N61811	S335-0.250-D3-R020.0-Z3	1/4	1/4	3/4	2-1/2	3	ALTIN	0.020	CYLINDRICAL
N61812	S335-0.281-F2-R020.0-Z3	9/32	5/16	7/16	2	3	ALTIN	0.020	CYLINDRICAL
N61813	S335-0.281-F3-R020.0-Z3	9/32	5/16	13/16	2-1/2	3	ALTIN	0.020	CYLINDRICAL
N61814	S335-0.313-D1-R020.0-Z3	5/16	5/16	7/16	2	3	ALTIN	0.020	CYLINDRICAL
N61815	S335-0.313-D3-R020.0-Z3	5/16	5/16	13/16	2-1/2	3	ALTIN	0.020	CYLINDRICAL
N61818	S335-0.375-D1-R020.3-Z3	3/8	3/8	1/2	2	3	ALTIN	0.020	WELDON
N61819	S335-0.375-D3-R020.3-Z3	3/8	3/8	1	2-1/2	3	ALTIN	0.020	WELDON
N61820	S335-0.438-D1-R020.3-Z3	7/16	7/16	9/16	2-1/2	3	ALTIN	0.020	WELDON
N61821	S335-0.438-D2-R020.3-Z3	7/16	7/16	1	2-3/4	3	ALTIN	0.020	WELDON
N61822	S335-0.500-D1-R030.3-Z3	1/2	1/2	5/8	2-1/2	3	ALTIN	0.030	WELDON
N61823	S335-0.500-D3-R030.3-Z3	1/2	1/2	1-1/4	3	3	ALTIN	0.030	WELDON
N61824	S335-0.625-D1-R030.3-Z3	5/8	5/8	3/4	3	3	ALTIN	0.030	WELDON
N61825	S335-0.625-D3-R030.3-Z3	5/8	5/8	1-5/8	3-1/2	3	ALTIN	0.030	WELDON
N61826	S335-0.750-D1-R030.3-Z3	3/4	3/4	1	3	3	ALTIN	0.030	WELDON
N61827	S335-0.750-D2-R030.3-Z3	3/4	3/4	1-5/8	4	3	ALTIN	0.030	WELDON
N61828	S335-1.000-D1-R030.3-Z3	1	1	1-1/4	4	3	ALTIN	0.030	WELDON
N61829	S335-1.000-D2-R030.3-Z3	1	1	2	5	3	ALTIN	0.030	WELDON

## SB335

SOLID  
CARBIDE



CENTER  
CUTTING

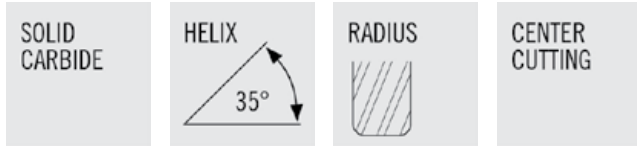


- Ideal for slotting in steel, stainless steel, titanium and high temperature alloys
- Large area for chip evacuation
- Cutting Data - Page 100-101
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N66218	SB335-0.125-D2-B.0-Z3	1/8	1/8	1/4	1-1/2	3	ALTIN	CYLINDRICAL
N66219	SB335-0.125-D4-B.0-Z3	1/8	1/8	1/2	1-1/2	3	ALTIN	CYLINDRICAL
N66220	SB335-0.156-F2-B.0-Z3	5/32	3/16	5/16	2	3	ALTIN	CYLINDRICAL
N66221	SB335-0.156-F4-B.0-Z3	5/32	3/16	9/16	2	3	ALTIN	CYLINDRICAL
N66222	SB335-0.188-D2-B.0-Z3	3/16	3/16	5/16	2	3	ALTIN	CYLINDRICAL
N66223	SB335-0.188-D3-B.0-Z3	3/16	3/16	9/16	2	3	ALTIN	CYLINDRICAL
N66224	SB335-0.219-F2-B.0-Z3	7/32	1/4	3/8	2	3	ALTIN	CYLINDRICAL
N66225	SB335-0.219-F3-B.0-Z3	7/32	1/4	3/4	2-1/2	3	ALTIN	CYLINDRICAL
N66226	SB335-0.250-D2-B.0-Z3	1/4	1/4	3/8	2	3	ALTIN	CYLINDRICAL
N66227	SB335-0.250-D3-B.0-Z3	1/4	1/4	3/4	2-1/2	3	ALTIN	CYLINDRICAL
N66228	SB335-0.281-F2-B.0-Z3	9/32	5/16	7/16	2	3	ALTIN	CYLINDRICAL
N66229	SB335-0.281-F3-B.0-Z3	9/32	5/16	13/16	2-1/2	3	ALTIN	CYLINDRICAL
N66230	SB335-0.313-D1-B.0-Z3	5/16	5/16	7/16	2	3	ALTIN	CYLINDRICAL
N66231	SB335-0.313-D3-B.0-Z3	5/16	5/16	13/16	2-1/2	3	ALTIN	CYLINDRICAL
N66232	SB335-0.344-F1-B.3-Z3	11/32	3/8	1/2	2	3	ALTIN	WELDON
N66233	SB335-0.344-F3-B.3-Z3	11/32	3/8	1	2-1/2	3	ALTIN	WELDON
N66234	SB335-0.375-D1-B.3-Z3	3/8	3/8	1/2	2	3	ALTIN	WELDON
N66235	SB335-0.375-D3-B.3-Z3	3/8	3/8	1	2-1/2	3	ALTIN	WELDON
N66236	SB335-0.438-D1-B.3-Z3	7/16	7/16	9/16	2-1/2	3	ALTIN	WELDON
N66237	SB335-0.438-D2-B.3-Z3	7/16	7/16	1	2-3/4	3	ALTIN	WELDON
N66238	SB335-0.500-D1-B.3-Z3	1/2	1/2	5/8	2-1/2	3	ALTIN	WELDON
N66239	SB335-0.500-D3-B.3-Z3	1/2	1/2	1-1/4	3	3	ALTIN	WELDON
N66241	SB335-0.625-D3-B.3-Z3	5/8	5/8	1-5/8	3-1/2	3	ALTIN	WELDON
N66243	SB335-0.750-D2-B.3-Z3	3/4	3/4	1-5/8	4	3	ALTIN	WELDON
N66245	SB335-1.000-D2-B.3-Z3	1	1	2	5	3	ALTIN	WELDON



## SN335

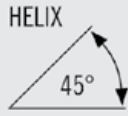


- Ideal for slotting, pocketing and long reach peripheral milling in steel, stainless steel, titanium, and exotic alloys
- Cutting Data - Page 102-103
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	RADIUS	SHANK TYPE
N18648	SN335-0.250-E2-R020.0-Z3	1/4	1/4	3/8	4	.240	2-1/8	3	ALTIN	0.020	CYLINDRICAL
N18650	SN335-0.375-E1-R020.3-Z3	3/8	3/8	1/2	4	.360	2-1/8	3	ALTIN	0.020	WELDON
N18651	SN335-0.375-E2-R020.3-Z3	3/8	3/8	1/2	6	.360	3-3/8	3	ALTIN	0.020	WELDON
N18654	SN335-0.500-E1-R030.3-Z3	1/2	1/2	5/8	4	.480	2-1/8	3	ALTIN	0.030	WELDON
N18655	SN335-0.500-E2-R030.3-Z3	1/2	1/2	5/8	5	.480	3-1/8	3	ALTIN	0.030	WELDON
N18656	SN335-0.500-E3-R030.3-Z3	1/2	1/2	5/8	6	.480	4-1/8	3	ALTIN	0.030	WELDON
N18657	SN335-0.625-E1-R030.3-Z3	5/8	5/8	3/4	4	.600	2-1/8	3	ALTIN	0.030	WELDON
N18659	SN335-0.625-E3-R030.3-Z3	5/8	5/8	3/4	6	.600	4	3	ALTIN	0.030	WELDON
N18661	SN335-0.750-E2-R030.3-Z3	3/4	3/4	1	5	.720	3	3	ALTIN	0.030	WELDON

## S545

SOLID  
CARBIDE



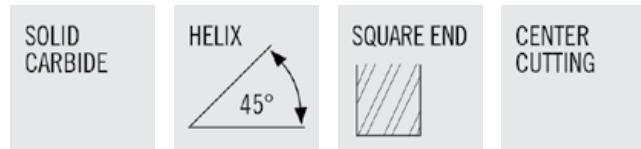
CENTER  
CUTTING



- Eccentric primary relief
- Ideal for peripheral finish milling in steel, stainless steel, titanium and high temperature alloys
- Cutting Data - Page 104
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N61830	S545-0.125-D2-S.0-Z5	1/8	1/8	1/4	1-1/2	5	UNCOATED	CYLINDRICAL
N61983	S545-0.125-D2-S.0-Z5	1/8	1/8	1/4	1-1/2	5	ALTIN	CYLINDRICAL
N61831	S545-0.125-D4-S.0-Z5	1/8	1/8	1/2	1-1/2	5	UNCOATED	CYLINDRICAL
N61984	S545-0.125-D4-S.0-Z5	1/8	1/8	1/2	1-1/2	5	ALTIN	CYLINDRICAL
N61832	S545-0.156-F2-S.0-Z5	5/32	3/16	5/16	2	5	UNCOATED	CYLINDRICAL
N61985	S545-0.156-F2-S.0-Z5	5/32	3/16	5/16	2	5	ALTIN	CYLINDRICAL
N61833	S545-0.156-F4-S.0-Z5	5/32	3/16	9/16	2	5	UNCOATED	CYLINDRICAL
N61986	S545-0.156-F4-S.0-Z5	5/32	3/16	9/16	2	5	ALTIN	CYLINDRICAL
N61834	S545-0.188-D2-S.0-Z5	3/16	3/16	5/16	2	5	UNCOATED	CYLINDRICAL
N61987	S545-0.188-D2-S.0-Z5	3/16	3/16	5/16	2	5	ALTIN	CYLINDRICAL
N61835	S545-0.188-D3-S.0-Z5	3/16	3/16	9/16	2	5	UNCOATED	CYLINDRICAL
N61988	S545-0.188-D3-S.0-Z5	3/16	3/16	9/16	2	5	ALTIN	CYLINDRICAL
N61836	S545-0.219-F2-S.0-Z5	7/32	1/4	3/8	2	5	UNCOATED	CYLINDRICAL
N61989	S545-0.219-F2-S.0-Z5	7/32	1/4	3/8	2	5	ALTIN	CYLINDRICAL
N61837	S545-0.219-F3-S.0-Z5	7/32	1/4	3/4	2-1/2	5	UNCOATED	CYLINDRICAL
N61990	S545-0.219-F3-S.0-Z5	7/32	1/4	3/4	2-1/2	5	ALTIN	CYLINDRICAL
N61838	S545-0.250-D2-S.0-Z5	1/4	1/4	3/8	2	5	UNCOATED	CYLINDRICAL
N61991	S545-0.250-D2-S.0-Z5	1/4	1/4	3/8	2	5	ALTIN	CYLINDRICAL
N61839	S545-0.250-D3-S.0-Z5	1/4	1/4	3/4	2-1/2	5	UNCOATED	CYLINDRICAL
N61992	S545-0.250-D3-S.0-Z5	1/4	1/4	3/4	2-1/2	5	ALTIN	CYLINDRICAL
N61840	S545-0.250-D5-S.0-Z5	1/4	1/4	1-1/4	4	5	UNCOATED	CYLINDRICAL
N61993	S545-0.250-D5-S.0-Z5	1/4	1/4	1-1/4	4	5	ALTIN	CYLINDRICAL
N61842	S545-0.281-F3-S.0-Z5	9/32	5/16	13/16	2-1/2	5	UNCOATED	CYLINDRICAL
N61995	S545-0.281-F3-S.0-Z5	9/32	5/16	13/16	2-1/2	5	ALTIN	CYLINDRICAL
N61843	S545-0.313-D1-S.0-Z5	5/16	5/16	7/16	2	5	UNCOATED	CYLINDRICAL
N61996	S545-0.313-D1-S.0-Z5	5/16	5/16	7/16	2	5	ALTIN	CYLINDRICAL
N61844	S545-0.313-D3-S.0-Z5	5/16	5/16	13/16	2-1/2	5	UNCOATED	CYLINDRICAL
N61997	S545-0.313-D3-S.0-Z5	5/16	5/16	13/16	2-1/2	5	ALTIN	CYLINDRICAL
N61845	S545-0.313-D4-S.0-Z5	5/16	5/16	1-1/4	4	5	UNCOATED	CYLINDRICAL
N61998	S545-0.313-D4-S.0-Z5	5/16	5/16	1-1/4	4	5	ALTIN	CYLINDRICAL
N61846	S545-0.313-D7-S.0-Z5	5/16	5/16	2-1/8	4	5	UNCOATED	CYLINDRICAL
N61999	S545-0.313-D7-S.0-Z5	5/16	5/16	2-1/8	4	5	ALTIN	CYLINDRICAL
N61849	S545-0.375-D1-S.0-Z5	3/8	3/8	1/2	2	5	UNCOATED	CYLINDRICAL
N62002	S545-0.375-D1-S.0-Z5	3/8	3/8	1/2	2	5	ALTIN	CYLINDRICAL

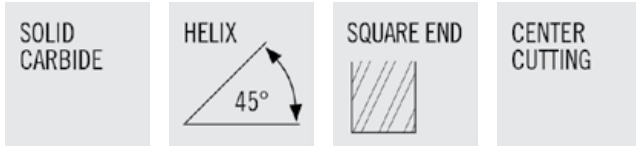
**S545 (CON'T)**



- Eccentric primary relief
- Ideal for peripheral finish milling in steel, stainless steel, titanium and high temperature alloys
- Cutting Data - Page 104
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N61850	S545-0.375-D3-S.0-Z5	3/8	3/8	1	2-1/2	5	UNCOATED	CYLINDRICAL
N62003	S545-0.375-D3-S.0-Z5	3/8	3/8	1	2-1/2	5	ALTIN	CYLINDRICAL
N61851	S545-0.375-D4-S.0-Z5	3/8	3/8	1-1/2	4	5	UNCOATED	CYLINDRICAL
N62004	S545-0.375-D4-S.0-Z5	3/8	3/8	1-1/2	4	5	ALTIN	CYLINDRICAL
N61852	S545-0.375-D7-S.0-Z5	3/8	3/8	2-1/2	6	5	UNCOATED	CYLINDRICAL
N62005	S545-0.375-D7-S.0-Z5	3/8	3/8	2-1/2	6	5	ALTIN	CYLINDRICAL
N61855	S545-0.438-D1-S.0-Z5	7/16	7/16	9/16	2-1/2	5	UNCOATED	CYLINDRICAL
N62008	S545-0.438-D1-S.0-Z5	7/16	7/16	9/16	2-1/2	5	ALTIN	CYLINDRICAL
N61856	S545-0.438-D2-S.0-Z5	7/16	7/16	1	2-3/4	5	UNCOATED	CYLINDRICAL
N62009	S545-0.438-D2-S.0-Z5	7/16	7/16	1	2-3/4	5	ALTIN	CYLINDRICAL
N61857	S545-0.438-D5-S.0-Z5	7/16	7/16	2	4	5	UNCOATED	CYLINDRICAL
N62010	S545-0.438-D5-S.0-Z5	7/16	7/16	2	4	5	ALTIN	CYLINDRICAL
N61860	S545-0.500-D1-S.0-Z5	1/2	1/2	5/8	2-1/2	5	UNCOATED	CYLINDRICAL
N62013	S545-0.500-D1-S.0-Z5	1/2	1/2	5/8	2-1/2	5	ALTIN	CYLINDRICAL
N61861	S545-0.500-D3-S.0-Z5	1/2	1/2	1-1/4	3	5	UNCOATED	CYLINDRICAL
N62014	S545-0.500-D3-S.0-Z5	1/2	1/2	1-1/4	3	5	ALTIN	CYLINDRICAL
N61862	S545-0.500-D4-S.0-Z5	1/2	1/2	2	4	5	UNCOATED	CYLINDRICAL
N62015	S545-0.500-D4-S.0-Z5	1/2	1/2	2	4	5	ALTIN	CYLINDRICAL
N61863	S545-0.500-D6-S.0-Z5	1/2	1/2	3-1/8	6	5	UNCOATED	CYLINDRICAL
N62016	S545-0.500-D6-S.0-Z5	1/2	1/2	3-1/8	6	5	ALTIN	CYLINDRICAL
N55330	S545-0.563-D3-S.0-Z5	9/16	9/16	1-1/2	3-1/2	5	UNCOATED	CYLINDRICAL
N55333	S545-0.563-D3-S.0-Z5	9/16	9/16	1-1/2	3-1/2	5	ALTIN	CYLINDRICAL
N61864	S545-0.625-D1-S.0-Z5	5/8	5/8	3/4	3	5	UNCOATED	CYLINDRICAL
N62017	S545-0.625-D1-S.0-Z5	5/8	5/8	3/4	3	5	ALTIN	CYLINDRICAL
N61865	S545-0.625-D3-S.0-Z5	5/8	5/8	1-5/8	3-1/2	5	UNCOATED	CYLINDRICAL
N62018	S545-0.625-D3-S.0-Z5	5/8	5/8	1-5/8	3-1/2	5	ALTIN	CYLINDRICAL
N61866	S545-0.625-D4-S.0-Z5	5/8	5/8	2-1/2	5	5	UNCOATED	CYLINDRICAL
N62019	S545-0.625-D4-S.0-Z5	5/8	5/8	2-1/2	5	5	ALTIN	CYLINDRICAL
N61867	S545-0.625-D6-S.0-Z5	5/8	5/8	4	6	5	UNCOATED	CYLINDRICAL
N62020	S545-0.625-D6-S.0-Z5	5/8	5/8	4	6	5	ALTIN	CYLINDRICAL
N61868	S545-0.750-D1-S.0-Z5	3/4	3/4	1	3	5	UNCOATED	CYLINDRICAL
N62021	S545-0.750-D1-S.0-Z5	3/4	3/4	1	3	5	ALTIN	CYLINDRICAL
N61869	S545-0.750-D2-S.0-Z5	3/4	3/4	1-5/8	4	5	UNCOATED	CYLINDRICAL
N62022	S545-0.750-D2-S.0-Z5	3/4	3/4	1-5/8	4	5	ALTIN	CYLINDRICAL

**S545 (CONT'D) & S545M**

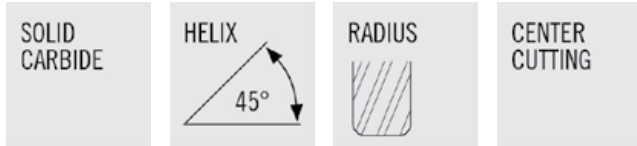


- Eccentric primary relief
- Ideal for peripheral finish milling in steel, stainless steel, titanium and high temperature alloys

- Cutting Data S545 - Page 104
- Tolerance Specs S545 - Page 335
- Cutting Data S545M - Page 107
- Tolerance Specs S545M - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
<b>INCH - S545 (CONT'D)</b>								
N61870	S545-0.750-D3-S.0-Z5	3/4	3/4	2-1/4	5	5	UNCOATED	CYLINDRICAL
N62023	S545-0.750-D3-S.0-Z5	3/4	3/4	2-1/4	5	5	ALTIN	CYLINDRICAL
N61871	S545-0.750-D4-S.0-Z5	3/4	3/4	3-1/4	6	5	UNCOATED	CYLINDRICAL
N62024	S545-0.750-D4-S.0-Z5	3/4	3/4	3-1/4	6	5	ALTIN	CYLINDRICAL
N61872	S545-0.750-D5-S.0-Z5	3/4	3/4	4	6	5	UNCOATED	CYLINDRICAL
N62025	S545-0.750-D5-S.0-Z5	3/4	3/4	4	6	5	ALTIN	CYLINDRICAL
N61873	S545-1.000-D1-S.0-Z5	1	1	1-1/4	4	5	UNCOATED	CYLINDRICAL
N62026	S545-1.000-D1-S.0-Z5	1	1	1-1/4	4	5	ALTIN	CYLINDRICAL
N61874	S545-1.000-D2-S.0-Z5	1	1	2	4	5	UNCOATED	CYLINDRICAL
N62027	S545-1.000-D2-S.0-Z5	1	1	2	4	5	ALTIN	CYLINDRICAL
N61875	S545-1.000-D3-S.0-Z5	1	1	2-5/8	6	5	UNCOATED	CYLINDRICAL
N62028	S545-1.000-D3-S.0-Z5	1	1	2-5/8	6	5	ALTIN	CYLINDRICAL
N61876	S545-1.000-D4-S.0-Z5	1	1	3-1/4	6	5	UNCOATED	CYLINDRICAL
N62029	S545-1.000-D4-S.0-Z5	1	1	3-1/4	6	5	ALTIN	CYLINDRICAL
N61877	S545-1.000-D5-S.0-Z5	1	1	4-1/8	7	5	UNCOATED	CYLINDRICAL
N62030	S545-1.000-D5-S.0-Z5	1	1	4-1/8	7	5	ALTIN	CYLINDRICAL
N61878	S545-1.250-D2-S.0-Z7	1-1/4	1-1/4	2	4-1/2	7	UNCOATED	CYLINDRICAL
N62031	S545-1.250-D2-S.0-Z7	1-1/4	1-1/4	2	4-1/2	7	ALTIN	CYLINDRICAL
N61879	S545-1.250-D3-S.0-Z7	1-1/4	1-1/4	3-1/4	6	7	UNCOATED	CYLINDRICAL
N62032	S545-1.250-D3-S.0-Z7	1-1/4	1-1/4	3-1/4	6	7	ALTIN	CYLINDRICAL
N61880	S545-1.250-D4-S.0-Z7	1-1/4	1-1/4	5	7-1/2	7	UNCOATED	CYLINDRICAL
N62033	S545-1.250-D4-S.0-Z7	1-1/4	1-1/4	5	7-1/2	7	ALTIN	CYLINDRICAL
<b>METRIC - S545M</b>								
N67967	S545M-040-D3-S.0-Z5	4MM	4MM	11MM	50MM	5	ALTIN	CYLINDRICAL
N67969	S545M-060-D2-S.0-Z5	6MM	6MM	13MM	57MM	5	ALTIN	CYLINDRICAL
N67970	S545M-080-D2-S.0-Z5	8MM	8MM	19MM	63MM	5	ALTIN	CYLINDRICAL
N67972	S545M-100-D2-S.0-Z5	10MM	10MM	22MM	72MM	5	ALTIN	CYLINDRICAL
N67973	S545M-120-D2-S.0-Z5	12MM	12MM	26MM	83MM	5	ALTIN	CYLINDRICAL

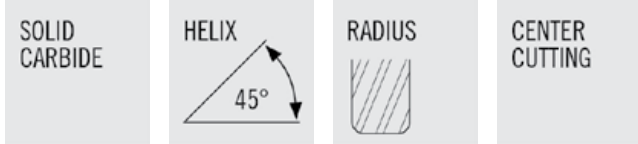
## S545R



- Eccentric primary relief
- Ideal for peripheral finish milling in steel, stainless steel, titanium and high temperature alloys
- Cutting Data - Page 104
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N90927	S545R-0.125-D2-R015.0-Z5	1/8	1/8	1/4	1-1/2	5	ALTIN	0.015	CYLINDRICAL
N90928	S545R-0.125-D2-R020.0-Z5	1/8	1/8	1/4	1-1/2	5	ALTIN	0.020	CYLINDRICAL
N90929	S545R-0.125-D4-R015.0-Z5	1/8	1/8	1/2	1-1/2	5	ALTIN	0.015	CYLINDRICAL
N90930	S545R-0.125-D4-R020.0-Z5	1/8	1/8	1/2	1-1/2	5	ALTIN	0.020	CYLINDRICAL
N90931	S545R-0.188-D2-R015.0-Z5	3/16	3/16	5/16	2	5	ALTIN	0.015	CYLINDRICAL
N90932	S545R-0.188-D2-R020.0-Z5	3/16	3/16	5/16	2	5	ALTIN	0.020	CYLINDRICAL
N90908	S545R-0.188-D3-R015.0-Z5	3/16	3/16	9/16	2	5	ALTIN	0.015	CYLINDRICAL
N90933	S545R-0.188-D3-R020.0-Z5	3/16	3/16	9/16	2	5	ALTIN	0.020	CYLINDRICAL
N90935	S545R-0.250-D2-R015.0-Z5	1/4	1/4	3/8	2	5	ALTIN	0.015	CYLINDRICAL
N90936	S545R-0.250-D2-R020.0-Z5	1/4	1/4	3/8	2	5	ALTIN	0.020	CYLINDRICAL
N90937	S545R-0.250-D2-R030.0-Z5	1/4	1/4	3/8	2	5	ALTIN	0.030	CYLINDRICAL
N90938	S545R-0.250-D2-R045.0-Z5	1/4	1/4	3/8	2	5	ALTIN	0.045	CYLINDRICAL
N90926	S545R-0.250-D3-R015.0-Z5	1/4	1/4	3/4	2-1/2	5	ALTIN	0.015	CYLINDRICAL
N90940	S545R-0.250-D3-R020.0-Z5	1/4	1/4	3/4	2-1/2	5	ALTIN	0.020	CYLINDRICAL
N90934	S545R-0.250-D3-R030.0-Z5	1/4	1/4	3/4	2-1/2	5	ALTIN	0.030	CYLINDRICAL
N90941	S545R-0.250-D3-R045.0-Z5	1/4	1/4	3/4	2-1/2	5	ALTIN	0.045	CYLINDRICAL
N90943	S545R-0.313-D1-R015.0-Z5	5/16	5/16	7/16	2	5	ALTIN	0.015	CYLINDRICAL
N90945	S545R-0.313-D1-R030.0-Z5	5/16	5/16	7/16	2	5	ALTIN	0.030	CYLINDRICAL
N90944	S545R-0.313-D1-R020.0-Z5	5/16	5/16	7/16	2	5	ALTIN	0.020	CYLINDRICAL
N90946	S545R-0.313-D1-R045.0-Z5	5/16	5/16	7/16	2	5	ALTIN	0.045	CYLINDRICAL
N90947	S545R-0.313-D3-R015.0-Z5	5/16	5/16	13/16	2-1/2	5	ALTIN	0.015	CYLINDRICAL
N90948	S545R-0.313-D3-R020.0-Z5	5/16	5/16	13/16	2-1/2	5	ALTIN	0.020	CYLINDRICAL
N90939	S545R-0.313-D3-R030.0-Z5	5/16	5/16	13/16	2-1/2	5	ALTIN	0.030	CYLINDRICAL
N90949	S545R-0.313-D3-R045.0-Z5	5/16	5/16	13/16	2-1/2	5	ALTIN	0.045	CYLINDRICAL
N90950	S545R-0.375-D1-R015.0-Z5	3/8	3/8	1/2	2	5	ALTIN	0.015	CYLINDRICAL
N90952	S545R-0.375-D1-R020.0-Z5	3/8	3/8	1/2	2	5	ALTIN	0.020	CYLINDRICAL
N90953	S545R-0.375-D1-R030.0-Z5	3/8	3/8	1/2	2	5	ALTIN	0.030	CYLINDRICAL
N90954	S545R-0.375-D1-R045.0-Z5	3/8	3/8	1/2	2	5	ALTIN	0.045	CYLINDRICAL
N90955	S545R-0.375-D1-R060.0-Z5	3/8	3/8	1/2	2	5	ALTIN	0.060	CYLINDRICAL
N90956	S545R-0.375-D3-R015.0-Z5	3/8	3/8	1	2-1/2	5	ALTIN	0.015	CYLINDRICAL
N90957	S545R-0.375-D3-R020.0-Z5	3/8	3/8	1	2-1/2	5	ALTIN	0.020	CYLINDRICAL
N90958	S545R-0.375-D3-R030.0-Z5	3/8	3/8	1	2-1/2	5	ALTIN	0.030	CYLINDRICAL
N90942	S545R-0.375-D3-R045.0-Z5	3/8	3/8	1	2-1/2	5	ALTIN	0.045	CYLINDRICAL
N90960	S545R-0.438-D1-R015.0-Z5	7/16	7/16	9/16	2-1/2	5	ALTIN	0.015	CYLINDRICAL
N90961	S545R-0.438-D1-R020.0-Z5	7/16	7/16	9/16	2-1/2	5	ALTIN	0.020	CYLINDRICAL
N90962	S545R-0.438-D1-R030.0-Z5	7/16	7/16	9/16	2-1/2	5	ALTIN	0.030	CYLINDRICAL

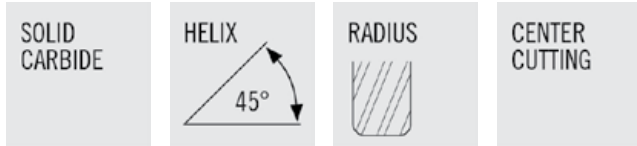
# S545R (CONT'D)



- Eccentric primary relief
- Ideal for peripheral finish milling in steel, stainless steel, titanium and high temperature alloys
- Cutting Data - Page 104
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N90963	S545R-0.438-D1-R045.0-Z5	7/16	7/16	9/16	2-1/2	5	ALTIN	0.045	CYLINDRICAL
N90964	S545R-0.438-D1-R060.0-Z5	7/16	7/16	9/16	2-1/2	5	ALTIN	0.060	CYLINDRICAL
N90965	S545R-0.438-D1-R090.0-Z5	7/16	7/16	9/16	2-1/2	5	ALTIN	0.090	CYLINDRICAL
N90967	S545R-0.438-D1-R125.0-Z5	7/16	7/16	9/16	2-1/2	5	ALTIN	0.125	CYLINDRICAL
N90951	S545R-0.438-D2-R015.0-Z5	7/16	7/16	1	2-3/4	5	ALTIN	0.015	CYLINDRICAL
N90972	S545R-0.438-D2-R020.0-Z5	7/16	7/16	1	2-3/4	5	ALTIN	0.020	CYLINDRICAL
N90973	S545R-0.438-D2-R030.0-Z5	7/16	7/16	1	2-3/4	5	ALTIN	0.030	CYLINDRICAL
N90976	S545R-0.438-D2-R045.0-Z5	7/16	7/16	1	2-3/4	5	ALTIN	0.045	CYLINDRICAL
N90977	S545R-0.438-D2-R060.0-Z5	7/16	7/16	1	2-3/4	5	ALTIN	0.060	CYLINDRICAL
N90978	S545R-0.438-D2-R090.0-Z5	7/16	7/16	1	2-3/4	5	ALTIN	0.090	CYLINDRICAL
N90979	S545R-0.438-D2-R125.0-Z5	7/16	7/16	1	2-3/4	5	ALTIN	0.125	CYLINDRICAL
N90982	S545R-0.500-D1-R015.0-Z5	1/2	1/2	5/8	2-1/2	5	ALTIN	0.015	CYLINDRICAL
N90987	S545R-0.500-D1-R020.0-Z5	1/2	1/2	5/8	2-1/2	5	ALTIN	0.020	CYLINDRICAL
N91004	S545R-0.500-D1-R030.0-Z5	1/2	1/2	5/8	2-1/2	5	ALTIN	0.030	CYLINDRICAL
N91008	S545R-0.500-D1-R045.0-Z5	1/2	1/2	5/8	2-1/2	5	ALTIN	0.045	CYLINDRICAL
N91009	S545R-0.500-D1-R060.0-Z5	1/2	1/2	5/8	2-1/2	5	ALTIN	0.060	CYLINDRICAL
N91010	S545R-0.500-D1-R090.0-Z5	1/2	1/2	5/8	2-1/2	5	ALTIN	0.090	CYLINDRICAL
N91011	S545R-0.500-D1-R125.0-Z5	1/2	1/2	5/8	2-1/2	5	ALTIN	0.125	CYLINDRICAL
N90959	S545R-0.500-D3-R015.0-Z5	1/2	1/2	1-1/4	3	5	ALTIN	0.015	CYLINDRICAL
N91012	S545R-0.500-D3-R020.0-Z5	1/2	1/2	1-1/4	3	5	ALTIN	0.020	CYLINDRICAL
N91013	S545R-0.500-D3-R030.0-Z5	1/2	1/2	1-1/4	3	5	ALTIN	0.030	CYLINDRICAL
N91015	S545R-0.500-D3-R045.0-Z5	1/2	1/2	1-1/4	3	5	ALTIN	0.045	CYLINDRICAL
N91017	S545R-0.500-D3-R060.0-Z5	1/2	1/2	1-1/4	3	5	ALTIN	0.060	CYLINDRICAL
N91019	S545R-0.500-D3-R090.0-Z5	1/2	1/2	1-1/4	3	5	ALTIN	0.090	CYLINDRICAL
N91021	S545R-0.500-D3-R125.0-Z5	1/2	1/2	1-1/4	3	5	ALTIN	0.125	CYLINDRICAL
N91042	S545R-0.625-D1-R015.0-Z5	5/8	5/8	3/4	3	5	ALTIN	0.015	CYLINDRICAL
N91051	S545R-0.625-D1-R020.0-Z5	5/8	5/8	3/4	3	5	ALTIN	0.020	CYLINDRICAL
N91060	S545R-0.625-D1-R030.0-Z5	5/8	5/8	3/4	3	5	ALTIN	0.030	CYLINDRICAL
N91075	S545R-0.625-D1-R045.0-Z5	5/8	5/8	3/4	3	5	ALTIN	0.045	CYLINDRICAL
N91076	S545R-0.625-D1-R060.0-Z5	5/8	5/8	3/4	3	5	ALTIN	0.060	CYLINDRICAL
N91077	S545R-0.625-D1-R090.0-Z5	5/8	5/8	3/4	3	5	ALTIN	0.090	CYLINDRICAL
N91078	S545R-0.625-D1-R125.0-Z5	5/8	5/8	3/4	3	5	ALTIN	0.125	CYLINDRICAL
N90980	S545R-0.625-D3-R015.0-Z5	5/8	5/8	1-5/8	3-1/2	5	ALTIN	0.015	CYLINDRICAL
N91079	S545R-0.625-D3-R020.0-Z5	5/8	5/8	1-5/8	3-1/2	5	ALTIN	0.020	CYLINDRICAL
N91084	S545R-0.625-D3-R030.0-Z5	5/8	5/8	1-5/8	3-1/2	5	ALTIN	0.030	CYLINDRICAL
N91086	S545R-0.625-D3-R045.0-Z5	5/8	5/8	1-5/8	3-1/2	5	ALTIN	0.045	CYLINDRICAL

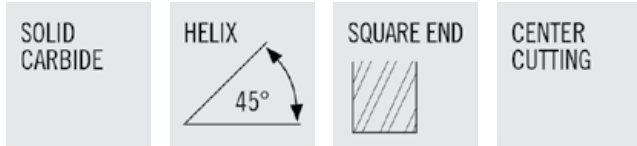
## S545R (CONT'D)



- Eccentric primary relief
- Ideal for peripheral finish milling in steel, stainless steel, titanium and high temperature alloys
- Cutting Data - Page 104
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N91090	S545R-0.625-D3-R060.0-Z5	5/8	5/8	1-5/8	3-1/2	5	ALTIN	0.060	CYLINDRICAL
N91091	S545R-0.625-D3-R090.0-Z5	5/8	5/8	1-5/8	3-1/2	5	ALTIN	0.090	CYLINDRICAL
N91093	S545R-0.625-D3-R125.0-Z5	5/8	5/8	1-5/8	3-1/2	5	ALTIN	0.125	CYLINDRICAL
N91095	S545R-0.750-D1-R015.0-Z5	3/4	3/4	1	3	5	ALTIN	0.015	CYLINDRICAL
N91096	S545R-0.750-D1-R020.0-Z5	3/4	3/4	1	3	5	ALTIN	0.020	CYLINDRICAL
N91097	S545R-0.750-D1-R030.0-Z5	3/4	3/4	1	3	5	ALTIN	0.030	CYLINDRICAL
N91098	S545R-0.750-D1-R045.0-Z5	3/4	3/4	1	3	5	ALTIN	0.045	CYLINDRICAL
N91099	S545R-0.750-D1-R060.0-Z5	3/4	3/4	1	3	5	ALTIN	0.060	CYLINDRICAL
N91102	S545R-0.750-D1-R090.0-Z5	3/4	3/4	1	3	5	ALTIN	0.090	CYLINDRICAL
N91103	S545R-0.750-D1-R125.0-Z5	3/4	3/4	1	3	5	ALTIN	0.125	CYLINDRICAL
N91104	S545R-0.750-D1-R190.0-Z5	3/4	3/4	1	3	5	ALTIN	0.190	CYLINDRICAL
N91039	S545R-0.750-D2-R015.0-Z5	3/4	3/4	1-5/8	4	5	ALTIN	0.015	CYLINDRICAL
N91105	S545R-0.750-D2-R020.0-Z5	3/4	3/4	1-5/8	4	5	ALTIN	0.020	CYLINDRICAL
N91107	S545R-0.750-D2-R030.0-Z5	3/4	3/4	1-5/8	4	5	ALTIN	0.030	CYLINDRICAL
N91108	S545R-0.750-D2-R045.0-Z5	3/4	3/4	1-5/8	4	5	ALTIN	0.045	CYLINDRICAL
N91110	S545R-0.750-D2-R060.0-Z5	3/4	3/4	1-5/8	4	5	ALTIN	0.060	CYLINDRICAL
N91111	S545R-0.750-D2-R090.0-Z5	3/4	3/4	1-5/8	4	5	ALTIN	0.090	CYLINDRICAL
N91116	S545R-0.750-D2-R125.0-Z5	3/4	3/4	1-5/8	4	5	ALTIN	0.125	CYLINDRICAL
N91117	S545R-0.750-D2-R190.0-Z5	3/4	3/4	1-5/8	4	5	ALTIN	0.190	CYLINDRICAL
N91133	S545R-1.000-D1-R015.0-Z5	1	1	1-1/4	4	5	ALTIN	0.015	CYLINDRICAL
N91135	S545R-1.000-D1-R020.0-Z5	1	1	1-1/4	4	5	ALTIN	0.020	CYLINDRICAL
N91136	S545R-1.000-D1-R030.0-Z5	1	1	1-1/4	4	5	ALTIN	0.030	CYLINDRICAL
N91138	S545R-1.000-D1-R045.0-Z5	1	1	1-1/4	4	5	ALTIN	0.045	CYLINDRICAL
N91139	S545R-1.000-D1-R060.0-Z5	1	1	1-1/4	4	5	ALTIN	0.060	CYLINDRICAL
N91142	S545R-1.000-D1-R090.0-Z5	1	1	1-1/4	4	5	ALTIN	0.090	CYLINDRICAL
N91143	S545R-1.000-D1-R125.0-Z5	1	1	1-1/4	4	5	ALTIN	0.125	CYLINDRICAL
N91145	S545R-1.000-D1-R190.0-Z5	1	1	1-1/4	4	5	ALTIN	0.190	CYLINDRICAL
N91094	S545R-1.000-D2-R015.0-Z5	1	1	2	4	5	ALTIN	0.015	CYLINDRICAL
N91146	S545R-1.000-D2-R020.0-Z5	1	1	2	4	5	ALTIN	0.020	CYLINDRICAL
N91148	S545R-1.000-D2-R030.0-Z5	1	1	2	4	5	ALTIN	0.030	CYLINDRICAL
N91149	S545R-1.000-D2-R045.0-Z5	1	1	2	4	5	ALTIN	0.045	CYLINDRICAL
N91152	S545R-1.000-D2-R060.0-Z5	1	1	2	4	5	ALTIN	0.060	CYLINDRICAL
N91155	S545R-1.000-D2-R090.0-Z5	1	1	2	4	5	ALTIN	0.090	CYLINDRICAL
N91158	S545R-1.000-D2-R125.0-Z5	1	1	2	4	5	ALTIN	0.125	CYLINDRICAL
N91163	S545R-1.000-D2-R190.0-Z5	1	1	2	4	5	ALTIN	0.190	CYLINDRICAL

## S645M



- Eccentric primary relief
- Ideal for peripheral finish milling in steel, stainless steel, titanium and high temperature alloys
- Cutting Data - Page 108
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N47858	S645M-030-D4-S.0-Z6	3MM	3MM	12MM	38MM	6	ALTIN	CYLINDRICAL
N47860	S645M-040-D2-S.0-Z6	4MM	4MM	6MM	50MM	6	ALTIN	CYLINDRICAL
N47862	S645M-040-D3-S.0-Z6	4MM	4MM	12MM	50MM	6	ALTIN	CYLINDRICAL
N47864	S645M-050-D3-S.0-Z6	5MM	5MM	14MM	50MM	6	ALTIN	CYLINDRICAL
N47866	S645M-060-D1-S.0-Z6	6MM	6MM	8MM	51MM	6	ALTIN	CYLINDRICAL
N47868	S645M-060-D3-S.0-Z6	6MM	6MM	16MM	58MM	6	ALTIN	CYLINDRICAL
N47870	S645M-080-D1-S.0-Z6	8MM	8MM	10MM	59MM	6	ALTIN	CYLINDRICAL
N47872	S645M-080-D2-S.0-Z6	8MM	8MM	20MM	64MM	6	ALTIN	CYLINDRICAL
N47874	S645M-100-D1-S.0-Z6	10MM	10MM	11MM	67MM	6	ALTIN	CYLINDRICAL
N47876	S645M-100-D2-S.0-Z6	10MM	10MM	22MM	73MM	6	ALTIN	CYLINDRICAL
N47880	S645M-120-D3-S.0-Z6	12MM	12MM	32MM	84MM	6	ALTIN	CYLINDRICAL
N47886	S645M-160-D1-S.0-Z6	16MM	16MM	16MM	83MM	6	ALTIN	CYLINDRICAL
N47888	S645M-160-D2-S.0-Z6	16MM	16MM	36MM	89MM	6	ALTIN	CYLINDRICAL
N47894	S645M-200-D2-S.0-Z6	20MM	20MM	38MM	101MM	6	ALTIN	CYLINDRICAL
N47896	S645M-200-D3-S.0-Z6	20MM	20MM	50MM	104MM	6	ALTIN	CYLINDRICAL



## SR420 & SR420M

SOLID CARBIDE



CENTER CUTTING

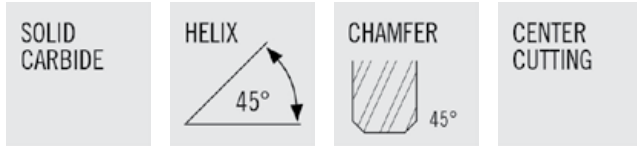


- Fine-pitch knuckle form
- Designed for steels, stainless steel, and cast iron

- Cutting Data SR420 - Page 105
- Tolerance Specs SR420 - Page 335
- Cutting Data SR420M - Page 109
- Tolerance Specs SR420M - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER	SHANK TYPE
<b>INCH - SR420</b>									
N76130	SR420-0.250-D2-C020.0-Z4	1/4	1/4	3/8	2	4	UNCOATED	0.020	CYLINDRICAL
N76178	SR420-0.250-D2-C020.0-Z4	1/4	1/4	3/8	2	4	ALTIN	0.020	CYLINDRICAL
N76131	SR420-0.250-D3-C020.0-Z4	1/4	1/4	3/4	2-1/2	4	UNCOATED	0.020	CYLINDRICAL
N76179	SR420-0.250-D3-C020.0-Z4	1/4	1/4	3/4	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N76132	SR420-0.313-D1-C020.0-Z4	5/16	5/16	7/16	2	4	UNCOATED	0.020	CYLINDRICAL
N76180	SR420-0.313-D1-C020.0-Z4	5/16	5/16	7/16	2	4	ALTIN	0.020	CYLINDRICAL
N76133	SR420-0.313-D3-C020.0-Z4	5/16	5/16	13/16	2-1/2	4	UNCOATED	0.020	CYLINDRICAL
N76181	SR420-0.313-D3-C020.0-Z4	5/16	5/16	13/16	2-1/2	4	ALTIN	0.020	CYLINDRICAL
N76134	SR420-0.375-D1-C020.3-Z4	3/8	3/8	1/2	2	4	UNCOATED	0.020	WELDON
N76182	SR420-0.375-D1-C020.3-Z4	3/8	3/8	1/2	2	4	ALTIN	0.020	WELDON
N76135	SR420-0.375-D3-C020.3-Z4	3/8	3/8	1	2-1/2	4	UNCOATED	0.020	WELDON
N76183	SR420-0.375-D3-C020.3-Z4	3/8	3/8	1	2-1/2	4	ALTIN	0.020	WELDON
N76136	SR420-0.438-D1-C020.3-Z4	7/16	7/16	9/16	2-1/2	4	UNCOATED	0.020	WELDON
N76184	SR420-0.438-D1-C020.3-Z4	7/16	7/16	9/16	2-1/2	4	ALTIN	0.020	WELDON
N76137	SR420-0.438-D2-C020.3-Z4	7/16	7/16	1	2-3/4	4	UNCOATED	0.020	WELDON
N76185	SR420-0.438-D2-C020.3-Z4	7/16	7/16	1	2-3/4	4	ALTIN	0.020	WELDON
N76138	SR420-0.500-D1-C025.3-Z4	1/2	1/2	5/8	2-1/2	4	UNCOATED	0.025	WELDON
N76186	SR420-0.500-D1-C025.3-Z4	1/2	1/2	5/8	2-1/2	4	ALTIN	0.025	WELDON
N76139	SR420-0.500-D3-C025.3-Z4	1/2	1/2	1-1/4	3	4	UNCOATED	0.025	WELDON
N76187	SR420-0.500-D3-C025.3-Z4	1/2	1/2	1-1/4	3	4	ALTIN	0.025	WELDON
N76140	SR420-0.625-D1-C025.3-Z4	5/8	5/8	3/4	3	4	UNCOATED	0.025	WELDON
N76188	SR420-0.625-D1-C025.3-Z4	5/8	5/8	3/4	3	4	ALTIN	0.025	WELDON
N76141	SR420-0.625-D3-C025.3-Z4	5/8	5/8	1-5/8	3-1/2	4	UNCOATED	0.025	WELDON
N76189	SR420-0.625-D3-C025.3-Z4	5/8	5/8	1-5/8	3-1/2	4	ALTIN	0.025	WELDON
N76142	SR420-0.750-D1-C025.3-Z4	3/4	3/4	1	3	4	UNCOATED	0.025	WELDON
N76190	SR420-0.750-D1-C025.3-Z4	3/4	3/4	1	3	4	ALTIN	0.025	WELDON
N76143	SR420-0.750-D2-C025.3-Z4	3/4	3/4	1-5/8	4	4	UNCOATED	0.025	WELDON
N76191	SR420-0.750-D2-C025.3-Z4	3/4	3/4	1-5/8	4	4	ALTIN	0.025	WELDON
N76144	SR420-1.000-D1-C025.3-Z5	1	1	1-1/4	4	5	UNCOATED	0.025	WELDON
N76192	SR420-1.000-D1-C025.3-Z5	1	1	1-1/4	4	5	ALTIN	0.025	WELDON
N76145	SR420-1.000-D2-C025.3-Z5	1	1	2	5	5	UNCOATED	0.025	WELDON
N76193	SR420-1.000-D2-C025.3-Z5	1	1	2	5	5	ALTIN	0.025	WELDON
<b>METRIC - SR420M</b>									
N47902	SR420M-060-D3-C050.0-Z4	6MM	6MM	16MM	58MM	4	ALTIN	0.50MM	CYLINDRICAL
N47904	SR420M-080-D2-C050.0-Z4	8MM	8MM	20MM	64MM	4	ALTIN	0.50MM	CYLINDRICAL
N47906	SR420M-100-D2-C050.0-Z4	10MM	10MM	22MM	73MM	4	ALTIN	0.50MM	CYLINDRICAL
N47907	SR420M-120-D1-C100.0-Z4	12MM	12MM	12MM	74MM	4	ALTIN	1.00MM	CYLINDRICAL
N47908	SR420M-120-D3-C100.0-Z4	12MM	12MM	32MM	84MM	4	ALTIN	1.00MM	CYLINDRICAL
N47910	SR420M-140-D2-C100.0-Z4	14MM	14MM	32MM	84MM	4	ALTIN	1.00MM	CYLINDRICAL
N47912	SR420M-160-D2-C100.0-Z4	16MM	16MM	36MM	93MM	4	ALTIN	1.00MM	CYLINDRICAL
N47916	SR420M-200-D3-C100.0-Z4	20MM	20MM	50MM	105MM	4	ALTIN	1.00MM	CYLINDRICAL

## SR545



- Fine-pitch knuckle profile
- Designed for peripheral milling (25% of tool diameter maximum) Stainless, High Temp Alloys, Titanium
- High shearing action to reduce radial deflection
- Fine pitch knuckle design
- Cutting Data - Page 106
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER	SHANK TYPE
N99050	SR545-0.375-D1-C020.0-Z5	3/8	3/8	1/2	2	5	UNCOATED	0.020	CYLINDRICAL
N99092	SR545-0.375-D1-C020.0-Z5	3/8	3/8	1/2	2	5	ALTIN	0.020	CYLINDRICAL
N99051	SR545-0.375-D3-C020.0-Z5	3/8	3/8	1	2-1/2	5	UNCOATED	0.020	CYLINDRICAL
N99093	SR545-0.375-D3-C020.0-Z5	3/8	3/8	1	2-1/2	5	ALTIN	0.020	CYLINDRICAL
N99053	SR545-0.438-D2-C020.0-Z5	7/16	7/16	1	2-3/4	5	UNCOATED	0.020	CYLINDRICAL
N99095	SR545-0.438-D2-C020.0-Z5	7/16	7/16	1	2-3/4	5	ALTIN	0.020	CYLINDRICAL
N99054	SR545-0.500-D1-C025.0-Z5	1/2	1/2	5/8	2-1/2	5	UNCOATED	0.025	CYLINDRICAL
N99096	SR545-0.500-D1-C025.0-Z5	1/2	1/2	5/8	2-1/2	5	ALTIN	0.025	CYLINDRICAL
N99055	SR545-0.500-D3-C025.0-Z5	1/2	1/2	1-1/4	3	5	UNCOATED	0.025	CYLINDRICAL
N99097	SR545-0.500-D3-C025.0-Z5	1/2	1/2	1-1/4	3	5	ALTIN	0.025	CYLINDRICAL
N99057	SR545-0.625-D3-C025.0-Z5	5/8	5/8	1-5/8	3-1/2	5	UNCOATED	0.025	CYLINDRICAL
N99099	SR545-0.625-D3-C025.0-Z5	5/8	5/8	1-5/8	3-1/2	5	ALTIN	0.025	CYLINDRICAL
N99058	SR545-0.750-D1-C025.0-Z5	3/4	3/4	1	3	5	UNCOATED	0.025	CYLINDRICAL
N99100	SR545-0.750-D1-C025.0-Z5	3/4	3/4	1	3	5	ALTIN	0.025	CYLINDRICAL
N99059	SR545-0.750-D2-C025.0-Z5	3/4	3/4	1-5/8	4	5	UNCOATED	0.025	CYLINDRICAL
N99101	SR545-0.750-D2-C025.0-Z5	3/4	3/4	1-5/8	4	5	ALTIN	0.025	CYLINDRICAL
N99061	SR545-1.000-D2-C025.0-Z5	1	1	2	4	5	UNCOATED	0.025	CYLINDRICAL
N99103	SR545-1.000-D2-C025.0-Z5	1	1	2	4	5	ALTIN	0.025	CYLINDRICAL

DISCOUNT CODE D43

# CUTTING DATA - ELITE S SERIES HIGH PERFORMANCE

## NS240R - START VALUES

### SIDE MILLING - FINISHING

ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>f</sub> (sf / min)	Z <sub>n</sub> = 2											
					1/4	5/16	3/8	1/2	5/8	3/4	1	1 1/4				
P	E / M / A 1 - 2	5	0.02	660	n (rev/min)	10080	8070	6720	5040	4030	3360	2520	2020			
				f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125				
				590 - 720	v <sub>f</sub> (in/min)	50.4	50.4	50.4	50.4	50.4	50.4	50.4	50.5			
	E / M / A 3 - 4	5	0.02	590	n (rev/min)	9020	7210	6010	4510	3610	3010	2250	1800			
				f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125				
				520 - 660	v <sub>f</sub> (in/min)	45.1	45.1	45.1	45.1	45.1	45.2	45.0	45.0			
E / M / A 5 - 6	5	0.02	520	n (rev/min)	7950	6360	5300	3970	3180	2650	1990	1590				
			f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125					
			460 - 590	v <sub>f</sub> (in/min)	39.8	39.8	39.8	39.7	39.8	39.8	39.8	39.8				
M	E / M / A 8 - 9	5	0.02	330	n (rev/min)	5040	4030	3360	2520	2020	1680	1260	1010			
				f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125				
				260 - 390	v <sub>f</sub> (in/min)	25.2	25.2	25.2	25.2	25.3	25.2	25.2	25.3			
	E / M / A 10 - 11	5	0.02	260	n (rev/min)	3970	3180	2650	1990	1590	1320	990	790			
				f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125				
				200 - 330	v <sub>f</sub> (in/min)	19.9	19.9	19.9	19.9	19.9	19.8	19.8	19.8			
K	E 12 - 13	5	0.02	390	n (rev/min)	5960	4770	3970	2980	2380	1990	1490	1190			
				f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125				
				330 - 460	v <sub>f</sub> (in/min)	29.8	29.8	29.8	29.8	29.8	29.9	29.8	29.8			
	E 14 - 15	5	0.02	330	n (rev/min)	5040	4030	3360	2520	2020	1680	1260	1010			
				f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125				
				260 - 390	v <sub>f</sub> (in/min)	25.2	25.2	25.2	25.2	25.3	25.2	25.2	25.3			
N	E / M / A 16	5	0.02	2620	n (rev/min)	40030	32030	26690	20020	16010	13340	10010	8010			
				f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125				
				2300 - 2950	v <sub>f</sub> (in/min)	200.2	200.2	200.2	200.2	200.1	200.1	200.2	200.3			
	E / M / A 17	5	0.02	2620	n (rev/min)	40030	32030	26690	20020	16010	13340	10010	8010			
				f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125				
				2300 - 2950	v <sub>f</sub> (in/min)	200.2	200.2	200.2	200.2	200.1	200.1	200.2	200.3			
E / M / A 18	5	0.02	1310	n (rev/min)	20020	16010	13340	10010	8010	6670	5000	4000				
			f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125					
			1150 - 1480	v <sub>f</sub> (in/min)	100.1	100.1	100.1	100.1	100.1	100.1	100.0	100.0				
S	E / M / A 19	5	0.02	160	n (rev/min)	2440	1960	1630	1220	980	810	610	490			
				f <sub>z</sub> (in)	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0070	0.0088				
				130 - 200	v <sub>f</sub> (in/min)	8.5	8.6	8.6	8.5	8.6	8.5	8.5	8.6			
				E / M / A 20	5	0.02	160	n (rev/min)	2440	1960	1630	1220	980	810	610	490
							f <sub>z</sub> (in)	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0070	0.0088	
							130 - 200	v <sub>f</sub> (in/min)	8.5	8.6	8.6	8.5	8.6	8.5	8.5	8.6
	E / M / A 21	5	0.02	130	n (rev/min)	1990	1590	1320	990	790	660	500	400			
				f <sub>z</sub> (in)	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0070	0.0088				
				100 - 160	v <sub>f</sub> (in/min)	7.0	7.0	6.9	6.9	6.9	6.9	7.0	7.0			
	E / M / A 22	5	0.02	330	n (rev/min)	5040	4030	3360	2520	2020	1680	1260	1010			
				f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125				
				260 - 390	v <sub>f</sub> (in/min)	25.2	25.2	25.2	25.2	25.3	25.2	25.2	25.3			
A / D GRAPHITE				5	0.02	3280	n (rev/min)	50120	40090	33410	25060	20050	16710	12530	10020	
						f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125		
						2950 - 3610	v <sub>f</sub> (in/min)	250.6	250.6	250.6	250.6	250.6	250.7	250.6	250.5	
A / D PLASTIC (SOFT)	5	0.02	3280	n (rev/min)	50120	40090	33410	25060	20050	16710	12530	10020				
			f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125					
			2950 - 3610	v <sub>f</sub> (in/min)	250.6	250.6	250.6	250.6	250.6	250.7	250.6	250.5				
A / D PLASTIC (HARD)	5	0.02	1970	n (rev/min)	30100	24080	20070	15050	12040	10030	7530	6020				
			f <sub>z</sub> (in)	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125					
			1640 - 2300	v <sub>f</sub> (in/min)	150.5	150.5	150.5	150.5	150.5	150.5	150.6	150.5				

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## S335 - START VALUES

		SLOTTING											
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	1.0	1.00	395	n (rev/min)	24142	12071	6036	4024	3018	2414	2012	1509
					f <sub>z</sub> (in)	0.0003	0.0005	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040
					v <sub>f</sub> (in/min)	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1
	E 3 - 4	1.0	1.00	330	n (rev/min)	20170	10085	5042	3362	2521	2017	1681	1261
					f <sub>z</sub> (in)	0.0003	0.0005	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040
					v <sub>f</sub> (in/min)	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1
	E 5 - 6	1.0	1.00	260	n (rev/min)	15891	7946	3973	2649	1986	1589	1324	993
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0012	0.0016	0.0020	0.0024	0.0032
					v <sub>f</sub> (in/min)	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
M	E 8 - 9	1.0	1.00	260	n (rev/min)	15891	7946	3973	2649	1986	1589	1324	993
					f <sub>z</sub> (in)	0.0002	0.0003	0.0007	0.0010	0.0013	0.0016	0.0020	0.0026
					v <sub>f</sub> (in/min)	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
	E 10 - 11	1.0	1.00	230	n (rev/min)	14058	7029	3514	2343	1757	1406	1171	879
					f <sub>z</sub> (in)	0.0002	0.0003	0.0007	0.0010	0.0013	0.0016	0.0020	0.0026
					v <sub>f</sub> (in/min)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
K	E 12 - 13	1.0	1.00	385	n (rev/min)	23531	11766	5883	3922	2941	2353	1961	1471
					f <sub>z</sub> (in)	0.0003	0.0006	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045
					v <sub>f</sub> (in/min)	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9
	E 14 - 15	1.0	1.00	340	n (rev/min)	20781	10390	5195	3463	2598	2078	1732	1299
					f <sub>z</sub> (in)	0.0003	0.0006	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045
					v <sub>f</sub> (in/min)	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
S	E 19	1.0	1.00	110	n (rev/min)	6723	3362	1681	1121	840	672	560	420
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
					v <sub>f</sub> (in/min)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	E 20	1.0	1.00	110	n (rev/min)	6723	3362	1681	1121	840	672	560	420
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
					v <sub>f</sub> (in/min)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	E 21	1.0	1.00	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015
	E 22	1.0	1.00	180	n (rev/min)	11002	5501	2750	1834	1375	1100	917	688
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0009	0.0011	0.0014	0.0017	0.0023
v <sub>f</sub> (in/min)					4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## S335 - START VALUES

SIDE MILLING - ROUGHING													
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	1.0	0.20	525	n (rev/min)	32088	16044	8022	5348	4011	3209	2674	2006
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
					v <sub>f</sub> (in/min)	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8
	E 3 - 4	1.0	0.20	460	n (rev/min)	28115	14058	7029	4686	3514	2812	2343	1757
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
					v <sub>f</sub> (in/min)	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
	E 5 - 6	1.0	0.20	330	n (rev/min)	20170	10085	5042	3362	2521	2017	1681	1261
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
					v <sub>f</sub> (in/min)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
M	E 8 - 9	1.0	0.20	280	n (rev/min)	17114	8557	4278	2852	2139	1711	1426	1070
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0011	0.0013	0.0017
					v <sub>f</sub> (in/min)	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
	E 10 - 11	1.0	0.20	250	n (rev/min)	15280	7640	3820	2547	1910	1528	1273	955
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0011	0.0013	0.0017
					v <sub>f</sub> (in/min)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
K	E 12 - 13	1.0	0.20	340	n (rev/min)	20781	10390	5195	3463	2598	2078	1732	1299
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
					v <sub>f</sub> (in/min)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
	E 14 - 15	1.0	0.20	440	n (rev/min)	26893	13446	6723	4482	3362	2689	2241	1681
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
					v <sub>f</sub> (in/min)	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
S	E 19	0.5	0.20	120	n (rev/min)	7334	3667	1834	1222	917	733	611	458
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
					v <sub>f</sub> (in/min)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	E 20	0.5	0.20	120	n (rev/min)	7334	3667	1834	1222	917	733	611	458
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
					v <sub>f</sub> (in/min)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	E 21	0.5	0.20	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015
					v <sub>f</sub> (in/min)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
	E 22	0.5	0.20	220	n (rev/min)	13446	6723	3362	2241	1681	1345	1121	840
f <sub>z</sub> (in)					0.0001	0.0003	0.0006	0.0009	0.0011	0.0014	0.0017	0.0023	
v <sub>f</sub> (in/min)					5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	
v <sub>f</sub> (in/min)					5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - ELITE S SERIES HIGH PERFORMANCE



## SB335 - START VALUES

		SLOTTING											
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	1.0	0.75	315	n (rev/min)	19253	9626	4813	3209	2407	1925	1604	1203
					f <sub>z</sub> (in)	0.0003	0.0005	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040
					v <sub>f</sub> (in/min)	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
	E 3 - 4	1.0	0.75	264	n (rev/min)	16136	8068	4034	2689	2017	1614	1345	1008
					f <sub>z</sub> (in)	0.0003	0.0005	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040
					v <sub>f</sub> (in/min)	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
	E 5 - 6	1.0	0.75	208	n (rev/min)	12713	6356	3178	2119	1589	1271	1059	795
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0012	0.0016	0.0020	0.0024	0.0032
					v <sub>f</sub> (in/min)	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
M	E 8 - 9	1.0	0.75	208	n (rev/min)	12713	6356	3178	2119	1589	1271	1059	795
					f <sub>z</sub> (in)	0.0002	0.0003	0.0007	0.0010	0.0013	0.0016	0.0020	0.0026
					v <sub>f</sub> (in/min)	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
	E 10 - 11	1.0	0.75	185	n (rev/min)	11307	5654	2827	1885	1413	1131	942	707
					f <sub>z</sub> (in)	0.0002	0.0003	0.0007	0.0010	0.0013	0.0016	0.0020	0.0026
					v <sub>f</sub> (in/min)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
K	E 12 - 13	1.0	0.75	308	n (rev/min)	18825	9412	4706	3137	2353	1882	1569	1177
					f <sub>z</sub> (in)	0.0003	0.0006	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045
					v <sub>f</sub> (in/min)	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9
	E 14 - 15	1.0	0.75	272	n (rev/min)	16625	8312	4156	2771	2078	1662	1385	1039
					f <sub>z</sub> (in)	0.0003	0.0006	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045
					v <sub>f</sub> (in/min)	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
S	E 19	1.0	0.75	88	n (rev/min)	5379	2689	1345	896	672	538	448	336
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
					v <sub>f</sub> (in/min)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	E 20	1.0	0.75	88	n (rev/min)	5379	2689	1345	896	672	538	448	336
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
					v <sub>f</sub> (in/min)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	E 21	1.0	0.75	56	n (rev/min)	3423	1711	856	570	428	342	285	214
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015
					v <sub>f</sub> (in/min)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	E 22	1.0	0.75	145	n (rev/min)	8862	4431	2216	1477	1108	886	739	554
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0009	0.0011	0.0014	0.0017	0.0023
					v <sub>f</sub> (in/min)	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - ELITE S SERIES HIGH PERFORMANCE

## SB335 - START VALUES

SIDE MILLING - ROUGHING														
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3								
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1	
P	E 1 - 2	1.0	0.20	420	n (rev/min)	25670	12835	6418	4278	3209	2567	2139	1604	
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	
					v <sub>f</sub> (in/min)	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	
	E 3 - 4	1.0	0.20	368	n (rev/min)	22492	11246	5623	3749	2812	2249	1874	1406	
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	
					v <sub>f</sub> (in/min)	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	
	E 5 - 6	1.0	0.20	264	n (rev/min)	16136	8068	4034	2689	2017	1614	1345	1008	
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	
					v <sub>f</sub> (in/min)	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	
M	E 8 - 9	1.0	0.20	225	n (rev/min)	13752	6876	3438	2292	1719	1375	1146	860	
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0011	0.0013	0.0017	
					v <sub>f</sub> (in/min)	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	
	E 10 - 11	1.0	0.20	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764	
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0011	0.0013	0.0017	
					v <sub>f</sub> (in/min)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	
K	E 12 - 13	1.0	0.20	272	n (rev/min)	16625	8312	4156	2771	2078	1662	1385	1039	
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	
					v <sub>f</sub> (in/min)	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	
	E 14 - 15	1.0	0.20	350	n (rev/min)	21392	10696	5348	3565	2674	2139	1783	1337	
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	
					v <sub>f</sub> (in/min)	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	
S	E 19	0.5	0.20	96	n (rev/min)	5868	2934	1467	978	733	587	489	367	
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	
	E 20	0.5	0.20	96	n (rev/min)	5868	2934	1467	978	733	587	489	367	
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	
	E 21	0.5	0.20	64	n (rev/min)	3912	1956	978	652	489	391	326	244	
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	
	E 22	0.5	0.20	175	n (rev/min)	10696	5348	2674	1783	1337	1070	891	669	
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0009	0.0011	0.0014	0.0017	0.0023	
					115	-	235	v <sub>f</sub> (in/min)	4.6	4.6	4.6	4.6	4.6	4.6

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## SN335 - START VALUES

		SLOTTING											
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	V <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	1.0	1.00	316	n (rev/min)	19314	9657	4828	3219	2414	1931	1609	1207
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
					v <sub>f</sub> (in/min)	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9
	E 3 - 4	1.0	1.00	264	n (rev/min)	16136	8068	4034	2689	2017	1614	1345	1008
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
					v <sub>f</sub> (in/min)	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
	E 5 - 6	1.0	1.00	210	n (rev/min)	12835	6418	3209	2139	1604	1284	1070	802
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
					v <sub>f</sub> (in/min)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
M	E 8 - 9	1.0	1.00	210	n (rev/min)	12835	6418	3209	2139	1604	1284	1070	802
					f <sub>z</sub> (in)	0.0001	0.0003	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020
					v <sub>f</sub> (in/min)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
	E 10 - 11	1.0	1.00	185	n (rev/min)	11307	5654	2827	1885	1413	1131	942	707
					f <sub>z</sub> (in)	0.0001	0.0003	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020
					v <sub>f</sub> (in/min)	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
K	E 12 - 13	1.0	1.00	310	n (rev/min)	18947	9474	4737	3158	2368	1895	1579	1184
					f <sub>z</sub> (in)	0.0002	0.0004	0.0009	0.0013	0.0017	0.0021	0.0026	0.0034
					v <sub>f</sub> (in/min)	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
	E 14 - 15	1.0	1.00	272	n (rev/min)	16625	8312	4156	2771	2078	1662	1385	1039
					f <sub>z</sub> (in)	0.0002	0.0004	0.0009	0.0013	0.0017	0.0021	0.0026	0.0034
					v <sub>f</sub> (in/min)	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6
S	E 19	1.0	1.00	88	n (rev/min)	5379	2689	1345	896	672	538	448	336
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
	E 20	1.0	1.00	88	n (rev/min)	5379	2689	1345	896	672	538	448	336
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
	E 21	1.0	1.00	56	n (rev/min)	3423	1711	856	570	428	342	285	214
					f <sub>z</sub> (in)	0.0001	0.0001	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011
					v <sub>f</sub> (in/min)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	E 22	1.0	1.00	144	n (rev/min)	8801	4401	2200	1467	1100	880	733	550
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0009	0.0011	0.0013	0.0017
					v <sub>f</sub> (in/min)	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## SN335 - START VALUES

		SIDE MILLING - ROUGHING											
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	V <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	1.0	0.20	420	n (rev/min)	25670	12835	6418	4278	3209	2567	2139	1604
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
	E 3 - 4	1.0	0.20	368	n (rev/min)	22492	11246	5623	3749	2812	2249	1874	1406
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
	E 5 - 6	1.0	0.20	264	n (rev/min)	16136	8068	4034	2689	2017	1614	1345	1008
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
M	E 8 - 9	1.0	0.20	224	n (rev/min)	13691	6845	3423	2282	1711	1369	1141	856
					f <sub>z</sub> (in)	0.0001	0.0002	0.0003	0.0005	0.0007	0.0008	0.0010	0.0013
					v <sub>f</sub> (in/min)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
	E 10 - 11	1.0	0.20	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0001	0.0002	0.0003	0.0005	0.0007	0.0008	0.0010	0.0013
					v <sub>f</sub> (in/min)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
K	E 12 - 13	1.0	0.20	272	n (rev/min)	16625	8312	4156	2771	2078	1662	1385	1039
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
	E 14 - 15	1.0	0.20	352	n (rev/min)	21514	10757	5379	3586	2689	2151	1793	1345
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
S	E 19	0.5	0.20	96	n (rev/min)	5868	2934	1467	978	733	587	489	367
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	E 20	0.5	0.20	96	n (rev/min)	5868	2934	1467	978	733	587	489	367
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	E 21	0.5	0.20	64	n (rev/min)	3912	1956	978	652	489	391	326	244
					f <sub>z</sub> (in)	0.0001	0.0001	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011
					v <sub>f</sub> (in/min)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	E 22	0.5	0.20	176	n (rev/min)	10757	5379	2689	1793	1345	1076	896	672
f <sub>z</sub> (in)					0.0001	0.0002	0.0004	0.0006	0.0009	0.0011	0.0013	0.0017	
v <sub>f</sub> (in/min)					3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	
					116 - 236								

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - ELITE S SERIES HIGH PERFORMANCE



## S545 / S545R - START VALUES

### SIDE MILLING - ROUGHING

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	V <sub>c</sub> (sf / min)		Z <sub>n</sub> = 5							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
						n (rev/min)	f <sub>z</sub> (in)	v <sub>f</sub> (in/min)	n (rev/min)	f <sub>z</sub> (in)	v <sub>f</sub> (in/min)	n (rev/min)	f <sub>z</sub> (in)
P	E 1-2	1.0	0.25	500	n (rev/min)	30560	15280	7640	5093	3820	3056	2547	1910
					f <sub>z</sub> (in)	0.0003	0.0006	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045
					v <sub>f</sub> (in/min)	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	E 3-4	1.0	0.25	380	n (rev/min)	23226	11613	5806	3871	2903	2323	1935	1452
					f <sub>z</sub> (in)	0.0003	0.0005	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040
					v <sub>f</sub> (in/min)	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
	E 5-6	1.0	0.20	300	n (rev/min)	18336	9168	4584	3056	2292	1834	1528	1146
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0012	0.0016	0.0019	0.0023	0.0031
					v <sub>f</sub> (in/min)	17.8	17.8	17.8	17.8	17.8	17.8	17.8	17.8
H	M / A / D 7a (48-52HRC)	1.0	0.10	150	n (rev/min)	9168	4584	2292	1528	1146	917	764	573
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0012	0.0016	0.0019	0.0023	0.0031
					v <sub>f</sub> (in/min)	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9
M	E 8-9	1.0	0.20	250	n (rev/min)	15280	7640	3820	2547	1910	1528	1273	955
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0012	0.0016	0.0020	0.0024	0.0032
					v <sub>f</sub> (in/min)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
	E 10-11	1.0	0.20	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
					v <sub>f</sub> (in/min)	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
K	E 12-13	1.0	0.25	300	n (rev/min)	18336	9168	4584	3056	2292	1834	1528	1146
					f <sub>z</sub> (in)	0.0005	0.0009	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072
					v <sub>f</sub> (in/min)	41.3	41.3	41.3	41.3	41.3	41.3	41.3	41.3
	E 12-13	1.0	0.25	180	n (rev/min)	11002	5501	2750	1834	1375	1100	917	688
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0012	0.0016	0.0019	0.0023	0.0031
					v <sub>f</sub> (in/min)	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7
N	E / M / A 16	2.0	0.05	800	n (rev/min)	11002	5501	2750	1834	1375	1100	917	688
					f <sub>z</sub> (in)	0.0005	0.0010	0.0020	0.0030	0.0040	0.0050	0.0060	0.0080
					v <sub>f</sub> (in/min)	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
	E / M / A 17	2.0	0.05	800	n (rev/min)	11002	5501	2750	1834	1375	1100	917	688
					f <sub>z</sub> (in)	0.0005	0.0010	0.0020	0.0030	0.0040	0.0050	0.0060	0.0080
					v <sub>f</sub> (in/min)	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
S	E 19	1.0	0.05	90	n (rev/min)	5501	2750	1375	917	688	550	458	344
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	E 20	1.0	0.05	90	n (rev/min)	5501	2750	1375	917	688	550	458	344
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	E 21	1.0	0.05	90	n (rev/min)	5501	2750	1375	917	688	550	458	344
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
	E 22	1.0	0.15	120	n (rev/min)	7334	3667	1834	1222	917	733	611	458
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
					v <sub>f</sub> (in/min)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9

SMG = Seco Material Group  
 n [min-1] = RPM  
 V<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - ELITE S SERIES HIGH PERFORMANCE

## SR420 - START VALUES

		SLOTTING									
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4					
						1/4	3/8	1/2	5/8	3/4	1
P	E 1-2	1.00	1.00	300	n (rev/min)	4584	3056	2292	1834	1528	1146
					f <sub>z</sub> (in)	0.0008	0.0012	0.0016	0.0020	0.0023	0.0031
					v <sub>f</sub> (in/min)	14.3	14.3	14.3	14.3	14.3	14.3
	E 3-4	1.00	1.00	250	n (rev/min)	3820	2547	1910	1528	1273	955
					f <sub>z</sub> (in)	0.0005	0.0008	0.0010	0.0013	0.0016	0.0021
					v <sub>f</sub> (in/min)	8.3	8.3	8.3	8.3	8.3	8.3
	E 5-6	1.00	1.00	380	n (rev/min)	5806	3871	2903	2323	1935	1452
					f <sub>z</sub> (in)	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018
					v <sub>f</sub> (in/min)	10.2	10.2	10.2	10.2	10.2	10.2
M	E 8-9	0.50	1.00	380	n (rev/min)	5806	3871	2903	2323	1935	1452
					f <sub>z</sub> (in)	0.0005	0.0008	0.0011	0.0014	0.0016	0.0022
					v <sub>f</sub> (in/min)	12.5	12.5	12.5	12.5	12.5	12.5
	E 10-11	0.30	1.00	200	n (rev/min)	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
					v <sub>f</sub> (in/min)	4.4	4.4	4.4	4.4	4.4	4.4
K	E 12-13	1.00	1.00	380	n (rev/min)	5806	3871	2903	2323	1935	1452
					f <sub>z</sub> (in)	0.0012	0.0017	0.0023	0.0029	0.0035	0.0046
					v <sub>f</sub> (in/min)	26.9	26.9	26.9	26.9	26.9	26.9
	E 14-15	0.30	1.00	150	n (rev/min)	2292	1528	1146	917	764	573
					f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0020	0.0027
					v <sub>f</sub> (in/min)	6.2	6.2	6.2	6.2	6.2	6.2

		SIDE MILLING - ROUGHING									
P	E 1-2	1.00	0.40	300	n (rev/min)	4584	3056	2292	1834	1528	1146
					f <sub>z</sub> (in)	0.0010	0.0015	0.0020	0.0024	0.0029	0.0039
					v <sub>f</sub> (in/min)	17.9	17.9	17.9	17.9	17.9	17.9
	E 3-4	1.00	0.40	250	n (rev/min)	3820	2547	1910	1528	1273	955
					f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0020	0.0027
					v <sub>f</sub> (in/min)	10.3	10.3	10.3	10.3	10.3	10.3
	E 5-6	1.00	0.40	175	n (rev/min)	2674	1783	1337	1070	891	669
					f <sub>z</sub> (in)	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
					v <sub>f</sub> (in/min)	5.9	5.9	5.9	5.9	5.9	5.9
M	E 8-9	1.00	0.40	380	n (rev/min)	5806	3871	2903	2323	1935	1452
					f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0020	0.0027
					v <sub>f</sub> (in/min)	15.7	15.7	15.7	15.7	15.7	15.7
	E 10-11	1.00	0.30	200	n (rev/min)	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
					v <sub>f</sub> (in/min)	5.5	5.5	5.5	5.5	5.5	5.5
K	E 12-13	1.00	0.40	380	n (rev/min)	5806	3871	2903	2323	1935	1452
					f <sub>z</sub> (in)	0.0015	0.0022	0.0029	0.0036	0.0044	0.0058
					v <sub>f</sub> (in/min)	33.7	33.7	33.7	33.7	33.7	33.7
	E 14-15	1.00	0.30	150	n (rev/min)	2292	1528	1146	917	764	573
					f <sub>z</sub> (in)	0.0009	0.0013	0.0017	0.0021	0.0026	0.0034
					v <sub>f</sub> (in/min)	7.8	7.8	7.8	7.8	7.8	7.8

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## SR545 - START VALUES

SIDE MILLING - ROUGHING											
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 5					
						1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	1.00	0.30	300	n (rev/min)	4584	3056	2292	1834	1528	1146
					f <sub>z</sub> (in)	0.0010	0.0015	0.0020	0.0024	0.0029	0.0039
				200 - 400	v <sub>f</sub> (in/min)	22.3	22.3	22.3	22.3	22.3	22.3
	E 3 - 4	1.00	0.30	250	n (rev/min)	3820	2547	1910	1528	1273	955
					f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0020	0.0027
				225 - 275	v <sub>f</sub> (in/min)	12.9	12.9	12.9	12.9	12.9	12.9
E 5 - 6	1.00	0.30	175	n (rev/min)	2674	1783	1337	1070	891	669	
				f <sub>z</sub> (in)	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022	
			150 - 200	v <sub>f</sub> (in/min)	7.4	7.4	7.4	7.4	7.4	7.4	
M	E 8 - 9	1.00	0.30	380	n (rev/min)	5806	3871	2903	2323	1935	1452
					f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0020	0.0027
	330 - 430	v <sub>f</sub> (in/min)	19.6	19.6	19.6	19.6	19.6	19.6			
	E 10 - 11	1.00	0.25	200	n (rev/min)	3056	2037	1528	1222	1019	764
f <sub>z</sub> (in)					0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	
150 - 250	v <sub>f</sub> (in/min)	6.9	6.9	6.9	6.9	6.9	6.9				
K	E 12 - 13	1.00	0.30	380	n (rev/min)	5806	3871	2903	2323	1935	1452
					f <sub>z</sub> (in)	0.0015	0.0022	0.0029	0.0036	0.0044	0.0058
	330 - 430	v <sub>f</sub> (in/min)	42.1	42.1	42.1	42.1	42.1	42.1			
	E 14 - 15	1.00	0.25	150	n (rev/min)	2292	1528	1146	917	764	573
f <sub>z</sub> (in)					0.0009	0.0013	0.0017	0.0021	0.0026	0.0034	
100 - 200	v <sub>f</sub> (in/min)	9.7	9.7	9.7	9.7	9.7	9.7				
S	E 22	1.0	0.20	275	n (rev/min)	4202	2801	2101	1681	1401	1051
					f <sub>z</sub> (in)	0.0009	0.0013	0.0017	0.0021	0.0026	0.0034
				225 - 325	v <sub>f</sub> (in/min)	17.9	17.9	17.9	17.9	17.9	17.9

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - ELITE S SERIES HIGH PERFORMANCE

## S545M - START VALUES

SIDE MILLING - ROUGHING										
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (m / min)	Z <sub>n</sub> = 5					
					4	6	8	10	12	
P	E 1 - 2	1.0	0.25	490 395 - 690	n (min-1)	11886	7924	5943	4754	3962
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	42.1	42.1	42.1	42.1	42.1
	E 3 - 4	1.0	0.25	395 330 - 690	n (min-1)	9582	6388	4791	3833	3194
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	34.0	34.0	34.0	34.0	34.0
	E 5 - 6	1.0	0.20	295 195 - 395	n (min-1)	7156	4771	3578	2862	2385
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	25.4	25.4	25.4	25.4	25.4
H	M / A / D 7a (48-52HRC)	1.0	0.10	165 65 - 195	n (min-1)	4002	2668	2001	1601	1334
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	14.2	14.2	14.2	14.2	14.2
M	E 8 - 9	1.0	0.20	260 165 - 360	n (min-1)	6307	4205	3153	2523	2102
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	22.3	22.3	22.3	22.3	22.3
	E 10 - 11	1.0	0.20	195 165 - 360	n (min-1)	4730	3153	2365	1892	1577
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	16.8	16.8	16.8	16.8	16.8
K	E 12 - 13	1.0	0.25	295 230 - 360	n (min-1)	7156	4771	3578	2862	2385
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	25.4	25.4	25.4	25.4	25.4
	E 12 - 13	1.0	0.25	165 100 - 230	n (min-1)	4002	2668	2001	1601	1334
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	14.2	14.2	14.2	14.2	14.2
N	E / M / A 16	2.0	0.05	785 655 - 1310	n (min-1)	19042	12694	9521	7617	6347
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	67.5	67.5	67.5	67.5	67.5
	E / M / A 17	2.0	0.05	785 655 - 1310	n (min-1)	19042	12694	9521	7617	6347
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	67.5	67.5	67.5	67.5	67.5
S	E 19	1.0	0.05	100 65 - 130	n (min-1)	2426	1617	1213	970	809
					fz (in)	0.0180	0.0270	0.0360	0.0450	0.0540
					vf (in/min)	218.3	218.3	218.3	218.3	218.3
	E 20	1.0	0.05	100 65 - 130	n (min-1)	2426	1617	1213	970	809
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	8.6	8.6	8.6	8.6	8.6
	E 21	1.0	0.05	100 65 - 130	n (min-1)	2426	1617	1213	970	809
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	8.6	8.6	8.6	8.6	8.6
	E 22	1.0	0.15	130 100 - 165	n (min-1)	3153	2102	1577	1261	1051
					fz (in)	0.0007	0.0011	0.0014	0.0018	0.0021
					vf (in/min)	11.2	11.2	11.2	11.2	11.2

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - ELITE S SERIES HIGH PERFORMANCE



## S645M - START VALUES

		SIDE MILLING - ROUGHING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 6									
						3	4	5	6	8	10	12	14	16	20
P	E 1 - 2	1.0	0.25	490	n (min-1)	15848	11886	9509	7924	5943	4754	3962	3396	2971	2377
					fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035
					vf (in/min)	50.5	50.5	50.5	50.5	50.5	50.5	50.5	50.5	50.5	50.5
	E 3 - 4	1.0	0.25	395	n (min-1)	12775	9582	7665	6388	4791	3833	3194	2738	2395	1916
					fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035
					vf (in/min)	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7
E 5 - 6	1.0	0.20	295	n (min-1)	9541	7156	5725	4771	3578	2862	2385	2045	1789	1431	
				fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035	
				vf (in/min)	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4
H	M / A / D 7a (48-52HRC)	1.0	0.10	165	n (min-1)	5337	4002	3202	2668	2001	1601	1334	1144	1001	800
					fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035
					vf (in/min)	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
M	E 8 - 9	1.0	0.20	260	n (min-1)	8409	6307	5045	4205	3153	2523	2102	1802	1577	1261
					fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035
					vf (in/min)	26.8	26.8	26.8	26.8	26.8	26.8	26.8	26.8	26.8	26.8
	E 10 - 11	1.0	0.20	195	n (min-1)	6307	4730	3784	3153	2365	1892	1577	1351	1183	946
					fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035
					vf (in/min)	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1
K	E 12 - 13	1.0	0.25	295	n (min-1)	9541	7156	5725	4771	3578	2862	2385	2045	1789	1431
					fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035
					vf (in/min)	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4
	E 14 - 15	1.0	0.25	165	n (min-1)	5337	4002	3202	2668	2001	1601	1334	1144	1001	800
					fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035
					vf (in/min)	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
N	E / M / A 16	2.0	0.05	785	n (min-1)	25389	19042	15233	12694	9521	7617	6347	5440	4760	3808
					fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035
					vf (in/min)	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0
	E / M / A 17	2.0	0.05	785	n (min-1)	25389	19042	15233	12694	9521	7617	6347	5440	4760	3808
					fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035
					vf (in/min)	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0
S	E 19	1.0	0.05	100	n (min-1)	3234	2426	1941	1617	1213	970	809	693	606	485
					fz (in)	0.0135	0.0180	0.0225	0.0270	0.0360	0.0450	0.0540	0.0630	0.0720	0.0900
					vf (in/min)	262.0	262.0	262.0	262.0	262.0	262.0	262.0	262.0	262.0	262.0
	E 20	1.0	0.05	100	n (min-1)	3234	2426	1941	1617	1213	970	809	693	606	485
					fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035
					vf (in/min)	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
	E 21	1.0	0.05	100	n (min-1)	3234	2426	1941	1617	1213	970	809	693	606	485
					fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035
					vf (in/min)	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
	E 22	1.0	0.15	130	n (min-1)	4205	3153	2523	2102	1577	1261	1051	901	788	631
					fz (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0025	0.0028	0.0035
					vf (in/min)	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - ELITE S SERIES HIGH PERFORMANCE



## SR420M - START VALUES

		SLOTTING										
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)	Z <sub>n</sub> = 4							
					6	8	10	12	14	16	20	
P	E 1 - 2	1.00	1.00	295	n (min-1)	4771	3578	2862	2385	2045	1789	1431
					fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024
				230 - 360	vf (in/min)	14.0	14.0	14.0	14.0	14.0	14.0	14.0
	E 3 - 4	1.00	1.00	260	n (min-1)	4205	3153	2523	2102	1802	1577	1261
					fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024
				195 - 295	vf (in/min)	12.3	12.3	12.3	12.3	12.3	12.3	12.3
E 5 - 6	1.00	1.00	165	n (min-1)	2668	2001	1601	1334	1144	1001	800	
				fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024	
			130 - 230	vf (in/min)	7.8	7.8	7.8	7.8	7.8	7.8	7.8	
M	E 8 - 9	0.50	1.00	395	n (min-1)	6388	4791	3833	3194	2738	2395	1916
					fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024
				360 - 425	vf (in/min)	18.7	18.7	18.7	18.7	18.7	18.7	18.7
	E 10 - 11	0.30	1.00	195	n (min-1)	3153	2365	1892	1577	1351	1183	946
					fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024
				165 - 230	vf (in/min)	9.2	9.2	9.2	9.2	9.2	9.2	9.2
K	E 12 - 13	1.00	1.00	395	n (min-1)	6388	4791	3833	3194	2738	2395	1916
					fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024
				330 - 425	vf (in/min)	18.7	18.7	18.7	18.7	18.7	18.7	18.7
	E 14 - 15	0.30	1.00	165	n (min-1)	2668	2001	1601	1334	1144	1001	800
					fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024
				100 - 195	vf (in/min)	7.8	7.8	7.8	7.8	7.8	7.8	7.8

		SIDE MILLING - ROUGHING										
P	E 1 - 2	1.00	0.40	295	n (min-1)	4771	3578	2862	2385	2045	1789	1431
					fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024
				230 - 360	vf (in/min)	14.0	14.0	14.0	14.0	14.0	14.0	14.0
	E 3 - 4	1.00	0.40	260	n (min-1)	4205	3153	2523	2102	1802	1577	1261
					fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024
				195 - 295	vf (in/min)	12.3	12.3	12.3	12.3	12.3	12.3	12.3
E 5 - 6	1.00	0.40	165	n (min-1)	2668	2001	1601	1334	1144	1001	800	
				fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024	
			130 - 230	vf (in/min)	7.8	7.8	7.8	7.8	7.8	7.8	7.8	
M	E 8 - 9	1.00	0.40	395	n (min-1)	6388	4791	3833	3194	2738	2395	1916
					fz (in)	0.0006	0.0009	0.0011	0.0013	0.0015	0.0017	0.0021
				360 - 425	vf (in/min)	16.3	16.3	16.3	16.3	16.3	16.3	16.3
	E 10 - 11	1.00	0.30	195	n (min-1)	3153	2365	1892	1577	1351	1183	946
					fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024
				165 - 230	vf (in/min)	9.2	9.2	9.2	9.2	9.2	9.2	9.2
K	E 12 - 13	1.00	0.40	395	n (min-1)	6388	4791	3833	3194	2738	2395	1916
					fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024
				330 - 425	vf (in/min)	18.7	18.7	18.7	18.7	18.7	18.7	18.7
	E 14 - 15	1.00	0.30	165	n (min-1)	2668	2001	1601	1334	1144	1001	800
					fz (in)	0.0007	0.0010	0.0012	0.0015	0.0017	0.0020	0.0024
				100 - 195	vf (in/min)	7.8	7.8	7.8	7.8	7.8	7.8	7.8

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## SOLID CARBIDE HIGH FEED MILL

# SN200R, 400R & 500R

The SN200R, SN400R and SN500R series offers a complete range of 2-, 4- and 5-flute end mills to cover a broad range of applications and materials. Available in 3, 5 and 7 times diameter reach, these end mills feature a defined radius ( $r_p$ ) directing radial cutting pressure axially up into the tool holder and spindle. This feature allows for increased metal removal rates in deep pockets and long reach applications.

### PRODUCT OVERVIEW

- Solid carbide high feed tools excel in face, slot and plunge milling
- High feed capabilities yield significant productivity gains
- Reduced production costs when processing deep and shallow pockets
- Longer tool life than previous cutters when applied at the same table feed rates
- Low radial forces minimize vibration and machine wear
- Wide application area covered, from steel to exotic materials
- AlTiN coating for high heat and abrasion resistance
- Edge prep to increase cutting edge strength
- JIF modifications on shank only

### YOUR NIAGARA CUTTER BENEFIT

- Multiple flutes
- Long tool overhang
- Axial directed cutting forces
- High heat and abrasion resistant
- Reduced cycle time, higher metal removal rates
- Deep cavity milling
- Smoother cutting in long reach applications
- Long and predictable tool life

### RANGE OVERVIEW

- 2-, 4- and 5-flute end mill diameters from 1/16"-1/2" diameter
- 3xD, 5xD and 7xD length versions available

### TECHNICAL SPECIFICATIONS

Diameter range:	ø1/16" - ø1/2"
# flutes:	2,4,5
Helix angle:	0°
Rake angle:	0°
Relief:	-5° tapered
Flute Diameter	
Tolerance:	+0.000 / -0.002
Shank Diameter	
Tolerance:	h6
Corner Radius	
Tolerance:	+ / -.0005
Unequal Index:	No
Edge preparation:	Yes
Coating:	AlTiN

### MATERIAL GROUPS

steel < 450 N/mm <sup>2</sup>
450 < 700 N/mm <sup>2</sup>
700 < 1200 N/mm <sup>2</sup>
Hardened steel
Stainless steel
Cast Iron
Fe based super alloys
CO-based super alloys
Ni-based super alloys
Titanium alloys

**FOCUS ON ISO P, S AND K MATERIALS INCLUDING STAINLESS STEEL, INCONEL AND TITANIUM.**



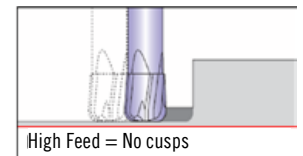
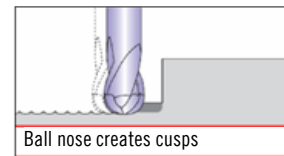
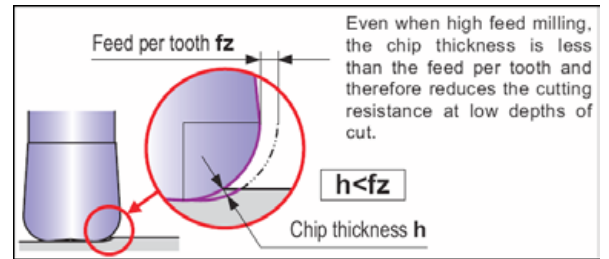
## HOW DOES HIGH FEED MILLING WORK?

The key to high feed milling cutters is the lead angle (or large radius) that allows you to have higher feed rates based on chip thinning.

When milling with a ball end mill, varying the depth of cut results in a chip-thinning effect. Large depths of cut involve bigger chip thicknesses, while shallow depths of cut mean smaller chip thickness. Machining with smaller depths of cuts, allows you to increase the feed rate to get the proper chip thickness (load).

### CHATTER AND SURFACE FINISH

High feed end mills have a low cutting resistance compared to ballnose endmills. This enables higher feed rates & longer overhangs to be achieved with less risk of vibration.



Ball nose directs force sideways, creating chatter.

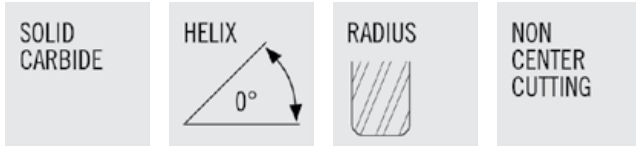


High feed directs force upwards, minimizing chatter.

## CHOOSING THE RIGHT HIGH FEED TOOL

Product	Product Family	APMX	Range	Material suitability	Machine suitability		Ramping capability	Plunging suitability
	<b>MZN410R &amp; MZN510R</b> - 4- and 5-flute versions - 1/8" - 5/8" diameters - AlTiN coating - Open flute cavity	5.5%*DCX	1/8" - 5/8"	P K S H	✓	=	✓	✗
	<b>SN200R, 400R &amp; 500R</b> - 2-, 4- and 5-flute versions - 1/16"-1/2" diameter range - 3xD, 5xD and 7xD - Deep pockets and long reach - AlTiN coating	9%*DCX	1/16"-1/2"	P M K S H	✓	=	✓	✓

## SN200R



- 3, 5, and 7 x Diameter of reach
- Defined radius (rp)
- Wide range of materials including Steels (<52 Rc), Stainless Steels, Titanium, and Cast Iron
- Face, slot, and plunge milling
- Long reach applications
- Deep cavity milling

- Cutting Data - Page 114-118
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	RADIUS	SHANK TYPE
N13984	SN200R-0.063-G1-H007.0-Z2	1/16	1/4	.004	2	.055	.188	2	ALTIN	0.0074	CYLINDRICAL
N13985	SN200R-0.063-G2-H007.0-Z2	1/16	1/4	.004	2	.055	.313	2	ALTIN	0.0074	CYLINDRICAL
N13986	SN200R-0.063-J3-H007.0-Z2	1/16	1/4	.004	2	.055	.438	2	ALTIN	0.0074	CYLINDRICAL
N13987	SN200R-0.094-G1-H011.0-Z2	3/32	1/4	.006	2	.082	.281	2	ALTIN	0.0111	CYLINDRICAL
N13988	SN200R-0.094-G2-H011.0-Z2	3/32	1/4	.006	2	.082	.469	2	ALTIN	0.0111	CYLINDRICAL
N13989	SN200R-0.094-J3-H011.0-Z2	3/32	1/4	.006	2-1/2	.082	.656	2	ALTIN	0.0111	CYLINDRICAL
N13992	SN200R-0.125-G1-H015.0-Z2	1/8	1/4	.008	2	.082	.375	2	ALTIN	0.0148	CYLINDRICAL
N13993	SN200R-0.125-G2-H015.0-Z2	1/8	1/4	.008	2-1/2	.109	.625	2	ALTIN	0.0148	CYLINDRICAL
N13994	SN200R-0.125-J3-H015.0-Z2	1/8	1/4	.008	2-1/2	.109	.875	2	ALTIN	0.0148	CYLINDRICAL
N13997	SN200R-0.156-G1-H020.0-Z2	5/32	1/4	.010	2	.136	.469	2	ALTIN	0.0200	CYLINDRICAL
N13998	SN200R-0.156-G2-H020.0-Z2	5/32	1/4	.010	2-1/2	.136	.781	2	ALTIN	0.0200	CYLINDRICAL
N13999	SN200R-0.156-J3-H020.0-Z2	5/32	1/4	.010	2-1/2	.136	1.094	2	ALTIN	0.0200	CYLINDRICAL
N14004	SN200R-0.188-G1-H023.0-Z2	3/16	1/4	.012	2	.166	.562	2	ALTIN	0.0230	CYLINDRICAL
N14005	SN200R-0.188-G2-H023.0-Z2	3/16	1/4	.012	2-1/2	.166	.937	2	ALTIN	0.0230	CYLINDRICAL
N14006	SN200R-0.188-J3-H023.0-Z2	3/16	1/4	.012	3	.166	1.313	2	ALTIN	0.0230	CYLINDRICAL
N14009	SN200R-0.250-E1-H032.0-Z2	1/4	1/4	.014	2-1/2	.218	.750	2	ALTIN	0.0322	CYLINDRICAL
N14012	SN200R-0.250-E2-H032.0-Z2	1/4	1/4	.014	3	.218	1.250	2	ALTIN	0.0322	CYLINDRICAL
N14013	SN200R-0.250-J3-H032.0-Z2	1/4	1/4	.014	3-1/2	.218	1.750	2	ALTIN	0.0322	CYLINDRICAL
N14016	SN200R-0.313-G1-H037.0-Z2	5/16	3/8	.016	2-1/2	.273	.938	2	ALTIN	0.0373	CYLINDRICAL
N14017	SN200R-0.313-G2-H037.0-Z2	5/16	3/8	.016	3-1/2	.273	1.563	2	ALTIN	0.0373	CYLINDRICAL
N14018	SN200R-0.313-J3-H037.0-Z2	5/16	3/8	.016	4	.273	2.188	2	ALTIN	0.0373	CYLINDRICAL
N14023	SN200R-0.375-E1-H043.0-Z2	3/8	3/8	.018	3	.329	1.125	2	ALTIN	0.0432	CYLINDRICAL
N14024	SN200R-0.375-E2-H043.0-Z2	3/8	3/8	.018	3-1/2	.329	1.875	2	ALTIN	0.0432	CYLINDRICAL
N14025	SN200R-0.375-J3-H043.0-Z2	3/8	3/8	.018	4-1/2	.329	2.625	2	ALTIN	0.0432	CYLINDRICAL
N14029	SN200R-0.500-E1-H061.0-Z2	1/2	1/2	.020	3-1/2	.444	1.500	2	ALTIN	0.0614	CYLINDRICAL
N14032	SN200R-0.500-E2-H061.0-Z2	1/2	1/2	.020	4-1/2	.444	2.500	2	ALTIN	0.0614	CYLINDRICAL
N14033	SN200R-0.500-J3-H061.0-Z2	1/2	1/2	.020	6	.444	3.500	2	ALTIN	0.0614	CYLINDRICAL

DISCOUNT CODE D43

## SN400R

SOLID CARBIDE	HELIX 	RADIUS 	NON CENTER CUTTING
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- 3, 5 x Diameter of reach
- Defined radius (rp)
- Wide range of materials including Steels (<52 Rc), Stainless Steels, Titanium, and Cast Iron
- Face, slot, and plunge milling
- Long reach applications
- Deep cavity milling

- Cutting Data - Page 114-118
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	RADIUS	SHANK TYPE
N13995	SN400R-0.125-G1-H015.0-Z4	1/8	1/4	.008	2	.109	.375	4	ALTIN	0.0148	CYLINDRICAL
N13996	SN400R-0.125-G2-H015.0-Z4	1/8	1/4	.008	2-1/2	.109	.625	4	ALTIN	0.0148	CYLINDRICAL
N14002	SN400R-0.156-G1-H020.0-Z4	5/32	1/4	.010	2	.136	.469	4	ALTIN	0.0200	CYLINDRICAL
N14003	SN400R-0.156-G2-H020.0-Z4	5/32	1/4	.010	2-1/2	.136	.781	4	ALTIN	0.0200	CYLINDRICAL
N14007	SN400R-0.188-G1-H023.0-Z4	3/16	1/4	.012	2	.166	.562	4	ALTIN	0.0230	CYLINDRICAL
N14008	SN400R-0.188-G2-H023.0-Z4	3/16	1/4	.012	2-1/2	.166	.937	4	ALTIN	0.0230	CYLINDRICAL
N14014	SN400R-0.250-E1-H032.0-Z4	1/4	1/4	.014	2-1/2	.218	.750	4	ALTIN	0.0322	CYLINDRICAL
N14015	SN400R-0.250-E2-H032.0-Z4	1/4	1/4	.014	3	.218	1.250	4	ALTIN	0.0322	CYLINDRICAL
N14019	SN400R-0.313-G1-H037.0-Z4	5/16	3/8	.016	2-1/2	.273	.938	4	ALTIN	0.0373	CYLINDRICAL
N14022	SN400R-0.313-G2-H037.0-Z4	5/16	3/8	.016	3-1/2	.273	1.563	4	ALTIN	0.0373	CYLINDRICAL
N14026	SN400R-0.375-E1-H043.0-Z4	3/8	3/8	.018	3	.329	1.125	4	ALTIN	0.0432	CYLINDRICAL
N14028	SN400R-0.375-E2-H043.0-Z4	3/8	3/8	.018	3-1/2	.329	1.875	4	ALTIN	0.0432	CYLINDRICAL
N14034	SN400R-0.500-E1-H061.0-Z4	1/2	1/2	.020	3-1/2	.444	1.500	4	ALTIN	0.0614	CYLINDRICAL
N14036	SN400R-0.500-E2-H061.0-Z4	1/2	1/2	.020	4-1/2	.444	2.500	4	ALTIN	0.0614	CYLINDRICAL

## SN500R

SOLID CARBIDE	HELIX 	RADIUS 	NON CENTER CUTTING
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- 3 x Diameter of reach
- Defined radius (rp)
- Wide range of materials including Steels (<52 Rc), Stainless Steels, Titanium, and Cast Iron
- Face, slot, and plunge milling
- Long reach applications
- Deep cavity milling

- Cutting Data - Page 114-118
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	RADIUS	SHANK TYPE
N14027	SN500R-0.375-E1-H043.0-Z5	3/8	3/8	.018	3	.329	1.125	5	ALTIN	0.0432	CYLINDRICAL
N14035	SN500R-0.500-E1-H061.0-Z5	1/2	1/2	.020	3-1/2	.444	1.500	5	ALTIN	0.0614	CYLINDRICAL

## CUTTING DATA -SN200R, SN400R, SN500R SLOT MILLING - START VALUES

		SLOT MILLING											
ISO GROUP	SMG	a <sub>e</sub> (Max)	v <sub>c</sub> (sf / min)		Zn = 2								
					1/16	3/32	1/8	5/32	3/16	1/4	5/16	3/8	1/2
P	M/A/D 1 - 2	1.00 x DCX	984	n [rev/min]	60157	40105	30079	24062	20052	15039	12031	10026	7520
				fz [in]	0.0021	0.0031	0.0041	0.0052	0.0062	0.0083	0.0103	0.0124	0.0165
		820	1148	vf [in/min]	248	248	248	248	248	248	248	248	248
	M/A/D 3 - 4	1.00 x DCX	738	n [rev/min]	45118	30079	22559	18047	15039	11280	9024	7520	5640
				fz [in]	0.0019	0.0028	0.0038	0.0047	0.0056	0.0075	0.0094	0.0113	0.0150
		656	820	vf [in/min]	169	169	169	169	169	169	169	169	169
	M/A/D 5 - 6	1.00 x DCX	574	n [rev/min]	35092	23395	17546	14036	11697	8773	7018	5849	4386
				fz [in]	0.0017	0.0025	0.0034	0.0042	0.0051	0.0068	0.0084	0.0101	0.0135
		492	656	vf [in/min]	118	118	118	118	118	118	118	118	118
H	M/A/D 7a	1.00 x DCX	312	n [rev/min]	19050	12700	9525	7620	6350	4762	3810	3175	2381
				fz [in]	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120
		262	361	vf [in/min]	57	57	57	57	57	57	57	57	57
M	E/M/A 8 - 9	1.00 x DCX	410	n [rev/min]	25066	16710	12533	10026	8355	6266	5013	4178	3133
				fz [in]	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120
		361	459	vf [in/min]	75	75	75	75	75	75	75	75	
	E/M/A 10 - 11	1.00 x DCX	312	n [rev/min]	19050	12700	9525	7620	6350	4762	3810	3175	2381
				fz [in]	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120
		262	361	vf [in/min]	57	57	57	57	57	57	57	57	
K	E/M/A 12 - 13	1.00 x DCX	574	n [rev/min]	35092	23395	17546	14036	11697	8773	7018	5849	4386
				fz [in]	0.0019	0.0028	0.0038	0.0047	0.0056	0.0075	0.0094	0.0113	0.0150
		492	656	vf [in/min]	132	132	132	132	132	132	132	132	
	E/M/A 14 - 15	1.00 x DCX	410	n [rev/min]	25066	16710	12533	10026	8355	6266	5013	4178	3133
				fz [in]	0.0017	0.0025	0.0034	0.0042	0.0051	0.0068	0.0084	0.0101	0.0135
		328	492	vf [in/min]	85	85	85	85	85	85	85	85	
S	E 19	1.00 x DCX	164	n [rev/min]	10026	6684	5013	4010	3342	2507	2005	1671	1253
				fz [in]	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0090
		131	197	vf [in/min]	23	23	23	23	23	23	23	23	
	E 20	1.00 x DCX	164	n [rev/min]	10026	6684	5013	4010	3342	2507	2005	1671	1253
				fz [in]	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0090
		131	197	vf [in/min]	23	23	23	23	23	23	23	23	
	E 21	1.00 x DCX	98	n [rev/min]	6016	4010	3008	2406	2005	1504	1203	1003	752
				fz [in]	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0090
		66	131	vf [in/min]	14	14	14	14	14	14	14	14	
	E 22	1.00 x DCX	377	n [rev/min]	23060	15374	11530	9224	7687	5765	4612	3843	2883
				fz [in]	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0090
		328	427	vf [in/min]	52	52	52	52	52	52	52	52	
				ap max**	0.0020	0.0030	0.0040	0.0050	0.0060	0.0070	0.0080	0.0090	0.0100

\*\*Reduce APMX 20% and Feed per tooth 15% when using 5 x D version

\*\*Reduce APMX 40% and Feed per tooth 30% when using 7 x D version

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## CUTTING DATA -SN200R, SN400R, SN500R SLOT MILLING - START VALUES

ISO GROUP	SMG	a <sub>e</sub> (Max)	v <sub>c</sub> (sf / min)	SLOT MILLING											
				Zn = 4										Zn = 5	
				1/8	5/32	3/16	1/4	5/16	3/8	1/2	3/8	1/2			
P	M/A/D 1 - 2	1.00 x DCX	984	n [rev/min]	30079	24062	20052	15039	12031	10026	7520	10026	7520		
				fz [in]	0.0041	0.0052	0.0062	0.0083	0.0103	0.0124	0.0165	0.0124	0.0165		
			820	1148	vf [in/min]	496	496	496	496	496	496	496	620	620	
		1.00 x DCX	738	ap max**	0.0080	0.0100	0.0120	0.0140	0.0160	0.0180	0.0200	0.0180	0.0200		
				n [rev/min]	22559	18047	15039	11280	9024	7520	5640	7520	5640		
			656	820	vf [in/min]	338	338	338	338	338	338	338	423	423	
	M/A/D 3 - 4	1.00 x DCX	574	n [rev/min]	17546	14036	11697	8773	7018	5849	4386	5849	4386		
				fz [in]	0.0034	0.0042	0.0051	0.0068	0.0084	0.0101	0.0135	0.0101	0.0135		
			492	656	vf [in/min]	237	237	237	237	237	237	237	296	296	
		M/A/D 5 - 6	1.00 x DCX	312	n [rev/min]	9525	7620	6350	4762	3810	3175	2381	3175	2381	
					fz [in]	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120	0.0090	0.0120	
			262	361	vf [in/min]	114	114	114	114	114	114	114	143	143	
H	M/A/D 7a	1.00 x DCX	410	n [rev/min]	12533	10026	8355	6266	5013	4178	3133	4178	3133		
				fz [in]	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120	0.0090	0.0120		
			361	459	vf [in/min]	150	150	150	150	150	150	150	188	188	
		E/M/A 8 - 9	1.00 x DCX	312	n [rev/min]	9525	7620	6350	4762	3810	3175	2381	3175	2381	
					fz [in]	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120	0.0090	0.0120	
			262	361	vf [in/min]	114	114	114	114	114	114	114	143	143	
	E/M/A 10 - 11	1.00 x DCX	574	n [rev/min]	17546	14036	11697	8773	7018	5849	4386	5849	4386		
				fz [in]	0.0038	0.0047	0.0056	0.0075	0.0094	0.0113	0.0150	0.0113	0.0150		
			492	656	vf [in/min]	263	263	263	263	263	263	263	329	329	
		E/M/A 12 - 13	1.00 x DCX	410	n [rev/min]	12533	10026	8355	6266	5013	4178	3133	4178	3133	
					fz [in]	0.0034	0.0042	0.0051	0.0068	0.0084	0.0101	0.0135	0.0101	0.0135	
			328	492	vf [in/min]	169	169	169	169	169	169	169	211	211	
K	E/M/A 14 - 15	1.00 x DCX	164	n [rev/min]	5013	4010	3342	2507	2005	1671	1253	1671	1253		
				fz [in]	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0090	0.0068	0.0090		
			131	197	vf [in/min]	45	45	45	45	45	45	45	56	56	
		E 19	1.00 x DCX	164	n [rev/min]	5013	4010	3342	2507	2005	1671	1253	1671	1253	
					fz [in]	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0090	0.0068	0.0090	
			131	197	vf [in/min]	45	45	45	45	45	45	45	56	56	
	E 20	1.00 x DCX	98	n [rev/min]	3008	2406	2005	1504	1203	1003	752	1003	752		
				fz [in]	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0090	0.0068	0.0090		
			66	131	vf [in/min]	27	27	27	27	27	27	27	34	34	
		E 21	1.00 x DCX	377	n [rev/min]	11530	9224	7687	5765	4612	3843	2883	3843	2883	
					fz [in]	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0090	0.0068	0.0090	
			328	427	vf [in/min]	104	104	104	104	104	104	104	130	130	
E 22	1.00 x DCX	377	n [rev/min]	11530	9224	7687	5765	4612	3843	2883	3843	2883			
			fz [in]	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0090	0.0068	0.0090			
	328	427	vf [in/min]	104	104	104	104	104	104	104	130	130			
E 22	1.00 x DCX	377	n [rev/min]	11530	9224	7687	5765	4612	3843	2883	3843	2883			
			fz [in]	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0090	0.0068	0.0090			
	328	427	vf [in/min]	104	104	104	104	104	104	104	130	130			

\*\*Reduce APMX 20% and Feed per tooth 15% when using 5 x D version  
 \*\*Reduce APMX 40% and Feed per tooth 30% when using 7 x D version

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>f</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## CUTTING DATA - SN200R, SN400R, SN500R SIDE MILLING - START VALUES

ISO GROUP	SMG	a <sub>e</sub> (Max)	v <sub>c</sub> (sf / min)	SIDE MILLING													
				Zn = 2													
				1/16	3/32	1/8	5/32	3/16	1/4	5/16	3/8	1/2					
P	M/A/D 1 - 2	0.30 x DCX	984	n [rev/min]	60157	40105	30079	24062	20052	15039	12031	10026	7520				
				fz [in]	0.0034	0.0052	0.0069	0.0086	0.0103	0.0138	0.0172	0.0206	0.0275				
			820	1148	vf [in/min]	414	414	414	414	414	414	414	414	414			
		0.30 x DCX	738	ap max**	0.0040	0.0060	0.0080	0.0100	0.0120	0.0140	0.0160	0.0180	0.0200				
				n [rev/min]	45118	30079	22559	18047	15039	11280	9024	7520	5640				
			656	820	fz [in]	0.0031	0.0047	0.0063	0.0078	0.0094	0.0125	0.0156	0.0188	0.0250			
	M	E/M/A 8 - 9	0.30 x DCX	410	vf [in/min]	282	282	282	282	282	282	282	282	282			
					ap max**	0.0040	0.0060	0.0080	0.0100	0.0120	0.0140	0.0160	0.0180	0.0200			
				574	656	n [rev/min]	35092	23395	17546	14036	11697	8773	7018	5849	4386		
			H	M/A/D 7a	0.30 x DCX	312	fz [in]	0.0028	0.0042	0.0056	0.0070	0.0084	0.0113	0.0141	0.0169	0.0225	
							492	656	vf [in/min]	197	197	197	197	197	197	197	197
						0.30 x DCX	262	ap max**	0.0040	0.0060	0.0080	0.0100	0.0120	0.0140	0.0160	0.0180	0.0200
361		n [rev/min]			19050			12700	9525	7620	6350	4762	3810	3175	2381		
262		361			fz [in]		0.0025	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125	0.0150	0.0200		
K		E/M/A 12 - 13			0.30 x DCX	410	vf [in/min]	95	95	95	95	95	95	95	95	95	
			ap max**	0.0032			0.0048	0.0064	0.0080	0.0096	0.0112	0.0128	0.0144	0.0160			
			361	459		n [rev/min]	25066	16710	12533	10026	8355	6266	5013	4178	3133		
			S	E/M/A 10 - 11	0.30 x DCX	459	fz [in]	0.0025	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125	0.0150	0.0200	
	262						361	vf [in/min]	125	125	125	125	125	125	125	125	125
	0.30 x DCX					262	ap max**	0.0032	0.0048	0.0064	0.0080	0.0096	0.0112	0.0128	0.0144	0.0160	
		361			n [rev/min]		28073	18716	14037	11229	9358	7018	5615	4679	3509		
		262			361	fz [in]	0.0025	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125	0.0150	0.0200		
	E	E/M/A 14 - 15			0.30 x DCX	574	vf [in/min]	140	140	140	140	140	140	140	140	140	
				ap max**			0.0032	0.0048	0.0064	0.0080	0.0096	0.0112	0.0128	0.0144	0.0160		
				492		656	n [rev/min]	35092	23395	17546	14036	11697	8773	7018	5849	4386	
				E	E/M/A 12 - 13	0.30 x DCX	410	fz [in]	0.0019	0.0028	0.0038	0.0047	0.0056	0.0075	0.0094	0.0113	0.0150
328								492	vf [in/min]	94	94	94	94	94	94	94	94
0.30 x DCX							328	ap max**	0.0040	0.0060	0.0080	0.0100	0.0120	0.0140	0.0160	0.0180	0.0200
		492				n [rev/min]		10026	6684	5013	4010	3342	2507	2005	1671	1253	
		328	492			fz [in]	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120		
E		E/M/A 14 - 15	0.30 x DCX			164	vf [in/min]	30	30	30	30	30	30	30	30	30	
					ap max**		0.0020	0.0030	0.0040	0.0050	0.0060	0.0070	0.0080	0.0090	0.0100		
					131	197	n [rev/min]	10026	6684	5013	4010	3342	2507	2005	1671	1253	
			E		E/M/A 14 - 15	0.30 x DCX	164	fz [in]	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120
	131							197	vf [in/min]	30	30	30	30	30	30	30	30
	0.30 x DCX						131	ap max**	0.0020	0.0030	0.0040	0.0050	0.0060	0.0070	0.0080	0.0090	0.0100
		197				n [rev/min]		6016	4010	3008	2406	2005	1504	1203	1003	752	
		66		131		fz [in]	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120		
	E	E/M/A 14 - 15		0.30 x DCX		98	vf [in/min]	18	18	18	18	18	18	18	18	18	
					ap max**		0.0020	0.0030	0.0040	0.0050	0.0060	0.0070	0.0080	0.0090	0.0100		
					66	131	n [rev/min]	23060	15374	11530	9224	7687	5765	4612	3843	2883	
				E	E/M/A 14 - 15	0.30 x DCX	377	fz [in]	0.0022	0.0033	0.0044	0.0055	0.0066	0.0088	0.0109	0.0131	0.0175
328								427	vf [in/min]	101	101	101	101	101	101	101	101
0.30 x DCX							328	ap max**	0.0020	0.0030	0.0040	0.0050	0.0060	0.0070	0.0080	0.0090	0.0100
		427				n [rev/min]		23060	15374	11530	9224	7687	5765	4612	3843	2883	

\*\*Reduce APMX 20% and Feed per tooth 15% when using 5 x D version  
 \*\*Reduce APMX 40% and Feed per tooth 30% when using 7 x D version

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>f</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## CUTTING DATA -SN200R, SN400R, SN500R SIDE MILLING - START VALUES

SIDE MILLING															
ISO GROUP	SMG	a <sub>e</sub> (Max)	v <sub>c</sub> (sf / min)		Zn = 4						Zn = 5				
					1/8	5/32	3/16	1/4	5/16	3/8	1/2	3/8	1/2		
P	M/A/D 1 - 2	0.30 x DCX	984	n [rev/min]	30079	24062	20052	15039	12031	10026	7520	10026	7520		
				fz [in]	0.0069	0.0086	0.0103	0.0138	0.0172	0.0206	0.0275	0.0206	0.0275		
			820	1148	vf [in/min]	827	827	827	827	827	827	827	1034	1034	
		M/A/D 3 - 4	0.30 x DCX	738	n [rev/min]	22559	18047	15039	11280	9024	7520	5640	7520	5640	
					fz [in]	0.0063	0.0078	0.0094	0.0125	0.0156	0.0188	0.0250	0.0188	0.0250	
			656	820	vf [in/min]	564	564	564	564	564	564	564	705	705	
	M/A/D 5 - 6	0.30 x DCX	574	n [rev/min]	17546	14036	11697	8773	7018	5849	4386	5849	4386		
				fz [in]	0.0056	0.0070	0.0084	0.0113	0.0141	0.0169	0.0225	0.0169	0.0225		
		492	656	vf [in/min]	395	395	395	395	395	395	395	493	493		
	H	M/A/D 7a	0.30 x DCX	312	n [rev/min]	9525	7620	6350	4762	3810	3175	2381	3175	2381	
					fz [in]	0.0050	0.0063	0.0075	0.0100	0.0125	0.0150	0.0200	0.0150	0.0200	
				262	361	vf [in/min]	190	190	190	190	190	190	190	238	238
E/M/A 8 - 9			0.30 x DCX	410	n [rev/min]	12533	10026	8355	6266	5013	4178	3133	4178	3133	
					fz [in]	0.0050	0.0063	0.0075	0.0100	0.0125	0.0150	0.0200	0.0150	0.0200	
			361	459	vf [in/min]	251	251	251	251	251	251	251	313	313	
E/M/A 10 - 11		0.30 x DCX	459	n [rev/min]	14037	11229	9358	7018	5615	4679	3509	4679	3509		
				fz [in]	0.0050	0.0063	0.0075	0.0100	0.0125	0.0150	0.0200	0.0150	0.0200		
		262	361	vf [in/min]	281	281	281	281	281	281	281	351	351		
K		E/M/A 12 - 13	0.30 x DCX	574	n [rev/min]	17546	14036	11697	8773	7018	5849	4386	5849	4386	
					fz [in]	0.0050	0.0063	0.0075	0.0100	0.0125	0.0150	0.0200	0.0150	0.0200	
				492	656	vf [in/min]	351	351	351	351	351	351	351	439	439
	E/M/A 14 - 15		0.30 x DCX	410	n [rev/min]	12533	10026	8355	6266	5013	4178	3133	4178	3133	
					fz [in]	0.0038	0.0047	0.0056	0.0075	0.0094	0.0113	0.0150	0.0113	0.0150	
			328	492	vf [in/min]	188	188	188	188	188	188	188	235	235	
	S	E 19	0.30 x DCX	164	n [rev/min]	5013	4010	3342	2507	2005	1671	1253	1671	1253	
					fz [in]	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120	0.0090	0.0120	
				131	197	vf [in/min]	60	60	60	60	60	60	60	75	75
			E 20	0.30 x DCX	164	n [rev/min]	5013	4010	3342	2507	2005	1671	1253	1671	1253
						fz [in]	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120	0.0090	0.0120
				131	197	vf [in/min]	60	60	60	60	60	60	60	75	75
E 21		0.30 x DCX	98	n [rev/min]	3008	2406	2005	1504	1203	1003	752	1003	752		
				fz [in]	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090	0.0120	0.0090	0.0120		
		66	131	vf [in/min]	36	36	36	36	36	36	36	45	45		
E 22		0.30 x DCX	377	n [rev/min]	11530	9224	7687	5765	4612	3843	2883	3843	2883		
				fz [in]	0.0044	0.0055	0.0066	0.0088	0.0109	0.0131	0.0175	0.0131	0.0175		
		328	427	vf [in/min]	202	202	202	202	202	202	202	252	252		
				ap max**	0.0040	0.0050	0.0060	0.0070	0.0080	0.0090	0.0100	0.0090	0.0100		

\*\*Reduce APMX 20% and Feed per tooth 15% when using 5 x D version  
 \*\*Reduce APMX 40% and Feed per tooth 30% when using 7 x D version

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>f</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## CUTTING DATA - SN200R PLUNGE MILLING - START VALUES

ISO GROUP	SMG	a <sub>e</sub> (Max)	v <sub>c</sub> (sf / min)	PLUNGE MILLING											
				Zn = 2											
				1/16	3/32	1/8	5/32	3/16	1/4	5/16	3/8	1/2			
P	M/A/D 1 - 2	0.30 x DCX	699	n [rev/min]	42712	28475	21356	17084	14237	10678	8542	7119	5339		
				fz [in]	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050		
			576	822	vf [in/min]	53	53	53	53	53	53	53	53	53	
	M/A/D 3 - 4	0.30 x DCX	518	n [rev/min]	31683	21122	15841	12673	10561	7921	6337	5280	3960		
				fz [in]	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050		
			459	577	vf [in/min]	40	40	40	40	40	40	40	40		
			ap=pd***	0.1250	0.1875	0.2500	0.3125	0.3750	0.5000	0.6250	0.7500	1.0000			
			M/A/D 5 - 6	0.30 x DCX	410	n [rev/min]	25066	16710	12533	10026	8355	6266	5013	4178	3133
					fz [in]	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050	
M/A/D 7a	0.30 x DCX	361	459	vf [in/min]	31	31	31	31	31	31	31	31			
		ap=pd***	0.1250	0.1875	0.2500	0.3125	0.3750	0.5000	0.6250	0.7500	1.0000				
		213	n [rev/min]	13034	8689	6517	5213	4345	3259	2607	2172	1629			
H	M/A/D 7a	0.30 x DCX	180	fz [in]	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018	0.0022	0.0026	0.0035		
				246	246	vf [in/min]	11	11	11	11	11	11	11	11	
			ap=pd***	0.1250	0.1875	0.2500	0.3125	0.3750	0.5000	0.6250	0.7500	1.0000			
	M	E/M/A 8 - 9	0.30 x DCX	289	n [rev/min]	17646	11764	8823	7058	5882	4412	3529	2941	2206	
					fz [in]	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018	0.0022	0.0026	0.0035	
				246	331	vf [in/min]	15	15	15	15	15	15	15	15	
		E/M/A 10 - 11	0.30 x DCX	246	n [rev/min]	15039	10026	7520	6016	5013	3760	3008	2507	1880	
					fz [in]	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018	0.0022	0.0026	0.0035	
				180	246	vf [in/min]	13	13	13	13	13	13	13	13	
K	E/M/A 12 - 13	0.30 x DCX	410	n [rev/min]	25066	16710	12533	10026	8355	6266	5013	4178	3133		
				fz [in]	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018	0.0022	0.0026	0.0035		
			361	459	vf [in/min]	22	22	22	22	22	22	22	22		
	E/M/A 14 - 15	0.30 x DCX	295	ap=pd***	0.1250	0.1875	0.2500	0.3125	0.3750	0.5000	0.6250	0.7500	1.0000		
				n [rev/min]	18047	12031	9024	7219	6016	4512	3609	3008	2256		
			fz [in]	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0023	0.0030			
			230	361	vf [in/min]	14	14	14	14	14	14	14	14		
			ap=pd***	0.1250	0.1875	0.2500	0.3125	0.3750	0.5000	0.6250	0.7500	1.0000			
			n [rev/min]	7018	4679	3509	2807	2339	1755	1404	1170	877			
S	E 19	0.30 x DCX	115	fz [in]	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0023	0.0030		
				98	131	vf [in/min]	5	5	5	5	5	5	5	5	
			ap=pd***	0.1250	0.1875	0.2500	0.3125	0.3750	0.5000	0.6250	0.7500	1.0000			
	E 20	0.30 x DCX	115	n [rev/min]	7018	4679	3509	2807	2339	1755	1404	1170	877		
				fz [in]	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0023	0.0030		
			98	131	vf [in/min]	5	5	5	5	5	5	5	5		
	E 21	0.30 x DCX	75	ap=pd***	0.1250	0.1875	0.2500	0.3125	0.3750	0.5000	0.6250	0.7500	1.0000		
				n [rev/min]	4612	3075	2306	1845	1537	1153	922	769	577		
			fz [in]	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0023	0.0030			
E 22	0.30 x DCX	49	vf [in/min]	3	3	3	3	3	3	3	3	3			
			ap=pd***	0.1250	0.1875	0.2500	0.3125	0.3750	0.5000	0.6250	0.7500	1.0000			
		262	n [rev/min]	16042	10695	8021	6417	5347	4010	3208	2674	2005			
230	fz [in]	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018	0.0022	0.0026	0.0035					
	295	295	vf [in/min]	14	14	14	14	14	14	14	14				
ap=pd***	0.1250	0.1875	0.2500	0.3125	0.3750	0.5000	0.6250	0.7500	1.0000						

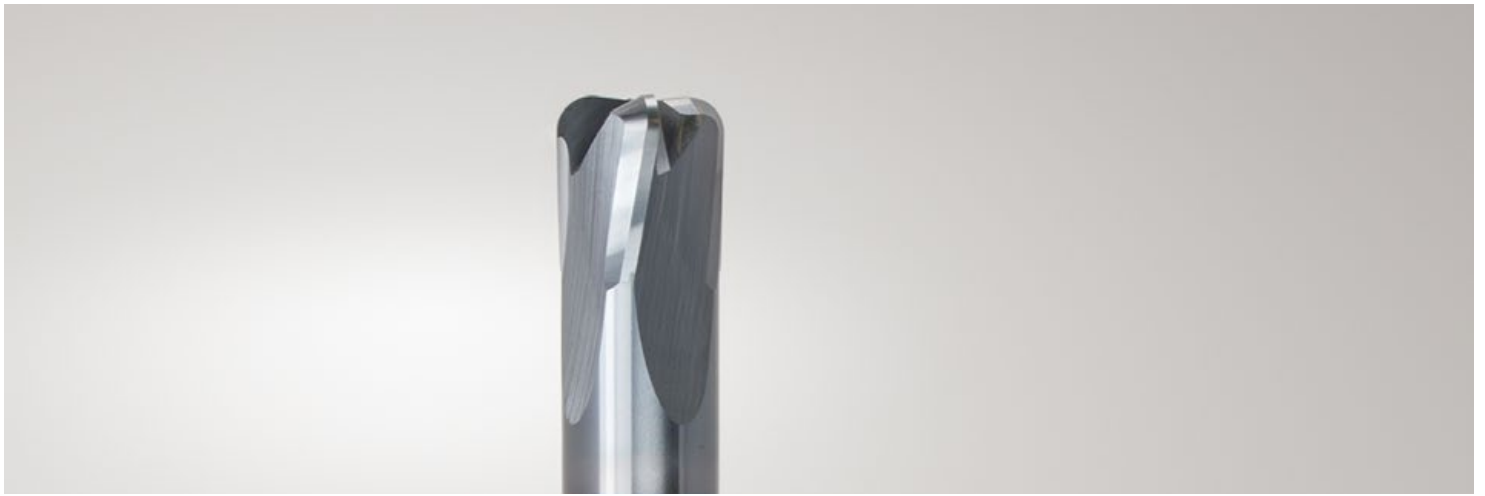
\*\*\*pd: plunge depth

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.





