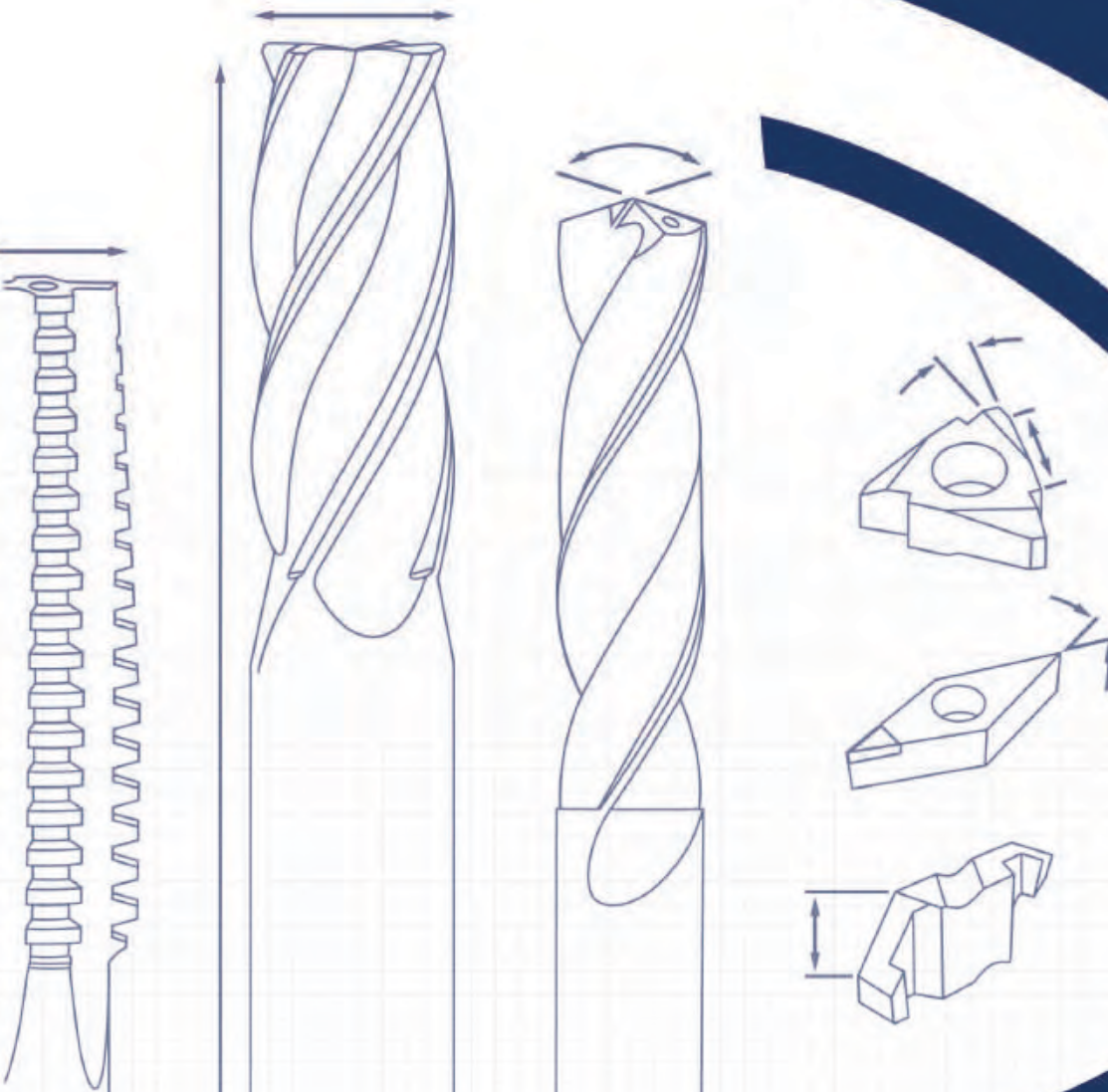


# GWOS

TOOL GROUP

MILLING  
SPECIALTY  
HOLEMAKING  
THREADING  
INSERTS



# GWS

TOOL GROUP

GWS Tool Group is a North American-based, vertically integrated manufacturer of highly engineered custom, standard, and modified standard cutting tools, primarily servicing the aerospace and defense, power generation, automotive and medical sectors.

GWS Tool Group has acquired multiple businesses in the course of its growth which now serve as the respective manufacturing divisions for the company.

The continued expansion of GWS Tool Group by way of acquisitions and constant investment in the business' capabilities has created an explosive value proposition for customers to leverage in all advanced machining environments. We remain committed to the expansion of this value proposition always.



# Acquisitions Effectuated



Florida – Founded in 1984, GW Schultz Tool had been known as a premier manufacturer of solid round carbide cutting tools. They became the custom endmill manufacturing division for GWS Tool Group in 2014.



Indiana – Founded in 1958, CGI Tool (formerly Carbide Grinding Company) became the manufacturer of our most complex and tight tolerance carbide, PCD and CBN insert tooling solutions in 2017.



Michigan – Founded in 1995, Alliance CNC now serves as our designer and builder of application-specific, tight tolerance drills, reamers, and micro-tools. Acquired in 2018, other products include our PAC Reamers and PAC Drills.



Massachusetts – Founded in 1980, Benchmark Carbide served as the production division for a great deal of the GWS catalog round tool and standard high-performance endmills starting in 2018.



Arizona – Founded in 1996, Intrepid Tool Industries (ITI) now serves as the provider of carbide, HSS, and PCD cutting tools for the aerospace sector, including threaded shank and/or brazed construction drills, reamers and countersinks since 2020.



Illinois – Founded in 1986, North American Tool Corporation (NATC) now serves as our manufacturer of special taps, dies, and gages. These include solid carbide thread mills, high-speed steel taps and thread gages since 2020.



North Carolina – Founded in 1993, STF Precision now serves as the leading manufacturer of diamond-tipped cutting tools, including polycrystalline diamond tools (PCD) and single-crystal diamond tools (SCD) for GWS since 2020.



Illinois – Founded in 1976, Taurus Tool & Engineering served as a manufacturer of our precision custom cutting tools, primarily in the categories of both HSS and carbide hole making and milling tools starting in 2021.



Illinois – Founded in 1978, CJT Koolcarb Inc. served as a leader in the manufacturing of carbide and carbide-tipped drills and reamers for industries such as aerospace and automotive for GWS starting in 2021.



ON, AB, Canada – Founded in 1965, Indexable now serves as our fully vertically integrated production facility of ceramic materials and inserts, including whisker ceramics, silicon nitride and white ceramics since 2021.



California – Monster Tool Company was founded in 1992, and quickly built the reputation as a cost and service leader in carbide tooling that includes end mills, drills, reamers and burrs.



Wisconsin – Founded in 1992, Carbide Tools Mfg. Inc is committed to providing high quality special carbide round tools supported by state-of-the-art grinding equipment, and in-house PVD coating technology.



Tennessee – Founded in 1958, Peterson Tool Company's work holding and machine-optimized tooling capability has been complementing the cutting tool capability of GWS since 2022.



Wisconsin – Founded in 1958, Balax Inc. brings their premium tapping solutions of both the standard and custom variety to the GWS portfolio since 2022.

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# CORE CAPABILITIES

## CUSTOM TOOLS



Specially designed cutting tools are required for a variety of reasons; whether it's a little extra length for reach, or specialized forms and tight tolerances to meet difficult part requirements. At GWS, we have built our capabilities around the necessity for high precision and fast expedient service. By combining talented engineering and design staff with the latest in automation technology, GWS can output custom tooling for high production facilities in as little as a few hours.

## MILLING



We have a large portfolio of stocked standard solid carbide end mills, designed for metal cutting applications in an array of industries including Medical, Aerospace, Automotive, Heavy Industry, and General Engineering.

If one of our high performance series like our Hurrimill or Alumigator end mills aren't the best fit for your application, we'll help you find the perfect cutting tool by building it custom for you.

## SPECIALTY



The GWS Specialty section encompasses an array of unique metalworking solutions. From routers and burrs, to carbide blanks and the GWS Armory series of tools for defense systems machining, GWS has you covered.





## HOLEMAKING

GWS offers an extensive range of high performance and holemaking solutions. From solid carbide drills to brazed carbide-tip drills, we have the right tool for your application. Need custom drilling solutions? We can quickly create a custom drill perfectly tailored for your application in no time.



## THREADING

The threading solutions category includes everything from thread mills and unique special taps to gages, dies, extensions and drill/tap combos. Be it an odd H-limit or a unique thread form such as ACME or British Pipe, we've got you covered. If we don't have it, we can make in as little as 24 hours.



## TURNING INSERTS

GWS offers a complete insert solution for our customers via a vast standard and custom indexable insert platform. From patented ceramic turning inserts to custom PCD and PCBN inserts, we can provide the perfect insert for your application. Be it custom or standard, GWS has a variety of grades and designs available in carbide, PCD, PCBN and ceramic to enhance productivity and extend tool life.

















## TOOL RECONDITIONING

Material costs, manufacturing process time, volume shipping and inventory reductions prove the cost savings of a GWS Regrind. Our cost savings are data-driven, not anecdotal.

# ICON GUIDE

## TOOL SPECIFICATIONS

### APPLICATION ICONS

	Slotting		Chamfering
	Ramping		Countersinking
	Side Milling		Pocketing
	High Speed Milling		Contouring
	Drilling		Blind
	Helical		Through
	Profiling		External Threading

### COATING ICONS

	<b>Bright</b> - Uncoated tool		<b>FX1</b> - High performance nano composite coating with extreme high hardness and high heat resistance for hardened steels and Ni Alloys
	<b>Zirconium Nitride</b> - Ideal for non-ferrous applications and resists BUE		<b>FX2</b> - High performance nano composite coating with extreme high hardness and high heat resistance ideal for use with form tools
	<b>Titanium Nitride</b> - A general purpose coating that adds lubricity and wear resistance		<b>FX3</b> - An AlCrN-based nano layered coating with high hardness and heat resistance that performs in wet or dry applications
	<b>Titanium Carbon Nitride</b> - A performance coating ideally suited for HSS tools		<b>FX5</b> - AlTiN-based PVD nanolayer coating with high hardness and heat resistance ideal for holemaking and drilling operations
	<b>Titanium Aluminum Nitride</b> - Performance coating with high hardness and oxidation temperature ideal for carbide tools		<b>FX7</b> - A high performance coating for steels, stainless steels, hardened steels and titanium in wet or dry applications
	<b>Aluminum Titanium Nitride</b> - Performance coating with high hardness and increased oxidation temperature ideal for carbide tools		<b>Super TiN</b> - Multi-layer coating that improves the titanium nitride performance for very abrasive cold form tapping applications
	<b>AlCrN</b> - Aluminum Chromium Nitride - High performance coating with high hardness and increased oxidation temperature ideal for exotic materials in wet or dry environments		<b>Steam Oxide</b> - Dark blue tool finish that increases the lubricity of the tool surface and can be applied over a nitride surface
	<b>Bal-Plus</b> - Shiny gold colored thin-film coating that provides anti-galling and extra wear resistance		<b>Nitride Steam</b> - Salt bath case hardening process to increase wear resistance. Resists galling or pickup when tapping mild steels

## FEATURE ICONS

 0°	Helix Angle	 118°	Point Angle
 1FL	Number of flutes	 THRU	Coolant-Through
 CHF	Corner Chamfer	 8	8-Facet
 BALL	Ball Nose		External Thread
 RAD	Corner Radius	 PILOT	Piloted
 SQ	Square	 REDUCED SHANK	Reduced Shank
	Non-Center Cutting		Speed & Feed
 Necked	Reduced Neck		Threaded Shank
 THRU	Coolant-Through	 Wiper Flat	Wiper Flat
 h6	h6 Shank	 LONG	Long
 Weldon	Weldon Flat	 CARBIDE	Carbide
	Chip Breakers	 CARBIDE TIP	Brazed Carbide-Tip
 LHC LHS	Left Hand Cut & Helix	 HSS	High Speed Steel
 THRU	Coolant-Through	 PCD	PCD
 STUB	Stub	 STI	Screw Thread Insert
 LH	Left Hand Thread	 X-LONG	Extra Long
 JOBBER	Jobber	 TAPER	Taper
 REGULAR	Regular	 SHORT	Short

# MATERIAL OVERVIEW

ISO MATERIALS



# ALUMIGATOR

NEXT GENERATION OF  
PERFORMANCE END MILLS  
FOR ALUMINUM ALLOYS

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

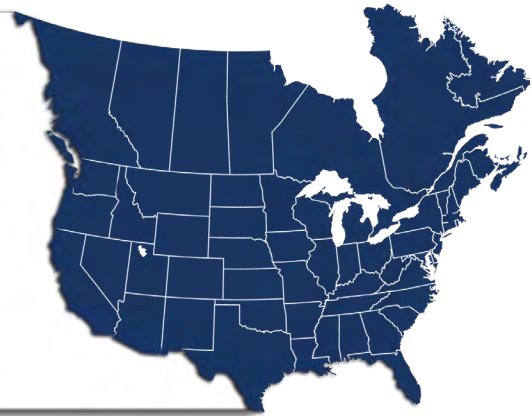
INSERTS

ISO		Material	Condition	Tensile Strength	Hardness HB
P	1	Non-Alloyed Steel, Free Cutting Steel, Cast Steel	Annealed (<.25% C)	420	125
			Annealed (≥.25% C)	650	190
			Quenched & Tempered (>.55% C)	850	250
			Annealed (≥.55% C)	750	220
			Quenched & Tempered	1000	300
	2	Low Carbon Steel, Medium Carbon Steel, Cast Steel	Annealed	600	200
				930	275
			Quenched & Tempered	1000	300
				1200	350
	3	High Carbon Steel, Alloy Steel, Tool Steel	Annealed	680	200
Quenched & Tempered			1100	325	
M	1	Stainless Steel	Ferritic/Martensitic	680	
			Martensitic	820	
			Austenitic	600	200
	2	PH Stainless Steel			240
					180
K	1	Grey Cast Iron (GG)	Ferritic		160
			Pearlitic		250
	2	Cast Iron Nodular (GGG)	Ferritic/Pearlitic		180
			Pearlitic		260
N	1	Aluminum Wrought Alloy	Not Cureable		60
			Cured		100
	2	Aluminum Cast, High Silicon Aluminum	Not Cureable (<12% Si)		75
			Cured		90
			High Temp. (>12% Si)		130
S	1	High Temp. Alloys, HRSA	Annealed (Fe based)		200
			Cured (Fe based)		280
			Annealed (Ni or Co based)		250
			Cured (Ni or Co based)		350
			Cast (Ni or Co based)		320
	2	Titanium, Titanium Alloys		RM 400	
			Alpha+beta alloys cured	RM 1050	
H	1	Hardened Steel (H13, S7, A2)	Hardened		45-55 HRC
	2	Hardened Steel (D2, CPM, M2)	Hardened		55-60 HRC

## FIND A DISTRIBUTOR

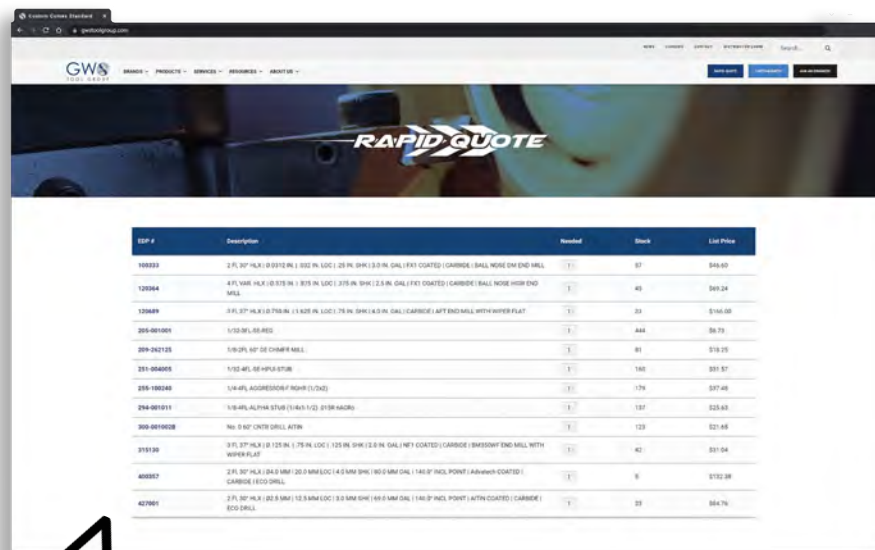
Interested in ordering GWS cutting tools?

You can easily search for an authorized distributor by visiting our website and get your order started quickly.



## STOCK AND PRICING

Use the GWS Rapid-Quote tool to get instant pricing and availability on up to 250 tools at one time. You can then print, save, or email your quote directly from our site.



# LITERATURE

Need to get the latest product brochures or catalog from GWS?

You can download all of our latest literature like brochures and catalogs for milling, holemaking, threading and insert tooling.



# FIND YOUR SALES REPRESENTATIVE

With our user-friendly map, you can quickly get in touch with the right person who understands your needs and can provide you with the best service and support.

Our sales representatives are always eager to assist you and answer any questions you may have.

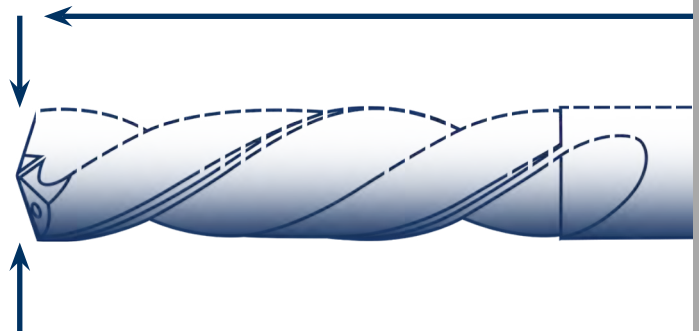


# MODIFY A STOCK TOOL



Creating a custom tool has never been this easy.

From our website product page, simply click the "Modify" button and adjust whatever tool parameters you need. Click submit and you are done! A GWS representative will send you a quote for your request within 24 hours.



# CUSTOM TOOLS

## CUSTOMIZED TOOLS TO FIT ANY APPLICATION

Specialty cutting tools come in a variety of shapes and sizes. Every application is different and GWS Tool Group is prepared to help you with your particular situation. The information is basic and will enable us to design the best tool for your application. From the beginning, GWS Tool Group has specialized in custom design and we look forward to working with you in creating a unique tool that meets and often exceeds your expectations.

Minimum order quantities for Specialty/Custom tools may be required. Please call **877 497-8665** for more information. If possible, please provide us with a 3D solid model, CAD drawing or sketch, including the profile you need to cut, along with any additional information you have for your custom tool design.

### Typical lead times

1 Week	2 Weeks	3 Weeks	4 Weeks	6 Weeks
Standard or modified standard end mills, inserts & drills. Modify existing stock <ul style="list-style-type: none"> <li>• Flat</li> <li>• Undercut</li> <li>• Radius</li> <li>• <b>SAFE-LOCK®</b></li> </ul>	Standard or modified standard end mills with material in stock. Repeat special/custom with program and material.	Repeat specials with material in stock.	Repeat orders of special tools without material in stock.	Special/custom requiring pre-form materials that are not in stock.





# REQUEST A CUSTOM TOOL



Online at [www.gwstoolgroup.com](http://www.gwstoolgroup.com)



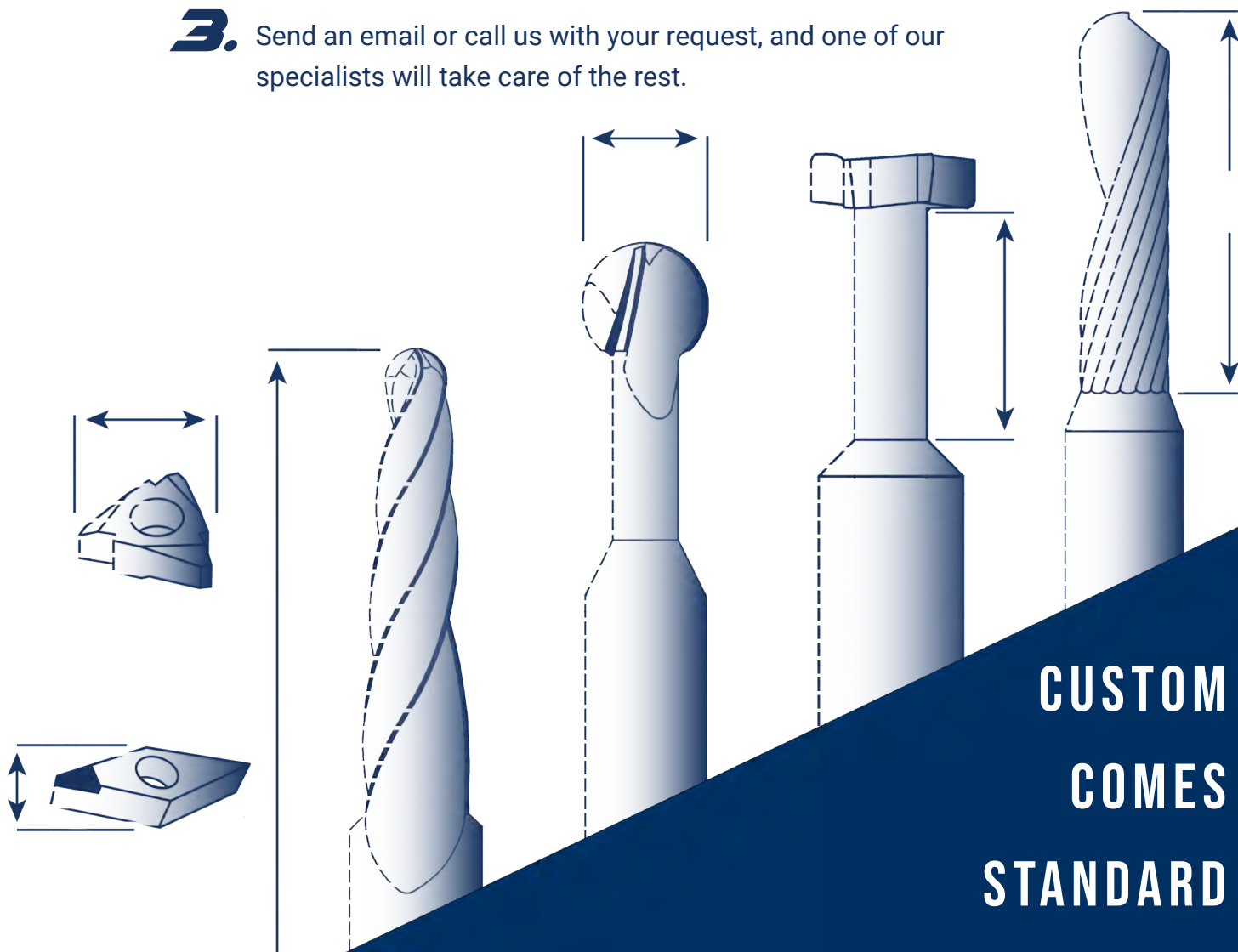
Over the phone 877 497-8665



Email your sketches to  
[Sales@gwstoolgroup.com](mailto:Sales@gwstoolgroup.com)

## THREE WAYS TO REQUEST CUSTOM

- 1.** Fill out and submit one of our many preformatted custom tool quote forms from our website.
- 2.** Upload a drawing, sketch or file using our drawing upload feature on [gwstoolgroup.com](http://gwstoolgroup.com). An engineer will promptly receive and quote your request.
- 3.** Send an email or call us with your request, and one of our specialists will take care of the rest.



**CUSTOM  
COMES  
STANDARD**

# ***TOOL RECONDITIONING***

**THE GWS TOOL RECONDITIONING PROGRAM**

INTRO

MILLING

SPECIALTY

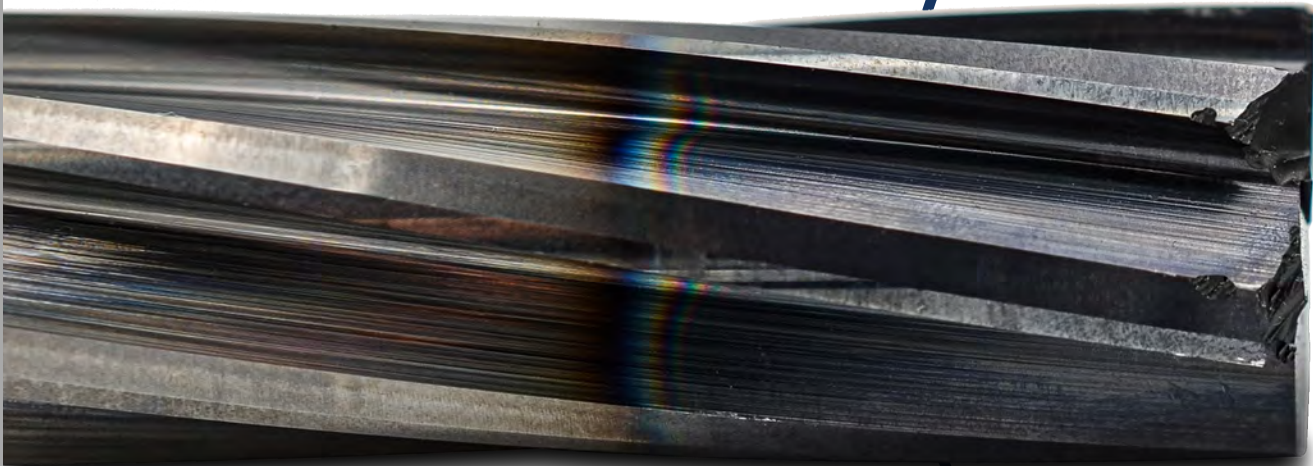
HOLEMAKING

THREADING

INSERTS

***Reduced tooling costs***

***Geometries on our regrinds  
are superior to others***

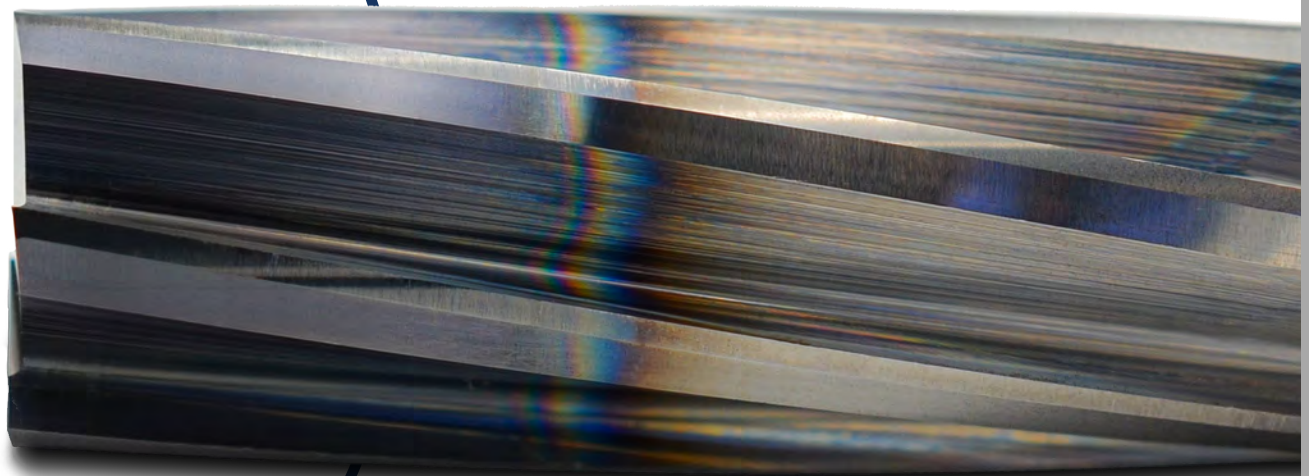


***Round & insert tooling  
Carbide, PCD, Ceramic, CBN***

***Free or reduced shipping  
based on quantity***

*Reduces inventory and unnecessary waste*

*Inventory management programs*



*Available to regrind non-GWS tools*

*Custom etching on regrinds ensures the operator has the correct tools*

**GET YOUR  
REGRIND STARTED**



**CALL 877 497-8665**

# MILLING

*From material specific milling cutters to general purpose end mills for general engineering, we have you covered with the sizes, lengths and application-specific geometry you need.*

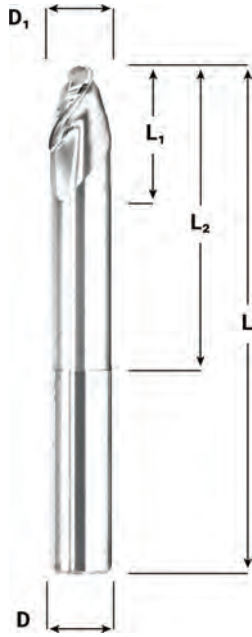
*Custom Comes Standard - If we don't have the perfect tool on the shelf, we can build it for you.*





# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>PERFORMANCE</b> <b>AL</b></p> <p><b>All-Terrain Aluminum Milling</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>For conventional or high speed machining of Aluminum</li> <li>Productivity and cost-efficiency</li> <li>Highly polished cutting face and flutes</li> <li>Stocked Bright or NF1 coating for Aluminum machining</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>45°</li> <li>2FL</li> <li>Necked</li> <li>BALL</li> <li>h6</li> <li>NF1</li> <li>Bright</li> <li>P 165</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series 2014** | 250 | 2FL | Reduced Neck | Ball Nose

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Bright	NF1
1/4	3/8	1-1/8	2-1/2	1/4	314223	314227
5/16	7/16	1-1/8	2-1/2	5/16	314245	314249
5/16	7/16	2-1/8	4	5/16	314253	314255
3/8	1/2	1-1/8	2-1/2	3/8	314273	314275
3/8	1/2	2-1/8	4	3/8	314278	314280
1/2	5/8	1-3/8	3	1/2	314303	314307
1/2	5/8	2-3/8	4	1/2	314309	314312
1/2	5/8	3-3/8	6	1/2	314316	314319
5/8	3/4	1-5/8	3-1/2	5/8	314343	314346
5/8	3/4	2-3/8	5	5/8	314350	314353
5/8	3/4	3-3/8	6	5/8	314357	314359
3/4	1	1-5/8	4	3/4	314378	314382
3/4	1	2-3/8	5	3/4	314386	314390
3/4	1	3-3/8	6	3/4	314392	314396
1	1-1/4	2-1/8	5	1	314415	314417
1	1-1/4	3-3/8	6	1	314421	314425
1	1-1/4	4-3/8	7	1	314428	314431

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>PERFORMANCE AL</b></p> <p><b>All-Terrain Aluminum Milling</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>For conventional or high speed machining of Aluminum</li> <li>Productivity and cost-efficiency</li> <li>Highly polished cutting face and flutes</li> <li>Stocked Bright or NF1 coating for Aluminum machining</li> </ul>		<p><b>CARBIDE</b> <b>45°</b></p> <p><b>2FL</b> <b>BALL</b></p> <p><b>h6</b> <b>NF1</b></p> <p><b>Bright</b> <b>P 165</b></p>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							●	●				

● Best ○ Good

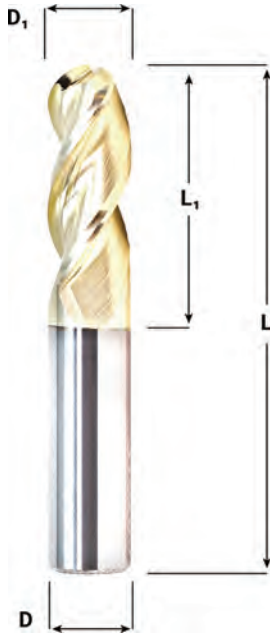
**Series 2015** | 250BN | 2FL | Ball Nose

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	NF1
1/8	1/4	1-1/2	1/8	-	313567
1/8	1/2	2	1/8	-	313563
1/8	3/4	2	1/8	-	313571
3/16	5/16	2	3/16	-	313573
3/16	5/8	2-1/2	3/16	-	313576
3/16	1	2-1/2	3/16	-	313580
1/4	3/8	2-1/2	1/4	313584	313588
1/4	3/4	2-1/2	1/4	313592	313596
1/4	1-1/4	3	1/4	313598	313602
5/16	7/16	2-1/2	5/16	313604	313607
5/16	13/16	2-1/2	5/16	313609	313612
5/16	1-1/4	3	5/16	313615	313617
3/8	1/2	2-1/2	3/8	313621	313624
3/8	1	2-1/2	3/8	313628	313630
3/8	1-1/2	4	3/8	313632	313636
7/16	9/16	2-3/4	7/16	313640	313643
7/16	1	2-3/4	7/16	313645	313649
7/16	2	4	7/16	313652	313655
1/2	5/8	3	1/2	313659	313662
1/2	1-1/4	3	1/2	313666	313668
1/2	2	4	1/2	313671	313674
5/8	3/4	3-1/2	5/8	313678	313682
5/8	1-5/8	3-1/2	5/8	313685	313687
5/8	2-1/2	5	5/8	313691	313693
3/4	1	4	3/4	313697	313700
3/4	1-5/8	4	3/4	313704	313707
3/4	3-1/4	6	3/4	313709	313711
1	1-1/4	5	1	313714	313717
1	2	5	1	313721	313723

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>PERFORMANCE</b> <b>AL</b></p> <p><b>All-Terrain Aluminum Milling</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>For conventional or high speed machining of Aluminum</li> <li>Productivity and cost-efficiency</li> <li>Highly polished cutting face and flutes</li> <li>Stocked Bright or NF1 coating for Aluminum machining</li> </ul>		<p><b>CARBIDE</b> <b>37°</b></p> <p><b>3FL</b> <b>BALL</b></p> <p><b>h6</b> <b>NF1</b></p> <p><b>Bright</b> <b>P 165</b></p>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							●	●				

● Best ○ Good

**Series 2045** | **350BN | 3FL | Ball Nose**

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	NF1
1/4	1-1/4	3	1/4	315212	315215
1/4	3/4	2-1/2	1/4	315219	315221
1/4	3/8	2-1/2	1/4	315223	315227
5/16	1-1/4	3	5/16	315229	315232
5/16	13/16	2-1/2	5/16	315236	315238
5/16	7/16	2-1/2	5/16	315240	315244
3/8	1	2-1/2	3/8	315248	315250
3/8	1/2	2-1/2	3/8	315253	315256
3/8	1-1/2	4	3/8	315259	315261
7/16	1	2-3/4	7/16	315265	315268
7/16	2	4	7/16	315271	315274
7/16	9/16	2-3/4	7/16	315277	315280
1/2	1-1/4	3	1/2	315282	315285
1/2	2	4	1/2	315288	315292
1/2	5/8	3	1/2	315296	315299
5/8	1-5/8	3-1/2	5/8	315303	315306
5/8	2-1/2	5	5/8	315308	315312
5/8	3/4	3-1/2	5/8	315316	315318
3/4	1	4	3/4	315320	315322
3/4	1-5/8	4	3/4	315324	315326
3/4	3-1/4	6	3/4	315330	315333
1	1-1/4	5	1	315336	315340
1	2	5	1	315343	315346
1	3-1/2	6	1	315348	315352

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>PERFORMANCE AL</b></p> <p><b>All-Terrain Aluminum Milling</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>For conventional or high speed machining of Aluminum</li> <li>Productivity and cost-efficiency</li> <li>Highly polished cutting face and flutes</li> <li>Stocked Bright or NF1 coating for Aluminum machining</li> </ul>		<p><b>CARBIDE</b> <b>37°</b></p> <p><b>3FL</b> <b>BALL</b></p> <p><b>Necked</b> <b>h6</b></p> <p><b>NF1</b> <b>Bright</b></p> <p><b>P 165</b></p>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series 2047** | 350BN | 3FL | Reduced Neck | Ball Nose

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Bright	NF1
1/4	3/8	1-1/8	2-1/2	1/4	315779	315781
1/4	3/8	2-1/8	4	1/4	315790	-
5/16	7/16	1-1/8	2-1/2	5/16	315799	315802
5/16	7/16	2-1/8	4	5/16	315811	315814
3/8	1/2	1-1/8	2-1/2	3/8	315823	315825
3/8	1/2	2-1/8	4	3/8	315835	315838
1/2	5/8	1-3/8	3	1/2	315848	315852
1/2	5/8	2-3/8	4	1/2	315860	315864
1/2	5/8	3-3/8	6	1/2	315873	315877
5/8	3/4	1-5/8	3-1/2	5/8	315884	315886
5/8	3/4	2-3/8	5	5/8	315895	315899
5/8	3/4	3-3/8	6	5/8	315909	315912
3/4	1	1-5/8	4	3/4	315920	315924
3/4	1	2-3/8	5	3/4	315935	315938
3/4	1	3-3/8	6	3/4	315947	315951
1	1-1/4	2-1/8	5	1	315960	315963
1	1-1/4	3-3/8	6	1	315973	315977
1	1-1/4	4-3/8	7	1	315987	315991

\*bold numbers are EDPs for ordering

## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**

**CUSTOM COMES STANDARD**

# ADVANCED PERFORMANCE

Roughing End Mill For Aluminum



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>AGGRESSOR</h2> <h3>Roughing Mills - Coarse Pitch</h3> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Corner chamfer for edge strength and wear protection</li> <li>Designed for heavy material removal applications where cycle times are critical</li> <li>Coarse tooth serrations promote smooth chip clearance by creating small chips</li> <li>Diameter Tol.: +0/-0.002"</li> <li>Shank Tol.: +0/-0.0004"</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>37°</li> <li>3FL</li> <li>CHF</li> <li>Weldon</li> <li>Bright</li> <li>NF1</li> <li>P 167</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series 2133** | AGG-C | 3FL | Corner Chamfer | Coarse Pitch Rougher | Weldon

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	NF1
3/16	3/4	2	3/16	<b>255-050187</b>	<b>255-050187D</b>
1/4	3/4	2-1/2	1/4	<b>255-050250</b>	<b>255-050250D</b>
5/16	7/8	2-1/2	5/16	<b>255-050312</b>	<b>255-050312D</b>
3/8	1	2-1/2	3/8	<b>255-050375</b>	<b>255-050375D</b>
1/2	1-1/4	3	1/2	<b>255-050500</b>	<b>255-050500D</b>
5/8	1-1/4	3-1/2	5/8	<b>255-050625</b>	<b>255-050625D</b>
3/4	1-5/8	4	3/4	<b>255-050750</b>	<b>255-050750D</b>
1	1-3/4	4	1	<b>255-051000</b>	<b>255-051000D</b>

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mill For Pocketing And Ramping In Aluminum



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Alumigator Ramping Tool</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Ultra-high speed pocketing</li> <li>Aggressive ramping into pockets up to 45°</li> <li>Ultra-free cutting</li> <li>Staggered chip breakers to rough and finish</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>37°</li> <li>3FL</li> <li>RAD</li> <li>h6</li> <li>DC</li> <li>Bright</li> <li>P 153</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

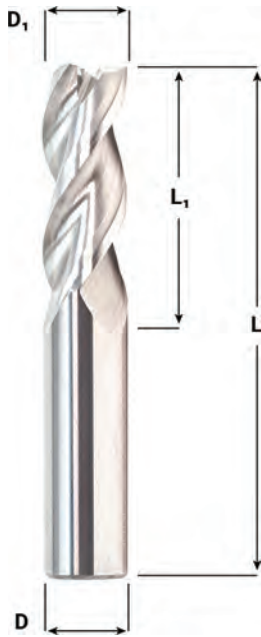
**Series 1010** | ART | 3FL | Chip Breaker | Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
3/16	5/8	2	3/16	0.03	118300
3/16	5/8	2	3/16	0.015	125966
1/4	3/4	2-1/2	1/4	0.03	122493
1/4	3/4	2-1/2	1/4	0.015	125967
1/4	1-1/8	3	1/4	0.03	125969
1/4	1-1/8	3	1/4	0.015	125968
5/16	3/4	2-1/2	5/16	0.03	122494
5/16	3/4	2-1/2	5/16	0.015	125970
5/16	1-1/8	3	5/16	0.03	125973
5/16	1-1/8	3	5/16	0.015	125972
3/8	1	2-1/2	3/8	0.06	118084
3/8	1	2-1/2	3/8	0.03	120499
3/8	1	2-1/2	3/8	0.015	118083
3/8	1-1/2	4	3/8	0.06	125668
3/8	1-1/2	4	3/8	0.03	125974
3/8	1-1/2	4	3/8	0.015	125667
1/2	1-1/4	3	1/2	0.09	125975
1/2	1-1/4	3	1/2	0.06	117601
1/2	1-1/4	3	1/2	0.045	125965
1/2	1-1/4	3	1/2	0.03	118988
1/2	1-1/4	3	1/2	0.015	118043
1/2	2-1/4	4	1/2	0.09	125977
1/2	2-1/4	4	1/2	0.06	125671
1/2	2-1/4	4	1/2	0.045	125976
1/2	2-1/4	4	1/2	0.03	125670
1/2	2-1/4	4	1/2	0.015	125669
5/8	1-5/8	3-1/2	5/8	0.09	122562
5/8	1-5/8	3-1/2	5/8	0.06	118301
5/8	1-5/8	3-1/2	5/8	0.045	125957
5/8	1-5/8	3-1/2	5/8	0.03	125020
5/8	1-5/8	3-1/2	5/8	0.015	125978
5/8	2-1/2	5	5/8	0.09	125981
5/8	2-1/2	5	5/8	0.06	125674
5/8	2-1/2	5	5/8	0.03	125980
3/4	1-5/8	4	3/4	0.12	119621
3/4	1-5/8	4	3/4	0.09	125956
3/4	1-5/8	4	3/4	0.06	118489
3/4	1-5/8	4	3/4	0.03	118488
3/4	2-1/2	5	3/4	0.12	125677
3/4	2-1/2	5	3/4	0.09	125983
3/4	2-1/2	5	3/4	0.06	125982
3/4	2-1/2	5	3/4	0.03	125676

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<p><b>Roughing And Finishing</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Conventional or high speed machining of Aluminum</li> <li>Polished flutes resist built-up edge</li> <li>Built-in wiper flat for improved finish</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>37°</td> </tr> <tr> <td>3FL</td> <td>SQ</td> </tr> <tr> <td>h6</td> <td>Bright</td> </tr> <tr> <td>P 165</td> <td></td> </tr> </table>	CARBIDE	37°	3FL	SQ	h6	Bright	P 165	
CARBIDE	37°									
3FL	SQ									
h6	Bright									
P 165										

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							●	●				

● Best ○ Good

**Series 1025** | **GWA3 | 3FL | Square**

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	NF1
3/32	5/16	1-1/2	1/8	<b>102537</b>	<b>103123</b>
1/8	1/4	1-1/2	1/8	<b>101035</b>	<b>101037</b>
1/8	1/2	1-1/2	1/8	<b>100942</b>	<b>105059</b>
3/16	5/16	2	3/16	<b>101039</b>	<b>101040</b>
3/16	5/8	2	3/16	<b>100947</b>	<b>100952</b>
1/4	3/8	2-1/2	1/4	<b>101044</b>	<b>101045</b>
1/4	3/4	2-1/2	1/4	<b>100955</b>	<b>103126</b>
1/4	1-1/8	3	1/4	<b>100994</b>	<b>100996</b>
5/16	7/16	2-1/2	5/16	<b>101046</b>	<b>101048</b>
5/16	3/4	2-1/2	5/16	<b>100960</b>	<b>100963</b>
5/16	1-1/8	3	5/16	<b>100997</b>	<b>100998</b>
3/8	1/2	2-1/2	3/8	<b>101049</b>	<b>101053</b>
3/8	1	2-1/2	3/8	<b>100964</b>	<b>100971</b>
3/8	1-1/2	4	3/8	<b>100999</b>	<b>101002</b>
1/2	5/8	3	1/2	<b>101054</b>	<b>101056</b>
1/2	1-1/4	3	1/2	<b>100972</b>	<b>104458</b>
1/2	2-1/4	4	1/2	<b>101003</b>	<b>101011</b>
5/8	3/4	3-1/2	5/8	<b>101057</b>	<b>101058</b>
5/8	1-5/8	3-1/2	5/8	<b>100986</b>	<b>100987</b>
5/8	2-1/2	5	5/8	<b>101012</b>	<b>101013</b>
3/4	1	4	3/4	<b>101061</b>	<b>101062</b>
3/4	1-5/8	4	3/4	<b>100988</b>	<b>105058</b>
3/4	2-1/2	5	3/4	<b>101014</b>	<b>101018</b>
5/32	1/2	2	3/16	<b>106407</b>	<b>108028</b>
1	1-1/4	4	1	<b>101063</b>	<b>101065</b>
1	2	4	1	<b>100992</b>	<b>100993</b>
1	2-1/2	6	1	<b>101020</b>	<b>101022</b>

\*bold numbers are EDPs for ordering

INTRO

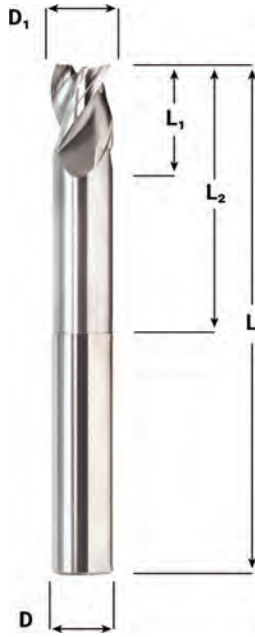
MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



FEATURES / DESCRIPTION		APPLICATION	FEATURES																																							
<p><b>Roughing And Finishing</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Conventional or high speed machining of Aluminum</li> <li>Polished flutes resist built-up edge</li> </ul>			<b>CARBIDE</b> <b>37°</b> <b>3FL</b> <b>SQ</b> <b>h6</b> <b>Bright</b> <b>P 165</b>																																							
<table border="1"> <thead> <tr> <th colspan="3">STEEL</th> <th colspan="2">STAINLESS</th> <th colspan="2">CAST IRON</th> <th colspan="2">NON-FERROUS</th> <th colspan="2">HRSA</th> <th colspan="2">HARDENED STEEL</th> </tr> <tr> <th>P1</th><th>P2</th><th>P3</th> <th>M1</th><th>M2</th> <th>K1</th><th>K2</th> <th>N1</th><th>N2</th> <th>S1</th><th>S2</th> <th>H1</th><th>H2</th> </tr> </thead> <tbody> <tr> <td></td><td></td><td></td> <td></td><td></td> <td></td><td></td> <td>●</td><td>●</td> <td></td><td></td> <td></td><td></td> </tr> </tbody> </table>		STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL		P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2								●	●						
STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL																															
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2																														
							●	●																																		

● Best ○ Good

**Series 1026** | **GWA3 | 3FL | Reduced Neck | Square**

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Bright	NF1
1/8	1/4	3/4	1-1/2	1/8	101066	109102
1/8	1/4	1-1/4	2	1/8	101023	109101
3/16	5/16	1	2	3/16	101067	109103
3/16	5/16	1-1/2	3	3/16	101024	103152
1/4	3/8	1-1/8	2-1/2	1/4	101068	109104
1/4	3/8	2-1/8	4	1/4	101026	103153
1/4	3/8	2-7/8	4	1/4	101091	109110
5/16	7/16	1-1/8	2-1/2	5/16	101069	108136
5/16	7/16	2-1/8	4	5/16	101028	103154
5/16	7/16	2-7/8	4	5/16	101092	103161
3/8	1/2	1-1/8	2-1/2	3/8	101070	109105
3/8	1/2	2-1/8	4	3/8	101029	103155
3/8	1/2	3-3/8	6	3/8	101093	109111
1/2	5/8	1-3/8	3	1/2	101071	109106
1/2	5/8	2-1/8	4	1/2	101030	103156
1/2	5/8	3-3/8	6	1/2	101094	109112
5/8	3/4	1-5/8	3-1/2	5/8	101073	109107
5/8	3/4	2-3/8	6	5/8	101031	103157
5/8	3/4	3-3/8	6	5/8	101095	109113
3/4	1	1-5/8	4	3/4	101074	109108
3/4	1	2-1/2	6	3/4	101032	103158
3/4	1	3-3/8	6	3/4	101096	109114
1	1-1/4	2	4	1	101080	109109
1	1-1/4	3-3/8	6	1	101034	103159
1	1-1/4	4-1/2	7	1	101097	109115

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Finishing In Aluminum



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>PERFORMANCE AL</b></p> <p><b>All-Terrain Aluminum Milling</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>For conventional or high speed machining of Aluminum</li> <li>Productivity and cost-efficiency</li> <li>Highly polished cutting face and flutes</li> </ul>		<p><b>CARBIDE</b> <b>37°</b></p> <p><b>3FL</b> <b>SQ</b></p> <p><b>Wiper Flat</b> <b>h6</b></p> <p><b>NF1</b> <b>P 165</b></p>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series 3031** 350WF | 3FL | Square | Wiper Flats

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
1/8	1/4	1-1/2	1/8	315123
1/8	1/2	2	1/8	315126
1/8	3/4	2	1/8	315130
3/16	5/16	2	3/16	315133
3/16	5/8	2-1/2	3/16	315137
3/16	3/4	2-1/2	3/16	315140
1/4	3/8	2-1/2	1/4	315143
1/4	3/4	2-1/2	1/4	315147
1/4	1-1/4	3	1/4	315149
5/16	7/16	2-1/2	5/16	315152
5/16	13/16	2-1/2	5/16	315155
5/16	1-1/4	3	5/16	315159
3/8	1/2	2-1/2	3/8	315162
3/8	1	2-1/2	3/8	315165
3/8	1-1/2	4	3/8	315167
1/2	5/8	3	1/2	315171
1/2	1-1/4	3	1/2	315173
1/2	2	4	1/2	315175
1/2	3-1/4	6	1/2	315178
5/8	3/4	3-1/2	5/8	315180
5/8	1-5/8	3-1/2	5/8	315184
5/8	2-1/2	5	5/8	315188
3/4	1	4	3/4	315190
3/4	1-5/8	4	3/4	315192
3/4	2-1/2	5	3/4	315196
3/4	3-1/4	6	3/4	315200
1	1-1/4	3	1	315203
1	2	5	1	315205
1	3	6	1	315209

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES																																							
<p><b>PERFORMANCE AL</b></p> <p><b>All-Terrain Aluminum Milling</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>For conventional or high speed machining of Aluminum</li> <li>Productivity and cost-efficiency</li> <li>Highly polished cutting face and flutes</li> <li>Stocked Bright or NF1 coating for Aluminum machining</li> </ul>		<p><b>CARBIDE</b> <b>45°</b></p> <p><b>2FL</b> <b>SQ</b></p> <p><b>RAD</b> <b>h6</b></p> <p><b>NF1</b> <b>Bright</b></p> <p><b>P 165</b></p>																																							
<table border="1"> <thead> <tr> <th colspan="3">STEEL</th> <th colspan="2">STAINLESS</th> <th colspan="2">CAST IRON</th> <th colspan="2">NON-FERROUS</th> <th colspan="2">HRSA</th> <th colspan="2">HARDENED STEEL</th> </tr> <tr> <th>P1</th> <th>P2</th> <th>P3</th> <th>M1</th> <th>M2</th> <th>K1</th> <th>K2</th> <th>N1</th> <th>N2</th> <th>S1</th> <th>S2</th> <th>H1</th> <th>H2</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>●</td> <td>●</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>● Best ○ Good</p>			STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL		P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2								●	●				
STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL																														
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2																													
							●	●																																	

**Series 2010** | 250 | 2FL | Square And Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	NF1
1/8	1/4	1-1/2	1/8	-	312896	312900
1/8	1/4	1-1/2	1/8	0.01	-	312902
1/8	5/16	1-1/2	1/8	-	312904	312908
1/8	3/8	1-1/2	1/8	-	312911	312924
1/8	3/8	1-1/2	1/8	0.01	-	312915
1/8	3/8	1-1/2	1/8	0.02	-	312918
1/8	3/8	1-1/2	1/8	0.03	-	312922
1/8	1/2	2	1/8	-	312926	312928
1/8	5/8	2	1/8	-	312930	312934
1/8	3/4	2	1/8	-	312937	312939
1/8	1	2-1/2	1/8	-	312942	312944
3/16	5/16	2	3/16	-	312958	312960
3/16	5/16	2	3/16	0.02	-	312964
3/16	5/16	3	3/16	-	-	312966
3/16	3/8	2	3/16	-	312970	312973
3/16	5/8	2-1/2	3/16	-	312976	312979
3/16	5/8	2-1/2	3/16	0.01	-	312981
3/16	5/8	2-1/2	3/16	0.02	-	312984
3/16	5/8	2-1/2	3/16	0.03	-	312986
3/16	3/4	2-1/2	3/16	-	312988	312990
3/16	1	2-1/2	3/16	-	312993	312995
1/4	3/8	2-1/2	1/4	-	313010	313013
1/4	3/8	2-1/2	1/4	0.015	-	313015
1/4	3/8	2-1/2	1/4	0.02	-	313017
1/4	3/8	2-1/2	1/4	0.03	-	313021
1/4	3/8	2-1/2	1/4	0.06	-	313024
1/4	1/2	2-1/2	1/4	-	313028	313031
1/4	5/8	2-1/2	1/4	-	313033	313035
1/4	3/4	2-1/2	1/4	-	313037	313039
1/4	3/4	2-1/2	1/4	0.01	-	313042
1/4	3/4	2-1/2	1/4	0.015	-	313044
1/4	3/4	2-1/2	1/4	0.02	-	313047
1/4	3/4	2-1/2	1/4	0.03	-	313049
1/4	3/4	2-1/2	1/4	0.045	-	313052
1/4	3/4	2-1/2	1/4	0.06	-	313054
1/4	1	2-1/2	1/4	-	313056	313060
1/4	1-1/8	2-1/2	1/4	-	313063	313067
1/4	1-1/4	3	1/4	-	313070	313072
1/4	1-1/2	3	1/4	-	313074	313077
1/4	2	4	1/4	-	313079	313083
5/16	7/16	2-1/2	5/16	-	313096	313098
5/16	7/16	2-1/2	5/16	0.02	-	313100
5/16	7/16	2-1/2	5/16	0.03	-	313102
5/16	1/2	2-1/2	5/16	-	313104	313108
5/16	13/16	2-1/2	5/16	-	313111	313114

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



Series 2010		250   2FL   Square and Radius				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	NF1
5/16	13/16	2-1/2	5/16	0.02	-	313117
5/16	13/16	2-1/2	5/16	0.03	-	313120
5/16	13/16	2-1/2	5/16	0.06	-	313122
5/16	1-1/8	2-1/2	5/16	-	313124	313127
5/16	1-1/4	3-1/2	5/16	-	313129	313133
5/16	1-1/2	3-1/2	5/16	-	313136	313140
5/16	2-1/8	4	5/16	-	313144	313148
3/8	1/2	2-1/2	3/8	-	313162	313164
3/8	1/2	2-1/2	3/8	0.02	-	313166
3/8	1/2	2-1/2	3/8	0.03	-	313169
3/8	1/2	2-1/2	3/8	0.045	-	313172
3/8	5/8	2-1/2	3/8	-	313175	313177
3/8	3/4	2-1/2	3/8	-	313181	313183
3/8	1	2-1/2	3/8	-	313187	313189
3/8	1	2-1/2	3/8	0.02	-	313192
3/8	1	2-1/2	3/8	0.03	-	313194
3/8	1	2-1/2	3/8	0.045	-	313198
3/8	1	2-1/2	3/8	0.06	-	313201
3/8	1-1/4	3	3/8	-	313203	313207
3/8	1-1/2	4	3/8	-	313209	313212
3/8	2	4	3/8	-	313215	313218
3/8	2-1/2	6	3/8	-	313222	313225
7/16	9/16	2-3/4	7/16	-	313241	313244
7/16	1	2-3/4	7/16	-	313246	313249
7/16	2	4	7/16	-	313252	313254
1/2	5/8	3	1/2	-	313270	313274
1/2	5/8	3	1/2	0.015	-	313276
1/2	5/8	3	1/2	0.02	-	313278
1/2	5/8	3	1/2	0.03	-	313281
1/2	5/8	3	1/2	0.06	-	313284
1/2	5/8	3	1/2	0.09	-	313288
1/2	5/8	6	1/2	-	313978	313982
1/2	3/4	3	1/2	-	313291	313293
1/2	1	3	1/2	-	313297	313300
1/2	1-1/4	3	1/2	-	313302	313304
1/2	1-1/4	3	1/2	0.015	-	313307
1/2	1-1/4	3	1/2	0.02	-	313311
1/2	1-1/4	3	1/2	0.03	-	313315
1/2	1-1/4	3	1/2	0.06	-	313317
1/2	1-1/4	3	1/2	0.09	-	313321
1/2	1-1/4	3	1/2	0.12	-	313325
1/2	1-1/2	4	1/2	-	313329	313331
1/2	2	4	1/2	-	313333	313337
1/2	2-1/4	6	1/2	-	313339	313341
1/2	2-1/2	6	1/2	-	313344	313346
1/2	3-1/4	6	1/2	-	313348	313350
1/2	4	8	1/2	-	313353	313356
5/8	3/4	3-1/2	5/8	-	313358	313362
5/8	3/4	5	5/8	-	314027	314030
5/8	3/4	6	5/8	-	314037	314039
5/8	1-1/4	3-1/2	5/8	-	313366	313370
5/8	1-5/8	3-1/2	5/8	-	313372	313374
5/8	1-5/8	3-1/2	5/8	0.03	-	313378
5/8	1-5/8	3-1/2	5/8	0.06	-	313381
5/8	1-5/8	3-1/2	5/8	0.09	-	313383
5/8	1-5/8	3-1/2	5/8	0.12	-	313385
5/8	2	5	5/8	-	313389	313392
5/8	2-1/2	5	5/8	-	313395	313397
5/8	2-3/4	5	5/8	-	313399	313401
5/8	3-1/4	6	5/8	-	313403	313406
5/8	4	8	5/8	-	313410	313414
3/4	1	4	3/4	-	313418	313422
3/4	1	4	3/4	0.06	-	313424
3/4	1	4	3/4	0.09	-	313427
3/4	1	4	3/4	0.12	-	313429
3/4	1-1/2	4	3/4	-	313431	313435
3/4	1-5/8	4	3/4	-	313439	313443
3/4	1-5/8	4	3/4	0.06	-	313447
3/4	1-5/8	4	3/4	0.09	-	313450
3/4	1-5/8	4	3/4	0.12	-	313453
3/4	2	5	3/4	-	313456	313458
3/4	2-1/4	5	3/4	-	313461	313463
3/4	2-1/2	5	3/4	-	313465	313469
3/4	3	6	3/4	-	313473	313477
3/4	3-1/4	6	3/4	-	313479	313483
3/4	3-1/2	6	3/4	-	313487	313489

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



Series 2010		250   2FL   Square and Radius				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	NF1
3/4	4	7	3/4	-	313492	313496
3/4	5	8	3/4	-	313499	313502
5/32	5/16	2	3/16	-	312946	312948
5/32	9/16	2	3/16	-	312952	312955
7/32	3/8	2-1/2	1/4	-	312997	313000
7/32	3/4	2-1/2	1/4	-	313002	313006
9/32	7/16	2-1/2	5/16	-	313087	313089
9/32	13/16	2-1/2	5/16	-	313091	313094
11/32	1/2	2-1/2	3/8	-	313150	313153
11/32	1	2-1/2	3/8	-	313157	313159
13/32	9/16	2-3/4	7/16	-	313229	313231
13/32	1	2-3/4	7/16	-	313234	313238
15/32	5/8	3	1/2	-	313257	313260
15/32	1-1/4	3	1/2	-	313264	313266
1	1-1/4	5	1	-	313506	313509
1	1-1/4	6	1	-	314146	314149
1	1-1/4	7	1	-	314172	314176
1	1-1/2	5	1	-	313511	313514
1	2	5	1	-	313517	313519
1	2	5	1	0.06	-	313523
1	2	5	1	0.09	-	313526
1	2	5	1	0.12	-	313528
1	2-1/2	5	1	-	313531	313533
1	3	6	1	-	313535	313537
1	3-1/2	6	1	-	313541	313543
1	4-1/8	7	1	-	313546	313548
1	5-1/2	8	1	-	313550	313553
1-1/4	1-1/4	4-1/2	1-1/4	-	-	313555
1-1/4	2	4-1/2	1-1/4	-	-	313557
1-1/4	5	7-1/2	1-1/4	-	-	313560

\*bold numbers are EDPs for ordering

## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**®

**CUSTOM  
COMES  
STANDARD**

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<p><b>PERFORMANCE AL</b></p> <p><b>All-Terrain Aluminum Milling</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>For conventional or high speed machining of Aluminum</li> <li>Productivity and cost-efficiency</li> <li>Highly polished cutting face and flutes</li> <li>Stocked Bright or NF1 coating for Aluminum machining</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>45°</td> </tr> <tr> <td>2FL</td> <td>Necked</td> </tr> <tr> <td>SQ</td> <td>RAD</td> </tr> <tr> <td>h6</td> <td>NF1</td> </tr> <tr> <td>Bright</td> <td>P 165</td> </tr> </table>	CARBIDE	45°	2FL	Necked	SQ	RAD	h6	NF1	Bright	P 165
CARBIDE	45°											
2FL	Necked											
SQ	RAD											
h6	NF1											
Bright	P 165											

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							●	●				

● Best ○ Good

**Series 2012** | 250 | 2FL | Reduced Neck | Square And Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	NF1
1/8	1/4	-	1-1/2	1/8	-	313733	313736
1/8	1/4	-	3	1/8	-	313751	313755
1/8	1/4	1/2	1-1/2	1/8	-	313739	313743
1/8	1/4	1/2	1-1/2	1/8	0.02	-	313745
1/8	1/4	1/2	1-1/2	1/8	0.03	-	313749
1/8	1/4	1-3/8	3	1/8	-	313758	313761
1/8	1/4	1-3/8	3	1/8	0.02	-	313763
1/8	1/4	1-3/8	3	1/8	0.03	-	313766
3/16	5/16	-	2	3/16	-	313768	313771
3/16	5/16	-	3	3/16	-	313788	-
3/16	5/16	1/2	2	3/16	-	313773	313777
3/16	5/16	1/2	2	3/16	0.01	-	313781
3/16	5/16	1/2	2	3/16	0.03	-	313785
3/16	5/16	1-3/8	3	3/16	-	313792	313794
3/16	5/16	1-3/8	3	3/16	0.01	-	313797
3/16	5/16	1-3/8	3	3/16	0.03	-	313800
1/4	3/8	-	2-1/2	1/4	-	313802	313805
1/4	3/8	-	4	1/4	-	313822	313826
1/4	3/8	1-1/8	2-1/2	1/4	-	313808	-
1/4	3/8	1-1/8	2-1/2	1/4	0.015	-	313811
1/4	3/8	1-1/8	2-1/2	1/4	0.03	-	313813
1/4	3/8	1-1/8	2-1/2	1/4	0.06	-	313817
1/4	3/8	1-1/8	2-1/2	1/4	0.09	-	313819
1/4	3/8	2-1/8	4	1/4	-	313828	313831
1/4	3/8	2-1/8	4	1/4	0.015	-	313834
1/4	3/8	2-1/8	4	1/4	0.03	-	313836
1/4	3/8	2-1/8	4	1/4	0.06	-	313839
1/4	3/8	2-1/8	4	1/4	0.09	-	313843
1/4	3/4	2-1/8	4	1/4	0.015	-	313847
1/4	3/4	2-1/8	4	1/4	0.03	-	313851
1/4	3/4	2-1/8	4	1/4	0.06	-	313855
1/4	3/4	2-1/8	4	1/4	0.09	-	313858
5/16	7/16	-	2-1/2	5/16	-	313862	313864
5/16	7/16	-	4	5/16	-	313877	313879
5/16	7/16	1-1/8	2-1/2	5/16	-	313867	313869
5/16	7/16	1-1/8	2-1/2	5/16	0.015	-	313873
5/16	7/16	2-1/8	4	5/16	-	313882	313886
5/16	13/16	2-1/8	4	5/16	0.015	-	313888
3/8	1/2	-	2-1/2	3/8	-	313892	313894
3/8	1/2	-	4	3/8	-	313900	313904
3/8	1/2	1-1/8	2-1/2	3/8	-	313897	-
3/8	1/2	2-1/8	4	3/8	-	313907	313909
3/8	1/2	2-1/8	4	3/8	0.03	-	313913
1/2	5/8	-	3	1/2	-	313917	313920
1/2	5/8	-	4	1/2	-	313947	313949

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



Series 2012		250   2FL   Reduced Neck   Square and Radius					
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	NF1
1/2	5/8	1-3/8	3	1/2	-	<b>313924</b>	313927
1/2	5/8	1-3/8	3	1/2	0.015	-	313929
1/2	5/8	1-3/8	3	1/2	0.02	-	313932
1/2	5/8	1-3/8	3	1/2	0.03	-	313936
1/2	5/8	1-3/8	3	1/2	0.06	-	313938
1/2	5/8	1-3/8	3	1/2	0.09	-	313941
1/2	5/8	1-3/8	3	1/2	0.12	-	313943
1/2	5/8	2-3/8	4	1/2	-	<b>313953</b>	313957
1/2	5/8	2-3/8	4	1/2	0.015	-	313961
1/2	5/8	2-3/8	4	1/2	0.02	-	313963
1/2	5/8	2-3/8	4	1/2	0.03	-	313967
1/2	5/8	2-3/8	4	1/2	0.06	-	313969
1/2	5/8	2-3/8	4	1/2	0.09	-	313972
1/2	5/8	2-3/8	4	1/2	0.12	-	313974
1/2	5/8	3-3/8	6	1/2	0.015	-	313986
1/2	5/8	3-3/8	6	1/2	0.02	-	313989
1/2	5/8	3-3/8	6	1/2	0.03	-	313992
1/2	5/8	3-3/8	6	1/2	0.06	-	313994
1/2	5/8	3-3/8	6	1/2	0.09	-	313996
1/2	5/8	3-3/8	6	1/2	0.12	-	313999
1/2	1-1/4	3-3/8	6	1/2	0.015	-	314001
1/2	1-1/4	3-3/8	6	1/2	0.03	-	314004
1/2	1-1/4	3-3/8	6	1/2	0.06	-	314008
1/2	1-1/4	3-3/8	6	1/2	0.09	-	314010
1/2	1-1/4	3-3/8	6	1/2	0.12	-	314014
5/8	3/4	-	3-1/2	5/8	-	<b>314017</b>	314019
5/8	3/4	1-5/8	3-1/2	5/8	-	<b>314022</b>	314024
5/8	3/4	2-3/8	5	5/8	-	<b>314032</b>	314035
5/8	3/4	3-3/8	6	5/8	-	<b>314043</b>	314045
3/4	1	-	4	3/4	-	<b>314049</b>	314053
3/4	1	-	5	3/4	-	<b>314077</b>	314079
3/4	1	-	6	3/4	-	<b>314101</b>	314105
3/4	1	1-5/8	4	3/4	-	<b>314057</b>	314060
3/4	1	1-5/8	4	3/4	0.03	-	314064
3/4	1	1-5/8	4	3/4	0.06	-	314067
3/4	1	1-5/8	4	3/4	0.09	-	314071
3/4	1	1-5/8	4	3/4	0.12	-	314074
3/4	1	2-1/2	5	3/4	-	<b>314082</b>	314086
3/4	1	2-1/2	5	3/4	0.03	-	314088
3/4	1	2-1/2	5	3/4	0.06	-	314091
3/4	1	2-1/2	5	3/4	0.09	-	314095
3/4	1	2-1/2	5	3/4	0.12	-	314098
3/4	1	3-3/8	6	3/4	-	<b>314109</b>	314111
3/4	1	3-3/8	6	3/4	0.03	-	314114
3/4	1	3-3/8	6	3/4	0.06	-	314116
3/4	1	3-3/8	6	3/4	0.09	-	314119
3/4	1	3-3/8	6	3/4	0.12	-	314122
3/4	1-5/8	3-3/8	6	3/4	0.03	-	314128
3/4	1-5/8	3-3/8	6	3/4	0.06	-	314130
3/4	1-5/8	3-3/8	6	3/4	0.09	-	314133
3/4	1-5/8	3-3/8	6	3/4	0.12	-	314126
1	1-1/4	-	5	1	-	<b>314136</b>	314140
1	1-1/4	2-1/8	5	1	-	<b>314142</b>	314144
1	1-1/4	3-3/8	6	1	-	<b>314153</b>	314157
1	1-1/4	3-3/8	6	1	0.03	-	314161
1	1-1/4	3-3/8	6	1	0.06	-	314165
1	1-1/4	3-3/8	6	1	0.09	-	314167
1	1-1/4	3-3/8	6	1	0.12	-	314170
1	1-1/4	4-3/8	7	1	-	<b>314179</b>	314181
1	1-1/4	4-3/8	7	1	0.03	-	314184
1	1-1/4	4-3/8	7	1	0.06	-	314186
1	1-1/4	4-3/8	7	1	0.09	-	314190
1	1-1/4	4-3/8	7	1	0.12	-	314193
1	2	4-3/8	7	1	0.03	-	314197
1	2	4-3/8	7	1	0.06	-	314199
1	2	4-3/8	7	1	0.09	-	314202
1	2	4-3/8	7	1	0.12	-	314206

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mill For Roughing And Slotting In Aluminum



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<p><b>Alumigator Slotting And Roughing Tool</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Ultra-high speed roughing in Aluminum</li> <li>Roughing and slotting at speeds in excess of 200 IPM</li> <li>Ultra-free cutting action</li> <li>Staggered chip breakers to rough and finish</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td></td> </tr> <tr> <td>37°</td> <td>3FL</td> </tr> <tr> <td>RAD</td> <td>SQ</td> </tr> <tr> <td>h6</td> <td>Bright</td> </tr> <tr> <td>P 153</td> <td></td> </tr> </table>	CARBIDE		37°	3FL	RAD	SQ	h6	Bright	P 153	
CARBIDE												
37°	3FL											
RAD	SQ											
h6	Bright											
P 153												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series 1015** | AST | 3FL | Chip Breaker | Square And Radius | Slotting Tool

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
3/16	5/8	2	3/16	-	120650
3/16	5/8	2	3/16	0.015	125984
3/16	5/8	2	3/16	0.03	120652
1/4	3/4	2-1/2	1/4	-	120653
1/4	3/4	2-1/2	1/4	0.015	125985
1/4	3/4	2-1/2	1/4	0.03	124047
1/4	1-1/8	3	1/4	-	125625
1/4	1-1/8	3	1/4	0.015	125986
1/4	1-1/8	3	1/4	0.03	125987
5/16	3/4	2-1/2	5/16	-	120656
5/16	3/4	2-1/2	5/16	0.015	125988
5/16	3/4	2-1/2	5/16	0.03	125960
5/16	1-1/8	3	5/16	-	125626
5/16	1-1/8	3	5/16	0.015	125989
5/16	1-1/8	3	5/16	0.03	125990
3/8	1	2-1/2	3/8	-	120659
3/8	1	2-1/2	3/8	0.015	120660
3/8	1	2-1/2	3/8	0.03	121652
3/8	1	2-1/2	3/8	0.06	120661
3/8	1-1/2	4	3/8	-	125627
3/8	1-1/2	4	3/8	0.015	125635
3/8	1-1/2	4	3/8	0.03	125991
3/8	1-1/2	4	3/8	0.06	125636
1/2	1-1/4	3	1/2	-	120662
1/2	1-1/4	3	1/2	0.015	120663
1/2	1-1/4	3	1/2	0.03	124010
1/2	1-1/4	3	1/2	0.045	125958
1/2	1-1/4	3	1/2	0.06	124078
1/2	1-1/4	3	1/2	0.09	125959
1/2	2-1/4	4	1/2	-	125628
1/2	2-1/4	4	1/2	0.015	125637
1/2	2-1/4	4	1/2	0.03	125992
1/2	2-1/4	4	1/2	0.06	125993
1/2	2-1/4	4	1/2	0.09	125994
5/8	1-5/8	3-1/2	5/8	-	120665
5/8	1-5/8	3-1/2	5/8	0.015	125995
5/8	1-5/8	3-1/2	5/8	0.03	125961
5/8	1-5/8	3-1/2	5/8	0.045	125962
5/8	1-5/8	3-1/2	5/8	0.06	125963
5/8	1-5/8	3-1/2	5/8	0.09	125964
5/8	2-1/2	5	5/8	-	125629
5/8	2-1/2	5	5/8	0.015	125996
5/8	2-1/2	5	5/8	0.03	125997
5/8	2-1/2	5	5/8	0.06	125998
5/8	2-1/2	5	5/8	0.09	125999

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mill For Roughing And Slotting In Aluminum



Series 1015		AST   3FL   Chip Breaker   Square and Radius   Slotting Tool				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP	
3/4	1-5/8	4	3/4	-	<b>120668</b>	
3/4	1-5/8	4	3/4	0.03	<b>120669</b>	
3/4	1-5/8	4	3/4	0.06	<b>123610</b>	
3/4	1-5/8	4	3/4	0.09	<b>123397</b>	
3/4	1-5/8	4	3/4	0.12	<b>120670</b>	
3/4	2-1/2	5	3/4	-	<b>125630</b>	
3/4	2-1/2	5	3/4	0.03	<b>125641</b>	
3/4	2-1/2	5	3/4	0.06	<b>125642</b>	
3/4	2-1/2	5	3/4	0.09	<b>125643</b>	
3/4	2-1/2	5	3/4	0.12	<b>125644</b>	

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**<sup>®</sup>

**CUSTOM  
COMES  
STANDARD**

# ADVANCED PERFORMANCE

Solid Carbide End Mill For Finishing In Aluminum



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



FEATURES / DESCRIPTION		APPLICATION	FEATURES																																							
<p><b>Alumigator Finisher Tool</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>High speed finishing of Aluminum</li> <li>Polished flutes and wiper flats produce mirror-like finishes</li> <li>Ideal for floor finishing</li> </ul>																																										
<table border="1"> <thead> <tr> <th colspan="3">STEEL</th> <th colspan="2">STAINLESS</th> <th colspan="2">CAST IRON</th> <th colspan="2">NON-FERROUS</th> <th colspan="2">HRSA</th> <th colspan="2">HARDENED STEEL</th> </tr> <tr> <th>P1</th><th>P2</th><th>P3</th> <th>M1</th><th>M2</th> <th>K1</th><th>K2</th> <th>N1</th><th>N2</th> <th>S1</th><th>S2</th> <th>H1</th><th>H2</th> </tr> </thead> <tbody> <tr> <td></td><td></td><td></td> <td></td><td></td> <td></td><td></td> <td>●</td><td>●</td> <td></td><td></td> <td></td><td></td> </tr> </tbody> </table>		STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL		P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2								●	●						
STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL																															
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2																														
							●	●																																		

● Best ○ Good

**Series 1020**     **AFT | 3FL | Square And Radius | Finishing Tool**

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
3/16	5/8	2	3/16	-	120671
3/16	5/8	2	3/16	0.01	120672
3/16	5/8	2	3/16	0.03	120673
1/4	3/4	2-1/2	1/4	-	120674
1/4	3/4	2-1/2	1/4	0.01	120675
1/4	3/4	2-1/2	1/4	0.03	123922
1/4	3/4	2-1/2	1/4	0.04	120676
1/4	1-1/8	3	1/4	-	125645
1/4	1-1/8	3	1/4	0.01	125651
1/4	1-1/8	3	1/4	0.04	125652
5/16	3/4	2-1/2	5/16	-	120677
5/16	3/4	2-1/2	5/16	0.01	120678
5/16	3/4	2-1/2	5/16	0.03	125952
5/16	3/4	2-1/2	5/16	0.05	120679
5/16	1-1/8	3	5/16	-	125646
5/16	1-1/8	3	5/16	0.01	125653
5/16	1-1/8	3	5/16	0.05	125654
3/8	1	2-1/2	3/8	-	120680
3/8	1	2-1/2	3/8	0.015	120681
3/8	1	2-1/2	3/8	0.03	123921
3/8	1	2-1/2	3/8	0.06	120682
3/8	1-1/2	4	3/8	-	125647
3/8	1-1/2	4	3/8	0.015	125655
3/8	1-1/2	4	3/8	0.06	125656
1/2	1-1/4	3	1/2	-	120683
1/2	1-1/4	3	1/2	0.015	120684
1/2	1-1/4	3	1/2	0.03	123624
1/2	1-1/4	3	1/2	0.045	125950
1/2	1-1/4	3	1/2	0.06	124804
1/2	1-1/4	3	1/2	0.08	120685
1/2	1-1/4	3	1/2	0.09	125951
1/2	2-1/4	4	1/2	-	125648
1/2	2-1/4	4	1/2	0.015	125657
1/2	2-1/4	4	1/2	0.08	125658
5/8	1-5/8	3-1/2	5/8	-	120686
5/8	1-5/8	3-1/2	5/8	0.02	120687
5/8	1-5/8	3-1/2	5/8	0.03	125953
5/8	1-5/8	3-1/2	5/8	0.06	125954
5/8	1-5/8	3-1/2	5/8	0.09	125955
5/8	1-5/8	3-1/2	5/8	0.1	120688
5/8	2-1/2	5	5/8	-	125649
5/8	2-1/2	5	5/8	0.02	125659
5/8	2-1/2	5	5/8	0.1	125660
3/4	1-5/8	4	3/4	-	120689
3/4	1-5/8	4	3/4	0.03	120690

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mill For Finishing In Aluminum



Series 1020		AFT   3FL   Square and Radius   Finishing Tool			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
3/4	1-5/8	4	3/4	0.06	<b>123896</b>
3/4	1-5/8	4	3/4	0.09	<b>124422</b>
3/4	1-5/8	4	3/4	0.12	<b>120691</b>
3/4	2-1/2	5	3/4	-	<b>125650</b>
3/4	2-1/2	5	3/4	0.03	<b>125661</b>
3/4	2-1/2	5	3/4	0.12	<b>125662</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

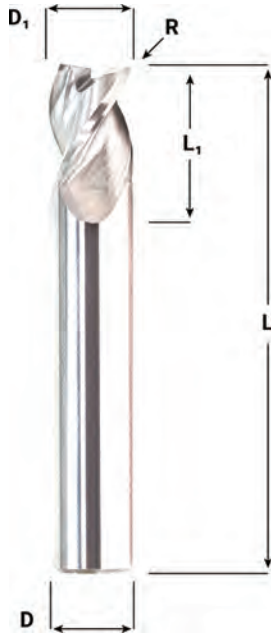
## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**<sup>®</sup>

**CUSTOM COMES STANDARD**

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES																																							
<p><b>PERFORMANCE AL</b></p> <p><b>All-Terrain Aluminum Milling</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>For conventional or high speed machining of Aluminum</li> <li>Productivity and cost-efficiency</li> <li>Highly polished cutting face and flutes</li> <li>Stocked Bright or NF1 coating for Aluminum machining</li> </ul>		<p><b>CARBIDE</b> <b>37°</b></p> <p><b>3FL</b> <b>SQ</b></p> <p><b>RAD</b> <b>h6</b></p> <p><b>NF1</b> <b>Bright</b></p> <p><b>P 165</b></p>																																							
<table border="1"> <thead> <tr> <th colspan="3">STEEL</th> <th colspan="2">STAINLESS</th> <th colspan="2">CAST IRON</th> <th colspan="2">NON-FERROUS</th> <th colspan="2">HRSA</th> <th colspan="2">HARDENED STEEL</th> </tr> <tr> <th>P1</th> <th>P2</th> <th>P3</th> <th>M1</th> <th>M2</th> <th>K1</th> <th>K2</th> <th>N1</th> <th>N2</th> <th>S1</th> <th>S2</th> <th>H1</th> <th>H2</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>●</td> <td>●</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>● Best ○ Good</p>			STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL		P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2								●	●				
STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL																														
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2																													
							●	●																																	

**Series 3030**     **350 | 3FL | Square And Radius**

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	NF1
1/8	1/4	1-1/2	1/8	-	314434	314436
1/8	5/16	1-1/2	1/8	-	314442	314445
1/8	3/8	1-1/2	1/8	-	314447	314450
1/8	3/8	1-1/2	1/8	0.02	314456	-
1/8	3/8	1-1/2	1/8	0.03	314458	-
1/8	1/2	2	1/8	-	314462	314466
1/8	5/8	2	1/8	-	314468	314472
1/8	3/4	2	1/8	-	314476	314479
1/8	1	2-1/2	1/8	-	314483	314487
3/16	5/16	2	3/16	-	314498	314502
3/16	3/8	2	3/16	-	314508	314512
3/16	5/8	2-1/2	3/16	-	314516	314518
3/16	3/4	2-1/2	3/16	-	314531	314534
3/16	1	2-1/2	3/16	-	314536	314539
1/4	3/8	2-1/2	1/4	-	314551	314553
1/4	1/2	2-1/2	1/4	-	314568	314570
1/4	5/8	2-1/2	1/4	-	314572	314575
1/4	3/4	2-1/2	1/4	-	314577	314581
1/4	3/4	2-1/2	1/4	0.01	314584	-
1/4	3/4	2-1/2	1/4	0.015	314586	-
1/4	3/4	2-1/2	1/4	0.02	314590	-
1/4	3/4	2-1/2	1/4	0.03	314592	-
1/4	3/4	2-1/2	1/4	0.045	314596	-
1/4	3/4	2-1/2	1/4	0.06	314598	-
1/4	1	2-1/2	1/4	-	314600	314602
1/4	1-1/8	2-1/2	1/4	-	314605	314607
1/4	1-1/4	3	1/4	-	314610	314614
1/4	1-1/2	3	1/4	-	314616	314618
1/4	2	4	1/4	-	314622	314624
5/16	7/16	2-1/2	5/16	-	314639	-
5/16	1/2	2-1/2	5/16	-	314651	314655
5/16	13/16	2-1/2	5/16	-	314657	314661
5/16	1-1/8	2-1/2	5/16	-	314672	-
5/16	1-1/8	2-1/2	5/16	-	314674	-
5/16	1-1/4	3-1/2	5/16	-	314678	-
5/16	1-1/4	3	5/16	-	314681	-
5/16	1-1/2	3-1/2	5/16	-	314684	314687
5/16	2-1/8	4	5/16	-	314690	314692
3/8	1/2	2-1/2	3/8	-	314705	314709
3/8	5/8	2-1/2	3/8	-	314719	314723
3/8	3/4	2-1/2	3/8	-	314726	314729
3/8	1	2-1/2	3/8	-	314732	314736
3/8	1-1/4	3	3/8	-	314749	314753
3/8	1-1/2	4	3/8	-	314755	314758
3/8	2	4	3/8	-	314762	314766

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



Series 2030		350   3FL   Square and Radius				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	NF1
3/8	2-1/2	6	3/8	-	314768	314771
7/16	9/16	2-3/4	7/16	-	314783	314786
7/16	1	2-3/4	7/16	-	314790	314793
7/16	2	4	7/16	-	314797	314801
1/2	5/8	3	1/2	-	314814	314818
1/2	3/4	3	1/2	-	314834	314836
1/2	1	3	1/2	-	314838	314840
1/2	1-1/4	3	1/2	-	314843	314845
1/2	1-1/2	4	1/2	-	314863	314865
1/2	2	4	1/2	-	314869	314872
1/2	2-1/4	6	1/2	-	314876	314878
1/2	2-1/2	6	1/2	-	314880	314884
1/2	3-1/4	6	1/2	-	314888	314892
1/2	4	8	1/2	-	314896	314900
5/8	3/4	3-1/2	5/8	-	314904	314908
5/8	1-1/4	3-1/2	5/8	-	314912	314914
5/8	1-5/8	3-1/2	5/8	-	314917	314920
5/8	2	5	5/8	-	314938	314941
5/8	2-1/2	5	5/8	-	314944	314948
5/8	2-3/4	5	5/8	-	314952	314954
5/8	3-1/4	6	5/8	-	314956	314960
5/8	4	8	5/8	-	314962	314965
3/4	1	4	3/4	-	314969	314972
3/4	1-1/2	4	3/4	-	314983	314987
3/4	1-5/8	4	3/4	-	314991	314994
3/4	2	5	3/4	-	315005	315007
3/4	2-1/4	5	3/4	-	315011	315013
3/4	2-1/2	5	3/4	-	315017	315021
3/4	3	6	3/4	-	315023	315025
3/4	3-1/4	6	3/4	-	315027	315029
3/4	3-1/2	6	3/4	-	315031	315033
3/4	4	7	3/4	-	315036	315039
3/4	5	8	3/4	-	315043	315047
5/32	5/16	2	3/16	-	314491	314493
5/32	9/16	2	3/16	-	314496	-
7/32	3/8	2-1/2	1/4	-	314542	314545
7/32	3/4	2-1/2	1/4	-	314547	314549
9/32	7/16	2-1/2	5/16	-	314626	314630
9/32	13/16	2-1/2	5/16	-	314633	314636
11/32	1/2	2-1/2	3/8	-	314694	314696
11/32	1	2-1/2	3/8	-	314700	314703
13/32	9/16	2-3/4	7/16	-	314773	314775
13/32	1	2-3/4	7/16	-	314779	314781
15/32	5/8	3	1/2	-	314803	314805
15/32	1-1/4	3	1/2	-	314808	314810
1	1-1/4	5	1	-	315051	315054
1	1-1/2	5	1	-	315057	315060
1	2	5	1	-	315062	315065
1	2-1/2	5	1	-	315077	-
1	2-1/2	5	1	-	315081	-
1	3	6	1	-	315084	315086
1	3-1/2	6	1	-	315090	315093
1	4-1/8	7	1	-	315096	315099
1	5-1/2	8	1	-	315101	315105
1-1/4	2	4-1/2	1-1/4	-	315109	315112
1-1/4	3-1/4	6	1-1/4	-	315115	315118

\*bold numbers are EDPs for ordering

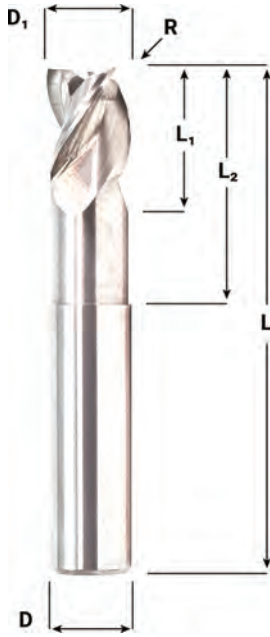
## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**®

**CUSTOM  
COMES  
STANDARD**

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES																																							
<p><b>PERFORMANCE AL</b></p> <p><b>All-Terrain Aluminum Milling</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>For conventional or high speed machining of Aluminum</li> <li>Productivity and cost-efficiency</li> <li>Highly polished cutting face and flutes</li> <li>Reduced neck</li> <li>Stocked Bright or NF1 coating for Aluminum machining</li> </ul>		<p><b>CARBIDE</b> <b>37°</b></p> <p><b>3FL</b> <b>Necked</b></p> <p><b>SQ</b> <b>RAD</b></p> <p><b>h6</b> <b>NF1</b></p> <p><b>Bright</b> <b>P 165</b></p>																																							
<table border="1"> <thead> <tr> <th colspan="3">STEEL</th> <th colspan="2">STAINLESS</th> <th colspan="2">CAST IRON</th> <th colspan="2">NON-FERROUS</th> <th colspan="2">HRSA</th> <th colspan="2">HARDENED STEEL</th> </tr> <tr> <th>P1</th> <th>P2</th> <th>P3</th> <th>M1</th> <th>M2</th> <th>K1</th> <th>K2</th> <th>N1</th> <th>N2</th> <th>S1</th> <th>S2</th> <th>H1</th> <th>H2</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>●</td> <td>●</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>● Best ○ Good</p>			STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL		P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2								●	●				
STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL																														
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2																													
							●	●																																	

**Series 3032** | 350 | 3FL | Reduced Neck | Square And Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	NF1
1/8	1/4	1/2	1-1/2	1/8	0.02	-	315355
1/8	1/4	1/2	1-1/2	1/8	0.03	-	315359
1/8	1/4	1-3/8	3	1/8	0.02	-	315363
1/8	1/4	1-3/8	3	1/8	0.03	-	315367
3/16	5/16	1/2	2	3/16	0.01	-	315369
3/16	5/16	1/2	2	3/16	0.03	-	315371
3/16	5/16	1-3/8	3	3/16	0.01	-	315374
3/16	5/16	1-3/8	3	3/16	0.03	-	315377
1/4	3/8	-	2-1/2	1/4	-	315379	315381
1/4	3/8	-	2-1/2	1/4	-	315403	315405
1/4	3/8	1-1/8	2-1/2	1/4	-	315384	315388
1/4	3/8	1-1/8	2-1/2	1/4	0.015	-	315392
1/4	3/8	1-1/8	2-1/2	1/4	0.03	-	315394
1/4	3/8	1-1/8	2-1/2	1/4	0.06	-	315397
1/4	3/8	1-1/8	2-1/2	1/4	0.09	-	315399
1/4	3/8	2-1/8	4	1/4	-	315408	315411
1/4	3/8	2-1/8	4	1/4	0.015	-	315413
1/4	3/8	2-1/8	4	1/4	0.03	-	315415
1/4	3/8	2-1/8	4	1/4	0.06	-	315417
1/4	3/8	2-1/8	4	1/4	0.09	-	315419
1/4	3/4	2-1/8	4	1/4	0.015	-	315423
1/4	3/4	2-1/8	4	1/4	0.03	-	315427
1/4	3/4	2-1/8	4	1/4	0.06	-	315429
1/4	3/4	2-1/8	4	1/4	0.09	-	315433
5/16	7/16	-	2-1/2	5/16	-	315437	315441
5/16	7/16	1-1/8	2-1/2	5/16	-	315445	-
5/16	7/16	1-1/8	2-1/2	5/16	-	-	315447
5/16	7/16	1-1/8	2-1/2	5/16	0.015	-	315450
5/16	7/16	-	4	5/16	-	315453	315456
5/16	7/16	2-1/8	4	5/16	-	315458	315460
5/16	13/16	2-1/8	4	5/16	0.015	-	315464
3/8	1/2	-	2-1/2	3/8	-	315466	315469
3/8	1/2	-	2-1/2	3/8	-	315478	315481
3/8	1/2	1-1/8	2-1/2	3/8	-	315473	315476
3/8	1/2	2-1/8	4	3/8	-	315483	-
3/8	1/2	2-1/8	4	3/8	-	-	315486
3/8	1/2	2-1/8	4	3/8	0.03	-	315489
1/2	5/8	-	3	1/2	-	315491	315495
1/2	5/8	1-3/8	3	1/2	-	315498	-
1/2	5/8	1-3/8	3	1/2	-	-	315502
1/2	5/8	1-3/8	3	1/2	0.015	-	315505
1/2	5/8	1-3/8	3	1/2	0.02	-	315507
1/2	5/8	1-3/8	3	1/2	0.03	-	315511
1/2	5/8	1-3/8	3	1/2	0.06	-	315515
1/2	5/8	1-3/8	3	1/2	0.09	-	315518

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Aluminum And Non-Ferrous Materials



Series 2032		350   3FL   Reduced Neck   Square and Radius					
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	NF1
1/2	5/8	1-3/8	3	1/2	0.12	-	315520
1/2	5/8	-	4	1/2	-	315523	315525
1/2	5/8	2-3/8	4	1/2	-	315527	-
1/2	5/8	2-3/8	4	1/2	-	-	315529
1/2	5/8	2-3/8	4	1/2	0.015	-	315532
1/2	5/8	2-3/8	4	1/2	0.02	-	315535
1/2	5/8	2-3/8	4	1/2	0.03	-	315537
1/2	5/8	2-3/8	4	1/2	0.06	-	315539
1/2	5/8	2-3/8	4	1/2	0.09	-	315542
1/2	5/8	2-3/8	4	1/2	0.12	-	315546
1/2	5/8	-	6	1/2	-	315548	315552
1/2	5/8	3-3/8	6	1/2	-	315554	-
1/2	5/8	3-3/8	6	1/2	0.015	-	315558
1/2	5/8	3-3/8	6	1/2	0.02	-	315562
1/2	5/8	3-3/8	6	1/2	0.03	-	315565
1/2	5/8	3-3/8	6	1/2	0.06	-	315569
1/2	5/8	3-3/8	6	1/2	0.09	-	315572
1/2	5/8	3-3/8	6	1/2	0.12	-	315574
1/2	1-1/4	3-3/8	6	1/2	0.015	-	315578
1/2	1-1/4	3-3/8	6	1/2	0.03	-	315581
1/2	1-1/4	3-3/8	6	1/2	0.06	-	315583
1/2	1-1/4	3-3/8	6	1/2	0.09	-	315586
1/2	1-1/4	3-3/8	6	1/2	0.12	-	315589
5/8	3/4	-	3-1/2	5/8	-	315591	315593
5/8	3/4	1-5/8	3-1/2	5/8	-	315597	315599
5/8	3/4	-	5	5/8	-	315601	315603
5/8	3/4	2-3/8	5	5/8	-	315605	315607
5/8	3/4	-	6	5/8	-	315609	315611
5/8	3/4	3-3/8	6	5/8	-	315615	315618
3/4	1	-	4	3/4	-	315621	315625
3/4	1	1-5/8	4	3/4	-	315627	-
3/4	1	1-5/8	4	3/4	-	-	315629
3/4	1	1-5/8	4	3/4	0.03	-	315632
3/4	1	1-5/8	4	3/4	0.06	-	315636
3/4	1	1-5/8	4	3/4	0.09	-	315640
3/4	1	1-5/8	4	3/4	0.12	-	315642
3/4	1	-	5	3/4	-	-	315644
3/4	1	2-1/2	5	3/4	-	315646	315650
3/4	1	2-1/2	5	3/4	0.03	-	315654
3/4	1	2-1/2	5	3/4	0.06	-	315656
3/4	1	2-1/2	5	3/4	0.09	-	315659
3/4	1	2-1/2	5	3/4	0.12	-	315662
3/4	1	-	6	3/4	-	-	315664
3/4	1	3-3/8	6	3/4	-	315667	315669
3/4	1	3-3/8	6	3/4	0.03	-	315671
3/4	1	3-3/8	6	3/4	0.06	-	315673
3/4	1	3-3/8	6	3/4	0.09	-	315675
3/4	1	3-3/8	6	3/4	0.12	-	315677
3/4	1-5/8	3-3/8	6	3/4	0.03	-	315679
3/4	1-5/8	3-3/8	6	3/4	0.06	-	315683
3/4	1-5/8	3-3/8	6	3/4	0.09	-	315686
3/4	1-5/8	3-3/8	6	3/4	0.12	-	315689
1	1-1/4	-	5	1	-	315693	315696
1	1-1/4	2-1/8	5	1	-	315699	315702
1	1-1/4	-	6	1	-	315706	315709
1	1-1/4	3-3/8	6	1	-	315713	-
1	1-1/4	3-3/8	6	1	-	-	315716
1	1-1/4	3-3/8	6	1	0.03	-	315720
1	1-1/4	3-3/8	6	1	0.06	-	315724
1	1-1/4	3-3/8	6	1	0.09	-	315728
1	1-1/4	3-3/8	6	1	0.12	-	315730
1	1-1/4	-	7	1	-	315734	315738
1	1-1/4	4-3/8	7	1	-	315742	-
1	1-1/4	4-3/8	7	1	-	-	315745
1	1-1/4	4-3/8	7	1	0.03	-	315749
1	1-1/4	4-3/8	7	1	0.06	-	315751
1	1-1/4	4-3/8	7	1	0.09	-	315755
1	1-1/4	4-3/8	7	1	0.12	-	315758
1	2	4-3/8	7	1	0.03	-	315761
1	2	4-3/8	7	1	0.06	-	315764
1	2	4-3/8	7	1	0.09	-	315767
1	2	4-3/8	7	1	0.12	-	315771

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide Coolant-Through End Mills For High Speed Roughing In Aluminum



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<p><b>Super Rougher</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Coolant-through design for high efficiency milling of Aluminum</li> <li>Chip breakers allow for reduced cutting torque</li> <li>Unequal indexing configuration</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>37°</td> </tr> <tr> <td>5FL</td> <td>SQ</td> </tr> <tr> <td>RAD</td> <td>CC</td> </tr> <tr> <td>h6</td> <td>THRU</td> </tr> <tr> <td>Bright</td> <td>P 154</td> </tr> </table>	CARBIDE	37°	5FL	SQ	RAD	CC	h6	THRU	Bright	P 154
CARBIDE	37°											
5FL	SQ											
RAD	CC											
h6	THRU											
Bright	P 154											

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series 1500** | ASR5 | 5FL | Chip Breaker | Square And Radius | Coolant-Through

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
3/8	1-1/8	3	3/8	-	150001
3/8	1-1/8	3	3/8	0.015	150002
3/8	1-1/8	3	3/8	0.03	150003
3/8	1-1/8	3	3/8	0.06	150004
1/2	1-1/2	3-1/2	1/2	-	150005
1/2	1-1/2	3-1/2	1/2	0.015	150006
1/2	1-1/2	3-1/2	1/2	0.03	150007
1/2	1-1/2	3-1/2	1/2	0.06	150008
5/8	1-7/8	4	5/8	-	150009
5/8	1-7/8	4	5/8	0.03	150010
5/8	1-7/8	4	5/8	0.06	150011
5/8	1-7/8	4	5/8	0.09	150012
3/4	2-1/4	5	3/4	-	150013
3/4	2-1/4	5	3/4	0.03	150014
3/4	2-1/4	5	3/4	0.06	150015
3/4	2-1/4	5	3/4	0.09	150016
1	3	5-1/2	1	-	150017
1	3	5-1/2	1	0.03	150018
1	3	5-1/2	1	0.06	150019
1	3	5-1/2	1	0.09	150020

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For High Speed Roughing In Aluminum



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<p><b>Super Rougher</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Chip breakers for reduced cutting torque</li> <li>Unequal indexing configuration</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>37°</td> </tr> <tr> <td>5FL</td> <td>SQ</td> </tr> <tr> <td>RAD</td> <td>h6</td> </tr> <tr> <td>Bright</td> <td>P 154</td> </tr> </table>	CARBIDE	37°	5FL	SQ	RAD	h6	Bright	P 154
CARBIDE	37°									
5FL	SQ									
RAD	h6									
Bright	P 154									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

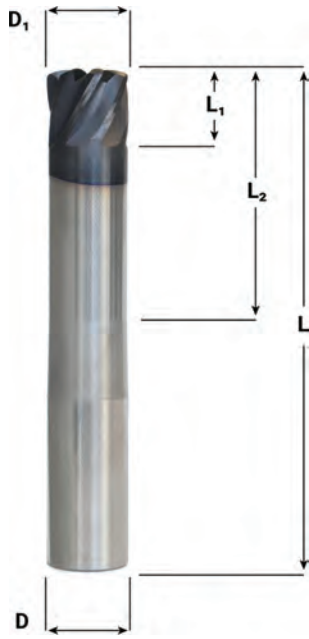
**Series 1502** | ASR5 | 5FL | Chip Breaker | Square And Radius | Solid

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
3/8	1-1/8	3	3/8	-	150201
3/8	1-1/8	3	3/8	0.015	150202
3/8	1-1/8	3	3/8	0.03	150203
3/8	1-1/8	3	3/8	0.06	150204
1/2	1-1/2	3-1/2	1/2	-	150205
1/2	1-1/2	3-1/2	1/2	0.015	150206
1/2	1-1/2	3-1/2	1/2	0.03	150207
1/2	1-1/2	3-1/2	1/2	0.06	150208
5/8	1-7/8	4	5/8	-	150209
5/8	1-7/8	4	5/8	0.03	150210
5/8	1-7/8	4	5/8	0.06	150211
5/8	1-7/8	4	5/8	0.09	150212
3/4	2-1/4	5	3/4	-	150213
3/4	2-1/4	5	3/4	0.03	150214
3/4	2-1/4	5	3/4	0.06	150215
3/4	2-1/4	5	3/4	0.09	150216
1	3	5-1/2	1	-	150217
1	3	5-1/2	1	0.03	150218
1	3	5-1/2	1	0.06	150219
1	3	5-1/2	1	0.09	150220

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide High Feed End Mills For Titanium



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>Ti FEED</h2> <p><b>High Feed Mill For Ti</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Ideal for stainless steels and Titanium</li> <li>Suited for Z-Level machining and 5-axis machines</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>30°</li> <li>Multi</li> <li>RAD</li> <li>h6</li> <li>CC</li> <li>Necked</li> <li>AITiN</li> <li>P 172</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
			●	●					○	●		

● Best ○ Good

Series 2052		TF   5-7FL   Corner Radius   High Feed				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	EDP	
1/4	1/8	0.21	3	1/4	205201	
3/8	5/16	0.34	4	3/8	205202	
1/2	3/8	0.46	5	1/2	205203	
5/8	3/8	0.59	6	5/8	205204	
3/4	7/16	0.71	6	3/4	205205	
1	3/4	0.96	6	1	205206	

\*bold numbers are EDPs for ordering

INTRO

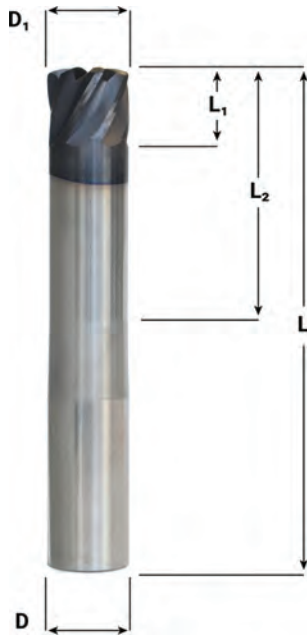
MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>Ti FEED</h2> <p><b>High Feed Mill For Ti</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Ideal for stainless steels and Titanium</li> <li>Suited for Z-Level machining and 5-axis machines</li> <li>Coolant-through</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>30°</li> <li>Multi</li> <li>RAD</li> <li>THRU</li> <li>h6</li> <li>DC</li> <li>Necked</li> <li>AlTiN</li> <li>P 172</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
			●	●					○	●		

● Best ○ Good

Series 2053		TF   5-7FL   Corner Radius   Coolant-Through   High Feed				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	EDP	
1/4	0.13	0.21	3	1/4	205301	
3/8	5/16	0.34	4	3/8	205302	
1/2	3/8	0.46	5	1/2	205303	
5/8	3/8	0.59	6	5/8	205304	
3/4	7/16	0.71	6	3/4	205305	
1	3/4	0.96	6	1	205306	

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

End Mills For Titanium Alloys



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>PERFORMANCE Ti</b></p> <p><b>High Helix For Titanium Alloys</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>8-10 flute design distributes heat to reduce wear</li> <li>FX3 coating adds heat resistance and lubricity</li> <li>High helix with increased flute counts for improved heat control</li> <li>Ideal for 6Al4V</li> <li>Available with and without neck for extended reach</li> <li>SafeLock® shank available upon request</li> </ul>		<p>CARBIDE 40°</p> <p>SQ RAD</p> <p>h6 FX3</p> <p>P 163</p>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
			○	○						●		

● Best ○ Good

## Series 280 840 | Multi Flute | Square And Radius | Titanium

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	Flutes	EDP
1/2	5/8	-	3	1/2	-	8	317204
1/2	5/8	1-1/8	3	1/2	-	8	317321
1/2	5/8	-	3	1/2	0.03	8	317208
1/2	5/8	1-1/8	3	1/2	0.03	8	317324
1/2	5/8	-	3	1/2	0.06	8	317212
1/2	5/8	1-1/8	3	1/2	0.06	8	317326
1/2	5/8	2 1/8	4	1/2	-	8	317329
1/2	5/8	2 1/8	4	1/2	0.03	8	317331
1/2	5/8	2 1/8	4	1/2	0.06	8	317335
1/2	5/8	3 1/8	6	1/2	-	8	317339
1/2	5/8	3 1/8	6	1/2	0.03	8	317343
1/2	5/8	3 1/8	6	1/2	0.06	8	317345
1/2	1-1/4	-	3	1/2	-	8	317216
1/2	1-1/4	-	3	1/2	0.03	8	317218
1/2	1-1/4	-	3	1/2	0.06	8	317221
5/8	3/4	-	3	5/8	-	8	317225
5/8	3/4	-	3	5/8	0.03	8	317228
5/8	3/4	-	3	5/8	0.06	8	317232
5/8	3/4	-	3	5/8	0.09	8	317236
5/8	3/4	1 5/8	4	5/8	-	8	317349
5/8	3/4	1 5/8	4	5/8	0.03	8	317352
5/8	3/4	1 5/8	4	5/8	0.06	8	317354
5/8	3/4	1 5/8	4	5/8	0.09	8	317358
5/8	3/4	2 5/8	5	5/8	-	8	317362
5/8	3/4	2 5/8	5	5/8	0.03	8	317364
5/8	3/4	2 5/8	5	5/8	0.06	8	317368
5/8	3/4	2 5/8	5	5/8	0.09	8	317370
5/8	3/4	3 5/8	6	5/8	-	8	317374
5/8	3/4	3 5/8	6	5/8	0.03	8	317376
5/8	3/4	3 5/8	6	5/8	0.06	8	317378
5/8	3/4	3 5/8	6	5/8	0.09	8	317381
5/8	1-5/8	-	3-1/2	5/8	-	8	317238
5/8	1-5/8	-	3-1/2	5/8	0.03	8	317240
5/8	1-5/8	-	3-1/2	5/8	0.06	8	317243
5/8	1-5/8	-	3-1/2	5/8	0.09	8	317245
3/4	1	-	4	3/4	-	10	317247
3/4	1	1 7/8	4	3/4	-	10	317385
3/4	1	-	4	3/4	0.03	10	317249
3/4	1	1 7/8	4	3/4	0.03	10	317388
3/4	1	-	4	3/4	0.06	10	317253
3/4	1	1 7/8	4	3/4	0.06	10	317391
3/4	1	-	4	3/4	0.09	10	317257
3/4	1	1 7/8	4	3/4	0.09	10	317395
3/4	1	-	4	3/4	0.12	10	317260
3/4	1	1 7/8	4	3/4	0.12	10	317398

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# ADVANCED PERFORMANCE

End Mills For Titanium Alloys



Series 280		840   Multi Flute   Square and Radius   Titanium					
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	Flutes	EDP
3/4	1	2 7/8	5	3/4	-	10	<b>317402</b>
3/4	1	2 7/8	5	3/4	0.03	10	<b>317406</b>
3/4	1	2 7/8	5	3/4	0.06	10	<b>317409</b>
3/4	1	2 7/8	5	3/4	0.09	10	<b>317412</b>
3/4	1	2 7/8	5	3/4	0.12	10	<b>317414</b>
3/4	1	3 7/8	6	3/4	-	10	<b>317416</b>
3/4	1	3 7/8	6	3/4	0.03	10	<b>317420</b>
3/4	1	3 7/8	6	3/4	0.06	10	<b>317423</b>
3/4	1	3 7/8	6	3/4	0.09	10	<b>317427</b>
3/4	1	3 7/8	6	3/4	0.12	10	<b>317430</b>
3/4	1-5/8	-	4	3/4	-	10	<b>317262</b>
3/4	1-5/8	-	4	3/4	0.03	10	<b>317264</b>
3/4	1-5/8	-	4	3/4	0.06	10	<b>317267</b>
3/4	1-5/8	-	4	3/4	0.09	10	<b>317269</b>
3/4	1-5/8	-	4	3/4	0.12	10	<b>317272</b>
1	1-1/4	-	4	1	-	10	<b>317275</b>
1	1-1/4	-	4	1	-	10	<b>317433</b>
1	1-1/4	-	4	1	0.03	10	<b>317277</b>
1	1-1/4	-	4	1	0.03	10	<b>317435</b>
1	1-1/4	-	4	1	0.06	10	<b>317279</b>
1	1-1/4	1 5/8	4	1	0.06	10	<b>317439</b>
1	1-1/4	-	4	1	0.09	10	<b>317282</b>
1	1-1/4	1 5/8	4	1	0.09	10	<b>317441</b>
1	1-1/4	-	4	1	0.12	10	<b>317286</b>
1	1-1/4	1 5/8	4	1	0.12	10	<b>317444</b>
1	1-1/4	2 5/8	5	1	-	10	<b>317447</b>
1	1-1/4	2 5/8	5	1	0.03	10	<b>317449</b>
1	1-1/4	2 5/8	5	1	0.06	10	<b>317452</b>
1	1-1/4	2 5/8	5	1	0.09	10	<b>317454</b>
1	1-1/4	2 5/8	5	1	0.12	10	<b>317458</b>
1	1-1/4	3 5/8	6	1	-	10	<b>317461</b>
1	1-1/4	3 5/8	6	1	0.03	10	<b>317464</b>
1	1-1/4	3 5/8	6	1	0.06	10	<b>317467</b>
1	1-1/4	3 5/8	6	1	0.09	10	<b>317470</b>
1	1-1/4	3 5/8	6	1	0.12	10	<b>317474</b>
1	2	-	4	1	-	10	<b>317288</b>
1	2	-	4	1	0.03	10	<b>317291</b>
1	2	-	4	1	0.06	10	<b>317295</b>
1	2	-	4	1	0.09	10	<b>317299</b>
1	2	-	4	1	0.12	10	<b>317302</b>
1	3-1/4	-	6	1	-	10	<b>317305</b>
1	3-1/4	-	6	1	0.03	10	<b>317309</b>
1	3-1/4	-	6	1	0.06	10	<b>317311</b>
1	3-1/4	-	6	1	0.09	10	<b>317314</b>
1	3-1/4	-	6	1	0.12	10	<b>317317</b>

\*bold numbers are EDPs for ordering

INTRO

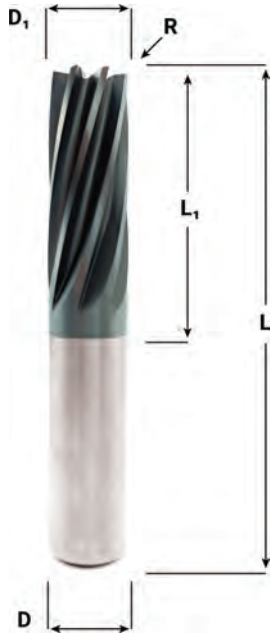
MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<p><b>PERFORMANCE Ni</b></p> <p><b>Slow Helix For Nickel Alloys</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>6 -12 flute mills ideal for HRSA</li> <li>Ideal for Nickel Alloys</li> <li>Tapered core with low helix for rigidity</li> <li>Slow helix increases core diameter for maximum rigidity</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>15°</td> </tr> <tr> <td>Multi</td> <td>SQ</td> </tr> <tr> <td>RAD</td> <td>h6</td> </tr> <tr> <td>FX3</td> <td>P 162</td> </tr> </table>	CARBIDE	15°	Multi	SQ	RAD	h6	FX3	P 162
CARBIDE	15°									
Multi	SQ									
RAD	h6									
FX3	P 162									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
					○	○			●		●	●

● Best ○ Good

**Series 270** | 815 | Multi Flute | Square And Radius | Ni Alloys

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Flutes	EDP
3/8	1/2	2-1/2	3/8	-	6	<b>317080</b>
3/8	1/2	2-1/2	3/8	0.02	6	<b>317083</b>
3/8	1/2	2-1/2	3/8	0.03	6	<b>317086</b>
3/8	1	2-1/2	3/8	-	6	<b>317088</b>
3/8	1	2-1/2	3/8	0.02	6	<b>317092</b>
3/8	1	2-1/2	3/8	0.03	6	<b>317096</b>
3/8	1	3	3/8	-	6	<b>317099</b>
3/8	1	3	3/8	0.02	6	<b>317102</b>
3/8	1	3	3/8	0.03	6	<b>317106</b>
1/2	5/8	3	1/2	-	8	<b>317110</b>
1/2	5/8	3	1/2	0.03	8	<b>317113</b>
1/2	5/8	3	1/2	0.06	8	<b>317117</b>
1/2	1-1/4	3	1/2	-	8	<b>317119</b>
1/2	1-1/4	3	1/2	0.03	8	<b>317123</b>
1/2	1-1/4	3	1/2	0.06	8	<b>317125</b>
1/2	1-1/4	4	1/2	-	8	<b>317127</b>
5/8	3/4	3	5/8	-	8	<b>317130</b>
5/8	3/4	3	5/8	0.03	8	<b>317132</b>
5/8	3/4	3	5/8	0.06	8	<b>317135</b>
5/8	1-5/8	3-1/2	5/8	-	8	<b>317138</b>
5/8	1-5/8	3-1/2	5/8	0.03	8	<b>317142</b>
5/8	1-5/8	3-1/2	5/8	0.06	8	<b>317146</b>
3/4	1	4	3/4	-	10	<b>317148</b>
3/4	1	4	3/4	0.03	10	<b>317150</b>
3/4	1	4	3/4	0.06	10	<b>317152</b>
3/4	1-5/8	4	3/4	-	10	<b>317155</b>
3/4	1-5/8	4	3/4	0.03	10	<b>317158</b>
3/4	1-5/8	4	3/4	0.06	10	<b>317162</b>
3/4	1-5/8	4	3/4	0.09	10	<b>317164</b>
1	1-1/4	4	1	-	12	<b>317168</b>
1	1-1/4	4	1	0.03	12	<b>317172</b>
1	1-1/4	4	1	0.06	12	<b>317174</b>
1	1-1/4	4	1	0.09	12	<b>317176</b>
1	2	4	1	-	12	<b>317180</b>
1	2	4	1	0.03	12	<b>317182</b>
1	2	4	1	0.06	12	<b>317186</b>
1	2	4	1	0.09	12	<b>317190</b>
1	3-1/4	6	1	-	12	<b>317193</b>
1	3-1/4	6	1	0.03	12	<b>317195</b>
1	3-1/4	6	1	0.06	12	<b>317199</b>
1	3-1/4	6	1	0.09	12	<b>317201</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Roughing End Mill For Steel, Stainless And Cast Iron



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>AGGRESSOR</h2> <h3>Roughing Mills - Medium Pitch</h3> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Corner chamfer for edge strength and wear protection</li> <li>Designed for heavy material removal applications where cycle times are critical</li> <li>Medium tooth serrations promote smooth chip clearance by creating small chips in hard materials</li> <li>Diameter Tol.: +0/-0.002"</li> <li>Shank Tol.: +0/-0.0004"</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>30°</li> <li>Multi</li> <li>CHF</li> <li>Weldon</li> <li>Bright</li> <li>FX3</li> <li>P 168</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●			●	●			○	○		

● Best ○ Good

**Series 2135** | AGG-M | 3-5FL | Corner Chamfer | Med Pitch Rougher | Weldon

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	Bright	FX3
3/16	5/8	2	3/16	3	<b>256-187625</b>	<b>256-187628</b>
1/4	3/4	2-1/2	1/4	4	<b>256-250750</b>	<b>256-250753</b>
1/4	1-1/8	3	1/4	4	<b>256-250850</b>	<b>256-250853</b>
5/16	3/4	2-1/2	5/16	4	<b>256-312812</b>	<b>256-312815</b>
3/8	7/8	2-1/2	3/8	4	<b>256-375875</b>	<b>256-375878</b>
7/16	1	2-3/4	7/16	4	<b>256-437100</b>	<b>256-437103</b>
1/2	1-1/4	3	1/2	4	<b>256-500100</b>	<b>256-500103</b>
5/8	1-1/4	3-1/2	5/8	4	<b>256-625114</b>	<b>256-625117</b>
3/4	1-5/8	4	3/4	4	<b>256-750112</b>	<b>256-750115</b>
1	1-3/4	4	1	5	<b>256-100112</b>	<b>256-100115</b>

\*bold numbers are EDPs for ordering

### Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**

## CUSTOM COMES STANDARD

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>2-Flute Ball Nose End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>2FL</td> </tr> <tr> <td>BALL</td> <td>30°</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>TiCN</td> <td>AlTiN</td> </tr> <tr> <td>P 169</td> <td></td> </tr> </table>	CARBIDE	2FL	BALL	30°	Bright	TiN	TiCN	AlTiN	P 169	
CARBIDE	2FL											
BALL	30°											
Bright	TiN											
TiCN	AlTiN											
P 169												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○			○	○	○	○			○	

● Best ○ Good

## Series 219 2FL | Multi Length | Ball Nose

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
1/64	3/64	1-1/2	1/8	221-001000	221-000995	221-000996	221-000997
1/32	1/16	1-1/2	1/8	219-001001	219-001002	219-001003	219-001004
1/32	1/8	1-1/2	1/8	221-001005	221-001006	221-021005	221-001016
3/64	3/32	1-1/2	1/8	219-001010	219-001011	219-001012	219-001013
3/64	1/8	1-1/2	1/8	221-001007	221-001004	221-021007	221-001013
1/16	1/8	1-1/2	1/8	219-001020	219-001021	219-001022	219-001023
1/16	1/4	1-1/2	1/8	221-001008AA	221-001002	221-000999	221-001003
5/64	5/32	1-1/2	1/8	219-001025	219-011025	219-021025	219-031025
5/64	1/4	1-1/2	1/8	221-001009	221-001008	221-021009	221-001018
3/32	3/16	1-1/2	1/8	219-001030	219-001031	219-001032	219-001033
3/32	3/8	1-1/2	1/8	221-001010	221-001011	221-001012	221-001019
7/64	7/32	1-1/2	1/8	219-001035	219-011035	219-021035	219-031035
7/64	3/8	1-1/2	1/8	221-001014	221-001015	221-021014	221-001017
1/8	1/4	1-1/2	1/8	219-001040	219-001041	219-001042	219-001043
1/8	1/2	1-1/2	1/8	221-001020	221-001021	221-001026	221-001023
1/8	3/4	2-1/4	1/8	224-001001	224-001002	224-001003	224-001004
1/8	1	3	1/8	227-001001	227-001002	227-001003	227-001004
9/64	9/32	2	3/16	219-001045	219-011045	219-021045	219-031045
9/64	9/16	2	3/16	221-001024	221-001025	221-021024	221-001027
5/32	5/16	2	3/16	219-001050	219-001051	219-001052	219-001053
5/32	9/16	2	3/16	221-001030	221-001031	221-001032	221-001033
5/32	3/4	2-1/2	3/16	224-001005	224-001006	224-001007	224-001008
5/32	1-1/8	3	3/16	227-001005	227-001006	227-001007	227-001008
11/64	5/16	2	3/16	219-001055	219-011055	219-021055	219-031055
11/64	9/16	2	3/16	221-001034	221-001035	221-021034	221-001037
3/16	3/8	2	3/16	219-001060	219-001061	219-001062	219-001063
3/16	5/8	2	3/16	221-001040	221-001041	221-001042	221-001043
3/16	3/4	2-1/2	3/16	224-001012	224-001013	224-001014	224-001015
3/16	1-1/8	3	3/16	227-001010	227-001011	227-001012	227-001013
13/64	3/8	2	1/4	219-001065	219-011065	219-021065	219-031065
13/64	5/8	2-1/2	1/4	221-001044	221-001045	221-021044	221-001047
7/32	7/16	2	1/4	219-001070	219-001071	219-001072	219-001073
7/32	5/8	2-1/2	1/4	221-001050	221-001051	221-001052	221-001053
15/64	7/16	2	1/4	219-001075	219-011075	219-021075	219-031075
15/64	3/4	2-1/2	1/4	221-001054	221-001055	221-021054	221-001057
1/4	1/2	2	1/4	219-001080	219-001081	219-001082	219-001083
1/4	3/4	2-1/2	1/4	221-001060	221-001061	221-001059	221-001062
1/4	1-1/8	3	1/4	224-001020	224-001021	224-001022	224-001023
1/4	1-1/2	4	1/4	227-001020	227-001021	227-001022	227-001023
1/4	1-1/2	6	1/4	227-001025	227-001027	227-001028	227-001029
17/64	3/4	2-1/2	5/16	221-001063	221-001064	221-001065	221-001066
9/32	1/2	2	5/16	219-001085	-	-	-
9/32	3/4	2-1/2	5/16	221-001070	221-001071	221-001072	221-001073
19/64	13/16	2-1/2	5/16	221-001075	221-001076	221-001077	221-001078
5/16	1/2	2	5/16	219-001090	219-001091	219-001092	219-001093

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

Series 219		2FL   Multi Length   Ball Nose					
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
5/16	13/16	2-1/2	5/16	221-001080	221-001081	221-001082	221-001079
5/16	1-1/8	3	5/16	224-001030	224-001031	224-001032	224-001033
5/16	1-1/2	6	5/16	227-001033A	227-001033C	227-001033D	227-001033B
5/16	1-5/8	4	5/16	227-001030	227-001031	227-001032	227-001033
21/64	1	2-1/2	3/8	221-001083	221-001084	221-021083	221-031083
11/32	1	2-1/2	3/8	221-001085	221-001086	221-001165	221-001087
23/64	1	2-1/2	3/8	221-001088	221-001089	221-021088	221-031088
3/8	5/8	2	3/8	219-001100	219-001101	219-001102	219-001103
3/8	1	2-1/2	3/8	221-001090	221-001095	221-001167	221-001091
3/8	1-1/8	3	3/8	224-001040	224-001041	224-001042	224-001044
3/8	1-1/2	6	3/8	227-001035	227-001049	227-001037	227-001035A
3/8	1-3/4	4	3/8	227-001040	227-001041	227-001042	227-001043
25/64	1	2-3/4	7/16	221-001093	221-001094	221-021093	221-031093
13/32	1	2-3/4	7/16	221-001096	221-001097	221-021096	221-001118
27/64	1	2-3/4	7/16	221-001098	221-001099	221-021099	221-031099
7/16	5/8	2-1/2	7/16	219-001110	219-001111	219-001112	219-001113
7/16	1	2-3/4	7/16	221-001100	221-001101	221-001104	221-001119
7/16	2	4	7/16	224-001050	224-001051	224-001052	224-001053
7/16	3	6	7/16	227-001050	227-001051	227-001052	227-001053
29/64	1	3	1/2	221-001102	221-001103	221-021102	221-031102
15/32	1	3	1/2	221-001105	221-001106	221-021105	221-001123
31/64	1	3	1/2	221-001108	221-001109	221-021108	221-031108
1/2	5/8	2-1/2	1/2	219-001120	219-001121	219-001122	219-001123
1/2	1	3	1/2	221-001110	221-001115	221-001116	221-001117
1/2	1-1/2	4	1/2	224-001059	224-001059A	224-001059C	224-001059B
1/2	1-1/2	6	1/2	227-001053A	227-001057	227-001058	227-001059
1/2	2	4	1/2	224-001060	224-001061	224-001062	224-001063
1/2	3	6	1/2	227-001054	227-001061	227-001062	227-001064
9/16	1-1/4	3-1/2	9/16	221-001120	221-001121	221-001125	221-001124
5/8	3/4	3	5/8	219-001130	219-001131	219-001132	219-001133
5/8	1-1/4	3-1/2	5/8	221-001130	221-001131	221-001133	221-001134
5/8	1-1/2	6	5/8	227-001073A	227-001073C	227-001073D	227-001073B
5/8	2-1/4	5	5/8	224-001070	224-001071	224-001072	224-001073
5/8	3	6	5/8	227-001070	227-001071	227-001072	227-001074
11/16	1-1/2	4	3/4	221-001140	221-001141	221-021140	221-031140
3/4	1	3	3/4	219-001140	219-001141	219-001142	219-001143
3/4	1-1/2	4	3/4	221-001150	221-001151	221-001153	221-001154
3/4	1-1/2	6	3/4	227-001085	227-001085A	227-001085B	227-001086
3/4	2-1/4	5	3/4	224-001080	224-001081	224-001082	224-001083
3/4	3	6	3/4	227-001080	227-001081	227-001082	227-001084
3/4	4	7	3/4	227-001080A	-	-	-
7/8	1-1/2	4	7/8	221-001155	221-001156	221-021155	221-001158
1	1-1/2	4	1	221-001160	221-001161	221-001163	221-001164
1	1-1/2	6	1	227-001088	227-001088A	227-001088C	227-001089
1	2-1/4	5	1	224-001090	224-001091	224-001092	224-001093
1	3	6	1	227-001090	227-001091	227-001092	227-001094

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>2-Flute Metric Ball Nose End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> <li>• All listed dimensions in millimeters</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>2FL</td> </tr> <tr> <td>BALL</td> <td>30°</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>TiCN</td> <td>AlTiN</td> </tr> <tr> <td>P 169</td> <td></td> </tr> </table>	CARBIDE	2FL	BALL	30°	Bright	TiN	TiCN	AlTiN	P 169	
CARBIDE	2FL											
BALL	30°											
Bright	TiN											
TiCN	AlTiN											
P 169												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○			○	○	○	○			○	

● Best ○ Good

**Series 219M** | 2FL | Multi Length | Ball Nose | Metric

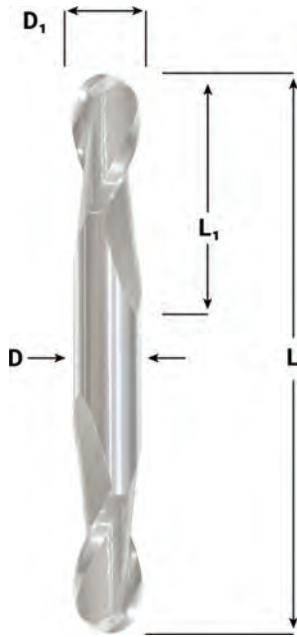
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
1mm	5.5mm	39mm	3mm	-	221-001400A	221-001400C	221-001400B
1.5mm	5mm	39mm	3mm	221-001410	221-001410A	221-001410C	221-001410B
2mm	8mm	39mm	3mm	221-001420	221-001420A	221-001420C	221-001420B
2.5mm	9.5mm	39mm	3mm	221-001425	221-001425A	221-001425C	221-001425B
3mm	12mm	39mm	3mm	221-001430	221-001430A	221-001430C	221-001430B
3.5mm	12mm	51mm	4mm	221-001435	221-001435A	221-001435C	221-001435B
4mm	14mm	51mm	4mm	221-001440	221-001440A	221-001440C	221-001440B
4.5mm	16mm	51mm	5mm	221-001445	221-001445A	221-001445C	221-001445B
5mm	16mm	51mm	5mm	221-001450	221-001450A	221-001450C	221-001450B
6mm	19mm	63mm	6mm	221-001460	221-001460A	221-001460C	221-001460B
7mm	19mm	63mm	8mm	221-001470	221-001470A	221-001470C	221-001470B
8mm	20mm	63mm	8mm	221-001480	221-001480A	221-001480C	221-001480B
9mm	22mm	63mm	10mm	221-001490	221-001490A	221-001490C	221-001490B
10mm	22mm	76mm	10mm	221-001500	221-001500A	221-001500C	221-001500B
11mm	25mm	76mm	12mm	221-001510	-	221-001510C	221-001510B
12mm	25mm	76mm	12mm	221-001520	221-001520A	221-001520C	221-001520B
14mm	32mm	90mm	14mm	221-001540	221-001540A	221-001540C	221-001540B
16mm	32mm	102mm	16mm	221-001560	221-001560A	221-001560C	221-001560B
18mm	38mm	102mm	18mm	221-001580	221-001580A	221-001580C	221-001580B
20mm	38mm	102mm	20mm	221-001600	221-001600A	221-001600C	221-001600B
22mm	38mm	102mm	22mm	221-001620	-	-	221-001620B
25mm	38mm	102mm	25mm	221-001650	-	-	221-001650B

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>2-Flute Double-Ended Ball Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Weldon for regular length sizes</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>2FL</td> </tr> <tr> <td>BALL</td> <td>30°</td> </tr> <tr> <td>Weldon</td> <td>Bright</td> </tr> <tr> <td>TiN</td> <td>TiCN</td> </tr> <tr> <td>AlTiN</td> <td>P 169</td> </tr> </table>	CARBIDE	2FL	BALL	30°	Weldon	Bright	TiN	TiCN	AlTiN	P 169
CARBIDE	2FL											
BALL	30°											
Weldon	Bright											
TiN	TiCN											
AlTiN	P 169											

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

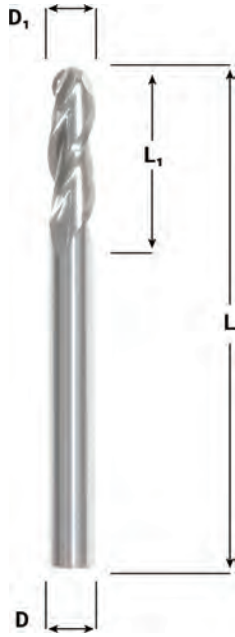
**Series 219D** | 2FL | Multi Length | Ball Nose | Double End

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
1/32	1/16	1-1/2	1/8	240-001001	240-001005	240-021001	240-031001
3/64	3/32	1-1/2	1/8	240-001001A	240-001011	240-021010	240-031010
1/16	1/8	1-1/2	1/8	240-001002	240-001021	240-021002	240-031003
5/64	1/8	1-1/2	1/8	240-001003	240-001013	240-021003	240-031002
3/32	3/16	1-1/2	1/8	240-001003A	240-001031	240-021030	240-031030
7/64	3/16	1-1/2	1/8	240-001004	240-001036	240-021004	240-031004
1/8	1/4	1-1/2	1/8	240-001040	240-001041	240-021040	240-031040
1/8	3/8	3	3/8	243-001001	-	-	243-001004
9/64	5/16	2	3/16	240-001044	240-001043	240-021044	240-031044
5/32	5/16	2	3/16	240-001050	240-001051	240-021050	240-031050
5/32	7/16	3	3/8	243-001010	-	-	243-001013
11/64	5/16	2	3/16	240-001055	240-001056	240-001057	240-031055
3/16	3/8	2	3/16	240-001060	240-001061	240-021060	240-031060
3/16	1/2	3	3/8	243-001020	-	-	243-001023
13/64	1/2	2-1/2	1/4	240-001065	240-001066	240-021065	240-031065
7/32	1/2	2-1/2	1/4	240-001070	240-001071	240-021070	240-031070
7/32	9/16	3-1/2	3/8	243-001030	-	-	243-001033
15/64	1/2	2-1/2	1/4	240-001075	240-001076	240-021075	240-031075
1/4	1/2	2-1/2	1/4	240-001080	240-001081	240-021080	240-031080
1/4	5/8	3-1/2	3/8	243-001040	-	-	243-001043
9/32	1/2	2-1/2	5/16	240-001085	240-001086	240-021085	240-031085
9/32	11/16	3-1/2	3/8	243-001050	-	-	243-001053
5/16	1/2	2-1/2	5/16	240-001090	240-001091	240-021090	240-031090
5/16	3/4	3-1/2	3/8	243-001060	-	-	243-001063
11/32	9/16	2-1/2	3/8	240-001094	240-001095	240-021094	240-031094
11/32	3/4	3-1/2	3/8	243-001070	-	-	243-001073
3/8	9/16	2-1/2	3/8	240-001100	240-001101	240-021100	240-031100
3/8	3/4	3-1/2	3/8	243-001080	-	-	243-001083
7/16	9/16	2-3/4	7/16	240-001110	240-001111	240-021110	240-031110
7/16	7/8	4	1/2	243-001090	-	-	243-001093
1/2	5/8	3	1/2	240-001120	240-001121	240-021120	240-031120
1/2	1	4	1/2	243-001100	-	-	243-001103

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>3-Flute Ball Nose End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>3FL</td> </tr> <tr> <td>BALL</td> <td>30°</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>TiCN</td> <td>AlTiN</td> </tr> <tr> <td>P 169</td> <td></td> </tr> </table>	CARBIDE	3FL	BALL	30°	Bright	TiN	TiCN	AlTiN	P 169	
CARBIDE	3FL											
BALL	30°											
Bright	TiN											
TiCN	AlTiN											
P 169												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 222 | 3FL | Regular Length | Ball Nose