## MOLD & DIE

# MZN410R & MZN510R

The MZN410R and MZN510R are designed to maximize productivity in hardened steels and superalloys. These end mills feature optimized substrate, geometry and coating to offer superior performance and process reliability.

These high feed end mills are available in 1/8" to 5/8" diameters, in four or five flute options, depending on the diameter. This range also features a short and long reach option to fit various work piece requirements.

The MZN410R and MZN510R are effective in hardened steels, cast irons and nickel-based super alloys. A typical application for this end mill is when machining hardened tool steels used in mold & die components.

### ADVANTAGES OF HIGH FEED MILLING

High Feed Milling (HFM) can reduce machining times and cut costs allowing one tool to be used in a wide range of operations & strategies. Reduce component costs by maximizing material removal rates and reduce processing time by allowing close-to-profile pocketing of 90° walls. HFM can also minimize semi-finishing operations, thus further increasing efficiency.

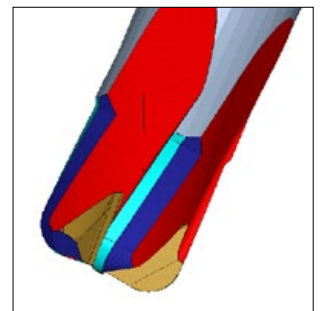
The open end tooth design provides superior chip evacuation. This provides process reliability because chips are effectively removed from the cutting zone and not being "re-cut" which leads to edge chipping.

### PRODUCT OVERVIEW

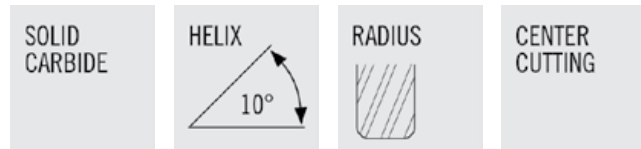
- End tooth design - Improved surface quality
- Open flute cavity and relief length - Improved chip evacuation
- Full form radius - More stability
- Edge preparation - Increases tool life

### THE NIAGARA CUTTER BENEFIT

- Added strength to the cutting edge
- Improved process reliability and performance due to enhanced chip evacuation
- Allows for machining to near net shape on forms and corners
- Strengthens and protects the cutting edge with improved wear resistance



**MZN410R / MZN510R**



- Strong end tooth design
- Hardened steels (>48 Rc) and nickel based super alloys such as Inconel
- Edge preparation for increased cutting edge strength
- 2° back taper with reduced neck diameter for workpiece clearance
- Shrink fit first choice as toolholder
- Cutting Data - Page 121-122
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	RADIUS	SHANK TYPE
N00305	MZN410R-0.125-J1-R030.0-Z4	1/8	1/4	0.030	2-1/2	.112	.375	4	ALTIN	0.030	CYLINDRICAL
N00001	MZN410R-0.125-J2-R030.0-Z4	1/8	1/4	0.030	2-1/2	.112	.625	4	ALTIN	0.030	CYLINDRICAL
N00002	MZN410R-0.188-J1-R050.0-Z4	3/16	1/4	0.050	2-1/2	.172	.562	4	ALTIN	0.050	CYLINDRICAL
N00003	MZN410R-0.188-J2-R050.0-Z4	3/16	1/4	0.050	2-1/2	.172	.937	4	ALTIN	0.050	CYLINDRICAL
N00004	MZN410R-0.250-E1-R060.0-Z4	1/4	1/4	0.060	2-1/2	.230	.750	4	ALTIN	0.060	CYLINDRICAL
N00005	MZN410R-0.250-E2-R060.0-Z4	1/4	1/4	0.060	2-1/2	.230	1.250	4	ALTIN	0.060	CYLINDRICAL
N00006	MZN410R-0.313-G1-R080.0-Z4	5/16	3/8	0.080	3	.290	.750	4	ALTIN	0.080	CYLINDRICAL
N00007	MZN410R-0.313-G2-R080.0-Z4	5/16	3/8	0.080	3	.290	1.250	4	ALTIN	0.080	CYLINDRICAL
N00008	MZN410R-0.375-E1-R080.0-Z4	3/8	3/8	0.080	3	.348	1.125	4	ALTIN	0.080	CYLINDRICAL
N00009	MZN510R-0.375-E2-R080.0-Z5	3/8	3/8	0.080	3	.348	1.125	5	ALTIN	0.080	CYLINDRICAL
N00010	MZN410R-0.375-E3-R080.0-Z4	3/8	3/8	0.080	3	.348	1.875	4	ALTIN	0.080	CYLINDRICAL
N00011	MZN410R-0.500-E1-R120.0-Z4	1/2	1/2	0.120	4	.468	1.500	4	ALTIN	0.120	CYLINDRICAL
N00012	MZN510R-0.500-E2-R120.0-Z5	1/2	1/2	0.120	4	.468	1.500	5	ALTIN	0.120	CYLINDRICAL
N00013	MZN510R-0.625-E1-R120.0-Z5	5/8	5/8	0.120	4	.584	1.875	5	ALTIN	0.120	CYLINDRICAL

DISCOUNT CODE D43

## MZN410R / MZN510R - START VALUES

SLOTTING														
ISO GROUP	SMG	$a_e \times D_c^2$ (max)	$v_c$ (sf / min)			$Z_n = 4$						$Z_n = 5$		
						1/8	3/16	1/4	5/16	3/8	1/2	5/8	1/2	5/8
P	E / M / A 5 - 6	1.00	740		n (rev/min)	22614	15076	11967	9046	7538	5654	4523	5654	4523
					$f_z$ (in)	0.0031	0.0047	0.0059	0.0078	0.0094	0.0125	0.0156	0.0125	0.0156
			690 - 790		$v_f$ (in/min)	283	283	283	283	283	283	283	353	353
					max ( $a_p$ )	0.0059	0.0079	0.0098	0.0138	0.0157	0.0177	0.0197	0.0217	0.0217
H	M / A / D 7a	1.00	440		n (rev/min)	13446	8964	7115	5379	4482	3362	2689	3362	2689
					$f_z$ (in)	0.0031	0.0047	0.0059	0.0078	0.0094	0.0125	0.0156	0.0125	0.0156
			390 - 490		$v_f$ (in/min)	168	168	168	168	168	168	168	210	210
					max ( $a_p$ )	0.0059	0.0079	0.0098	0.0138	0.0157	0.0177	0.0197	0.0217	0.0217
	M / A / D 7b	1.00	230		n (rev/min)	7029	4686	3719	2812	2343	1757	1406	1757	1406
					$f_z$ (in)	0.0025	0.0038	0.0047	0.0063	0.0075	0.0100	0.0125	0.0100	0.0125
			200 - 260		$v_f$ (in/min)	70	70	70	70	70	70	70	88	88
					max ( $a_p$ )	0.0030	0.0039	0.0049	0.0069	0.0079	0.0089	0.0098	0.0108	0.0108
K	E / M / A 12 - 13	1.00	570		n (rev/min)	17419	11610	9220	6970	5810	4350	3480	4350	3480
					$f_z$ (in)	0.0030	0.0045	0.0057	0.0075	0.0090	0.0120	0.0150	0.0120	0.0150
			490 - 660		$v_f$ (in/min)	209	209	209	209	209	209	209	261	261
	max ( $a_p$ )	0.0059			0.0079	0.0098	0.0138	0.0157	0.0177	0.0197	0.0217	0.0217		
	E / M / A 14 - 15	1.00			410		n (rev/min)	12530	8353	6630	5012	4177	3132	2506
			$f_z$ (in)	0.0023			0.0034	0.0043	0.0056	0.0068	0.0090	0.0113	0.0090	0.0113
330 - 490			$v_f$ (in/min)	113	113	113	113	113	113	113	141	141		
		max ( $a_p$ )	0.0059	0.0079	0.0098	0.0138	0.0157	0.0177	0.0197	0.0217	0.0217			
		S	E 21	1.00	100		n (rev/min)	3056	2037	1617	1222	1019	764	611
$f_z$ (in)	0.0017						0.0026	0.0033	0.0042	0.0051	0.0070	0.0087	0.0070	0.0087
90 - 110					$v_f$ (in/min)	21	21	21	21	21	21	21	27	27
					max ( $a_p$ )	0.0038	0.0050	0.0070	0.0077	0.0100	0.0150	0.0150	0.0150	0.0150

SMG = Seco Material Group  
 n [min-1] = RPM  
 $v_c$  (sf/min) = Surface feet/min

$f_z$  [in] = Feed/tooth  
 $a_p/D_c$  = % of diameter  
 $v_f$  [in/min] = Feed rate  
 $a_p/D_c$  = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## MZN410R / MZN510R - START VALUES

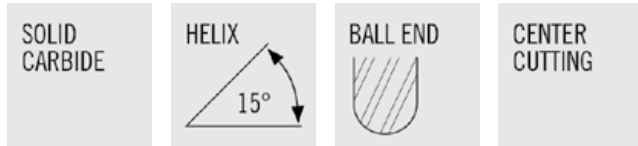
SIDE MILLING - ROUGHING																
ISO GROUP	SMG	$a_e \times D_c^2$ (max)	$v_c$ (sf / min)		$Z_n = 4$						$Z_n = 5$					
					1/8	3/16	1/4	5/16	3/8	1/2	5/8	1/2	5/8			
P	E / M / A 5 - 6	0.30	740	n (rev/min)	22614	15076	11967	9046	7538	5654	4523	5654	4523			
					$f_z$ (in)	0.0050	0.0075	0.0094	0.0125	0.0150	0.0200	0.0250	0.0200	0.0250		
			690	790	$v_f$ (in/min)	452	452	452	452	452	452	452	565	565		
						max ( $a_p$ )	0.0047	0.0063	0.0079	0.0110	0.0126	0.0142	0.0157	0.0173	0.0173	
			H	M / A / D 7a	0.30	480	n (rev/min)	14669	9779	7762	5868	4890	3667	2934	3667	2934
								$f_z$ (in)	0.0050	0.0075	0.0094	0.0125	0.0150	0.0200	0.0250	0.0200
430	520	$v_f$ (in/min)				293	293	293	293	293	293	293	367	367		
				max ( $a_p$ )	0.0047	0.0063	0.0079	0.0110	0.0126	0.0142	0.0157	0.0173	0.0173			
M / A / D 7b	0.30	260		n (rev/min)	7946	5297	4205	3178	2649	1986	1589	1986	1589			
					$f_z$ (in)	0.0038	0.0056	0.0071	0.0094	0.0113	0.0150	0.0188	0.0150	0.0188		
		230	300	$v_f$ (in/min)	119	119	119	119	119	119	119	149	149			
max ( $a_p$ )	0.0047				0.0063	0.0079	0.0110	0.0126	0.0142	0.0157	0.0173	0.0173				
K	E / M / A 12 - 13	0.30	570	n (rev/min)	17419	11613	9218	6968	5806	4355	3484	4355	3484			
					$f_z$ (in)	0.0050	0.0075	0.0094	0.0125	0.0150	0.0200	0.0250	0.0200	0.0250		
			490	660	$v_f$ (in/min)	348	348	348	348	348	348	348	435	435		
	max ( $a_p$ )	0.0059				0.0079	0.0098	0.0138	0.0157	0.0177	0.0197	0.0217	0.0217			
	E / M / A 14 - 15	0.30	410	n (rev/min)	12530	8353	6630	5012	4177	3132	2506	3132	2506			
					$f_z$ (in)	0.0038	0.0056	0.0071	0.0094	0.0113	0.0150	0.0188	0.0150	0.0188		
330			490	$v_f$ (in/min)	188	188	188	188	188	188	188	235	235			
	max ( $a_p$ )	0.0059			0.0079	0.0098	0.0138	0.0157	0.0177	0.0197	0.0217	0.0217				
S	E 21	0.30	100	n (rev/min)	3056	2037	1617	1222	1019	764	611	764	611			
					$f_z$ (in)	0.0026	0.0039	0.0049	0.0065	0.0078	0.0105	0.0130	0.0105	0.0130		
			90	110	$v_f$ (in/min)	32	32	32	32	32	32	32	40	40		
						max ( $a_p$ )	0.0038	0.0050	0.0070	0.0077	0.0100	0.0150	0.0150	0.0150	0.0150	

SMG = Seco Material Group  
 $n$  [min-1] = RPM  
 $v_c$  (sf/min) = Surface feet/min

$f_z$  [in] = Feed/tooth  
 $a_p/D_c$  = % of diameter  
 $v_f$  [in/min] = Feed rate  
 $a_p/D_c$  = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# MB215 & MB215M

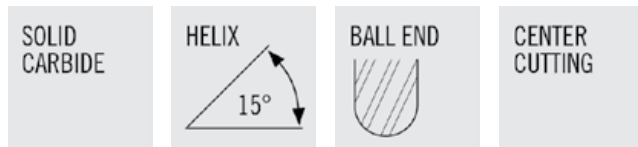


- Cylindrical Shank
- 7° Draft Angle
- Ideal for milling hardened mold and die steels up to 52HRc
- Rough and finish milling of contours and complex shapes

- Cutting Data MB215 - Page 125
- Tolerance Specs MB215 - Page 335
- Cutting Data MB215M - Page 125
- Tolerance Specs MB215M - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING
<b>INCH - MB215</b>									
N76671	MB215-0.063-G1-B.0-Z2	1/16	1/4	1/16	2-1/2	.059	1/8	2	ALTIN
N76673	MB215-0.125-G1-B.0-Z2	1/8	1/4	1/8	3	.121	1/4	2	ALTIN
N76675	MB215-0.250-E1-B.0-Z2	1/4	1/4	1/4	3	.246	1/2	2	ALTIN
N76677	MB215-0.375-E1-B.0-Z2	3/8	3/8	3/8	3	.367	3/4	2	ALTIN
N76679	MB215-0.500-E1-B.0-Z2	1/2	1/2	1/2	4	.492	1	2	ALTIN
<b>METRIC - MB215M</b>									
N76660	MB215M-010-G1-B.0-Z2	1MM	6MM	1MM	64MM	.9MM	2MM	2	ALTIN
N76661	MB215M-020-G1-B.0-Z2	2MM	6MM	2MM	64MM	1.9MM	4MM	2	ALTIN
N76662	MB215M-030-G1-B.0-Z2	3MM	6MM	3MM	64MM	2.9MM	6MM	2	ALTIN
N76663	MB215M-040-G1-B.0-Z2	4MM	6MM	4MM	64MM	3.9MM	8MM	2	ALTIN
N76665	MB215M-060-E1-B.0-Z2	6MM	6MM	6MM	64MM	5.9MM	12MM	2	ALTIN
N76666	MB215M-080-E1-B.0-Z2	8MM	8MM	8MM	80MM	7.8MM	16MM	2	ALTIN
N76667	MB215M-100-E1-B.0-Z2	10MM	10MM	10MM	82MM	9.8MM	20MM	2	ALTIN
N76668	MB215M-120-E1-B.0-Z2	12MM	12MM	12MM	100MM	11.8MM	24MM	2	ALTIN

# MBZ215

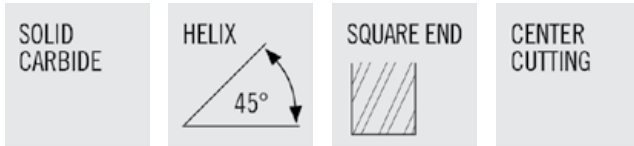


- Cylindrical Shank
- 7° Draft Angle
- Ideal for milling hardened mold and die steels up to 62HRc
- Rough and finish milling of contours and complex shapes

- Cutting Data - Page 126
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING
N76691	MBZ215-0.063-G1-B.0-Z2	1/16	1/4	1/16	2-1/2	.059	1/8	2	ALTIN
N76693	MBZ215-0.125-G1-B.0-Z2	1/8	1/4	1/8	3	.121	1/4	2	ALTIN
N76695	MBZ215-0.250-E1-B.0-Z2	1/4	1/4	1/4	3	.246	1/2	2	ALTIN
N76697	MBZ215-0.375-E1-B.0-Z2	3/8	3/8	3/8	3	.367	3/4	2	ALTIN
N76699	MBZ215-0.500-E1-B.0-Z2	1/2	1/2	1/2	4	.492	1	2	ALTIN

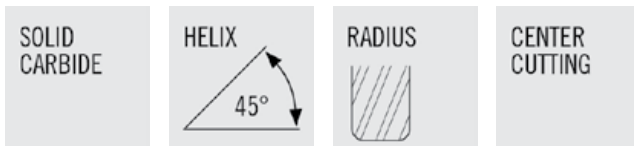
## MZ645



- Cylindrical Shank
- Ideal for peripheral milling of hard steels up to 62HRc
- Cutting Data - Page 126
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N76617	MZ645-0.125-F3-S.0-Z6	1/8	1/4	3/8	3	6	ALTIN
N76619	MZ645-0.188-F3-S.0-Z6	3/16	1/4	1/2	3	6	ALTIN
N76621	MZ645-0.250-D3-S.0-Z6	1/4	1/4	5/8	3	6	ALTIN
N76623	MZ645-0.313-D2-S.0-Z6	5/16	5/16	3/4	3	6	ALTIN
N76625	MZ645-0.375-D3-S.0-Z6	3/8	3/8	1	3	6	ALTIN
N76627	MZ645-0.500-D2-S.0-Z6	1/2	1/2	1-1/8	4	6	ALTIN

## MZ645R



- Cylindrical Shank
- Ideal for peripheral milling of hard steels up to 62HRc
- Cutting Data - Page 126
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS
N76616	MZ645R-0.125-F3-R020.0-Z6	1/8	1/4	3/8	3	6	ALTIN	0.020
N76618	MZ645R-0.188-F3-R020.0-Z6	3/16	1/4	1/2	3	6	ALTIN	0.020
N76620	MZ645R-0.250-D3-R020.0-Z6	1/4	1/4	5/8	3	6	ALTIN	0.020
N76622	MZ645R-0.313-D2-R020.0-Z6	5/16	5/16	3/4	3	6	ALTIN	0.020
N76624	MZ645R-0.375-D3-R020.0-Z6	3/8	3/8	1	3	6	ALTIN	0.020
N76626	MZ645R-0.500-D2-R030.0-Z6	1/2	1/2	1-1/8	4	6	ALTIN	0.030

## MB215 - START VALUES

SIDE MILLING - ROUGHING																	
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 2											
						1/32	1/16	3/32	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
P	E 5 - 6	0.10	0.30	500	n (rev/min)	61120	30560	20373	15280	10187	7640	6112	5093	3820	3056	2547	1910
					f <sub>z</sub> (in)	0.00030	0.00059	0.00089	0.00119	0.00178	0.00238	0.00297	0.00356	0.00475	0.00594	0.00713	0.00950
					v <sub>f</sub> (in/min)	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3
H	M / A / D 7a (48>52HRc)	0.05	0.20	450	n (rev/min)	55008	27504	18336	13752	9168	6876	5501	4584	3438	2750	2292	1719
					f <sub>z</sub> (in)	0.00027	0.00054	0.00081	0.00108	0.00161	0.00215	0.00269	0.00323	0.00430	0.00538	0.00645	0.00860
					v <sub>f</sub> (in/min)	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6

SIDE MILLING - FINISHING																	
P	E 5 - 6	0.10	0.15	500	n (rev/min)	61120	30560	20373	15280	10187	7640	6112	5093	3820	3056	2547	1910
					f <sub>z</sub> (in)	0.00030	0.00059	0.00089	0.00119	0.00178	0.00238	0.00297	0.00356	0.00475	0.00594	0.00713	0.00950
					v <sub>f</sub> (in/min)	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3
K	M / A / D 7a (48>52HRc)	0.05	0.10	450	n (rev/min)	55008	27504	18336	13752	9168	6876	5501	4584	3438	2750	2292	1719
					f <sub>z</sub> (in)	0.00027	0.00054	0.00081	0.00108	0.00161	0.00215	0.00269	0.00323	0.00430	0.00538	0.00645	0.00860
					v <sub>f</sub> (in/min)	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6

## MB215M - START VALUES

SIDE MILLING - ROUGHING																
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (m / min)		Z <sub>n</sub> = 2										
						1	2	3	4	5	6	8	10	12	16	
P	E 5 - 6	0.10	0.30	152	n (rev/min)	48380	24190	16130	12100	9680	8060	6050	4840	4030	3020	
					f <sub>z</sub> (mm)	0.010	0.019	0.029	0.038	0.048	0.057	0.076	0.095	0.114	0.152	
					v <sub>f</sub> (mm/min)	919	919	919	920	920	919	920	920	919	918	
H	M / A / D 7a (48>52HRc)	0.05	0.20	137	n (rev/min)	43610	21800	14540	10900	8720	7270	5450	4360	3630	2730	
					f <sub>z</sub> (mm)	0.009	0.017	0.026	0.034	0.043	0.052	0.069	0.086	0.103	0.138	
					v <sub>f</sub> (mm/min)	750	750	750	750	750	750	750	750	749	751	

SIDE MILLING - FINISHING																
P	E 5 - 6	0.10	0.15	152	n (rev/min)	48380	24190	16130	12100	9680	8060	6050	4840	4030	3020	
					f <sub>z</sub> (mm)	0.010	0.019	0.029	0.038	0.048	0.057	0.076	0.095	0.114	0.152	
					v <sub>f</sub> (mm/min)	919	919	919	920	920	919	920	920	919	918	
H	M / A / D 7a (48>52HRc)	0.05	0.10	137	n (rev/min)	43610	21800	14540	10900	8720	7270	5450	4360	3630	2730	
					f <sub>z</sub> (mm)	0.009	0.017	0.026	0.034	0.043	0.052	0.069	0.086	0.103	0.138	
					v <sub>f</sub> (mm/min)	750	750	750	750	750	750	750	750	749	751	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## MBZ215 - START VALUES

SIDE MILLING - ROUGHING																	
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 2											
						1/32	1/16	3/32	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
P	E 5 - 6	0.10	0.30	500	n (rev/min)	61120	30560	20373	15280	10187	7640	6112	5093	3820	3056	2547	1910
					f <sub>z</sub> (in)	0.00030	0.00059	0.00089	0.00119	0.00178	0.00238	0.00297	0.00356	0.00475	0.00594	0.00713	0.00950
					v <sub>f</sub> (in/min)	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3
H	M / A / D 7a (48>52HRc)	0.05	0.20	450	n (rev/min)	55008	27504	18336	13752	9168	6876	5501	4584	3438	2750	2292	1719
					f <sub>z</sub> (in)	0.00027	0.00054	0.00081	0.00108	0.00161	0.00215	0.00269	0.00323	0.00430	0.00538	0.00645	0.00860
					v <sub>f</sub> (in/min)	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6
	M / A / D 7b (52>62HRc)	0.03	0.10	400	n (rev/min)	48896	24448	16299	12224	8149	6112	4890	4075	3056	2445	2037	1528
					f <sub>z</sub> (in)	0.00019	0.00038	0.00056	0.00075	0.00113	0.00150	0.00188	0.00225	0.00300	0.00375	0.00450	0.00600
					v <sub>f</sub> (in/min)	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3

SIDE MILLING - FINISHING																	
P	E 5 - 6	0.10	0.15	500	n (rev/min)	61120	30560	20373	15280	10187	7640	6112	5093	3820	3056	2547	1910
					f <sub>z</sub> (in)	0.00030	0.00059	0.00089	0.00119	0.00178	0.00238	0.00297	0.00356	0.00475	0.00594	0.00713	0.00950
					v <sub>f</sub> (in/min)	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3
H	M / A / D 7a (48>52HRc)	0.05	0.10	450	n (rev/min)	55008	27504	18336	13752	9168	6876	5501	4584	3438	2750	2292	1719
					f <sub>z</sub> (in)	0.00027	0.00054	0.00081	0.00108	0.00161	0.00215	0.00269	0.00323	0.00430	0.00538	0.00645	0.00860
					v <sub>f</sub> (in/min)	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6
	M / A / D 7b (52>62HRc)	0.03	0.05	400	n (rev/min)	48896	24448	16299	12224	8149	6112	4890	4075	3056	2445	2037	1528
					f <sub>z</sub> (in)	0.00019	0.00038	0.00056	0.00075	0.00113	0.00150	0.00188	0.00225	0.00300	0.00375	0.00450	0.00600
					v <sub>f</sub> (in/min)	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3

## MZ645 / MZ645R - START VALUES

SIDE MILLING - ROUGHING																
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 6										
						1/8	3/16	1/4	5/16	3/8	1/2					
P	E 5 - 6	1.50	0.10	450	n (rev/min)	13752	9168	6876	5501	4584	3438					
					f <sub>z</sub> (in)	0.00075	0.00113	0.00150	0.00188	0.00225	0.00300					
					v <sub>f</sub> (in/min)	61.9	61.9	61.9	61.9	61.9	61.9					
H	M / A / D 7a (48>52HRc)	1.00	0.05	450	n (rev/min)	13752	9168	6876	5501	4584	3438					
					f <sub>z</sub> (in)	0.00056	0.00084	0.00113	0.00141	0.00169	0.00225					
					v <sub>f</sub> (in/min)	46.4	46.4	46.4	46.4	46.4	46.4					
	M / A / D 7b (52>62HRc)	1.00	0.02	400	n (rev/min)	12224	8149	6112	4890	4075	3056					
					f <sub>z</sub> (in)	0.00040	0.00060	0.00080	0.00100	0.00120	0.00160					
					v <sub>f</sub> (in/min)	29.3	29.3	29.3	29.3	29.3	29.3					

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.





## DESIGNED FOR GRAPHITE AND CARBON FIBER REINFORCED PLASTICS (CFRP) CVD DIAMOND COATING

Niagara Cutter CVD diamond raises the bar in performance and tool life when machining the toughest and most abrasive components made from graphite and CFRP. The unique in-house CVD diamond coating coupled with advanced geometries and the highest quality carbide substrates provide unsurpassed tool life and performance.

Niagara Cutter's graphite machining family of tools includes: DIA230, DIA230M, DIAL230, DIA430, DIA430M, DIACR430, DIAL430, DIAXRR430, DIAB230, DIAB230M, DIAB430, DIALB430, DIAXSB430 and DIAXRB430.

Developed for machining CFRP, the CVD Diamond range provides superior tool life while reducing un-cut fibers. Our offering includes the following products with both coarse and fine tooth configurations: Compression cutters DIACC and router burrs DIAEPB, DIABEB, DIAPPB. Also in this family of products is a new range of nicked routers for trimming and slot milling applications. Two versions are available, DIARTRBE - burr end style and DIARTREM - end mill style.

### PRODUCT OVERVIEW

- In-house CVD diamond coated end mills for a wide range of applications
- Patented geometries yield significant productivity gains
- Continuous in-house R&D
- Premium carbide substrates

### YOUR NIAGARA CUTTER BENEFIT

- Wide application area, from graphite electrodes to CFRP
- High performance at a competitive price
- Reduced cycle time, higher material removal rates
- Smoother cutting with advanced and patented geometries
- Long and predictable tool life with CVD coatings

### RANGE OVERVIEW

- Inch and metric size available
- Wide range of geometries available
- Specials available upon request

PREFERRED MATERIAL GROUPS
Graphite
Plastic
Thermoplast
Thermoset

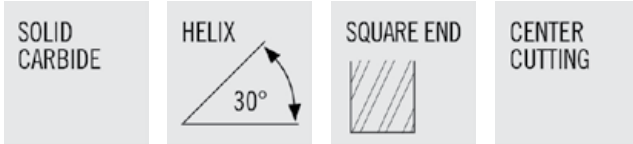
### INDUSTRY TARGETS

- Mold & Die
- Aerospace
- Consumer
- Sports
- Auto

### INDUSTRY APPLICATIONS

**Aerospace:** Well suited for a wide range of materials, a complete CVD diamond family sets Niagara Cutter apart from the competition.

## DIA230 & DIA230M

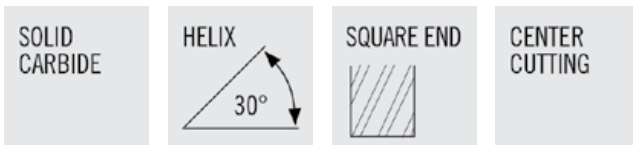


- Cylindrical Shank
- General purpose geometry designed for carbon fiber, composite applications, graphite and green ceramics

- Cutting Data DIA230 - Page 140-141
- Tolerance Specs DIA230 - Page 335
- Cutting Data DIA230M - Page 144-145
- Tolerance Specs DIA230M - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
<b>INCH - DIA230</b>							
N77898	DIA230-0.016-F3-S.0-Z2	1/64	1/8	3/64	1-1/2	2	CVDDIA
N77901	DIA230-0.031-F3-S.0-Z2	1/32	1/8	3/32	1-1/2	2	CVDDIA
N77904	DIA230-0.063-F3-S.0-Z2	1/16	1/8	3/16	1-1/2	2	CVDDIA
N77910	DIA230-0.125-D4-S.0-Z2	1/8	1/8	1/2	1-1/2	2	CVDDIA
N77913	DIA230-0.188-D3-S.0-Z2	3/16	3/16	5/8	2	2	CVDDIA
N77916	DIA230-0.250-D3-S.0-Z2	1/4	1/4	3/4	2-1/2	2	CVDDIA
N77928	DIA230-0.500-D2-S.0-Z2	1/2	1/2	1	3	2	CVDDIA
<b>METRIC - DIA230M</b>							
N77259	DIA230M-010-F4-S.0-Z2	1MM	3MM	4MM	45MM	2	CVDDIA
N77260	DIA230M-020-F5-S.0-Z2	2MM	3MM	10MM	45MM	2	CVDDIA
N77261	DIA230M-030-D5-S.0-Z2	3MM	3MM	15MM	45MM	2	CVDDIA
N77263	DIA230M-060-D3-S.0-Z2	6MM	6MM	20MM	64MM	2	CVDDIA
N77264	DIA230M-080-D2-S.0-Z2	8MM	8MM	20MM	64MM	2	CVDDIA
N77265	DIA230M-100-D2-S.0-Z2	10MM	10MM	25MM	63MM	2	CVDDIA
N77266	DIA230M-120-D2-S.0-Z2	12MM	12MM	30MM	76MM	2	CVDDIA

## DIAL230

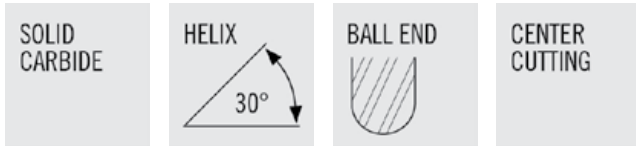


- Cylindrical Shank
- General purpose geometry designed for carbon fiber, composite applications, graphite and green ceramics

- Cutting Data - Page 142-143
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N77964	DIAL230-0.125-D8-S.0-Z2	1/8	1/8	1	3	2	CVDDIA
N77967	DIAL230-0.188-D6-S.0-Z2	3/16	3/16	1-1/8	3	2	CVDDIA
N77970	DIAL230-0.250-D5-S.0-Z2	1/4	1/4	1-1/4	3	2	CVDDIA
N77976	DIAL230-0.375-D4-S.0-Z2	3/8	3/8	1-3/8	3-1/4	2	CVDDIA
N18692	DIAL230-0.500-D4-S.0-Z2	1/2	1/2	1-3/8	6	2	CVDDIA
N77982	DIAL230-0.500-D5-S.0-Z2	1/2	1/2	2	4	2	CVDDIA

**DIAB230 & DIAB230M**

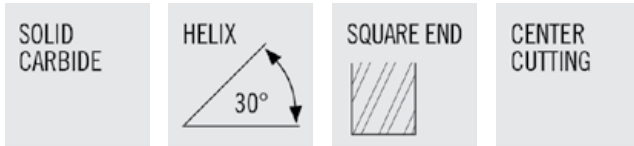


- Cylindrical Shank
- General purpose geometry designed for carbon fiber, composite applications, graphite and green ceramics

- Cutting Data DIAB230 - Page 140-141
- Tolerance Specs DIAB230 - Page 335
- Cutting Data DIAB230M - Page 144-145
- Tolerance Specs DIAB230M - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
<b>INCH - DIAB230</b>							
N77931	DIAB230-0.016-F3-B.0-Z2	1/64	1/8	3/64	1-1/2	2	CVDDIA
N77934	DIAB230-0.031-F3-B.0-Z2	1/32	1/8	3/32	1-1/2	2	CVDDIA
N77174	DIAB230-0.047-F3-B.0-Z2	3/64	1/8	1/8	1-1/2	2	CVDDIA
N77937	DIAB230-0.063-F3-B.0-Z2	1/16	1/8	3/16	1-1/2	2	CVDDIA
N77943	DIAB230-0.125-D4-B.0-Z2	1/8	1/8	1/2	1-1/2	2	CVDDIA
N77946	DIAB230-0.188-D3-B.0-Z2	3/16	3/16	5/8	2	2	CVDDIA
N77949	DIAB230-0.250-D3-B.0-Z2	1/4	1/4	3/4	2-1/2	2	CVDDIA
N77961	DIAB230-0.500-D2-B.0-Z2	1/2	1/2	1	3	2	CVDDIA
<b>METRIC - DIAB230M</b>							
N77267	DIAB230M-010-F4-B.0-Z2	1MM	3MM	4MM	45MM	2	CVDDIA
N77268	DIAB230M-020-F5-B.0-Z2	2MM	3MM	10MM	45MM	2	CVDDIA
N77269	DIAB230M-030-D5-B.0-Z2	3MM	3MM	15MM	45MM	2	CVDDIA
N77270	DIAB230M-040-D4-B.0-Z2	4MM	4MM	15MM	55MM	2	CVDDIA
N77271	DIAB230M-060-D3-B.0-Z2	6MM	6MM	20MM	64MM	2	CVDDIA

## DIA430 & DIA430M

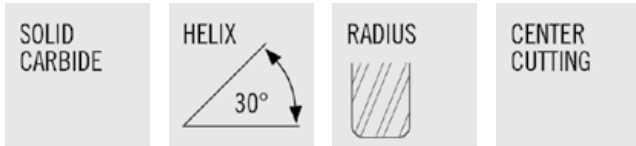


- Cylindrical Shank
- General purpose geometry designed for carbon fiber, composite applications, graphite and green ceramics

- Cutting Data DIA430 - Page 146-147
- Tolerance Specs DIA430 - Page 335
- Cutting Data DIA430M - Page 150-151
- Tolerance Specs DIA430M - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
<b>INCH - DIA430</b>							
N77790	DIA430-0.016-F3-S.0-Z4	1/64	1/8	3/64	1-1/2	4	CVDDIA
N77793	DIA430-0.031-F3-S.0-Z4	1/32	1/8	3/32	1-1/2	4	CVDDIA
N77796	DIA430-0.063-F3-S.0-Z4	1/16	1/8	3/16	1-1/2	4	CVDDIA
N77799	DIA430-0.094-F4-S.0-Z4	3/32	1/8	3/8	1-1/2	4	CVDDIA
N77802	DIA430-0.125-D4-S.0-Z4	1/8	1/8	1/2	1-1/2	4	CVDDIA
N77805	DIA430-0.188-D3-S.0-Z4	3/16	3/16	5/8	2	4	CVDDIA
N77808	DIA430-0.250-D3-S.0-Z4	1/4	1/4	3/4	2-1/2	4	CVDDIA
N77814	DIA430-0.375-D2-S.0-Z4	3/8	3/8	7/8	2-1/2	4	CVDDIA
N77820	DIA430-0.500-D2-S.0-Z4	1/2	1/2	1	3	4	CVDDIA
<b>METRIC - DIA430M</b>							
N77276	DIA430M-020-F5-S.0-Z4	2MM	3MM	10MM	45MM	4	CVDDIA
N77277	DIA430M-030-D5-S.0-Z4	3MM	3MM	15MM	45MM	4	CVDDIA
N77278	DIA430M-040-D4-S.0-Z4	4MM	4MM	15MM	55MM	4	CVDDIA
N77279	DIA430M-060-D3-S.0-Z4	6MM	6MM	20MM	64MM	4	CVDDIA
N77280	DIA430M-080-D2-S.0-Z4	8MM	8MM	20MM	64MM	4	CVDDIA

## DIACR430

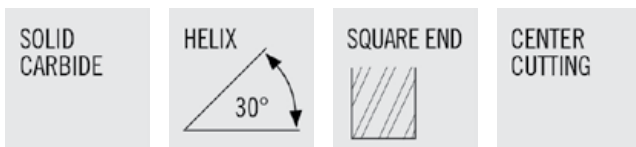


- Cylindrical Shank
- General purpose geometry designed for carbon fiber, composite applications, graphite and green ceramics

- Cutting Data - Page 146-147
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS
N18415	DIACR430-0.063-F3-R010.0-Z4	1/16	1/8	3/16	1-1/2	4	CVDDIA	0.010
N18416	DIACR430-0.063-F3-R015.0-Z4	1/16	1/8	3/16	1-1/2	4	CVDDIA	0.015
N18417	DIACR430-0.125-D4-R015.0-Z4	1/8	1/8	1/2	1-1/2	4	CVDDIA	0.015
N18418	DIACR430-0.125-D4-R020.0-Z4	1/8	1/8	1/2	1-1/2	4	CVDDIA	0.020
N18419	DIACR430-0.188-D3-R020.0-Z4	3/16	3/16	5/8	2	4	CVDDIA	0.020
N18421	DIACR430-0.250-D3-R020.0-Z4	1/4	1/4	3/4	2-1/2	4	CVDDIA	0.020
N18422	DIACR430-0.250-D3-R030.0-Z4	1/4	1/4	3/4	2-1/2	4	CVDDIA	0.030
N77191	DIACR430-0.250-D6-R030.0-Z4	1/4	1/4	1-3/8	4	4	CVDDIA	0.030
N18423	DIACR430-0.375-D2-R020.0-Z4	3/8	3/8	7/8	2-1/2	4	CVDDIA	0.020
N18424	DIACR430-0.375-D2-R030.0-Z4	3/8	3/8	7/8	2-1/2	4	CVDDIA	0.030
N18425	DIACR430-0.500-D2-R030.0-Z4	1/2	1/2	1	3	4	CVDDIA	0.030
N18426	DIACR430-0.500-D2-R060.0-Z4	1/2	1/2	1	3	4	CVDDIA	0.060
N77194	DIACR430-0.500-D3-R030.0-Z4	1/2	1/2	1-3/8	4	4	CVDDIA	0.030

## DIAL430

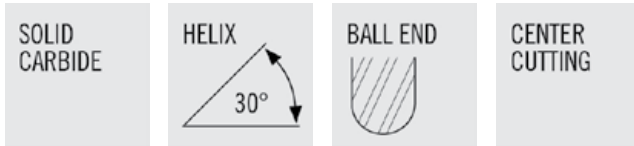


- Cylindrical Shank
- General purpose geometry designed for carbon fiber, composite applications, graphite and green ceramics

- Cutting Data - Page 148-149
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N77856	DIAL430-0.125-D8-S.0-Z4	1/8	1/8	1	3	4	CVDDIA
N77859	DIAL430-0.188-D5-S.0-Z4	3/16	3/16	1	4	4	CVDDIA
N72693	DIAL430-0.188-D6-S.0-Z4	3/16	3/16	1-1/8	3	4	CVDDIA
N77862	DIAL430-0.250-D5-S.0-Z4	1/4	1/4	1-1/4	3	4	CVDDIA
N72699	DIAL430-0.250-D6-S.0-Z4	1/4	1/4	1-3/8	4	4	CVDDIA
N77868	DIAL430-0.375-D4-S.0-Z4	3/8	3/8	1-3/8	3-1/4	4	CVDDIA
N72717	DIAL430-0.375-D5-S.0-Z4	3/8	3/8	1-3/8	4	4	CVDDIA
N18695	DIAL430-0.500-D3-S.0-Z4	1/2	1/2	1-3/8	4	4	CVDDIA
N77874	DIAL430-0.500-D5-S.0-Z4	1/2	1/2	2	4	4	CVDDIA
N72729	DIAL430-0.500-D6-S.0-Z4	1/2	1/2	3	6	4	CVDDIA

## DIAB430

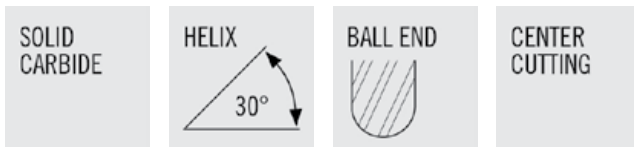


- Cylindrical Shank
- General purpose geometry designed for carbon fiber, composite applications, graphite and green ceramics

- Cutting Data - Page 146-147
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N77823	DIAB430-0.016-F3-B.0-Z4	1/64	1/8	3/64	1-1/2	4	CVDDIA
N77826	DIAB430-0.031-F3-B.0-Z4	1/32	1/8	3/32	1-1/2	4	CVDDIA
N77829	DIAB430-0.063-F3-B.0-Z4	1/16	1/8	3/16	1-1/2	4	CVDDIA
N77183	DIAB430-0.078-F3-B.0-Z4	5/64	1/8	1/4	1-1/2	4	CVDDIA
N77832	DIAB430-0.094-F4-B.0-Z4	3/32	1/8	3/8	1-1/2	4	CVDDIA
N77835	DIAB430-0.125-D4-B.0-Z4	1/8	1/8	1/2	1-1/2	4	CVDDIA
N77838	DIAB430-0.188-D3-B.0-Z4	3/16	3/16	5/8	2	4	CVDDIA
N77841	DIAB430-0.250-D3-B.0-Z4	1/4	1/4	3/4	2-1/2	4	CVDDIA
N77847	DIAB430-0.375-D2-B.0-Z4	3/8	3/8	7/8	2-1/2	4	CVDDIA
N77853	DIAB430-0.500-D2-B.0-Z4	1/2	1/2	1	3	4	CVDDIA

## DIALB430

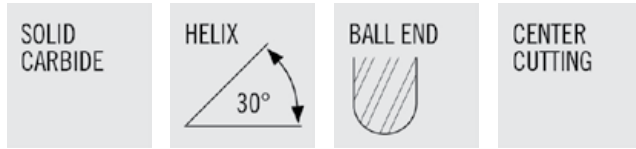


- Cylindrical Shank
- General purpose geometry designed for carbon fiber, composite applications, graphite and green Ceramics

- Cutting Data - Page 148-149
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N77877	DIALB430-0.125-D8-B.0-Z4	1/8	1/8	1	3	4	CVDDIA
N77880	DIALB430-0.188-D5-B.0-Z4	3/16	3/16	1	4	4	CVDDIA
N72696	DIALB430-0.188-D6-B.0-Z4	3/16	3/16	1-1/8	3	4	CVDDIA
N77883	DIALB430-0.250-D5-B.0-Z4	1/4	1/4	1-1/4	3	4	CVDDIA
N72702	DIALB430-0.250-D6-B.0-Z4	1/4	1/4	1-3/8	4	4	CVDDIA
N72708	DIALB430-0.250-D7-B.0-Z4	1/4	1/4	1-3/8	6	4	CVDDIA
N72720	DIALB430-0.375-D5-B.0-Z4	3/8	3/8	1-3/8	4	4	CVDDIA
N72726	DIALB430-0.375-D6-B.0-Z4	3/8	3/8	1-3/8	6	4	CVDDIA
N18697	DIALB430-0.500-D3-B.0-Z4	1/2	1/2	1-3/8	4	4	CVDDIA
N77895	DIALB430-0.500-D5-B.0-Z4	1/2	1/2	2	4	4	CVDDIA
N18698	DIALB430-0.500-D4-B.0-Z4	1/2	1/2	1-3/8	6	4	CVDDIA
N72732	DIALB430-0.500-D6-B.0-Z4	1/2	1/2	3	6	4	CVDDIA

## DIAXRB430 & DIAXS430

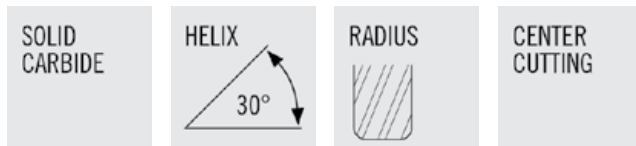


- Cylindrical Shank
- General purpose geometry designed for carbon fiber, composite applications, graphite and green ceramics

- Cutting Data - Page 148-149
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING
<b>REGULAR LENGTH - DIAXRB430</b>									
N18681	DIAXRB430-0.031-G4-B.0-Z4	1/32	1/8	3/32	3	.028	3/8	4	CVDDIA
N18686	DIAXRB430-0.031-G5-B.0-Z4	1/32	1/8	3/32	3	.028	1/2	4	CVDDIA
N18682	DIAXRB430-0.047-G3-B.0-Z4	3/64	1/8	9/64	3	.043	9/16	4	CVDDIA
N18687	DIAXRB430-0.047-G4-B.0-Z4	3/64	1/8	9/64	3	.043	3/4	4	CVDDIA
N18683	DIAXRB430-0.063-G4-B.0-Z4	1/16	1/8	3/16	3	.057	3/4	4	CVDDIA
N18688	DIAXRB430-0.063-G5-B.0-Z4	1/16	1/8	3/16	3	.057	1	4	CVDDIA
N18684	DIAXRB430-0.094-G3-B.0-Z4	3/32	1/8	9/32	3	.086	1	4	CVDDIA
N18689	DIAXRB430-0.094-G4-B.0-Z4	3/32	1/8	9/32	3	.086	1-1/2	4	CVDDIA
N18685	DIAXRB430-0.125-E3-B.0-Z4	1/8	1/8	3/8	3	.115	1-1/2	4	CVDDIA
N18690	DIAXRB430-0.125-E4-B.0-Z4	1/8	1/8	3/8	3	.115	2	4	CVDDIA
<b>STUB LENGTH - DIAXS430</b>									
N77214	DIAXS430-0.063-G1-B.0-Z4	1/16	1/8	1/16	3	.057	5/16	4	CVDDIA
N77216	DIAXS430-0.125-E1-B.0-Z4	1/8	1/8	1/8	3	.115	5/8	4	CVDDIA
N77218	DIAXS430-0.250-E1-B.0-Z4	1/4	1/4	1/4	4	.240	3/4	4	CVDDIA

## DIAXRR430

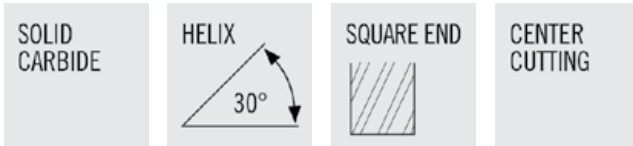


- Cylindrical Shank
- General purpose geometry designed for carbon fiber, composite applications, graphite and green ceramics

- Cutting Data - Page 148-149
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	RADIUS
N18671	DIAXRR430-0.031-G3-R005.0-Z4	1/32	1/8	3/32	3	.028	3/8	4	CVDDIA	0.005
N18676	DIAXRR430-0.031-G4-R005.0-Z4	1/32	1/8	3/32	3	.028	1/2	4	CVDDIA	0.005
N18672	DIAXRR430-0.047-G3-R010.0-Z4	3/64	1/8	9/64	3	.043	9/16	4	CVDDIA	0.010
N18677	DIAXRR430-0.047-G4-R010.0-Z4	3/64	1/8	9/64	3	.043	3/4	4	CVDDIA	0.010
N18673	DIAXRR430-0.063-G4-R010.0-Z4	1/16	1/8	3/16	3	.057	3/4	4	CVDDIA	0.010
N18678	DIAXRR430-0.063-G5-R010.0-Z4	1/16	1/8	3/16	3	.057	1	4	CVDDIA	0.010
N18674	DIAXRR430-0.094-G3-R010.0-Z4	3/32	1/8	9/32	3	.086	1	4	CVDDIA	0.010
N18679	DIAXRR430-0.094-G4-R010.0-Z4	3/32	1/8	9/32	3	.086	1-1/2	4	CVDDIA	0.010
N18675	DIAXRR430-0.125-E3-R010.0-Z4	1/8	1/8	3/8	3	.115	1-1/2	4	CVDDIA	0.010
N77253	DIAXRR430-0.125-E6-R030.0-Z4	1/8	1/8	3/4	3	.115	1-1/2	4	CVDDIA	0.030

## DIACC



- Compression Cutter
- Cylindrical Shank
- Chip breaking notches
- Open flute design
- "X" DIM equals the length to helix transition from end teeth
- Designed to avoid delamination
- Designed for carbon fiber, composite applications, graphite, and green ceramics
- Cutting Data - Page 152-153
- Tolerance Specs - Page 335

## COARSE PITCH

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	"X" DIM
N77311	DIACC-0.250-D3-S.0-Z3	1/4	1/4	3/4	2-1/2	3	CVDDIA	0.150
N77312	DIACC-0.375-D3-S.0-Z3	3/8	3/8	1	3	3	CVDDIA	0.213
N77313	DIACC-0.500-D3-S.0-Z5	1/2	1/2	1-1/4	3	5	CVDDIA	0.275

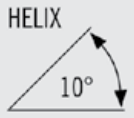
## FINE PITCH

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	"X" DIM
N68196	DIACC-0.250-D3-S.0-Z5	1/4	1/4	3/4	2-1/2	5	CVDDIA	0.150
N68197	DIACC-0.375-D3-S.0-Z5	3/8	3/8	1	3	5	CVDDIA	0.213
N68198	DIACC-0.500-D3-S.0-Z7	1/2	1/2	1-1/4	3	7	CVDDIA	0.275



## DIARTREM

SOLID  
CARBIDE

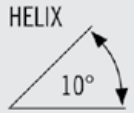


- Left hand helix directs cutting forces into workholding
- Right hand cut for normal spindle rotation direction
- Unique left hand flute shape reduces fluted length
- CVD diamond coating for maximum tool life
- Designed for carbon fiber, composite applications, and honeycomb materials
- For slotting and side milling
- End mill style end teeth
- Cutting Data - Page 154
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
03134674	DIARTREM-0.125-D3-S.0-Z6	1/8	1/8	3/8	1-1/2	6	CVDDIA
03134675	DIARTREM-0.125-D4-S.0-Z8	1/8	1/8	1/2	1-1/2	8	CVDDIA
03134677	DIARTREM-0.188-D3-S.0-Z6	3/16	3/16	9/16	2	6	CVDDIA
03134678	DIARTREM-0.188-D4-S.0-Z8	3/16	3/16	3/4	2	8	CVDDIA
03134682	DIARTREM-0.250-D3-S.0-Z10	1/4	1/4	3/4	2-1/2	10	CVDDIA
03134685	DIARTREM-0.250-D4-S.0-Z10	1/4	1/4	1	3	10	CVDDIA
03134688	DIARTREM-0.375-D3-S.0-Z12	3/8	3/8	1-1/8	3	12	CVDDIA
03134690	DIARTREM-0.375-D4-S.0-Z12	3/8	3/8	1-1/2	4	12	CVDDIA
03134692	DIARTREM-0.500-D2-S.0-Z14	1/2	1/2	1	3	14	CVDDIA

## DIARTRBE

SOLID  
CARBIDE



- Left hand helix directs cutting forces into workholding
- Right hand cut for normal spindle rotation direction
- Unique left hand flute shape reduces fluted length
- CVD diamond coating for maximum tool life
- Designed for carbon fiber, composite applications, and honeycomb materials
- For slotting and side milling
- Burr end style end teeth
- Cutting Data - Page 154
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
03134673	DIARTRBE-0.125-D2-S.0-Z6	1/8	1/8	1/4	1-1/2	6	CVDDIA
03134676	DIARTRBE-0.188-D2-S.0-Z6	3/16	3/16	3/8	2	6	CVDDIA
03134679	DIARTRBE-0.250-D2-S.0-Z8	1/4	1/4	1/2	2-1/2	8	CVDDIA
03134680	DIARTRBE-0.250-D3-S.0-Z8	1/4	1/4	3/4	2-1/2	8	CVDDIA
03134681	DIARTRBE-0.250-D3-S.0-Z10	1/4	1/4	3/4	2-1/2	10	CVDDIA
03134683	DIARTRBE-0.250-D4-S.0-Z8	1/4	1/4	1	3	8	CVDDIA
03134684	DIARTRBE-0.250-D4-S.0-Z10	1/4	1/4	1	3	10	CVDDIA
03134686	DIARTRBE-0.375-D2-S.0-Z12	3/8	3/8	3/4	2-1/2	12	CVDDIA
03134687	DIARTRBE-0.375-D3-S.0-Z12	3/8	3/8	1-1/8	3	12	CVDDIA
03134689	DIARTRBE-0.375-D4-S.0-Z12	3/8	3/8	1-1/2	4	12	CVDDIA
03134691	DIARTRBE-0.500-D2-S.0-Z14	1/2	1/2	1	3	14	CVDDIA

## DIAEPB

SOLID  
CARBIDE

- End mill point burr
- Cylindrical Shank
- Positive end cutting geometry
- Low cutting forces
- End mill style end teeth geometry
- High shearing capabilities to reduce material delamination
- Designed for carbon fiber, composite applications, graphite and green ceramics
- Cutting Data - Page 155-157
- Tolerance Specs - Page 335

### COARSE PITCH

- Can be utilized up to 100% radial engagement



ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	COATING
N68077	DIAEPB-0.125-D1-S.0-Z	1/8	1/8	1/2	1-1/2	CVDDIA
N68078	DIAEPB-0.250-D2-S.0-Z	1/4	1/4	3/4	2-1/2	CVDDIA
N68079	DIAEPB-0.250-D4-S.0-Z	1/4	1/4	1-3/8	3	CVDDIA
N68081	DIAEPB-0.375-D1-S.0-Z	3/8	3/8	1-3/8	3-1/4	CVDDIA
N68083	DIAEPB-0.500-D1-S.0-Z	1/2	1/2	1	3	CVDDIA
N68084	DIAEPB-0.500-D3-S.0-Z	1/2	1/2	2	4	CVDDIA

### FINE PITCH

- Improved surface finish as compared to coarse pitch
- Up to 50% radial engagement



ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	COATING
N68172	DIAEPB-0.125-D2-S.0-Z	1/8	1/8	1/2	1-1/2	CVDDIA
N68173	DIAEPB-0.250-D1-S.0-Z	1/4	1/4	3/4	2-1/2	CVDDIA
N68176	DIAEPB-0.375-D4-S.0-Z	3/8	3/8	1-3/8	3-1/4	CVDDIA
N68178	DIAEPB-0.500-D2-S.0-Z	1/2	1/2	1	3	CVDDIA
N68179	DIAEPB-0.500-D4-S.0-Z	1/2	1/2	2	4	CVDDIA

## DIABEB

SOLID  
CARBIDE

- Burr end burr
- Positive cutting geometry
- Lower cutting forces
- High shear capabilities to reduce material delamination
- Burr style end teeth geometry
- Designed for carbon fiber, composite applications, graphite and green ceramics
- Cutting Data - Page 155-157
- Tolerance Specs - Page 335

### COARSE PITCH

- Can be utilized up to 100% radial engagement



ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	COATING
N68093	DIABEB-0.125-D1-S.0-Z	1/8	1/8	1/2	1-1/2	CVDDIA
N68094	DIABEB-0.250-D1-S.0-Z	1/4	1/4	3/4	2-1/2	CVDDIA
N68097	DIABEB-0.375-D1-S.0-Z	3/8	3/8	1-3/8	3-1/4	CVDDIA
N68098	DIABEB-0.375-D7-S.0-Z	3/8	3/8	2-1/8	4	CVDDIA
N68099	DIABEB-0.500-D1-S.0-Z	1/2	1/2	1	3	CVDDIA
N68100	DIABEB-0.500-D3-S.0-Z	1/2	1/2	2	4	CVDDIA

### FINE PITCH

- Improved surface finish as compared to coarse pitch
- Up to 50% radial engagement



ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	COATING
N68188	DIABEB-0.125-D2-S.0-Z	1/8	1/8	1/2	1-1/2	CVDDIA
N68189	DIABEB-0.250-D2-S.0-Z	1/4	1/4	3/4	2-1/2	CVDDIA
N68192	DIABEB-0.375-D2-S.0-Z	3/8	3/8	1-3/8	3-1/4	CVDDIA
N68193	DIABEB-0.375-D8-S.0-Z	3/8	3/8	2-1/8	4	CVDDIA
N68194	DIABEB-0.500-D2-S.0-Z	1/2	1/2	1	3	CVDDIA
N68195	DIABEB-0.500-D4-S.0-Z	1/2	1/2	2	4	CVDDIA

## DIAPPB

SOLID  
CARBIDE

- Plunge point burr
- Cylindrical Shank
- Drill point design
- Positive end cutting geometry
- Low cutting forces
- High shearing capabilities to reduce material delamination
- Designed for carbon fiber, composite applications, graphite and green ceramics
- Cutting Data - Page 155-157
- Tolerance Specs - Page 335

### COARSE PITCH



ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	COATING
N68085	DIAPPB-0.125-D1-C.0-Z	1/8	1/8	1/2	1-1/2	CVDDIA
N68086	DIAPPB-0.250-D1-C.0-Z	1/4	1/4	3/4	2-1/2	CVDDIA
N68087	DIAPPB-0.250-D3-C.0-Z	1/4	1/4	1-3/8	3	CVDDIA
N68088	DIAPPB-0.250-D5-C.0-Z	1/4	1/4	2	4	CVDDIA

### FINE PITCH

- Improved surface finish as compared to coarse pitch



ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	COATING
N68180	DIAPPB-0.125-D2-C.0-Z	1/8	1/8	1/2	1-1/2	CVDDIA
N68181	DIAPPB-0.250-D2-C.0-Z	1/4	1/4	3/4	2-1/2	CVDDIA
N68182	DIAPPB-0.250-D4-C.0-Z	1/4	1/4	1-3/8	3	CVDDIA
N68183	DIAPPB-0.250-D6-C.0-Z	1/4	1/4	2	4	CVDDIA

## DIA230 / DIAB230 - START VALUES

SLOTTING													
SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 2								
					1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	
GRAPHITE	1.00	1.00	1425	n (rev/min)	43548	29032	21774	17419	14516	10887	8710	7258	
				f <sub>z</sub> (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0023	0.0027	
			1125 - 1725	v <sub>f</sub> (in/min)	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5
				n (rev/min)	43548	29032	21774	17419	14516	10887	8710	7258	
			1125 - 1725	f <sub>z</sub> (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0023	0.0027	
				v <sub>f</sub> (in/min)	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	
PLASTIC (SOFT)	1.00	1.00	1425	n (rev/min)	43548	29032	21774	17419	14516	10887	8710	7258	
				f <sub>z</sub> (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0023	0.0027	
			1125 - 1725	v <sub>f</sub> (in/min)	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	
				n (rev/min)	43548	29032	21774	17419	14516	10887	8710	7258	
			1125 - 1725	f <sub>z</sub> (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0023	0.0027	
				v <sub>f</sub> (in/min)	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	
PLASTIC (HARD)	1.00	1.00	1425	n (rev/min)	43548	29032	21774	17419	14516	10887	8710	7258	
				f <sub>z</sub> (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0023	0.0027	
			1125 - 1725	v <sub>f</sub> (in/min)	39.5	39.5	39.5	39.5	39.5	39.5	39.5	39.5	
				n (rev/min)	40110	26740	20055	16044	13370	10028	8022	6685	
			1163 - 1463	f <sub>z</sub> (in)	0.0005	0.0007	0.0010	0.0012	0.0015	0.0020	0.0025	0.0030	
				v <sub>f</sub> (in/min)	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	
THERMOPLAST	0.80	1.00	1425	n (rev/min)	43548	29032	21774	17419	14516	10887	8710	7258	
				f <sub>z</sub> (in)	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040	0.0050	0.0059	
			1335 - 1515	v <sub>f</sub> (in/min)	86.2	86.2	86.2	86.2	86.2	86.2	86.2	86.2	
				n (rev/min)	40110	26740	20055	16044	13370	10028	8022	6685	
			1162.5 - 1462.5	f <sub>z</sub> (in)	0.0005	0.0007	0.0010	0.0012	0.0015	0.0020	0.0025	0.0030	
				v <sub>f</sub> (in/min)	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	
THERMOSET	0.80	1.00	1425	n (rev/min)	43548	29032	21774	17419	14516	10887	8710	7258	
				f <sub>z</sub> (in)	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040	0.0050	0.0059	
			1335 - 1515	v <sub>f</sub> (in/min)	86.2	86.2	86.2	86.2	86.2	86.2	86.2	86.2	
				n (rev/min)	40110	26740	20055	16044	13370	10028	8022	6685	
			1162.5 - 1462.5	f <sub>z</sub> (in)	0.0005	0.0007	0.0010	0.0012	0.0015	0.0020	0.0025	0.0030	
				v <sub>f</sub> (in/min)	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIA230 / DIAB230 - START VALUES

SIDE MILLING - ROUGHING															
SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Zn = 2									
						1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4		
GRAPHITE	1.00	0.40	1900	-	2200	n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677	
						f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0021	0.0028	0.0034	0.0041	
			1600	-	2200	v <sub>f</sub> (in/min)	79.8	79.8	79.8	79.8	79.8	79.8	79.8	79.8	
						n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677	
PLASTIC (SOFT)	1.00	0.40	1900	-	2200	f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0021	0.0028	0.0034	0.0041	
						v <sub>f</sub> (in/min)	79.8	79.8	79.8	79.8	79.8	79.8	79.8	79.8	
			1600	-	2200	n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677	
						f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0021	0.0028	0.0034	0.0041	
PLASTIC (HARD)	1.00	0.40	1900	-	2200	v <sub>f</sub> (in/min)	79.8	79.8	79.8	79.8	79.8	79.8	79.8		
						n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677	
			1600	-	2200	f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0021	0.0028	0.0034	0.0041	
						v <sub>f</sub> (in/min)	79.8	79.8	79.8	79.8	79.8	79.8	79.8	79.8	
THERMOPLAST	CFRP	1.00	0.40	1750	-	1900	n (rev/min)	53480	35653	26740	21392	17827	13370	10696	8913
							f <sub>z</sub> (in)	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	0.0038	0.0045
				1600	-	1900	v <sub>f</sub> (in/min)	80.2	80.2	80.2	80.2	80.2	80.2	80.2	80.2
	GRP	1.00	0.40	1900	-	1990	n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677
							f <sub>z</sub> (in)	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090
				1810	-	1990	v <sub>f</sub> (in/min)	174.2	174.2	174.2	174.2	174.2	174.2	174.2	174.2
THERMOSET	CFRP	1.00	0.40	1750	-	1900	n (rev/min)	53480	35653	26740	21392	17827	13370	10696	8913
							f <sub>z</sub> (in)	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	0.0038	0.0045
				1600	-	1900	v <sub>f</sub> (in/min)	80.2	80.2	80.2	80.2	80.2	80.2	80.2	80.2
	GRP	1.00	0.40	1900	-	1990	n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677
							f <sub>z</sub> (in)	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090
				1810	-	1990	v <sub>f</sub> (in/min)	174.2	174.2	174.2	174.2	174.2	174.2	174.2	174.2

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIAL230 - START VALUES

SLOTTING															
SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Zn = 2									
						1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4		
GRAPHITE	1.00	1.00	1140	-	1440	n (rev/min)	34838	23226	17419	13935	11613	8710	6968	5806	
						f <sub>z</sub> (in)	0.0003	0.0005	0.0007	0.0009	0.0010	0.0014	0.0017	0.0020	
			v <sub>f</sub> (in/min)	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7		
PLASTIC (SOFT)	1.00	1.00	1140	-	1440	n (rev/min)	34838	23226	17419	13935	11613	8710	6968	5806	
						f <sub>z</sub> (in)	0.0003	0.0005	0.0007	0.0009	0.0010	0.0014	0.0017	0.0020	
			v <sub>f</sub> (in/min)	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7		
PLASTIC (HARD)	1.00	1.00	1140	-	1440	n (rev/min)	34838	23226	17419	13935	11613	8710	6968	5806	
						f <sub>z</sub> (in)	0.0003	0.0005	0.0007	0.0009	0.0010	0.0014	0.0017	0.0020	
			v <sub>f</sub> (in/min)	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7	23.7		
THERMOPLAST	CFRP	1.00	1050	-	1200	n (rev/min)	32088	21392	16044	12835	10696	8022	6418	5348	
						f <sub>z</sub> (in)	0.0004	0.0006	0.0007	0.0009	0.0011	0.0015	0.0019	0.0022	
			v <sub>f</sub> (in/min)	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8		
	GRP	0.80	1.00	1140	-	1230	n (rev/min)	34838	23226	17419	13935	11613	8710	6968	5806
							f <sub>z</sub> (in)	0.0007	0.0011	0.0015	0.0019	0.0022	0.0030	0.0037	0.0045
				v <sub>f</sub> (in/min)	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.7	
THERMOSET	CFRP	1.00	1050	-	1200	n (rev/min)	32088	21392	16044	12835	10696	8022	6418	5348	
						f <sub>z</sub> (in)	0.0004	0.0006	0.0007	0.0009	0.0011	0.0015	0.0019	0.0022	
			v <sub>f</sub> (in/min)	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8	23.8		
	GRP	0.80	1.00	1140	-	1230	n (rev/min)	34838	23226	17419	13935	11613	8710	6968	5806
							f <sub>z</sub> (in)	0.0007	0.0011	0.0015	0.0019	0.0022	0.0030	0.0037	0.0045
				v <sub>f</sub> (in/min)	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.7	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## DIAL230 - START VALUES

SIDE MILLING - ROUGHING															
SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	V <sub>c</sub> (sf / min)			Zn = 2									
						1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4		
GRAPHITE	1.00	0.40	1520	-	1820	n (rev/min)	46451	30967	23226	18580	15484	11613	9290	7742	
						f <sub>z</sub> (in)	0.0005	0.0008	0.0010	0.0013	0.0015	0.0021	0.0026	0.0031	
			v <sub>f</sub> (in/min)	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9		
			1220	-	1820										
PLASTIC (SOFT)	1.00	0.40	1520	-	1820	n (rev/min)	46451	30967	23226	18580	15484	11613	9290	7742	
						f <sub>z</sub> (in)	0.0005	0.0008	0.0010	0.0013	0.0015	0.0021	0.0026	0.0031	
			v <sub>f</sub> (in/min)	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9		
			1220	-	1820										
PLASTIC (HARD)	1.00	0.40	1520	-	1820	n (rev/min)	46451	30967	23226	18580	15484	11613	9290	7742	
						f <sub>z</sub> (in)	0.0005	0.0008	0.0010	0.0013	0.0015	0.0021	0.0026	0.0031	
			v <sub>f</sub> (in/min)	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9		
			1220	-	1820										
THERMOPLAST	CFRP	1.00	0.40	1400	-	1550	n (rev/min)	42784	28523	21392	17114	14261	10696	8557	7131
							f <sub>z</sub> (in)	0.0006	0.0008	0.0011	0.0014	0.0017	0.0023	0.0028	0.0034
				v <sub>f</sub> (in/min)	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	
	GRP	1.00	0.40	1520	-	1610	n (rev/min)	46451	30967	23226	18580	15484	11613	9290	7742
							f <sub>z</sub> (in)	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068
				v <sub>f</sub> (in/min)	104.5	104.5	104.5	104.5	104.5	104.5	104.5	104.5	104.5		
THERMOSET	CFRP	1.00	0.40	1400	-	1550	n (rev/min)	42784	28523	21392	17114	14261	10696	8557	7131
							f <sub>z</sub> (in)	0.0006	0.0008	0.0011	0.0014	0.0017	0.0023	0.0028	0.0034
				v <sub>f</sub> (in/min)	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1		
	GRP	1.00	0.40	1520	-	1610	n (rev/min)	46451	30967	23226	18580	15484	11613	9290	7742
							f <sub>z</sub> (in)	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068
				v <sub>f</sub> (in/min)	104.5	104.5	104.5	104.5	104.5	104.5	104.5	104.5	104.5		

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIA230M / DIAB230M - START VALUES

SLOTTING															
SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	V <sub>c</sub> (sf / min)			Zn = 2									
						1	2	3	4	6	8	10	12		
GRAPHITE	1.00	1.00	1425	-	1725	n (min-1)	138265	69132	46088	34566	23044	17283	13826	11522	
						fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	
			vf (in/min)	39.2	39.2	39.2	39.2	39.2	39.2	39.2	39.2	39.2			
PLASTIC (SOFT)	1.00	1.00	1425	-	1725	n (min-1)	138265	69132	46088	34566	23044	17283	13826	11522	
						fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	
			vf (in/min)	39.2	39.2	39.2	39.2	39.2	39.2	39.2	39.2	39.2			
PLASTIC (HARD)	1.00	1.00	1425	-	1725	n (min-1)	138265	69132	46088	34566	23044	17283	13826	11522	
						fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	
			vf (in/min)	39.2	39.2	39.2	39.2	39.2	39.2	39.2	39.2	39.2			
THERMOPLAST	CFRP	1.00	1.00	1310	-	1465	n (min-1)	127107	63553	42369	31777	21184	15888	12711	10592
							fz (in)	0.0002	0.0003	0.0005	0.0006	0.0009	0.0013	0.0016	0.0019
				vf (in/min)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0		
	GRP	0.80	1.00	1425	-	1515	n (min-1)	138265	69132	46088	34566	23044	17283	13826	11522
							fz (in)	0.0003	0.0006	0.0009	0.0012	0.0019	0.0025	0.0031	0.0037
				vf (in/min)	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0		
THERMOSET	CFRP	1.00	1.00	1310	-	1465	n (min-1)	127107	63553	42369	31777	21184	15888	12711	10592
							fz (in)	0.0002	0.0003	0.0005	0.0006	0.0009	0.0013	0.0016	0.0019
				vf (in/min)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0		
	GRP	0.80	1.00	1425	-	1515	n (min-1)	138265	69132	46088	34566	23044	17283	13826	11522
							fz (in)	0.0003	0.0006	0.0009	0.0012	0.0019	0.0025	0.0031	0.0037
				vf (in/min)	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0	86.0		

SMG = Seco Material Group  
 n [min-1] = RPM  
 V<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIA230M / DIAB230M - START VALUES

SIDE MILLING - ROUGHING															
SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Zn = 2									
						1	2	3	4	6	8	10	12		
GRAPHITE	1.00	0.40	1600	-	2200	1900	n (min-1)	184353	92177	61451	46088	30726	23044	18435	15363
						fz (in)	0.0002	0.0004	0.0006	0.0009	0.0013	0.0017	0.0022	0.0026	
						vf (in/min)	79.8	79.8	79.8	79.8	79.8	79.8	79.8	79.8	
PLASTIC (SOFT)	1.00	0.40	1600	-	2200	1900	n (min-1)	184353	92177	61451	46088	30726	23044	18435	15363
						fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	
						vf (in/min)	52.3	52.3	52.3	52.3	52.3	52.3	52.3	52.3	
PLASTIC (HARD)	1.00	0.40	1600	-	2200	1900	n (min-1)	184353	92177	61451	46088	30726	23044	18435	15363
						fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	
						vf (in/min)	52.3	52.3	52.3	52.3	52.3	52.3	52.3	52.3	
THERMOPLAST	CFRP	1.00	1600	-	1900	1750	n (min-1)	169799	84900	56600	42450	28300	21225	16980	14150
						fz (in)	0.0002	0.0003	0.0005	0.0006	0.0009	0.0013	0.0016	0.0019	
						vf (in/min)	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5	
	GRP	1.00	1810	-	1990	1900	n (min-1)	184353	92177	61451	46088	30726	23044	18435	15363
						fz (in)	0.0003	0.0006	0.0009	0.0012	0.0019	0.0025	0.0031	0.0037	
						vf (in/min)	114.7	114.7	114.7	114.7	114.7	114.7	114.7	114.7	
THERMOSET	CFRP	1.00	1600	-	1900	1750	n (min-1)	169799	84900	56600	42450	28300	21225	16980	14150
						fz (in)	0.0002	0.0003	0.0005	0.0006	0.0009	0.0013	0.0016	0.0019	
						vf (in/min)	53.5	53.5	53.5	53.5	53.5	53.5	53.5	53.5	
	GRP	1.00	1810	-	1990	1900	n (min-1)	184353	92177	61451	46088	30726	23044	18435	15363
						fz (in)	0.0003	0.0006	0.0009	0.0012	0.0019	0.0025	0.0031	0.0037	
						vf (in/min)	114.7	114.7	114.7	114.7	114.7	114.7	114.7	114.7	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIA430 / DIACR430 / DIAB430 - START VALUES

SLOTTING																				
SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4															
						1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4							
GRAPHITE	1.00	1.00	1425	-	1725	n (rev/min)	43548	29032	21774	17419	14516	10887	8710	7258						
						f <sub>z</sub> (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0023	0.0027						
			PLASTIC (SOFT)	1.00	1.00	1425	-	1725	v <sub>f</sub> (in/min)	79.0	79.0	79.0	79.0	79.0	79.0	79.0	79.0			
									n (rev/min)	43548	29032	21774	17419	14516	10887	8710	7258			
						PLASTIC (HARD)	1.00	1.00	1425	-	1725	f <sub>z</sub> (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0023	0.0027
												v <sub>f</sub> (in/min)	79.0	79.0	79.0	79.0	79.0	79.0	79.0	79.0
THERMOPLAST	1.00	1.00	1313	-	1463	f <sub>z</sub> (in)	40110	26740	20055	16044	13370	10028	8022	6685						
						v <sub>f</sub> (in/min)	0.0005	0.0007	0.0010	0.0012	0.0015	0.0020	0.0025	0.0030						
			GRP	0.80	1.00	1425	-	1515	f <sub>z</sub> (in)	79.4	79.4	79.4	79.4	79.4	79.4	79.4	79.4			
									v <sub>f</sub> (in/min)	43548	29032	21774	17419	14516	10887	8710	7258			
						THERMOSET	1.00	1.00	1313	-	1462.5	f <sub>z</sub> (in)	40110	26740	20055	16044	13370	10028	8022	6685
												v <sub>f</sub> (in/min)	0.0005	0.0007	0.0010	0.0012	0.0015	0.0020	0.0025	0.0030
GRP	0.80	1.00	1425	-	1515	f <sub>z</sub> (in)	79.4	79.4	79.4	79.4	79.4	79.4	79.4	79.4						
						v <sub>f</sub> (in/min)	43548	29032	21774	17419	14516	10887	8710	7258						
			THERMOSET	0.80	1.00	1425	-	1515	f <sub>z</sub> (in)	0.0010	0.0015	0.0020	0.0025	0.0030	0.0040	0.0050	0.0059			
									v <sub>f</sub> (in/min)	172.5	172.5	172.5	172.4	172.5	172.5	172.5	172.5	172.5	172.5	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIA430 / DIACR430 / DIAB430 - START VALUES

SIDE MILLING - ROUGHING															
SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 4									
						1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4		
GRAPHITE	1.00	0.40	1600	-	2200	n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677	
						f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0021	0.0028	0.0034	0.0041	
						v <sub>f</sub> (in/min)	159.7	159.7	159.7	159.7	159.7	159.7	159.7	159.7	
						n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677	
						f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0021	0.0028	0.0034	0.0041	
						v <sub>f</sub> (in/min)	159.7	159.7	159.7	159.7	159.7	159.7	159.7	159.7	
PLASTIC (SOFT)	1.00	0.40	1600	-	2200	n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677	
						f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0021	0.0028	0.0034	0.0041	
						v <sub>f</sub> (in/min)	159.7	159.7	159.7	159.7	159.7	159.7	159.7	159.7	
						n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677	
						f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0021	0.0028	0.0034	0.0041	
						v <sub>f</sub> (in/min)	159.7	159.7	159.7	159.7	159.7	159.7	159.7	159.7	
PLASTIC (HARD)	1.00	0.40	1600	-	2200	n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677	
						f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0021	0.0028	0.0034	0.0041	
						v <sub>f</sub> (in/min)	159.7	159.7	159.7	159.7	159.7	159.7	159.7	159.7	
						n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677	
						f <sub>z</sub> (in)	0.0007	0.0010	0.0014	0.0017	0.0021	0.0028	0.0034	0.0041	
						v <sub>f</sub> (in/min)	159.7	159.7	159.7	159.7	159.7	159.7	159.7	159.7	
THERMOPLAST	CFRP	1.00	0.40	1600	-	1900	n (rev/min)	53480	35653	26740	21392	17827	13370	10696	8913
							f <sub>z</sub> (in)	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	0.0038	0.0045
							v <sub>f</sub> (in/min)	160.4	160.4	160.4	160.4	160.4	160.4	160.4	160.4
							n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677
							f <sub>z</sub> (in)	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090
							v <sub>f</sub> (in/min)	348.4	348.4	348.4	348.4	348.4	348.4	348.4	348.4
THERMOSET	CFRP	1.00	0.40	1600	-	1900	n (rev/min)	53480	35653	26740	21392	17827	13370	10696	8913
							f <sub>z</sub> (in)	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	0.0038	0.0045
							v <sub>f</sub> (in/min)	160.4	160.4	160.4	160.4	160.4	160.4	160.4	160.4
							n (rev/min)	58064	38709	29032	23226	19355	14516	11613	9677
							f <sub>z</sub> (in)	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060	0.0075	0.0090
							v <sub>f</sub> (in/min)	348.4	348.4	348.4	348.4	348.4	348.4	348.4	348.4

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIAXSB430 / DIAL430 / DIALB430 / DIAARR430 / DIAARB430 - START VALUES

SLOTTING																		
SMG	ap x Dc (max)	ae x Dc (max)	vc (sf / min)				Zn = 4											
							1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4				
GRAPHITE	1.00	1.00	1140	840	-	1440	n (rev/min)	34838	23226	17419	13935	11613	8710	6968	5806			
							fz (in)	0.0003	0.0005	0.0007	0.0009	0.0010	0.0014	0.0017	0.0020			
							vf (in/min)	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4		
			PLASTIC (SOFT)	1.00	1.00	1140	840	-	1440	n (rev/min)	34838	23226	17419	13935	11613	8710	6968	5806
										fz (in)	0.0003	0.0005	0.0007	0.0009	0.0010	0.0014	0.0017	0.0020
										vf (in/min)	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4
PLASTIC (HARD)	1.00	1.00	1140	840	-	1440	n (rev/min)	34838	23226	17419	13935	11613	8710	6968	5806			
							fz (in)	0.0003	0.0005	0.0007	0.0009	0.0010	0.0014	0.0017	0.0020			
							vf (in/min)	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4		
THERMOPLAST	1.00	1.00	1050	900	-	1200	n (rev/min)	32088	21392	16044	12835	10696	8022	6418	5348			
							fz (in)	0.0004	0.0006	0.0007	0.0009	0.0011	0.0015	0.0019	0.0022			
							vf (in/min)	47.7	47.7	47.7	47.6	47.7	47.7	47.7	47.7	47.7		
			GRP	0.80	1.00	1140	1050	-	1230	n (rev/min)	34838	23226	17419	13935	11613	8710	6968	5806
										fz (in)	0.0007	0.0011	0.0015	0.0019	0.0022	0.0030	0.0037	0.0045
										vf (in/min)	103.5	103.5	103.5	103.5	103.5	103.5	103.5	103.5
THERMOSET	1.00	1.00	1050	900	-	1200	n (rev/min)	32088	21392	16044	12835	10696	8022	6418	5348			
							fz (in)	0.0004	0.0006	0.0007	0.0009	0.0011	0.0015	0.0019	0.0022			
							vf (in/min)	47.7	47.7	47.7	47.6	47.7	47.7	47.7	47.7	47.7		
			GRP	0.80	1.00	1140	1050	-	1230	n (rev/min)	34838	23226	17419	13935	11613	8710	6968	5806
										fz (in)	0.0007	0.0011	0.0015	0.0019	0.0022	0.0030	0.0037	0.0045
										vf (in/min)	103.5	103.5	103.5	103.5	103.5	103.5	103.5	103.5

SMG = Seco Material Group  
 n [min-1] = RPM  
 vc (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 ap/Dc = % of diameter  
 vf [in/min] = Feed rate  
 ae/Dc = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIAXSB430 / DIAL430 / DIALB430 / DIAXRR430 / DIAXRB430 - START VALUES

### SIDE MILLING - ROUGHING

SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4							
					1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4
					n (rev/min)	f <sub>z</sub> (in)	v <sub>f</sub> (in/min)	n (rev/min)	f <sub>z</sub> (in)	v <sub>f</sub> (in/min)	n (rev/min)	f <sub>z</sub> (in)
GRAPHITE	1.00	0.40	1520	n (rev/min)	46451	30967	23226	18580	15484	11613	9290	7742
				f <sub>z</sub> (in)	0.0005	0.0008	0.0010	0.0013	0.0015	0.0021	0.0026	0.0031
			1220 - 1820	v <sub>f</sub> (in/min)	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8
				n (rev/min)	46451	30967	23226	18580	15484	11613	9290	7742
			1520	f <sub>z</sub> (in)	0.0005	0.0008	0.0010	0.0013	0.0015	0.0021	0.0026	0.0031
				v <sub>f</sub> (in/min)	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8
PLASTIC (SOFT)	1.00	0.40	1520	n (rev/min)	46451	30967	23226	18580	15484	11613	9290	7742
				f <sub>z</sub> (in)	0.0005	0.0008	0.0010	0.0013	0.0015	0.0021	0.0026	0.0031
			1220 - 1820	v <sub>f</sub> (in/min)	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8
				n (rev/min)	46451	30967	23226	18580	15484	11613	9290	7742
			1520	f <sub>z</sub> (in)	0.0005	0.0008	0.0010	0.0013	0.0015	0.0021	0.0026	0.0031
				v <sub>f</sub> (in/min)	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8
PLASTIC (HARD)	1.00	0.40	1520	n (rev/min)	46451	30967	23226	18580	15484	11613	9290	7742
				f <sub>z</sub> (in)	0.0005	0.0008	0.0010	0.0013	0.0015	0.0021	0.0026	0.0031
			1220 - 1820	v <sub>f</sub> (in/min)	95.8	95.8	95.8	95.8	95.8	95.8	95.8	95.8
				n (rev/min)	42784	28523	21392	17114	14261	10696	8557	7131
			1400	f <sub>z</sub> (in)	0.0006	0.0008	0.0011	0.0014	0.0017	0.0023	0.0028	0.0034
				v <sub>f</sub> (in/min)	96.3	96.3	96.3	96.3	96.3	96.3	96.3	96.3
THERMOPLAST	1.00	0.40	1520	n (rev/min)	46451	30967	23226	18580	15484	11613	9290	7742
				f <sub>z</sub> (in)	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068
			1430 - 1610	v <sub>f</sub> (in/min)	209.0	209.0	209.0	209.0	209.0	209.0	209.0	209.0
				n (rev/min)	42784	28523	21392	17114	14261	10696	8557	7131
			1400	f <sub>z</sub> (in)	0.0006	0.0008	0.0011	0.0014	0.0017	0.0023	0.0028	0.0034
				v <sub>f</sub> (in/min)	96.3	96.3	96.3	96.3	96.3	96.3	96.3	96.3
THERMOSET	1.00	0.40	1520	n (rev/min)	46451	30967	23226	18580	15484	11613	9290	7742
				f <sub>z</sub> (in)	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068
			1430 - 1610	v <sub>f</sub> (in/min)	209.0	209.0	209.0	209.0	209.0	209.0	209.0	209.0
				n (rev/min)	42784	28523	21392	17114	14261	10696	8557	7131
			1400	f <sub>z</sub> (in)	0.0006	0.0008	0.0011	0.0014	0.0017	0.0023	0.0028	0.0034
				v <sub>f</sub> (in/min)	96.3	96.3	96.3	96.3	96.3	96.3	96.3	96.3

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIA430M - START VALUES

SLOTTING												
SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 4						
						2	3	4	6	8		
GRAPHITE	1.00	1.00	1425			n (min-1)	69132	46088	34566	23044	17283	
						fz (in)	0.0003	0.0004	0.0006	0.0009	0.0011	
			1125	-	1725	vf (in/min)	78.4	78.4	78.4	78.4	78.4	
PLASTIC (SOFT)	1.00	1.00	1425			n (min-1)	69132	46088	34566	23044	17283	
						fz (in)	0.0003	0.0004	0.0006	0.0009	0.0011	
			1125	-	1725	vf (in/min)	78.4	78.4	78.4	78.4	78.4	
PLASTIC (HARD)	1.00	1.00	1425			n (min-1)	69132	46088	34566	23044	17283	
						fz (in)	0.0003	0.0004	0.0006	0.0009	0.0011	
			1125	-	1725	vf (in/min)	78.4	78.4	78.4	78.4	78.4	
THERMOPLAST	CFRP	1.00	1.00	1310			n (min-1)	63553	42369	31777	21184	15888
							fz (in)	0.0003	0.0005	0.0006	0.0009	0.0013
				1160	-	1465	vf (in/min)	80.1	80.1	80.1	80.1	80.1
	GRP	0.80	1.00	1425			n (min-1)	69132	46088	34566	23044	17283
							fz (in)	0.0006	0.0009	0.0012	0.0019	0.0025
				1335	-	1515	vf (in/min)	172.0	172.0	172.0	172.0	172.0
THERMOSET	CFRP	1.00	1.00	1310			n (min-1)	63553	42369	31777	21184	15888
							fz (in)	0.0003	0.0005	0.0006	0.0009	0.0013
				1160	-	1465	vf (in/min)	80.1	80.1	80.1	80.1	80.1
	GRP	0.80	1.00	1425			n (min-1)	69132	46088	34566	23044	17283
							fz (in)	0.0006	0.0009	0.0012	0.0019	0.0025
				1335	-	1515	vf (in/min)	172.0	172.0	172.0	172.0	172.0

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## DIA430M - START VALUES

SIDE MILLING - ROUGHING												
SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 4						
						2	3	4	6	8		
GRAPHITE	1.00	0.40	1900			n (min-1)	92177	61451	46088	30726	23044	
						fz (in)	0.0004	0.0006	0.0009	0.0013	0.0017	
			1600	-	2200	vf (in/min)	159.7	159.7	159.7	159.7	159.7	
PLASTIC (SOFT)	1.00	0.40	1900			n (min-1)	92177	61451	46088	30726	23044	
						fz (in)	0.0003	0.0004	0.0006	0.0009	0.0011	
			1600	-	2200	vf (in/min)	104.5	104.5	104.5	104.5	104.5	
PLASTIC (HARD)	1.00	0.40	1900			n (min-1)	92177	61451	46088	30726	23044	
						fz (in)	0.0003	0.0004	0.0006	0.0009	0.0011	
			1600	-	2200	vf (in/min)	104.5	104.5	104.5	104.5	104.5	
THERMOPLAST	CFRP	1.00	0.40	1750			n (min-1)	84900	56600	42450	28300	21225
							fz (in)	0.0003	0.0005	0.0006	0.0009	0.0013
				1600	-	1900	vf (in/min)	107.0	107.0	107.0	107.0	107.0
	GRP	1.00	0.40	1900			n (min-1)	92177	61451	46088	30726	23044
							fz (in)	0.0006	0.0009	0.0012	0.0019	0.0025
				1810	-	1990	vf (in/min)	229.4	229.4	229.4	229.4	229.4
THERMOSET	CFRP	1.00	0.40	1750			n (min-1)	84900	56600	42450	28300	21225
							fz (in)	0.0003	0.0005	0.0006	0.0009	0.0013
				1600	-	1900	vf (in/min)	107.0	107.0	107.0	107.0	107.0
	GRP	1.00	0.40	1900			n (min-1)	92177	61451	46088	30726	23044
							fz (in)	0.0006	0.0009	0.0012	0.0019	0.0025
				1810	-	1990	vf (in/min)	229.4	229.4	229.4	229.4	229.4

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIACC COARSE-PITCH - START VALUES

		SLOTTING										
SMG	$a_p \times D_c$ (max)	$a_e \times D_c$ (max)	$v_c$ (sf / min)			$Z_n = 3$		$Z_n = 5$				
						1/4	3/8	1/2				
GRAPHITE	1.00	1.00	1425	-	1725	n (rev/min)	21774	14516	10887			
						$f_z$ (in)	0.0009	0.0014	0.0018			
						$v_f$ (in/min)	59.3	59.3	98.8			
			PLASTIC (SOFT)	1.00	1.00	1425	-	1725	n (rev/min)	21774	14516	10887
									$f_z$ (in)	0.0009	0.0014	0.0018
									$v_f$ (in/min)	59.3	59.3	98.8
PLASTIC (HARD)	1.00	1.00				1425	-	1725	n (rev/min)	21774	14516	10887
									$f_z$ (in)	0.0009	0.0014	0.0018
									$v_f$ (in/min)	59.3	59.3	98.8
			THERMOPLAST	1.00	1.00	1313	-	1463	n (rev/min)	20055	13370	10028
									$f_z$ (in)	0.0010	0.0015	0.0020
									$v_f$ (in/min)	59.6	59.6	99.3
THERMOPLAST	0.80	1.00				1425	-	1515	n (rev/min)	21774	14516	10887
									$f_z$ (in)	0.0010	0.0015	0.0020
									$v_f$ (in/min)	64.7	64.7	107.8
			THERMOSET	1.00	1.00	1313	-	1462.5	n (rev/min)	20055	13370	10028
									$f_z$ (in)	0.0010	0.0015	0.0020
									$v_f$ (in/min)	59.6	59.6	99.3
THERMOSET	0.80	1.00				1425	-	1515	n (rev/min)	21774	14516	10887
									$f_z$ (in)	0.0010	0.0015	0.0020
									$v_f$ (in/min)	64.7	64.7	107.8

		SIDE MILLING - ROUGHING										
GRAPHITE	2.00	0.40	1900	-	2200	n (rev/min)	29032	19355	14516			
						$f_z$ (in)	0.0014	0.0021	0.0028			
						$v_f$ (in/min)	119.8	119.8	199.6			
			PLASTIC (SOFT)	2.00	0.40	1900	-	2200	n (rev/min)	29032	19355	14516
									$f_z$ (in)	0.0014	0.0021	0.0028
									$v_f$ (in/min)	119.8	119.8	199.6
PLASTIC (HARD)	2.00	0.40				1900	-	2200	n (rev/min)	29032	19355	14516
									$f_z$ (in)	0.0014	0.0021	0.0028
									$v_f$ (in/min)	119.8	119.8	199.6
			THERMOPLAST	2.00	0.40	1750	-	1900	n (rev/min)	26740	17827	13370
									$f_z$ (in)	0.0015	0.0023	0.0030
									$v_f$ (in/min)	120.3	120.3	200.6
THERMOPLAST	2.00	0.40				1900	-	1990	n (rev/min)	29032	19355	14516
									$f_z$ (in)	0.0015	0.0023	0.0030
									$v_f$ (in/min)	130.6	130.6	217.7
			THERMOSET	2.00	0.40	1750	-	1900	n (rev/min)	26740	17827	13370
									$f_z$ (in)	0.0015	0.0023	0.0030
									$v_f$ (in/min)	120.3	120.3	200.6
THERMOSET	2.00	0.40				1900	-	1990	n (rev/min)	29032	19355	14516
									$f_z$ (in)	0.0015	0.0023	0.0030
									$v_f$ (in/min)	130.6	130.6	217.7

SMG = Seco Material Group  
 n [min-1] = RPM  
 $v_c$  (sf/min) = Surface feet/min

$f_z$  [in] = Feed/tooth  
 $a_p/D_c$  = % of diameter  
 $v_f$  [in/min] = Feed rate  
 $a_e/D_c$  = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIACC - FINE PITCH - START VALUES

		SIDE MILLING - ROUGHING							
SMG	$a_p \times D_c$ (max)	$a_e \times D_c$ (max)	$v_c$ (sf / min)				$Z_n = 5$		$Z_n = 7$
							1/4	3/8	1/2
GRAPHITE	2.00	0.40	1600	-	2200	n (rev/min)	29032	19355	14516
						$f_z$ (in)	0.0014	0.0021	0.0028
						$v_f$ (in/min)	199.6	199.6	279.4
						n (rev/min)	29032	19355	14516
						$f_z$ (in)	0.0014	0.0021	0.0028
						$v_f$ (in/min)	199.6	199.6	279.4
PLASTIC (SOFT)	2.00	0.40	1600	-	2200	n (rev/min)	29032	19355	14516
						$f_z$ (in)	0.0014	0.0021	0.0028
						$v_f$ (in/min)	199.6	199.6	279.4
						n (rev/min)	29032	19355	14516
						$f_z$ (in)	0.0014	0.0021	0.0028
						$v_f$ (in/min)	199.6	199.6	279.4
PLASTIC (HARD)	2.00	0.40	1600	-	2200	n (rev/min)	29032	19355	14516
						$f_z$ (in)	0.0014	0.0021	0.0028
						$v_f$ (in/min)	199.6	199.6	279.4
						n (rev/min)	29032	19355	14516
						$f_z$ (in)	0.0014	0.0021	0.0028
						$v_f$ (in/min)	199.6	199.6	279.4
THERMOPLAST	2.00	0.40	1600	-	1900	n (rev/min)	26740	17827	13370
						$f_z$ (in)	0.0015	0.0023	0.0030
						$v_f$ (in/min)	200.6	200.6	280.8
						n (rev/min)	29032	19355	14516
						$f_z$ (in)	0.0015	0.0023	0.0030
						$v_f$ (in/min)	217.7	217.7	304.8
THERMOSET	2.00	0.40	1600	-	1900	n (rev/min)	26740	17827	13370
						$f_z$ (in)	0.0015	0.0023	0.0030
						$v_f$ (in/min)	200.6	200.6	280.8
						n (rev/min)	29032	19355	14516
						$f_z$ (in)	0.0015	0.0023	0.0030
						$v_f$ (in/min)	217.7	217.7	304.8

SMG = Seco Material Group  
 n [min-1] = RPM  
 $v_c$  (sf/min) = Surface feet/min

$f_z$  [in] = Feed/tooth  
 $a_p/D_c$  = % of diameter  
 $v_f$  [in/min] = Feed rate  
 $a_e/D_c$  = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIARTRBE / DIARTREM - START VALUES