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
1/32	1/8	1-1/2	1/8	<b>222-001001</b>	<b>222-001002</b>	<b>222-001003</b>	<b>222-001004</b>
3/64	1/8	1-1/2	1/8	<b>222-001020</b>	<b>222-001021</b>	<b>222-001022</b>	<b>222-001023</b>
1/16	1/4	1-1/2	1/8	<b>222-001030</b>	<b>222-001031</b>	<b>222-001032</b>	<b>222-001033</b>
5/64	1/4	1-1/2	1/8	<b>222-001040</b>	<b>222-001041</b>	<b>222-001042</b>	<b>222-001043</b>
3/32	3/8	1-1/2	1/8	<b>222-001050</b>	<b>222-001051</b>	<b>222-001052</b>	<b>222-001053</b>
7/64	3/8	1-1/2	1/8	<b>222-001060</b>	<b>222-001061</b>	<b>222-001062</b>	<b>222-001063</b>
1/8	1/2	1-1/2	1/8	<b>222-001070</b>	<b>222-001071</b>	<b>222-001072</b>	<b>222-001073</b>
5/32	9/16	2	3/16	<b>222-001090</b>	<b>222-001091</b>	<b>222-001092</b>	<b>222-001093</b>
3/16	5/8	2	3/16	<b>222-001110</b>	<b>222-001111</b>	<b>222-001112</b>	<b>222-001113</b>
7/32	5/8	2-1/2	1/4	<b>222-001130</b>	<b>222-001131</b>	<b>222-001132</b>	<b>222-001133</b>
1/4	3/4	2-1/2	1/4	<b>222-001140</b>	<b>222-001141</b>	<b>222-001142</b>	<b>222-001143</b>
9/32	3/4	2-1/2	5/16	<b>222-001150</b>	<b>222-001151</b>	<b>222-001152</b>	<b>222-001153</b>
5/16	13/16	2-1/2	5/16	<b>222-001160</b>	<b>222-001161</b>	<b>222-001162</b>	<b>222-001163</b>
3/8	1	2-1/2	3/8	<b>222-001180</b>	<b>222-001181</b>	<b>222-001182</b>	<b>222-001183</b>
7/16	1	2-3/4	7/16	<b>222-001200</b>	<b>222-001201</b>	<b>222-001202</b>	<b>222-001203</b>
1/2	1	3	1/2	<b>222-001210</b>	<b>222-001211</b>	<b>222-001212</b>	<b>222-001213</b>
9/16	1-1/4	3-1/2	9/16	<b>222-001220</b>	<b>222-001221</b>	<b>222-001222</b>	<b>222-001223</b>
5/8	1-1/4	3-1/2	5/8	<b>222-001230</b>	<b>222-001231</b>	<b>222-001232</b>	<b>222-001233</b>
3/4	1-1/2	4	3/4	<b>222-001250</b>	<b>222-001251</b>	<b>222-001252</b>	<b>222-001253</b>
1	1-1/2	4	1	<b>222-001270</b>	<b>222-001271</b>	<b>222-001272</b>	<b>222-001273</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

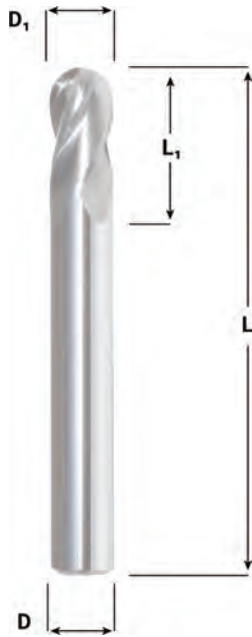
THREADING

INSERTS



# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<b>4-Flute Ball Nose End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>4FL</td> </tr> <tr> <td>BALL</td> <td>30°</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>TiCN</td> <td>AlTiN</td> </tr> </table>	CARBIDE	4FL	BALL	30°	Bright	TiN	TiCN	AlTiN
CARBIDE	4FL									
BALL	30°									
Bright	TiN									
TiCN	AlTiN									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○			○	○	○	○			○	

● Best ○ Good

## Series 220 4FL | Multi Length | Ball Nose

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
1/64	3/64	1-1/2	1/8	223-000998	223-000995	223-020998	223-001007
1/32	1/16	1-1/2	1/8	220-001001	220-001002	220-001003	220-001004
1/32	1/8	1-1/2	1/8	223-000999	223-001003	223-000996	223-001009
3/64	3/32	1-1/2	1/8	220-001010	220-001011	220-001012	220-001013
3/64	1/8	1-1/2	1/8	223-001000	223-001004	223-021000	223-001014
1/16	1/8	1-1/2	1/8	220-001020	220-001022	220-001021	220-001023
1/16	1/4	1-1/2	1/8	223-001001	223-001002	223-001015	223-001016
5/64	5/32	1-1/2	1/8	220-001025	220-011025	220-021025	220-031025
5/64	1/4	1-1/2	1/8	223-001005	223-001006	223-001008	223-001019
3/32	3/16	1-1/2	1/8	220-001030	220-001032	220-001031	220-001033
3/32	3/8	1-1/2	1/8	223-001010	223-001011	223-001012	223-001013
7/64	7/32	1-1/2	1/8	220-001035	220-011035	220-021035	220-031035
7/64	3/8	1-1/2	1/8	223-001017	223-001052	223-021051	223-001039
1/8	1/4	1-1/2	1/8	220-001040	220-001042	220-001041	220-001043
1/8	1/2	1-1/2	1/8	223-001020	223-001021	223-001023	223-001028
1/8	3/4	2-1/4	1/8	226-001001	226-001002	226-001003	226-001004
1/8	1	3	1/8	229-001001	229-001002	229-001003	229-001004
9/64	9/32	2	3/16	220-001045	220-011045	220-021045	220-031045
9/64	9/16	2	3/16	223-001025	223-001026	223-001027	223-001029
5/32	5/16	2	3/16	220-001050	220-001052	220-001051	220-001053
5/32	9/16	2	3/16	223-001030	223-001031	223-001033	223-001032
5/32	3/4	2-1/2	3/16	226-001005	226-001006	226-001008	226-001007
5/32	1-1/8	3	3/16	229-001005	229-001006	229-001008	229-001009
11/64	5/16	2	3/16	220-001055	220-011055	220-021055	220-031055
11/64	9/16	2	3/16	223-001035	223-001055	223-021054	223-001043
3/16	3/8	2	3/16	220-001060	220-001062	220-001061	220-001063
3/16	5/8	2	3/16	223-001040	223-001041	223-001042	223-001034
3/16	3/4	2-1/2	3/16	226-001012	226-001013	226-001014	226-001016
3/16	1	4	3/16	229-001015	-	-	-
3/16	1-1/8	3	3/16	229-001010	229-001011	229-001012	229-001014
13/64	3/8	2	1/4	220-001065	220-011065	220-021065	220-031065
13/64	5/8	2-1/2	1/4	223-001046	223-001059	223-021058	223-001047
7/32	7/16	2	1/4	220-001070	220-001072	220-001071	220-001073
7/32	5/8	2-1/2	1/4	223-001050	223-001056	223-001037	223-001036
15/64	7/16	2	1/4	220-001075	220-011075	220-021075	220-031075
15/64	3/4	2-1/2	1/4	223-001053	223-001057	223-021053	223-001045
1/4	1/2	2	1/4	220-001080	220-001082	220-001081	220-001083
1/4	3/4	2-1/2	1/4	223-001060	223-001062	223-001063	223-001066
1/4	1-1/8	3	1/4	226-001020	226-001021	226-001022	226-001024
1/4	1-1/2	4	1/4	229-001020	229-001021	229-001022	229-001024
1/4	1-1/2	6	1/4	229-001026	229-001026A	229-001026C	229-001027
17/64	3/4	2-1/2	5/16	223-001061	223-001064	223-021061	223-031061
9/32	3/4	2-1/2	5/16	223-001070	223-001065	223-001067	223-001068
19/64	13/16	2-1/2	5/16	223-001071	223-001072	223-021071	223-031071
5/16	1/2	2	5/16	220-001090	220-001092	220-001091	220-001093

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



Series 220		4FL   Multi Length   Ball Nose					
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
5/16	13/16	2-1/2	5/16	223-001080	223-001082	223-001083	223-001073
5/16	1-1/8	3	5/16	226-001030	226-001031	226-001032	226-001034
5/16	1-1/2	6	5/16	229-001035	229-001035A	229-001035C	229-001036
5/16	1-5/8	4	5/16	229-001030	229-001031	229-001032	229-001034
21/64	1	2-1/2	3/8	223-001084	223-001085	223-021084	223-031084
11/32	1	2-1/2	3/8	223-001086	223-001087	223-001169	223-001115
23/64	1	2-1/2	3/8	223-001088	223-001089	223-021088	223-031088
3/8	5/8	2	3/8	220-001100	220-001101	220-001102	220-001103
3/8	1	2-1/2	3/8	223-001090	223-001092	223-001093	223-001116
3/8	1-1/8	3	3/8	226-001040	226-001041	226-001042	226-001044
3/8	1-1/2	6	3/8	229-001046	229-001048	229-001049	229-001047
3/8	1-3/4	4	3/8	229-001040	229-001041	229-001042	229-001044
25/64	1	2-3/4	7/16	223-001094	223-001096	223-021094	223-031094
13/32	1	2-3/4	7/16	223-001095	223-001097	223-021095	223-001117
27/64	1	2-3/4	7/16	223-001098	223-001099	223-021098	223-031098
7/16	5/8	2-1/2	7/16	220-001110	220-001111	220-001112	220-001113
7/16	1	2-3/4	7/16	223-001100	223-001101	223-001102	223-001118
7/16	2	4	7/16	226-001050	226-001051	226-001052	226-001054
7/16	3	6	7/16	229-001050	229-001051	229-001052	229-001053
29/64	1	3	1/2	223-001103	223-001104	223-021103	223-031103
15/32	1	3	1/2	223-001105	223-001107	223-001121	223-001119
31/64	1	3	1/2	223-001109	223-001108	223-021108	223-031108
1/2	5/8	2-1/2	1/2	220-001120	220-001121	220-001122	220-001123
1/2	1	3	1/2	223-001110	223-001111	223-001112	223-001114
1/2	1-1/2	4	1/2	226-001059	226-001057	226-001058	226-001059A
1/2	1-1/2	6	1/2	229-001053A	229-001055	229-001056	229-001057
1/2	2	4	1/2	226-001060	226-001061	226-001062	226-001064
1/2	3	6	1/2	229-001053AA	229-001066	229-001067	229-001068
9/16	1-1/4	3-1/2	9/16	223-001120	223-001125	223-001126	223-001127
5/8	3/4	3	5/8	220-001130	220-001131	220-001132	220-001133
5/8	1-1/4	3-1/2	5/8	223-001130	223-001131	223-001132	223-001135
5/8	1-1/2	6	5/8	229-001076	229-001076A	229-001076C	229-001077
5/8	2-1/4	5	5/8	226-001070	226-001071	226-001072	226-001074
5/8	3	6	5/8	229-001070	229-001071	229-001072	229-001074
11/16	1-1/2	4	3/4	223-001140	223-001155	223-021156	223-001167
3/4	1	3	3/4	220-001140	220-001141	220-001142	220-001143
3/4	1-1/2	4	3/4	223-001150	223-001151	223-001152	223-001154
3/4	1-1/2	6	3/4	229-001085	229-001085A	229-001085C	229-001086
3/4	2-1/4	5	3/4	226-001080	226-001081	226-001082	226-001084
3/4	3	6	3/4	229-001080	229-001081	229-001082	229-001084
3/4	4	7	3/4	229-001080A	-	229-001080C	229-001080B
7/8	1-1/2	4	7/8	223-001157	223-001159	223-021157	223-001165
1	1-1/2	4	1	223-001160	223-001162	-	223-001163
1	1-1/2	6	1	229-001095	229-001095C	-	229-001096
1	2-1/4	5	1	226-001090	226-001092	-	226-001097
1	3	6	1	229-001090	229-001092	-	229-001094

\*bold numbers are EDPs for ordering

Series 220M		4FL   Multi Length   Ball Nose   Metric					
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
1mm	4mm	39mm	3mm	223-001400	-	223-001400C	223-001400B
1.5mm	4.5mm	39mm	3mm	223-001405	223-001410C	-	223-001410B
2mm	8mm	39mm	3mm	223-001421	-	-	223-001420B
2.5mm	9.5mm	39mm	3mm	223-001425	-	223-001425C	223-001425B
3mm	12mm	39mm	3mm	223-001430	-	223-001430C	223-001430B
3.5mm	12mm	51mm	4mm	223-001435	-	223-001435C	223-001435B
4mm	14mm	51mm	4mm	223-001440	-	223-001440C	223-001440B
4.5mm	16mm	51mm	5mm	223-001445	-	223-001445C	223-001445B
5mm	16mm	51mm	5mm	223-001450	-	223-001450C	223-001450B
6mm	19mm	63mm	6mm	223-001460	-	223-001460C	223-001460B
7mm	19mm	63mm	8mm	223-001470	-	223-001470C	223-001470B
8mm	20mm	63mm	8mm	223-001480	-	223-001480C	223-001480B
9mm	22mm	63mm	10mm	223-001490	223-001490C	-	223-001490B
10mm	22mm	76mm	10mm	223-001500	-	223-001500C	223-001500B
11mm	25mm	76mm	12mm	223-001510	-	223-001510C	223-001510B
12mm	25mm	76mm	12mm	223-001520	-	223-001520C	223-001520B
14mm	32mm	90mm	14mm	223-001540	-	223-001540C	223-001540B
16mm	32mm	102mm	16mm	223-001560	-	223-001560C	223-001560B
18mm	38mm	102mm	18mm	223-001580	-	223-001580C	223-001580B
20mm	38mm	102mm	20mm	223-001600	-	223-001600C	223-001600B
22mm	38mm	102mm	22mm	223-001620	-	-	223-001620B
25mm	38mm	102mm	25mm	223-001650	-	-	223-001650B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

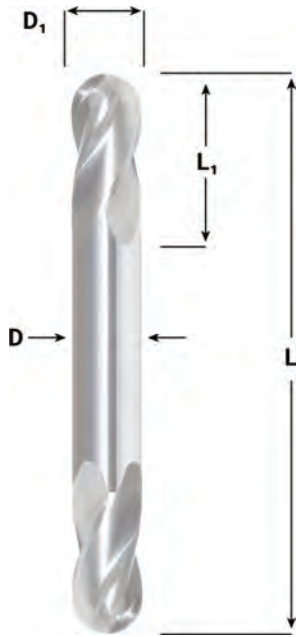
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>4-Flute Double-Ended Ball Nose End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Weldon flat for regular length sizes</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>4FL</td> </tr> <tr> <td>BALL</td> <td>Weldon</td> </tr> <tr> <td>30°</td> <td>Bright</td> </tr> <tr> <td>TiN</td> <td>TiCN</td> </tr> <tr> <td>AlTiN</td> <td>P 169</td> </tr> </table>	CARBIDE	4FL	BALL	Weldon	30°	Bright	TiN	TiCN	AlTiN	P 169
CARBIDE	4FL											
BALL	Weldon											
30°	Bright											
TiN	TiCN											
AlTiN	P 169											

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 220D 4FL | Multi Length | Ball Nose | Double End

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Weldon	Bright	TiN	TiCN	AlTiN
1/32	1/16	1-1/2	1/8	No	242-001001	242-001011	242-021001	242-031011
3/64	3/32	1-1/2	1/8	No	242-001010	242-001012	242-021010	242-031012
1/16	1/8	1-1/2	1/8	No	242-001010A	242-001021	242-001022	242-031026
5/64	1/8	1-1/2	1/8	No	242-001019	242-001026	242-001027	242-031021
3/32	3/16	1-1/2	1/8	No	242-001030	242-001031	242-001032	242-031031
7/64	3/16	1-1/2	1/8	No	242-001035	242-001036	242-001037	242-031036
1/8	1/4	1-1/2	1/8	No	242-001040	242-001041	242-001042	242-001043
1/8	3/8	3	3/8	Yes	245-001001	245-001002	-	245-001003
9/64	5/16	2	3/16	No	242-001044	242-001045	242-001046	242-031044
5/32	5/16	2	3/16	No	242-001050	242-001051	242-001052	242-001053
5/32	7/16	3	3/8	Yes	245-001010	-	-	245-001013
11/64	5/16	2	3/16	No	242-001055	242-001056	242-001057	242-031055
3/16	3/8	2	3/16	No	242-001060	242-001061	242-001062	242-001063
3/16	1/2	3	3/8	Yes	245-001020	-	-	245-001023
13/64	1/2	2-1/2	1/4	No	242-001065	242-001066	242-001067	242-031065
7/32	1/2	2-1/2	1/4	No	242-001070	242-001071	242-001072	242-031070
7/32	9/16	3-1/2	3/8	Yes	245-001030	-	-	245-001033
15/64	1/2	2-1/2	1/4	No	242-001075	242-001076	242-001077	242-031075
1/4	1/2	2-1/2	1/4	No	242-001080	242-001081	242-001082	242-001083
1/4	5/8	3-1/2	3/8	Yes	245-001040	245-001041	-	245-001043
17/64	1/2	2-1/2	5/16	No	242-001084	-	-	-
9/32	1/2	2-1/2	5/16	No	242-001085	242-001087	242-001088	242-031085
9/32	11/16	3-1/2	3/8	Yes	245-001050	-	-	245-001053
19/64	1/2	2-1/2	5/16	No	242-001147	-	-	-
5/16	1/2	2-1/2	5/16	No	242-001090	242-001091	242-001093	242-001094
5/16	3/4	3-1/2	3/8	Yes	245-001060	-	-	245-001063
11/32	9/16	2-1/2	3/8	No	242-001092	242-001095	242-001096	242-031092
11/32	3/4	3-1/2	3/8	Yes	245-001070	-	-	245-001073
3/8	9/16	2-1/2	3/8	No	242-001100	242-001101	242-001102	242-001104
3/8	3/4	3-1/2	3/8	Yes	245-001080	-	-	245-001083
7/16	9/16	2-3/4	7/16	No	242-001110	242-001111	242-001112	242-001114
7/16	7/8	4	1/2	Yes	245-001090	-	-	245-001093
1/2	5/8	3	1/2	No	242-001120	242-001121	242-001122	242-001124
1/2	1	4	1/2	Yes	245-001100	-	-	245-001103

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide Chamfer Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<b>Chamfer Mills</b> <ul style="list-style-type: none"> <li>• 2FL &amp; 4FL chamfer mills</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Optimizes drilling, spotting, and countersinking processes</li> <li>• Multiple included angles</li> <li>• Diameter Tol.: +0/-0.0005"</li> <li>• Shank Tol.: +0/-0.0005"</li> <li>• Angle: +/- 1.0°</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>CHF</td> </tr> <tr> <td>2FL</td> <td>4FL</td> </tr> <tr> <td>Bright</td> <td>AlTiN</td> </tr> <tr> <td>P 171</td> <td></td> </tr> </table>	CARBIDE	CHF	2FL	4FL	Bright	AlTiN	P 171	
CARBIDE	CHF									
2FL	4FL									
Bright	AlTiN									
P 171										

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 209**      **2 And 4 FL | 60°, 82°, 90°**

Diameter (D <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	Incl. Angle	Bright	AlTiN
1/8	1-1/2	1/8	2	60°	209-062125	209-062125B
1/8	1-1/2	1/8	2	82°	209-082125	209-082125B
1/8	1-1/2	1/8	2	90°	209-092125	209-092125B
3/16	2	3/16	2	60°	209-062187	209-062187B
3/16	2	3/16	2	82°	209-082187	209-082187B
3/16	2	3/16	2	90°	209-092187	209-092187B
1/4	2-1/2	1/4	2	60°	209-062250	209-062250B
1/4	2-1/2	1/4	2	82°	209-082250	209-082250B
1/4	2-1/2	1/4	2	90°	209-092250	209-092250B
3/8	2-1/2	3/8	2	60°	209-062375	209-062375B
3/8	2-1/2	3/8	2	82°	209-082375	209-082375B
3/8	2-1/2	3/8	2	90°	209-092375	209-092375B
1/2	3	1/2	2	60°	209-062500	209-062500B
1/2	3	1/2	2	82°	209-082500	209-082500B
1/2	3	1/2	2	90°	209-092500	209-092500B
3/4	3	3/4	2	60°	209-062750	209-062750B
3/4	3	3/4	2	82°	209-082750	209-082750B
3/4	3	3/4	2	90°	209-092750	209-092750B
1/8	1-1/2	1/8	4	60°	209-064125	209-064125B
1/8	1-1/2	1/8	4	82°	209-084125	209-084125B
1/8	1-1/2	1/8	4	90°	209-094125	209-094125B
3/16	2	3/16	4	60°	209-064187	209-064187B
3/16	2	3/16	4	82°	209-084187	209-084187B
3/16	2	3/16	4	90°	209-094187	209-094187B
1/4	2-1/2	1/4	4	60°	209-064250	209-064250B
1/4	2-1/2	1/4	4	82°	209-084250	209-084250B
1/4	2-1/2	1/4	4	90°	209-094250	209-094250B
3/8	2-1/2	3/8	4	60°	209-064375	209-064375B
3/8	2-1/2	3/8	4	82°	209-084375	209-084375B
3/8	2-1/2	3/8	4	90°	209-094375	209-094375B
1/2	3	1/2	4	60°	209-064500	209-064500B
1/2	3	1/2	4	82°	209-084500	209-084500B
1/2	3	1/2	4	90°	209-094500	209-094500B
3/4	3	3/4	4	60°	209-064750	209-064750B
3/4	3	3/4	4	82°	209-084750	209-084750B
3/4	3	3/4	4	90°	209-094750	209-094750B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

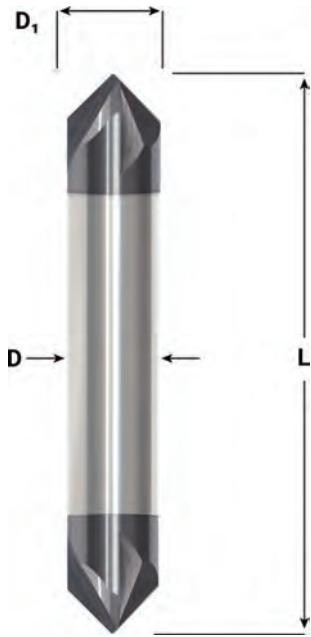
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Chamfer Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<b>Chamfer Mills - Double Ended</b> <ul style="list-style-type: none"> <li>• 2FL &amp; 4FL chamfer mills</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Optimizes drilling, spotting, and countersinking processes</li> <li>• Multiple included angles</li> <li>• Diameter Tol.: +0/-0.0005"</li> <li>• Shank Tol.: +0/-0.0005"</li> <li>• Angle: +/- 1.0°</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>CHF</td> </tr> <tr> <td>2FL</td> <td>4FL</td> </tr> <tr> <td>Bright</td> <td>AlTiN</td> </tr> <tr> <td>P 171</td> <td></td> </tr> </table>	CARBIDE	CHF	2FL	4FL	Bright	AlTiN	P 171	
CARBIDE	CHF									
2FL	4FL									
Bright	AlTiN									
P 171										

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 209D** | 2 And 4 FL | 60° 90° | Double End

Diameter (D <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	Incl. Angle	Bright	AlTiN
1/8	1-1/2	1/8	2	60°	<b>209-262125</b>	<b>209-262125B</b>
1/8	1-1/2	1/8	2	90°	<b>209-292125</b>	<b>209-292125B</b>
3/16	2	3/16	2	60°	<b>209-262187</b>	<b>209-262187B</b>
3/16	2	3/16	2	90°	<b>209-292187</b>	<b>209-292187B</b>
1/4	2-1/2	1/4	2	60°	<b>209-262250</b>	<b>209-262250B</b>
1/4	2-1/2	1/4	2	90°	<b>209-292250</b>	<b>209-292250B</b>
3/8	2-1/2	3/8	2	60°	<b>209-262375</b>	<b>209-262375B</b>
3/8	2-1/2	3/8	2	90°	<b>209-292375</b>	<b>209-292375B</b>
1/2	3	1/2	2	60°	<b>209-262500</b>	<b>209-262500B</b>
1/2	3	1/2	2	90°	<b>209-292500</b>	<b>209-292500B</b>
1/8	1-1/2	1/8	4	90°	<b>209-694125</b>	<b>209-694125B</b>
3/16	2	3/16	4	90°	<b>209-694187</b>	<b>209-694187B</b>
1/4	2-1/2	1/4	4	90°	<b>209-694250</b>	<b>209-694250B</b>
3/8	2-1/2	3/8	4	90°	<b>209-694375</b>	<b>209-694375B</b>
1/2	3	1/2	4	90°	<b>209-694500</b>	<b>209-694500B</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>2-Flute Corner Radius End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>2FL</td> </tr> <tr> <td>RAD</td> <td>30°</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>TiCN</td> <td>AITiN</td> </tr> <tr> <td>P 169</td> <td></td> </tr> </table>	CARBIDE	2FL	RAD	30°	Bright	TiN	TiCN	AITiN	P 169	
CARBIDE	2FL											
RAD	30°											
Bright	TiN											
TiCN	AITiN											
P 169												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○			○	○	○	○			○	

● Best ○ Good

## Series 204 | 2FL | Multi Length | Corner Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	TiN	TiCN	AITiN
1/8	1/2	1-1/2	1/8	0.01	204-602300	204-602301	204-602302	204-602303
1/8	1/2	1-1/2	1/8	0.015	204-602306	204-602307	204-602308	204-602309
1/8	1/2	1-1/2	1/8	0.02	204-602312	204-602313	204-602314	204-602315
1/8	1/2	1-1/2	1/8	0.03	204-602318	204-602319	204-602320	204-602321
3/16	5/8	2	3/16	0.01	204-602424	204-602425	204-602426	204-602427
3/16	5/8	2	3/16	0.015	204-602430	204-602431	204-602432	204-602433
3/16	5/8	2	3/16	0.02	204-602436	204-602437	204-602438	204-602439
3/16	5/8	2	3/16	0.03	204-602442	204-602443	204-602444	204-602445
3/16	5/8	2	3/16	0.045	204-602448	204-602449	204-602450	204-602451
3/16	5/8	2	3/16	0.06	204-602452	-	-	-
1/4	3/4	2-1/2	1/4	0.015	204-602551	204-602552	204-602553	204-602554
1/4	3/4	2-1/2	1/4	0.02	204-602557	204-602558	204-602559	204-602560
1/4	3/4	2-1/2	1/4	0.025	204-602563	204-602564	204-602565	204-602566
1/4	3/4	2-1/2	1/4	0.03	204-602569	204-602570	204-602571	204-602572
1/4	3/4	2-1/2	1/4	0.045	204-602575	204-602576	204-602577	204-602578
1/4	3/4	2-1/2	1/4	0.06	204-602581	204-602582	204-602583	204-602584
5/16	13/16	2-1/2	5/16	0.015	204-602684	204-602685	204-602686	204-602687
5/16	13/16	2-1/2	5/16	0.02	204-602690	204-602691	204-602692	204-602693
5/16	13/16	2-1/2	5/16	0.025	204-602696	204-602697	204-602698	204-602699
5/16	13/16	2-1/2	5/16	0.03	204-602702	204-602703	204-602704	204-602705
5/16	13/16	2-1/2	5/16	0.045	204-602708	204-602709	204-602710	204-602711
5/16	13/16	2-1/2	5/16	0.06	204-602714	204-602715	204-602716	204-602717
3/8	1	2-1/2	3/8	0.015	204-602820	204-602821	204-602822	204-602823
3/8	1	2-1/2	3/8	0.02	204-602826	204-602827	204-602828	204-602829
3/8	1	2-1/2	3/8	0.025	204-602832	204-602833	204-602834	204-602835
3/8	1	2-1/2	3/8	0.03	204-602838	204-602839	204-602840	204-602841
3/8	1	2-1/2	3/8	0.045	204-602844	204-602845	204-602846	204-602847
3/8	1	2-1/2	3/8	0.06	204-602850	204-602851	204-602852	204-602853
3/8	1	2-1/2	3/8	0.09	204-602856	204-602857	204-602858	204-602859
3/8	1	2-1/2	3/8	0.125	204-999375	-	-	-
7/16	1	2-3/4	7/16	0.015	204-602961	204-602962	204-602963	204-602964
7/16	1	2-3/4	7/16	0.02	204-602967	204-602968	204-602969	204-602970
7/16	1	2-3/4	7/16	0.025	204-602974	204-602975	204-602976	204-602977
7/16	1	2-3/4	7/16	0.03	204-602980	204-602981	204-602982	204-602983
7/16	1	2-3/4	7/16	0.045	204-602986	204-602987	204-602988	204-602989
7/16	1	2-3/4	7/16	0.06	204-602992	204-602993	204-602994	204-602995
7/16	1	2-3/4	7/16	0.09	204-602998	204-602999	204-603000	204-603001
1/2	1	3	1/2	0.015	204-603003	204-603004	204-603005	204-603006
1/2	1	3	1/2	0.02	204-603009	204-603010	204-603011	204-603012
1/2	1	3	1/2	0.025	204-603015	204-603016	204-603017	204-603018
1/2	1	3	1/2	0.03	204-603021	204-603022	204-603023	204-603024
1/2	1	3	1/2	0.045	204-603027	204-603028	204-603029	204-603030
1/2	1	3	1/2	0.06	204-603033	204-603034	204-603035	204-603036
1/2	1	3	1/2	0.09	204-603039	204-603040	204-603041	204-603042
1/2	1	3	1/2	0.125	204-603045	204-603046	204-603047	204-603048

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



Series 204		2FL   Multi Length   Corner Radius						
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	TiN	TiCN	AlTiN
5/8	1-1/4	3-1/2	5/8	0.015	204-603150	204-603151	204-603152	204-603153
5/8	1-1/4	3-1/2	5/8	0.02	204-603156	204-603157	204-603158	204-603159
5/8	1-1/4	3-1/2	5/8	0.025	204-603162	204-603163	204-603164	204-603165
5/8	1-1/4	3-1/2	5/8	0.03	204-603168	204-603169	204-603170	204-603171
5/8	1-1/4	3-1/2	5/8	0.045	204-603174	204-603175	204-603176	204-603177
5/8	1-1/4	3-1/2	5/8	0.06	204-603180	204-603181	204-603182	204-603183
5/8	1-1/4	3-1/2	5/8	0.09	204-603186	204-603187	204-603188	204-603189
5/8	1-1/4	3-1/2	5/8	0.125	204-603192	204-603193	204-603194	204-603195
5/8	1-1/4	3-1/2	5/8	0.25	204-603196	-	-	-
3/4	1-1/2	4	3/4	0.015	204-603297	204-603298	204-603299	204-603300
3/4	1-1/2	4	3/4	0.02	204-603303	204-603304	204-603305	204-603306
3/4	1-1/2	4	3/4	0.025	204-603309	204-603310	204-603311	204-603312
3/4	1-1/2	4	3/4	0.03	204-603315	204-603316	204-603317	204-603318
3/4	1-1/2	4	3/4	0.045	204-603321	204-603322	204-603323	204-603324
3/4	1-1/2	4	3/4	0.06	204-603327	204-603328	204-603329	204-603330
3/4	1-1/2	4	3/4	0.09	204-603333	204-603334	204-603335	204-603336
3/4	1-1/2	4	3/4	0.125	204-603339	204-603340	204-603341	204-603342
3/4	1-1/2	4	3/4	0.19	204-603345	204-603346	204-603347	204-603348
3/4	1-1/2	4	3/4	0.25	204-603349	-	-	-
1	1-1/2	4	1	0.015	204-603450	204-603451	204-603452	204-603453
1	1-1/2	4	1	0.02	204-603456	204-603457	204-603458	204-603459
1	1-1/2	4	1	0.025	204-603462	204-603463	204-603464	204-603465
1	1-1/2	4	1	0.03	204-603468	204-603469	204-603470	204-603471
1	1-1/2	4	1	0.045	204-603474	204-603475	204-603476	204-603477
1	1-1/2	4	1	0.06	204-603480	204-603481	204-603482	204-603483
1	1-1/2	4	1	0.09	204-603486	204-603487	204-603488	204-603489
1	1-1/2	4	1	0.125	204-603492	204-603493	204-603494	204-603495
1	1-1/2	4	1	0.19	204-603498	204-603499	204-603500	204-603501
1	1-1/2	4	1	0.25	204-603504	204-603505	204-603506	204-603507

\*bold numbers are EDPs for ordering

## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**®

**CUSTOM  
COMES  
STANDARD**

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>4-Flute Corner Radius End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>4FL</td> </tr> <tr> <td>RAD</td> <td>30°</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>TiCN</td> <td>AlTiN</td> </tr> <tr> <td>P 169</td> <td></td> </tr> </table>	CARBIDE	4FL	RAD	30°	Bright	TiN	TiCN	AlTiN	P 169	
CARBIDE	4FL											
RAD	30°											
Bright	TiN											
TiCN	AlTiN											
P 169												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 206 | 4FL | Multi Length | Corner Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	TiN	TiCN	AlTiN
1/8	1/2	1-1/2	1/8	0.005	206-602297	-	-	206-602298
1/8	1/2	1-1/2	1/8	0.01	206-602300	206-602301	206-602302	206-602303
1/8	1/2	1-1/2	1/8	0.015	206-602306	206-602307	206-602308	206-602309
1/8	1/2	1-1/2	1/8	0.02	206-602312	206-602313	206-602314	206-602315
1/8	1/2	1-1/2	1/8	0.03	206-602318	206-602319	206-602320	206-602321
3/16	5/8	2	3/16	0.01	206-602424	206-602425	206-602426	206-602427
3/16	5/8	2	3/16	0.015	206-602430	206-602431	206-602432	206-602433
3/16	5/8	2	3/16	0.02	206-602436	206-602437	206-602438	206-602439
3/16	5/8	2	3/16	0.03	206-602442	206-602443	206-602444	206-602445
3/16	5/8	2	3/16	0.045	206-602448	206-602449	206-602450	206-602451
3/16	5/8	2	3/16	0.05	206-602452	-	-	206-602455
3/16	5/8	2	3/16	0.06	206-602453	-	-	206-602456
1/4	3/4	2-1/2	1/4	0.005	206-602545	-	-	-
1/4	3/4	2-1/2	1/4	0.01	206-602548	-	-	206-602549
1/4	3/4	2-1/2	1/4	0.015	206-602551	206-602552	206-602553	206-602554
1/4	3/4	2-1/2	1/4	0.02	206-602557	206-602558	206-602559	206-602560
1/4	3/4	2-1/2	1/4	0.025	206-602563	206-602564	206-602565	206-602566
1/4	3/4	2-1/2	1/4	0.03	206-602569	206-602570	206-602571	206-602572
1/4	3/4	2-1/2	1/4	0.045	206-602575	206-602576	206-602577	206-602578
1/4	3/4	2-1/2	1/4	0.06	206-602581	206-602582	206-602583	206-602584
1/4	3/4	2-1/2	1/4	0.09	206-602595	-	-	206-602598
5/16	13/16	2-1/2	5/16	0.015	206-602684	206-602685	206-602686	206-602687
5/16	13/16	2-1/2	5/16	0.02	206-602690	206-602691	206-602692	206-602693
5/16	13/16	2-1/2	5/16	0.025	206-602696	206-602697	206-602698	206-602699
5/16	13/16	2-1/2	5/16	0.03	206-602702	206-602703	206-602704	206-602705
5/16	13/16	2-1/2	5/16	0.045	206-602708	206-602709	206-602710	206-602711
5/16	13/16	2-1/2	5/16	0.06	206-602714	206-602715	206-602716	206-602717
5/16	13/16	2-1/2	5/16	0.09	206-602719	-	-	206-602722
5/16	13/16	2-1/2	5/16	0.125	206-602723	-	-	206-602726
3/8	1	2-1/2	3/8	0.02	206-602826	206-602827	206-602828	206-602829
3/8	1	2-1/2	3/8	0.025	206-602832	206-602833	206-602834	206-602835
3/8	1	2-1/2	3/8	0.03	206-602838	206-602839	206-602840	206-602841
3/8	1	2-1/2	3/8	0.045	206-602844	206-602845	206-602846	206-602847
3/8	1	2-1/2	3/8	0.06	206-602850	206-602851	206-602852	206-602853
3/8	1	2-1/2	3/8	0.09	206-602856	206-602857	206-602858	206-602859
3/8	1	2-1/2	3/8	0.125	206-602860	-	-	206-602863
3/8	1	2-1/2	3/8	0.015	206-602820	206-602821	206-602822	206-602823
7/16	1	2-3/4	7/16	0.015	206-602961	206-602962	206-602963	206-602964
7/16	1	2-3/4	7/16	0.02	206-602967	206-602968	206-602969	206-602970
7/16	1	2-3/4	7/16	0.025	206-602974	206-602975	206-602976	206-602977
7/16	1	2-3/4	7/16	0.03	206-602980	206-602981	206-602982	206-602983
7/16	1	2-3/4	7/16	0.045	206-602986	206-602987	206-602988	206-602989
7/16	1	2-3/4	7/16	0.06	206-602992	206-602993	206-602994	206-602995
7/16	1	2-3/4	7/16	0.09	206-602998	206-602999	206-603000	206-603001
7/16	1	2-3/4	7/16	0.125	206-603002	-	-	206-603002B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



Series 206		4FL   Multi Length   Corner Radius						
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	TiN	TiCN	AlTiN
1/2	1	3	1/2	0.015	206-603003	206-603004	206-603005	206-603006
1/2	1	3	1/2	0.02	206-603009	206-603010	206-603011	206-603012
1/2	1	3	1/2	0.025	206-603015	206-603016	206-603017	206-603018
1/2	1	3	1/2	0.03	206-603021	206-603022	206-603023	206-603024
1/2	1	3	1/2	0.045	206-603027	206-603028	206-603029	206-603030
1/2	1	3	1/2	0.06	206-603033	206-603034	206-603035	206-603036
1/2	1	3	1/2	0.09	206-603039	206-603040	206-603041	206-603042
1/2	1	3	1/2	0.125	206-603045	206-603046	206-603047	206-603048
5/8	1-1/4	3-1/2	5/8	0.015	206-603150	206-603151	206-603152	206-603153
5/8	1-1/4	3-1/2	5/8	0.02	206-603156	206-603157	206-603158	206-603159
5/8	1-1/4	3-1/2	5/8	0.025	206-603162	206-603163	206-603164	206-603165
5/8	1-1/4	3-1/2	5/8	0.03	206-603168	206-603169	206-603170	206-603171
5/8	1-1/4	3-1/2	5/8	0.045	206-603174	206-603175	206-603176	206-603177
5/8	1-1/4	3-1/2	5/8	0.06	206-603180	206-603181	206-603182	206-603183
5/8	1-1/4	3-1/2	5/8	0.09	206-603186	206-603187	206-603188	206-603189
5/8	1-1/4	3-1/2	5/8	0.125	206-603192	206-603193	206-603194	206-603195
3/4	1-1/2	4	3/4	0.015	206-603297	206-603298	206-603299	206-603300
3/4	1-1/2	4	3/4	0.02	206-603303	206-603304	206-603305	206-603306
3/4	1-1/2	4	3/4	0.025	206-603309	206-603310	206-603311	206-603312
3/4	1-1/2	4	3/4	0.03	206-603315	206-603316	206-603317	206-603318
3/4	1-1/2	4	3/4	0.045	206-603321	206-603322	206-603323	206-603324
3/4	1-1/2	4	3/4	0.06	206-603327	206-603328	206-603329	206-603330
3/4	1-1/2	4	3/4	0.09	206-603333	206-603334	206-603335	206-603336
3/4	1-1/2	4	3/4	0.125	206-603339	206-603340	206-603341	206-603342
3/4	1-1/2	4	3/4	0.19	206-603345	206-603346	206-603347	206-603348
3/4	1-1/2	4	3/4	0.25	206-603350	-	-	206-603353
1	1-1/2	4	1	0.015	206-603450	206-603451	206-603452	206-603453
1	1-1/2	4	1	0.02	206-603456	206-603457	206-603458	206-603459
1	1-1/2	4	1	0.025	206-603462	206-603463	206-603464	206-603465
1	1-1/2	4	1	0.03	206-603468	206-603469	206-603470	206-603471
1	1-1/2	4	1	0.045	206-603474	206-603475	206-603476	206-603477
1	1-1/2	4	1	0.06	206-603480	206-603481	206-603482	206-603483
1	1-1/2	4	1	0.09	206-603486	206-603487	206-603488	206-603489
1	1-1/2	4	1	0.125	206-603492	206-603493	206-603494	206-603495
1	1-1/2	4	1	0.19	206-603498	206-603499	206-603500	206-603501
1	1-1/2	4	1	0.25	206-603504	206-603505	206-603506	206-603507

\*bold numbers are EDPs for ordering

## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**®

**CUSTOM  
COMES  
STANDARD**



# PERFORMANCE

Solid Carbide Drill/Mill For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Drill Mill</b> <ul style="list-style-type: none"> <li>• One tool - five applications: drill, mill, chamfer, spot and countersink</li> <li>• Two flute design optimizes drilling, spotting, and countersinking processes</li> <li>• Multiple included angles</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> <li>• Angle: +/- 1.0°</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 207**      **2FL | 60°, 82°, 90°**

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Incl. Angle	Bright	AlTiN
1/8	1/2	1-1/2	1/8	60°	<b>208-621250</b>	<b>208-621253</b>
1/8	1/2	1-1/2	1/8	82°	<b>208-822125</b>	<b>208-822125B</b>
1/8	1/2	1-1/2	1/8	90°	<b>208-000125</b>	<b>208-010125</b>
3/16	5/8	2	3/16	60°	<b>208-621870</b>	<b>208-621873</b>
3/16	5/8	2	3/16	82°	<b>208-822187</b>	<b>208-822187B</b>
3/16	5/8	2	3/16	90°	<b>208-000187</b>	<b>208-010187</b>
1/4	3/4	2-1/2	1/4	60°	<b>208-622500</b>	<b>208-622503</b>
1/4	3/4	2-1/2	1/4	82°	<b>208-822250</b>	<b>208-822250B</b>
1/4	3/4	2-1/2	1/4	90°	<b>208-000250</b>	<b>208-010250</b>
5/16	13/16	2-1/2	5/16	60°	<b>208-623120</b>	<b>208-623123</b>
5/16	13/16	2-1/2	5/16	90°	<b>208-000312</b>	<b>208-010312</b>
3/8	1	2-1/2	3/8	60°	<b>208-623750</b>	<b>208-623753</b>
3/8	1	2-1/2	3/8	82°	<b>208-822375</b>	<b>208-822375B</b>
3/8	1	2-1/2	3/8	90°	<b>208-000375</b>	<b>208-010375</b>
7/16	1	2-3/4	7/16	60°	<b>208-624370</b>	<b>208-624373</b>
7/16	1	2-3/4	7/16	90°	<b>208-000437</b>	<b>208-010437</b>
1/2	1	3	1/2	60°	<b>208-625000</b>	<b>208-625003</b>
1/2	1	3	1/2	82°	<b>208-822500</b>	<b>208-822500B</b>
1/2	1	3	1/2	90°	<b>208-000500</b>	<b>208-010500</b>
5/8	1-1/4	3-1/2	5/8	60°	<b>208-626250</b>	<b>208-626253</b>
5/8	1-1/4	3-1/2	5/8	90°	<b>208-000625</b>	<b>208-010625</b>
3/4	1-1/2	4	3/4	60°	<b>208-627500</b>	<b>208-627503</b>
3/4	1-1/2	4	3/4	90°	<b>208-000750</b>	<b>208-010750</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

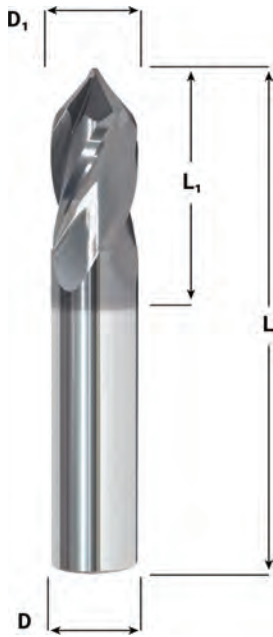
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Drill/Mill For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Drill Mill</b> <ul style="list-style-type: none"> <li>• One tool - five applications: drill, mill, chamfer, spot and countersink</li> <li>• Two flute design optimizes drilling, spotting, and countersinking processes</li> <li>• Multiple included angles</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> <li>• Angle: +/- 1.0°</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

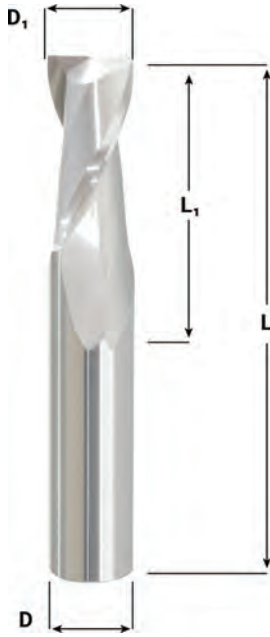
**Series 208** | 4FL | 60°, 82°, 90°, 120°

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Incl. Angle	Bright	AITiN
1/8	1/2	1-1/2	1/8	60°	<b>208-641250</b>	<b>208-641253</b>
1/8	1/2	1-1/2	1/8	82°	<b>208-824125</b>	<b>208-824125B</b>
1/8	1/2	1-1/2	1/8	90°	<b>208-400125</b>	<b>208-420125</b>
3/16	5/8	2	3/16	60°	<b>208-641870</b>	<b>208-641873</b>
3/16	5/8	2	3/16	82°	<b>208-824187</b>	<b>208-824188</b>
3/16	5/8	2	3/16	90°	<b>208-400187</b>	<b>208-420187</b>
1/4	3/4	2-1/2	1/4	120°	<b>208-662500</b>	<b>208-662503</b>
1/4	3/4	2-1/2	1/4	60°	<b>208-642500</b>	<b>208-642503</b>
1/4	3/4	2-1/2	1/4	82°	<b>208-824250</b>	<b>208-824253</b>
1/4	3/4	2-1/2	1/4	90°	<b>208-400250</b>	<b>208-420250</b>
5/16	13/16	2-1/2	5/16	60°	<b>208-643120</b>	<b>208-643123</b>
5/16	13/16	2-1/2	5/16	90°	<b>208-400312</b>	<b>208-420312</b>
3/8	1	2-1/2	3/8	120°	<b>208-663750</b>	<b>208-663753</b>
3/8	1	2-1/2	3/8	60°	<b>208-643750</b>	<b>208-643753</b>
3/8	1	2-1/2	3/8	82°	<b>208-824375</b>	<b>208-824378</b>
3/8	1	2-1/2	3/8	90°	<b>208-400375</b>	<b>208-420375</b>
7/16	1	2-3/4	7/16	60°	<b>208-644370</b>	<b>208-644373</b>
7/16	1	2-3/4	7/16	90°	<b>208-400437</b>	<b>208-420437</b>
1/2	1	3	1/2	120°	<b>208-665000</b>	<b>208-665003</b>
1/2	1	3	1/2	60°	<b>208-645000</b>	<b>208-645003</b>
1/2	1	3	1/2	82°	<b>208-824500</b>	<b>208-824503</b>
1/2	1	3	1/2	90°	<b>208-400500</b>	<b>208-420500</b>
5/8	1-1/4	3-1/2	5/8	60°	<b>208-646250</b>	<b>208-646253</b>
5/8	1-1/4	3-1/2	5/8	90°	<b>208-400625</b>	<b>208-420625</b>
3/4	1-1/2	4	3/4	60°	<b>208-647500</b>	<b>208-647503</b>
3/4	1-1/2	4	3/4	90°	<b>208-400750</b>	<b>208-420750</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>2-Flute Square End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>30°</td> </tr> <tr> <td>CHF</td> <td>Multi</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>TiCN</td> <td>AlTiN</td> </tr> <tr> <td>P 169</td> <td></td> </tr> </table>	CARBIDE	30°	CHF	Multi	Bright	TiN	TiCN	AlTiN	P 169	
CARBIDE	30°											
CHF	Multi											
Bright	TiN											
TiCN	AlTiN											
P 169												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○			○	○	○	○			○	

● Best ○ Good

## Series 202 2FL | Multi Length | Square

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
1/64	3/64	1-1/2	1/8	204-001000	204-000995	-	204-000997
1/32	1/16	1-1/2	1/8	202-001001	202-001002	202-001003	202-001004
1/32	1/8	1-1/2	1/8	204-001001	204-001002	204-001003	204-001005
3/64	3/32	1-1/2	1/8	202-001010	202-001011	202-001012	202-001013
3/64	1/8	1-1/2	1/8	204-001010	204-001011	204-021010	204-001013
1/16	1/8	1-1/2	1/8	202-001020	202-001021	202-001022	202-001023
1/16	1/4	1-1/2	1/8	204-001020	204-001021	204-001022	204-001023
5/64	5/32	1-1/2	1/8	202-001030	202-001031	202-001032	202-001033
5/64	1/4	1-1/2	1/8	204-001030	204-001032	204-001033	204-001036
3/32	3/16	1-1/2	1/8	202-001040	202-001041	202-001042	202-001043
3/32	3/8	1-1/2	1/8	204-001040	204-001041	204-001042	204-001043
7/64	7/32	1-1/2	1/8	202-001050	202-001051	202-001052	202-001053
7/64	3/8	1-1/2	1/8	204-001050	204-001052	204-021050	204-001055
1/8	1/4	1-1/2	1/8	202-001060	202-001061	202-001062	202-001063
1/8	1/2	1-1/2	1/8	204-001060	204-001061	204-001062	204-001063
1/8	3/4	2-1/4	1/8	213-001001	213-001002	213-001003	213-001004
1/8	1	3	1/8	216-001001	216-001002	216-001003	216-001004
9/64	9/32	2	3/16	202-001070	202-001071	202-001072	202-001073
9/64	9/16	2	3/16	204-001070	204-001072	204-021070	204-001074
5/32	5/16	2	3/16	202-001080	202-001081	202-001082	202-001083
5/32	9/16	2	3/16	204-001080	204-001081	204-001083	204-001084
5/32	3/4	2-1/2	3/16	213-001005	213-001006	213-001007	213-001008
5/32	1-1/8	3	3/16	216-001005	216-001006	216-001007	216-001008
11/64	5/16	2	3/16	202-001090	202-001091	202-001092	202-001093
11/64	9/16	2	3/16	204-001090	204-001092	204-021090	204-001094
3/16	3/8	2	3/16	202-001100	202-001101	202-001102	202-001103
3/16	5/8	2	3/16	204-001100	204-001101	204-001103	204-001104
3/16	3/4	2-1/2	3/16	213-001012	213-001013	213-001016	213-001014
3/16	1-1/8	3	3/16	216-001010	216-001011	216-001012	216-001013
13/64	3/8	2	1/4	202-001110	202-001111	202-001112	202-001113
13/64	5/8	2-1/2	1/4	204-001110	204-001112	204-021110	204-001114
7/32	7/16	2	1/4	202-001120	202-001121	202-001122	202-001123
7/32	5/8	2-1/2	1/4	204-001120	204-001121	204-001123	204-001124
15/64	7/16	2	1/4	202-001125	202-001126	202-001127	202-001128
15/64	3/4	2-1/2	1/4	204-001125	204-001127	204-001125	204-001129
1/4	1/2	2	1/4	202-001130	202-001131	202-001132	202-001133
1/4	3/4	2-1/2	1/4	204-001130	204-001131	204-001133	204-001134
1/4	1-1/8	3	1/4	213-001020	213-001021	213-001022	213-001023
1/4	1-1/2	4	1/4	216-001020	216-001021	216-001022	216-001023
1/4	1-1/2	6	1/4	216-001025	216-001027	216-001028	216-001029
17/64	3/4	2-1/2	5/16	204-001135	204-001137	204-021181	204-001139
9/32	1/2	2	5/16	202-001140	202-001141	202-001142	202-001143
9/32	3/4	2-1/2	5/16	204-001140	204-001141	204-001143	204-001144
19/64	13/16	2-1/2	5/16	204-001145	204-001148	204-021145	204-031145
5/16	1/2	2	5/16	202-001150	202-001151	202-001152	202-001153

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



Series 202		2FL   Multi Length   Square					
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
5/16	13/16	2-1/2	5/16	204-001150	204-001151	204-001155	204-001153
5/16	1-1/8	3	5/16	213-001030	213-001031	213-001032	213-001033
5/16	1-1/2	6	5/16	216-001034	216-001035	216-001036	216-001034A
5/16	1-5/8	4	5/16	216-001030	216-001031	216-001032	216-001033
21/64	1	2-1/2	3/8	204-001154	204-001157	204-021154	204-031154
11/32	1	2-1/2	3/8	204-001160	204-001162	204-001163	204-001164
23/64	1	2-1/2	3/8	204-001165	204-001166	204-021165	204-031165
3/8	5/8	2	3/8	202-001170	202-001171	202-001172	202-001173
3/8	1	2-1/2	3/8	204-001170	204-001171	204-001179	204-001173
3/8	1-1/8	3	3/8	213-001040	213-001009	213-001015	213-001010
3/8	1-1/2	6	3/8	216-001045	216-001046	216-001047	216-001048
3/8	1-3/4	4	3/8	216-001040	216-001041	216-001042	216-001043
25/64	1	2-3/4	7/16	204-001175	204-001178	204-021175	204-031175
13/32	1	2-3/4	7/16	204-001180	204-001182	204-021180	204-001184
27/64	1	2-3/4	7/16	204-001185	204-001187	204-021185	204-031185
7/16	5/8	2-1/2	7/16	202-001190	202-001191	202-001192	202-001193
7/16	1	2-3/4	7/16	204-001190	204-001191	204-001189	204-001198
7/16	2	4	7/16	213-001050	213-001051	213-001053	213-001052
7/16	3	6	7/16	216-001050	216-001051	216-001052	216-001053
29/64	1	3	1/2	204-001192	204-001194	204-021192	204-031192
15/32	1	3	1/2	204-001193	204-001197	204-021193	204-001196
31/64	1	3	1/2	204-001195	204-001199	204-021195	204-031195
1/2	5/8	2-1/2	1/2	202-001200	202-001201	202-001202	202-001203
1/2	1	3	1/2	204-001200	204-001201	204-001202	204-001205
1/2	1-1/4	3	1/2	204-001200A	204-001200AA	204-001200C	204-001205A
1/2	1-1/2	4	1/2	213-001059	213-001056	213-001062	213-001063
1/2	1-1/2	6	1/2	216-001053A	216-001057	216-001058	216-001059
1/2	2	4	1/2	213-001060	213-001061	213-001065	213-001064
1/2	3	6	1/2	216-001054	216-001061	216-001062	216-001063
33/64	1-1/4	3-1/2	9/16	204-001206	204-001206A	204-001206C	204-001206B
17/32	1-1/4	3-1/2	9/16	204-001207	204-001207A	204-001207C	204-001207B
9/16	1-1/4	3-1/2	9/16	204-001210	204-001209	204-001211	204-001212
5/8	3/4	3	5/8	202-001220	202-001221	202-001222	202-001223
5/8	1-1/4	3-1/2	5/8	204-001220	204-001222	204-001225	204-001224
5/8	1-1/2	6	5/8	216-001074	216-001076	216-001075	216-001074A
5/8	2-1/4	5	5/8	213-001070	213-001071	213-001072	213-001073
5/8	3	6	5/8	216-001070	216-001071	216-001072	216-001073
11/16	1-1/2	4	3/4	204-001230	204-001231	204-001233	204-001232
3/4	1	3	3/4	202-001240	202-001241	202-001242	202-001243
3/4	1-1/2	4	3/4	204-001240	204-001241	204-001243	204-001242
3/4	1-1/2	6	3/4	216-001084	216-001085	216-001086	216-001084A
3/4	2-1/4	5	3/4	213-001080	213-001081	213-001082	213-001083
3/4	3	6	3/4	216-001080	216-001081	216-001082	216-001083
3/4	4	7	3/4	216-001087	216-001087A	216-001087C	216-001087B
7/8	1-1/2	4	7/8	204-001250	204-001251	204-001252	204-001253
1	1-1/2	4	1	204-001260	204-001261	204-001262	204-001263
1	1-1/2	6	1	216-001095	216-001097	216-001098	216-001096
1	2-1/4	5	1	213-001090	213-001091	213-001092	213-001093
1	3	6	1	216-001090	216-001091	216-001092	216-001093
1	4	7	1	216-001099	216-001099A	216-001099C	216-001099B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

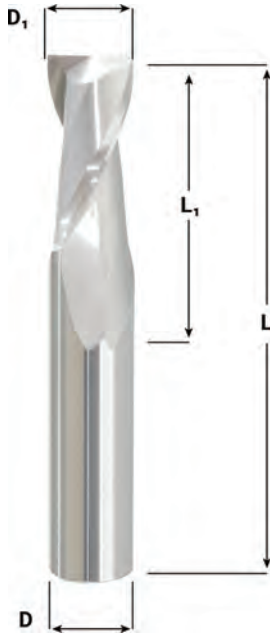
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>2-Flute Metric Square End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> <li>• All listed dimensions in millimeters</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>2FL</td> </tr> <tr> <td>SQ</td> <td>30°</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>TiCN</td> <td>AlTiN</td> </tr> <tr> <td>P 169</td> <td></td> </tr> </table>	CARBIDE	2FL	SQ	30°	Bright	TiN	TiCN	AlTiN	P 169	
CARBIDE	2FL											
SQ	30°											
Bright	TiN											
TiCN	AlTiN											
P 169												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○			○	○	○	○			○	

● Best ○ Good

**Series 202M**      **2FL | Square | Metric**

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
1mm	4mm	39mm	3mm	204-001275	204-001270A	204-001270C	204-001270B
1.5mm	5mm	39mm	3mm	204-001285	204-001285A	204-001285C	204-001285B
2mm	8mm	39mm	3mm	204-001295	204-001295A	204-001295C	204-001295B
2.5mm	9.5mm	39mm	3mm	204-001301	204-001297A	204-001297C	204-001297B
3mm	12mm	39mm	3mm	204-001313	204-001311A	204-001311C	204-001311B
3.5mm	12mm	51mm	4mm	204-001321	204-001321A	204-001321C	204-001321B
4mm	14mm	51mm	4mm	204-001330	204-001330A	204-001330C	204-001330B
4.5mm	16mm	51mm	5mm	204-001341	204-001341A	204-001341C	204-001341B
5mm	16mm	51mm	5mm	204-001351	204-001351A	204-001351C	204-001351B
6mm	19mm	63mm	6mm	204-001361	204-001361A	204-001361C	204-001361B
7mm	19mm	63mm	8mm	204-001371	204-001371A	204-001371C	204-001371B
8mm	20mm	63mm	8mm	204-001381	204-001381A	204-001381C	204-001381B
9mm	22mm	63mm	10mm	204-001391	204-001391A	204-001391C	204-001391B
10mm	22mm	76mm	10mm	204-001400	204-001400A	204-001400C	204-001400B
11mm	25mm	76mm	12mm	204-001410	204-001410A	204-001410C	204-001410B
12mm	25mm	76mm	12mm	204-001420	204-001420A	204-001420C	204-001420B
14mm	32mm	90mm	14mm	204-001430	204-001430A	204-001430C	204-001430B
16mm	38mm	102mm	16mm	204-001440	204-001440A	204-001440C	204-001440B
18mm	38mm	102mm	18mm	204-001450	204-001450A	204-001450C	204-001450B
20mm	38mm	102mm	20mm	204-001460	204-001460A	204-001460C	204-001460B
22mm	38mm	102mm	22mm	204-001470	-	-	204-001470B
25mm	38mm	102mm	25mm	204-001480	-	-	204-001480B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

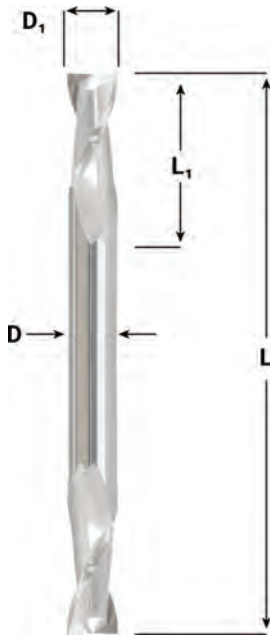
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>2-Flute Double-Ended Square End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Weldon flat standard for regular length sizes</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>2FL</td> </tr> <tr> <td>SQ</td> <td>30°</td> </tr> <tr> <td>Weldon</td> <td>Bright</td> </tr> <tr> <td>TiN</td> <td>TiCN</td> </tr> <tr> <td>AlTiN</td> <td>P 169</td> </tr> </table>	CARBIDE	2FL	SQ	30°	Weldon	Bright	TiN	TiCN	AlTiN	P 169
CARBIDE	2FL											
SQ	30°											
Weldon	Bright											
TiN	TiCN											
AlTiN	P 169											

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

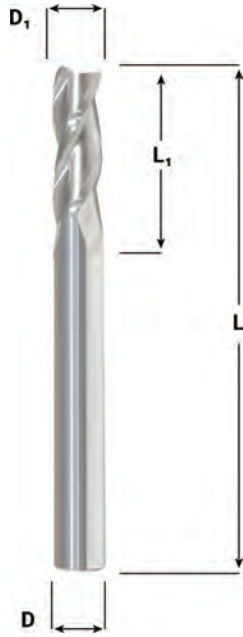
**Series 202D** | 2FL | Multi Length | Square | Double End

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
1/32	1/16	1-1/2	1/8	234-001001	234-001002	234-001003	234-001004
3/64	3/32	1-1/2	1/8	234-001010	234-001011	234-021010	234-031010
1/16	1/8	1-1/2	1/8	234-001011A	234-001021	234-001022	234-001015
5/64	1/8	1-1/2	1/8	234-001012	234-001013	234-001014	234-001024
3/32	3/16	1-1/2	1/8	234-001030	234-001031	234-001033	234-001034
7/64	3/16	1-1/2	1/8	234-001035	234-001036	234-001037	234-001038
1/8	1/4	1-1/2	1/8	234-001040	234-001041	234-021040	234-001044
1/8	3/8	3	3/8	237-001001	-	-	237-001004
9/64	5/16	2	3/16	234-001042	234-001043	234-001048	234-001049
5/32	5/16	2	3/16	234-001050	234-001051	234-001052	234-001054
5/32	7/16	3	3/8	237-001010	-	-	237-001013
11/64	5/16	2	3/16	234-001055	234-001056	234-001057	234-001058
3/16	1/2	3	3/8	237-001020	-	-	237-001023
13/64	1/2	2-1/2	1/4	234-001063	234-001064	234-001065	234-001066
7/32	1/2	2-1/2	1/4	234-001070	234-001071	234-001072	234-001074
7/32	9/16	3-1/2	3/8	237-001030	-	-	237-001033
15/64	1/2	2-1/2	1/4	234-001075	234-001076	234-001077	234-001078
1/4	1/2	2-1/2	1/4	234-001080	234-001081	234-021081	234-001084
1/4	5/8	3-1/2	3/8	237-001040	-	237-001042	237-001043
9/32	1/2	2-1/2	5/16	234-001082	234-001086	234-001087	234-001088
9/32	11/16	3-1/2	3/8	237-001050	-	-	237-001053
5/16	1/2	2-1/2	5/16	234-001090	234-001091	234-001092	234-001093
5/16	3/4	3-1/2	3/8	237-001060	-	-	237-001063
11/32	9/16	2-1/2	3/8	234-001094	234-001095	234-001096	234-001098
11/32	3/4	3-1/2	3/8	237-001070	-	-	237-001073
3/8	9/16	2-1/2	3/8	234-001100	234-001101	234-001102	234-001104
3/8	3/4	3-1/2	3/8	237-001080	237-001081	-	237-001083
7/16	9/16	2-3/4	7/16	234-001110	234-001111	234-021111	234-001114
7/16	7/8	4	1/2	237-001090	-	-	237-001093
1/2	5/8	3	1/2	234-001120	234-001121	234-021121	234-001124
1/2	1	4	1/2	237-001100	-	-	237-001103

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>3-Flute Square End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>3FL</td> </tr> <tr> <td>SQ</td> <td>30°</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>TiCN</td> <td>AlTiN</td> </tr> <tr> <td>P 169</td> <td></td> </tr> </table>	CARBIDE	3FL	SQ	30°	Bright	TiN	TiCN	AlTiN	P 169	
CARBIDE	3FL											
SQ	30°											
Bright	TiN											
TiCN	AlTiN											
P 169												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○			○	○	○	○			○	

● Best ○ Good

## Series 205 | 3FL | Regular Length | Square

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
1/32	1/8	1-1/2	1/8	205-001001	205-001002	205-001003	205-001004
3/64	1/8	1-1/2	1/8	205-001020	205-001021	205-001022	205-001023
1/16	1/4	1-1/2	1/8	205-001030	205-001031	205-001032	205-001033
5/64	1/4	1-1/2	1/8	205-001040	205-001041	205-001042	205-001043
3/32	3/8	1-1/2	1/8	205-001050	205-001051	205-001052	205-001053
7/64	3/8	1-1/2	1/8	205-001060	205-001061	205-001062	205-001063
1/8	1/2	1-1/2	1/8	205-001070	205-001071	205-001072	205-001073
5/32	9/16	2	3/16	205-001090	205-001091	205-001092	205-001093
3/16	5/8	2	3/16	205-001110	205-001111	205-001112	205-001113
7/32	5/8	2-1/2	1/4	205-001130	205-001131	205-001132	205-001133
1/4	3/4	2-1/2	1/4	205-001140	205-001143	205-021140	205-031140
9/32	3/4	2-1/2	5/16	205-001150	205-001151	205-001152	205-001153
5/16	13/16	2-1/2	5/16	205-001160	205-001161	205-001162	205-001163
3/8	1	2-1/2	3/8	205-001180	205-001184	205-001185	205-001186
7/16	1	2-3/4	7/16	205-001200	205-001201	205-001202	205-001203
1/2	1	3	1/2	205-001210	205-001214	205-001215	205-001216
9/16	1-1/4	3-1/2	9/16	205-001220	-	-	205-001223
5/8	1-1/4	3-1/2	5/8	205-001230	205-001231	205-001232	205-001233
3/4	1-1/2	4	3/4	205-001250	205-001251	205-001252	205-001253
7/8	1-1/2	4	7/8	205-001260	205-001261	205-001262	205-001263
11/32	1	2-1/2	3/8	205-001170	205-001171	205-001172	205-001173
1	1-1/2	4	1	205-001270	205-001271	205-001272	205-001273

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

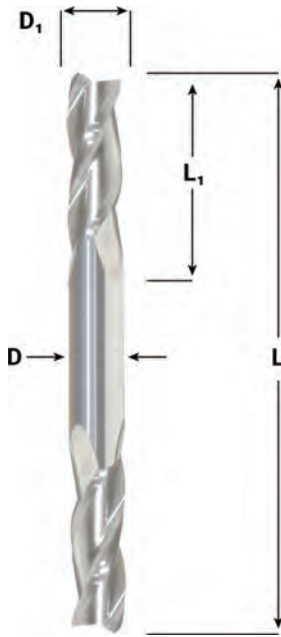
THREADING

INSERTS



# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES						
<b>3-Flute Double-Ended End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>3FL</td> </tr> <tr> <td>SQ</td> <td>30°</td> </tr> <tr> <td>Bright</td> <td>P 169</td> </tr> </table>	CARBIDE	3FL	SQ	30°	Bright	P 169
CARBIDE	3FL							
SQ	30°							
Bright	P 169							

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 205D | 3FL | Stub Length | Square | Double End

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
1/32	1/16	1-1/2	1/8	<b>235-001001</b>
3/64	3/32	1-1/2	1/8	<b>235-001010</b>
1/16	1/8	1-1/2	1/8	<b>235-001020</b>
3/32	3/16	1-1/2	1/8	<b>235-001030</b>
1/8	1/4	1-1/2	1/8	<b>235-001040</b>
3/16	3/8	2	3/16	<b>235-001060</b>
7/32	1/2	2-1/2	1/4	<b>235-001070</b>
1/4	1/2	2-1/2	1/4	<b>235-001080</b>
5/16	1/2	2-1/2	5/16	<b>235-001090</b>
3/8	9/16	2-1/2	3/8	<b>235-001100</b>
7/16	9/16	2-3/4	7/16	<b>235-001110</b>
1/2	5/8	3	1/2	<b>235-001120</b>

\*bold numbers are EDPs for ordering

### Popular Custom Milling Options

<ul style="list-style-type: none"> <li>Proprietary GWS tool coatings</li> <li>Longer lengths</li> <li>Enhanced geometry</li> <li>Special shank modifications like <b>SAFE-LOCK</b>®</li> </ul>	<p><b>CUSTOM COMES STANDARD</b></p>
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# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>4-Flute Square End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>4FL</td> </tr> <tr> <td>SQ</td> <td>30°</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>TiCN</td> <td>AlTiN</td> </tr> <tr> <td>P 169</td> <td></td> </tr> </table>	CARBIDE	4FL	SQ	30°	Bright	TiN	TiCN	AlTiN	P 169	
CARBIDE	4FL											
SQ	30°											
Bright	TiN											
TiCN	AlTiN											
P 169												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○			○	○	○	○			○	

● Best ○ Good

## Series 203 4FL | Multi Length | Square

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
1/64	3/64	1-1/2	1/8	206-001000	206-000995	206-000996	206-000997
1/32	1/16	1-1/2	1/8	203-001001	203-001002	203-001003	203-001004
1/32	1/8	1-1/2	1/8	206-001001	206-001002	206-001003	206-001005
3/64	3/32	1-1/2	1/8	203-001010	203-001011	203-001012	203-001013
3/64	1/8	1-1/2	1/8	206-001010	206-001011	206-001013	206-001015
1/16	1/8	1-1/2	1/8	203-001020	203-001021	203-001022	203-001023
1/16	1/4	1-1/2	1/8	206-001020	206-001021	206-001022	206-001027
5/64	5/32	1-1/2	1/8	203-001030	203-001031	203-001032	203-001033
5/64	1/4	1-1/2	1/8	206-001030	206-001031	206-001032	206-001036
3/32	3/16	1-1/2	1/8	203-001040	203-001041	203-001042	203-001043
3/32	3/8	1-1/2	1/8	206-001040	206-001041	206-001042	206-001044
7/64	7/32	1-1/2	1/8	203-001050	203-001051	203-001052	203-001053
7/64	3/8	1-1/2	1/8	206-001050	206-001051	206-001052	206-001053
1/8	1/4	1-1/2	1/8	203-001060	203-001061	203-001062	203-001063
1/8	1/2	1-1/2	1/8	206-001060	206-001061	206-001063	206-001067
1/8	3/4	2-1/4	1/8	215-001001	215-001002	215-001003	215-001004
1/8	1	3	1/8	218-001001	218-001002	218-001003	218-001004
9/64	9/32	2	3/16	203-001070	203-001071	203-001072	203-001073
9/64	9/16	2	3/16	206-001070	206-001071	206-001072	206-001073
5/32	5/16	2	3/16	203-001080	203-001081	203-001082	203-001083
5/32	9/16	2	3/16	206-001080	206-001081	206-001082	206-001083
5/32	3/4	2-1/2	3/16	215-001005	215-001006	215-001007	215-001008
5/32	1-1/8	3	3/16	218-001005	218-001006	218-001007	218-001008
11/64	5/16	2	3/16	203-001090	203-001091	203-001092	203-001093
11/64	9/16	2	3/16	206-001090	206-001091	206-021090	206-001093
3/16	3/8	2	3/16	203-001100	203-001101	203-001105	203-001103
3/16	5/8	2	3/16	206-001100	206-001101	206-001102	206-001107
3/16	3/4	2-1/2	3/16	215-001012	215-001013	215-001014	215-001015
3/16	1	4	3/16	218-001015	218-001015A	218-001015B	218-001015C
3/16	1-1/8	3	3/16	218-001010	218-001011	218-001012	218-001013
13/64	3/8	2	1/4	203-001110	203-001111	203-001112	203-001113
13/64	5/8	2-1/2	1/4	206-001110	206-001111	206-021110	206-001113
7/32	7/16	2	1/4	203-001120	203-001121	203-001122	203-001123
7/32	5/8	2-1/2	1/4	206-001120	206-001121	206-001122	206-001123
15/64	7/16	2	1/4	203-001125	203-001126	203-001127	203-001128
15/64	3/4	2-1/2	1/4	206-001125	206-001126	206-021125	206-001128
1/4	1/2	2	1/4	203-001130	203-001131	203-001132	203-001133
1/4	3/4	2-1/2	1/4	206-001130	206-001131	206-001132	206-001137
1/4	1	4	1/4	218-001019	218-001019A	218-001019C	218-001019B
1/4	1-1/8	3	1/4	215-001020	215-001021	215-001022	215-001023
1/4	1-1/2	4	1/4	218-001020	218-001021	218-001024	218-001023
1/4	1-1/2	6	1/4	218-001025	218-001026	218-001027	218-001028
17/64	3/4	2-1/2	5/16	206-001133	206-001135	206-021133	206-001136
9/32	1/2	2	5/16	203-001140	203-001141	203-001142	203-001143
9/32	3/4	2-1/2	5/16	206-001140	206-001142	206-001143	206-001144

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials

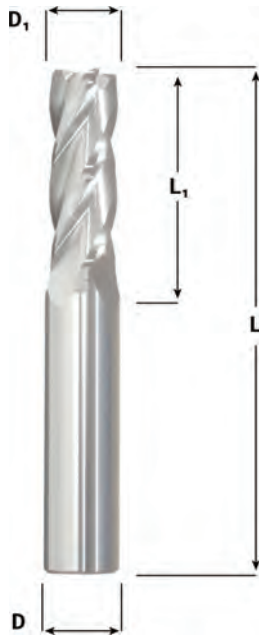


Series 203		4FL   Multi Length   Square					
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
19/64	13/16	2-1/2	5/16	206-001147	206-001145	206-021147	206-031147
5/16	1/2	2	5/16	203-001150	203-001151	203-001152	203-001153
5/16	13/16	2-1/2	5/16	206-001150	206-001151	206-001152	206-001153
5/16	1-1/8	3	5/16	215-001030	215-001033	215-001029	215-001028
5/16	1-1/2	6	5/16	218-001029	218-001029AA	218-001029B	218-001029A
5/16	1-5/8	4	5/16	218-001030	218-001031	218-001032	218-001033
21/64	1	2-1/2	3/8	206-001154	206-001157	206-021154	206-031154
11/32	1	2-1/2	3/8	206-001160	206-001161	206-001162	206-001163
23/64	1	2-1/2	3/8	206-001169	206-001165	206-021169	206-031169
3/8	5/8	2	3/8	203-001170	203-001171	203-001172	203-001173
3/8	1	2-1/2	3/8	206-001170	206-001171	206-001176	206-001177
3/8	1	4	3/8	218-001035	218-001035A	218-001036	218-001037
3/8	1-1/8	3	3/8	215-001040	215-001041	215-001044	215-001043
3/8	1-1/2	6	3/8	218-001045	218-001046	218-001048	218-001047
3/8	1-3/4	4	3/8	218-001040	218-001039	218-001036	218-001038
25/64	1	2-3/4	7/16	206-001175	206-001178	206-021175	206-031175
13/32	1	2-3/4	7/16	206-001180	206-001181	206-001182	206-001183
27/64	1	2-3/4	7/16	206-001185	206-001187	206-021185	206-031185
7/16	5/8	2-1/2	7/16	203-001190	203-001191	203-001192	203-001193
7/16	1	2-3/4	7/16	206-001190	206-001191	206-001192	206-001193
7/16	2	4	7/16	215-001050	215-001051	215-001052	215-001053
7/16	3	6	7/16	218-001050	218-001051	218-001052	218-001053
29/64	1	3	1/2	206-001195	206-001194	206-021195	206-031195
15/32	1	3	1/2	206-001198	206-001196	206-021198	206-001206
31/64	1	3	1/2	206-001199	206-001197	206-021199	206-031199
1/2	5/8	2-1/2	1/2	203-001200	203-001201	203-001202	203-001203
1/2	1	3	1/2	206-001200	206-001201	206-001204	206-001207
1/2	1	4	1/2	215-001054	215-001054A	215-001054C	215-001054B
1/2	1-1/4	3	1/2	206-001203	206-001203B	206-001203C	206-001203A
1/2	1-1/2	4	1/2	215-001059	215-001058	215-001057	215-001056
1/2	1-1/2	6	1/2	218-001053A	218-001061	218-001062	218-001059
1/2	2	4	1/2	215-001060	215-001063	215-001065	215-001067
1/2	3	6	1/2	218-001053AA	218-001056	218-001057	218-001058
1/2	4	7	1/2	218-001150	-	-	218-001150B
1/2	5	8	1/2	218-001151	-	-	218-001151B
33/64	1-1/4	3-1/2	9/16	206-001208	206-001208A	206-001208B	206-001218
17/32	1-1/4	3-1/2	9/16	206-001209	206-001209A	206-001209C	206-001219
9/16	1-1/4	3-1/2	9/16	206-001210	206-001211	206-001212	206-001213
19/32	1-1/4	3-1/2	5/8	206-001217	206-001217A	206-001217C	206-001217B
5/8	3/4	3	5/8	203-001220	203-001221	203-001222	203-001223
5/8	1-1/4	3-1/2	5/8	206-001220	206-001221	206-001225	206-001226
5/8	1-1/2	6	5/8	218-001074	218-001075	218-001076	218-001074A
5/8	2-1/4	5	5/8	215-001070	215-001071	215-001072	215-001073
5/8	3	6	5/8	218-001070	218-001071	218-001072	218-001073
5/8	4	7	5/8	218-001152	-	-	218-001152B
5/8	5	8	5/8	218-001153	-	-	218-001153B
5/8	6	9	5/8	218-001154	-	-	218-001154B
41/64	1-1/2	4	3/4	206-001236	206-001236A	206-001236C	206-001237
21/32	1-1/2	4	3/4	206-001228	206-001228A	206-001228C	206-001228B
11/16	1-1/2	4	3/4	206-001230	206-001231	206-001232	206-001233
47/64	1-1/2	4	3/4	206-001237F	206-001237FA	206-001237FC	206-001237FB
3/4	1	3	3/4	203-001240	203-001241	203-001242	203-001243
3/4	1	4	3/4	206-001238	-	-	206-001238B
3/4	1-1/2	4	3/4	206-001239	206-001241	206-001243	206-001244
3/4	1-1/2	6	3/4	218-001101	218-001101A	218-001101B	218-001102
3/4	2-1/4	5	3/4	215-001080	215-001081	215-001082	215-001083
3/4	3	6	3/4	218-001080	218-001082	218-001086	218-001079
3/4	4	7	3/4	218-001081	218-001083	218-001087	218-001084
3/4	5	8	3/4	218-001155	-	-	218-001155B
3/4	6	9	3/4	218-001156	-	-	218-001156B
3/4	8	12	3/4	218-001157	-	-	218-001157B
13/16	1-1/2	4	7/8	206-001245	206-001245A	206-001245C	206-001246
7/8	1-1/2	4	7/8	206-001250	206-001251	206-001252	206-001254
15/16	1-1/2	4	1	206-001255	206-001255A	206-001255C	206-001256
1	1	3	1	203-001260	203-001261	203-001262	203-001263
1	1	4	1	206-001259	-	-	206-001259B
1	1-1/2	4	1	206-001260	206-001261	206-001263	206-001264
1	1-1/2	6	1	218-001103	218-001105	218-001106	218-001104
1	2-1/4	5	1	215-001090	215-001091	215-001092	215-001093
1	3	6	1	218-001090	218-001088	218-001097	218-001094
1	4	7	1	218-001091	218-001089	218-001098	218-001095
1	5	8	1	218-001158	-	-	218-001158B
1	6	9	1	218-001159	-	-	218-001159B
1	7	10	1	218-001160	-	-	218-001160B
1	8	12	1	218-001161	-	-	218-001161B
1-1/4	2	4-1/2	1-1/4	206-001266	206-001266A	206-001266C	206-001266B

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>4-Flute Metric Square End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> <li>• All listed dimensions in millimeters</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>4FL</td> </tr> <tr> <td>SQ</td> <td>30°</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>TiCN</td> <td>AlTiN</td> </tr> <tr> <td>P 169</td> <td></td> </tr> </table>	CARBIDE	4FL	SQ	30°	Bright	TiN	TiCN	AlTiN	P 169	
CARBIDE	4FL											
SQ	30°											
Bright	TiN											
TiCN	AlTiN											
P 169												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○			○	○	○	○			○	

● Best ○ Good

Series 203M		4FL   Multi Length   Square   Metric					
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	TiCN	AlTiN
1.5mm	5mm	39mm	3mm	206-001285	206-001285A	206-001285C	206-001287
2.5mm	9.5mm	39mm	3mm	206-001300	206-001300A	206-001300C	206-001302
3.5mm	12mm	51mm	4mm	206-001320	206-001320A	206-001320C	206-001322
4mm	14mm	51mm	4mm	206-001330	206-001330A	206-001330C	206-001330B
4.5mm	16mm	51mm	5mm	206-001340	206-001340A	206-001340C	206-001340B
5mm	16mm	51mm	5mm	206-001350	206-001350A	206-001350C	206-001350B
6mm	19mm	63mm	6mm	206-001360	206-001360A	206-001360C	206-001360B
7mm	19mm	63mm	8mm	206-001370	206-001370A	206-001370C	206-001372
8mm	20mm	63mm	8mm	206-001380	206-001380A	206-001380C	206-001380B
9mm	22mm	63mm	10mm	206-001390	206-001390A	206-001390C	206-001390B
10mm	22mm	76mm	10mm	206-001400	206-001400A	206-001400C	206-001402
11mm	25mm	76mm	12mm	206-001410	206-001410A	206-001410C	206-001412
12mm	25mm	76mm	12mm	206-001420	206-001420A	206-001420C	206-001420B
14mm	32mm	90mm	14mm	206-001430	206-001430A	206-001430C	206-001430B
16mm	32mm	102mm	16mm	206-001440	206-001440A	206-001440C	206-001442
18mm	38mm	102mm	18mm	206-001450	206-001450A	206-001450C	206-001452
20mm	38mm	102mm	20mm	206-001460	206-001460A	206-001460C	206-001460B
22mm	38mm	102mm	22mm	206-001470	206-001470A	206-001470C	206-001470B
25mm	38mm	102mm	25mm	206-001480	206-001480A	206-001480C	206-001480B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

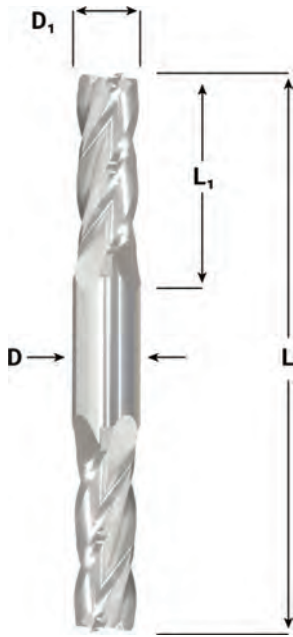
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<b>4-Flute Double-Ended Square End Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Weldon flat for regular length sizes</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>4FL</td> </tr> <tr> <td>SQ</td> <td>30°</td> </tr> <tr> <td>Weldon</td> <td>Bright</td> </tr> <tr> <td>TiN</td> <td>TiCN</td> </tr> <tr> <td>AlTiN</td> <td>P 169</td> </tr> </table>	CARBIDE	4FL	SQ	30°	Weldon	Bright	TiN	TiCN	AlTiN	P 169
CARBIDE	4FL											
SQ	30°											
Weldon	Bright											
TiN	TiCN											
AlTiN	P 169											

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 203D 4FL | Multi Length | Square | Double End

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Weldon	Bright	TiN	TiCN	AlTiN
1/32	1/16	1-1/2	1/8	No	236-001001	236-001011	236-001003	236-001004
3/64	3/32	1-1/2	1/8	No	236-001010	236-001012	236-001013	236-001014
1/16	1/8	1-1/2	1/8	No	236-001020	236-001021	236-001028	236-031025
5/64	1/8	1-1/2	1/8	No	236-001025	236-001026	236-021025	236-001027
3/32	3/16	1-1/2	1/8	No	236-001030	236-001031	236-001037	236-001034
7/64	3/16	1-1/2	1/8	No	236-001035	236-001036	236-021036	236-031035
1/8	1/4	1-1/2	1/8	No	236-001040	236-001041	236-001045	236-001047
1/8	3/8	3	3/8	Yes	239-001001	239-001002	-	239-001003
9/64	5/16	2	3/16	No	236-001042	236-001044	236-021044	236-031042
5/32	5/16	2	3/16	No	236-001050	236-001051	236-001053	236-001054
5/32	7/16	3	3/8	Yes	239-001010	239-001011	-	239-001013
11/64	5/16	2	3/16	No	236-001055	236-001056	236-021055	236-001057
3/16	3/8	2	3/16	No	236-001060	236-001061	236-001062	236-001064
3/16	1/2	3	3/8	Yes	239-001020	239-001021	-	239-001023
13/64	1/2	2-1/2	1/4	No	236-001065	236-001066	236-021065	236-031065
7/32	1/2	2-1/2	1/4	No	236-001070	236-001071	236-001073	236-001074
7/32	9/16	3-1/2	3/8	Yes	239-001030	-	-	239-001033
15/64	1/2	2-1/2	1/4	No	236-001075	236-001076	236-021075	236-031075
1/4	1/2	2-1/2	1/4	No	236-001080	236-001081	236-001083	236-001085
1/4	5/8	3-1/2	3/8	Yes	239-001040	239-001041	-	239-001043
9/32	1/2	2-1/2	5/16	No	236-001082	236-001087	236-001088	236-001089
9/32	11/16	3-1/2	3/8	Yes	239-001050	-	-	239-001053
5/16	1/2	2-1/2	5/16	No	236-001090	236-001091	236-001093	236-001094
5/16	3/4	3-1/2	3/8	Yes	239-001060	239-001061	-	239-001063
11/32	9/16	2-1/2	3/8	No	236-001092	236-001095	236-001096	236-031092
11/32	3/4	3-1/2	3/8	Yes	239-001070	-	-	239-001073
3/8	9/16	2-1/2	3/8	No	236-001100	236-001101	236-001102	236-001103
3/8	3/4	3-1/2	3/8	Yes	239-001080	-	-	239-001083
7/16	9/16	2-3/4	7/16	No	236-001110	236-021111	236-001111	236-031110
7/16	7/8	4	1/2	Yes	239-001090	-	-	239-001093
1/2	5/8	3	1/2	No	236-001120	236-001121	236-001122	236-001124
1/2	1	4	1/2	Yes	239-001100	239-001101	239-001102	239-001103

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<b>Micro 2-Flute Ball Mills</b> <ul style="list-style-type: none"> <li>• Micro mills</li> <li>• Universal application with 30° helix</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +/- 0.0005"</li> <li>• Shank Tol.: +0/-0.0003"</li> <li>• LOC Tol.: +0/-0.0120"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>2FL</td> </tr> <tr> <td>30°</td> <td>BALL</td> </tr> <tr> <td>Bright</td> <td>AlTiN</td> </tr> <tr> <td>P 170</td> <td></td> </tr> </table>	CARBIDE	2FL	30°	BALL	Bright	AlTiN	P 170	
CARBIDE	2FL									
30°	BALL									
Bright	AlTiN									
P 170										

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 252 | 2FL | Ball Nose | Micro

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AlTiN
.010	0.015	1-1/2	1/8	250-360100	250-360100B
.010	0.03	1-1/2	1/8	250-320010	250-320010B
.011	0.033	1-1/2	1/8	250-320011	250-320011B
.012	0.036	1-1/2	1/8	250-320012	250-320012B
.013	0.039	1-1/2	1/8	250-320013	250-320013B
.014	0.042	1-1/2	1/8	250-320014	250-320014B
.015	0.023	1-1/2	1/8	250-360200	250-360200B
.015	0.045	1-1/2	1/8	250-320015	250-320015B
1/64	1/8	1-1/2	1/8	251-001100	251-001100B
.016	0.048	1-1/2	1/8	250-320016	250-320016B
.017	0.051	1-1/2	1/8	250-320017	250-320017B
.018	0.054	1-1/2	1/8	250-320018	250-320018B
.019	0.057	1-1/2	1/8	250-320019	250-320019B
.020	0.03	1-1/2	1/8	250-360250	250-360250B
.020	0.06	1-1/2	1/8	250-320020	250-320020B
.021	0.063	1-1/2	1/8	250-320021	250-320021B
.022	0.066	1-1/2	1/8	250-320022	250-320022B
.023	0.069	1-1/2	1/8	250-320023	250-320023B
.024	0.072	1-1/2	1/8	250-320024	250-320024B
.025	0.038	1-1/2	1/8	250-360300	250-360300B
.025	0.075	1-1/2	1/8	250-320025	250-320025B
.026	0.078	1-1/2	1/8	250-320026	250-320026B
.027	0.081	1-1/2	1/8	250-320027	250-320027B
.028	0.084	1-1/2	1/8	250-320028	250-320028B
.029	0.087	1-1/2	1/8	250-320029	250-320029B
.030	0.045	1-1/2	1/8	250-360350	250-360350B
.030	0.09	1-1/2	1/8	250-320030	250-320030B
.031	0.093	1-1/2	1/8	250-320031	250-320031B
1/32	1/4	1-1/2	1/8	251-001101	251-001101B
1/32	3/8	1-1/2	1/8	251-001102	251-001102B
.032	0.096	1-1/2	1/8	250-320032	250-320032B
.033	0.099	1-1/2	1/8	250-320033	250-320033B
.034	0.102	1-1/2	1/8	250-320034	250-320034B
.035	0.053	1-1/2	1/8	250-360400	250-360400B
.035	0.105	1-1/2	1/8	250-320035	250-320035B
.036	0.108	1-1/2	1/8	250-320036	250-320036B
.037	0.111	1-1/2	1/8	250-320037	250-320037B
.038	0.114	1-1/2	1/8	250-320038	250-320038B
.039	0.117	1-1/2	1/8	250-320039	250-320039B
.040	0.06	1-1/2	1/8	250-360450	250-360450B
.040	0.12	1-1/2	1/8	250-320040	250-320040B
.041	0.123	1-1/2	1/8	250-320041	250-320041B
.042	0.126	1-1/2	1/8	250-320042	250-320042B
.043	0.129	1-1/2	1/8	250-320043	250-320043B
.044	0.132	1-1/2	1/8	250-320044	250-320044B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



Series 252		2FL   Ball Nose   Micro			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AlTiN
.045	0.068	1-1/2	1/8	250-360500	250-360500B
.045	0.135	1-1/2	1/8	250-320045	250-320045B
.046	0.138	1-1/2	1/8	250-320046	250-320046B
3/64	1/4	1-1/2	1/8	251-001110	251-001110B
3/64	3/8	1-1/2	1/8	251-001111	251-001111B
3/64	1/2	1-1/2	1/8	251-001112	251-001112B
.047	0.141	1-1/2	1/8	250-320047	250-320047B
.048	0.144	1-1/2	1/8	250-320048	250-320048B
.049	0.147	1-1/2	1/8	250-320049	250-320049B
.050	0.075	1-1/2	1/8	250-360550	250-360550B
.050	0.15	1-1/2	1/8	250-320050	250-320050B
.051	0.153	1-1/2	1/8	250-320051	250-320051B
.052	0.156	1-1/2	1/8	250-320052	250-320052B
.053	0.159	1-1/2	1/8	250-320053	250-320053B
.054	0.162	1-1/2	1/8	250-320054	250-320054B
.055	0.083	1-1/2	1/8	250-360600	250-360600B
.055	0.165	1-1/2	1/8	250-320055	250-320055B
.056	0.168	1-1/2	1/8	250-320056	250-320056B
.057	0.171	1-1/2	1/8	250-320057	250-320057B
.058	0.174	1-1/2	1/8	250-320058	250-320058B
.059	0.177	1-1/2	1/8	250-320059	250-320059B
.060	0.09	1-1/2	1/8	250-360620	250-360620B
.060	0.18	1-1/2	1/8	250-320060	250-320060B
.061	0.183	1-1/2	1/8	250-320061	250-320061B
.062	0.186	1-1/2	1/8	250-320062	250-320062B
1/16	1/2	1-1/2	1/8	251-001120	251-001120B
1/16	3/4	1-1/2	1/8	251-001121	251-001121B
1/16	1	1-1/2	1/8	251-001122	251-001122B
.063	0.189	1-1/2	1/8	250-320063	250-320063B
.064	0.192	1-1/2	1/8	250-320064	250-320064B
.065	0.098	1-1/2	1/8	250-360640	250-360640B
.065	0.195	1-1/2	1/8	250-320065	250-320065B
.070	0.105	1-1/2	1/8	250-360660	250-360660B
.070	0.21	1-1/2	1/8	250-320070	250-320070B
.075	0.113	1-1/2	1/8	250-360680	250-360680B
.075	0.225	1-1/2	1/8	250-320075	250-320075B
5/64	1/2	1-1/2	1/8	251-001130	251-001130B
.080	0.12	1-1/2	1/8	250-360700	250-360700B
.080	0.24	1-1/2	1/8	250-320080	250-320080B
.085	0.128	1-1/2	1/8	250-360720	250-360720B
.085	0.255	1-1/2	1/8	250-320085	250-320085B
.090	0.135	1-1/2	1/8	250-360740	250-360740B
.090	0.27	1-1/2	1/8	250-320090	250-320090B
3/32	1/2	1-1/2	1/8	251-001140	251-001140B
3/32	3/4	1-1/2	1/8	251-001141	251-001141B
.095	0.143	1-1/2	1/8	250-360760	250-360760B
.095	0.285	1-1/2	1/8	250-320095	250-320095B
.100	0.15	1-1/2	1/8	250-360780	250-360780B
.100	0.3	1-1/2	1/8	250-320100	250-320100B
.105	0.158	1-1/2	1/8	250-360800	250-360800B
.105	0.315	1-1/2	1/8	250-320105	250-320105B
.110	0.165	1-1/2	1/8	250-360820	250-360820B
.110	0.33	1-1/2	1/8	250-320110	250-320110B
.115	0.173	1-1/2	1/8	250-360840	250-360840B
.115	0.345	1-1/2	1/8	250-320115	250-320115B
.120	0.18	1-1/2	1/8	250-360860	250-360860B
.120	0.36	1-1/2	1/8	250-320120	250-320120B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<b>Micro 4-Flute Ball Mills</b> <ul style="list-style-type: none"> <li>• Micro mills</li> <li>• Universal application with 30° helix</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +/- 0.0005"</li> <li>• Shank Tol.: +0/-0.0003"</li> <li>• LOC Tol.: +0.120"/-0</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>4FL</td> </tr> <tr> <td>30°</td> <td>BALL</td> </tr> <tr> <td>Bright</td> <td>AlTiN</td> </tr> <tr> <td>P 170</td> <td></td> </tr> </table>	CARBIDE	4FL	30°	BALL	Bright	AlTiN	P 170	
CARBIDE	4FL									
30°	BALL									
Bright	AlTiN									
P 170										

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 256 | 4FL | Ball Nose | Micro

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AlTiN
.010	0.015	1-1/2	1/8	250-370150	250-370150B
.010	0.03	1-1/2	1/8	250-340010	250-340010B
.011	0.033	1-1/2	1/8	250-340011	250-340011B
.012	0.036	1-1/2	1/8	250-340012	250-340012B
.013	0.039	1-1/2	1/8	250-340013	250-340013B
.014	0.042	1-1/2	1/8	250-340014	250-340014B
.015	0.023	1-1/2	1/8	250-370200	250-370200B
.015	0.045	1-1/2	1/8	250-340015	250-340015B
1/64	1/8	2-1/2	1/8	251-002100	251-002100B
.016	0.048	1-1/2	1/8	250-340016	250-340016B
.017	0.051	1-1/2	1/8	250-340017	250-340017B
.018	0.054	1-1/2	1/8	250-340018	250-340018B
.019	0.057	1-1/2	1/8	250-340019	250-340019B
.020	0.03	1-1/2	1/8	250-370250	250-370250B
.020	0.06	1-1/2	1/8	250-340020	250-340020B
.021	0.063	1-1/2	1/8	250-340021	250-340021B
.022	0.066	1-1/2	1/8	250-340022	250-340022B
.023	0.069	1-1/2	1/8	250-340023	250-340023B
.024	0.072	1-1/2	1/8	250-340024	250-340024B
.025	0.038	1-1/2	1/8	250-370300	250-370300B
.025	0.075	1-1/2	1/8	250-340025	250-340025B
.026	0.078	1-1/2	1/8	250-340026	250-340026B
.027	0.081	1-1/2	1/8	250-340027	250-340027B
.028	0.084	1-1/2	1/8	250-340028	250-340028B
.029	0.087	1-1/2	1/8	250-340029	250-340029B
.030	0.045	1-1/2	1/8	250-370350	250-370350B
.030	0.09	1-1/2	1/8	250-340030	250-340030B
.031	0.093	1-1/2	1/8	250-340031	250-340031B
1/32	1/4	2-1/2	1/8	251-002101	251-002101B
1/32	3/8	2-1/2	1/8	251-002102	251-002102B
.032	0.096	1-1/2	1/8	250-340032	250-340032B
.033	0.099	1-1/2	1/8	250-340033	250-340033B
.034	0.102	1-1/2	1/8	250-340034	250-340034B
.035	0.053	1-1/2	1/8	250-370400	250-370400B
.035	0.105	1-1/2	1/8	250-340035	250-340035B
.036	0.108	1-1/2	1/8	250-340036	250-340036B
.037	0.111	1-1/2	1/8	250-340037	250-340037B
.038	0.114	1-1/2	1/8	250-340038	250-340038B
.039	0.117	1-1/2	1/8	250-340039	250-340039B
.040	0.06	1-1/2	1/8	250-370450	250-370450B
.040	0.12	1-1/2	1/8	250-340040	250-340040B
.041	0.123	1-1/2	1/8	250-340041	250-340041B
.042	0.126	1-1/2	1/8	250-340042	250-340042B
.043	0.129	1-1/2	1/8	250-340043	250-340043B
.044	0.132	1-1/2	1/8	250-340044	250-340044B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



Series 256		4FL   Ball Nose   Micro			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AlTiN
.045	0.068	1-1/2	1/8	250-370500	250-370500B
.045	0.135	1-1/2	1/8	250-340045	250-340045B
.046	0.138	1-1/2	1/8	250-340046	250-340046B
3/64	1/4	2-1/2	1/8	251-002110	251-002110B
3/64	3/8	2-1/2	1/8	251-002111	251-002111B
3/64	1/2	2-1/2	1/8	251-002112	251-002112B
.047	0.141	1-1/2	1/8	250-340047	250-340047B
.048	0.144	1-1/2	1/8	250-340048	250-340048B
.049	0.147	1-1/2	1/8	250-340049	250-340049B
.050	0.075	1-1/2	1/8	250-370550	250-370550B
.050	0.15	1-1/2	1/8	250-340050	250-340050B
.051	0.153	1-1/2	1/8	250-340051	250-340051B
.052	0.156	1-1/2	1/8	250-340052	250-340052B
.053	0.159	1-1/2	1/8	250-340053	250-340053B
.054	0.162	1-1/2	1/8	250-340054	250-340054B
.055	0.083	1-1/2	1/8	250-370600	250-370600B
.055	0.165	1-1/2	1/8	250-340055	250-340055B
.056	0.168	1-1/2	1/8	250-340056	250-340056B
.057	0.171	1-1/2	1/8	250-340057	250-340057B
.058	0.174	1-1/2	1/8	250-340058	250-340058B
.059	0.177	1-1/2	1/8	250-340059	250-340059B
.060	0.09	1-1/2	1/8	250-370620	250-370620B
.060	0.18	1-1/2	1/8	250-340060	250-340060B
.061	0.183	1-1/2	1/8	250-340061	250-340061B
.062	0.186	1-1/2	1/8	250-340062	250-340062B
1/16	1/2	2-1/2	1/8	251-002120	251-002120B
1/16	3/4	2-1/2	1/8	251-002121	251-002121B
1/16	1	2-1/2	1/8	251-002122	251-002122B
.063	0.189	1-1/2	1/8	250-340063	250-340063B
.064	0.192	1-1/2	1/8	250-340064	250-340064B
.065	0.098	1-1/2	1/8	250-370640	250-370640B
.065	0.195	1-1/2	1/8	250-340065	250-340065B
.070	0.105	1-1/2	1/8	250-370660	250-370660B
.070	0.21	1-1/2	1/8	250-340070	250-340070B
.075	0.113	1-1/2	1/8	250-370680	250-370680B
.075	0.225	1-1/2	1/8	250-340075	250-340075B
5/64	1/2	2-1/2	1/8	251-002130	251-002130B
.080	0.12	1-1/2	1/8	250-370700	250-370700B
.080	0.24	1-1/2	1/8	250-340080	250-340080B
.085	0.128	1-1/2	1/8	250-370720	250-370720B
.085	0.255	1-1/2	1/8	250-340085	250-340085B
.090	0.135	1-1/2	1/8	250-370740	250-370740B
.090	0.27	1-1/2	1/8	250-340090	250-340090B
3/32	1/2	2-1/2	1/8	251-002140	251-002140B
3/32	3/4	2-1/2	1/8	251-002141	251-002141B
.095	0.143	1-1/2	1/8	250-370760	250-370760B
.095	0.285	1-1/2	1/8	250-340095	250-340095B
.100	0.15	1-1/2	1/8	250-370780	250-370780B
.100	0.3	1-1/2	1/8	250-340100	250-340100B
.105	0.158	1-1/2	1/8	250-370800	250-370800B
.105	0.315	1-1/2	1/8	250-340105	250-340105B
.110	0.165	1-1/2	1/8	250-370820	250-370820B
.110	0.33	1-1/2	1/8	250-340110	250-340110B
.115	0.173	1-1/2	1/8	250-370840	250-370840B
.115	0.345	1-1/2	1/8	250-340115	250-340115B
.120	0.18	1-1/2	1/8	250-370860	250-370860B
.120	0.36	1-1/2	1/8	250-340120	250-340120B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Micro 2-Flute Radius Mills</b> <ul style="list-style-type: none"> <li>• Micro mills</li> <li>• Universal application with 30° helix</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +/- 0.0005"</li> <li>• Shank Tol.: +0/-0.0003"</li> <li>• LOC Tol.: +0/-0.0120"</li> </ul>		<div style="display: flex; flex-wrap: wrap;"> <div style="margin: 2px;">CARBIDE</div> <div style="margin: 2px;">2FL</div> <div style="margin: 2px;">30°</div> <div style="margin: 2px;">RAD</div> <div style="margin: 2px;">Bright</div> <div style="margin: 2px;">AlTiN</div> <div style="margin: 2px;">P 170</div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 251 2FL | Corner Radius | Micro

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	AlTiN
.010	0.015	1-1/2	1/8	0.002	250-6201002	250-6201002B
.010	0.03	1-1/2	1/8	0.002	250-5201002	250-5201002B
.015	0.023	1-1/2	1/8	0.002	250-6201502	250-6201502B
.015	0.045	1-1/2	1/8	0.002	250-5201502	250-5201502B
.020	0.03	1-1/2	1/8	0.005	250-6202005	250-6202005B
.020	0.06	1-1/2	1/8	0.005	250-5202005	250-5202005B
.025	0.038	1-1/2	1/8	0.005	250-6202505	250-6202505B
.025	0.075	1-1/2	1/8	0.005	250-5202505	250-5202505B
.030	0.045	1-1/2	1/8	0.005	250-6203005	250-6203005B
.030	0.045	1-1/2	1/8	0.01	250-6203010	250-6203010B
.030	0.09	1-1/2	1/8	0.005	250-5203005	250-5203005B
.030	0.09	1-1/2	1/8	0.01	250-5203010	250-5203010B
.031	0.047	1-1/2	1/8	0.005	250-6203105	250-6203105B
.031	0.047	1-1/2	1/8	0.01	250-6203110	250-6203110B
.031	0.093	1-1/2	1/8	0.005	250-5203105	250-5203105B
.031	0.093	1-1/2	1/8	0.01	250-5203110	250-5203110B
.035	0.053	1-1/2	1/8	0.005	250-6203505	250-6203505B
.035	0.053	1-1/2	1/8	0.01	250-6203510	250-6203510B
.035	0.105	1-1/2	1/8	0.005	250-5203505	250-5203505B
.035	0.105	1-1/2	1/8	0.01	250-5203510	250-5203510B
.040	0.06	1-1/2	1/8	0.005	250-6204005	250-6204005B
.040	0.06	1-1/2	1/8	0.01	250-6204010	250-6204010B
.040	0.12	1-1/2	1/8	0.005	250-5204005	250-5204005B
.040	0.12	1-1/2	1/8	0.01	250-5204010	250-5204010B
.045	0.068	1-1/2	1/8	0.005	250-6204505	250-6204505B
.045	0.068	1-1/2	1/8	0.01	250-6204510	250-6204510B
.045	0.068	1-1/2	1/8	0.015	250-6204515	250-6204515B
.045	0.135	1-1/2	1/8	0.005	250-5204505	250-5204505B
.045	0.135	1-1/2	1/8	0.01	250-5204510	250-5204510B
.045	0.135	1-1/2	1/8	0.015	250-5204515	250-5204515B
.047	0.071	1-1/2	1/8	0.005	250-6204705	250-6204705B
.047	0.071	1-1/2	1/8	0.01	250-6204710	250-6204710B
.047	0.071	1-1/2	1/8	0.015	250-6204715	250-6204715B
.047	0.141	1-1/2	1/8	0.005	250-5204705	250-5204705B
.047	0.141	1-1/2	1/8	0.01	250-5204710	250-5204710B
.047	0.141	1-1/2	1/8	0.015	250-5204715	250-5204715B
.050	0.075	1-1/2	1/8	0.005	250-6205005	250-6205005B
.050	0.075	1-1/2	1/8	0.01	250-6205010	250-6205010B
.050	0.075	1-1/2	1/8	0.015	250-6205015	250-6205015B
.050	0.15	1-1/2	1/8	0.005	250-5205005	250-5205005B
.050	0.15	1-1/2	1/8	0.01	250-5205010	250-5205010B
.050	0.15	1-1/2	1/8	0.015	250-5205015	250-5205015B
.055	0.083	1-1/2	1/8	0.005	250-6205505	250-6205505B
.055	0.083	1-1/2	1/8	0.01	250-6205510	250-6205510B
.055	0.083	1-1/2	1/8	0.015	250-6205515	250-6205515B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



Series 251		2FL   Corner Radius   Micro				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	AlTiN
.055	0.165	1-1/2	1/8	0.005	250-5205505	250-5205505B
.055	0.165	1-1/2	1/8	0.01	250-5205510	250-5205510B
.055	0.165	1-1/2	1/8	0.015	250-5205515	250-5205515B
.060	0.09	1-1/2	1/8	0.005	250-6206005	250-6206005B
.060	0.09	1-1/2	1/8	0.01	250-6206010	250-6206010B
.060	0.09	1-1/2	1/8	0.015	250-6206015	250-6206015B
.060	0.18	1-1/2	1/8	0.005	250-5206005	250-5206005B
.060	0.18	1-1/2	1/8	0.01	250-5206010	250-5206010B
.060	0.18	1-1/2	1/8	0.015	250-5206015	250-5206015B
.062	0.093	1-1/2	1/8	0.005	250-6206205	250-6206205B
.062	0.093	1-1/2	1/8	0.01	250-6206210	250-6206210B
.062	0.093	1-1/2	1/8	0.015	250-6206215	250-6206215B
.062	0.186	1-1/2	1/8	0.005	250-5206205	250-5206205B
.062	0.186	1-1/2	1/8	0.01	250-5206210	250-5206210B
.062	0.186	1-1/2	1/8	0.015	250-5206215	250-5206215B
.065	0.098	1-1/2	1/8	0.005	250-6206505	250-6206505B
.065	0.098	1-1/2	1/8	0.01	250-6206510	250-6206510B
.065	0.098	1-1/2	1/8	0.015	250-6206515	250-6206515B
.065	0.195	1-1/2	1/8	0.005	250-5206505	250-5206505B
.065	0.195	1-1/2	1/8	0.01	250-5206510	250-5206510B
.065	0.195	1-1/2	1/8	0.015	250-5206515	250-5206515B
.070	0.105	1-1/2	1/8	0.005	250-6207005	250-6207005B
.070	0.105	1-1/2	1/8	0.01	250-6207010	250-6207010B
.070	0.105	1-1/2	1/8	0.015	250-6207015	250-6207015B
.070	0.21	1-1/2	1/8	0.005	250-5207005	250-5207005B
.070	0.21	1-1/2	1/8	0.01	250-5207010	250-5207010B
.070	0.21	1-1/2	1/8	0.015	250-5207015	250-5207015B
.075	0.113	1-1/2	1/8	0.005	250-6207505	250-6207505B
.075	0.113	1-1/2	1/8	0.01	250-6207510	250-6207510B
.075	0.113	1-1/2	1/8	0.015	250-6207515	250-6207515B
.075	0.225	1-1/2	1/8	0.005	250-5207505	250-5207505B
.075	0.225	1-1/2	1/8	0.01	250-5207510	250-5207510B
.075	0.225	1-1/2	1/8	0.015	250-5207515	250-5207515B
.078	0.117	1-1/2	1/8	0.005	250-6207805	250-6207805B
.078	0.117	1-1/2	1/8	0.01	250-6207810	250-6207810B
.078	0.117	1-1/2	1/8	0.015	250-6207815	250-6207815B
.078	0.234	1-1/2	1/8	0.005	250-5207805	250-5207805B
.078	0.234	1-1/2	1/8	0.01	250-5207810	250-5207810B
.078	0.234	1-1/2	1/8	0.015	250-5207815	250-5207815B
.080	0.12	1-1/2	1/8	0.005	250-6208005	250-6208005B
.080	0.12	1-1/2	1/8	0.01	250-6208010	250-6208010B
.080	0.12	1-1/2	1/8	0.015	250-6208015	250-6208015B
.080	0.24	1-1/2	1/8	0.005	250-5208005	250-5208005B
.080	0.24	1-1/2	1/8	0.01	250-5208010	250-5208010B
.080	0.24	1-1/2	1/8	0.015	250-5208015	250-5208015B
.085	0.128	1-1/2	1/8	0.005	250-6208505	250-6208505B
.085	0.128	1-1/2	1/8	0.01	250-6208510	250-6208510B
.085	0.128	1-1/2	1/8	0.015	250-6208515	250-6208515B
.085	0.255	1-1/2	1/8	0.005	250-5208505	250-5208505B
.085	0.255	1-1/2	1/8	0.01	250-5208510	250-5208510B
.085	0.255	1-1/2	1/8	0.015	250-5208515	250-5208515B
.090	0.135	1-1/2	1/8	0.005	250-6209005	250-6209005B
.090	0.135	1-1/2	1/8	0.01	250-6209010	250-6209010B
.090	0.135	1-1/2	1/8	0.015	250-6209015	250-6209015B
.090	0.27	1-1/2	1/8	0.005	250-5209005	250-5209005B
.090	0.27	1-1/2	1/8	0.01	250-5209010	250-5209010B
.090	0.27	1-1/2	1/8	0.015	250-5209015	250-5209015B
.093	0.14	1-1/2	1/8	0.005	250-6209305	250-6209305B
.093	0.14	1-1/2	1/8	0.01	250-6209310	250-6209310B
.093	0.14	1-1/2	1/8	0.015	250-6209315	250-6209315B
.093	0.279	1-1/2	1/8	0.005	250-5209305	250-5209305B
.093	0.279	1-1/2	1/8	0.01	250-5209310	250-5209310B
.093	0.279	1-1/2	1/8	0.015	250-5209315	250-5209315B
.095	0.143	1-1/2	1/8	0.005	250-6209505	250-6209505B
.095	0.143	1-1/2	1/8	0.01	250-6209510	250-6209510B
.095	0.143	1-1/2	1/8	0.015	250-6209515	250-6209515B
.095	0.285	1-1/2	1/8	0.005	250-5209505	250-5209505B
.095	0.285	1-1/2	1/8	0.01	250-5209510	250-5209510B
.095	0.285	1-1/2	1/8	0.015	250-5209515	250-5209515B
.100	0.15	1-1/2	1/8	0.005	250-6210005	250-6210005B
.100	0.15	1-1/2	1/8	0.01	250-6210010	250-6210010B
.100	0.15	1-1/2	1/8	0.015	250-6210015	250-6210015B
.100	0.3	1-1/2	1/8	0.005	250-5210005	250-5210005B
.100	0.3	1-1/2	1/8	0.01	250-5210010	250-5210010B
.100	0.3	1-1/2	1/8	0.015	250-5210015	250-5210015B
.105	0.158	1-1/2	1/8	0.01	250-6210510	250-6210510B

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



Series 251		2FL   Corner Radius   Micro				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	AlTiN
.105	0.158	1-1/2	1/8	0.015	250-6210515	250-6210515B
.105	0.158	1-1/2	1/8	0.02	250-6210520	250-6210520B
.105	0.315	1-1/2	1/8	0.01	250-5210510	250-5210510B
.105	0.315	1-1/2	1/8	0.015	250-5210515	250-5210515B
.105	0.315	1-1/2	1/8	0.02	250-5210520	250-5210520B
.110	0.165	1-1/2	1/8	0.01	250-6211010	250-6211010B
.110	0.165	1-1/2	1/8	0.015	250-6211015	250-6211015B
.110	0.165	1-1/2	1/8	0.02	250-6211020	250-6211020B
.110	0.33	1-1/2	1/8	0.01	250-5211010	250-5211010B
.110	0.33	1-1/2	1/8	0.015	250-5211015	250-5211015B
.110	0.33	1-1/2	1/8	0.02	250-5211020	250-5211020B
.115	0.173	1-1/2	1/8	0.01	250-6211510	250-6211510B
.115	0.173	1-1/2	1/8	0.015	250-6211515	250-6211515B
.115	0.173	1-1/2	1/8	0.02	250-6211520	250-6211520B
.115	0.345	1-1/2	1/8	0.01	250-5211510	250-5211510B
.115	0.345	1-1/2	1/8	0.015	250-5211515	250-5211515B
.115	0.345	1-1/2	1/8	0.02	250-5211520	250-5211520B
.120	0.18	1-1/2	1/8	0.01	250-6212010	250-6212010B
.120	0.18	1-1/2	1/8	0.015	250-6212015	250-6212015B
.120	0.18	1-1/2	1/8	0.02	250-6212020	250-6212020B
.120	0.36	1-1/2	1/8	0.01	250-5212010	250-5212010B
.120	0.36	1-1/2	1/8	0.015	250-5212015	250-5212015B
.120	0.36	1-1/2	1/8	0.02	250-5212020	250-5212020B

\*bold numbers are EDPs for ordering

## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**<sup>®</sup>

**CUSTOM  
COMES  
STANDARD**

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Micro 4-Flute Radius Mills</b> <ul style="list-style-type: none"> <li>• Micro mills</li> <li>• Universal application with 30° helix</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +/- 0.0005"</li> <li>• Shank Tol.: +/-0-0.0003"</li> <li>• LOC Tol.: +0.0120"/-0</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 255 4FL | Corner Radius | Micro

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	AlTiN
.010	0.015	1-1/2	1/8	0.002	250-6401002	250-6401002B
.010	0.03	1-1/2	1/8	0.002	250-5401002	250-5401002B
.015	0.023	1-1/2	1/8	0.002	250-6401502	250-6401502B
.015	0.045	1-1/2	1/8	0.002	250-5401502	250-5401502B
.020	0.03	1-1/2	1/8	0.005	250-6402005	250-6402005B
.020	0.06	1-1/2	1/8	0.005	250-5402005	250-5402005B
.025	0.038	1-1/2	1/8	0.005	250-6402505	250-6402505B
.025	0.075	1-1/2	1/8	0.005	250-5402505	250-5402505B
.030	0.045	1-1/2	1/8	0.005	250-6403005	250-6403005B
.030	0.045	1-1/2	1/8	0.01	250-6403010	250-6403010B
.030	0.09	1-1/2	1/8	0.005	250-5403005	250-5403005B
.030	0.09	1-1/2	1/8	0.01	250-5403010	250-5403010B
.031	0.047	1-1/2	1/8	0.005	250-6403105	250-6403105B
.031	0.047	1-1/2	1/8	0.01	250-6403110	250-6403110B
.031	0.093	1-1/2	1/8	0.005	250-5403105	250-5403105B
.031	0.093	1-1/2	1/8	0.01	250-5403110	250-5403110B
.035	0.053	1-1/2	1/8	0.005	250-6403505	250-6403505B
.035	0.053	1-1/2	1/8	0.01	250-6403510	250-6403510B
.035	0.105	1-1/2	1/8	0.005	250-5403505	250-5403505B
.035	0.105	1-1/2	1/8	0.01	250-5403510	250-5403510B
.040	0.06	1-1/2	1/8	0.005	250-6404005	250-6404005B
.040	0.06	1-1/2	1/8	0.01	250-6404010	250-6404010B
.040	0.12	1-1/2	1/8	0.005	250-5404005	250-5404005B
.040	0.12	1-1/2	1/8	0.01	250-5404010	250-5404010B
.045	0.068	1-1/2	1/8	0.005	250-6404505	250-6404505B
.045	0.068	1-1/2	1/8	0.01	250-6404510	250-6404510B
.045	0.068	1-1/2	1/8	0.015	250-6404515	250-6404515B
.045	0.135	1-1/2	1/8	0.005	250-5404505	250-5404505B
.045	0.135	1-1/2	1/8	0.01	250-5404510	250-5404510B
.045	0.135	1-1/2	1/8	0.015	250-5404515	250-5404515B
.047	0.071	1-1/2	1/8	0.005	250-6404705	250-6404705B
.047	0.071	1-1/2	1/8	0.01	250-6404710	250-6404710B
.047	0.071	1-1/2	1/8	0.015	250-6404715	250-6404715B
.047	0.141	1-1/2	1/8	0.005	250-5404705	250-5404705B
.047	0.141	1-1/2	1/8	0.01	250-5404710	250-5404710B
.047	0.141	1-1/2	1/8	0.015	250-5404715	250-5404715B
.050	0.075	1-1/2	1/8	0.005	250-6405005	250-6405005B
.050	0.075	1-1/2	1/8	0.01	250-6405010	250-6405010B
.050	0.075	1-1/2	1/8	0.015	250-6405015	250-6405015B
.050	0.15	1-1/2	1/8	0.005	250-5405005	250-5405005B
.050	0.15	1-1/2	1/8	0.01	250-5405010	250-5405010B
.050	0.15	1-1/2	1/8	0.015	250-5405015	250-5405015B
.055	0.083	1-1/2	1/8	0.005	250-6405505	250-6405505B
.055	0.083	1-1/2	1/8	0.01	250-6405510	250-6405510B
.055	0.083	1-1/2	1/8	0.015	250-6405515	250-6405515B

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



Series 255		4FL   Corner Radius   Micro				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	AlTiN
.055	0.165	1-1/2	1/8	0.005	250-5405505	250-5405505B
.055	0.165	1-1/2	1/8	0.01	250-5405510	250-5405510B
.055	0.165	1-1/2	1/8	0.015	250-5405515	250-5405515B
.060	0.09	1-1/2	1/8	0.005	250-6406005	250-6406005B
.060	0.09	1-1/2	1/8	0.01	250-6406010	250-6406010B
.060	0.09	1-1/2	1/8	0.015	250-6406015	250-6406015B
.060	0.18	1-1/2	1/8	0.005	250-5406005	250-5406005B
.060	0.18	1-1/2	1/8	0.01	250-5406010	250-5406010B
.060	0.18	1-1/2	1/8	0.015	250-5406015	250-5406015B
.062	0.093	1-1/2	1/8	0.005	250-6406205	250-6406205B
.062	0.093	1-1/2	1/8	0.01	250-6406210	250-6406210B
.062	0.093	1-1/2	1/8	0.015	250-6406215	250-6406215B
.062	0.186	1-1/2	1/8	0.005	250-5406205	250-5406205B
.062	0.186	1-1/2	1/8	0.01	250-5406210	250-5406210B
.062	0.186	1-1/2	1/8	0.015	250-5406215	250-5406215B
.065	0.098	1-1/2	1/8	0.005	250-6406505	250-6406505B
.065	0.098	1-1/2	1/8	0.01	250-6406510	250-6406510B
.065	0.098	1-1/2	1/8	0.015	250-6406515	250-6406515B
.065	0.195	1-1/2	1/8	0.005	250-5406505	250-5406505B
.065	0.195	1-1/2	1/8	0.01	250-5406510	250-5406510B
.065	0.195	1-1/2	1/8	0.015	250-5406515	250-5406515B
.070	0.105	1-1/2	1/8	0.005	250-6407005	250-6407005B
.070	0.105	1-1/2	1/8	0.01	250-6407010	250-6407010B
.070	0.105	1-1/2	1/8	0.015	250-6407015	250-6407015B
.070	0.21	1-1/2	1/8	0.005	250-5407005	250-5407005B
.070	0.21	1-1/2	1/8	0.01	250-5407010	250-5407010B
.070	0.21	1-1/2	1/8	0.015	250-5407015	250-5407015B
.075	0.113	1-1/2	1/8	0.005	250-6407505	250-6407505B
.075	0.113	1-1/2	1/8	0.01	250-6407510	250-6407510B
.075	0.113	1-1/2	1/8	0.015	250-6407515	250-6407515B
.075	0.225	1-1/2	1/8	0.005	250-5407505	250-5407505B
.075	0.225	1-1/2	1/8	0.01	250-5407510	250-5407510B
.075	0.225	1-1/2	1/8	0.015	250-5407515	250-5407515B
.078	0.117	1-1/2	1/8	0.005	250-6407805	250-6407805B
.078	0.117	1-1/2	1/8	0.01	250-6407810	250-6407810B
.078	0.117	1-1/2	1/8	0.015	250-6407815	250-6407815B
.078	0.234	1-1/2	1/8	0.005	250-5407805	250-5407805B
.078	0.234	1-1/2	1/8	0.01	250-5407810	250-5407810B
.078	0.234	1-1/2	1/8	0.015	250-5407815	250-5407815B
.080	0.12	1-1/2	1/8	0.005	250-6408005	250-6408005B
.080	0.12	1-1/2	1/8	0.01	250-6408010	250-6408010B
.080	0.12	1-1/2	1/8	0.015	250-6408015	250-6408015B
.080	0.24	1-1/2	1/8	0.005	250-5408005	250-5408005B
.080	0.24	1-1/2	1/8	0.01	250-5408010	250-5408010B
.080	0.24	1-1/2	1/8	0.015	250-5408015	250-5408015B
.085	0.128	1-1/2	1/8	0.005	250-6408505	250-6408505B
.085	0.128	1-1/2	1/8	0.01	250-6408510	250-6408510B
.085	0.128	1-1/2	1/8	0.015	250-6408515	250-6408515B
.085	0.255	1-1/2	1/8	0.005	250-5408505	250-5408505B
.085	0.255	1-1/2	1/8	0.01	250-5408510	250-5408510B
.085	0.255	1-1/2	1/8	0.015	250-5408515	250-5408515B
.090	0.135	1-1/2	1/8	0.005	250-6409005	250-6409005B
.090	0.135	1-1/2	1/8	0.01	250-6409010	250-6409010B
.090	0.135	1-1/2	1/8	0.015	250-6409015	250-6409015B
.090	0.27	1-1/2	1/8	0.005	250-5409005	250-5409005B
.090	0.27	1-1/2	1/8	0.01	250-5409010	250-5409010B
.090	0.27	1-1/2	1/8	0.015	250-5409015	250-5409015B
.093	0.14	1-1/2	1/8	0.005	250-6409305	250-6409305B
.093	0.14	1-1/2	1/8	0.01	250-6409310	250-6409310B
.093	0.14	1-1/2	1/8	0.015	250-6409315	250-6409315B
.093	0.279	1-1/2	1/8	0.005	250-5409305	250-5409305B
.093	0.279	1-1/2	1/8	0.01	250-5409310	250-5409310B
.093	0.279	1-1/2	1/8	0.015	250-5409315	250-5409315B
.095	0.143	1-1/2	1/8	0.005	250-6409505	250-6409505B
.095	0.143	1-1/2	1/8	0.01	250-6409510	250-6409510B
.095	0.143	1-1/2	1/8	0.015	250-6409515	250-6409515B
.095	0.285	1-1/2	1/8	0.005	250-5409505	250-5409505B
.095	0.285	1-1/2	1/8	0.01	250-5409510	250-5409510B
.095	0.285	1-1/2	1/8	0.015	250-5409515	250-5409515B
.100	0.15	1-1/2	1/8	0.005	250-6410005	250-6410005B
.100	0.15	1-1/2	1/8	0.01	250-6410010	250-6410010B
.100	0.15	1-1/2	1/8	0.015	250-6410015	250-6410015B
.100	0.3	1-1/2	1/8	0.005	250-5410005	250-5410005B
.100	0.3	1-1/2	1/8	0.01	250-5410010	250-5410010B
.100	0.3	1-1/2	1/8	0.015	250-5410015	250-5410015B
.105	0.158	1-1/2	1/8	0.01	250-6410510	250-6410510B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



Series 255		4FL   Corner Radius   Micro				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	AITiN
.105	0.158	1-1/2	1/8	0.015	<b>250-6410515</b>	<b>250-6410515B</b>
.105	0.158	1-1/2	1/8	0.02	<b>250-6410520</b>	<b>250-6410520B</b>
.105	0.315	1-1/2	1/8	0.01	<b>250-5410510</b>	<b>250-5410510B</b>
.105	0.315	1-1/2	1/8	0.015	<b>250-5410515</b>	<b>250-5410515B</b>
.105	0.315	1-1/2	1/8	0.02	<b>250-5410520</b>	<b>250-5410520B</b>
.110	0.165	1-1/2	1/8	0.01	<b>250-6411010</b>	<b>250-6411010B</b>
.110	0.165	1-1/2	1/8	0.015	<b>250-6411015</b>	<b>250-6411015B</b>
.110	0.165	1-1/2	1/8	0.02	<b>250-6411020</b>	<b>250-6411020B</b>
.110	0.33	1-1/2	1/8	0.01	<b>250-5411010</b>	<b>250-5411010B</b>
.110	0.33	1-1/2	1/8	0.015	<b>250-5411015</b>	<b>250-5411015B</b>
.110	0.33	1-1/2	1/8	0.02	<b>250-5411020</b>	<b>250-5411020B</b>
.115	0.173	1-1/2	1/8	0.01	<b>250-6411510</b>	<b>250-6411510B</b>
.115	0.173	1-1/2	1/8	0.015	<b>250-6411515</b>	<b>250-6411515B</b>
.115	0.173	1-1/2	1/8	0.02	<b>250-6411520</b>	<b>250-6411520B</b>
.115	0.345	1-1/2	1/8	0.01	<b>250-5411510</b>	<b>250-5411510B</b>
.115	0.345	1-1/2	1/8	0.015	<b>250-5411515</b>	<b>250-5411515B</b>
.115	0.345	1-1/2	1/8	0.02	<b>250-5411520</b>	<b>250-5411520B</b>
.120	0.18	1-1/2	1/8	0.01	<b>250-6412010</b>	<b>250-6412010B</b>
.120	0.18	1-1/2	1/8	0.015	<b>250-6412015</b>	<b>250-6412015B</b>
.120	0.18	1-1/2	1/8	0.02	<b>250-6412020</b>	<b>250-6412020B</b>
.120	0.36	1-1/2	1/8	0.01	<b>250-5412010</b>	<b>250-5412010B</b>
.120	0.36	1-1/2	1/8	0.015	<b>250-5412015</b>	<b>250-5412015B</b>
.120	0.36	1-1/2	1/8	0.02	<b>250-5412020</b>	<b>250-5412020B</b>

\*bold numbers are EDPs for ordering

## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**<sup>®</sup>

**CUSTOM  
COMES  
STANDARD**



# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<b>Micro 2-Flute Square Mills</b> <ul style="list-style-type: none"> <li>• Universal application</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +/- 0.0005"</li> <li>• Shank Tol.: +0/-0.0003"</li> <li>• LOC Tol.: +0/-0.0120"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>2FL</td> </tr> <tr> <td>30°</td> <td>SQ</td> </tr> <tr> <td>Bright</td> <td>AlTiN</td> </tr> <tr> <td>P 170</td> <td></td> </tr> </table>	CARBIDE	2FL	30°	SQ	Bright	AlTiN	P 170	
CARBIDE	2FL									
30°	SQ									
Bright	AlTiN									
P 170										

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 250 2FL | Square | Micro

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AlTiN
1/64	1/8	2-1/2	1/8	<b>251-001000</b>	<b>251-001000B</b>
1/32	1/4	2-1/2	1/8	<b>251-001001</b>	<b>251-001001B</b>
1/32	3/8	2-1/2	1/8	<b>251-001002</b>	<b>251-001002B</b>
3/64	1/4	2-1/2	1/8	<b>251-001010</b>	<b>251-001010B</b>
3/64	3/8	2-1/2	1/8	<b>251-001011</b>	<b>251-001011B</b>
3/64	1/2	2-1/2	1/8	<b>251-001013</b>	<b>251-001013B</b>
1/16	1/2	2-1/2	1/8	<b>251-001020</b>	<b>251-001020B</b>
1/16	3/4	2-1/2	1/8	<b>251-001021</b>	<b>251-001021B</b>
1/16	1	2-1/2	1/8	<b>251-001022</b>	<b>251-001022B</b>
5/64	1/2	2-1/2	1/8	<b>251-001030</b>	<b>251-001030B</b>
3/32	1/2	2-1/2	1/8	<b>251-001040</b>	<b>251-001040B</b>
3/32	3/4	2-1/2	1/8	<b>251-001041</b>	<b>251-001041B</b>

\*bold numbers are EDPs for ordering

### Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**

**CUSTOM  
COMES  
STANDARD**

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<b>Micro 4-Flute Square Mills</b> <ul style="list-style-type: none"> <li>• Micro mills</li> <li>• Universal application with 30° helix</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Multiple coating options</li> <li>• Diameter Tol.: +/- 0.0005"</li> <li>• Shank Tol.: +0/-0.0003"</li> <li>• LOC Tol.: +0.120"/-0</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>4FL</td> </tr> <tr> <td>30°</td> <td>SQ</td> </tr> <tr> <td>Bright</td> <td>AlTiN</td> </tr> <tr> <td>P 170</td> <td></td> </tr> </table>	CARBIDE	4FL	30°	SQ	Bright	AlTiN	P 170	
CARBIDE	4FL									
30°	SQ									
Bright	AlTiN									
P 170										

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 254 4FL | Square | Micro

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AlTiN
.005	0.008	1-1/2	1/8	250-305100	-
.005	0.015	1-1/2	1/8	250-100410	-
.006	0.009	1-1/2	1/8	250-305110	-
.007	0.011	1-1/2	1/8	250-305120	-
.007	0.021	1-1/2	1/8	250-205120	-
.008	0.012	1-1/2	1/8	250-305130	-
.008	0.024	1-1/2	1/8	250-205130	-
.009	0.014	1-1/2	1/8	250-305140	-
.009	0.027	1-1/2	1/8	250-205140	-
.010	0.015	1-1/2	1/8	250-305150	250-305150B
.010	0.03	1-1/2	1/8	250-100430	250-100430B
.011	0.017	1-1/2	1/8	250-305160	250-305160B
.011	0.033	1-1/2	1/8	250-205160	250-205160B
.012	0.018	1-1/2	1/8	250-305170	250-305170B
.012	0.036	1-1/2	1/8	250-205170	250-205170B
.013	0.02	1-1/2	1/8	250-305180	250-305180B
.013	0.039	1-1/2	1/8	250-205180	250-205180B
.014	0.021	1-1/2	1/8	250-305190	250-305190B
.014	0.042	1-1/2	1/8	250-205190	250-205190B
.015	0.023	1-1/2	1/8	250-305200	250-305200B
.015	0.045	1-1/2	1/8	250-100450	250-100450B
1/64	1/8	1-1/2	1/8	251-002000	-
.016	0.024	1-1/2	1/8	250-305210	250-305210B
.016	0.048	1-1/2	1/8	250-205210	250-205210B
.017	0.026	1-1/2	1/8	250-305220	250-305220B
.017	0.051	1-1/2	1/8	250-205220	250-205220B
.018	0.027	1-1/2	1/8	250-305230	250-305230B
.018	0.054	1-1/2	1/8	250-205230	250-205230B
.019	0.029	1-1/2	1/8	250-305240	250-305240B
.019	0.057	1-1/2	1/8	250-205240	250-205240B
.020	0.03	1-1/2	1/8	250-305250	250-305250B
.020	0.06	1-1/2	1/8	250-100470	250-100470B
.021	0.032	1-1/2	1/8	250-305260	250-305260B
.021	0.063	1-1/2	1/8	250-205260	250-205260B
.022	0.033	1-1/2	1/8	250-305270	250-305270B
.022	0.066	1-1/2	1/8	250-205270	250-205270B
.023	0.035	1-1/2	1/8	250-305280	250-305280B
.023	0.069	1-1/2	1/8	250-205280	250-205280B
.024	0.036	1-1/2	1/8	250-305290	250-305290B
.024	0.072	1-1/2	1/8	250-205290	250-205290B
.025	0.038	1-1/2	1/8	250-305300	250-305300B
.025	0.075	1-1/2	1/8	250-100490	250-100490B
.026	0.039	1-1/2	1/8	250-305310	250-305310B
.026	0.078	1-1/2	1/8	250-205310	250-205310B
.027	0.041	1-1/2	1/8	250-305320	250-305320B