SLOTTING													
ISO GROUP	SMG	ap x DC	ae x DC	vc (m/min)		Zn=6		Zn=8			Zn=10	Zn=12	Zn=14
						1/8	3/16	1/8	3/16	1/4	1/4	3/8	1/2
A Thermoset Carbon & Glass Fiber	CFRP	1.00	1.00	510 - 425 - 595	n [min-1]	15586	10390	15586	10390	7793	7793	5195	3896
					fz [in]	0.0003	0.0004	0.0003	0.0004	0.0006	0.0006	0.0008	0.0011
					vf [in/min]	25.7	25.7	34.3	34.3	34.3	42.9	51.4	60.0
	CRP	1.00	1.00	330 - 260 - 400	n [min-1]	10085	6723	10085	6723	5042	5042	3362	2521
					fz [in]	0.0003	0.0004	0.0003	0.0004	0.0006	0.0006	0.0008	0.0011
					vf [in/min]	16.6	16.6	22.2	22.2	22.2	27.7	33.3	38.8
A Thermoplast Carbon & Glass Fiber	CFRP	1.00	1.00	330 - 275 - 385	n [min-1]	10085	6723	10085	6723	5042	5042	3362	2521
					fz [in]	0.0003	0.0004	0.0003	0.0004	0.0006	0.0006	0.0008	0.0011
					vf [in/min]	16.6	16.6	22.2	22.2	22.2	27.7	33.3	38.8
	CRP	1.00	1.00	165 - 100 - 230	n [min-1]	5042	3362	5042	3362	2521	2521	1681	1261
					fz [in]	0.0003	0.0004	0.0003	0.0004	0.0006	0.0006	0.0008	0.0011
					vf [in/min]	8.3	8.3	11.1	11.1	11.1	13.9	16.6	19.4

SIDE MILLING - ROUGHING													
ISO GROUP	SMG	ap x DC	ae x DC	vc (m/min)		Zn=6		Zn=8			Zn=10	Zn=12	Zn=14
						1/8	3/16	1/8	3/16	1/4	1/4	3/8	1/2
A Thermoset Carbon & Glass Fiber	CFRP	1.50	0.35	605 - 510 - 700	n [min-1]	18489	12326	18489	12326	9244	9244	6163	4622
					fz [in]	0.0004	0.0006	0.0004	0.0006	0.0008	0.0008	0.0012	0.0016
					vf [in/min]	44.4	44.4	59.2	59.2	59.2	74.0	88.7	103.5
	CRP	1.50	0.35	410 - 330 - 490	n [min-1]	12530	8353	12530	8353	6265	6265	4177	3132
					fz [in]	0.0004	0.0006	0.0004	0.0006	0.0008	0.0008	0.0012	0.0016
					vf [in/min]	30.1	30.1	40.1	40.1	40.1	50.1	60.1	70.2
A Thermoplast Carbon & Glass Fiber	CFRP	1.50	0.35	410 - 295 - 525	n [min-1]	12530	8353	12530	8353	6265	6265	4177	3132
					fz [in]	0.0004	0.0006	0.0004	0.0006	0.0008	0.0008	0.0012	0.0016
					vf [in/min]	30.1	30.1	40.1	40.1	40.1	50.1	60.1	70.2
	CRP	1.50	0.35	195 - 120 - 270	n [min-1]	5959	3973	5959	3973	2980	2980	1986	1490
					fz [in]	0.0004	0.0006	0.0004	0.0006	0.0008	0.0008	0.0012	0.0016
					vf [in/min]	14.3	14.3	19.1	19.1	19.1	23.8	28.6	33.4

SMG = Seco Material Group  
 n [min-1] = RPM  
 vc (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 ap/dc = % of diameter  
 vf [in/min] = Feed rate  
 ae/dc = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIAEPB / DIAPPB / DIABEB COARSE PITCH - START VALUES

		SLOTTING											
SMG	$a_p \times D_c$ (max)	$a_e \times D_c$ (max)	$v_c$ (sf / min)										
						1/8	3/16	1/4	5/16	3/8	1/2		
GRAPHITE	1.00	1.00	1800	-	2000	n (rev/min)	55008	36672	27504	22003	18336	13752	
						$f_z$ (in)	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024	
			1600	-	2000	$v_f$ (in/min)	32.9	32.9	32.9	32.9	32.9	32.9	32.9
						n (rev/min)	55008	36672	27504	22003	18336	13752	
			1800	-	2000	$f_z$ (in)	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024	
						$v_f$ (in/min)	32.9	32.9	32.9	32.9	32.9	32.9	
PLASTIC (SOFT)	1.00	1.00	1800	-	2000	n (rev/min)	55008	36672	27504	22003	18336	13752	
						$f_z$ (in)	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024	
			1600	-	2000	$v_f$ (in/min)	32.9	32.9	32.9	32.9	32.9	32.9	
						n (rev/min)	55008	36672	27504	22003	18336	13752	
			1800	-	2000	$f_z$ (in)	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024	
						$v_f$ (in/min)	32.9	32.9	32.9	32.9	32.9	32.9	
PLASTIC (HARD)	1.00	1.00	1800	-	2000	n (rev/min)	55008	36672	27504	22003	18336	13752	
						$f_z$ (in)	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024	
			1600	-	2000	$v_f$ (in/min)	32.9	32.9	32.9	32.9	32.9	32.9	
						n (rev/min)	55008	36672	27504	22003	18336	13752	
			1800	-	2000	$f_z$ (in)	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024	
						$v_f$ (in/min)	32.9	32.9	32.9	32.9	32.9	32.9	
THERMOPLAST	1.00	1.00	1800	-	2000	n (rev/min)	55008	36672	27504	22003	18336	13752	
						$f_z$ (in)	0.0005	0.0007	0.0010	0.0012	0.0015	0.0020	
			1600	-	2000	$v_f$ (in/min)	27.2	27.2	27.2	27.2	27.2	27.2	
						n (rev/min)	55008	36672	27504	22003	18336	13752	
			1800	-	2000	$f_z$ (in)	0.0005	0.0007	0.0010	0.0012	0.0015	0.0020	
						$v_f$ (in/min)	27.2	27.2	27.2	27.2	27.2	27.2	
THERMOSET	1.00	1.00	1800	-	2000	n (rev/min)	55008	36672	27504	22003	18336	13752	
						$f_z$ (in)	0.0005	0.0007	0.0010	0.0012	0.0015	0.0020	
			1600	-	2000	$v_f$ (in/min)	27.2	27.2	27.2	27.2	27.2	27.2	
						n (rev/min)	55008	36672	27504	22003	18336	13752	
			1800	-	2000	$f_z$ (in)	0.0005	0.0007	0.0010	0.0012	0.0015	0.0020	
						$v_f$ (in/min)	27.2	27.2	27.2	27.2	27.2	27.2	

SMG = Seco Material Group  
 n [min-1] = RPM  
 $v_c$  (sf/min) = Surface feet/min

$f_z$  [in] = Feed/tooth  
 $a_p/D_c$  = % of diameter  
 $v_f$  [in/min] = Feed rate  
 $a_e/D_c$  = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIAEPB / DIAPPB / DIABEB COARSE PITCH - START VALUES

SIDE MILLING - ROUGHING													
SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)										
					1/8	3/16	1/4	5/16	3/8	1/2			
GRAPHITE	2.00	0.50	2400	n (rev/min)	73344	48896	36672	29338	24448	18336			
				f <sub>z</sub> (in)	0.0009	0.0014	0.0018	0.0023	0.0027	0.0036			
			2200 - 2600	v <sub>f</sub> (in/min)	66.5	66.5	66.5	66.5	66.5	66.5	66.5	66.5	
				n (rev/min)	73344	48896	36672	29338	24448	18336			
			2400	f <sub>z</sub> (in)	0.0009	0.0014	0.0018	0.0023	0.0027	0.0036			
				v <sub>f</sub> (in/min)	66.5	66.5	66.5	66.5	66.5	66.5	66.5	66.5	
PLASTIC (SOFT)	2.00	0.50	2400	n (rev/min)	73344	48896	36672	29338	24448	18336			
				f <sub>z</sub> (in)	0.0009	0.0014	0.0018	0.0023	0.0027	0.0036			
			2200 - 2600	v <sub>f</sub> (in/min)	66.5	66.5	66.5	66.5	66.5	66.5	66.5	66.5	
				n (rev/min)	73344	48896	36672	29338	24448	18336			
			2400	f <sub>z</sub> (in)	0.0009	0.0014	0.0018	0.0023	0.0027	0.0036			
				v <sub>f</sub> (in/min)	66.5	66.5	66.5	66.5	66.5	66.5	66.5	66.5	
PLASTIC (HARD)	2.00	0.50	2400	n (rev/min)	73344	48896	36672	29338	24448	18336			
				f <sub>z</sub> (in)	0.0009	0.0014	0.0018	0.0023	0.0027	0.0036			
			2200 - 2600	v <sub>f</sub> (in/min)	66.5	66.5	66.5	66.5	66.5	66.5	66.5	66.5	
				n (rev/min)	73344	48896	36672	29338	24448	18336			
			2400	f <sub>z</sub> (in)	0.0009	0.0014	0.0018	0.0023	0.0027	0.0036			
				v <sub>f</sub> (in/min)	66.5	66.5	66.5	66.5	66.5	66.5	66.5	66.5	
THERMOPLAST	2.00	0.50	2400	n (rev/min)	73344	48896	36672	29338	24448	18336			
				f <sub>z</sub> (in)	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030			
			2200 - 2600	v <sub>f</sub> (in/min)	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	
				n (rev/min)	73344	48896	36672	29338	24448	18336			
			2400	f <sub>z</sub> (in)	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030			
				v <sub>f</sub> (in/min)	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	
THERMOSET	2.00	0.50	2400	n (rev/min)	73344	48896	36672	29338	24448	18336			
				f <sub>z</sub> (in)	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030			
			2200 - 2600	v <sub>f</sub> (in/min)	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	
				n (rev/min)	73344	48896	36672	29338	24448	18336			
			2400	f <sub>z</sub> (in)	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030			
				v <sub>f</sub> (in/min)	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## DIAEPB / DIAPPB / DIABEB FINE PITCH - START VALUES

SIDE MILLING - ROUGHING													
SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	V <sub>c</sub> (sf / min)			1/8	1/4	3/8	1/2				
						n (rev/min)	f <sub>z</sub> (in)	v <sub>f</sub> (in/min)	n (rev/min)	f <sub>z</sub> (in)	v <sub>f</sub> (in/min)		
GRAPHITE	2.00	0.25	2100	-	2700	n (rev/min)	73344	36672	24448	18336			
						f <sub>z</sub> (in)	0.0009	0.0018	0.0027	0.0036			
					v <sub>f</sub> (in/min)	66.5	66.5	66.5	66.5				
					n (rev/min)	73344	36672	24448	18336				
PLASTIC (SOFT)	2.00	0.25	2100	-	2700	n (rev/min)	73344	36672	24448	18336			
						f <sub>z</sub> (in)	0.0009	0.0018	0.0027	0.0036			
					v <sub>f</sub> (in/min)	66.5	66.5	66.5	66.5				
					n (rev/min)	73344	36672	24448	18336				
PLASTIC (HARD)	2.00	0.25	2100	-	2700	n (rev/min)	73344	36672	24448	18336			
						f <sub>z</sub> (in)	0.0009	0.0018	0.0027	0.0036			
					v <sub>f</sub> (in/min)	66.5	66.5	66.5	66.5				
					n (rev/min)	73344	36672	24448	18336				
THERMOPLAST	2.00	0.25	2250	-	2550	n (rev/min)	73344	36672	24448	18336			
						f <sub>z</sub> (in)	0.0008	0.0015	0.0023	0.0030			
					v <sub>f</sub> (in/min)	55.0	55.0	55.0	55.0				
			GRP	2.00	0.25	2310	-	2490	n (rev/min)	73344	36672	24448	18336
									f <sub>z</sub> (in)	0.0008	0.0015	0.0023	0.0030
								v <sub>f</sub> (in/min)	55.0	55.0	55.0	55.0	
		n (rev/min)				73344	36672	24448	18336				
THERMOSET	2.00	0.25	2250	-	2550	n (rev/min)	73344	36672	24448	18336			
						f <sub>z</sub> (in)	0.0008	0.0015	0.0023	0.0030			
					v <sub>f</sub> (in/min)	55.0	55.0	55.0	55.0				
			GRP	2.00	0.25	2310	-	2490	n (rev/min)	73344	36672	24448	18336
									f <sub>z</sub> (in)	0.0008	0.0015	0.0023	0.0030
								v <sub>f</sub> (in/min)	55.0	55.0	55.0	55.0	
		n (rev/min)				73344	36672	24448	18336				

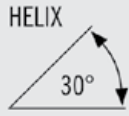
SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## C230

SOLID  
CARBIDE



CENTER  
CUTTING

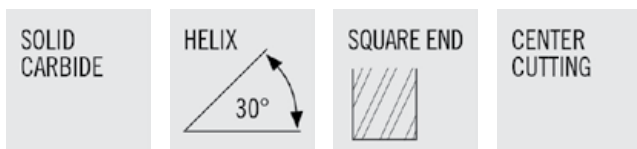


- General Purpose
- General machining of most material types
- Cutting Data - Page 192-193
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85261	C230-0.031-F3-S.0-Z2	1/32	1/8	5/64	1-1/2	2	UNCOATED	CYLINDRICAL
N85337	C230-0.031-F3-S.0-Z2	1/32	1/8	5/64	1-1/2	2	TIALN	CYLINDRICAL
N54012	C230-0.031-F4-S.0-Z2	1/32	1/8	3/32	1-1/2	2	UNCOATED	CYLINDRICAL
N54018	C230-0.031-F4-S.0-Z2	1/32	1/8	3/32	1-1/2	2	TIALN	CYLINDRICAL
N85262	C230-0.047-F2-S.0-Z2	3/64	1/8	7/64	1-1/2	2	UNCOATED	CYLINDRICAL
N85338	C230-0.047-F2-S.0-Z2	3/64	1/8	7/64	1-1/2	2	TIALN	CYLINDRICAL
N54013	C230-0.047-F3-S.0-Z2	3/64	1/8	1/8	1-1/2	2	UNCOATED	CYLINDRICAL
N54019	C230-0.047-F3-S.0-Z2	3/64	1/8	1/8	1-1/2	2	TIALN	CYLINDRICAL
N85408	C230-0.063-F2-S.0-Z2	1/16	1/8	1/8	1-1/2	2	UNCOATED	CYLINDRICAL
N85434	C230-0.063-F2-S.0-Z2	1/16	1/8	1/8	1-1/2	2	TIALN	CYLINDRICAL
N85263	C230-0.063-F3-S.0-Z2	1/16	1/8	3/16	1-1/2	2	UNCOATED	CYLINDRICAL
N85339	C230-0.063-F3-S.0-Z2	1/16	1/8	3/16	1-1/2	2	TIALN	CYLINDRICAL
N55334	C230-0.063-F4-S.0-Z2	1/16	1/8	1/4	1-1/2	2	UNCOATED	CYLINDRICAL
N55430	C230-0.063-F4-S.0-Z2	1/16	1/8	1/4	1-1/2	2	TIALN	CYLINDRICAL
N85264	C230-0.078-F2-S.0-Z2	5/64	1/8	3/16	1-1/2	2	UNCOATED	CYLINDRICAL
N85340	C230-0.078-F2-S.0-Z2	5/64	1/8	3/16	1-1/2	2	TIALN	CYLINDRICAL
N55335	C230-0.078-F3-S.0-Z2	5/64	1/8	1/4	1-1/2	2	UNCOATED	CYLINDRICAL
N55431	C230-0.078-F3-S.0-Z2	5/64	1/8	1/4	1-1/2	2	TIALN	CYLINDRICAL
N85409	C230-0.094-F2-S.0-Z2	3/32	1/8	3/16	1-1/2	2	UNCOATED	CYLINDRICAL
N85435	C230-0.094-F2-S.0-Z2	3/32	1/8	3/16	1-1/2	2	TIALN	CYLINDRICAL
N85265	C230-0.094-F3-S.0-Z2	3/32	1/8	9/32	1-1/2	2	UNCOATED	CYLINDRICAL
N85341	C230-0.094-F3-S.0-Z2	3/32	1/8	9/32	1-1/2	2	TIALN	CYLINDRICAL
N55336	C230-0.094-F4-S.0-Z2	3/32	1/8	3/8	1-1/2	2	UNCOATED	CYLINDRICAL
N55432	C230-0.094-F4-S.0-Z2	3/32	1/8	3/8	1-1/2	2	TIALN	CYLINDRICAL
N85266	C230-0.109-F3-S.0-Z2	7/64	1/8	3/8	1-1/2	2	UNCOATED	CYLINDRICAL
N85342	C230-0.109-F3-S.0-Z2	7/64	1/8	3/8	1-1/2	2	TIALN	CYLINDRICAL
N85410	C230-0.125-D2-S.0-Z2	1/8	1/8	1/4	1-1/2	2	UNCOATED	CYLINDRICAL
N85436	C230-0.125-D2-S.0-Z2	1/8	1/8	1/4	1-1/2	2	TIALN	CYLINDRICAL
N85267	C230-0.125-D4-S.0-Z2	1/8	1/8	1/2	1-1/2	2	UNCOATED	CYLINDRICAL
N85343	C230-0.125-D4-S.0-Z2	1/8	1/8	1/2	1-1/2	2	TIALN	CYLINDRICAL
N55337	C230-0.125-D5-S.0-Z2	1/8	1/8	5/8	2	2	UNCOATED	CYLINDRICAL
N55433	C230-0.125-D5-S.0-Z2	1/8	1/8	5/8	2	2	TIALN	CYLINDRICAL
N55338	C230-0.125-D6-S.0-Z2	1/8	1/8	3/4	3	2	UNCOATED	CYLINDRICAL
N55434	C230-0.125-D6-S.0-Z2	1/8	1/8	3/4	3	2	TIALN	CYLINDRICAL
N55339	C230-0.125-D8-S.0-Z2	1/8	1/8	1	3	2	UNCOATED	CYLINDRICAL
N55435	C230-0.125-D8-S.0-Z2	1/8	1/8	1	3	2	TIALN	CYLINDRICAL
N85411	C230-0.156-F2-S.0-Z2	5/32	3/16	5/16	2	2	UNCOATED	CYLINDRICAL
N85437	C230-0.156-F2-S.0-Z2	5/32	3/16	5/16	2	2	TIALN	CYLINDRICAL
N85269	C230-0.156-F3-S.0-Z2	5/32	3/16	1/2	2	2	UNCOATED	CYLINDRICAL



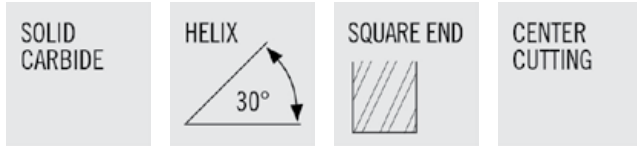
## C230 (CONT'D)



- General Purpose
- General machining of most material types
- Cutting Data - Page 192-193
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85345	C230-0.156-F3-S.0-Z2	5/32	3/16	1/2	2	2	TIALN	CYLINDRICAL
N85412	C230-0.188-D2-S.0-Z2	3/16	3/16	3/8	2	2	UNCOATED	CYLINDRICAL
N85438	C230-0.188-D2-S.0-Z2	3/16	3/16	3/8	2	2	TIALN	CYLINDRICAL
N85271	C230-0.188-D3-S.0-Z2	3/16	3/16	5/8	2	2	UNCOATED	CYLINDRICAL
N85347	C230-0.188-D3-S.0-Z2	3/16	3/16	5/8	2	2	TIALN	CYLINDRICAL
N85448	C230-0.188-D4-S.0-Z2	3/16	3/16	3/4	2-1/2	2	UNCOATED	CYLINDRICAL
N85484	C230-0.188-D4-S.0-Z2	3/16	3/16	3/4	2-1/2	2	TIALN	CYLINDRICAL
N55341	C230-0.188-D6-S.0-Z2	3/16	3/16	1	4	2	UNCOATED	CYLINDRICAL
N55437	C230-0.188-D6-S.0-Z2	3/16	3/16	1	4	2	TIALN	CYLINDRICAL
N85449	C230-0.188-D7-S.0-Z2	3/16	3/16	1-1/8	3	2	UNCOATED	CYLINDRICAL
N85485	C230-0.188-D7-S.0-Z2	3/16	3/16	1-1/8	3	2	TIALN	CYLINDRICAL
N85272	C230-0.203-F3-S.0-Z2	13/64	1/4	5/8	2-1/2	2	UNCOATED	CYLINDRICAL
N85348	C230-0.203-F3-S.0-Z2	13/64	1/4	5/8	2-1/2	2	TIALN	CYLINDRICAL
N85413	C230-0.219-F2-S.0-Z2	7/32	1/4	7/16	2	2	UNCOATED	CYLINDRICAL
N85439	C230-0.219-F2-S.0-Z2	7/32	1/4	7/16	2	2	TIALN	CYLINDRICAL
N85273	C230-0.219-F3-S.0-Z2	7/32	1/4	5/8	2-1/2	2	UNCOATED	CYLINDRICAL
N85349	C230-0.219-F3-S.0-Z2	7/32	1/4	5/8	2-1/2	2	TIALN	CYLINDRICAL
N85274	C230-0.234-F3-S.0-Z2	15/64	1/4	3/4	2-1/2	2	UNCOATED	CYLINDRICAL
N85350	C230-0.234-F3-S.0-Z2	15/64	1/4	3/4	2-1/2	2	TIALN	CYLINDRICAL
N85414	C230-0.250-D2-S.0-Z2	1/4	1/4	1/2	2	2	UNCOATED	CYLINDRICAL
N85440	C230-0.250-D2-S.0-Z2	1/4	1/4	1/2	2	2	TIALN	CYLINDRICAL
N85275	C230-0.250-D3-S.0-Z2	1/4	1/4	3/4	2-1/2	2	UNCOATED	CYLINDRICAL
N85351	C230-0.250-D3-S.0-Z2	1/4	1/4	3/4	2-1/2	2	TIALN	CYLINDRICAL
N55342	C230-0.250-D4-S.0-Z2	1/4	1/4	1	3	2	UNCOATED	CYLINDRICAL
N55438	C230-0.250-D4-S.0-Z2	1/4	1/4	1	3	2	TIALN	CYLINDRICAL
N55343	C230-0.250-D5-S.0-Z2	1/4	1/4	1	4	2	UNCOATED	CYLINDRICAL
N55439	C230-0.250-D5-S.0-Z2	1/4	1/4	1	4	2	TIALN	CYLINDRICAL
N85450	C230-0.250-D6-S.0-Z2	1/4	1/4	1-1/8	3	2	UNCOATED	CYLINDRICAL
N85486	C230-0.250-D6-S.0-Z2	1/4	1/4	1-1/8	3	2	TIALN	CYLINDRICAL
N85451	C230-0.250-D7-S.0-Z2	1/4	1/4	1-1/2	4	2	UNCOATED	CYLINDRICAL
N85487	C230-0.250-D7-S.0-Z2	1/4	1/4	1-1/2	4	2	TIALN	CYLINDRICAL
N55344	C230-0.250-D8-S.0-Z2	1/4	1/4	1-1/2	6	2	UNCOATED	CYLINDRICAL
N55440	C230-0.250-D8-S.0-Z2	1/4	1/4	1-1/2	6	2	TIALN	CYLINDRICAL
N85276	C230-0.266-F3-S.0-Z2	17/64	5/16	3/4	2-1/2	2	UNCOATED	CYLINDRICAL
N85352	C230-0.266-F3-S.0-Z2	17/64	5/16	3/4	2-1/2	2	TIALN	CYLINDRICAL
N85277	C230-0.281-F3-S.0-Z2	9/32	5/16	3/4	2-1/2	2	UNCOATED	CYLINDRICAL
N85353	C230-0.281-F3-S.0-Z2	9/32	5/16	3/4	2-1/2	2	TIALN	CYLINDRICAL
N85415	C230-0.313-D2-S.0-Z2	5/16	5/16	1/2	2	2	UNCOATED	CYLINDRICAL

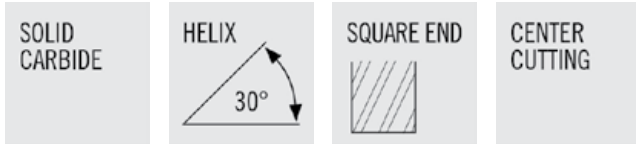
## C230 (CONT'D)



- General Purpose
- General machining of most material types
- Cutting Data - Page 192-193
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85441	C230-0.313-D2-S.0-Z2	5/16	5/16	1/2	2	2	TIALN	CYLINDRICAL
N85279	C230-0.313-D3-S.0-Z2	5/16	5/16	13/16	2-1/2	2	UNCOATED	CYLINDRICAL
N85355	C230-0.313-D3-S.0-Z2	5/16	5/16	13/16	2-1/2	2	TIALN	CYLINDRICAL
N55345	C230-0.313-D4-S.0-Z2	5/16	5/16	1	3	2	UNCOATED	CYLINDRICAL
N55441	C230-0.313-D4-S.0-Z2	5/16	5/16	1	3	2	TIALN	CYLINDRICAL
N55346	C230-0.313-D5-S.0-Z2	5/16	5/16	1	4	2	UNCOATED	CYLINDRICAL
N55442	C230-0.313-D5-S.0-Z2	5/16	5/16	1	4	2	TIALN	CYLINDRICAL
N85280	C230-0.328-F3-S.0-Z2	21/64	3/8	1	2-1/2	2	UNCOATED	CYLINDRICAL
N85356	C230-0.328-F3-S.0-Z2	21/64	3/8	1	2-1/2	2	TIALN	CYLINDRICAL
N85281	C230-0.344-F3-S.0-Z2	11/32	3/8	1	2-1/2	2	UNCOATED	CYLINDRICAL
N85357	C230-0.344-F3-S.0-Z2	11/32	3/8	1	2-1/2	2	TIALN	CYLINDRICAL
N85416	C230-0.375-D1-S.0-Z2	3/8	3/8	5/8	2	2	UNCOATED	CYLINDRICAL
N85442	C230-0.375-D1-S.0-Z2	3/8	3/8	5/8	2	2	TIALN	CYLINDRICAL
N85283	C230-0.375-D2-S.0-Z2	3/8	3/8	1	2-1/2	2	UNCOATED	CYLINDRICAL
N85359	C230-0.375-D2-S.0-Z2	3/8	3/8	1	2-1/2	2	TIALN	CYLINDRICAL
N55348	C230-0.375-D3-S.0-Z2	3/8	3/8	1	3	2	UNCOATED	CYLINDRICAL
N55444	C230-0.375-D3-S.0-Z2	3/8	3/8	1	3	2	TIALN	CYLINDRICAL
N55349	C230-0.375-D4-S.0-Z2	3/8	3/8	1	4	2	UNCOATED	CYLINDRICAL
N55445	C230-0.375-D4-S.0-Z2	3/8	3/8	1	4	2	TIALN	CYLINDRICAL
N85454	C230-0.375-D5-S.0-Z2	3/8	3/8	1-1/8	3	2	UNCOATED	CYLINDRICAL
N85490	C230-0.375-D5-S.0-Z2	3/8	3/8	1-1/8	3	2	TIALN	CYLINDRICAL
N55350	C230-0.375-D6-S.0-Z2	3/8	3/8	1-1/2	6	2	UNCOATED	CYLINDRICAL
N55446	C230-0.375-D6-S.0-Z2	3/8	3/8	1-1/2	6	2	TIALN	CYLINDRICAL
N85455	C230-0.375-D7-S.0-Z2	3/8	3/8	1-3/4	4	2	UNCOATED	CYLINDRICAL
N85491	C230-0.375-D7-S.0-Z2	3/8	3/8	1-3/4	4	2	TIALN	CYLINDRICAL
N55351	C230-0.375-D8-S.0-Z2	3/8	3/8	2	4	2	UNCOATED	CYLINDRICAL
N55447	C230-0.375-D8-S.0-Z2	3/8	3/8	2	4	2	TIALN	CYLINDRICAL
N55352	C230-0.375-D9-S.0-Z2	3/8	3/8	3	6	2	UNCOATED	CYLINDRICAL
N55448	C230-0.375-D9-S.0-Z2	3/8	3/8	3	6	2	TIALN	CYLINDRICAL
N85287	C230-0.438-D2-S.0-Z2	7/16	7/16	1	2-3/4	2	UNCOATED	CYLINDRICAL
N85363	C230-0.438-D2-S.0-Z2	7/16	7/16	1	2-3/4	2	TIALN	CYLINDRICAL
N55355	C230-0.438-D5-S.0-Z2	7/16	7/16	2	4	2	UNCOATED	CYLINDRICAL
N55451	C230-0.438-D5-S.0-Z2	7/16	7/16	2	4	2	TIALN	CYLINDRICAL
N85418	C230-0.500-D1-S.0-Z2	1/2	1/2	5/8	2-1/2	2	UNCOATED	CYLINDRICAL
N85444	C230-0.500-D1-S.0-Z2	1/2	1/2	5/8	2-1/2	2	TIALN	CYLINDRICAL
N85291	C230-0.500-D2-S.0-Z2	1/2	1/2	1	3	2	UNCOATED	CYLINDRICAL
N85367	C230-0.500-D2-S.0-Z2	1/2	1/2	1	3	2	TIALN	CYLINDRICAL
N55356	C230-0.500-D3-S.0-Z2	1/2	1/2	1	4	2	UNCOATED	CYLINDRICAL

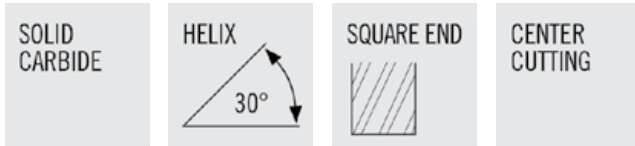
## C230 (CONT'D)



- General Purpose
- General machining of most material types
- Cutting Data - Page 192-193
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N55452	C230-0.500-D3-S.0-Z2	1/2	1/2	1	4	2	TIALN	CYLINDRICAL
N55357	C230-0.500-D4-S.0-Z2	1/2	1/2	1-1/2	6	2	UNCOATED	CYLINDRICAL
N55453	C230-0.500-D4-S.0-Z2	1/2	1/2	1-1/2	6	2	TIALN	CYLINDRICAL
N55358	C230-0.500-D5-S.0-Z2	1/2	1/2	2	4	2	UNCOATED	CYLINDRICAL
N55454	C230-0.500-D5-S.0-Z2	1/2	1/2	2	4	2	TIALN	CYLINDRICAL
N85458	C230-0.500-D6-S.0-Z2	1/2	1/2	2	4-1/2	2	UNCOATED	CYLINDRICAL
N85494	C230-0.500-D6-S.0-Z2	1/2	1/2	2	4-1/2	2	TIALN	CYLINDRICAL
N85459	C230-0.500-D7-S.0-Z2	1/2	1/2	3	6	2	UNCOATED	CYLINDRICAL
N85495	C230-0.500-D7-S.0-Z2	1/2	1/2	3	6	2	TIALN	CYLINDRICAL
N85292	C230-0.563-D2-S.0-Z2	9/16	9/16	1-1/8	3-1/2	2	UNCOATED	CYLINDRICAL
N85368	C230-0.563-D2-S.0-Z2	9/16	9/16	1-1/8	3-1/2	2	TIALN	CYLINDRICAL
N55360	C230-0.563-D5-S.0-Z2	9/16	9/16	3	6	2	UNCOATED	CYLINDRICAL
N55456	C230-0.563-D5-S.0-Z2	9/16	9/16	3	6	2	TIALN	CYLINDRICAL
N85293	C230-0.625-D2-S.0-Z2	5/8	5/8	1-1/4	3-1/2	2	UNCOATED	CYLINDRICAL
N85369	C230-0.625-D2-S.0-Z2	5/8	5/8	1-1/4	3-1/2	2	TIALN	CYLINDRICAL
N85460	C230-0.625-D4-S.0-Z2	5/8	5/8	2-1/4	5	2	UNCOATED	CYLINDRICAL
N85496	C230-0.625-D4-S.0-Z2	5/8	5/8	2-1/4	5	2	TIALN	CYLINDRICAL
N85461	C230-0.625-D5-S.0-Z2	5/8	5/8	3	6	2	UNCOATED	CYLINDRICAL
N85497	C230-0.625-D5-S.0-Z2	5/8	5/8	3	6	2	TIALN	CYLINDRICAL
N85294	C230-0.688-F2-S.0-Z2	11/16	3/4	1-3/8	4	2	UNCOATED	CYLINDRICAL
N85370	C230-0.688-F2-S.0-Z2	11/16	3/4	1-3/8	4	2	TIALN	CYLINDRICAL
N85420	C230-0.750-D1-S.0-Z2	3/4	3/4	1	3	2	UNCOATED	CYLINDRICAL
N85446	C230-0.750-D1-S.0-Z2	3/4	3/4	1	3	2	TIALN	CYLINDRICAL
N85295	C230-0.750-D2-S.0-Z2	3/4	3/4	1-1/2	4	2	UNCOATED	CYLINDRICAL
N85371	C230-0.750-D2-S.0-Z2	3/4	3/4	1-1/2	4	2	TIALN	CYLINDRICAL
N55362	C230-0.750-D3-S.0-Z2	3/4	3/4	2	6	2	UNCOATED	CYLINDRICAL
N55458	C230-0.750-D3-S.0-Z2	3/4	3/4	2	6	2	TIALN	CYLINDRICAL
N85462	C230-0.750-D4-S.0-Z2	3/4	3/4	2-1/4	5	2	UNCOATED	CYLINDRICAL
N85498	C230-0.750-D4-S.0-Z2	3/4	3/4	2-1/4	5	2	TIALN	CYLINDRICAL
N85463	C230-0.750-D5-S.0-Z2	3/4	3/4	3	6	2	UNCOATED	CYLINDRICAL
N85499	C230-0.750-D5-S.0-Z2	3/4	3/4	3	6	2	TIALN	CYLINDRICAL
N85296	C230-0.875-D2-S.0-Z2	7/8	7/8	1-1/2	4	2	UNCOATED	CYLINDRICAL
N85372	C230-0.875-D2-S.0-Z2	7/8	7/8	1-1/2	4	2	TIALN	CYLINDRICAL
N85297	C230-1.000-D2-S.0-Z2	1	1	1-1/2	4	2	UNCOATED	CYLINDRICAL
N85373	C230-1.000-D2-S.0-Z2	1	1	1-1/2	4	2	TIALN	CYLINDRICAL
N85465	C230-1.000-D5-S.0-Z2	1	1	3	6	2	UNCOATED	CYLINDRICAL
N85501	C230-1.000-D5-S.0-Z2	1	1	3	6	2	TIALN	CYLINDRICAL
N55365	C230-1.000-D6-S.0-Z2	1	1	4	7	2	UNCOATED	CYLINDRICAL
N55461	C230-1.000-D6-S.0-Z2	1	1	4	7	2	TIALN	CYLINDRICAL

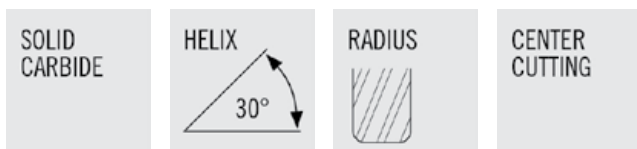
## METRIC C230M



- General Purpose
- General machining of most material types
- Cutting Data - Page 196-197
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N46328	C230M-010-F4-S.0-Z2	1MM	3MM	4MM	39MM	2	ALTIN
N46332	C230M-020-F3-S.0-Z2	2MM	3MM	6.3MM	39MM	2	ALTIN
N46336	C230M-030-D4-S.0-Z2	3MM	3MM	12MM	39MM	2	ALTIN
N46340	C230M-040-D4-S.0-Z2	4MM	4MM	14MM	51MM	2	ALTIN
N46342	C230M-045-F4-S.0-Z2	4.5MM	6MM	16MM	51MM	2	ALTIN
N46346	C230M-060-D3-S.0-Z2	6MM	6MM	19MM	51MM	2	ALTIN
N46350	C230M-080-D2-S.0-Z2	8MM	8MM	20MM	64MM	2	ALTIN
N46354	C230M-100-D2-S.0-Z2	10MM	10MM	22MM	73MM	2	ALTIN
N46358	C230M-120-D2-S.0-Z2	12MM	12MM	25MM	74MM	2	ALTIN
N46360	C230M-140-F2-S.0-Z2	14MM	14MM	32MM	84MM	2	ALTIN
N46362	C230M-160-D2-S.0-Z2	16MM	16MM	32MM	93MM	2	ALTIN
N46364	C230M-180-D2-S.0-Z2	18MM	18MM	38MM	100MM	2	ALTIN
N46366	C230M-200-D2-S.0-Z2	20MM	20MM	38MM	100MM	2	ALTIN

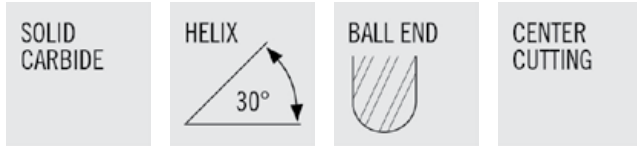
## C230R



- General Purpose
- General machining of most material types
- Cutting Data - Page 192-193
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N91165	C230R-0.125-D4-R015.0-Z2	1/8	1/8	1/2	1-1/2	2	TIALN	0.015	CYLINDRICAL
N91168	C230R-0.188-D3-R015.0-Z2	3/16	3/16	5/8	2	2	TIALN	0.015	CYLINDRICAL
N91170	C230R-0.250-D3-R015.0-Z2	1/4	1/4	3/4	2-1/2	2	TIALN	0.015	CYLINDRICAL
N91173	C230R-0.250-D3-R030.0-Z2	1/4	1/4	3/4	2-1/2	2	TIALN	0.030	CYLINDRICAL
N91321	C230R-0.375-D3-R015.0-Z2	3/8	3/8	1	2-1/2	2	TIALN	0.015	CYLINDRICAL
N91323	C230R-0.375-D3-R030.0-Z2	3/8	3/8	1	2-1/2	2	TIALN	0.030	CYLINDRICAL
N91327	C230R-0.438-D2-R015.0-Z2	7/16	7/16	1	2-3/4	2	TIALN	0.015	CYLINDRICAL
N91330	C230R-0.438-D2-R030.0-Z2	7/16	7/16	1	2-3/4	2	TIALN	0.030	CYLINDRICAL
N91332	C230R-0.438-D2-R060.0-Z2	7/16	7/16	1	2-3/4	2	TIALN	0.060	CYLINDRICAL
N91333	C230R-0.438-D2-R090.0-Z2	7/16	7/16	1	2-3/4	2	TIALN	0.090	CYLINDRICAL
N91334	C230R-0.438-D2-R125.0-Z2	7/16	7/16	1	2-3/4	2	TIALN	0.125	CYLINDRICAL
N91335	C230R-0.500-D2-R015.0-Z2	1/2	1/2	1	3	2	TIALN	0.015	CYLINDRICAL
N91337	C230R-0.500-D2-R030.0-Z2	1/2	1/2	1	3	2	TIALN	0.030	CYLINDRICAL
N91339	C230R-0.500-D2-R060.0-Z2	1/2	1/2	1	3	2	TIALN	0.060	CYLINDRICAL
N91341	C230R-0.500-D2-R090.0-Z2	1/2	1/2	1	3	2	TIALN	0.090	CYLINDRICAL
N91342	C230R-0.500-D2-R125.0-Z2	1/2	1/2	1	3	2	TIALN	0.125	CYLINDRICAL
N91343	C230R-0.625-D2-R015.0-Z2	5/8	5/8	1-1/4	3-1/2	2	TIALN	0.015	CYLINDRICAL
N91345	C230R-0.625-D2-R030.0-Z2	5/8	5/8	1-1/4	3-1/2	2	TIALN	0.030	CYLINDRICAL
N91347	C230R-0.625-D2-R060.0-Z2	5/8	5/8	1-1/4	3-1/2	2	TIALN	0.060	CYLINDRICAL
N91348	C230R-0.625-D2-R090.0-Z2	5/8	5/8	1-1/4	3-1/2	2	TIALN	0.090	CYLINDRICAL
N91349	C230R-0.625-D2-R125.0-Z2	5/8	5/8	1-1/4	3-1/2	2	TIALN	0.125	CYLINDRICAL
N91132	C230R-0.750-D2-R015.0-Z2	3/4	3/4	1-1/2	4	2	TIALN	0.015	CYLINDRICAL
N91352	C230R-0.750-D2-R030.0-Z2	3/4	3/4	1-1/2	4	2	TIALN	0.030	CYLINDRICAL
N91159	C230R-0.750-D2-R060.0-Z2	3/4	3/4	1-1/2	4	2	TIALN	0.060	CYLINDRICAL
N91356	C230R-0.750-D2-R090.0-Z2	3/4	3/4	1-1/2	4	2	TIALN	0.090	CYLINDRICAL
N91358	C230R-0.750-D2-R125.0-Z2	3/4	3/4	1-1/2	4	2	TIALN	0.125	CYLINDRICAL
N91362	C230R-0.750-D2-R190.0-Z2	3/4	3/4	1-1/2	4	2	TIALN	0.190	CYLINDRICAL
N91363	C230R-1.000-D2-R015.0-Z2	1	1	1-1/2	4	2	TIALN	0.015	CYLINDRICAL
N91365	C230R-1.000-D2-R030.0-Z2	1	1	1-1/2	4	2	TIALN	0.030	CYLINDRICAL
N91367	C230R-1.000-D2-R060.0-Z2	1	1	1-1/2	4	2	TIALN	0.060	CYLINDRICAL
N91368	C230R-1.000-D2-R090.0-Z2	1	1	1-1/2	4	2	TIALN	0.090	CYLINDRICAL
N91369	C230R-1.000-D2-R125.0-Z2	1	1	1-1/2	4	2	TIALN	0.125	CYLINDRICAL
N91371	C230R-1.000-D2-R190.0-Z2	1	1	1-1/2	4	2	TIALN	0.190	CYLINDRICAL

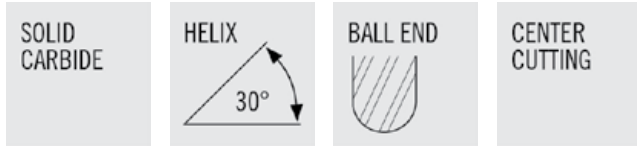
## CB230



- General Purpose
- General machining of most material types
- Cutting Data - Page 194-195
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N86149	CB230-0.016-F2-B.0-Z2	1/64	1/8	1/32	1-1/2	2	UNCOATED	CYLINDRICAL
N86225	CB230-0.016-F2-B.0-Z2	1/64	1/8	1/32	1-1/2	2	TIALN	CYLINDRICAL
N86150	CB230-0.031-F3-B.0-Z2	1/32	1/8	5/64	1-1/2	2	UNCOATED	CYLINDRICAL
N86226	CB230-0.031-F3-B.0-Z2	1/32	1/8	5/64	1-1/2	2	TIALN	CYLINDRICAL
N54020	CB230-0.031-F4-B.0-Z2	1/32	1/8	3/32	1-1/2	2	UNCOATED	CYLINDRICAL
N54032	CB230-0.031-F4-B.0-Z2	1/32	1/8	3/32	1-1/2	2	TIALN	CYLINDRICAL
N86151	CB230-0.047-F2-B.0-Z2	3/64	1/8	7/64	1-1/2	2	UNCOATED	CYLINDRICAL
N86227	CB230-0.047-F2-B.0-Z2	3/64	1/8	7/64	1-1/2	2	TIALN	CYLINDRICAL
N54021	CB230-0.047-F3-B.0-Z2	3/64	1/8	1/8	1-1/2	2	UNCOATED	CYLINDRICAL
N54033	CB230-0.047-F3-B.0-Z2	3/64	1/8	1/8	1-1/2	2	TIALN	CYLINDRICAL
N55462	CB230-0.063-F2-B.0-Z2	1/16	1/8	1/8	1-1/2	2	UNCOATED	CYLINDRICAL
N55615	CB230-0.063-F2-B.0-Z2	1/16	1/8	1/8	1-1/2	2	TIALN	CYLINDRICAL
N86152	CB230-0.063-F3-B.0-Z2	1/16	1/8	3/16	1-1/2	2	UNCOATED	CYLINDRICAL
N86228	CB230-0.063-F3-B.0-Z2	1/16	1/8	3/16	1-1/2	2	TIALN	CYLINDRICAL
N54022	CB230-0.063-F4-B.0-Z2	1/16	1/8	1/4	1-1/2	2	UNCOATED	CYLINDRICAL
N54034	CB230-0.063-F4-B.0-Z2	1/16	1/8	1/4	1-1/2	2	TIALN	CYLINDRICAL
N86153	CB230-0.078-F2-B.0-Z2	5/64	1/8	3/16	1-1/2	2	UNCOATED	CYLINDRICAL
N86229	CB230-0.078-F2-B.0-Z2	5/64	1/8	3/16	1-1/2	2	TIALN	CYLINDRICAL
N54023	CB230-0.078-F3-B.0-Z2	5/64	1/8	1/4	1-1/2	2	UNCOATED	CYLINDRICAL
N54035	CB230-0.078-F3-B.0-Z2	5/64	1/8	1/4	1-1/2	2	TIALN	CYLINDRICAL
N55463	CB230-0.094-F2-B.0-Z2	3/32	1/8	3/16	1-1/2	2	UNCOATED	CYLINDRICAL
N55616	CB230-0.094-F2-B.0-Z2	3/32	1/8	3/16	1-1/2	2	TIALN	CYLINDRICAL
N86154	CB230-0.094-F3-B.0-Z2	3/32	1/8	9/32	1-1/2	2	UNCOATED	CYLINDRICAL
N86230	CB230-0.094-F3-B.0-Z2	3/32	1/8	9/32	1-1/2	2	TIALN	CYLINDRICAL
N55464	CB230-0.094-F4-B.0-Z2	3/32	1/8	3/8	1-1/2	2	UNCOATED	CYLINDRICAL
N55617	CB230-0.094-F4-B.0-Z2	3/32	1/8	3/8	1-1/2	2	TIALN	CYLINDRICAL
N55465	CB230-0.125-D2-B.0-Z2	1/8	1/8	1/4	1-1/2	2	UNCOATED	CYLINDRICAL
N55618	CB230-0.125-D2-B.0-Z2	1/8	1/8	1/4	1-1/2	2	TIALN	CYLINDRICAL
N86156	CB230-0.125-D4-B.0-Z2	1/8	1/8	1/2	1-1/2	2	UNCOATED	CYLINDRICAL
N86232	CB230-0.125-D4-B.0-Z2	1/8	1/8	1/2	1-1/2	2	TIALN	CYLINDRICAL
N55466	CB230-0.125-D5-B.0-Z2	1/8	1/8	5/8	2	2	UNCOATED	CYLINDRICAL
N55619	CB230-0.125-D5-B.0-Z2	1/8	1/8	5/8	2	2	TIALN	CYLINDRICAL
N55467	CB230-0.125-D6-B.0-Z2	1/8	1/8	3/4	3	2	UNCOATED	CYLINDRICAL
N55620	CB230-0.125-D6-B.0-Z2	1/8	1/8	3/4	3	2	TIALN	CYLINDRICAL
N55468	CB230-0.125-D8-B.0-Z2	1/8	1/8	1	3	2	UNCOATED	CYLINDRICAL
N55621	CB230-0.125-D8-B.0-Z2	1/8	1/8	1	3	2	TIALN	CYLINDRICAL
N55469	CB230-0.156-F2-B.0-Z2	5/32	3/16	5/16	2	2	UNCOATED	CYLINDRICAL
N55622	CB230-0.156-F2-B.0-Z2	5/32	3/16	5/16	2	2	TIALN	CYLINDRICAL

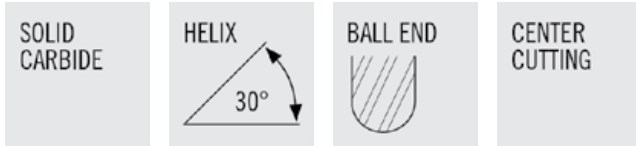
## CB230 (CONT'D)



- General Purpose
- General machining of most material types
- Cutting Data - Page 194-195
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N86158	CB230-0.156-F3-B.0-Z2	5/32	3/16	1/2	2	2	UNCOATED	CYLINDRICAL
N86234	CB230-0.156-F3-B.0-Z2	5/32	3/16	1/2	2	2	TIALN	CYLINDRICAL
N55470	CB230-0.188-D2-B.0-Z2	3/16	3/16	3/8	2	2	UNCOATED	CYLINDRICAL
N55623	CB230-0.188-D2-B.0-Z2	3/16	3/16	3/8	2	2	TIALN	CYLINDRICAL
N86160	CB230-0.188-D3-B.0-Z2	3/16	3/16	5/8	2	2	UNCOATED	CYLINDRICAL
N86236	CB230-0.188-D3-B.0-Z2	3/16	3/16	5/8	2	2	TIALN	CYLINDRICAL
N55471	CB230-0.188-D4-B.0-Z2	3/16	3/16	1	3	2	UNCOATED	CYLINDRICAL
N55624	CB230-0.188-D4-B.0-Z2	3/16	3/16	1	3	2	TIALN	CYLINDRICAL
N55472	CB230-0.188-D5-B.0-Z2	3/16	3/16	1	4	2	UNCOATED	CYLINDRICAL
N55625	CB230-0.188-D5-B.0-Z2	3/16	3/16	1	4	2	TIALN	CYLINDRICAL
N55473	CB230-0.188-D6-B.0-Z2	3/16	3/16	1-1/8	3	2	UNCOATED	CYLINDRICAL
N55626	CB230-0.188-D6-B.0-Z2	3/16	3/16	1-1/8	3	2	TIALN	CYLINDRICAL
N55475	CB230-0.250-D2-B.0-Z2	1/4	1/4	1/2	2	2	UNCOATED	CYLINDRICAL
N55628	CB230-0.250-D2-B.0-Z2	1/4	1/4	1/2	2	2	TIALN	CYLINDRICAL
N86164	CB230-0.250-D3-B.0-Z2	1/4	1/4	3/4	2-1/2	2	UNCOATED	CYLINDRICAL
N86240	CB230-0.250-D3-B.0-Z2	1/4	1/4	3/4	2-1/2	2	TIALN	CYLINDRICAL
N55476	CB230-0.250-D4-B.0-Z2	1/4	1/4	1	3	2	UNCOATED	CYLINDRICAL
N55629	CB230-0.250-D4-B.0-Z2	1/4	1/4	1	3	2	TIALN	CYLINDRICAL
N55477	CB230-0.250-D5-B.0-Z2	1/4	1/4	1	4	2	UNCOATED	CYLINDRICAL
N55630	CB230-0.250-D5-B.0-Z2	1/4	1/4	1	4	2	TIALN	CYLINDRICAL
N55478	CB230-0.250-D6-B.0-Z2	1/4	1/4	1-1/2	4	2	UNCOATED	CYLINDRICAL
N55631	CB230-0.250-D6-B.0-Z2	1/4	1/4	1-1/2	4	2	TIALN	CYLINDRICAL
N55479	CB230-0.250-D7-B.0-Z2	1/4	1/4	1-1/2	6	2	UNCOATED	CYLINDRICAL
N55632	CB230-0.250-D7-B.0-Z2	1/4	1/4	1-1/2	6	2	TIALN	CYLINDRICAL
N86166	CB230-0.281-F3-B.0-Z2	9/32	5/16	3/4	2-1/2	2	UNCOATED	CYLINDRICAL
N86242	CB230-0.281-F3-B.0-Z2	9/32	5/16	3/4	2-1/2	2	TIALN	CYLINDRICAL
N86168	CB230-0.313-D3-B.0-Z2	5/16	5/16	13/16	2-1/2	2	UNCOATED	CYLINDRICAL
N86244	CB230-0.313-D3-B.0-Z2	5/16	5/16	13/16	2-1/2	2	TIALN	CYLINDRICAL
N55482	CB230-0.313-D5-B.0-Z2	5/16	5/16	1	4	2	UNCOATED	CYLINDRICAL
N55635	CB230-0.313-D5-B.0-Z2	5/16	5/16	1	4	2	TIALN	CYLINDRICAL
N55484	CB230-0.313-D7-B.0-Z2	5/16	5/16	1-5/8	4	2	UNCOATED	CYLINDRICAL
N55637	CB230-0.313-D7-B.0-Z2	5/16	5/16	1-5/8	4	2	TIALN	CYLINDRICAL
N55485	CB230-0.375-D2-B.0-Z2	3/8	3/8	5/8	2	2	UNCOATED	CYLINDRICAL
N55638	CB230-0.375-D2-B.0-Z2	3/8	3/8	5/8	2	2	TIALN	CYLINDRICAL
N86172	CB230-0.375-D3-B.0-Z2	3/8	3/8	1	2-1/2	2	UNCOATED	CYLINDRICAL
N86248	CB230-0.375-D3-B.0-Z2	3/8	3/8	1	2-1/2	2	TIALN	CYLINDRICAL
N55486	CB230-0.375-D4-B.0-Z2	3/8	3/8	1	3	2	UNCOATED	CYLINDRICAL
N55639	CB230-0.375-D4-B.0-Z2	3/8	3/8	1	3	2	TIALN	CYLINDRICAL
N55487	CB230-0.375-D5-B.0-Z2	3/8	3/8	1	4	2	UNCOATED	CYLINDRICAL

## CB230 (CONT'D)

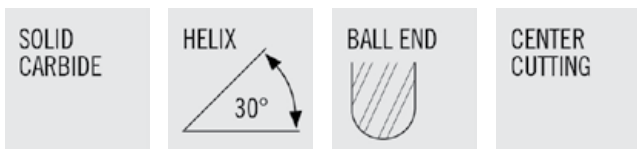


- General Purpose
- General machining of most material types
- Cutting Data - Page 194-195
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N55640	CB230-0.375-D5-B.0-Z2	3/8	3/8	1	4	2	TIALN	CYLINDRICAL
N55488	CB230-0.375-D6-B.0-Z2	3/8	3/8	1-1/2	6	2	UNCOATED	CYLINDRICAL
N55641	CB230-0.375-D6-B.0-Z2	3/8	3/8	1-1/2	6	2	TIALN	CYLINDRICAL
N55489	CB230-0.375-D7-B.0-Z2	3/8	3/8	2	4	2	UNCOATED	CYLINDRICAL
N55642	CB230-0.375-D7-B.0-Z2	3/8	3/8	2	4	2	TIALN	CYLINDRICAL
N55492	CB230-0.438-D3-B.0-Z2	7/16	7/16	1	4	2	UNCOATED	CYLINDRICAL
N55645	CB230-0.438-D3-B.0-Z2	7/16	7/16	1	4	2	TIALN	CYLINDRICAL
N55496	CB230-0.500-D1-B.0-Z2	1/2	1/2	5/8	2-1/2	2	UNCOATED	CYLINDRICAL
N55649	CB230-0.500-D1-B.0-Z2	1/2	1/2	5/8	2-1/2	2	TIALN	CYLINDRICAL
N86180	CB230-0.500-D2-B.0-Z2	1/2	1/2	1	3	2	UNCOATED	CYLINDRICAL
N86256	CB230-0.500-D2-B.0-Z2	1/2	1/2	1	3	2	TIALN	CYLINDRICAL
N55497	CB230-0.500-D3-B.0-Z2	1/2	1/2	1	4	2	UNCOATED	CYLINDRICAL
N55650	CB230-0.500-D3-B.0-Z2	1/2	1/2	1	4	2	TIALN	CYLINDRICAL
N55498	CB230-0.500-D4-B.0-Z2	1/2	1/2	1-1/2	6	2	UNCOATED	CYLINDRICAL
N55651	CB230-0.500-D4-B.0-Z2	1/2	1/2	1-1/2	6	2	TIALN	CYLINDRICAL
N55499	CB230-0.500-D5-B.0-Z2	1/2	1/2	2	4	2	UNCOATED	CYLINDRICAL
N55652	CB230-0.500-D5-B.0-Z2	1/2	1/2	2	4	2	TIALN	CYLINDRICAL
N55500	CB230-0.500-D6-B.0-Z2	1/2	1/2	3	6	2	UNCOATED	CYLINDRICAL
N55653	CB230-0.500-D6-B.0-Z2	1/2	1/2	3	6	2	TIALN	CYLINDRICAL
N55501	CB230-0.563-D4-B.0-Z2	9/16	9/16	2	6	2	UNCOATED	CYLINDRICAL
N55654	CB230-0.563-D4-B.0-Z2	9/16	9/16	2	6	2	TIALN	CYLINDRICAL
N86182	CB230-0.625-D2-B.0-Z2	5/8	5/8	1-1/4	3-1/2	2	UNCOATED	CYLINDRICAL
N86258	CB230-0.625-D2-B.0-Z2	5/8	5/8	1-1/4	3-1/2	2	TIALN	CYLINDRICAL
N55506	CB230-0.750-D1-B.0-Z2	3/4	3/4	1	3	2	UNCOATED	CYLINDRICAL
N55659	CB230-0.750-D1-B.0-Z2	3/4	3/4	1	3	2	TIALN	CYLINDRICAL
N86184	CB230-0.750-D2-B.0-Z2	3/4	3/4	1-1/2	4	2	UNCOATED	CYLINDRICAL
N86260	CB230-0.750-D2-B.0-Z2	3/4	3/4	1-1/2	4	2	TIALN	CYLINDRICAL
N55507	CB230-0.750-D3-B.0-Z2	3/4	3/4	2	6	2	UNCOATED	CYLINDRICAL
N55660	CB230-0.750-D3-B.0-Z2	3/4	3/4	2	6	2	TIALN	CYLINDRICAL
N55508	CB230-0.750-D4-B.0-Z2	3/4	3/4	3	6	2	UNCOATED	CYLINDRICAL
N55661	CB230-0.750-D4-B.0-Z2	3/4	3/4	3	6	2	TIALN	CYLINDRICAL
N86185	CB230-0.875-D2-B.0-Z2	7/8	7/8	1-1/2	4	2	UNCOATED	CYLINDRICAL
N86261	CB230-0.875-D2-B.0-Z2	7/8	7/8	1-1/2	4	2	TIALN	CYLINDRICAL
N86186	CB230-1.000-D1-B.0-Z2	1	1	1-1/2	4	2	UNCOATED	CYLINDRICAL
N86262	CB230-1.000-D1-B.0-Z2	1	1	1-1/2	4	2	TIALN	CYLINDRICAL
N55510	CB230-1.000-D2-B.0-Z2	1	1	2	6	2	UNCOATED	CYLINDRICAL
N55663	CB230-1.000-D2-B.0-Z2	1	1	2	6	2	TIALN	CYLINDRICAL
N55512	CB230-1.000-D4-B.0-Z2	1	1	4	7	2	UNCOATED	CYLINDRICAL
N55665	CB230-1.000-D4-B.0-Z2	1	1	4	7	2	TIALN	CYLINDRICAL



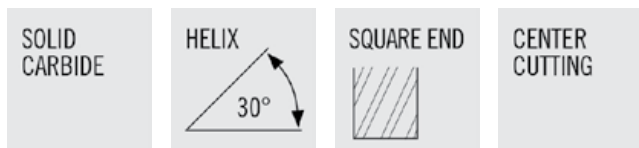
## METRIC CB230M



- General Purpose
- General machining of most material types
- Cutting Data - Page 198-199
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N46370	CB230M-010-F4-B.0-Z2	1MM	3MM	4MM	39MM	2	ALTIN	CYLINDRICAL
N46374	CB230M-020-F3-B.0-Z2	2MM	3MM	6.3MM	39MM	2	ALTIN	CYLINDRICAL
N46378	CB230M-030-D4-B.0-Z2	3MM	3MM	12MM	39MM	2	ALTIN	CYLINDRICAL
N46382	CB230M-040-D4-B.0-Z2	4MM	4MM	14MM	51MM	2	ALTIN	CYLINDRICAL
N46386	CB230M-050-F3-B.0-Z2	5MM	6MM	16MM	51MM	2	ALTIN	CYLINDRICAL
N46388	CB230M-060-D3-B.0-Z2	6MM	6MM	19MM	51MM	2	ALTIN	CYLINDRICAL
N46392	CB230M-080-D2-B.0-Z2	8MM	8MM	20MM	64MM	2	ALTIN	CYLINDRICAL

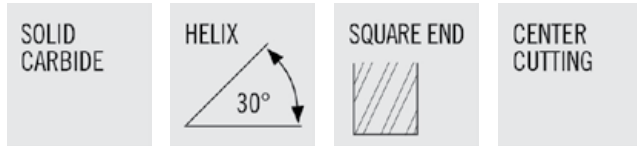
## CD230



- General Purpose
- General machining of most material types
- Cutting Data - Page 192-193
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85375	CD230-0.125-XF3-S.3-Z2	1/8	3/8	3/8	3-1/16	2	UNCOATED	WELDON
N85397	CD230-0.125-XF3-S.3-Z2	1/8	3/8	3/8	3-1/16	2	TIALN	WELDON
N85377	CD230-0.188-XF3-S.3-Z2	3/16	3/8	1/2	3-1/4	2	UNCOATED	WELDON
N85399	CD230-0.188-XF3-S.3-Z2	3/16	3/8	1/2	3-1/4	2	TIALN	WELDON
N85379	CD230-0.250-XF3-S.3-Z2	1/4	3/8	5/8	3-3/8	2	UNCOATED	WELDON
N85401	CD230-0.250-XF3-S.3-Z2	1/4	3/8	5/8	3-3/8	2	TIALN	WELDON
N85381	CD230-0.313-XF2-S.3-Z2	5/16	3/8	3/4	3-1/2	2	UNCOATED	WELDON
N85403	CD230-0.313-XF2-S.3-Z2	5/16	3/8	3/4	3-1/2	2	TIALN	WELDON
N85383	CD230-0.375-XD2-S.3-Z2	3/8	3/8	3/4	3-1/2	2	UNCOATED	WELDON
N85405	CD230-0.375-XD2-S.3-Z2	3/8	3/8	3/4	3-1/2	2	TIALN	WELDON
N85385	CD230-0.500-XD2-S.3-Z2	1/2	1/2	1	4	2	UNCOATED	WELDON
N85407	CD230-0.500-XD2-S.3-Z2	1/2	1/2	1	4	2	TIALN	WELDON

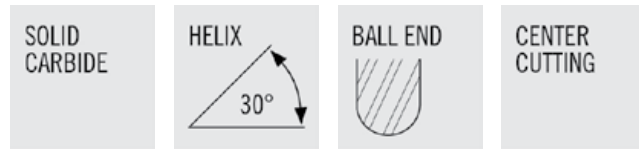
## CSD230



- General Purpose
- Stub Length
- General Machining for most material types
- Cutting Data - Page 192-193
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N89650	CSD230-0.031-XF2-S.0-Z2	1/32	1/8	1/16	1-1/2	2	UNCOATED	CYLINDRICAL
N89653	CSD230-0.031-XF2-S.0-Z2	1/32	1/8	1/16	1-1/2	2	TIALN	CYLINDRICAL
N89654	CSD230-0.047-XF2-S.0-Z2	3/64	1/8	3/32	1-1/2	2	UNCOATED	CYLINDRICAL
N89657	CSD230-0.047-XF2-S.0-Z2	3/64	1/8	3/32	1-1/2	2	TIALN	CYLINDRICAL
N89658	CSD230-0.063-XF2-S.0-Z2	1/16	1/8	1/8	1-1/2	2	UNCOATED	CYLINDRICAL
N89661	CSD230-0.063-XF2-S.0-Z2	1/16	1/8	1/8	1-1/2	2	TIALN	CYLINDRICAL
N89662	CSD230-0.078-XF2-S.0-Z2	5/64	1/8	1/8	1-1/2	2	UNCOATED	CYLINDRICAL
N89665	CSD230-0.078-XF2-S.0-Z2	5/64	1/8	1/8	1-1/2	2	TIALN	CYLINDRICAL
N89666	CSD230-0.094-XF2-S.0-Z2	3/32	1/8	3/16	1-1/2	2	UNCOATED	CYLINDRICAL
N89669	CSD230-0.094-XF2-S.0-Z2	3/32	1/8	3/16	1-1/2	2	TIALN	CYLINDRICAL
N89674	CSD230-0.125-XD2-S.0-Z2	1/8	1/8	1/4	1-1/2	2	UNCOATED	CYLINDRICAL
N89677	CSD230-0.125-XD2-S.0-Z2	1/8	1/8	1/4	1-1/2	2	TIALN	CYLINDRICAL
N89682	CSD230-0.156-XF2-S.0-Z2	5/32	3/16	5/16	2	2	UNCOATED	CYLINDRICAL
N89685	CSD230-0.156-XF2-S.0-Z2	5/32	3/16	5/16	2	2	TIALN	CYLINDRICAL
N89690	CSD230-0.188-XD2-S.0-Z2	3/16	3/16	3/8	2	2	UNCOATED	CYLINDRICAL
N89693	CSD230-0.188-XD2-S.0-Z2	3/16	3/16	3/8	2	2	TIALN	CYLINDRICAL
N89698	CSD230-0.219-XF2-S.0-Z2	7/32	1/4	1/2	2-1/2	2	UNCOATED	CYLINDRICAL
N89701	CSD230-0.219-XF2-S.0-Z2	7/32	1/4	1/2	2-1/2	2	TIALN	CYLINDRICAL
N89706	CSD230-0.250-XD2-S.0-Z2	1/4	1/4	1/2	2-1/2	2	UNCOATED	CYLINDRICAL
N89709	CSD230-0.250-XD2-S.0-Z2	1/4	1/4	1/2	2-1/2	2	TIALN	CYLINDRICAL
N89714	CSD230-0.313-XD2-S.0-Z2	5/16	5/16	1/2	2-1/2	2	UNCOATED	CYLINDRICAL
N89717	CSD230-0.313-XD2-S.0-Z2	5/16	5/16	1/2	2-1/2	2	TIALN	CYLINDRICAL
N89722	CSD230-0.375-XD2-S.0-Z2	3/8	3/8	9/16	2-1/2	2	UNCOATED	CYLINDRICAL
N89725	CSD230-0.375-XD2-S.0-Z2	3/8	3/8	9/16	2-1/2	2	TIALN	CYLINDRICAL
N89730	CSD230-0.500-XD1-S.0-Z2	1/2	1/2	5/8	3	2	UNCOATED	CYLINDRICAL
N89733	CSD230-0.500-XD1-S.0-Z2	1/2	1/2	5/8	3	2	TIALN	CYLINDRICAL

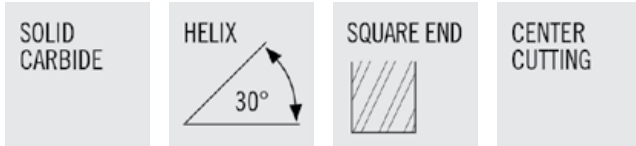
## CSDB230



- General Purpose Stub Length
- General machining of most material types
- Cutting Data - Page 194-195
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N89734	CSDB230-0.031-XF2-B.0-Z2	1/32	1/8	1/16	1-1/2	2	UNCOATED	CYLINDRICAL
N89737	CSDB230-0.031-XF2-B.0-Z2	1/32	1/8	1/16	1-1/2	2	TIALN	CYLINDRICAL
N89738	CSDB230-0.047-XF2-B.0-Z2	3/64	1/8	3/32	1-1/2	2	UNCOATED	CYLINDRICAL
N89741	CSDB230-0.047-XF2-B.0-Z2	3/64	1/8	3/32	1-1/2	2	TIALN	CYLINDRICAL
N89742	CSDB230-0.063-XF2-B.0-Z2	1/16	1/8	1/8	1-1/2	2	UNCOATED	CYLINDRICAL
N89745	CSDB230-0.063-XF2-B.0-Z2	1/16	1/8	1/8	1-1/2	2	TIALN	CYLINDRICAL
N89746	CSDB230-0.078-XF2-B.0-Z2	5/64	1/8	1/8	1-1/2	2	UNCOATED	CYLINDRICAL
N89749	CSDB230-0.078-XF2-B.0-Z2	5/64	1/8	1/8	1-1/2	2	TIALN	CYLINDRICAL
N89750	CSDB230-0.094-XF2-B.0-Z2	3/32	1/8	3/16	1-1/2	2	UNCOATED	CYLINDRICAL
N89753	CSDB230-0.094-XF2-B.0-Z2	3/32	1/8	3/16	1-1/2	2	TIALN	CYLINDRICAL
N89758	CSDB230-0.125-XD2-B.0-Z2	1/8	1/8	1/4	1-1/2	2	UNCOATED	CYLINDRICAL
N89761	CSDB230-0.125-XD2-B.0-Z2	1/8	1/8	1/4	1-1/2	2	TIALN	CYLINDRICAL
N89762	CSDB230-0.141-XF2-B.0-Z2	9/64	3/16	5/16	2	2	UNCOATED	CYLINDRICAL
N89765	CSDB230-0.141-XF2-B.0-Z2	9/64	3/16	5/16	2	2	TIALN	CYLINDRICAL
N89774	CSDB230-0.188-XD2-B.0-Z2	3/16	3/16	3/8	2	2	UNCOATED	CYLINDRICAL
N89777	CSDB230-0.188-XD2-B.0-Z2	3/16	3/16	3/8	2	2	TIALN	CYLINDRICAL
N89790	CSDB230-0.250-XD2-B.0-Z2	1/4	1/4	1/2	2-1/2	2	UNCOATED	CYLINDRICAL
N89793	CSDB230-0.250-XD2-B.0-Z2	1/4	1/4	1/2	2-1/2	2	TIALN	CYLINDRICAL
N89798	CSDB230-0.313-XD2-B.0-Z2	5/16	5/16	1/2	2-1/2	2	UNCOATED	CYLINDRICAL
N89801	CSDB230-0.313-XD2-B.0-Z2	5/16	5/16	1/2	2-1/2	2	TIALN	CYLINDRICAL
N89806	CSDB230-0.375-XD2-B.0-Z2	3/8	3/8	9/16	2-1/2	2	UNCOATED	CYLINDRICAL
N89809	CSDB230-0.375-XD2-B.0-Z2	3/8	3/8	9/16	2-1/2	2	TIALN	CYLINDRICAL
N89814	CSDB230-0.500-XD1-B.0-Z2	1/2	1/2	5/8	3	2	UNCOATED	CYLINDRICAL
N89817	CSDB230-0.500-XD1-B.0-Z2	1/2	1/2	5/8	3	2	TIALN	CYLINDRICAL

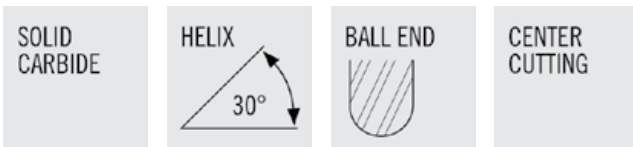
## CNC230



- General Purpose
- NC Tolerance
- General machining of most material types
- Cutting Data - Page 192-193
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85775	CNC230-0.125-D4-S.0-Z2	1/8	1/8	1/2	1-1/2	2	TIALN	CYLINDRICAL
N85777	CNC230-0.188-D3-S.0-Z2	3/16	3/16	5/8	2	2	TIALN	CYLINDRICAL
N85779	CNC230-0.250-D3-S.0-Z2	1/4	1/4	3/4	2-1/2	2	TIALN	CYLINDRICAL
N85781	CNC230-0.313-D3-S.0-Z2	5/16	5/16	13/16	2-1/2	2	TIALN	CYLINDRICAL
N85782	CNC230-0.375-D2-S.3-Z2	3/8	3/8	7/8	2-1/2	2	TIALN	WELDON
N85784	CNC230-0.500-D2-S.3-Z2	1/2	1/2	1	3	2	TIALN	WELDON
N85786	CNC230-0.625-D2-S.3-Z2	5/8	5/8	1-1/4	3-1/2	2	TIALN	WELDON
N85787	CNC230-0.750-D2-S.3-Z2	3/4	3/4	1-1/2	4	2	TIALN	WELDON

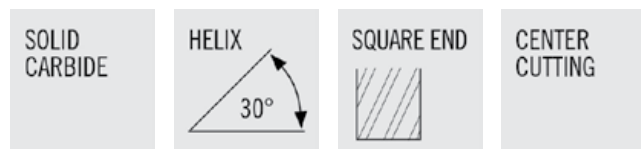
## CNCB230



- General Purpose
- NC Tolerance
- General machining of most material types
- Cutting Data - Page 194-195
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85818	CNCB230-0.125-D4-B.0-Z2	1/8	1/8	1/2	1-1/2	2	TIALN	CYLINDRICAL
N85820	CNCB230-0.188-D3-B.0-Z2	3/16	3/16	5/8	2	2	TIALN	CYLINDRICAL
N85825	CNCB230-0.375-D2-B.3-Z2	3/8	3/8	7/8	2-1/2	2	TIALN	WELDON
N85827	CNCB230-0.500-D2-B.3-Z2	1/2	1/2	1	3	2	TIALN	WELDON
N85822	CNCB230-0.250-D3-B.0-Z2	1/4	1/4	3/4	2-1/2	2	TIALN	CYLINDRICAL
N85830	CNCB230-0.750-D2-B.3-Z2	3/4	3/4	1-1/2	4	2	TIALN	WELDON

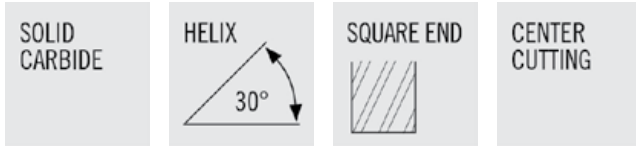
## C330



- General Purpose
- General machining (slotting/pocketing/profiling) of most material types
- Cutting Data - Page 200-201
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85920	C330-0.031-F3-S.0-Z3	1/32	1/8	5/64	1-1/2	3	UNCOATED	CYLINDRICAL
N85996	C330-0.031-F3-S.0-Z3	1/32	1/8	5/64	1-1/2	3	TIALN	CYLINDRICAL
N85921	C330-0.047-F2-S.0-Z3	3/64	1/8	7/64	1-1/2	3	UNCOATED	CYLINDRICAL
N85997	C330-0.047-F2-S.0-Z3	3/64	1/8	7/64	1-1/2	3	TIALN	CYLINDRICAL
N85922	C330-0.063-F3-S.0-Z3	1/16	1/8	3/16	1-1/2	3	UNCOATED	CYLINDRICAL
N85998	C330-0.063-F3-S.0-Z3	1/16	1/8	3/16	1-1/2	3	TIALN	CYLINDRICAL
N85923	C330-0.078-F2-S.0-Z3	5/64	1/8	3/16	1-1/2	3	UNCOATED	CYLINDRICAL
N85999	C330-0.078-F2-S.0-Z3	5/64	1/8	3/16	1-1/2	3	TIALN	CYLINDRICAL
N85924	C330-0.094-F3-S.0-Z3	3/32	1/8	9/32	1-1/2	3	UNCOATED	CYLINDRICAL
N86000	C330-0.094-F3-S.0-Z3	3/32	1/8	9/32	1-1/2	3	TIALN	CYLINDRICAL
N85925	C330-0.109-F3-S.0-Z3	7/64	1/8	3/8	1-1/2	3	UNCOATED	CYLINDRICAL
N86001	C330-0.109-F3-S.0-Z3	7/64	1/8	3/8	1-1/2	3	TIALN	CYLINDRICAL
N85926	C330-0.125-D4-S.0-Z3	1/8	1/8	1/2	1-1/2	3	UNCOATED	CYLINDRICAL
N86002	C330-0.125-D4-S.0-Z3	1/8	1/8	1/2	1-1/2	3	TIALN	CYLINDRICAL
N85928	C330-0.156-F3-S.0-Z3	5/32	3/16	1/2	2	3	UNCOATED	CYLINDRICAL
N86004	C330-0.156-F3-S.0-Z3	5/32	3/16	1/2	2	3	TIALN	CYLINDRICAL
N85930	C330-0.188-D3-S.0-Z3	3/16	3/16	5/8	2	3	UNCOATED	CYLINDRICAL
N86006	C330-0.188-D3-S.0-Z3	3/16	3/16	5/8	2	3	TIALN	CYLINDRICAL
N85931	C330-0.203-F3-S.0-Z3	13/64	1/4	5/8	2-1/2	3	UNCOATED	CYLINDRICAL
N86007	C330-0.203-F3-S.0-Z3	13/64	1/4	5/8	2-1/2	3	TIALN	CYLINDRICAL
N85932	C330-0.219-F3-S.0-Z3	7/32	1/4	5/8	2-1/2	3	UNCOATED	CYLINDRICAL
N86008	C330-0.219-F3-S.0-Z3	7/32	1/4	5/8	2-1/2	3	TIALN	CYLINDRICAL
N85933	C330-0.234-F3-S.0-Z3	15/64	1/4	3/4	2-1/2	3	UNCOATED	CYLINDRICAL
N86009	C330-0.234-F3-S.0-Z3	15/64	1/4	3/4	2-1/2	3	TIALN	CYLINDRICAL
N85934	C330-0.250-D3-S.0-Z3	1/4	1/4	3/4	2-1/2	3	UNCOATED	CYLINDRICAL
N86010	C330-0.250-D3-S.0-Z3	1/4	1/4	3/4	2-1/2	3	TIALN	CYLINDRICAL
N85938	C330-0.313-D3-S.0-Z3	5/16	5/16	13/16	2-1/2	3	UNCOATED	CYLINDRICAL
N86014	C330-0.313-D3-S.0-Z3	5/16	5/16	13/16	2-1/2	3	TIALN	CYLINDRICAL
N85942	C330-0.375-D3-S.0-Z3	3/8	3/8	1	2-1/2	3	UNCOATED	CYLINDRICAL
N86018	C330-0.375-D3-S.0-Z3	3/8	3/8	1	2-1/2	3	TIALN	CYLINDRICAL
N85946	C330-0.438-D2-S.0-Z3	7/16	7/16	1	2-3/4	3	UNCOATED	CYLINDRICAL
N86022	C330-0.438-D2-S.0-Z3	7/16	7/16	1	2-3/4	3	TIALN	CYLINDRICAL
N85950	C330-0.500-D2-S.0-Z3	1/2	1/2	1	3	3	UNCOATED	CYLINDRICAL

## C330 (CONT'D) & C330M

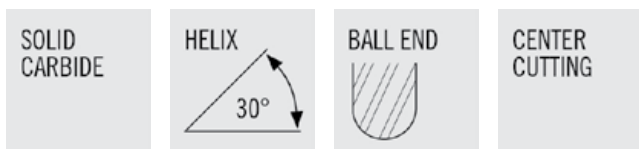


- General Purpose
- General machining (slotting/pocketing/profiling) of most material types

- Cutting Data C330 - Page 200-201
- Tolerance Specs C330 - Page 335
- Cutting Data C330M - Page 202-203
- Tolerance Specs C330M - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
<b>INCH - C330 (CONT'D)</b>								
N86026	C330-0.500-D2-S.0-Z3	1/2	1/2	1	3	3	TIALN	CYLINDRICAL
N85951	C330-0.563-D2-S.0-Z3	9/16	9/16	1-1/8	3-1/2	3	UNCOATED	CYLINDRICAL
N86027	C330-0.563-D2-S.0-Z3	9/16	9/16	1-1/8	3-1/2	3	TIALN	CYLINDRICAL
N85952	C330-0.625-D2-S.0-Z3	5/8	5/8	1-1/4	3-1/2	3	UNCOATED	CYLINDRICAL
N86028	C330-0.625-D2-S.0-Z3	5/8	5/8	1-1/4	3-1/2	3	TIALN	CYLINDRICAL
N85954	C330-0.750-D2-S.0-Z3	3/4	3/4	1-1/2	4	3	UNCOATED	CYLINDRICAL
N86030	C330-0.750-D2-S.0-Z3	3/4	3/4	1-1/2	4	3	TIALN	CYLINDRICAL
N85955	C330-0.875-D2-S.0-Z3	7/8	7/8	1-1/2	4	3	UNCOATED	CYLINDRICAL
N86031	C330-0.875-D2-S.0-Z3	7/8	7/8	1-1/2	4	3	TIALN	CYLINDRICAL
N85956	C330-1.000-D2-S.0-Z3	1	1	1-1/2	4	3	UNCOATED	CYLINDRICAL
N86032	C330-1.000-D2-S.0-Z3	1	1	1-1/2	4	3	TIALN	CYLINDRICAL
<b>METRIC - C330M</b>								
N47704	C330M-010-F4-S.0-Z3	1MM	3MM	4MM	39MM	3	ALTIN	CYLINDRICAL
N47714	C330M-030-D4-S.0-Z3	3MM	3MM	12MM	39MM	3	ALTIN	CYLINDRICAL
N47728	C330M-060-D3-S.0-Z3	6MM	6MM	19MM	51MM	3	ALTIN	CYLINDRICAL
N47734	C330M-080-D2-S.0-Z3	8MM	8MM	20MM	64MM	3	ALTIN	CYLINDRICAL
N47740	C330M-100-D2-S.0-Z3	10MM	10MM	22MM	73MM	3	ALTIN	CYLINDRICAL
N47742	C330M-110-F2-S.0-Z3	11MM	12MM	25MM	74MM	3	ALTIN	CYLINDRICAL

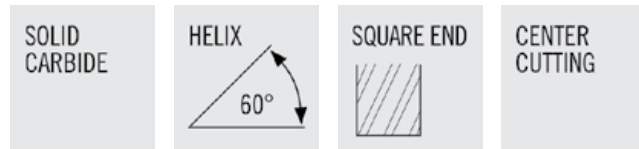
## CB330



- General Purpose
- General machining (slotting/pocketing/profiling) of most material types
- Cutting Data - Page 204-205
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N86034	CB330-0.016-F2-B.0-Z3	1/64	1/8	1/32	1-1/2	3	UNCOATED	CYLINDRICAL
N86110	CB330-0.016-F2-B.0-Z3	1/64	1/8	1/32	1-1/2	3	TIALN	CYLINDRICAL
N86035	CB330-0.031-F3-B.0-Z3	1/32	1/8	5/64	1-1/2	3	UNCOATED	CYLINDRICAL
N86111	CB330-0.031-F3-B.0-Z3	1/32	1/8	5/64	1-1/2	3	TIALN	CYLINDRICAL
N86037	CB330-0.063-F3-B.0-Z3	1/16	1/8	3/16	1-1/2	3	UNCOATED	CYLINDRICAL
N86113	CB330-0.063-F3-B.0-Z3	1/16	1/8	3/16	1-1/2	3	TIALN	CYLINDRICAL
N86039	CB330-0.094-F3-B.0-Z3	3/32	1/8	9/32	1-1/2	3	UNCOATED	CYLINDRICAL
N86115	CB330-0.094-F3-B.0-Z3	3/32	1/8	9/32	1-1/2	3	TIALN	CYLINDRICAL
N86041	CB330-0.125-D4-B.0-Z3	1/8	1/8	1/2	1-1/2	3	UNCOATED	CYLINDRICAL
N86117	CB330-0.125-D4-B.0-Z3	1/8	1/8	1/2	1-1/2	3	TIALN	CYLINDRICAL
N86043	CB330-0.156-F3-B.0-Z3	5/32	3/16	1/2	2	3	UNCOATED	CYLINDRICAL
N86119	CB330-0.156-F3-B.0-Z3	5/32	3/16	1/2	2	3	TIALN	CYLINDRICAL
N86045	CB330-0.188-D3-B.0-Z3	3/16	3/16	5/8	2	3	UNCOATED	CYLINDRICAL
N86121	CB330-0.188-D3-B.0-Z3	3/16	3/16	5/8	2	3	TIALN	CYLINDRICAL
N86047	CB330-0.219-F3-B.0-Z3	7/32	1/4	5/8	2-1/2	3	UNCOATED	CYLINDRICAL
N86123	CB330-0.219-F3-B.0-Z3	7/32	1/4	5/8	2-1/2	3	TIALN	CYLINDRICAL
N86049	CB330-0.250-D3-B.0-Z3	1/4	1/4	3/4	2-1/2	3	UNCOATED	CYLINDRICAL
N86125	CB330-0.250-D3-B.0-Z3	1/4	1/4	3/4	2-1/2	3	TIALN	CYLINDRICAL
N86057	CB330-0.375-D3-B.0-Z3	3/8	3/8	1	2-1/2	3	UNCOATED	CYLINDRICAL
N86133	CB330-0.375-D3-B.0-Z3	3/8	3/8	1	2-1/2	3	TIALN	CYLINDRICAL
N86065	CB330-0.500-D2-B.0-Z3	1/2	1/2	1	3	3	UNCOATED	CYLINDRICAL
N86141	CB330-0.500-D2-B.0-Z3	1/2	1/2	1	3	3	TIALN	CYLINDRICAL
N86066	CB330-0.563-D2-B.0-Z3	9/16	9/16	1-1/8	3-1/2	3	UNCOATED	CYLINDRICAL
N86142	CB330-0.563-D2-B.0-Z3	9/16	9/16	1-1/8	3-1/2	3	TIALN	CYLINDRICAL
N86067	CB330-0.625-D2-B.0-Z3	5/8	5/8	1-1/4	3-1/2	3	UNCOATED	CYLINDRICAL
N86143	CB330-0.625-D2-B.0-Z3	5/8	5/8	1-1/4	3-1/2	3	TIALN	CYLINDRICAL
N86069	CB330-0.750-D2-B.0-Z3	3/4	3/4	1-1/2	4	3	UNCOATED	CYLINDRICAL
N86145	CB330-0.750-D2-B.0-Z3	3/4	3/4	1-1/2	4	3	TIALN	CYLINDRICAL

## C360

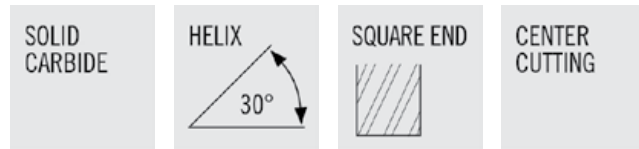


- General Purpose
- General machining of most material types
- Cutting Data - Page 206
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N18854	C360-0.250-D3-S.0-Z3	1/4	1/4	3/4	2-1/2	3	UNCOATED	CYLINDRICAL
N86850	C360-0.250-D3-S.0-Z3	1/4	1/4	3/4	2-1/2	3	TIALN	CYLINDRICAL
N18858	C360-0.375-D2-S.0-Z3	3/8	3/8	7/8	2-1/2	3	UNCOATED	CYLINDRICAL
N86852	C360-0.375-D2-S.0-Z3	3/8	3/8	7/8	2-1/2	3	TIALN	CYLINDRICAL
N18862	C360-0.500-D2-S.0-Z3	1/2	1/2	1	3	3	UNCOATED	CYLINDRICAL
N86854	C360-0.500-D2-S.0-Z3	1/2	1/2	1	3	3	TIALN	CYLINDRICAL
N18866	C360-0.625-D2-S.0-Z3	5/8	5/8	1-1/4	3-1/2	3	UNCOATED	CYLINDRICAL
N86856	C360-0.625-D2-S.0-Z3	5/8	5/8	1-1/4	3-1/2	3	TIALN	CYLINDRICAL
N18870	C360-0.750-D3-S.0-Z4	3/4	3/4	1-1/2	4	4	UNCOATED	CYLINDRICAL
N86858	C360-0.750-D3-S.0-Z4	3/4	3/4	1-1/2	4	4	TIALN	CYLINDRICAL



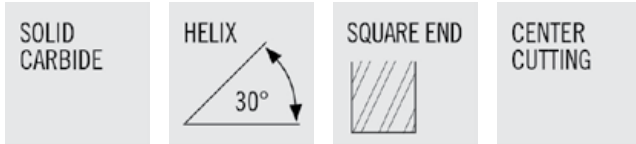
## C430



- General Purpose
- General machining of most material types
- Cutting Data - Page 207-208
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85503	C430-0.016-F2-S.0-Z4	1/64	1/8	1/32	1-1/2	4	UNCOATED	CYLINDRICAL
N85579	C430-0.016-F2-S.0-Z4	1/64	1/8	1/32	1-1/2	4	TIALN	CYLINDRICAL
N85504	C430-0.031-F3-S.0-Z4	1/32	1/8	5/64	1-1/2	4	UNCOATED	CYLINDRICAL
N85580	C430-0.031-F3-S.0-Z4	1/32	1/8	5/64	1-1/2	4	TIALN	CYLINDRICAL
N55666	C430-0.031-F4-S.0-Z4	1/32	1/8	3/32	1-1/2	4	UNCOATED	CYLINDRICAL
N55792	C430-0.031-F4-S.0-Z4	1/32	1/8	3/32	1-1/2	4	TIALN	CYLINDRICAL
N85505	C430-0.047-F2-S.0-Z4	3/64	1/8	7/64	1-1/2	4	UNCOATED	CYLINDRICAL
N85581	C430-0.047-F2-S.0-Z4	3/64	1/8	7/64	1-1/2	4	TIALN	CYLINDRICAL
N55667	C430-0.047-F3-S.0-Z4	3/64	1/8	1/8	1-1/2	4	UNCOATED	CYLINDRICAL
N55793	C430-0.047-F3-S.0-Z4	3/64	1/8	1/8	1-1/2	4	TIALN	CYLINDRICAL
N85652	C430-0.063-F2-S.0-Z4	1/16	1/8	1/8	1-1/2	4	UNCOATED	CYLINDRICAL
N85678	C430-0.063-F2-S.0-Z4	1/16	1/8	1/8	1-1/2	4	TIALN	CYLINDRICAL
N85506	C430-0.063-F3-S.0-Z4	1/16	1/8	3/16	1-1/2	4	UNCOATED	CYLINDRICAL
N85582	C430-0.063-F3-S.0-Z4	1/16	1/8	3/16	1-1/2	4	TIALN	CYLINDRICAL
N55668	C430-0.063-F4-S.0-Z4	1/16	1/8	1/4	1-1/2	4	UNCOATED	CYLINDRICAL
N55794	C430-0.063-F4-S.0-Z4	1/16	1/8	1/4	1-1/2	4	TIALN	CYLINDRICAL
N55669	C430-0.063-F8-S.0-Z4	1/16	1/8	1	3	4	UNCOATED	CYLINDRICAL
N55795	C430-0.063-F8-S.0-Z4	1/16	1/8	1	3	4	TIALN	CYLINDRICAL
N55670	C430-0.063-F9-S.0-Z4	1/16	1/8	1	4	4	UNCOATED	CYLINDRICAL
N55796	C430-0.063-F9-S.0-Z4	1/16	1/8	1	4	4	TIALN	CYLINDRICAL
N85507	C430-0.078-F2-S.0-Z4	5/64	1/8	3/16	1-1/2	4	UNCOATED	CYLINDRICAL
N85583	C430-0.078-F2-S.0-Z4	5/64	1/8	3/16	1-1/2	4	TIALN	CYLINDRICAL
N55671	C430-0.078-F3-S.0-Z4	5/64	1/8	1/4	1-1/2	4	UNCOATED	CYLINDRICAL
N55797	C430-0.078-F3-S.0-Z4	5/64	1/8	1/4	1-1/2	4	TIALN	CYLINDRICAL
N85653	C430-0.094-F2-S.0-Z4	3/32	1/8	3/16	1-1/2	4	UNCOATED	CYLINDRICAL
N85679	C430-0.094-F2-S.0-Z4	3/32	1/8	3/16	1-1/2	4	TIALN	CYLINDRICAL
N85508	C430-0.094-F3-S.0-Z4	3/32	1/8	9/32	1-1/2	4	UNCOATED	CYLINDRICAL
N85584	C430-0.094-F3-S.0-Z4	3/32	1/8	9/32	1-1/2	4	TIALN	CYLINDRICAL
N55672	C430-0.094-F4-S.0-Z4	3/32	1/8	3/8	1-1/2	4	UNCOATED	CYLINDRICAL
N55798	C430-0.094-F4-S.0-Z4	3/32	1/8	3/8	1-1/2	4	TIALN	CYLINDRICAL
N55673	C430-0.094-F8-S.0-Z4	3/32	1/8	1	3	4	UNCOATED	CYLINDRICAL
N55799	C430-0.094-F8-S.0-Z4	3/32	1/8	1	3	4	TIALN	CYLINDRICAL
N85509	C430-0.109-F3-S.0-Z4	7/64	1/8	3/8	1-1/2	4	UNCOATED	CYLINDRICAL
N85585	C430-0.109-F3-S.0-Z4	7/64	1/8	3/8	1-1/2	4	TIALN	CYLINDRICAL
N85654	C430-0.125-D2-S.0-Z4	1/8	1/8	1/4	1-1/2	4	UNCOATED	CYLINDRICAL
N85680	C430-0.125-D2-S.0-Z4	1/8	1/8	1/4	1-1/2	4	TIALN	CYLINDRICAL
N85510	C430-0.125-D4-S.0-Z4	1/8	1/8	1/2	1-1/2	4	UNCOATED	CYLINDRICAL
N85586	C430-0.125-D4-S.0-Z4	1/8	1/8	1/2	1-1/2	4	TIALN	CYLINDRICAL

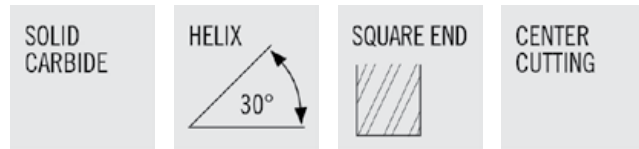
## C430 (CONT'D)



- General Purpose
- General machining of most material types
- Cutting Data - Page 207-208
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N55675	C430-0.125-D5-S.0-Z4	1/8	1/8	5/8	2	4	UNCOATED	CYLINDRICAL
N55801	C430-0.125-D5-S.0-Z4	1/8	1/8	5/8	2	4	TIALN	CYLINDRICAL
N55676	C430-0.125-D6-S.0-Z4	1/8	1/8	3/4	3	4	UNCOATED	CYLINDRICAL
N55802	C430-0.125-D6-S.0-Z4	1/8	1/8	3/4	3	4	TIALN	CYLINDRICAL
N55677	C430-0.125-D8-S.0-Z4	1/8	1/8	1	3	4	UNCOATED	CYLINDRICAL
N55803	C430-0.125-D8-S.0-Z4	1/8	1/8	1	3	4	TIALN	CYLINDRICAL
N55678	C430-0.125-D9-S.0-Z4	1/8	1/8	1	4	4	UNCOATED	CYLINDRICAL
N55804	C430-0.125-D9-S.0-Z4	1/8	1/8	1	4	4	TIALN	CYLINDRICAL
N85511	C430-0.141-F4-S.0-Z4	9/64	3/16	1/2	2	4	UNCOATED	CYLINDRICAL
N85587	C430-0.141-F4-S.0-Z4	9/64	3/16	1/2	2	4	TIALN	CYLINDRICAL
N85655	C430-0.156-F2-S.0-Z4	5/32	3/16	5/16	2	4	UNCOATED	CYLINDRICAL
N85681	C430-0.156-F2-S.0-Z4	5/32	3/16	5/16	2	4	TIALN	CYLINDRICAL
N85512	C430-0.156-F3-S.0-Z4	5/32	3/16	1/2	2	4	UNCOATED	CYLINDRICAL
N85588	C430-0.156-F3-S.0-Z4	5/32	3/16	1/2	2	4	TIALN	CYLINDRICAL
N85513	C430-0.172-F4-S.0-Z4	11/64	3/16	5/8	2	4	UNCOATED	CYLINDRICAL
N85589	C430-0.172-F4-S.0-Z4	11/64	3/16	5/8	2	4	TIALN	CYLINDRICAL
N85656	C430-0.188-D2-S.0-Z4	3/16	3/16	3/8	2	4	UNCOATED	CYLINDRICAL
N85682	C430-0.188-D2-S.0-Z4	3/16	3/16	3/8	2	4	TIALN	CYLINDRICAL
N85514	C430-0.188-D3-S.0-Z4	3/16	3/16	5/8	2	4	UNCOATED	CYLINDRICAL
N85590	C430-0.188-D3-S.0-Z4	3/16	3/16	5/8	2	4	TIALN	CYLINDRICAL
N85692	C430-0.188-D4-S.0-Z4	3/16	3/16	3/4	2-1/2	4	UNCOATED	CYLINDRICAL
N85728	C430-0.188-D4-S.0-Z4	3/16	3/16	3/4	2-1/2	4	TIALN	CYLINDRICAL
N55679	C430-0.188-D5-S.0-Z4	3/16	3/16	1	3	4	UNCOATED	CYLINDRICAL
N55805	C430-0.188-D5-S.0-Z4	3/16	3/16	1	3	4	TIALN	CYLINDRICAL
N55680	C430-0.188-D6-S.0-Z4	3/16	3/16	1	4	4	UNCOATED	CYLINDRICAL
N55806	C430-0.188-D6-S.0-Z4	3/16	3/16	1	4	4	TIALN	CYLINDRICAL
N85693	C430-0.188-D7-S.0-Z4	3/16	3/16	1-1/8	3	4	UNCOATED	CYLINDRICAL
N85729	C430-0.188-D7-S.0-Z4	3/16	3/16	1-1/8	3	4	TIALN	CYLINDRICAL
N85515	C430-0.203-F3-S.0-Z4	13/64	1/4	5/8	2-1/2	4	UNCOATED	CYLINDRICAL
N85591	C430-0.203-F3-S.0-Z4	13/64	1/4	5/8	2-1/2	4	TIALN	CYLINDRICAL
N85657	C430-0.219-F2-S.0-Z4	7/32	1/4	7/16	2	4	UNCOATED	CYLINDRICAL
N85683	C430-0.219-F2-S.0-Z4	7/32	1/4	7/16	2	4	TIALN	CYLINDRICAL
N85516	C430-0.219-F3-S.0-Z4	7/32	1/4	5/8	2-1/2	4	UNCOATED	CYLINDRICAL
N85592	C430-0.219-F3-S.0-Z4	7/32	1/4	5/8	2-1/2	4	TIALN	CYLINDRICAL
N85517	C430-0.234-F3-S.0-Z4	15/64	1/4	3/4	2-1/2	4	UNCOATED	CYLINDRICAL
N85593	C430-0.234-F3-S.0-Z4	15/64	1/4	3/4	2-1/2	4	TIALN	CYLINDRICAL
N85658	C430-0.250-D2-S.0-Z4	1/4	1/4	1/2	2	4	UNCOATED	CYLINDRICAL
N85684	C430-0.250-D2-S.0-Z4	1/4	1/4	1/2	2	4	TIALN	CYLINDRICAL

## C430 (CONT'D)

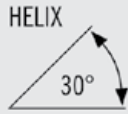


- General Purpose
- General machining of most material types
- Cutting Data - Page 207-208
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85518	C430-0.250-D3-S.0-Z4	1/4	1/4	3/4	2-1/2	4	UNCOATED	CYLINDRICAL
N85594	C430-0.250-D3-S.0-Z4	1/4	1/4	3/4	2-1/2	4	TIALN	CYLINDRICAL
N55681	C430-0.250-D4-S.0-Z4	1/4	1/4	1	3	4	UNCOATED	CYLINDRICAL
N55807	C430-0.250-D4-S.0-Z4	1/4	1/4	1	3	4	TIALN	CYLINDRICAL
N55682	C430-0.250-D5-S.0-Z4	1/4	1/4	1	4	4	UNCOATED	CYLINDRICAL
N55808	C430-0.250-D5-S.0-Z4	1/4	1/4	1	4	4	TIALN	CYLINDRICAL
N85694	C430-0.250-D6-S.0-Z4	1/4	1/4	1-1/8	3	4	UNCOATED	CYLINDRICAL
N85730	C430-0.250-D6-S.0-Z4	1/4	1/4	1-1/8	3	4	TIALN	CYLINDRICAL
N85695	C430-0.250-D7-S.0-Z4	1/4	1/4	1-1/2	4	4	UNCOATED	CYLINDRICAL
N85731	C430-0.250-D7-S.0-Z4	1/4	1/4	1-1/2	4	4	TIALN	CYLINDRICAL
N55683	C430-0.250-D8-S.0-Z4	1/4	1/4	1-1/2	6	4	UNCOATED	CYLINDRICAL
N55809	C430-0.250-D8-S.0-Z4	1/4	1/4	1-1/2	6	4	TIALN	CYLINDRICAL
N85519	C430-0.266-F3-S.0-Z4	17/64	5/16	3/4	2-1/2	4	UNCOATED	CYLINDRICAL
N85595	C430-0.266-F3-S.0-Z4	17/64	5/16	3/4	2-1/2	4	TIALN	CYLINDRICAL
N85520	C430-0.281-F3-S.0-Z4	9/32	5/16	3/4	2-1/2	4	UNCOATED	CYLINDRICAL
N85596	C430-0.281-F3-S.0-Z4	9/32	5/16	3/4	2-1/2	4	TIALN	CYLINDRICAL
N85521	C430-0.297-F3-S.0-Z4	19/64	5/16	13/16	2-1/2	4	UNCOATED	CYLINDRICAL
N85597	C430-0.297-F3-S.0-Z4	19/64	5/16	13/16	2-1/2	4	TIALN	CYLINDRICAL
N85659	C430-0.313-D2-S.0-Z4	5/16	5/16	1/2	2	4	UNCOATED	CYLINDRICAL
N85685	C430-0.313-D2-S.0-Z4	5/16	5/16	1/2	2	4	TIALN	CYLINDRICAL
N85522	C430-0.313-D3-S.0-Z4	5/16	5/16	13/16	2-1/2	4	UNCOATED	CYLINDRICAL
N85598	C430-0.313-D3-S.0-Z4	5/16	5/16	13/16	2-1/2	4	TIALN	CYLINDRICAL
N55684	C430-0.313-D4-S.0-Z4	5/16	5/16	1	3	4	UNCOATED	CYLINDRICAL
N55810	C430-0.313-D4-S.0-Z4	5/16	5/16	1	3	4	TIALN	CYLINDRICAL
N55685	C430-0.313-D5-S.0-Z4	5/16	5/16	1	4	4	UNCOATED	CYLINDRICAL
N55811	C430-0.313-D5-S.0-Z4	5/16	5/16	1	4	4	TIALN	CYLINDRICAL
N85696	C430-0.313-D6-S.0-Z4	5/16	5/16	1-1/8	3	4	UNCOATED	CYLINDRICAL
N85732	C430-0.313-D6-S.0-Z4	5/16	5/16	1-1/8	3	4	TIALN	CYLINDRICAL
N55686	C430-0.313-D7-S.0-Z4	5/16	5/16	1-1/2	6	4	UNCOATED	CYLINDRICAL
N55812	C430-0.313-D7-S.0-Z4	5/16	5/16	1-1/2	6	4	TIALN	CYLINDRICAL
N85697	C430-0.313-D8-S.0-Z4	5/16	5/16	1-5/8	4	4	UNCOATED	CYLINDRICAL
N85733	C430-0.313-D8-S.0-Z4	5/16	5/16	1-5/8	4	4	TIALN	CYLINDRICAL
N85523	C430-0.328-F3-S.0-Z4	21/64	3/8	1	2-1/2	4	UNCOATED	CYLINDRICAL
N85599	C430-0.328-F3-S.0-Z4	21/64	3/8	1	2-1/2	4	TIALN	CYLINDRICAL
N85524	C430-0.344-F3-S.0-Z4	11/32	3/8	1	2-1/2	4	UNCOATED	CYLINDRICAL
N85600	C430-0.344-F3-S.0-Z4	11/32	3/8	1	2-1/2	4	TIALN	CYLINDRICAL
N85525	C430-0.359-F3-S.0-Z4	23/64	3/8	1	2-1/2	4	UNCOATED	CYLINDRICAL
N85601	C430-0.359-F3-S.0-Z4	23/64	3/8	1	2-1/2	4	TIALN	CYLINDRICAL

## C430 (CONT'D)

SOLID  
CARBIDE



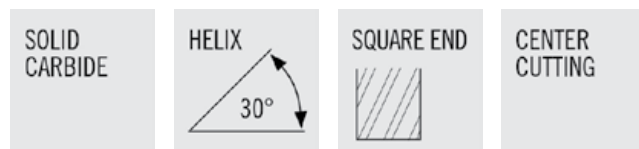
CENTER  
CUTTING



- General Purpose
- General machining of most material types
- Cutting Data - Page 207-208
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85660	C430-0.375-D1-S.0-Z4	3/8	3/8	5/8	2	4	UNCOATED	CYLINDRICAL
N85686	C430-0.375-D1-S.0-Z4	3/8	3/8	5/8	2	4	TIALN	CYLINDRICAL
N85526	C430-0.375-D2-S.0-Z4	3/8	3/8	1	2-1/2	4	UNCOATED	CYLINDRICAL
N85602	C430-0.375-D2-S.0-Z4	3/8	3/8	1	2-1/2	4	TIALN	CYLINDRICAL
N55687	C430-0.375-D3-S.0-Z4	3/8	3/8	1	3	4	UNCOATED	CYLINDRICAL
N55813	C430-0.375-D3-S.0-Z4	3/8	3/8	1	3	4	TIALN	CYLINDRICAL
N55688	C430-0.375-D4-S.0-Z4	3/8	3/8	1	4	4	UNCOATED	CYLINDRICAL
N55814	C430-0.375-D4-S.0-Z4	3/8	3/8	1	4	4	TIALN	CYLINDRICAL
N85698	C430-0.375-D5-S.0-Z4	3/8	3/8	1-1/8	3	4	UNCOATED	CYLINDRICAL
N85734	C430-0.375-D5-S.0-Z4	3/8	3/8	1-1/8	3	4	TIALN	CYLINDRICAL
N55689	C430-0.375-D6-S.0-Z4	3/8	3/8	1-1/2	6	4	UNCOATED	CYLINDRICAL
N55815	C430-0.375-D6-S.0-Z4	3/8	3/8	1-1/2	6	4	TIALN	CYLINDRICAL
N85699	C430-0.375-D7-S.0-Z4	3/8	3/8	1-3/4	4	4	UNCOATED	CYLINDRICAL
N85735	C430-0.375-D7-S.0-Z4	3/8	3/8	1-3/4	4	4	TIALN	CYLINDRICAL
N55690	C430-0.375-D8-S.0-Z4	3/8	3/8	2	4	4	UNCOATED	CYLINDRICAL
N55816	C430-0.375-D8-S.0-Z4	3/8	3/8	2	4	4	TIALN	CYLINDRICAL
N55691	C430-0.375-D9-S.0-Z4	3/8	3/8	3	6	4	UNCOATED	CYLINDRICAL
N55817	C430-0.375-D9-S.0-Z4	3/8	3/8	3	6	4	TIALN	CYLINDRICAL
N85527	C430-0.391-F3-S.0-Z4	25/64	7/16	1	2-3/4	4	UNCOATED	CYLINDRICAL
N85603	C430-0.391-F3-S.0-Z4	25/64	7/16	1	2-3/4	4	TIALN	CYLINDRICAL
N85528	C430-0.406-F2-S.0-Z4	13/32	7/16	1	2-3/4	4	UNCOATED	CYLINDRICAL
N85604	C430-0.406-F2-S.0-Z4	13/32	7/16	1	2-3/4	4	TIALN	CYLINDRICAL
N85529	C430-0.422-F2-S.0-Z4	27/64	7/16	1	2-3/4	4	UNCOATED	CYLINDRICAL
N85605	C430-0.422-F2-S.0-Z4	27/64	7/16	1	2-3/4	4	TIALN	CYLINDRICAL
N85661	C430-0.438-D1-S.0-Z4	7/16	7/16	5/8	2-1/2	4	UNCOATED	CYLINDRICAL
N85687	C430-0.438-D1-S.0-Z4	7/16	7/16	5/8	2-1/2	4	TIALN	CYLINDRICAL
N85530	C430-0.438-D2-S.0-Z4	7/16	7/16	1	2-3/4	4	UNCOATED	CYLINDRICAL
N85606	C430-0.438-D2-S.0-Z4	7/16	7/16	1	2-3/4	4	TIALN	CYLINDRICAL
N55692	C430-0.438-D3-S.0-Z4	7/16	7/16	1	4	4	UNCOATED	CYLINDRICAL
N55818	C430-0.438-D3-S.0-Z4	7/16	7/16	1	4	4	TIALN	CYLINDRICAL
N55693	C430-0.438-D4-S.0-Z4	7/16	7/16	1-1/2	6	4	UNCOATED	CYLINDRICAL
N55819	C430-0.438-D4-S.0-Z4	7/16	7/16	1-1/2	6	4	TIALN	CYLINDRICAL
N55694	C430-0.438-D5-S.0-Z4	7/16	7/16	2	4	4	UNCOATED	CYLINDRICAL
N55820	C430-0.438-D5-S.0-Z4	7/16	7/16	2	4	4	TIALN	CYLINDRICAL
N85700	C430-0.438-D6-S.0-Z4	7/16	7/16	2	4-1/2	4	UNCOATED	CYLINDRICAL
N85736	C430-0.438-D6-S.0-Z4	7/16	7/16	2	4-1/2	4	TIALN	CYLINDRICAL
N85701	C430-0.438-D7-S.0-Z4	7/16	7/16	3	6	4	UNCOATED	CYLINDRICAL
N85737	C430-0.438-D7-S.0-Z4	7/16	7/16	3	6	4	TIALN	CYLINDRICAL