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



Series 254		4FL   Square   Micro			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AlTiN
.027	0.081	1-1/2	1/8	250-205320	250-205320B
.028	0.042	1-1/2	1/8	250-305330	250-305330B
.028	0.084	1-1/2	1/8	250-205330	250-205330B
.029	0.044	1-1/2	1/8	250-305340	250-305340B
.029	0.087	1-1/2	1/8	250-205340	250-205340B
.030	0.045	1-1/2	1/8	250-305350	250-305350B
.030	0.09	1-1/2	1/8	250-100510	250-100510B
.031	0.047	1-1/2	1/8	250-305360	250-305360B
.031	0.093	1-1/2	1/8	250-205360	250-205360B
1/32	1/4	2-1/2	1/8	251-002001	-
1/32	3/8	2-1/2	1/8	251-002002	-
.032	0.048	1-1/2	1/8	250-305370	250-305370B
.032	0.096	1-1/2	1/8	250-205370	250-205370B
.033	0.05	1-1/2	1/8	250-305380	250-305380B
.033	0.099	1-1/2	1/8	250-205380	250-205380B
.034	0.051	1-1/2	1/8	250-305390	250-305390B
.034	0.102	1-1/2	1/8	250-205390	250-205390B
.035	0.053	1-1/2	1/8	250-305400	250-305400B
.035	0.105	1-1/2	1/8	250-100530	250-100530B
.036	0.054	1-1/2	1/8	250-305410	250-305410B
.036	0.108	1-1/2	1/8	250-205410	250-205410B
.037	0.056	1-1/2	1/8	250-305420	250-305420B
.037	0.111	1-1/2	1/8	250-205420	250-205420B
.038	0.057	1-1/2	1/8	250-305430	250-305430B
.038	0.114	1-1/2	1/8	250-205430	250-205430B
.039	0.059	1-1/2	1/8	250-305440	250-305440B
.039	0.117	1-1/2	1/8	250-205440	250-205440B
.040	0.06	1-1/2	1/8	250-305450	250-305450B
.040	0.12	1-1/2	1/8	250-100550	250-100550B
.041	0.062	1-1/2	1/8	250-305460	250-305460B
.041	0.123	1-1/2	1/8	250-205460	250-205460B
.042	0.063	1-1/2	1/8	250-305470	250-305470B
.042	0.126	1-1/2	1/8	250-205470	250-205470B
.043	0.065	1-1/2	1/8	250-305480	250-305480B
.043	0.129	1-1/2	1/8	250-205480	250-205480B
.044	0.066	1-1/2	1/8	250-305490	250-305490B
.044	0.132	1-1/2	1/8	250-205490	250-205490B
.045	0.068	1-1/2	1/8	250-305500	250-305500B
.045	0.135	1-1/2	1/8	250-100570	250-100570B
.046	0.069	1-1/2	1/8	250-305510	250-305510B
.046	0.138	1-1/2	1/8	250-205510	250-205510B
3/64	1/4	2-1/2	1/8	251-002010	-
3/64	3/8	2-1/2	1/8	251-002011	-
3/64	1/2	2-1/2	1/8	251-002013	-
.047	0.071	1-1/2	1/8	250-305520	250-305520B
.047	0.141	1-1/2	1/8	250-205520	250-205520B
.048	0.072	1-1/2	1/8	250-305530	250-305530B
.048	0.144	1-1/2	1/8	250-205530	250-205530B
.049	0.074	1-1/2	1/8	250-305540	250-305540B
.049	0.147	1-1/2	1/8	250-205540	250-205540B
.050	0.075	1-1/2	1/8	250-305550	250-305550B
.050	0.15	1-1/2	1/8	250-100590	250-100590B
.051	0.077	1-1/2	1/8	250-305560	250-305560B
.051	0.153	1-1/2	1/8	250-205560	250-205560B
.052	0.078	1-1/2	1/8	250-305570	250-305570B
.052	0.156	1-1/2	1/8	250-205570	250-205570B
.053	0.08	1-1/2	1/8	250-305580	250-305580B
.053	0.159	1-1/2	1/8	250-205580	250-205580B
.054	0.081	1-1/2	1/8	250-305590	250-305590B
.054	0.162	1-1/2	1/8	250-205590	250-205590B
.055	0.083	1-1/2	1/8	250-305600	250-305600B
.055	0.165	1-1/2	1/8	250-100610	250-100610B
.056	0.084	1-1/2	1/8	250-305610	250-305610B
.056	0.168	1-1/2	1/8	250-205610	250-205610B
.057	0.086	1-1/2	1/8	250-305620	250-305620B
.057	0.171	1-1/2	1/8	250-205620	250-205620B
.058	0.087	1-1/2	1/8	250-305630	250-305630B
.058	0.174	1-1/2	1/8	250-205630	250-205630B
.059	0.089	1-1/2	1/8	250-305640	250-305640B
.059	0.177	1-1/2	1/8	250-205640	250-205640B
.060	0.09	1-1/2	1/8	250-305650	250-305650B
.060	0.18	1-1/2	1/8	250-100630	250-100630B
.061	0.092	1-1/2	1/8	250-305660	250-305660B
.061	0.183	1-1/2	1/8	250-205660	250-205660B
.062	0.093	1-1/2	1/8	250-305670	250-305670B
.062	0.186	1-1/2	1/8	250-205670	250-205670B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Micro End Mills For Ferrous And Non-Ferrous Materials



Series 254		4FL   Square   Micro			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AlTiN
1/16	1/2	2-1/2	1/8	251-002020	-
1/16	3/4	2-1/2	1/8	251-002021	-
1/16	1	2-1/2	1/8	251-002022	-
.063	0.095	1-1/2	1/8	250-305680	250-305680B
.063	0.189	1-1/2	1/8	250-205680	250-205680B
.064	0.096	1-1/2	1/8	250-305690	250-305690B
.064	0.192	1-1/2	1/8	250-205690	250-205690B
.065	0.098	1-1/2	1/8	250-305700	250-305700B
.065	0.195	1-1/2	1/8	250-100650	250-100650B
.070	0.105	1-1/2	1/8	250-305750	250-305750B
.070	0.21	1-1/2	1/8	250-100670	250-100670B
.075	0.113	1-1/2	1/8	250-305800	250-305800B
.075	0.225	1-1/2	1/8	250-100690	250-100690B
5/64	1/2	2-1/2	1/8	251-002030	-
.080	0.12	1-1/2	1/8	250-305850	250-305850B
.080	0.24	1-1/2	1/8	250-100710	250-100710B
.085	0.128	1-1/2	1/8	250-305900	250-305900B
.085	0.255	1-1/2	1/8	250-100730	250-100730B
.090	0.135	1-1/2	1/8	250-305950	250-305950B
.090	0.27	1-1/2	1/8	250-100750	250-100750B
3/32	1/2	2-1/2	1/8	251-002040	-
3/32	3/4	2-1/2	1/8	251-002041	-
.095	0.143	1-1/2	1/8	250-306000	250-306000B
.095	0.285	1-1/2	1/8	250-100770	250-100770B
.100	0.15	1-1/2	1/8	250-306050	250-306050B
.100	0.3	1-1/2	1/8	250-100790	250-100790B
.105	0.158	1-1/2	1/8	250-306100	250-306100B
.105	0.315	1-1/2	1/8	250-100801	250-100801B
.110	0.165	1-1/2	1/8	250-306150	250-306150B
.110	0.33	1-1/2	1/8	250-100803	250-100803B
.115	0.173	1-1/2	1/8	250-306200	250-306200B
.115	0.345	1-1/2	1/8	250-100805	250-100805B
.120	0.18	1-1/2	1/8	250-306250	250-306250B
.120	0.36	1-1/2	1/8	250-100807	250-100807B

\*bold numbers are EDPs for ordering

## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**®

**CUSTOM  
COMES  
STANDARD**

# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>ALPHA</h2> <p><b>Variable Helix, Unequal Index End Mills</b></p> <ul style="list-style-type: none"> <li>Sub-micron grade carbide substrate for wear resistance</li> <li>Raised land construction for rigidity</li> <li>Eccentric relief reduces cutting friction</li> <li>Variable helix, unequal index design for vibration mitigation</li> </ul>		<div style="display: grid; grid-template-columns: repeat(2, 1fr); gap: 5px;"> <div>CARBIDE</div> <div>VAR</div> <div>4FL</div> <div>RAD</div> <div>h6</div> <div>FX2</div> <div>P 158</div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

### Series 2004 Alpha4 | 4FL | Multi Length | Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/8	1/4	1-1/2	1/8	0.015	294-001011
1/8	1/4	1-1/2	1/8	0.02	294-001012
1/8	1/4	1-1/2	1/8	0.03	294-001013
1/8	1/2	1-1/2	1/8	0.015	294-002011
1/8	1/2	1-1/2	1/8	0.02	294-002012
1/8	1/2	1-1/2	1/8	0.03	294-002013
3/16	3/8	2	3/16	0.015	294-001021
3/16	3/8	2	3/16	0.02	294-001022
3/16	3/8	2	3/16	0.03	294-001023
3/16	5/8	2	3/16	0.015	294-002021
3/16	5/8	2	3/16	0.02	294-002022
3/16	5/8	2	3/16	0.03	294-002023
1/4	1/2	2	1/4	0.015	294-001029
1/4	1/2	2	1/4	0.02	294-001031
1/4	1/2	2	1/4	0.03	294-001032
1/4	1/2	2	1/4	0.06	294-001033
1/4	3/4	2-1/2	1/4	0.015	294-002029
1/4	3/4	2-1/2	1/4	0.02	294-002031
1/4	3/4	2-1/2	1/4	0.03	294-002032
1/4	3/4	2-1/2	1/4	0.06	294-002033
1/4	1-1/8	4	1/4	0.02	294-003031
5/16	5/8	2	5/16	0.015	294-001039
5/16	5/8	2	5/16	0.03	294-001041
5/16	5/8	2	5/16	0.06	294-001042
5/16	3/4	2-1/2	5/16	0.015	294-002039
5/16	3/4	2-1/2	5/16	0.03	294-002041
5/16	3/4	2-1/2	5/16	0.06	294-002042
3/8	5/8	2	3/8	0.015	294-001049
3/8	5/8	2	3/8	0.03	294-001051
3/8	5/8	2	3/8	0.06	294-001052
3/8	1	2-1/2	3/8	0.015	294-002049
3/8	1	2-1/2	3/8	0.03	294-002051
3/8	1	2-1/2	3/8	0.06	294-002052
3/8	1-1/2	4	3/8	0.03	294-003051
7/16	1	2-3/4	7/16	0.03	294-002056
1/2	5/8	2-1/2	1/2	0.015	294-001059
1/2	5/8	2-1/2	1/2	0.03	294-001061
1/2	5/8	2-1/2	1/2	0.06	294-001062
1/2	5/8	2-1/2	1/2	0.09	294-001063
1/2	5/8	2-1/2	1/2	0.12	294-001064
1/2	1-1/4	3	1/2	0.015	294-002059
1/2	1-1/4	3	1/2	0.03	294-002061
1/2	1-1/4	3	1/2	0.045	294-002062
1/2	1-1/4	3	1/2	0.06	294-002063
1/2	1-1/4	3	1/2	0.09	294-002064

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



Series 2004		Alpha4   4FL   Multi Length   Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/2	1-1/4	3	1/2	0.12	<b>294-002065</b>
1/2	2	4	1/2	0.03	<b>294-003061</b>
5/8	3/4	3	5/8	0.03	<b>294-001069</b>
5/8	3/4	3	5/8	0.045	<b>294-001071</b>
5/8	3/4	3	5/8	0.06	<b>294-001072</b>
5/8	3/4	3	5/8	0.09	<b>294-001073</b>
5/8	3/4	3	5/8	0.12	<b>294-001074</b>
5/8	1-1/4	3-1/2	5/8	0.03	<b>294-002069</b>
5/8	1-1/4	3-1/2	5/8	0.045	<b>294-002071</b>
5/8	1-1/4	3-1/2	5/8	0.06	<b>294-002072</b>
5/8	1-1/4	3-1/2	5/8	0.09	<b>294-002073</b>
5/8	1-1/4	3-1/2	5/8	0.12	<b>294-002074</b>
5/8	2-1/4	5	5/8	0.045	<b>294-003071</b>
3/4	1	3	3/4	0.03	<b>294-001079</b>
3/4	1	3	3/4	0.045	<b>294-001081</b>
3/4	1	3	3/4	0.06	<b>294-001082</b>
3/4	1	3	3/4	0.09	<b>294-001083</b>
3/4	1	3	3/4	0.12	<b>294-001084</b>
3/4	1-1/2	4	3/4	0.03	<b>294-002079</b>
3/4	1-1/2	4	3/4	0.045	<b>294-002081</b>
3/4	1-1/2	4	3/4	0.06	<b>294-002082</b>
3/4	1-1/2	4	3/4	0.09	<b>294-002083</b>
3/4	1-1/2	4	3/4	0.12	<b>294-002084</b>
3/4	2-1/4	5	3/4	0.045	<b>294-003081</b>
3/4	3-1/4	6	3/4	0.05	<b>294-003083</b>
1	1-1/2	4	1	0.03	<b>294-002089</b>
1	1-1/2	4	1	0.06	<b>294-002091</b>
1	1-1/2	4	1	0.09	<b>294-002092</b>
1	1-1/2	4	1	0.12	<b>294-002093</b>
1	2-1/4	5	1	0.06	<b>294-003091</b>
1	3	6	1	0.06	<b>294-003093</b>
1	4	7	1	0.06	<b>294-003095</b>

\*bold numbers are EDPs for ordering

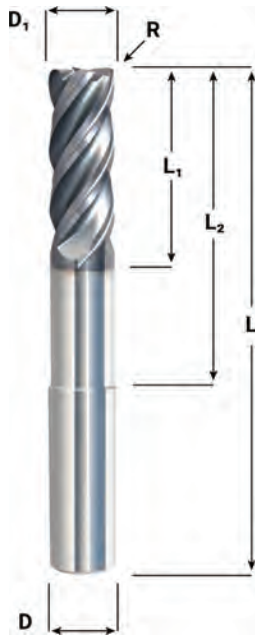
## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**®

**CUSTOM  
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STANDARD**

# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



## ALPHA

### Variable Helix, Unequal Index End Mills

- Sub-micron grade carbide substrate for wear resistance
- Raised land construction for rigidity
- Eccentric relief reduces cutting friction
- Variable helix, unequal index design for vibration mitigation
- Reduced neck

**APPLICATION**

**FEATURES**

CARBIDE

VAR

4FL

RAD

Necked

h6

FX2

P 158

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

## Series 2004R Alpha4 | 4FL | Multi Length | Radius | Reduced Neck

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/8	1/4	1-3/8	3	1/8	0.01	294-004001
1/8	1/4	1-3/8	3	1/8	0.015	294-004002
1/8	1/4	1-3/8	3	1/8	0.03	294-004003
3/16	5/16	1-3/8	3	3/16	0.015	294-004011
3/16	5/16	1-3/8	3	3/16	0.03	294-004012
1/4	3/8	2-1/8	4	1/4	0.015	294-004021
1/4	3/8	2-1/8	4	1/4	0.03	294-004022
1/4	3/8	2-1/8	4	1/4	0.06	294-004023
3/8	1/2	1-1/2	3	3/8	0.015	294-004033
3/8	1/2	1-1/2	3	3/8	0.03	294-004034
3/8	1/2	1-1/2	3	3/8	0.06	294-004035
3/8	1/2	1-1/2	3	3/8	0.09	294-004036
3/8	1/2	1-1/2	3	3/8	0.12	294-004037
3/8	1/2	2-1/8	4	3/8	0.015	294-004038
3/8	1/2	2-1/8	4	3/8	0.03	294-004039
3/8	1/2	2-1/8	4	3/8	0.06	294-004040
3/8	1/2	2-1/8	4	3/8	0.09	294-004041
3/8	1/2	2-1/8	4	3/8	0.12	294-004042
1/2	5/8	2-3/8	4	1/2	0.03	294-004051
1/2	5/8	2-3/8	4	1/2	0.06	294-004052
1/2	5/8	2-3/8	4	1/2	0.09	294-004053
1/2	5/8	2-3/8	4	1/2	0.12	294-004054
1/2	5/8	3-3/8	6	1/2	0.03	294-004055
1/2	5/8	3-3/8	6	1/2	0.06	294-004056
1/2	5/8	3-3/8	6	1/2	0.09	294-004057
1/2	5/8	3-3/8	6	1/2	0.12	294-004058
5/8	3/4	2-3/8	5	5/8	0.03	294-004071
5/8	3/4	2-3/8	5	5/8	0.06	294-004072
5/8	3/4	2-3/8	5	5/8	0.09	294-004073
5/8	3/4	2-3/8	5	5/8	0.12	294-004074
5/8	3/4	2-3/8	6	5/8	0.03	294-004075
5/8	3/4	2-3/8	6	5/8	0.06	294-004076
5/8	3/4	2-3/8	6	5/8	0.09	294-004077
5/8	3/4	2-3/8	6	5/8	0.12	294-004078
3/4	1	3-1/2	6	3/4	0.03	294-004091
3/4	1	3-1/2	6	3/4	0.06	294-004092
3/4	1	3-1/2	6	3/4	0.09	294-004093
3/4	1	3-1/2	6	3/4	0.12	294-004094
3/4	1	4-1/2	7	3/4	0.03	294-004095
3/4	1	4-1/2	7	3/4	0.06	294-004096
3/4	1	4-1/2	7	3/4	0.09	294-004097
3/4	1	4-1/2	7	3/4	0.12	294-004098
1	1-1/4	3-1/2	6	1	0.03	294-004111
1	1-1/4	3-1/2	6	1	0.06	294-004112
1	1-1/4	3-1/2	6	1	0.09	294-004113

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



Series 2004R		Alpha4   4FL   Multi Length   Radius   Reduced Neck				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1	1-1/4	3-1/2	6	1	0.12	<b>294-004114</b>
1	1-1/4	4-1/2	7	1	0.03	<b>294-004115</b>
1	1-1/4	4-1/2	7	1	0.06	<b>294-004116</b>
1	1-1/4	4-1/2	7	1	0.09	<b>294-004117</b>
1	1-1/4	4-1/2	7	1	0.12	<b>294-004118</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

## Popular Custom Milling Options

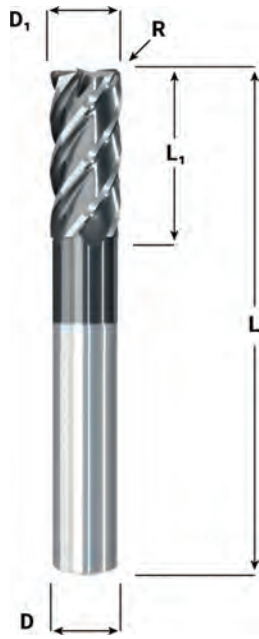
- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**<sup>®</sup>

**CUSTOM  
COMES  
STANDARD**



# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>ALPHA</h2> <h3>Unequal Index End Mill</h3> <ul style="list-style-type: none"> <li>Sub-micron grade carbide substrate for wear resistance</li> <li>Raised land construction for rigidity</li> <li>Eccentric relief reduces cutting friction</li> <li>Unequal index design for vibration mitigation</li> <li>NEW square end sizes now available online</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>40°</li> <li>5FL</li> <li>RAD</li> <li>h6</li> <li>FX2</li> <li>P 159</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

## Series 2005 Alpha5 | 5FL | Multi Length | Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/8	1/4	2-1/2	1/8	0.01	295-010125B
1/8	1/4	2-1/2	1/8	0.02	295-010126B
1/8	1/4	2-1/2	1/8	0.03	295-010127B
1/8	1/2	2-1/2	1/8	0.01	295-020125B
1/8	1/2	2-1/2	1/8	0.02	295-020126B
1/8	1/2	2-1/2	1/8	0.03	295-020127B
3/16	3/8	2-1/2	3/16	0.01	295-010187B
3/16	3/8	2-1/2	3/16	0.02	295-010188B
3/16	3/8	2-1/2	3/16	0.03	295-010189B
3/16	5/8	2-1/2	3/16	0.01	295-020187B
3/16	5/8	2-1/2	3/16	0.02	295-020188B
3/16	5/8	2-1/2	3/16	0.03	295-020189B
1/4	3/8	2-1/2	1/4	0.015	295-010249B
1/4	3/8	2-1/2	1/4	0.02	295-010250B
1/4	3/8	2-1/2	1/4	0.03	295-010251B
1/4	3/8	2-1/2	1/4	0.06	295-010252B
1/4	3/4	2-1/2	1/4	0.015	295-020249B
1/4	3/4	2-1/2	1/4	0.02	295-020250B
1/4	3/4	2-1/2	1/4	0.03	295-020251B
1/4	3/4	2-1/2	1/4	0.06	295-020252B
1/4	1-1/4	4	1/4	0.015	295-030249B
1/4	1-1/4	4	1/4	0.02	295-030250B
1/4	1-1/4	4	1/4	0.03	295-030251B
1/4	1-1/4	4	1/4	0.06	295-030252B
5/16	1/2	2-1/2	5/16	0.02	295-010312B
5/16	13/16	2-1/2	5/16	0.02	295-020312B
5/16	1-1/4	4	5/16	0.02	295-030312B
3/8	1/2	2-1/2	3/8	0.015	295-010374B
3/8	1/2	2-1/2	3/8	0.02	295-010375B
3/8	1/2	2-1/2	3/8	0.03	295-010376B
3/8	1/2	2-1/2	3/8	0.06	295-010377B
3/8	1	2-1/2	3/8	0.015	295-020374B
3/8	1	2-1/2	3/8	0.02	295-020375B
3/8	1	2-1/2	3/8	0.03	295-020376B
3/8	1	2-1/2	3/8	0.06	295-020377B
3/8	1-1/2	4	3/8	0.015	295-030374B
3/8	1-1/2	4	3/8	0.02	295-030375B
3/8	1-1/2	4	3/8	0.03	295-030376B
3/8	1-1/2	4	3/8	0.06	295-030377B
1/2	5/8	3	1/2	0.02	295-010500B
1/2	5/8	3	1/2	0.03	295-010501B
1/2	5/8	3	1/2	0.06	295-010502B
1/2	5/8	3	1/2	0.09	295-010503B
1/2	5/8	3	1/2	0.12	295-010504B
1/2	1-1/4	3	1/2	0.02	295-020500B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



Series 2005		Alpha5   5FL   Multi Length   Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/2	1-1/4	3	1/2	0.03	295-020501B
1/2	1-1/4	3	1/2	0.06	295-020502B
1/2	1-1/4	3	1/2	0.09	295-020503B
1/2	1-1/4	3	1/2	0.12	295-020504B
1/2	1-5/8	4	1/2	0.02	295-030490B
1/2	1-5/8	4	1/2	0.03	295-030491B
1/2	1-5/8	4	1/2	0.06	295-030492B
1/2	1-5/8	4	1/2	0.09	295-030493B
1/2	1-5/8	4	1/2	0.12	295-030494B
1/2	2	4	1/2	0.02	295-030500B
1/2	2	4	1/2	0.03	295-030501B
1/2	2	4	1/2	0.06	295-030502B
1/2	2	4	1/2	0.09	295-030503B
1/2	2	4	1/2	0.12	295-030504B
5/8	3/4	3-1/2	5/8	0.02	295-010625B
5/8	3/4	3-1/2	5/8	0.03	295-010626B
5/8	3/4	3-1/2	5/8	0.06	295-010627B
5/8	3/4	3-1/2	5/8	0.09	295-010628B
5/8	3/4	3-1/2	5/8	0.12	295-010629B
5/8	1-1/4	3-1/2	5/8	0.02	295-020625B
5/8	1-1/4	3-1/2	5/8	0.03	295-020626B
5/8	1-1/4	3-1/2	5/8	0.06	295-020627B
5/8	1-1/4	3-1/2	5/8	0.09	295-020628B
5/8	1-1/4	3-1/2	5/8	0.12	295-020629B
5/8	2-1/2	5	5/8	0.02	295-030625B
5/8	2-1/2	5	5/8	0.03	295-030626B
5/8	2-1/2	5	5/8	0.06	295-030627B
5/8	2-1/2	5	5/8	0.09	295-030628B
5/8	2-1/2	5	5/8	0.12	295-030629B
3/4	1	4	3/4	0.02	295-010750B
3/4	1	4	3/4	0.03	295-010751B
3/4	1	4	3/4	0.06	295-010752B
3/4	1	4	3/4	0.09	295-010753B
3/4	1	4	3/4	0.12	295-010754B
3/4	1	4	3/4	0.156	295-010755B
3/4	1	4	3/4	0.19	295-010756B
3/4	1-5/8	4	3/4	0.02	295-020750B
3/4	1-5/8	4	3/4	0.03	295-020751B
3/4	1-5/8	4	3/4	0.06	295-020752B
3/4	1-5/8	4	3/4	0.09	295-020753B
3/4	1-5/8	4	3/4	0.12	295-020754B
3/4	1-5/8	4	3/4	0.156	295-020755B
3/4	1-5/8	4	3/4	0.19	295-020756B
3/4	2-1/2	5	3/4	0.02	295-030750B
3/4	2-1/2	5	3/4	0.03	295-030751B
3/4	2-1/2	5	3/4	0.06	295-030752B
3/4	2-1/2	5	3/4	0.09	295-030753B
3/4	2-1/2	5	3/4	0.12	295-030754B
3/4	2-1/2	5	3/4	0.156	295-030755B
3/4	2-1/2	5	3/4	0.19	295-030756B
1	1-3/4	4	1	0.02	295-021000B
1	1-3/4	4	1	0.03	295-021001B
1	1-3/4	4	1	0.06	295-021002B
1	1-3/4	4	1	0.09	295-021003B
1	1-3/4	4	1	0.12	295-021004B
1	1-3/4	4	1	0.156	295-021005B
1	1-3/4	4	1	0.19	295-021006B
1	1-3/4	4	1	0.25	295-021007B
1	2-5/8	6	1	0.02	295-031000B
1	2-5/8	6	1	0.03	295-031001B
1	2-5/8	6	1	0.06	295-031002B
1	2-5/8	6	1	0.09	295-031003B
1	2-5/8	6	1	0.12	295-031004B
1	2-5/8	6	1	0.156	295-031005B
1	2-5/8	6	1	0.19	295-031006B
1	2-5/8	6	1	0.25	295-031007B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

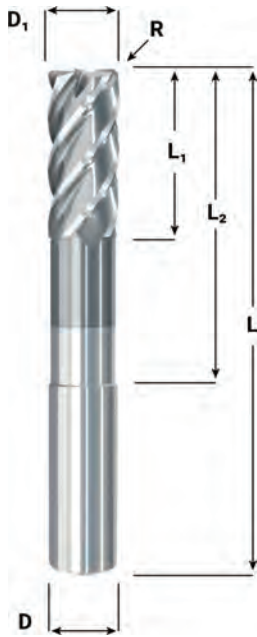
HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



## ALPHA

### Unequal Index End Mill

- Sub-micron grade carbide substrate for wear resistance
- Raised land construction for rigidity
- Eccentric relief reduces cutting friction
- Unequal index design for vibration mitigation
- Reduced neck

**APPLICATION**

**FEATURES**

- CARBIDE
- 40°
- 5FL
- RAD
- h6
- Necked
- FX2
- P 159

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

## Series 2005R      Alpha5 | 5FL | Multi Length | Radius | Reduced Neck

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/8	1/4	1-3/8	3	1/8	0.01	295-054001
1/8	1/4	1-3/8	3	1/8	0.015	295-054002
1/8	1/4	1-3/8	3	1/8	0.03	295-054003
3/16	5/16	1-3/8	3	3/16	0.015	295-054011
3/16	5/16	1-3/8	3	3/16	0.03	295-054012
1/4	3/8	2-1/8	4	1/4	0.015	295-054021
1/4	3/8	2-1/8	4	1/4	0.03	295-054022
1/4	3/8	2-1/8	4	1/4	0.06	295-054023
3/8	1/2	1-1/2	3	3/8	0.015	295-054033
3/8	1/2	1-1/2	3	3/8	0.03	295-054034
3/8	1/2	1-1/2	3	3/8	0.06	295-054035
3/8	1/2	1-1/2	3	3/8	0.09	295-054036
3/8	1/2	1-1/2	3	3/8	0.12	295-054037
3/8	1/2	2-1/8	4	3/8	0.015	295-054038
3/8	1/2	2-1/8	4	3/8	0.03	295-054039
3/8	1/2	2-1/8	4	3/8	0.06	295-054040
3/8	1/2	2-1/8	4	3/8	0.09	295-054041
3/8	1/2	2-1/8	4	3/8	0.12	295-054042
1/2	5/8	2-3/8	4	1/2	0.03	295-054051
1/2	5/8	2-3/8	4	1/2	0.06	295-054052
1/2	5/8	2-3/8	4	1/2	0.09	295-054053
1/2	5/8	2-3/8	4	1/2	0.12	295-054054
1/2	5/8	3-3/8	6	1/2	0.03	295-054055
1/2	5/8	3-3/8	6	1/2	0.06	295-054056
1/2	5/8	3-3/8	6	1/2	0.09	295-054057
1/2	5/8	3-3/8	6	1/2	0.12	295-054058
5/8	3/4	2-3/8	5	5/8	0.03	295-054071
5/8	3/4	2-3/8	5	5/8	0.06	295-054072
5/8	3/4	2-3/8	5	5/8	0.09	295-054073
5/8	3/4	2-3/8	5	5/8	0.12	295-054074
5/8	3/4	3-3/8	6	5/8	0.03	295-054075
5/8	3/4	3-3/8	6	5/8	0.06	295-054076
5/8	3/4	3-3/8	6	5/8	0.09	295-054077
5/8	3/4	3-3/8	6	5/8	0.12	295-054078
3/4	1	3-1/2	6	3/4	0.03	295-054091
3/4	1	3-1/2	6	3/4	0.06	295-054092
3/4	1	3-1/2	6	3/4	0.09	295-054093
3/4	1	3-1/2	6	3/4	0.12	295-054094
3/4	1	4-1/2	7	3/4	0.03	295-054095
3/4	1	4-1/2	7	3/4	0.06	295-054096
3/4	1	4-1/2	7	3/4	0.09	295-054097
3/4	1	4-1/2	7	3/4	0.12	295-054098
3/4	1	4-1/2	7	3/4	0.156	295-054099
3/4	1	4-1/2	7	3/4	0.19	295-054100
1	1-1/4	3-1/2	6	1	0.03	295-054111

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



Series 2005R		Alpha5   5FL   Multi Length   Radius   Reduced Neck				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1	1-1/4	3-1/2	6	1	0.06	<b>295-054112</b>
1	1-1/4	3-1/2	6	1	0.09	<b>295-054113</b>
1	1-1/4	3-1/2	6	1	0.12	<b>295-054114</b>
1	1-1/4	4-1/2	7	1	0.03	<b>295-054115</b>
1	1-1/4	4-1/2	7	1	0.06	<b>295-054116</b>
1	1-1/4	4-1/2	7	1	0.09	<b>295-054117</b>
1	1-1/4	4-1/2	7	1	0.12	<b>295-054118</b>
1	1-1/4	4-1/2	7	1	0.156	<b>295-054119</b>
1	1-1/4	4-1/2	7	1	0.19	<b>295-054120</b>
1	1-1/4	4-1/2	7	1	0.25	<b>295-054121</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**<sup>®</sup>

**CUSTOM  
COMES  
STANDARD**

# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<p><b>Equal Index End Mill</b></p> <ul style="list-style-type: none"> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Raised land construction for rigidity</li> <li>• Eccentric relief reduces cutting friction</li> <li>• Equal index</li> <li>• Progressive 40° helix for maximum MRR</li> <li>• NEW square end sizes now available online</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>40°</td> </tr> <tr> <td>6FL</td> <td>RAD</td> </tr> <tr> <td>h6</td> <td>FX2</td> </tr> <tr> <td>P 160</td> <td></td> </tr> </table>	CARBIDE	40°	6FL	RAD	h6	FX2	P 160	
CARBIDE	40°									
6FL	RAD									
h6	FX2									
P 160										

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

**Series 2006** | Alpha6 | 6FL | Multi Length | Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/4	1/2	2	1/4	0.02	292-201133
1/4	3/4	2-1/2	1/4	0.02	292-301133
1/4	1-1/8	3	1/4	0.02	292-401133
1/4	1-1/2	4	1/4	0.02	292-501133
1/4	1-1/2	6	1/4	0.02	292-601133
5/16	13/16	2-1/2	5/16	0.02	292-301153
5/16	1-1/8	3	5/16	0.02	292-401153
5/16	1-1/2	6	5/16	0.02	292-601153
5/16	1-5/8	4	5/16	0.02	292-501153
3/8	5/8	2	3/8	0.02	292-201173
3/8	1	2-1/2	3/8	0.02	292-301173
3/8	1-1/8	3	3/8	0.02	292-401173
3/8	1-1/2	6	3/8	0.02	292-601173
3/8	1-3/4	4	3/8	0.02	292-501173
3/8	3	6	3/8	0.02	292-601193
1/2	5/8	2-1/2	1/2	0.02	292-201203
1/2	1	3	1/2	0.02	292-301203
1/2	1-1/2	6	1/2	0.02	292-601203
1/2	1-5/8	4	1/2	0.02	292-401193
1/2	2	4	1/2	0.02	292-401203
1/2	3	6	1/2	0.02	292-501203
5/8	1	3	5/8	0.02	292-201223
5/8	1-1/4	3-1/2	5/8	0.02	292-301223
5/8	1-1/2	6	5/8	0.02	292-601223
5/8	2-1/4	5	5/8	0.02	292-401223
5/8	3-1/4	6	5/8	0.02	292-501223
3/4	1	3	3/4	0.02	292-201243
3/4	1-1/2	4	3/4	0.02	292-301243
3/4	1-1/2	6	3/4	0.02	292-601233
3/4	2-1/4	5	3/4	0.02	292-401243
3/4	3-1/4	6	3/4	0.02	292-501243
3/4	4	7	3/4	0.02	292-601243
1	1-1/2	6	1	0.02	292-601253
1	1-3/4	4	1	0.02	292-301263
1	2-1/4	5	1	0.02	292-401263
1	3-1/4	6	1	0.02	292-501270
1	4	7	1	0.02	292-601263
1	4-1/2	7	1	0.02	292-601293

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

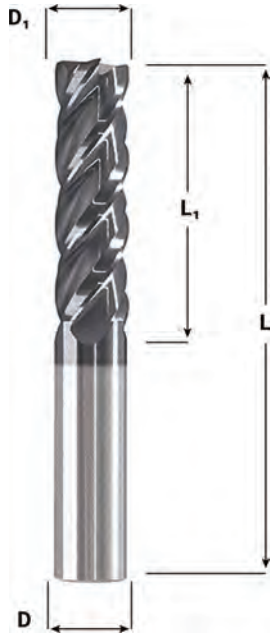
HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

## Variable Helix End Mill For Carbon And Alloy Steels



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<p><b>FUSION</b> </p> <p><b>Variable Helix HP-Hybrid End Mills</b></p> <ul style="list-style-type: none"> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Variable helix, unequal index design for vibration mitigation</li> <li>• Dual edge-prep technology</li> <li>• Excellent cost-to-performance value</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0004"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>VAR</td> </tr> <tr> <td>4FL</td> <td>RAD</td> </tr> <tr> <td>SQ</td> <td>Bright</td> </tr> <tr> <td>FX2</td> <td>P 161</td> </tr> </table>	CARBIDE	VAR	4FL	RAD	SQ	Bright	FX2	P 161
CARBIDE	VAR									
4FL	RAD									
SQ	Bright									
FX2	P 161									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	○	○	○	●	○	○

● Best ○ Good

### Series 1130 Fusion | 4FL | Multi Length | Square And Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	FX2
1/8	1/4	1-1/2	1/8	-	284-000058	284-000059
1/8	1/4	1-1/2	1/8	0.01	284-000375	284-000376
1/8	1/4	1-1/2	1/8	0.015	284-000377	284-000378
1/8	1/4	1-1/2	1/8	0.02	284-000379	284-000380
1/8	1/4	1-1/2	1/8	0.03	284-000381	284-000382
1/8	1/2	1-1/2	1/8	-	284-000060	284-000061
1/8	1/2	1-1/2	1/8	0.01	284-000383	284-000384
1/8	1/2	1-1/2	1/8	0.015	284-000385	284-000386
1/8	1/2	1-1/2	1/8	0.02	284-000387	284-000388
1/8	1/2	1-1/2	1/8	0.03	284-000389	284-000390
1/8	3/4	2-1/4	1/8	-	284-000062	284-000063
1/8	3/4	2-1/4	1/8	0.015	284-000391	284-000392
1/8	3/4	2-1/4	1/8	0.02	284-000393	284-000394
1/8	3/4	2-1/4	1/8	0.03	284-000395	284-000396
1/8	1	3	1/8	-	284-000064	284-000065
1/8	1	3	1/8	0.015	284-000397	284-000398
1/8	1	3	1/8	0.02	284-000399	284-000400
1/8	1	3	1/8	0.03	284-000401	284-000402
3/16	3/8	2	3/16	-	284-000088	284-000089
3/16	3/8	2	3/16	0.01	284-000403	284-000404
3/16	3/8	2	3/16	0.015	284-000405	284-000406
3/16	3/8	2	3/16	0.02	284-000407	284-000408
3/16	3/8	2	3/16	0.03	284-000409	284-000410
3/16	3/8	2	3/16	0.045	284-000411	284-000412
3/16	5/8	2	3/16	-	284-000090	284-000091
3/16	5/8	2	3/16	0.01	284-000413	284-000414
3/16	5/8	2	3/16	0.015	284-000415	284-000416
3/16	5/8	2	3/16	0.02	284-000417	284-000418
3/16	5/8	2	3/16	0.03	284-000419	284-000420
3/16	5/8	2	3/16	0.045	284-000421	284-000422
3/16	3/4	2-1/2	3/16	-	284-000092	284-000093
3/16	3/4	2-1/2	3/16	0.015	284-000423	284-000424
3/16	3/4	2-1/2	3/16	0.02	284-000425	284-000426
3/16	3/4	2-1/2	3/16	0.03	284-000427	284-000428
3/16	1	4	3/16	0.015	284-000435	284-000436
3/16	1	4	3/16	0.02	284-000437	284-000438
3/16	1	4	3/16	0.03	284-000439	284-000440
3/16	1-1/8	3	3/16	-	284-000094	284-000095
3/16	1-1/8	3	3/16	0.015	284-000429	284-000430
3/16	1-1/8	3	3/16	0.02	284-000431	284-000432
3/16	1-1/8	3	3/16	0.03	284-000433	284-000434
1/4	1/2	2-1/2	1/4	-	284-000118	284-000119
1/4	1/2	2-1/2	1/4	0.015	284-000441	284-000442
1/4	1/2	2-1/2	1/4	0.02	284-000443	284-000444
1/4	1/2	2-1/2	1/4	0.03	284-000445	284-000446

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



## Series 1130

Fusion | 4FL | Multi Length | Square and Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	FX2
1/4	1/2	2-1/2	1/4	0.045	284-000447	284-000448
1/4	1/2	2-1/2	1/4	0.06	284-000449	284-000450
1/4	3/4	2-1/2	1/4	-	284-000120	284-000121
1/4	3/4	2-1/2	1/4	0.015	284-000451	284-000452
1/4	3/4	2-1/2	1/4	0.02	284-000453	284-000454
1/4	3/4	2-1/2	1/4	0.03	284-000455	284-000456
1/4	3/4	2-1/2	1/4	0.045	284-000457	284-000458
1/4	3/4	2-1/2	1/4	0.06	284-000459	284-000460
1/4	1	4	1/4	0.015	284-000471	284-000472
1/4	1	4	1/4	0.02	284-000473	284-000474
1/4	1	4	1/4	0.03	284-000475	284-000476
1/4	1	4	1/4	0.045	284-000477	284-000478
1/4	1	4	1/4	0.06	284-000479	284-000480
1/4	1-1/8	3	1/4	-	284-000122	284-000123
1/4	1-1/8	3	1/4	0.015	284-000461	284-000462
1/4	1-1/8	3	1/4	0.02	284-000463	284-000464
1/4	1-1/8	3	1/4	0.03	284-000465	284-000466
1/4	1-1/8	3	1/4	0.045	284-000467	284-000468
1/4	1-1/8	3	1/4	0.06	284-000469	284-000470
1/4	1-1/2	4	1/4	-	284-000124	284-000125
1/4	1-1/2	4	1/4	0.015	284-000481	284-000482
1/4	1-1/2	4	1/4	0.02	284-000483	284-000484
1/4	1-1/2	4	1/4	0.03	284-000485	284-000486
1/4	1-1/2	4	1/4	0.045	284-000487	284-000488
1/4	1-1/2	4	1/4	0.06	284-000489	284-000490
1/4	1-1/2	6	1/4	0.015	284-000491	284-000492
1/4	1-1/2	6	1/4	0.02	284-000493	284-000494
1/4	1-1/2	6	1/4	0.03	284-000495	284-000496
1/4	1-1/2	6	1/4	0.045	284-000497	284-000498
1/4	1-1/2	6	1/4	0.06	284-000499	284-000500
5/16	1/2	2-1/2	5/16	-	284-000148	284-000149
5/16	1/2	2-1/2	5/16	0.015	284-000501	284-000502
5/16	1/2	2-1/2	5/16	0.02	284-000503	284-000504
5/16	1/2	2-1/2	5/16	0.03	284-000505	284-000506
5/16	1/2	2-1/2	5/16	0.045	284-000507	284-000508
5/16	1/2	2-1/2	5/16	0.06	284-000509	284-000510
5/16	1/2	2-1/2	5/16	0.09	284-000511	284-000512
5/16	13/16	2-1/2	5/16	-	284-000150	284-000151
5/16	13/16	2-1/2	5/16	0.015	284-000513	284-000514
5/16	13/16	2-1/2	5/16	0.02	284-000515	284-000516
5/16	13/16	2-1/2	5/16	0.03	284-000517	284-000518
5/16	13/16	2-1/2	5/16	0.045	284-000519	284-000520
5/16	13/16	2-1/2	5/16	0.06	284-000521	284-000522
5/16	13/16	2-1/2	5/16	0.09	284-000523	284-000524
5/16	1-1/8	3	5/16	-	284-000152	284-000153
5/16	1-1/8	3	5/16	0.015	284-000525	284-000526
5/16	1-1/8	3	5/16	0.02	284-000527	284-000528
5/16	1-1/8	3	5/16	0.03	284-000529	284-000530
5/16	1-1/8	3	5/16	0.045	284-000531	284-000532
5/16	1-1/8	3	5/16	0.06	284-000533	284-000534
5/16	1-1/2	6	5/16	0.015	284-000545	284-000546
5/16	1-1/2	6	5/16	0.02	284-000547	284-000548
5/16	1-1/2	6	5/16	0.03	284-000549	284-000550
5/16	1-1/2	6	5/16	0.045	284-000551	284-000552
5/16	1-1/2	6	5/16	0.06	284-000553	284-000554
5/16	1-5/8	4	5/16	-	284-000154	284-000155
5/16	1-5/8	4	5/16	0.015	284-000535	284-000536
5/16	1-5/8	4	5/16	0.02	284-000537	284-000538
5/16	1-5/8	4	5/16	0.03	284-000539	284-000540
5/16	1-5/8	4	5/16	0.045	284-000541	284-000542
5/16	1-5/8	4	5/16	0.06	284-000543	284-000544
3/8	5/8	2-1/2	3/8	-	284-000178	284-000179
3/8	5/8	2-1/2	3/8	0.015	284-000555	284-000556
3/8	5/8	2-1/2	3/8	0.02	284-000557	284-000558
3/8	5/8	2-1/2	3/8	0.03	284-000559	284-000560
3/8	5/8	2-1/2	3/8	0.045	284-000561	284-000562
3/8	5/8	2-1/2	3/8	0.06	284-000563	284-000564
3/8	5/8	2-1/2	3/8	0.09	284-000565	284-000566
3/8	1	2-1/2	3/8	-	284-000180	284-000181
3/8	1	2-1/2	3/8	0.015	284-000567	284-000568
3/8	1	2-1/2	3/8	0.02	284-000569	284-000570
3/8	1	2-1/2	3/8	0.03	284-000571	284-000572
3/8	1	2-1/2	3/8	0.045	284-000573	284-000574
3/8	1	2-1/2	3/8	0.06	284-000575	284-000576
3/8	1	2-1/2	3/8	0.09	284-000577	284-000578
3/8	1	4	3/8	0.015	284-000589	284-000590

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



Series 1130		Fusion   4FL   Multi Length   Square and Radius				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	FX2
3/8	1	4	3/8	0.02	284-000591	284-000592
3/8	1	4	3/8	0.03	284-000593	284-000594
3/8	1	4	3/8	0.045	284-000595	284-000596
3/8	1	4	3/8	0.06	284-000597	284-000598
3/8	1-1/8	3	3/8	-	284-000182	284-000183
3/8	1-1/8	3	3/8	0.015	284-000579	284-000580
3/8	1-1/8	3	3/8	0.02	284-000581	284-000582
3/8	1-1/8	3	3/8	0.03	284-000583	284-000584
3/8	1-1/8	3	3/8	0.045	284-000585	284-000586
3/8	1-1/8	3	3/8	0.06	284-000587	284-000588
3/8	1-1/2	6	3/8	0.015	284-000609	284-000610
3/8	1-1/2	6	3/8	0.02	284-000611	284-000612
3/8	1-1/2	6	3/8	0.03	284-000613	284-000614
3/8	1-1/2	6	3/8	0.045	284-000615	284-000616
3/8	1-1/2	6	3/8	0.06	284-000617	284-000618
3/8	1-3/4	4	3/8	-	284-000184	284-000185
3/8	1-3/4	4	3/8	0.015	284-000599	284-000600
3/8	1-3/4	4	3/8	0.02	284-000601	284-000602
3/8	1-3/4	4	3/8	0.03	284-000603	284-000604
3/8	1-3/4	4	3/8	0.045	284-000605	284-000606
3/8	1-3/4	4	3/8	0.06	284-000607	284-000608
7/16	1	2-3/4	7/16	-	284-000210	284-000211
7/16	1	2-3/4	7/16	0.03	284-000619	284-000620
7/16	1	2-3/4	7/16	0.045	284-000621	284-000622
7/16	1	2-3/4	7/16	0.06	284-000623	284-000624
7/16	1	2-3/4	7/16	0.09	284-000625	284-000626
7/16	1	2-3/4	7/16	0.125	284-000627	284-000628
7/16	2	4	7/16	-	284-000212	284-000213
7/16	3	6	7/16	-	284-000214	284-000215
1/2	5/8	3	1/2	-	284-000238	284-000239
1/2	5/8	3	1/2	0.015	284-000629	284-000630
1/2	5/8	3	1/2	0.02	284-000631	284-000632
1/2	5/8	3	1/2	0.03	284-000633	284-000634
1/2	5/8	3	1/2	0.045	284-000635	284-000636
1/2	5/8	3	1/2	0.06	284-000637	284-000638
1/2	5/8	3	1/2	0.09	284-000639	284-000640
1/2	5/8	3	1/2	0.125	284-000641	284-000642
1/2	1	3	1/2	-	284-000240	284-000241
1/2	1	4	1/2	0.015	284-000657	284-000658
1/2	1	4	1/2	0.02	284-000659	284-000660
1/2	1	4	1/2	0.03	284-000661	284-000662
1/2	1	4	1/2	0.045	284-000663	284-000664
1/2	1	4	1/2	0.06	284-000665	284-000666
1/2	1	4	1/2	0.09	284-000667	284-000668
1/2	1	4	1/2	0.125	284-000669	284-000670
1/2	1-1/4	3	1/2	-	284-000242	284-000243
1/2	1-1/4	3	1/2	0.015	284-000643	284-000644
1/2	1-1/4	3	1/2	0.02	284-000645	284-000646
1/2	1-1/4	3	1/2	0.03	284-000647	284-000648
1/2	1-1/4	3	1/2	0.045	284-000649	284-000650
1/2	1-1/4	3	1/2	0.06	284-000651	284-000652
1/2	1-1/4	3	1/2	0.09	284-000653	284-000654
1/2	1-1/4	3	1/2	0.125	284-000655	284-000656
1/2	1-1/2	4	1/2	-	284-000244	284-000245
1/2	1-1/2	4	1/2	0.015	284-000671	284-000672
1/2	1-1/2	4	1/2	0.02	284-000673	284-000674
1/2	1-1/2	4	1/2	0.03	284-000675	284-000676
1/2	1-1/2	4	1/2	0.045	284-000677	284-000678
1/2	1-1/2	4	1/2	0.06	284-000679	284-000680
1/2	1-1/2	4	1/2	0.09	284-000681	284-000682
1/2	1-1/2	4	1/2	0.125	284-000683	284-000684
1/2	1-1/2	6	1/2	0.015	284-000699	284-000700
1/2	1-1/2	6	1/2	0.02	284-000701	284-000702
1/2	1-1/2	6	1/2	0.03	284-000703	284-000704
1/2	1-1/2	6	1/2	0.045	284-000705	284-000706
1/2	1-1/2	6	1/2	0.06	284-000707	284-000708
1/2	1-1/2	6	1/2	0.09	284-000709	284-000710
1/2	1-1/2	6	1/2	0.125	284-000711	284-000712
1/2	2	4	1/2	-	284-000246	284-000247
1/2	2	4	1/2	0.015	284-000685	284-000686
1/2	2	4	1/2	0.02	284-000687	284-000688
1/2	2	4	1/2	0.03	284-000689	284-000690
1/2	2	4	1/2	0.045	284-000691	284-000692
1/2	2	4	1/2	0.06	284-000693	284-000694
1/2	2	4	1/2	0.09	284-000695	284-000696
1/2	2	4	1/2	0.125	284-000697	284-000698

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



Series 1130

Fusion | 4FL | Multi Length | Square and Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	FX2
1/2	3	6	1/2	-	284-000248	284-000249
1/2	3	6	1/2	0.015	284-000713	284-000714
1/2	3	6	1/2	0.02	284-000715	284-000716
1/2	3	6	1/2	0.03	284-000717	284-000718
1/2	3	6	1/2	0.045	284-000719	284-000720
1/2	3	6	1/2	0.06	284-000721	284-000722
1/2	3	6	1/2	0.09	284-000723	284-000724
1/2	3	6	1/2	0.125	284-000725	284-000726
5/8	3/4	3-1/2	5/8	-	284-000268	284-000269
5/8	3/4	3-1/2	5/8	0.015	284-000727	284-000728
5/8	3/4	3-1/2	5/8	0.02	284-000729	284-000730
5/8	3/4	3-1/2	5/8	0.03	284-000731	284-000732
5/8	3/4	3-1/2	5/8	0.045	284-000733	284-000734
5/8	3/4	3-1/2	5/8	0.06	284-000735	284-000736
5/8	3/4	3-1/2	5/8	0.09	284-000737	284-000738
5/8	3/4	3-1/2	5/8	0.125	284-000739	284-000740
5/8	1-1/4	3-1/2	5/8	-	284-000270	284-000271
5/8	1-1/4	3-1/2	5/8	0.015	284-000741	284-000742
5/8	1-1/4	3-1/2	5/8	0.02	284-000743	284-000744
5/8	1-1/4	3-1/2	5/8	0.03	284-000745	284-000746
5/8	1-1/4	3-1/2	5/8	0.045	284-000747	284-000748
5/8	1-1/4	3-1/2	5/8	0.06	284-000749	284-000750
5/8	1-1/4	3-1/2	5/8	0.09	284-000751	284-000752
5/8	1-1/4	3-1/2	5/8	0.125	284-000753	284-000754
5/8	1-1/2	6	5/8	0.03	284-000765	284-000766
5/8	1-1/2	6	5/8	0.045	284-000767	284-000768
5/8	1-1/2	6	5/8	0.06	284-000769	284-000770
5/8	1-1/2	6	5/8	0.09	284-000771	284-000772
5/8	1-1/2	6	5/8	0.125	284-000773	284-000774
5/8	2-1/4	5	5/8	-	284-000272	284-000273
5/8	2-1/4	5	5/8	0.03	284-000755	284-000756
5/8	2-1/4	5	5/8	0.045	284-000757	284-000758
5/8	2-1/4	5	5/8	0.06	284-000759	284-000760
5/8	2-1/4	5	5/8	0.09	284-000761	284-000762
5/8	2-1/4	5	5/8	0.125	284-000763	284-000764
5/8	3	6	5/8	-	284-000274	284-000275
5/8	3	6	5/8	0.03	284-000775	284-000776
5/8	3	6	5/8	0.045	284-000777	284-000778
5/8	3	6	5/8	0.06	284-000779	284-000780
5/8	3	6	5/8	0.09	284-000781	284-000782
5/8	3	6	5/8	0.125	284-000783	284-000784
3/4	1	4	3/4	-	284-000298	284-000299
3/4	1	4	3/4	0.03	284-000785	284-000786
3/4	1	4	3/4	0.045	284-000787	284-000788
3/4	1	4	3/4	0.06	284-000789	284-000790
3/4	1	4	3/4	0.09	284-000791	284-000792
3/4	1	4	3/4	0.125	284-000793	284-000794
3/4	1	4	3/4	0.19	284-000795	284-000796
3/4	1	4	3/4	0.25	284-000797	284-000798
3/4	1-1/2	4	3/4	-	284-000300	284-000301
3/4	1-1/2	4	3/4	0.03	284-000799	284-000800
3/4	1-1/2	4	3/4	0.045	284-000801	284-000802
3/4	1-1/2	4	3/4	0.06	284-000803	284-000804
3/4	1-1/2	4	3/4	0.09	284-000805	284-000806
3/4	1-1/2	4	3/4	0.125	284-000807	284-000808
3/4	1-1/2	4	3/4	0.19	284-000809	284-000810
3/4	1-1/2	4	3/4	0.25	284-000811	284-000812
3/4	1-1/2	6	3/4	0.03	284-000825	284-000826
3/4	1-1/2	6	3/4	0.045	284-000827	284-000828
3/4	1-1/2	6	3/4	0.06	284-000829	284-000830
3/4	1-1/2	6	3/4	0.09	284-000831	284-000832
3/4	1-1/2	6	3/4	0.125	284-000833	284-000834
3/4	1-1/2	6	3/4	0.25	284-000835	284-000836
3/4	2-1/4	5	3/4	-	284-000302	284-000303
3/4	2-1/4	5	3/4	0.03	284-000813	284-000814
3/4	2-1/4	5	3/4	0.045	284-000815	284-000816
3/4	2-1/4	5	3/4	0.06	284-000817	284-000818
3/4	2-1/4	5	3/4	0.09	284-000819	284-000820
3/4	2-1/4	5	3/4	0.125	284-000821	284-000822
3/4	2-1/4	5	3/4	0.25	284-000823	284-000824
3/4	3	6	3/4	-	284-000304	284-000305
3/4	3	6	3/4	0.03	284-000837	284-000838
3/4	3	6	3/4	0.045	284-000839	284-000840
3/4	3	6	3/4	0.06	284-000841	284-000842
3/4	3	6	3/4	0.09	284-000843	284-000844
3/4	3	6	3/4	0.125	284-000845	284-000846

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# ADVANCED PERFORMANCE

Variable Helix End Mill For Carbon And Alloy Steels



Series 1130		Fusion   4FL   Multi Length   Square and Radius						
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	FX2		
3/4	3	6	3/4	0.25	284-000847	284-000848		
3/4	4	7	3/4	-	284-000306	284-000307		
3/4	4	7	3/4	0.03	284-000849	284-000850		
3/4	4	7	3/4	0.045	284-000851	284-000852		
3/4	4	7	3/4	0.06	284-000853	284-000854		
3/4	4	7	3/4	0.09	284-000855	284-000856		
3/4	4	7	3/4	0.125	284-000857	284-000858		
3/4	4	7	3/4	0.25	284-000859	284-000860		
1	1-1/2	4	1	-	284-000330	284-000331		
1	1-1/2	4	1	0.03	284-000861	284-000862		
1	1-1/2	4	1	0.045	284-000863	284-000864		
1	1-1/2	4	1	0.06	284-000865	284-000866		
1	1-1/2	4	1	0.09	284-000867	284-000868		
1	1-1/2	4	1	0.125	284-000869	284-000870		
1	1-1/2	4	1	0.19	284-000871	284-000872		
1	1-1/2	4	1	0.25	284-000873	284-000874		
1	1-1/2	6	1	0.03	284-000887	284-000888		
1	1-1/2	6	1	0.045	284-000889	284-000890		
1	1-1/2	6	1	0.06	284-000891	284-000892		
1	1-1/2	6	1	0.09	284-000893	284-000894		
1	1-1/2	6	1	0.125	284-000895	284-000896		
1	1-1/2	6	1	0.25	284-000897	284-000898		
1	2-1/4	5	1	-	284-000332	284-000333		
1	2-1/4	5	1	0.03	284-000875	284-000876		
1	2-1/4	5	1	0.045	284-000877	284-000878		
1	2-1/4	5	1	0.06	284-000879	284-000880		
1	2-1/4	5	1	0.09	284-000881	284-000882		
1	2-1/4	5	1	0.125	284-000883	284-000884		
1	2-1/4	5	1	0.25	284-000885	284-000886		
1	3	6	1	-	284-000334	284-000335		
1	3	6	1	0.03	284-000899	284-000900		
1	3	6	1	0.045	284-000901	284-000902		
1	3	6	1	0.06	284-000903	284-000904		
1	3	6	1	0.09	284-000905	284-000906		
1	3	6	1	0.125	284-000907	284-000908		
1	3	6	1	0.25	284-000909	284-000910		
1	4	7	1	-	284-000336	284-000337		
1	4	7	1	0.03	284-000911	284-000912		
1	4	7	1	0.045	284-000913	284-000914		
1	4	7	1	0.06	284-000915	284-000916		
1	4	7	1	0.09	284-000917	284-000918		
1	4	7	1	0.125	284-000919	284-000920		
1	4	7	1	0.25	284-000921	284-000922		

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Alloyed Steels And Hardened Steels



INTRO

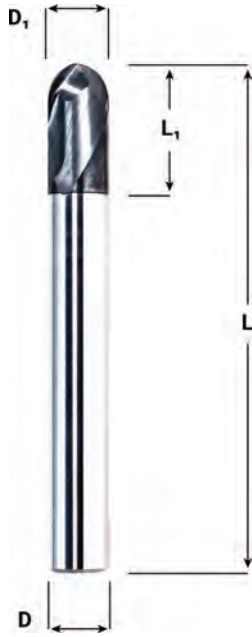
MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>DM2</h2> <p><b>Contouring Mill For Die/Mold</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Ideal for hardened steels 40-65 Rc</li> <li>Robust core diameter and low rake for hard milling applications</li> <li>FX1 coating ensures long stable tool life</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>30°</li> <li>2FL</li> <li>BALL</li> <li>h6</li> <li>FX1</li> <li>P 152</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
	●	●				○			○		●	●

● Best ○ Good

**Series 1050** | DM2 | 2FL | Ball Nose | Die/Mold

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
1/32	1/32	3	1/4	<b>100333</b>
1/16	1/16	3	1/4	<b>100334</b>
3/32	3/32	3	1/4	<b>100335</b>
1/8	1/8	3	1/4	<b>100336</b>
3/16	3/16	3	1/4	<b>100342</b>
1/4	1/4	3	1/4	<b>100346</b>
5/16	5/16	3	5/16	<b>100348</b>
3/8	3/8	3-1/2	3/8	<b>100349</b>
1/2	1/2	4	1/2	<b>100351</b>
5/32	5/32	3	1/4	<b>100338</b>

\*bold numbers are EDPs for ordering

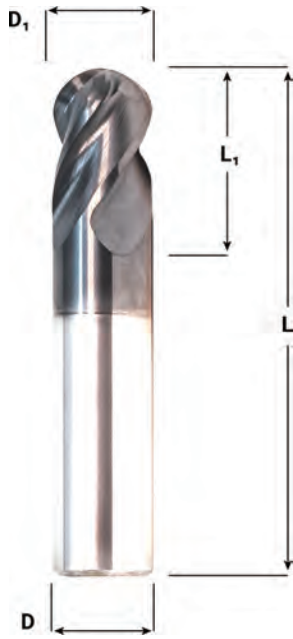
### Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**

**CUSTOM  
COMES  
STANDARD**

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h1>PYSTL</h1> <h2>Unequal Index End Mill</h2> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Unequal index tool for Titanium, stainless and other gummy materials</li> <li>Suited for slotting and profiling milling operations</li> <li>Specialized edge honing</li> <li>SafeLock® shank available upon request</li> </ul>		<div style="display: grid; grid-template-columns: repeat(2, 1fr); gap: 5px;"> <div>CARBIDE</div> <div>VAR</div> <div>4FL</div> <div>BALL</div> <div>h6</div> <div>FX3</div> <div>P 155</div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	●	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 2115 438 | 4FL | Ball Nose

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
1/8	1/4	2	1/8	<b>311169</b>
1/8	1/2	2	1/8	<b>311171</b>
3/16	5/16	2	3/16	<b>311174</b>
3/16	5/8	2	3/16	<b>311176</b>
1/4	3/8	2	1/4	<b>311179</b>
1/4	1/2	2-1/2	1/4	<b>311183</b>
1/4	3/4	2-1/2	1/4	<b>311186</b>
5/16	7/16	2	5/16	<b>311190</b>
5/16	13/16	2-1/2	5/16	<b>311193</b>
3/8	1/2	2	3/8	<b>311197</b>
3/8	1	2-1/2	3/8	<b>311201</b>
1/2	5/8	2-1/2	1/2	<b>311204</b>
1/2	1	3	1/2	<b>311208</b>
1/2	1-1/4	3	1/2	<b>311210</b>
5/8	1-1/4	3-1/2	5/8	<b>311214</b>
5/8	1-5/8	3-1/2	5/8	<b>311216</b>
3/4	1	3	3/4	<b>311219</b>
3/4	1-5/8	4	3/4	<b>311222</b>
1	1-1/4	4	1	<b>311224</b>
1	2	4	1	<b>311226</b>

\*bold numbers are EDPs for ordering

### Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK®**

## CUSTOM COMES STANDARD

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



INTRO

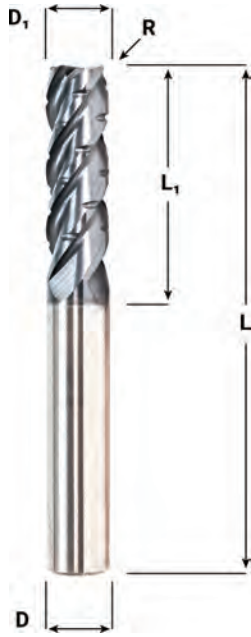
MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<h1>PYSTL</h1> <h2>Unequal Index End Mill</h2> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Unequal index tool for Titanium, stainless and other gummy materials</li> <li>Suited for slotting and profiling milling operations</li> <li>Specialized edge honing</li> <li>Staggered chip breakers</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>38°</td> </tr> <tr> <td>4FL</td> <td>RAD</td> </tr> <tr> <td>SQ</td> <td>h6</td> </tr> <tr> <td>FX3</td> <td></td> </tr> <tr> <td>VAR</td> <td>P 155</td> </tr> </table>	CARBIDE	38°	4FL	RAD	SQ	h6	FX3		VAR	P 155
CARBIDE	38°											
4FL	RAD											
SQ	h6											
FX3												
VAR	P 155											

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	●	○	○	○	○	○	○	○	○

● Best ○ Good

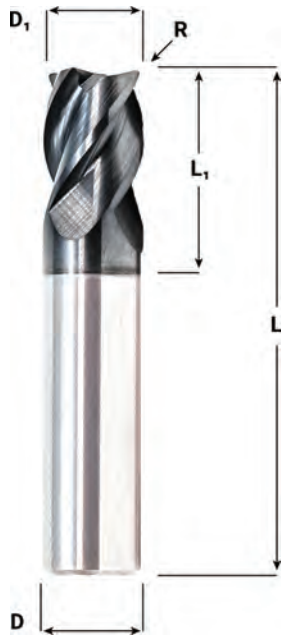
## Series 2117 438CB | 4FL | Radius | Chip Breaker