## C430 (CONT'D)



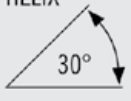
- General Purpose
- General machining of most material types
- Cutting Data - Page 207-208
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85532	C430-0.469-F2-S.0-Z4	15/32	1/2	1	3	4	UNCOATED	CYLINDRICAL
N85608	C430-0.469-F2-S.0-Z4	15/32	1/2	1	3	4	TIALN	CYLINDRICAL
N85662	C430-0.500-D1-S.0-Z4	1/2	1/2	5/8	2-1/2	4	UNCOATED	CYLINDRICAL
N85688	C430-0.500-D1-S.0-Z4	1/2	1/2	5/8	2-1/2	4	TIALN	CYLINDRICAL
N85534	C430-0.500-D2-S.0-Z4	1/2	1/2	1	3	4	UNCOATED	CYLINDRICAL
N85610	C430-0.500-D2-S.0-Z4	1/2	1/2	1	3	4	TIALN	CYLINDRICAL
N55695	C430-0.500-D3-S.0-Z4	1/2	1/2	1	4	4	UNCOATED	CYLINDRICAL
N55821	C430-0.500-D3-S.0-Z4	1/2	1/2	1	4	4	TIALN	CYLINDRICAL
N55696	C430-0.500-D4-S.0-Z4	1/2	1/2	1-1/2	6	4	UNCOATED	CYLINDRICAL
N55822	C430-0.500-D4-S.0-Z4	1/2	1/2	1-1/2	6	4	TIALN	CYLINDRICAL
N55697	C430-0.500-D5-S.0-Z4	1/2	1/2	2	4	4	UNCOATED	CYLINDRICAL
N55823	C430-0.500-D5-S.0-Z4	1/2	1/2	2	4	4	TIALN	CYLINDRICAL
N85702	C430-0.500-D6-S.0-Z4	1/2	1/2	2	4-1/2	4	UNCOATED	CYLINDRICAL
N85738	C430-0.500-D6-S.0-Z4	1/2	1/2	2	4-1/2	4	TIALN	CYLINDRICAL
N85703	C430-0.500-D7-S.0-Z4	1/2	1/2	3	6	4	UNCOATED	CYLINDRICAL
N85739	C430-0.500-D7-S.0-Z4	1/2	1/2	3	6	4	TIALN	CYLINDRICAL
N85535	C430-0.563-D2-S.0-Z4	9/16	9/16	1-1/8	3-1/2	4	UNCOATED	CYLINDRICAL
N85611	C430-0.563-D2-S.0-Z4	9/16	9/16	1-1/8	3-1/2	4	TIALN	CYLINDRICAL
N85663	C430-0.625-D1-S.0-Z4	5/8	5/8	3/4	3	4	UNCOATED	CYLINDRICAL
N85689	C430-0.625-D1-S.0-Z4	5/8	5/8	3/4	3	4	TIALN	CYLINDRICAL
N85536	C430-0.625-D2-S.0-Z4	5/8	5/8	1-1/4	3-1/2	4	UNCOATED	CYLINDRICAL
N85612	C430-0.625-D2-S.0-Z4	5/8	5/8	1-1/4	3-1/2	4	TIALN	CYLINDRICAL
N55700	C430-0.625-D3-S.0-Z4	5/8	5/8	2	6	4	UNCOATED	CYLINDRICAL
N55826	C430-0.625-D3-S.0-Z4	5/8	5/8	2	6	4	TIALN	CYLINDRICAL
N85704	C430-0.625-D4-S.0-Z4	5/8	5/8	2-1/4	5	4	UNCOATED	CYLINDRICAL
N85740	C430-0.625-D4-S.0-Z4	5/8	5/8	2-1/4	5	4	TIALN	CYLINDRICAL
N85705	C430-0.625-D5-S.0-Z4	5/8	5/8	3	6	4	UNCOATED	CYLINDRICAL
N85741	C430-0.625-D5-S.0-Z4	5/8	5/8	3	6	4	TIALN	CYLINDRICAL
N85537	C430-0.688-F2-S.0-Z4	11/16	3/4	1-3/8	4	4	UNCOATED	CYLINDRICAL
N85613	C430-0.688-F2-S.0-Z4	11/16	3/4	1-3/8	4	4	TIALN	CYLINDRICAL
N85664	C430-0.750-D1-S.0-Z4	3/4	3/4	1	3	4	UNCOATED	CYLINDRICAL
N85690	C430-0.750-D1-S.0-Z4	3/4	3/4	1	3	4	TIALN	CYLINDRICAL
N85538	C430-0.750-D2-S.0-Z4	3/4	3/4	1-1/2	4	4	UNCOATED	CYLINDRICAL
N85614	C430-0.750-D2-S.0-Z4	3/4	3/4	1-1/2	4	4	TIALN	CYLINDRICAL
N55701	C430-0.750-D3-S.0-Z4	3/4	3/4	2	6	4	UNCOATED	CYLINDRICAL
N55827	C430-0.750-D3-S.0-Z4	3/4	3/4	2	6	4	TIALN	CYLINDRICAL
N85706	C430-0.750-D4-S.0-Z4	3/4	3/4	2-1/4	5	4	UNCOATED	CYLINDRICAL
N85742	C430-0.750-D4-S.0-Z4	3/4	3/4	2-1/4	5	4	TIALN	CYLINDRICAL
N85707	C430-0.750-D5-S.0-Z4	3/4	3/4	3	6	4	UNCOATED	CYLINDRICAL
N85743	C430-0.750-D5-S.0-Z4	3/4	3/4	3	6	4	TIALN	CYLINDRICAL

# C430 (CONT'D) & C430M

SOLID CARBIDE

HELIX



30°

SQUARE END

CENTER CUTTING

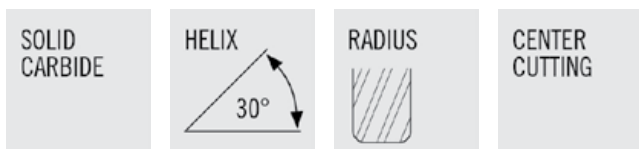


- Cutting Data C430 - Page 207-208
- Tolerance Specs C430 - Page 335
- Cutting Data C430M - Page 211-212
- Tolerance Specs C430M - Page 335

- General Purpose
- General machining of most material types

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
<b>INCH - C430 (CONT'D)</b>								
N55702	C430-0.750-D6-S.0-Z4	3/4	3/4	4	6	4	UNCOATED	CYLINDRICAL
N55828	C430-0.750-D6-S.0-Z4	3/4	3/4	4	6	4	TIALN	CYLINDRICAL
N85539	C430-0.875-D2-S.0-Z4	7/8	7/8	1-1/2	4	4	UNCOATED	CYLINDRICAL
N85615	C430-0.875-D2-S.0-Z4	7/8	7/8	1-1/2	4	4	TIALN	CYLINDRICAL
N55703	C430-1.000-D1-S.0-Z4	1	1	1	3	4	UNCOATED	CYLINDRICAL
N55829	C430-1.000-D1-S.0-Z4	1	1	1	3	4	TIALN	CYLINDRICAL
N85540	C430-1.000-D2-S.0-Z4	1	1	1-1/2	4	4	UNCOATED	CYLINDRICAL
N85616	C430-1.000-D2-S.0-Z4	1	1	1-1/2	4	4	TIALN	CYLINDRICAL
N55704	C430-1.000-D3-S.0-Z4	1	1	2	6	4	UNCOATED	CYLINDRICAL
N55830	C430-1.000-D3-S.0-Z4	1	1	2	6	4	TIALN	CYLINDRICAL
N85708	C430-1.000-D4-S.0-Z4	1	1	2-1/4	5	4	UNCOATED	CYLINDRICAL
N85744	C430-1.000-D4-S.0-Z4	1	1	2-1/4	5	4	TIALN	CYLINDRICAL
N85709	C430-1.000-D5-S.0-Z4	1	1	3	6	4	UNCOATED	CYLINDRICAL
N85745	C430-1.000-D5-S.0-Z4	1	1	3	6	4	TIALN	CYLINDRICAL
N55705	C430-1.000-D6-S.0-Z4	1	1	4	7	4	UNCOATED	CYLINDRICAL
N55831	C430-1.000-D6-S.0-Z4	1	1	4	7	4	TIALN	CYLINDRICAL
N55706	C430-1.250-D2-S.0-Z4	1-1/4	1-1/4	2	4-1/2	4	UNCOATED	CYLINDRICAL
N55832	C430-1.250-D2-S.0-Z4	1-1/4	1-1/4	2	4-1/2	4	TIALN	CYLINDRICAL
N55707	C430-1.250-D3-S.0-Z4	1-1/4	1-1/4	3	6	4	UNCOATED	CYLINDRICAL
N55833	C430-1.250-D3-S.0-Z4	1-1/4	1-1/4	3	6	4	TIALN	CYLINDRICAL
<b>METRIC - C430M</b>								
N46412	C430M-010-F4-S.0-Z4	1MM	3MM	4MM	39MM	4	ALTIN	CYLINDRICAL
N46414	C430M-015-F3-S.0-Z4	1.5MM	3MM	4.5MM	39MM	4	ALTIN	CYLINDRICAL
N34456	C430M-020-F2-S.0-Z4	2MM	3MM	4MM	39MM	4	ALTIN	CYLINDRICAL
N46416	C430M-020-F3-S.0-Z4	2MM	3MM	6.3MM	39MM	4	ALTIN	CYLINDRICAL
N46420	C430M-030-D4-S.0-Z4	3MM	3MM	12MM	39MM	4	ALTIN	CYLINDRICAL
N46422	C430M-035-F3-S.0-Z4	3.5MM	4MM	12MM	51MM	4	ALTIN	CYLINDRICAL
N46424	C430M-040-D4-S.0-Z4	4MM	4MM	14MM	51MM	4	ALTIN	CYLINDRICAL
N34332	C430M-050-F5-S.0-Z4	5MM	6MM	25MM	75MM	4	ALTIN	CYLINDRICAL
N46428	C430M-050-F3-S.0-Z4	5MM	6MM	16MM	51MM	4	ALTIN	CYLINDRICAL
N46430	C430M-060-D3-S.0-Z4	6MM	6MM	19MM	51MM	4	ALTIN	CYLINDRICAL
N46434	C430M-080-D2-S.0-Z4	8MM	8MM	20MM	64MM	4	ALTIN	CYLINDRICAL
N46436	C430M-090-F2-S.0-Z4	9MM	10MM	22MM	73MM	4	ALTIN	CYLINDRICAL
N46438	C430M-100-D2-S.0-Z4	10MM	10MM	22MM	73MM	4	ALTIN	CYLINDRICAL
N34344	C430M-100-D5-S.0-Z4	10MM	10MM	38MM	150MM	4	ALTIN	CYLINDRICAL
N46440	C430M-110-F2-S.0-Z4	11MM	12MM	25MM	74MM	4	ALTIN	CYLINDRICAL
N46442	C430M-120-D2-S.0-Z4	12MM	12MM	25MM	74MM	4	ALTIN	CYLINDRICAL
N34346	C430M-120-D4-S.0-Z4	12MM	12MM	50MM	100MM	4	ALTIN	CYLINDRICAL

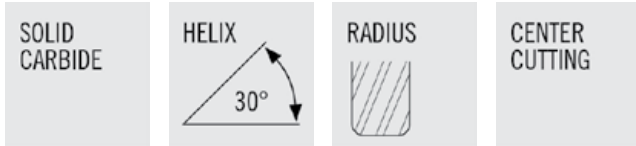
## C430R



- General Purpose
- Standard with radius
- General machining of most material types
- Cutting Data - Page 207-208
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N91372	C430R-0.125-D4-R015.0-Z4	1/8	1/8	1/2	1-1/2	4	TIALN	0.015	CYLINDRICAL
N91373	C430R-0.125-D4-R020.0-Z4	1/8	1/8	1/2	1-1/2	4	TIALN	0.020	CYLINDRICAL
N91374	C430R-0.125-D4-R030.0-Z4	1/8	1/8	1/2	1-1/2	4	TIALN	0.030	CYLINDRICAL
N91375	C430R-0.188-D3-R015.0-Z4	3/16	3/16	5/8	2	4	TIALN	0.015	CYLINDRICAL
N91376	C430R-0.188-D3-R020.0-Z4	3/16	3/16	5/8	2	4	TIALN	0.020	CYLINDRICAL
N91377	C430R-0.188-D3-R030.0-Z4	3/16	3/16	5/8	2	4	TIALN	0.030	CYLINDRICAL
N91378	C430R-0.250-D3-R015.0-Z4	1/4	1/4	3/4	2-1/2	4	TIALN	0.015	CYLINDRICAL
N91379	C430R-0.250-D3-R020.0-Z4	1/4	1/4	3/4	2-1/2	4	TIALN	0.020	CYLINDRICAL
N91380	C430R-0.250-D3-R030.0-Z4	1/4	1/4	3/4	2-1/2	4	TIALN	0.030	CYLINDRICAL
N91381	C430R-0.250-D3-R045.0-Z4	1/4	1/4	3/4	2-1/2	4	TIALN	0.045	CYLINDRICAL
N91382	C430R-0.313-D3-R015.0-Z4	5/16	5/16	13/16	2-1/2	4	TIALN	0.015	CYLINDRICAL
N91383	C430R-0.313-D3-R020.0-Z4	5/16	5/16	13/16	2-1/2	4	TIALN	0.020	CYLINDRICAL
N91384	C430R-0.313-D3-R030.0-Z4	5/16	5/16	13/16	2-1/2	4	TIALN	0.030	CYLINDRICAL
N91385	C430R-0.313-D3-R045.0-Z4	5/16	5/16	13/16	2-1/2	4	TIALN	0.045	CYLINDRICAL
N91386	C430R-0.375-D3-R015.0-Z4	3/8	3/8	1	2-1/2	4	TIALN	0.015	CYLINDRICAL
N91387	C430R-0.375-D3-R020.0-Z4	3/8	3/8	1	2-1/2	4	TIALN	0.020	CYLINDRICAL
N91389	C430R-0.375-D3-R030.0-Z4	3/8	3/8	1	2-1/2	4	TIALN	0.030	CYLINDRICAL
N91390	C430R-0.375-D3-R045.0-Z4	3/8	3/8	1	2-1/2	4	TIALN	0.045	CYLINDRICAL
N91391	C430R-0.438-D2-R015.0-Z4	7/16	7/16	1	2-3/4	4	TIALN	0.015	CYLINDRICAL
N91393	C430R-0.438-D2-R030.0-Z4	7/16	7/16	1	2-3/4	4	TIALN	0.030	CYLINDRICAL
N91395	C430R-0.438-D2-R060.0-Z4	7/16	7/16	1	2-3/4	4	TIALN	0.060	CYLINDRICAL
N91397	C430R-0.438-D2-R125.0-Z4	7/16	7/16	1	2-3/4	4	TIALN	0.125	CYLINDRICAL
N91392	C430R-0.438-D2-R020.0-Z4	7/16	7/16	1	2-3/4	4	TIALN	0.020	CYLINDRICAL
N91394	C430R-0.438-D2-R045.0-Z4	7/16	7/16	1	2-3/4	4	TIALN	0.045	CYLINDRICAL
N91396	C430R-0.438-D2-R090.0-Z4	7/16	7/16	1	2-3/4	4	TIALN	0.090	CYLINDRICAL
N91398	C430R-0.500-D2-R020.0-Z4	1/2	1/2	1	3	4	TIALN	0.020	CYLINDRICAL
N91399	C430R-0.500-D2-R030.0-Z4	1/2	1/2	1	3	4	TIALN	0.030	CYLINDRICAL
N91401	C430R-0.500-D2-R045.0-Z4	1/2	1/2	1	3	4	TIALN	0.045	CYLINDRICAL
N91402	C430R-0.500-D2-R060.0-Z4	1/2	1/2	1	3	4	TIALN	0.060	CYLINDRICAL
N91403	C430R-0.500-D2-R090.0-Z4	1/2	1/2	1	3	4	TIALN	0.090	CYLINDRICAL
N91404	C430R-0.500-D2-R125.0-Z4	1/2	1/2	1	3	4	TIALN	0.125	CYLINDRICAL
N91353	C430R-0.500-D2-R015.0-Z4	1/2	1/2	1	3	4	TIALN	0.015	CYLINDRICAL

## C430R (CONT'D)

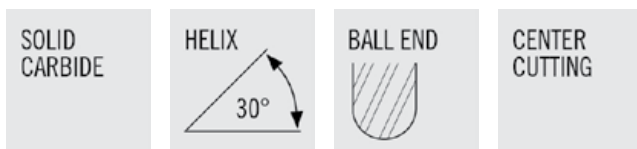


- General Purpose
- Standard with radius
- General machining of most material types
- Cutting Data - Page 207-208
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	SHANK TYPE
N91406	C430R-0.625-D2-R015.0-Z4	5/8	5/8	1-1/4	3-1/2	4	TIALN	0.015	CYLINDRICAL
N91408	C430R-0.625-D2-R020.0-Z4	5/8	5/8	1-1/4	3-1/2	4	TIALN	0.020	CYLINDRICAL
N91409	C430R-0.625-D2-R030.0-Z4	5/8	5/8	1-1/4	3-1/2	4	TIALN	0.030	CYLINDRICAL
N91410	C430R-0.625-D2-R045.0-Z4	5/8	5/8	1-1/4	3-1/2	4	TIALN	0.045	CYLINDRICAL
N91411	C430R-0.625-D2-R060.0-Z4	5/8	5/8	1-1/4	3-1/2	4	TIALN	0.060	CYLINDRICAL
N91412	C430R-0.625-D2-R090.0-Z4	5/8	5/8	1-1/4	3-1/2	4	TIALN	0.090	CYLINDRICAL
N91413	C430R-0.625-D2-R125.0-Z4	5/8	5/8	1-1/4	3-1/2	4	TIALN	0.125	CYLINDRICAL
N91415	C430R-0.750-D2-R020.0-Z4	3/4	3/4	1-1/2	4	4	TIALN	0.020	CYLINDRICAL
N91416	C430R-0.750-D2-R030.0-Z4	3/4	3/4	1-1/2	4	4	TIALN	0.030	CYLINDRICAL
N91417	C430R-0.750-D2-R045.0-Z4	3/4	3/4	1-1/2	4	4	TIALN	0.045	CYLINDRICAL
N91418	C430R-0.750-D2-R060.0-Z4	3/4	3/4	1-1/2	4	4	TIALN	0.060	CYLINDRICAL
N91419	C430R-0.750-D2-R090.0-Z4	3/4	3/4	1-1/2	4	4	TIALN	0.090	CYLINDRICAL
N91420	C430R-0.750-D2-R125.0-Z4	3/4	3/4	1-1/2	4	4	TIALN	0.125	CYLINDRICAL
N91421	C430R-0.750-D2-R190.0-Z4	3/4	3/4	1-1/2	4	4	TIALN	0.190	CYLINDRICAL
N91361	C430R-0.750-D2-R015.0-Z4	3/4	3/4	1-1/2	4	4	TIALN	0.015	CYLINDRICAL
N91422	C430R-1.000-D2-R015.0-Z4	1	1	1-1/2	4	4	TIALN	0.015	CYLINDRICAL
N91423	C430R-1.000-D2-R020.0-Z4	1	1	1-1/2	4	4	TIALN	0.020	CYLINDRICAL
N91424	C430R-1.000-D2-R045.0-Z4	1	1	1-1/2	4	4	TIALN	0.045	CYLINDRICAL
N91425	C430R-1.000-D2-R060.0-Z4	1	1	1-1/2	4	4	TIALN	0.060	CYLINDRICAL
N91426	C430R-1.000-D2-R090.0-Z4	1	1	1-1/2	4	4	TIALN	0.090	CYLINDRICAL
N91427	C430R-1.000-D2-R125.0-Z4	1	1	1-1/2	4	4	TIALN	0.125	CYLINDRICAL
N91428	C430R-1.000-D2-R190.0-Z4	1	1	1-1/2	4	4	TIALN	0.190	CYLINDRICAL
N91405	C430R-1.000-D2-R030.0-Z4	1	1	1-1/2	4	4	TIALN	0.030	CYLINDRICAL



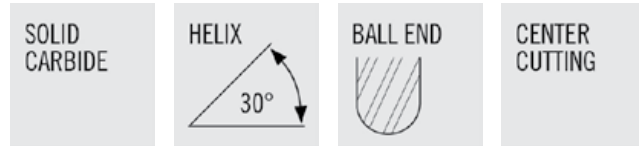
## CB430



- General Purpose
- General machining for most material types
- Cutting Data - Page 209-210
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N86264	CB430-0.016-F2-B.0-Z4	1/64	1/8	1/32	1-1/2	4	UNCOATED	CYLINDRICAL
N86340	CB430-0.016-F2-B.0-Z4	1/64	1/8	1/32	1-1/2	4	TIALN	CYLINDRICAL
N86265	CB430-0.031-F3-B.0-Z4	1/32	1/8	5/64	1-1/2	4	UNCOATED	CYLINDRICAL
N86341	CB430-0.031-F3-B.0-Z4	1/32	1/8	5/64	1-1/2	4	TIALN	CYLINDRICAL
N55834	CB430-0.031-F4-B.0-Z4	1/32	1/8	3/32	1-1/2	4	UNCOATED	CYLINDRICAL
N56014	CB430-0.031-F4-B.0-Z4	1/32	1/8	3/32	1-1/2	4	TIALN	CYLINDRICAL
N86266	CB430-0.047-F2-B.0-Z4	3/64	1/8	7/64	1-1/2	4	UNCOATED	CYLINDRICAL
N86342	CB430-0.047-F2-B.0-Z4	3/64	1/8	7/64	1-1/2	4	TIALN	CYLINDRICAL
N55835	CB430-0.047-F3-B.0-Z4	3/64	1/8	1/8	1-1/2	4	UNCOATED	CYLINDRICAL
N56015	CB430-0.047-F3-B.0-Z4	3/64	1/8	1/8	1-1/2	4	TIALN	CYLINDRICAL
N55836	CB430-0.063-F2-B.0-Z4	1/16	1/8	1/8	1-1/2	4	UNCOATED	CYLINDRICAL
N56016	CB430-0.063-F2-B.0-Z4	1/16	1/8	1/8	1-1/2	4	TIALN	CYLINDRICAL
N86267	CB430-0.063-F3-B.0-Z4	1/16	1/8	3/16	1-1/2	4	UNCOATED	CYLINDRICAL
N86343	CB430-0.063-F3-B.0-Z4	1/16	1/8	3/16	1-1/2	4	TIALN	CYLINDRICAL
N55837	CB430-0.063-F4-B.0-Z4	1/16	1/8	1/4	1-1/2	4	UNCOATED	CYLINDRICAL
N56017	CB430-0.063-F4-B.0-Z4	1/16	1/8	1/4	1-1/2	4	TIALN	CYLINDRICAL
N55838	CB430-0.063-F8-B.0-Z4	1/16	1/8	1	3	4	UNCOATED	CYLINDRICAL
N56018	CB430-0.063-F8-B.0-Z4	1/16	1/8	1	3	4	TIALN	CYLINDRICAL
N86268	CB430-0.078-F2-B.0-Z4	5/64	1/8	3/16	1-1/2	4	UNCOATED	CYLINDRICAL
N86344	CB430-0.078-F2-B.0-Z4	5/64	1/8	3/16	1-1/2	4	TIALN	CYLINDRICAL
N55840	CB430-0.078-F3-B.0-Z4	5/64	1/8	1/4	1-1/2	4	UNCOATED	CYLINDRICAL
N56020	CB430-0.078-F3-B.0-Z4	5/64	1/8	1/4	1-1/2	4	TIALN	CYLINDRICAL
N55841	CB430-0.094-F2-B.0-Z4	3/32	1/8	3/16	1-1/2	4	UNCOATED	CYLINDRICAL
N56021	CB430-0.094-F2-B.0-Z4	3/32	1/8	3/16	1-1/2	4	TIALN	CYLINDRICAL
N86269	CB430-0.094-F3-B.0-Z4	3/32	1/8	9/32	1-1/2	4	UNCOATED	CYLINDRICAL
N86345	CB430-0.094-F3-B.0-Z4	3/32	1/8	9/32	1-1/2	4	TIALN	CYLINDRICAL
N55842	CB430-0.094-F4-B.0-Z4	3/32	1/8	3/8	1-1/2	4	UNCOATED	CYLINDRICAL
N56022	CB430-0.094-F4-B.0-Z4	3/32	1/8	3/8	1-1/2	4	TIALN	CYLINDRICAL
N55843	CB430-0.094-F8-B.0-Z4	3/32	1/8	1	3	4	UNCOATED	CYLINDRICAL
N56023	CB430-0.094-F8-B.0-Z4	3/32	1/8	1	3	4	TIALN	CYLINDRICAL
N86270	CB430-0.109-F3-B.0-Z4	7/64	1/8	3/8	1-1/2	4	UNCOATED	CYLINDRICAL
N86346	CB430-0.109-F3-B.0-Z4	7/64	1/8	3/8	1-1/2	4	TIALN	CYLINDRICAL
N55845	CB430-0.125-D2-B.0-Z4	1/8	1/8	1/4	1-1/2	4	UNCOATED	CYLINDRICAL
N56025	CB430-0.125-D2-B.0-Z4	1/8	1/8	1/4	1-1/2	4	TIALN	CYLINDRICAL
N86271	CB430-0.125-D4-B.0-Z4	1/8	1/8	1/2	1-1/2	4	UNCOATED	CYLINDRICAL
N86347	CB430-0.125-D4-B.0-Z4	1/8	1/8	1/2	1-1/2	4	TIALN	CYLINDRICAL
N55846	CB430-0.125-D5-B.0-Z4	1/8	1/8	5/8	2	4	UNCOATED	CYLINDRICAL
N56026	CB430-0.125-D5-B.0-Z4	1/8	1/8	5/8	2	4	TIALN	CYLINDRICAL
N55847	CB430-0.125-D6-B.0-Z4	1/8	1/8	3/4	3	4	UNCOATED	CYLINDRICAL
N56027	CB430-0.125-D6-B.0-Z4	1/8	1/8	3/4	3	4	TIALN	CYLINDRICAL

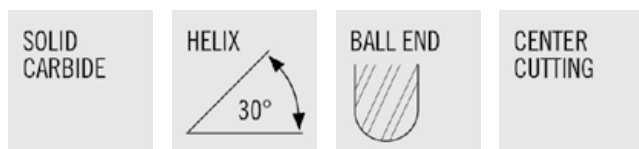
## CB430 (CONT'D)



- General Purpose
- General machining for most material types
- Cutting Data - Page 209-210
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N55848	CB430-0.125-D7-B.0-Z4	1/8	1/8	1	3	4	UNCOATED	CYLINDRICAL
N56028	CB430-0.125-D7-B.0-Z4	1/8	1/8	1	3	4	TIALN	CYLINDRICAL
N55849	CB430-0.125-D8-B.0-Z4	1/8	1/8	1	4	4	UNCOATED	CYLINDRICAL
N56029	CB430-0.125-D8-B.0-Z4	1/8	1/8	1	4	4	TIALN	CYLINDRICAL
N86272	CB430-0.141-F4-B.0-Z4	9/64	3/16	1/2	2	4	UNCOATED	CYLINDRICAL
N86348	CB430-0.141-F4-B.0-Z4	9/64	3/16	1/2	2	4	TIALN	CYLINDRICAL
N55850	CB430-0.156-F2-B.0-Z4	5/32	3/16	5/16	2	4	UNCOATED	CYLINDRICAL
N56030	CB430-0.156-F2-B.0-Z4	5/32	3/16	5/16	2	4	TIALN	CYLINDRICAL
N86273	CB430-0.156-F3-B.0-Z4	5/32	3/16	1/2	2	4	UNCOATED	CYLINDRICAL
N86349	CB430-0.156-F3-B.0-Z4	5/32	3/16	1/2	2	4	TIALN	CYLINDRICAL
N86274	CB430-0.172-F4-B.0-Z4	11/64	3/16	5/8	2	4	UNCOATED	CYLINDRICAL
N86350	CB430-0.172-F4-B.0-Z4	11/64	3/16	5/8	2	4	TIALN	CYLINDRICAL
N55851	CB430-0.188-D2-B.0-Z4	3/16	3/16	3/8	2	4	UNCOATED	CYLINDRICAL
N56031	CB430-0.188-D2-B.0-Z4	3/16	3/16	3/8	2	4	TIALN	CYLINDRICAL
N86275	CB430-0.188-D3-B.0-Z4	3/16	3/16	5/8	2	4	UNCOATED	CYLINDRICAL
N86351	CB430-0.188-D3-B.0-Z4	3/16	3/16	5/8	2	4	TIALN	CYLINDRICAL
N55852	CB430-0.188-D4-B.0-Z4	3/16	3/16	1	3	4	UNCOATED	CYLINDRICAL
N56032	CB430-0.188-D4-B.0-Z4	3/16	3/16	1	3	4	TIALN	CYLINDRICAL
N55853	CB430-0.188-D5-B.0-Z4	3/16	3/16	1	4	4	UNCOATED	CYLINDRICAL
N56033	CB430-0.188-D5-B.0-Z4	3/16	3/16	1	4	4	TIALN	CYLINDRICAL
N55854	CB430-0.188-D6-B.0-Z4	3/16	3/16	1-1/8	3	4	UNCOATED	CYLINDRICAL
N53972	CB430-0.188-D6-B.0-Z4	3/16	3/16	1-1/8	3	4	TIALN	CYLINDRICAL
N86276	CB430-0.203-F3-B.0-Z4	13/64	1/4	5/8	2-1/2	4	UNCOATED	CYLINDRICAL
N86352	CB430-0.203-F3-B.0-Z4	13/64	1/4	5/8	2-1/2	4	TIALN	CYLINDRICAL
N86277	CB430-0.219-F3-B.0-Z4	7/32	1/4	5/8	2-1/2	4	UNCOATED	CYLINDRICAL
N86353	CB430-0.219-F3-B.0-Z4	7/32	1/4	5/8	2-1/2	4	TIALN	CYLINDRICAL
N86278	CB430-0.234-F3-B.0-Z4	15/64	1/4	3/4	2-1/2	4	UNCOATED	CYLINDRICAL
N86354	CB430-0.234-F3-B.0-Z4	15/64	1/4	3/4	2-1/2	4	TIALN	CYLINDRICAL
N55856	CB430-0.250-D2-B.0-Z4	1/4	1/4	1/2	2	4	UNCOATED	CYLINDRICAL
N53974	CB430-0.250-D2-B.0-Z4	1/4	1/4	1/2	2	4	TIALN	CYLINDRICAL
N86279	CB430-0.250-D3-B.0-Z4	1/4	1/4	3/4	2-1/2	4	UNCOATED	CYLINDRICAL
N86355	CB430-0.250-D3-B.0-Z4	1/4	1/4	3/4	2-1/2	4	TIALN	CYLINDRICAL
N55857	CB430-0.250-D4-B.0-Z4	1/4	1/4	1	3	4	UNCOATED	CYLINDRICAL
N53975	CB430-0.250-D4-B.0-Z4	1/4	1/4	1	3	4	TIALN	CYLINDRICAL
N55858	CB430-0.250-D5-B.0-Z4	1/4	1/4	1	4	4	UNCOATED	CYLINDRICAL
N53976	CB430-0.250-D5-B.0-Z4	1/4	1/4	1	4	4	TIALN	CYLINDRICAL
N55859	CB430-0.250-D6-B.0-Z4	1/4	1/4	1-1/2	4	4	UNCOATED	CYLINDRICAL
N53977	CB430-0.250-D6-B.0-Z4	1/4	1/4	1-1/2	4	4	TIALN	CYLINDRICAL
N55860	CB430-0.250-D7-B.0-Z4	1/4	1/4	1-1/2	6	4	UNCOATED	CYLINDRICAL
N53978	CB430-0.250-D7-B.0-Z4	1/4	1/4	1-1/2	6	4	TIALN	CYLINDRICAL

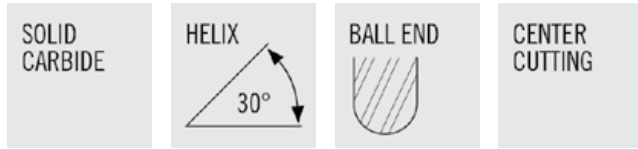
## CB430 (CONT'D)



- General Purpose
- General machining for most material types
- Cutting Data - Page 209-210
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N86281	CB430-0.281-F3-B.0-Z4	9/32	5/16	3/4	2-1/2	4	UNCOATED	CYLINDRICAL
N86357	CB430-0.281-F3-B.0-Z4	9/32	5/16	3/4	2-1/2	4	TIALN	CYLINDRICAL
N55861	CB430-0.313-D2-B.0-Z4	5/16	5/16	1/2	2	4	UNCOATED	CYLINDRICAL
N53979	CB430-0.313-D2-B.0-Z4	5/16	5/16	1/2	2	4	TIALN	CYLINDRICAL
N86283	CB430-0.313-D3-B.0-Z4	5/16	5/16	13/16	2-1/2	4	UNCOATED	CYLINDRICAL
N86359	CB430-0.313-D3-B.0-Z4	5/16	5/16	13/16	2-1/2	4	TIALN	CYLINDRICAL
N55862	CB430-0.313-D4-B.0-Z4	5/16	5/16	1	3	4	UNCOATED	CYLINDRICAL
N53980	CB430-0.313-D4-B.0-Z4	5/16	5/16	1	3	4	TIALN	CYLINDRICAL
N55864	CB430-0.313-D6-B.0-Z4	5/16	5/16	1-1/2	6	4	UNCOATED	CYLINDRICAL
N53982	CB430-0.313-D6-B.0-Z4	5/16	5/16	1-1/2	6	4	TIALN	CYLINDRICAL
N86284	CB430-0.328-F3-B.0-Z4	21/64	3/8	1	2-1/2	4	UNCOATED	CYLINDRICAL
N86360	CB430-0.328-F3-B.0-Z4	21/64	3/8	1	2-1/2	4	TIALN	CYLINDRICAL
N86285	CB430-0.344-F3-B.0-Z4	11/32	3/8	1	2-1/2	4	UNCOATED	CYLINDRICAL
N86361	CB430-0.344-F3-B.0-Z4	11/32	3/8	1	2-1/2	4	TIALN	CYLINDRICAL
N55866	CB430-0.375-D2-B.0-Z4	3/8	3/8	5/8	2	4	UNCOATED	CYLINDRICAL
N53984	CB430-0.375-D2-B.0-Z4	3/8	3/8	5/8	2	4	TIALN	CYLINDRICAL
N86287	CB430-0.375-D3-B.0-Z4	3/8	3/8	1	2-1/2	4	UNCOATED	CYLINDRICAL
N86363	CB430-0.375-D3-B.0-Z4	3/8	3/8	1	2-1/2	4	TIALN	CYLINDRICAL
N55867	CB430-0.375-D4-B.0-Z4	3/8	3/8	1	3	4	UNCOATED	CYLINDRICAL
N53985	CB430-0.375-D4-B.0-Z4	3/8	3/8	1	3	4	TIALN	CYLINDRICAL
N55868	CB430-0.375-D5-B.0-Z4	3/8	3/8	1	4	4	UNCOATED	CYLINDRICAL
N53986	CB430-0.375-D5-B.0-Z4	3/8	3/8	1	4	4	TIALN	CYLINDRICAL
N55869	CB430-0.375-D6-B.0-Z4	3/8	3/8	1-1/2	6	4	UNCOATED	CYLINDRICAL
N53987	CB430-0.375-D6-B.0-Z4	3/8	3/8	1-1/2	6	4	TIALN	CYLINDRICAL
N55870	CB430-0.375-D7-B.0-Z4	3/8	3/8	2	4	4	UNCOATED	CYLINDRICAL
N53988	CB430-0.375-D7-B.0-Z4	3/8	3/8	2	4	4	TIALN	CYLINDRICAL
N55871	CB430-0.375-D8-B.0-Z4	3/8	3/8	3	6	4	UNCOATED	CYLINDRICAL
N53989	CB430-0.375-D8-B.0-Z4	3/8	3/8	3	6	4	TIALN	CYLINDRICAL
N86289	CB430-0.406-F2-B.0-Z4	13/32	7/16	1	2-3/4	4	UNCOATED	CYLINDRICAL
N86365	CB430-0.406-F2-B.0-Z4	13/32	7/16	1	2-3/4	4	TIALN	CYLINDRICAL
N86291	CB430-0.438-D2-B.0-Z4	7/16	7/16	1	2-3/4	4	UNCOATED	CYLINDRICAL
N86367	CB430-0.438-D2-B.0-Z4	7/16	7/16	1	2-3/4	4	TIALN	CYLINDRICAL
N55873	CB430-0.438-D3-B.0-Z4	7/16	7/16	1	4	4	UNCOATED	CYLINDRICAL
N53991	CB430-0.438-D3-B.0-Z4	7/16	7/16	1	4	4	TIALN	CYLINDRICAL
N86293	CB430-0.469-F2-B.0-Z4	15/32	1/2	1	3	4	UNCOATED	CYLINDRICAL
N86369	CB430-0.469-F2-B.0-Z4	15/32	1/2	1	3	4	TIALN	CYLINDRICAL
N55877	CB430-0.500-D1-B.0-Z4	1/2	1/2	5/8	2-1/2	4	UNCOATED	CYLINDRICAL
N53995	CB430-0.500-D1-B.0-Z4	1/2	1/2	5/8	2-1/2	4	TIALN	CYLINDRICAL
N86295	CB430-0.500-D2-B.0-Z4	1/2	1/2	1	3	4	UNCOATED	CYLINDRICAL

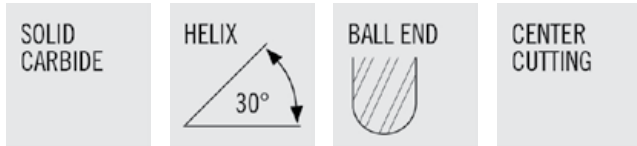
**CB430 (CONT'D)**



- General Purpose
- General machining for most material types
- Cutting Data - Page 209-210
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N86371	CB430-0.500-D2-B.0-Z4	1/2	1/2	1	3	4	TIALN	CYLINDRICAL
N55878	CB430-0.500-D3-B.0-Z4	1/2	1/2	1	4	4	UNCOATED	CYLINDRICAL
N53996	CB430-0.500-D3-B.0-Z4	1/2	1/2	1	4	4	TIALN	CYLINDRICAL
N55879	CB430-0.500-D4-B.0-Z4	1/2	1/2	1-1/2	6	4	UNCOATED	CYLINDRICAL
N53997	CB430-0.500-D4-B.0-Z4	1/2	1/2	1-1/2	6	4	TIALN	CYLINDRICAL
N55880	CB430-0.500-D5-B.0-Z4	1/2	1/2	2	4	4	UNCOATED	CYLINDRICAL
N53998	CB430-0.500-D5-B.0-Z4	1/2	1/2	2	4	4	TIALN	CYLINDRICAL
N55881	CB430-0.500-D6-B.0-Z4	1/2	1/2	3	6	4	UNCOATED	CYLINDRICAL
N53999	CB430-0.500-D6-B.0-Z4	1/2	1/2	3	6	4	TIALN	CYLINDRICAL
N86296	CB430-0.563-D2-B.0-Z4	9/16	9/16	1-1/8	3-1/2	4	UNCOATED	CYLINDRICAL
N86372	CB430-0.563-D2-B.0-Z4	9/16	9/16	1-1/8	3-1/2	4	TIALN	CYLINDRICAL
N55884	CB430-0.625-D1-B.0-Z4	5/8	5/8	3/4	3	4	UNCOATED	CYLINDRICAL
N54002	CB430-0.625-D1-B.0-Z4	5/8	5/8	3/4	3	4	TIALN	CYLINDRICAL
N86297	CB430-0.625-D2-B.0-Z4	5/8	5/8	1-1/4	3-1/2	4	UNCOATED	CYLINDRICAL
N86373	CB430-0.625-D2-B.0-Z4	5/8	5/8	1-1/4	3-1/2	4	TIALN	CYLINDRICAL
N55885	CB430-0.625-D3-B.0-Z4	5/8	5/8	2	6	4	UNCOATED	CYLINDRICAL
N54003	CB430-0.625-D3-B.0-Z4	5/8	5/8	2	6	4	TIALN	CYLINDRICAL
N55886	CB430-0.625-D5-B.0-Z4	5/8	5/8	3	6	4	UNCOATED	CYLINDRICAL
N54004	CB430-0.625-D5-B.0-Z4	5/8	5/8	3	6	4	TIALN	CYLINDRICAL
N55887	CB430-0.750-D1-B.0-Z4	3/4	3/4	1	3	4	UNCOATED	CYLINDRICAL
N54005	CB430-0.750-D1-B.0-Z4	3/4	3/4	1	3	4	TIALN	CYLINDRICAL
N86299	CB430-0.750-D2-B.0-Z4	3/4	3/4	1-1/2	4	4	UNCOATED	CYLINDRICAL
N86375	CB430-0.750-D2-B.0-Z4	3/4	3/4	1-1/2	4	4	TIALN	CYLINDRICAL
N55888	CB430-0.750-D3-B.0-Z4	3/4	3/4	2	6	4	UNCOATED	CYLINDRICAL
N54006	CB430-0.750-D3-B.0-Z4	3/4	3/4	2	6	4	TIALN	CYLINDRICAL
N55889	CB430-0.750-D4-B.0-Z4	3/4	3/4	3	6	4	UNCOATED	CYLINDRICAL
N54007	CB430-0.750-D4-B.0-Z4	3/4	3/4	3	6	4	TIALN	CYLINDRICAL
N55890	CB430-0.750-D5-B.0-Z4	3/4	3/4	4	6	4	UNCOATED	CYLINDRICAL
N54008	CB430-0.750-D5-B.0-Z4	3/4	3/4	4	6	4	TIALN	CYLINDRICAL
N86300	CB430-0.875-D2-B.0-Z4	7/8	7/8	1-1/2	4	4	UNCOATED	CYLINDRICAL
N86376	CB430-0.875-D2-B.0-Z4	7/8	7/8	1-1/2	4	4	TIALN	CYLINDRICAL
N86301	CB430-1.000-D2-B.0-Z4	1	1	1-1/2	4	4	UNCOATED	CYLINDRICAL
N86377	CB430-1.000-D2-B.0-Z4	1	1	1-1/2	4	4	TIALN	CYLINDRICAL
N55891	CB430-1.000-D3-B.0-Z4	1	1	2	6	4	UNCOATED	CYLINDRICAL
N54009	CB430-1.000-D3-B.0-Z4	1	1	2	6	4	TIALN	CYLINDRICAL
N55892	CB430-1.000-D4-B.0-Z4	1	1	3	6	4	UNCOATED	CYLINDRICAL
N54010	CB430-1.000-D4-B.0-Z4	1	1	3	6	4	TIALN	CYLINDRICAL
N55893	CB430-1.000-D5-B.0-Z4	1	1	4	7	4	UNCOATED	CYLINDRICAL
N54011	CB430-1.000-D5-B.0-Z4	1	1	4	7	4	TIALN	CYLINDRICAL

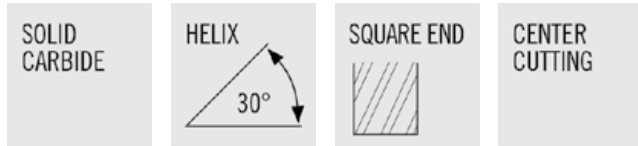
## METRIC CB430M



- General Purpose
- General machining for most material types
- Cutting Data - Page 213-214
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N46454	CB430M-010-F4-B.0-Z4	1MM	3MM	4MM	39MM	4	ALTIN
N34478	CB430M-020-F2-B.0-Z4	2MM	3MM	4MM	39MM	4	ALTIN
N47938	CB430M-030-D2-B.0-Z4	3MM	3MM	6MM	39MM	4	ALTIN
N46462	CB430M-030-D4-B.0-Z4	3MM	3MM	12MM	39MM	4	ALTIN
N46466	CB430M-040-D4-B.0-Z4	4MM	4MM	14MM	51MM	4	ALTIN
N34362	CB430M-040-D6-B.0-Z4	4MM	4MM	25MM	75MM	4	ALTIN
N46470	CB430M-050-F3-B.0-Z4	5MM	6MM	16MM	51MM	4	ALTIN
N47942	CB430M-060-D2-B.0-Z4	6MM	6MM	9MM	51MM	4	ALTIN
N46472	CB430M-060-D3-B.0-Z4	6MM	6MM	19MM	51MM	4	ALTIN
N34370	CB430M-080-D3-B.0-Z4	8MM	8MM	25MM	75MM	4	ALTIN
N34372	CB430M-080-D4-B.0-Z4	8MM	8MM	25MM	150MM	4	ALTIN
N46480	CB430M-100-D2-B.0-Z4	10MM	10MM	22MM	73MM	4	ALTIN
N46484	CB430M-120-D2-B.0-Z4	12MM	12MM	25MM	74MM	4	ALTIN

## CD430

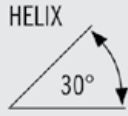


- General Purpose
- General machining for most material types
- Cutting Data - Page 207-208
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85618	CD430-0.125-XF3-S.3-Z4	1/8	3/8	3/8	3-1/16	4	UNCOATED	WELDON
N85640	CD430-0.125-XF3-S.3-Z4	1/8	3/8	3/8	3-1/16	4	TIALN	WELDON
N85619	CD430-0.156-XF3-S.3-Z4	5/32	3/8	7/16	3-1/8	4	UNCOATED	WELDON
N85641	CD430-0.156-XF3-S.3-Z4	5/32	3/8	7/16	3-1/8	4	TIALN	WELDON
N85620	CD430-0.188-XF3-S.3-Z4	3/16	3/8	1/2	3-1/4	4	UNCOATED	WELDON
N85642	CD430-0.188-XF3-S.3-Z4	3/16	3/8	1/2	3-1/4	4	TIALN	WELDON
N85621	CD430-0.219-XF3-S.3-Z4	7/32	3/8	9/16	3-3/8	4	UNCOATED	WELDON
N85643	CD430-0.219-XF3-S.3-Z4	7/32	3/8	9/16	3-3/8	4	TIALN	WELDON
N85622	CD430-0.250-XF3-S.3-Z4	1/4	3/8	5/8	3-3/8	4	UNCOATED	WELDON
N85644	CD430-0.250-XF3-S.3-Z4	1/4	3/8	5/8	3-3/8	4	TIALN	WELDON
N85623	CD430-0.281-XF2-S.3-Z4	9/32	3/8	11/16	3-1/2	4	UNCOATED	WELDON
N85645	CD430-0.281-XF2-S.3-Z4	9/32	3/8	11/16	3-1/2	4	TIALN	WELDON
N85624	CD430-0.313-XF2-S.3-Z4	5/16	3/8	3/4	3-1/2	4	UNCOATED	WELDON
N85646	CD430-0.313-XF2-S.3-Z4	5/16	3/8	3/4	3-1/2	4	TIALN	WELDON
N85625	CD430-0.344-XF2-S.3-Z4	11/32	3/8	3/4	3-1/2	4	UNCOATED	WELDON
N85647	CD430-0.344-XF2-S.3-Z4	11/32	3/8	3/4	3-1/2	4	TIALN	WELDON
N85626	CD430-0.375-XD2-S.3-Z4	3/8	3/8	3/4	3-1/2	4	UNCOATED	WELDON
N85648	CD430-0.375-XD2-S.3-Z4	3/8	3/8	3/4	3-1/2	4	TIALN	WELDON
N85627	CD430-0.438-XF2-S.3-Z4	7/16	1/2	7/8	4	4	UNCOATED	WELDON
N85649	CD430-0.438-XF2-S.3-Z4	7/16	1/2	7/8	4	4	TIALN	WELDON
N85628	CD430-0.500-XD2-S.3-Z4	1/2	1/2	1	4	4	UNCOATED	WELDON
N85650	CD430-0.500-XD2-S.3-Z4	1/2	1/2	1	4	4	TIALN	WELDON

## CSD430

SOLID  
CARBIDE



CENTER  
CUTTING

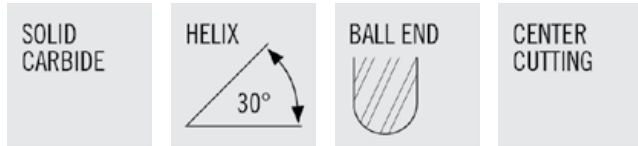


- General Purpose
- General machining for most material types
- Cutting Data - Page 207-208
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N89818	CSD430-0.031-XF2-S.0-Z4	1/32	1/8	1/16	1-1/2	4	UNCOATED	CYLINDRICAL
N89821	CSD430-0.031-XF2-S.0-Z4	1/32	1/8	1/16	1-1/2	4	TIALN	CYLINDRICAL
N89822	CSD430-0.047-XF2-S.0-Z4	3/64	1/8	3/32	1-1/2	4	UNCOATED	CYLINDRICAL
N89825	CSD430-0.047-XF2-S.0-Z4	3/64	1/8	3/32	1-1/2	4	TIALN	CYLINDRICAL
N89826	CSD430-0.063-XF2-S.0-Z4	1/16	1/8	1/8	1-1/2	4	UNCOATED	CYLINDRICAL
N89829	CSD430-0.063-XF2-S.0-Z4	1/16	1/8	1/8	1-1/2	4	TIALN	CYLINDRICAL
N89830	CSD430-0.078-XF2-S.0-Z4	5/64	1/8	1/8	1-1/2	4	UNCOATED	CYLINDRICAL
N89833	CSD430-0.078-XF2-S.0-Z4	5/64	1/8	1/8	1-1/2	4	TIALN	CYLINDRICAL
N89834	CSD430-0.094-XF2-S.0-Z4	3/32	1/8	3/16	1-1/2	4	UNCOATED	CYLINDRICAL
N89837	CSD430-0.094-XF2-S.0-Z4	3/32	1/8	3/16	1-1/2	4	TIALN	CYLINDRICAL
N89838	CSD430-0.109-XF2-S.0-Z4	7/64	1/8	3/16	1-1/2	4	UNCOATED	CYLINDRICAL
N89841	CSD430-0.109-XF2-S.0-Z4	7/64	1/8	3/16	1-1/2	4	TIALN	CYLINDRICAL
N89842	CSD430-0.125-XD2-S.0-Z4	1/8	1/8	1/4	1-1/2	4	UNCOATED	CYLINDRICAL
N89845	CSD430-0.125-XD2-S.0-Z4	1/8	1/8	1/4	1-1/2	4	TIALN	CYLINDRICAL
N89846	CSD430-0.141-XF2-S.0-Z4	9/64	3/16	5/16	2	4	UNCOATED	CYLINDRICAL
N89849	CSD430-0.141-XF2-S.0-Z4	9/64	3/16	5/16	2	4	TIALN	CYLINDRICAL
N89850	CSD430-0.156-XF2-S.0-Z4	5/32	3/16	5/16	2	4	UNCOATED	CYLINDRICAL
N89853	CSD430-0.156-XF2-S.0-Z4	5/32	3/16	5/16	2	4	TIALN	CYLINDRICAL
N89854	CSD430-0.172-XF2-S.0-Z4	11/64	3/16	5/16	2	4	UNCOATED	CYLINDRICAL
N89857	CSD430-0.172-XF2-S.0-Z4	11/64	3/16	5/16	2	4	TIALN	CYLINDRICAL
N89858	CSD430-0.188-XD2-S.0-Z4	3/16	3/16	3/8	2	4	UNCOATED	CYLINDRICAL
N89861	CSD430-0.188-XD2-S.0-Z4	3/16	3/16	3/8	2	4	TIALN	CYLINDRICAL
N89862	CSD430-0.203-XF2-S.0-Z4	13/64	1/4	1/2	2-1/2	4	UNCOATED	CYLINDRICAL
N89865	CSD430-0.203-XF2-S.0-Z4	13/64	1/4	1/2	2-1/2	4	TIALN	CYLINDRICAL
N89866	CSD430-0.219-XF2-S.0-Z4	7/32	1/4	1/2	2-1/2	4	UNCOATED	CYLINDRICAL
N89869	CSD430-0.219-XF2-S.0-Z4	7/32	1/4	1/2	2-1/2	4	TIALN	CYLINDRICAL
N89870	CSD430-0.234-XF2-S.0-Z4	15/64	1/4	1/2	2-1/2	4	UNCOATED	CYLINDRICAL
N89873	CSD430-0.234-XF2-S.0-Z4	15/64	1/4	1/2	2-1/2	4	TIALN	CYLINDRICAL
N89874	CSD430-0.250-XD2-S.0-Z4	1/4	1/4	1/2	2-1/2	4	UNCOATED	CYLINDRICAL
N89877	CSD430-0.250-XD2-S.0-Z4	1/4	1/4	1/2	2-1/2	4	TIALN	CYLINDRICAL
N89878	CSD430-0.281-XF2-S.0-Z4	9/32	5/16	1/2	2-1/2	4	UNCOATED	CYLINDRICAL
N89881	CSD430-0.281-XF2-S.0-Z4	9/32	5/16	1/2	2-1/2	4	TIALN	CYLINDRICAL
N89882	CSD430-0.313-XD2-S.0-Z4	5/16	5/16	1/2	2-1/2	4	UNCOATED	CYLINDRICAL
N89885	CSD430-0.313-XD2-S.0-Z4	5/16	5/16	1/2	2-1/2	4	TIALN	CYLINDRICAL
N89886	CSD430-0.344-XF2-S.0-Z4	11/32	3/8	9/16	2-1/2	4	UNCOATED	CYLINDRICAL
N89890	CSD430-0.375-XD2-S.0-Z4	3/8	3/8	9/16	2-1/2	4	UNCOATED	CYLINDRICAL
N89893	CSD430-0.375-XD2-S.0-Z4	3/8	3/8	9/16	2-1/2	4	TIALN	CYLINDRICAL
N89894	CSD430-0.438-XD1-S.0-Z4	7/16	7/16	9/16	2-3/4	4	UNCOATED	CYLINDRICAL
N89897	CSD430-0.438-XD1-S.0-Z4	7/16	7/16	9/16	2-3/4	4	TIALN	CYLINDRICAL
N89898	CSD430-0.500-XD1-S.0-Z4	1/2	1/2	5/8	3	4	UNCOATED	CYLINDRICAL
N89901	CSD430-0.500-XD1-S.0-Z4	1/2	1/2	5/8	3	4	TIALN	CYLINDRICAL

DISCOUNT CODE D42

## CSDB430

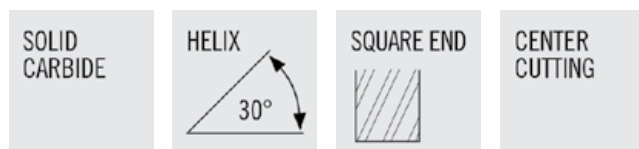


- General Purpose
- General machining for most material types
- Cutting Data - Page 209-210
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N89902	CSDB430-0.031-XF2-B.0-Z4	1/32	1/8	1/16	1-1/2	4	UNCOATED	CYLINDRICAL
N89905	CSDB430-0.031-XF2-B.0-Z4	1/32	1/8	1/16	1-1/2	4	TIALN	CYLINDRICAL
N89906	CSDB430-0.047-XF2-B.0-Z4	3/64	1/8	3/32	1-1/2	4	UNCOATED	CYLINDRICAL
N89909	CSDB430-0.047-XF2-B.0-Z4	3/64	1/8	3/32	1-1/2	4	TIALN	CYLINDRICAL
N89910	CSDB430-0.063-XF2-B.0-Z4	1/16	1/8	1/8	1-1/2	4	UNCOATED	CYLINDRICAL
N89913	CSDB430-0.063-XF2-B.0-Z4	1/16	1/8	1/8	1-1/2	4	TIALN	CYLINDRICAL
N89914	CSDB430-0.078-XF2-B.0-Z4	5/64	1/8	1/8	1-1/2	4	UNCOATED	CYLINDRICAL
N89917	CSDB430-0.078-XF2-B.0-Z4	5/64	1/8	1/8	1-1/2	4	TIALN	CYLINDRICAL
N89918	CSDB430-0.094-XF2-B.0-Z4	3/32	1/8	3/16	1-1/2	4	UNCOATED	CYLINDRICAL
N89921	CSDB430-0.094-XF2-B.0-Z4	3/32	1/8	3/16	1-1/2	4	TIALN	CYLINDRICAL
N89926	CSDB430-0.125-XD2-B.0-Z4	1/8	1/8	1/4	1-1/2	4	UNCOATED	CYLINDRICAL
N89929	CSDB430-0.125-XD2-B.0-Z4	1/8	1/8	1/4	1-1/2	4	TIALN	CYLINDRICAL
N89930	CSDB430-0.141-XF2-B.0-Z4	9/64	3/16	5/16	2	4	UNCOATED	CYLINDRICAL
N89933	CSDB430-0.141-XF2-B.0-Z4	9/64	3/16	5/16	2	4	TIALN	CYLINDRICAL
N89934	CSDB430-0.156-XF2-B.0-Z4	5/32	3/16	5/16	2	4	UNCOATED	CYLINDRICAL
N89937	CSDB430-0.156-XF2-B.0-Z4	5/32	3/16	5/16	2	4	TIALN	CYLINDRICAL
N89938	CSDB430-0.172-XF2-B.0-Z4	11/64	3/16	5/16	2	4	UNCOATED	CYLINDRICAL
N89941	CSDB430-0.172-XF2-B.0-Z4	11/64	3/16	5/16	2	4	TIALN	CYLINDRICAL
N89942	CSDB430-0.188-XD2-B.0-Z4	3/16	3/16	3/8	2	4	UNCOATED	CYLINDRICAL
N89945	CSDB430-0.188-XD2-B.0-Z4	3/16	3/16	3/8	2	4	TIALN	CYLINDRICAL
N89958	CSDB430-0.250-XD2-B.0-Z4	1/4	1/4	1/2	2-1/2	4	UNCOATED	CYLINDRICAL
N89961	CSDB430-0.250-XD2-B.0-Z4	1/4	1/4	1/2	2-1/2	4	TIALN	CYLINDRICAL
N89962	CSDB430-0.281-XF2-B.0-Z4	9/32	5/16	1/2	2-1/2	4	UNCOATED	CYLINDRICAL
N89965	CSDB430-0.281-XF2-B.0-Z4	9/32	5/16	1/2	2-1/2	4	TIALN	CYLINDRICAL
N89966	CSDB430-0.313-XD2-B.0-Z4	5/16	5/16	1/2	2-1/2	4	UNCOATED	CYLINDRICAL
N89969	CSDB430-0.313-XD2-B.0-Z4	5/16	5/16	1/2	2-1/2	4	TIALN	CYLINDRICAL
N89974	CSDB430-0.375-XD2-B.0-Z4	3/8	3/8	9/16	2-1/2	4	UNCOATED	CYLINDRICAL
N89977	CSDB430-0.375-XD2-B.0-Z4	3/8	3/8	9/16	2-1/2	4	TIALN	CYLINDRICAL
N89982	CSDB430-0.500-XD1-B.0-Z4	1/2	1/2	5/8	3	4	UNCOATED	CYLINDRICAL
N89985	CSDB430-0.500-XD1-B.0-Z4	1/2	1/2	5/8	3	4	TIALN	CYLINDRICAL



## CNC430

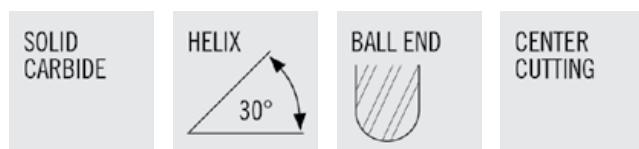


- General Purpose
- NC Tolerance
- General machining for most material types

- Cutting Data - Page 207-208
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85833	CNC430-0.125-D4-S.0-Z4	1/8	1/8	1/2	1-1/2	4	UNCOATED	CYLINDRICAL
N85861	CNC430-0.125-D4-S.0-Z4	1/8	1/8	1/2	1-1/2	4	TIALN	CYLINDRICAL
N85834	CNC430-0.156-F4-S.0-Z4	5/32	3/16	9/16	2	4	UNCOATED	CYLINDRICAL
N85862	CNC430-0.156-F4-S.0-Z4	5/32	3/16	9/16	2	4	TIALN	CYLINDRICAL
N85835	CNC430-0.188-D3-S.0-Z4	3/16	3/16	5/8	2	4	UNCOATED	CYLINDRICAL
N85863	CNC430-0.188-D3-S.0-Z4	3/16	3/16	5/8	2	4	TIALN	CYLINDRICAL
N85837	CNC430-0.250-D3-S.0-Z4	1/4	1/4	3/4	2-1/2	4	UNCOATED	CYLINDRICAL
N85865	CNC430-0.250-D3-S.0-Z4	1/4	1/4	3/4	2-1/2	4	TIALN	CYLINDRICAL
N85839	CNC430-0.313-D3-S.0-Z4	5/16	5/16	13/16	2-1/2	4	UNCOATED	CYLINDRICAL
N85867	CNC430-0.313-D3-S.0-Z4	5/16	5/16	13/16	2-1/2	4	TIALN	CYLINDRICAL
N85840	CNC430-0.375-D2-S.3-Z4	3/8	3/8	7/8	2-1/2	4	UNCOATED	WELDON
N85868	CNC430-0.375-D2-S.3-Z4	3/8	3/8	7/8	2-1/2	4	TIALN	WELDON
N85842	CNC430-0.500-D2-S.3-Z4	1/2	1/2	1	3	4	UNCOATED	WELDON
N85870	CNC430-0.500-D2-S.3-Z4	1/2	1/2	1	3	4	TIALN	WELDON
N85844	CNC430-0.625-D2-S.3-Z4	5/8	5/8	1-1/4	3-1/2	4	UNCOATED	WELDON
N85872	CNC430-0.625-D2-S.3-Z4	5/8	5/8	1-1/4	3-1/2	4	TIALN	WELDON
N85845	CNC430-0.750-D2-S.3-Z4	3/4	3/4	1-1/2	4	4	UNCOATED	WELDON
N85873	CNC430-0.750-D2-S.3-Z4	3/4	3/4	1-1/2	4	4	TIALN	WELDON
N85846	CNC430-1.000-D2-S.3-Z4	1	1	1-1/2	4	4	UNCOATED	WELDON
N85874	CNC430-1.000-D2-S.3-Z4	1	1	1-1/2	4	4	TIALN	WELDON

## CNCB430



- General Purpose
- NC Tolerance
- General machining for most material types

- Cutting Data - Page 209-210
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	SHANK TYPE
N85906	CNCB430-0.188-D3-B.0-Z4	3/16	3/16	5/8	2	4	TIALN	CYLINDRICAL
N85908	CNCB430-0.250-D3-B.0-Z4	1/4	1/4	3/4	2-1/2	4	TIALN	CYLINDRICAL
N85910	CNCB430-0.313-D3-B.0-Z4	5/16	5/16	13/16	2-1/2	4	TIALN	CYLINDRICAL
N85911	CNCB430-0.375-D2-B.3-Z4	3/8	3/8	7/8	2-1/2	4	TIALN	WELDON
N85913	CNCB430-0.500-D2-B.3-Z4	1/2	1/2	1	3	4	TIALN	WELDON

# CUTTING DATA - GENERAL PURPOSE SOLID CARBIDE

## C230 / G230R / CNC230 / CD230 / CSD230 - START VALUES

SLOTTING													
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 2							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	0.30	1.00	400	n (rev/min)	24448	12224	6112	4075	3056	2445	2037	1528
					f <sub>z</sub> (in)	0.0002	0.0005	0.0009	0.0014	0.0018	0.0023	0.0027	0.0036
				340 - 460	v <sub>f</sub> (in/min)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
	E 3 - 4	0.20	1.00	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				140 - 260	v <sub>f</sub> (in/min)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
	E 5 - 6	0.20	1.00	100	n (rev/min)	6112	3056	1528	1019	764	611	509	382
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0010	0.0012	0.0014	0.0019
				40 - 160	v <sub>f</sub> (in/min)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
M	E 8 - 9	0.50	1.00	320	n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018
				290 - 350	v <sub>f</sub> (in/min)	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
	E 10 - 11	0.30	1.00	250	n (rev/min)	15280	7640	3820	2547	1910	1528	1273	955
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0016
				220 - 280	v <sub>f</sub> (in/min)	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
K	E 12 - 13	0.30	1.00	270	n (rev/min)	16502	8251	4126	2750	2063	1650	1375	1031
					f <sub>z</sub> (in)	0.0003	0.0006	0.0012	0.0017	0.0023	0.0029	0.0035	0.0046
				210 - 330	v <sub>f</sub> (in/min)	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
	E 14 - 15	0.20	1.00	145	n (rev/min)	8862	4431	2216	1477	1108	886	739	554
					f <sub>z</sub> (in)	0.0002	0.0003	0.0007	0.0010	0.0014	0.0017	0.0020	0.0027
				85 - 205	v <sub>f</sub> (in/min)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
N	E / M / A 16	1.00	1.00	700	n (rev/min)	42784	21392	10696	7131	5348	4278	3565	2674
					f <sub>z</sub> (in)	0.0005	0.0009	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072
				400 - 1000	v <sub>f</sub> (in/min)	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5
	E / M / A 17	1.00	1.00	700	n (rev/min)	42784	21392	10696	7131	5348	4278	3565	2674
					f <sub>z</sub> (in)	0.0005	0.0009	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072
				400 - 1000	v <sub>f</sub> (in/min)	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5
S	E 19	0.30	1.00	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				50 - 110	v <sub>f</sub> (in/min)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	E 20	0.30	1.00	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				50 - 110	v <sub>f</sub> (in/min)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	E 21	0.30	1.00	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				50 - 110	v <sub>f</sub> (in/min)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	E 22	0.30	1.00	140	n (rev/min)	8557	4278	2139	1426	1070	856	713	535
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				80 - 200	v <sub>f</sub> (in/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE SOLID CARBIDE

## C230 / G230R / CNC230 / CD230 / CSD230 - START VALUES

SIDE MILLING - ROUGHING															
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 2									
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1		
P	E 1 - 2	1.00	0.25	400	-	460	n (rev/min)	24448	12224	6112	4075	3056	2445	2037	1528
							f <sub>z</sub> (in)	0.0003	0.0006	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045
	E 3 - 4	1.00	0.25	200	-	260	v <sub>f</sub> (in/min)	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
							n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
	E 5 - 6	1.00	0.20	100	-	160	f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
							v <sub>f</sub> (in/min)	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
E 8 - 9	0.50	0.20	320	-	350	n (rev/min)	6112	3056	1528	1019	764	611	509	382	
						f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024	
E 10 - 11	0.30	0.20	250	-	280	v <sub>f</sub> (in/min)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
						n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222	
E 12 - 13	1.00	0.25	270	-	330	f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022	
						v <sub>f</sub> (in/min)	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	
E 14 - 15	0.50	0.25	145	-	205	n (rev/min)	15280	7640	3820	2547	1910	1528	1273	955	
						f <sub>z</sub> (in)	0.0001	0.0003	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020	
E 16 - 17	2.00	0.05	700	-	1000	v <sub>f</sub> (in/min)	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	
						n (rev/min)	16502	8251	4126	2750	2063	1650	1375	1031	
E 18 - 19	0.50	0.25	210	-	330	f <sub>z</sub> (in)	0.0004	0.0007	0.0015	0.0022	0.0029	0.0036	0.0044	0.0058	
						v <sub>f</sub> (in/min)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
E 20 - 21	2.00	0.05	700	-	1000	n (rev/min)	8862	4431	2216	1477	1108	886	739	554	
						f <sub>z</sub> (in)	0.0002	0.0004	0.0009	0.0013	0.0017	0.0021	0.0026	0.0034	
E 22 - 23	0.50	0.25	85	-	205	v <sub>f</sub> (in/min)	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	
						n (rev/min)	42784	21392	10696	7131	5348	4278	3565	2674	
E 24 - 25	2.00	0.05	400	-	1000	f <sub>z</sub> (in)	0.0006	0.0011	0.0023	0.0034	0.0045	0.0056	0.0068	0.0090	
						v <sub>f</sub> (in/min)	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	
E 26 - 27	2.00	0.05	700	-	1000	n (rev/min)	42784	21392	10696	7131	5348	4278	3565	2674	
						f <sub>z</sub> (in)	0.0006	0.0011	0.0023	0.0034	0.0045	0.0056	0.0068	0.0090	
E 28 - 29	400	-	1000	-	1000	v <sub>f</sub> (in/min)	48.1	48.1	48.1	48.1	48.1	48.1	48.1	48.1	
						n (rev/min)	4890	2445	1222	815	611	489	407	306	
E 30 - 31	0.20	0.05	80	-	110	f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	
						v <sub>f</sub> (in/min)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
E 32 - 33	0.20	0.05	80	-	110	n (rev/min)	4890	2445	1222	815	611	489	407	306	
						f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	
E 34 - 35	0.20	0.05	80	-	110	v <sub>f</sub> (in/min)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
						n (rev/min)	4890	2445	1222	815	611	489	407	306	
E 36 - 37	0.30	0.15	140	-	200	f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028	
						v <sub>f</sub> (in/min)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
E 38 - 39	0.30	0.15	140	-	200	n (rev/min)	8557	4278	2139	1426	1070	856	713	535	
						f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028	
E 40 - 41	0.30	0.15	140	-	200	v <sub>f</sub> (in/min)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## CB230 / CNCB230 / CSDB230 - START VALUES

SLOTTING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 2							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	0.50	1.00	320	n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222
					f <sub>z</sub> (in)	0.0002	0.0005	0.0009	0.0014	0.0018	0.0023	0.0027	0.0036
				260 - 380	v <sub>f</sub> (in/min)	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
	E 3 - 4	0.40	1.00	160	n (rev/min)	9779	4890	2445	1630	1222	978	815	611
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				100 - 220	v <sub>f</sub> (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
	E 5 - 6	0.30	1.00	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0010	0.0012	0.0014	0.0019
				20 - 140	v <sub>f</sub> (in/min)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
M	E 8 - 9	0.50	1.00	256	n (rev/min)	15647	7823	3912	2608	1956	1565	1304	978
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018
				226 - 286	v <sub>f</sub> (in/min)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
	E 10 - 11	0.40	1.00	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0016
				170 - 230	v <sub>f</sub> (in/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
K	E 12 - 13	0.50	1.00	216	n (rev/min)	13202	6601	3300	2200	1650	1320	1100	825
					f <sub>z</sub> (in)	0.0003	0.0006	0.0012	0.0017	0.0023	0.0029	0.0035	0.0046
				156 - 276	v <sub>f</sub> (in/min)	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
	E 14 - 15	0.30	1.00	116	n (rev/min)	7090	3545	1772	1182	886	709	591	443
					f <sub>z</sub> (in)	0.0002	0.0003	0.0007	0.0010	0.0014	0.0017	0.0020	0.0027
				56 - 176	v <sub>f</sub> (in/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
N	E / M / A 16	1.00	1.00	560	n (rev/min)	34227	17114	8557	5705	4278	3423	2852	2139
					f <sub>z</sub> (in)	0.0005	0.0009	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072
				260 - 860	v <sub>f</sub> (in/min)	30.8	30.8	30.8	30.8	30.8	30.8	30.8	30.8
	E / M / A 17	1.00	1.00	560	n (rev/min)	34227	17114	8557	5705	4278	3423	2852	2139
					f <sub>z</sub> (in)	0.0005	0.0009	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072
				260 - 860	v <sub>f</sub> (in/min)	30.8	30.8	30.8	30.8	30.8	30.8	30.8	30.8
S	E 19	0.20	1.00	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				40 - 100	v <sub>f</sub> (in/min)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	E 20	0.20	1.00	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				40 - 100	v <sub>f</sub> (in/min)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	E 21	0.20	1.00	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				40 - 100	v <sub>f</sub> (in/min)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	E 22	0.30	1.00	112	n (rev/min)	6845	3423	1711	1141	856	685	570	428
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				52 - 172	v <sub>f</sub> (in/min)	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9

SMG = Seco Material Group  
n [min-1] = RPM  
v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
a<sub>p</sub>/D<sub>c</sub> = % of diameter  
v<sub>f</sub> [in/min] = Feed rate  
a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
All cutting data are start values. All cutting data is in inch values.  
Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE SOLID CARBIDE

## CB230 / CNCB230 / CSDB230 - START VALUES

SIDE MILLING - ROUGHING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 2							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	1.00	0.30	320	n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222
					f <sub>z</sub> (in)	0.0003	0.0006	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045
					v <sub>f</sub> (in/min)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
	E 3 - 4	1.00	0.30	160	n (rev/min)	9779	4890	2445	1630	1222	978	815	611
					f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
					v <sub>f</sub> (in/min)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
	E 5 - 6	1.00	0.20	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
					v <sub>f</sub> (in/min)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
M	E 8 - 9	0.50	0.30	256	n (rev/min)	15647	7823	3912	2608	1956	1565	1304	978
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
					v <sub>f</sub> (in/min)	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
	E 10 - 11	0.30	0.20	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0001	0.0003	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020
					v <sub>f</sub> (in/min)	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
K	E 12 - 13	1.00	0.50	216	n (rev/min)	13202	6601	3300	2200	1650	1320	1100	825
					f <sub>z</sub> (in)	0.0004	0.0007	0.0015	0.0022	0.0029	0.0036	0.0044	0.0058
					v <sub>f</sub> (in/min)	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
	E 14 - 15	0.50	0.30	116	n (rev/min)	7090	3545	1772	1182	886	709	591	443
					f <sub>z</sub> (in)	0.0002	0.0004	0.0009	0.0013	0.0017	0.0021	0.0026	0.0034
					v <sub>f</sub> (in/min)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
N	E / M / A 16	2.00	0.50	560	n (rev/min)	34227	17114	8557	5705	4278	3423	2852	2139
					f <sub>z</sub> (in)	0.0006	0.0011	0.0023	0.0034	0.0045	0.0056	0.0068	0.0090
					v <sub>f</sub> (in/min)	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5
	E / M / A 17	2.00	0.50	560	n (rev/min)	34227	17114	8557	5705	4278	3423	2852	2139
					f <sub>z</sub> (in)	0.0006	0.0011	0.0023	0.0034	0.0045	0.0056	0.0068	0.0090
					v <sub>f</sub> (in/min)	38.5	38.5	38.5	38.5	38.5	38.5	38.5	38.5
S	E 19	0.20	0.10	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
					v <sub>f</sub> (in/min)	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
	E 20	0.20	0.10	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
					v <sub>f</sub> (in/min)	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
	E 21	0.20	0.10	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
					v <sub>f</sub> (in/min)	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
	E 22	0.30	0.20	112	n (rev/min)	6845	3423	1711	1141	856	685	570	428
					f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
					v <sub>f</sub> (in/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## C230M - START VALUES

		SLOTTING															
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 2											
						1	2	3	4	6	8	10	12	14	16	18	
P	E 1 - 2	0.30	1.00	400	n [min-1]	38811	19406	12937	9703	6469	4851	3881	3234	2772	2426	2156	
					fz [in]	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	
					vf [in/min]	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
	E 3 - 4	0.20	1.00	200	n [min-1]	19406	9703	6469	4851	3234	2426	1941	1617	1386	1213	1078	
					fz [in]	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	
					vf [in/min]	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
	E 5 - 6	0.20	1.00	100	n [min-1]	9703	4851	3234	2426	1617	1213	970	809	693	606	539	
					fz [in]	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	
					vf [in/min]	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
M	E 8 - 9	0.50	1.00	320	n [min-1]	31049	15524	10350	7762	5175	3881	3105	2587	2218	1941	1725	
					fz [in]	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	
					vf [in/min]	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
	E 10 - 11	0.30	1.00	250	n [min-1]	24257	12129	8086	6064	4043	3032	2426	2021	1733	1516	1348	
					fz [in]	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	
					vf [in/min]	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
K	E 12 - 13	0.30	1.00	270	n [min-1]	26198	13099	8733	6549	4366	3275	2620	2183	1871	1637	1455	
					fz [in]	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	
					vf [in/min]	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
	E 14 - 15	0.20	1.00	145	n [min-1]	14069	7035	4690	3517	2345	1759	1407	1172	1005	879	782	
					fz [in]	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	
					vf [in/min]	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
N	E / M / A 16	1.00	1.00	700	n [min-1]	67920	33960	22640	16980	11320	8490	6792	5660	4851	4245	3773	
					fz [in]	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	
					vf [in/min]	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3
	E / M / A 17	1.00	1.00	700	n [min-1]	67920	33960	22640	16980	11320	8490	6792	5660	4851	4245	3773	
					fz [in]	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	
					vf [in/min]	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3
S	E 19	0.30	1.00	80	n [min-1]	7762	3881	2587	1941	1294	970	776	647	554	485	431	
					fz [in]	0.0036	0.0072	0.0108	0.0144	0.0216	0.0288	0.0360	0.0432	0.0504	0.0576	0.0648	
					vf [in/min]	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
					50	-	110										
	E 20	0.30	1.00	80	n [min-1]	7762	3881	2587	1941	1294	970	776	647	554	485	431	
					fz [in]	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	
					vf [in/min]	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
					50	-	110										
	E 21	0.30	1.00	80	n [min-1]	7762	3881	2587	1941	1294	970	776	647	554	485	431	
					fz [in]	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	
					vf [in/min]	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
					50	-	110										
E 22	0.30	1.00	140	n [min-1]	13584	6792	4528	3396	2264	1698	1358	1132	970	849	755		
				fz [in]	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026		
				vf [in/min]	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	
				80	-	200											

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE SOLID CARBIDE

## C230M - START VALUES

		SIDE MILLING - ROUGHING														
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 2										
						1	2	3	4	6	8	10	12	14	16	18
P	E 1 - 2	1.00	0.25	400	n (min-1)	38811	19406	12937	9703	6469	4851	3881	3234	2772	2426	2156
					fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
					vf (in/min)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
	E 3 - 4	1.00	0.25	200	n (min-1)	19406	9703	6469	4851	3234	2426	1941	1617	1386	1213	1078
					fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
					vf (in/min)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
	E 5 - 6	1.00	0.20	100	n (min-1)	9703	4851	3234	2426	1617	1213	970	809	693	606	539
					fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
					vf (in/min)	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
M	E 8 - 9	0.50	0.20	320	n (min-1)	31049	15524	10350	7762	5175	3881	3105	2587	2218	1941	1725
					fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
					vf (in/min)	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
	E 10 - 11	0.30	0.20	250	n (min-1)	24257	12129	8086	6064	4043	3032	2426	2021	1733	1516	1348
					fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
					vf (in/min)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
K	E 12 - 13	1.00	0.25	270	n (min-1)	26198	13099	8733	6549	4366	3275	2620	2183	1871	1637	1455
					fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
					vf (in/min)	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
	E 14 - 15	0.50	0.25	145	n (min-1)	14069	7035	4690	3517	2345	1759	1407	1172	1005	879	782
					fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
					vf (in/min)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
N	E / M / A 16	2.00	0.05	700	n (min-1)	67920	33960	22640	16980	11320	8490	6792	5660	4851	4245	3773
					fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
					vf (in/min)	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3
	E / M / A 17	2.00	0.05	700	n (min-1)	67920	33960	22640	16980	11320	8490	6792	5660	4851	4245	3773
					fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
					vf (in/min)	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3
S	E 19	0.20	0.05	80	n (min-1)	7762	3881	2587	1941	1294	970	776	647	554	485	431
					fz (in)	0.0036	0.0072	0.0108	0.0144	0.0216	0.0288	0.0360	0.0432	0.0504	0.0576	0.0648
					vf (in/min)	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9
					50 - 110											
	E 20	0.20	0.05	80	n (min-1)	7762	3881	2587	1941	1294	970	776	647	554	485	431
					fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
					vf (in/min)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
					50 - 110											
	E 21	0.20	0.05	80	n (min-1)	7762	3881	2587	1941	1294	970	776	647	554	485	431
					fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026
					vf (in/min)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
					50 - 110											
E 22	0.30	0.15	140	n (min-1)	13584	6792	4528	3396	2264	1698	1358	1132	970	849	755	
				fz (in)	0.0001	0.0003	0.0004	0.0006	0.0009	0.0011	0.0014	0.0017	0.0020	0.0023	0.0026	
				vf (in/min)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	
				80 - 200												

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## CB230M - START VALUES

SLOTTING															
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 2								
							1	2	3	4	5	6	8		
P	E 1 - 2	0.50	1.00	320	260	-	380	n (min-1)	31049	15524	10350	7762	6210	5175	3881
								fz (in)	0.0001	0.0003	0.0004	0.0006	0.0007	0.0009	0.0011
								vf (in/min)	8.8	8.8	8.8	8.8	8.8	8.8	8.8
	E 3 - 4	0.40	1.00	160	100	-	220	n (min-1)	15524	7762	5175	3881	3105	2587	1941
								fz (in)	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0007
								vf (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7
	E 5 - 6	0.30	1.00	80	20	-	140	n (min-1)	7762	3881	2587	1941	1552	1294	970
								fz (in)	0.0001	0.0001	0.0002	0.0003	0.0004	0.0004	0.0006
								vf (in/min)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
M	E 8 - 9	0.50	1.00	255	225	-	285	n (min-1)	24742	12371	8247	6186	4948	4124	3093
								fz (in)	0.0001	0.0001	0.0002	0.0003	0.0004	0.0004	0.0006
								vf (in/min)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
	E 10 - 11	0.40	1.00	200	170	-	230	n (min-1)	19406	9703	6469	4851	3881	3234	2426
								fz (in)	0.0001	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005
								vf (in/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4
K	E 12 - 13	0.50	1.00	215	155	-	275	n (min-1)	20861	10431	6954	5215	4172	3477	2608
								fz (in)	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
								vf (in/min)	7.6	7.6	7.6	7.6	7.6	7.6	7.6
	E 14 - 15	0.30	1.00	115	55	-	175	n (min-1)	11158	5579	3719	2790	2232	1860	1395
								fz (in)	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0009
								vf (in/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4
N	E / M / A 16	1.00	1.00	560	260	-	860	n (min-1)	54336	27168	18112	13584	10867	9056	6792
								fz (in)	0.0003	0.0006	0.0009	0.0011	0.0014	0.0017	0.0023
								vf (in/min)	30.8	30.8	30.8	30.8	30.8	30.8	30.8
	E / M / A 17	1.00	1.00	560	260	-	860	n (min-1)	54336	27168	18112	13584	10867	9056	6792
								fz (in)	0.0003	0.0006	0.0009	0.0011	0.0014	0.0017	0.0023
								vf (in/min)	30.8	30.8	30.8	30.8	30.8	30.8	30.8
S	E 19	0.20	1.00	70	40	-	100	n (min-1)	6792	3396	2264	1698	1358	1132	849
								fz (in)	0.0024	0.0048	0.0072	0.0096	0.0120	0.0144	0.0192
								vf (in/min)	32.6	32.6	32.6	32.6	32.6	32.6	32.6
	E 20	0.20	1.00	70	40	-	100	n (min-1)	6792	3396	2264	1698	1358	1132	849
								fz (in)	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008
								vf (in/min)	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	E 21	0.20	1.00	70	40	-	100	n (min-1)	6792	3396	2264	1698	1358	1132	849
								fz (in)	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008
								vf (in/min)	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	E 22	0.30	1.00	110	50	-	170	n (min-1)	10673	5337	3558	2668	2135	1779	1334
								fz (in)	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0007
								vf (in/min)	1.8	1.8	1.8	1.8	1.8	1.8	1.8

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter

vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## CB230M - START VALUES

SIDE MILLING - ROUGHING															
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 2								
							1	2	3	4	5	6	8		
P	E 1 - 2	1.00	0.30	320	260	-	380	n (min-1)	31049	15524	10350	7762	6210	5175	3881
								fz (in)	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014
								vf (in/min)	11.0	11.0	11.0	11.0	11.0	11.0	11.0
	E 3 - 4	1.00	0.30	160	100	-	220	n (min-1)	15524	7762	5175	3881	3105	2587	1941
								fz (in)	0.0001	0.0002	0.0003	0.0004	0.0006	0.0007	0.0009
								vf (in/min)	3.4	3.4	3.4	3.4	3.4	3.4	3.4
	E 5 - 6	1.00	0.20	80	20	-	140	n (min-1)	7762	3881	2587	1941	1552	1294	970
								fz (in)	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008
								vf (in/min)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
M	E 8 - 9	0.50	0.30	255	225	-	285	n (min-1)	24742	12371	8247	6186	4948	4124	3093
								fz (in)	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0007
								vf (in/min)	4.3	4.3	4.3	4.3	4.3	4.3	4.3
	E 10 - 11	0.30	0.20	200	170	-	230	n (min-1)	19406	9703	6469	4851	3881	3234	2426
								fz (in)	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006
								vf (in/min)	3.1	3.1	3.1	3.1	3.1	3.1	3.1
K	E 12 - 13	1.00	0.50	215	155	-	275	n (min-1)	20861	10431	6954	5215	4172	3477	2608
								fz (in)	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018
								vf (in/min)	9.5	9.5	9.5	9.5	9.5	9.5	9.5
	E 14 - 15	0.50	0.30	115	55	-	175	n (min-1)	11158	5579	3719	2790	2232	1860	1395
								fz (in)	0.0001	0.0003	0.0004	0.0005	0.0007	0.0008	0.0011
								vf (in/min)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
N	E / M / A 16	2.00	0.50	560	260	-	860	n (min-1)	54336	27168	18112	13584	10867	9056	6792
								fz (in)	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
								vf (in/min)	38.5	38.5	38.5	38.5	38.5	38.5	38.5
	E / M / A 17	2.00	0.50	560	260	-	860	n (min-1)	54336	27168	18112	13584	10867	9056	6792
								fz (in)	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
								vf (in/min)	38.5	38.5	38.5	38.5	38.5	38.5	38.5
S	E 19	0.20	0.10	70	40	-	100	n (min-1)	6792	3396	2264	1698	1358	1132	849
								fz (in)	0.0030	0.0060	0.0090	0.0120	0.0150	0.0180	0.0240
								vf (in/min)	40.8	40.8	40.8	40.8	40.8	40.8	40.8
	E 20	0.20	0.10	70	40	-	100	n (min-1)	6792	3396	2264	1698	1358	1132	849
								fz (in)	0.0001	0.0002	0.0004	0.0005	0.0006	0.0007	0.0009
								vf (in/min)	1.6	1.6	1.6	1.6	1.6	1.6	1.6
	E 21	0.20	0.10	70	40	-	100	n (min-1)	6792	3396	2264	1698	1358	1132	849
								fz (in)	0.0001	0.0002	0.0004	0.0005	0.0006	0.0007	0.0009
								vf (in/min)	1.6	1.6	1.6	1.6	1.6	1.6	1.6
	E 22	0.30	0.20	110	50	-	170	n (min-1)	10673	5337	3558	2668	2135	1779	1334
								fz (in)	0.0001	0.0002	0.0003	0.0004	0.0006	0.0007	0.0009
								vf (in/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## C330 - START VALUES

SLOTTING															
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		n (rev/min)	Z <sub>n</sub> = 3								
							1/16	1/8	1/4	3/8	1/2	5/8	3/4	1	
P	E 1 - 2	0.50	1.00	400	-	460	n (rev/min)	24448	12224	6112	4075	3056	2445	2037	1528
							f <sub>z</sub> (in)	0.0002	0.0005	0.0009	0.0014	0.0018	0.0023	0.0027	0.0036
				v <sub>f</sub> (in/min)	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5		
	E 3 - 4	0.40	1.00	200	-	260	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
							f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				v <sub>f</sub> (in/min)	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1		
E 5 - 6	0.30	1.00	100	-	160	n (rev/min)	6112	3056	1528	1019	764	611	509	382	
						f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0010	0.0012	0.0014	0.0019	
			v <sub>f</sub> (in/min)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2			
M	E 8 - 9	0.50	1.00	320	-	350	n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222
							f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018
	v <sub>f</sub> (in/min)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5					
	E 10 - 11	0.40	1.00	290	-	320	n (rev/min)	17725	8862	4431	2954	2216	1772	1477	1108
f <sub>z</sub> (in)							0.0001	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0016	
v <sub>f</sub> (in/min)	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3						
K	E 12 - 13	0.50	1.00	270	-	330	n (rev/min)	16502	8251	4126	2750	2063	1650	1375	1031
							f <sub>z</sub> (in)	0.0003	0.0006	0.0012	0.0017	0.0023	0.0029	0.0035	0.0046
	v <sub>f</sub> (in/min)	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4					
	E 14 - 15	0.30	1.00	145	-	205	n (rev/min)	8862	4431	2216	1477	1108	886	739	554
f <sub>z</sub> (in)							0.0002	0.0003	0.0007	0.0010	0.0014	0.0017	0.0020	0.0027	
v <sub>f</sub> (in/min)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5						
N	E / M / A 16	1.00	1.00	700	-	1000	n (rev/min)	42784	21392	10696	7131	5348	4278	3565	2674
							f <sub>z</sub> (in)	0.0005	0.0009	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072
	v <sub>f</sub> (in/min)	57.8	57.8	57.8	57.8	57.8	57.8	57.8	57.8	57.8					
	E / M / A 17	1.00	1.00	700	-	1000	n (rev/min)	42784	21392	10696	7131	5348	4278	3565	2674
f <sub>z</sub> (in)							0.0005	0.0009	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	
v <sub>f</sub> (in/min)	57.8	57.8	57.8	57.8	57.8	57.8	57.8	57.8	57.8						
S	E 19	0.20	1.00	80	-	110	n (rev/min)	4890	2445	1222	815	611	489	407	306
							f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				v <sub>f</sub> (in/min)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2			
	E 20	0.20	1.00	80	-	110	n (rev/min)	4890	2445	1222	815	611	489	407	306
							f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				v <sub>f</sub> (in/min)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2			
	E 21	0.20	1.00	80	-	110	n (rev/min)	4890	2445	1222	815	611	489	407	306
							f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
v <sub>f</sub> (in/min)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2							
E 22	0.30	1.00	130	-	190	n (rev/min)	7946	3973	1986	1324	993	795	662	497	
						f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022	
			v <sub>f</sub> (in/min)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3				

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE SOLID CARBIDE

## C330 - START VALUES

SIDE MILLING - ROUGHING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	1.00	0.30	400	n (rev/min)	24448	12224	6112	4075	3056	2445	2037	1528
					f <sub>z</sub> (in)	0.0003	0.0006	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045
				340 - 460	v <sub>f</sub> (in/min)	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6
	E 3 - 4	1.00	0.30	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
				140 - 260	v <sub>f</sub> (in/min)	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
	E 5 - 6	1.00	0.20	100	n (rev/min)	6112	3056	1528	1019	764	611	509	382
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				40 - 160	v <sub>f</sub> (in/min)	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
M	E 8 - 9	0.50	0.30	320	n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				290 - 350	v <sub>f</sub> (in/min)	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
	E 10 - 11	0.30	0.20	290	n (rev/min)	17725	8862	4431	2954	2216	1772	1477	1108
					f <sub>z</sub> (in)	0.0001	0.0003	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020
				260 - 320	v <sub>f</sub> (in/min)	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
K	E 12 - 13	1.00	0.50	270	n (rev/min)	16502	8251	4126	2750	2063	1650	1375	1031
					f <sub>z</sub> (in)	0.0004	0.0007	0.0015	0.0022	0.0029	0.0036	0.0044	0.0058
				210 - 330	v <sub>f</sub> (in/min)	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9
	E 14 - 15	0.50	0.30	145	n (rev/min)	8862	4431	2216	1477	1108	886	739	554
					f <sub>z</sub> (in)	0.0002	0.0004	0.0009	0.0013	0.0017	0.0021	0.0026	0.0034
				85 - 205	v <sub>f</sub> (in/min)	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
N	E / M / A 16	2.00	0.50	700	n (rev/min)	42784	21392	10696	7131	5348	4278	3565	2674
					f <sub>z</sub> (in)	0.0006	0.0011	0.0023	0.0034	0.0045	0.0056	0.0068	0.0090
				400 - 1000	v <sub>f</sub> (in/min)	72.2	72.2	72.2	72.2	72.2	72.2	72.2	72.2
	E / M / A 17	2.00	0.50	700	n (rev/min)	42784	21392	10696	7131	5348	4278	3565	2674
					f <sub>z</sub> (in)	0.0006	0.0011	0.0023	0.0034	0.0045	0.0056	0.0068	0.0090
				400 - 1000	v <sub>f</sub> (in/min)	72.2	72.2	72.2	72.2	72.2	72.2	72.2	72.2
S	E 19	0.20	0.10	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
				50 - 110	v <sub>f</sub> (in/min)	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
	E 20	0.20	0.10	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
				50 - 110	v <sub>f</sub> (in/min)	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
	E 21	0.20	0.10	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
				50 - 110	v <sub>f</sub> (in/min)	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
	E 22	0.30	0.20	130	n (rev/min)	7946	3973	1986	1324	993	795	662	497
					f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
				70 - 190	v <sub>f</sub> (in/min)	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## C330M - START VALUES

SLOTTING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 3						
							1	3	6	8	10	11	
P	E 1 - 2	0.50	1.00	400	340	- 460	n (min-1)	38811	12937	6469	4851	3881	3528
							fz (in)	0.0001	0.0004	0.0009	0.0011	0.0014	0.0016
							vf (in/min)	16.5	16.5	16.5	16.5	16.5	16.5
	E 3 - 4	0.40	1.00	200	140	- 260	n (min-1)	19406	6469	3234	2426	1941	1764
							fz (in)	0.0001	0.0003	0.0005	0.0007	0.0009	0.0010
							vf (in/min)	5.1	5.1	5.1	5.1	5.1	5.1
E 5 - 6	0.30	1.00	100	40	- 160	n (min-1)	9703	3234	1617	1213	970	882	
						fz (in)	0.0001	0.0002	0.0005	0.0006	0.0008	0.0008	
						vf (in/min)	2.2	2.2	2.2	2.2	2.2	2.2	
M	E 8 - 9	0.50	1.00	320	290	- 350	n (min-1)	31049	10350	5175	3881	3105	2823
							fz (in)	0.0001	0.0002	0.0004	0.0006	0.0007	0.0008
	E 10 - 11	0.40	1.00	290	260	- 320	n (min-1)	28138	9379	4690	3517	2814	2558
							fz (in)	0.0001	0.0002	0.0004	0.0005	0.0006	0.0007
K	E 12 - 13	0.50	1.00	270	210	- 330	n (min-1)	26198	8733	4366	3275	2620	2382
							fz (in)	0.0002	0.0005	0.0011	0.0015	0.0018	0.0020
	E 14 - 15	0.30	1.00	145	85	- 205	n (min-1)	14069	4690	2345	1759	1407	1279
							fz (in)	0.0001	0.0003	0.0006	0.0009	0.0011	0.0012
N	E / M / A 16	1.00	1.00	700	400	- 1000	n (min-1)	67920	22640	11320	8490	6792	6175
							fz (in)	0.0003	0.0009	0.0017	0.0023	0.0028	0.0031
	E / M / A 17	1.00	1.00	700	400	- 1000	n (min-1)	67920	22640	11320	8490	6792	6175
							fz (in)	0.0003	0.0009	0.0017	0.0023	0.0028	0.0031
S	E 19	0.20	1.00	80	50	- 110	n (min-1)	7762	2587	1294	970	776	706
							fz (in)	0.0024	0.0072	0.0144	0.0192	0.0240	0.0264
							vf (in/min)	55.9	55.9	55.9	55.9	55.9	55.9
	E 20	0.20	1.00	80	50	- 110	n (min-1)	7762	2587	1294	970	776	706
							fz (in)	0.0001	0.0003	0.0006	0.0008	0.0009	0.0010
							vf (in/min)	2.2	2.2	2.2	2.2	2.2	2.2
	E 21	0.20	1.00	80	50	- 110	n (min-1)	7762	2587	1294	970	776	706
							fz (in)	0.0001	0.0003	0.0006	0.0008	0.0009	0.0010
E 22	0.30	1.00	130	70	- 180	n (min-1)	12614	4205	2102	1577	1261	1147	
						fz (in)	0.0001	0.0003	0.0005	0.0007	0.0009	0.0010	
						vf (in/min)	3.3	3.3	3.3	3.3	3.3	3.3	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter

vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE SOLID CARBIDE

## C330M - START VALUES

SIDE MILLING - ROUGHING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3							
						1	3	6	8	10	11		
P	E 1 - 2	1.00	0.30	400	340	- 460	n (min-1)	38811	12937	6469	4851	3881	3528
							fz (in)	0.0002	0.0005	0.0011	0.0014	0.0018	0.0019
							vf (in/min)	20.6	20.6	20.6	20.6	20.6	20.6
	E 3 - 4	1.00	0.30	200	140	- 260	n (min-1)	19406	6469	3234	2426	1941	1764
							fz (in)	0.0001	0.0003	0.0007	0.0009	0.0011	0.0012
							vf (in/min)	6.4	6.4	6.4	6.4	6.4	6.4
	E 5 - 6	1.00	0.20	100	40	- 160	n (min-1)	9703	3234	1617	1213	970	882
							fz (in)	0.0001	0.0003	0.0006	0.0008	0.0009	0.0010
							vf (in/min)	2.8	2.8	2.8	2.8	2.8	2.8
M	E 8 - 9	0.50	0.30	320	290	- 350	n (min-1)	31049	10350	5175	3881	3105	2823
							fz (in)	0.0001	0.0003	0.0005	0.0007	0.0009	0.0010
							vf (in/min)	8.1	8.1	8.1	8.1	8.1	8.1
	E 10 - 11	0.30	0.20	290	260	- 320	n (min-1)	28138	9379	4690	3517	2814	2558
							fz (in)	0.0001	0.0002	0.0005	0.0006	0.0008	0.0009
							vf (in/min)	6.6	6.6	6.6	6.6	6.6	6.6
K	E 12 - 13	1.00	0.50	270	210	- 330	n (min-1)	26198	8733	4366	3275	2620	2382
							fz (in)	0.0002	0.0007	0.0014	0.0018	0.0023	0.0025
							vf (in/min)	17.9	17.9	17.9	17.9	17.9	17.9
	E 14 - 15	0.50	0.30	145	85	- 205	n (min-1)	14069	4690	2345	1759	1407	1279
							fz (in)	0.0001	0.0004	0.0008	0.0011	0.0013	0.0015
							vf (in/min)	5.6	5.6	5.6	5.6	5.6	5.6
N	E / M / A 16	2.00	0.50	700	400	- 1000	n (min-1)	67920	22640	11320	8490	6792	6175
							fz (in)	0.0004	0.0011	0.0021	0.0028	0.0035	0.0039
							vf (in/min)	72.2	72.2	72.2	72.2	72.2	72.2
	E / M / A 17	2.00	0.50	700	400	- 1000	n (min-1)	67920	22640	11320	8490	6792	6175
							fz (in)	0.0004	0.0011	0.0021	0.0028	0.0035	0.0039
							vf (in/min)	72.2	72.2	72.2	72.2	72.2	72.2
S	E 19	0.20	0.10	80	50	- 110	n (min-1)	7762	2587	1294	970	776	706
							fz (in)	0.0030	0.0090	0.0180	0.0240	0.0300	0.0330
							vf (in/min)	69.9	69.9	69.9	69.9	69.9	69.9
	E 20	0.20	0.10	80	50	- 110	n (min-1)	7762	2587	1294	970	776	706
							fz (in)	0.0001	0.0004	0.0007	0.0009	0.0012	0.0013
							vf (in/min)	2.8	2.8	2.8	2.8	2.8	2.8
	E 21	0.20	0.10	80	50	- 110	n (min-1)	7762	2587	1294	970	776	706
							fz (in)	0.0001	0.0004	0.0007	0.0009	0.0012	0.0013
							vf (in/min)	2.8	2.8	2.8	2.8	2.8	2.8
	E 22	0.30	0.20	130	70	- 180	n (min-1)	12614	4205	2102	1577	1261	1147
							fz (in)	0.0001	0.0003	0.0007	0.0009	0.0011	0.0012
							vf (in/min)	4.2	4.2	4.2	4.2	4.2	4.2

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## CB330 - START VALUES

SLOTTING															
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		n (rev/min)	Z <sub>n</sub> = 3								
							1/16	1/8	1/4	3/8	1/2	5/8	3/4	1	
P	E 1-2	0.30	1.00	320	-	380	n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222
							f <sub>z</sub> (in)	0.0002	0.0005	0.0009	0.0014	0.0018	0.0023	0.0027	0.0036
				v <sub>f</sub> (in/min)	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2		
	E 3-4	0.20	1.00	150	-	210	n (rev/min)	9168	4584	2292	1528	1146	917	764	573
							f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				v <sub>f</sub> (in/min)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9		
E 5-6	0.20	1.00	80	-	140	n (rev/min)	4890	2445	1222	815	611	489	407	306	
						f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0010	0.0012	0.0014	0.0019	
			v <sub>f</sub> (in/min)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8			
M	E 8-9	0.60	1.00	240	-	270	n (rev/min)	14669	7334	3667	2445	1834	1467	1222	917
							f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018
	v <sub>f</sub> (in/min)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8					
	E 10-11	0.30	1.00	200	-	230	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
f <sub>z</sub> (in)							0.0001	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0016	
v <sub>f</sub> (in/min)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7					
K	E 12-13	0.40	1.00	200	-	260	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
							f <sub>z</sub> (in)	0.0003	0.0006	0.0012	0.0017	0.0023	0.0029	0.0035	0.0046
	v <sub>f</sub> (in/min)	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6					
	E 14-15	0.20	1.00	120	-	180	n (rev/min)	7334	3667	1834	1222	917	733	611	458
f <sub>z</sub> (in)							0.0002	0.0003	0.0007	0.0010	0.0014	0.0017	0.0020	0.0027	
v <sub>f</sub> (in/min)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7						
N	E / M / A 16	0.20	1.00	400	-	700	n (rev/min)	24448	12224	6112	4075	3056	2445	2037	1528
							f <sub>z</sub> (in)	0.0005	0.0009	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072
	v <sub>f</sub> (in/min)	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0					
	E / M / A 17	0.20	1.00	400	-	700	n (rev/min)	24448	12224	6112	4075	3056	2445	2037	1528
f <sub>z</sub> (in)							0.0005	0.0009	0.0018	0.0027	0.0036	0.0045	0.0054	0.0072	
v <sub>f</sub> (in/min)	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0						
S	E 19	0.10	1.00	60	-	90	n (rev/min)	3667	1834	917	611	458	367	306	229
							f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
	v <sub>f</sub> (in/min)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7						
	E 20	0.10	1.00	60	-	90	n (rev/min)	3667	1834	917	611	458	367	306	229
							f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
	v <sub>f</sub> (in/min)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7						
	E 21	0.10	1.00	60	-	90	n (rev/min)	3667	1834	917	611	458	367	306	229
							f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
v <sub>f</sub> (in/min)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7							
E 22	0.10	1.00	100	-	160	n (rev/min)	6112	3056	1528	1019	764	611	509	382	
						f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022	
v <sub>f</sub> (in/min)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6							

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE SOLID CARBIDE

## CB330 - START VALUES

SIDE MILLING - ROUGHING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	1.00	0.30	320	n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222
					f <sub>z</sub> (in)	0.0003	0.0006	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045
				260 - 380	v <sub>f</sub> (in/min)	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
	E 3 - 4	1.00	0.30	150	n (rev/min)	9168	4584	2292	1528	1146	917	764	573
					f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
				90 - 210	v <sub>f</sub> (in/min)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
	E 5 - 6	1.00	0.20	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				20 - 140	v <sub>f</sub> (in/min)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
M	E 8 - 9	1.00	0.30	240	n (rev/min)	14669	7334	3667	2445	1834	1467	1222	917
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				210 - 270	v <sub>f</sub> (in/min)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
	E 10 - 11	1.00	0.20	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0001	0.0003	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020
				170 - 230	v <sub>f</sub> (in/min)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
K	E 12 - 13	1.00	0.40	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0004	0.0007	0.0015	0.0022	0.0029	0.0036	0.0044	0.0058
				140 - 260	v <sub>f</sub> (in/min)	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3
	E 14 - 15	1.00	0.20	120	n (rev/min)	7334	3667	1834	1222	917	733	611	458
					f <sub>z</sub> (in)	0.0002	0.0004	0.0009	0.0013	0.0017	0.0021	0.0026	0.0034
				60 - 180	v <sub>f</sub> (in/min)	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
N	E / M / A 16	2.00	0.70	400	n (rev/min)	24448	12224	6112	4075	3056	2445	2037	1528
					f <sub>z</sub> (in)	0.0006	0.0011	0.0023	0.0034	0.0045	0.0056	0.0068	0.0090
				100 - 700	v <sub>f</sub> (in/min)	41.3	41.3	41.3	41.3	41.3	41.3	41.3	41.3
	E / M / A 17	2.00	0.70	400	n (rev/min)	24448	12224	6112	4075	3056	2445	2037	1528
					f <sub>z</sub> (in)	0.0006	0.0011	0.0023	0.0034	0.0045	0.0056	0.0068	0.0090
				100 - 700	v <sub>f</sub> (in/min)	41.3	41.3	41.3	41.3	41.3	41.3	41.3	41.3
S	E 19	0.50	0.30	60	n (rev/min)	3667	1834	917	611	458	367	306	229
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
				30 - 90	v <sub>f</sub> (in/min)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
	E 20	0.50	0.30	60	n (rev/min)	3667	1834	917	611	458	367	306	229
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
				30 - 90	v <sub>f</sub> (in/min)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
	E 21	0.50	0.30	60	n (rev/min)	3667	1834	917	611	458	367	306	229
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
				30 - 90	v <sub>f</sub> (in/min)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
	E 22	0.50	0.20	100	n (rev/min)	6112	3056	1528	1019	764	611	509	382
					f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
				40 - 160	v <sub>f</sub> (in/min)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## C360 - START VALUES

SIDE MILLING - ROUGHING															
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		n (rev/min)	Z <sub>n</sub> = 3								
							1/16	1/8	1/4	3/8	1/2	5/8	3/4	1	
P	E 1 - 2	1.00	0.15	340	-	460	n (rev/min)	24448	12224	6112	4075	3056	2445	2037	1528
							f <sub>z</sub> (in)	0.0003	0.0006	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045
	E 3 - 4	1.00	0.15	140	-	260	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
							f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
	E 5 - 6	1.00	0.15	40	-	160	n (rev/min)	6112	3056	1528	1019	764	611	509	382
							f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
M	E 8 - 9	0.50	0.15	290	-	350	n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222
							f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
	E 10 - 11	0.30	0.15	260	-	320	n (rev/min)	17725	8862	4431	2954	2216	1772	1477	1108
							f <sub>z</sub> (in)	0.0001	0.0003	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020
K	E 12 - 13	1.00	0.15	210	-	330	n (rev/min)	16502	8251	4126	2750	2063	1650	1375	1031
							f <sub>z</sub> (in)	0.0004	0.0007	0.0015	0.0022	0.0029	0.0036	0.0044	0.0058
	E 14 - 15	0.50	0.15	85	-	205	n (rev/min)	8862	4431	2216	1477	1108	886	739	554
							f <sub>z</sub> (in)	0.0002	0.0004	0.0009	0.0013	0.0017	0.0021	0.0026	0.0034
N	E / M / A 16	2.00	0.15	400	-	1000	n (rev/min)	42784	21392	10696	7131	5348	4278	3565	2674
							f <sub>z</sub> (in)	0.0006	0.0011	0.0023	0.0034	0.0045	0.0056	0.0068	0.0090
	E / M / A 17	2.00	0.15	400	-	1000	n (rev/min)	42784	21392	10696	7131	5348	4278	3565	2674
							f <sub>z</sub> (in)	0.0006	0.0011	0.0023	0.0034	0.0045	0.0056	0.0068	0.0090
S	E 19	0.20	0.15	50	-	110	n (rev/min)	4890	2445	1222	815	611	489	407	306
							f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
	E 20	0.20	0.15	50	-	110	n (rev/min)	4890	2445	1222	815	611	489	407	306
							f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
	E 21	0.20	0.15	50	-	110	n (rev/min)	4890	2445	1222	815	611	489	407	306
							f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
	E 22	0.30	0.15	70	-	190	n (rev/min)	7946	3973	1986	1324	993	795	662	497
							f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
							v <sub>f</sub> (in/min)	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## C430 / C430R / CNC430 / CD430 / CSD430 - START VALUES

SLOTTING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	0.50	1.00	400	n (rev/min)	24448	12224	6112	4075	3056	2445	2037	1528
					f <sub>z</sub> (in)	0.0002	0.0005	0.0009	0.0014	0.0018	0.0023	0.0027	0.0036
				340 - 460	v <sub>f</sub> (in/min)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
	E 3 - 4	0.40	1.00	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				140 - 260	v <sub>f</sub> (in/min)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
	E 5 - 6	0.30	1.00	100	n (rev/min)	6112	3056	1528	1019	764	611	509	382
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0010	0.0012	0.0014	0.0019
				40 - 160	v <sub>f</sub> (in/min)	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
M	E 8 - 9	0.50	1.00	320	n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018
				290 - 350	v <sub>f</sub> (in/min)	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
	E 10 - 11	0.40	1.00	250	n (rev/min)	15280	7640	3820	2547	1910	1528	1273	955
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0016
				220 - 280	v <sub>f</sub> (in/min)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
K	E 12 - 13	0.50	1.00	270	n (rev/min)	16502	8251	4126	2750	2063	1650	1375	1031
					f <sub>z</sub> (in)	0.0003	0.0006	0.0012	0.0017	0.0023	0.0029	0.0035	0.0046
				210 - 330	v <sub>f</sub> (in/min)	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1
	E 14 - 15	0.30	1.00	145	n (rev/min)	8862	4431	2216	1477	1108	886	739	554
					f <sub>z</sub> (in)	0.0002	0.0003	0.0007	0.0010	0.0014	0.0017	0.0020	0.0027
				85 - 205	v <sub>f</sub> (in/min)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
S	E 19	0.20	1.00	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
				40 - 100	v <sub>f</sub> (in/min)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
	E 20	0.20	1.00	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
				40 - 100	v <sub>f</sub> (in/min)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
	E 21	0.20	1.00	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
				40 - 100	v <sub>f</sub> (in/min)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
	E 22	0.20	1.00	112	n (rev/min)	6845	3423	1711	1141	856	685	570	428
					f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
				52 - 172	v <sub>f</sub> (in/min)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter

v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## C430 / C430R / CNC430 / CD430 / CSD430 - START VALUES

SIDE MILLING - ROUGHING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	1.00	0.30	400	n (rev/min)	24448	12224	6112	4075	3056	2445	2037	1528
					f <sub>z</sub> (in)	0.0003	0.0006	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045
				340 - 460	v <sub>f</sub> (in/min)	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
	E 3 - 4	1.00	0.30	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
				140 - 260	v <sub>f</sub> (in/min)	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
	E 5 - 6	1.00	0.20	100	n (rev/min)	6112	3056	1528	1019	764	611	509	382
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				40 - 160	v <sub>f</sub> (in/min)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
M	E 8 - 9	0.50	0.30	320	n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				290 - 350	v <sub>f</sub> (in/min)	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8
	E 10 - 11	0.30	0.20	250	n (rev/min)	15280	7640	3820	2547	1910	1528	1273	955
					f <sub>z</sub> (in)	0.0001	0.0003	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020
				220 - 280	v <sub>f</sub> (in/min)	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
K	E 12 - 13	1.00	0.50	270	n (rev/min)	16502	8251	4126	2750	2063	1650	1375	1031
					f <sub>z</sub> (in)	0.0004	0.0007	0.0015	0.0022	0.0029	0.0036	0.0044	0.0058
				210 - 330	v <sub>f</sub> (in/min)	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9
	E 14 - 15	0.50	0.30	145	n (rev/min)	8862	4431	2216	1477	1108	886	739	554
					f <sub>z</sub> (in)	0.0002	0.0004	0.0009	0.0013	0.0017	0.0021	0.0026	0.0034
				85 - 205	v <sub>f</sub> (in/min)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
S	E 19	0.20	0.10	120	n (rev/min)	7334	3667	1834	1222	917	733	611	458
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
	90 - 150	v <sub>f</sub> (in/min)	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
	E 20	0.20	0.10	120	n (rev/min)	7334	3667	1834	1222	917	733	611	458
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
	90 - 150	v <sub>f</sub> (in/min)	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
	E 21	0.20	0.10	120	n (rev/min)	7334	3667	1834	1222	917	733	611	458
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
	90 - 150	v <sub>f</sub> (in/min)	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		
	E 22	0.30	0.20	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
f <sub>z</sub> (in)					0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022	
20 - 140	v <sub>f</sub> (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7		

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE SOLID CARBIDE

## CB430 / CNCB430 / CSDB430 - START VALUES

SLOTTING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	0.50	1.00	320	n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222
					f <sub>z</sub> (in)	0.0002	0.0005	0.0009	0.0014	0.0018	0.0023	0.0027	0.0036
				260 - 380	v <sub>f</sub> (in/min)	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
	E 3 - 4	0.40	1.00	160	n (rev/min)	9779	4890	2445	1630	1222	978	815	611
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				100 - 220	v <sub>f</sub> (in/min)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
	E 5 - 6	0.30	1.00	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
					f <sub>z</sub> (in)	0.0001	0.0002	0.0005	0.0007	0.0010	0.0012	0.0014	0.0019
				20 - 140	v <sub>f</sub> (in/min)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
M	E 8 - 9	0.50	1.00	256	n (rev/min)	15647	7823	3912	2608	1956	1565	1304	978
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0007	0.0009	0.0011	0.0013	0.0018
				226 - 286	v <sub>f</sub> (in/min)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
	E 10 - 11	0.40	1.00	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0001	0.0002	0.0004	0.0006	0.0008	0.0010	0.0012	0.0016
				170 - 230	v <sub>f</sub> (in/min)	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
K	E 12 - 13	0.50	1.00	216	n (rev/min)	13202	6601	3300	2200	1650	1320	1100	825
					f <sub>z</sub> (in)	0.0003	0.0006	0.0012	0.0017	0.0023	0.0029	0.0035	0.0046
				156 - 276	v <sub>f</sub> (in/min)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
	E 14 - 15	0.30	1.00	116	n (rev/min)	7090	3545	1772	1182	886	709	591	443
					f <sub>z</sub> (in)	0.0002	0.0003	0.0007	0.0010	0.0014	0.0017	0.0020	0.0027
				56 - 176	v <sub>f</sub> (in/min)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
S	E 19	0.10	1.00	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
				40 - 100	v <sub>f</sub> (in/min)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
	E 20	0.10	1.00	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
				40 - 100	v <sub>f</sub> (in/min)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
	E 21	0.10	1.00	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0004	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030
				40 - 100	v <sub>f</sub> (in/min)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
	E 22	0.20	1.00	112	n (rev/min)	6845	3423	1711	1141	856	685	570	428
					f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
				52 - 172	v <sub>f</sub> (in/min)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## CB430 / CNCB430 / CSDB430 - START VALUES

SIDE MILLING - ROUGHING													
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4							
						1/16	1/8	1/4	3/8	1/2	5/8	3/4	1
P	E 1 - 2	1.00	0.30	320	n (rev/min)	19558	9779	4890	3260	2445	1956	1630	1222
					f <sub>z</sub> (in)	0.0003	0.0006	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045
				260 - 380	v <sub>f</sub> (in/min)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
	E 3 - 4	1.00	0.30	160	n (rev/min)	9779	4890	2445	1630	1222	978	815	611
					f <sub>z</sub> (in)	0.0002	0.0004	0.0007	0.0011	0.0014	0.0018	0.0021	0.0028
				100 - 220	v <sub>f</sub> (in/min)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
	E 5 - 6	1.00	0.20	80	n (rev/min)	4890	2445	1222	815	611	489	407	306
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				20 - 140	v <sub>f</sub> (in/min)	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
M	E 8 - 9	0.50	0.30	256	n (rev/min)	15647	7823	3912	2608	1956	1565	1304	978
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				226 - 286	v <sub>f</sub> (in/min)	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
	E 10 - 11	0.30	0.20	200	n (rev/min)	12224	6112	3056	2037	1528	1222	1019	764
					f <sub>z</sub> (in)	0.0001	0.0003	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020
				170 - 230	v <sub>f</sub> (in/min)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
K	E 12 - 13	1.00	0.50	216	n (rev/min)	13202	6601	3300	2200	1650	1320	1100	825
					f <sub>z</sub> (in)	0.0004	0.0007	0.0015	0.0022	0.0029	0.0036	0.0044	0.0058
				156 - 276	v <sub>f</sub> (in/min)	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1
	E 14 - 15	0.50	0.30	116	n (rev/min)	7090	3545	1772	1182	886	709	591	443
					f <sub>z</sub> (in)	0.0002	0.0004	0.0009	0.0013	0.0017	0.0021	0.0026	0.0034
				56 - 176	v <sub>f</sub> (in/min)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
S	E 19	0.30	0.10	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				40 - 100	v <sub>f</sub> (in/min)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
	E 20	0.30	0.10	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				40 - 100	v <sub>f</sub> (in/min)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
	E 21	0.30	0.10	70	n (rev/min)	4278	2139	1070	713	535	428	357	267
					f <sub>z</sub> (in)	0.0002	0.0003	0.0006	0.0009	0.0012	0.0015	0.0018	0.0024
				40 - 100	v <sub>f</sub> (in/min)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
	E 22	0.40	0.20	112	n (rev/min)	6845	3423	1711	1141	856	685	570	428
					f <sub>z</sub> (in)	0.0001	0.0003	0.0006	0.0008	0.0011	0.0014	0.0017	0.0022
				52 - 172	v <sub>f</sub> (in/min)	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## C430M - START VALUES

		SLOTTING																
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4												
						1	1.5	2	3	3.5	4	5	6	8	9	10	11	12
P	E 1 - 2	0.50	1.00	400	n (min-1)	38811	25874	19406	12937	11089	9703	7762	6469	4851	4312	3881	3528	3234
					fz (in)	.0001	.0002	.0003	.0004	.0005	.0006	.0007	.0009	.0011	.0013	.0014	.0016	.0017
					vf (in/min)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
	E 3 - 4	0.40	1.00	200	n (min-1)	19406	12937	9703	6469	5544	4851	3881	3234	2426	2156	1941	1764	1617
					fz (in)	.0001	.0001	.0002	.0003	.0003	.0003	.0004	.0005	.0007	.0008	.0009	.0010	.0010
					vf (in/min)	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
	E 5 - 6	0.30	1.00	100	n (min-1)	9703	6469	4851	3234	2772	2426	1941	1617	1213	1078	970	882	809
					fz (in)	.0001	.0001	.0001	.0002	.0003	.0003	.0004	.0004	.0006	.0007	.0007	.0008	.0009
					vf (in/min)	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
M	E 8 - 9	0.50	1.00	320	n (min-1)	31049	20699	15524	10350	8871	7762	6210	5175	3881	3450	3105	2823	2587
					fz (in)	.0001	.0001	.0001	.0002	.0002	.0003	.0004	.0004	.0006	.0006	.0007	.0008	.0009
					vf (in/min)	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
	E 10 - 11	0.40	1.00	250	n (min-1)	24257	16171	12129	8086	6931	6064	4851	4043	3032	2695	2426	2205	2021
					fz (in)	.0001	.0001	.0001	.0002	.0002	.0003	.0003	.0004	.0005	.0006	.0006	.0007	.0008
					vf (in/min)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
K	E 12 - 13	0.50	1.00	270	n (min-1)	26198	17465	13099	8733	7485	6549	5240	4366	3275	2911	2620	2382	2183
					fz (in)	.0002	.0003	.0004	.0005	.0006	.0007	.0009	.0011	.0014	.0016	.0018	.0020	.0022
					vf (in/min)	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
	E 14 - 15	0.30	1.00	145	n (min-1)	14069	9379	7035	4690	4020	3517	2814	2345	1759	1563	1407	1279	1172
					fz (in)	.0001	.0002	.0002	.0003	.0004	.0004	.0005	.0006	.0009	.0010	.0011	.0012	.0013
					vf (in/min)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
S	E 19	0.20	1.00	70	n (min-1)	6792	4528	3396	2264	1941	1698	1358	1132	849	755	679	617	566
					fz (in)	.0030	.0045	.0060	.0090	.0105	.0120	.0150	.0180	.0240	.0270	.0300	.0330	.0360
					vf (in/min)	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5
	E 20	0.20	1.00	70	n (min-1)	6792	4528	3396	2264	1941	1698	1358	1132	849	755	679	617	566
					fz (in)	.0001	.0002	.0002	.0004	.0004	.0005	.0006	.0007	.0009	.0011	.0012	.0013	.0014
					vf (in/min)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
	E 21	0.20	1.00	70	n (min-1)	6792	4528	3396	2264	1941	1698	1358	1132	849	755	679	617	566
					fz (in)	.0001	.0002	.0002	.0004	.0004	.0005	.0006	.0007	.0009	.0011	.0012	.0013	.0014
					vf (in/min)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
	E 22	0.20	1.00	110	n (min-1)	10673	7115	5337	3558	3049	2668	2135	1779	1334	1186	1067	970	889
					fz (in)	.0001	.0002	.0002	.0003	.0004	.0004	.0006	.0007	.0009	.0010	.0011	.0012	.0013
					vf (in/min)	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE SOLID CARBIDE



## C430M - START VALUES

		SIDE MILLING - ROUGHING																
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4												
						1	1.5	2	3	3.5	4	5	6	8	9	10	11	12
P	E 1 - 2	1.00	0.30	400	n (min-1)	38811	25874	19406	12937	11089	9703	7762	6469	4851	4312	3881	3528	3234
					fz (in)	.0002	.0003	.0004	.0005	.0006	.0007	.0009	.0011	.0014	.0016	.0018	.0019	.0021
					vf (in/min)	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
	E 3 - 4	1.00	0.30	200	n (min-1)	19406	12937	9703	6469	5544	4851	3881	3234	2426	2156	1941	1764	1617
					fz (in)	.0001	.0002	.0002	.0003	.0004	.0004	.0006	.0007	.0009	.0010	.0011	.0012	.0013
					vf (in/min)	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
E 5 - 6	1.00	0.20	100	n (min-1)	9703	6469	4851	3234	2772	2426	1941	1617	1213	1078	970	882	809	
				fz (in)	.0001	.0001	.0002	.0003	.0003	.0004	.0005	.0006	.0008	.0009	.0009	.0010	.0011	
				vf (in/min)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
M	E 8 - 9	0.50	0.30	320	n (min-1)	31049	20699	15524	10350	8871	7762	6210	5175	3881	3450	3105	2823	2587
					fz (in)	.0001	.0001	.0002	.0003	.0003	.0003	.0004	.0005	.0007	.0008	.0009	.0010	.0010
					vf (in/min)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	E 10 - 11	0.30	0.20	250	n (min-1)	24257	16171	12129	8086	6931	6064	4851	4043	3032	2695	2426	2205	2021
					fz (in)	.0001	.0001	.0002	.0002	.0003	.0003	.0004	.0005	.0006	.0007	.0008	.0009	.0009
					vf (in/min)	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
K	E 12 - 13	1.00	0.50	270	n (min-1)	26198	17465	13099	8733	7485	6549	5240	4366	3275	2911	2620	2382	2183
					fz (in)	.0002	.0003	.0005	.0007	.0008	.0009	.0011	.0014	.0018	.0021	.0023	.0025	.0027
					vf (in/min)	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9
	E 14 - 15	0.50	0.30	145	n (min-1)	14069	9379	7035	4690	4020	3517	2814	2345	1759	1563	1407	1279	1172
					fz (in)	.0001	.0002	.0003	.0004	.0005	.0005	.0007	.0008	.0011	.0012	.0013	.0015	.0016
					vf (in/min)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
S	E 19	0.20	0.10	120	n (min-1)	11643	7762	5822	3881	3327	2911	2329	1941	1455	1294	1164	1058	970
					fz (in)	.0024	.0036	.0048	.0072	.0084	.0096	.0120	.0144	.0192	.0216	.0240	.0264	.0288
					vf (in/min)	111.8	111.8	111.8	111.8	111.8	111.8	111.8	111.8	111.8	111.8	111.8	111.8	111.8
	E 20	0.20	0.10	120	n (min-1)	11643	7762	5822	3881	3327	2911	2329	1941	1455	1294	1164	1058	970
					fz (in)	.0001	.0001	.0002	.0003	.0003	.0004	.0005	.0006	.0008	.0009	.0009	.0010	.0011
					vf (in/min)	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
	E 21	0.20	0.10	120	n (min-1)	11643	7762	5822	3881	3327	2911	2329	1941	1455	1294	1164	1058	970
					fz (in)	.0001	.0001	.0002	.0003	.0003	.0004	.0005	.0006	.0008	.0009	.0009	.0010	.0011
vf (in/min)					4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	
E 22	0.30	0.20	80	n (min-1)	7762	5175	3881	2587	2218	1941	1552	1294	970	862	776	706	647	
				fz (in)	.0001	.0001	.0002	.0003	.0003	.0003	.0004	.0005	.0007	.0008	.0009	.0010	.0010	
				vf (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE SOLID CARBIDE

## CB430M - START VALUES

		SLOTTING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4									
						1	2	3	4	5	6	8	10	12	
P	E 1 - 2	0.50	1.00	320	n (min-1)	31049	15524	10350	7762	6210	5175	3881	3105	2587	
					fz (in)	0.0001	0.0003	0.0004	0.0006	0.0007	0.0009	0.0011	0.0014	0.0017	
					vf (in/min)	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	
	E 3 - 4	0.40	1.00	160	n (min-1)	15524	7762	5175	3881	3105	2587	1941	1552	1294	
					fz (in)	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0007	0.0009	0.0010	
					vf (in/min)	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	
	E 5 - 6	0.30	1.00	80	n (min-1)	7762	3881	2587	1941	1552	1294	970	776	647	
					fz (in)	0.0001	0.0001	0.0002	0.0003	0.0004	0.0004	0.0006	0.0007	0.0009	
					vf (in/min)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	
M	E 8 - 9	0.50	1.00	255	n (min-1)	24742	12371	8247	6186	4948	4124	3093	2474	2062	
					fz (in)	0.0001	0.0001	0.0002	0.0003	0.0004	0.0004	0.0006	0.0007	0.0009	
					vf (in/min)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
	E 10 - 11	0.40	1.00	200	n (min-1)	19406	9703	6469	4851	3881	3234	2426	1941	1617	
					fz (in)	0.0001	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0006	0.0008	
					vf (in/min)	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	
K	E 12 - 13	0.50	1.00	215	n (min-1)	20861	10431	6954	5215	4172	3477	2608	2086	1738	
					fz (in)	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0022	
					vf (in/min)	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	
	E 14 - 15	0.30	1.00	115	n (min-1)	11158	5579	3719	2790	2232	1860	1395	1116	930	
					fz (in)	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0009	0.0011	0.0013	
					vf (in/min)	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	
S	E 19	0.10	1.00	70	n (min-1)	6792	3396	2264	1698	1358	1132	849	679	566	
					fz (in)	0.0030	0.0060	0.0090	0.0120	0.0150	0.0180	0.0240	0.0300	0.0360	
					vf (in/min)	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	81.5	
	E 20	0.10	1.00	70	n (min-1)	6792	3396	2264	1698	1358	1132	849	679	566	
					fz (in)	0.0001	0.0002	0.0004	0.0005	0.0006	0.0007	0.0009	0.0012	0.0014	
					vf (in/min)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	
	E 21	0.10	1.00	70	n (min-1)	6792	3396	2264	1698	1358	1132	849	679	566	
					fz (in)	0.0001	0.0002	0.0004	0.0005	0.0006	0.0007	0.0009	0.0012	0.0014	
					vf (in/min)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	
	E 22	0.20	1.00	110	n (min-1)	10673	5337	3558	2668	2135	1779	1334	1067	889	
fz (in)					0.0001	0.0002	0.0003	0.0004	0.0006	0.0007	0.0009	0.0011	0.0013		
vf (in/min)					4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7		

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## CB430M - START VALUES

SIDE MILLING - ROUGHING															
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4									
						1	2	3	4	5	6	8	10	12	
P	E 1 - 2	1.00	0.30	320	n (min-1)	31049	15524	10350	7762	6210	5175	3881	3105	2587	
					fz (in)	0.0002	0.0004	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	
					vf (in/min)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
	E 3 - 4	1.00	0.30	160	n (min-1)	15524	7762	5175	3881	3105	2587	1941	1552	1294	
					fz (in)	0.0001	0.0002	0.0003	0.0004	0.0006	0.0007	0.0009	0.0011	0.0013	
					vf (in/min)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
	E 5 - 6	1.00	0.20	80	n (min-1)	7762	3881	2587	1941	1552	1294	970	776	647	
					fz (in)	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0009	0.0011	
					vf (in/min)	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
M	E 8 - 9	0.50	0.30	255	n (min-1)	24742	12371	8247	6186	4948	4124	3093	2474	2062	
					fz (in)	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0007	0.0009	0.0010	
					vf (in/min)	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	
	E 10 - 11	0.30	0.20	200	n (min-1)	19406	9703	6469	4851	3881	3234	2426	1941	1617	
					fz (in)	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0009	
					vf (in/min)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	
K	E 12 - 13	1.00	0.50	215	n (min-1)	20861	10431	6954	5215	4172	3477	2608	2086	1738	
					fz (in)	0.0002	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0023	0.0027	
					vf (in/min)	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1	
	E 14 - 15	0.50	0.30	115	n (min-1)	11158	5579	3719	2790	2232	1860	1395	1116	930	
					fz (in)	0.0001	0.0003	0.0004	0.0005	0.0007	0.0008	0.0011	0.0013	0.0016	
					vf (in/min)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
S	E 19	0.30	0.10	70	n (min-1)	6792	3396	2264	1698	1358	1132	849	679	566	
					fz (in)	0.0024	0.0048	0.0072	0.0096	0.0120	0.0144	0.0192	0.0240	0.0288	
	E 20	0.30	0.10	70	n (min-1)	6792	3396	2264	1698	1358	1132	849	679	566	
					fz (in)	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0009	0.0011	
	E 21	0.30	0.10	70	n (min-1)	6792	3396	2264	1698	1358	1132	849	679	566	
					fz (in)	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0009	0.0011	
	E 22	0.40	0.20	110	n (min-1)	10673	5337	3558	2668	2135	1779	1334	1067	889	
					fz (in)	0.0001	0.0002	0.0003	0.0003	0.0004	0.0005	0.0007	0.0009	0.0010	
					50	vf (in/min)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	

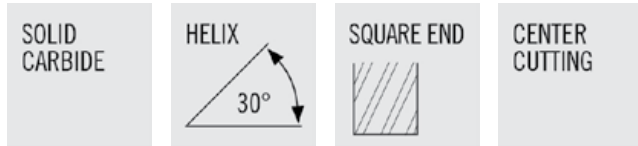
SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## ME230

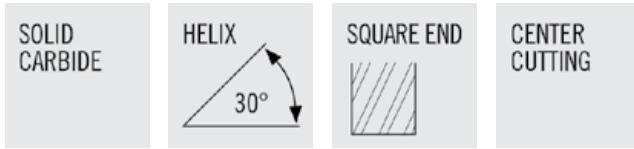


- Sub micron grain carbide
- Uncoated
- ME230 LOC = 3xD

- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	SHANK TYPE
N59570	ME230-0.005-F3-S.0-Z2	.005	1/8	.0150	1-1/2	2	CYLINDRICAL
N59571	ME230-0.006-F3-S.0-Z2	.006	1/8	.0180	1-1/2	2	CYLINDRICAL
N59572	ME230-0.007-F3-S.0-Z2	.007	1/8	.0210	1-1/2	2	CYLINDRICAL
N59573	ME230-0.008-F3-S.0-Z2	.008	1/8	.0240	1-1/2	2	CYLINDRICAL
N59574	ME230-0.009-F3-S.0-Z2	.009	1/8	.0270	1-1/2	2	CYLINDRICAL
N59575	ME230-0.010-F3-S.0-Z2	.010	1/8	.0300	1-1/2	2	CYLINDRICAL
N59576	ME230-0.011-F3-S.0-Z2	.011	1/8	.0330	1-1/2	2	CYLINDRICAL
N59577	ME230-0.012-F3-S.0-Z2	.012	1/8	.0360	1-1/2	2	CYLINDRICAL
N59578	ME230-0.013-F3-S.0-Z2	.013	1/8	.0390	1-1/2	2	CYLINDRICAL
N59579	ME230-0.014-F3-S.0-Z2	.014	1/8	.0420	1-1/2	2	CYLINDRICAL
N59580	ME230-0.015-F3-S.0-Z2	.015	1/8	.0450	1-1/2	2	CYLINDRICAL
N59581	ME230-0.016-F3-S.0-Z2	.016	1/8	.0480	1-1/2	2	CYLINDRICAL
N59582	ME230-0.017-F3-S.0-Z2	.017	1/8	.0510	1-1/2	2	CYLINDRICAL
N59583	ME230-0.018-F3-S.0-Z2	.018	1/8	.0540	1-1/2	2	CYLINDRICAL
N59584	ME230-0.019-F3-S.0-Z2	.019	1/8	.0570	1-1/2	2	CYLINDRICAL
N59585	ME230-0.020-F3-S.0-Z2	.020	1/8	.0600	1-1/2	2	CYLINDRICAL
N59586	ME230-0.021-F3-S.0-Z2	.021	1/8	.0630	1-1/2	2	CYLINDRICAL
N59587	ME230-0.022-F3-S.0-Z2	.022	1/8	.0660	1-1/2	2	CYLINDRICAL
N59588	ME230-0.023-F3-S.0-Z2	.023	1/8	.0690	1-1/2	2	CYLINDRICAL
N59589	ME230-0.024-F3-S.0-Z2	.024	1/8	.0720	1-1/2	2	CYLINDRICAL
N59590	ME230-0.025-F3-S.0-Z2	.025	1/8	.0750	1-1/2	2	CYLINDRICAL
N59591	ME230-0.026-F3-S.0-Z2	.026	1/8	.0780	1-1/2	2	CYLINDRICAL
N59592	ME230-0.027-F3-S.0-Z2	.027	1/8	.0810	1-1/2	2	CYLINDRICAL
N59593	ME230-0.028-F3-S.0-Z2	.028	1/8	.0840	1-1/2	2	CYLINDRICAL
N59594	ME230-0.029-F3-S.0-Z2	.029	1/8	.0870	1-1/2	2	CYLINDRICAL
N59595	ME230-0.030-F3-S.0-Z2	.030	1/8	.0900	1-1/2	2	CYLINDRICAL
N59596	ME230-0.031-F3-S.0-Z2	.031	1/8	.0930	1-1/2	2	CYLINDRICAL
N59597	ME230-0.032-F3-S.0-Z2	.032	1/8	.0960	1-1/2	2	CYLINDRICAL
N59598	ME230-0.033-F3-S.0-Z2	.033	1/8	.0990	1-1/2	2	CYLINDRICAL
N59599	ME230-0.034-F3-S.0-Z2	.034	1/8	.1020	1-1/2	2	CYLINDRICAL
N59600	ME230-0.035-F3-S.0-Z2	.035	1/8	.1050	1-1/2	2	CYLINDRICAL
N59601	ME230-0.036-F3-S.0-Z2	.036	1/8	.1080	1-1/2	2	CYLINDRICAL
N59602	ME230-0.037-F3-S.0-Z2	.037	1/8	.1110	1-1/2	2	CYLINDRICAL
N59603	ME230-0.038-F3-S.0-Z2	.038	1/8	.1140	1-1/2	2	CYLINDRICAL
N59604	ME230-0.039-F3-S.0-Z2	.039	1/8	.1170	1-1/2	2	CYLINDRICAL
N59605	ME230-0.040-F3-S.0-Z2	.040	1/8	.1200	1-1/2	2	CYLINDRICAL
N59606	ME230-0.041-F3-S.0-Z2	.041	1/8	.1230	1-1/2	2	CYLINDRICAL
N59607	ME230-0.042-F3-S.0-Z2	.042	1/8	.1260	1-1/2	2	CYLINDRICAL
N59608	ME230-0.043-F3-S.0-Z2	.043	1/8	.1290	1-1/2	2	CYLINDRICAL

## ME230 (CONT'D) & MES230



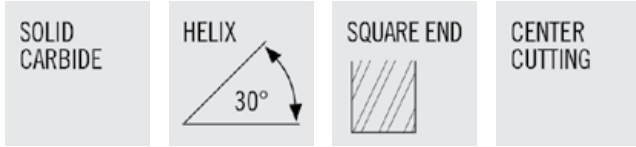
- Sub micron grain carbide
- Uncoated
- ME230 LOC = 3xD
- MES230 LOC = 1.5xD

- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	SHANK TYPE
<b>REGULAR LENGTH ME230 (CONT'D)</b>							
N59609	ME230-0.044-F3-S.0-Z2	.044	1/8	.1320	1-1/2	2	CYLINDRICAL
N59610	ME230-0.045-F3-S.0-Z2	.045	1/8	.1350	1-1/2	2	CYLINDRICAL
N59611	ME230-0.046-F3-S.0-Z2	.046	1/8	.1380	1-1/2	2	CYLINDRICAL
N59612	ME230-0.047-F3-S.0-Z2	.047	1/8	.1410	1-1/2	2	CYLINDRICAL
N59613	ME230-0.048-F3-S.0-Z2	.048	1/8	.1440	1-1/2	2	CYLINDRICAL
N59614	ME230-0.049-F3-S.0-Z2	.049	1/8	.1470	1-1/2	2	CYLINDRICAL
N59615	ME230-0.050-F3-S.0-Z2	.050	1/8	.1500	1-1/2	2	CYLINDRICAL
N59616	ME230-0.051-F3-S.0-Z2	.051	1/8	.1530	1-1/2	2	CYLINDRICAL
N59617	ME230-0.052-F3-S.0-Z2	.052	1/8	.1560	1-1/2	2	CYLINDRICAL
N59618	ME230-0.053-F3-S.0-Z2	.053	1/8	.1590	1-1/2	2	CYLINDRICAL
N59619	ME230-0.054-F3-S.0-Z2	.054	1/8	.1620	1-1/2	2	CYLINDRICAL
N59620	ME230-0.055-F3-S.0-Z2	.055	1/8	.1650	1-1/2	2	CYLINDRICAL
N59621	ME230-0.060-F3-S.0-Z2	.060	1/8	.1800	1-1/2	2	CYLINDRICAL
N59622	ME230-0.065-F3-S.0-Z2	.065	1/8	.1950	1-1/2	2	CYLINDRICAL
N59623	ME230-0.070-F3-S.0-Z2	.070	1/8	.2100	1-1/2	2	CYLINDRICAL
N59624	ME230-0.075-F3-S.0-Z2	.075	1/8	.2250	1-1/2	2	CYLINDRICAL
N59625	ME230-0.080-F3-S.0-Z2	.080	1/8	.2400	1-1/2	2	CYLINDRICAL
N59626	ME230-0.085-F3-S.0-Z2	.085	1/8	.2550	1-1/2	2	CYLINDRICAL
N59627	ME230-0.090-F3-S.0-Z2	.090	1/8	.2700	1-1/2	2	CYLINDRICAL
N59628	ME230-0.095-F3-S.0-Z2	.095	1/8	.2850	1-1/2	2	CYLINDRICAL
N59629	ME230-0.100-F3-S.0-Z2	.100	1/8	.3000	1-1/2	2	CYLINDRICAL
N59630	ME230-0.105-F3-S.0-Z2	.105	1/8	.3150	1-1/2	2	CYLINDRICAL
N59631	ME230-0.110-F3-S.0-Z2	.110	1/8	.3300	1-1/2	2	CYLINDRICAL
N59632	ME230-0.115-F3-S.0-Z2	.115	1/8	.3450	1-1/2	2	CYLINDRICAL
N59633	ME230-0.120-F3-S.0-Z2	.120	1/8	.3600	1-1/2	2	CYLINDRICAL
<b>STUB LENGTH - MES230</b>							
N59693	MES230-0.005-F2-S.0-Z2	.005	1/8	.0075	1-1/2	2	CYLINDRICAL
N59694	MES230-0.006-F2-S.0-Z2	.006	1/8	.0090	1-1/2	2	CYLINDRICAL
N59695	MES230-0.007-F2-S.0-Z2	.007	1/8	.0105	1-1/2	2	CYLINDRICAL
N59696	MES230-0.008-F2-S.0-Z2	.008	1/8	.0120	1-1/2	2	CYLINDRICAL
N59697	MES230-0.009-F2-S.0-Z2	.009	1/8	.0135	1-1/2	2	CYLINDRICAL
N59698	MES230-0.010-F2-S.0-Z2	.010	1/8	.0150	1-1/2	2	CYLINDRICAL
N59699	MES230-0.011-F2-S.0-Z2	.011	1/8	.0165	1-1/2	2	CYLINDRICAL
N59700	MES230-0.012-F2-S.0-Z2	.012	1/8	.0180	1-1/2	2	CYLINDRICAL
N59701	MES230-0.013-F2-S.0-Z2	.013	1/8	.0195	1-1/2	2	CYLINDRICAL
N59702	MES230-0.014-F2-S.0-Z2	.014	1/8	.0210	1-1/2	2	CYLINDRICAL
N59703	MES230-0.015-F2-S.0-Z2	.015	1/8	.0225	1-1/2	2	CYLINDRICAL
N59704	MES230-0.016-F2-S.0-Z2	.016	1/8	.0240	1-1/2	2	CYLINDRICAL

DISCOUNT CODE D42

## MES230 (CONT'D)



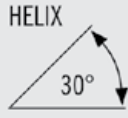
- Sub micron grain carbide
- Uncoated
- MES230 LOC = 1.5xD

- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	SHANK TYPE
N59705	MES230-0.017-F2-S.0-Z2	.017	1/8	.0255	1-1/2	2	CYLINDRICAL
N59706	MES230-0.018-F2-S.0-Z2	.018	1/8	.0270	1-1/2	2	CYLINDRICAL
N59707	MES230-0.019-F2-S.0-Z2	.019	1/8	.0285	1-1/2	2	CYLINDRICAL
N59708	MES230-0.020-F2-S.0-Z2	.020	1/8	.0300	1-1/2	2	CYLINDRICAL
N59709	MES230-0.021-F2-S.0-Z2	.021	1/8	.0315	1-1/2	2	CYLINDRICAL
N59710	MES230-0.022-F2-S.0-Z2	.022	1/8	.0330	1-1/2	2	CYLINDRICAL
N59711	MES230-0.023-F2-S.0-Z2	.023	1/8	.0345	1-1/2	2	CYLINDRICAL
N59712	MES230-0.024-F2-S.0-Z2	.024	1/8	.0360	1-1/2	2	CYLINDRICAL
N59713	MES230-0.025-F2-S.0-Z2	.025	1/8	.0375	1-1/2	2	CYLINDRICAL
N59714	MES230-0.026-F2-S.0-Z2	.026	1/8	.0390	1-1/2	2	CYLINDRICAL
N59715	MES230-0.027-F2-S.0-Z2	.027	1/8	.0405	1-1/2	2	CYLINDRICAL
N59716	MES230-0.028-F2-S.0-Z2	.028	1/8	.0420	1-1/2	2	CYLINDRICAL
N59717	MES230-0.029-F2-S.0-Z2	.029	1/8	.0435	1-1/2	2	CYLINDRICAL
N59718	MES230-0.030-F2-S.0-Z2	.030	1/8	.0450	1-1/2	2	CYLINDRICAL
N59719	MES230-0.031-F2-S.0-Z2	.031	1/8	.0465	1-1/2	2	CYLINDRICAL
N59720	MES230-0.032-F2-S.0-Z2	.032	1/8	.0480	1-1/2	2	CYLINDRICAL
N59721	MES230-0.033-F2-S.0-Z2	.033	1/8	.0495	1-1/2	2	CYLINDRICAL
N59722	MES230-0.034-F2-S.0-Z2	.034	1/8	.0510	1-1/2	2	CYLINDRICAL
N59723	MES230-0.035-F2-S.0-Z2	.035	1/8	.0525	1-1/2	2	CYLINDRICAL
N59724	MES230-0.036-F2-S.0-Z2	.036	1/8	.0540	1-1/2	2	CYLINDRICAL
N59725	MES230-0.037-F2-S.0-Z2	.037	1/8	.0555	1-1/2	2	CYLINDRICAL
N59726	MES230-0.038-F2-S.0-Z2	.038	1/8	.0570	1-1/2	2	CYLINDRICAL
N59727	MES230-0.039-F2-S.0-Z2	.039	1/8	.0585	1-1/2	2	CYLINDRICAL
N59728	MES230-0.040-F2-S.0-Z2	.040	1/8	.0600	1-1/2	2	CYLINDRICAL
N59729	MES230-0.041-F2-S.0-Z2	.041	1/8	.0615	1-1/2	2	CYLINDRICAL
N59730	MES230-0.042-F2-S.0-Z2	.042	1/8	.0630	1-1/2	2	CYLINDRICAL
N59731	MES230-0.043-F2-S.0-Z2	.043	1/8	.0645	1-1/2	2	CYLINDRICAL
N59732	MES230-0.044-F2-S.0-Z2	.044	1/8	.0660	1-1/2	2	CYLINDRICAL
N59733	MES230-0.045-F2-S.0-Z2	.045	1/8	.0675	1-1/2	2	CYLINDRICAL
N59734	MES230-0.046-F2-S.0-Z2	.046	1/8	.0690	1-1/2	2	CYLINDRICAL
N59735	MES230-0.047-F2-S.0-Z2	.047	1/8	.0705	1-1/2	2	CYLINDRICAL
N59736	MES230-0.048-F2-S.0-Z2	.048	1/8	.0720	1-1/2	2	CYLINDRICAL
N59737	MES230-0.049-F2-S.0-Z2	.049	1/8	.0735	1-1/2	2	CYLINDRICAL
N59738	MES230-0.050-F2-S.0-Z2	.050	1/8	.0750	1-1/2	2	CYLINDRICAL
N59739	MES230-0.051-F2-S.0-Z2	.051	1/8	.0765	1-1/2	2	CYLINDRICAL
N59740	MES230-0.052-F2-S.0-Z2	.052	1/8	.0780	1-1/2	2	CYLINDRICAL
N59741	MES230-0.053-F2-S.0-Z2	.053	1/8	.0795	1-1/2	2	CYLINDRICAL
N59742	MES230-0.054-F2-S.0-Z2	.054	1/8	.0810	1-1/2	2	CYLINDRICAL
N59743	MES230-0.055-F2-S.0-Z2	.055	1/8	.0825	1-1/2	2	CYLINDRICAL

## MEB230

SOLID  
CARBIDE



CENTER  
CUTTING




- Sub micron grain carbide
- Uncoated
- MEB230 LOC = 3xD

- Tolerance Specs - Page 335


ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	SHANK TYPE
N59634	MEB230-0.010-F3-B.0-Z2	.010	1/8	.0300	1-1/2	2	CYLINDRICAL
N59635	MEB230-0.011-F3-B.0-Z2	.011	1/8	.0330	1-1/2	2	CYLINDRICAL
N59636	MEB230-0.012-F3-B.0-Z2	.012	1/8	.0360	1-1/2	2	CYLINDRICAL
N59637	MEB230-0.013-F3-B.0-Z2	.013	1/8	.0390	1-1/2	2	CYLINDRICAL
N59638	MEB230-0.014-F3-B.0-Z2	.014	1/8	.0420	1-1/2	2	CYLINDRICAL
N59639	MEB230-0.015-F3-B.0-Z2	.015	1/8	.0450	1-1/2	2	CYLINDRICAL
N59640	MEB230-0.016-F3-B.0-Z2	.016	1/8	.0480	1-1/2	2	CYLINDRICAL
N59641	MEB230-0.017-F3-B.0-Z2	.017	1/8	.0510	1-1/2	2	CYLINDRICAL
N59642	MEB230-0.018-F3-B.0-Z2	.018	1/8	.0540	1-1/2	2	CYLINDRICAL
N59643	MEB230-0.019-F3-B.0-Z2	.019	1/8	.0570	1-1/2	2	CYLINDRICAL
N59644	MEB230-0.020-F3-B.0-Z2	.020	1/8	.0600	1-1/2	2	CYLINDRICAL
N59645	MEB230-0.021-F3-B.0-Z2	.021	1/8	.0630	1-1/2	2	CYLINDRICAL
N59646	MEB230-0.022-F3-B.0-Z2	.022	1/8	.0660	1-1/2	2	CYLINDRICAL
N59647	MEB230-0.023-F3-B.0-Z2	.023	1/8	.0690	1-1/2	2	CYLINDRICAL
N59648	MEB230-0.024-F3-B.0-Z2	.024	1/8	.0720	1-1/2	2	CYLINDRICAL
N59649	MEB230-0.025-F3-B.0-Z2	.025	1/8	.0750	1-1/2	2	CYLINDRICAL
N59650	MEB230-0.026-F3-B.0-Z2	.026	1/8	.0780	1-1/2	2	CYLINDRICAL
N59651	MEB230-0.027-F3-B.0-Z2	.027	1/8	.0810	1-1/2	2	CYLINDRICAL
N59652	MEB230-0.028-F3-B.0-Z2	.028	1/8	.0840	1-1/2	2	CYLINDRICAL
N59653	MEB230-0.029-F3-B.0-Z2	.029	1/8	.0870	1-1/2	2	CYLINDRICAL
N59654	MEB230-0.030-F3-B.0-Z2	.030	1/8	.0900	1-1/2	2	CYLINDRICAL
N59655	MEB230-0.031-F3-B.0-Z2	.031	1/8	.0930	1-1/2	2	CYLINDRICAL
N59656	MEB230-0.032-F3-B.0-Z2	.032	1/8	.0960	1-1/2	2	CYLINDRICAL
N59657	MEB230-0.033-F3-B.0-Z2	.033	1/8	.0990	1-1/2	2	CYLINDRICAL
N59658	MEB230-0.034-F3-B.0-Z2	.034	1/8	.1020	1-1/2	2	CYLINDRICAL
N59659	MEB230-0.035-F3-B.0-Z2	.035	1/8	.1050	1-1/2	2	CYLINDRICAL
N59660	MEB230-0.036-F3-B.0-Z2	.036	1/8	.1080	1-1/2	2	CYLINDRICAL
N59661	MEB230-0.037-F3-B.0-Z2	.037	1/8	.1110	1-1/2	2	CYLINDRICAL
N59662	MEB230-0.038-F3-B.0-Z2	.038	1/8	.1140	1-1/2	2	CYLINDRICAL
N59663	MEB230-0.039-F3-B.0-Z2	.039	1/8	.1170	1-1/2	2	CYLINDRICAL
N59664	MEB230-0.040-F3-B.0-Z2	.040	1/8	.1200	1-1/2	2	CYLINDRICAL
N59665	MEB230-0.041-F3-B.0-Z2	.041	1/8	.1230	1-1/2	2	CYLINDRICAL
N59666	MEB230-0.042-F3-B.0-Z2	.042	1/8	.1260	1-1/2	2	CYLINDRICAL
N59667	MEB230-0.043-F3-B.0-Z2	.043	1/8	.1290	1-1/2	2	CYLINDRICAL
N59668	MEB230-0.044-F3-B.0-Z2	.044	1/8	.1320	1-1/2	2	CYLINDRICAL
N59669	MEB230-0.045-F3-B.0-Z2	.045	1/8	.1350	1-1/2	2	CYLINDRICAL
N59670	MEB230-0.046-F3-B.0-Z2	.046	1/8	.1380	1-1/2	2	CYLINDRICAL

## MEB230 (CONT'D) & MESB230

SOLID  
CARBIDE



HELIX  
30°



BALL END

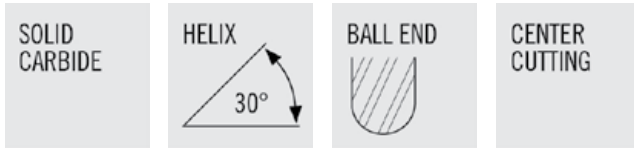
CENTER  
CUTTING



- Sub micron grain carbide
  - Uncoated
  - MEB230 LOC = 3xD , MESB230 LOC = 1.5xD
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	SHANK TYPE
<b>REGULAR LENGTH MEB230 (CONT'D)</b>							
N59671	MEB230-0.047-F3-B.0-Z2	.047	1/8	.1410	1-1/2	2	CYLINDRICAL
N59672	MEB230-0.048-F3-B.0-Z2	.048	1/8	.1440	1-1/2	2	CYLINDRICAL
N59673	MEB230-0.049-F3-B.0-Z2	.049	1/8	.1470	1-1/2	2	CYLINDRICAL
N59674	MEB230-0.050-F3-B.0-Z2	.050	1/8	.1500	1-1/2	2	CYLINDRICAL
N59675	MEB230-0.051-F3-B.0-Z2	.051	1/8	.1530	1-1/2	2	CYLINDRICAL
N59676	MEB230-0.052-F3-B.0-Z2	.052	1/8	.1560	1-1/2	2	CYLINDRICAL
N59677	MEB230-0.053-F3-B.0-Z2	.053	1/8	.1590	1-1/2	2	CYLINDRICAL
N59678	MEB230-0.054-F3-B.0-Z2	.054	1/8	.1620	1-1/2	2	CYLINDRICAL
N59679	MEB230-0.055-F3-B.0-Z2	.055	1/8	.1650	1-1/2	2	CYLINDRICAL
N59680	MEB230-0.060-F3-B.0-Z2	.060	1/8	.1800	1-1/2	2	CYLINDRICAL
N59681	MEB230-0.065-F3-B.0-Z2	.065	1/8	.1950	1-1/2	2	CYLINDRICAL
N59682	MEB230-0.070-F3-B.0-Z2	.070	1/8	.2100	1-1/2	2	CYLINDRICAL
N59683	MEB230-0.075-F3-B.0-Z2	.075	1/8	.2250	1-1/2	2	CYLINDRICAL
N59684	MEB230-0.080-F3-B.0-Z2	.080	1/8	.2400	1-1/2	2	CYLINDRICAL
N59685	MEB230-0.085-F3-B.0-Z2	.085	1/8	.2550	1-1/2	2	CYLINDRICAL
N59686	MEB230-0.090-F3-B.0-Z2	.090	1/8	.2700	1-1/2	2	CYLINDRICAL
N59687	MEB230-0.095-F3-B.0-Z2	.095	1/8	.2850	1-1/2	2	CYLINDRICAL
N59688	MEB230-0.100-F3-B.0-Z2	.100	1/8	.3000	1-1/2	2	CYLINDRICAL
N59689	MEB230-0.105-F3-B.0-Z2	.105	1/8	.3150	1-1/2	2	CYLINDRICAL
N59690	MEB230-0.110-F3-B.0-Z2	.110	1/8	.3300	1-1/2	2	CYLINDRICAL
N59691	MEB230-0.115-F3-B.0-Z2	.115	1/8	.3450	1-1/2	2	CYLINDRICAL
N59692	MEB230-0.120-F3-B.0-Z2	.120	1/8	.3600	1-1/2	2	CYLINDRICAL
<b>STUB LENGTH MESB230</b>							
N59744	MESB230-0.005-F2-B.0-Z2	.005	1/8	.0075	1-1/2	2	CYLINDRICAL
N59745	MESB230-0.006-F2-B.0-Z2	.006	1/8	.0090	1-1/2	2	CYLINDRICAL
N59746	MESB230-0.007-F2-B.0-Z2	.007	1/8	.0105	1-1/2	2	CYLINDRICAL
N59747	MESB230-0.008-F2-B.0-Z2	.008	1/8	.0120	1-1/2	2	CYLINDRICAL
N59748	MESB230-0.009-F2-B.0-Z2	.009	1/8	.0135	1-1/2	2	CYLINDRICAL
N59749	MESB230-0.010-F2-B.0-Z2	.010	1/8	.0150	1-1/2	2	CYLINDRICAL
N59750	MESB230-0.011-F2-B.0-Z2	.011	1/8	.0165	1-1/2	2	CYLINDRICAL
N59751	MESB230-0.012-F2-B.0-Z2	.012	1/8	.0180	1-1/2	2	CYLINDRICAL
N59752	MESB230-0.013-F2-B.0-Z2	.013	1/8	.0195	1-1/2	2	CYLINDRICAL
N59753	MESB230-0.014-F2-B.0-Z2	.014	1/8	.0210	1-1/2	2	CYLINDRICAL
N59754	MESB230-0.015-F2-B.0-Z2	.015	1/8	.0225	1-1/2	2	CYLINDRICAL
N59755	MESB230-0.016-F2-B.0-Z2	.016	1/8	.0240	1-1/2	2	CYLINDRICAL
N59756	MESB230-0.017-F2-B.0-Z2	.017	1/8	.0255	1-1/2	2	CYLINDRICAL

## MESB230 (CONT'D)

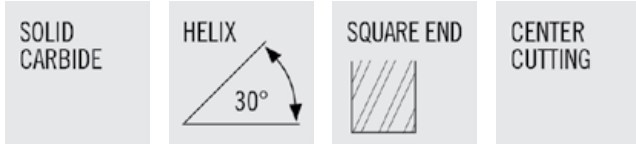


- Sub micron grain carbide
- Uncoated
- MESB230 LOC = 1.5xD

- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	SHANK TYPE
N59757	MESB230-0.018-F2-B.0-Z2	.018	1/8	.0270	1-1/2	2	CYLINDRICAL
N59758	MESB230-0.019-F2-B.0-Z2	.019	1/8	.0285	1-1/2	2	CYLINDRICAL
N59759	MESB230-0.020-F2-B.0-Z2	.020	1/8	.0300	1-1/2	2	CYLINDRICAL
N59760	MESB230-0.021-F2-B.0-Z2	.021	1/8	.0315	1-1/2	2	CYLINDRICAL
N59761	MESB230-0.022-F2-B.0-Z2	.022	1/8	.0330	1-1/2	2	CYLINDRICAL
N59762	MESB230-0.023-F2-B.0-Z2	.023	1/8	.0345	1-1/2	2	CYLINDRICAL
N59763	MESB230-0.024-F2-B.0-Z2	.024	1/8	.0360	1-1/2	2	CYLINDRICAL
N59764	MESB230-0.025-F2-B.0-Z2	.025	1/8	.0375	1-1/2	2	CYLINDRICAL
N59765	MESB230-0.026-F2-B.0-Z2	.026	1/8	.0390	1-1/2	2	CYLINDRICAL
N59766	MESB230-0.027-F2-B.0-Z2	.027	1/8	.0405	1-1/2	2	CYLINDRICAL
N59767	MESB230-0.028-F2-B.0-Z2	.028	1/8	.0420	1-1/2	2	CYLINDRICAL
N59768	MESB230-0.029-F2-B.0-Z2	.029	1/8	.0435	1-1/2	2	CYLINDRICAL
N59769	MESB230-0.030-F2-B.0-Z2	.030	1/8	.0450	1-1/2	2	CYLINDRICAL
N59770	MESB230-0.031-F2-B.0-Z2	.031	1/8	.0465	1-1/2	2	CYLINDRICAL
N59771	MESB230-0.032-F2-B.0-Z2	.032	1/8	.0480	1-1/2	2	CYLINDRICAL
N59772	MESB230-0.033-F2-B.0-Z2	.033	1/8	.0495	1-1/2	2	CYLINDRICAL
N59773	MESB230-0.034-F2-B.0-Z2	.034	1/8	.0510	1-1/2	2	CYLINDRICAL
N59774	MESB230-0.035-F2-B.0-Z2	.035	1/8	.0525	1-1/2	2	CYLINDRICAL
N59775	MESB230-0.036-F2-B.0-Z2	.036	1/8	.0540	1-1/2	2	CYLINDRICAL
N59776	MESB230-0.037-F2-B.0-Z2	.037	1/8	.0555	1-1/2	2	CYLINDRICAL
N59777	MESB230-0.038-F2-B.0-Z2	.038	1/8	.0570	1-1/2	2	CYLINDRICAL
N59778	MESB230-0.039-F2-B.0-Z2	.039	1/8	.0585	1-1/2	2	CYLINDRICAL
N59779	MESB230-0.040-F2-B.0-Z2	.040	1/8	.0600	1-1/2	2	CYLINDRICAL
N59780	MESB230-0.041-F2-B.0-Z2	.041	1/8	.0615	1-1/2	2	CYLINDRICAL
N59781	MESB230-0.042-F2-B.0-Z2	.042	1/8	.0630	1-1/2	2	CYLINDRICAL
N59782	MESB230-0.043-F2-B.0-Z2	.043	1/8	.0645	1-1/2	2	CYLINDRICAL
N59783	MESB230-0.044-F2-B.0-Z2	.044	1/8	.0660	1-1/2	2	CYLINDRICAL
N59784	MESB230-0.045-F2-B.0-Z2	.045	1/8	.0675	1-1/2	2	CYLINDRICAL
N59785	MESB230-0.046-F2-B.0-Z2	.046	1/8	.0690	1-1/2	2	CYLINDRICAL
N59786	MESB230-0.047-F2-B.0-Z2	.047	1/8	.0705	1-1/2	2	CYLINDRICAL
N59787	MESB230-0.048-F2-B.0-Z2	.048	1/8	.0720	1-1/2	2	CYLINDRICAL
N59788	MESB230-0.049-F2-B.0-Z2	.049	1/8	.0735	1-1/2	2	CYLINDRICAL
N59789	MESB230-0.050-F2-B.0-Z2	.050	1/8	.0750	1-1/2	2	CYLINDRICAL
N59790	MESB230-0.051-F2-B.0-Z2	.051	1/8	.0765	1-1/2	2	CYLINDRICAL
N59791	MESB230-0.052-F2-B.0-Z2	.052	1/8	.0780	1-1/2	2	CYLINDRICAL
N59792	MESB230-0.053-F2-B.0-Z2	.053	1/8	.0795	1-1/2	2	CYLINDRICAL
N59793	MESB230-0.054-F2-B.0-Z2	.054	1/8	.0810	1-1/2	2	CYLINDRICAL
N59794	MESB230-0.055-F2-B.0-Z2	.055	1/8	.0825	1-1/2	2	CYLINDRICAL

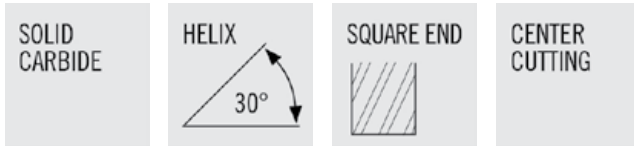
## ME430



- Sub micron grain carbide
- Uncoated
- ME430 LOC = 3xD
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	SHANK TYPE
N59795	ME430-0.005-F3-S.0-Z4	.005	1/8	.0150	1-1/2	4	CYLINDRICAL
N59796	ME430-0.006-F3-S.0-Z4	.006	1/8	.0180	1-1/2	4	CYLINDRICAL
N59797	ME430-0.007-F3-S.0-Z4	.007	1/8	.0210	1-1/2	4	CYLINDRICAL
N59798	ME430-0.008-F3-S.0-Z4	.008	1/8	.0240	1-1/2	4	CYLINDRICAL
N59799	ME430-0.009-F3-S.0-Z4	.009	1/8	.0270	1-1/2	4	CYLINDRICAL
N59800	ME430-0.010-F3-S.0-Z4	.010	1/8	.0300	1-1/2	4	CYLINDRICAL
N59801	ME430-0.011-F3-S.0-Z4	.011	1/8	.0330	1-1/2	4	CYLINDRICAL
N59802	ME430-0.012-F3-S.0-Z4	.012	1/8	.0360	1-1/2	4	CYLINDRICAL
N59803	ME430-0.013-F3-S.0-Z4	.013	1/8	.0390	1-1/2	4	CYLINDRICAL
N59804	ME430-0.014-F3-S.0-Z4	.014	1/8	.0420	1-1/2	4	CYLINDRICAL
N59805	ME430-0.015-F3-S.0-Z4	.015	1/8	.0450	1-1/2	4	CYLINDRICAL
N59806	ME430-0.016-F3-S.0-Z4	.016	1/8	.0480	1-1/2	4	CYLINDRICAL
N59807	ME430-0.017-F3-S.0-Z4	.017	1/8	.0510	1-1/2	4	CYLINDRICAL
N59808	ME430-0.018-F3-S.0-Z4	.018	1/8	.0540	1-1/2	4	CYLINDRICAL
N59809	ME430-0.019-F3-S.0-Z4	.019	1/8	.0570	1-1/2	4	CYLINDRICAL
N59810	ME430-0.020-F3-S.0-Z4	.020	1/8	.0600	1-1/2	4	CYLINDRICAL
N59811	ME430-0.021-F3-S.0-Z4	.021	1/8	.0630	1-1/2	4	CYLINDRICAL
N59812	ME430-0.022-F3-S.0-Z4	.022	1/8	.0660	1-1/2	4	CYLINDRICAL
N59813	ME430-0.023-F3-S.0-Z4	.023	1/8	.0690	1-1/2	4	CYLINDRICAL
N59814	ME430-0.024-F3-S.0-Z4	.024	1/8	.0720	1-1/2	4	CYLINDRICAL
N59815	ME430-0.025-F3-S.0-Z4	.025	1/8	.0750	1-1/2	4	CYLINDRICAL
N59816	ME430-0.026-F3-S.0-Z4	.026	1/8	.0780	1-1/2	4	CYLINDRICAL
N59817	ME430-0.027-F3-S.0-Z4	.027	1/8	.0810	1-1/2	4	CYLINDRICAL
N59818	ME430-0.028-F3-S.0-Z4	.028	1/8	.0840	1-1/2	4	CYLINDRICAL
N59819	ME430-0.029-F3-S.0-Z4	.029	1/8	.0870	1-1/2	4	CYLINDRICAL
N59820	ME430-0.030-F3-S.0-Z4	.030	1/8	.0900	1-1/2	4	CYLINDRICAL
N59821	ME430-0.031-F3-S.0-Z4	.031	1/8	.0930	1-1/2	4	CYLINDRICAL
N59822	ME430-0.032-F3-S.0-Z4	.032	1/8	.0960	1-1/2	4	CYLINDRICAL
N59823	ME430-0.033-F3-S.0-Z4	.033	1/8	.0990	1-1/2	4	CYLINDRICAL
N59824	ME430-0.034-F3-S.0-Z4	.034	1/8	.1020	1-1/2	4	CYLINDRICAL
N59825	ME430-0.035-F3-S.0-Z4	.035	1/8	.1050	1-1/2	4	CYLINDRICAL
N59826	ME430-0.036-F3-S.0-Z4	.036	1/8	.1080	1-1/2	4	CYLINDRICAL
N59827	ME430-0.037-F3-S.0-Z4	.037	1/8	.1110	1-1/2	4	CYLINDRICAL

## ME430 (CONT'D)

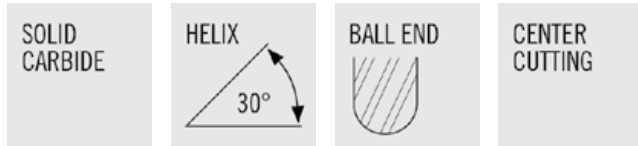


- Sub micron grain carbide
- Uncoated
- ME430 LOC = 3xD
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	SHANK TYPE
N59828	ME430-0.038-F3-S.0-Z4	.038	1/8	.1140	1-1/2	4	CYLINDRICAL
N59829	ME430-0.039-F3-S.0-Z4	.039	1/8	.1170	1-1/2	4	CYLINDRICAL
N59830	ME430-0.040-F3-S.0-Z4	.040	1/8	.1200	1-1/2	4	CYLINDRICAL
N59831	ME430-0.041-F3-S.0-Z4	.041	1/8	.1230	1-1/2	4	CYLINDRICAL
N59832	ME430-0.042-F3-S.0-Z4	.042	1/8	.1260	1-1/2	4	CYLINDRICAL
N59833	ME430-0.043-F3-S.0-Z4	.043	1/8	.1290	1-1/2	4	CYLINDRICAL
N59834	ME430-0.044-F3-S.0-Z4	.044	1/8	.1320	1-1/2	4	CYLINDRICAL
N59835	ME430-0.045-F3-S.0-Z4	.045	1/8	.1350	1-1/2	4	CYLINDRICAL
N59836	ME430-0.046-F3-S.0-Z4	.046	1/8	.1380	1-1/2	4	CYLINDRICAL
N59837	ME430-0.047-F3-S.0-Z4	.047	1/8	.1410	1-1/2	4	CYLINDRICAL
N59838	ME430-0.048-F3-S.0-Z4	.048	1/8	.1440	1-1/2	4	CYLINDRICAL
N59839	ME430-0.049-F3-S.0-Z4	.049	1/8	.1470	1-1/2	4	CYLINDRICAL
N59840	ME430-0.050-F3-S.0-Z4	.050	1/8	.1500	1-1/2	4	CYLINDRICAL
N59841	ME430-0.051-F3-S.0-Z4	.051	1/8	.1530	1-1/2	4	CYLINDRICAL
N59842	ME430-0.052-F3-S.0-Z4	.052	1/8	.1560	1-1/2	4	CYLINDRICAL
N59843	ME430-0.053-F3-S.0-Z4	.053	1/8	.1590	1-1/2	4	CYLINDRICAL
N59844	ME430-0.054-F3-S.0-Z4	.054	1/8	.1620	1-1/2	4	CYLINDRICAL
N59845	ME430-0.055-F3-S.0-Z4	.055	1/8	.1650	1-1/2	4	CYLINDRICAL
N59846	ME430-0.060-F3-S.0-Z4	.060	1/8	.1800	1-1/2	4	CYLINDRICAL
N59847	ME430-0.065-F3-S.0-Z4	.065	1/8	.1950	1-1/2	4	CYLINDRICAL
N59848	ME430-0.070-F3-S.0-Z4	.070	1/8	.2100	1-1/2	4	CYLINDRICAL
N59849	ME430-0.075-F3-S.0-Z4	.075	1/8	.2250	1-1/2	4	CYLINDRICAL
N59850	ME430-0.080-F3-S.0-Z4	.080	1/8	.2400	1-1/2	4	CYLINDRICAL
N59851	ME430-0.085-F3-S.0-Z4	.085	1/8	.2550	1-1/2	4	CYLINDRICAL
N59852	ME430-0.090-F3-S.0-Z4	.090	1/8	.2700	1-1/2	4	CYLINDRICAL
N59853	ME430-0.095-F3-S.0-Z4	.095	1/8	.2850	1-1/2	4	CYLINDRICAL
N59854	ME430-0.100-F3-S.0-Z4	.100	1/8	.3000	1-1/2	4	CYLINDRICAL
N59855	ME430-0.105-F3-S.0-Z4	.105	1/8	.3150	1-1/2	4	CYLINDRICAL
N59856	ME430-0.110-F3-S.0-Z4	.110	1/8	.3300	1-1/2	4	CYLINDRICAL
N59857	ME430-0.115-F3-S.0-Z4	.115	1/8	.3450	1-1/2	4	CYLINDRICAL
N59858	ME430-0.120-F3-S.0-Z4	.120	1/8	.3600	1-1/2	4	CYLINDRICAL



## MEB430

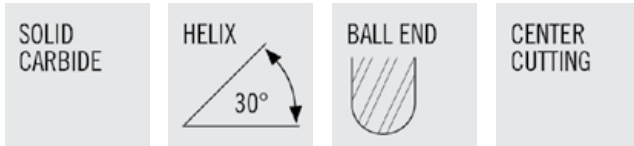


- Sub micron grain carbide
- Uncoated
- MEB430 LOC = 3xD
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	SHANK TYPE
N59859	MEB430-0.015-F3-B.0-Z4	.015	1/8	.0450	1-1/2	4	CYLINDRICAL
N59860	MEB430-0.016-F3-B.0-Z4	.016	1/8	.0480	1-1/2	4	CYLINDRICAL
N59861	MEB430-0.017-F3-B.0-Z4	.017	1/8	.0510	1-1/2	4	CYLINDRICAL
N59862	MEB430-0.018-F3-B.0-Z4	.018	1/8	.0540	1-1/2	4	CYLINDRICAL
N59863	MEB430-0.019-F3-B.0-Z4	.019	1/8	.0570	1-1/2	4	CYLINDRICAL
N59864	MEB430-0.020-F3-B.0-Z4	.020	1/8	.0600	1-1/2	4	CYLINDRICAL
N59865	MEB430-0.021-F3-B.0-Z4	.021	1/8	.0630	1-1/2	4	CYLINDRICAL
N59866	MEB430-0.022-F3-B.0-Z4	.022	1/8	.0660	1-1/2	4	CYLINDRICAL
N59867	MEB430-0.023-F3-B.0-Z4	.023	1/8	.0690	1-1/2	4	CYLINDRICAL
N59868	MEB430-0.024-F3-B.0-Z4	.024	1/8	.0720	1-1/2	4	CYLINDRICAL
N59869	MEB430-0.025-F3-B.0-Z4	.025	1/8	.0750	1-1/2	4	CYLINDRICAL
N59870	MEB430-0.026-F3-B.0-Z4	.026	1/8	.0780	1-1/2	4	CYLINDRICAL
N59871	MEB430-0.027-F3-B.0-Z4	.027	1/8	.0810	1-1/2	4	CYLINDRICAL
N59872	MEB430-0.028-F3-B.0-Z4	.028	1/8	.0840	1-1/2	4	CYLINDRICAL
N59873	MEB430-0.029-F3-B.0-Z4	.029	1/8	.0870	1-1/2	4	CYLINDRICAL
N59874	MEB430-0.030-F3-B.0-Z4	.030	1/8	.0900	1-1/2	4	CYLINDRICAL
N59875	MEB430-0.031-F3-B.0-Z4	.031	1/8	.0930	1-1/2	4	CYLINDRICAL
N59876	MEB430-0.032-F3-B.0-Z4	.032	1/8	.0960	1-1/2	4	CYLINDRICAL
N59877	MEB430-0.033-F3-B.0-Z4	.033	1/8	.0990	1-1/2	4	CYLINDRICAL
N59878	MEB430-0.034-F3-B.0-Z4	.034	1/8	.1020	1-1/2	4	CYLINDRICAL
N59879	MEB430-0.035-F3-B.0-Z4	.035	1/8	.1050	1-1/2	4	CYLINDRICAL
N59880	MEB430-0.036-F3-B.0-Z4	.036	1/8	.1080	1-1/2	4	CYLINDRICAL
N59881	MEB430-0.037-F3-B.0-Z4	.037	1/8	.1110	1-1/2	4	CYLINDRICAL
N59882	MEB430-0.038-F3-B.0-Z4	.038	1/8	.1140	1-1/2	4	CYLINDRICAL
N59883	MEB430-0.039-F3-B.0-Z4	.039	1/8	.1170	1-1/2	4	CYLINDRICAL
N59884	MEB430-0.040-F3-B.0-Z4	.040	1/8	.1200	1-1/2	4	CYLINDRICAL
N59885	MEB430-0.041-F3-B.0-Z4	.041	1/8	.1230	1-1/2	4	CYLINDRICAL
N59886	MEB430-0.042-F3-B.0-Z4	.042	1/8	.1260	1-1/2	4	CYLINDRICAL
N59887	MEB430-0.043-F3-B.0-Z4	.043	1/8	.1290	1-1/2	4	CYLINDRICAL
N59888	MEB430-0.044-F3-B.0-Z4	.044	1/8	.1320	1-1/2	4	CYLINDRICAL
N59889	MEB430-0.045-F3-B.0-Z4	.045	1/8	.1350	1-1/2	4	CYLINDRICAL
N59890	MEB430-0.046-F3-B.0-Z4	.046	1/8	.1380	1-1/2	4	CYLINDRICAL
N59891	MEB430-0.047-F3-B.0-Z4	.047	1/8	.1410	1-1/2	4	CYLINDRICAL
N59892	MEB430-0.048-F3-B.0-Z4	.048	1/8	.1440	1-1/2	4	CYLINDRICAL
N59893	MEB430-0.049-F3-B.0-Z4	.049	1/8	.1470	1-1/2	4	CYLINDRICAL
N59894	MEB430-0.050-F3-B.0-Z4	.050	1/8	.1500	1-1/2	4	CYLINDRICAL
N59895	MEB430-0.051-F3-B.0-Z4	.051	1/8	.1530	1-1/2	4	CYLINDRICAL
N59896	MEB430-0.052-F3-B.0-Z4	.052	1/8	.1560	1-1/2	4	CYLINDRICAL

DISCOUNT CODE D42

## MEB430 (CONT'D)

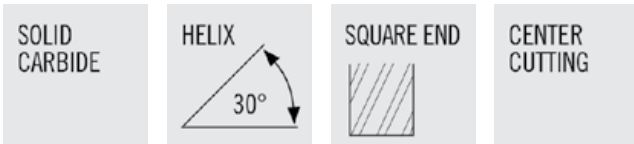


- Sub micron grain carbide
- Uncoated
- MEB430 LOC = 3xD

- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	SHANK TYPE
N59897	MEB430-0.053-F3-B.0-Z4	.053	1/8	.1590	1-1/2	4	CYLINDRICAL
N59898	MEB430-0.054-F3-B.0-Z4	.054	1/8	.1620	1-1/2	4	CYLINDRICAL
N59899	MEB430-0.055-F3-B.0-Z4	.055	1/8	.1650	1-1/2	4	CYLINDRICAL
N59900	MEB430-0.060-F3-B.0-Z4	.060	1/8	.1800	1-1/2	4	CYLINDRICAL
N59901	MEB430-0.065-F3-B.0-Z4	.065	1/8	.1950	1-1/2	4	CYLINDRICAL
N59902	MEB430-0.070-F3-B.0-Z4	.070	1/8	.2100	1-1/2	4	CYLINDRICAL
N59903	MEB430-0.075-F3-B.0-Z4	.075	1/8	.2250	1-1/2	4	CYLINDRICAL
N59904	MEB430-0.080-F3-B.0-Z4	.080	1/8	.2400	1-1/2	4	CYLINDRICAL
N59905	MEB430-0.085-F3-B.0-Z4	.085	1/8	.2550	1-1/2	4	CYLINDRICAL
N59906	MEB430-0.090-F3-B.0-Z4	.090	1/8	.2700	1-1/2	4	CYLINDRICAL
N59907	MEB430-0.095-F3-B.0-Z4	.095	1/8	.2850	1-1/2	4	CYLINDRICAL
N59908	MEB430-0.100-F3-B.0-Z4	.100	1/8	.3000	1-1/2	4	CYLINDRICAL
N59909	MEB430-0.105-F3-B.0-Z4	.105	1/8	.3150	1-1/2	4	CYLINDRICAL
N59910	MEB430-0.110-F3-B.0-Z4	.110	1/8	.3300	1-1/2	4	CYLINDRICAL
N59911	MEB430-0.115-F3-B.0-Z4	.115	1/8	.3450	1-1/2	4	CYLINDRICAL
N59912	MEB430-0.120-F3-B.0-Z4	.120	1/8	.3600	1-1/2	4	CYLINDRICAL

## MES430



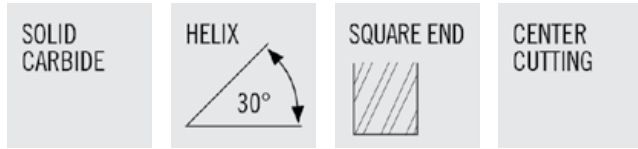
- Sub micron grain carbide
- Uncoated
- MES430 LOC = 1.5xD

- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	SHANK TYPE
N59913	MES430-0.005-F2-S.0-Z4	.005	1/8	.0075	1-1/2	4	CYLINDRICAL
N59914	MES430-0.006-F2-S.0-Z4	.006	1/8	.0090	1-1/2	4	CYLINDRICAL
N59915	MES430-0.007-F2-S.0-Z4	.007	1/8	.0105	1-1/2	4	CYLINDRICAL
N59916	MES430-0.008-F2-S.0-Z4	.008	1/8	.0120	1-1/2	4	CYLINDRICAL
N59917	MES430-0.009-F2-S.0-Z4	.009	1/8	.0135	1-1/2	4	CYLINDRICAL
N59918	MES430-0.010-F2-S.0-Z4	.010	1/8	.0150	1-1/2	4	CYLINDRICAL
N59919	MES430-0.011-F2-S.0-Z4	.011	1/8	.0165	1-1/2	4	CYLINDRICAL
N59920	MES430-0.012-F2-S.0-Z4	.012	1/8	.0180	1-1/2	4	CYLINDRICAL
N59921	MES430-0.013-F2-S.0-Z4	.013	1/8	.0195	1-1/2	4	CYLINDRICAL
N59922	MES430-0.014-F2-S.0-Z4	.014	1/8	.0210	1-1/2	4	CYLINDRICAL
N59923	MES430-0.015-F2-S.0-Z4	.015	1/8	.0225	1-1/2	4	CYLINDRICAL

DISCOUNT CODE D42

## MES430 (CONT'D)

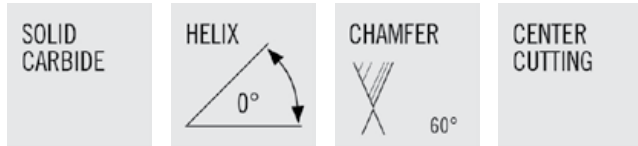


- Sub micron grain carbide
- Uncoated
- MES430 LOC = 1.5xD
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	SHANK TYPE
N59924	MES430-0.016-F2-S.0-Z4	.016	1/8	.0240	1-1/2	4	CYLINDRICAL
N59925	MES430-0.017-F2-S.0-Z4	.017	1/8	.0255	1-1/2	4	CYLINDRICAL
N59926	MES430-0.018-F2-S.0-Z4	.018	1/8	.0270	1-1/2	4	CYLINDRICAL
N59927	MES430-0.019-F2-S.0-Z4	.019	1/8	.0285	1-1/2	4	CYLINDRICAL
N59928	MES430-0.020-F2-S.0-Z4	.020	1/8	.0300	1-1/2	4	CYLINDRICAL
N59929	MES430-0.021-F2-S.0-Z4	.021	1/8	.0315	1-1/2	4	CYLINDRICAL
N59930	MES430-0.022-F2-S.0-Z4	.022	1/8	.0330	1-1/2	4	CYLINDRICAL
N59931	MES430-0.023-F2-S.0-Z4	.023	1/8	.0345	1-1/2	4	CYLINDRICAL
N59932	MES430-0.024-F2-S.0-Z4	.024	1/8	.0360	1-1/2	4	CYLINDRICAL
N59933	MES430-0.025-F2-S.0-Z4	.025	1/8	.0375	1-1/2	4	CYLINDRICAL
N59934	MES430-0.026-F2-S.0-Z4	.026	1/8	.0390	1-1/2	4	CYLINDRICAL
N59935	MES430-0.027-F2-S.0-Z4	.027	1/8	.0405	1-1/2	4	CYLINDRICAL
N59936	MES430-0.028-F2-S.0-Z4	.028	1/8	.0420	1-1/2	4	CYLINDRICAL
N59937	MES430-0.029-F2-S.0-Z4	.029	1/8	.0435	1-1/2	4	CYLINDRICAL
N59938	MES430-0.030-F2-S.0-Z4	.030	1/8	.0450	1-1/2	4	CYLINDRICAL
N59939	MES430-0.031-F2-S.0-Z4	.031	1/8	.0465	1-1/2	4	CYLINDRICAL
N59940	MES430-0.032-F2-S.0-Z4	.032	1/8	.0480	1-1/2	4	CYLINDRICAL
N59941	MES430-0.033-F2-S.0-Z4	.033	1/8	.0495	1-1/2	4	CYLINDRICAL
N59942	MES430-0.034-F2-S.0-Z4	.034	1/8	.0510	1-1/2	4	CYLINDRICAL
N59943	MES430-0.035-F2-S.0-Z4	.035	1/8	.0525	1-1/2	4	CYLINDRICAL
N59944	MES430-0.036-F2-S.0-Z4	.036	1/8	.0540	1-1/2	4	CYLINDRICAL
N59945	MES430-0.037-F2-S.0-Z4	.037	1/8	.0555	1-1/2	4	CYLINDRICAL
N59946	MES430-0.038-F2-S.0-Z4	.038	1/8	.0570	1-1/2	4	CYLINDRICAL
N59947	MES430-0.039-F2-S.0-Z4	.039	1/8	.0585	1-1/2	4	CYLINDRICAL
N59948	MES430-0.040-F2-S.0-Z4	.040	1/8	.0600	1-1/2	4	CYLINDRICAL
N59949	MES430-0.041-F2-S.0-Z4	.041	1/8	.0615	1-1/2	4	CYLINDRICAL
N59950	MES430-0.042-F2-S.0-Z4	.042	1/8	.0630	1-1/2	4	CYLINDRICAL
N59951	MES430-0.043-F2-S.0-Z4	.043	1/8	.0645	1-1/2	4	CYLINDRICAL
N59952	MES430-0.044-F2-S.0-Z4	.044	1/8	.0660	1-1/2	4	CYLINDRICAL
N59953	MES430-0.045-F2-S.0-Z4	.045	1/8	.0675	1-1/2	4	CYLINDRICAL
N59954	MES430-0.046-F2-S.0-Z4	.046	1/8	.0690	1-1/2	4	CYLINDRICAL
N59955	MES430-0.047-F2-S.0-Z4	.047	1/8	.0705	1-1/2	4	CYLINDRICAL
N59956	MES430-0.048-F2-S.0-Z4	.048	1/8	.0720	1-1/2	4	CYLINDRICAL
N59957	MES430-0.049-F2-S.0-Z4	.049	1/8	.0735	1-1/2	4	CYLINDRICAL
N59958	MES430-0.050-F2-S.0-Z4	.050	1/8	.0750	1-1/2	4	CYLINDRICAL
N59959	MES430-0.051-F2-S.0-Z4	.051	1/8	.0765	1-1/2	4	CYLINDRICAL
N59960	MES430-0.052-F2-S.0-Z4	.052	1/8	.0780	1-1/2	4	CYLINDRICAL
N59961	MES430-0.053-F2-S.0-Z4	.053	1/8	.0795	1-1/2	4	CYLINDRICAL
N59962	MES430-0.054-F2-S.0-Z4	.054	1/8	.0810	1-1/2	4	CYLINDRICAL
N59963	MES430-0.055-F2-S.0-Z4	.055	1/8	.0825	1-1/2	4	CYLINDRICAL

DISCOUNT CODE D42

## CM260

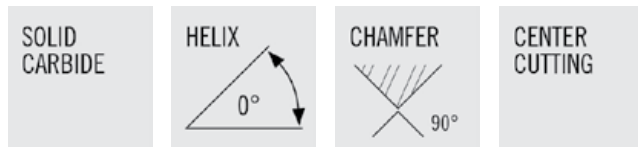


- Cylindrical Shank
- General Purpose

- Cutting Data - Page 228-229
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N76590	CM260-0.250-D1-C.0-Z2	1/4	1/4	3/16	2-1/2	2	TIALN	60°
N76591	CM260-0.375-D1-C.0-Z2	3/8	3/8	5/16	2-1/2	2	TIALN	60°
N76592	CM260-0.500-D1-C.0-Z2	1/2	1/2	7/16	3	2	TIALN	60°

## CM290

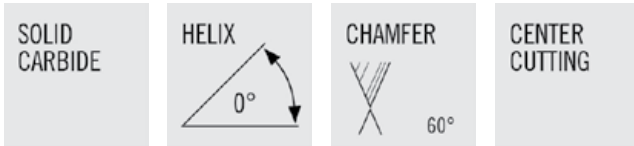


- Cylindrical Shank
- General Purpose

- Cutting Data - Page 228-229
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N76593	CM290-0.250-D1-C.0-Z2	1/4	1/4	1/8	2-1/2	2	TIALN	90°
N76594	CM290-0.375-D1-C.0-Z2	3/8	3/8	3/16	2-1/2	2	TIALN	90°
N76595	CM290-0.500-D1-C.0-Z2	1/2	1/2	1/4	3	2	TIALN	90°

## CM460



- Cylindrical Shank
- General Purpose

- Cutting Data - Page 230-231
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N76596	CM460-0.250-D1-C.0-Z4	1/4	1/4	3/16	2-1/2	4	TIALN	60°
N76597	CM460-0.375-D1-C.0-Z4	3/8	3/8	5/16	2-1/2	4	TIALN	60°
N76598	CM460-0.500-D1-C.0-Z4	1/2	1/2	7/16	3	4	TIALN	60°
N76599	CM460-0.750-D1-C.0-Z4	3/4	3/4	5/8	3	4	TIALN	60°

## CM490



- Cylindrical Shank
- General Purpose

- Cutting Data - Page 230-231
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N76600	CM490-0.250-D1-C.0-Z4	1/4	1/4	1/8	2-1/2	4	TIALN	90°
N76601	CM490-0.375-D1-C.0-Z4	3/8	3/8	3/16	2-1/2	4	TIALN	90°
N76602	CM490-0.500-D1-C.0-Z4	1/2	1/2	1/4	3	4	TIALN	90°
N76603	CM490-0.750-D1-C.0-Z4	3/4	3/4	3/8	3	4	TIALN	90°

## CM260 / CM290 - START VALUES

		SLOTTING										
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 2					
							1/4	3/8	1/2	5/8	3/4	
P	E 1 - 2	0.30	1.00	340	-	460	n (rev/min)	6112	4075	3056	2445	2037
							f <sub>z</sub> (in)	0.00050	0.00075	0.00100	0.00125	0.00150
				v <sub>f</sub> (in/min)	6.1	6.1	6.1	6.1	6.1			
	E 3 - 4	0.20	1.00	140	-	260	n (rev/min)	3056	2037	1528	1222	1019
							f <sub>z</sub> (in)	0.00028	0.00042	0.00056	0.00070	0.00084
				v <sub>f</sub> (in/min)	1.7	1.7	1.7	1.7	1.7			
	E 5 - 6	0.20	1.00	40	-	160	n (rev/min)	1528	1019	764	611	509
							f <sub>z</sub> (in)	0.00240	0.00360	0.00480	0.00600	0.00720
				v <sub>f</sub> (in/min)	7.3	7.3	7.3	7.3	7.3			
H	M / A / D 7a (48-52HRc)	0.20	1.00	55	-	85	n (rev/min)	1070	713	535	428	357
							f <sub>z</sub> (in)	0.00016	0.00024	0.00032	0.00040	0.00048
				v <sub>f</sub> (in/min)	0.3	0.3	0.3	0.3	0.3			
M	E 8 - 9	0.50	1.00	290	-	350	n (rev/min)	4890	3260	2445	1956	1630
							f <sub>z</sub> (in)	0.00024	0.00036	0.00048	0.00060	0.00072
				v <sub>f</sub> (in/min)	2.3	2.3	2.3	2.3	2.3			
	E 10 - 11	0.30	1.00	220	-	280	n (rev/min)	3820	2547	1910	1528	1273
							f <sub>z</sub> (in)	0.00020	0.00030	0.00040	0.00050	0.00060
				v <sub>f</sub> (in/min)	1.5	1.5	1.5	1.5	1.5			
K	E 12 - 13	0.30	1.00	210	-	330	n (rev/min)	4126	2750	2063	1650	1375
							f <sub>z</sub> (in)	0.00058	0.00087	0.00116	0.00145	0.00174
				v <sub>f</sub> (in/min)	4.8	4.8	4.8	4.8	4.8			
	E 14 - 15	0.20	1.00	85	-	205	n (rev/min)	2216	1477	1108	886	739
							f <sub>z</sub> (in)	0.00034	0.00051	0.00068	0.00085	0.00102
				v <sub>f</sub> (in/min)	1.5	1.5	1.5	1.5	1.5			

SMG = Seco Material Group  
n [min-1] = RPM  
v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
a<sub>p</sub>/D<sub>c</sub> = % of diameter  
v<sub>f</sub> [in/min] = Feed rate  
a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
All cutting data are start values. All cutting data is in inch values.  
Please reference the Workpiece Material Classification chart located on page 15.

## CM260 / CM290 - START VALUES

SIDE MILLING - ROUGHING												
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 2					
							1/4	3/8	1/2	5/8	3/4	
P	E 1 - 2	1.00	0.50	400	-	460	n (rev/min)	6112	4075	3056	2445	2037
							f <sub>z</sub> (in)	0.00063	0.00094	0.00125	0.00156	0.00188
				v <sub>f</sub> (in/min)	7.6	7.6	7.6	7.6	7.6			
	E 3 - 4	1.00	0.50	200	-	260	n (rev/min)	3056	2037	1528	1222	1019
							f <sub>z</sub> (in)	0.00035	0.00053	0.00070	0.00088	0.00105
				v <sub>f</sub> (in/min)	2.1	2.1	2.1	2.1	2.1			
	E 5 - 6	1.00	0.50	100	-	160	n (rev/min)	1528	1019	764	611	509
							f <sub>z</sub> (in)	0.00030	0.00045	0.00060	0.00075	0.00090
				v <sub>f</sub> (in/min)	0.9	0.9	0.9	0.9	0.9			
H	M / A / D 7a (48-52HRc)	0.30	0.20	70	-	85	n (rev/min)	1070	713	535	428	357
							f <sub>z</sub> (in)	0.00020	0.00030	0.00040	0.00050	0.00060
				v <sub>f</sub> (in/min)	0.4	0.4	0.4	0.4	0.4			
M	E 8 - 9	1.00	0.50	320	-	350	n (rev/min)	4890	3260	2445	1956	1630
							f <sub>z</sub> (in)	0.00030	0.00045	0.00060	0.00075	0.00090
				v <sub>f</sub> (in/min)	2.9	2.9	2.9	2.9	2.9			
	E 10 - 11	1.00	0.50	250	-	280	n (rev/min)	3820	2547	1910	1528	1273
							f <sub>z</sub> (in)	0.00025	0.00038	0.00050	0.00063	0.00075
				v <sub>f</sub> (in/min)	1.9	1.9	1.9	1.9	1.9			
K	E 12 - 13	1.00	0.50	270	-	330	n (rev/min)	4126	2750	2063	1650	1375
							f <sub>z</sub> (in)	0.00073	0.00109	0.00145	0.00181	0.00218
				v <sub>f</sub> (in/min)	6.0	6.0	6.0	6.0	6.0			
	E 14 - 15	1.00	0.50	145	-	205	n (rev/min)	2216	1477	1108	886	739
							f <sub>z</sub> (in)	0.00043	0.00064	0.00085	0.00106	0.00128
				v <sub>f</sub> (in/min)	1.9	1.9	1.9	1.9	1.9			

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## CM460 / CM490 - START VALUES

		SLOTTING										
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 4					
							1/4	3/8	1/2	5/8	3/4	
P	E 1 - 2	0.30	1.00	400			n (rev/min)	6112	4075	3056	2445	2037
							f <sub>z</sub> (in)	0.00050	0.00075	0.00100	0.00125	0.00150
				340 - 460			v <sub>f</sub> (in/min)	12.2	12.2	12.2	12.2	12.2
	E 3 - 4	0.20	1.00				200			n (rev/min)	3056	2037
				f <sub>z</sub> (in)	0.00028	0.00042				0.00056	0.00070	0.00084
				140 - 260			v <sub>f</sub> (in/min)	3.4	3.4	3.4	3.4	3.4
	E 5 - 6	0.20	1.00				100			n (rev/min)	1528	1019
				f <sub>z</sub> (in)	0.00240	0.00360				0.00480	0.00600	0.00720
				40 - 160			v <sub>f</sub> (in/min)	14.7	14.7	14.7	14.7	14.7
H	M / A / D 7a (48-52HRc)	0.20	1.00				70			n (rev/min)	1070	713
				f <sub>z</sub> (in)	0.00016	0.00024				0.00032	0.00040	0.00048
				55 - 85			v <sub>f</sub> (in/min)	0.7	0.7	0.7	0.7	0.7
M	E 8 - 9	0.50	1.00				320			n (rev/min)	4890	3260
				f <sub>z</sub> (in)	0.00024	0.00036				0.00048	0.00060	0.00072
				290 - 350			v <sub>f</sub> (in/min)	4.7	4.7	4.7	4.7	4.7
	E 10 - 11	0.30	1.00				250			n (rev/min)	3820	2547
				f <sub>z</sub> (in)	0.00020	0.00030				0.00040	0.00050	0.00060
				220 - 280			v <sub>f</sub> (in/min)	3.1	3.1	3.1	3.1	3.1
K	E 12 - 13	0.30	1.00				270			n (rev/min)	4126	2750
				f <sub>z</sub> (in)	0.00058	0.00087				0.00116	0.00145	0.00174
				210 - 330			v <sub>f</sub> (in/min)	9.6	9.6	9.6	9.6	9.6
	E 14 - 15	0.20	1.00				145			n (rev/min)	2216	1477
				f <sub>z</sub> (in)	0.00034	0.00051				0.00068	0.00085	0.00102
				85 - 205			v <sub>f</sub> (in/min)	3.0	3.0	3.0	3.0	3.0

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## CM460 / CM490 - START VALUES

SIDE MILLING - ROUGHING												
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 4					
							1/4	3/8	1/2	5/8	3/4	
P	E 1 - 2	1.00	0.50	340	-	460	n (rev/min)	6112	4075	3056	2445	2037
							f <sub>z</sub> (in)	0.00063	0.00094	0.00125	0.00156	0.00188
							v <sub>f</sub> (in/min)	15.3	15.3	15.3	15.3	15.3
	E 3 - 4	1.00	0.50	140	-	260	n (rev/min)	3056	2037	1528	1222	1019
							f <sub>z</sub> (in)	0.00035	0.00053	0.00070	0.00088	0.00105
							v <sub>f</sub> (in/min)	4.3	4.3	4.3	4.3	4.3
	E 5 - 6	1.00	0.50	40	-	160	n (rev/min)	1528	1019	764	611	509
							f <sub>z</sub> (in)	0.00030	0.00045	0.00060	0.00075	0.00090
							v <sub>f</sub> (in/min)	1.8	1.8	1.8	1.8	1.8
H	M / A / D 7a (48-52HRc)	0.30	0.20	55	-	85	n (rev/min)	1070	713	535	428	357
							f <sub>z</sub> (in)	0.00020	0.00030	0.00040	0.00050	0.00060
							v <sub>f</sub> (in/min)	0.9	0.9	0.9	0.9	0.9
M	E 8 - 9	1.00	0.50	290	-	350	n (rev/min)	4890	3260	2445	1956	1630
							f <sub>z</sub> (in)	0.00030	0.00045	0.00060	0.00075	0.00090
							v <sub>f</sub> (in/min)	5.9	5.9	5.9	5.9	5.9
	E 10 - 11	1.00	0.50	220	-	280	n (rev/min)	3820	2547	1910	1528	1273
							f <sub>z</sub> (in)	0.00025	0.00038	0.00050	0.00063	0.00075
							v <sub>f</sub> (in/min)	3.8	3.8	3.8	3.8	3.8
K	E 12 - 13	1.00	0.50	210	-	330	n (rev/min)	4126	2750	2063	1650	1375
							f <sub>z</sub> (in)	0.00073	0.00109	0.00145	0.00181	0.00218
							v <sub>f</sub> (in/min)	12.0	12.0	12.0	12.0	12.0
	E 14 - 15	1.00	0.50	85	-	205	n (rev/min)	2216	1477	1108	886	739
							f <sub>z</sub> (in)	0.00043	0.00064	0.00085	0.00106	0.00128
							v <sub>f</sub> (in/min)	3.8	3.8	3.8	3.8	3.8

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## COBALT HIGH PERFORMANCE MILLING

# VARIABLE FACE PROFILE

The VFP product family has been specifically engineered for milling Titanium. The variable helix and polished rake face provide increased material shearing capability, yielding excellent chip formation and evacuation. The VFP's unique geometry and superior cutting edge result in reduced heat generation and excellent workpiece surface finish.

### PRODUCT OVERVIEW

- M42 Cobalt Material
- Polished rake face
- Center cutting end teeth
- Standard with corner chamfer
- Standard with Weldon flat
- Uncoated & AlCrN coated
- Radius modification possible on all sizes

### YOUR NIAGARA CUTTER BENEFIT

- Optimal chip formation and evacuation
- Increased metal removal rates compared to alternative endmills
- Smooth workpiece finish
- Reduced horsepower requirements

### RANGE OVERVIEW

**VFP435 / VFP635 / VFP<sup>2</sup>435 / VFP<sup>2</sup>635**

- Diameters 3/4" - 2"
- Up to .156" corner radius through modification

**VFP435SB / VFP635SB / VFP435SBR / VFP635SBR**

- Diameters 1 1/4" - 2"
- Up to .250" corner radius option
- Short block design
- AlCrN coated option

### TECHNICAL SPECIFICATIONS

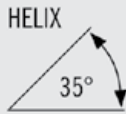
Diameter range:	ø3/4" - ø2"
# flutes:	4-6
Helix angle:	Variable
Rake angle:	10°
Relief:	10°
Shank Dia Tolerance:	- .0001 / - .0005
Cutting Dia Tolerance:	+ .002 / - .000
Chamfer:	45°
Unequal Index:	No
Edge preparation:	No
Coating:	AlCrN or Uncoated

### PREFERRED MATERIAL GROUPS

Stainless steel  
Titanium alloys

## VFP435 / VFP635

M42  
8% COBALT



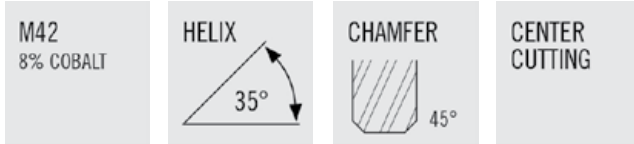
CENTER  
CUTTING



- Optimal chip formation and evacuation
- Polished rake face
- Weldon flat standard
- Up to .156" Corner Radius through modification
- Designed for stainless steel and titanium
- Cutting Data - Page 290
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	CHAMFER
N68948	VFP435-0.750-D2-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	0.030
N68949	VFP435-0.750-D3-C030.3-Z4	3/4	3/4	2-1/4	4-1/2	4	0.030
N68950	VFP435-0.750-D4-C030.3-Z4	3/4	3/4	3	5-1/4	4	0.030
N68952	VFP435-1.000-D2-C030.3-Z4	1	1	2	4-1/2	4	0.030
N68953	VFP635-1.000-D2-C030.3-Z6	1	1	2	4-1/2	6	0.030
N68954	VFP435-1.000-D3-C030.3-Z4	1	1	3	5-1/2	4	0.030
N68955	VFP635-1.000-D3-C030.3-Z6	1	1	3	5-1/2	6	0.030
N68956	VFP435-1.000-D4-C030.3-Z4	1	1	4	6-1/2	4	0.030
N68957	VFP635-1.000-D4-C030.3-Z6	1	1	4	6-1/2	6	0.030
N68958	VFP435-1.250-D2-C040.3-Z4	1-1/4	1-1/4	2	4-1/2	4	0.040
N68959	VFP635-1.250-D2-C040.3-Z6	1-1/4	1-1/4	2	4-1/2	6	0.040
N68960	VFP435-1.250-D3-C040.3-Z4	1-1/4	1-1/4	3	5-1/2	4	0.040
N68961	VFP635-1.250-D3-C040.3-Z6	1-1/4	1-1/4	3	5-1/2	6	0.040
N68962	VFP435-1.250-D4-C040.3-Z4	1-1/4	1-1/4	4	6-1/2	4	0.040
N68963	VFP635-1.250-D4-C040.3-Z6	1-1/4	1-1/4	4	6-1/2	6	0.040
N68965	VFP635-1.500-P1-C040.3-Z6	1-1/2	1-1/4	2	4-1/2	6	0.040
N68966	VFP635-1.500-P2-C040.3-Z6	1-1/2	1-1/4	3	5-1/2	6	0.040
N68967	VFP635-1.500-P3-C040.3-Z6	1-1/2	1-1/4	4	6-1/2	6	0.040
N68968	VFP635-1.500-P4-C040.3-Z6	1-1/2	1-1/4	6	8-1/2	6	0.040
N68969	VFP635-2.000-D1-C040.3-Z6	2	2	2	5-3/4	6	0.040
N68970	VFP635-2.000-D2-C040.3-Z6	2	2	3	6-3/4	6	0.040
N68971	VFP635-2.000-D3-C040.3-Z6	2	2	4	7-3/4	6	0.040
N68972	VFP635-2.000-D4-C040.3-Z6	2	2	6	9-3/4	6	0.040

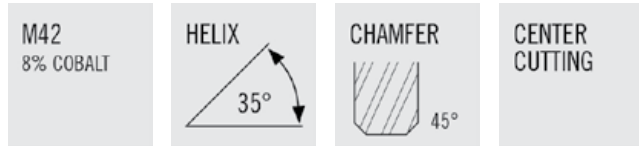
## VFP<sup>2</sup>435 / VFP<sup>2</sup>635



- For less rigid setups
  - Optimal chip formation and evacuation
  - Polished rake face
  - Weldon flat standard
  - Less aggressive profile compared to VFP1
  - Up to .156" Corner Radius through modification
  - Designed for stainless steel and titanium
- Cutting Data - Page 290
  - Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	CHAMFER
N68974	VFP2435-0.750-D2-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	0.030
N68975	VFP2435-0.750-D3-C030.3-Z4	3/4	3/4	2-1/4	4-1/2	4	0.030
N68976	VFP2435-0.750-D4-C030.3-Z4	3/4	3/4	3	5-1/4	4	0.030
N68978	VFP2435-1.000-D2-C030.3-Z4	1	1	2	4-1/2	4	0.030
N68979	VFP2635-1.000-D2-C030.3-Z6	1	1	2	4-1/2	6	0.030
N68980	VFP2435-1.000-D3-C030.3-Z4	1	1	3	5-1/2	4	0.030
N68981	VFP2635-1.000-D3-C030.3-Z6	1	1	3	5-1/2	6	0.030
N68983	VFP2635-1.000-D4-C030.3-Z6	1	1	4	6-1/2	6	0.030
N68985	VFP2635-1.250-D2-C040.3-Z6	1-1/4	1-1/4	2	4-1/2	6	0.040
N68987	VFP2635-1.250-D3-C040.3-Z6	1-1/4	1-1/4	3	5-1/2	6	0.040
N68989	VFP2635-1.250-D4-C040.3-Z6	1-1/4	1-1/4	4	6-1/2	6	0.040
N68996	VFP2635-2.000-D2-C040.3-Z6	2	2	3	6-3/4	6	0.040

## SHORT BLOCK-VFP435SB / VFP635SB

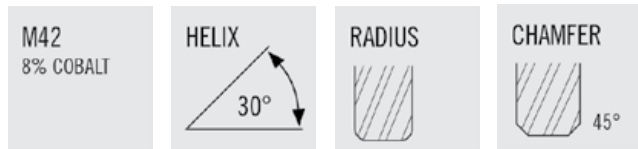


- Optimal chip formation and evacuation
- Polished rake face
- Weldon flat standard
- Up to .250" corner radius through modification
- Designed for stainless steel and titanium

- Cutting Data - Page 290
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	CHAMFER
N69387	VFP435SB-1.250-D2-C040.3-Z4	1-1/4	1-1/4	2	4-1/2	4	0.040
N69388	VFP635SB-1.250-D1-C040.3-Z6	1-1/4	1-1/4	2	4-1/2	6	0.040
N69389	VFP435SB-1.250-D3-C040.3-Z4	1-1/4	1-1/4	3	5-1/2	4	0.040
N69390	VFP635SB-1.250-D2-C040.3-Z6	1-1/4	1-1/4	3	5-1/2	6	0.040
N69391	VFP435SB-1.250-D4-C040.3-Z4	1-1/4	1-1/4	4	6-1/2	4	0.040
N69392	VFP635SB-1.250-D3-C040.3-Z6	1-1/4	1-1/4	4	6-1/2	6	0.040
N69393	VFP635SB-1.250-D5-C040.3-Z6	1-1/4	1-1/4	6	8-1/2	6	0.040
N69394	VFP635SB-2.000-D1-C040.3-Z6	2	2	2	5-3/4	6	0.040
N69395	VFP635SB-2.000-D2-C040.3-Z6	2	2	3	6-3/4	6	0.040
N69396	VFP635SB-2.000-D3-C040.3-Z6	2	2	4	7-3/4	6	0.040
N69397	VFP635SB-2.000-D4-C040.3-Z6	2	2	6	9-3/4	6	0.040
N69398	VFP635SB-2.000-D5-C040.3-Z6	2	2	8	11-3/4	6	0.040

## ALCRN COATED - VFP435SB / VFP435SBR / VFP635SB / VFP635SBR



- Optimal chip formation and evacuation
  - Polished rake face
  - Weldon flat standard
  - AlCrN coated for increased performance and tool life
  - Specifically engineered for titanium and stainless steel
  - Available with chamfer or corner radius
- Cutting Data - Page 290
  - Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	RADIUS	CHAMFER
03136025	VFP435SBR-1.250-D2-R120.3-Z4	1-1/4	1-1/4	2	4-1/2	4	AlCrN	0.120	-
03136026	VFP635SBR-1.250-D2-R120.3-Z6	1-1/4	1-1/4	2	4-1/2	6	AlCrN	0.120	-
03136027	VFP435SB-1.250-D3-C040.3-Z4	1-1/4	1-1/4	3	5-1/2	4	AlCrN	-	0.040
03136028	VFP635SB-1.250-D3-C040.3-Z6	1-1/4	1-1/4	3	5-1/2	6	AlCrN	-	0.040
03136029	VFP635SBR-1.250-D3-R120.3-Z6	1-1/4	1-1/4	3	5-1/2	6	AlCrN	0.120	-
03136030	VFP635SBR-1.250-D3-R156.3-Z6	1-1/4	1-1/4	3	5-1/2	6	AlCrN	0.156	-
03136031	VFP435SBR-1.250-D4-R120.3-Z4	1-1/4	1-1/4	4	6-1/2	4	AlCrN	0.120	-
03136032	VFP635SB-1.250-D4-C040.3-Z6	1-1/4	1-1/4	4	6-1/2	6	AlCrN	-	0.040
03136033	VFP635SBR-1.250-D4-R120.3-Z6	1-1/4	1-1/4	4	6-1/2	6	AlCrN	0.120	-
03136034	VFP635SBR-1.250-D4-R156.3-Z6	1-1/4	1-1/4	4	6-1/2	6	AlCrN	0.156	-
03136035	VFP635SBR-1.250-D6-R120.3-Z6	1-1/4	1-1/4	6	8-1/2	6	AlCrN	0.120	-
03136036	VFP635SB-2.000-D1-C040.3-Z6	2	2	2	5-3/4	6	AlCrN	-	0.040
03136037	VFP635SBR-2.000-D1-R120.3-Z6	2	2	2	5-3/4	6	AlCrN	0.120	-
03136038	VFP635SBR-2.000-D1-R250.3-Z6	2	2	2	5-3/4	6	AlCrN	0.250	-
03136039	VFP635SB-2.000-D2-C040.3-Z6	2	2	3	6-3/4	6	AlCrN	-	0.040
03136040	VFP635SBR-2.000-D2-R120.3-Z6	2	2	3	6-3/4	6	AlCrN	0.120	-
03136041	VFP635SBR-2.000-D2-R250.3-Z6	2	2	3	6-3/4	6	AlCrN	0.250	-
03136042	VFP635SB-2.000-D3-C040.3-Z6	2	2	4	7-3/4	6	AlCrN	-	0.040
03136043	VFP635SBR-2.000-D3-R120.3-Z6	2	2	4	7-3/4	6	AlCrN	0.120	-
03136044	VFP635SBR-2.000-D3-R250.3-Z6	2	2	4	7-3/4	6	AlCrN	0.250	-
03136045	VFP635SB-2.000-D4-C040.3-Z6	2	2	6	9-3/4	6	AlCrN	-	0.040
03136046	VFP635SBR-2.000-D4-R120.3-Z6	2	2	6	9-3/4	6	AlCrN	0.120	-
03136047	VFP635SBR-2.000-D4-R250.3-Z6	2	2	6	9-3/4	6	AlCrN	0.250	-

## SP205

M42  
8% COBALT

HELIX  
30°

SQUARE END

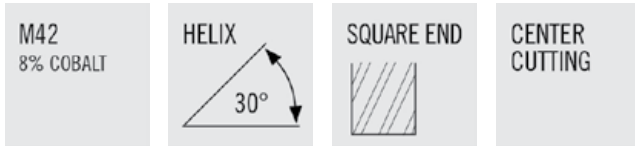
CENTER CUTTING



- Weldon flat standard
- Designed for pocketing and slotting in all materials including high temperature alloys
- Cutting Data - Page 264-265
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N50041	SP205-0.125-F3-S.3-Z2	1/8	3/8	3/8	2-5/16	2	UNCOATED
N88565	SP205-0.125-F3-S.3-Z2	1/8	3/8	3/8	2-5/16	2	TICN
N50051	SP205-0.156-F3-S.3-Z2	5/32	3/8	7/16	2-5/16	2	UNCOATED
N88566	SP205-0.156-F3-S.3-Z2	5/32	3/8	7/16	2-5/16	2	TICN
N50061	SP205-0.188-F2-S.3-Z2	3/16	3/8	7/16	2-5/16	2	UNCOATED
N88567	SP205-0.188-F2-S.3-Z2	3/16	3/8	7/16	2-5/16	2	TICN
N50071	SP205-0.219-F2-S.3-Z2	7/32	3/8	1/2	2-5/16	2	UNCOATED
N88568	SP205-0.219-F2-S.3-Z2	7/32	3/8	1/2	2-5/16	2	TICN
N50081	SP205-0.250-F2-S.3-Z2	1/4	3/8	1/2	2-5/16	2	UNCOATED
N88569	SP205-0.250-F2-S.3-Z2	1/4	3/8	1/2	2-5/16	2	TICN
N50091	SP205-0.281-F2-S.3-Z2	9/32	3/8	9/16	2-5/16	2	UNCOATED
N88570	SP205-0.281-F2-S.3-Z2	9/32	3/8	9/16	2-5/16	2	TICN
N50101	SP205-0.313-F2-S.3-Z2	5/16	3/8	9/16	2-5/16	2	UNCOATED
N88571	SP205-0.313-F2-S.3-Z2	5/16	3/8	9/16	2-5/16	2	TICN
N50121	SP205-0.375-D2-S.3-Z2	3/8	3/8	9/16	2-5/16	2	UNCOATED
N88573	SP205-0.375-D2-S.3-Z2	3/8	3/8	9/16	2-5/16	2	TICN
N50141	SP205-0.438-P2-S.3-Z2	7/16	3/8	13/16	2-1/2	2	UNCOATED
N88574	SP205-0.438-P2-S.3-Z2	7/16	3/8	13/16	2-1/2	2	TICN
N50161	SP205-0.500-P2-S.3-Z2	1/2	3/8	13/16	2-1/2	2	UNCOATED
N88575	SP205-0.500-P2-S.3-Z2	1/2	3/8	13/16	2-1/2	2	TICN
N50162	SP205-0.500-D2-S.3-Z2	1/2	1/2	1	3	2	UNCOATED
N88576	SP205-0.500-D2-S.3-Z2	1/2	1/2	1	3	2	TICN
N50182	SP205-0.563-P2-S.3-Z2	9/16	1/2	1-1/8	3-1/8	2	UNCOATED
N88577	SP205-0.563-P2-S.3-Z2	9/16	1/2	1-1/8	3-1/8	2	TICN
N50203	SP205-0.625-D2-S.3-Z2	5/8	5/8	1-5/16	3-7/16	2	UNCOATED
N88578	SP205-0.625-D2-S.3-Z2	5/8	5/8	1-5/16	3-7/16	2	TICN
N50242	SP205-0.750-P2-S.3-Z2	3/4	1/2	1-5/16	3-5/16	2	UNCOATED
N88579	SP205-0.750-P2-S.3-Z2	3/4	1/2	1-5/16	3-5/16	2	TICN
N50244	SP205-0.750-D2-S.3-Z2	3/4	3/4	1-5/16	3-9/16	2	UNCOATED
N88580	SP205-0.750-D2-S.3-Z2	3/4	3/4	1-5/16	3-9/16	2	TICN
N50285	SP205-0.875-D2-S.3-Z2	7/8	7/8	1-1/2	3-3/4	2	UNCOATED
N88581	SP205-0.875-D2-S.3-Z2	7/8	7/8	1-1/2	3-3/4	2	TICN
N50324	SP205-1.000-P2-S.3-Z2	1	3/4	1-1/2	3-3/4	2	UNCOATED
N88582	SP205-1.000-P2-S.3-Z2	1	3/4	1-1/2	3-3/4	2	TICN

## SP205 (CONT'D)



- Weldon flat standard
- Designed for pocketing and slotting in all materials including high temperature alloys
- Cutting Data - Page 264-265
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N50326	SP205-1.000-D2-S.3-Z2	1	1	1-5/8	4-1/8	2	UNCOATED
N88583	SP205-1.000-D2-S.3-Z2	1	1	1-5/8	4-1/8	2	TICN
N50366	SP205-1.125-P1-S.3-Z2	1-1/8	1	1-5/8	4-1/8	2	UNCOATED
N88584	SP205-1.125-P1-S.3-Z2	1-1/8	1	1-5/8	4-1/8	2	TICN
N50407	SP205-1.250-D1-S.3-Z2	1-1/4	1-1/4	1-5/8	4-1/8	2	UNCOATED
N88586	SP205-1.250-D1-S.3-Z2	1-1/4	1-1/4	1-5/8	4-1/8	2	TICN
N50487	SP205-1.500-P1-S.3-Z2	1-1/2	1-1/4	1-5/8	4-1/8	2	UNCOATED
N88587	SP205-1.500-P1-S.3-Z2	1-1/2	1-1/4	1-5/8	4-1/8	2	TICN
N50647	SP205-2.000-P1-S.3-Z2	2	1-1/4	1-5/8	4-1/8	2	UNCOATED
N88588	SP205-2.000-P1-S.3-Z2	2	1-1/4	1-5/8	4-1/8	2	TICN



## EXCEL SERIES-EX350

PREMIUM  
PARTICLE  
METAL  
8.5% COBALT



CENTER  
CUTTING

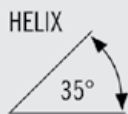


- Weldon flat standard
- Form ground flutes
- Cutting Data - Page 266-267
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N53342	EX350-0.375-D7-S.3-Z4	3/8	3/8	2-1/2	4-1/4	4	UNCOATED
N53458	EX350-0.375-D7-S.3-Z4	3/8	3/8	2-1/2	4-1/4	4	TICN
N53343	EX350-0.500-D1-S.3-Z4	1/2	1/2	1/2	2-1/2	4	UNCOATED
N53459	EX350-0.500-D1-S.3-Z4	1/2	1/2	1/2	2-1/2	4	TICN
N53344	EX350-0.500-D3-S.3-Z4	1/2	1/2	1-1/4	3-1/4	4	UNCOATED
N53460	EX350-0.500-D3-S.3-Z4	1/2	1/2	1-1/4	3-1/4	4	TICN
N53346	EX350-0.500-D8-S.3-Z4	1/2	1/2	4	6	4	UNCOATED
N53462	EX350-0.500-D8-S.3-Z4	1/2	1/2	4	6	4	TICN
N53347	EX350-0.625-D1-S.3-Z4	5/8	5/8	5/8	2-3/4	4	UNCOATED
N53463	EX350-0.625-D1-S.3-Z4	5/8	5/8	5/8	2-3/4	4	TICN
N53348	EX350-0.625-D3-S.3-Z4	5/8	5/8	1-5/8	3-3/4	4	UNCOATED
N53464	EX350-0.625-D3-S.3-Z4	5/8	5/8	1-5/8	3-3/4	4	TICN
N53352	EX350-0.750-D1-S.3-Z4	3/4	3/4	3/4	3	4	UNCOATED
N53468	EX350-0.750-D1-S.3-Z4	3/4	3/4	3/4	3	4	TICN
N53353	EX350-0.750-D2-S.3-Z4	3/4	3/4	1-5/8	3-7/8	4	UNCOATED
N53469	EX350-0.750-D2-S.3-Z4	3/4	3/4	1-5/8	3-7/8	4	TICN
N53355	EX350-0.750-D3-S.3-Z4	3/4	3/4	2	4-1/4	4	UNCOATED
N53471	EX350-0.750-D3-S.3-Z4	3/4	3/4	2	4-1/4	4	TICN
N53357	EX350-0.750-D4-S.3-Z4	3/4	3/4	3	5-1/4	4	UNCOATED
N53473	EX350-0.750-D4-S.3-Z4	3/4	3/4	3	5-1/4	4	TICN
N53359	EX350-0.750-D5-S.3-Z4	3/4	3/4	4	6-1/4	4	UNCOATED
N53475	EX350-0.750-D5-S.3-Z4	3/4	3/4	4	6-1/4	4	TICN
N53363	EX350-1.000-D1-S.3-Z4	1	1	1	3-1/2	4	UNCOATED
N53479	EX350-1.000-D1-S.3-Z4	1	1	1	3-1/2	4	TICN
N53364	EX350-1.000-D2-S.3-Z4	1	1	2	4-1/2	4	UNCOATED
N53480	EX350-1.000-D2-S.3-Z4	1	1	2	4-1/2	4	TICN
N53366	EX350-1.000-D3-S.3-Z4	1	1	3	5-1/2	4	UNCOATED
N53482	EX350-1.000-D3-S.3-Z4	1	1	3	5-1/2	4	TICN
N53368	EX350-1.000-D4-S.3-Z4	1	1	4	6-1/2	4	UNCOATED
N53484	EX350-1.000-D4-S.3-Z4	1	1	4	6-1/2	4	TICN
N53370	EX350-1.000-D6-S.3-Z4	1	1	6	8-1/2	4	UNCOATED
N53486	EX350-1.000-D6-S.3-Z4	1	1	6	8-1/2	4	TICN
N53374	EX350-1.250-D3-S.3-Z4	1-1/4	1-1/4	3	5-1/2	4	UNCOATED
N53490	EX350-1.250-D3-S.3-Z4	1-1/4	1-1/4	3	5-1/2	4	TICN
N53375	EX350-1.250-D3-S.3-Z6	1-1/4	1-1/4	3	5-1/2	6	UNCOATED

## EXCEL SERIES-EX350 (CONT'D)

PREMIUM  
PARTICLE  
METAL  
8.5% COBALT



CENTER  
CUTTING



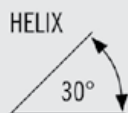
- Weldon flat standard
- Form ground flutes

- Cutting Data - Page 266-267
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N53491	EX350-1.250-D3-S.3-Z6	1-1/4	1-1/4	3	5-1/2	6	TICN
N53379	EX350-1.250-D5-S.3-Z6	1-1/4	1-1/4	6	8-1/2	6	UNCOATED
N53495	EX350-1.250-D5-S.3-Z6	1-1/4	1-1/4	6	8-1/2	6	TICN
N53385	EX350-1.500-P3-S.3-Z6	1-1/2	1-1/4	4	6-1/2	6	UNCOATED
N53501	EX350-1.500-P3-S.3-Z6	1-1/2	1-1/4	4	6-1/2	6	TICN
N53395	EX350-2.000-D4-S.7-Z6	2	2	6	9-3/4	6	UNCOATED
N53511	EX350-2.000-D4-S.7-Z6	2	2	6	9-3/4	6	TICN

## SPC408

M42  
8% COBALT



CENTER  
CUTTING



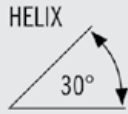
- Weldon flat standard
- Designed for profiling in all materials