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/8	1/4	2	1/8	0.01	<b>311228</b>
1/8	1/2	2	1/8	0.01	<b>311231</b>
1/8	3/4	2-1/2	1/8	0.01	<b>311235</b>
3/16	5/16	2	3/16	0.01	<b>311237</b>
3/16	3/4	2-1/2	3/16	0.01	<b>311245</b>
3/16	9/16	2	3/16	0.01	<b>311241</b>
1/4	3/8	2	1/4	0.02	<b>311248</b>
1/4	1/2	2-1/2	1/4	0.02	<b>311250</b>
1/4	3/4	2-1/2	1/4	0.02	<b>311254</b>
1/4	1	3	1/4	0.02	<b>311258</b>
5/16	7/16	2	5/16	0.02	<b>311262</b>
5/16	13/16	2-1/2	5/16	0.02	<b>311265</b>
5/16	1	3	5/16	0.02	<b>311268</b>
3/8	1/2	2	3/8	0.02	<b>311271</b>
3/8	7/8	2-1/2	3/8	0.02	<b>311275</b>
3/8	1	2-1/2	3/8	0.02	<b>311278</b>
3/8	1-1/4	3	3/8	0.02	<b>311280</b>
3/8	1-1/2	3	3/8	0.02	<b>311282</b>
1/2	5/8	2-1/2	1/2	0.03	<b>311284</b>
1/2	1	3	1/2	0.03	<b>311287</b>
1/2	1-1/4	3	1/2	0.03	<b>311290</b>
1/2	1-5/8	4	1/2	0.02	<b>311292</b>
1/2	1-5/8	4	1/2	0.03	<b>311294</b>
1/2	2	4	1/2	0.03	<b>311297</b>
5/8	3/4	3	5/8	0.03	<b>311300</b>
5/8	1-1/4	3-1/2	5/8	0.03	<b>311302</b>
5/8	1-5/8	3-1/2	5/8	0.03	<b>311305</b>
5/8	2-1/8	4	5/8	0.03	<b>311307</b>
5/8	2-1/2	5	5/8	0.03	<b>311310</b>
3/4	1	3	3/4	0.03	<b>311314</b>
3/4	1-5/8	4	3/4	0.03	<b>311317</b>
3/4	2-1/4	5	3/4	0.03	<b>311320</b>
3/4	2-3/4	5	3/4	0.03	<b>311324</b>
3/4	3-1/4	6	3/4	0.03	<b>311327</b>
1	1-1/4	4	1	0.03	<b>311330</b>
1	2	4	1	0.03	<b>311333</b>
1	2-5/8	5	1	0.03	<b>311337</b>
1	3-1/4	6	1	0.03	<b>311340</b>
1	4-1/4	7	1	0.03	<b>311344</b>

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<h1>PYSTL</h1> <h2>Unequal Index End Mill</h2> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Unequal index tool for Titanium, stainless and other gummy materials</li> <li>Suited for slotting and profiling milling operations</li> <li>Specialized edge honing</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>VAR</td> </tr> <tr> <td>4FL</td> <td>RAD</td> </tr> <tr> <td>SQ</td> <td>h6</td> </tr> <tr> <td>FX3</td> <td>P 155</td> </tr> </table>	CARBIDE	VAR	4FL	RAD	SQ	h6	FX3	P 155
CARBIDE	VAR									
4FL	RAD									
SQ	h6									
FX3	P 155									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	●	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 2100 438 | 4FL | Square And Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/8	1/4	2	1/8	-	310001
1/8	1/4	2	1/8	0.01	310005
1/8	1/4	2	1/8	0.02	310007
1/8	1/4	2	1/8	0.03	310009
1/8	1/2	2	1/8	-	310013
1/8	1/2	2	1/8	0.01	310017
1/8	1/2	2	1/8	0.02	310019
1/8	1/2	2	1/8	0.03	310023
1/8	3/4	2-1/2	1/8	-	310025
1/8	3/4	2-1/2	1/8	0.01	310029
1/8	3/4	2-1/2	1/8	0.02	310031
1/8	3/4	2-1/2	1/8	0.03	310034
3/16	5/16	2	3/16	-	310037
3/16	5/16	2	3/16	0.01	310040
3/16	5/16	2	3/16	0.02	310044
3/16	5/16	2	3/16	0.03	310048
3/16	3/4	2-1/2	3/16	-	310063
3/16	3/4	2-1/2	3/16	0.01	310066
3/16	3/4	2-1/2	3/16	0.02	310069
3/16	3/4	2-1/2	3/16	0.03	310071
3/16	9/16	2	3/16	-	310050
3/16	9/16	2	3/16	0.01	310054
3/16	9/16	2	3/16	0.02	310058
3/16	9/16	2	3/16	0.03	310060
1/4	3/8	2	1/4	-	310074
1/4	3/8	2	1/4	0.01	310078
1/4	3/8	2	1/4	0.02	310081
1/4	3/8	2	1/4	0.03	310085
1/4	3/8	2	1/4	0.06	310089
1/4	1/2	2-1/2	1/4	-	310093
1/4	1/2	2-1/2	1/4	0.01	310097
1/4	1/2	2-1/2	1/4	0.02	310100
1/4	1/2	2-1/2	1/4	0.03	310103
1/4	1/2	2-1/2	1/4	0.06	310105
1/4	3/4	2-1/2	1/4	-	310109
1/4	3/4	2-1/2	1/4	0.01	310113
1/4	3/4	2-1/2	1/4	0.02	310115
1/4	3/4	2-1/2	1/4	0.03	310117
1/4	3/4	2-1/2	1/4	0.06	310121
1/4	1	3	1/4	-	310125
1/4	1	3	1/4	0.01	310128
1/4	1	3	1/4	0.02	310130
1/4	1	3	1/4	0.03	310133
1/4	1	3	1/4	0.06	310136
1/4	1-1/4	3	1/4	-	310139

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



Series 2100		438   4FL   Square and Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/4	1-1/4	3	1/4	0.01	310141
1/4	1-1/4	3	1/4	0.02	310144
1/4	1-1/4	3	1/4	0.03	310147
1/4	1-1/4	3	1/4	0.06	310150
5/16	7/16	2	5/16	-	310154
5/16	7/16	2	5/16	0.01	310158
5/16	7/16	2	5/16	0.02	310160
5/16	7/16	2	5/16	0.03	310162
5/16	7/16	2	5/16	0.06	310166
5/16	13/16	2-1/2	5/16	-	310168
5/16	13/16	2-1/2	5/16	0.01	310172
5/16	13/16	2-1/2	5/16	0.02	310176
5/16	13/16	2-1/2	5/16	0.03	310180
5/16	13/16	2-1/2	5/16	0.06	310182
5/16	1	3	5/16	-	310186
5/16	1	3	5/16	0.01	310190
5/16	1	3	5/16	0.02	310194
5/16	1	3	5/16	0.03	310198
5/16	1	3	5/16	0.06	310201
3/8	1/2	2	3/8	-	310203
3/8	1/2	2	3/8	0.01	310205
3/8	1/2	2	3/8	0.02	310207
3/8	1/2	2	3/8	0.03	310210
3/8	1/2	2	3/8	0.06	310212
3/8	1/2	2	3/8	0.09	310214
3/8	1	2-1/2	3/8	-	310217
3/8	1	2-1/2	3/8	0.01	310220
3/8	1	2-1/2	3/8	0.02	310222
3/8	1	2-1/2	3/8	0.03	310224
3/8	1	2-1/2	3/8	0.06	310226
3/8	1	2-1/2	3/8	0.09	310229
3/8	1-1/4	3	3/8	-	310231
3/8	1-1/4	3	3/8	0.01	310233
3/8	1-1/4	3	3/8	0.02	310236
3/8	1-1/4	3	3/8	0.03	310238
3/8	1-1/4	3	3/8	0.06	310240
3/8	1-1/4	3	3/8	0.09	310243
3/8	1-1/2	3	3/8	-	310245
3/8	1-1/2	3	3/8	0.01	310247
3/8	1-1/2	3	3/8	0.02	310251
3/8	1-1/2	3	3/8	0.03	310255
3/8	1-1/2	3	3/8	0.06	310257
3/8	1-1/2	3	3/8	0.09	310259
1/2	5/8	2-1/2	1/2	-	310263
1/2	5/8	2-1/2	1/2	0.02	310267
1/2	5/8	2-1/2	1/2	0.03	310269
1/2	5/8	2-1/2	1/2	0.06	310273
1/2	5/8	2-1/2	1/2	0.09	310275
1/2	5/8	2-1/2	1/2	0.12	310279
1/2	1	3	1/2	-	310281
1/2	1	3	1/2	0.02	310284
1/2	1	3	1/2	0.03	310288
1/2	1	3	1/2	0.06	310290
1/2	1	3	1/2	0.09	310293
1/2	1	3	1/2	0.12	310295
1/2	1-1/4	3	1/2	-	310297
1/2	1-1/4	3	1/2	0.02	310301
1/2	1-1/4	3	1/2	0.03	310303
1/2	1-1/4	3	1/2	0.06	310307
1/2	1-1/4	3	1/2	0.09	310310
1/2	1-1/4	3	1/2	0.12	310312
1/2	1-5/8	4	1/2	-	310316
1/2	1-5/8	4	1/2	0.02	310318
1/2	1-5/8	4	1/2	0.03	310322
1/2	1-5/8	4	1/2	0.06	310325
1/2	1-5/8	4	1/2	0.09	310328
1/2	1-5/8	4	1/2	0.12	310332
1/2	2	4	1/2	-	310334
1/2	2	4	1/2	0.02	310338
1/2	2	4	1/2	0.03	310342
1/2	2	4	1/2	0.06	310346
1/2	2	4	1/2	0.09	310350
1/2	2	4	1/2	0.12	310354
5/8	3/4	3	5/8	-	310356
5/8	3/4	3	5/8	0.03	310360
5/8	3/4	3	5/8	0.06	310364

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



Series 2100		438   4FL   Square and Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
5/8	3/4	3	5/8	0.09	<b>310367</b>
5/8	3/4	3	5/8	0.12	<b>310370</b>
5/8	1-1/4	3-1/2	5/8	-	<b>310374</b>
5/8	1-1/4	3-1/2	5/8	0.03	<b>310376</b>
5/8	1-1/4	3-1/2	5/8	0.06	<b>310379</b>
5/8	1-1/4	3-1/2	5/8	0.09	<b>310383</b>
5/8	1-1/4	3-1/2	5/8	0.12	<b>310385</b>
5/8	1-5/8	3-1/2	5/8	-	<b>310388</b>
5/8	1-5/8	3-1/2	5/8	0.03	<b>310392</b>
5/8	1-5/8	3-1/2	5/8	0.06	<b>310395</b>
5/8	1-5/8	3-1/2	5/8	0.09	<b>310397</b>
5/8	1-5/8	3-1/2	5/8	0.12	<b>310400</b>
5/8	2-1/8	4	5/8	-	<b>310403</b>
5/8	2-1/8	4	5/8	0.03	<b>310407</b>
5/8	2-1/8	4	5/8	0.06	<b>310410</b>
5/8	2-1/8	4	5/8	0.09	<b>310412</b>
5/8	2-1/8	4	5/8	0.12	<b>310414</b>
5/8	2-1/2	5	5/8	-	<b>310416</b>
5/8	2-1/2	5	5/8	0.03	<b>310420</b>
5/8	2-1/2	5	5/8	0.06	<b>310422</b>
5/8	2-1/2	5	5/8	0.09	<b>310425</b>
5/8	2-1/2	5	5/8	0.12	<b>310429</b>
3/4	1	3	3/4	-	<b>310431</b>
3/4	1	3	3/4	0.03	<b>310434</b>
3/4	1	3	3/4	0.06	<b>310437</b>
3/4	1	3	3/4	0.09	<b>310441</b>
3/4	1	3	3/4	0.12	<b>310444</b>
3/4	1	3	3/4	0.25	<b>310447</b>
3/4	1-5/8	4	3/4	-	<b>310451</b>
3/4	1-5/8	4	3/4	0.03	<b>310455</b>
3/4	1-5/8	4	3/4	0.06	<b>310458</b>
3/4	1-5/8	4	3/4	0.09	<b>310461</b>
3/4	1-5/8	4	3/4	0.12	<b>310463</b>
3/4	1-5/8	4	3/4	0.25	<b>310467</b>
3/4	2-1/4	5	3/4	-	<b>310469</b>
3/4	2-1/4	5	3/4	0.03	<b>310473</b>
3/4	2-1/4	5	3/4	0.06	<b>310476</b>
3/4	2-1/4	5	3/4	0.09	<b>310479</b>
3/4	2-1/4	5	3/4	0.12	<b>310483</b>
3/4	2-1/4	5	3/4	0.25	<b>310485</b>
3/4	2-3/4	5	3/4	-	<b>310489</b>
3/4	2-3/4	5	3/4	0.03	<b>310491</b>
3/4	2-3/4	5	3/4	0.06	<b>310494</b>
3/4	2-3/4	5	3/4	0.09	<b>310496</b>
3/4	2-3/4	5	3/4	0.12	<b>310498</b>
3/4	2-3/4	5	3/4	0.25	<b>310502</b>
3/4	3-1/4	6	3/4	-	<b>310505</b>
3/4	3-1/4	6	3/4	0.03	<b>310509</b>
3/4	3-1/4	6	3/4	0.06	<b>310513</b>
3/4	3-1/4	6	3/4	0.09	<b>310515</b>
3/4	3-1/4	6	3/4	0.12	<b>310519</b>
3/4	3-1/4	6	3/4	0.25	<b>310521</b>
1	1-1/4	4	1	-	<b>310525</b>
1	1-1/4	4	1	0.03	<b>310529</b>
1	1-1/4	4	1	0.06	<b>310531</b>
1	1-1/4	4	1	0.09	<b>310534</b>
1	1-1/4	4	1	0.12	<b>310536</b>
1	1-1/4	4	1	0.25	<b>310538</b>
1	2	4	1	-	<b>310541</b>
1	2	4	1	0.03	<b>310545</b>
1	2	4	1	0.06	<b>310549</b>
1	2	4	1	0.09	<b>310553</b>
1	2	4	1	0.12	<b>310557</b>
1	2	4	1	0.25	<b>310559</b>
1	2-5/8	5	1	-	<b>310562</b>
1	2-5/8	5	1	0.03	<b>310565</b>
1	2-5/8	5	1	0.06	<b>310567</b>
1	2-5/8	5	1	0.09	<b>310569</b>
1	2-5/8	5	1	0.12	<b>310573</b>
1	2-5/8	5	1	0.25	<b>310576</b>
1	3-1/4	6	1	-	<b>310578</b>
1	3-1/4	6	1	0.03	<b>310582</b>
1	3-1/4	6	1	0.06	<b>310586</b>
1	3-1/4	6	1	0.09	<b>310590</b>
1	3-1/4	6	1	0.12	<b>310592</b>
1	3-1/4	6	1	0.25	<b>310596</b>

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



Series 2100		438   4FL   Square and Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1	4-1/4	7	1	-	<b>310600</b>
1	4-1/4	7	1	0.03	<b>310602</b>
1	4-1/4	7	1	0.06	<b>310605</b>
1	4-1/4	7	1	0.09	<b>310609</b>
1	4-1/4	7	1	0.12	<b>310613</b>
1	4-1/4	7	1	0.25	<b>310617</b>
1-1/4	1-1/2	4-1/2	1-1/4	-	<b>310621</b>
1-1/4	1-1/2	4-1/2	1-1/4	0.03	<b>310624</b>
1-1/4	1-1/2	4-1/2	1-1/4	0.06	<b>310628</b>
1-1/4	1-1/2	4-1/2	1-1/4	0.09	<b>310630</b>
1-1/4	1-1/2	4-1/2	1-1/4	0.12	<b>310632</b>
1-1/4	1-1/2	4-1/2	1-1/4	0.25	<b>310636</b>
1-1/4	2	4-1/2	1-1/4	-	<b>310640</b>
1-1/4	2	4-1/2	1-1/4	0.03	<b>310642</b>
1-1/4	2	4-1/2	1-1/4	0.06	<b>310644</b>
1-1/4	2	4-1/2	1-1/4	0.09	<b>310648</b>
1-1/4	2	4-1/2	1-1/4	0.12	<b>310651</b>
1-1/4	2	4-1/2	1-1/4	0.25	<b>310654</b>
1-1/4	2-5/8	6	1-1/4	-	<b>310657</b>
1-1/4	2-5/8	6	1-1/4	0.03	<b>310661</b>
1-1/4	2-5/8	6	1-1/4	0.06	<b>310664</b>
1-1/4	2-5/8	6	1-1/4	0.09	<b>310667</b>
1-1/4	2-5/8	6	1-1/4	0.12	<b>310671</b>
1-1/4	2-5/8	6	1-1/4	0.25	<b>310673</b>
1-1/4	4-1/2	7	1-1/4	-	<b>310676</b>
1-1/4	4-1/2	7	1-1/4	0.03	<b>310680</b>
1-1/4	4-1/2	7	1-1/4	0.06	<b>310683</b>
1-1/4	4-1/2	7	1-1/4	0.09	<b>310687</b>
1-1/4	4-1/2	7	1-1/4	0.12	<b>310690</b>
1-1/4	4-1/2	7	1-1/4	0.25	<b>310693</b>

\*bold numbers are EDPs for ordering

## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**<sup>®</sup>

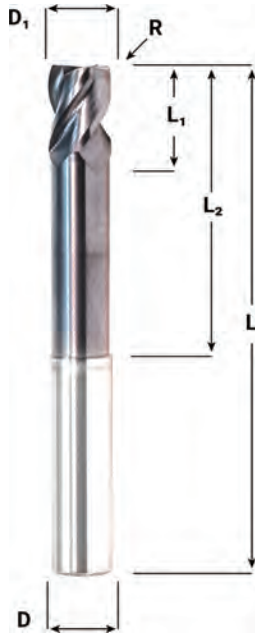
**CUSTOM  
COMES  
STANDARD**

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS



# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>PYSTL</h2> <h3>Unequal Index End Mill</h3> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Unequal index tool for Titanium, stainless and other gummy materials</li> <li>Suited for slotting and profiling milling operations</li> <li>Specialized edge honing</li> <li>Reduced neck</li> <li>SafeLock® shank available upon request</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	●	○	○	●	●	○	○	○	○

● Best ○ Good

## Series 2105 | 438RN | 4FL | Reduced Neck | Square And Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/8	3/16	3/8	2	1/8	-	310697
1/8	3/16	3/8	3	1/8	0.01	310701
1/8	3/16	3/8	3	1/8	0.02	310704
1/8	3/16	3/8	3	1/8	0.03	310706
1/8	3/16	1/2	3	1/8	-	310709
1/8	3/16	1/2	3	1/8	0.01	310711
1/8	3/16	1/2	3	1/8	0.02	310714
1/8	3/16	1/2	3	1/8	0.03	310717
1/8	3/16	3/4	3	1/8	-	310719
1/8	3/16	3/4	3	1/8	0.01	310722
1/8	3/16	3/4	3	1/8	0.02	310724
1/8	3/16	3/4	3	1/8	0.03	310727
3/16	1/4	1/2	3	3/16	-	310729
3/16	1/4	1/2	3	3/16	0.01	310732
3/16	1/4	1/2	3	3/16	0.02	310735
3/16	1/4	1/2	3	3/16	0.03	310738
3/16	1/4	3/4	3	3/16	-	310741
3/16	1/4	3/4	3	3/16	0.01	310745
3/16	1/4	3/4	3	3/16	0.02	310748
3/16	1/4	3/4	3	3/16	0.03	310750
3/16	1/4	1-1/8	3	3/16	-	310754
3/16	1/4	1-1/8	3	3/16	0.01	310758
3/16	1/4	1-1/8	3	3/16	0.02	310760
3/16	1/4	1-1/8	3	3/16	0.03	310762
1/4	3/8	3/4	4	1/4	-	310765
1/4	3/8	3/4	4	1/4	0.01	310767
1/4	3/8	3/4	4	1/4	0.02	310769
1/4	3/8	3/4	3	1/4	0.03	310772
1/4	3/8	3/4	4	1/4	0.06	310776
1/4	3/8	1-1/8	4	1/4	-	310780
1/4	3/8	1-1/8	4	1/4	0.01	310783
1/4	3/8	1-1/8	4	1/4	0.02	310787
1/4	3/8	1-1/8	4	1/4	0.03	310791
1/4	3/8	1-1/8	4	1/4	0.06	310794
1/4	3/8	2-1/8	4	1/4	-	310798
1/4	3/8	2-1/8	4	1/4	0.01	310802
1/4	3/8	2-1/8	4	1/4	0.02	310806
1/4	3/8	2-1/8	4	1/4	0.03	310810
1/4	3/8	2-1/8	4	1/4	0.06	310814
3/8	1/2	1-1/8	4	3/8	-	310817
3/8	1/2	1-1/8	4	3/8	0.02	310819
3/8	1/2	1-1/8	4	3/8	0.03	310821
3/8	1/2	1-1/8	4	3/8	0.06	310823
3/8	1/2	1-1/8	4	3/8	0.09	310825
3/8	1/2	2-1/8	4	3/8	-	310829

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



Series 2105		438RN   4FL   Reduced Neck   Square and Radius				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
3/8	1/2	2-1/8	4	3/8	0.02	310831
3/8	1/2	2-1/8	4	3/8	0.03	310835
3/8	1/2	2-1/8	4	3/8	0.06	310837
3/8	1/2	2-1/8	4	3/8	0.09	310839
3/8	1/2	3-1/8	6	3/8	-	310841
3/8	1/2	3-1/8	6	3/8	0.02	310843
3/8	1/2	3-1/8	6	3/8	0.03	310845
3/8	1/2	3-1/8	6	3/8	0.06	310848
3/8	1/2	3-1/8	6	3/8	0.09	310850
3/8	1/2	4-1/8	6	3/8	-	310853
3/8	1/2	4-1/8	6	3/8	0.02	310857
3/8	1/2	4-1/8	6	3/8	0.03	310860
3/8	1/2	4-1/8	6	3/8	0.06	310863
3/8	1/2	4-1/8	6	3/8	0.09	310866
1/2	5/8	1-1/2	4	1/2	-	310870
1/2	5/8	1-1/2	4	1/2	0.02	310874
1/2	5/8	1-1/2	4	1/2	0.06	310878
1/2	5/8	1-1/2	4	1/2	0.09	310881
1/2	5/8	1-1/2	4	1/2	0.12	310884
1/2	5/8	2-1/4	4	1/2	-	310888
1/2	5/8	2-1/4	4	1/2	0.02	310890
1/2	5/8	2-1/4	4	1/2	0.03	310893
1/2	5/8	2-1/4	4	1/2	0.06	310895
1/2	5/8	2-1/4	4	1/2	0.09	310897
1/2	5/8	2-1/4	4	1/2	0.12	310900
1/2	5/8	3-3/8	6	1/2	-	310903
1/2	5/8	3-3/8	6	1/2	0.02	310906
1/2	5/8	3-3/8	6	1/2	0.03	310910
1/2	5/8	3-3/8	6	1/2	0.06	310912
1/2	5/8	3-3/8	6	1/2	0.09	310915
1/2	5/8	3-3/8	6	1/2	0.12	310917
1/2	5/8	4-1/8	6	1/2	-	310921
1/2	5/8	4-1/8	6	1/2	0.02	310925
1/2	5/8	4-1/8	6	1/2	0.03	310927
1/2	5/8	4-1/8	6	1/2	0.06	310929
1/2	5/8	4-1/8	6	1/2	0.09	310933
1/2	5/8	4-1/8	6	1/2	0.12	310935
5/8	3/4	1-5/8	4	5/8	-	310937
5/8	3/4	1-5/8	4	5/8	0.03	310941
5/8	3/4	1-5/8	4	5/8	0.06	310943
5/8	3/4	1-5/8	4	5/8	0.09	310945
5/8	3/4	1-5/8	4	5/8	0.12	310949
5/8	3/4	2-3/8	6	5/8	-	310951
5/8	3/4	2-3/8	6	5/8	0.03	310955
5/8	3/4	2-3/8	6	5/8	0.06	310957
5/8	3/4	2-3/8	6	5/8	0.09	310961
5/8	3/4	2-3/8	6	5/8	0.12	310964
5/8	3/4	3-3/8	6	5/8	-	310968
5/8	3/4	3-3/8	6	5/8	0.03	310972
5/8	3/4	3-3/8	6	5/8	0.06	310975
5/8	3/4	3-3/8	6	5/8	0.09	310979
5/8	3/4	3-3/8	6	5/8	0.12	310982
5/8	3/4	4-1/8	6	5/8	-	310985
5/8	3/4	4-1/8	6	5/8	0.03	310987
5/8	3/4	4-1/8	6	5/8	0.06	310989
5/8	3/4	4-1/8	6	5/8	0.09	310992
5/8	3/4	4-1/8	6	5/8	0.12	310994
3/4	1	2	4	3/4	-	310997
3/4	1	2	4	3/4	0.03	310999
3/4	1	2	4	3/4	0.06	311002
3/4	1	2	4	3/4	0.09	311006
3/4	1	2	4	3/4	0.12	311010
3/4	1	2	4	3/4	0.19	311013
3/4	1	2	4	3/4	0.25	311016
3/4	1	2-1/2	6	3/4	-	311019
3/4	1	2-1/2	6	3/4	0.03	311023
3/4	1	2-1/2	6	3/4	0.06	311027
3/4	1	2-1/2	6	3/4	0.09	311031
3/4	1	2-1/2	6	3/4	0.12	311034
3/4	1	2-1/2	6	3/4	0.19	311037
3/4	1	2-1/2	6	3/4	0.25	311041
3/4	1	3-3/8	6	3/4	-	311043
3/4	1	3-3/8	6	3/4	0.03	311045
3/4	1	3-3/8	6	3/4	0.06	311049
3/4	1	3-3/8	6	3/4	0.09	311051
3/4	1	3-3/8	6	3/4	0.12	311053

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



Series 2105		438RN   4FL   Reduced Neck   Square and Radius				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
3/4	1	3-3/8	6	3/4	0.19	<b>311056</b>
3/4	1	3-3/8	6	3/4	0.25	<b>311059</b>
3/4	1	4-1/8	6	3/4	-	<b>311063</b>
3/4	1	4-1/8	6	3/4	0.03	<b>311067</b>
3/4	1	4-1/8	6	3/4	0.06	<b>311071</b>
3/4	1	4-1/8	6	3/4	0.09	<b>311075</b>
3/4	1	4-1/8	6	3/4	0.12	<b>311077</b>
3/4	1	4-1/8	6	3/4	0.19	<b>311079</b>
3/4	1	4-1/8	6	3/4	0.25	<b>311082</b>
1	1-1/4	2-1/4	4	1	-	<b>311084</b>
1	1-1/4	2-1/4	4	1	0.03	<b>311088</b>
1	1-1/4	2-1/4	4	1	0.06	<b>311090</b>
1	1-1/4	2-1/4	4	1	0.09	<b>311092</b>
1	1-1/4	2-1/4	4	1	0.12	<b>311096</b>
1	1-1/4	2-1/4	4	1	0.19	<b>311099</b>
1	1-1/4	2-1/4	4	1	0.25	<b>311102</b>
1	1-1/4	2-5/8	6	1	-	<b>311104</b>
1	1-1/4	2-5/8	6	1	0.03	<b>311108</b>
1	1-1/4	2-5/8	6	1	0.06	<b>311110</b>
1	1-1/4	2-5/8	6	1	0.09	<b>311114</b>
1	1-1/4	2-5/8	6	1	0.12	<b>311118</b>
1	1-1/4	2-5/8	6	1	0.19	<b>311121</b>
1	1-1/4	2-5/8	6	1	0.25	<b>311124</b>
1	1-1/4	3-3/8	6	1	-	<b>311127</b>
1	1-1/4	3-3/8	6	1	0.03	<b>311131</b>
1	1-1/4	3-3/8	6	1	0.06	<b>311135</b>
1	1-1/4	3-3/8	6	1	0.09	<b>311138</b>
1	1-1/4	3-3/8	6	1	0.12	<b>311142</b>
1	1-1/4	3-3/8	6	1	0.19	<b>311144</b>
1	1-1/4	3-3/8	6	1	0.25	<b>311146</b>
1	1-1/4	4-1/8	6	1	-	<b>311149</b>
1	1-1/4	4-1/8	6	1	0.03	<b>311152</b>
1	1-1/4	4-1/8	6	1	0.06	<b>311156</b>
1	1-1/4	4-1/8	6	1	0.09	<b>311158</b>
1	1-1/4	4-1/8	6	1	0.12	<b>311160</b>
1	1-1/4	4-1/8	6	1	0.19	<b>311163</b>
1	1-1/4	4-1/8	6	1	0.25	<b>311167</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

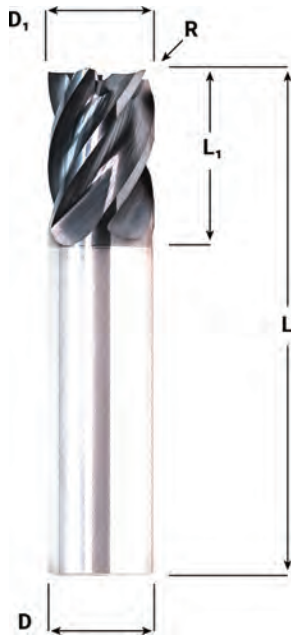
HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<h2>PYSTL</h2> <h3>Unequal Index End Mill</h3> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Unequal index tool for Titanium, stainless and other gummy materials</li> <li>Ideal for HEM profiling milling operations</li> <li>Specialized edge honing</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>VAR</td> </tr> <tr> <td>5FL</td> <td>RAD</td> </tr> <tr> <td>SQ</td> <td>h6</td> </tr> <tr> <td>FX3</td> <td>P 156</td> </tr> </table>	CARBIDE	VAR	5FL	RAD	SQ	h6	FX3	P 156
CARBIDE	VAR									
5FL	RAD									
SQ	h6									
FX3	P 156									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	●	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 2205 538 | 5FL | Square And Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/8	1/4	1-1/2	1/8	-	311348
1/8	1/4	1-1/2	1/8	0.01	311351
1/8	1/4	1-1/2	1/8	0.02	311353
1/8	1/4	1-1/2	1/8	0.03	311356
1/8	1/2	2	1/8	-	311358
1/8	1/2	2	1/8	0.01	311360
1/8	1/2	2	1/8	0.02	311362
1/8	1/2	2	1/8	0.03	311364
1/8	3/4	2-1/2	1/8	-	311367
1/8	3/4	2-1/2	1/8	0.01	311369
1/8	3/4	2-1/2	1/8	0.02	311371
3/16	5/16	2	3/16	-	311373
3/16	5/16	2	3/16	0.01	311375
3/16	5/16	2	3/16	0.02	311378
3/16	3/4	2-1/2	3/16	-	311395
3/16	3/4	2-1/2	3/16	0.01	311398
3/16	3/4	2-1/2	3/16	0.02	311401
3/16	3/4	2-1/2	3/16	0.03	311403
3/16	9/16	2	3/16	-	311381
3/16	9/16	2	3/16	0.01	311384
3/16	9/16	2	3/16	0.02	311388
3/16	9/16	2	3/16	0.03	311392
1/4	3/8	2	1/4	-	311405
1/4	3/8	2	1/4	0.01	311408
1/4	3/8	2	1/4	0.02	311410
1/4	3/8	2	1/4	0.03	311413
1/4	3/8	2	1/4	0.06	311417
1/4	1/2	2-1/2	1/4	-	311421
1/4	1/2	2-1/2	1/4	0.01	311423
1/4	1/2	2-1/2	1/4	0.02	311425
1/4	1/2	2-1/2	1/4	0.03	311427
1/4	1/2	2-1/2	1/4	0.06	311430
1/4	3/4	2-1/2	1/4	-	311432
1/4	3/4	2-1/2	1/4	0.01	311434
1/4	3/4	2-1/2	1/4	0.02	311438
1/4	3/4	2-1/2	1/4	0.03	311440
1/4	3/4	2-1/2	1/4	0.06	311444
1/4	1	3	1/4	-	311446
1/4	1	3	1/4	0.01	311448
1/4	1	3	1/4	0.02	311452
1/4	1	3	1/4	0.03	311454
1/4	1	3	1/4	0.06	311458
1/4	1-1/4	3	1/4	-	311461
1/4	1-1/4	3	1/4	0.01	311464
1/4	1-1/4	3	1/4	0.02	311467

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

Series 2205		538   5FL   Square and Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/4	1-1/4	3	1/4	0.03	<b>311469</b>
1/4	1-1/4	3	1/4	0.06	<b>311473</b>
5/16	7/16	2	5/16	-	<b>311477</b>
5/16	7/16	2	5/16	0.01	<b>311480</b>
5/16	7/16	2	5/16	0.02	<b>311484</b>
5/16	7/16	2	5/16	0.03	<b>311486</b>
5/16	7/16	2	5/16	0.06	<b>311489</b>
5/16	13/16	2-1/2	5/16	-	<b>311491</b>
5/16	13/16	2-1/2	5/16	0.01	<b>311495</b>
5/16	13/16	2-1/2	5/16	0.02	<b>311499</b>
5/16	13/16	2-1/2	5/16	0.03	<b>311501</b>
5/16	13/16	2-1/2	5/16	0.06	<b>311503</b>
5/16	1	3	5/16	-	<b>311505</b>
5/16	1	3	5/16	0.01	<b>311509</b>
5/16	1	3	5/16	0.02	<b>311512</b>
5/16	1	3	5/16	0.03	<b>311514</b>
5/16	1	3	5/16	0.06	<b>311518</b>
3/8	1/2	2	3/8	-	<b>311522</b>
3/8	1/2	2	3/8	0.01	<b>311524</b>
3/8	1/2	2	3/8	0.02	<b>311528</b>
3/8	1/2	2	3/8	0.03	<b>311531</b>
3/8	1/2	2	3/8	0.06	<b>311535</b>
3/8	1/2	2	3/8	0.09	<b>311537</b>
3/8	1	2-1/2	3/8	-	<b>311540</b>
3/8	1	2-1/2	3/8	0.01	<b>311543</b>
3/8	1	2-1/2	3/8	0.02	<b>311547</b>
3/8	1	2-1/2	3/8	0.03	<b>311550</b>
3/8	1	2-1/2	3/8	0.06	<b>311553</b>
3/8	1	2-1/2	3/8	0.09	<b>311556</b>
3/8	1-1/4	3	3/8	-	<b>311558</b>
3/8	1-1/4	3	3/8	0.01	<b>311562</b>
3/8	1-1/4	3	3/8	0.02	<b>311566</b>
3/8	1-1/4	3	3/8	0.03	<b>311568</b>
3/8	1-1/4	3	3/8	0.06	<b>311570</b>
3/8	1-1/4	3	3/8	0.09	<b>311574</b>
3/8	1-1/2	4	3/8	-	<b>311576</b>
3/8	1-1/2	4	3/8	0.01	<b>311578</b>
3/8	1-1/2	4	3/8	0.02	<b>311582</b>
3/8	1-1/2	4	3/8	0.03	<b>311586</b>
3/8	1-1/2	4	3/8	0.06	<b>311588</b>
3/8	1-1/2	4	3/8	0.09	<b>311590</b>
1/2	5/8	2-1/2	1/2	-	<b>311594</b>
1/2	5/8	2-1/2	1/2	0.02	<b>311597</b>
1/2	5/8	2-1/2	1/2	0.03	<b>311601</b>
1/2	5/8	2-1/2	1/2	0.06	<b>311604</b>
1/2	5/8	2-1/2	1/2	0.09	<b>311606</b>
1/2	5/8	2-1/2	1/2	0.12	<b>311610</b>
1/2	1	3	1/2	-	<b>311613</b>
1/2	1	3	1/2	0.02	<b>311615</b>
1/2	1	3	1/2	0.03	<b>311619</b>
1/2	1	3	1/2	0.06	<b>311622</b>
1/2	1	3	1/2	0.09	<b>311626</b>
1/2	1	3	1/2	0.12	<b>311630</b>
1/2	1-1/4	3	1/2	-	<b>311634</b>
1/2	1-1/4	3	1/2	0.02	<b>311637</b>
1/2	1-1/4	3	1/2	0.03	<b>311640</b>
1/2	1-1/4	3	1/2	0.06	<b>311642</b>
1/2	1-1/4	3	1/2	0.09	<b>311644</b>
1/2	1-1/4	3	1/2	0.12	<b>311648</b>
1/2	1-5/8	4	1/2	-	<b>311652</b>
1/2	1-5/8	4	1/2	0.02	<b>311654</b>
1/2	1-5/8	4	1/2	0.03	<b>311658</b>
1/2	1-5/8	4	1/2	0.06	<b>311660</b>
1/2	1-5/8	4	1/2	0.09	<b>311664</b>
1/2	1-5/8	4	1/2	0.12	<b>311666</b>
1/2	2	4	1/2	-	<b>311670</b>
1/2	2	4	1/2	0.02	<b>311674</b>
1/2	2	4	1/2	0.03	<b>311678</b>
1/2	2	4	1/2	0.06	<b>311681</b>
1/2	2	4	1/2	0.09	<b>311683</b>
1/2	2	4	1/2	0.12	<b>311687</b>
5/8	3/4	3	5/8	-	<b>311691</b>
5/8	3/4	3	5/8	0.03	<b>311695</b>
5/8	3/4	3	5/8	0.06	<b>311699</b>
5/8	3/4	3	5/8	0.09	<b>311703</b>
5/8	3/4	3	5/8	0.12	<b>311705</b>

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



## Series 2205 538 | 5FL | Square and Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
5/8	1-1/4	3-1/2	5/8	-	311708
5/8	1-1/4	3-1/2	5/8	0.03	311712
5/8	1-1/4	3-1/2	5/8	0.06	311715
5/8	1-1/4	3-1/2	5/8	0.09	311719
5/8	1-1/4	3-1/2	5/8	0.12	311723
5/8	1-5/8	3-1/2	5/8	-	311725
5/8	1-5/8	3-1/2	5/8	0.03	311727
5/8	1-5/8	3-1/2	5/8	0.06	311730
5/8	1-5/8	3-1/2	5/8	0.09	311734
5/8	1-5/8	3-1/2	5/8	0.12	311737
5/8	2-1/8	4	5/8	-	311741
5/8	2-1/8	4	5/8	0.03	311743
5/8	2-1/8	4	5/8	0.06	311745
5/8	2-1/8	4	5/8	0.09	311748
5/8	2-1/8	4	5/8	0.12	311750
5/8	2-1/2	5	5/8	-	311754
5/8	2-1/2	5	5/8	0.03	311756
5/8	2-1/2	5	5/8	0.06	311759
5/8	2-1/2	5	5/8	0.09	311761
5/8	2-1/2	5	5/8	0.12	311764
3/4	1	3	3/4	-	311767
3/4	1	3	3/4	0.03	311771
3/4	1	3	3/4	0.06	311773
3/4	1	3	3/4	0.09	311776
3/4	1	3	3/4	0.12	311778
3/4	1	3	3/4	0.25	311780
3/4	1-5/8	4	3/4	-	311782
3/4	1-5/8	4	3/4	0.03	311785
3/4	1-5/8	4	3/4	0.06	311787
3/4	1-5/8	4	3/4	0.09	311789
3/4	1-5/8	4	3/4	0.12	311793
3/4	1-5/8	4	3/4	0.25	311796
3/4	2-1/4	5	3/4	-	311800
3/4	2-1/4	5	3/4	0.03	311804
3/4	2-1/4	5	3/4	0.06	311808
3/4	2-1/4	5	3/4	0.09	311810
3/4	2-1/4	5	3/4	0.12	311812
3/4	2-1/4	5	3/4	0.25	311814
3/4	2-3/4	5	3/4	-	311818
3/4	2-3/4	5	3/4	0.03	311820
3/4	2-3/4	5	3/4	0.06	311824
3/4	2-3/4	5	3/4	0.09	311826
3/4	2-3/4	5	3/4	0.12	311828
3/4	2-3/4	5	3/4	0.25	311831
3/4	3-1/4	6	3/4	-	311833
3/4	3-1/4	6	3/4	0.03	311837
3/4	3-1/4	6	3/4	0.06	311839
3/4	3-1/4	6	3/4	0.09	311842
3/4	3-1/4	6	3/4	0.12	311846
3/4	3-1/4	6	3/4	0.25	311848
1	1-1/4	4	1	-	311852
1	1-1/4	4	1	0.03	311855
1	1-1/4	4	1	0.06	311857
1	1-1/4	4	1	0.09	311860
1	1-1/4	4	1	0.12	311864
1	1-1/4	4	1	0.25	311868
1	2	4	1	-	311872
1	2	4	1	0.03	311876
1	2	4	1	0.06	311878
1	2	4	1	0.09	311881
1	2	4	1	0.12	311884
1	2	4	1	0.25	311888
1	2-5/8	5	1	-	311890
1	2-5/8	5	1	0.03	311893
1	2-5/8	5	1	0.06	311896
1	2-5/8	5	1	0.09	311900
1	2-5/8	5	1	0.12	311902
1	2-5/8	5	1	0.25	311905
1	3-1/4	6	1	-	311909
1	3-1/4	6	1	0.03	311913
1	3-1/4	6	1	0.06	311915
1	3-1/4	6	1	0.09	311918
1	3-1/4	6	1	0.12	311920
1	3-1/4	6	1	0.25	311924
1	4-1/4	7	1	-	311927
1	4-1/4	7	1	0.03	311931

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INTRO

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INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



INTRO

MILLING

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INSERTS

Series 2205		538   5FL   Square and Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1	4-1/4	7	1	0.06	<b>311933</b>
1	4-1/4	7	1	0.09	<b>311935</b>
1	4-1/4	7	1	0.12	<b>311937</b>
1	4-1/4	7	1	0.25	<b>311940</b>
1-1/4	1-1/2	4-1/2	1-1/4	-	<b>311943</b>
1-1/4	1-1/2	4-1/2	1-1/4	0.03	<b>311947</b>
1-1/4	1-1/2	4-1/2	1-1/4	0.06	<b>311949</b>
1-1/4	1-1/2	4-1/2	1-1/4	0.09	<b>311951</b>
1-1/4	1-1/2	4-1/2	1-1/4	0.12	<b>311955</b>
1-1/4	1-1/2	4-1/2	1-1/4	0.25	<b>311957</b>
1-1/4	2	4-1/2	1-1/4	-	<b>311961</b>
1-1/4	2	4-1/2	1-1/4	0.03	<b>311964</b>
1-1/4	2	4-1/2	1-1/4	0.06	<b>311966</b>
1-1/4	2	4-1/2	1-1/4	0.09	<b>311968</b>
1-1/4	2	4-1/2	1-1/4	0.12	<b>311971</b>
1-1/4	2	4-1/2	1-1/4	0.25	<b>311975</b>
1-1/4	2-5/8	6	1-1/4	-	<b>311977</b>
1-1/4	2-5/8	6	1-1/4	0.03	<b>311979</b>
1-1/4	2-5/8	6	1-1/4	0.06	<b>311983</b>
1-1/4	2-5/8	6	1-1/4	0.09	<b>311985</b>
1-1/4	2-5/8	6	1-1/4	0.12	<b>311987</b>
1-1/4	2-5/8	6	1-1/4	0.25	<b>311991</b>
1-1/4	4-1/2	7	1-1/4	-	<b>311993</b>
1-1/4	4-1/2	7	1-1/4	0.03	<b>311995</b>
1-1/4	4-1/2	7	1-1/4	0.06	<b>311998</b>
1-1/4	4-1/2	7	1-1/4	0.09	<b>312001</b>
1-1/4	4-1/2	7	1-1/4	0.12	<b>312003</b>
1-1/4	4-1/2	7	1-1/4	0.25	<b>312005</b>

\*bold numbers are EDPs for ordering

## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**<sup>®</sup>

**CUSTOM  
COMES  
STANDARD**

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



INTRO

MILLING

SPECIALTY

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INSERTS



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<h1>PYSTL</h1> <h2>Unequal Index End Mill</h2> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Unequal index tool for Titanium, stainless and other gummy materials</li> <li>Ideal for HEM profiling milling operations</li> <li>Specialized edge honing</li> <li>Reduced neck</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>VAR</td> </tr> <tr> <td>5FL</td> <td>RAD</td> </tr> <tr> <td>SQ</td> <td>Necked</td> </tr> <tr> <td>h6</td> <td>FX3</td> </tr> <tr> <td>P 156</td> <td></td> </tr> </table>	CARBIDE	VAR	5FL	RAD	SQ	Necked	h6	FX3	P 156	
CARBIDE	VAR											
5FL	RAD											
SQ	Necked											
h6	FX3											
P 156												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	●	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 2213 538RN | 5FL | Reduced Neck | Square And Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/8	3/16	3/8	2	1/8	0.02	<b>312009</b>
1/8	3/16	3/8	2	1/8	0.03	<b>312011</b>
1/8	3/16	1/2	2	1/8	-	<b>312013</b>
1/8	3/16	1/2	2	1/8	0.01	<b>312015</b>
1/8	3/16	1/2	2	1/8	0.02	<b>312018</b>
1/8	3/16	1/2	2	1/8	0.03	<b>312022</b>
1/8	3/16	3/4	2-1/2	1/8	-	<b>312025</b>
1/8	3/16	3/4	2-1/2	1/8	0.01	<b>312029</b>
1/8	3/16	3/4	2-1/2	1/8	0.02	<b>312033</b>
1/8	3/16	3/4	2-1/2	1/8	0.03	<b>312036</b>
3/16	1/4	1/2	2	3/16	-	<b>312038</b>
3/16	1/4	1/2	2	3/16	0.01	<b>312041</b>
3/16	1/4	1/2	2	3/16	0.02	<b>312044</b>
3/16	1/4	1/2	2	3/16	0.03	<b>312046</b>
3/16	1/4	3/4	2-1/2	3/16	-	<b>312050</b>
3/16	1/4	3/4	2-1/2	3/16	0.01	<b>312053</b>
3/16	1/4	3/4	2-1/2	3/16	0.02	<b>312056</b>
3/16	1/4	3/4	2-1/2	3/16	0.03	<b>312060</b>
3/16	1/4	1-1/8	2-1/2	3/16	-	<b>312064</b>
3/16	1/4	1-1/8	2-1/2	3/16	0.01	<b>312066</b>
3/16	1/4	1-1/8	2-1/2	3/16	0.02	<b>312068</b>
3/16	1/4	1-1/8	2-1/2	3/16	0.03	<b>312071</b>
1/4	3/8	3/4	4	1/4	-	<b>312073</b>
1/4	3/8	3/4	4	1/4	0.01	<b>312075</b>
1/4	3/8	3/4	4	1/4	0.02	<b>312079</b>
1/4	3/8	3/4	4	1/4	0.03	<b>312082</b>
1/4	3/8	3/4	4	1/4	0.06	<b>312086</b>
1/4	3/8	1-1/8	4	1/4	-	<b>312090</b>
1/4	3/8	1-1/8	4	1/4	0.01	<b>312093</b>
1/4	3/8	1-1/8	4	1/4	0.02	<b>312096</b>
1/4	3/8	1-1/8	4	1/4	0.03	<b>312099</b>
1/4	3/8	1-1/8	4	1/4	0.06	<b>312103</b>
1/4	3/8	2-1/8	4	1/4	-	<b>312106</b>
1/4	3/8	2-1/8	4	1/4	0.01	<b>312109</b>
1/4	3/8	2-1/8	4	1/4	0.02	<b>312113</b>
1/4	3/8	2-1/8	4	1/4	0.03	<b>312116</b>
1/4	3/8	2-1/8	4	1/4	0.06	<b>312118</b>
3/8	1/2	1-1/8	4	3/8	-	<b>312122</b>
3/8	1/2	1-1/8	4	3/8	0.02	<b>312126</b>
3/8	1/2	1-1/8	4	3/8	0.03	<b>312130</b>
3/8	1/2	1-1/8	4	3/8	0.06	<b>312134</b>
3/8	1/2	1-1/8	4	3/8	0.09	<b>312137</b>
3/8	1/2	2-1/8	4	3/8	-	<b>312140</b>
3/8	1/2	2-1/8	4	3/8	0.02	<b>312143</b>
3/8	1/2	2-1/8	4	3/8	0.03	<b>312145</b>

\*bold numbers are EDPs for ordering



# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



Series 2213		538RN   5FL   Reduced Neck   Square and Radius				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
3/8	1/2	2-1/8	4	3/8	0.06	312149
3/8	1/2	2-1/8	4	3/8	0.09	312153
3/8	1/2	3-1/8	6	3/8	-	312155
3/8	1/2	3-1/8	6	3/8	0.02	312157
3/8	1/2	3-1/8	6	3/8	0.03	312159
3/8	1/2	3-1/8	6	3/8	0.06	312161
3/8	1/2	3-1/8	6	3/8	0.09	312164
3/8	1/2	4-1/8	6	3/8	-	312168
3/8	1/2	4-1/8	6	3/8	0.02	312171
3/8	1/2	4-1/8	6	3/8	0.03	312174
3/8	1/2	4-1/8	6	3/8	0.06	312176
3/8	1/2	4-1/8	6	3/8	0.09	312180
1/2	5/8	1-1/2	4	1/2	-	312182
1/2	5/8	1-1/2	4	1/2	0.02	312184
1/2	5/8	1-1/2	4	1/2	0.06	312187
1/2	5/8	1-1/2	4	1/2	0.09	312190
1/2	5/8	1-1/2	4	1/2	0.12	312193
1/2	5/8	2-1/4	4	1/2	-	312197
1/2	5/8	2-1/4	4	1/2	0.02	312199
1/2	5/8	2-1/4	4	1/2	0.03	312203
1/2	5/8	2-1/4	4	1/2	0.06	312207
1/2	5/8	2-1/4	4	1/2	0.09	312209
1/2	5/8	2-1/4	4	1/2	0.12	312212
1/2	5/8	3-3/8	6	1/2	-	312214
1/2	5/8	3-3/8	6	1/2	0.02	312217
1/2	5/8	3-3/8	6	1/2	0.03	312220
1/2	5/8	3-3/8	6	1/2	0.06	312222
1/2	5/8	3-3/8	6	1/2	0.09	312226
1/2	5/8	3-3/8	6	1/2	0.12	312228
1/2	5/8	4-1/8	6	1/2	-	312230
1/2	5/8	4-1/8	6	1/2	0.02	312233
1/2	5/8	4-1/8	6	1/2	0.03	312237
1/2	5/8	4-1/8	6	1/2	0.06	312241
1/2	5/8	4-1/8	6	1/2	0.09	312244
1/2	5/8	4-1/8	6	1/2	0.12	312248
5/8	3/4	1-5/8	4	5/8	-	312251
5/8	3/4	1-5/8	4	5/8	0.03	312253
5/8	3/4	1-5/8	4	5/8	0.06	312256
5/8	3/4	1-5/8	4	5/8	0.09	312259
5/8	3/4	1-5/8	4	5/8	0.12	312261
5/8	3/4	2-3/8	6	5/8	-	312263
5/8	3/4	2-3/8	6	5/8	0.03	312267
5/8	3/4	2-3/8	6	5/8	0.06	312270
5/8	3/4	2-3/8	6	5/8	0.09	312273
5/8	3/4	2-3/8	6	5/8	0.12	312275
5/8	3/4	3-3/8	6	5/8	-	312277
5/8	3/4	3-3/8	6	5/8	0.03	312279
5/8	3/4	3-3/8	6	5/8	0.06	312282
5/8	3/4	3-3/8	6	5/8	0.09	312286
5/8	3/4	3-3/8	6	5/8	0.12	312290
5/8	3/4	4-1/8	6	5/8	-	312293
5/8	3/4	4-1/8	6	5/8	0.03	312297
5/8	3/4	4-1/8	6	5/8	0.06	312300
5/8	3/4	4-1/8	6	5/8	0.09	312302
5/8	3/4	4-1/8	6	5/8	0.12	312306
3/4	1	2	4	3/4	-	312309
3/4	1	2	4	3/4	0.03	312312
3/4	1	2	4	3/4	0.06	312314
3/4	1	2	4	3/4	0.09	312318
3/4	1	2	4	3/4	0.12	312322
3/4	1	2	4	3/4	0.19	312325
3/4	1	2	4	3/4	0.25	312329
3/4	1	2-1/2	6	3/4	-	312333
3/4	1	2-1/2	6	3/4	0.03	312335
3/4	1	2-1/2	6	3/4	0.06	312338
3/4	1	2-1/2	6	3/4	0.09	312340
3/4	1	2-1/2	6	3/4	0.12	312342
3/4	1	2-1/2	6	3/4	0.19	312345
3/4	1	2-1/2	6	3/4	0.25	312349
3/4	1	3-3/8	6	3/4	-	312353
3/4	1	3-3/8	6	3/4	0.03	312357
3/4	1	3-3/8	6	3/4	0.06	312360
3/4	1	3-3/8	6	3/4	0.09	312364
3/4	1	3-3/8	6	3/4	0.12	312366
3/4	1	3-3/8	6	3/4	0.19	312370
3/4	1	3-3/8	6	3/4	0.25	312372

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



## Series 2213

## 538RN | 5FL | Reduced Neck | Square and Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
3/4	1	4-1/8	6	3/4	-	<b>312374</b>
3/4	1	4-1/8	6	3/4	0.03	<b>312378</b>
3/4	1	4-1/8	6	3/4	0.06	<b>312381</b>
3/4	1	4-1/8	6	3/4	0.09	<b>312385</b>
3/4	1	4-1/8	6	3/4	0.12	<b>312388</b>
3/4	1	4-1/8	6	3/4	0.19	<b>312391</b>
3/4	1	4-1/8	6	3/4	0.25	<b>312394</b>
1	1-1/4	2-1/4	4	1	-	<b>312398</b>
1	1-1/4	2-1/4	4	1	0.03	<b>312401</b>
1	1-1/4	2-1/4	4	1	0.06	<b>312404</b>
1	1-1/4	2-1/4	4	1	0.09	<b>312408</b>
1	1-1/4	2-1/4	4	1	0.12	<b>312411</b>
1	1-1/4	2-1/4	4	1	0.19	<b>312415</b>
1	1-1/4	2-1/4	4	1	0.25	<b>312417</b>
1	1-1/4	2-5/8	6	1	-	<b>312419</b>
1	1-1/4	2-5/8	6	1	0.03	<b>312423</b>
1	1-1/4	2-5/8	6	1	0.06	<b>312425</b>
1	1-1/4	2-5/8	6	1	0.09	<b>312428</b>
1	1-1/4	2-5/8	6	1	0.12	<b>312432</b>
1	1-1/4	2-5/8	6	1	0.19	<b>312436</b>
1	1-1/4	2-5/8	6	1	0.25	<b>312438</b>
1	1-1/4	3-3/8	6	1	-	<b>312441</b>
1	1-1/4	3-3/8	6	1	0.03	<b>312444</b>
1	1-1/4	3-3/8	6	1	0.06	<b>312448</b>
1	1-1/4	3-3/8	6	1	0.09	<b>312451</b>
1	1-1/4	3-3/8	6	1	0.12	<b>312455</b>
1	1-1/4	3-3/8	6	1	0.19	<b>312458</b>
1	1-1/4	3-3/8	6	1	0.25	<b>312461</b>
1	1-1/4	4-1/8	6	1	-	<b>312463</b>
1	1-1/4	4-1/8	6	1	0.03	<b>312467</b>
1	1-1/4	4-1/8	6	1	0.06	<b>312470</b>
1	1-1/4	4-1/8	6	1	0.09	<b>312474</b>
1	1-1/4	4-1/8	6	1	0.12	<b>312477</b>
1	1-1/4	4-1/8	6	1	0.19	<b>312480</b>
1	1-1/4	4-1/8	6	1	0.25	<b>312484</b>
1-1/4	1-1/2	2-1/4	5	1-1/4	-	<b>312487</b>
1-1/4	1-1/2	2-1/4	5	1-1/4	0.03	<b>312490</b>
1-1/4	1-1/2	2-1/4	5	1-1/4	0.06	<b>312493</b>
1-1/4	1-1/2	2-1/4	5	1-1/4	0.09	<b>312495</b>
1-1/4	1-1/2	2-1/4	5	1-1/4	0.12	<b>312499</b>
1-1/4	1-1/2	2-1/4	5	1-1/4	0.19	<b>312501</b>
1-1/4	1-1/2	2-1/4	5	1-1/4	0.25	<b>312505</b>
1-1/4	1-1/2	2-5/8	6	1-1/4	-	<b>312507</b>
1-1/4	1-1/2	2-5/8	6	1-1/4	0.03	<b>312510</b>
1-1/4	1-1/2	2-5/8	6	1-1/4	0.06	<b>312514</b>
1-1/4	1-1/2	2-5/8	6	1-1/4	0.09	<b>312517</b>
1-1/4	1-1/2	2-5/8	6	1-1/4	0.12	<b>312521</b>
1-1/4	1-1/2	2-5/8	6	1-1/4	0.19	<b>312525</b>
1-1/4	1-1/2	2-5/8	6	1-1/4	0.25	<b>312528</b>
1-1/4	1-1/2	3-3/8	6	1-1/4	-	<b>312532</b>
1-1/4	1-1/2	3-3/8	6	1-1/4	0.03	<b>312536</b>
1-1/4	1-1/2	3-3/8	6	1-1/4	0.06	<b>312540</b>
1-1/4	1-1/2	3-3/8	6	1-1/4	0.09	<b>312544</b>
1-1/4	1-1/2	3-3/8	6	1-1/4	0.12	<b>312547</b>
1-1/4	1-1/2	3-3/8	6	1-1/4	0.19	<b>312549</b>
1-1/4	1-1/2	3-3/8	6	1-1/4	0.25	<b>312551</b>
1-1/4	1-1/2	4-1/8	6	1-1/4	-	<b>312553</b>
1-1/4	1-1/2	4-1/8	6	1-1/4	0.03	<b>312556</b>
1-1/4	1-1/2	4-1/8	6	1-1/4	0.06	<b>312558</b>
1-1/4	1-1/2	4-1/8	6	1-1/4	0.09	<b>312560</b>
1-1/4	1-1/2	4-1/8	6	1-1/4	0.12	<b>312564</b>
1-1/4	1-1/2	4-1/8	6	1-1/4	0.19	<b>312568</b>
1-1/4	1-1/2	4-1/8	6	1-1/4	0.25	<b>312571</b>

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<h1>PYSTL</h1> <h2>Equal Index End Mill</h2> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Ideal tool for Titanium, stainless and other gummy materials</li> <li>Well suited for slotting and profiling milling operations</li> <li>Specialized edge honing</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>38°</td> </tr> <tr> <td>7FL</td> <td>RAD</td> </tr> <tr> <td>SQ</td> <td>h6</td> </tr> <tr> <td>FX3</td> <td>P 157</td> </tr> </table>	CARBIDE	38°	7FL	RAD	SQ	h6	FX3	P 157
CARBIDE	38°									
7FL	RAD									
SQ	h6									
FX3	P 157									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	●	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 2215 | 738 | 7FL | Square And Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
3/8	1/2	2	3/8	-	312575
3/8	1/2	2	3/8	0.03	312577
3/8	1/2	2	3/8	0.06	312581
3/8	1	2-1/2	3/8	-	312585
3/8	1	2-1/2	3/8	0.03	312589
3/8	1	2-1/2	3/8	0.06	312591
3/8	1-1/4	3	3/8	-	312595
3/8	1-1/4	3	3/8	0.03	312597
3/8	1-1/4	3	3/8	0.06	312599
3/8	1-1/2	4	3/8	-	312603
3/8	1-1/2	4	3/8	0.03	312606
3/8	1-1/2	4	3/8	0.06	312608
3/8	2-1/2	6	3/8	-	312610
3/8	2-1/2	6	3/8	0.03	312612
3/8	2-1/2	6	3/8	0.06	312614
1/2	3/4	2-1/2	1/2	-	312616
1/2	3/4	2-1/2	1/2	0.03	312620
1/2	3/4	2-1/2	1/2	0.06	312624
1/2	3/4	2-1/2	1/2	0.09	312628
1/2	1-1/4	3	1/2	-	312632
1/2	1-1/4	3	1/2	0.03	312636
1/2	1-1/4	3	1/2	0.06	312638
1/2	1-1/4	3	1/2	0.09	312642
1/2	2	4	1/2	-	312645
1/2	2	4	1/2	0.03	312649
1/2	2	4	1/2	0.06	312652
1/2	2	4	1/2	0.09	312654
1/2	3-1/4	6	1/2	-	312657
1/2	3-1/4	6	1/2	0.03	312659
1/2	3-1/4	6	1/2	0.06	312662
1/2	3-1/4	6	1/2	0.09	312664
5/8	3/4	3	5/8	-	312666
5/8	3/4	3	5/8	0.03	312669
5/8	3/4	3	5/8	0.06	312672
5/8	3/4	3	5/8	0.09	312674
5/8	3/4	3	5/8	0.12	312676
5/8	1-5/8	3-1/2	5/8	-	312679
5/8	1-5/8	3-1/2	5/8	0.03	312681
5/8	1-5/8	3-1/2	5/8	0.06	312684
5/8	1-5/8	3-1/2	5/8	0.09	312688
5/8	1-5/8	3-1/2	5/8	0.12	312692
5/8	2	5	5/8	-	312695
5/8	2	5	5/8	0.03	312697
5/8	2	5	5/8	0.06	312699
5/8	2	5	5/8	0.09	312701

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Stainless, Titanium, Steel And Other Ferrous Alloys



## Series 2215

## 738 | 7FL | Square and Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
5/8	2	5	5/8	0.12	<b>312705</b>
5/8	3-1/4	6	5/8	-	<b>312708</b>
5/8	3-1/4	6	5/8	0.03	<b>312710</b>
5/8	3-1/4	6	5/8	0.06	<b>312714</b>
5/8	3-1/4	6	5/8	0.09	<b>312718</b>
5/8	3-1/4	6	5/8	0.12	<b>312720</b>
3/4	1	3	3/4	-	<b>312724</b>
3/4	1	3	3/4	0.03	<b>312726</b>
3/4	1	3	3/4	0.06	<b>312728</b>
3/4	1	3	3/4	0.09	<b>312730</b>
3/4	1	3	3/4	0.12	<b>312732</b>
3/4	1-5/8	4	3/4	-	<b>312736</b>
3/4	1-5/8	4	3/4	0.03	<b>312739</b>
3/4	1-5/8	4	3/4	0.06	<b>312742</b>
3/4	1-5/8	4	3/4	0.09	<b>312744</b>
3/4	1-5/8	4	3/4	0.12	<b>312746</b>
3/4	2-1/4	5	3/4	-	<b>312749</b>
3/4	2-1/4	5	3/4	0.03	<b>312753</b>
3/4	2-1/4	5	3/4	0.06	<b>312757</b>
3/4	2-1/4	5	3/4	0.09	<b>312759</b>
3/4	2-1/4	5	3/4	0.12	<b>312761</b>
3/4	3-1/4	6	3/4	-	<b>312764</b>
3/4	3-1/4	6	3/4	0.03	<b>312766</b>
3/4	3-1/4	6	3/4	0.06	<b>312770</b>
3/4	3-1/4	6	3/4	0.09	<b>312773</b>
3/4	3-1/4	6	3/4	0.12	<b>312777</b>
1	1-1/4	4	1	-	<b>312781</b>
1	1-1/4	4	1	0.03	<b>312783</b>
1	1-1/4	4	1	0.06	<b>312787</b>
1	1-1/4	4	1	0.09	<b>312791</b>
1	1-1/4	4	1	0.12	<b>312793</b>
1	2	5	1	-	<b>312795</b>
1	2	5	1	0.03	<b>312798</b>
1	2	5	1	0.06	<b>312800</b>
1	2	5	1	0.09	<b>312802</b>
1	2	5	1	0.12	<b>312804</b>
1	3-1/4	6	1	-	<b>312807</b>
1	3-1/4	6	1	0.03	<b>312809</b>
1	3-1/4	6	1	0.06	<b>312811</b>
1	3-1/4	6	1	0.09	<b>312815</b>
1	3-1/4	6	1	0.12	<b>312818</b>
1	4-1/8	7	1	-	<b>312821</b>
1	4-1/8	7	1	0.03	<b>312824</b>
1	4-1/8	7	1	0.06	<b>312828</b>
1	4-1/8	7	1	0.09	<b>312830</b>
1	4-1/8	7	1	0.12	<b>312834</b>
1-1/4	2	4-1/2	1-1/4	-	<b>312836</b>
1-1/4	2	4-1/2	1-1/4	0.03	<b>312839</b>
1-1/4	2	4-1/2	1-1/4	0.06	<b>312842</b>
1-1/4	2	4-1/2	1-1/4	0.09	<b>312846</b>
1-1/4	2	4-1/2	1-1/4	0.12	<b>312848</b>
1-1/4	2-5/8	6	1-1/4	-	<b>312851</b>
1-1/4	2-5/8	6	1-1/4	0.03	<b>312855</b>
1-1/4	2-5/8	6	1-1/4	0.06	<b>312858</b>
1-1/4	2-5/8	6	1-1/4	0.09	<b>312861</b>
1-1/4	2-5/8	6	1-1/4	0.12	<b>312863</b>
1-1/4	3-1/4	6	1-1/4	-	<b>312867</b>
1-1/4	3-1/4	6	1-1/4	0.03	<b>312869</b>
1-1/4	3-1/4	6	1-1/4	0.06	<b>312871</b>
1-1/4	3-1/4	6	1-1/4	0.09	<b>312874</b>
1-1/4	3-1/4	6	1-1/4	0.12	<b>312877</b>
1-1/4	4-1/8	7-1/2	1-1/4	-	<b>312880</b>
1-1/4	4-1/8	7-1/2	1-1/4	0.03	<b>312884</b>
1-1/4	4-1/8	7-1/2	1-1/4	0.06	<b>312887</b>
1-1/4	4-1/8	7-1/2	1-1/4	0.09	<b>312889</b>
1-1/4	4-1/8	7-1/2	1-1/4	0.12	<b>312893</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Alloy Steels, HRSA, Hardened Steel



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<p><b>Variable Helix, Unequal Index</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Ideal for hardened steel, die steel and HRSA</li> <li>4-flute variable helix design for slotting and profile milling</li> <li>Ideal for High Efficiency Milling</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>VAR</td> </tr> <tr> <td>4FL</td> <td>BALL</td> </tr> <tr> <td>h6</td> <td>FX1</td> </tr> <tr> <td>P 146</td> <td></td> </tr> </table>	CARBIDE	VAR	4FL	BALL	h6	FX1	P 146	
CARBIDE	VAR									
4FL	BALL									
h6	FX1									
P 146										