- Cutting Data - Page 268-270
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N52041	SPC408-0.125-F3-S.3-Z4	1/8	3/8	3/8	2-5/16	4	UNCOATED
N88604	SPC408-0.125-F3-S.3-Z4	1/8	3/8	3/8	2-5/16	4	TICN
N52051	SPC408-0.156-F3-S.3-Z4	5/32	3/8	1/2	2-3/8	4	UNCOATED
N88605	SPC408-0.156-F3-S.3-Z4	5/32	3/8	1/2	2-3/8	4	TICN
N52049	SPC408-0.188-F1-S.3-Z4	3/16	3/8	3/16	2-1/16	4	UNCOATED
N89446	SPC408-0.188-F1-S.3-Z4	3/16	3/8	3/16	2-1/16	4	TICN
N52061	SPC408-0.188-F3-S.3-Z4	3/16	3/8	1/2	2-3/8	4	UNCOATED
N88606	SPC408-0.188-F3-S.3-Z4	3/16	3/8	1/2	2-3/8	4	TICN
N52071	SPC408-0.219-F3-S.3-Z4	7/32	3/8	5/8	2-7/16	4	UNCOATED
N88607	SPC408-0.219-F3-S.3-Z4	7/32	3/8	5/8	2-7/16	4	TICN
N52069	SPC408-0.250-F1-S.3-Z4	1/4	3/8	1/4	2-1/16	4	UNCOATED
N89447	SPC408-0.250-F1-S.3-Z4	1/4	3/8	1/4	2-1/16	4	TICN
N52081	SPC408-0.250-F3-S.3-Z4	1/4	3/8	5/8	2-7/16	4	UNCOATED
N88608	SPC408-0.250-F3-S.3-Z4	1/4	3/8	5/8	2-7/16	4	TICN
N52082	SPC408-0.250-F5-S.3-Z4	1/4	3/8	1-1/4	3-1/16	4	UNCOATED
N88609	SPC408-0.250-F5-S.3-Z4	1/4	3/8	1-1/4	3-1/16	4	TICN

## SPC408 (CONT'D)

M42  
8% COBALT



CENTER  
CUTTING



- Weldon flat standard
- Designed for profiling in all materials
- Cutting Data - Page 268-270
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N52083	SPC408-0.250-F7-S.3-Z4	1/4	3/8	1-3/4	3-9/16	4	UNCOATED
N88610	SPC408-0.250-F7-S.3-Z4	1/4	3/8	1-3/4	3-9/16	4	TICN
N52091	SPC408-0.281-F2-S.3-Z4	9/32	3/8	5/8	2-7/16	4	UNCOATED
N88611	SPC408-0.281-F2-S.3-Z4	9/32	3/8	5/8	2-7/16	4	TICN
N52109	SPC408-0.313-F1-S.3-Z4	5/16	3/8	5/16	2-1/16	4	UNCOATED
N89448	SPC408-0.313-F1-S.3-Z4	5/16	3/8	5/16	2-1/16	4	TICN
N52101	SPC408-0.313-F2-S.3-Z4	5/16	3/8	3/4	2-1/2	4	UNCOATED
N88612	SPC408-0.313-F2-S.3-Z4	5/16	3/8	3/4	2-1/2	4	TICN
N52102	SPC408-0.313-F4-S.3-Z4	5/16	3/8	1-3/8	3-1/8	4	UNCOATED
N88613	SPC408-0.313-F4-S.3-Z4	5/16	3/8	1-3/8	3-1/8	4	TICN
N52103	SPC408-0.313-F6-S.3-Z4	5/16	3/8	2	3-3/4	4	UNCOATED
N88614	SPC408-0.313-F6-S.3-Z4	5/16	3/8	2	3-3/4	4	TICN
N52129	SPC408-0.375-D1-S.3-Z4	3/8	3/8	3/8	2-1/8	4	UNCOATED
N89449	SPC408-0.375-D1-S.3-Z4	3/8	3/8	3/8	2-1/8	4	TICN
N52121	SPC408-0.375-D2-S.3-Z4	3/8	3/8	3/4	2-1/2	4	UNCOATED
N88616	SPC408-0.375-D2-S.3-Z4	3/8	3/8	3/4	2-1/2	4	TICN
N52122	SPC408-0.375-D4-S.3-Z4	3/8	3/8	1-1/2	3-1/4	4	UNCOATED
N88617	SPC408-0.375-D4-S.3-Z4	3/8	3/8	1-1/2	3-1/4	4	TICN
N52123	SPC408-0.375-D7-S.3-Z4	3/8	3/8	2-1/2	4-1/4	4	UNCOATED
N88618	SPC408-0.375-D7-S.3-Z4	3/8	3/8	2-1/2	4-1/4	4	TICN
N52141	SPC408-0.438-P2-S.3-Z4	7/16	3/8	1	2-11/16	4	UNCOATED
N88619	SPC408-0.438-P2-S.3-Z4	7/16	3/8	1	2-11/16	4	TICN
N52142	SPC408-0.438-P5-S.3-Z4	7/16	3/8	2	3-11/16	4	UNCOATED
N88620	SPC408-0.438-P5-S.3-Z4	7/16	3/8	2	3-11/16	4	TICN
N52166	SPC408-0.500-P2-S.3-Z4	1/2	3/8	1	2-11/16	4	UNCOATED
N88625	SPC408-0.500-P2-S.3-Z4	1/2	3/8	1	2-11/16	4	TICN
N52160	SPC408-0.500-D3-S.3-Z4	1/2	1/2	1-1/4	3-1/4	4	UNCOATED
N88621	SPC408-0.500-D3-S.3-Z4	1/2	1/2	1-1/4	3-1/4	4	TICN
N52162	SPC408-0.500-D3-S.3-Z6	1/2	1/2	1-1/4	3-1/4	6	UNCOATED
N88622	SPC408-0.500-D3-S.3-Z6	1/2	1/2	1-1/4	3-1/4	6	TICN
N52163	SPC408-0.500-D4-S.3-Z4	1/2	1/2	2	4	4	UNCOATED
N88623	SPC408-0.500-D4-S.3-Z4	1/2	1/2	2	4	4	TICN
N52164	SPC408-0.500-D6-S.3-Z4	1/2	1/2	3	5	4	UNCOATED
N88624	SPC408-0.500-D6-S.3-Z4	1/2	1/2	3	5	4	TICN
N52167	SPC408-0.500-D8-S.3-Z4	1/2	1/2	4	6	4	UNCOATED

## SPC408 (CONT'D)

M42  
8% COBALT

HELIX

SQUARE END

CENTER CUTTING



- Weldon flat standard
- Designed for profiling in all materials
- Cutting Data - Page 268-270
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N88626	SPC408-0.500-D8-S.3-Z4	1/2	1/2	4	6	4	TICN
N52182	SPC408-0.563-P2-S.3-Z4	9/16	1/2	1-3/8	3-3/8	4	UNCOATED
N88627	SPC408-0.563-P2-S.3-Z4	9/16	1/2	1-3/8	3-3/8	4	TICN
N52200	SPC408-0.625-D3-S.3-Z4	5/8	5/8	1-5/8	3-3/4	4	UNCOATED
N88628	SPC408-0.625-D3-S.3-Z4	5/8	5/8	1-5/8	3-3/4	4	TICN
N52203	SPC408-0.625-D3-S.3-Z6	5/8	5/8	1-5/8	3-3/4	6	UNCOATED
N88631	SPC408-0.625-D3-S.3-Z6	5/8	5/8	1-5/8	3-3/4	6	TICN
N52201	SPC408-0.625-D4-S.3-Z4	5/8	5/8	2-1/2	4-5/8	4	UNCOATED
N88629	SPC408-0.625-D4-S.3-Z4	5/8	5/8	2-1/2	4-5/8	4	TICN
N52202	SPC408-0.625-D5-S.3-Z4	5/8	5/8	3	5-1/8	4	UNCOATED
N88630	SPC408-0.625-D5-S.3-Z4	5/8	5/8	3	5-1/8	4	TICN
N52204	SPC408-0.625-D6-S.3-Z4	5/8	5/8	4	6-1/8	4	UNCOATED
N88632	SPC408-0.625-D6-S.3-Z4	5/8	5/8	4	6-1/8	4	TICN
N52206	SPC408-0.750-P2-S.3-Z4	3/4	1/2	1-5/8	3-5/8	4	UNCOATED
N88633	SPC408-0.750-P2-S.3-Z4	3/4	1/2	1-5/8	3-5/8	4	TICN
N52240	SPC408-0.750-D2-S.3-Z4	3/4	3/4	1-5/8	3-7/8	4	UNCOATED
N88634	SPC408-0.750-D2-S.3-Z4	3/4	3/4	1-5/8	3-7/8	4	TICN
N52244	SPC408-0.750-D2-S.3-Z6	3/4	3/4	1-5/8	3-7/8	6	UNCOATED
N88638	SPC408-0.750-D2-S.3-Z6	3/4	3/4	1-5/8	3-7/8	6	TICN
N52241	SPC408-0.750-D3-S.3-Z4	3/4	3/4	2	4-1/4	4	UNCOATED
N88635	SPC408-0.750-D3-S.3-Z4	3/4	3/4	2	4-1/4	4	TICN
N52242	SPC408-0.750-D4-S.3-Z4	3/4	3/4	3	5-1/4	4	UNCOATED
N88636	SPC408-0.750-D4-S.3-Z4	3/4	3/4	3	5-1/4	4	TICN
N52243	SPC408-0.750-D5-S.3-Z4	3/4	3/4	4	6-1/4	4	UNCOATED
N88637	SPC408-0.750-D5-S.3-Z4	3/4	3/4	4	6-1/4	4	TICN
N52247	SPC408-0.750-D5-S.3-Z6	3/4	3/4	4	6-1/4	6	UNCOATED
N88640	SPC408-0.750-D5-S.3-Z6	3/4	3/4	4	6-1/4	6	TICN
N52285	SPC408-0.875-D2-S.3-Z4	7/8	7/8	1-7/8	4-1/8	4	UNCOATED
N88642	SPC408-0.875-D2-S.3-Z4	7/8	7/8	1-7/8	4-1/8	4	TICN
N52286	SPC408-0.875-D4-S.3-Z4	7/8	7/8	3-1/2	5-3/4	4	UNCOATED
N88643	SPC408-0.875-D4-S.3-Z4	7/8	7/8	3-1/2	5-3/4	4	TICN
N52334	SPC408-1.000-P2-S.3-Z4	1	3/4	1-7/8	4-1/8	4	UNCOATED
N88652	SPC408-1.000-P2-S.3-Z4	1	3/4	1-7/8	4-1/8	4	TICN
N52320	SPC408-1.000-D2-S.3-Z4	1	1	2	4-1/2	4	UNCOATED
N88644	SPC408-1.000-D2-S.3-Z4	1	1	2	4-1/2	4	TICN

## SPC408 (CONT'D)

M42  
8% COBALT

HELIX  
30°

SQUARE END

CENTER CUTTING

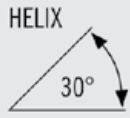


- Weldon flat standard
- Designed for profiling in all materials
- Cutting Data - Page 268-270
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N52326	SPC408-1.000-D2-S.3-Z6	1	1	2	4-1/2	6	UNCOATED
N88649	SPC408-1.000-D2-S.3-Z6	1	1	2	4-1/2	6	TICN
N52321	SPC408-1.000-D3-S.3-Z4	1	1	3	5-1/2	4	UNCOATED
N88645	SPC408-1.000-D3-S.3-Z4	1	1	3	5-1/2	4	TICN
N52327	SPC408-1.000-D3-S.3-Z6	1	1	3	5-1/2	6	UNCOATED
N88650	SPC408-1.000-D3-S.3-Z6	1	1	3	5-1/2	6	TICN
N52322	SPC408-1.000-D4-S.3-Z4	1	1	4	6-1/2	4	UNCOATED
N88646	SPC408-1.000-D4-S.3-Z4	1	1	4	6-1/2	4	TICN
N52324	SPC408-1.000-D4-S.3-Z6	1	1	4	6-1/2	6	UNCOATED
N88648	SPC408-1.000-D4-S.3-Z6	1	1	4	6-1/2	6	TICN
N52323	SPC408-1.000-D6-S.3-Z4	1	1	6	8-1/2	4	UNCOATED
N88647	SPC408-1.000-D6-S.3-Z4	1	1	6	8-1/2	4	TICN
N52329	SPC408-1.000-D6-S.3-Z6	1	1	6	8-1/2	6	UNCOATED
N88651	SPC408-1.000-D6-S.3-Z6	1	1	6	8-1/2	6	TICN
N52366	SPC408-1.125-P2-S.3-Z6	1-1/8	1	2	4-1/2	6	UNCOATED
N88653	SPC408-1.125-P2-S.3-Z6	1-1/8	1	2	4-1/2	6	TICN
N52367	SPC408-1.125-P4-S.3-Z6	1-1/8	1	4	6-1/2	6	UNCOATED
N88654	SPC408-1.125-P4-S.3-Z6	1-1/8	1	4	6-1/2	6	TICN
N52414	SPC408-1.250-P2-S.3-Z4	1-1/4	1	2	4-1/2	4	UNCOATED
N88663	SPC408-1.250-P2-S.3-Z4	1-1/4	1	2	4-1/2	4	TICN
N52416	SPC408-1.250-P2-S.3-Z6	1-1/4	1	2	4-1/2	6	UNCOATED
N88664	SPC408-1.250-P2-S.3-Z6	1-1/4	1	2	4-1/2	6	TICN
N52400	SPC408-1.250-D1-S.3-Z4	1-1/4	1-1/4	2	4-1/2	4	UNCOATED
N88655	SPC408-1.250-D1-S.3-Z4	1-1/4	1-1/4	2	4-1/2	4	TICN
N52407	SPC408-1.250-D1-S.3-Z6	1-1/4	1-1/4	2	4-1/2	6	UNCOATED
N88660	SPC408-1.250-D1-S.3-Z6	1-1/4	1-1/4	2	4-1/2	6	TICN
N52401	SPC408-1.250-D2-S.3-Z4	1-1/4	1-1/4	3	5-1/2	4	UNCOATED
N88656	SPC408-1.250-D2-S.3-Z4	1-1/4	1-1/4	3	5-1/2	4	TICN
N52406	SPC408-1.250-D2-S.3-Z6	1-1/4	1-1/4	3	5-1/2	6	UNCOATED
N88659	SPC408-1.250-D2-S.3-Z6	1-1/4	1-1/4	3	5-1/2	6	TICN
N52402	SPC408-1.250-D3-S.3-Z4	1-1/4	1-1/4	4	6-1/2	4	UNCOATED
N88657	SPC408-1.250-D3-S.3-Z4	1-1/4	1-1/4	4	6-1/2	4	TICN
N52409	SPC408-1.250-D3-S.3-Z6	1-1/4	1-1/4	4	6-1/2	6	UNCOATED
N88661	SPC408-1.250-D3-S.3-Z6	1-1/4	1-1/4	4	6-1/2	6	TICN

## SPC408 (CONT'D)

M42  
8% COBALT



CENTER  
CUTTING



- Weldon flat standard
- Designed for profiling in all materials
- Cutting Data - Page 268-270
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N52403	SPC408-1.250-D5-S.3-Z4	1-1/4	1-1/4	6	8-1/2	4	UNCOATED
N88658	SPC408-1.250-D5-S.3-Z4	1-1/4	1-1/4	6	8-1/2	4	TICN
N52410	SPC408-1.250-D5-S.3-Z6	1-1/4	1-1/4	6	8-1/2	6	UNCOATED
N88662	SPC408-1.250-D5-S.3-Z6	1-1/4	1-1/4	6	8-1/2	6	TICN
N52480	SPC408-1.500-P1-S.3-Z4	1-1/2	1-1/4	2	4-1/2	4	UNCOATED
N88665	SPC408-1.500-P1-S.3-Z4	1-1/2	1-1/4	2	4-1/2	4	TICN
N52487	SPC408-1.500-P1-S.3-Z6	1-1/2	1-1/4	2	4-1/2	6	UNCOATED
N88667	SPC408-1.500-P1-S.3-Z6	1-1/2	1-1/4	2	4-1/2	6	TICN
N52486	SPC408-1.500-P4-S.3-Z6	1-1/2	1-1/4	4	6-1/2	6	UNCOATED
N88666	SPC408-1.500-P4-S.3-Z6	1-1/2	1-1/4	4	6-1/2	6	TICN
N52499	SPC408-1.500-P5-S.3-Z6	1-1/2	1-1/4	8	10-1/2	6	UNCOATED
N88669	SPC408-1.500-P5-S.3-Z6	1-1/2	1-1/4	8	10-1/2	6	TICN
N52644	SPC408-2.000-P1-S.3-Z6	2	1-1/4	2	4-1/2	6	UNCOATED
N88670	SPC408-2.000-P1-S.3-Z6	2	1-1/4	2	4-1/2	6	TICN
N52646	SPC408-2.000-P2-S.3-Z6	2	1-1/4	4	6-1/2	6	UNCOATED
N88671	SPC408-2.000-P2-S.3-Z6	2	1-1/4	4	6-1/2	6	TICN

## SMM845

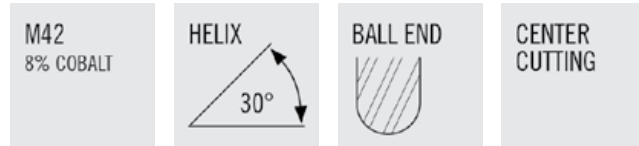
M42 8% COBALT	HELIX 30°	SQUARE END	CENTER CUTTING
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- Weldon flat standard
- Metric flute
- Inch shank
- Designed for profiling in all materials
- Cutting Data - Page 271-272
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N72861	SMM845-0.118-F3-S.3-Z4	3MM	3/8	3/8	2-5/16	4	UNCOATED
N88949	SMM845-0.118-F3-S.3-Z4	3MM	3/8	3/8	2-5/16	4	TICN
N72862	SMM845-0.157-F3-S.3-Z4	4MM	3/8	1/2	2-5/16	4	UNCOATED
N88950	SMM845-0.157-F3-S.3-Z4	4MM	3/8	1/2	2-5/16	4	TICN
N72863	SMM845-0.197-F3-S.3-Z4	5MM	3/8	9/16	2-1/2	4	UNCOATED
N88951	SMM845-0.197-F3-S.3-Z4	5MM	3/8	9/16	2-1/2	4	TICN
N72864	SMM845-0.236-F3-S.3-Z4	6MM	3/8	5/8	2-1/2	4	UNCOATED
N88952	SMM845-0.236-F3-S.3-Z4	6MM	3/8	5/8	2-1/2	4	TICN
N72866	SMM845-0.315-F2-S.3-Z4	8MM	3/8	3/4	2-1/2	4	UNCOATED
N88954	SMM845-0.315-F2-S.3-Z4	8MM	3/8	3/4	2-1/2	4	TICN
N72867	SMM845-0.394-P3-S.3-Z4	10MM	3/8	1	2-11/16	4	UNCOATED
N88955	SMM845-0.394-P3-S.3-Z4	10MM	3/8	1	2-11/16	4	TICN
N72868	SMM845-0.472-F2-S.3-Z4	12MM	1/2	1	3	4	UNCOATED
N88956	SMM845-0.472-F2-S.3-Z4	12MM	1/2	1	3	4	TICN
N72869	SMM845-0.551-P2-S.3-Z4	14MM	1/2	1-3/8	3-3/8	4	UNCOATED
N88957	SMM845-0.551-P2-S.3-Z4	14MM	1/2	1-3/8	3-3/8	4	TICN
N72870	SMM845-0.630-P3-S.3-Z4	16MM	5/8	1-5/8	3-3/4	4	UNCOATED
N88958	SMM845-0.630-P3-S.3-Z4	16MM	5/8	1-5/8	3-3/4	4	TICN
N72871	SMM845-0.709-P2-S.3-Z4	18MM	5/8	1-5/8	3-3/4	4	UNCOATED
N88959	SMM845-0.709-P2-S.3-Z4	18MM	5/8	1-5/8	3-3/4	4	TICN
N72872	SMM845-0.787-P2-S.3-Z4	20MM	3/4	1-7/8	4-1/8	4	UNCOATED
N88960	SMM845-0.787-P2-S.3-Z4	20MM	3/4	1-7/8	4-1/8	4	TICN

## SPB540





- Weldon flat standard
- Designed for profiling and contouring in all materials
- Cutting Data - Page 268-270
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N54041	SPB540-0.125-F3-B.3-Z4	1/8	3/8	3/8	2-5/16	4	UNCOATED
N88688	SPB540-0.125-F3-B.3-Z4	1/8	3/8	3/8	2-5/16	4	TICN
N54061	SPB540-0.188-F3-B.3-Z4	3/16	3/8	1/2	2-3/8	4	UNCOATED
N88689	SPB540-0.188-F3-B.3-Z4	3/16	3/8	1/2	2-3/8	4	TICN
N54081	SPB540-0.250-F3-B.3-Z4	1/4	3/8	5/8	2-7/16	4	UNCOATED
N88690	SPB540-0.250-F3-B.3-Z4	1/4	3/8	5/8	2-7/16	4	TICN
N54121	SPB540-0.375-D2-B.3-Z4	3/8	3/8	3/4	2-1/2	4	UNCOATED
N88692	SPB540-0.375-D2-B.3-Z4	3/8	3/8	3/4	2-1/2	4	TICN
N67272	SPB540-0.375-D4-B.3-Z4	3/8	3/8	1-1/2	3-1/4	4	UNCOATED
N67342	SPB540-0.375-D4-B.3-Z4	3/8	3/8	1-1/2	3-1/4	4	TICN
N67275	SPB540-0.500-D2-B.3-Z4	1/2	1/2	1	3	4	UNCOATED
N67345	SPB540-0.500-D2-B.3-Z4	1/2	1/2	1	3	4	TICN
N54160	SPB540-0.500-D3-B.3-Z4	1/2	1/2	1-1/4	3-1/4	4	UNCOATED
N88693	SPB540-0.500-D3-B.3-Z4	1/2	1/2	1-1/4	3-1/4	4	TICN
N67276	SPB540-0.500-D4-B.3-Z4	1/2	1/2	2	4	4	UNCOATED
N67346	SPB540-0.500-D4-B.3-Z4	1/2	1/2	2	4	4	TICN
N67277	SPB540-0.500-D5-B.3-Z4	1/2	1/2	2-1/2	4-1/2	4	UNCOATED
N67347	SPB540-0.500-D5-B.3-Z4	1/2	1/2	2-1/2	4-1/2	4	TICN
N54200	SPB540-0.625-D3-B.3-Z4	5/8	5/8	1-5/8	3-3/4	4	UNCOATED
N88694	SPB540-0.625-D3-B.3-Z4	5/8	5/8	1-5/8	3-3/4	4	TICN
N54240	SPB540-0.750-D2-B.3-Z4	3/4	3/4	1-5/8	3-7/8	4	UNCOATED
N88695	SPB540-0.750-D2-B.3-Z4	3/4	3/4	1-5/8	3-7/8	4	TICN
N67283	SPB540-0.750-D3-B.3-Z4	3/4	3/4	2-1/4	4-1/2	4	UNCOATED
N67353	SPB540-0.750-D3-B.3-Z4	3/4	3/4	2-1/4	4-1/2	4	TICN
N54280	SPB540-0.875-D2-B.3-Z4	7/8	7/8	1-7/8	4-1/8	4	UNCOATED
N88696	SPB540-0.875-D2-B.3-Z4	7/8	7/8	1-7/8	4-1/8	4	TICN
N54320	SPB540-1.000-D2-B.3-Z4	1	1	2	4-1/2	4	UNCOATED
N88697	SPB540-1.000-D2-B.3-Z4	1	1	2	4-1/2	4	TICN
N67287	SPB540-1.000-D3-B.3-Z4	1	1	3	5-1/2	4	UNCOATED
N67357	SPB540-1.000-D3-B.3-Z4	1	1	3	5-1/2	4	TICN
N67288	SPB540-1.000-D4-B.3-Z4	1	1	4	6-1/2	4	UNCOATED
N67358	SPB540-1.000-D4-B.3-Z4	1	1	4	6-1/2	4	TICN
N67290	SPB540-1.000-D6-B.3-Z4	1	1	6	8-1/2	4	UNCOATED
N67360	SPB540-1.000-D6-B.3-Z4	1	1	6	8-1/2	4	TICN
N54407	SPB540-1.250-D1-B.3-Z6	1-1/4	1-1/4	2	4-1/2	6	UNCOATED
N88698	SPB540-1.250-D1-B.3-Z6	1-1/4	1-1/4	2	4-1/2	6	TICN



## SPB540 (CONT'D)




<b>M42</b> 8% COBALT	<b>HELIX</b> 	<b>BALL END</b> 	<b>CENTER CUTTING</b>
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- Weldon flat standard
- Designed for profiling and contouring in all materials
- Cutting Data - Page 268-270
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N54487	SPB540-1.500-P1-B.3-Z6	1-1/2	1-1/4	2	4-1/2	6	UNCOATED
N88699	SPB540-1.500-P1-B.3-Z6	1-1/2	1-1/4	2	4-1/2	6	TICN
N67297	SPB540-2.000-D1-B.7-Z6	2	2	2	5-3/4	6	UNCOATED
N67367	SPB540-2.000-D1-B.7-Z6	2	2	2	5-3/4	6	TICN
N67299	SPB540-2.000-D3-B.7-Z6	2	2	4	7-3/4	6	UNCOATED
N67369	SPB540-2.000-D3-B.7-Z6	2	2	4	7-3/4	6	TICN
N67300	SPB540-2.000-D4-B.7-Z6	2	2	6	9-3/4	6	UNCOATED
N67370	SPB540-2.000-D4-B.7-Z6	2	2	6	9-3/4	6	TICN

## RTM713

<b>M42</b> 8% COBALT	<b>HELIX</b> 	<b>CHAMFER</b> 	<b>CENTER CUTTING</b>	<b>COARSE PITCH</b> 
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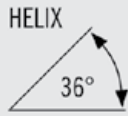


- Weldon flat standard
- Designed for profiling and slotting in all materials
- Cutting Data - Page 273
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N73081	RTM713-0.250-F3-C020.3-Z3	1/4	3/8	5/8	2-1/2	3	UNCOATED	0.020
N89019	RTM713-0.250-F3-C020.3-Z3	1/4	3/8	5/8	2-1/2	3	TICN	0.020
N73121	RTM713-0.375-D2-C020.3-Z3	3/8	3/8	7/8	2-3/4	3	UNCOATED	0.020
N89022	RTM713-0.375-D2-C020.3-Z3	3/8	3/8	7/8	2-3/4	3	TICN	0.020
N73162	RTM713-0.500-D2-C025.3-Z3	1/2	1/2	1	3-1/16	3	UNCOATED	0.025
N89025	RTM713-0.500-D2-C025.3-Z3	1/2	1/2	1	3-1/16	3	TICN	0.025
N73203	RTM713-0.625-D2-C025.3-Z3	5/8	5/8	1-1/4	3-1/2	3	UNCOATED	0.025
N89027	RTM713-0.625-D2-C025.3-Z3	5/8	5/8	1-1/4	3-1/2	3	TICN	0.025
N73249	RTM713-0.750-D1-C025.3-Z3	3/4	3/4	3/4	3	3	UNCOATED	0.025
N89030	RTM713-0.750-D1-C025.3-Z3	3/4	3/4	3/4	3	3	TICN	0.025
N73244	RTM713-0.750-D2-C025.3-Z3	3/4	3/4	1-1/2	3-3/4	3	UNCOATED	0.025
N89029	RTM713-0.750-D2-C025.3-Z3	3/4	3/4	1-1/2	3-3/4	3	TICN	0.025
N73327	RTM713-1.000-P1-C030.3-Z3	1	3/4	1	3-1/4	3	UNCOATED	0.030
N89035	RTM713-1.000-P1-C030.3-Z3	1	3/4	1	3-1/4	3	TICN	0.030
N73326	RTM713-1.000-D2-C030.3-Z3	1	1	1-3/4	4-5/8	3	UNCOATED	0.030
N89034	RTM713-1.000-D2-C030.3-Z3	1	1	1-3/4	4-5/8	3	TICN	0.030

## RTM447

M42  
8% COBALT



CENTER CUTTING

FINE PITCH

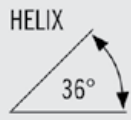



- Weldon flat standard
- Designed for profiling and slotting in steel, stainless steel and high temperature alloys
- Cutting Data - Page 275-276
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N44701	RTM447-0.250-F1-C020.3-Z3	1/4	3/8	1/4	2-1/8	3	UNCOATED	0.020
N88456	RTM447-0.250-F1-C020.3-Z3	1/4	3/8	1/4	2-1/8	3	TICN	0.020
N44703	RTM447-0.250-F3-C020.3-Z3	1/4	3/8	5/8	2-1/2	3	UNCOATED	0.020
N88457	RTM447-0.250-F3-C020.3-Z3	1/4	3/8	5/8	2-1/2	3	TICN	0.020
N44705	RTM447-0.375-D1-C020.3-Z3	3/8	3/8	3/8	2-1/4	3	UNCOATED	0.020
N88458	RTM447-0.375-D1-C020.3-Z3	3/8	3/8	3/8	2-1/4	3	TICN	0.020
N44707	RTM447-0.375-D2-C020.3-Z3	3/8	3/8	7/8	2-3/4	3	UNCOATED	0.020
N88459	RTM447-0.375-D2-C020.3-Z3	3/8	3/8	7/8	2-3/4	3	TICN	0.020
N44709	RTM447-0.500-D1-C025.3-Z3	1/2	1/2	1/2	2-9/16	3	UNCOATED	0.025
N88460	RTM447-0.500-D1-C025.3-Z3	1/2	1/2	1/2	2-9/16	3	TICN	0.025
N44711	RTM447-0.500-D2-C025.3-Z3	1/2	1/2	1	3-1/16	3	UNCOATED	0.025
N88461	RTM447-0.500-D2-C025.3-Z3	1/2	1/2	1	3-1/16	3	TICN	0.025
N44713	RTM447-0.625-D1-C025.3-Z3	5/8	5/8	5/8	2-7/8	3	UNCOATED	0.025
N88462	RTM447-0.625-D1-C025.3-Z3	5/8	5/8	5/8	2-7/8	3	TICN	0.025
N44715	RTM447-0.625-D2-C025.3-Z3	5/8	5/8	1-1/4	3-1/2	3	UNCOATED	0.025
N88463	RTM447-0.625-D2-C025.3-Z3	5/8	5/8	1-1/4	3-1/2	3	TICN	0.025
N44719	RTM447-0.750-D2-C025.3-Z3	3/4	3/4	1-1/2	3-3/4	3	UNCOATED	0.025
N88465	RTM447-0.750-D2-C025.3-Z3	3/4	3/4	1-1/2	3-3/4	3	TICN	0.025
N44731	RTM447-1.000-D2-C030.3-Z3	1	1	1-3/4	4-5/8	3	UNCOATED	0.030
N88471	RTM447-1.000-D2-C030.3-Z3	1	1	1-3/4	4-5/8	3	TICN	0.030

## RHC752

M42  
8% COBALT



CENTER  
CUTTING

COARSE  
PITCH



- Weldon flat standard
- Designed for profiling and slotting in aluminum and non-ferrous materials
- Cutting Data - Page 274
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N75215	RHC752-0.250-F3-C020.3-Z3	1/4	3/8	5/8	2-7/16	3	UNCOATED	0.020
N79460	RHC752-0.250-F3-C020.3-Z3	1/4	3/8	5/8	2-7/16	3	TICN	0.020
N75201	RHC752-0.375-D2-C025.3-Z3	3/8	3/8	3/4	2-1/2	3	UNCOATED	0.025
N69360	RHC752-0.375-D2-C025.3-Z3	3/8	3/8	3/4	2-1/2	3	TICN	0.025
N75203	RHC752-0.375-D4-C025.3-Z3	3/8	3/8	1-1/2	3-1/4	3	UNCOATED	0.025
N79464	RHC752-0.375-D4-C025.3-Z3	3/8	3/8	1-1/2	3-1/4	3	TICN	0.025
N75205	RHC752-0.500-D2-C030.3-Z3	1/2	1/2	1-1/4	3-1/4	3	UNCOATED	0.030
N69361	RHC752-0.500-D2-C030.3-Z3	1/2	1/2	1-1/4	3-1/4	3	TICN	0.030
N75209	RHC752-0.500-D4-C030.3-Z3	1/2	1/2	2	4	3	UNCOATED	0.030
N69362	RHC752-0.500-D4-C030.3-Z3	1/2	1/2	2	4	3	TICN	0.030
N75213	RHC752-0.625-D3-C040.3-Z3	5/8	5/8	1-5/8	3-3/4	3	UNCOATED	0.040
N69363	RHC752-0.625-D3-C040.3-Z3	5/8	5/8	1-5/8	3-3/4	3	TICN	0.040
N75217	RHC752-0.625-D5-C040.3-Z3	5/8	5/8	2-1/2	4-5/8	3	UNCOATED	0.040
N69364	RHC752-0.625-D5-C040.3-Z3	5/8	5/8	2-1/2	4-5/8	3	TICN	0.040
N75233	RHC752-0.750-D1-C040.3-Z3	3/4	3/4	3/4	3	3	UNCOATED	0.040
N69368	RHC752-0.750-D1-C040.3-Z3	3/4	3/4	3/4	3	3	TICN	0.040
N75229	RHC752-0.750-D3-C040.3-Z3	3/4	3/4	1-1/2	3-3/4	3	UNCOATED	0.040
N69367	RHC752-0.750-D3-C040.3-Z3	3/4	3/4	1-1/2	3-3/4	3	TICN	0.040
N75221	RHC752-0.750-D4-C040.3-Z3	3/4	3/4	1-5/8	3-7/8	3	UNCOATED	0.040
N69365	RHC752-0.750-D4-C040.3-Z3	3/4	3/4	1-5/8	3-7/8	3	TICN	0.040
N75225	RHC752-0.750-D5-C040.3-Z3	3/4	3/4	2	4-1/4	3	UNCOATED	0.040
N69366	RHC752-0.750-D5-C040.3-Z3	3/4	3/4	2	4-1/4	3	TICN	0.040
N75223	RHC752-0.750-D6-C040.3-Z3	3/4	3/4	2-1/2	4-3/4	3	UNCOATED	0.040
N79478	RHC752-0.750-D6-C040.3-Z3	3/4	3/4	2-1/2	4-3/4	3	TICN	0.040
N75235	RHC752-0.750-D7-C040.3-Z3	3/4	3/4	3	5-1/4	3	UNCOATED	0.040
N79479	RHC752-0.750-D7-C040.3-Z3	3/4	3/4	3	5-1/4	3	TICN	0.040
N75253	RHC752-1.000-P3-C040.3-Z3	1	3/4	1-1/2	3-3/4	3	UNCOATED	0.040
N69373	RHC752-1.000-P3-C040.3-Z3	1	3/4	1-1/2	3-3/4	3	TICN	0.040
N75245	RHC752-1.000-D3-C040.3-Z3	1	1	2	4-1/2	3	UNCOATED	0.040
N69371	RHC752-1.000-D3-C040.3-Z3	1	1	2	4-1/2	3	TICN	0.040
N75249	RHC752-1.000-D4-C040.3-Z3	1	1	3	5-1/2	3	UNCOATED	0.040
N69372	RHC752-1.000-D4-C040.3-Z3	1	1	3	5-1/2	3	TICN	0.040
N75351	RHC752-1.000-D5-C040.3-Z3	1	1	4	6-1/2	3	UNCOATED	0.040
N79493	RHC752-1.000-D5-C040.3-Z3	1	1	4	6-1/2	3	TICN	0.040
N75261	RHC752-1.250-D2-C045.3-Z3	1-1/4	1-1/4	2	4-1/2	3	UNCOATED	0.045
N69375	RHC752-1.250-D2-C045.3-Z3	1-1/4	1-1/4	2	4-1/2	3	TICN	0.045
N75265	RHC752-1.250-D3-C045.3-Z3	1-1/4	1-1/4	3	5-1/2	3	UNCOATED	0.045
N69376	RHC752-1.250-D3-C045.3-Z3	1-1/4	1-1/4	3	5-1/2	3	TICN	0.045
N75283	RHC752-1.500-P7-C045.3-Z3	1-1/2	1-1/4	4	6-1/2	3	UNCOATED	0.045
N79508	RHC752-1.500-P7-C045.3-Z3	1-1/2	1-1/4	4	6-1/2	3	TICN	0.045

## RHLC754



- Weldon flat standard
- Designed for profiling and slotting in aluminum and non-ferrous materials
- Cutting Data - Page 274
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	CHAMFER
N75421	RHLC754-1.000-E2-C040.3-Z3	1	1	2-1/2	6-1/2	.850	4	3	UNCOATED	0.040
N89112	RHLC754-1.000-E2-C040.3-Z3	1	1	2-1/2	6-1/2	.850	4	3	TICN	0.040
N75425	RHLC754-1.000-E3-C040.3-Z3	1	1	2-1/2	8-1/2	.850	6	3	UNCOATED	0.040
N89113	RHLC754-1.000-E3-C040.3-Z3	1	1	2-1/2	8-1/2	.850	6	3	TICN	0.040
N75441	RHLC754-1.250-E3-C045.3-Z3	1-1/4	1-1/4	2-1/2	8-1/2	1.050	6	3	UNCOATED	0.045
N89115	RHLC754-1.250-E3-C045.3-Z3	1-1/4	1-1/4	2-1/2	8-1/2	1.050	6	3	TICN	0.045
N75459	RHLC754-1.500-P6-C045.3-Z3	1-1/2	1-1/4	2-1/2	10-1/2	1.050	6	3	UNCOATED	0.045
N89118	RHLC754-1.500-P6-C045.3-Z3	1-1/2	1-1/4	2-1/2	10-1/2	1.050	6	3	TICN	0.045

## REM710



- Weldon flat standard
- Designed for profiling and slotting in all materials
- Cutting Data - Page 277-278
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N71061	REM710-0.188-F3-C020.3-Z4	3/16	3/8	1/2	2-3/8	4	UNCOATED	0.020
N69290	REM710-0.188-F3-C020.3-Z4	3/16	3/8	1/2	2-3/8	4	TICN	0.020
N71081	REM710-0.250-F2-C020.3-Z4	1/4	3/8	5/8	2-7/16	4	UNCOATED	0.020
N71084	REM710-0.250-F2-C020.3-Z4	1/4	3/8	5/8	2-7/16	4	TICN	0.020
N71082	REM710-0.250-F4-C020.3-Z4	1/4	3/8	1-1/4	3-1/16	4	UNCOATED	0.020
N69291	REM710-0.250-F4-C020.3-Z4	1/4	3/8	1-1/4	3-1/16	4	TICN	0.020
N71101	REM710-0.313-F2-C025.3-Z4	5/16	3/8	3/4	2-1/2	4	UNCOATED	0.025
N71104	REM710-0.313-F2-C025.3-Z4	5/16	3/8	3/4	2-1/2	4	TICN	0.025
N71102	REM710-0.313-F4-C025.3-Z4	5/16	3/8	1-3/8	3-1/8	4	UNCOATED	0.025
N69293	REM710-0.313-F4-C025.3-Z4	5/16	3/8	1-3/8	3-1/8	4	TICN	0.025
N71121	REM710-0.375-D2-C025.3-Z4	3/8	3/8	3/4	2-1/2	4	UNCOATED	0.025
N71124	REM710-0.375-D2-C025.3-Z4	3/8	3/8	3/4	2-1/2	4	TICN	0.025
N71126	REM710-0.375-D3-C025.3-Z4	3/8	3/8	1-3/8	3-1/8	4	UNCOATED	0.025
N70940	REM710-0.375-D3-C025.3-Z4	3/8	3/8	1-3/8	3-1/8	4	TICN	0.025
N71122	REM710-0.375-D4-C025.3-Z4	3/8	3/8	1-1/2	3-1/4	4	UNCOATED	0.025
N69294	REM710-0.375-D4-C025.3-Z4	3/8	3/8	1-1/2	3-1/4	4	TICN	0.025

DISCOUNT CODE D41

## REM710 - (CONT'D)



- Weldon flat standard
- Designed for profiling and slotting in all materials
- Cutting Data - Page 277-278
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N71141	REM710-0.438-P2-C025.3-Z4	7/16	3/8	1	2-11/16	4	UNCOATED	0.025
N69295	REM710-0.438-P2-C025.3-Z4	7/16	3/8	1	2-11/16	4	TICN	0.025
N71161	REM710-0.500-D1-C025.3-Z4	1/2	1/2	1	3	4	UNCOATED	0.025
N79420	REM710-0.500-D1-C025.3-Z4	1/2	1/2	1	3	4	TICN	0.025
N71162	REM710-0.500-D2-C025.3-Z4	1/2	1/2	1-1/4	3-1/4	4	UNCOATED	0.025
N71165	REM710-0.500-D2-C025.3-Z4	1/2	1/2	1-1/4	3-1/4	4	TICN	0.025
N72162	REM710-0.500-D3-C025.3-Z4	1/2	1/2	1-5/8	3-5/8	4	UNCOATED	0.025
N79421	REM710-0.500-D3-C025.3-Z4	1/2	1/2	1-5/8	3-5/8	4	TICN	0.025
N71163	REM710-0.500-D4-C025.3-Z4	1/2	1/2	2	4	4	UNCOATED	0.025
N69296	REM710-0.500-D4-C025.3-Z4	1/2	1/2	2	4	4	TICN	0.025
N72163	REM710-0.500-D5-C025.3-Z4	1/2	1/2	2-1/2	4-1/2	4	UNCOATED	0.025
N79422	REM710-0.500-D5-C025.3-Z4	1/2	1/2	2-1/2	4-1/2	4	TICN	0.025
N72167	REM710-0.500-D6-C025.3-Z4	1/2	1/2	3	5	4	UNCOATED	0.025
N79423	REM710-0.500-D6-C025.3-Z4	1/2	1/2	3	5	4	TICN	0.025
N71182	REM710-0.563-P2-C025.3-Z4	9/16	1/2	1-3/8	3-3/8	4	UNCOATED	0.025
N69297	REM710-0.563-P2-C025.3-Z4	9/16	1/2	1-3/8	3-3/8	4	TICN	0.025
N71206	REM710-0.625-D1-C030.3-Z4	5/8	5/8	3/4	2-7/8	4	UNCOATED	0.030
N79424	REM710-0.625-D1-C030.3-Z4	5/8	5/8	3/4	2-7/8	4	TICN	0.030
N71202	REM710-0.625-D2-C030.3-Z4	5/8	5/8	1-1/4	3-3/8	4	UNCOATED	0.030
N79425	REM710-0.625-D2-C030.3-Z4	5/8	5/8	1-1/4	3-3/8	4	TICN	0.030
N71203	REM710-0.625-D3-C030.3-Z4	5/8	5/8	1-5/8	3-3/4	4	UNCOATED	0.030
N71208	REM710-0.625-D3-C030.3-Z4	5/8	5/8	1-5/8	3-3/4	4	TICN	0.030
N71204	REM710-0.625-D5-C030.3-Z4	5/8	5/8	2-1/2	4-5/8	4	UNCOATED	0.030
N69298	REM710-0.625-D5-C030.3-Z4	5/8	5/8	2-1/2	4-5/8	4	TICN	0.030
N72204	REM710-0.625-D6-C030.3-Z4	5/8	5/8	3-1/8	5-1/4	4	UNCOATED	0.030
N79427	REM710-0.625-D6-C030.3-Z4	5/8	5/8	3-1/8	5-1/4	4	TICN	0.030
N71243	REM710-0.750-P2-C030.3-Z4	3/4	5/8	1-5/8	3-3/4	4	UNCOATED	0.030
N69301	REM710-0.750-P2-C030.3-Z4	3/4	5/8	1-5/8	3-3/4	4	TICN	0.030
N72243	REM710-0.750-D1-C030.3-Z4	3/4	3/4	3/4	3	4	UNCOATED	0.030
N69300	REM710-0.750-D1-C030.3-Z4	3/4	3/4	3/4	3	4	TICN	0.030
N71241	REM710-0.750-D2-C030.3-Z4	3/4	3/4	1-1/4	3-1/2	4	UNCOATED	0.030
N79429	REM710-0.750-D2-C030.3-Z4	3/4	3/4	1-1/4	3-1/2	4	TICN	0.030
N72241	REM710-0.750-D3-C030.3-Z4	3/4	3/4	1-1/2	3-3/4	4	UNCOATED	0.030
N79430	REM710-0.750-D3-C030.3-Z4	3/4	3/4	1-1/2	3-3/4	4	TICN	0.030
N71244	REM710-0.750-D4-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	UNCOATED	0.030
N71245	REM710-0.750-D4-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	TICN	0.030
N71247	REM710-0.750-D5-C030.3-Z4	3/4	3/4	2	4-1/4	4	UNCOATED	0.030
N79431	REM710-0.750-D5-C030.3-Z4	3/4	3/4	2	4-1/4	4	TICN	0.030
N72245	REM710-0.750-D6-C030.3-Z4	3/4	3/4	2-1/2	4-3/4	4	UNCOATED	0.030

## REM710 (CONT'D)



- Weldon flat standard
- Designed for profiling and slotting in all materials
- Cutting Data - Page 277-278
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N79432	REM710-0.750-D6-C030.3-Z4	3/4	3/4	2-1/2	4-3/4	4	TICN	0.030
N72244	REM710-0.750-D7-C030.3-Z4	3/4	3/4	3	5-1/4	4	UNCOATED	0.030
N69299	REM710-0.750-D7-C030.3-Z4	3/4	3/4	3	5-1/4	4	TICN	0.030
N72248	REM710-0.750-D8-C030.3-Z4	3/4	3/4	4-1/8	6-3/8	4	UNCOATED	0.030
N79433	REM710-0.750-D8-C030.3-Z4	3/4	3/4	4-1/8	6-3/8	4	TICN	0.030
N72284	REM710-0.875-P3-C030.3-Z5	7/8	3/4	1-7/8	4-1/8	5	UNCOATED	0.030
N69302	REM710-0.875-P3-C030.3-Z5	7/8	3/4	1-7/8	4-1/8	5	TICN	0.030
N71283	REM710-0.875-P4-C030.3-Z5	7/8	3/4	3-1/2	5-3/4	5	UNCOATED	0.030
N69303	REM710-0.875-P4-C030.3-Z5	7/8	3/4	3-1/2	5-3/4	5	TICN	0.030
N71284	REM710-0.875-D2-C030.3-Z5	7/8	7/8	1-7/8	4-1/8	5	UNCOATED	0.030
N69304	REM710-0.875-D2-C030.3-Z5	7/8	7/8	1-7/8	4-1/8	5	TICN	0.030
N71285	REM710-0.875-D4-C030.3-Z5	7/8	7/8	3-1/2	5-3/4	5	UNCOATED	0.030
N69305	REM710-0.875-D4-C030.3-Z5	7/8	7/8	3-1/2	5-3/4	5	TICN	0.030
N71324	REM710-1.000-P1-C030.3-Z5	1	3/4	3/4	3	5	UNCOATED	0.030
N69310	REM710-1.000-P1-C030.3-Z5	1	3/4	3/4	3	5	TICN	0.030
N72324	REM710-1.000-P3-C030.3-Z5	1	3/4	1-1/2	3-3/4	5	UNCOATED	0.030
N69309	REM710-1.000-P3-C030.3-Z5	1	3/4	1-1/2	3-3/4	5	TICN	0.030
N71330	REM710-1.000-P4-C030.3-Z5	1	3/4	2	4-1/4	5	UNCOATED	0.030
N79439	REM710-1.000-P4-C030.3-Z5	1	3/4	2	4-1/4	5	TICN	0.030
N71326	REM710-1.000-D3-C030.3-Z5	1	1	2	4-1/2	5	UNCOATED	0.030
N71329	REM710-1.000-D3-C030.3-Z5	1	1	2	4-1/2	5	TICN	0.030
N71327	REM710-1.000-D4-C030.3-Z5	1	1	3	5-1/2	5	UNCOATED	0.030
N69306	REM710-1.000-D4-C030.3-Z5	1	1	3	5-1/2	5	TICN	0.030
N72326	REM710-1.000-D5-C030.3-Z5	1	1	4	6-1/2	5	UNCOATED	0.030
N69307	REM710-1.000-D5-C030.3-Z5	1	1	4	6-1/2	5	TICN	0.030
N72327	REM710-1.000-D6-C030.3-Z5	1	1	6	8-1/2	5	UNCOATED	0.030
N69308	REM710-1.000-D6-C030.3-Z5	1	1	6	8-1/2	5	TICN	0.030
N71366	REM710-1.125-P3-C040.3-Z6	1-1/8	1	2	4-1/2	6	UNCOATED	0.040
N69311	REM710-1.125-P3-C040.3-Z6	1-1/8	1	2	4-1/2	6	TICN	0.040
N71367	REM710-1.125-P4-C040.3-Z6	1-1/8	1	3-1/2	6	6	UNCOATED	0.040
N79446	REM710-1.125-P4-C040.3-Z6	1-1/8	1	3-1/2	6	6	TICN	0.040
N71404	REM710-1.250-P1-C040.3-Z6	1-1/4	3/4	3/4	3	6	UNCOATED	0.040
N69317	REM710-1.250-P1-C040.3-Z6	1-1/4	3/4	3/4	3	6	TICN	0.040
N72404	REM710-1.250-P3-C040.3-Z6	1-1/4	3/4	1-1/2	3-3/4	6	UNCOATED	0.040
N69316	REM710-1.250-P3-C040.3-Z6	1-1/4	3/4	1-1/2	3-3/4	6	TICN	0.040
N71406	REM710-1.250-P4-C040.3-Z6	1-1/4	3/4	2	4-1/4	6	UNCOATED	0.040
N79448	REM710-1.250-P4-C040.3-Z6	1-1/4	3/4	2	4-1/4	6	TICN	0.040
N71407	REM710-1.250-D2-C040.3-Z6	1-1/4	1-1/4	2	4-1/2	6	UNCOATED	0.040

## REM710 (CONT'D)



- Weldon flat standard
- Designed for profiling and slotting in all materials
- Cutting Data - Page 277-278
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N69312	REM710-1.250-D2-C040.3-Z6	1-1/4	1-1/4	2	4-1/2	6	TICN	0.040
N71408	REM710-1.250-D3-C040.3-Z6	1-1/4	1-1/4	3	5-1/2	6	UNCOATED	0.040
N69313	REM710-1.250-D3-C040.3-Z6	1-1/4	1-1/4	3	5-1/2	6	TICN	0.040
N72407	REM710-1.250-D4-C040.3-Z6	1-1/4	1-1/4	4	6-1/2	6	UNCOATED	0.040
N69314	REM710-1.250-D4-C040.3-Z6	1-1/4	1-1/4	4	6-1/2	6	TICN	0.040
N72408	REM710-1.250-D5-C040.3-Z6	1-1/4	1-1/4	6	8-1/2	6	UNCOATED	0.040
N69315	REM710-1.250-D5-C040.3-Z6	1-1/4	1-1/4	6	8-1/2	6	TICN	0.040
N72484	REM710-1.500-P3-C040.3-Z6	1-1/2	3/4	1-1/2	3-3/4	6	UNCOATED	0.040
N69324	REM710-1.500-P3-C040.3-Z6	1-1/2	3/4	1-1/2	3-3/4	6	TICN	0.040
N72485	REM710-1.500-P4-C040.3-Z6	1-1/2	3/4	2	4-1/4	6	UNCOATED	0.040
N79453	REM710-1.500-P4-C040.3-Z6	1-1/2	3/4	2	4-1/4	6	TICN	0.040
N71487	REM710-1.500-P5-C040.3-Z6	1-1/2	1-1/4	2	4-1/2	6	UNCOATED	0.040
N69318	REM710-1.500-P5-C040.3-Z6	1-1/2	1-1/4	2	4-1/2	6	TICN	0.040
N71488	REM710-1.500-P6-C040.3-Z6	1-1/2	1-1/4	3	5-1/2	6	UNCOATED	0.040
N69319	REM710-1.500-P6-C040.3-Z6	1-1/2	1-1/4	3	5-1/2	6	TICN	0.040
N72487	REM710-1.500-P7-C040.3-Z6	1-1/2	1-1/4	4	6-1/2	6	UNCOATED	0.040
N69320	REM710-1.500-P7-C040.3-Z6	1-1/2	1-1/4	4	6-1/2	6	TICN	0.040
N72488	REM710-1.500-P8-C040.3-Z6	1-1/2	1-1/4	5	7-1/2	6	UNCOATED	0.040
N69321	REM710-1.500-P8-C040.3-Z6	1-1/2	1-1/4	5	7-1/2	6	TICN	0.040
N71489	REM710-1.500-P9-C040.3-Z6	1-1/2	1-1/4	6	8-1/2	6	UNCOATED	0.040
N69322	REM710-1.500-P9-C040.3-Z6	1-1/2	1-1/4	6	8-1/2	6	TICN	0.040
N72489	REM710-1.500-P10-C040.3-Z6	1-1/2	1-1/4	8	10-1/2	6	UNCOATED	0.040
N69323	REM710-1.500-P10-C040.3-Z6	1-1/2	1-1/4	8	10-1/2	6	TICN	0.040
N72574	REM710-1.750-P5-C040.3-Z6	1-3/4	1-1/4	4	6-1/2	6	UNCOATED	0.040
N69328	REM710-1.750-P5-C040.3-Z6	1-3/4	1-1/4	4	6-1/2	6	TICN	0.040
N71640	REM710-2.000-P2-C040.3-Z8	2	3/4	1-1/8	3-3/8	8	UNCOATED	0.040
N79456	REM710-2.000-P2-C040.3-Z8	2	3/4	1-1/8	3-3/8	8	TICN	0.040
N71645	REM710-2.000-P4-C040.3-Z8	2	1-1/4	2	4-1/2	8	UNCOATED	0.040
N69331	REM710-2.000-P4-C040.3-Z8	2	1-1/4	2	4-1/2	8	TICN	0.040
N71648	REM710-2.000-P5-C040.3-Z8	2	1-1/4	4	6-1/2	8	UNCOATED	0.040
N69332	REM710-2.000-P5-C040.3-Z8	2	1-1/4	4	6-1/2	8	TICN	0.040
N71343	REM710-2.000-D3-C040.7-Z8	2	2	4	7-3/4	8	UNCOATED	0.040
N69335	REM710-2.000-D3-C040.7-Z8	2	2	4	7-3/4	8	TICN	0.040
N71353	REM710-2.000-D4-C040.7-Z8	2	2	5	8-3/4	8	UNCOATED	0.040
N69336	REM710-2.000-D4-C040.7-Z8	2	2	5	8-3/4	8	TICN	0.040
N71363	REM710-2.000-D5-C040.7-Z8	2	2	6	9-3/4	8	UNCOATED	0.040
N69337	REM710-2.000-D5-C040.7-Z8	2	2	6	9-3/4	8	TICN	0.040
N71383	REM710-2.000-D7-C040.7-Z8	2	2	8	11-3/4	8	UNCOATED	0.040
N69339	REM710-2.000-D7-C040.7-Z8	2	2	8	11-3/4	8	TICN	0.040

## REC700



- Weldon flat standard
- Designed for profiling and slotting in all materials
- Cutting Data - Page 277-278
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N70013	REC700-0.188-F3-C020.3-Z4	3/16	3/8	1/2	2-3/8	4	UNCOATED	0.020
N88861	REC700-0.188-F3-C020.3-Z4	3/16	3/8	1/2	2-3/8	4	TICN	0.020
N70210	REC700-0.250-F2-C020.3-Z4	1/4	3/8	3/8	2-3/16	4	UNCOATED	0.020
N70212	REC700-0.250-F2-C020.3-Z4	1/4	3/8	3/8	2-3/16	4	TICN	0.020
N70015	REC700-0.250-F3-C020.3-Z4	1/4	3/8	5/8	2-7/16	4	UNCOATED	0.020
N88862	REC700-0.250-F3-C020.3-Z4	1/4	3/8	5/8	2-7/16	4	TICN	0.020
N70017	REC700-0.250-F5-C020.3-Z4	1/4	3/8	1-1/4	3-1/16	4	UNCOATED	0.020
N88863	REC700-0.250-F5-C020.3-Z4	1/4	3/8	1-1/4	3-1/16	4	TICN	0.020
N70019	REC700-0.313-F2-C025.3-Z4	5/16	3/8	3/4	2-1/2	4	UNCOATED	0.025
N88864	REC700-0.313-F2-C025.3-Z4	5/16	3/8	3/4	2-1/2	4	TICN	0.025
N70023	REC700-0.375-D2-C025.3-Z4	3/8	3/8	3/4	2-1/2	4	UNCOATED	0.025
N88866	REC700-0.375-D2-C025.3-Z4	3/8	3/8	3/4	2-1/2	4	TICN	0.025
N70025	REC700-0.375-D4-C025.3-Z4	3/8	3/8	1-1/2	3-1/4	4	UNCOATED	0.025
N88867	REC700-0.375-D4-C025.3-Z4	3/8	3/8	1-1/2	3-1/4	4	TICN	0.025
N70027	REC700-0.438-P2-C025.3-Z4	7/16	3/8	1	2-11/16	4	UNCOATED	0.025
N88868	REC700-0.438-P2-C025.3-Z4	7/16	3/8	1	2-11/16	4	TICN	0.025
N70216	REC700-0.500-D1-C025.3-Z4	1/2	1/2	5/8	2-5/8	4	UNCOATED	0.025
N70218	REC700-0.500-D1-C025.3-Z4	1/2	1/2	5/8	2-5/8	4	TICN	0.025
N70129	REC700-0.500-D2-C025.3-Z4	1/2	1/2	1	3	4	UNCOATED	0.025
N88869	REC700-0.500-D2-C025.3-Z4	1/2	1/2	1	3	4	TICN	0.025
N70031	REC700-0.500-D3-C025.3-Z4	1/2	1/2	1-1/4	3-1/4	4	UNCOATED	0.025
N88870	REC700-0.500-D3-C025.3-Z4	1/2	1/2	1-1/4	3-1/4	4	TICN	0.025
N70033	REC700-0.500-D4-C025.3-Z4	1/2	1/2	1-5/8	3-5/8	4	UNCOATED	0.025
N79526	REC700-0.500-D4-C025.3-Z4	1/2	1/2	1-5/8	3-5/8	4	TICN	0.025
N70035	REC700-0.500-D5-C025.3-Z4	1/2	1/2	2	4	4	UNCOATED	0.025
N88871	REC700-0.500-D5-C025.3-Z4	1/2	1/2	2	4	4	TICN	0.025
N70137	REC700-0.500-D6-C025.3-Z4	1/2	1/2	2-1/2	4-1/2	4	UNCOATED	0.025
N79527	REC700-0.500-D6-C025.3-Z4	1/2	1/2	2-1/2	4-1/2	4	TICN	0.025
N70139	REC700-0.500-D7-C025.3-Z4	1/2	1/2	3	5	4	UNCOATED	0.025
N79528	REC700-0.500-D7-C025.3-Z4	1/2	1/2	3	5	4	TICN	0.025
N70037	REC700-0.563-P2-C025.3-Z4	9/16	1/2	1-3/8	3-3/8	4	UNCOATED	0.025
N88872	REC700-0.563-P2-C025.3-Z4	9/16	1/2	1-3/8	3-3/8	4	TICN	0.025
N70029	REC700-0.625-D3-C030.3-Z4	5/8	5/8	1-1/4	3-3/8	4	UNCOATED	0.030
N79530	REC700-0.625-D3-C030.3-Z4	5/8	5/8	1-1/4	3-3/8	4	TICN	0.030
N70039	REC700-0.625-D4-C030.3-Z4	5/8	5/8	1-5/8	3-3/4	4	UNCOATED	0.030
N88873	REC700-0.625-D4-C030.3-Z4	5/8	5/8	1-5/8	3-3/4	4	TICN	0.030
N70043	REC700-0.625-D6-C030.3-Z4	5/8	5/8	2-1/2	4-5/8	4	UNCOATED	0.030
N88874	REC700-0.625-D6-C030.3-Z4	5/8	5/8	2-1/2	4-5/8	4	TICN	0.030
N70045	REC700-0.625-D7-C030.3-Z4	5/8	5/8	3-1/8	5-1/4	4	UNCOATED	0.030
N79532	REC700-0.625-D7-C030.3-Z4	5/8	5/8	3-1/8	5-1/4	4	TICN	0.030



## REC700 (CONT'D)



- Weldon flat standard
- Designed for profiling and slotting in all materials
- Cutting Data - Page 277-278
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N70049	REC700-0.750-D1-C030.3-Z4	3/4	3/4	3/4	3	4	UNCOATED	0.030
N88876	REC700-0.750-D1-C030.3-Z4	3/4	3/4	3/4	3	4	TICN	0.030
N70151	REC700-0.750-D2-C030.3-Z4	3/4	3/4	1-1/4	3-1/2	4	UNCOATED	0.030
N79534	REC700-0.750-D2-C030.3-Z4	3/4	3/4	1-1/4	3-1/2	4	TICN	0.030
N70153	REC700-0.750-D3-C030.3-Z4	3/4	3/4	1-1/2	3-3/4	4	UNCOATED	0.030
N79535	REC700-0.750-D3-C030.3-Z4	3/4	3/4	1-1/2	3-3/4	4	TICN	0.030
N70047	REC700-0.750-D4-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	UNCOATED	0.030
N88875	REC700-0.750-D4-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	TICN	0.030
N70149	REC700-0.750-D5-C030.3-Z4	3/4	3/4	2	4-1/4	4	UNCOATED	0.030
N79536	REC700-0.750-D5-C030.3-Z4	3/4	3/4	2	4-1/4	4	TICN	0.030
N70155	REC700-0.750-D6-C030.3-Z4	3/4	3/4	2-1/2	4-3/4	4	UNCOATED	0.030
N79537	REC700-0.750-D6-C030.3-Z4	3/4	3/4	2-1/2	4-3/4	4	TICN	0.030
N70051	REC700-0.750-D7-C030.3-Z4	3/4	3/4	3	5-1/4	4	UNCOATED	0.030
N88877	REC700-0.750-D7-C030.3-Z4	3/4	3/4	3	5-1/4	4	TICN	0.030
N70157	REC700-0.750-D8-C030.3-Z4	3/4	3/4	4-1/8	6-3/8	4	UNCOATED	0.030
N79538	REC700-0.750-D8-C030.3-Z4	3/4	3/4	4-1/8	6-3/8	4	TICN	0.030
N70055	REC700-0.875-P3-C030.3-Z5	7/8	3/4	1-7/8	4-1/8	5	UNCOATED	0.030
N88879	REC700-0.875-P3-C030.3-Z5	7/8	3/4	1-7/8	4-1/8	5	TICN	0.030
N70059	REC700-0.875-P4-C030.3-Z5	7/8	3/4	3-1/2	5-3/4	5	UNCOATED	0.030
N88880	REC700-0.875-P4-C030.3-Z5	7/8	3/4	3-1/2	5-3/4	5	TICN	0.030

## RMB700



- Weldon flat standard
- Designed for profiling, slotting and contouring in all materials
- Cutting Data - Page 277-278
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N70162	RMB700-0.500-D3-B.3-Z4	1/2	1/2	1-1/4	3-1/4	4	UNCOATED
N88897	RMB700-0.500-D3-B.3-Z4	1/2	1/2	1-1/4	3-1/4	4	TICN
N70203	RMB700-0.625-D3-B.3-Z4	5/8	5/8	1-5/8	3-3/4	4	UNCOATED
N88898	RMB700-0.625-D3-B.3-Z4	5/8	5/8	1-5/8	3-3/4	4	TICN
N70244	RMB700-0.750-D2-B.3-Z4	3/4	3/4	1-5/8	3-7/8	4	UNCOATED
N88899	RMB700-0.750-D2-B.3-Z4	3/4	3/4	1-5/8	3-7/8	4	TICN
N70326	RMB700-1.000-D2-B.3-Z5	1	1	2	4-1/2	5	UNCOATED
N88900	RMB700-1.000-D2-B.3-Z5	1	1	2	4-1/2	5	TICN

DISCOUNT CODE D41

## RXC753



- Weldon flat standard
- Designed for profiling and slotting in all materials
- Cutting Data - Page 279
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	NECK DIA	REACH	FLUTES	COATING	CHAMFER
N75341	RXC753-1.000-E2-C030.3-Z5	1	1	2-1/2	6-1/2	.850	4	5	UNCOATED	0.030
N89100	RXC753-1.000-E2-C030.3-Z5	1	1	2-1/2	6-1/2	.850	4	5	TICN	0.030
N75345	RXC753-1.000-E3-C030.3-Z5	1	1	2-1/2	8-1/2	.850	6	5	UNCOATED	0.030
N89101	RXC753-1.000-E3-C030.3-Z5	1	1	2-1/2	8-1/2	.850	6	5	TICN	0.030
N75353	RXC753-1.250-E3-C040.3-Z6	1-1/4	1-1/4	2-1/2	8-1/2	1.050	6	6	UNCOATED	0.040
N89103	RXC753-1.250-E3-C040.3-Z6	1-1/4	1-1/4	2-1/2	8-1/2	1.050	6	6	TICN	0.040
N75365	RXC753-1.500-P4-C040.3-Z6	1-1/2	1-1/4	2-1/2	10-1/2	1.050	8	6	UNCOATED	0.040
N89106	RXC753-1.500-P4-C040.3-Z6	1-1/2	1-1/4	2-1/2	10-1/2	1.050	8	6	TICN	0.040

## EXCEL SERIES-EXR350



- Weldon flat standard
- Designed for pocketing, profiling and slotting applications
- Cutting Data - Page 280-281
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N53809	EXR350-0.375-D2-C025.3-Z4	3/8	3/8	3/4	2-1/2	4	UNCOATED	0.025
N53911	EXR350-0.375-D2-C025.3-Z4	3/8	3/8	3/4	2-1/2	4	TIALN	0.025
N53810	EXR350-0.375-D4-C025.3-Z4	3/8	3/8	1-1/2	3-1/4	4	UNCOATED	0.025
N53912	EXR350-0.375-D4-C025.3-Z4	3/8	3/8	1-1/2	3-1/4	4	TIALN	0.025
N53811	EXR350-0.500-D1-C025.3-Z4	1/2	1/2	1/2	2-1/2	4	UNCOATED	0.025
N53913	EXR350-0.500-D1-C025.3-Z4	1/2	1/2	1/2	2-1/2	4	TIALN	0.025
N53812	EXR350-0.500-D3-C025.3-Z4	1/2	1/2	1-1/4	3-1/4	4	UNCOATED	0.025
N53914	EXR350-0.500-D3-C025.3-Z4	1/2	1/2	1-1/4	3-1/4	4	TIALN	0.025
N53813	EXR350-0.500-D4-C025.3-Z4	1/2	1/2	2	4	4	UNCOATED	0.025
N53915	EXR350-0.500-D4-C025.3-Z4	1/2	1/2	2	4	4	TIALN	0.025
N53815	EXR350-0.625-D3-C030.3-Z4	5/8	5/8	1-5/8	3-3/4	4	UNCOATED	0.030
N53917	EXR350-0.625-D3-C030.3-Z4	5/8	5/8	1-5/8	3-3/4	4	TIALN	0.030
N53818	EXR350-0.750-D2-C030.3-Z4	3/4	3/4	1-5/8	3-3/4	4	UNCOATED	0.030
N53920	EXR350-0.750-D2-C030.3-Z4	3/4	3/4	1-5/8	3-1/2	4	TIALN	0.030
N53819	EXR350-0.750-D4-C030.3-Z4	3/4	3/4	3	5-1/4	4	UNCOATED	0.030
N53921	EXR350-0.750-D4-C030.3-Z4	3/4	3/4	3	5-1/4	4	TIALN	0.030
N53820	EXR350-1.000-D1-C030.3-Z5	1	1	1	3-1/2	5	UNCOATED	0.030

## EXCEL SERIES-EXR350 (CONT'D)

<b>PREMIUM PARTICLE METAL</b> 8.5% COBALT	<b>HELIX</b> 35°	<b>CHAMFER</b> 45°	<b>CENTER CUTTING</b>	<b>FINE PITCH</b> 		
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- Weldon flat standard
- Designed for pocketing, profiling and slotting applications
- Cutting Data - Page 280-281
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N53922	EXR350-1.000-D1-C030.3-Z5	1	1	1	3-1/2	5	TIALN	0.030
N53821	EXR350-1.000-D2-C030.3-Z5	1	1	2	4-1/2	5	UNCOATED	0.030
N53923	EXR350-1.000-D2-C030.3-Z5	1	1	2	4-1/2	5	TIALN	0.030
N53822	EXR350-1.000-D3-C030.3-Z5	1	1	3	5-1/2	5	UNCOATED	0.030
N53924	EXR350-1.000-D3-C030.3-Z5	1	1	3	5-1/2	5	TIALN	0.030
N53823	EXR350-1.000-D4-C030.3-Z5	1	1	4	6-1/2	5	UNCOATED	0.030
N53925	EXR350-1.000-D4-C030.3-Z5	1	1	4	6-1/2	5	TIALN	0.030
N53826	EXR350-1.250-D2-C040.3-Z6	1-1/4	1-1/4	2	4-1/2	6	UNCOATED	0.040
N53928	EXR350-1.250-D2-C040.3-Z6	1-1/4	1-1/4	2	4-1/2	6	TIALN	0.040
N53828	EXR350-1.250-D4-C040.3-Z6	1-1/4	1-1/4	4	6-1/2	6	UNCOATED	0.040
N53930	EXR350-1.250-D4-C040.3-Z6	1-1/4	1-1/4	4	6-1/2	6	TIALN	0.040

## REM445

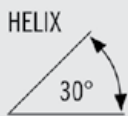
<b>M42</b> 8% COBALT	<b>HELIX</b> 30°	<b>CHAMFER</b> 45°	<b>NON CENTER CUTTING</b>	<b>FINE PITCH</b> 		
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- Weldon flat standard
- Designed for profiling and slotting in all materials including high temperature alloys
- Cutting Data - Page 282-283
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N44501	REM445-0.188-F3-C020.3-Z4	3/16	3/8	1/2	2-3/8	4	UNCOATED	0.020
N75655	REM445-0.188-F3-C020.3-Z4	3/16	3/8	1/2	2-3/8	4	TIALN	0.020
N44503	REM445-0.250-F3-C020.3-Z4	1/4	3/8	5/8	2-7/16	4	UNCOATED	0.020
N75656	REM445-0.250-F3-C020.3-Z4	1/4	3/8	5/8	2-7/16	4	TIALN	0.020
N44505	REM445-0.250-F5-C020.3-Z4	1/4	3/8	1-1/4	3-1/16	4	UNCOATED	0.020
N75657	REM445-0.250-F5-C020.3-Z4	1/4	3/8	1-1/4	3-1/16	4	TIALN	0.020
N44507	REM445-0.313-F2-C025.3-Z4	5/16	3/8	3/4	2-1/2	4	UNCOATED	0.025
N75658	REM445-0.313-F2-C025.3-Z4	5/16	3/8	3/4	2-1/2	4	TIALN	0.025
N44509	REM445-0.313-F4-C025.3-Z4	5/16	3/8	1-3/8	3-1/8	4	UNCOATED	0.025
N75659	REM445-0.313-F4-C025.3-Z4	5/16	3/8	1-3/8	3-1/8	4	TIALN	0.025
N44511	REM445-0.375-D2-C025.3-Z4	3/8	3/8	3/4	2-1/2	4	UNCOATED	0.025
N75660	REM445-0.375-D2-C025.3-Z4	3/8	3/8	3/4	2-1/2	4	TIALN	0.025
N44513	REM445-0.375-D4-C025.3-Z4	3/8	3/8	1-1/2	3-1/4	4	UNCOATED	0.025

## REM445 (CONT'D)

M42  
8% COBALT



NON  
CENTER  
CUTTING

FINE PITCH



- Weldon flat standard
- Designed for profiling and slotting in all materials including high temperature alloys
- Cutting Data - Page 282-283
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N75661	REM445-0.375-D4-C025.3-Z4	3/8	3/8	1-1/2	3-1/4	4	TIALN	0.025
N44515	REM445-0.438-P2-C025.3-Z4	7/16	3/8	1	2-11/16	4	UNCOATED	0.025
N75662	REM445-0.438-P2-C025.3-Z4	7/16	3/8	1	2-11/16	4	TIALN	0.025
N45415	REM445-0.500-D2-C025.3-Z4	1/2	1/2	1	3	4	UNCOATED	0.025
N75663	REM445-0.500-D2-C025.3-Z4	1/2	1/2	1	3	4	TIALN	0.025
N44517	REM445-0.500-D3-C025.3-Z4	1/2	1/2	1-1/4	3-1/4	4	UNCOATED	0.025
N75664	REM445-0.500-D3-C025.3-Z4	1/2	1/2	1-1/4	3-1/4	4	TIALN	0.025
N45417	REM445-0.500-D5-C025.3-Z4	1/2	1/2	1-5/8	3-5/8	4	UNCOATED	0.025
N75665	REM445-0.500-D5-C025.3-Z4	1/2	1/2	1-5/8	3-5/8	4	TIALN	0.025
N44519	REM445-0.500-D4-C025.3-Z4	1/2	1/2	2	4	4	UNCOATED	0.025
N75666	REM445-0.500-D4-C025.3-Z4	1/2	1/2	2	4	4	TIALN	0.025
N45419	REM445-0.500-D6-C025.3-Z4	1/2	1/2	2-1/2	4-1/2	4	UNCOATED	0.025
N75667	REM445-0.500-D6-C025.3-Z4	1/2	1/2	2-1/2	4-1/2	4	TIALN	0.025
N45421	REM445-0.500-D7-C025.3-Z4	1/2	1/2	3	5	4	UNCOATED	0.025
N75668	REM445-0.500-D7-C025.3-Z4	1/2	1/2	3	5	4	TIALN	0.025
N45423	REM445-0.625-D1-C030.3-Z4	5/8	5/8	3/4	2-7/8	4	UNCOATED	0.030
N75670	REM445-0.625-D1-C030.3-Z4	5/8	5/8	3/4	2-7/8	4	TIALN	0.030
N45425	REM445-0.625-D2-C030.3-Z4	5/8	5/8	1-1/4	3-3/8	4	UNCOATED	0.030
N75671	REM445-0.625-D2-C030.3-Z4	5/8	5/8	1-1/4	3-3/8	4	TIALN	0.030
N44523	REM445-0.625-D3-C030.3-Z4	5/8	5/8	1-5/8	3-3/4	4	UNCOATED	0.030
N75672	REM445-0.625-D3-C030.3-Z4	5/8	5/8	1-5/8	3-3/4	4	TIALN	0.030
N45427	REM445-0.625-D5-C030.3-Z4	5/8	5/8	2-1/8	4-1/4	4	UNCOATED	0.030
N75673	REM445-0.625-D5-C030.3-Z4	5/8	5/8	2-1/8	4-1/4	4	TIALN	0.030
N44525	REM445-0.625-D4-C030.3-Z4	5/8	5/8	2-1/2	4-5/8	4	UNCOATED	0.030
N75674	REM445-0.625-D4-C030.3-Z4	5/8	5/8	2-1/2	4-5/8	4	TIALN	0.030
N45429	REM445-0.625-D6-C030.3-Z4	5/8	5/8	3-1/8	5-1/4	4	UNCOATED	0.030
N75675	REM445-0.625-D6-C030.3-Z4	5/8	5/8	3-1/8	5-1/4	4	TIALN	0.030
N44531	REM445-0.750-D1-C030.3-Z4	3/4	3/4	3/4	3	4	UNCOATED	0.030
N75678	REM445-0.750-D1-C030.3-Z4	3/4	3/4	3/4	3	4	TIALN	0.030
N45433	REM445-0.750-D2-C030.3-Z4	3/4	3/4	1-1/4	3-1/2	4	UNCOATED	0.030
N75679	REM445-0.750-D2-C030.3-Z4	3/4	3/4	1-1/4	3-1/2	4	TIALN	0.030
N45435	REM445-0.750-D3-C030.3-Z4	3/4	3/4	1-1/2	3-3/4	4	UNCOATED	0.030
N75680	REM445-0.750-D3-C030.3-Z4	3/4	3/4	1-1/2	3-3/4	4	TIALN	0.030
N44527	REM445-0.750-D4-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	UNCOATED	0.030
N75681	REM445-0.750-D4-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	TIALN	0.030
N45437	REM445-0.750-D5-C030.3-Z4	3/4	3/4	2	4-1/4	4	UNCOATED	0.030

## REM445 (CONT'D)



- Weldon flat standard
- Designed for profiling and slotting in all materials including high temperature alloys
- Cutting Data - Page 282-283
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N75682	REM445-0.750-D5-C030.3-Z4	3/4	3/4	2	4-1/4	4	TIALN	0.030
N45439	REM445-0.750-D6-C030.3-Z4	3/4	3/4	2-1/2	4-3/4	4	UNCOATED	0.030
N75683	REM445-0.750-D6-C030.3-Z4	3/4	3/4	2-1/2	4-3/4	4	TIALN	0.030
N44529	REM445-0.750-D7-C030.3-Z4	3/4	3/4	3	5-1/4	4	UNCOATED	0.030
N75684	REM445-0.750-D7-C030.3-Z4	3/4	3/4	3	5-1/4	4	TIALN	0.030
N45441	REM445-0.750-D8-C030.3-Z4	3/4	3/4	4-1/8	6-3/8	4	UNCOATED	0.030
N75685	REM445-0.750-D8-C030.3-Z4	3/4	3/4	4-1/8	6-3/8	4	TIALN	0.030
N44551	REM445-1.000-P3-C030.3-Z5	1	3/4	1-1/2	3-3/4	5	UNCOATED	0.030
N75696	REM445-1.000-P3-C030.3-Z5	1	3/4	1-1/2	3-3/4	5	TIALN	0.030
N45453	REM445-1.000-P4-C030.3-Z5	1	3/4	2	4-1/4	5	UNCOATED	0.030
N75697	REM445-1.000-P4-C030.3-Z5	1	3/4	2	4-1/4	5	TIALN	0.030
N45459	REM445-1.000-D1-C030.3-Z5	1	1	1-1/8	3-5/8	5	UNCOATED	0.030
N75700	REM445-1.000-D1-C030.3-Z5	1	1	1-1/8	3-5/8	5	TIALN	0.030
N44543	REM445-1.000-D3-C030.3-Z5	1	1	2	4-1/2	5	UNCOATED	0.030
N75702	REM445-1.000-D3-C030.3-Z5	1	1	2	4-1/2	5	TIALN	0.030
N44545	REM445-1.000-D4-C030.3-Z5	1	1	3	5-1/2	5	UNCOATED	0.030
N75703	REM445-1.000-D4-C030.3-Z5	1	1	3	5-1/2	5	TIALN	0.030
N44547	REM445-1.000-D5-C030.3-Z5	1	1	4	6-1/2	5	UNCOATED	0.030
N75704	REM445-1.000-D5-C030.3-Z5	1	1	4	6-1/2	5	TIALN	0.030
N44549	REM445-1.000-D6-C030.3-Z5	1	1	6	8-1/2	5	UNCOATED	0.030
N75705	REM445-1.000-D6-C030.3-Z5	1	1	6	8-1/2	5	TIALN	0.030
N44557	REM445-1.250-D2-C040.3-Z6	1-1/4	1-1/4	2	4-1/2	6	UNCOATED	0.040
N75715	REM445-1.250-D2-C040.3-Z6	1-1/4	1-1/4	2	4-1/2	6	TIALN	0.040
N44559	REM445-1.250-D3-C040.3-Z6	1-1/4	1-1/4	3	5-1/2	6	UNCOATED	0.040
N75716	REM445-1.250-D3-C040.3-Z6	1-1/4	1-1/4	3	5-1/2	6	TIALN	0.040
N44561	REM445-1.250-D4-C040.3-Z6	1-1/4	1-1/4	4	6-1/2	6	UNCOATED	0.040
N75717	REM445-1.250-D4-C040.3-Z6	1-1/4	1-1/4	4	6-1/2	6	TIALN	0.040
N44563	REM445-1.250-D5-C040.3-Z6	1-1/4	1-1/4	6	8-1/2	6	UNCOATED	0.040
N75718	REM445-1.250-D5-C040.3-Z6	1-1/4	1-1/4	6	8-1/2	6	TIALN	0.040
N44569	REM445-1.500-P5-C040.3-Z6	1-1/2	1-1/4	2	4-1/2	6	UNCOATED	0.040
N75725	REM445-1.500-P5-C040.3-Z6	1-1/2	1-1/4	2	4-1/2	6	TIALN	0.040
N44599	REM445-2.000-D3-C040.7-Z8	2	2	4	7-3/4	8	UNCOATED	0.040
N75745	REM445-2.000-D3-C040.7-Z8	2	2	4	7-3/4	8	TIALN	0.040
N44603	REM445-2.000-D5-C040.7-Z8	2	2	6	9-3/4	8	UNCOATED	0.040
N75747	REM445-2.000-D5-C040.7-Z8	2	2	6	9-3/4	8	TIALN	0.040

## REC448



- Weldon flat standard
- Designed for profiling and slotting in all materials including high temperature alloys
- Cutting Data - Page 282-283
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N44839	REC448-0.188-F3-C020.3-Z4	3/16	3/8	1/2	2-3/8	4	UNCOATED	0.020
N14554	REC448-0.188-F3-C020.3-Z4	3/16	3/8	1/2	2-3/8	4	TIALN	0.020
N44841	REC448-0.250-F3-C020.3-Z4	1/4	3/8	5/8	2-7/16	4	UNCOATED	0.020
N14555	REC448-0.250-F3-C020.3-Z4	1/4	3/8	5/8	2-7/16	4	TIALN	0.020
N44843	REC448-0.250-F5-C020.3-Z4	1/4	3/8	1-1/4	3-1/16	4	UNCOATED	0.020
N14556	REC448-0.250-F5-C020.3-Z4	1/4	3/8	1-1/4	3-1/16	4	TIALN	0.020
N44845	REC448-0.313-F2-C025.3-Z4	5/16	3/8	3/4	2-1/2	4	UNCOATED	0.025
N14558	REC448-0.313-F2-C025.3-Z4	5/16	3/8	3/4	2-1/2	4	TIALN	0.025
N44873	REC448-0.375-D1-C025.3-Z4	3/8	3/8	1/2	2-1/4	4	UNCOATED	0.025
N14560	REC448-0.375-D1-C025.3-Z4	3/8	3/8	1/2	2-1/4	4	TIALN	0.025
N44849	REC448-0.375-D2-C025.3-Z4	3/8	3/8	3/4	2-1/2	4	UNCOATED	0.025
N14561	REC448-0.375-D2-C025.3-Z4	3/8	3/8	3/4	2-1/2	4	TIALN	0.025
N44876	REC448-0.500-D1-C025.3-Z4	1/2	1/2	5/8	2-5/8	4	UNCOATED	0.025
N14564	REC448-0.500-D1-C025.3-Z4	1/2	1/2	5/8	2-5/8	4	TIALN	0.025
N44801	REC448-0.500-D3-C025.3-Z4	1/2	1/2	1-1/4	3-1/4	4	UNCOATED	0.025
N14565	REC448-0.500-D3-C025.3-Z4	1/2	1/2	1-1/4	3-1/4	4	TIALN	0.025
N44803	REC448-0.500-D4-C025.3-Z4	1/2	1/2	2	4	4	UNCOATED	0.025
N14566	REC448-0.500-D4-C025.3-Z4	1/2	1/2	2	4	4	TIALN	0.025
N44879	REC448-0.625-D1-C030.3-Z4	5/8	5/8	5/8	2-3/4	4	UNCOATED	0.030
N14568	REC448-0.625-D1-C030.3-Z4	5/8	5/8	5/8	2-3/4	4	TIALN	0.030
N44805	REC448-0.625-D3-C030.3-Z4	5/8	5/8	1-5/8	3-3/4	4	UNCOATED	0.030
N14570	REC448-0.625-D3-C030.3-Z4	5/8	5/8	1-5/8	3-3/4	4	TIALN	0.030
N44807	REC448-0.625-D4-C030.3-Z4	5/8	5/8	2-1/2	4-5/8	4	UNCOATED	0.030
N14571	REC448-0.625-D4-C030.3-Z4	5/8	5/8	2-1/2	4-5/8	4	TIALN	0.030
N44859	REC448-0.750-D1-C030.3-Z4	3/4	3/4	3/4	3	4	UNCOATED	0.030
N14573	REC448-0.750-D1-C030.3-Z4	3/4	3/4	3/4	3	4	TIALN	0.030
N44809	REC448-0.750-D2-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	UNCOATED	0.030
N14574	REC448-0.750-D2-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	TIALN	0.030
N44811	REC448-0.750-D4-C030.3-Z4	3/4	3/4	3	5-1/4	4	UNCOATED	0.030
N14575	REC448-0.750-D4-C030.3-Z4	3/4	3/4	3	5-1/4	4	TIALN	0.030

## RMB449

M42  
8% COBALT



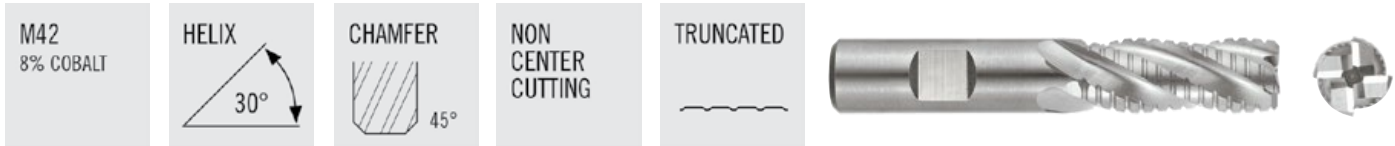
CENTER  
CUTTING



- Weldon flat standard
- Designed for profiling, slotting and contouring in all materials including high temperature alloys
- Cutting Data - Page 282-283
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N44901	RMB449-0.500-D3-B.3-Z4	1/2	1/2	1-1/4	3-1/4	4	UNCOATED
N75764	RMB449-0.500-D3-B.3-Z4	1/2	1/2	1-1/4	3-1/4	4	TIALN
N45903	RMB449-0.625-D4-B.3-Z4	5/8	5/8	2-1/2	4-5/8	4	UNCOATED
N75767	RMB449-0.625-D4-B.3-Z4	5/8	5/8	2-1/2	4-5/8	4	TIALN
N44905	RMB449-0.750-D2-B.3-Z4	3/4	3/4	1-5/8	3-7/8	4	UNCOATED
N75768	RMB449-0.750-D2-B.3-Z4	3/4	3/4	1-5/8	3-7/8	4	TIALN
N45907	RMB449-1.000-D4-B.3-Z5	1	1	4	6-1/2	5	UNCOATED
N75771	RMB449-1.000-D4-B.3-Z5	1	1	4	6-1/2	5	TIALN

## RFM440

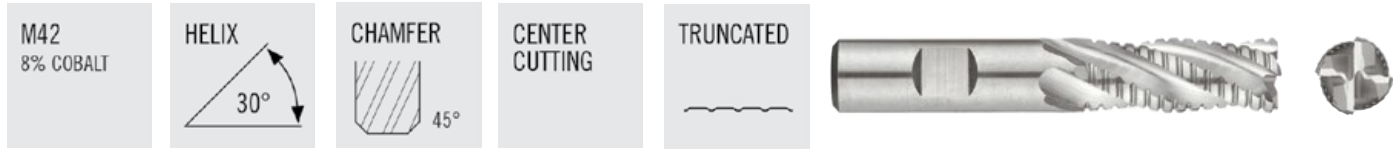


- Weldon flat standard
- Designed for profiling and slotting in all materials
- Cutting Data - Page 284-286
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N44063	RFM440-0.188-F3-C020.3-Z4	3/16	3/8	1/2	2-3/8	4	UNCOATED	0.020
N43700	RFM440-0.188-F3-C020.3-Z4	3/16	3/8	1/2	2-3/8	4	TICN	0.020
N44083	RFM440-0.250-F3-C020.3-Z4	1/4	3/8	5/8	2-7/16	4	UNCOATED	0.020
N43701	RFM440-0.250-F3-C020.3-Z4	1/4	3/8	5/8	2-7/16	4	TICN	0.020
N44085	RFM440-0.250-F5-C020.3-Z4	1/4	3/8	1-1/4	3-1/16	4	UNCOATED	0.020
N43702	RFM440-0.250-F5-C020.3-Z4	1/4	3/8	1-1/4	3-1/16	4	TICN	0.020
N44103	RFM440-0.313-F2-C025.3-Z4	5/16	3/8	3/4	2-1/2	4	UNCOATED	0.025
N43703	RFM440-0.313-F2-C025.3-Z4	5/16	3/8	3/4	2-1/2	4	TICN	0.025
N44123	RFM440-0.375-D2-C025.3-Z4	3/8	3/8	3/4	2-1/2	4	UNCOATED	0.025
N43705	RFM440-0.375-D2-C025.3-Z4	3/8	3/8	3/4	2-1/2	4	TICN	0.025
N44125	RFM440-0.375-D4-C025.3-Z4	3/8	3/8	1-1/2	3-1/4	4	UNCOATED	0.025
N43706	RFM440-0.375-D4-C025.3-Z4	3/8	3/8	1-1/2	3-1/4	4	TICN	0.025
N43163	RFM440-0.500-D3-C025.3-Z4	1/2	1/2	1-1/4	3-1/4	4	UNCOATED	0.025
N43709	RFM440-0.500-D3-C025.3-Z4	1/2	1/2	1-1/4	3-1/4	4	TICN	0.025
N44163	RFM440-0.500-D4-C025.3-Z4	1/2	1/2	1-5/8	3-5/8	4	UNCOATED	0.025
N43710	RFM440-0.500-D4-C025.3-Z4	1/2	1/2	1-5/8	3-5/8	4	TICN	0.025
N44204	RFM440-0.625-D3-C030.3-Z4	5/8	5/8	1-5/8	3-3/4	4	UNCOATED	0.030
N43717	RFM440-0.625-D3-C030.3-Z4	5/8	5/8	1-5/8	3-3/4	4	TICN	0.030
N43241	RFM440-0.750-P2-C030.3-Z4	3/4	5/8	1-5/8	3-3/4	4	UNCOATED	0.030
N43722	RFM440-0.750-P2-C030.3-Z4	3/4	5/8	1-5/8	3-3/4	4	TICN	0.030
N44245	RFM440-0.750-D4-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	UNCOATED	0.030
N43726	RFM440-0.750-D4-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	TICN	0.030
N44248	RFM440-0.750-D7-C030.3-Z4	3/4	3/4	3	5-1/4	4	UNCOATED	0.030
N43729	RFM440-0.750-D7-C030.3-Z4	3/4	3/4	3	5-1/4	4	TICN	0.030
N43322	RFM440-1.000-D3-C030.3-Z5	1	1	2	4-1/2	5	UNCOATED	0.030
N43747	RFM440-1.000-D3-C030.3-Z5	1	1	2	4-1/2	5	TICN	0.030
N44653	RFM440-2.000-D7-C040.7-Z8	2	2	8	11-3/4	8	UNCOATED	0.040
N43791	RFM440-2.000-D7-C040.7-Z8	2	2	8	11-3/4	8	TICN	0.040



## RFM441



- Weldon flat standard
- Designed for profiling and slotting in all materials
- Cutting Data - Page 284-286
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING	CHAMFER
N41667	RFM441-0.250-F3-C020.3-Z4	1/4	3/8	5/8	2-7/16	4	UNCOATED	0.020
N41669	RFM441-0.250-F3-C020.3-Z4	1/4	3/8	5/8	2-7/16	4	TICN	0.020
N41679	RFM441-0.500-D4-C025.3-Z4	1/2	1/2	2	4	4	UNCOATED	0.025
N41681	RFM441-0.500-D4-C025.3-Z4	1/2	1/2	2	4	4	TICN	0.025
N41682	RFM441-0.500-D6-C025.3-Z4	1/2	1/2	3	5	4	UNCOATED	0.025
N41684	RFM441-0.500-D6-C025.3-Z4	1/2	1/2	3	5	4	TICN	0.025
N41697	RFM441-0.750-D2-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	UNCOATED	0.030
N41699	RFM441-0.750-D2-C030.3-Z4	3/4	3/4	1-5/8	3-7/8	4	TICN	0.030
N41703	RFM441-0.750-D3-C030.3-Z4	3/4	3/4	2	4-1/4	4	UNCOATED	0.030
N41705	RFM441-0.750-D3-C030.3-Z4	3/4	3/4	2	4-1/4	4	TICN	0.030
N41724	RFM441-1.000-D2-C030.3-Z5	1	1	2	4-1/2	5	UNCOATED	0.030
N41726	RFM441-1.000-D2-C030.3-Z5	1	1	2	4-1/2	5	TICN	0.030
N41766	RFM441-2.000-P1-C040.3-Z8	2	1-1/4	2	4-1/2	8	UNCOATED	0.040
N41768	RFM441-2.000-P1-C040.3-Z8	2	1-1/4	2	4-1/2	8	TICN	0.040

## RFCB444



- Weldon flat standard
- Designed for profiling and slotting in all materials
- Cutting Data - Page 287-289
- Tolerance Specs - Page 336

ORDER NO.	DESCRIPTION	FLUTE DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	FLUTES	COATING
N44918	RFCB444-0.500-D3-S.3-Z4	1/2	1/2	1-1/4	3-1/4	4	UNCOATED
N44920	RFCB444-0.500-D3-S.3-Z4	1/2	1/2	1-1/4	3-1/4	4	TICN
N44939	RFCB444-0.625-D6-S.3-Z4	5/8	5/8	4	6-1/8	4	UNCOATED
N44941	RFCB444-0.625-D6-S.3-Z4	5/8	5/8	4	6-1/8	4	TICN
N44948	RFCB444-0.750-D3-S.3-Z4	3/4	3/4	2	4-1/4	4	UNCOATED
N44950	RFCB444-0.750-D3-S.3-Z4	3/4	3/4	2	4-1/4	4	TICN
N44969	RFCB444-1.000-D2-S.3-Z4	1	1	2	4-1/2	4	UNCOATED
N44971	RFCB444-1.000-D2-S.3-Z4	1	1	2	4-1/2	4	TICN
N44972	RFCB444-1.000-D2-S.3-Z6	1	1	2	4-1/2	6	UNCOATED
N44974	RFCB444-1.000-D2-S.3-Z6	1	1	2	4-1/2	6	TICN

## SP205 - START VALUES

		SLOTTING														
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 2										
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2	
P	E 1 - 2	1.00	1.00	110	n (rev/min)	1681	1121	840	672	560	420	336	280	240	210	
					f <sub>z</sub> (in)	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0079	0.0090	
	E 3 - 4	1.00	1.00	50	v <sub>f</sub> (in/min)	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
					n (rev/min)	764	509	382	306	255	191	153	127	109	96	
	E 5 - 6	1.00	1.00	35	f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070	
					v <sub>f</sub> (in/min)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
E 8 - 9	1.00	1.00	50	n (rev/min)	764	509	382	306	255	191	153	127	109	96		
				f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070		
E 10 - 11	1.00	1.00	40	v <sub>f</sub> (in/min)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3		
				n (rev/min)	611	407	306	244	204	153	122	102	87	76		
E 12 - 13	1.00	1.00	50	f <sub>z</sub> (in)	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	0.0038	0.0045	0.0053	0.0060		
				v <sub>f</sub> (in/min)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9		
E 14 - 15	1.00	1.00	40	n (rev/min)	764	509	382	306	255	191	153	127	109	96		
				f <sub>z</sub> (in)	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0079	0.0090		
E 18	1.00	1.00	240	v <sub>f</sub> (in/min)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7		
				n (rev/min)	611	407	306	244	204	153	122	102	87	76		
E 20	1.00	1.00	8	f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070		
				v <sub>f</sub> (in/min)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1		
E 21	1.00	1.00	8	n (rev/min)	3667	2445	1834	1467	1222	917	733	611	524	458		
				f <sub>z</sub> (in)	0.0013	0.0019	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0088	0.0100		
E 22	1.00	1.00	40	v <sub>f</sub> (in/min)	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2		
				n (rev/min)	122	81	61	49	41	31	24	20	17	15		
E 20	1.00	1.00	8	f <sub>z</sub> (in)	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0023	0.0026	0.0030		
				v <sub>f</sub> (in/min)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
E 21	1.00	1.00	8	n (rev/min)	122	81	61	49	41	31	24	20	17	15		
				f <sub>z</sub> (in)	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0044	0.0050		
E 22	1.00	1.00	40	v <sub>f</sub> (in/min)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		
				n (rev/min)	611	407	306	244	204	153	122	102	87	76		
E 20	1.00	1.00	8	f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070		
				v <sub>f</sub> (in/min)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1		

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter

v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE COBALT END MILLS

## SP205 - START VALUES

SIDE MILLING - ROUGHING															
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 2									
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2
P	E 1 - 2	1.50	0.25	160	n (rev/min)	2445	1630	1222	978	815	611	489	407	349	306
					f <sub>z</sub> (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	0.0113
					v <sub>f</sub> (in/min)	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
	E 3 - 4	1.50	0.25	80	n (rev/min)	1222	815	611	489	407	306	244	204	175	153
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
	E 5 - 6	1.50	0.25	50	n (rev/min)	764	509	382	306	255	191	153	127	109	96
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
M	E 8 - 9	1.50	0.25	80	n (rev/min)	1222	815	611	489	407	306	244	204	175	153
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
	E 10 - 11	1.50	0.25	60	n (rev/min)	917	611	458	367	306	229	183	153	131	115
					f <sub>z</sub> (in)	0.0009	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056	0.0066	0.0075
					v <sub>f</sub> (in/min)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
K	E 12 - 13	1.50	0.25	95	n (rev/min)	1452	968	726	581	484	363	290	242	207	181
					f <sub>z</sub> (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	0.0113
					v <sub>f</sub> (in/min)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
	E 14 - 15	1.50	0.25	65	n (rev/min)	993	662	497	397	331	248	199	166	142	124
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
N	E 18	1.50	0.25	350	n (rev/min)	5348	3565	2674	2139	1783	1337	1070	891	764	669
					f <sub>z</sub> (in)	0.0016	0.0023	0.0031	0.0039	0.0047	0.0063	0.0078	0.0094	0.0109	0.0125
					v <sub>f</sub> (in/min)	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
S	E 20	1.50	0.25	10	n (rev/min)	153	102	76	61	51	38	31	25	22	19
					f <sub>z</sub> (in)	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0044	0.0050
					v <sub>f</sub> (in/min)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	E 21	1.50	0.25	12	n (rev/min)	183	122	92	73	61	46	37	31	26	23
					f <sub>z</sub> (in)	0.0008	0.0012	0.0016	0.0020	0.0023	0.0031	0.0039	0.0047	0.0055	0.0063
					v <sub>f</sub> (in/min)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	E 22	1.50	0.25	60	n (rev/min)	917	611	458	367	306	229	183	153	131	115
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## EX350 - START VALUES

SLOTTING														
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 2				Z <sub>n</sub> = 5	Z <sub>n</sub> = 6		
							3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	
M	E 8 - 9	1.00	1.00	80	-	90	n (rev/min)	815	611	489	407	306	244	204
							f <sub>z</sub> (in)	0.0011	0.0015	0.0019	0.0023	0.0030	0.0038	0.0045
				v <sub>f</sub> (in/min)	3.7	3.7	3.7	3.7	4.6	5.5	5.5			
	E 10 - 11	1.00	1.00	60	-	70	n (rev/min)	611	458	367	306	229	183	153
							f <sub>z</sub> (in)	0.0011	0.0015	0.0019	0.0023	0.0030	0.0038	0.0045
				v <sub>f</sub> (in/min)	2.8	2.8	2.8	2.8	3.4	4.1	4.1			
S	E 20	1.00	1.00	8	-	10	n (rev/min)	81	61	49	41	31	24	20
							f <sub>z</sub> (in)	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0023
				v <sub>f</sub> (in/min)	0.2	0.2	0.2	0.2	0.2	0.3	0.3			
	E 21	1.00	1.00	8	-	10	n (rev/min)	81	61	49	41	31	24	20
							f <sub>z</sub> (in)	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038
				v <sub>f</sub> (in/min)	0.3	0.3	0.3	0.3	0.4	0.5	0.5			
	E 22	1.00	1.00	40	-	50	n (rev/min)	407	306	244	204	153	122	102
							f <sub>z</sub> (in)	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053
				v <sub>f</sub> (in/min)	2.1	2.1	2.1	2.1	2.7	3.2	3.2			

## EX350 - START VALUES

SLOTTING												
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 8					
							2	2				
M	E 8 - 9	0.50	1.00	80	-	90	n (rev/min)	153				
							f <sub>z</sub> (in)	0.0060				
				v <sub>f</sub> (in/min)	7.3							
	E 10 - 11	0.50	1.00	60	-	70	n (rev/min)	115				
							f <sub>z</sub> (in)	0.0060				
				v <sub>f</sub> (in/min)	5.5							
S	E 20	0.50	1.00	8	-	10	n (rev/min)	15				
							f <sub>z</sub> (in)	0.0030				
				v <sub>f</sub> (in/min)	0.4							
	E 21	0.50	1.00	8	-	10	n (rev/min)	15				
							f <sub>z</sub> (in)	0.0050				
				v <sub>f</sub> (in/min)	0.6							
	E 22	0.50	1.00	40	-	50	n (rev/min)	76				
							f <sub>z</sub> (in)	0.0070				
				v <sub>f</sub> (in/min)	4.3							

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## EX350 - START VALUES

### SIDE MILLING - ROUGHING

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 4				Z <sub>n</sub> = 5	Z <sub>n</sub> = 6			
							3/8	1/2	5/8	3/4	1	1 1/4	1 1/2		
M	E 8 - 9	1.50	0.25	96	86	-	106	n (rev/min)	978	733	587	489	367	293	244
								f <sub>z</sub> (in)	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056
								v <sub>f</sub> (in/min)	5.5	5.5	5.5	5.5	6.9	8.3	8.3
	E 10 - 11	1.50	0.25	72	62	-	82	n (rev/min)	733	550	440	367	275	220	183
								f <sub>z</sub> (in)	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056
								v <sub>f</sub> (in/min)	4.1	4.1	4.1	4.1	5.2	6.2	6.2
S	E 20	1.50	0.25	10	8	-	12	n (rev/min)	98	73	59	49	37	29	24
								f <sub>z</sub> (in)	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0028
								v <sub>f</sub> (in/min)	0.3	0.3	0.3	0.3	0.3	0.4	0.4
	E 21	1.50	0.25	10	8	-	12	n (rev/min)	98	73	59	49	37	29	24
								f <sub>z</sub> (in)	0.0012	0.0016	0.0020	0.0023	0.0031	0.0039	0.0047
								v <sub>f</sub> (in/min)	0.5	0.5	0.5	0.5	0.6	0.7	0.7
E 22	1.50	0.25	48	38	-	58	n (rev/min)	489	367	293	244	183	147	122	
							f <sub>z</sub> (in)	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	
							v <sub>f</sub> (in/min)	3.2	3.2	3.2	3.2	4.0	4.8	4.8	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE COBALT END MILLS

## SPC408 / SPB540 - START VALUES

		SLOTTING														
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4										
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2	
P	E 1 - 2	1.00	1.00	110	n (rev/min)	1681	1121	840	672	560	420	336	280	240	210	
					f <sub>z</sub> (in)	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0079	0.0090	
	E 3 - 4	1.00	1.00	50	v <sub>f</sub> (in/min)	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
					n (rev/min)	764	509	382	306	255	191	153	127	109	96	
	E 5 - 6	1.00	1.00	35	f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070	
					v <sub>f</sub> (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
E 8 - 9	1.00	1.00	50	n (rev/min)	764	509	382	306	255	191	153	127	109	96		
				f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070		
E 10 - 11	1.00	1.00	40	v <sub>f</sub> (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	
				n (rev/min)	611	407	306	244	204	153	122	102	87	76		
E 12 - 13	1.00	1.00	50	f <sub>z</sub> (in)	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	0.0038	0.0045	0.0053	0.0060		
				v <sub>f</sub> (in/min)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
E 14 - 15	1.00	1.00	40	n (rev/min)	764	509	382	306	255	191	153	127	109	96		
				f <sub>z</sub> (in)	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0079	0.0090		
E 18	1.00	1.00	240	v <sub>f</sub> (in/min)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	
				n (rev/min)	611	407	306	244	204	153	122	102	87	76		
E 20	1.00	1.00	8	f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070		
				v <sub>f</sub> (in/min)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
E 21	1.00	1.00	8	n (rev/min)	3667	2445	1834	1467	1222	917	733	611	524	458		
				f <sub>z</sub> (in)	0.0013	0.0019	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0088	0.0100		
E 22	1.00	1.00	40	v <sub>f</sub> (in/min)	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	
				n (rev/min)	122	81	61	49	41	31	24	20	17	15		
E 20	1.00	1.00	8	f <sub>z</sub> (in)	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0023	0.0026	0.0030		
				v <sub>f</sub> (in/min)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
E 21	1.00	1.00	8	n (rev/min)	122	81	61	49	41	31	24	20	17	15		
				f <sub>z</sub> (in)	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0044	0.0050		
E 22	1.00	1.00	40	v <sub>f</sub> (in/min)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
				n (rev/min)	611	407	306	244	204	153	122	102	87	76		
E 20	1.00	1.00	8	f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070		
				v <sub>f</sub> (in/min)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE COBALT END MILLS

## SPC408 / SPB540 - START VALUES

### SIDE MILLING - ROUGHING

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4										
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2	
P	E 1 - 2	1.50	0.25	160	n (rev/min)	2445	1630	1222	978	815	611	489	407	349	306	
					f <sub>z</sub> (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	0.0113	
	E 3 - 4	1.50	0.25	80	v <sub>f</sub> (in/min)	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
					n (rev/min)	1222	815	611	489	407	306	244	204	175	153	
	E 5 - 6	1.50	0.25	50	f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088	
					v <sub>f</sub> (in/min)	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
M	E 8 - 9	1.50	0.25	80	n (rev/min)	1222	815	611	489	407	306	244	204	175	153	
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088	
	E 10 - 11	1.50	0.25	60	v <sub>f</sub> (in/min)	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	
					n (rev/min)	917	611	458	367	306	229	183	153	131	115	
	E 12 - 13	1.50	0.25	95	f <sub>z</sub> (in)	0.0009	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056	0.0066	0.0075	
					v <sub>f</sub> (in/min)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
K	E 14 - 15	1.50	0.25	65	n (rev/min)	1452	968	726	581	484	363	290	242	207	181	
					f <sub>z</sub> (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	0.0113	
	E 16 - 17	1.50	0.25	75	v <sub>f</sub> (in/min)	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	
					n (rev/min)	993	662	497	397	331	248	199	166	142	124	
E 18 - 19	1.50	0.25	45	f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088		
				v <sub>f</sub> (in/min)	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	
N	E 20	1.50	0.25	350	n (rev/min)	5348	3565	2674	2139	1783	1337	1070	891	764	669	
					f <sub>z</sub> (in)	0.0016	0.0023	0.0031	0.0039	0.0047	0.0063	0.0078	0.0094	0.0109	0.0125	
S	E 21	1.50	0.25	10	v <sub>f</sub> (in/min)	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	
					n (rev/min)	153	102	76	61	51	38	31	25	22	19	
	E 22	1.50	0.25	8	f <sub>z</sub> (in)	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0044	0.0050	
					v <sub>f</sub> (in/min)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	E 23	1.50	0.25	12	n (rev/min)	183	122	92	73	61	46	37	31	26	23	
					f <sub>z</sub> (in)	0.0008	0.0012	0.0016	0.0020	0.0023	0.0031	0.0039	0.0047	0.0055	0.0063	
E 24	1.50	0.25	60	v <sub>f</sub> (in/min)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		
				n (rev/min)	917	611	458	367	306	229	183	153	131	115		
E 25	1.50	0.25	40	f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088		
				v <sub>f</sub> (in/min)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## SPC408 / SPB540 - START VALUES

SIDE MILLING - ROUGHING															
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 6									
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2
P	E 1 - 2	1.50	0.25	160	n (rev/min)	2445	1630	1222	978	815	611	489	407	349	306
					f <sub>z</sub> (mm)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	0.0113
					v <sub>f</sub> (m/min)	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6
	E 3 - 4	1.50	0.25	80	n (rev/min)	1222	815	611	489	407	306	244	204	175	153
					f <sub>z</sub> (mm)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (m/min)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
E 5 - 6	1.50	0.25	50	n (rev/min)	764	509	382	306	255	191	153	127	109	96	
				f <sub>z</sub> (mm)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088	
				v <sub>f</sub> (m/min)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
M	E 8 - 9	1.50	0.25	80	n (rev/min)	1222	815	611	489	407	306	244	204	175	153
					f <sub>z</sub> (mm)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (m/min)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
	E 10 - 11	1.50	0.25	60	n (rev/min)	917	611	458	367	306	229	183	153	131	115
					f <sub>z</sub> (mm)	0.0009	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056	0.0066	0.0075
					v <sub>f</sub> (m/min)	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
K	E 12 - 13	1.50	0.25	95	n (rev/min)	1452	968	726	581	484	363	290	242	207	181
					f <sub>z</sub> (mm)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	0.0113
					v <sub>f</sub> (m/min)	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2
	E 14 - 15	1.50	0.25	65	n (rev/min)	993	662	497	397	331	248	199	166	142	124
					f <sub>z</sub> (mm)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (m/min)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
N	E 18	1.50	0.25	350	n (rev/min)	5348	3565	2674	2139	1783	1337	1070	891	764	669
					f <sub>z</sub> (mm)	0.0016	0.0023	0.0031	0.0039	0.0047	0.0063	0.0078	0.0094	0.0109	0.0125
S	E 20	1.50	0.25	10	n (rev/min)	153	102	76	61	51	38	31	25	22	19
					f <sub>z</sub> (mm)	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0044	0.0050
					v <sub>f</sub> (m/min)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	E 21	1.50	0.25	12	n (rev/min)	183	122	92	73	61	46	37	31	26	23
					f <sub>z</sub> (mm)	0.0008	0.0012	0.0016	0.0020	0.0023	0.0031	0.0039	0.0047	0.0055	0.0063
	E 22	1.50	0.25	60	n (rev/min)	917	611	458	367	306	229	183	153	131	115
f <sub>z</sub> (mm)					0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088	
v <sub>f</sub> (m/min)					6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



# CUTTING DATA - GENERAL PURPOSE COBALT END MILLS

## SMM845 - START VALUES

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (m / min)		SLOTTING											
						Z <sub>n</sub> = 4											
						3	4	5	6	8	10	12	14	16	18	20	
P	E 1-2	1.00	1.00	110	n (min-1)	3558	2668	2135	1779	1334	1067	889	762	667	593	534	
					fz (in)	.0005	.0007	.0009	.0011	.0014	.0018	.0021	.0025	.0028	.0032	.0035	
	E 3-4	1.00	1.00	50	80 - 140	vf (in/min)	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
					n (min-1)	1617	1213	970	809	606	485	404	347	303	270	243	
	E 5-6	1.00	1.00	35	fz (in)	.0004	.0006	.0007	.0008	.0011	.0014	.0017	.0019	.0022	.0025	.0028	
					40 - 60	vf (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
M	E 8-9	1.00	1.00	50	n (min-1)	1617	1213	970	809	606	485	404	347	303	270	243	
					fz (in)	.0004	.0006	.0007	.0008	.0011	.0014	.0017	.0019	.0022	.0025	.0028	
	E 10-11	1.00	1.00	40	40 - 60	vf (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	
					n (min-1)	1294	970	776	647	485	388	323	277	243	216	194	
	E 12-13	1.00	1.00	50	fz (in)	.0004	.0005	.0006	.0007	.0009	.0012	.0014	.0017	.0019	.0021	.0024	
					30 - 50	vf (in/min)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
E 14-15	1.00	1.00	40	n (min-1)	1617	1213	970	809	606	485	404	347	303	270	243		
				fz (in)	.0005	.0007	.0009	.0011	.0014	.0018	.0021	.0025	.0028	.0032	.0035		
E 18	1.00	1.00	240	40 - 60	vf (in/min)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	
				n (min-1)	1294	970	776	647	485	388	323	277	243	216	194		
S	E 20	1.00	1.00	5	fz (in)	.0004	.0006	.0007	.0008	.0011	.0014	.0017	.0019	.0022	.0025	.0028	
					5 - 10	vf (in/min)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
	E 21	1.00	1.00	5	n (min-1)	7762	5822	4657	3881	2911	2329	1941	1663	1455	1294	1164	
					fz (in)	.0006	.0008	.0010	.0012	.0016	.0020	.0024	.0028	.0031	.0035	.0039	
	E 22	1.00	1.00	40	200 - 280	vf (in/min)	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3
					n (min-1)	162	121	97	81	61	49	40	35	30	27	24	
fz (in)	.0002	.0002	.0003	.0004	.0005	.0006	.0007	.0008	.0009	.0011	.0012						
5 - 10	vf (in/min)	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1						

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE COBALT END MILLS



## SMM845 - START VALUES

		SIDE MILLING - ROUGHING														
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (m / min)		Z <sub>n</sub> = 4										
						3	4	5	6	8	10	12	14	16	18	20
P	E 1 - 2	1.50	0.25	160	n (min-1)	5175	3881	3105	2587	1941	1552	1294	1109	970	862	776
					fz (in)	.0007	.0009	.0011	.0013	.0018	.0022	.0026	.0031	.0035	.0040	.0044
				120 - 200	vf (in/min)	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7
	E 3 - 4	1.50	0.25	80	n (min-1)	2587	1941	1552	1294	970	776	647	554	485	431	388
					fz (in)	.0005	.0007	.0009	.0010	.0014	.0017	.0021	.0024	.0028	.0031	.0035
				60 - 100	vf (in/min)	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
E 5 - 6	1.50	0.25	50	n (min-1)	1617	1213	970	809	606	485	404	347	303	270	243	
				fz (in)	.0005	.0007	.0009	.0010	.0014	.0017	.0021	.0024	.0028	.0031	.0035	
			30 - 70	vf (in/min)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
M	E 8 - 9	1.50	0.25	80	n (min-1)	2587	1941	1552	1294	970	776	647	554	485	431	388
					fz (in)	.0005	.0007	.0009	.0010	.0014	.0017	.0021	.0024	.0028	.0031	.0035
	E 10 - 11	1.50	0.25	60	n (min-1)	1941	1455	1164	970	728	582	485	416	364	323	291
					fz (in)	.0004	.0006	.0007	.0009	.0012	.0015	.0018	.0021	.0024	.0027	.0030
K	E 12 - 13	1.50	0.25	95	n (min-1)	3073	2304	1844	1536	1152	922	768	658	576	512	461
					fz (in)	.0007	.0009	.0011	.0013	.0018	.0022	.0026	.0031	.0035	.0040	.0044
	E 14 - 15	1.50	0.25	65	n (min-1)	2102	1577	1261	1051	788	631	526	450	394	350	315
					fz (in)	.0005	.0007	.0009	.0010	.0014	.0017	.0021	.0024	.0028	.0031	.0035
N	E 18	1.50	0.25	350	n (min-1)	11320	8490	6792	5660	4245	3396	2830	2426	2122	1887	1698
					fz (in)	.0007	.0010	.0012	.0015	.0020	.0025	.0030	.0035	.0040	.0045	.0050
S	E 20	1.50	0.25	10	n (min-1)	323	243	194	162	121	97	81	69	61	54	49
					fz (in)	.0003	.0004	.0005	.0006	.0008	.0010	.0012	.0014	.0016	.0018	.0020
				5 - 15	vf (in/min)	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
	E 21	1.50	0.25	15	n (min-1)	485	364	291	243	182	146	121	104	91	81	73
					fz (in)	.0004	.0005	.0006	.0007	.0010	.0012	.0015	.0017	.0020	.0022	.0024
	E 22	1.50	0.25	60	n (min-1)	1941	1455	1164	970	728	582	485	416	364	323	291
fz (in)					.0005	.0007	.0009	.0010	.0014	.0017	.0021	.0024	.0028	.0031	.0035	
40 - 80				vf (in/min)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

fz [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 vf [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## RTM713 - START VALUES

SLOTTING												
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3						
						1/4	3/8	1/2	5/8	3/4	1	1 1/4
P	E 1 - 2	1.00	1.00	132	n (rev/min)	2017	1345	1008	807	672	504	403
					f <sub>z</sub> (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070
				102 - 162	v <sub>f</sub> (in/min)	8.5	8.5	8.5	8.5	8.5	8.5	8.5
	E 3 - 4	1.00	1.00	60	n (rev/min)	917	611	458	367	306	229	183
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055
				50 - 70	v <sub>f</sub> (in/min)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
K	E 12 - 13	1.00	1.00	60	n (rev/min)	917	611	458	367	306	229	183
					f <sub>z</sub> (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070
				50 - 70	v <sub>f</sub> (in/min)	3.9	3.9	3.9	3.9	3.9	3.9	3.9
N	E 18	1.00	1.00	288	n (rev/min)	4401	2934	2200	1760	1467	1100	880
					f <sub>z</sub> (in)	0.0016	0.0023	0.0031	0.0039	0.0047	0.0063	0.0078
				248 - 328	v <sub>f</sub> (in/min)	20.6	20.6	20.6	20.6	20.6	20.6	20.6

SIDE MILLING - ROUGHING												
P	E 1 - 2	1.50	0.25	192	n (rev/min)	2934	1956	1467	1174	978	733	587
					f <sub>z</sub> (in)	0.0018	0.0026	0.0035	0.0044	0.0053	0.0070	0.0088
				152 - 232	v <sub>f</sub> (in/min)	15.5	15.5	15.5	15.5	15.5	15.5	15.5
	E 3 - 4	1.50	0.25	96	n (rev/min)	1467	978	733	587	489	367	293
					f <sub>z</sub> (in)	0.0014	0.0021	0.0027	0.0034	0.0041	0.0055	0.0068
				76 - 116	v <sub>f</sub> (in/min)	6.0	6.0	6.0	6.0	6.0	6.0	6.0
K	E 12 - 13	1.50	0.25	114	n (rev/min)	1742	1161	871	697	581	435	348
					f <sub>z</sub> (in)	0.0018	0.0026	0.0035	0.0044	0.0053	0.0070	0.0088
				94 - 134	v <sub>f</sub> (in/min)	9.2	9.2	9.2	9.2	9.2	9.2	9.2
N	E 18	1.50	0.25	420	n (rev/min)	6418	4278	3209	2567	2139	1604	1284
					f <sub>z</sub> (in)	0.0020	0.0029	0.0039	0.0049	0.0059	0.0078	0.0098
				370 - 470	v <sub>f</sub> (in/min)	37.6	37.6	37.6	37.6	37.6	37.6	37.6

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## RHC752 - START VALUES

SLOTTING															
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3									
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2
N	E 16	1.00	1.00	600	n (rev/min)	9168	6112	4584	3667	3056	2292	1834	1528	1310	1146
					f <sub>z</sub> (in)	0.0031	0.0047	0.0063	0.0078	0.0094	0.0125	0.0156	0.0188	0.0219	0.0250
					v <sub>f</sub> (in/min)	86.0	86.0	86.0	85.9	86.0	86.0	86.0	86.0	86.0	86.0
	E 17	1.00	1.00	600	n (rev/min)	9168	6112	4584	3667	3056	2292	1834	1528	1310	1146
					f <sub>z</sub> (in)	0.0031	0.0047	0.0063	0.0078	0.0094	0.0125	0.0156	0.0188	0.0219	0.0250
					v <sub>f</sub> (in/min)	86.0	86.0	86.0	85.9	86.0	86.0	86.0	86.0	86.0	86.0

SIDE MILLING - ROUGHING															
N	E 16	1.50	0.25	900	n (rev/min)	13752	9168	6876	5501	4584	3438	2750	2292	1965	1719
					f <sub>z</sub> (in)	0.0039	0.0059	0.0078	0.0098	0.0117	0.0156	0.0195	0.0234	0.0273	0.0313
					v <sub>f</sub> (in/min)	161.2	161.2	161.2	161.2	161.2	161.2	161.1	161.2	161.2	161.2
	E 17	1.50	0.25	900	n (rev/min)	13752	9168	6876	5501	4584	3438	2750	2292	1965	1719
					f <sub>z</sub> (in)	0.0039	0.0059	0.0078	0.0098	0.0117	0.0156	0.0195	0.0234	0.0273	0.0313
					v <sub>f</sub> (in/min)	161.2	161.2	161.2	161.2	161.2	161.2	161.1	161.2	161.2	161.2

## RHLC754 - START VALUES

SLOTTING															
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3									
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2
N	E 16	1.00	1.00	500	n (rev/min)	7640	5093	3820	3056	2547	1910	1528	1273	1091	955
					f <sub>z</sub> (in)	0.0025	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125	0.0150	0.0175	0.0200
					v <sub>f</sub> (in/min)	57.3	57.3	57.3	57.3	57.3	57.3	57.3	57.3	57.3	57.3
	E 17	1.00	1.00	500	n (rev/min)	7640	5093	3820	3056	2547	1910	1528	1273	1091	955
					f <sub>z</sub> (in)	0.0025	0.0038	0.0050	0.0063	0.0075	0.0100	0.0125	0.0150	0.0175	0.0200
					v <sub>f</sub> (in/min)	57.3	57.3	57.3	57.3	57.3	57.3	57.3	57.3	57.3	57.3

SIDE MILLING - ROUGHING															
N	E 16	1.50	0.25	750	n (rev/min)	11460	7640	5730	4584	3820	2865	2292	1910	1637	1433
					f <sub>z</sub> (in)	0.0031	0.0047	0.0063	0.0078	0.0094	0.0125	0.0156	0.0188	0.0219	0.0250
					v <sub>f</sub> (in/min)	107.4	107.4	107.4	107.4	107.4	107.4	107.4	107.4	107.4	107.4
	E 17	1.50	0.25	750	n (rev/min)	11460	7640	5730	4584	3820	2865	2292	1910	1637	1433
					f <sub>z</sub> (in)	0.0031	0.0047	0.0063	0.0078	0.0094	0.0125	0.0156	0.0188	0.0219	0.0250
					v <sub>f</sub> (in/min)	107.4	107.4	107.4	107.4	107.4	107.4	107.4	107.4	107.4	107.4

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE COBALT END MILLS

## RTM447 - START VALUES

SLOTTING												
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3						
						1/4	3/8	1/2	5/8	3/4	1	1 1/4
P	E 5 - 6	1.00	1.00	42	n (rev/min)	642	428	321	257	214	160	128
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055
					v <sub>f</sub> (in/min)	2.1	2.1	2.1	2.1	2.1	2.1	2.1
M	E 8 - 9	1.00	1.00	60	n (rev/min)	917	611	458	367	306	229	183
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055
					v <sub>f</sub> (in/min)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	E 10 - 11	1.00	1.00	48	n (rev/min)	733	489	367	293	244	183	147
					f <sub>z</sub> (in)	0.0009	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047
					v <sub>f</sub> (in/min)	2.1	2.1	2.1	2.1	2.1	2.1	2.1
K	E 14 - 15	1.00	1.00	48	n (rev/min)	733	489	367	293	244	183	147
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055
					v <sub>f</sub> (in/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4
S	E 20	1.00	1.00	9.6	n (rev/min)	147	98	73	59	49	37	29
					f <sub>z</sub> (in)	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023
					v <sub>f</sub> (in/min)	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	E 21	1.00	1.00	9.6	n (rev/min)	147	98	73	59	49	37	29
					f <sub>z</sub> (in)	0.0008	0.0012	0.0016	0.0020	0.0023	0.0031	0.0039
					v <sub>f</sub> (in/min)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	E 22	1.00	1.00	48	n (rev/min)	733	489	367	293	244	183	147
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055
					v <sub>f</sub> (in/min)	2.4	2.4	2.4	2.4	2.4	2.4	2.4

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## RTM447 - START VALUES

SIDE MILLING - ROUGHING												
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 3						
						1/4	3/8	1/2	5/8	3/4	1	1 1/4
P	E 5 - 6	1.50	0.25	63	n (rev/min)	955	637	478	382	318	239	191
					f <sub>z</sub> (in)	0.0014	0.0021	0.0027	0.0034	0.0041	0.0055	0.0068
					v <sub>f</sub> (in/min)	3.9	3.9	3.9	3.9	3.9	3.9	3.9
M	E 8 - 9	1.50	0.25	96	n (rev/min)	1467	978	733	587	489	367	293
					f <sub>z</sub> (in)	0.0014	0.0018	0.0023	0.0029	0.0035	0.0047	0.0059
					v <sub>f</sub> (in/min)	6.0	5.2	5.2	5.2	5.2	5.2	5.2
	E 10 - 11	1.50	0.25	72	n (rev/min)	1100	733	550	440	367	275	220
					f <sub>z</sub> (in)	0.0012	0.0018	0.0023	0.0029	0.0035	0.0047	0.0059
					v <sub>f</sub> (in/min)	3.9	3.9	3.9	3.9	3.9	3.9	3.9
K	E 14 - 15	1.50	0.25	78	n (rev/min)	1192	795	596	477	397	298	238
					f <sub>z</sub> (in)	0.0014	0.0021	0.0027	0.0034	0.0041	0.0055	0.0068
					v <sub>f</sub> (in/min)	4.9	4.9	4.9	4.9	4.9	4.9	4.9
S	E 20	1.50	0.25	12	n (rev/min)	183	122	92	73	61	46	37
					f <sub>z</sub> (in)	0.0006	0.0009	0.0012	0.0015	0.0018	0.0023	0.0029
					v <sub>f</sub> (in/min)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	E 21	1.50	0.25	14	n (rev/min)	220	147	110	88	73	55	44
					f <sub>z</sub> (in)	0.0010	0.0015	0.0020	0.0024	0.0029	0.0039	0.0049
					v <sub>f</sub> (in/min)	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	E 22	1.50	0.25	72	n (rev/min)	1100	733	550	440	367	275	220
					f <sub>z</sub> (in)	0.0014	0.0021	0.0027	0.0034	0.0041	0.0055	0.0068
					v <sub>f</sub> (in/min)	4.5	4.5	4.5	4.5	4.5	4.5	4.5

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE COBALT END MILLS

## REM710 / REC700 / RMB700 - START VALUES

SLOTTING															
ISO GROUP	SMG	$a_p \times D_c$ (max)	$a_e \times D_c$ (max)	$v_c$ (sf / min)		$Z_n = 4$					$Z_n = 5$		$Z_n = 6$		
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	
P	E 1 - 2	1.00	1.00	132	n (rev/min)	2017	1345	1008	807	672	504	403	336	288	
					$f_z$ (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	
					$v_f$ (in/min)	11.3	11.3	11.3	11.3	11.3	14.2	17.0	17.0	17.0	
	E 3 - 4	1.00	1.00	60	n (rev/min)	917	611	458	367	306	229	183	153	131	
					$f_z$ (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	
					$v_f$ (in/min)	4.0	4.0	4.0	4.0	4.0	5.0	6.0	6.0	6.0	
K	E 12 - 13	1.00	1.00	60	n (rev/min)	917	611	458	367	306	229	183	153	131	
					$f_z$ (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	
					$v_f$ (in/min)	5.2	5.2	5.2	5.2	5.2	6.4	7.7	7.7	7.7	
N	E 18	1.00	1.00	288	n (rev/min)	4401	2934	2200	1760	1467	1100	880	733	629	
					$f_z$ (in)	0.0016	0.0023	0.0031	0.0039	0.0047	0.0063	0.0078	0.0094	0.0109	
					$v_f$ (in/min)	27.5	27.5	27.5	27.5	27.5	34.4	41.3	41.3	41.3	

## REM710 / REC700 / RMB700 - START VALUES

SLOTTING														
ISO GROUP	SMG	$a_p \times D_c$ (max)	$a_e \times D_c$ (max)	$v_c$ (sf / min)		$Z_n = 8$			$Z_n = 10$					
						2	2 1/2	3						
P	E 1 - 2	0.50	1.00	132	n (rev/min)	252	202	168						
					$f_z$ (in)	0.0113	0.0141	0.0169						
					$v_f$ (in/min)	22.7	22.7	28.4						
	E 3 - 4	0.50	1.00	60	n (rev/min)	115	92	76						
					$f_z$ (in)	0.0088	0.0109	0.0131						
					$v_f$ (in/min)	8.0	8.0	10.0						
K	E 12 - 13	0.50	1.00	60	n (rev/min)	115	92	76						
					$f_z$ (in)	0.0113	0.0141	0.0169						
					$v_f$ (in/min)	10.3	10.3	12.9						
N	E 18	0.50	1.00	288	n (rev/min)	550	440	367						
					$f_z$ (in)	0.0125	0.0156	0.0188						
					$v_f$ (in/min)	55.0	55.0	68.8						

SMG = Seco Material Group  
 n [min-1] = RPM  
 $v_c$  (sf/min) = Surface feet/min

$f_z$  [in] = Feed/tooth  
 $a_p/D_c$  = % of diameter  
 $v_f$  [in/min] = Feed rate  
 $a_e/D_c$  = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## REM710 / REC700 / RMB700 - START VALUES

### SIDE MILLING - ROUGHING

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub>												
						Z <sub>n</sub> = 4					Z <sub>n</sub> = 5		Z <sub>n</sub> = 6			Z <sub>n</sub> = 8		Z <sub>n</sub> = 10
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/2	3	
P	E 1 - 2	1.50	0.25	192	n (rev/min)	2934	1956	1467	1174	978	733	587	489	419	367	293	244	
					f <sub>z</sub> (in)	0.0018	0.0026	0.0035	0.0044	0.0053	0.0070	0.0088	0.0105	0.0123	0.0141	0.0176	0.0211	
				152 - 232	v <sub>f</sub> (in/min)	20.6	20.6	20.6	20.6	20.6	25.8	30.9	30.9	30.9	41.3	41.3	51.6	
	E 3 - 4	1.50	0.25	96	n (rev/min)	1467	978	733	587	489	367	293	244	210	183	147	122	
					f <sub>z</sub> (in)	0.0014	0.0021	0.0027	0.0034	0.0041	0.0055	0.0068	0.0082	0.0096	0.0109	0.0137	0.0164	
				76 - 116	v <sub>f</sub> (in/min)	8.0	8.0	8.0	8.0	8.0	10.0	12.0	12.0	12.0	16.0	16.0	20.1	
K	E 12 - 13	1.50	0.25	114	n (rev/min)	1742	1161	871	697	581	435	348	290	249	218	174	145	
					f <sub>z</sub> (in)	0.0018	0.0026	0.0035	0.0044	0.0053	0.0070	0.0088	0.0105	0.0123	0.0141	0.0176	0.0211	
				94 - 134	v <sub>f</sub> (in/min)	12.2	12.2	12.2	12.2	12.2	15.3	18.4	18.4	18.4	24.5	24.5	30.6	
N	E 18	1.50	0.25	420	n (rev/min)	6418	4278	3209	2567	2139	1604	1284	1070	917	802	642	535	
					f <sub>z</sub> (in)	0.0020	0.0029	0.0039	0.0049	0.0059	0.0078	0.0098	0.0117	0.0137	0.0156	0.0195	0.0234	
				370 - 470	v <sub>f</sub> (in/min)	50.1	50.1	50.1	50.1	50.1	62.7	75.2	75.2	75.2	100.3	100.3	125.3	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## RXC753 - START VALUES

		SLOTTING							
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 5		Z <sub>n</sub> = 6	
						1	1 1/4	1 1/2	
P	E 1 - 2	1.00	1.00	110	n (rev/min)	420	336	280	
					f <sub>z</sub> (in)	0.0045	0.0056	0.0068	
					80 - 140	v <sub>f</sub> (in/min)	9.5	11.3	11.3
	E 3 - 4	1.00	1.00	50	n (rev/min)	191	153	127	
					f <sub>z</sub> (in)	0.0035	0.0044	0.0053	
					40 - 60	v <sub>f</sub> (in/min)	3.3	4.0	4.0
K	E 12 - 13	1.00	1.00	50	n (rev/min)	191	153	127	
					f <sub>z</sub> (in)	0.0045	0.0056	0.0068	
					40 - 60	v <sub>f</sub> (in/min)	4.3	5.2	5.2
N	E 18	1.00	1.00	240	n (rev/min)	917	733	611	
					f <sub>z</sub> (in)	0.0050	0.0063	0.0075	
					200 - 280	v <sub>f</sub> (in/min)	22.9	27.5	27.5

## RXC753 - START VALUES

		SLOTTING						
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 8		
						2		
P	E 1 - 2	0.50	1.00	110	n (rev/min)	210		
					f <sub>z</sub> (in)	0.0090		
					80 - 140	v <sub>f</sub> (in/min)	15.1	
	E 3 - 4	0.50	1.00	50	n (rev/min)	96		
					f <sub>z</sub> (in)	0.0070		
					40 - 60	v <sub>f</sub> (in/min)	5.3	
K	E 12 - 13	0.50	1.00	50	n (rev/min)	96		
					f <sub>z</sub> (in)	0.0090		
					40 - 60	v <sub>f</sub> (in/min)	6.9	
N	E 18	0.50	1.00	240	n (rev/min)	458		
					f <sub>z</sub> (in)	0.0100		
					200 - 280	v <sub>f</sub> (in/min)	36.7	

## RXC753 - START VALUES

		SIDE MILLING - ROUGHING								
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 5		Z <sub>n</sub> = 6		Z <sub>n</sub> = 8
						1	1 1/4	1 1/2	2	
P	E 1 - 2	1.50	0.25	192	n (rev/min)	733	587	489	367	
					f <sub>z</sub> (in)	0.0056	0.0070	0.0084	0.0113	
					152 - 232	v <sub>f</sub> (in/min)	20.6	24.8	24.8	33.0
	E 3 - 4	1.50	0.25	96	n (rev/min)	367	293	244	183	
					f <sub>z</sub> (in)	0.0044	0.0055	0.0066	0.0088	
					76 - 116	v <sub>f</sub> (in/min)	8.0	9.6	9.6	12.8
K	E 12 - 13	1.50	0.25	114	n (rev/min)	435	348	290	218	
					f <sub>z</sub> (in)	0.0056	0.0070	0.0084	0.0113	
					94 - 134	v <sub>f</sub> (in/min)	12.2	14.7	14.7	19.6
N	E 18	1.50	0.25	420	n (rev/min)	1604	1284	1070	802	
					f <sub>z</sub> (in)	0.0063	0.0078	0.0094	0.0125	
					370 - 470	v <sub>f</sub> (in/min)	50.1	60.2	60.2	80.2

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## EXR350 - START VALUES

SLOTTING												
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4				Z <sub>n</sub> = 5	Z <sub>n</sub> = 6	
						3/8	1/2	5/8	3/4	1	1 1/4	1 1/2
M	E 8 - 9	1.00	1.00	96	n (rev/min)	978	733	587	489	367	293	244
					f <sub>z</sub> (in)	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056
					v <sub>f</sub> (in/min)	5.5	5.5	5.5	5.5	6.9	8.3	8.3
	E 10 - 11	1.00	1.00	72	n (rev/min)	733	550	440	367	275	220	183
					f <sub>z</sub> (in)	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056
					v <sub>f</sub> (in/min)	4.1	4.1	4.1	4.1	5.2	6.2	6.2
S	E 20	1.00	1.00	10	n (rev/min)	98	73	59	49	37	29	24
					f <sub>z</sub> (in)	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0028
					v <sub>f</sub> (in/min)	0.3	0.3	0.3	0.3	0.3	0.4	0.4
	E 21	1.00	1.00	10	n (rev/min)	98	73	59	49	37	29	24
					f <sub>z</sub> (in)	0.0012	0.0016	0.0020	0.0023	0.0031	0.0039	0.0047
					v <sub>f</sub> (in/min)	0.5	0.5	0.5	0.5	0.6	0.7	0.7
E 22	1.00	1.00	48	n (rev/min)	489	367	293	244	183	147	122	
				f <sub>z</sub> (in)	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	
				v <sub>f</sub> (in/min)	3.2	3.2	3.2	3.2	4.0	4.8	4.8	

## EXR350 - START VALUES

SLOTTING												
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 8						
						2						
M	E 8 - 9	0.50	1.00	96	n (rev/min)	183						
					f <sub>z</sub> (in)	0.0075						
					v <sub>f</sub> (in/min)	11.0						
	E 10 - 11	0.50	1.00	72	n (rev/min)	138						
					f <sub>z</sub> (in)	0.0075						
					v <sub>f</sub> (in/min)	8.3						
S	E 20	0.50	1.00	10	n (rev/min)	18						
					f <sub>z</sub> (in)	0.0038						
					v <sub>f</sub> (in/min)	0.6						
	E 21	0.50	1.00	10	n (rev/min)	18						
					f <sub>z</sub> (in)	0.0063						
					v <sub>f</sub> (in/min)	0.9						
E 22	0.50	1.00	48	n (rev/min)	92							
				f <sub>z</sub> (in)	0.0088							
				v <sub>f</sub> (in/min)	6.4							

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## EXR350 - START VALUES

### SIDE MILLING - ROUGHING

ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)			Z <sub>n</sub> = 4				Z <sub>n</sub> = 5	Z <sub>n</sub> = 6		Z <sub>n</sub> = 8		
							3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	2		
							n (rev/min)	f <sub>z</sub> (in)	v <sub>f</sub> (in/min)	n (rev/min)	f <sub>z</sub> (in)	v <sub>f</sub> (in/min)	n (rev/min)	f <sub>z</sub> (in)	v <sub>f</sub> (in/min)	n (rev/min)
M	E 8 - 9	1.50	0.25	115	105	-	125	n (rev/min)	1174	880	704	587	440	352	293	220
								f <sub>z</sub> (in)	0.0018	0.0023	0.0029	0.0035	0.0047	0.0059	0.0070	0.0094
								v <sub>f</sub> (in/min)	8.3	8.3	8.3	8.3	10.3	12.4	12.4	16.5
	E 10 - 11	1.50	0.25	86	76	-	96	n (rev/min)	880	660	528	440	330	264	220	165
								f <sub>z</sub> (in)	0.0018	0.0023	0.0029	0.0035	0.0047	0.0059	0.0070	0.0094
								v <sub>f</sub> (in/min)	6.2	6.2	6.2	6.2	7.7	9.3	9.3	12.4
S	E 20	1.50	0.25	12	10	-	14	n (rev/min)	122	92	73	61	46	37	31	23
								f <sub>z</sub> (in)	0.0009	0.0012	0.0015	0.0018	0.0023	0.0029	0.0035	0.0047
								v <sub>f</sub> (in/min)	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.9
	E 21	1.50	0.25	12	10	-	14	n (rev/min)	122	92	73	61	46	37	31	23
								f <sub>z</sub> (in)	0.0015	0.0020	0.0024	0.0029	0.0039	0.0049	0.0059	0.0078
								v <sub>f</sub> (in/min)	0.7	0.7	0.7	0.7	0.9	1.1	1.1	1.4
E 22	1.50	0.25	57.6	47.6	-	67.6	n (rev/min)	587	440	352	293	220	176	147	110	
							f <sub>z</sub> (in)	0.0021	0.0027	0.0034	0.0041	0.0055	0.0068	0.0082	0.0109	
							v <sub>f</sub> (in/min)	4.8	4.8	4.8	4.8	6.0	7.2	7.2	9.6	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE COBALT END MILLS

## REM445 / REC448 / RMB449 - START VALUES

		SLOTTING												
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4					Z <sub>n</sub> = 5		Z <sub>n</sub> = 6	
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4
P	E 5 - 6	1.00	1.00	42	n (rev/min)	642	428	321	257	214	160	128	107	92
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077
					v <sub>f</sub> (in/min)	2.8	2.8	2.8	2.8	2.8	3.5	4.2	4.2	4.2
M	E 8 - 9	1.00	1.00	96	n (rev/min)	1467	978	733	587	489	367	293	244	210
					f <sub>z</sub> (in)	0.0009	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056	0.0066
					v <sub>f</sub> (in/min)	5.5	5.5	5.5	5.5	5.5	6.9	8.3	8.3	8.3
	E 10 - 11	1.00	1.00	72	n (rev/min)	1100	733	550	440	367	275	220	183	157
					f <sub>z</sub> (in)	0.0009	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056	0.0066
					v <sub>f</sub> (in/min)	4.1	4.1	4.1	4.1	4.1	5.2	6.2	6.2	6.2
S	E 20	1.00	1.00	9.6	n (rev/min)	147	98	73	59	49	37	29	24	21
					f <sub>z</sub> (in)	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0028	0.0033
					v <sub>f</sub> (in/min)	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4
	E 21	1.00	1.00	9.6	n (rev/min)	147	98	73	59	49	37	29	24	21
					f <sub>z</sub> (in)	0.0008	0.0012	0.0016	0.0020	0.0023	0.0031	0.0039	0.0047	0.0055
					v <sub>f</sub> (in/min)	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7
E 22	1.00	1.00	48	n (rev/min)	733	489	367	293	244	183	147	122	105	
				f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	
				v <sub>f</sub> (in/min)	3.2	3.2	3.2	3.2	3.2	4.0	4.8	4.8	4.8	

## REM445 / REC448 / RMB449 - START VALUES

		SLOTTING										
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 8			Z <sub>n</sub> = 10			
						2	2 1/2	3				
P	E 5 - 6	0.50	1.00	42	n (rev/min)	80	64	53				
					f <sub>z</sub> (in)	0.0088	0.0109	0.0131				
					v <sub>f</sub> (in/min)	5.6	5.6	7.0				
M	E 8 - 9	0.50	1.00	96	n (rev/min)	183	147	122				
					f <sub>z</sub> (in)	0.0075	0.0094	0.0113				
					v <sub>f</sub> (in/min)	11.0	11.0	13.8				
	E 10 - 11	0.50	1.00	72	n (rev/min)	138	110	92				
					f <sub>z</sub> (in)	0.0075	0.0094	0.0113				
					v <sub>f</sub> (in/min)	8.3	8.3	10.3				
S	E 20	0.50	1.00	9.6	n (rev/min)	18	15	12				
					f <sub>z</sub> (in)	0.0038	0.0047	0.0056				
					v <sub>f</sub> (in/min)	0.6	0.6	0.7				
	E 21	0.50	1.00	9.6	n (rev/min)	18	15	12				
					f <sub>z</sub> (in)	0.0063	0.0078	0.0094				
					v <sub>f</sub> (in/min)	0.9	0.9	1.1				
E 22	0.50	1.00	48	n (rev/min)	92	73	61					
				f <sub>z</sub> (in)	0.0088	0.0109	0.0131					
				v <sub>f</sub> (in/min)	6.4	6.4	8.0					

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## REM445 / REC448 / RMB449 - START VALUES

### SIDE MILLING - ROUGHING

ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4					Z <sub>n</sub> = 5	Z <sub>n</sub> = 6			Z <sub>n</sub> = 8		Z <sub>n</sub> = 10
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/2	3
P	E 5 - 6	1.50	0.25	63	n (rev/min)	955	637	478	382	318	239	191	159	136	119	96	80
					f <sub>z</sub> (in)	0.0014	0.0021	0.0027	0.0034	0.0041	0.0055	0.0068	0.0082	0.0096	0.0109	0.0137	0.0164
					v <sub>f</sub> (in/min)	5.2	5.2	5.2	5.2	5.2	6.5	7.8	7.8	7.8	10.4	10.4	13.1
M	E 8 - 9	1.50	0.25	115	n (rev/min)	1760	1174	880	704	587	440	352	293	251	220	176	147
					f <sub>z</sub> (in)	0.0012	0.0018	0.0023	0.0029	0.0035	0.0047	0.0059	0.0070	0.0082	0.0094	0.0117	0.0141
					v <sub>f</sub> (in/min)	8.3	8.3	8.3	8.3	8.3	10.3	12.4	12.4	12.4	16.5	16.5	20.6
	E 10 - 11	1.50	0.25	86	n (rev/min)	1320	880	660	528	440	330	264	220	189	165	132	110
					f <sub>z</sub> (in)	0.0012	0.0018	0.0023	0.0029	0.0035	0.0047	0.0059	0.0070	0.0082	0.0094	0.0117	0.0141
					v <sub>f</sub> (in/min)	6.2	6.2	6.2	6.2	6.2	7.7	9.3	9.3	9.3	12.4	12.4	15.5
S	E 20	1.50	0.25	12	n (rev/min)	183	122	92	73	61	46	37	31	26	23	18	15
					f <sub>z</sub> (in)	0.0006	0.0009	0.0012	0.0015	0.0018	0.0023	0.0029	0.0035	0.0041	0.0047	0.0059	0.0070
					v <sub>f</sub> (in/min)	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.9	0.9	1.1
	E 21	1.50	0.25	14	n (rev/min)	220	147	110	88	73	55	44	37	31	28	22	18
					f <sub>z</sub> (in)	0.0010	0.0015	0.0020	0.0024	0.0029	0.0039	0.0049	0.0059	0.0068	0.0078	0.0098	0.0117
					v <sub>f</sub> (in/min)	0.9	0.9	0.9	0.9	0.9	1.1	1.3	1.3	1.3	1.7	1.7	2.1
E 22	1.50	0.25	72	n (rev/min)	1100	733	550	440	367	275	220	183	157	138	110	92	
				f <sub>z</sub> (in)	0.0014	0.0021	0.0027	0.0034	0.0041	0.0055	0.0068	0.0082	0.0096	0.0109	0.0137	0.0164	
				v <sub>f</sub> (in/min)	6.0	6.0	6.0	6.0	6.0	7.5	9.0	9.0	9.0	12.0	12.0	15.0	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## RFM440 / RFM441 - START VALUES

ISO GROUP	SMG	$a_p \times D_c$ (max)	$a_e \times D_c$ (max)	$v_c$ (sf / min)	SLOTTING										
						$Z_n = 4$					$Z_n = 5$		$Z_n = 6$		
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	
P	E 1 - 2	1.00	1.00	132	n (rev/min)	2017	1345	1008	807	672	504	403	336	288	
					$f_z$ (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	
					$v_f$ (in/min)	11.3	11.3	11.3	11.3	11.3	14.2	17.0	17.0	17.0	
	E 3 - 4	1.00	1.00	60	n (rev/min)	917	611	458	367	306	229	183	153	131	
					$f_z$ (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	
					$v_f$ (in/min)	4.0	4.0	4.0	4.0	4.0	5.0	6.0	6.0	6.0	
	E 5 - 6	1.00	1.00	42	n (rev/min)	642	428	321	257	214	160	128	107	92	
					$f_z$ (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	
					$v_f$ (in/min)	2.8	2.8	2.8	2.8	2.8	3.5	4.2	4.2	4.2	
M	E 8 - 9	1.00	1.00	96	n (rev/min)	1467	978	733	587	489	367	293	244	210	
					$f_z$ (in)	0.0009	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056	0.0066	
					$v_f$ (in/min)	5.5	5.5	5.5	5.5	5.5	6.9	8.3	8.3	8.3	
	E 10 - 11	1.00	1.00	72	n (rev/min)	1100	733	550	440	367	275	220	183	157	
					$f_z$ (in)	0.0009	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056	0.0066	
					$v_f$ (in/min)	4.1	4.1	4.1	4.1	4.1	5.2	6.2	6.2	6.2	
K	E 12 - 13	1.00	1.00	60	n (rev/min)	917	611	458	367	306	229	183	153	131	
					$f_z$ (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	
					$v_f$ (in/min)	5.2	5.2	5.2	5.2	5.2	6.4	7.7	7.7	7.7	
	E 14 - 15	1.00	1.00	48	n (rev/min)	733	489	367	293	244	183	147	122	105	
					$f_z$ (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	
					$v_f$ (in/min)	3.2	3.2	3.2	3.2	3.2	4.0	4.8	4.8	4.8	
N	E 18	1.00	1.00	288	n (rev/min)	4401	2934	2200	1760	1467	1100	880	733	629	
					$f_z$ (in)	0.0016	0.0023	0.0031	0.0039	0.0047	0.0063	0.0078	0.0094	0.0109	
					$v_f$ (in/min)	27.5	27.5	27.5	27.5	27.5	34.4	41.3	41.3	41.3	
S	E 20	1.00	1.00	10	n (rev/min)	147	98	73	59	49	37	29	24	21	
					$f_z$ (in)	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0028	0.0033	
					$v_f$ (in/min)	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	
	E 21	1.00	1.00	10	n (rev/min)	147	98	73	59	49	37	29	24	21	
					$f_z$ (in)	0.0008	0.0012	0.0016	0.0020	0.0023	0.0031	0.0039	0.0047	0.0055	
					$v_f$ (in/min)	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	
	E 22	1.00	1.00	48	n (rev/min)	733	489	367	293	244	183	147	122	105	
					$f_z$ (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	
					$v_f$ (in/min)	3.2	3.2	3.2	3.2	3.2	4.0	4.8	4.8	4.8	

SMG = Seco Material Group  
 n [min-1] = RPM  
 $v_c$  (sf/min) = Surface feet/min

$f_z$  [in] = Feed/tooth  
 $a_p/D_c$  = % of diameter  
 $v_f$  [in/min] = Feed rate  
 $a_e/D_c$  = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## RFM440 / RFM441 - START VALUES

SLOTTING								
ISO GROUP	SMG	$a_p \times D_c$ (max)	$a_e \times D_c$ (max)	$v_c$ (sf / min)			$Z_n = 8$	
							$n$ (rev/min)	$f_z$ (in)
P	E 1 - 2	0.50	1.00	132			$n$ (rev/min)	252
				122 - 142			$f_z$ (in)	0.0113
				122 - 142			$v_f$ (in/min)	22.7
	E 3 - 4	0.50	1.00	60			$n$ (rev/min)	115
				50 - 70			$f_z$ (in)	0.0088
				50 - 70			$v_f$ (in/min)	8.0
	E 5 - 6	0.50	1.00	42			$n$ (rev/min)	80
				32 - 52			$f_z$ (in)	0.0088
				32 - 52			$v_f$ (in/min)	5.6
M	E 8 - 9	0.50	1.00	96			$n$ (rev/min)	183
				86 - 106			$f_z$ (in)	0.0075
	E 10 - 11	0.50	1.00	72			$n$ (rev/min)	138
				62 - 82			$f_z$ (in)	0.0075
K	E 12 - 13	0.50	1.00	60			$n$ (rev/min)	115
				50 - 70			$f_z$ (in)	0.0113
	E 14 - 15	0.50	1.00	48			$v_f$ (in/min)	10.3
				38 - 58			$n$ (rev/min)	92
N	E 18	0.50	1.00	288			$f_z$ (in)	0.0125
				286 - 290			$v_f$ (in/min)	55.0
S	E 20	0.50	1.00	10			$n$ (rev/min)	18
				8 - 12			$f_z$ (in)	0.0038
	E 21	0.50	1.00	10			$v_f$ (in/min)	0.6
				8 - 12			$n$ (rev/min)	18
	E 22	0.50	1.00	48			$f_z$ (in)	0.0063
				38 - 58			$v_f$ (in/min)	0.9

SMG = Seco Material Group  
 $n$  [min-1] = RPM  
 $v_c$  (sf/min) = Surface feet/min

$f_z$  [in] = Feed/tooth  
 $a_p/D_c$  = % of diameter

$v_f$  [in/min] = Feed rate  
 $a_e/D_c$  = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## RFM440 / RFM441 - START VALUES

SIDE MILLING - ROUGHING															
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4				Z <sub>n</sub> = 5	Z <sub>n</sub> = 6			Z <sub>n</sub> = 8	
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2
P	E 1 - 2	1.50	0.25	192	n (rev/min)	2934	1956	1467	1174	978	733	587	489	419	367
					f <sub>z</sub> (in)	0.0018	0.0026	0.0035	0.0044	0.0053	0.0070	0.0088	0.0105	0.0123	0.0141
					v <sub>f</sub> (in/min)	20.6	20.6	20.6	20.6	20.6	25.8	30.9	30.9	30.9	41.3
	E 3 - 4	1.50	0.25	96	n (rev/min)	1467	978	733	587	489	367	293	244	210	183
					f <sub>z</sub> (in)	0.0014	0.0021	0.0027	0.0034	0.0041	0.0055	0.0068	0.0082	0.0096	0.0109
					v <sub>f</sub> (in/min)	8.0	8.0	8.0	8.0	8.0	10.0	12.0	12.0	12.0	16.0
E 5 - 6	1.50	0.25	63	n (rev/min)	955	637	478	382	318	239	191	159	136	119	
				f <sub>z</sub> (in)	0.0014	0.0021	0.0027	0.0034	0.0041	0.0055	0.0068	0.0082	0.0096	0.0109	
				v <sub>f</sub> (in/min)	5.2	5.2	5.2	5.2	5.2	6.5	7.8	7.8	7.8	10.4	
M	E 8 - 9	1.50	0.25	115	n (rev/min)	1760	1174	880	704	587	440	352	293	251	220
					f <sub>z</sub> (in)	0.0012	0.0018	0.0023	0.0029	0.0035	0.0047	0.0059	0.0070	0.0082	0.0094
					v <sub>f</sub> (in/min)	8.3	8.3	8.3	8.3	8.3	10.3	12.4	12.4	12.4	16.5
	E 10 - 11	1.50	0.25	86	n (rev/min)	1320	880	660	528	440	330	264	220	189	165
					f <sub>z</sub> (in)	0.0012	0.0018	0.0023	0.0029	0.0035	0.0047	0.0059	0.0070	0.0082	0.0094
					v <sub>f</sub> (in/min)	6.2	6.2	6.2	6.2	6.2	7.7	9.3	9.3	9.3	12.4
K	E 12 - 13	1.50	0.25	114	n (rev/min)	1742	1161	871	697	581	435	348	290	249	218
					f <sub>z</sub> (in)	0.0018	0.0026	0.0035	0.0044	0.0053	0.0070	0.0088	0.0105	0.0123	0.0141
					v <sub>f</sub> (in/min)	12.2	12.2	12.2	12.2	12.2	15.3	18.4	18.4	18.4	24.5
	E 14 - 15	1.50	0.25	78	n (rev/min)	1192	795	596	477	397	298	238	199	170	149
					f <sub>z</sub> (in)	0.0014	0.0021	0.0027	0.0034	0.0041	0.0055	0.0068	0.0082	0.0096	0.0109
					v <sub>f</sub> (in/min)	6.5	6.5	6.5	6.5	6.5	8.1	9.8	9.8	9.8	13.0
N	E 18	1.50	0.25	420	n (rev/min)	6418	4278	3209	2567	2139	1604	1284	1070	917	802
					f <sub>z</sub> (in)	0.0020	0.0029	0.0039	0.0049	0.0059	0.0078	0.0098	0.0117	0.0137	0.0156
					v <sub>f</sub> (in/min)	50.1	50.1	50.1	50.1	50.1	62.7	75.2	75.2	75.2	100.3
S	E 20	1.50	0.25	12	n (rev/min)	183	122	92	73	61	46	37	31	26	23
					f <sub>z</sub> (in)	0.0006	0.0009	0.0012	0.0015	0.0018	0.0023	0.0029	0.0035	0.0041	0.0047
					v <sub>f</sub> (in/min)	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.9
	E 21	1.50	0.25	14	n (rev/min)	220	147	110	88	73	55	44	37	31	28
					f <sub>z</sub> (in)	0.0010	0.0015	0.0020	0.0024	0.0029	0.0039	0.0049	0.0059	0.0068	0.0078
					v <sub>f</sub> (in/min)	0.9	0.9	0.9	0.9	0.9	1.1	1.3	1.3	1.3	1.7
E 22	1.50	0.25	72	n (rev/min)	1100	733	550	440	367	275	220	183	157	138	
				f <sub>z</sub> (in)	0.0014	0.0021	0.0027	0.0034	0.0041	0.0055	0.0068	0.0082	0.0096	0.0109	
				v <sub>f</sub> (in/min)	6.0	6.0	6.0	6.0	6.0	7.5	9.0	9.0	9.0	12.0	

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.



## RFCB444 - START VALUES

		SLOTTING													
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4									
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2
P	E 1 - 2	1.00	1.00	110	n (rev/min)	1681	1121	840	672	560	420	336	280	240	210
					f <sub>z</sub> (in)	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0079	0.0090
					v <sub>f</sub> (in/min)	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
	E 3 - 4	1.00	1.00	50	n (rev/min)	764	509	382	306	255	191	153	127	109	96
					f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070
					v <sub>f</sub> (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
	E 5 - 6	1.00	1.00	50	n (rev/min)	764	509	382	306	255	191	153	127	109	96
					f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070
					v <sub>f</sub> (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
M	E 8 - 9	1.00	1.00	50	n (rev/min)	764	509	382	306	255	191	153	127	109	96
					f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070
					v <sub>f</sub> (in/min)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
	E 10 - 11	1.00	1.00	40	n (rev/min)	611	407	306	244	204	153	122	102	87	76
					f <sub>z</sub> (in)	0.0008	0.0011	0.0015	0.0019	0.0023	0.0030	0.0038	0.0045	0.0053	0.0060
					v <sub>f</sub> (in/min)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
K	E 12 - 13	1.00	1.00	50	n (rev/min)	764	509	382	306	255	191	153	127	109	96
					f <sub>z</sub> (in)	0.0011	0.0017	0.0023	0.0028	0.0034	0.0045	0.0056	0.0068	0.0079	0.0090
					v <sub>f</sub> (in/min)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
	E 14 - 15	1.00	1.00	40	n (rev/min)	611	407	306	244	204	153	122	102	87	76
					f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070
					v <sub>f</sub> (in/min)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
N	E 18	1.00	1.00	240	n (rev/min)	3667	2445	1834	1467	1222	917	733	611	524	458
					f <sub>z</sub> (in)	0.0013	0.0019	0.0025	0.0031	0.0038	0.0050	0.0063	0.0075	0.0088	0.0100
					v <sub>f</sub> (in/min)	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3
S	E 20	1.00	1.00	8	n (rev/min)	122	81	61	49	41	31	24	20	17	15
					f <sub>z</sub> (in)	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0023	0.0026	0.0030
					v <sub>f</sub> (in/min)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	E 21	1.00	1.00	8	n (rev/min)	122	81	61	49	41	31	24	20	17	15
					f <sub>z</sub> (in)	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0044	0.0050
					v <sub>f</sub> (in/min)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	E 22	1.00	1.00	40	n (rev/min)	611	407	306	244	204	153	122	102	87	76
					f <sub>z</sub> (in)	0.0009	0.0013	0.0018	0.0022	0.0026	0.0035	0.0044	0.0053	0.0061	0.0070
					v <sub>f</sub> (in/min)	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## RFCB444 - START VALUES

SIDE MILLING - ROUGHING															
ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4									
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2
P	E 1 - 2	1.50	0.25	160	n (rev/min)	2445	1630	1222	978	815	611	489	407	349	306
					f <sub>z</sub> (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	0.0113
					v <sub>f</sub> (in/min)	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
	E 3 - 4	1.50	0.25	80	n (rev/min)	1222	815	611	489	407	306	244	204	175	153
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
	E 5 - 6	1.50	0.25	50	n (rev/min)	764	509	382	306	255	191	153	127	109	96
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
M	E 8 - 9	1.50	0.25	80	n (rev/min)	1222	815	611	489	407	306	244	204	175	153
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
	E 10 - 11	1.50	0.25	60	n (rev/min)	917	611	458	367	306	229	183	153	131	115
					f <sub>z</sub> (in)	0.0009	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056	0.0066	0.0075
					v <sub>f</sub> (in/min)	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
K	E 12 - 13	1.50	0.25	95	n (rev/min)	1452	968	726	581	484	363	290	242	207	181
					f <sub>z</sub> (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	0.0113
					v <sub>f</sub> (in/min)	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
	E 14 - 15	1.50	0.25	65	n (rev/min)	993	662	497	397	331	248	199	166	142	124
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
N	E 18	1.50	0.25	350	n (rev/min)	5348	3565	2674	2139	1783	1337	1070	891	764	669
					f <sub>z</sub> (in)	0.0016	0.0023	0.0031	0.0039	0.0047	0.0063	0.0078	0.0094	0.0109	0.0125
					v <sub>f</sub> (in/min)	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4	33.4
S	E 20	1.50	0.25	10	n (rev/min)	153	102	76	61	51	38	31	25	22	19
					f <sub>z</sub> (in)	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0044	0.0050
					v <sub>f</sub> (in/min)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	E 21	1.50	0.25	12	n (rev/min)	183	122	92	73	61	46	37	31	26	23
					f <sub>z</sub> (in)	0.0008	0.0012	0.0016	0.0020	0.0023	0.0031	0.0039	0.0047	0.0055	0.0063
					v <sub>f</sub> (in/min)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	E 22	1.50	0.25	60	n (rev/min)	917	611	458	367	306	229	183	153	131	115
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# CUTTING DATA - GENERAL PURPOSE COBALT END MILLS

## RFCB444 - START VALUES

### SIDE MILLING - ROUGHING

ISO GROUP	SMG	a <sub>p</sub> x Dc (max)	a <sub>e</sub> x Dc (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 6									
						1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2
P	E 1 - 2	1.50	0.25	160	n (rev/min)	2445	1630	1222	978	815	611	489	407	349	306
					f <sub>z</sub> (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	0.0113
					v <sub>f</sub> (in/min)	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6
	E 3 - 4	1.50	0.25	80	n (rev/min)	1222	815	611	489	407	306	244	204	175	153
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
	E 5 - 6	1.50	0.25	50	n (rev/min)	764	509	382	306	255	191	153	127	109	96
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
M	E 8 - 9	1.50	0.25	80	n (rev/min)	1222	815	611	489	407	306	244	204	175	153
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
	E 10 - 11	1.50	0.25	60	n (rev/min)	917	611	458	367	306	229	183	153	131	115
					f <sub>z</sub> (in)	0.0009	0.0014	0.0019	0.0023	0.0028	0.0038	0.0047	0.0056	0.0066	0.0075
					v <sub>f</sub> (in/min)	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
K	E 12 - 13	1.50	0.25	95	n (rev/min)	1452	968	726	581	484	363	290	242	207	181
					f <sub>z</sub> (in)	0.0014	0.0021	0.0028	0.0035	0.0042	0.0056	0.0070	0.0084	0.0098	0.0113
					v <sub>f</sub> (in/min)	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2
	E 14 - 15	1.50	0.25	65	n (rev/min)	993	662	497	397	331	248	199	166	142	124
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
					v <sub>f</sub> (in/min)	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
N	E 18	1.50	0.25	350	n (rev/min)	5348	3565	2674	2139	1783	1337	1070	891	764	669
					f <sub>z</sub> (in)	0.0016	0.0023	0.0031	0.0039	0.0047	0.0063	0.0078	0.0094	0.0109	0.0125
S	E 20	1.50	0.25	10	n (rev/min)	153	102	76	61	51	38	31	25	22	19
					f <sub>z</sub> (in)	0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0044	0.0050
					v <sub>f</sub> (in/min)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	E 21	1.50	0.25	12	n (rev/min)	183	122	92	73	61	46	37	31	26	23
					f <sub>z</sub> (in)	0.0008	0.0012	0.0016	0.0020	0.0023	0.0031	0.0039	0.0047	0.0055	0.0063
					v <sub>f</sub> (in/min)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	E 22	1.50	0.25	60	n (rev/min)	917	611	458	367	306	229	183	153	131	115
					f <sub>z</sub> (in)	0.0011	0.0016	0.0022	0.0027	0.0033	0.0044	0.0055	0.0066	0.0077	0.0088
				40 - 80	v <sub>f</sub> (in/min)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

SMG = Seco Material Group  
n [min-1] = RPM  
v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
a<sub>p</sub>/D<sub>c</sub> = % of diameter  
v<sub>f</sub> [in/min] = Feed rate  
a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
All cutting data are start values. All cutting data is in inch values.  
Please reference the Workpiece Material Classification chart located on page 15.

## VFP435 / VFP635 / VFP<sup>2</sup>435 / VFP<sup>2</sup>635 / VFP435SB / VFP635SB / VFP435SBR / VFP635SBR - START VALUES

SLOTTING											
ISO GROUP	SMG	a <sub>p</sub> x D <sub>c</sub> (max)	a <sub>e</sub> x D <sub>c</sub> (max)	v <sub>c</sub> (sf / min)		Z <sub>n</sub> = 4			Z <sub>n</sub> = 6		
						3/4	1	1 1/4	1 1/4	1 1/2	2
M	E 8 - 9	1.00	1.00	65	n (rev/min)	331	248	199	199	166	124
					f <sub>z</sub> (in)	0.0024	0.0032	0.0040	0.0040	0.0048	0.0064
					v <sub>f</sub> (in/min)	3.2	3.2	3.2	4.8	4.8	4.8
	E 10 - 11	1.00	1.00	40	n (rev/min)	204	153	122	122	102	76
					f <sub>z</sub> (in)	0.0024	0.0032	0.0040	0.0040	0.0048	0.0064
					v <sub>f</sub> (in/min)	2.0	2.0	2.0	2.9	2.9	2.9
S	E 22	1.00	1.00	60	n (rev/min)	306	229	183	183	153	115
					f <sub>z</sub> (in)	0.0021	0.0028	0.0035	0.0035	0.0042	0.0056
					v <sub>f</sub> (in/min)	2.6	2.6	2.6	3.9	3.9	3.9

SIDE MILLING - ROUGHING											
M	E 8 - 9	1.50	0.25	78	n (rev/min)	397	298	238	238	199	149
					f <sub>z</sub> (in)	0.0030	0.0040	0.0050	0.0050	0.0060	0.0080
					v <sub>f</sub> (in/min)	4.8	4.8	4.8	7.2	7.2	7.2
	E 10 - 11	1.50	0.25	48	n (rev/min)	244	183	147	147	122	92
					f <sub>z</sub> (in)	0.0030	0.0040	0.0050	0.0050	0.0060	0.0080
					v <sub>f</sub> (in/min)	2.9	2.9	2.9	4.4	4.4	4.4
S	E 22	1.50	0.25	72	n (rev/min)	367	275	220	220	183	138
					f <sub>z</sub> (in)	0.0026	0.0035	0.0044	0.0044	0.0053	0.0070
					v <sub>f</sub> (in/min)	3.9	3.9	3.9	5.8	5.8	5.8

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>e</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

# UN THREADMILLS-NTM100UN

SOLID CARBIDE



- Helical flutes for internal and external threading
- Ideal for flat bottom holes
- Large diameter applications where torque and horsepower requirements for taps are not available
- Suitable for use in most materials
- Cutting Data - Page 296-297
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	THREAD SIZE	THREADS PER INCH	CUTTER DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	CUTTING TEETH	COATING	DRILL SIZE 50%	DRILL SIZE 75%
N68794	NTM100-5/8X18UN-.500	5/8	18	0.470	1/2	1.2500	4	4	ALCRN	19/32	37/64
N68796	NTM100-3/4X10UN-.500	3/4	10	0.495	1/2	1.2500	4	4	ALCRN	11/16	21/32
N68798	NTM100-3/4X12UN-.500	3/4	12	0.495	1/2	1.2500	4	4	ALCRN	11/16	43/64
N68800	NTM100-3/4X16UN-.500	3/4	16	0.495	1/2	1.2500	4	4	ALCRN	45/64	11/16
N68802	NTM100-3/4X20UN-.500	3/4	20	0.495	1/2	1.2500	4	4	ALCRN	23/32	45/64
N68804	NTM100-7/8X9UN-.625	7/8	9	0.620	5/8	1.3750	4	4	ALCRN	51/64	49/64
N68806	NTM100-7/8X12UN-.625	7/8	12	0.620	5/8	1.3750	4	4	ALCRN	13/16	51/64
N68808	NTM100-7/8X14UN-.625	7/8	14	0.620	5/8	1.3750	4	4	ALCRN	53/64	13/16
N68810	NTM100-7/8X16UN-.625	7/8	16	0.620	5/8	1.3750	4	4	ALCRN	53/64	13/16
N68812	NTM100-7/8X20UN-.625	7/8	20	0.620	5/8	1.3750	4	4	ALCRN	27/32	53/64
N68814	NTM100-1X8UN-.625	1	8	0.620	5/8	1.3750	4	4	ALCRN	59/64	7/8
N68816	NTM100-1X12UN-.625	1	12	0.620	5/8	1.3750	4	4	ALCRN	61/64	15/16
N68818	NTM100-1X16UN-.625	1	16	0.620	5/8	1.3750	4	4	ALCRN	61/64	15/16
N68746	NTM100-NR.2X56UN-.125	2	56	0.065	1/8	.1250	2	3	ALCRN	49	50
N68748	NTM100-NR.4X40UN-.125	4	40	0.085	1/8	.1750	2	3	ALCRN	41	43
N68750	NTM100-NR.6X32UN-.125	6	32	0.100	1/8	.2180	2	3	ALCRN	32	36
N68752	NTM100-NR.8X32UN-.125	8	32	0.115	1/8	.2500	2	3	ALCRN	27	29
N68754	NTM100-NR.10X24UN-.187	10	24	0.134	3/16	.3130	2	3	ALCRN	20	25
N68756	NTM100-NR.12X28UN-.187	10	28	0.134	3/16	.3130	2	3	ALCRN	19	23
N68758	NTM100-NR.10X32UN-.187	10	32	0.134	3/16	.3130	2	3	ALCRN	18	21
N68760	NTM100-1/4X20UN-.187	1/4	20	0.180	3/16	.5000	2-1/2	3	ALCRN	7/32	7
N68762	NTM100-1/4X28UN-.187	1/4	28	0.180	3/16	.5000	2-1/2	3	ALCRN	1	3
N68764	NTM100-1/4X32UN-.187	1/4	32	0.180	3/16	.5000	2-1/2	3	ALCRN	1	7/32
N68766	NTM100-5/16X18UN-.250	5/16	18	0.235	1/4	.6250	2-1/2	3	ALCRN	J	F
N68768	NTM100-5/16X24UN-.250	5/16	24	0.235	1/4	.6250	2-1/2	3	ALCRN	9/32	I
N68770	NTM100-5/16X32UN-.250	5/16	32	0.235	1/4	.6250	2-1/2	3	ALCRN	L	9/32
N68772	NTM100-3/8X16UN-.312	3/8	16	0.285	5/16	.7500	3	3	ALCRN	Q	5/16
N68774	NTM100-3/8X24UN-.312	3/8	24	0.285	5/16	.7500	3	3	ALCRN	S	Q
N68776	NTM100-7/16X14UN-.312	7/16	14	0.305	5/16	.8750	3	3	ALCRN	25/64	U
N68778	NTM100-7/16X20UN-.312	7/16	20	0.305	5/16	.8750	3	3	ALCRN	13/32	25/64
N68780	NTM100-1/2X13UN-.375	1/2	13	0.350	3/8	.8750	3-1/2	3	ALCRN	29/64	27/64
N68782	NTM100-1/2X20UN-.375	1/2	20	0.350	3/8	.8750	3-1/2	3	ALCRN	15/32	29/64
N68784	NTM100-1/2X28UN-.375	1/2	28	0.350	3/8	.8750	3-1/2	3	ALCRN	15/32	15/32
N68786	NTM100-9/16X12UN-.375	9/16	12	0.370	3/8	.8750	3-1/2	4	ALCRN	33/64	31/64
N68788	NTM100-9/16X18UN-.375	9/16	18	0.370	3/8	.8750	3-1/2	4	ALCRN	17/32	33/64
N68790	NTM100-5/8X11UN-.500	5/8	11	0.470	1/2	1.2500	4	4	ALCRN	9/16	17/32
N68792	NTM100-5/8X12UN-.500	5/8	12	0.470	1/2	1.2500	4	4	ALCRN	9/16	35/64

# UN THREADMILLS-NTM120UN

SOLID  
CARBIDE



- Helical flutes for internal and external threading
- Coolant-through feature
- Ideal for flat bottom holes
- Large diameter applications where torque and horsepower requirements for taps are not available
- Suitable for use in most materials
- Cutting Data - Page 296-297
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	THREAD SIZE	THREADS PER INCH	CUTTER DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	CUTTING TEETH	COATING	DRILL SIZE 50%	DRILL SIZE 75%
N34479	NTM120-NR.10X24UN-.187	10	24	0.134	3/16	.3130	2	3	ALCRN	20	25
N34480	NTM120-NR.10X32UN-.187	10	32	0.134	3/16	.3130	2	3	ALCRN	18	21
N34481	NTM120-1/4X20UN-.187	1/4	20	0.180	3/16	.5000	2-1/2	3	ALCRN	7/32	7
N34482	NTM120-1/4X28UN-.187	1/4	28	0.180	3/16	.5000	2-1/2	3	ALCRN	1	3
N34483	NTM120-5/16X18UN-.250	5/16	18	0.235	1/4	.6250	2-1/2	3	ALCRN	J	F
N34484	NTM120-5/16X24UN-.250	5/16	24	0.235	1/4	.6250	2-1/2	3	ALCRN	9/32	I
N34485	NTM120-3/8X16UN-.312	3/8	16	0.285	5/16	.7500	3	3	ALCRN	Q	5/16
N34486	NTM120-3/8X24UN-.312	3/8	24	0.285	5/16	.7500	3	3	ALCRN	S	Q
N34487	NTM120-7/16X14UN-.312	7/16	14	0.305	5/16	.8750	3	3	ALCRN	25/64	U
N34488	NTM120-7/16X20UN-.312	7/16	20	0.305	5/16	.8750	3	3	ALCRN	13/32	25/64
N34489	NTM120-1/2X13UN-.375	1/2	13	0.350	3/8	.8750	3-1/2	3	ALCRN	29/64	27/64
N34490	NTM120-1/2X20UN-.375	1/2	20	0.350	3/8	.8750	3-1/2	3	ALCRN	15/32	29/64
N34491	NTM120-9/16X12UN-.375	9/16	12	0.370	3/8	.8750	3-1/2	4	ALCRN	33/64	31/64
N34492	NTM120-9/16X18UN-.375	9/16	18	0.370	3/8	.8750	3-1/2	4	ALCRN	17/32	33/64
N34493	NTM120-5/8X11UN-.500	5/8	11	0.470	1/2	1.2500	4	4	ALCRN	9/16	17/32
N34494	NTM120-3/4X10UN-.500	3/4	10	0.495	1/2	1.2500	4	4	ALCRN	11/16	21/32
N34495	NTM120-3/4X12UN-.500	3/4	12	0.495	1/2	1.2500	4	4	ALCRN	11/16	43/64
N34496	NTM120-3/4X16UN-.500	3/4	16	0.495	1/2	1.2500	4	4	ALCRN	45/64	11/16
N34497	NTM120-7/8X9UN-.625	7/8	9	0.620	5/8	1.3750	4	4	ALCRN	51/64	49/64
N34498	NTM120-1X8UN-.625	1	8	0.620	5/8	1.3750	4	4	ALCRN	59/64	7/8

## UN THREAD MILLS-NTM160UN

SOLID  
CARBIDE



- Helical flutes for internal and external threading
- Extended reach
- Ideal for flat bottom holes
- Large diameter applications where torque and horsepower requirements for taps are not available
- Suitable for use in most materials
- Cutting Data - Page 296-297
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	THREAD SIZE	THREADS PER INCH	CUTTER DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	CUTTING TEETH	COATING	REACH	DRILL SIZE 50%	DRILL SIZE 75%
N34570	NTM160-NR.10X32UN-.187	10	32	0.134	3/16	.1000	2	3	ALCRN	.500	18	21
N34569	NTM160-NR.10X28UN-.187	10	28	0.134	3/16	.1100	2	3	ALCRN	.400	19	23
N34568	NTM160-NR.10X24UN-.187	10	24	0.134	3/16	.1250	2	3	ALCRN	.300	20	25
N34573	NTM160-1/4X32UN-.187	1/4	32	0.180	3/16	.1000	2-1/2	3	ALCRN	.950	1	7/32
N34572	NTM160-1/4X28UN-.187	1/4	28	0.180	3/16	.1100	2-1/2	3	ALCRN	.875	1	3
N34571	NTM160-1/4X20UN-.187	1/4	20	0.180	3/16	.1500	2-1/2	3	ALCRN	.670	7/32	7
N34576	NTM160-5/16X32UN-.250	5/16	32	0.235	1/4	.1000	2-1/2	3	ALCRN	1.375	L	9/32
N34575	NTM160-5/16X24UN-.250	5/16	24	0.235	1/4	.1250	2-1/2	3	ALCRN	1.250	9/32	I
N34574	NTM160-5/16X18UN-.250	5/16	18	0.235	1/4	.1700	2-1/2	3	ALCRN	1	J	F
N34578	NTM160-3/8X24UN-.312	3/8	24	0.285	5/16	.1250	3	3	ALCRN	1.625	S	Q
N34577	NTM160-3/8X16UN-.312	3/8	16	0.285	5/16	.1880	3	3	ALCRN	1.350	Q	5/16
N34580	NTM160-7/16X20UN-.312	7/16	20	0.305	5/16	.1500	3	3	ALCRN	1.670	13/32	25/64
N34579	NTM160-7/16X14UN-.312	7/16	14	0.305	5/16	.2150	3	3	ALCRN	1.375	25/64	U
N34583	NTM160-1/2X28UN-.375	1/2	28	0.350	3/8	.1100	4	3	ALCRN	2.250	15/32	15/32
N34582	NTM160-1/2X20UN-.375	1/2	20	0.350	3/8	.1500	4	3	ALCRN	1.250	15/32	29/64
N34581	NTM160-1/2X13UN-.375	1/2	13	0.350	3/8	.2300	4	3	ALCRN	1.670	29/64	27/64
N34584	NTM160-9/16X12UN-.375	9/16	12	0.370	3/8	.2500	4	4	ALCRN	1.725	33/64	31/64
N34585	NTM160-9/16X18UN-.375	9/16	18	0.370	3/8	.1700	4	4	ALCRN	2.100	17/32	33/64
N34588	NTM160-5/8X18UN-.500	5/8	18	0.470	1/2	.1700	4-1/2	4	ALCRN	2.900	19/32	37/64
N34587	NTM160-5/8X12UN-.500	5/8	12	0.470	1/2	.2500	4-1/2	4	ALCRN	2.525	9/16	35/64
N34586	NTM160-5/8X11UN-.500	5/8	11	0.470	1/2	.2750	4-1/2	4	ALCRN	2.400	9/16	17/32
N34592	NTM160-3/4X20UN-.500	3/4	20	0.495	1/2	.1500	5	4	ALCRN	3.188	23/32	45/64
N34591	NTM160-3/4X16UN-.500	3/4	16	0.495	1/2	.1880	5	4	ALCRN	3.000	45/64	11/16
N34590	NTM160-3/4X12UN-.500	3/4	12	0.495	1/2	.2500	5	4	ALCRN	2.750	11/16	43/64
N34589	NTM160-3/4X10UN-.500	3/4	10	0.495	1/2	.3000	5	4	ALCRN	2.500	11/16	21/32
N34597	NTM160-7/8X20UN-.625	7/8	20	0.620	5/8	.1500	6	4	ALCRN	4.188	27/32	53/64
N34596	NTM160-7/8X16UN-.625	7/8	16	0.620	5/8	.1880	6	4	ALCRN	4.000	53/64	13/16
N34595	NTM160-7/8X14UN-.625	7/8	14	0.620	5/8	.2150	6	4	ALCRN	3.900	53/64	13/16
N34594	NTM160-7/8X12UN-.625	7/8	12	0.620	5/8	.2500	6	4	ALCRN	3.725	13/16	51/64
N34593	NTM160-7/8X9UN-.625	7/8	9	0.620	5/8	.3300	6	4	ALCRN	3.300	51/64	49/64
N34600	NTM160-1X16UN-.625	1	16	0.620	5/8	.1880	6	4	ALCRN	4.000	61/64	15/16
N34599	NTM160-1X12UN-.625	1	12	0.620	5/8	.2500	6	4	ALCRN	3.725	61/64	15/16
N34598	NTM160-1X8UN-.625	1	8	0.620	5/8	.3750	6	4	ALCRN	3.150	59/64	7/8

## METRIC THREAD MILLS-NTM400MI

SOLID  
CARBIDE



- Helical flutes for internal and external threading
- Cutting Data - Page 296-297
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	THREAD SIZE	THREADS PER INCH	CUTTER DIA	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	CUTTING TEETH	COATING	DRILL SIZE 75%
N68850	NTM400-M3X.5ISO-.125	M3	0.5	0.085	1/8	.1780	2	3	ALCRN	39
N68852	NTM400-M3.5X.6ISO-.125	M3.5	0.6	0.095	1/8	.2350	2	3	ALCRN	32
N68854	NTM400-M4X.7ISO-.125	M4	0.7	0.115	1/8	.2760	2	3	ALCRN	30
N68856	NTM400-M4.5X.75ISO-.187	M4.5	0.75	0.134	3/16	.3130	2	3	ALCRN	19
N68858	NTM400-M5-X.8ISO-.187	M5	0.8	0.134	3/16	.3130	2	3	ALCRN	19
N68860	NTM400-M6X1.0ISO-.187	M6	1	0.170	3/16	.5000	2-1/2	3	ALCRN	8
N68862	NTM400-M8X1.0ISO-.250	M8	1	0.235	1/4	.6250	2-1/2	3	ALCRN	J
N68864	NTM400-M8X1.25ISO-.250	M8	1.25	0.235	1/4	.6250	2-1/2	3	ALCRN	H
N68866	NTM400-M10X1.25ISO-.312	M10	1.25	0.300	5/16	.7500	3	3	ALCRN	11/32
N68868	NTM400-M10X1.5ISO-.312	M10	1.5	0.300	5/16	.7500	3	3	ALCRN	R
N68870	NTM400-M12X1.25ISO-.375	M12	1.25	0.360	3/8	.8750	3-1/2	3	ALCRN	27/64
N68872	NTM400-M12X1.75ISO-.375	M12	1.75	0.360	3/8	.8750	3-1/2	3	ALCRN	13/32
N68874	NTM400-M14X1.25ISO-.375	M14	1.25	0.370	3/8	.8750	3-1/2	4	ALCRN	1/2
N68876	NTM400-M14X1.5ISO-.375	M14	1.5	0.370	3/8	.8750	3-1/2	4	ALCRN	1/2
N68878	NTM400-M14X2.0ISO-.375	M14	2	0.370	3/8	.8750	3-1/2	4	ALCRN	15/32
N68880	NTM400-M16X2.0ISO-.500	M16	2	0.470	1/2	1.2500	4	4	ALCRN	35/64
N68882	NTM400-M18X2.5ISO-.500	M18	2.5	0.490	1/2	1.2500	4	4	ALCRN	39/64
N68884	NTM400-M20X1.5ISO-.500	M20	1.5	0.495	1/2	1.2500	4	4	ALCRN	47/64
N68886	NTM400-M20X2.0ISO-.500	M20	2	0.495	1/2	1.2500	4	4	ALCRN	11/16
N68888	NTM400-M20X2.5ISO-.500	M20	2.5	0.495	1/2	1.2500	4	4	ALCRN	11/16
N68890	NTM400-M24X1.5ISO-.625	M24	1.5	0.620	5/8	1.3730	4	4	ALCRN	22.5MM
N68892	NTM400-M24X2.0ISO-.625	M24	2	0.620	5/8	1.3730	4	4	ALCRN	7/8
N68894	NTM400-M24X2.5ISO-.625	M24	2.5	0.620	5/8	1.3730	4	4	ALCRN	21.5MM
N68896	NTM400-M24X3.0ISO-.625	M24	3	0.620	5/8	1.3750	4	4	ALCRN	53/64



## THREAD MILLS-NTM200NPT

SOLID  
CARBIDE



- Straight flutes for internal and external threading
- National Pipe Taper
- Cutting Data - Page 296-297
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	THREAD SIZE	THREADS PER INCH	CUTTER DIAMETER	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	CUTTING TEETH	COATING	DRILL SIZE
N68820	NTM200-1/16X27NPT-.250	1/16	27	0.245	1/4	.4375	2-1/2	3	ALCRN	B
N68822	NTM200-1/8X27NPT-.250	1/8	27	0.245	1/4	.4375	2-1/2	3	ALCRN	21/64
N68824	NTM200-1/4X18NPT-.312	1/4	18	0.312	5/16	.6250	3	3	ALCRN	27/64
N68826	NTM200-3/8X18NPT-.312	3/8	18	0.312	5/16	.6250	3	3	ALCRN	9/16
N68828	NTM200-1/2X14NPT-.500	1/2	14	0.495	1/2	.8750	4	4	ALCRN	11/16
N68830	NTM200-3/4X14NPT-.500	3/4	14	0.495	1/2	.8750	4	4	ALCRN	29/32
N68832	NTM200-1X11.5NPT-.625	1	11.5	0.620	5/8	1.1250	4	4	ALCRN	1-5/32
N68834	NTM200-2-1/2X8NPT-.750	2.5	8	0.745	3/4	1.5000	5	4	ALCRN	2-39/64

## THREAD MILLS-NTM300NPTF

SOLID  
CARBIDE



- Straight flutes for internal and external threading
- National Pipe Taper for Fuels
- Cutting Data - Page 296-297
- Tolerance Specs - Page 335

ORDER NO.	DESCRIPTION	THREAD SIZE	THREADS PER INCH	CUTTER DIAMETER	SHANK DIA	LENGTH OF CUT	OVERALL LENGTH	CUTTING TEETH	COATING	DRILL SIZE
N68836	NTM300-1/16X27NPTF-.250	1/16	27	0.245	1/4	.4375	2-1/2	3	ALCRN	B
N68838	NTM300-1/8X27NPTF-.250	1/8	27	0.245	1/4	.4375	2-1/2	3	ALCRN	21/64
N68840	NTM300-1/4X18NPTF-.312	1/4	18	0.305	5/16	.6250	3	3	ALCRN	27/64
N68842	NTM300-3/8X18NPTF-.312	3/8	18	0.305	5/16	.6250	3	3	ALCRN	9/16
N68844	NTM300-1/2X14NPTF-.500	1/2	14	0.495	1/2	.8750	4	4	ALCRN	11/16
N68846	NTM300-3/4X14NPTF-.500	3/4	14	0.495	1/2	.8750	4	4	ALCRN	29/32
N68848	NTM300-1X11.5NPTF-.625	1	11.5	0.620	5/8	1.1250	4	4	ALCRN	1-5/32

## THREAD MILLS - INCH - START VALUES

		THREAD MILLING										
ISO GROUP	SMG	V <sub>C</sub> (sf / min)		Z <sub>n</sub> = 3						Z <sub>n</sub> = 4		
				1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
P	E 1 - 2	500	n (rev/min)	15280	10187	7640	6112	5093	3820	3056	2547	1910
			f <sub>z</sub> (in)	0.0005	0.0008	0.0010	0.0013	0.0015	0.0020	0.0025	0.0030	0.0040
	450 - 550	v <sub>f</sub> (in/min)	22.9	22.9	22.9	22.9	22.9	22.9	30.6	30.6	30.6	
		n (rev/min)	10696	7131	5348	4278	3565	2674	2139	1783	1337	
	E 3 - 4	350	f <sub>z</sub> (in)	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0023	0.0027	0.0036
			v <sub>f</sub> (in/min)	14.4	14.4	14.4	14.4	14.4	14.4	19.3	19.3	19.3
E 5 - 6	275	n (rev/min)	8404	5603	4202	3362	2801	2101	1681	1401	1051	
		f <sub>z</sub> (in)	0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0023	0.0030	
250 - 300	v <sub>f</sub> (in/min)	9.5	9.5	9.5	9.5	9.5	9.5	12.6	12.6	12.6		
	H	M / A 7 >45HRc	150	n (rev/min)	4584	3056	2292	1834	1528	1146	917	764
f <sub>z</sub> (in)				0.0002	0.0003	0.0005	0.0006	0.0007	0.0009	0.0011	0.0014	0.0018
125 - 175	v <sub>f</sub> (in/min)	3.1	3.1	3.1	3.1	3.1	3.1	4.1	4.1	4.1		
	M	E 8 - 9	350	n (rev/min)	10696	7131	5348	4278	3565	2674	2139	1783
f <sub>z</sub> (in)				0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0023	0.0030
300 - 400	v <sub>f</sub> (in/min)	12.0	12.0	12.0	12.0	12.0	12.0	16.0	16.0	16.0		
	E 10 - 11	250	n (rev/min)	7640	5093	3820	3056	2547	1910	1528	1273	955
f <sub>z</sub> (in)			0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0023	0.0030	
200 - 300	v <sub>f</sub> (in/min)	8.6	8.6	8.6	8.6	8.6	8.6	11.5	11.5	11.5		
	K	E 12 - 13	500	n (rev/min)	15280	10187	7640	6112	5093	3820	3056	2547
f <sub>z</sub> (in)				0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
450 - 550	v <sub>f</sub> (in/min)	28.7	28.7	28.7	28.7	28.7	28.7	38.2	38.2	38.2		
	E 14 - 15	425	n (rev/min)	12988	8659	6494	5195	4329	3247	2598	2165	1624
f <sub>z</sub> (in)			0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0023	0.0027	0.0036	
375 - 475	v <sub>f</sub> (in/min)	17.5	17.5	17.5	17.5	17.5	17.5	23.4	23.4	23.4		
	N	E 16	600	n (rev/min)	18336	12224	9168	7334	6112	4584	3667	3056
f <sub>z</sub> (in)				0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
550 - 650	v <sub>f</sub> (in/min)	34.4	34.4	34.4	34.4	34.4	34.4	45.8	45.8	45.8		
	E 17	600	n (rev/min)	18336	12224	9168	7334	6112	4584	3667	3056	2292
f <sub>z</sub> (in)			0.0006	0.0009	0.0013	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050	
550 - 650	v <sub>f</sub> (in/min)	34.4	34.4	34.4	34.4	34.4	34.4	45.8	45.8	45.8		
	E 18	600	n (rev/min)	18336	12224	9168	7334	6112	4584	3667	3056	2292
f <sub>z</sub> (in)			0.0005	0.0008	0.0010	0.0013	0.0015	0.0020	0.0025	0.0030	0.0040	
550 - 650	v <sub>f</sub> (in/min)	27.5	27.5	27.5	27.5	27.5	27.5	36.7	36.7	36.7		
	S	E 20	100	n (rev/min)	3056	2037	1528	1222	1019	764	611	509
f <sub>z</sub> (in)				0.0003	0.0005	0.0006	0.0008	0.0009	0.0012	0.0015	0.0018	0.0024
80 - 120	v <sub>f</sub> (in/min)	2.8	2.8	2.8	2.8	2.8	2.8	3.7	3.7	3.7		
	E 21	100	n (rev/min)	3056	2037	1528	1222	1019	764	611	509	382
f <sub>z</sub> (in)			0.0003	0.0005	0.0006	0.0008	0.0009	0.0012	0.0015	0.0018	0.0024	
80 - 120	v <sub>f</sub> (in/min)	2.8	2.8	2.8	2.8	2.8	2.8	3.7	3.7	3.7		
	E 22	350	n (rev/min)	10696	7131	5348	4278	3565	2674	2139	1783	1337
f <sub>z</sub> (in)			0.0004	0.0006	0.0008	0.0009	0.0011	0.0015	0.0019	0.0023	0.0030	
330 - 370	v <sub>f</sub> (in/min)	12.0	12.0	12.0	12.0	12.0	12.0	16.0	16.0	16.0		
	GRAPHITE	300	n (rev/min)	9168	6112	4584	3667	3056	2292	1834	1528	1146
f <sub>z</sub> (in)			0.0004	0.0005	0.0007	0.0009	0.0011	0.0014	0.0018	0.0021	0.0028	
250 - 350	v <sub>f</sub> (in/min)	9.6	9.6	9.6	9.6	9.6	9.6	12.8	12.8	12.8		

SMG = Seco Material Group  
 n [min-1] = RPM  
 V<sub>C</sub> (sf/min) = Surface feet/min

f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## THREAD MILLS - METRIC - START VALUES

		THREAD MILLING															
ISO GROUP	SMG	vc (m / min)		Zn = 3								Zn = 4					
				3	4	5	6	8	10	12	14	16	18	20	24		
P	E 1 - 2	500	n [min-1]	16171	12129	9703	8086	6064	4851	4043	3465	3032	2695	2426	2021		
			fz [in]	.0005	.0006	.0008	.0009	.0013	.0016	.0019	.0022	.0025	.0028	.0031	.0038		
	E 3 - 4	350	450 - 550	vf [in/min]	22.9	22.9	22.9	22.9	22.9	22.9	22.9	3.6	3.6	3.6	3.6	3.6	
			n [min-1]	11320	8490	6792	5660	4245	3396	2830	2426	2122	1887	1698	1415		
	E 5 - 6	275	400 - 400	vf [in/min]	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	19.3	19.3	19.3	19.3	
			n [min-1]	8894	6671	5337	4447	3335	2668	2224	1906	1668	1482	1334	1112		
E 5 - 6	250 - 300	vf [in/min]	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	12.6	12.6	12.6	12.6	12.6		
		fz [in]	.0004	.0005	.0006	.0007	.0009	.0012	.0014	.0017	.0019	.0021	.0024	.0028			
H	M / A 7 >45HRC	150	n [min-1]	4851	3639	2911	2426	1819	1455	1213	1040	910	809	728	606		
			fz [in]	.0002	.0003	.0004	.0004	.0006	.0007	.0009	.0010	.0011	.0013	.0014	.0017		
H	M / A 7 >45HRC	125 - 175	vf [in/min]	3.1	3.1	3.1	3.1	3.1	3.1	3.1	4.1	4.1	4.1	4.1	4.1		
			n [min-1]	11320	8490	6792	5660	4245	3396	2830	2426	2122	1887	1698	1415		
M	E 8 - 9	350	n [min-1]	11320	8490	6792	5660	4245	3396	2830	2426	2122	1887	1698	1415		
			fz [in]	.0004	.0005	.0006	.0007	.0009	.0012	.0014	.0017	.0019	.0021	.0024	.0028		
	E 10 - 11	250	300 - 1310	vf [in/min]	12.0	12.0	12.0	12.0	12.0	12.0	12.0	16.0	16.0	16.0	16.0		
			n [min-1]	8086	6064	4851	4043	3032	2426	2021	1733	1516	1348	1213	1011		
E 10 - 11	200 - 300	vf [in/min]	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	11.5	11.5	11.5	11.5	11.5		
		fz [in]	.0004	.0005	.0006	.0007	.0009	.0012	.0014	.0017	.0019	.0021	.0024	.0028			
K	E 12 - 13	500	n [min-1]	16171	12129	9703	8086	6064	4851	4043	3465	3032	2695	2426	2021		
			fz [in]	.0006	.0008	.0010	.0012	.0016	.0020	.0024	.0028	.0031	.0035	.0039	.0047		
	E 14 - 15	425	450 - 550	vf [in/min]	28.7	28.7	28.7	28.7	28.7	28.7	28.7	38.2	38.2	38.2	38.2		
			n [min-1]	13746	10309	8247	6873	5155	4124	3436	2945	2577	2291	2062	1718		
E 14 - 15	375 - 475	vf [in/min]	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	23.4	23.4	23.4	23.4			
		fz [in]	.0004	.0006	.0007	.0009	.0011	.0014	.0017	.0020	.0023	.0026	.0028	.0034			
N	E 16	600	n [min-1]	19406	14554	11643	9703	7277	5822	4851	4158	3639	3234	2911	2426		
			fz [in]	.0006	.0008	.0010	.0012	.0016	.0020	.0024	.0028	.0031	.0035	.0039	.0047		
	E 17	600	550 - 650	vf [in/min]	34.4	34.4	34.4	34.4	34.4	34.4	34.4	45.8	45.8	45.8	45.8		
			n [min-1]	19406	14554	11643	9703	7277	5822	4851	4158	3639	3234	2911	2426		
	E 18	600	550 - 650	vf [in/min]	34.4	34.4	34.4	34.4	34.4	34.4	34.4	45.8	45.8	45.8	45.8		
			n [min-1]	19406	14554	11643	9703	7277	5822	4851	4158	3639	3234	2911	2426		
E 18	550 - 650	vf [in/min]	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	36.7	36.7	36.7	36.7			
		fz [in]	.0005	.0006	.0008	.0009	.0013	.0016	.0019	.0022	.0025	.0028	.0031	.0038			
S	E 20	100	n [min-1]	3234	2426	1941	1617	1213	970	809	693	606	539	485	404		
			fz [in]	.0003	.0004	.0005	.0006	.0008	.0009	.0011	.0013	.0015	.0017	.0019	.0023		
	E 21	100	80 - 120	vf [in/min]	2.8	2.8	2.8	2.8	2.8	2.8	2.8	3.7	3.7	3.7	3.7		
			n [min-1]	3234	2426	1941	1617	1213	970	809	693	606	539	485	404		
	E 22	350	80 - 120	vf [in/min]	2.8	2.8	2.8	2.8	2.8	2.8	2.8	3.7	3.7	3.7	3.7		
			n [min-1]	11320	8490	6792	5660	4245	3396	2830	2426	2122	1887	1698	1415		
E 22	330 - 370	vf [in/min]	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	16.0	16.0	16.0	16.0			
		fz [in]	.0004	.0005	.0006	.0007	.0009	.0012	.0014	.0017	.0019	.0021	.0024	.0028			
GRAPHITE	300	n [min-1]	9703	7277	5822	4851	3639	2911	2426	2079	1819	1617	1455	1213			
		fz [in]	.0003	.0004	.0006	.0007	.0009	.0011	.0013	.0015	.0018	.0020	.0022	.0026			
GRAPHITE	250 - 350	vf [in/min]	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	12.8	12.8	12.8	12.8			
		n [min-1]	9703	7277	5822	4851	3639	2911	2426	2079	1819	1617	1455	1213			

SMG = Seco Material Group

n [min-1] = RPM

vc (sf/min) = Surface feet/min

fz [in] = Feed/tooth

a<sub>p</sub>/D<sub>c</sub> = % of diameter

vf [in/min] = Feed rate

a<sub>p</sub>/D<sub>c</sub> = % of diameter

A = Air D = Dry E = Emulsion (flood coolant) M = Mist

All cutting data are start values. All cutting data is in inch values.

Please reference the Workpiece Material Classification chart located on page 15.

## THREAD FORMS AND DESIGN

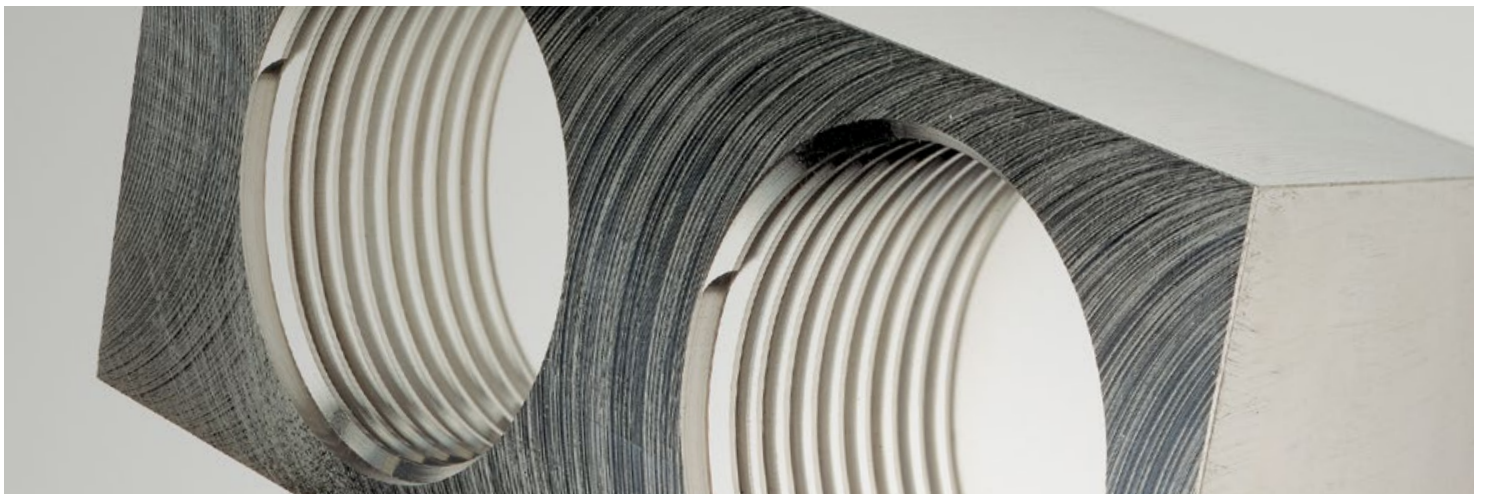
Standard Niagara Cutter Thread Mills - Thread Form Styles

- Unified National Coarse – UNC / 60 Degree / Common Std.
- Unified National Fine – UNF / 60 Degree / Common Std.
- Unified National Extra Fine – UNEF / 60 Degree / Common Std.
- National Pipe Tapered – NPT – 60 Degree
- National Pipe Tapered - NPTF
- Metric – M Series

## THREAD MILL DESIGN

Niagara Cutter Thread Mills are designed and comply with following standards:

- UN - ASME B1.1
- NPT / NPTF - ANSI / ASME B1.20.1
- Metric ISO 724



## THREAD MILL JUSTIFICATION

With modern machining centers utilizing helical interpolation programs, thread milling operations can be achieved economically. Thread milling offers many advantages over tapping and is a fast growing machining concept in the industry today.

Thread milling offers many advantages:

- One thread mill produces varying thread diameters of the same pitch
- One tool for left and right hand threads
- Increases quality; milled threads can be cut to full depth with excellent form, finish, and dimensional accuracy
- Easy machining of difficult materials
- Pitch diameter can be controlled by CNC offset
- NPT holes do not require taper reaming
- Produces small controllable chips
- Eliminates the safety issues and downtime associated with tap breakage
- Smaller machines can produce larger threads due to less spindle torque
- Less cutting pressure for thin walled workpieces
- Allows 100% thread depth -Tapping usually permits 65-75%



Is it faster to thread mill or tap the work piece?

This question is often asked. Look at the following example:

## THREADING APPLICATION COMPARISON

Material	4140 Steel	
Thread Size	1/4 - 20	
Depth-of-Thread	1/2"	
Parameters	Thread Milling	Standard Tapping
SFM	150	50
IPM	16.04	38.20
Time-in-Cut (seconds)	.100	.218

Thread milling is generating a very small circumference at a high feed rate.

Example: Circumference = .050"      Feed Rate = 16.04 IPM

## TAPPING VS THREAD MILLING

Machining Comparison	Thread Mill	Traditional Tap
Broken Tooling Easy to Remove	+	-
Free Cutting	+	-
Consistent Results	+	-
Easy to thread difficult materials: Inconel, Stainless, Titanium, etc.	+	-
Special Programming	-	+

## APPLICATION RECOMMENDATIONS

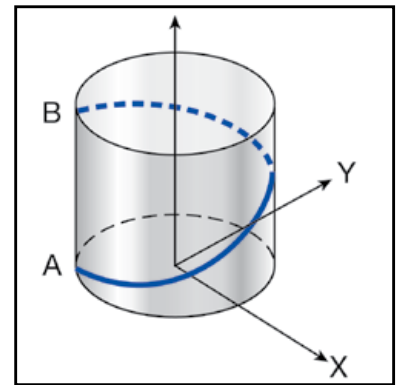
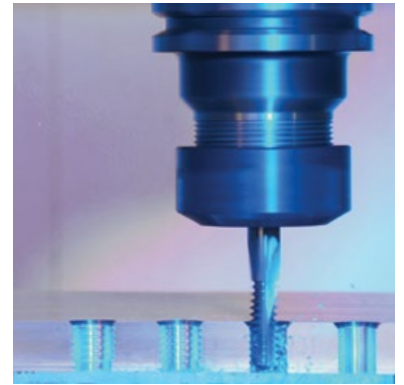
Thread milling tools form a thread using a motion referred to as helical interpolation. This process involves the movement of all three axes on the machine simultaneously. The X and Y axes move in a circular motion and the Z in an axial direction per 360 degrees at a distance equal to the pitch of the thread being machined.

Shown in Figure 1, the programmed tool path starts from the bottom (Point A) and moves toward the top (Point B). A right-hand thread will be climb cut using this process.

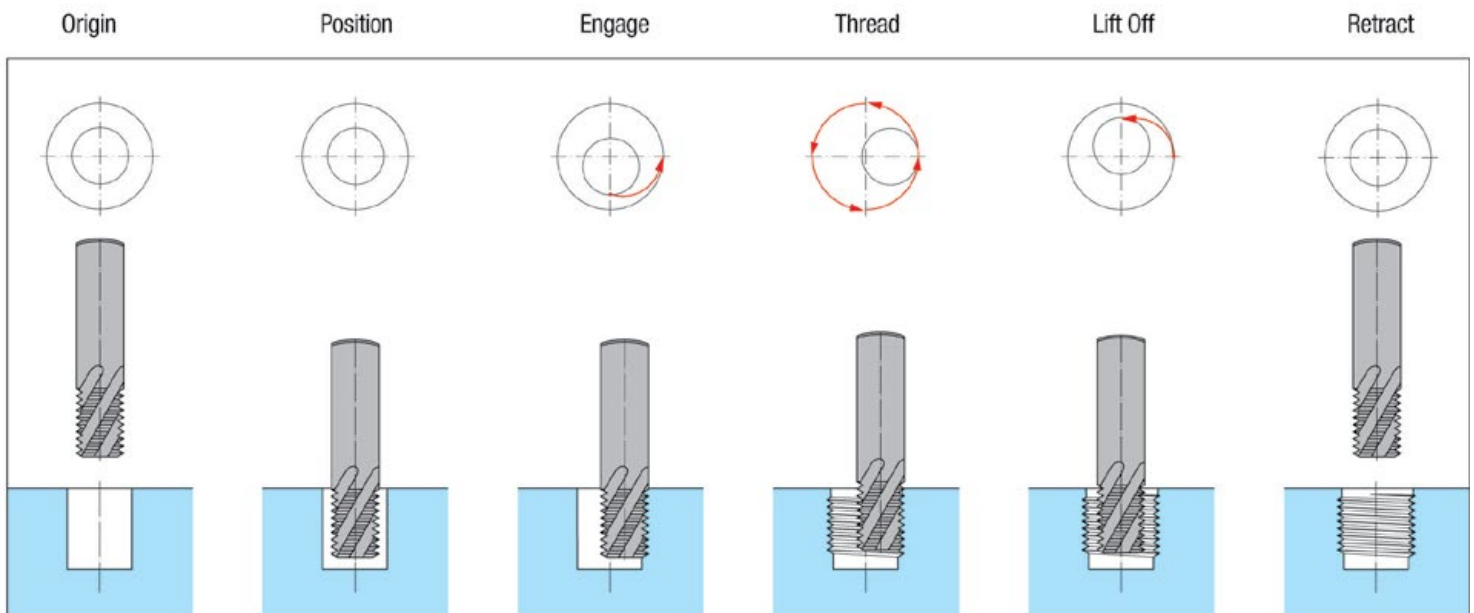
Note: When machining a right-hand thread you will be machining from bottom-to-top for climb cutting. If machining a left-hand thread you will start from top-to-bottom with a right-hand helix tool.

Left-hand threads can be climb cut with a left-hand helix tool starting from the bottom-to-top.

- Climb milling is the preferred method
- Start from the bottom of the hole to avoid re-cutting any chips
- Offset tool from center of the hole to allow a smooth start into the thread
- For difficult materials it may be necessary to make multiple passes



## TOOL PATH DURING THREADMILLING





## **FLEXIBILITY & PERFORMANCE**

# **NIAGARA UNIVERSAL DRILL**

Niagara Universal solid carbide drills feature advanced coating technology and optimized geometries for specialized applications that focus on hole quality, high-volume production and achieving the lowest cost per hole. The Universal Drill line adds to the Niagara Cutter family by bringing versatility and reduced inventory costs to low and medium batch production.

### **MULTI-PURPOSE GEOMETRY**

Niagara Universal drills offer performance and value for holemaking applications across all industry segments. The line features a multi-purpose, 4 facet point geometry that provides excellent centering capability, maintains an IT8 / 9 hole tolerance and is easy to regrind. These drills also feature a polished AlCrN coating that offers high-abrasion resistance, toughness and good chip evacuation.