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	●	●		○	●	●			●		●	○

● Best ○ Good

**Series 1032** | **HGW4BN | 4FL | Ball Nose**

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
1/8	1/4	1-1/2	1/8	<b>122963</b>
1/8	1/2	1-1/2	1/8	<b>120360</b>
3/16	5/16	2	3/16	<b>123087</b>
3/16	5/8	2	3/16	<b>120361</b>
3/16	3/4	2	3/16	<b>123098</b>
1/4	5/16	2	1/4	<b>123088</b>
1/4	1/2	2	1/4	<b>122983</b>
1/4	3/4	2-1/2	1/4	<b>120362</b>
1/4	1-1/8	3	1/4	<b>123099</b>
5/16	1/2	2	5/16	<b>123089</b>
5/16	13/16	2-1/2	5/16	<b>120363</b>
5/16	1-1/8	3	5/16	<b>123100</b>
3/8	5/8	2	3/8	<b>123090</b>
3/8	7/8	2-1/2	3/8	<b>120364</b>
3/8	1-1/8	3	3/8	<b>122969</b>
1/2	5/8	2-1/2	1/2	<b>123091</b>
1/2	1	3	1/2	<b>120526</b>
1/2	1-1/4	3	1/2	<b>123095</b>
1/2	1-1/2	3	1/2	<b>123096</b>
1/2	1-3/4	4	1/2	<b>122971</b>
1/2	2	4	1/2	<b>123101</b>
5/8	3/4	3	5/8	<b>123092</b>
5/8	1-1/4	3-1/2	5/8	<b>120365</b>
5/8	2-1/4	5	5/8	<b>123102</b>
3/4	7/8	3	3/4	<b>123093</b>
3/4	1-1/2	4	3/4	<b>120366</b>
3/4	2-1/4	5	3/4	<b>123103</b>
1	1	4	1	<b>123094</b>
1	1-1/2	4	1	<b>123097</b>
1	2-1/4	5	1	<b>123104</b>

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Roughing End Mill For Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES										
<h2>AGGRESSOR</h2> <h3>Roughing Mills - Fine Pitch</h3> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Unequal index for vibration mitigation</li> <li>Relaxed 20° helix enhances stability in hard materials</li> <li>Fine tooth serrations promote smooth chip clearance</li> <li>Diameter &lt; 1" = 4FL, Diameter &gt; 3/4" = 5FL</li> <li>Diameter Tol.: +0/-0.002"</li> <li>Shank Tol.: +0/-0.0004"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>37°</td> </tr> <tr> <td>4FL</td> <td>5FL</td> </tr> <tr> <td>CHF</td> <td>Weldon</td> </tr> <tr> <td>Bright</td> <td>FX3</td> </tr> <tr> <td>P 168</td> <td></td> </tr> </table>	CARBIDE	37°	4FL	5FL	CHF	Weldon	Bright	FX3	P 168	
CARBIDE	37°											
4FL	5FL											
CHF	Weldon											
Bright	FX3											
P 168												

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

## Series 2134 | AGG-F | 4-5FL | Corner Chamfer | Fine Pitch Rougher | Weldon

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	Bright	FX3
1/4	1/2	2	1/4	4	255-100240	255-100240B
1/4	3/4	2-1/2	1/4	4	255-100250	255-100250B
5/16	1/2	2	5/16	4	255-100302	255-100302B
5/16	13/16	2-1/2	5/16	4	255-100312	255-100312B
3/8	5/8	2	3/8	4	255-100365	255-100365B
3/8	1	2-1/2	3/8	4	255-100375	255-100375B
7/16	1	2-3/4	7/16	4	255-100437	255-100437B
1/2	5/8	2-1/2	1/2	4	255-100490	255-100490B
1/2	1-1/4	3	1/2	4	255-100500	255-100500B
1/2	2	4	1/2	4	255-200500	255-200500B
5/8	3/4	3	5/8	4	255-100615	255-100615B
5/8	1-5/8	4	5/8	4	255-100625	255-100625B
3/4	1	3-1/2	3/4	4	255-100740	255-100740B
3/4	1-3/4	4	3/4	4	255-100750	255-100750B
3/4	2-1/4	5	3/4	4	255-200750	255-200750B
3/4	3	6	3/4	4	255-300750	255-300750B
1	2	5	1	5	255-101000	255-101000B
1	2-5/8	5	1	5	255-201000	255-201000B
1	3-1/4	6	1	5	255-301000	255-301000B
1	4-1/8	7	1	5	255-301100	255-301100B

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# ADVANCED PERFORMANCE

Solid Carbide Roughing End Mills For Alloy Steels, HRSA, Hardened Steel



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<p><b>Roughing</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Ideal for hardened steel, die steel and HRSA</li> <li>Roughing serrations break chips and reduce cutting forces</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>VAR</td> </tr> <tr> <td>4FL</td> <td>SQ</td> </tr> <tr> <td>h6</td> <td>FX1</td> </tr> <tr> <td>P 149</td> <td></td> </tr> </table>	CARBIDE	VAR	4FL	SQ	h6	FX1	P 149	
CARBIDE	VAR									
4FL	SQ									
h6	FX1									
P 149										

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	●	●	○	○	●	●	○	○	●	○	●	○

● Best ○ Good

**Series 1031**     SRF4 | 4FL | Square | Chamfer

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Chamfer	EDP
1/8	1/4	1-1/2	1/8	0.007	<b>107988</b>
1/8	1/2	1-1/2	1/8	0.007	<b>111235</b>
3/16	5/16	2	3/16	0.007	<b>111252</b>
3/16	5/8	2	3/16	0.007	<b>111236</b>
1/4	1/2	2	1/4	0.010	<b>107794</b>
1/4	3/4	2-1/2	1/4	0.010	<b>111237</b>
1/4	1-1/8	3	1/4	0.010	<b>111244</b>
5/16	1/2	2	5/16	0.010	<b>107990</b>
5/16	13/16	2-1/2	5/16	0.010	<b>111238</b>
5/16	1-1/8	3	5/16	0.010	<b>111245</b>
3/8	5/8	2	3/8	0.010	<b>111253</b>
3/8	7/8	2-1/2	3/8	0.010	<b>111239</b>
3/8	1-1/8	3	3/8	0.010	<b>111246</b>
1/2	5/8	2-1/2	1/2	0.010	<b>107904</b>
1/2	1	3	1/2	0.015	<b>107905</b>
1/2	2	4	1/2	0.015	<b>111247</b>
5/8	3/4	3	5/8	0.015	<b>107992</b>
5/8	1-1/4	3-1/2	5/8	0.015	<b>111277</b>
5/8	2-1/4	5	5/8	0.015	<b>111248</b>
3/4	7/8	3	3/4	0.020	<b>107919</b>
3/4	1-1/2	4	3/4	0.020	<b>111242</b>
3/4	2-1/4	5	3/4	0.020	<b>111249</b>
1	1	4	1	0.020	<b>107997</b>
1	1-1/2	4	1	0.020	<b>111243</b>
1	2-1/4	5	1	0.020	<b>111250</b>

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Alloy Steels, HRSA, Hardened Steel



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<p><b>Variable Helix, Unequal Index</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Ideal for hardened steel, die steel and HRSA</li> <li>4-flute variable helix design</li> <li>Ideal for High Efficiency Milling</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>VAR</td> </tr> <tr> <td>4FL</td> <td>RAD</td> </tr> <tr> <td>SQ</td> <td>h6</td> </tr> <tr> <td>FX1</td> <td>P 146</td> </tr> </table>	CARBIDE	VAR	4FL	RAD	SQ	h6	FX1	P 146
CARBIDE	VAR									
4FL	RAD									
SQ	h6									
FX1	P 146									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	●	●	○	○	●	●	○	○	●	●	●	○

● Best ○ Good

**Series 1030** | HGW4 | 4FL | Square And Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/8	1/4	1-1/2	1/8	-	120432
1/8	1/4	1-1/2	1/8	0.005	120542
1/8	1/4	1-1/2	1/8	0.015	121556
1/8	1/4	1-1/2	1/8	0.03	121557
1/8	1/2	1-1/2	1/8	-	119342
1/8	1/2	1-1/2	1/8	0.005	119333
1/8	1/2	1-1/2	1/8	0.015	121425
1/8	1/2	1-1/2	1/8	0.03	121426
3/16	5/16	2	3/16	-	120433
3/16	5/16	2	3/16	0.005	120543
3/16	5/16	2	3/16	0.015	121558
3/16	5/16	2	3/16	0.03	121559
3/16	5/8	2	3/16	-	119343
3/16	5/8	2	3/16	0.005	119334
3/16	5/8	2	3/16	0.015	121427
3/16	5/8	2	3/16	0.03	121428
3/16	3/4	2	3/16	-	120151
3/16	3/4	2	3/16	0.005	120159
3/16	3/4	2	3/16	0.015	121518
3/16	3/4	2	3/16	0.03	121519
3/16	3/4	2	3/16	0.06	120550
1/4	5/16	2	1/4	-	121555
1/4	5/16	2	1/4	0.005	121560
1/4	5/16	2	1/4	0.01	121561
1/4	5/16	2	1/4	0.015	121562
1/4	5/16	2	1/4	0.03	121563
1/4	5/16	2	1/4	0.06	121564
1/4	1/2	2	1/4	-	120434
1/4	1/2	2	1/4	0.005	121565
1/4	1/2	2	1/4	0.01	120544
1/4	1/2	2	1/4	0.015	121566
1/4	1/2	2	1/4	0.03	121567
1/4	1/2	2	1/4	0.06	121568
1/4	3/4	2-1/2	1/4	-	119344
1/4	3/4	2-1/2	1/4	0.005	121429
1/4	3/4	2-1/2	1/4	0.01	119335
1/4	3/4	2-1/2	1/4	0.015	121430
1/4	3/4	2-1/2	1/4	0.03	120697
1/4	3/4	2-1/2	1/4	0.06	120473
1/4	1-1/8	3	1/4	-	120152
1/4	1-1/8	3	1/4	0.005	121521
1/4	1-1/8	3	1/4	0.01	120160
1/4	1-1/8	3	1/4	0.015	121522
1/4	1-1/8	3	1/4	0.03	121523
1/4	1-1/8	3	1/4	0.06	121524

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# ADVANCED PERFORMANCE

Solid Carbide End Mills For Alloy Steels, HRSA, Hardened Steel



Series 1030		HGW4   4FL   Square and Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
5/16	1/2	2	5/16	-	120435
5/16	1/2	2	5/16	0.01	120545
5/16	1/2	2	5/16	0.015	121569
5/16	1/2	2	5/16	0.03	121570
5/16	1/2	2	5/16	0.06	121571
5/16	13/16	2-1/2	5/16	-	119345
5/16	13/16	2-1/2	5/16	0.01	119336
5/16	13/16	2-1/2	5/16	0.015	121432
5/16	13/16	2-1/2	5/16	0.03	121433
5/16	13/16	2-1/2	5/16	0.06	121434
5/16	1-1/8	3	5/16	-	120153
5/16	1-1/8	3	5/16	0.01	120161
5/16	1-1/8	3	5/16	0.015	121525
5/16	1-1/8	3	5/16	0.03	121526
5/16	1-1/8	3	5/16	0.06	121527
3/8	7/16	2	3/8	-	122483
3/8	7/16	2	3/8	0.015	121572
3/8	7/16	2	3/8	0.03	121573
3/8	7/16	2	3/8	0.06	121574
3/8	5/8	2	3/8	-	120436
3/8	5/8	2	3/8	0.015	120546
3/8	5/8	2	3/8	0.03	121575
3/8	5/8	2	3/8	0.06	121576
3/8	7/8	2-1/2	3/8	-	119346
3/8	7/8	2-1/2	3/8	0.01	119315
3/8	7/8	2-1/2	3/8	0.015	119337
3/8	7/8	2-1/2	3/8	0.03	121435
3/8	7/8	2-1/2	3/8	0.06	121488
3/8	1-1/8	3	3/8	-	120154
3/8	1-1/8	3	3/8	0.01	120162
3/8	1-1/8	3	3/8	0.015	121528
3/8	1-1/8	3	3/8	0.03	121529
3/8	1-1/8	3	3/8	0.06	121530
3/8	1-1/8	3	3/8	0.09	121531
3/8	1-1/8	3	3/8	0.12	121532
1/2	5/8	2-1/2	1/2	-	120437
1/2	5/8	2-1/2	1/2	0.015	120547
1/2	5/8	2-1/2	1/2	0.03	120551
1/2	5/8	2-1/2	1/2	0.06	121577
1/2	5/8	2-1/2	1/2	0.09	121578
1/2	5/8	2-1/2	1/2	0.12	121579
1/2	1	3	1/2	-	119347
1/2	1	3	1/2	0.015	119338
1/2	1	3	1/2	0.02	121516
1/2	1	3	1/2	0.03	119546
1/2	1	3	1/2	0.06	120076
1/2	1	3	1/2	0.09	121489
1/2	1	3	1/2	0.12	121490
1/2	1-1/4	3	1/2	-	121515
1/2	1-1/4	3	1/2	0.015	121491
1/2	1-1/4	3	1/2	0.03	121492
1/2	1-1/4	3	1/2	0.06	121493
1/2	1-1/4	3	1/2	0.09	121494
1/2	1-1/4	3	1/2	0.12	121495
1/2	1-1/2	3	1/2	-	122282
1/2	1-1/2	3	1/2	0.015	121496
1/2	1-1/2	3	1/2	0.03	121497
1/2	1-1/2	3	1/2	0.06	121498
1/2	1-1/2	3	1/2	0.09	121499
1/2	1-1/2	3	1/2	0.12	121500
1/2	1-3/4	4	1/2	-	121517
1/2	1-3/4	4	1/2	0.015	121533
1/2	1-3/4	4	1/2	0.03	121534
1/2	1-3/4	4	1/2	0.06	121535
1/2	1-3/4	4	1/2	0.09	121536
1/2	1-3/4	4	1/2	0.12	121537
1/2	2	4	1/2	-	120155
1/2	2	4	1/2	0.015	120163
1/2	2	4	1/2	0.03	121538
1/2	2	4	1/2	0.06	121539
1/2	2	4	1/2	0.09	121540
1/2	2	4	1/2	0.12	121541
5/8	3/4	3	5/8	-	120438
5/8	3/4	3	5/8	0.015	121580
5/8	3/4	3	5/8	0.02	120548
5/8	3/4	3	5/8	0.03	121581

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Alloy Steels, HRSA, Hardened Steel



Series 1030		HGW4   4FL   Square and Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
5/8	3/4	3	5/8	0.06	121582
5/8	3/4	3	5/8	0.09	121583
5/8	3/4	3	5/8	0.12	121584
5/8	1-1/4	3-1/2	5/8	-	119348
5/8	1-1/4	3-1/2	5/8	0.015	121502
5/8	1-1/4	3-1/2	5/8	0.02	119339
5/8	1-1/4	3-1/2	5/8	0.03	121503
5/8	1-1/4	3-1/2	5/8	0.06	121504
5/8	1-1/4	3-1/2	5/8	0.09	121505
5/8	1-1/4	3-1/2	5/8	0.12	121506
5/8	2-1/4	5	5/8	-	120156
5/8	2-1/4	5	5/8	0.015	121542
5/8	2-1/4	5	5/8	0.02	120164
5/8	2-1/4	5	5/8	0.03	121543
5/8	2-1/4	5	5/8	0.06	121544
5/8	2-1/4	5	5/8	0.09	121545
5/8	2-1/4	5	5/8	0.12	121546
3/4	7/8	3	3/4	-	120439
3/4	7/8	3	3/4	0.015	121585
3/4	7/8	3	3/4	0.03	120486
3/4	7/8	3	3/4	0.06	121586
3/4	7/8	3	3/4	0.09	121587
3/4	7/8	3	3/4	0.12	121588
3/4	1-1/2	4	3/4	-	119349
3/4	1-1/2	4	3/4	0.015	121507
3/4	1-1/2	4	3/4	0.03	119340
3/4	1-1/2	4	3/4	0.06	121508
3/4	1-1/2	4	3/4	0.09	121509
3/4	1-1/2	4	3/4	0.12	121510
3/4	2-1/4	5	3/4	-	119722
3/4	2-1/4	5	3/4	0.015	121547
3/4	2-1/4	5	3/4	0.03	119723
3/4	2-1/4	5	3/4	0.06	121548
3/4	2-1/4	5	3/4	0.09	121549
3/4	2-1/4	5	3/4	0.12	121550
1	1	4	1	-	120440
1	1	4	1	0.015	121589
1	1	4	1	0.03	120549
1	1	4	1	0.06	121590
1	1	4	1	0.09	121591
1	1	4	1	0.12	121592
1	1-1/2	4	1	-	119350
1	1-1/2	4	1	0.015	121511
1	1-1/2	4	1	0.03	119341
1	1-1/2	4	1	0.06	121512
1	1-1/2	4	1	0.09	121513
1	1-1/2	4	1	0.12	121514
1	2-1/4	5	1	-	120158
1	2-1/4	5	1	0.015	121551
1	2-1/4	5	1	0.03	120166
1	2-1/4	5	1	0.06	121552
1	2-1/4	5	1	0.09	121553
1	2-1/4	5	1	0.12	121554

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Alloy Steels, HRSA, Hardened Steel



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<p><b>Variable Helix, Unequal Index</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Ideal for hardened steel, die steel and HRSA</li> <li>5-flute variable helix design for both slotting and profile milling</li> <li>Ideal for High Efficiency Milling</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>VAR</td> </tr> <tr> <td>5FL</td> <td>RAD</td> </tr> <tr> <td>SQ</td> <td>h6</td> </tr> <tr> <td>FX1</td> <td>P 147</td> </tr> </table>	CARBIDE	VAR	5FL	RAD	SQ	h6	FX1	P 147
CARBIDE	VAR									
5FL	RAD									
SQ	h6									
FX1	P 147									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	●	●	○	○	●	●	○	○	●	○	●	○

● Best ○ Good

**Series 1035** | HGW5 | 5FL | Square And Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/8	1/4	1-1/2	1/8	-	120979
1/8	1/4	1-1/2	1/8	0.005	120988
1/8	1/4	1-1/2	1/8	0.015	121373
1/8	1/4	1-1/2	1/8	0.03	121374
1/8	1/2	1-1/2	1/8	-	120954
1/8	1/2	1-1/2	1/8	0.005	120945
1/8	1/2	1-1/2	1/8	0.015	121298
1/8	1/2	1-1/2	1/8	0.03	121299
3/16	5/16	2	3/16	-	120980
3/16	5/16	2	3/16	0.005	120989
3/16	5/16	2	3/16	0.015	121375
3/16	5/16	2	3/16	0.03	121376
3/16	5/8	2	3/16	-	120955
3/16	5/8	2	3/16	0.005	120946
3/16	5/8	2	3/16	0.015	121300
3/16	5/8	2	3/16	0.03	121301
3/16	3/4	2	3/16	-	120963
3/16	3/4	2	3/16	0.005	120971
3/16	3/4	2	3/16	0.015	121341
3/16	3/4	2	3/16	0.03	121342
3/16	3/4	2	3/16	0.06	121343
1/4	5/16	2	1/4	-	120184
1/4	5/16	2	1/4	0.005	121472
1/4	5/16	2	1/4	0.01	121481
1/4	5/16	2	1/4	0.015	121482
1/4	5/16	2	1/4	0.03	121483
1/4	5/16	2	1/4	0.06	121484
1/4	1/2	2	1/4	-	120981
1/4	1/2	2	1/4	0.005	121377
1/4	1/2	2	1/4	0.01	120990
1/4	1/2	2	1/4	0.015	121380
1/4	1/2	2	1/4	0.03	121381
1/4	1/2	2	1/4	0.06	121382
1/4	3/4	2-1/2	1/4	-	120956
1/4	3/4	2-1/2	1/4	0.005	121302
1/4	3/4	2-1/2	1/4	0.01	120947
1/4	3/4	2-1/2	1/4	0.015	121303
1/4	3/4	2-1/2	1/4	0.03	121304
1/4	3/4	2-1/2	1/4	0.06	121305
1/4	1-1/8	3	1/4	-	120964
1/4	1-1/8	3	1/4	0.005	121344
1/4	1-1/8	3	1/4	0.01	120972
1/4	1-1/8	3	1/4	0.015	121345
1/4	1-1/8	3	1/4	0.03	121346
1/4	1-1/8	3	1/4	0.06	121347

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Alloy Steels, HRSA, Hardened Steel



Series 1035		HWG5   5FL   Square and Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
5/16	1/2	2	5/16	-	120982
5/16	1/2	2	5/16	0.01	120991
5/16	1/2	2	5/16	0.015	121383
5/16	1/2	2	5/16	0.03	121385
5/16	1/2	2	5/16	0.06	121386
5/16	13/16	2-1/2	5/16	-	120957
5/16	13/16	2-1/2	5/16	0.01	120948
5/16	13/16	2-1/2	5/16	0.015	121312
5/16	13/16	2-1/2	5/16	0.03	121313
5/16	13/16	2-1/2	5/16	0.06	121314
5/16	1-1/8	3	5/16	-	120965
5/16	1-1/8	3	5/16	0.01	120973
5/16	1-1/8	3	5/16	0.015	121348
5/16	1-1/8	3	5/16	0.03	121349
5/16	1-1/8	3	5/16	0.06	121350
3/8	7/16	2	3/8	-	122484
3/8	7/16	2	3/8	0.015	121485
3/8	7/16	2	3/8	0.03	121486
3/8	7/16	2	3/8	0.06	121487
3/8	5/8	2	3/8	-	120983
3/8	5/8	2	3/8	0.015	120992
3/8	5/8	2	3/8	0.03	121387
3/8	5/8	2	3/8	0.06	121388
3/8	7/8	2-1/2	3/8	-	120958
3/8	7/8	2-1/2	3/8	0.01	120481
3/8	7/8	2-1/2	3/8	0.015	120949
3/8	7/8	2-1/2	3/8	0.03	121315
3/8	7/8	2-1/2	3/8	0.06	121316
3/8	1-1/8	3	3/8	-	120966
3/8	1-1/8	3	3/8	0.01	120974
3/8	1-1/8	3	3/8	0.015	121351
3/8	1-1/8	3	3/8	0.03	121352
3/8	1-1/8	3	3/8	0.06	121353
3/8	1-1/8	3	3/8	0.09	121354
3/8	1-1/8	3	3/8	0.12	121355
1/2	5/8	2-1/2	1/2	-	120984
1/2	5/8	2-1/2	1/2	0.015	120993
1/2	5/8	2-1/2	1/2	0.03	121389
1/2	5/8	2-1/2	1/2	0.06	121390
1/2	5/8	2-1/2	1/2	0.09	121391
1/2	5/8	2-1/2	1/2	0.12	121392
1/2	1	3	1/2	-	119762
1/2	1	3	1/2	0.015	120950
1/2	1	3	1/2	0.02	122033
1/2	1	3	1/2	0.03	120648
1/2	1	3	1/2	0.06	121317
1/2	1	3	1/2	0.09	121318
1/2	1	3	1/2	0.12	121319
1/2	1-1/4	3	1/2	0.015	121457
1/2	1-1/4	3	1/2	0.03	121458
1/2	1-1/4	3	1/2	0.06	121459
1/2	1-1/4	3	1/2	0.09	121460
1/2	1-1/4	3	1/2	0.12	121461
1/2	1-1/2	3	1/2	-	121600
1/2	1-1/2	3	1/2	0.015	121462
1/2	1-1/2	3	1/2	0.03	121463
1/2	1-1/2	3	1/2	0.06	121464
1/2	1-1/2	3	1/2	0.09	121465
1/2	1-1/2	3	1/2	0.12	121466
1/2	1-3/4	4	1/2	-	121520
1/2	1-3/4	4	1/2	0.015	121467
1/2	1-3/4	4	1/2	0.03	121468
1/2	1-3/4	4	1/2	0.06	121469
1/2	1-3/4	4	1/2	0.09	121470
1/2	1-3/4	4	1/2	0.12	121471
1/2	2	4	1/2	-	120967
1/2	2	4	1/2	0.015	120975
1/2	2	4	1/2	0.03	121356
1/2	2	4	1/2	0.06	121357
1/2	2	4	1/2	0.09	121358
1/2	2	4	1/2	0.12	121359
5/8	3/4	3	5/8	-	120985
5/8	3/4	3	5/8	0.015	121393
5/8	3/4	3	5/8	0.02	120994
5/8	3/4	3	5/8	0.03	121394
5/8	3/4	3	5/8	0.06	121395

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Alloy Steels, HRSA, Hardened Steel



Series 1035		HGW5   5FL   Square and Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
5/8	3/4	3	5/8	0.09	121396
5/8	3/4	3	5/8	0.12	121398
5/8	1-1/4	3-1/2	5/8	-	119764
5/8	1-1/4	3-1/2	5/8	0.015	121320
5/8	1-1/4	3-1/2	5/8	0.02	119756
5/8	1-1/4	3-1/2	5/8	0.03	121321
5/8	1-1/4	3-1/2	5/8	0.06	121324
5/8	1-1/4	3-1/2	5/8	0.09	121325
5/8	1-1/4	3-1/2	5/8	0.12	121326
5/8	2-1/4	5	5/8	-	120968
5/8	2-1/4	5	5/8	0.015	121360
5/8	2-1/4	5	5/8	0.02	120976
5/8	2-1/4	5	5/8	0.03	121361
5/8	2-1/4	5	5/8	0.06	121362
5/8	2-1/4	5	5/8	0.09	121363
5/8	2-1/4	5	5/8	0.12	121364
3/4	7/8	3	3/4	-	120986
3/4	7/8	3	3/4	0.015	121399
3/4	7/8	3	3/4	0.03	120995
3/4	7/8	3	3/4	0.06	121400
3/4	7/8	3	3/4	0.09	121401
3/4	7/8	3	3/4	0.12	121402
3/4	1-1/2	4	3/4	-	119765
3/4	1-1/2	4	3/4	0.015	121327
3/4	1-1/2	4	3/4	0.03	119758
3/4	1-1/2	4	3/4	0.06	121328
3/4	1-1/2	4	3/4	0.09	121329
3/4	1-1/2	4	3/4	0.12	121330
3/4	2-1/4	5	3/4	-	120969
3/4	2-1/4	5	3/4	0.015	121365
3/4	2-1/4	5	3/4	0.03	120977
3/4	2-1/4	5	3/4	0.06	121366
3/4	2-1/4	5	3/4	0.09	121367
3/4	2-1/4	5	3/4	0.12	121368
1	1	4	1	-	120987
1	1	4	1	0.015	121403
1	1	4	1	0.03	120996
1	1	4	1	0.06	121404
1	1	4	1	0.09	121405
1	1	4	1	0.12	121406
1	1-1/2	4	1	-	119766
1	1-1/2	4	1	0.015	121336
1	1-1/2	4	1	0.03	119760
1	1-1/2	4	1	0.06	121338
1	1-1/2	4	1	0.09	121339
1	1-1/2	4	1	0.12	121340
1	2-1/4	5	1	-	120970
1	2-1/4	5	1	0.015	121369
1	2-1/4	5	1	0.03	120978
1	2-1/4	5	1	0.06	121370
1	2-1/4	5	1	0.09	121371
1	2-1/4	5	1	0.12	121372

\*bold numbers are EDPs for ordering

## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**<sup>®</sup>

**CUSTOM  
COMES  
STANDARD**

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Alloy Steels, HRSA, Hardened Steel



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<p><b>Variable Helix, Unequal Index</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Ideal for hardened steel, die steel and HRSA</li> <li>7-flute variable helix design</li> <li>Ideal for High Efficiency Dynamic Milling</li> <li>SafeLock® shank available upon request</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>VAR</td> </tr> <tr> <td>7FL</td> <td>RAD</td> </tr> <tr> <td>SQ</td> <td>h6</td> </tr> <tr> <td>FX1</td> <td>P 148</td> </tr> </table>	CARBIDE	VAR	7FL	RAD	SQ	h6	FX1	P 148
CARBIDE	VAR									
7FL	RAD									
SQ	h6									
FX1	P 148									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	●	●	○	○	●	●	○	○	●	○	●	○

● Best ○ Good

**Series 1040** | HGW7 | 7FL | Square And Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
1/8	1/4	1-1/2	1/8	-	122664
1/8	1/4	1-1/2	1/8	0.005	122612
1/8	1/4	1-1/2	1/8	0.015	122613
1/8	1/4	1-1/2	1/8	0.03	122614
1/8	1/2	1-1/2	1/8	-	122876
1/8	1/2	1-1/2	1/8	0.005	122798
1/8	1/2	1-1/2	1/8	0.015	122799
1/8	1/2	1-1/2	1/8	0.03	122800
3/16	5/16	2	3/16	-	122665
3/16	5/16	2	3/16	0.005	122615
3/16	5/16	2	3/16	0.015	122616
3/16	5/16	2	3/16	0.03	122617
3/16	5/8	2	3/16	-	122877
3/16	5/8	2	3/16	0.005	122801
3/16	5/8	2	3/16	0.015	122802
3/16	5/8	2	3/16	0.03	122803
3/16	3/4	2	3/16	-	122930
3/16	3/4	2	3/16	0.005	122885
3/16	3/4	2	3/16	0.015	122886
3/16	3/4	2	3/16	0.03	122887
3/16	3/4	2	3/16	0.06	122888
1/4	5/16	2	1/4	-	122666
1/4	5/16	2	1/4	0.005	122618
1/4	5/16	2	1/4	0.01	122619
1/4	5/16	2	1/4	0.015	122620
1/4	5/16	2	1/4	0.03	122621
1/4	5/16	2	1/4	0.06	122622
1/4	1/2	2	1/4	-	122667
1/4	1/2	2	1/4	0.005	122623
1/4	1/2	2	1/4	0.01	122624
1/4	1/2	2	1/4	0.015	122625
1/4	1/2	2	1/4	0.03	122626
1/4	1/2	2	1/4	0.06	122627
1/4	3/4	2-1/2	1/4	-	122878
1/4	3/4	2-1/2	1/4	0.005	122804
1/4	3/4	2-1/2	1/4	0.01	122805
1/4	3/4	2-1/2	1/4	0.015	122806
1/4	3/4	2-1/2	1/4	0.03	122807
1/4	3/4	2-1/2	1/4	0.06	122808
1/4	1-1/8	3	1/4	-	122931
1/4	1-1/8	3	1/4	0.005	122889
1/4	1-1/8	3	1/4	0.01	122890
1/4	1-1/8	3	1/4	0.015	122891
1/4	1-1/8	3	1/4	0.03	122892
1/4	1-1/8	3	1/4	0.06	122893

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Alloy Steels, HRSA, Hardened Steel



Series 1040		HGW7   7FL   Square and Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
5/16	1/2	2	5/16	-	122668
5/16	1/2	2	5/16	0.01	122628
5/16	1/2	2	5/16	0.015	122629
5/16	1/2	2	5/16	0.03	122630
5/16	1/2	2	5/16	0.06	122631
5/16	13/16	2-1/2	5/16	-	122879
5/16	13/16	2-1/2	5/16	0.01	122809
5/16	13/16	2-1/2	5/16	0.015	122810
5/16	13/16	2-1/2	5/16	0.03	122811
5/16	13/16	2-1/2	5/16	0.06	122812
5/16	1-1/8	3	5/16	-	122932
5/16	1-1/8	3	5/16	0.01	122894
5/16	1-1/8	3	5/16	0.015	122895
5/16	1-1/8	3	5/16	0.03	122896
5/16	1-1/8	3	5/16	0.06	122897
3/8	7/16	2	3/8	-	122670
3/8	7/16	2	3/8	0.015	122632
3/8	7/16	2	3/8	0.03	122633
3/8	7/16	2	3/8	0.06	122634
3/8	5/8	2	3/8	-	122669
3/8	5/8	2	3/8	0.015	122635
3/8	5/8	2	3/8	0.03	122636
3/8	5/8	2	3/8	0.06	122637
3/8	7/8	2-1/2	3/8	-	122880
3/8	7/8	2-1/2	3/8	0.01	122813
3/8	7/8	2-1/2	3/8	0.015	122814
3/8	7/8	2-1/2	3/8	0.03	122815
3/8	7/8	2-1/2	3/8	0.06	122816
3/8	1-1/8	3	3/8	-	122933
3/8	1-1/8	3	3/8	0.01	122898
3/8	1-1/8	3	3/8	0.015	122899
3/8	1-1/8	3	3/8	0.03	122900
3/8	1-1/8	3	3/8	0.06	122901
3/8	1-1/8	3	3/8	0.09	122902
3/8	1-1/8	3	3/8	0.12	122903
1/2	5/8	2-1/2	1/2	-	122671
1/2	5/8	2-1/2	1/2	0.015	122638
1/2	5/8	2-1/2	1/2	0.03	122639
1/2	5/8	2-1/2	1/2	0.06	122640
1/2	5/8	2-1/2	1/2	0.09	121901
1/2	5/8	2-1/2	1/2	0.12	122641
1/2	1	3	1/2	-	121242
1/2	1	3	1/2	0.015	124462
1/2	1	3	1/2	0.02	122823
1/2	1	3	1/2	0.03	122824
1/2	1	3	1/2	0.06	122825
1/2	1	3	1/2	0.09	122826
1/2	1	3	1/2	0.12	122827
1/2	1-1/4	3	1/2	-	122268
1/2	1-1/4	3	1/2	0.015	122828
1/2	1-1/4	3	1/2	0.03	122829
1/2	1-1/4	3	1/2	0.06	122830
1/2	1-1/4	3	1/2	0.09	122831
1/2	1-1/4	3	1/2	0.12	122832
1/2	1-1/2	3	1/2	-	122881
1/2	1-1/2	3	1/2	0.015	122833
1/2	1-1/2	3	1/2	0.03	122835
1/2	1-1/2	3	1/2	0.06	122836
1/2	1-1/2	3	1/2	0.09	122837
1/2	1-1/2	3	1/2	0.12	122838
1/2	1-3/4	4	1/2	-	122934
1/2	1-3/4	4	1/2	0.015	122904
1/2	1-3/4	4	1/2	0.03	122905
1/2	1-3/4	4	1/2	0.06	122906
1/2	1-3/4	4	1/2	0.09	122907
1/2	1-3/4	4	1/2	0.12	122908
1/2	2	4	1/2	-	122935
1/2	2	4	1/2	0.015	122909
1/2	2	4	1/2	0.03	122910
1/2	2	4	1/2	0.06	122911
1/2	2	4	1/2	0.09	122912
1/2	2	4	1/2	0.12	122913
5/8	3/4	3	5/8	-	122715
5/8	3/4	3	5/8	0.015	122642
5/8	3/4	3	5/8	0.02	122643
5/8	3/4	3	5/8	0.03	122644

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Alloy Steels, HRSA, Hardened Steel



Series 1040		HGW7   7FL   Square and Radius			
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	EDP
5/8	3/4	3	5/8	0.06	122645
5/8	3/4	3	5/8	0.09	122646
5/8	3/4	3	5/8	0.12	122647
5/8	1-1/4	3-1/2	5/8	-	122882
5/8	1-1/4	3-1/2	5/8	0.015	122839
5/8	1-1/4	3-1/2	5/8	0.02	122840
5/8	1-1/4	3-1/2	5/8	0.03	122841
5/8	1-1/4	3-1/2	5/8	0.06	122851
5/8	1-1/4	3-1/2	5/8	0.09	122852
5/8	1-1/4	3-1/2	5/8	0.12	122853
5/8	2-1/4	5	5/8	-	122936
5/8	2-1/4	5	5/8	0.015	122914
5/8	2-1/4	5	5/8	0.02	122915
5/8	2-1/4	5	5/8	0.03	122916
5/8	2-1/4	5	5/8	0.06	122917
5/8	2-1/4	5	5/8	0.09	122918
5/8	2-1/4	5	5/8	0.12	122919
3/4	7/8	3	3/4	-	122716
3/4	7/8	3	3/4	0.015	122648
3/4	7/8	3	3/4	0.03	122651
3/4	7/8	3	3/4	0.06	122654
3/4	7/8	3	3/4	0.09	122655
3/4	7/8	3	3/4	0.12	122656
3/4	1-1/2	4	3/4	-	122883
3/4	1-1/2	4	3/4	0.015	122854
3/4	1-1/2	4	3/4	0.03	122866
3/4	1-1/2	4	3/4	0.06	122867
3/4	1-1/2	4	3/4	0.09	122868
3/4	1-1/2	4	3/4	0.12	122761
3/4	2-1/4	5	3/4	-	122937
3/4	2-1/4	5	3/4	0.015	122920
3/4	2-1/4	5	3/4	0.03	122921
3/4	2-1/4	5	3/4	0.06	122922
3/4	2-1/4	5	3/4	0.09	122923
3/4	2-1/4	5	3/4	0.12	122924
1	1	4	1	-	122797
1	1	4	1	0.015	122659
1	1	4	1	0.03	122660
1	1	4	1	0.06	122661
1	1	4	1	0.09	122662
1	1	4	1	0.12	122663
1	1-1/2	4	1	-	122884
1	1-1/2	4	1	0.015	122869
1	1-1/2	4	1	0.03	122871
1	1-1/2	4	1	0.06	122872
1	1-1/2	4	1	0.09	122873
1	1-1/2	4	1	0.12	122875
1	2-1/4	5	1	-	122938
1	2-1/4	5	1	0.015	122925
1	2-1/4	5	1	0.03	122926
1	2-1/4	5	1	0.06	122927
1	2-1/4	5	1	0.09	122928
1	2-1/4	5	1	0.12	122929

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS



# ADVANCED PERFORMANCE

Carbide Hexalobe Micro End Mills For Bone Screws



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>HEXAMILL</b></p> <p><b>Torq Screw Milling</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>Micro end mills designed for the milling of medical-grade bone screws and components</li> <li>Features FX7 micro coating for small diameter end mills</li> <li>Designed for use with HexaDrill, Series 4060</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>Multi</li> <li>SQ</li> <li>30°</li> <li>h6</li> <li>FX7</li> <li>P 151</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	●	●	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 2150** | HXM | Multi Flute | Square | Metric

Torx Type	Diameter (D <sub>1</sub> )	L <sub>1</sub>	LDR	D (2)	L <sub>2</sub>	Shank (D)	OAL (L)	Flutes	EDP
T4	0.2mm	0.3	3X	0.19	0.7	3mm	40mm	3	<b>2150001</b>
T4	0.2mm	0.3	5X	0.19	1	3mm	40mm	3	<b>2150002</b>
T5	0.25mm	0.4	3X	0.23	0.88	3mm	40mm	3	<b>2150003</b>
T5	0.25mm	0.4	5X	0.23	1.25	3mm	40mm	3	<b>2150004</b>
T6/T7	0.3mm	0.45	3X	0.28	1.05	3mm	40mm	3	<b>2150005</b>
T6/T7	0.3mm	0.45	5X	0.28	1.5	3mm	40mm	3	<b>2150006</b>
T8/T10	0.4mm	0.6	3X	0.38	1.4	3mm	40mm	3	<b>2150007</b>
T8/T10	0.4mm	0.6	5X	0.38	2	3mm	40mm	3	<b>2150008</b>
T10/T15	0.5mm	0.75	3X	0.47	1.75	3mm	40mm	4	<b>2150009</b>
T10/T15	0.5mm	0.75	5X	0.47	2.5	3mm	40mm	4	<b>2150010</b>
T20	0.6mm	0.9	3X	0.56	2.1	3mm	40mm	4	<b>2150011</b>
T20	0.6mm	0.9	5X	0.56	3	3mm	40mm	4	<b>2150012</b>
T25	0.8mm	1.2	3X	0.75	2.8	3mm	40mm	4	<b>2150013</b>
T25	0.8mm	1.2	5X	0.75	4	3mm	40mm	4	<b>2150014</b>
T30	1mm	1.5	3X	0.94	3.5	3mm	40mm	4	<b>2150015</b>
T30	1mm	1.5	5X	0.94	5	3mm	40mm	4	<b>2150016</b>

\*bold numbers are EDPs for ordering

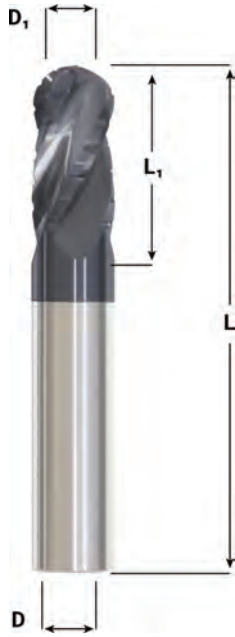
## Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**

**CUSTOM  
COMES  
STANDARD**

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>ATTACKER</h2> <h3>Chip Breaker End Mills</h3> <ul style="list-style-type: none"> <li>Sub-micron grade carbide substrate for wear resistance</li> <li>Designed for heavy material removal applications where cycle times are critical</li> <li>Chip breaker profile creates smaller chips for less edge build up and lower power usage</li> <li>Stocked Bright and AITiN</li> <li>Diameter Tol.: +0/-0.002"</li> <li>Shank Tol.: +0/-0.0004"</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>30°</li> <li>3FL</li> <li>BALL</li> <li>Bright</li> <li>AITiN</li> <li>P 166</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	●	●	○	○	○	○

● Best ○ Good

## Series 2143 | 3FL | Chip Breaker | Ball Nose

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AITiN
1/8	1/2	1-1/2	1/8	268-125500	268-125503
3/16	5/8	2	3/16	268-187625	268-187628
1/4	3/4	2-1/2	1/4	268-250750	268-250753
5/16	13/16	2-1/2	5/16	268-312812	268-312815
3/8	1	2-1/2	3/8	268-375875	268-375878
7/16	1	2-3/4	7/16	268-437100	268-437103
1/2	1	3	1/2	268-500100	268-500103
5/8	1-1/4	3-1/2	5/8	268-625114	268-625117
3/4	1-1/2	4	3/4	268-750112	268-750115
1	1-1/2	4	1	268-100112	268-100115

\*bold numbers are EDPs for ordering

### Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**

## CUSTOM COMES STANDARD

INTRO MILLING SPECIALTY HOLEMAKING THREADING INSERTS

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>ATTACKER</h2> <h3>Chip Breaker End Mills</h3> <ul style="list-style-type: none"> <li>Sub-micron grade carbide substrate for wear resistance</li> <li>Designed for heavy material removal applications where cycle times are critical</li> <li>Chip breaker profile creates smaller chips for less edge build up and lower power usage</li> <li>Stocked Bright and AITiN</li> <li>Diameter Tol.: +0/-0.002"</li> <li>Shank Tol.: +0/-0.0004"</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>30°</li> <li>4FL</li> <li>BALL</li> <li>Bright</li> <li>AITiN</li> <li>P 166</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	●	●	○	○	○	○

● Best ○ Good

## Series 2141 | 4FL | Chip Breaker | Ball Nose

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AITiN
1/8	1/2	1-1/2	1/8	258-125500	258-125503
3/16	5/8	2	3/16	258-187625	258-187628
1/4	3/4	2-1/2	1/4	258-250750	258-250753
5/16	13/16	2-1/2	5/16	258-312812	258-312815
3/8	1	2-1/2	3/8	258-375875	258-375878
7/16	1	2-3/4	7/16	258-437100	258-437103
1/2	1	3	1/2	258-500100	258-500103
5/8	1-1/4	3-1/2	5/8	258-625114	258-625117
3/4	1-1/2	4	3/4	258-750112	258-750115
1	1-1/2	4	1	258-100112	258-100115

\*bold numbers are EDPs for ordering

### Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**®

## CUSTOM COMES STANDARD

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



INTRO

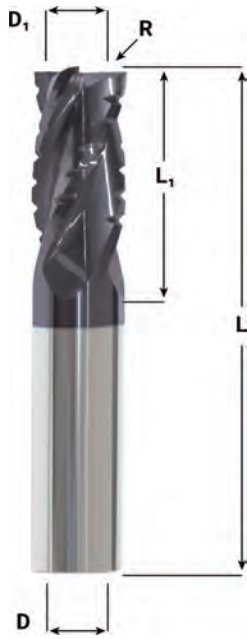
MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>ATTACKER</h2> <h3>Chip Breaker End Mills</h3> <ul style="list-style-type: none"> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Designed for heavy material removal applications where cycle times are critical</li> <li>• Chip breaker profile creates smaller chips for less edge build up and lower power usage</li> <li>• Stocked Bright and AlTiN</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0004"</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>30°</li> <li>3FL</li> <li>RAD</li> <li>Bright</li> <li>AlTiN</li> <li>P 166</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	●	●	○	○	○	○

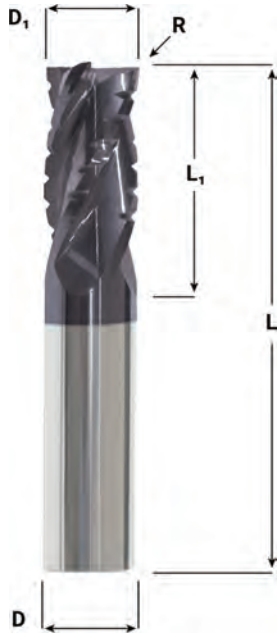
● Best ○ Good

Series 2142		3FL   Chip Breaker   Radius				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	AlTiN
1/8	1/2	1-1/2	1/8	0.01	267-125500	267-125503
3/16	5/8	2	3/16	0.01	267-187625	267-187628
1/4	3/4	2-1/2	1/4	0.01	267-250750	267-250753
5/16	13/16	2-1/2	5/16	0.01	267-312812	267-312815
3/8	1	2-1/2	3/8	0.015	267-375875	267-375878
7/16	1	2-3/4	7/16	0.015	267-437100	267-437103
1/2	1	3	1/2	0.015	267-500100	267-500103
5/8	1-1/4	3-1/2	5/8	0.02	267-625114	267-625117
3/4	1-1/2	4	3/4	0.02	267-750112	267-750115
1	1-1/2	4	1	0.02	267-100112	267-100115

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide End Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>ATTACKER</h2> <h3>Chip Breaker End Mills</h3> <ul style="list-style-type: none"> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• Designed for heavy material removal applications where cycle times are critical</li> <li>• Chip breaker profile creates smaller chips for less edge build up and lower power usage</li> <li>• Stocked Bright and AlTiN</li> <li>• Diameter Tol.: +0/-0.002"</li> <li>• Shank Tol.: +0/-0.0004"</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>30°</li> <li>4FL</li> <li>RAD</li> <li>Bright</li> <li>AlTiN</li> <li>P 166</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	●	●	○	○	○	○

● Best ○ Good

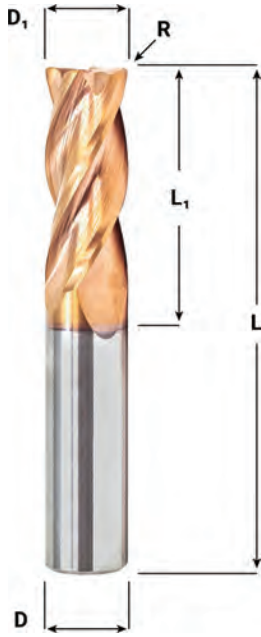
## Series 2140 | 4FL | Chip Breaker | Radius

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Bright	AlTiN
1/8	1/2	1-1/2	1/8	0.01	<b>257-125500</b>	<b>257-125503</b>
3/16	5/8	2	3/16	0.01	<b>257-187625</b>	<b>257-187628</b>
1/4	3/4	2-1/2	1/4	0.01	<b>257-250750</b>	<b>257-250753</b>
5/16	13/16	2-1/2	5/16	0.01	<b>257-312812</b>	<b>257-312815</b>
3/8	1	2-1/2	3/8	0.015	<b>257-375875</b>	<b>257-375878</b>
7/16	1	2-3/4	7/16	0.015	<b>257-437100</b>	<b>257-437103</b>
1/2	1	3	1/2	0.015	<b>257-500100</b>	<b>257-500103</b>
5/8	1-1/4	3-1/2	5/8	0.02	<b>257-625114</b>	<b>257-625117</b>
3/4	1-1/2	4	3/4	0.02	<b>257-750112</b>	<b>257-750115</b>
1	1-1/2	4	1	0.02	<b>257-100112</b>	<b>257-100115</b>

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

All-Terrain Carbide End Mills



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Variable Helix, Unequal Index</b></p> <ul style="list-style-type: none"> <li>Premium sub-micron grade carbide substrate for wear resistance</li> <li>All-terrain 4-flute variable helix carbide end mill</li> <li>Capable of drilling and aggressive ramping</li> <li>Dynamic milling or conventional roughing</li> <li>SafeLock® shank available upon request</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	●	○	●	●	○	○	○	○	○	○

● Best ○ Good

**Series 1034**     **AT4 | 4FL | Square And Radius | Plunge And Run**

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Weldon	EDP
1/8	1/4	1-1/2	1/8	-	-	<b>1034001</b>
1/8	1/4	1-1/2	1/8	0.005	-	<b>1034002</b>
1/8	1/4	1-1/2	1/8	0.015	-	<b>1034003</b>
1/8	1/4	1-1/2	1/8	0.03	-	<b>1034004</b>
3/16	5/16	2	3/16	-	-	<b>1034005</b>
3/16	5/16	2	3/16	0.005	-	<b>1034006</b>
3/16	5/16	2	3/16	0.015	-	<b>1034007</b>
3/16	5/16	2	3/16	0.03	-	<b>1034008</b>
1/4	5/16	2	1/4	-	-	<b>1034009</b>
1/4	5/16	2	1/4	0.015	-	<b>1034010</b>
1/4	5/16	2	1/4	0.03	-	<b>1034011</b>
1/4	5/16	2	1/4	0.06	-	<b>1034012</b>
1/4	1/2	2	1/4	-	-	<b>1034013</b>
1/4	1/2	2	1/4	0.015	-	<b>1034014</b>
1/4	1/2	2	1/4	0.03	-	<b>1034015</b>
1/4	1/2	2	1/4	0.06	-	<b>1034016</b>
1/4	3/4	2-1/2	1/4	-	-	<b>1034017</b>
1/4	3/4	2-1/2	1/4	0.015	-	<b>1034018</b>
1/4	3/4	2-1/2	1/4	0.03	-	<b>1034019</b>
1/4	3/4	2-1/2	1/4	0.06	-	<b>1034020</b>
5/16	1/2	2	5/16	-	-	<b>1034021</b>
5/16	1/2	2	5/16	0.015	-	<b>1034022</b>
5/16	1/2	2	5/16	0.03	-	<b>1034023</b>
5/16	1/2	2	5/16	0.06	-	<b>1034024</b>
5/16	13/16	2-1/2	5/16	-	-	<b>1034025</b>
5/16	13/16	2-1/2	5/16	0.015	-	<b>1034026</b>
5/16	13/16	2-1/2	5/16	0.03	-	<b>1034027</b>
5/16	13/16	2-1/2	5/16	0.06	-	<b>1034028</b>
3/8	7/16	2	3/8	-	-	<b>1034029</b>
3/8	7/16	2	3/8	0.015	-	<b>1034030</b>
3/8	7/16	2	3/8	0.03	-	<b>1034031</b>
3/8	7/16	2	3/8	0.06	-	<b>1034032</b>
3/8	5/8	2	3/8	-	-	<b>1034033</b>
3/8	5/8	2	3/8	0.015	-	<b>1034034</b>
3/8	5/8	2	3/8	0.03	-	<b>1034035</b>
3/8	5/8	2	3/8	0.06	-	<b>1034036</b>
3/8	7/8	2-1/2	3/8	-	-	<b>1034037</b>
3/8	7/8	2-1/2	3/8	0.015	-	<b>1034038</b>
3/8	7/8	2-1/2	3/8	0.03	-	<b>1034039</b>
3/8	7/8	2-1/2	3/8	0.06	-	<b>1034040</b>
1/2	5/8	3	1/2	-	<b>1034089</b>	<b>1034041</b>
1/2	5/8	3	1/2	0.015	<b>1034090</b>	<b>1034042</b>
1/2	5/8	3	1/2	0.03	<b>1034091</b>	<b>1034043</b>
1/2	5/8	3	1/2	0.06	<b>1034092</b>	<b>1034044</b>
1/2	5/8	3	1/2	0.09	<b>1034093</b>	<b>1034045</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

All-Terrain Carbide End Mills



INTRO  
MILLING  
SPECIALTY  
HOLEMAKING  
THREADING  
INSERTS

Series 1034		AT4   4FL   Square and Radius   Plunge and Run				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Radius (R)	Weldon	EDP
1/2	1	3	1/2	-	1034094	1034046
1/2	1	3	1/2	0.015	1034095	1034047
1/2	1	3	1/2	0.03	1034096	1034048
1/2	1	3	1/2	0.06	1034097	1034049
1/2	1	3	1/2	0.09	1034098	1034050
1/2	1-1/4	3	1/2	-	1034099	1034051
1/2	1-1/4	3	1/2	0.015	1034100	1034052
1/2	1-1/4	3	1/2	0.03	1034101	1034053
1/2	1-1/4	3	1/2	0.06	1034102	1034054
1/2	1-1/4	3	1/2	0.09	1034103	1034055
1/2	1-1/2	3-1/2	1/2	-	1034104	1034056
1/2	1-1/2	3-1/2	1/2	0.015	1034105	1034057
1/2	1-1/2	3-1/2	1/2	0.03	1034106	1034058
1/2	1-1/2	3-1/2	1/2	0.06	1034107	1034059
1/2	1-1/2	3-1/2	1/2	0.09	1034108	1034060
5/8	3/4	3	5/8	-	1034109	1034061
5/8	3/4	3	5/8	0.03	1034110	1034062
5/8	3/4	3	5/8	0.06	1034111	1034063
5/8	3/4	3	5/8	0.09	1034112	1034064
5/8	1-1/4	3-1/2	5/8	-	1034113	1034065
5/8	1-1/4	3-1/2	5/8	0.03	1034114	1034066
5/8	1-1/4	3-1/2	5/8	0.06	1034115	1034067
5/8	1-1/4	3-1/2	5/8	0.09	1034116	1034068
3/4	7/8	3	3/4	-	1034117	1034069
3/4	7/8	3	3/4	0.03	1034118	1034070
3/4	7/8	3	3/4	0.06	1034119	1034071
3/4	7/8	3	3/4	0.09	1034120	1034072
3/4	7/8	3	3/4	0.12	1034121	1034073
3/4	1-1/2	4	3/4	-	1034122	1034074
3/4	1-1/2	4	3/4	0.03	1034123	1034075
3/4	1-1/2	4	3/4	0.06	1034124	1034076
3/4	1-1/2	4	3/4	0.09	1034125	1034077
3/4	1-1/2	4	3/4	0.12	1034126	1034078
1	1	4	1	-	1034127	1034079
1	1	4	1	0.03	1034128	1034080
1	1	4	1	0.06	1034129	1034081
1	1	4	1	0.09	1034130	1034082
1	1	4	1	0.12	1034131	1034083
1	1-1/2	4	1	-	1034132	1034084
1	1-1/2	4	1	0.03	1034133	1034085
1	1-1/2	4	1	0.06	1034134	1034086
1	1-1/2	4	1	0.09	1034135	1034087
1	1-1/2	4	1	0.12	1034136	1034088

\*bold numbers are EDPs for ordering



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<h1>ATOMIC</h1> <h3>Variable Helix Micro Mills</h3> <ul style="list-style-type: none"> <li>Hydrostatically CNC ground for accuracy and precision</li> <li>Features 45° X 0.003" corner chamfer</li> <li>Square end design aids in surface finish quality</li> <li>Optional multilayer AlTiN coating for extra edge retention in ferrous materials</li> <li>3FL design for ultimate versatility in ferrous and non-ferrous materials</li> <li>Variable helix for vibration dampening</li> <li>Diameter Tol.: +/- 0.0005"</li> <li>LOC Tol.: +0.0120"/-0</li> <li>Shank Tol.: +0/-0.0003"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>VAR</td> </tr> <tr> <td>3FL</td> <td>CHF</td> </tr> <tr> <td>Bright</td> <td>AlTiN</td> </tr> <tr> <td>P 164</td> <td></td> </tr> </table>	CARBIDE	VAR	3FL	CHF	Bright	AlTiN	P 164	
CARBIDE	VAR									
3FL	CHF									
Bright	AlTiN									
P 164										

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	●	●	○	○	○	○

● Best ○ Good

### Series 1103 Atomic | 3FL | Chamfer | Variable Helix

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AlTiN
1/32	0.047	1-1/2	1/8	251-003005	251-003005B
1/32	0.093	1-1/2	1/8	251-003010	251-003010B
1/32	1/16	2-1/2	1/8	251-003015	251-003015B
1/32	1/16	2-1/2	1/8	251-003020	251-003020B
3/64	0.071	1-1/2	1/8	251-003025	251-003025B
3/64	0.141	1-1/2	1/8	251-003030	251-003030B
3/64	3/32	2-1/2	1/8	251-003035	251-003035B
3/64	3/32	2-1/2	1/8	251-003040	251-003040B
1/16	0.093	1-1/2	1/8	251-003045	251-003045B
1/16	0.186	1-1/2	1/8	251-003050	251-003050B
1/16	3/32	2-1/2	1/8	251-003055	251-003055B
1/16	3/32	2-1/2	1/8	251-003060	251-003060B
5/64	0.117	1-1/2	1/8	251-003065	251-003065B
5/64	0.234	1-1/2	1/8	251-003070	251-003070B
5/64	5/32	2-1/2	1/8	251-003075	251-003075B
5/64	5/32	2-1/2	1/8	251-003080	251-003080B
3/32	0.14	1-1/2	1/8	251-003085	251-003085B
3/32	0.279	1-1/2	1/8	251-003090	251-003090B
3/32	3/16	2-1/2	1/8	251-003095	251-003095B
3/32	3/16	2-1/2	1/8	251-003100	251-003100B
1/8	3/16	1-1/2	1/8	251-003105	251-003105B
1/8	3/8	1-1/2	1/8	251-003110	251-003110B
1/8	1/4	2-1/2	1/8	251-003115	251-003115B
1/8	1/4	2-1/2	1/8	251-003120	251-003120B

\*bold numbers are EDPs for ordering

### Popular Custom Milling Options

- Proprietary GWS tool coatings
- Longer lengths
- Enhanced geometry
- Special shank modifications like **SAFE-LOCK**

## CUSTOM COMES STANDARD





FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h1>ATOMIC</h1> <h3>Variable Helix Micro Mills</h3> <ul style="list-style-type: none"> <li>Hydrostatically CNC ground for accuracy and precision</li> <li>Features 45° X 0.003" corner chamfer</li> <li>Optional multilayer AlTiN coating for extra edge retention in ferrous materials</li> <li>Variable helix for vibration dampening</li> <li>Diameter Tol.: +/- 0.0005"</li> <li>LOC Tol.: +0.0120"/-0</li> <li>Shank Tol.: +0/-0.0003"</li> </ul>		<div style="display: grid; grid-template-columns: repeat(2, 1fr); gap: 5px;"> <div>CARBIDE</div> <div>VAR</div> <div>4FL</div> <div>CHF</div> <div>Bright</div> <div>AlTiN</div> <div>P 164</div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	●	●	○	○	○	○

● Best ○ Good

### Series 1104 Atomic | 4FL | Chamfer | Variable Helix

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AlTiN
1/32	0.047	1-1/2	1/8	251-004005	251-004005B
1/32	0.093	1-1/2	1/8	251-004010	251-004010B
1/32	1/16	2-1/2	1/8	251-004015	251-004015B
1/32	1/16	2-1/2	1/8	251-004020	251-004020B
3/64	0.071	1-1/2	1/8	251-004025	251-004025B
3/64	0.141	1-1/2	1/8	251-004030	251-004030B
3/64	3/32	2-1/2	1/8	251-004035	251-004035B
3/64	3/32	2-1/2	1/8	251-004040	251-004040B
1/16	0.093	1-1/2	1/8	251-004045	251-004045B
1/16	0.186	1-1/2	1/8	251-004050	251-004050B
1/16	3/32	2-1/2	1/8	251-004055	251-004055B
1/16	3/32	2-1/2	1/8	251-004060	251-004060B
5/64	0.117	1-1/2	1/8	251-004065	251-004065B
5/64	0.234	1-1/2	1/8	251-004070	251-004070B
5/64	5/32	2-1/2	1/8	251-004075	251-004075B
5/64	5/32	2-1/2	1/8	251-004080	251-004080B
3/32	0.14	1-1/2	1/8	251-004085	251-004085B
3/32	0.279	1-1/2	1/8	251-004090	251-004090B
3/32	3/16	2-1/2	1/8	251-004095	251-004095B
3/32	3/16	2-1/2	1/8	251-004100	251-004100B
1/8	3/16	1-1/2	1/8	251-004105	251-004105B
1/8	3/8	1-1/2	1/8	251-004110	251-004110B
1/8	1/4	2-1/2	1/8	251-004115	251-004115B
1/8	1/4	2-1/2	1/8	251-004120	251-004120B

\*bold numbers are EDPs for ordering

# **T**ECHNICAL DATA

## **MILLING**



**Series 1030, 1032**

HGW4 | 4 FL | SQ, CR, BN | Hurrimill

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
<b>P</b>	<b>Carbon Steel</b> 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	<b>220</b>	6723	13	3362	13	2241	16	1681	17	1345	16	1121	15
		1.25 x D	.3 x D	<b>264</b>	8068	19	4034	19	2689	23	2017	24	1614	23	1345	21
		1.5 X D	.1 x D	<b>343</b>	10488	42	5244	42	3496	50	2622	53	2098	51	1748	47
	<b>Alloy Steel</b> 4140, 8620	1 x D	1 x D	<b>180</b>	5501	21	2750	16	1834	13	1375	13	1100	13	917	12
		1.25 x D	.3 x D	<b>225</b>	6876	31	3438	24	2292	19	1719	20	1375	19	1146	17
		1.5 X D	.1 x D	<b>270</b>	8251	63	4126	47	2750	38	2063	40	1650	38	1375	35
	<b>Tool Steel</b> A2 ,A3, D2, H11, H13	1 x D	.5 x D	<b>180</b>	5501	10	2750	10	1834	13	1375	13	1100	13	917	12
		1.25 x D	.3 x D	<b>225</b>	6876	16	3438	16	2292	19	1719	20	1375	19	1146	17
		1.5 X D	.1 x D	<b>270</b>	8251	31	4126	31	2750	38	2063	40	1650	38	1375	35
<b>M</b>	<b>SS</b> 300 & 400 Series 303, 304, 316, 420, 417	.75 x D	1 x D	<b>140</b>	4278	7	2139	7	1426	8	1070	9	856	8	713	8
		1.25 x D	.3 x D	<b>185</b>	5654	11	2827	11	1885	13	1413	14	1131	13	942	12
		1.5 x D	.1 x D	<b>230</b>	7039	23	3519	23	2346	28	1760	29	1408	28	1173	25
	<b>Precipitation SS</b> 15-5, 16-6, 17-4, 17-6	2 X D	0.07 X D	<b>393 - 800</b>	12000	50	10696	107	7131	107	5348	107	4270	107	4075	107
		1.5 X D	0.15 X D	<b>393 - 800</b>	12000	55	10696	118	7131	118	5348	118	4270	118	4075	118
		1.0 X D	0.25 X D	<b>393 - 800</b>	12000	62	10696	132	7131	132	5348	132	4270	132	4075	132
<b>S</b>	<b>High Temp Alloys</b> Inconel 718, Hastalloy, A286, Waspalloy, CoCr	2 X D	0.1 X D	<b>93 - 125</b>	3820	8	1910	8	1273	5	955	8	764	8	477	6
		1.5 X D	0.15	<b>84 - 112</b>	3438	6	1719	6	1146	4	860	6	688	6	429	5
		1.0 X D	0.25	<b>70-90</b>	2865	5	1433	5	955	3	716	5	573	5	358	4

**Series 1035**

HGW5 | 5 FL | Square & Radius | Hurrmill

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
<b>P</b>	<b>Carbon Steel</b> 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	<b>220</b>	6723	17	3362	17	2241	20	1681	21	1345	20	1121	19
		1.25 x D	.3 x D	<b>264</b>	8068	24	4034	24	2689	29	2017	30	1614	29	1345	27
		1.5 X D	.1 x D	<b>343</b>	10488	52	5244	52	3496	63	2622	66	2098	63	1748	58
	<b>Alloy Steel</b> 4140, 8620	1 x D	1 x D	<b>180</b>	5501	16	2750	20	1834	16	1375	16	1100	16	917	14
		1.25 x D	.3 x D	<b>225</b>	6876	24	3438	29	2292	24	1719	25	1375	24	1146	22
		1.5 X D	.1 x D	<b>270</b>	8251	47	4126	59	2750	47	2063	49	1650	47	1375	43
	<b>Tool Steel</b> A2, A3, D2, H11, H13	1 x D	.5 x D	<b>180</b>	5501	13	2750	13	1834	16	1375	16	1100	16	917	14
		1.25 x D	.3 x D	<b>225</b>	6876	20	3438	20	2292	24	1719	25	1375	24	1146	22
		1.5 X D	.1 x D	<b>270</b>	8251	39	4126	39	2750	47	2063	49	1650	47	1375	43
<b>M</b>	<b>SS</b> 300 & 400 Series 303, 304, 316, 420, 417	.75 x D	1 x D	<b>140</b>	4278	9	2139	9	1426	10	1070	11	856	11	713	10
		1.25 x D	.3 x D	<b>185</b>	5654	14	2827	14	1885	17	1413	17	1131	17	942	15
		1.5 x D	.1 x D	<b>230</b>	7039	29	3519	29	2346	34	1760	36	1408	35	1173	32
	<b>Precipitation SS</b> 15-5, 16-6, 17-4, 17-6	2 X D	0.07 X D	<b>393 - 800</b>	12000	60	10696	107	7131	107	5348	107	4270	107	4075	107
		1.5 X D	0.15 X D	<b>393 - 800</b>	12000	66	10696	120	7131	120	5348	120	4270	120	4075	120
		1.0 X D	0.25 X D	<b>393 - 800</b>	12000	74	10696	150	7131	150	5348	150	4270	150	4075	150
<b>S</b>	<b>High Temp Alloys</b> Inconel 718, Hastalloy, A286, Waspalloy, CoCr	2 X D	0.07 X D	<b>93 - 125</b>	3820	10	1910	8	1273	5	955	8	764	8	477	6
		1.5 X D	0.15 X D	<b>84 - 112</b>	3438	8	1719	6	1146	4	860	6	688	6	429	5
		1.0 X D	0.25 X D	<b>70-90</b>	2865	6	1433	5	955	3	716	5	573	5	358	4