### **PRODUCT FEATURES**

- Drills steel, stainless steel, cast iron and more
- Incorporates a multi-purpose, 4 facet point geometry
- Optimized through a polished AlCrN coating

### **YOUR NIAGARA BENEFIT**

- Rigid multi-purpose geometry for predictable tool life
- Application security and high-capacity utilization
- Versatility and reduced inventory cost

### **RANGE OVERVIEW**

- Diameters ranging from 0.118" - 0.787" (3 - 20 mm), in increments of 0.004" (0.1 mm)
- 5 x D, coolant-through, R1 cylindrical shank
- 3 x D, coolant-through, R1 cylindrical shank
- 3 x D, non-coolant, R1 cylindrical shank
- Compatible with Seco shrinkfit holders, Seco hydraulic chucks and Seco high-precision collet chucks

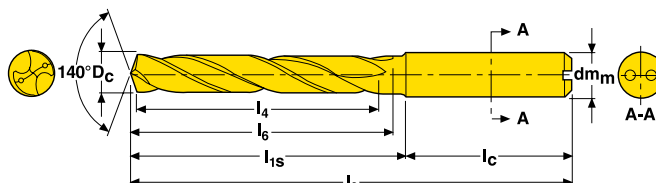
# ND1103A - INTERNAL COOLANT

SOLID CARBIDE



- Performance and value for holemaking applications
- High-volume production with lowest cost per hole
- Easy to regrind
- Drilling Depth 3xD
- Ideal for drill steel, stainless steel, cast iron, and more
- Incorporates a multi-purpose, 4 facet point geometry
- Optimized through a polished AlCrN coating

- Cutting Data - Page 319
- Hole tolerance: IT8-9



ORDER NO.	DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N00453	DRILL_3.0MM_3XD_A	3.000	—	—	—	—	14	62	26	36	20	6
N00525	DRILL_3.1MM_3XD_A	3.100	—	—	—	—	14	62	26	36	20	6
N00687	DRILL_1/8_3XD_A	3.175	1/8	—	—	—	14	62	26	36	20	6
N00526	DRILL_3.2MM_3XD_A	3.200	—	—	—	—	14	62	26	36	20	6
N00527	DRILL_3.25MM_3XD_A	3.250	—	—	—	M3.5	14	62	26	36	20	6
N00528	DRILL_3.3MM_3XD_A	3.300	—	—	M4	—	14	62	26	36	20	6
N00529	DRILL_3.4MM_3XD_A	3.400	—	—	—	—	14	62	26	36	20	6
N00532	DRILL_3.5MM_3XD_A	3.500	—	—	UNC8-32 / MF4X0.5 / UNF8-36	—	14	62	26	36	20	6
N00688	DRILL_9/64_3XD_A	3.572	9/64	—	—	—	14	62	26	36	20	6
N00533	DRILL_3.6MM_3XD_A	3.600	—	—	—	—	14	62	26	36	20	6
N00534	DRILL_3.65MM_3XD_A	3.650	—	—	—	—	14	62	26	36	20	6
N00535	DRILL_3.7MM_3XD_A	3.700	—	—	M4.5	M4	14	62	26	36	20	6
N00536	DRILL_3.8MM_3XD_A	3.800	—	—	—	—	17	66	30	36	24	6
N00537	DRILL_3.9MM_3XD_A	3.900	—	4H7	UNC10-24	—	17	66	30	36	24	6
N00689	DRILL_5/32_3XD_A	3.969	5/32	—	—	—	17	66	30	36	24	6
N00538	DRILL_4.0MM_3XD_A	4.000	—	—	—	—	17	66	30	36	24	6
N00539	DRILL_4.1MM_3XD_A	4.100	—	—	UNF10-32	—	17	66	30	36	24	6
N00542	DRILL_4.2MM_3XD_A	4.200	—	—	M5	—	17	66	30	36	24	6
N00543	DRILL_4.3MM_3XD_A	4.300	—	—	—	—	17	66	30	36	24	6
N00692	DRILL_11/64_3XD_A	4.366	11/64	—	—	—	17	66	30	36	24	6
N00545	DRILL_4.5MM_3XD_A	4.500	—	—	—	—	17	66	30	36	24	6
N00546	DRILL_4.6MM_3XD_A	4.600	—	—	—	—	17	66	30	36	24	6
N00547	DRILL_4.65MM_3XD_A	4.650	—	—	—	M5	17	66	30	36	24	6
N00548	DRILL_4.7MM_3XD_A	4.700	—	—	—	—	17	66	30	36	24	6
N00693	DRILL_3/16_3XD_A	4.763	3/16	—	—	—	20	66	30	36	28	6
N00549	DRILL_4.8MM_3XD_A	4.800	—	—	—	MF5	20	66	30	36	28	6
N00552	DRILL_4.9MM_3XD_A	4.900	—	5H7	—	—	20	66	30	36	28	6
N00424	DRILL_5.0MM_3XD_A	5.000	—	—	M6	—	20	66	30	36	28	6
N00553	DRILL_5.1MM_3XD_A	5.100	—	—	UNC1/4-20	—	20	66	30	36	28	6
N00694	DRILL_13/64_3XD_A	5.159	13/64	—	—	—	20	66	30	36	28	6
N00564	DRILL_5.2MM_3XD_A	5.200	—	—	MF6X0.75	—	20	66	30	36	28	6
N00554	DRILL_5.3MM_3XD_A	5.300	—	—	—	—	20	66	30	36	28	6



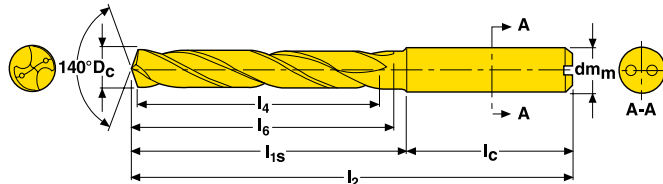
# ND1103A - INTERNAL COOLANT (CONT'D)

SOLID CARBIDE



- Performance and value for holmaking applications
- High-volume production with lowest cost per hole
- Easy to regrind
- Drilling Depth 3xD
- Ideal for drill steel, stainless steel, cast iron, and more
- Incorporates a multi-purpose, 4 facet point geometry
- Optimized through a polished AlCrN coating

- Cutting Data - Page 319
- Hole tolerance: IT8-9



ORDER NO.	DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm h6
N00555	DRILL_5.4MM_3XD_A	5.400	—	—	—	—	20	66	30	36	28	6
N00556	DRILL_5.5MM_3XD_A	5.500	—	—	UNF1/4-28	—	20	66	30	36	28	6
N00557	DRILL_5.55MM_3XD_A	5.550	—	—	—	M6	20	66	30	36	28	6
N00695	DRILL_7/32_3XD_A	5.556	7/32	—	—	—	20	66	30	36	28	6
N00558	DRILL_5.6MM_3XD_A	5.600	—	—	—	—	20	66	30	36	28	6
N00559	DRILL_5.7MM_3XD_A	5.700	—	—	—	—	20	66	30	36	28	6
N00562	DRILL_5.8MM_3XD_A	5.800	—	6H6	—	—	20	66	30	36	28	6
N00563	DRILL_5.9MM_3XD_A	5.900	—	6H6/6H7	—	—	20	66	30	36	28	6
N00696	DRILL_15/64_3XD_A	5.953	15/64	—	—	—	20	66	30	36	28	6
N00565	DRILL_6.0MM_3XD_A	6.000	—	—	M7	—	20	66	30	36	28	6
N00566	DRILL_6.1MM_3XD_A	6.100	—	—	NPTF1/16	—	24	79	43	36	34	8
N00567	DRILL_6.2MM_3XD_A	6.200	—	—	—	—	24	79	43	36	34	8
N00568	DRILL_6.3MM_3XD_A	6.300	—	—	—	—	24	79	43	36	34	8
N00697	DRILL_1/4_3XD_A	6.350	1/4	—	—	—	24	79	43	36	34	8
N00569	DRILL_6.4MM_3XD_A	6.400	—	—	—	—	24	79	43	36	34	8
N00572	DRILL_6.5MM_3XD_A	6.500	—	—	—	—	24	79	43	36	34	8
N00573	DRILL_6.6MM_3XD_A	6.600	—	—	UNC5/16-18	—	24	79	43	36	34	8
N00544	DRILL_6.7MM_3XD_A	6.700	—	—	—	—	24	79	43	36	34	8
N00698	DRILL_17/64_3XD_A	6.747	17/64	—	—	—	24	79	43	36	34	8
N00574	DRILL_6.8MM_3XD_A	6.800	—	7H6	M8	—	24	79	43	36	34	8
N00575	DRILL_6.9MM_3XD_A	6.900	—	7H6/7H7	UNF5/16-24	—	24	79	43	36	34	8
N00576	DRILL_7.0MM_3XD_A	7.000	—	—	MF8X1	—	24	79	43	36	34	8
N00577	DRILL_7.1MM_3XD_A	7.100	—	—	—	—	29	79	43	36	41	8
N00699	DRILL_9/32_3XD_A	7.144	9/32	—	—	—	29	79	43	36	41	8
N00578	DRILL_7.2MM_3XD_A	7.200	—	—	MF8X0.75	—	29	79	43	36	41	8
N00579	DRILL_7.3MM_3XD_A	7.300	—	—	—	—	29	79	43	36	41	8
N00582	DRILL_7.4MM_3XD_A	7.400	—	—	—	—	29	79	43	36	41	8
N00423	DRILL_7.5MM_3XD_A	7.500	—	—	—	—	29	79	43	36	41	8
N00702	DRILL_19/64_3XD_A	7.541	19/64	—	—	—	29	79	43	36	41	8
N00583	DRILL_7.55MM_3XD_A	7.550	—	—	—	MF8	29	79	43	36	41	8
N00584	DRILL_7.6MM_3XD_A	7.600	—	—	—	—	29	79	43	36	41	8
N00585	DRILL_7.7MM_3XD_A	7.700	—	—	—	—	29	79	43	36	41	8

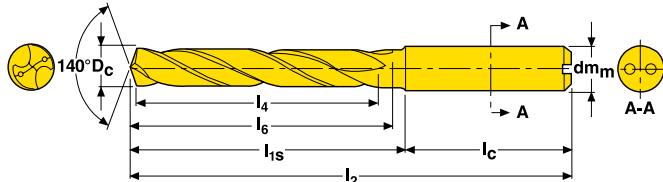
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							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm h6
N00586	DRILL_7.8MM_3XD_A	7.800	—	8H6	—	—	29	79	43	36	41	8
N00587	DRILL_7.9MM_3XD_A	7.900	—	8H6/8H7	—	—	29	79	43	36	41	8
N00703	DRILL_5/16_3XD_A	7.938	5/16	—	—	—	29	79	43	36	41	8
N00588	DRILL_8.0MM_3XD_A	8.000	—	—	UNC3/8-16	—	29	79	43	36	41	8
N00589	DRILL_8.1MM_3XD_A	8.100	—	—	—	—	35	89	49	40	47	10
N00592	DRILL_8.2MM_3XD_A	8.200	—	—	—	—	35	89	49	40	47	10
N00593	DRILL_8.3MM_3XD_A	8.300	—	—	—	—	35	89	49	40	47	10
N00704	DRILL_21/64_3XD_A	8.334	21/64	—	—	—	35	89	49	40	47	10
N00594	DRILL_8.4MM_3XD_A	8.400	—	—	NPT1/8 / NPTF1/8	—	35	89	49	40	47	10
N00595	DRILL_8.5MM_3XD_A	8.500	—	—	M10	—	35	89	49	40	47	10
N00596	DRILL_8.6MM_3XD_A	8.600	—	—	—	—	35	89	49	40	47	10
N00597	DRILL_8.7MM_3XD_A	8.700	—	—	—	—	35	89	49	40	47	10
N00705	DRILL_11/32_3XD_A	8.731	11/32	—	—	—	35	89	49	40	47	10
N00598	DRILL_8.8MM_3XD_A	8.800	—	9H6	G1/8 / MF10X1.25	—	35	89	49	40	47	10
N00599	DRILL_8.9MM_3XD_A	8.900	—	9H6/9H7	—	—	35	89	49	40	47	10
N00602	DRILL_9.0MM_3XD_A	9.000	—	—	MF10X1	—	35	89	49	40	47	10
N00603	DRILL_9.1MM_3XD_A	9.100	—	—	—	—	35	89	49	40	47	10
N00706	DRILL_23/64_3XD_A	9.128	23/64	—	—	—	35	89	49	40	47	10
N00604	DRILL_9.2MM_3XD_A	9.200	—	—	MF10X0.75	—	35	89	49	40	47	10
N00605	DRILL_9.3MM_3XD_A	9.300	—	—	—	—	35	89	49	40	47	10
N00606	DRILL_9.4MM_3XD_A	9.400	—	—	UNC7/16-14	—	35	89	49	40	47	10
N00607	DRILL_9.5MM_3XD_A	9.500	—	—	—	—	35	89	49	40	47	10
N00707	DRILL_3/8_3XD_A	9.525	3/8	—	—	—	35	89	49	40	47	10
N00608	DRILL_9.55MM_3XD_A	9.550	—	—	—	—	35	89	49	40	47	10
N00609	DRILL_9.6MM_3XD_A	9.600	—	—	—	—	35	89	49	40	47	10
N00612	DRILL_9.7MM_3XD_A	9.700	—	—	—	—	35	89	49	40	47	10
N00613	DRILL_9.8MM_3XD_A	9.800	—	10H6/10H7	UNF7/16-20	—	35	89	49	40	47	10
N00708	DRILL_25/64_3XD_A	9.922	25/64	—	—	—	35	89	49	40	47	10
N00614	DRILL_9.9MM_3XD_A	9.900	—	10H6/10H7	—	MF10	35	89	49	40	47	10
N00615	DRILL_10.0MM_3XD_A	10.000	—	—	—	—	35	89	49	40	47	10
N00616	DRILL_10.2MM_3XD_A	10.200	—	—	M12	—	40	102	57	45	55	12
N00709	DRILL_13/32_3XD_A	10.319	13/32	—	—	—	40	102	57	45	55	12
N00617	DRILL_10.4MM_3XD_A	10.400	—	—	—	—	40	102	57	45	55	12

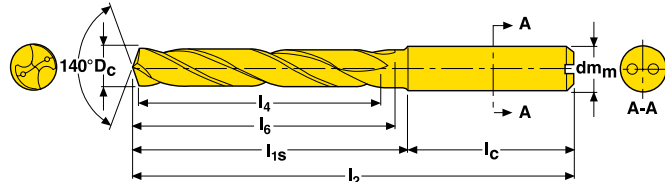
# ND1103A - INTERNAL COOLANT (CONT'D)

SOLID CARBIDE



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- Drilling Depth 3xD
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- Cutting Data - Page 319
- Hole tolerance: IT8-9



ORDER NO.	DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm h6
N00618	DRILL_10.5MM_3XD_A	10.500	—	—	MF12X1.5	—	40	102	57	45	55	12
N00619	DRILL_10.6MM_3XD_A	10.600	—	—	—	—	40	102	57	45	55	12
N00712	DRILL_27/64_3XD_A	10.716	27/64	—	—	—	40	102	57	45	55	12
N00622	DRILL_10.8MM_3XD_A	10.800	—	11H6/11H7	UNC1/2-13 / MF12X1.25	—	40	102	57	45	55	12
N00623	DRILL_10.9MM_3XD_A	10.900	—	11H6/11H7	—	—	40	102	57	45	55	12
N00624	DRILL_11.0MM_3XD_A	11.000	—	—	MF12X1 / NPTF1/4	—	40	102	57	45	55	12
N00625	DRILL_11.1MM_3XD_A	11.100	—	—	NPT1/4	—	40	102	57	45	55	12
N00713	DRILL_7/16_3XD_A	11.113	7/16	—	—	—	40	102	57	45	55	12
N00626	DRILL_11.2MM_3XD_A	11.200	—	—	—	M12	40	102	57	45	55	12
N00627	DRILL_11.3MM_3XD_A	11.300	—	—	—	—	40	102	57	45	55	12
N00628	DRILL_11.4MM_3XD_A	11.400	—	—	—	—	40	102	57	45	55	12
N00629	DRILL_11.5MM_3XD_A	11.500	—	—	UNF1/2-20	—	40	102	57	45	55	12
N00714	DRILL_29/64_3XD_A	11.509	29/64	—	—	—	40	102	57	45	55	12
N00632	DRILL_11.55MM_3XD_A	11.550	—	—	—	MF12	40	102	57	45	55	12
N00633	DRILL_11.6MM_3XD_A	11.600	—	—	—	—	40	102	57	45	55	12
N00634	DRILL_11.7MM_3XD_A	11.700	—	—	—	—	40	102	57	45	55	12
N00635	DRILL_11.8MM_3XD_A	11.800	—	12H6/12H7	G1/4	—	40	102	57	45	55	12
N00636	DRILL_11.9MM_3XD_A	11.900	—	12H6/12H7	—	—	40	102	57	45	55	12
N00715	DRILL_15/32_3XD_A	11.906	15/32	12H6/12H7	—	—	40	102	57	45	55	12
N00637	DRILL_12.0MM_3XD_A	12.000	—	—	M14	—	40	102	57	45	55	12
N00638	DRILL_12.1MM_3XD_A	12.100	—	—	—	—	43	107	62	45	60	14
N00639	DRILL_12.2MM_3XD_A	12.200	—	—	—	—	43	107	62	45	60	14
N00716	DRILL_31/64_3XD_A	12.303	31/64	—	—	—	43	107	62	45	60	14
N00642	DRILL_12.4MM_3XD_A	12.400	—	—	—	—	43	107	62	45	60	14
N00643	DRILL_12.5MM_3XD_A	12.500	—	—	MF14X1.5	—	43	107	62	45	60	14
N00644	DRILL_12.6MM_3XD_A	12.600	—	—	—	—	43	107	62	45	60	14
N00717	DRILL_1/2_3XD_A	12.700	1/2	—	—	—	43	107	62	45	60	14
N00645	DRILL_12.75MM_3XD_A	12.750	—	—	—	—	43	107	62	45	60	14
N00646	DRILL_12.8MM_3XD_A	12.800	—	13H6/13H7	MF14X1.25	—	43	107	62	45	60	14
N00647	DRILL_12.9MM_3XD_A	12.900	—	13H6/13H7	—	—	43	107	62	45	60	14
N00648	DRILL_13.0MM_3XD_A	13.000	—	—	MF14X1	—	43	107	62	45	60	14
N00649	DRILL_33/64_3XD_A	13.100	33/64	—	—	M14	43	107	62	45	60	14
N00652	DRILL_13.2MM_3XD_A	13.200	—	—	—	—	43	107	62	45	60	14

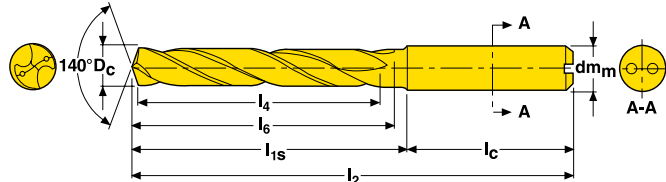
# ND1103A - INTERNAL COOLANT (CONT'D)

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ORDER NO.	DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N00653	DRILL_13.3MM_3XD_A	13.300	—	—	—	—	43	107	62	45	60	14
N00654	DRILL_13.4MM_3XD_A	13.400	—	—	—	—	43	107	62	45	60	14
N00718	DRILL_17/32_3XD_A	13.494	17/32	—	—	—	43	107	62	45	60	14
N00655	DRILL_13.5MM_3XD_A	13.500	—	—	—	—	43	107	62	45	60	14
N00656	DRILL_13.6MM_3XD_A	13.600	—	—	—	—	43	107	62	45	60	14
N00657	DRILL_13.7MM_3XD_A	13.700	—	—	—	—	43	107	62	45	60	14
N00658	DRILL_13.8MM_3XD_A	13.800	—	14H6/14H7	—	—	43	107	62	45	60	14
N00659	DRILL_35/64_3XD_A	13.890	35/64	14H6/14H7	—	—	43	107	62	45	60	14
N00662	DRILL_14.0MM_3XD_A	14.000	—	—	M16	—	43	107	62	45	60	14
N00663	DRILL_14.2MM_3XD_A	14.200	—	—	—	—	45	115	67	48	65	16
N00719	DRILL_9/16_3XD_A	14.288	9/16	—	—	—	45	115	67	48	65	16
N00664	DRILL_14.5MM_3XD_A	14.500	—	—	MF16X1.5 / UNF5/8-18	—	45	115	67	48	65	16
N00665	DRILL_37/64_3XD_A	14.680	37/64	—	—	—	45	115	67	48	65	16
N00666	DRILL_14.75MM_3XD_A	14.750	—	—	—	—	45	115	67	48	65	16
N00667	DRILL_14.8MM_3XD_A	14.800	—	15H6/15H7	—	—	45	115	67	48	65	16
N00668	DRILL_15.0MM_3XD_A	15.000	—	—	MF16X1	—	45	115	67	48	65	16
N00669	DRILL_15.1MM_3XD_A	15.100	—	—	—	M16	45	115	67	48	65	16
N00672	DRILL_15.3MM_3XD_A	15.300	—	—	—	—	45	115	67	48	65	16
N00673	DRILL_39/64_3XD_A	15.480	39/64	—	M18	—	45	115	67	48	65	16
N00674	DRILL_15.7MM_3XD_A	15.700	—	—	—	—	45	115	67	48	65	16
N00675	DRILL_15.8MM_3XD_A	15.800	—	16H6/16H7	—	—	45	115	67	48	65	16
N00722	DRILL_5/8_3XD_A	15.875	5/8	16H6/16H7	—	—	45	115	67	48	65	16
N00676	DRILL_16.0MM_3XD_A	16.000	—	—	—	—	45	115	67	48	65	16
N00677	DRILL_16.5MM_3XD_A	16.500	—	—	MF18X1.5	—	51	123	75	48	73	18
N00678	DRILL_17.0MM_3XD_A	17.000	—	—	MF18X1	—	51	123	75	48	73	18
N00679	DRILL_11/16_3XD_A	17.460	11/16	—	M20	—	51	123	75	48	73	18
N00682	DRILL_18.0MM_3XD_A	18.000	—	—	—	—	51	123	75	48	73	18
N00683	DRILL_18.5MM_3XD_A	18.500	—	—	MF20X1.5	—	55	131	81	50	79	20
N00684	DRILL_19.0MM_3XD_A	19.000	—	—	G1/2 / MF20X1	—	55	131	81	50	79	20
N00723	DRILL_3/4_3XD_A	19.050	3/4	—	—	—	55	131	81	50	79	20
N00685	DRILL_49/64_3XD_A	19.470	49/64	—	M22	—	55	131	81	50	79	20
N00686	DRILL_20.0MM_3XD_A	20.000	—	—	—	—	55	131	81	50	79	20

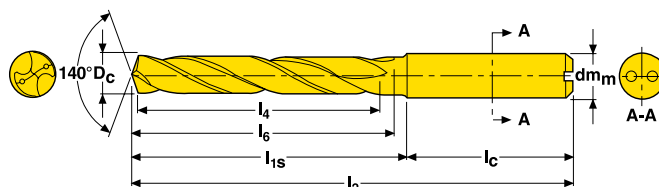
# ND1105A - INTERNAL COOLANT

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							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm h6
N00966	DRILL_3.0MM_5XD_A	3.000	—	—	—	—	23	66	30	36	28	6
N00967	DRILL_3.1MM_5XD_A	3.100	—	—	—	—	23	66	30	36	28	6
N12142	DRILL_1/8_5XD_A	3.175	1/8	—	—	—	23	66	30	36	28	6
N00968	DRILL_3.2MM_5XD_A	3.200	—	—	—	—	23	66	30	36	28	6
N00969	DRILL_3.25MM_5XD_A	3.250	—	—	—	M3.5	23	66	30	36	28	6
N00972	DRILL_3.3MM_5XD_A	3.300	—	—	M4	—	23	66	30	36	28	6
N00973	DRILL_3.4MM_5XD_A	3.400	—	—	—	—	23	66	30	36	28	6
N00974	DRILL_3.5MM_5XD_A	3.500	—	—	UNC8-32 / MF4X0.5 / UNF8-36	—	23	66	30	36	28	6
N12143	DRILL_9/64_5XD_A	3.572	9/64	—	—	—	23	66	30	36	28	6
N00975	DRILL_3.6MM_5XD_A	3.600	—	—	—	—	23	66	30	36	28	6
N00976	DRILL_3.65MM_5XD_A	3.650	—	—	—	—	23	66	30	36	28	6
N00977	DRILL_3.7MM_5XD_A	3.700	—	—	M4.5	M4	23	66	30	36	28	6
N00978	DRILL_3.8MM_5XD_A	3.800	—	—	—	—	29	74	38	36	36	6
N00979	DRILL_3.9MM_5XD_A	3.900	—	4H7	UNC10-24	—	29	74	38	36	36	6
N12144	DRILL_5/32_5XD_A	3.969	5/32	—	—	—	29	74	38	36	36	6
N00982	DRILL_4.0MM_5XD_A	4.000	—	—	—	—	29	74	38	36	36	6
N00983	DRILL_4.1MM_5XD_A	4.100	—	—	UNF10-32	—	29	74	38	36	36	6
N00984	DRILL_4.2MM_5XD_A	4.200	—	—	M5	—	29	74	38	36	36	6
N00985	DRILL_4.3MM_5XD_A	4.300	—	—	—	—	29	74	38	36	36	6
N12145	DRILL_11/64_5XD_A	4.366	11/64	—	—	—	29	74	38	36	36	6
N00986	DRILL_4.4MM_5XD_A	4.400	—	—	—	—	29	74	38	36	36	6
N00987	DRILL_4.5MM_5XD_A	4.500	—	—	UNC12-24 / MF5X0.5	—	29	74	38	36	36	6
N00988	DRILL_4.6MM_5XD_A	4.600	—	—	—	—	29	74	38	36	36	6
N00989	DRILL_4.65MM_5XD_A	4.650	—	—	—	M5	29	74	38	36	36	6
N00992	DRILL_4.7MM_5XD_A	4.700	—	—	—	—	29	74	38	36	36	6
N12146	DRILL_3/16_5XD_A	4.763	3/16	—	—	—	35	82	46	36	44	6
N12177	DRILL_4.8MM_5XD_A	4.800	—	—	—	MF5	35	82	46	36	44	6
N00993	DRILL_4.9MM_5XD_A	4.900	—	5H7	—	—	35	82	46	36	44	6
N00994	DRILL_5.0MM_5XD_A	5.000	—	—	M6	—	35	82	46	36	44	6
N00995	DRILL_5.1MM_5XD_A	5.100	—	—	UNC1/4-20	—	35	82	46	36	44	6
N12147	DRILL_13/64_5XD_A	5.159	13/64	—	—	—	35	82	46	36	44	6

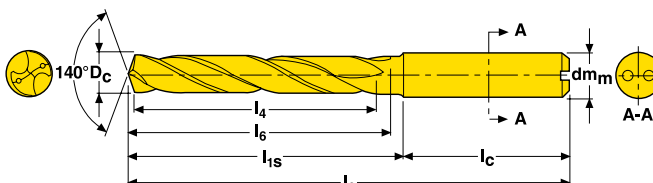
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							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N00996	DRILL_5.2MM_5XD_A	5.200	—	—	MF6X0.75	—	35	82	46	36	44	6
N00997	DRILL_5.3MM_5XD_A	5.300	—	—	—	—	35	82	46	36	44	6
N00998	DRILL_5.4MM_5XD_A	5.400	—	—	—	—	35	82	46	36	44	6
N00999	DRILL_5.5MM_5XD_A	5.500	—	—	UNF1/4-28	—	35	82	46	36	44	6
N12178	DRILL_5.55MM_5XD_A	5.550	—	—	—	M6	35	82	46	36	44	6
N12148	DRILL_7/32_5XD_A	5.556	7/32	—	—	—	35	82	46	36	44	6
N01002	DRILL_5.6MM_5XD_A	5.600	—	—	—	—	35	82	46	36	44	6
N01003	DRILL_5.7MM_5XD_A	5.700	—	—	—	—	35	82	46	36	44	6
N01004	DRILL_5.8MM_5XD_A	5.800	—	6H6	—	—	35	82	46	36	44	6
N01005	DRILL_5.9MM_5XD_A	5.900	—	6H6/6H7	—	—	35	82	46	36	44	6
N12149	DRILL_15/64_5XD_A	5.953	15/64	—	—	—	35	82	46	36	44	6
N01006	DRILL_6.0MM_5XD_A	6.000	—	—	M7	—	35	82	46	36	44	6
N01007	DRILL_6.1MM_5XD_A	6.100	—	—	NPTF1/16	—	43	91	55	36	53	8
N01008	DRILL_6.2MM_5XD_A	6.200	—	—	—	—	43	91	55	36	53	8
N01009	DRILL_6.3MM_5XD_A	6.300	—	—	—	—	43	91	55	36	53	8
N12152	DRILL_1/4_5XD_A	6.350	1/4	—	—	—	43	91	55	36	53	8
N01012	DRILL_6.4MM_5XD_A	6.400	—	—	—	—	43	91	55	36	53	8
N01013	DRILL_6.5MM_5XD_A	6.500	—	—	—	—	43	91	55	36	53	8
N01014	DRILL_6.6MM_5XD_A	6.600	—	—	UNC5/16-18	—	43	91	55	36	53	8
N01015	DRILL_6.7MM_5XD_A	6.700	—	—	—	—	43	91	55	36	53	8
N12153	DRILL_17/64_5XD_A	6.747	17/64	—	—	—	43	91	55	36	53	8
N01016	DRILL_6.8MM_5XD_A	6.800	—	7H6	M8	—	43	91	55	36	53	8
N01017	DRILL_6.9MM_5XD_A	6.900	—	7H6/7H7	UNF5/16-24	—	43	91	55	36	53	8
N01018	DRILL_7.0MM_5XD_A	7.000	—	—	MF8X1	—	43	91	55	36	53	8
N01019	DRILL_7.1MM_5XD_A	7.100	—	—	—	—	43	91	55	36	53	8
N12154	DRILL_9/32_5XD_A	7.144	9/32	—	—	—	43	91	55	36	53	8
N01022	DRILL_7.2MM_5XD_A	7.200	—	—	MF8X0.75	—	43	91	55	36	53	8
N01023	DRILL_7.3MM_5XD_A	7.300	—	—	—	—	43	91	55	36	53	8
N01024	DRILL_7.4MM_5XD_A	7.400	—	—	—	—	43	91	55	36	53	8
N01025	DRILL_7.5MM_5XD_A	7.500	—	—	—	—	43	91	55	36	53	8
N12155	DRILL_19/64_5XD_A	7.541	19/64	—	—	—	43	91	55	36	53	8

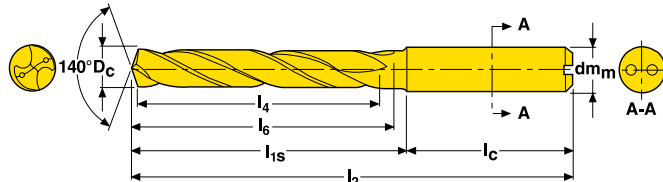
# ND1105A - INTERNAL COOLANT (CONT'D)

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- Cutting Data - Page 319
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ORDER NO.	DESCRIPTION	D <sub>c</sub> m7 (mm)	D <sub>c</sub> m7 (inch)	REAMER SIZE	TAP THREAD TYPE	FORMING TAP	DIMENSIONS IN MM					
							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N01026	DRILL_7.55MM_5XD_A	7.550	—	—	—	MF8	43	91	55	36	53	8
N01027	DRILL_7.6MM_5XD_A	7.600	—	—	—	—	43	91	55	36	53	8
N01028	DRILL_7.7MM_5XD_A	7.700	—	—	—	—	43	91	55	36	53	8
N01029	DRILL_7.8MM_5XD_A	7.800	—	8H6	—	—	43	91	55	36	53	8
N01032	DRILL_7.9MM_5XD_A	7.900	—	8H6/8H7	—	—	43	91	55	36	53	8
N12156	DRILL_5/16_5XD_A	7.938	5/16	—	—	—	43	91	55	36	53	8
N01033	DRILL_8.0MM_5XD_A	8.000	—	—	UNC3/8-16	—	43	91	55	36	53	8
N01034	DRILL_8.1MM_5XD_A	8.100	—	—	—	—	49	103	63	40	61	10
N01035	DRILL_8.2MM_5XD_A	8.200	—	—	—	—	49	103	63	40	61	10
N01036	DRILL_8.3MM_5XD_A	8.300	—	—	—	—	49	103	63	40	61	10
N12157	DRILL_21/64_5XD_A	8.334	21/64	—	—	—	49	103	63	40	61	10
N01037	DRILL_8.4MM_5XD_A	8.400	—	—	NPT1/8 / NPTF1/8	—	49	103	63	40	61	10
N01038	DRILL_8.5MM_5XD_A	8.500	—	—	M10	—	49	103	63	40	61	10
N01039	DRILL_8.6MM_5XD_A	8.600	—	—	—	—	49	103	63	40	61	10
N01042	DRILL_8.7MM_5XD_A	8.700	—	—	—	—	49	103	63	40	61	10
N12158	DRILL_11/32_5XD_A	8.731	11/32	—	—	—	49	103	63	40	61	10
N01043	DRILL_8.8MM_5XD_A	8.800	—	9H6	G1/8 / MF10X1.25	—	49	103	63	40	61	10
N01044	DRILL_8.9MM_5XD_A	8.900	—	9H6/9H7	—	—	49	103	63	40	61	10
N01045	DRILL_9.0MM_5XD_A	9.000	—	—	MF10X1	—	49	103	63	40	61	10
N01046	DRILL_9.1MM_5XD_A	9.100	—	—	—	—	49	103	63	40	61	10
N12159	DRILL_23/64_5XD_A	9.128	23/64	—	—	—	49	103	63	40	61	10
N01047	DRILL_9.2MM_5XD_A	9.200	—	—	MF10X0.75	—	49	103	63	40	61	10
N09239	DRILL_9.3MM_5XD_A	9.300	—	—	—	—	49	103	63	40	61	10
N09242	DRILL_9.4MM_5XD_A	9.400	—	—	UNC7/16-14	—	49	103	63	40	61	10
N09243	DRILL_9.5MM_5XD_A	9.500	—	—	—	—	49	103	63	40	61	10
N12162	DRILL_3/8_5XD_A	9.525	3/8	—	—	—	49	103	63	40	61	10
N09244	DRILL_9.55MM_5XD_A	9.550	—	—	—	MF10	49	103	63	40	61	10
N09245	DRILL_9.6MM_5XD_A	9.600	—	—	—	—	49	103	63	40	61	10
N09246	DRILL_9.7MM_5XD_A	9.700	—	—	—	—	49	103	63	40	61	10
N09247	DRILL_9.8MM_5XD_A	9.800	—	10H6/10H7	—	—	49	103	63	40	61	10
N09249	DRILL_9.9MM_5XD_A	9.900	—	10H6/10H7	UNF7/16-20	—	49	103	63	40	61	10

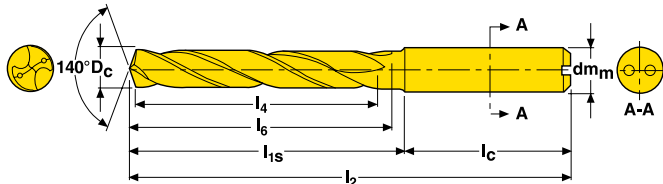
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							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N12163	DRILL_25/64_5XD_A	9.922	25/64	—	—	—	49	103	63	40	61	10
N09252	DRILL_10.0MM_5XD_A	10.000	—	—	—	—	49	103	63	40	61	10
N09253	DRILL_10.1MM_5XD_A	10.100	—	—	—	—	56	118	73	45	71	12
N09254	DRILL_10.2MM_5XD_A	10.200	—	—	M12	—	56	118	73	45	71	12
N09255	DRILL_10.3MM_5XD_A	10.300	—	—	—	—	56	118	73	45	71	12
N12164	DRILL_13/32_5XD_A	10.319	13/32	—	—	—	56	118	73	45	71	12
N09256	DRILL_10.4MM_5XD_A	10.400	—	—	—	—	56	118	73	45	71	12
N09257	DRILL_10.5MM_5XD_A	10.500	—	—	MF12X1.5	—	56	118	73	45	71	12
N09259	DRILL_10.6MM_5XD_A	10.600	—	—	—	—	56	118	73	45	71	12
N09262	DRILL_10.7MM_5XD_A	10.700	—	—	—	—	56	118	73	45	71	12
N12165	DRILL_27/64_5XD_A	10.716	27/64	—	—	—	56	118	73	45	71	12
N09263	DRILL_10.8MM_5XD_A	10.800	—	11H6/11H7	UNC1/2-13 / MF12X1.25	—	56	118	73	45	71	12
N09264	DRILL_10.9MM_5XD_A	10.900	—	11H6/11H7	—	—	56	118	73	45	71	12
N09265	DRILL_11.0MM_5XD_A	11.000	—	—	MF12X1 / NPTF1/4	—	56	118	73	45	71	12
N09266	DRILL_11.1MM_5XD_A	11.100	—	—	NPT1/4	—	56	118	73	45	71	12
N12166	DRILL_7/16_5XD_A	11.113	7/16	—	—	—	56	118	73	45	71	12
N09267	DRILL_11.2MM_5XD_A	11.200	—	—	—	M12	56	118	73	45	71	12
N09269	DRILL_11.3MM_5XD_A	11.300	—	—	—	—	56	118	73	45	71	12
N09272	DRILL_11.4MM_5XD_A	11.400	—	—	—	—	56	118	73	45	71	12
N09273	DRILL_11.5MM_5XD_A	11.500	—	—	UNF1/2-20	—	56	118	73	45	71	12
N12167	DRILL_29/64_5XD_A	11.509	29/64	—	—	—	56	118	73	45	71	12
N09274	DRILL_11.55MM_5XD_A	11.550	—	—	—	MF12	56	118	73	45	71	12
N09275	DRILL_11.6MM_5XD_A	11.600	—	—	—	—	56	118	73	45	71	12
N09276	DRILL_11.7MM_5XD_A	11.700	—	—	—	—	56	118	73	45	71	12
N09277	DRILL_11.8MM_5XD_A	11.800	—	12H6/12H7	G1/4	—	56	118	73	45	71	12
N09279	DRILL_11.9MM_5XD_A	11.900	—	12H6/12H7	—	—	56	118	73	45	71	12
N12168	DRILL_15/32_5XD_A	11.906	15/32	—	—	—	56	118	73	45	71	12
N09282	DRILL_12.0MM_5XD_A	12.000	—	—	M14	—	56	118	73	45	71	12
N09283	DRILL_12.1MM_5XD_A	12.100	—	—	—	—	60	124	79	45	77	14
N09284	DRILL_12.2MM_5XD_A	12.200	—	—	—	—	60	124	79	45	77	14
N09285	DRILL_12.25MM_5XD_A	12.250	—	—	—	—	60	124	79	45	77	14



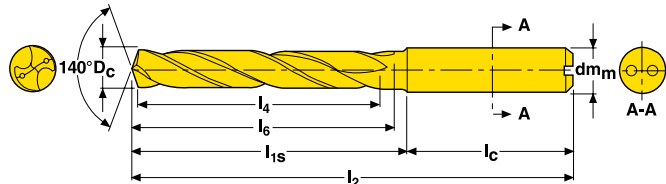
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							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N12169	DRILL_31/64_5XD_A	12.303	31/64	—	—	—	60	124	79	45	77	14
N09286	DRILL_12.4MM_5XD_A	12.400	—	—	—	—	60	124	79	45	77	14
N09287	DRILL_12.5MM_5XD_A	12.500	—	—	MF14X1.5	—	60	124	79	45	77	14
N09289	DRILL_12.6MM_5XD_A	12.600	—	—	—	—	60	124	79	45	77	14
N12172	DRILL_1/2_5XD_A	12.700	1/2	—	—	—	60	124	79	45	77	14
N09292	DRILL_12.75MM_5XD_A	12.750	—	—	—	—	60	124	79	45	77	14
N09293	DRILL_12.8MM_5XD_A	12.800	—	13H6/13H7	MF14X1.25	—	60	124	79	45	77	14
N09294	DRILL_12.9MM_5XD_A	12.900	—	13H6/13H7	—	—	60	124	79	45	77	14
N09295	DRILL_13.0MM_5XD_A	13.000	—	—	MF14X1	—	60	124	79	45	77	14
N09296	DRILL_33/64_5XD_A	13.100	33/64	—	—	M14	60	124	79	45	77	14
N09297	DRILL_13.2MM_5XD_A	13.200	—	—	—	—	60	124	79	45	77	14
N09299	DRILL_13.3MM_5XD_A	13.300	—	—	—	—	60	124	79	45	77	14
N09302	DRILL_13.4MM_5XD_A	13.400	—	—	—	—	60	124	79	45	77	14
N12173	DRILL_17/32_5XD_A	13.494	17/32	—	—	—	60	124	79	45	77	14
N09303	DRILL_13.5MM_5XD_A	13.500	—	—	—	—	60	124	79	45	77	14
N09304	DRILL_13.6MM_5XD_A	13.600	—	—	—	—	60	124	79	45	77	14
N09305	DRILL_13.7MM_5XD_A	13.700	—	—	—	—	60	124	79	45	77	14
N09306	DRILL_13.8MM_5XD_A	13.800	—	14H6/14H7	—	—	60	124	79	45	77	14
N09307	DRILL_35/64_5XD_A	13.890	35/64	14H6/14H7	—	—	60	124	79	45	77	14
N09309	DRILL_14.0MM_5XD_A	14.000	—	—	M16	—	60	124	79	45	77	14
N09313	DRILL_14.1MM_5XD_A	14.100	—	—	—	—	63	133	85	48	83	16
N09316	DRILL_14.2MM_5XD_A	14.200	—	—	—	—	63	133	85	48	83	16
N12174	DRILL_9/16_5XD_A	14.288	9/16	—	—	—	63	133	85	48	83	16
N09317	DRILL_14.3MM_5XD_A	14.300	—	—	NPT3/8 / NPTF3/8	—	63	133	85	48	83	16
N09319	DRILL_14.4MM_5XD_A	14.400	—	—	—	—	63	133	85	48	83	16
N09323	DRILL_14.5MM_5XD_A	14.500	—	—	MF16X1.5 / UNF5/8-18	—	63	133	85	48	83	16
N09326	DRILL_14.6MM_5XD_A	14.600	—	—	—	—	63	133	85	48	83	16
N09353	DRILL_37/64_5XD_A	14.680	37/64	—	—	—	63	133	85	48	83	16
N10398	DRILL_14.75MM_5XD_A	14.750	—	—	—	—	63	133	85	48	83	16
N11428	DRILL_14.8MM_5XD_A	14.800	—	15H6/15H7	—	—	63	133	85	48	83	16
N11460	DRILL_14.9MM_5XD_A	14.900	—	15H6/15H7	—	—	63	133	85	48	83	16

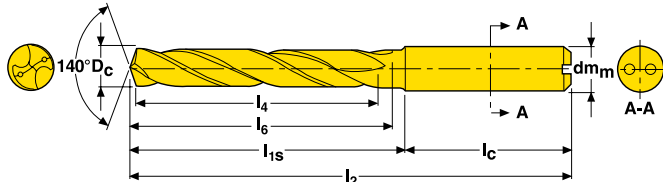
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							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N11929	DRILL_15.0MM_5XD_A	15.000	—	—	MF16X1	—	63	133	85	48	83	16
N12077	DRILL_19/32_5XD_A	15.080	19/32	—	—	M16	63	133	85	48	83	16
N12078	DRILL_15.2MM_5XD_A	15.200	—	—	—	—	63	133	85	48	83	16
N12079	DRILL_15.3MM_5XD_A	15.300	—	—	—	—	63	133	85	48	83	16
N12082	DRILL_15.4MM_5XD_A	15.400	—	—	—	—	63	133	85	48	83	16
N12083	DRILL_39/64_5XD_A	15.480	39/64	—	M18	—	63	133	85	48	83	16
N12084	DRILL_15.6MM_5XD_A	15.600	—	—	—	—	63	133	85	48	83	16
N12085	DRILL_15.7MM_5XD_A	15.700	—	—	—	—	63	133	85	48	83	16
N12086	DRILL_15.8MM_5XD_A	15.800	—	16H6/16H7	—	—	63	133	85	48	83	16
N12175	DRILL_5/8_5XD_A	15.875	5/8	16H6/16H7	—	—	63	133	85	48	83	16
N12087	DRILL_15.9MM_5XD_A	15.900	—	16H6/16H7	—	—	63	133	85	48	83	16
N12088	DRILL_16.0MM_5XD_A	16.000	—	—	—	—	63	133	85	48	83	16
N12089	DRILL_16.1MM_5XD_A	16.100	—	—	—	—	71	143	95	48	93	18
N12092	DRILL_16.2MM_5XD_A	16.200	—	—	—	—	71	143	95	48	93	18
N12093	DRILL_41/64_5XD_A	16.270	41/64	—	—	—	71	143	95	48	93	18
N12094	DRILL_16.4MM_5XD_A	16.400	—	—	—	—	71	143	95	48	93	18
N12095	DRILL_16.5MM_5XD_A	16.500	—	—	MF18X1.5	—	71	143	95	48	93	18
N12096	DRILL_16.6MM_5XD_A	16.600	—	—	—	—	71	143	95	48	93	18
N12097	DRILL_21/32_5XD_A	16.670	21/32	—	—	—	71	143	95	48	93	18
N12098	DRILL_16.75MM_5XD_A	16.750	—	—	—	—	71	143	95	48	93	18
N12099	DRILL_16.8MM_5XD_A	16.800	—	17H6/17H7	—	—	71	143	95	48	93	18
N12102	DRILL_16.9MM_5XD_A	16.900	—	17H6/17H7	—	—	71	143	95	48	93	18
N12103	DRILL_17.0MM_5XD_A	17.000	—	—	MF18X1	—	71	143	95	48	93	18
N12104	DRILL_43/64_5XD_A	17.070	43/64	—	—	—	71	143	95	48	93	18
N12105	DRILL_17.2MM_5XD_A	17.200	—	—	—	—	71	143	95	48	93	18
N12106	DRILL_17.3MM_5XD_A	17.300	—	—	—	—	71	143	95	48	93	18
N12107	DRILL_17.4MM_5XD_A	17.400	—	—	—	—	71	143	95	48	93	18
N12108	DRILL_11/16_5XD_A	17.460	11/16	—	M20	—	71	143	95	48	93	18
N12109	DRILL_17.6MM_5XD_A	17.600	—	—	NPTF1/2	—	71	143	95	48	93	18
N12112	DRILL_17.7MM_5XD_A	17.700	—	—	—	—	71	143	95	48	93	18

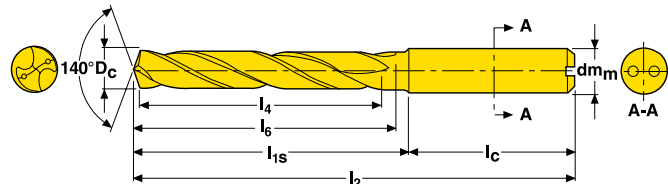
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							l4	l2	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N12113	DRILL_17.8MM_5XD_A	17.800	—	18H6/18H7	—	—	71	143	95	48	93	18
N12114	DRILL_45/64_5XD_A	17.860	45/64	18H6/18H7	NPT1/2	—	71	143	95	48	93	18
N12115	DRILL_18.0MM_5XD_A	18.000	—	—	—	—	71	143	95	48	93	18
N12116	DRILL_18.1MM_5XD_A	18.100	—	—	—	—	77	153	103	50	101	20
N12117	DRILL_18.2MM_5XD_A	18.200	—	—	—	—	77	153	103	50	101	20
N12118	DRILL_23/32_5XD_A	18.260	23/32	—	—	—	77	153	103	50	101	20
N12119	DRILL_18.4MM_5XD_A	18.400	—	—	—	—	77	153	103	50	101	20
N12122	DRILL_18.5MM_5XD_A	18.500	—	—	MF20X1.5	—	77	153	103	50	101	20
N12123	DRILL_18.6MM_5XD_A	18.600	—	—	—	—	77	153	103	50	101	20
N12124	DRILL_47/64_5XD_A	18.650	47/64	—	—	—	77	153	103	50	101	20
N12125	DRILL_18.8MM_5XD_A	18.800	—	19H6/19H7	—	—	77	153	103	50	101	20
N12126	DRILL_18.9MM_5XD_A	18.900	—	19H6/19H7	—	M20	77	153	103	50	101	20
N12127	DRILL_19.0MM_5XD_A	19.000	—	—	G1/2 / MF20X1	—	77	153	103	50	101	20
N12176	DRILL_3/4_5XD_A	19.050	3/4	—	—	—	77	153	103	50	101	20
N12128	DRILL_19.1MM_5XD_A	19.100	—	—	—	—	77	153	103	50	101	20
N12129	DRILL_19.2MM_5XD_A	19.200	—	—	—	—	77	153	103	50	101	20
N12132	DRILL_19.3MM_5XD_A	19.300	—	—	—	—	77	153	103	50	101	20
N12133	DRILL_19.4MM_5XD_A	19.400	—	—	—	—	77	153	103	50	101	20
N12134	DRILL_49/64_5XD_A	19.450	49/64	—	M22	—	77	153	103	50	101	20
N12135	DRILL_19.6MM_5XD_A	19.600	—	—	—	—	77	153	103	50	101	20
N12136	DRILL_19.7MM_5XD_A	19.700	—	—	—	—	77	153	103	50	101	20
N12137	DRILL_19.8MM_5XD_A	19.800	—	20H6/20H7	—	—	77	153	103	50	101	20
N12138	DRILL_25/32_5XD_A	19.840	25/32	20H6/20H7	—	—	77	153	103	50	101	20
N12139	DRILL_20.0MM_5XD_A	20.000	—	—	—	—	77	153	103	50	101	20

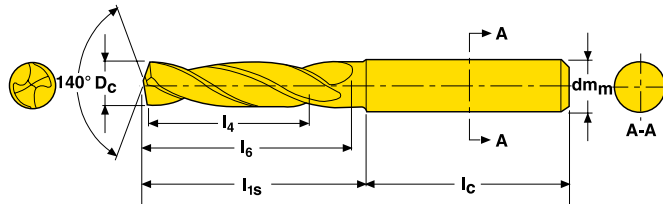
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							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N00963	DRILL_3.0MM_3XD	3.000	—	—	—	—	14	62	26	36	20	6
N00724	DRILL_3.1MM_3XD	3.100	—	—	—	—	14	62	26	36	20	6
N00926	DRILL_1/8_3XD	3.175	1/8	—	—	—	14	62	26	36	20	6
N00725	DRILL_3.2MM_3XD	3.200	—	—	—	—	14	62	26	36	20	6
N00726	DRILL_3.25MM_3XD	3.250	—	—	—	M3.5	14	62	26	36	20	6
N00727	DRILL_3.3MM_3XD	3.300	—	—	M4	—	14	62	26	36	20	6
N00728	DRILL_3.4MM_3XD	3.400	—	—	—	—	14	62	26	36	20	6
N00729	DRILL_3.5MM_3XD	3.500	—	—	UNC8-32 / MF4X0.5 / UNF8-36	—	14	62	26	36	20	6
N00927	DRILL_9/64_3XD	3.572	9/64	—	—	—	14	62	26	36	20	6
N00732	DRILL_3.6MM_3XD	3.600	—	—	—	—	14	62	26	36	20	6
N00733	DRILL_3.65MM_3XD	3.650	—	—	—	—	14	62	26	36	20	6
N00734	DRILL_3.7MM_3XD	3.700	—	—	M4.5	M4	14	62	26	36	20	6
N00735	DRILL_3.8MM_3XD	3.800	—	—	—	—	17	66	30	36	24	6
N00736	DRILL_3.9MM_3XD	3.900	—	4H7	UNC10-24	—	17	66	30	36	24	6
N00928	DRILL_5/32_3XD	3.969	5/32	—	—	—	17	66	30	36	24	6
N00737	DRILL_4.0MM_3XD	4.000	—	—	—	—	17	66	30	36	24	6
N00738	DRILL_4.1MM_3XD	4.100	—	—	UNF10-32	—	17	66	30	36	24	6
N00739	DRILL_4.2MM_3XD	4.200	—	—	M5	—	17	66	30	36	24	6
N00742	DRILL_4.3MM_3XD	4.300	—	—	—	—	17	66	30	36	24	6
N00929	DRILL_11/64_3XD	4.366	11/64	—	—	—	17	66	30	36	24	6
N00743	DRILL_4.4MM_3XD	4.400	—	—	UNC12-24 / MF5X0.5	—	17	66	30	36	24	6
N00744	DRILL_4.5MM_3XD	4.500	—	—	UNC12-24 / MF5X0.5	—	17	66	30	36	24	6
N00745	DRILL_4.6MM_3XD	4.600	—	—	—	M5	17	66	30	36	24	6
N00746	DRILL_4.65MM_3XD	4.650	—	—	—	M5	17	66	30	36	24	6
N00747	DRILL_4.7MM_3XD	4.700	—	—	—	—	17	66	30	36	24	6
N00932	DRILL_3/16_3XD	4.763	3/16	—	—	MF5	20	66	30	36	28	6
N00748	DRILL_4.8MM_3XD	4.800	—	—	—	MF5	20	66	30	36	28	6
N00749	DRILL_4.9MM_3XD	4.900	—	5H7	M6	—	20	66	30	36	28	6
N00964	DRILL_5.0MM_3XD	5.000	—	—	UNC1/4-20	—	20	66	30	36	28	6
N00752	DRILL_5.1MM_3XD	5.100	—	—	UNC1/4-20	—	20	66	30	36	28	6
N00933	DRILL_13/64_3XD	5.159	13/64	—	MF6X0.75	—	20	66	30	36	28	6
N00753	DRILL_5.2MM_3XD	5.200	—	—	MF6X0.75	—	20	66	30	36	28	6

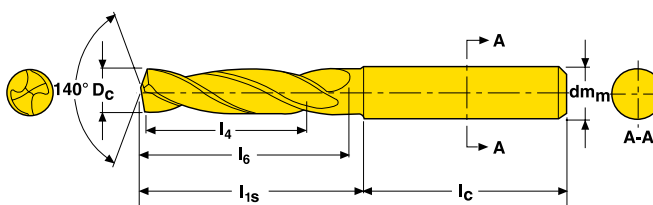
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							L <sub>4</sub>	L <sub>2</sub>	L <sub>1s</sub>	L <sub>c</sub>	L <sub>6</sub>	dm <sub>m</sub> h6
N00754	DRILL_5.3MM_3XD	5.300	—	—	—	—	20	66	30	36	28	6
N00755	DRILL_5.4MM_3XD	5.400	—	—	UNF1/4-28	—	20	66	30	36	28	6
N00756	DRILL_5.5MM_3XD	5.500	—	—	UNF1/4-28	—	20	66	30	36	28	6
N00757	DRILL_5.55MM_3XD	5.550	—	—	—	M6	20	66	30	36	28	6
N00934	DRILL_7/32_3XD	5.556	7/32	—	—	—	20	66	30	36	28	6
N00758	DRILL_5.6MM_3XD	5.600	—	—	—	—	20	66	30	36	28	6
N00759	DRILL_5.7MM_3XD	5.700	—	—	—	—	20	66	30	36	28	6
N00762	DRILL_5.8MM_3XD	5.800	—	6H6	—	—	20	66	30	36	28	6
N00763	DRILL_5.9MM_3XD	5.900	—	6H6/6H7	—	—	20	66	30	36	28	6
N00935	DRILL_15/64_3XD	5.953	15/64	—	M7	—	20	66	30	36	28	6
N00764	DRILL_6.0MM_3XD	6.000	—	—	NPTF1/16	—	20	66	30	36	28	6
N00765	DRILL_6.1MM_3XD	6.100	—	—	NPTF1/16	—	24	79	43	36	34	8
N00766	DRILL_6.2MM_3XD	6.200	—	—	—	—	24	79	43	36	34	8
N00767	DRILL_6.3MM_3XD	6.300	—	—	—	—	24	79	43	36	34	8
N00936	DRILL_1/4_3XD	6.350	1/4	—	—	—	24	79	43	36	34	8
N00787	DRILL_6.4MM_3XD	6.400	—	—	—	—	24	79	43	36	34	8
N00788	DRILL_6.5MM_3XD	6.500	—	—	UNC5/16-18	—	24	79	43	36	34	8
N00804	DRILL_6.6MM_3XD	6.600	—	—	UNC5/16-18	—	24	79	43	36	34	8
N00937	DRILL_17/64_3XD	6.747	17/64	—	—	—	24	79	43	36	34	8
N00805	DRILL_6.8MM_3XD	6.800	—	7H6	M8	—	24	79	43	36	34	8
N00806	DRILL_6.9MM_3XD	6.900	—	7H6/7H7	UNF5/16-24	—	24	79	43	36	34	8
N00807	DRILL_7.0MM_3XD	7.000	—	—	MF8X1	—	24	79	43	36	34	8
N00808	DRILL_7.1MM_3XD	7.100	—	—	—	—	29	79	43	36	41	8
N00938	DRILL_9/32_3XD	7.144	9/32	—	—	—	29	79	43	36	41	8
N00809	DRILL_7.2MM_3XD	7.200	—	—	MF8X0.75	—	29	79	43	36	41	8
N00814	DRILL_7.3MM_3XD	7.300	—	—	—	—	29	79	43	36	41	8
N00815	DRILL_7.4MM_3XD	7.400	—	—	—	—	29	79	43	36	41	8
N00816	DRILL_7.5MM_3XD	7.500	—	—	—	—	29	79	43	36	41	8
N00939	DRILL_19/64_3XD	7.541	19/64	—	—	—	29	79	43	36	41	8
N00817	DRILL_7.55MM_3XD	7.550	—	—	—	MF8	29	79	43	36	41	8
N00818	DRILL_7.6MM_3XD	7.600	—	—	—	—	29	79	43	36	41	8
N00819	DRILL_7.7MM_3XD	7.700	—	—	—	—	29	79	43	36	41	8

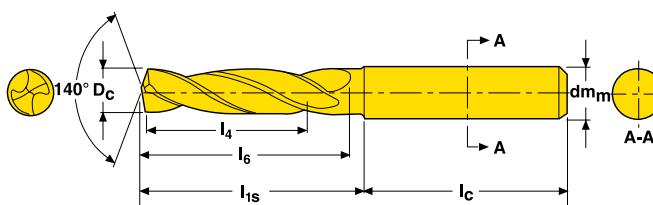
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							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N00824	DRILL_7.8MM_3XD	7.800	—	8H6	—	—	29	79	43	36	41	8
N00825	DRILL_7.9MM_3XD	7.900	—	—	—	—	29	79	43	36	41	8
N00942	DRILL_5/16_3XD	7.938	5/16	—	—	—	29	79	43	36	41	8
N00826	DRILL_8.0MM_3XD	8.000	—	—	UNC3/8-16	—	29	79	43	36	41	8
N00827	DRILL_8.1MM_3XD	8.100	—	—	—	—	35	89	49	40	47	10
N00828	DRILL_8.2MM_3XD	8.200	—	—	—	—	35	89	49	40	47	10
N00829	DRILL_8.3MM_3XD	8.300	—	—	—	—	35	89	49	40	47	10
N00943	DRILL_21/64_3XD	8.334	21/64	—	—	—	35	89	49	40	47	10
N00834	DRILL_8.4MM_3XD	8.400	—	—	NPT1/8 / NPTF1/8	—	35	89	49	40	47	10
N00835	DRILL_8.5MM_3XD	8.500	—	—	M10	—	35	89	49	40	47	10
N00836	DRILL_8.6MM_3XD	8.600	—	—	—	—	35	89	49	40	47	10
N00837	DRILL_8.7MM_3XD	8.700	—	—	—	—	35	89	49	40	47	10
N00944	DRILL_11/32_3XD	8.731	11/32	—	—	—	35	89	49	40	47	10
N00838	DRILL_8.8MM_3XD	8.800	—	9H6	G1/8 / MF10X1.25	—	35	89	49	40	47	10
N00839	DRILL_8.9MM_3XD	8.900	—	9H6/9H7	—	—	35	89	49	40	47	10
N00842	DRILL_9.0MM_3XD	9.000	—	—	MF10X1	—	35	89	49	40	47	10
N00843	DRILL_9.1MM_3XD	9.100	—	—	—	—	35	89	49	40	47	10
N00945	DRILL_23/64_3XD	9.128	23/64	—	—	—	35	89	49	40	47	10
N00844	DRILL_9.2MM_3XD	9.200	—	—	MF10X0.75	—	35	89	49	40	47	10
N00845	DRILL_9.3MM_3XD	9.300	—	—	—	—	35	89	49	40	47	10
N00846	DRILL_9.4MM_3XD	9.400	—	—	UNC7/16-14	—	35	89	49	40	47	10
N00847	DRILL_9.5MM_3XD	9.500	—	—	—	—	35	89	49	40	47	10
N00946	DRILL_3/8_3XD	9.525	3/8	—	—	—	35	89	49	40	47	10
N00848	DRILL_9.55MM_3XD	9.550	—	—	—	MF10	35	89	49	40	47	10
N00849	DRILL_9.6MM_3XD	9.600	—	—	—	—	35	89	49	40	47	10
N00852	DRILL_9.7MM_3XD	9.700	—	—	—	—	35	89	49	40	47	10
N00853	DRILL_9.8MM_3XD	9.800	—	10H6/10H7	—	—	35	89	49	40	47	10
N00854	DRILL_9.9MM_3XD	9.900	—	10H6/10H7	UNF7/16-20	—	35	89	49	40	47	10
N00947	DRILL_25/64_3XD	9.922	25/64	—	—	—	35	89	49	40	47	10
N00855	DRILL_10.0MM_3XD	10.000	—	—	—	—	35	89	49	40	47	10
N00856	DRILL_10.2MM_3XD	10.200	—	—	M12	—	40	102	57	45	55	12
N00948	DRILL_13/32_3XD	10.319	13/32	—	—	—	40	102	57	45	55	12
N00857	DRILL_10.4MM_3XD	10.400	—	—	—	—	40	102	57	45	55	12

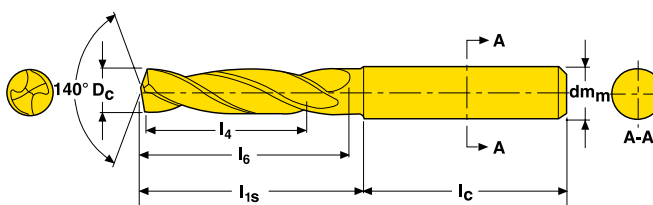
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							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N00858	DRILL_10.5MM_3XD	10.500	—	—	MF12X1.5	—	40	102	57	45	55	12
N00859	DRILL_10.6MM_3XD	10.600	—	—	—	—	40	102	57	45	55	12
N00949	DRILL_27/64_3XD	10.716	27/64	—	—	—	40	102	57	45	55	12
N00862	DRILL_10.8MM_3XD	10.800	—	11H6/11H7	UNC1/2-13 / MF12X1.25	—	40	102	57	45	55	12
N00863	DRILL_10.9MM_3XD	10.900	—	11H6/11H7	—	—	40	102	57	45	55	12
N00864	DRILL_11.0MM_3XD	11.000	—	—	MF12X1 / NPTF1/4	—	40	102	57	45	55	12
N00865	DRILL_11.1MM_3XD	11.100	—	—	NPT1/4	—	40	102	57	45	55	12
N00952	DRILL_7/16_3XD	11.113	7/16	—	—	—	40	102	57	45	55	12
N00866	DRILL_11.2MM_3XD	11.200	—	—	—	M12	40	102	57	45	55	12
N00867	DRILL_11.3MM_3XD	11.300	—	—	—	—	40	102	57	45	55	12
N00868	DRILL_11.4MM_3XD	11.400	—	—	—	—	40	102	57	45	55	12
N00869	DRILL_11.5MM_3XD	11.500	—	—	UNF1/2-20	—	40	102	57	45	55	12
N00953	DRILL_29/64_3XD	11.509	29/64	—	—	—	40	102	57	45	55	12
N00872	DRILL_11.55MM_3XD	11.550	—	—	—	MF12	40	102	57	45	55	12
N00873	DRILL_11.6MM_3XD	11.600	—	—	—	—	40	102	57	45	55	12
N00874	DRILL_11.7MM_3XD	11.700	—	—	—	—	40	102	57	45	55	12
N00875	DRILL_11.8MM_3XD	11.800	—	12H6/12H7	G1/4	—	40	102	57	45	55	12
N00876	DRILL_11.9MM_3XD	11.900	—	12H6/12H7	—	—	40	102	57	45	55	12
N00954	DRILL_15/32_3XD	11.906	15/32	—	—	—	40	102	57	45	55	12
N00877	DRILL_12.0MM_3XD	12.000	—	—	M14	—	40	102	57	45	55	12
N00965	DRILL_12.1MM_3XD	12.100	—	—	—	—	43	107	62	45	60	14
N00878	DRILL_12.2MM_3XD	12.200	—	—	—	—	43	107	62	45	60	14
N00955	DRILL_31/64_3XD	12.303	31/64	—	—	—	43	107	62	45	60	14
N00879	DRILL_12.4MM_3XD	12.400	—	—	—	—	43	107	62	45	60	14
N00882	DRILL_12.5MM_3XD	12.500	—	—	MF14X1.5	—	43	107	62	45	60	14
N00883	DRILL_12.6MM_3XD	12.600	—	—	—	—	43	107	62	45	60	14
N00956	DRILL_1/2_3XD	12.700	1/2	—	—	—	43	107	62	45	60	14
N00884	DRILL_12.75MM_3XD	12.750	—	—	—	—	43	107	62	45	60	14
N00885	DRILL_12.8MM_3XD	12.800	—	13H6/13H7	MF14X1.25	—	43	107	62	45	60	14
N00886	DRILL_12.9MM_3XD	12.900	—	13H6/13H7	—	—	43	107	62	45	60	14
N00887	DRILL_13.0MM_3XD	13.000	—	—	MF14X1	—	43	107	62	45	60	14
N00888	DRILL_33/64_3XD	13.100	33/64	—	—	M14	43	107	62	45	60	14
N00889	DRILL_13.2MM_3XD	13.200	—	—	—	—	43	107	62	45	60	14

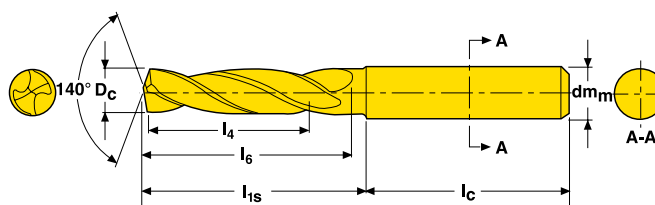
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							l <sub>4</sub>	l <sub>2</sub>	l <sub>1s</sub>	l <sub>c</sub>	l <sub>6</sub>	dm <sub>m</sub> h6
N00892	DRILL_13.3MM_3XD	13.300	—	—	—	—	43	107	62	45	60	14
N00893	DRILL_13.4MM_3XD	13.400	—	—	—	—	43	107	62	45	60	14
N00957	DRILL_17/32_3XD	13.494	17/32	—	—	—	43	107	62	45	60	14
N00894	DRILL_13.5MM_3XD	13.500	—	—	—	—	43	107	62	45	60	14
N00895	DRILL_13.6MM_3XD	13.600	—	—	—	—	43	107	62	45	60	14
N00896	DRILL_13.7MM_3XD	13.700	—	—	—	—	43	107	62	45	60	14
N00897	DRILL_13.8MM_3XD	13.800	—	14H6/14H7	—	—	43	107	62	45	60	14
N00898	DRILL_35/64_3XD	13.890	35/64	14H6/14H7	—	—	43	107	62	45	60	14
N00899	DRILL_14.0MM_3XD	14.000	—	—	—	—	43	107	62	45	60	14
N00902	DRILL_14.2MM_3XD	14.200	—	—	—	M16	45	115	67	48	65	16
N00958	DRILL_9/16_3XD	14.288	9/16	—	—	—	45	115	67	48	65	16
N00903	DRILL_14.5MM_3XD	14.500	—	—	MF16X1.5 / UNF5/8-18	—	45	115	67	48	65	16
N00904	DRILL_37/64_3XD	14.680	37/64	—	—	—	45	115	67	48	65	16
N00905	DRILL_14.75MM_3XD	14.750	—	—	—	—	45	115	67	48	65	16
N00906	DRILL_14.8MM_3XD	14.800	—	15H6/15H7	—	—	45	115	67	48	65	16
N00907	DRILL_15.0MM_3XD	15.000	—	—	MF16X1	—	45	115	67	48	65	16
N00908	DRILL_15.1MM_3XD	15.100	—	—	—	M16	45	115	67	48	65	16
N00909	DRILL_15.3MM_3XD	15.300	—	—	—	—	45	115	67	48	65	16
N00912	DRILL_39/64_3XD	15.480	39/64	—	M18	—	45	115	67	48	65	16
N00913	DRILL_15.7MM_3XD	15.700	—	—	—	—	45	115	67	48	65	16
N00914	DRILL_15.8MM_3XD	15.800	—	16H6/16H7	—	—	45	115	67	48	65	16
N00959	DRILL_5/8_3XD	15.875	5/8	16H6/16H7	—	—	45	115	67	48	65	16
N00915	DRILL_16.0MM_3XD	16.000	—	—	—	—	45	115	67	48	65	16
N00916	DRILL_16.5MM_3XD	16.500	—	—	MF18X1.5	—	51	123	75	48	73	18
N00917	DRILL_17.0MM_3XD	17.000	—	—	MF18X1	—	51	123	75	48	73	18
N00918	DRILL_11/16_3XD	17.460	11/16	—	M20	—	51	123	75	48	73	18
N00919	DRILL_18.0MM_3XD	18.000	—	—	—	—	51	123	75	48	73	18
N00922	DRILL_18.5MM_3XD	18.500	—	—	MF20X1.5	—	55	131	81	50	79	20
N00923	DRILL_19.0MM_3XD	19.000	—	—	G1/2 / MF20X1	—	55	131	81	50	79	20
N00962	DRILL_3/4_3XD	19.050	3/4	—	—	—	55	131	81	50	79	20
N00924	DRILL_49/64_3XD	19.447	49/64	—	M22	—	55	131	81	50	79	20
N00925	DRILL_20.0MM_3XD	20.000	—	—	—	—	55	131	81	50	79	20



## ND110X – Ø 0.118-0.787 - START VALUES

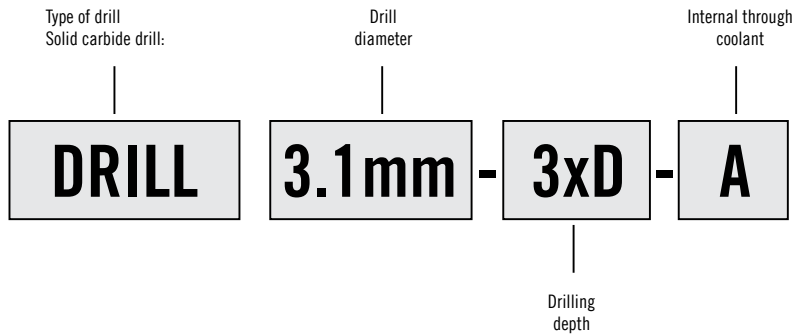
ISO GROUP	SMG	Recommended cutting speed Vc (sf/min)		Recommended feed f, (in/rev)									
		External Coolant Supply	Internal Coolant Supply	.118	.157	.236	.315	.394	.472	.551	.630	.709	.787
P	1	322	413	.0045	.0055	.0065	.0090	.0110	.0115	.0135	.0145	.0155	.0155
	2 - 3	231	368	.0045	.0055	.0065	.0090	.0110	.0115	.0135	.0145	.0155	.0155
	4 - 5	231	298	.0045	.0055	.0065	.0080	.0100	.0110	.0125	.0135	.0135	.0135
	6	186	231	.0035	.0045	.0055	.0070	.0080	.0090	.0110	.0115	.0115	.0115
H	7	140	186	.0025	.0035	.0045	.0055	.0065	.0070	.0080	.0090	.0100	.0100
M	8 - 9	140	186	.0025	.0025	.0035	.0045	.0055	.0065	.0070	.0070	.0070	.0080
K	12	252	322	.0065	.0070	.0090	.0115	.0145	.0155	.0180	.0190	.0200	.0205
	13 - 14	231	277	.0055	.0070	.0080	.0110	.0125	.0135	.0160	.0170	.0170	.0180
	15	161	207	.0035	.0035	.0045	.0065	.0070	.0080	.0090	.0100	.0100	.0100

SMG = Seco Material Group  
 n [min-1] = RPM  
 v<sub>c</sub> (sf/min) = Surface feet/min

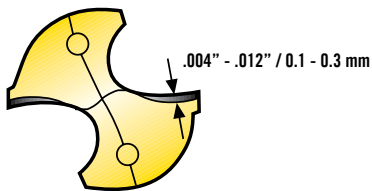
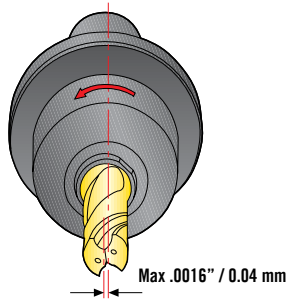
f<sub>z</sub> [in] = Feed/tooth  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter  
 v<sub>f</sub> [in/min] = Feed rate  
 a<sub>p</sub>/D<sub>c</sub> = % of diameter

A = Air    D = Dry    E = Emulsion (flood coolant)    M = Mist  
 All cutting data are start values. All cutting data is in inch values.  
 Please reference the Workpiece Material Classification chart located on page 15.

## CODE KEY NIAGARA CUTTER UNIVERSAL



## SET UP



### HOLDING/RUN-OUT

Drills with cylindrical shanks can be used with Shrinkfit holders, hydraulic chucks or collet chucks. For best results keep run-out < .0008" / .02 mm. Keep the total indicated run-out of the drill within Max .0016" / .04 mm.

### STABILITY

The stability of the application is important to obtain the best tool life and hole accuracy. Check the condition of the machine spindle, fixture and fixturing of the component to secure maximum stability and rigidity. Unstable conditions can cause tool breakages.

### TOOL LIFE

Drills should not be used with flank wear exceeding .004" - .012" / 0.1 - 0.3 mm measured at the largest point.

### RECOMMENDED TOOL HOLDERS

For best result use holders:

Type 5603 - Shrinkfit holders, DIN type

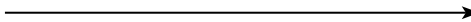
Type 5834 - Hydraulic chucks

Type 5672 - High precision collet chucks

For more information see EPB Tooling systems catalog

### SHRINKFIT HOLDER

(For cylindrical, R1 shanks only)



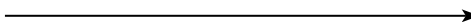
### HYDRAULIC CHUCK

(For cylindrical, -R1 shanks only)



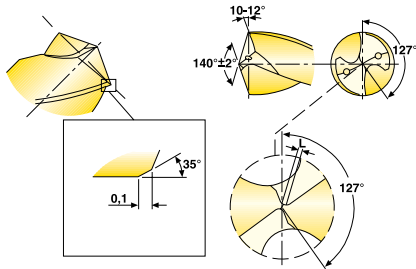
### HIGH PRECISION COLLET CHUCKS

(For cylindrical, -R1 shanks only)



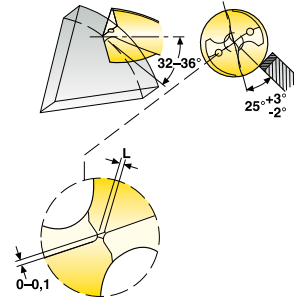
## REGRINDING INSTRUCTIONS

### 1. FOUR FACET POINT



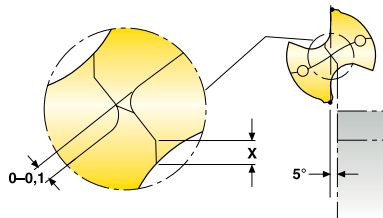
Lip height distance (axial run-out) to be within 0.02 mm

### 2. WEB THINNING



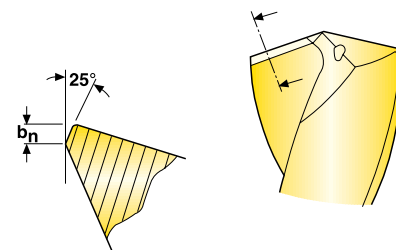
Drill $\varnothing D_c$ (mm)	L (mm)
2-10	0.1-0.3
10-20	0.2-0.4

### 3. GRINDING OF FLAT X



$$X = 0,08 \times \text{drill diameter } D_c$$

### 4. EDGE PREPARATION



Workpiece material	$b_n$ (mm)	
	Drill $\varnothing \leq 10$ (mm)	Drill $\varnothing > 10$ (mm)
Steel	0.05	0.10
Stainless steel	0.05	0.05
Cast iron	0.05	0.10

Max. allowed flank wear before regrinding is 0.1-0.3 mm / .004"-0.012" measured at the largest point.

## SPECIFICATIONS

Proposed specification of diamond wheels:


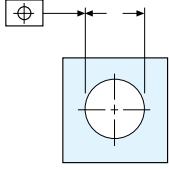
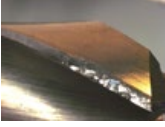
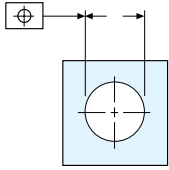

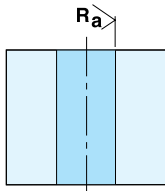

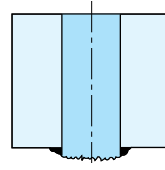

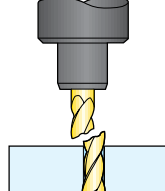
- Conical clearance: Wheel shape 12A2 Grit size D54 (picture 1)
- Gashing: Wheel shape 1A1 or 1V1 Grit size D64-D46 (picture 2-3)
- Corner chamfer: Wheel shape 1A1 or 12A2 (picture 1)
- Edge treatment: grinding K-land or brushing (picture 4)

## IMPORTANT:

- The cutting edges must be uniform and have the same size of edge preparation
- The edge preparation must be applied on the whole length of the cutting edges

## TROUBLESHOOTING – INITIAL CHECK POINTS

- Fixturing stability
- Machine spindle condition
- Tool holder condition
- Clamping of tool:
  - Run-out within .02 mm / .0008" TIR
  - If using pre drilling within .04 mm / .0016" TIR
- Chip evacuation:
  - Cutting data
- Coolant:
  - Pressure
  - Flow
  - Concentration

RAPID FLANK WEAR	UNSATISFACTORY DIAMETER TOLERANCE
<ul style="list-style-type: none"> <li>• Reduce the cutting speed</li> <li>• Increase coolant concentration</li> </ul> 	<ul style="list-style-type: none"> <li>• Increase the feed/rev</li> <li>• Use a reaming operation</li> <li>• Use a boring operation</li> </ul> 
WEAR / PERIPHERY LAND	UNSATISFACTORY POSITIONING OF THE HOLE
<ul style="list-style-type: none"> <li>• Reduce the cutting speed</li> <li>• Increase coolant concentration</li> </ul> 	<ul style="list-style-type: none"> <li>• Reduce feed/rev on entrance / Reduce feed/rev</li> <li>• Use a boring operation</li> <li>• If drilling through rough, hard and angled surfaces - reduce the feed by 30%-50% during entrance and exit</li> <li>• Center drill with a 140° point angle</li> </ul> 
CHIPPING / CENTER	UNSATISFACTORY SURFACE FINISH
<ul style="list-style-type: none"> <li>• Reduce feed during entrance</li> <li>• Increase coolant pressure and adjust the feed to optimize the chip formation</li> </ul> 	<ul style="list-style-type: none"> <li>• Reduce the feed/rev</li> <li>• Increase the cutting speed</li> <li>• Use a reaming operation</li> </ul> 
CHIPPING / OUTER CORNER, CUTTING EDGE	BURRS ON EXIT
<ul style="list-style-type: none"> <li>• Reduce feed during entrance/exit</li> <li>• Reduce the cutting speed</li> <li>• Increase coolant concentration</li> <li>• Regrind the drill</li> </ul> 	<ul style="list-style-type: none"> <li>• Reduce the feed/rev. on exit</li> <li>• Reduce the width of edge preparation (<math>b_n</math>)</li> </ul> 
BUILT-UP EDGE	BREAKAGE ON CONTACT / AT HOLE BOTTOM
<ul style="list-style-type: none"> <li>• If closer to the periphery increase the cutting speed</li> <li>• If closer to center increase feed/rev</li> <li>• If the drill is worn, regrind it</li> </ul> 	<ul style="list-style-type: none"> <li>• Reduce the feed/rev. during entrance/exit</li> <li>• Adjust cutting data for improved chip evacuation</li> </ul> 

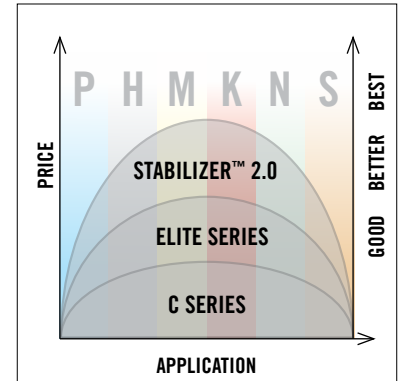
We can help you to increase your productivity, enhance your performance and reduce your costs with the range of products we offer that cover the full spectrum of application and performance requirements. Although every situation is different, we can make some general suggestions on tool selection, per material and machining application. You will need to assess every opportunity and decide which tool is the best fit for your requirements.

## PROVIDING SOLUTIONS FOR ANY APPLICATION

Stabilizer™ series tools provide high performance in the general machining category. These tools should be applied where performance is critical. The Stabilizer family offers high performance and versatility in a variety of materials and operations. The 4 flute Stabilizer 2.0 is available in square, ball and radius ends and an AlTiN coating. The 5 flute Stabilizer is available in square and radius ends with AlCrN coated inch tools and AlTiN coated metric tools.

Elite series tools are a high performance solution for material specific machining applications where performance is important. These tools come with and AlTiN coatings as standard and are available in multiple geometries and number of flutes to provide process optimization in various materials.

Niagara C series should be applied in basic general machining environments. These tools are offered in uncoated or TiAlN coated as standard. Square shoulder and ball end geometries with 2, 3 or 4 flute versions are available.



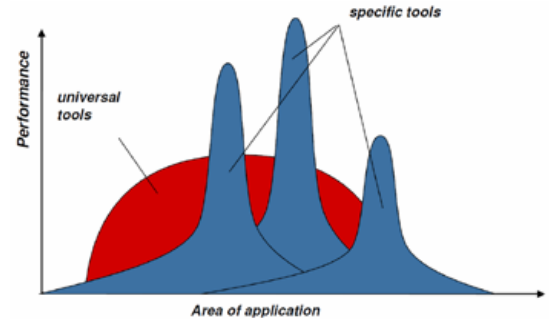
## RECOMMENDED TOOLING

ISO GROUP	SELECTION	SLOTTING		PROFILING		COPY MILLING	
		PRODUCT FAMILY	RANGE	PRODUCT FAMILY	RANGE	PRODUCT FAMILY	RANGE
P	1ST CHOICE	STR430.2	1/8 - 1"	STR540	1/4 - 1"	STB430.2	1/8 - 1"
	2ND CHOICE	S335	1/8 - 1"	S638	1/8 - 1"	CB230	1/64 - 1"
M	1ST CHOICE	STR440.2	1/8 - 1"	S638	1/8 - 1"	STB440.2	1/8 - 1"
	2ND CHOICE	STR430.2	1/8 - 1"	S738/S938	1/4 - 1"	SB335	1/8 - 1"
K	1ST CHOICE	STR430.2	1/8 - 1"	S638	1/8 - 1"	STB430.2	1/8 - 1"
	2ND CHOICE	S335	1/8 - 1"	S545	1/8 - 1 1/4"	CB230	1/64 - 1"
N	1ST CHOICE	AN340	3/16 - 1"	A345	1/8 - 1"	AB245	1/4 - 1"
	2ND CHOICE	A245	1/8 - 1"	A345R	1/8 - 1"	CB230	1/64 - 1"
S	1ST CHOICE	STR440.2	1/8 - 1"	S638	1/8 - 1"	STB440.2	1/8 - 1"
	2ND CHOICE	STR430.2	1/8 - 1"	S738/S938	1/4 - 1"	MB215	1/16 - 1/2"
H	1ST CHOICE	MZN410R	1/8 - 5/8"	MZ645/MZ645R	1/8 - 1/2"	MBZ215	1/16 - 1/2"
	2ND CHOICE	STR440.2	1/8 - 1"	S738/S938	1/4 - 1"	MB215	1/16 - 1/2"

## HIGH PERFORMANCE VS. GENERAL PURPOSE

Both High Performance and General Purpose tools use the highest quality carbide substrate and coatings. The difference between the two categories lies in their geometries.

High performance tools are designed to run exceptionally well in specific applications. General purpose tools are designed with versatility in mind, and run well over a wide application area.



## TOOL MATERIAL TYPES

### COBALT (HSCO)

- Low Cost
- Tough
- Shock Absorbing
- Versatile
- Greater heat and wear resistance than HSS

### SOLID CARBIDE

- Hardest material
- Most wear resistant
- Most brittle
- Most cost (above 1/2")
- Longest life
- High productivity
- Higher SFPM

### POWDER METAL (ASP2030)

- Finer grain size as compared to HSCO yielding increased toughness, superior wear resistance, and more shock resistance
- Great for High Temp Alloys (Inconel, Waspalloy)
- Higher cost than HSS or HSCO

## FACTORS IN CHOOSING THE CORRECT TOOL MATERIAL

- Age, type, strength, condition, hp of machine
- Rigidity of the machine and fixturing
- Spindle speed available
- Manual or power feed
- Workpiece material and condition
- Number of pcs to be produced
- Material removal rate required

## WHAT DO COATINGS DO?

In short, coatings increase tool life. They provide a thermal barrier between the cutting edge & the workpiece. Coatings increase the hardness on the surface of the tool. Coatings also increase lubricity for better chip flow and evacuation, causing less heat. They minimize built-up edge, improving surface finish, and reduce abrasive wear.

## PVD COATINGS

### **TiN - TITANIUM NITRIDE**

A general purpose coating for HSS, HSCO, and Solid Carbide end mills that provides effective protection against wear, abrasion, and edge buildup. Primary applications are milling steels in a non-hardened condition.

### **TiCN - TITANIUM CARBONITRIDE**

Incorporation of Carbon into the TiN matrix to increase hardness and abrasion resistance. TiCN is an alternative to TiN for HSS and HSCO applications where additional wear resistance is required. Primary Solid Carbide applications are milling aluminum alloys & cast iron.

### **TiAlN - TITANIUM ALUMINUM NITRIDE**

TiAlN offers a higher level of thermal stability above TiN and TiCN with abrasion resistance. Ideal for high heat applications found in milling steels, stainless steels and high temp alloys with a hardness 52 Rc and below.

### **AlTiN - ALUMINUM TITANIUM NITRIDE**

Increased thermal stability when milling high temp alloys and Die/Mold steels with a hardness 52 Rc and above. Excellent for HSM applications, Titanium, and Stainless Steels. HSS/HSCO end mills can't be coated with AlTiN.

### **AlCrN - ALUMINUM CHROMIUM NITRIDE**

Excellent wear resistance under conventional and extreme conditions when milling Die/Mold steels with a hardness 52 Rc and below. Excellent choice for tool steel, alloy steel, and stainless steel applications.

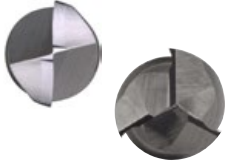



## CVD COATINGS

### **DIAMONDPLUS**

DiamondPlus coatings are made of multiple layers of uniquely structured nano-crystalline diamonds. The 100% ultra fine-grain diamond throughout the coating results in a tool that resists abrasive & adhesive wear and stands up to mechanical shock. The hard, smooth surface provides the best part finish with no built up edges. Primary applications are composite materials, high silicon aluminum, and graphite. When milling graphite, tool life 12-20 times longer than uncoated tungsten carbide is typical.

Do not use DiamondPlus on steels. The high heat generated from milling steels causes the carbon from the diamond to diffuse into the iron, causing chemical wear. Regrinding a DiamondPlus endmill is not recommended. Standard C430's or similar cannot be coated with DiamondPlus.

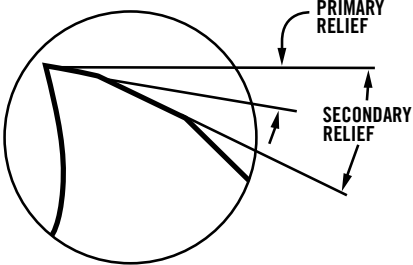
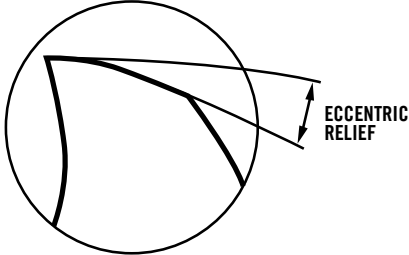
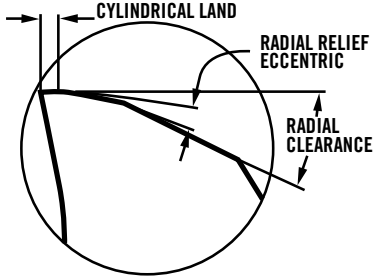
**FLUTE NUMBERS**

2 & 3 FLUTE	4 FLUTE	5 FLUTE	6 FLUTE
<ul style="list-style-type: none"> <li>• For slotting</li> <li>• Maximum chip evacuation</li> <li>• Preferred for softer materials</li> </ul> 	<ul style="list-style-type: none"> <li>• For slotting and profiling</li> <li>• Transitional tool between 3 flute and Multi Flute</li> </ul> 	<ul style="list-style-type: none"> <li>• For profiling</li> <li>• More teeth in cut for greater stability</li> </ul> 	<ul style="list-style-type: none"> <li>• Profiling in hard milling</li> <li>• Reduced chip loads</li> <li>• Larger core diameter for greatest rigidity</li> </ul> 

**END MILL CORNER DESIGN**

SQUARE	CORNER RADIUS / CORNER CHAMFER	BALL NOSE
<p>Designed for general machining at a true square angle.</p> 	<p>For general machining. Creates corner protection for increased tool life. Good in roughing operations.</p> 	<p>Designed for molds and dies, especially finishing 3d parts. There is zero cutting speed at center.</p> 

**RADIAL RELIEF**

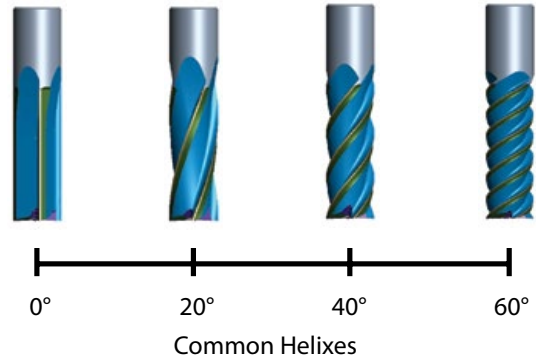
STANDARD	ECCENTRIC	CYLINDRICAL LAND
<p>The most common type of radial relief. Regrind primary relief to sharpen cutting edge (caution: radial rake can be affected).</p> 	<p>Stronger cutting edge than standard relief. Easier to regrind (face regrind). Constant relief angle.</p> 	<p>Balances the cutting edge in the cut. Best in aluminum applications. Reduced chatter and vibration. Eccentric relief strengthens the tooth.</p> 



## HELIX ANGLES

The helix angle is the angle of the cutting edge in relationship to the centerline. It affects the following:

- Cutting forces or shearing of the material
- Chip evacuation
- Surface finish



## KNUCKLE PITCH

### FINE PITCH



- Moderate chip loads
- Wide range of materials

#### APPLICATION AREAS

Ductile Cast Irons, Alloy Steels, Stainless Steels, Cobalt Alloys, Magnesium Alloys, Nickel Alloys, Titanium Alloys, Alloys

### COARSE PITCH



- Higher chip loads
- General purpose

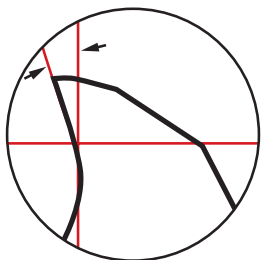
#### APPLICATION AREAS

Plastics, Wood, Aluminum Alloys, Copper Alloys, Lead, Tin, Zinc, Carbon Steel, Gray Cast Iron

## RAKE ANGLE

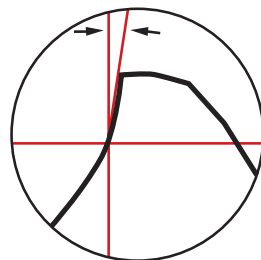
### POSITIVE RAKE ANGLE

Allows for freer machining and reduced cutting pressure. It is effective in softer and ferrous materials such as steels and stainless steels.

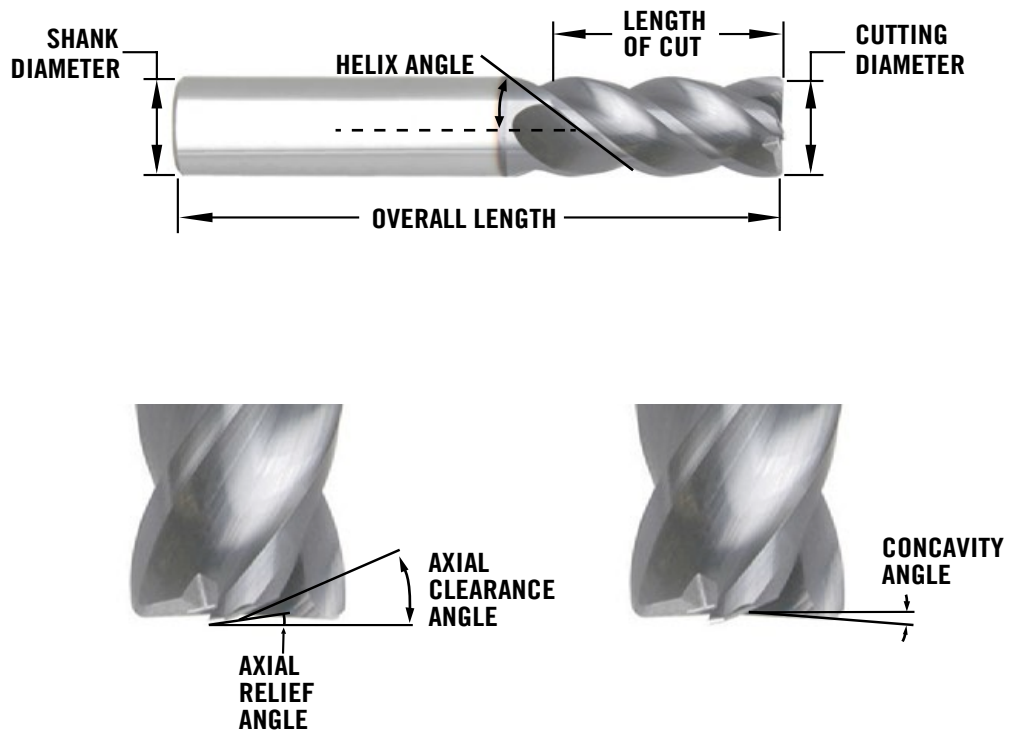


### NEGATIVE RAKE ANGLE

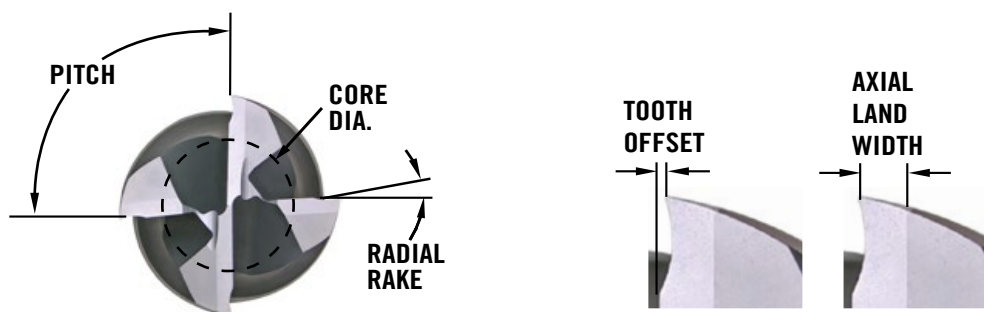
Creates stronger cutting edges optimal for harder to machine materials such as tool steels and hardened steels.



## SIDE VIEW



## END VIEW

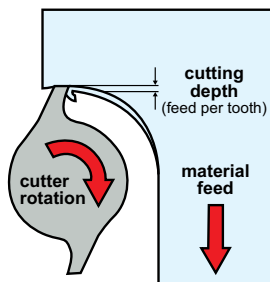


## CLIMB MILLING VS. CONVENTIONAL MILLING

### CLIMB MILLING (1ST CHOICE)

The tooth meets the work at the top of the cut, producing the thickest part of the chip first.

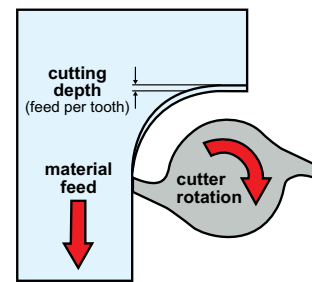
- Efficient cutting
- Long and reliable tool life
- Better surface finish, especially with stainless steels, aluminum or titanium alloys
- Risk tool breakage due to sudden machining backlash if the machine lacks rigidity



### CONVENTIONAL MILLING

The width of the chip starts at zero and increases to a maximum at the end of the cut.

- Use only when the machine tool lacks rigidity or works loosely (old milling machine, low quality machine, worn machine)
- Tendency to push the workpiece away
- Tool edge slides instead of cutting, causing high friction between tool flank face and material



## MILLING CONSIDERATIONS IN STEEL, ALUMINUM, AND STAINLESS STEEL

### STEEL

- Material grade
- Material hardness
- Rigidity is a must (machine, fixturing)
- Chip formation
- Chip evacuation
- Tool overhang must be kept to a minimum

### ALUMINUM

- Chatter
- Minimizing aluminum sticking to the cutting edge
- Chip formation
- Chip evacuation (controlling large amount of chips)
- Tool Rigidity / core strength

### STAINLESS STEEL

- Rigidity is a must (machine, fixturing)
- Tool overhang must be kept to a minimum
- Use flood coolant
- Use sufficient cutting depth so not to work harden the part (avoid rubbing and dwelling)
- Use a tool with a corner radius whenever possible (corner strength)
- Higher chip loads per tooth can be used with end mills that have a corner radius
- Surface finish is improved with a corner radius (larger radius the better the finish)



Good aluminum chips.



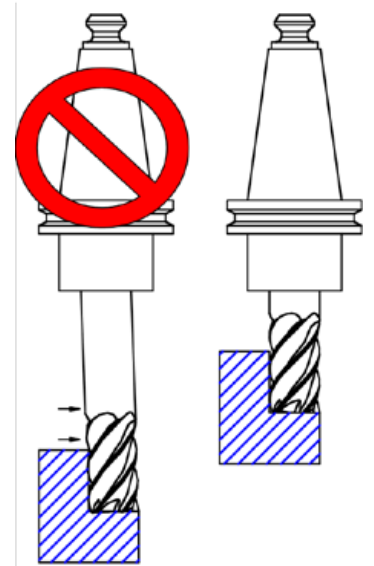
Caution!

**Work Hardening:** The remaining milled surface becomes harder, changing the cutting conditions. This occurs when the radial depth of cut is not sufficient and there is a rubbing action at the cutting interface. Work hardening results in increased cutting forces and increased heat.

## TOOL OVERHANG AND RUN-OUT

Tool Overhang is the distance that the tool extends from the end of toolholder (diameter to length ratio). Cutting forces, which push the tool away from the cut, cause tool deflection when tool overhang is excessive. The rule of thumb is to keep the maximum overhang 8:1 for length of cut and 12:1 for overall length.

Keeping tool overhang to a minimum can lead to the following benefits: increased tool life, reduced chatter and vibration, improved part finish, increased speed and feed, and increased productivity.



## DEFLECTION AND RELATIVE RIGIDITY (CANTILEVER BEAM)

The table below shows the relative rigidity of an endmill based on the diameter and tool overhang\*. In this case the basis is 1/4" x 1". From the table below, a 1/2" x 1" end mill is 16 times more rigid than a 1/4" x 1" end mill.

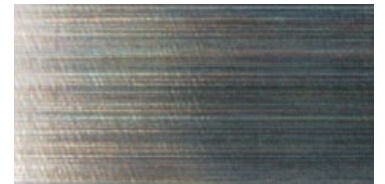
### Quick Tips:

A 20% reduction of length reduces deflection by 50%.

A 20% increase in tool diameter reduces deflection by 50%.

Optimal tool life can only be achieved if run-out is less than 0.0004".

DIAMETER	OVERHANG	RELATIVE RIGIDITY
1/4"	1"	1X
1/2"	1"	16X
1/2"	2"	2X
1/2"	4"	.26X
3/4"	1"	81X
3/4"	2"	10X
3/4"	4"	1.3X
1"	1"	260X
1"	2"	34X
1"	4"	4X



Smooth surface - rigid setup.



Chatter - unstable setup.

## WELDON TOOLHOLDERS - RECOMMENDED SET SCREW TIGHTENING TORQUE

HOLDER HOLE SIZE	SET SCREW SIZE	MAX FOOT POUNDS
3/16"	1/4" - 20	6.5
3/8"	3/8" - 16	16.7
1/2"	7/16" - 14	25
5/8"	9/16" - 12	37.5
3/4"	5/8" - 11	76.7
7/8"	5/8" - 11	76.7
1"	3/4" - 10	125
1 1/4"	3/4" - 10	125
2"	1" - 14	300
2 1/2"	1" - 14	300





# TROUBLESHOOTING GUIDE

PROBLEM / CAUSE	SOLUTION
<b>TOOL BREAKAGE</b>	
Feed rate excessive	Reduce feed rate
Depth of cut excessive	Decrease width and depth of cut
Overhang of tool is too much	Hold shank deeper, use shorter end mill
Wear is too much	Regrind at earlier stage
<b>EXCESSIVE WEAR</b>	
Speed is too fast	Decrease spindle speed, use better coolant
Hard work material	Use the right coating
Improper speed and feed (usually too slow)	Increase feed and speed
Improper helix angle	Change tool to correct helix angle
Primary relief angle is too large	Change to smaller relief angle
Recutting chips	Change feed and speed / Use more coolant or high pressure coolant/air
<b>REDUCED TOOL LIFE</b>	
Cutting friction is excessive	Regrind at earlier stage
Hard work material	Use an appropriate coolant
Improper helix and relief angle	Change to correct helix angle and primary relief
<b>CHIPPED CUTTING EDGES</b>	
Feed rate excessive	Reduce feed rate
Feed too heavy on first cut	Reduce feed rate on first cut
Lack of rigidity (machine & holder)	Use better machine or tool holder or change parameters
Lack of rigidity (tool)	Use shorter tool, hold shank deeper, try climb milling
Tool cutting corner too sharp	Decrease primary relief and cutting angle, reduce radial width-of-cut
Single chipped cutting edge	Reduce run-out to less than .0004"
<b>CHIP PACKING</b>	
Cut too heavy	Decrease width and depth of cut
Not enough chip clearance	Use end mill with fewer flutes
Not enough coolant	Use higher coolant pressure and reposition nozzle to point of cut or use air pressure

PROBLEM / CAUSE	SOLUTION
<b>WORK PIECE BURRS</b>	
Wear on primary relief is too much	Regrind at earlier stage
Incorrect feed and speed rates	Correct cutting parameters
Improper helix angle	Change to correct cutting angle
<b>ROUGH SURFACE FINISH</b>	
Feed rate too high	Reduce feed rate
Cutting speed too slow	Increase RPM
Wear is excessive	Regrind at earlier stage
Recutting chips	Change feed and speed. Use more coolant or high pressure coolant/air
<b>SQUEAL AND CHATTERING</b>	
Feed and speed too fast	Correct cutting parameters
Lack of rigidity (machine & holder)	Use better machine or tool holder or change parameters
Poor set up	Improve clamping rigidity
Cut is too heavy	Decrease width and depth of cut
Overhang of tool excessive	Hold shank deeper, use shorter end mill
Lack of relief	Decrease relief angle
<b>SIDE WALL TAPER IN WORKPIECE</b>	
Feed rate too heavy	Reduce feed rate
Overhang of tool excessive	Hold shank deeper, use shorter end mill
Too few flutes	Use multiflute end mill, use end mill with higher rigidity
<b>NO DIMENSIONAL ACCURACY</b>	
Cut is too heavy	Decrease width and depth of cut
Lack of accuracy (machine & holder)	Repair machine or holder
Rigidity is insufficient (machine & holder)	Change machine or tool holder or change parameters
Too few flutes	Use multiflute end mill, use end mill with higher rigidity

## WHEN IS IT TIME TO CHANGE A TOOL?

- When the part's surface finish is no longer acceptable
- When accuracy is no longer achievable and constant offset adjustment is required
- When Burrs start to appear on the work piece that were not there before
- When chips change to a blue, purple, black color
- When unusual noises start (increased vibration)
- When the spindle load reaches an unacceptable level (power consumption)
- When a pre-determined number of parts has been reached
- When the wear land reaches a certain level for the diameter and type of end mill (reference only, see right)

CUTTING DIAMETER	FINISHING END MILL	ROUGHING END MILL
1/8" - 3/8"	UP TO 0.004"	0.004" - 0.006"
3/8" - 3/4"	UP TO 0.006"	0.006" - 0.010"
3/4" - 1"	UP TO 0.008"	0.010" - 0.012"
1" - 1 1/4"	UP TO 0.010"	0.012" - 0.016"

Surface speed, surface footage, surface area are directly related. Cutting speed is the peripheral speed (velocity) at the outside edge of an endmill (surface speed). The faster the spindle speed the higher the SFM. SFM is the distance in feet that the cutting edge travels in one minute. IPM and IPT (The rate at which the cutting tool is advanced into the workpiece). Feed per tooth is the thickness of chip that each cutting edge removes in one pass.

**RPM**

$$n = \frac{v_c \cdot 12}{\pi \cdot D_c} \text{ or } \frac{v_c \cdot 3.82}{D_c} \quad (\text{rev/min})$$

**CUTTING SPEED**

$$v_c = \frac{n \cdot \pi \cdot D_c}{12} \text{ or } \frac{n \cdot D_c}{3.82} \quad (\text{sf/min})$$

**FEED SPEED**

$$v_f = n \cdot z_n \cdot f_z \quad (\text{inch/min})$$

$$v_f = n \cdot z_c \cdot f_z$$

**FEED PER REVOLUTION**

$$f = z_n \cdot f_z \quad (\text{inch/rev})$$

$$f = z_c \cdot f_z$$

**METAL REMOVAL RATE**

$$Q = a_e \cdot a_p \cdot v_f \quad (\text{inch}^3/\text{min})$$

**CUTTING SPEED AND RPM FOR COPYING**

$$v_c = \frac{n \cdot \pi \cdot D_w}{12} \text{ or } \frac{n \cdot D_w}{3.82} \quad (\text{sf/min})$$

$$n = \frac{v_c \cdot 12}{\pi \cdot D_w} \text{ or } \frac{v_c \cdot 3.82}{D_w} \quad (\text{RPM})$$

$$D_w = 2 \cdot \sqrt{a_p (D_c - a_p)} \quad (\text{inch})$$

**CALCULATION OF  $a_p$  VS. OVERHANG LENGTH:**

If the overhang length (XS) is longer than  $4 \times D_c$  and Cylindrical shanks are used it is important to adopt another depth of cut ( $a_p$ ) value than that indicated in the table. Use the following formula to calculate the new  $a_p$  value

$$a_p = a_p \cdot (4 \cdot D_c / xs) 2$$

**PROFILE HEIGHT**

$$H = \frac{D_c}{2} - \sqrt{\frac{D_c^2 - a_e^2}{2}}$$

$$D_w = 2 \cdot \sqrt{a_p (D_c - a_p)}$$

**Profile height H (um)**

D <sub>c</sub>	Pitch a <sub>e</sub> (μm)						
	0.06	0.08	0.11	0.15	0.20	0.30	0.45
1	0.90	1.60	3.00	5.70	10.00	23.00	53.00
2	0.45	0.80	1.50	2.80	5.00	11.00	26.00
4	0.23	0.40	0.76	1.40	2.50	5.60	13.00
6	0.15	0.27	0.50	0.94	1.70	3.80	8.40
8	0.11	0.20	0.38	0.70	1.30	2.80	6.30
10	0.09	0.16	0.30	0.56	1.00	2.30	5.10
12	0.08	0.13	0.25	0.47	0.83	1.90	4.20

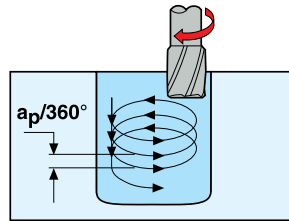
- $a_p$  = Depth of cut mm/axial depth of cut (in)
- $a_e$  = Width of cut mm/radial depth of cut (in)
- $D_c$  = Cutter diameter
- $f$  = Feed per revolution (in/rev)
- $f_z$  = Feed per tooth (in/tooth)
- $z_n$  = No. of teeth
- $n$  = RPM (rev/min)
- $Q$  = Material removal rate (in<sup>3</sup>/min)
- $v_c$  = Cutting speed (sf/min)
- $v_f$  = Feed speed (in/min)
- $D_w$  = Working diameter

## HELICAL INTERPOLATION

The table below shows the minimum hole diameter that should be made per the diameter of the end mill being used.

### RECOMMENDED DIAMETER OF HOLE FOR HELICAL INTERPOLATION RAMPING

DIAMETER OF END MILL $D_c$	DIAMETER OF HOLE
1/32 - 3/32	$1.4 \times D_c$
1/8 - 1/4	$1.3 \times D_c$
3/8 - 1/2	$1.2 \times D_c$
5/8 - 1 1/4	$1.15 \times D_c$

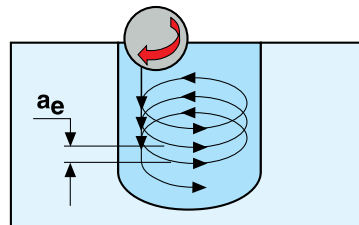


## TROCHOIDAL METHOD

The figure below shows a method often called the trochoidal method for milling slots.

### RECOMMENDED WIDTH OF SLOT

DIAMETER OF END MILL $D_c$	SLOT WIDTH
1/32 - 3/32	$1.8 \times D_c$
1/8 - 1/4	$1.6 \times D_c$
3/8 - 1/2	$1.4 \times D_c$
5/8 - 1 1/4	$1.2 \times D_c$



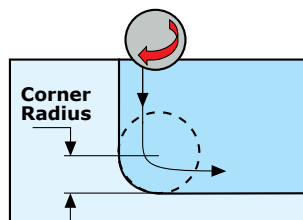
## CORNER CONTACT

Generate component corners to optimize tool life.

- Use maximum diameter of cutting tool, but have maximum difference between the radius of the tool and the radius in the corner of the component.
- In a corner the contact arc of the tool increases rapidly according to the difference in radius between the tool and the component. This results in more forces on the tool, resulting in deflection and increased temperature in the corner, which means a reduction in tool life.

### RECOMMENDATIONS

END MILL DIAMETER	MINIMUM CORNER RADIUS
1/64 - 3/32	$D_c / 2 \times 1.4$
1/8 - 1/4	$D_c / 2 \times 1.3$
3/8 - 1/2	$D_c / 2 \times 1.2$
5/8 - 1 1/4	$D_c / 2 \times 1.15$



Ex: 1/4 tool, minimum corner radius to be generated is .1625.



## SOLID CARBIDE END MILLS

END MILL STYLE	NUMBER OF FLUTES	NIAGARA CUT DIAMETER TOLERANCE	CORRESPONDING LIST NUMBERS
SINGLE-END DOUBLE-END FINISHERS	ALL	+ .000 / - .002	STS430.2, STR430.2, STB430.2, STRN430.2, STBN430.2, STS430M.2, STR430M.2, STB430M.2, STR440.2, STB440.2, STRN440.2, STBN440.2, STR440M.2, STB440M.2, STS540, STR540, STS540M, STR540M, A245, A245R, AB245, AN245, ANB245, AN340, A345, A345R, AN345, AN345R, A345M, S335, SB335, SN335, S545, S545R, S638, S638R, SB638, SBN638, SN638, SN638R, SCS638, SCS638R, S738, S738R, SCS738R, S938, S938R, SCS938R, S545M, S645M, SN200R, SN400R, SN500R, C230, C230R, C330, C360, C430, C430R, CB230, CB330, CB430, C230M, C430M, CB230M, CB430M, C330M, CD230, CD430, CSD230, CSD430, CSDB230, CSDB430
SINGLE-END & DOUBLE-END FINISHERS (FLUTE DIA <=7/64")	ALL	+ / - .0005	C230, CB230, CSD230, CSDB230, C330, CB330, C430, CB430, CSD430, CSDB430, C230M, CB230M, C330M, C430M, CB430M
HIGH FEED (FLUTE DIA <1/8")	2	+ / - .0005	SN200R
SINGLE-END FINISHERS NC TOLERANCE	2 & 4	+ .001 / - .000	CNC230, CNCB230, CNC430, CNCB430
SINGLE-END ROUGHERS	3, 4 & 5	+ .000 / - .003	AR330, SR420, SR545, SR420M
SINGLE-END MICRO DECIMAL	2 & 4	+ / - .0005	ME230, MES230, MEB230, MESB230, ME430, MES430, MEB430
THREAD MILLS	ALL	+ .000 / - .002	NTM100UN, NTM120UN, NTM160UN, NTM200NPT, NTM300NPTF, NTM400MI
COMPOSITE CUTTING TOOLS	ALL	+ .000 / - .002	DIARTREM, DIARTRBE, DIACC, DIAEPB, DIAPPB, DIABEB
DIAMOND COATED END MILLS	2 & 4	+ / - .001	DIA230, DIA430, DIAB230, DIAB430, DIACR430, DIAL230, DIAL430, DIALB430, DIAXRB430, DIAXRR430, DIAXSB430, DIA230M, DIAB230M, DIA430M
MOLD AND DIE	6	+ .000 / - .002	MZ645, MZ645R
MOLD AND DIE (FLUTE DIA < SHANK DIA)	2	+ / - .0005	MB215, MB215M, MBZ215
MOLD AND DIE (FLUTE DIA = SHANK DIA)	2	+ .000 / - .001	MB215, MB215M, MBZ215
BALL-END	ALL	BALL RADIUS TOLERANCE: FLUTE DIA TOLERANCE / 2	ALL
CORNER RADIUS	ALL	+ / - .001	ALL SERIES

SHANK DIAMETER TOLERANCES	END MILL STYLE	NIAGARA TOLERANCE
	ALL INCH SHANK	- .0001 / - .0004
	ALL METRIC SHANK	H6

LENGTH OF CUT TOLERANCES	END MILL STYLE	NIAGARA TOLERANCE
	ALL EXCLUDING MICRO DECIMAL	+ .030 / -0
	MICRO DECIMAL	+ .010 / -0

OVERALL LENGTH TOLERANCES	END MILL STYLE	NIAGARA TOLERANCE
	ALL	+ / - .060

TIR CONDITION	END MILL STYLE	CUTTING DIAMETER	NIAGARA TOLERANCE
		.005 - .030	.0001 MAX
	ALL EXCEPT ROUGHERS	.031 - .060	.0002 MAX
		.061 - .111	.0003 MAX
		.112 AND ABOVE	.0005 MAX
	ROUGHERS	ALL	.0010 MAX

BACK TAPER	END MILL STYLE	NIAGARA TOLERANCE
	ALL	.0005 MAX BACK TAPER PER INCH PERMISSIBLE. NOT TO EXCEED THE CUTTING DIAMETER TOLERANCE.

NOTE: ALL DIMENSIONS IN INCH UNLESS OTHERWISE NOTED

## COBALT END MILLS

END MILL STYLE	NUMBER OF FLUTES	TYPE OR RANGE	ANSI* TOLERANCE	NIAGARA CUT DIAMETER TOLERANCE	CORRESPONDING LIST NUMBERS
SINGLE-END FINISHERS	2, 4, & 6	ALL SIZES	+ .003 / - .000	+ .001 / - .000	SP205 , SPC408, SPB540
MULTI FLUTE COARSE & FINE PITCH ROUGHERS	4, 5, 6, & 8	1" FLUTE & UNDER 1-1/8" FLUTE & OVER	+ .025 / - .005	+ .003 / - .000 + .006 / - .000	EXR350 , RMB700 , RMB449 , REM710 , REC700 , RXC753, REM445 , REC448
ALL 3 FLUTE COARSE & FINE PITCH ROUGHERS	3	ALL SIZES	+ .025 / - .005	+ .005 / - .000	RTM713, RHC752, RHLC754, RTM447
TRUNCATED ROUGHER/FINISHERS AND CHIPBREAKERS	4, 5, 6, & 8	ALL SIZES	NO SPECIFICATIONS	+ .001 / - .000	RFM440 , RFM441 , RFCB444
METRIC FINISHERS WITH INCH SHANK	4	ALL SIZES	NO SPECIFICATIONS	+ .001 / - .000	SMM845
VFP	4 & 6	ALL SIZES	NO SPECIFICATIONS	+ .002 / - .000	VFP435, VFP635, VFP <sup>2</sup> 435, VFP <sup>2</sup> 635, VFP435SB, VFP635SB, VFP435SBR, VFP635SBR
BALL-END	ALL	ALL SIZES	NO SPECIFICATIONS	BALL RADIUS TOLERANCES: FLUTE DIA TOLERANCES / 2	

SHANK DIAMETER TOLERANCES	END MILL STYLE	OTHER SPECIFICATION	ANSI* TOLERANCE	NIAGARA TOLERANCE
	ALL INCH SHANK		- .0001 / - .0005	- .0001 / - .0005
	ALL METRIC SHANK	SPECIFICATION PER DIN 1835 FORM B	NO SPECIFICATION	DIN (H6)MM

LENGTH OF CUT TOLERANCES	END MILL STYLE	OTHER SPECIFICATION	ANSI* TOLERANCE	NIAGARA TOLERANCE
	ALL EXCLUDING HEAVY DUTY		+ .031 / - .031	+ .031 / - .000
	HEAVY DUTY		+ .062 / - .062	+ .062 / - .000
	ALL METRIC SHANK	SPECIFICATION PER DIN ANS	NO SPECIFICATION	+ 0.7MM / - 0

OVERALL LENGTH TOLERANCES	END MILL STYLE	OTHER SPECIFICATION	ANSI* TOLERANCE	NIAGARA TOLERANCE
	ALL EXCEPT HEAVY DUTY 3" DIA FLUTE		+ .062 / - .062	+ .062 / - .000
	3" DIA HEAVY DUTY		+ .125 / - .125	+ .125 / - .000
	ALL METRIC SHANK	SPECIFICATION PER DIN ANS	NO SPECIFICATION	+ 0.7MM / - 0

TIR CONDITION	END MILL STYLE	CUTTING DIAMETER	NIAGARA TOLERANCE
	ALL EXCEPT ROUGHERS	ALL SIZES	.0010 MAX
		LESS THAN .750	.0010 MAX
	ROUGHERS	.750 - 1.249	.0020 MAX
		1.250 AND ABOVE	.0030 MAX

BACK TAPER	END MILL STYLE	NIAGARA TOLERANCE
	ALL	.0005 MAX BACK TAPER PER INCH PERMISSIBLE. NOT TO EXCEED THE CUTTING DIAMETER TOLERANCE.

\*TAKEN FROM TABLE 77 OF THE USA STANDARDS FOR MILLING CUTTERS AND END MILLS, ANSI B94.19-1985 PUBLISHED BY THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

NOTE: ALL DIMENSIONS IN INCH UNLESS OTHERWISE NOTED.

**MECHANICAL/PHYSICAL HAZARD**

Cutting tools and holders may fragment in use. Metal chips can be very hot with sharp edges and should not be moved by hand. Chips can cause burns to the skin and damage to the eyes.

Make sure the insert and component are correctly secured in their holder before use, to prevent them coming loose during the process operation. Too much overhang can result in vibration and lead to tool damage/breakage.

Always wear appropriate safety equipment at all times and ensure all machine guards and safety interlocks are in place prior and during the operation. **DO NOT USE** any tool or product that shows signs of damage. Return the product to the appropriate location for repair, replacement or recycling.

Use all appropriate safety guards or machine encapsulations to securely collect particles such as chips or cutting elements that may spin off. Always use appropriate personal protective equipment.

**DUST AND MIST HAZARD**

Hardmetal products and tools should not be reground or sharpened without taking appropriate safety measures to contain dust and to prevent exposure to dust (e.g. ventilation and personal protection equipment). Operations such as grinding, cutting, burning and welding of hardmetal products may produce dust or fumes, which can be inhaled, swallowed or come in contact with the skin and eyes. Dust/mist may cause inflammation of the airways and irritate nose, throat, skin and eyes. Repeatedly inhaling high levels of hardmetal dust has been reported in publications to cause hardmetal disease (interstitial lung fibrosis). In a two-year study on rats and mice, inhalation of cobalt was shown to cause cancer.

**SENSITIZING HAZARD**

Uncoated hardmetal products may cause an allergic skin reaction as a result of prolonged skin contact with the product. Handle in a way that avoids direct skin contact or use gloves to minimize the risk of an allergic skin reaction when handling hardmetal products and tools. Cobalt and hardmetal are known sensitizers having potential to cause allergy through repeated exposure. A sensitized person could react with asthmatic symptoms or eczema.

Always review and understand the Safety Data Sheet or Safety Information Sheet for the product you are using, before using the product.

**PREVENTIVE MEASURES**

- Avoid formation and inhalation of dust. Use adequate local exhaust ventilation to keep personal exposure below the nationally allowed limits.
- If ventilation is not available or adequate, use nationally approved respirators for the purpose.
- Avoid skin contact. Wear suitable gloves. Wash skin thoroughly after handling.
- Use suitable protective clothing. Launder clothing as needed.
- Do not eat, drink, or smoke in the working area. Wash skin thoroughly before eating, drinking or smoking.
- Use safety goggles or glasses with side shields when necessary.
- Always wear appropriate safety equipment.
- Only operate machinery when all necessary guards, interlocks and other safety devices are in place and functional.
- **DO NOT** use or operate damaged tools or products.

Revised May 25, 2017. For more information and documents, visit [niagaracutter.com/safety](http://niagaracutter.com/safety) and [P65Warnings.ca.gov](http://P65Warnings.ca.gov).

## **CEMENTED CARBIDE END MILLS**

Cemented carbide end mills from Niagara Cutter are not included in the product range intended for the following requirements. Nevertheless Niagara Cutter can make the following declaration.

These products meet all requirements in RoHS (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment), WEEE (Waste Electrical & Electronic Equipment) and ELV (End of Life Vehicles) requirements. Products do not contain mercury, lead, hexavalent chromium, cadmium, CFC, HCFC, flame retardants or solvents in concentrations that exceed specifications in the regulations.

## **REGRINDING**

Wet or dry grinding can produce potentially hazardous dusts or mists that can irritate skin, eyes, nose, throat and result in lung damage or disease. To avoid injury use proper safety precautions and protective equipment.

## **DISPOSAL**

Niagara Cutter will buy back solid carbide tools for recycling. Solid carbide tools should be separated from other metal waste (steel, aluminium, copper etc). All packing material is fully recyclable.

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### **CUSTOMIZED TOOLING**

A significant portion of Niagara's offering is in the form of customized tools. Our engineers work in close cooperation with you to provide the best possible solution to specific machining challenges where the demands stretch beyond standard tools. We also offer a quick delivery solution for standard tools requiring simple modifications to meet specific dimensional requirements. Fast turnaround from quotation to product delivery is a hallmark of our modified tool program.

### **RECONDITIONING CUTS COST & TOOL INVENTORY**

Niagara's modern carbide tools offer remarkable performance by utilizing the best combinations of carbide substrates with high wear resistant coatings, optimized cutting geometry and controlled edge preparation.

However good a tool is, as part of its function, it will eventually show signs of wear on the cutting edge. Controlling this wear and the timely replacement of the tool will allow the used tool to be reconditioned, thus reducing tool investment costs.

We recondition your solid carbide tools using the same advanced technology and care that we use to manufacture our new products. These tools are remanufactured to our normal high standards with the original Niagara geometry, edge preparation and coating processes.

### **RECYCLING**

Tungsten carbide is a valuable and limited resource. Estimations of the existing reserves of tungsten suggest that with present consumption resources will be depleted within 40 - 100 years. For the last few years demand has been higher than production and a general trend toward higher consumption can clearly be seen.

Recycling of used material compared to the mining of virgin material reduces the environmental impact. By recycling we can prolong the time before the resources are at an end and reduce energy consumption by approximately 35%. At the same time, recycling tungsten carbide reduces CO2 emissions by approximately 40%.

**For further information on custom, modified, reconditioned tools or to set-up your recycling program please contact your local Authorized Distributor.**

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To find an Authorized SECO/Niagara  
Cutter Distributor near you, please refer  
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For technical assistance, call:  
**1-800-TEC-TEAM (1-800-832-8326)**

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P-1705-10000 GT17-136  
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