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

**Series 1040**

HGW7 | 7 FL | Square & Radius | Hurrmill

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
<b>P</b>	<b>Carbon Steel</b> 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	<b>220</b>	6723	24	3362	24	2241	28	1681	30	1345	28	1121	26
		1.25 x D	.3 x D	<b>264</b>	8068	34	4034	34	2689	41	2017	43	1614	41	1345	38
		1.5 X D	.1 x D	<b>343</b>	10488	73	5244	73	3496	88	2622	93	2098	89	1748	81
	<b>Alloy Steel</b> 4140, 8620	1 x D	1 x D	<b>180</b>	5501	37	2750	27	1834	22	1375	23	1100	22	917	20
		1.25 x D	.3 x D	<b>225</b>	6876	55	3438	41	2292	33	1719	35	1375	33	1146	30
		1.5 X D	.1 x D	<b>270</b>	8251	110	4126	82	2750	66	2063	69	1650	66	1375	61
	<b>Tool Steel</b> A2 ,A3, D2, H11, H13	1 x D	.5 x D	<b>180</b>	5501	18	2750	18	1834	22	1375	23	1100	22	917	20
		1.25 x D	.3 x D	<b>225</b>	6876	27	3438	27	2292	33	1719	35	1375	33	1146	30
		1.5 X D	.1 x D	<b>270</b>	8251	55	4126	55	2750	66	2063	69	1650	66	1375	61
<b>M</b>	<b>SS</b> 300 & 400 Series 303, 304, 316, 420, 417	.75 x D	1 x D	<b>140</b>	4278	12	2139	12	1426	15	1070	15	856	15	713	14
		1.25 x D	.3 x D	<b>185</b>	5654	19	2827	19	1885	23	1413	24	1131	23	942	21
		1.5 x D	.1 x D	<b>230</b>	7039	40	3519	40	2346	48	1760	51	1408	49	1173	44
	<b>Precipitation SS</b> 15-5, 16-6, 17-4, 17-6	2 X D	0.07 X D	<b>393 - 800</b>	12000	70	10696	107	7131	107	5348	107	4270	107	4075	107
		1.5 X D	0.15 X D	<b>393 - 800</b>	12000	80	10696	122	7131	122	5348	122	4270	122	4075	122
		1.0 X D	0.25 X D	<b>393 - 800</b>	12000	96	10696	146	7131	146	5348	146	4270	146	4075	146
<b>S</b>	<b>High Temp Alloys</b> Inconel 718, Hastalloy, A286, Waspalloy, CoCr	2 X D	0.07 X D	<b>93 - 125</b>	3820	10	1910	8	1273	5	955	8	764	8	477	6
		1.5 X D	0.15 X D	<b>84 - 112</b>	3438	8	1719	6	1146	4	860	6	688	6	429	5
		1.0 X D	0.25 X D	<b>70-90</b>	2865	6	1433	5	955	3	716	5	573	5	358	4

**Series 1031**

SRF4 | 4 FL | Square | Chip Breaker | Hurrimill

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
<b>P</b>	<b>Carbon Steel</b> 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	<b>220</b>	6723	13	3362	13	2241	16	1681	17	1345	16	1121	15
		1.25 x D	.3 x D	<b>264</b>	8068	19	4034	19	2689	23	2017	24	1614	23	1345	21
		1.5 X D	.1 x D	<b>343</b>	10488	42	5244	42	3496	50	2622	53	2098	51	1748	47
	<b>Alloy Steel</b> 4140, 8620	1 x D	1 x D	<b>180</b>	5501	21	2750	16	1834	13	1375	13	1100	13	917	12
		1.25 x D	.3 x D	<b>225</b>	6876	31	3438	24	2292	19	1719	20	1375	19	1146	17
		1.5 X D	.1 x D	<b>270</b>	8251	63	4126	47	2750	38	2063	40	1650	38	1375	35
	<b>Tool Steel</b> A2 ,A3, D2, H11, H13	1 x D	.5 x D	<b>180</b>	5501	10	2750	10	1834	13	1375	13	1100	13	917	12
		1.25 x D	.3 x D	<b>225</b>	6876	16	3438	16	2292	19	1719	20	1375	19	1146	17
		1.5 X D	.1 x D	<b>270</b>	8251	31	4126	31	2750	38	2063	40	1650	38	1375	35
<b>M</b>	<b>SS</b> 300 & 400 Series 303, 304, 316, 420, 416	.75 x D	1 x D	<b>140</b>	4278	7	2139	7	1426	8	1070	9	856	8	713	8
		1.25 x D	.3 x D	<b>185</b>	5654	11	2827	11	1885	13	1413	14	1131	13	942	12
		1.5 x D	.1 x D	<b>230</b>	7039	23	3519	23	2346	28	1760	29	1408	28	1173	25
	<b>Precipitation SS</b> 15-5, 16-6, 17-4, 17-5	2 X D	0.07 X D	<b>393 - 800</b>	12000	50	10696	107	7131	107	5348	107	4270	107	4075	107
		1.5 X D	0.15 X D	<b>393 - 800</b>	12000	55	10696	118	7131	118	5348	118	4270	118	4075	118
		1.0 X D	0.25 X D	<b>393 - 800</b>	12000	62	10696	132	7131	132	5348	132	4270	132	4075	132
<b>K</b>	<b>Cast Iron- Grey</b> GG-10, GG-40	1 x D	1 x D	<b>100</b>	3056	6	1528	6	1019	7	764	7	611	7	509	6
		1.25 x D	.3 x D	<b>125</b>	3820	8	1910	8	1273	10	955	10	764	10	637	9
		1.5 X D	.1 x D	<b>163</b>	4966	18	2483	18	1655	22	1242	23	993	22	828	20
	<b>Cast Iron- Ductile</b> GGG-40, GGG-70	.75 x D	1 x D	<b>155</b>	4737	8	2368	8	1579	10	1184	10	947	10	789	9
		1.25 x D	.3 x D	<b>180</b>	5501	11	2750	11	1834	14	1375	14	1100	14	917	13
		1.5 x D	.1 x D	<b>216</b>	6601	23	3300	23	2200	27	1650	29	1320	27	1100	25
<b>S</b>	<b>High Temp Alloys</b> Inconel 718, Hastalloy, A286, CoCr	2 X D	0.1 X D	<b>93 - 125</b>	3820	8	1910	8	1273	5	955	8	764	8	477	6
		1.5 X D	0.15	<b>84 - 112</b>	3438	6	1719	6	1146	4	860	6	688	6	429	5
		1.0 X D	0.25	<b>70-90</b>	2865	5	1433	5	955	3	716	5	573	5	358	4

INTRO  
**MILLING**  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

## Series 1034

### AT4 | 4 FL | Square End Radius

Material		Slotting	Side Milling	High Speed Milling
		Aa: 1.25xD	Aa: Loc Ar: 20%D	Aa: Loc Ar: 10%D
		SFM	SFM	SFM
<b>P1</b>	Carbon Steels (1018, 1050)	460 - 675	552 - 810	1050 - 1410
<b>P2</b>	Alloy Steels (4140, 8620)	430 - 615	520 - 740	900 - 1030
<b>P3</b>	Tool Steels (P20, S7, D2)	320 - 480	385 - 570	540 - 810
<b>M1</b>	Stainless Steels (303, 304)	260 - 350	360 - 420	470 - 600
<b>M2</b>	PH Stainless (17-4, 15-5)	200 - 280	250 - 310	320 - 430
<b>K1</b>	Cast Iron (A48, A319)	500 - 605	600 - 675	680 - 800
<b>K2</b>	Ductile Cast Iron (A536, CGI)	420 - 460	475 - 570	580 - 650
<b>S1</b>	Titanium (6Al4V, 5-38)	150 - 205	200 - 250	240 - 310
<b>N1</b>	Aluminum Alloy (6061, 7075)	1500 - 1600	1800 - 2100	2450 - 2710
<b>N2</b>	Cast Aluminum (A356, A319)	1100 - 1150	1250 - 1450	1500 - 1800

Inch Per Tooth									
Diameter	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
Ar < 0.5D	0.0007	0.0011	0.0019	0.002	0.0025	0.0032	0.0041	0.0045	0.0052
Ar > 0.5D	0.0005	0.0009	0.0013	0.0015	0.0021	0.0023	0.0033	0.0035	0.0042

## Series 1034

### Part Entry Guidelines

Material		Part Entry - Drilling								
		Inch Per Tooth								
		1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
<b>P1</b>	Carbon Steels (1018, 1050)	0.0004	0.0006	0.0008	0.0011	0.0015	0.0017	0.0020	0.0022	0.0030
<b>P2</b>	Alloy Steels (4140, 8620)	0.0003	0.0005	0.0006	0.0008	0.0011	0.0013	0.0015	0.0017	0.0023
<b>P3</b>	Tool Steels (P20, S7, D2)	0.0002	0.0003	0.0004	0.0006	0.0008	0.0009	0.0010	0.0011	0.0015
<b>K1</b>	Cast Iron (A48, A319)	0.0004	0.0006	0.0008	0.0011	0.0015	0.0017	0.0020	0.0022	0.0030
<b>N1</b>	Aluminum Alloy (6061, 7075)	0.0005	0.0007	0.0010	0.0013	0.0018	0.0020	0.0024	0.0026	0.0036
<b>N2</b>	Cast Aluminum (A356, A319)	0.0004	0.0005	0.0007	0.0010	0.0014	0.0015	0.0018	0.0020	0.0027

**Series 1034**

AT4 | 4 FL | Square End Radius

Material	Ramp Angle	Part Entry - Ramping & Helical Interpolation									
		Inch Per Tooth									
		1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	
<b>P1</b> Carbon Steels (1018, 1050)	45 °	0.0004	0.0006	0.0008	0.0011	0.0015	0.0017	0.0020	0.0022	0.0030	
<b>P2</b> Alloy Steels (4140, 8620)	30 °	0.0004	0.0005	0.0007	0.0010	0.0014	0.0015	0.0018	0.0020	0.0027	
<b>P3</b> Tool Steels (P20, S7, D2)	30 °	0.0003	0.0005	0.0006	0.0008	0.0011	0.0013	0.0015	0.0017	0.0023	
<b>M1</b> Stainless Steels (303, 304)	8 °	0.0002	0.0003	0.0004	0.0006	0.0008	0.0009	0.0010	0.0011	0.0015	
<b>M2</b> PH Stainless (17-4, 15-5)	5 °	0.0002	0.0003	0.0004	0.0006	0.0008	0.0009	0.0010	0.0011	0.0015	
<b>K1</b> Cast Iron (A48, A319)	45 °	0.0004	0.0007	0.0009	0.0012	0.0017	0.0019	0.0022	0.0024	0.0033	
<b>K2</b> Ductile Cast Iron (A536, CGI)	20 °	0.0004	0.0006	0.0008	0.0011	0.0015	0.0017	0.0020	0.0022	0.0030	
<b>S1</b> Titanium (6Al4V, 5-38)	10 °	0.00024	0.00036	0.00048	0.00066	0.0009	0.00102	0.0012	0.00132	0.0018	
<b>N1</b> Aluminum Alloy (6061, 7075)	30 °	0.0004	0.0006	0.0008	0.0011	0.0015	0.0017	0.0020	0.0022	0.0030	
<b>N2</b> Cast Aluminum (A356, A319)	30 °	0.0004	0.0005	0.0007	0.0010	0.0014	0.0015	0.0018	0.0020	0.0027	

**Series 2150**

HXM | Multi Flute | Square | Metrix

Work Material		M	S2
		316L, X2CrNiMo	Ti6Al4V, ASTM B348
m/min		20 - 40	15 - 35
Depth of Cut		Axial: 0.5 X D Radial: 0.1 X D	
Torx type	Diameter (mm)	mm/rev	mm/rev
T4	0.9	0.001 - 0.0015	0.001 - 0.0015
T5	1.0	0.0015 - 0.0025	0.0015 - 0.0025
T6	1.2	0.0025 - 0.0030	0.0025 - 0.0030
T7	1.4	0.0025 - 0.0030	0.0025 - 0.0030
T8	1.6	0.0030 - 0.0045	0.0030 - 0.0045
T10	1.9	0.0050 - 0.0060	0.0050 - 0.0060
T15	2.3	0.0050 - 0.0060	0.0050 - 0.0060
T20	2.7	0.0055 - 0.0065	0.0055 - 0.0065
T25	3.1	0.0073 - 0.0080	0.0073 - 0.0080
T30	3.8	0.0080 - 0.0100	0.0080 - 0.0100

\*Helical interpolation only recommended in Titanium Alloys. For helical interpolation, reduce feed by 50-60%. Recommended pitch for helical interpolation = 0.2 to 0.4 X D



**Series 1050**

**Speed & Feed Recommendations for 3-D Machining with GWS Ball End Mills**

Diameter	Roughing & Semi-finishing			Finishing		
	RPM			RPM		
	30-40HRC	40-50HRC	50-60 HRC	30-40 HRC	40-50HRC	50-60HRC
1/32	38,400 - 60,000	32,000 - 50,000	24,600 - 40,000	20,000 - 50,000	20,000 - 50,000	20,000 - 50,000
1/16	26,400 - 42,000	22,000 - 35,000	16,600 - 28,000	20,000 - 50,000	20,000 - 50,000	20,000 - 50,000
3/32	21,600 - 31,200	18,000 - 26,000	13,400 - 20,800	20,000 - 50,000	20,000 - 50,000	20,000 - 50,000
1/8	19,200 - 28,800	16,000 - 24,000	11,800 - 19,200	20,000 - 38,000	20,000 - 50,000	20,000 - 30,500
3/16	15,000 - 19,776	12,500 - 16,480	9,000 - 13,184	20,000 - 26,000	20,000 - 34,000	16,000 - 20,300
1/4	12,120 - 16,800	10,100-14,000	7,080 - 11,200	15,000 - 18,000	18,000 - 24,400	12,000 - 15,000
5/16	11,400 - 15,900	9,200 - 13,250	6,360 - 10,600	12,000 - 14,000	14,600 - 19,000	9,700 - 12,000
3/8	10,560 - 14,520	8,800 - 12,100	6,040 - 9,680	10,000 - 12,000	12,000 - 16,200	8,100- 10,000
7/16	9,480 - 12,480	7,900 - 10,400	5,320 - 8,320	8,700 - 10,400	10,000 - 13,900	6,900 - 8,700
1/2	8,280 - 10,920	6,900 - 9,100	4,520 - 7,280	7,800 - 9,800	9,100-12,200	6,100 - 7,600

**Chip Load per Tooth**

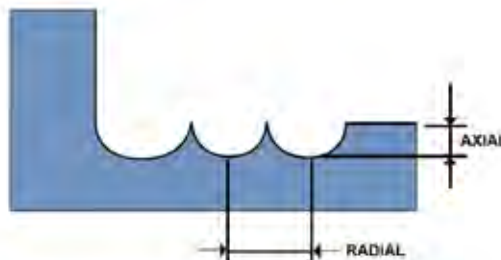
Diameter	30-40 HRC		40-50 HRC		50-60HRC	
	Rough & Semi	Finishing	Rough&Semi	Finishing	Rough & Semi	Finishing
1/32	0.0006 -0.0010	0.0006 -0.0009	0.0006 -0.0008	0.0005 -0.0007	0.0004 -0.0007	0.0004 -0.0006
1/16	0.0012 -0.0016	0.0010 -0.0015	0.0010 -0.0015	0.0010 -0.0014	0.0008 -0.0012	0.0007 -0.0010
3/32	0.0020 -0.0025	0.0014 -0.0024	0.0015 -0.0022	0.0014 -0.0020	0.0012 -0.0020	0.0010 -0.0014
1/8	0.0025 -0.0030	0.0019 -0.0028	0.0020 -0.0027	0.0019 -0.0026	0.0017 -0.0022	0.0015 -0.0020
3/16	0.0035 -0.0043	0.0032 -0.0042	0.0032 -0.0041	0.0030 -0.0040	0.0030 -0.0039	0.0023 -0.0031
1/4	0.0050 -0.0060	0.0040 -0.0053	0.0050 -0.0057	0.0040 -0.0051	0.0040 -0.0050	0.0038 -0.0048
5/16	0.0063 -0.0070	0.0053 -0.0068	0.0052 -0.0066	0.0052 -0.0063	0.0051 -0.0062	0.0046 -0.0054
3/8	0.0070 -0.0080	0.0062 -0.0079	0.0062 -0.0077	0.0054 -0.0065	0.0060 -0.0072	0.0050 -0.0061
7/16	0.0080 -0.0087	0.0068 -0.0086	0.0068 -0.0084	0.0060 -0.0078	0.0066 -0.0080	0.0053 -0.0070
1/2	0.0087 -0.0100	0.0080 -0.0094	0.0080 -0.0092	0.0070 -0.0090	0.0078 -0.0090	0.0062 -0.0081

**Axial Depth of Cut**

30 - 40 HRC = 0.10 X Diameter  
 40 - 50 HRC = 0.07 X Diameter  
 50 - 60 HRC = 0.05 X Diameter

**Radial Depth of Cut**

Roughing - 0.35 X Diameter  
 Finishing = 0.02 - 0.05 X Diameter



**Series 1010**

ART | 3 FL | Radius | Chip Breaker | Alumigator

Material	Axial ↓	Radial →	3/16		1/4		5/16		3/8		1/2		5/8		3/4	
			RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
N Aluminum, Brass, Copper 6061, 7050, 7075	0.5 X D	0.7 X D	12000	169	12000	227	12000	283	12000	341	12000	454	12000	568	12000	680
	1 X D	.6 X D	12000	155	12000	208	12000	260	12000	312	12000	416	12000	520	12000	624
	2 X D	.4 X D	12000	141	12000	189	12000	236	12000	284	12000	378	12000	473	12000	567
	0.5 X D	0.7 X D	12000	140	12000	188	12000	235	12000	282	12000	376	12000	470	12000	564
	1 X D	.6 X D	12000	133	12000	179	12000	223	12000	268	12000	357	12000	447	12000	536
	2 X D	.4 X D	12000	127	12000	170	12000	212	12000	256	12000	340	12000	426	12000	510

**Series 1015**

AST | 3 FL | Square & Radius | Chip Breaker | Alumigator

Material	Axial ↓	Radial →	3/16		1/4		5/16		3/8		1/2		5/8		3/4	
			RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
N Aluminum, Brass, Copper 6061, 7050, 7075	1 X D	1.0 X D	12000	98	12000	132	12000	165	12000	198	12000	263	12000	330	12000	395
	2 X D	1.0 X D	12000	74	12000	99	12000	124	12000	149	12000	198	12000	248	12000	297
	2 X D	.4 X D	12000	141	12000	189	12000	236	12000	284	12000	378	12000	473	12000	567
	1 X D	1.0 X D	12000	89	12000	119	12000	148	12000	178	12000	237	12000	297	12000	356
	2 X D	1.0 X D	12000	67	12000	89	12000	112	12000	134	12000	178	12000	223	12000	267
	2 X D	.4 X D	12000	127	12000	170	12000	212	12000	256	12000	340	12000	426	12000	510

**Series 1020**

AFT | 3 FL | Radius | Finisher | Alumigator

Material	Axial ↓	Radial →	3/16		1/4		5/16		3/8		1/2		5/8		3/4	
			RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
N Aluminum, Brass, Copper 6061, 7050, 7075	2 X D	.05 X D	12000	101	12000	135	12000	168	12000	203	12000	270	12000	338	12000	405
	.05 X D	0.65 X D	12000	111	12000	149	12000	185	12000	223	12000	297	12000	372	12000	446
	2 X D	.05 X D	12000	91	12000	122	12000	151	12000	183	12000	243	12000	304	12000	365
	.05 X D	0.65 X D	12000	100	12000	134	12000	166	12000	201	12000	267	12000	335	12000	401

**Series 1500**

ASR5 | 5 FL | Chip Breaker | Square & Radius | Coolant-Through | Alumigator

Material		Axial ↓	Radial →	SFM		3/8	1/2	5/8	3/4	1
						IPT	IPT	IPT	IPT	IPT
N	Aluminum Alloy 6061, 7075	.25 X D	1 X D	700	3930	0.0030	0.0050	0.0060	0.0080	0.0090
		0.5 X D	0.5 X D			0.0030	0.0050	0.0060	0.0080	0.0090
		2 X D	0.3 X D			0.0033	0.0055	0.0065	0.0087	0.0098
		Loc Max	0.1 X D			0.0051	0.0085	0.0102	0.0136	0.0153
		Loc Max	0.05 X D			0.0069	0.0115	0.0138	0.0184	0.0207
		Loc Max	0.02 X D			0.0105	0.0175	0.021	0.028	0.0315
	High Silicon Aluminum > 12%	.25 X D	1 X D	525	2948	0.0026	0.0045	0.0054	0.0072	0.0081
		0.5 X D	0.5 X D			0.0026	0.0045	0.0054	0.0072	0.0081
		2 X D	0.3 X D			0.0028	0.0049	0.0059	0.0078	0.0088
		Loc Max	0.1 X D			0.0043	0.0077	0.0092	0.0122	0.0138
		Loc Max	0.05 X D			0.0059	0.0104	0.0124	0.0166	0.0186
		Loc Max	0.02 X D			0.0089	0.0158	0.0189	0.0252	0.0284

**Series 1502**

ASR5 | 5 FL | Chip Breaker | Square & Radius | Solid | Alumigator

Material		Axial ↓	Radial →	SFM		3/8	1/2	5/8	3/4	1
						IPT	IPT	IPT	IPT	IPT
N	Aluminum Alloy 6061, 7075	.25 X D	1 X D	490	2751	0.0030	0.0050	0.0060	0.0080	0.0090
		0.5 X D	0.5 X D			0.0030	0.0050	0.0060	0.0080	0.0090
		2 X D	0.3 X D			0.0033	0.0055	0.0065	0.0087	0.0098
		Loc Max	0.1 X D			0.0051	0.0085	0.0102	0.0136	0.0153
		Loc Max	0.05 X D			0.0069	0.0115	0.0138	0.0184	0.0207
		Loc Max	0.02 X D			0.0105	0.0175	0.021	0.028	0.0315
	High Silicon Aluminum > 12%	.25 X D	1 X D	368	2063	0.0026	0.0045	0.0054	0.0072	0.0081
		0.5 X D	0.5 X D			0.0026	0.0045	0.0054	0.0072	0.0081
		2 X D	0.3 X D			0.0028	0.0049	0.0059	0.0078	0.0088
		Loc Max	0.1 X D			0.0043	0.0077	0.0092	0.0122	0.0138
		Loc Max	0.05 X D			0.0059	0.0104	0.0124	0.0166	0.0186
		Loc Max	0.02 X D			0.0089	0.0158	0.0189	0.0252	0.0284

**Series 2100, 2105, 2115, 2117**

438 | 4 FL | SQ, CR, BN, CB | PYSTL

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
<b>P</b>  <b>Carbon Steel</b> 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	<b>220</b>	6723	13	3362	13	2241	16	1681	17	1345	16	1121	15	
	1.25 x D	.3 x D	<b>264</b>	8068	19	4034	19	2689	23	2017	24	1614	23	1345	21	
	1.5 X D	.1 x D	<b>343</b>	10488	42	5244	42	3496	50	2622	53	2098	51	1748	47	
	<b>Alloy Steel</b> 4140, 8620	1 x D	1 x D	<b>180</b>	5501	21	2750	16	1834	13	1375	13	1100	13	917	12
		1.25 x D	.3 x D	<b>225</b>	6876	31	3438	24	2292	19	1719	20	1375	19	1146	17
		1.5 X D	.1 x D	<b>270</b>	8251	63	4126	47	2750	38	2063	40	1650	38	1375	35
	<b>Tool Steel</b> A2, A3, D2, H11, H13	1 x D	.5 x D	<b>180</b>	5501	10	2750	10	1834	13	1375	13	1100	13	917	12
		1.25 x D	.3 x D	<b>225</b>	6876	16	3438	16	2292	19	1719	20	1375	19	1146	17
		1.5 X D	.1 x D	<b>270</b>	8251	31	4126	31	2750	38	2063	40	1650	38	1375	35
<b>M</b>  <b>SS</b> 300 & 400 Series 303, 304, 316, 420, 416	.75 x D	1 x D	<b>140</b>	4278	7	2139	7	1426	8	1070	9	856	8	713	8	
	1.25 x D	.3 x D	<b>185</b>	5654	11	2827	11	1885	13	1413	14	1131	13	942	12	
	1.5 x D	.1 x D	<b>230</b>	7039	23	3519	23	2346	28	1760	29	1408	28	1173	25	
	<b>Precipitation SS</b> 15-5, 16-6, 17-4, 17-5	0.5	1 x D	<b>115</b>	3514	5	1757	5	1171	7	879	7	703	7	586	6
		1.25 x D	.3 x D	<b>180</b>	5501	10	2750	10	1834	12	1375	13	1100	12	917	11
		1.5 x D	.1 x D	<b>250</b>	7640	24	3820	24	2547	28	1910	30	1528	29	1273	26
<b>K</b>  <b>Cast Iron - Grey</b> GG-10 to GG-40	1 x D	1 x D	<b>100</b>	3056	6	1528	6	1019	7	764	7	611	7	509	6	
	1.25 x D	.3 x D	<b>125</b>	3820	8	1910	8	1273	10	955	10	764	10	637	9	
	1.5 X D	.1 x D	<b>163</b>	4966	18	2483	18	1655	22	1242	23	993	22	828	20	
	<b>Cast Iron- Ductile</b> GGG-40, to GGG-70	.75 x D	1 x D	<b>155</b>	4737	8	2368	8	1579	10	1184	10	947	10	789	9
		1.25 x D	.3 x D	<b>180</b>	5501	11	2750	11	1834	14	1375	14	1100	14	917	13
		1.5 x D	.1 x D	<b>216</b>	6601	23	3300	23	2200	27	1650	29	1320	27	1100	25
<b>S</b>  <b>High Temp Alloys</b> Inconel 718, Hastalloy, Waspalloy, A286, CoCr	.25 x D	.4 x D	<b>70</b>	2139	3	1070	3	713	4	535	4	428	4	357	3	
	1.25 x D	.2 x D	<b>80</b>	2445	4	1222	4	815	5	611	5	489	5	407	5	
	1.5 x D	.07 x D	<b>125</b>	3820	11	1910	11	1273	13	955	14	764	14	637	12	
	<b>Titanium Alloy</b> Ti-6Al4V Grades (5-38)	0.5	1 x D	<b>180</b>	5501	8	2750	8	1834	9	1375	10	1100	9	917	9
		1.25 x D	.3 x D	<b>225</b>	6876	12	3438	12	2292	14	1719	15	1375	14	1146	13
		1.5 x D	.1 x D	<b>360</b>	11002	31	5501	31	3667	37	2750	39	2200	37	1834	34

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

**Series 2205, 2213**

538 | 5 FL | Square & Radius | PYSTL

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
<b>P</b>	<b>Carbon Steel</b> 10XX, 11XX, 12XX, 13XX	1 x D	1 x D	<b>220</b>	6723	17	3362	17	2241	20	1681	21	1345	20	1121	19
		1.25 x D	.3 x D	<b>264</b>	8068	24	4034	24	2689	29	2017	30	1614	29	1345	27
		1.5 X D	.1 x D	<b>343</b>	10488	52	5244	52	3496	63	2622	66	2098	63	1748	58
	<b>Alloy Steel</b> 4140, 8620	1 x D	1 x D	<b>180</b>	5501	16	2750	20	1834	16	1375	16	1100	16	917	14
		1.25 x D	.3 x D	<b>225</b>	6876	24	3438	29	2292	24	1719	25	1375	24	1146	22
		1.5 X D	.1 x D	<b>270</b>	8251	47	4126	59	2750	47	2063	49	1650	47	1375	43
	<b>Tool Steel</b> A2 ,A3, D2, H11, H13	1 x D	.5 x D	<b>180</b>	5501	13	2750	13	1834	16	1375	16	1100	16	917	14
		1.25 x D	.3 x D	<b>225</b>	6876	20	3438	20	2292	24	1719	25	1375	24	1146	22
		1.5 X D	.1 x D	<b>270</b>	8251	39	4126	39	2750	47	2063	49	1650	47	1375	43
<b>M</b>	<b>SS</b> 300 & 400 Series 303, 304, 316, 420, 416	.75 x D	1 x D	<b>140</b>	4278	9	2139	9	1426	10	1070	11	856	11	713	10
		1.25 x D	.3 x D	<b>185</b>	5654	14	2827	14	1885	17	1413	17	1131	17	942	15
		1.5 x D	.1 x D	<b>230</b>	7039	29	3519	29	2346	34	1760	36	1408	35	1173	32
	<b>Precipitation SS</b> 15-5, 16-6, 17-4, 17-5	0.5	1 x D	<b>115</b>	3514	7	1757	7	1171	8	879	9	703	8	586	8
		1.25 x D	.3 x D	<b>180</b>	5501	13	2750	13	1834	15	1375	16	1100	15	917	14
		1.5 x D	.1 x D	<b>250</b>	7640	30	3820	30	2547	35	1910	37	1528	36	1273	33
<b>K</b>	<b>Cast Iron - Grey</b> GG-10 to GG-40	1 x D	1 x D	<b>100</b>	3056	7	1528	7	1019	8	764	9	611	8	509	8
		1.25 x D	.3 x D	<b>125</b>	3820	10	1910	10	1273	12	955	13	764	13	637	11
		1.5 X D	.1 x D	<b>163</b>	4966	22	2483	22	1655	27	1242	28	993	27	828	25
	<b>Cast Iron- Ductile</b> GGG-40, to GGG-70	.75 x D	1 x D	<b>155</b>	4737	10	2368	10	1579	12	1184	13	947	12	789	11
		1.25 x D	.3 x D	<b>180</b>	5501	14	2750	14	1834	17	1375	18	1100	17	917	16
		1.5 x D	.1 x D	<b>216</b>	6601	28	3300	28	2200	34	1650	36	1320	34	1100	31
<b>S</b>	<b>High Temp Alloys Inconel</b> 718, Hastalloy, Waspalloy, A286, CoCr	.25 x D	.4 x D	<b>70</b>	2139	4	1070	4	713	5	535	5	428	5	357	4
		1.25 x D	.2 x D	<b>80</b>	2445	5	1222	5	815	6	611	7	489	7	407	6
		1.5 x D	.07 x D	<b>125</b>	3820	14	1910	14	1273	17	955	18	764	17	637	16
	<b>Titanium Alloy</b> Ti-6Al4V Grades (5-38)	0.5	1 x D	<b>180</b>	5501	10	2750	10	1834	12	1375	12	1100	12	917	11
		1.25 x D	.3 x D	<b>225</b>	6876	14	3438	14	2292	17	1719	18	1375	17	1146	16
		1.5 x D	.1 x D	<b>360</b>	11002	38	5501	38	3667	46	2750	48	2200	46	1834	43

**Series 2215**

738 | 7 FL | Square & Radius | PYSTL

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4	
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
<b>P</b>  <b>Carbon Steel</b> 10XX, 11XX, 12XX, 13XX  <b>Alloy Steel</b> 4140, 8620  <b>Tool Steel</b> A2, A3, D2, H11, H13	1 x D	1 x D	<b>220</b>	6723	24	3362	24	2241	28	1681	30	1345	28	1121	26
	1.25 x D	.3 x D	<b>264</b>	8068	34	4034	34	2689	41	2017	43	1614	41	1345	38
	1.5 X D	.1 x D	<b>343</b>	10488	73	5244	73	3496	88	2622	93	2098	89	1748	81
	1 x D	1 x D	<b>180</b>	5501	37	2750	27	1834	22	1375	23	1100	22	917	20
	1.25 x D	.3 x D	<b>225</b>	6876	55	3438	41	2292	33	1719	35	1375	33	1146	30
	1.5 X D	.1 x D	<b>270</b>	8251	110	4126	82	2750	66	2063	69	1650	66	1375	61
	1 x D	.5 x D	<b>180</b>	5501	18	2750	18	1834	22	1375	23	1100	22	917	20
	1.25 x D	.3 x D	<b>225</b>	6876	27	3438	27	2292	33	1719	35	1375	33	1146	30
	1.5 X D	.1 x D	<b>270</b>	8251	55	4126	55	2750	66	2063	69	1650	66	1375	61
<b>M</b>  <b>SS</b> 300 & 400 Series 303, 304, 316, 420, 416  <b>Precipitation SS</b> 15-5, 16-6, 17-4, 17-5	.75 x D	1 x D	<b>140</b>	4278	12	2139	12	1426	15	1070	15	856	15	713	14
	1.25 x D	.3 x D	<b>185</b>	5654	19	2827	19	1885	23	1413	24	1131	23	942	21
	1.5 x D	.1 x D	<b>230</b>	7039	40	3519	40	2346	48	1760	51	1408	49	1173	44
	0.5	1 x D	<b>115</b>	3514	10	1757	10	1171	11	879	12	703	12	586	11
	1.25 x D	.3 x D	<b>180</b>	5501	18	2750	18	1834	21	1375	23	1100	22	917	20
	1.5 x D	.1 x D	<b>250</b>	7640	41	3820	41	2547	50	1910	52	1528	50	1273	46
<b>K</b>  <b>Cast Iron - Grey,</b> GG-10 to GG-40  <b>Cast Iron - Ductile</b> GGG-40, to GGG-70	1 x D	1 x D	<b>100</b>	3056	10	1528	10	1019	12	764	12	611	12	509	11
	1.25 x D	.3 x D	<b>125</b>	3820	14	1910	14	1273	17	955	18	764	18	637	16
	1.5 X D	.1 x D	<b>163</b>	4966	31	2483	31	1655	38	1242	40	993	38	828	35
	.75 x D	1 x D	<b>155</b>	4737	14	2368	14	1579	17	1184	18	947	17	789	16
	1.25 x D	.3 x D	<b>180</b>	5501	20	2750	20	1834	24	1375	25	1100	24	917	22
	1.5 x D	.1 x D	<b>216</b>	6601	40	3300	40	2200	48	1650	50	1320	48	1100	44
<b>S</b>  <b>High Temp Alloys</b> Inconel 718, Hastalloy, Waspalloy, A286, CoCr  <b>Titanium Alloy</b> Ti-6Al4V Grades (5-38)	.25 x D	.4 x D	<b>70</b>	2139	6	1070	6	713	7	535	7	428	7	357	6
	1.25 x D	.2 x D	<b>80</b>	2445	8	1222	8	815	9	611	10	489	9	407	8
	1.5 x D	.07 x D	<b>125</b>	3820	20	1910	20	1273	24	955	25	764	24	637	22
	0.5	1 x D	<b>180</b>	5501	13	2750	13	1834	16	1375	17	1100	16	917	15
	1.25 x D	.3 x D	<b>225</b>	6876	20	3438	20	2292	24	1719	25	1375	24	1146	22
	1.5 x D	.1 x D	<b>360</b>	11002	54	5501	54	3667	65	2750	68	2200	65	1834	60

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

**Series 2004, 2004R**

Alpha 4 | 4FL | Radius

Profiling				SFM based on RDOC				IPT *(BASELINE)								
				Cutting Diameter Engaged				Cutting Diameter								
Material			Hardness	5%	10%	25%	50%	*1/8	*3/16	*1/4	5/16	3/8	1/2	5/8	1/4	1
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	1475	1150	980	500									
	Steel	Medium Carbon Steels, 1140, 1145	28-38 Rc	1130	900	840	250	0.0012	0.0020	0.0024	0.0031	0.0039	0.0047	0.0060	0.0078	0.0100
	Steel	Alloy, 41XX	28-44 Rc	1035	840	765										
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	900	725	615	200									
M	Stainless Steels	430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	675	545	425	360									
	Stainless Steels	Austenitic, 301, 302, 303, 304, 304L, 420, 15-5PH, 17-4PH	≤ 28 Rc	525	430	400	210	0.0012	0.0020	0.0024	0.0031	0.0039	0.0047	0.0060	0.0078	0.0100
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316Ti, PH13-8Mo	> 28 Rc	410	330	295										
	Stainless Steels	Difficult to Machine, 17-4 PH, PH13-8Mo, Nitronics	> 28 Rc	525	430	395	110	0.0006	0.0010	0.0012	0.0016	0.0020	0.0024	0.0030	0.0040	0.0050
	Stainless Steels	22% Duplex	> 28 Rc	245	195	180										
S	Super Alloys	High Temp, Nimonic, Inconel, Monel, Hastelloy	≤ 42 Rc	180	150	130	85									
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	525	425	330	175	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	45-50 Rc	610	495	325	250	0.0006	0.0010	0.0012	0.0016	0.0020	0.0024	0.0030	0.0040	0.0050
	Hardened Steels	Tool Steel, Die Steel: D2, CPM-10V	50-55 Rc	510	410	280	200	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024
K	Cast-Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	1625	1295	870	350									
	Cast-Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220 ASTM A602	> 240 HB	675	540	510	260	0.0012	0.0020	0.0024	0.0031	0.0039	0.0047	0.0060	0.0078	0.0100

Slotting				SFM based on RDOC			IPT								
				Cutting Diameter Engaged			Cutting Diameter								
Material			Hardness	25%	50%	100%	*1/8	*3/16	*1/4	5/16	3/8	1/2	5/8	3/4	1
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	550	500	475									
	Steel	Medium Carbon Steels, 1140, 1145	28-38 Rc	275	250	225	0.0004	0.0010	0.0012	0.0016	0.0020	0.0025	0.0031	0.0040	0.0050
	Steel	Alloy, 41XX	28-44 Rc												
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	225	200	175									
M	Stainless Steels	430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	385	360	350									
	Stainless Steels	Austenitic, 301, 302, 303, 304, 304L, 420, 15-5PH, 17-4PH	≤ 28 Rc	225	210	200	0.0004	0.0010	0.0012	0.0016	0.0020	0.0024	0.0031	0.0040	0.0050
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti	> 28 Rc												
	Stainless Steels	Difficult to Machine, 17-4 PH, PH13-8Mo, Nitronics	> 28 Rc	125	110	100	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024
	Stainless Steels	22% Duplex	> 28 Rc	150	130	120									
S	Super Alloys	High Temp, Nimonic, Inconel, Monel, Hastelloy	≤ 42 Rc	100	85	75	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	180	175	160									
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	45-50 Rc	275	250	225	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024
	Hardened Steels	Tool Steel, Die Steel: D2, CPM-10V	50-55 Rc	225	200	175	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0015
K	Cast Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	375	350	325									
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	> 240 HB	275	260	250	0.0004	0.0010	0.0012	0.0016	0.0020	0.0024	0.0031	0.0040	0.0050

**Series 2005, 2005R**

Alpha 5 | 5FL | Radius

Profiling			SFM based on RDOC				IPT *(BASELINE)									
			Cutting Diameter Engaged				Cutting Diameter									
Material			Hardness	5%	10%	25%	50%	*1/8	*3/16	*1/4	5/16	3/8	1/2	5/8	1/4	1
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	1475	1150	980	500									
	Steel	Medium Carbon Steels, 1140, 1145	28-38 Rc	1130	900	830	250	0.0012	0.0020	0.0024	0.0031	0.0039	0.0047	0.0060	0.0078	0.0100
	Steel	Alloy, 41XX	28-44 Rc	1035	840	755										
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	900	725	615	200									
M	Stainless Steels	430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	675	545	425	360									
	Stainless Steels	Austenitic, 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH	≤ 28 Rc	525	430	400	210	0.0012	0.0020	0.0024	0.0031	0.0039	0.0047	0.0060	0.0078	0.0100
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321	> 28 Rc	410	430	295										
	Stainless Steels	Difficult to Machine, 17-4 PH, PH13-8Mo, Nitronics	> 28 Rc	525	430	395	110	0.0006	0.0010	0.0012	0.0016	0.0020	0.0024	0.0030	0.0040	0.0050
	Stainless Steels	22% Duplex	> 28 Rc	245	195	180										
S	Super Alloys	High Temp, Nimonics, Inconel, Monel, Hastelloy	≤ 42 Rc	180	150	130	85									
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	525	425	330	175	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	45-50 Rc	610	495	325	250	0.0006	0.0010	0.0012	0.0016	0.0020	0.0024	0.0030	0.0040	0.0050
	Hardened Steels	Tool Steel, Die Steel: D2, CPM-10V	50-55 Rc	510	410	280	200	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024
K	Cast Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	1625	1295	870	350	0.0012	0.0020	0.0024	0.0031	0.0039	0.0047	0.0060	0.0078	0.0100
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	> 240 HB	675	540	510	260									
Slotting			SFM based on RDOC				IPT									
			Cutting Diameter Engaged				Cutting Diameter									
Material			Hardness	25%	50%	100%	*1/8	*3/16	*1/4	5/16	3/8	1/2	5/8	3/4	1	
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	550	500	475										
	Steel	Medium Carbon Steels, 1140, 1145	28-38 Rc	275	250	225	0.0004	0.0010	0.0012	0.0016	0.0020	0.0025	0.0031	0.0040	0.0050	
	Steel	Alloy, 41XX	28-44 Rc													
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	225	200	175										
M	Stainless Steels	430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	275	250	225	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024	
	Stainless Steels	Austenitic, 301, 302, 303, 304, 304L, 420, 15-5PH, 17-4PH	≤ 28 Rc	225	200	175	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0015	
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321	> 28 Rc	385	360	350	0.0002	0.0004	0.0008	0.0012	0.0014	0.0018	0.0022	0.0026	0.0038	
	Stainless Steels	Difficult to Machine, 17-4 PH, PH13-8Mo, Nitronics	> 28 Rc	225	210	200										
	Stainless Steels	22% Duplex	> 28 Rc	125	110	100	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024	
S	Super Alloys	High Temp, Nimonics, Inconel, Monel, Hastelloy	≤ 42 Rc	135	120	110	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024	
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	100	85	75										
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	45-50 Rc	95	85	75	0.0003	0.0005	0.0006	0.0008	0.0010	0.0012	0.0016	0.0020	0.0024	
	Hardened Steels	Tool Steel, Die Steel: D2, CPM-10V	50-55 Rc	225	200	175										
K	Cast Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	375	350	325	0.0004	0.0010	0.0012	0.0016	0.0020	0.0024	0.0031	0.0040	0.0050	
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	> 240 HB	275	260	250										

INTRO

SPECIALTY

HOLEMAKING

THREADING

INSERTS



**Series 2006**

**Alpha 6 | 6FL | Radius**

Profiling			SFM based on RDOC					IPT *(BASELINE)							
			Cutting Diameter Engaged					Cutting Diameter							
Material			Hardness	5%	10%	20%	30%	50%	*1/8	*1/4	3/8	1/2	5/8	3/4	1
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	600	550	500	450	400	0.0011	0.0022	0.0035	0.0042	0.0059	0.0680	0.0900
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	600	550	500	450	400	0.0011	0.0022	0.0035	0.0042	0.0059	0.0680	0.0900
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	550	500	450	400	375	0.0011	0.0020	0.0033	0.0040	0.0055	0.0650	0.0850
M	Stainless Steels	Ferritic	≤ 28 Rc	360	370	300	280	260	0.0007	0.0014	0.0024	0.0030	0.0040	0.5200	0.0680
	Stainless Steels	Martensitic	≤ 28 Rc	360	370	300	280	260	0.0004	0.0008	0.0016	0.0018	0.0024	0.0300	0.0400
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316Ti, PH13-8Mo	> 28 Rc	320	300	280	260	240	0.0003	0.0006	0.0010	0.0015	0.0018	0.0240	0.0300
S	Super Alloys	High Temp, Nimonic, Inconel, Monel, Hastelloy	≤ 42 Rc	550	525	500	450	425	0.0010	0.0020	0.0033	0.0040	0.0055	0.0700	0.0100
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	550	525	500	450	425	0.0010	0.0020	0.0033	0.0040	0.0055	0.0700	0.0100
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	40-50 Rc	550	525	500	450	425	0.0010	0.0020	0.0033	0.0040	0.0055	0.0700	0.0100
	Hardened Steels	Tool Steel, Die Steel: D2, CPM-10V	50-55 Rc	165	165	130	115	100	0.0004	0.0008	0.0016	0.0018	0.0024	0.0300	0.0400
	Hardened Steels	Tool Steel, Die Steel: D2, CPM-10V	> 55 Rc	400	375	350	300	250	0.0004	0.0008	0.0016	0.0018	0.0024	0.0300	0.0400
K	Cast-Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	1625	1295	900	700	350	0.0012	0.0024	0.0039	0.0047	0.0060	0.0078	0.0100
	Cast-Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220 ASTM A602	> 240 HB	675	540	550	400	260	0.0012	0.0024	0.0039	0.0047	0.0060	0.0078	0.0100

Slotting			SFM			IPT *(BASELINE)							
			SFM based on RDOC			Cutting Diameter							
Material			Hardness	25%	50%	100%*	*1/8	*1/4	3/8	1/2	5/8	3/4	1
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	480	480	400	0.0005	0.0011	0.0017	0.0021	0.0029	0.0380	0.0480
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	480	480	400	0.0005	0.0011	0.0017	0.0021	0.0029	0.0380	0.0480
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	420	420	380	0.0005	0.0010	0.0016	0.0020	0.0027	0.0360	0.0460
M	Stainless Steels	Ferritic	≤ 28 Rc	420	420	400	0.0005	0.0010	0.0016	0.0020	0.0027	0.0035	0.0045
	Stainless Steels	Martensitic	≤ 28 Rc	420	420	400	0.0005	0.0010	0.0016	0.0020	0.0027	0.0035	0.0045
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316Ti, PH13-8Mo	> 28 Rc	400	400	380	0.0005	0.0010	0.0016	0.0009	0.0027	0.0035	0.0045
S	Super Alloys	High Temp, Nimonic, Inconel, Monel, Hastelloy	≤ 42 Rc	120	120	95	0.0002	0.0004	0.0008	0.0009	0.0012	0.0016	0.0020
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	200	200	175	0.0002	0.0004	0.0008	0.0009	0.0012	0.0016	0.0020
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	40-50 Rc	350	350	300	0.003	0.0006	0.0012	0.0015	0.0020	0.0024	0.0030
	Hardened Steels	Tool Steel, Die Steel: D2, CPM-10V	50-55 Rc	180	180	150	0.0002	0.0004	0.0008	0.0009	0.0012	0.0016	0.0020
	Hardened Materials	Tool Steel, Die Steel: D2, CPM-10V	> 55 Rc	150	150	100	0.0002	0.0003	0.0005	0.0007	0.0009	0.0011	0.0014
K	Cast Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	375	350	325	0.0004	0.00012	0.0020	0.0024	0.0031	0.0040	0.0050
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	> 240 HB	275	260	250	0.0004	0.00012	0.0020	0.0024	0.0031	0.0040	0.0050

**Series 1130**

Fusion | 4FL | Square

Profiling			SFM based on RDOC					IPT *(BASELINE)									
			Cutting Diameter Engaged					Cutting Diameter									
Material			Hardness	5%	10%	20%	30%	50%	*1/8	*3/16	*1/4	5/16	3/8	1/2	5/8	3/4	1
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	1050	700	385	375	350	0.00065	0.00097	0.00120	0.032	0.0038	0.0054	0.0065	0.0076	0.0108
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	630	420	320	250	210	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	525	350	300	275	250	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108
M	Stainless Steels	Ferritic	≤ 28 Rc	650	600	550	500	450	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108
	Stainless Steels	Martensitic	≤ 28 Rc	525	400	350	300	250	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316Ti, PH13-8Mo	> 28 Rc	525	400	350	300	250	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108
S	Super Alloys	High Temp, Nimonic, Inconel, Monel, Hastelloy	≤ 42 Rc	265	200	175	150	100	0.00048	0.00065	0.00096	0.0017	0.0019	0.0028	0.0032	0.0038	0.0054
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	230	200	175	150	125	0.00048	0.00065	0.00096	0.0017	0.0019	0.0028	0.0032	0.0038	0.0054
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	45-55 Rc	250	240	230	210	200	0.00360	0.00432	0.00504	0.0022	0.0025	0.0036	0.0043	0.0050	0.0072
K	Cast-Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	425	400	375	350	300	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108
	Cast-Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220, ASTM A602	> 240 HB	320	300	250	225	200	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108
N	Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics, Graphite	-	1000	960	920	880	840	0.00048	0.00065	0.00096	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108

Slotting			SFM			IPT *(BASELINE)									
			Cutting Diameter Engaged			Cutting Diameter									
Material			Hardness	25%	50%	100%	*1/8	*3/16	*1/4	5/16	3/8	1/2	5/8	3/4	1
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	462	444	420	0.00060	0.00084	0.00120	0.0019	0.0023	0.0037	0.00046	0.0046	0.0060
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	294	276	2652	0.00048	0.00084	0.00108	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	252	234	210	0.00048	0.00072	0.00096	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060
M	Stainless Steels	Ferritic	≤ 28 Rc	462	444	420	0.00060	0.00084	0.00120	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060
	Stainless Steels	Martensitic	≤ 28 Rc	294	252	210	0.00048	0.00084	0.00120	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	> 28 Rc	252	234	210	0.00036	0.00048	0.00060	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060
S	Super Alloys	High Temp, Nimonic, Inconel, Monel, Hastelloy	≤ 42 Rc	150	126	108	0.00036	0.00048	0.00060	0.0010	0.0012	0.0016	0.0019	0.0020	0.0031
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	120	108	96	0.00036	0.00048	0.00060	0.0010	0.0012	0.0016	0.0019	0.0020	0.0031
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	34-45 Rc	294	276	252	0.00024	0.00036	0.00048	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060
K	Cast Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	540	480	420	0.00060	0.00084	0.00120	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	> 240 HB	360	300	270	0.0048	0.00084	0.00108	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060
N	Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics, Graphite	-	900	720	540	0.00132	0.00204	0.00264	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

**Series 270**  
815 | Multi Flute | Square & Radius | Ni-Alloys

Material	Axial ↓	Radial →	SFM	1/8		1/4		3/8		1/2		5/8		3/4		
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	
<b>P</b>	<b>Carbon Steel</b> 10XX, 11XX, 12XX, 13XX	1 x D	.3 x D	<b>220</b>	6723	13	3362	13	2241	16	1681	17	1345	16	1121	15
		1.25 x D	.2 x D	<b>264</b>	8068	19	4034	194	2689	23	2017	24	1614	23	1345	21
		1.5 X D	.08 x D	<b>317</b>	9681	39	4841	39	3227	45	2420	47	1936	46	1614	42
		1.5 x D	.05 x D	<b>380</b>	11618	60	5809	51	3873	59	2904	62	2324	59	1936	54
	<b>Alloy Steel</b> 4140, 8620	1 x D	.3 x D	<b>180</b>	5501	11	2750	15	1834	13	1375	14	1100	13	917	12
		1.25 x D	.2 x D	<b>225</b>	6876	17	3438	23	2292	20	1719	21	1375	20	1146	18
		1.5 X D	.08 x D	<b>270</b>	8251	33	4126	462	2750	39	2063	40	1650	39	1375	36
		1.5 x D	.05 x D	<b>297</b>	9076	47	4538	54	3025	46	2269	48	1815	46	1513	42
	<b>Tool Steel</b> A2 ,A3, D2, H11, H13	.5 x D	.3 x D	<b>160</b>	4890	10	2445	14	1630	12	1222	12	978	12	815	11
		1.0 x D	.2 x D	<b>200</b>	6112	15	3056	21	2037	18	1528	18	1222	18	1019	16
		1.5 x D	.08 x D	<b>240</b>	7334	29	3667	411	2445	34	1834	36	1467	35	1222	32
		1.5 x D	.05 x D	<b>264</b>	8068	42	4034	48	2689	41	2017	43	1614	41	1345	38
<b>M</b>	<b>SS</b> 300 & 400 Series 303, 304, 316, 420, 417	.75 x D	.3 x D	<b>140</b>	4278	9	2139	7	1426	10	1070	11	856	10	713	9
		1.25 x D	.2 x D	<b>185</b>	5654	14	2827	11	1885	16	1413	17	1131	16	942	15
		1.5 x D	.08 x D	<b>230</b>	7039	28	3519	23	2346	33	1760	34	1408	33	1173	30
		1.5 x D	.05 x D	<b>276</b>	8446	44	4223	34	2815	43	2112	45	1689	43	1408	40
	<b>Precipitation SS</b> 15-5, 16-6, 17-4, 17-6	.5 x D	.3 x D	<b>115</b>	3514	7	1757	6	1171	7	879	7	703	7	586	6
		1.25 x D	.2 x D	<b>180</b>	5501	13	2750	11	1834	12	1375	12	1100	12	917	11
		1.5 x D	.08 x D	<b>250</b>	7640	31	3820	24	2547	26	1910	28	1528	27	1273	24
		1.5 x D	.05 x D	<b>300</b>	9168	48	4584	37	3056	44	2292	46	1834	44	1528	41
<b>S</b>	<b>High Temp Alloys</b> Inconel 718, Hastalloy, A286, Waspalloy, CoCr	.25 x D	.3 x D	<b>70</b>	2139	4	1070	3	713	4	535	4	428	4	357	4
		1 x D	.2 x D	<b>80</b>	2445	6	1222	5	815	5	611	5	489	5	407	5
		1.25 x D	.08 x D	<b>125</b>	3820	15	1910	12	1273	13	955	14	764	13	637	12
		1.5 x D	.05 x D	<b>160</b>	4890	25	2445	20	1630	23	1222	25	978	24	815	22

**Series 280**

840 | Multi Flute | Square & Radius | Titanium

Material		Axial ↓	Radial →	SFM	1/2		5/8		3/4	
					RPM	IPM	RPM	IPM	RPM	IPM
<b>P</b>	Carbon Steel 10XX, 11XX, 12XX, 13XX	1 x D	.5 x D	<b>220</b>	1681	32	1345	31	1121	35
		1.25 x D	.3 x D	<b>264</b>	2017	46	1614	45	1345	51
		1.5 X D	.1 x D	<b>343</b>	2622	100	2098	96	1748	110
		1.5 x D	.07 x D	<b>378</b>	2884	155	2307	148	1923	170
<b>M</b>	SS 300 & 400 Series 303, 304, 316, 420, 416	.75 x D	.5 x D	<b>140</b>	1070	18	856	17	713	19
		1.25 x D	.3 x D	<b>185</b>	1413	28	1131	27	942	31
		1.5 x D	.1 x D	<b>230</b>	1760	43	1408	41	1173	47
		1.5 x D	.07 x D	<b>276</b>	2112	68	1689	65	1408	75
<b>S</b>	High Temp Alloys Ti-6Al4V Grades (5-38)	.75 x D	.5 x D	<b>180</b>	1375	28	1100	27	917	30
		1.25 x D	.3 x D	<b>225</b>	1719	42	1375	40	1146	46
		1.5 x D	.1 x D	<b>275</b>	2101	85	1681	81	1401	93
		1.5 x D	.07 x D	<b>303</b>	2311	130	1849	125	1541	144

INTRO  
**MILLING**  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

**Series 1103, 1104**

Atomic | 3 & 4 FL | Chamfer | Micro

Profiling			Inches Per Tooth (IPT)								
			Cutting Diameter								
Material			Hardness	SFM	0.015	0.031	0.047	0.062	0.078	0.093	0.125
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	400	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28 - 38 Rc	300	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054
	Die Steels	A2, H13, L6, P20, S7	28 - 44 Rc	200	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054
M	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	400	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054
	Stainless Steels	Moderately Difficult to Machine, Nitronic 50, 301, 303, 304, 304L, 316, 316L, 321, 347	≤ 28 Rc	200	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316Ti, PH13-8Mo	> 28 Rc	150	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054
S	Super Alloys	High Temp, Nimonic, Inconel, Monel, Hastelloy	≤ 42 Rc	70	0.00004	0.00008	0.00015	0.00023	0.00027	0.00034	0.00040
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	150	0.00004	0.00008	0.00015	0.00023	0.00027	0.00034	0.00040
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	45-55 Rc	100	0.00010	0.00030	0.00050	0.00140	0.00180	0.00210	0.00300
K	Cast Iron	Gray: SAE J431, ASTM A48	160-200 HB	400	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	200-250 HB	250	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054
N	Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics, Graphite	-	100	0.00004	0.00008	0.00015	0.00023	0.00027	0.00034	0.00040

Slotting			Inches Per Tooth (IPT)								
			Cutting Diameter								
Material			Hardness	SFM	0.015	0.031	0.047	0.062	0.078	0.093	0.125
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	400	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	300	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	200	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0004
M	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	400	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005
	Stainless Steels	Moderately Difficult to Machine, Nitronic 50, 301, 303, 304, 304L, 316, 316L, 321, 347	≤ 28 Rc	200	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316Ti, PH13-8Mo	> 28 Rc	150	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003
S	Super Alloys	High Temp, Nimonic, Inconel, Monel, Hastelloy	≤ 42 Rc	70	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	150	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	35-45 Rc	100	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002
K	Cast Iron	Gray: SAE J431, ASTM A48	160-200 HB	400	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	200-250 HB	250	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004
N	Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics, Graphite	-	750	0.0002	0.0003	0.0005	0.0006	0.0007	0.0008	0.0011

**Series 2010, 2012, 2014, 2015**  
250 | 2 FL | SQ, CR, BN, RN | Performance-AL

Material	Axial ↓	Radial →	SFM	1/8		1/4		5/16		3/8		1/2		5/8		3/4	
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
N Aluminum, Brass, Copper 6061, 7050, 7075	.5 x D	1 x D	600	18336	44	9168	48	7334	53	6112	53	4584	55	3667	53	3056	53
	1.25 x D	.3 x D	720	22003	66	11002	70	8801	77	7334	77	5501	80	4401	77	3667	77
	1.5 x D	.1 x D	1200	36672	147	18336	150	14669	154	12224	154	9168	162	7334	155	6112	155
	.5 x D	1 x D	600	18336	37	9168	40	7334	44	6112	44	4584	46	3667	44	3056	44
	1.25 x D	.3 x D	720	22003	53	11002	56	8801	63	7334	63	5501	67	4401	64	3667	64
	1.5 x D	.1 x D	1200	36672	117	18336	121	14669	132	12224	132	9168	139	7334	133	6112	133

**Series 1025, 1026, 2030, 2031, 2032, 2045, 2047**  
350 | 3FL | SQ, CR, BN, RN | Performance-AL | GWA

Material	Axial ↓	Radial →	SFM	1/8		1/4		5/16		3/8		1/2		5/8		3/4	
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
N Aluminum, Brass, Copper 6061, 7050, 7075	.5 x D	1 x D	600	18336	44	9168	48	7334	53	6112	53	4584	55	3667	53	3056	53
	1.25 x D	.3 x D	720	22003	66	11002	70	8801	77	7334	77	5501	80	4401	77	3667	77
	1.5 x D	.1 x D	1200	36672	147	18336	150	14669	154	12224	154	9168	162	7334	155	6112	155
	.5 x D	1 x D	600	18336	37	9168	40	7334	44	6112	44	4584	46	3667	44	3056	44
	1.25 x D	.3 x D	720	22003	53	11002	56	8801	63	7334	63	5501	67	4401	64	3667	64
	1.5 x D	.1 x D	1200	36672	117	18336	121	14669	132	12224	132	9168	139	7334	133	6112	133

**Series 2045**  
350 | 3FL | SQ, CR, BN, RN | Performance-AL | GWA

Material	Axial ↓	Radial →	SFM	1/8		1/4		5/16		3/8		1/2		5/8		3/4	
				RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
N Aluminum, Brass, Copper 6061, 7050, 7075	.5 x D	1 x D	600	18336	66	9168	66	7334	79	6112	79	4584	83	3667	80	3056	80
	1.25 x D	.3 x D	720	22003	99	11002	96	8801	115	7334	115	5501	121	4401	116	3667	116
	1.5 x D	.1 x D	1200	36672	220	18336	193	14669	231	12224	231	9168	243	7334	233	6112	233
	.5 x D	1 x D	600	18336	55	9168	55	7334	66	6112	66	4584	69	3667	67	3056	67
	1.25 x D	.3 x D	720	22003	79	11002	79	8801	95	7334	95	5501	100	4401	96	3667	96
	1.5 x D	.1 x D	1200	36672	176	18336	165	14669	198	12224	198	9168	208	7334	200	6112	200

**Series 2140, 2141, 2142, 2143**

**Attacker | 3 & 4 FL | Chip Breaker**

Profiling			SFM based on RDOC					IPT *(BASELINE)						
			Cutting Diameter Engaged					Cutting Diameter						
Material			Hardness	5%	10%	20%	30%	50%	5/16	3/8	1/2	5/8	3/4	1
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	1050	700	385	375	350	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	630	420	320	250	210	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	525	350	300	275	250	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
M	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	650	600	550	500	450	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	Stainless Steels	Moderately Difficult to Machine, Nitronic 50, 301, 303, 304, 304L, 316, 316L, 321, 347	≤ 28 Rc	525	400	350	300	250	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316Ti, PH13-8Mo	> 28 Rc	525	400	350	300	250	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
S	Super Alloys	High Temp, Nimonic, Inconel, Monel, Hastelloy	≤ 42 Rc	265	200	175	150	100	0.0014	0.0016	0.0023	0.0027	0.0032	0.0045
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	230	200	175	150	125	0.0014	0.0016	0.0023	0.0027	0.0032	0.0045
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	45-55 Rc	250	240	230	210	200	0.0018	0.0021	0.0030	0.0036	0.0042	0.0060
	Hardened Steels	Tool Steel, Die Steel: D2, CPM-10V	55-65 Rc	200	180	160	150	100	0.0013	0.0014	0.0021	0.0024	0.0029	0.0041
K	Cast Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	425	400	375	350	300	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	> 240 HB	320	300	250	225	200	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
N	Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics, Graphite	-	1000	960	920	880	840	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090

Slotting			SFM					IPT *(BASELINE)				
			Cutting Diameter Engaged					Cutting Diameter				
Material			Hardness	25%	50%	100%	5/16	3/8	1/2	5/8	3/4	1
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	385	370	350	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	245	230	2210	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	210	195	175	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
M	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	385	370	350	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	Stainless Steels	Moderately Difficult to Machine, Nitronic 50, 301, 303, 304, 304L, 316, 316L, 321, 347	≤ 28 Rc	245	210	175	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316Ti, PH13-8Mo	> 28 Rc	210	195	175	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
S	Super Alloys	High Temp, Nimonic, Inconel, Monel, Hastelloy	≤ 42 Rc	125	105	90	0.0008	0.0010	0.0013	0.0016	0.0017	0.0026
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	100	90	80	0.0008	0.0010	0.0013	0.0016	0.0017	0.0026
H	Hardened Steels	Tool Steel, Alloyed Steel: P20, 4140H	35-45 Rc	245	230	210	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	45-55 Rc	175	160	140	0.0008	0.0010	0.0013	0.0016	0.0020	0.0025
	Hardened Steels	Tool Steel, Die Steel: D2, CPM-10V	55-65 Rc	150	125	100	0.0004	0.0005	0.0008	0.0008	0.0010	0.0012
K	Cast Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	450	400	350	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	> 240 HB	300	250	225	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
N	Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics, Graphite	-	750	600	450	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050

**Series 2133**

**Aggressor-C | 3 FL | Rougher | Aluminum**

Profiling		SFM based on RDOC				Inches Per Tooth (IPT)							
		Cutting Diameter Engaged				Cutting Diameter							
Material		10%	20%	30%	50%	*3/16	*1/4	5/16	3/8	1/2	5/8	3/4	
<b>N</b>	Non-Ferrous	Aluminum /Aluminum Alloys < 10% Si	2000	1800	1200	900	0.0037	0.005	0.0062	0.0075	0.01	0.0125	0.015
		Aluminum /Aluminum Alloys > 10% Si	1500	1200	1000	800	0.0037	0.005	0.0062	0.0075	0.01	0.0125	0.015
		Brass	900	800	600	500	0.0037	0.005	0.0062	0.0075	0.01	0.0125	0.015
		Cu/Cu Alloys / Magnesium	1000	800	600	500	0.0037	0.005	0.0062	0.0075	0.01	0.0125	0.015
		Plastics	900	800	600	500	0.0037	0.005	0.0062	0.0075	0.01	0.0125	0.015

Slotting		SFM				Inches Per Tooth (IPT)							
		Cutting Diameter Engaged				Cutting Diameter							
Material		25%	50%	100%	*3/16	*1/4	5/16	3/8	1/2	5/8	3/4	1	
<b>N</b>	Non-Ferrous	Aluminum /Aluminum Alloys < 10% Si	2000	1500	1000	0.0018	0.0025	0.0031	0.0037	0.0050	0.0065	0.0075	0.0100
		Aluminum /Aluminum Alloys > 10% Si	1500	1200	800	0.0018	0.0025	0.0031	0.0037	0.0050	0.0065	0.0075	0.0100
		Brass	600	500	400	0.0025	0.0032	0.0040	0.0050	0.0065	0.0075	0.0100	0.0120
		Cu/Cu Alloys / Magnesium	500	400	300	0.0025	0.0032	0.0040	0.0050	0.0065	0.0075	0.0100	0.0120
		Plastics	1200	1000	800	0.0025	0.0032	0.0040	0.0050	0.0065	0.0075	0.0100	0.0120

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



**Series 2134, 2135**

**Aggressor M & F | 3 - 5 FL | Rougher | Corner Chamfer**

Profiling			SFM based on RDOC					IPT *(BASELINE)					
			Cutting Diameter Engaged					Cutting Diameter					
Material			Hardness	5%	10%	20%	30%	50%	5/16	3/8	1/2	5/8	3/4
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	1485	1485	1155	1000	825	0.0033	0.0047	0.0066	0.0078	0.0090
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	890	890	825	750	660	0.0033	0.0047	0.0066	0.0078	0.0090
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	750	750	660	560	430	0.0033	0.0047	0.0066	0.0078	0.0090
M	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	500	500	430	400	350	0.0033	0.0047	0.0066	0.0078	0.0090
	Stainless Steels	Moderately Difficult to Machine, Nitronic 50, 301, 303, 304, 304L, 316, 316L, 321, 347	≤ 28 Rc	430	430	400	370	330	0.0025	0.0033	0.0049	0.0059	0.0066
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	> 28 Rc	430	430	400	360	330	0.0025	0.0033	0.0049	0.0059	0.0066
S	Super Alloys	High Temp, Nimonics, Inconel, Monel, Hastelloy	≤ 42 Rc	165	165	130	115	100	0.0008	0.0011	0.0017	0.0019	0.0023
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	400	400	370	300	250	0.0008	0.0011	0.0017	0.0019	0.0023
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	45-55 Rc	450	450	410	300	165	0.0029	0.0039	0.0059	0.0070	0.0078
	Hardened Steels	Tool Steel, Die Steel: D2, CPM-10V	55-65 Rc	380	380	350	250	150	0.0020	0.0029	0.0039	0.0051	0.0061
K	Cast Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	1180	1180	1120	800	630	0.0033	0.0047	0.0066	0.0078	0.0090
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	> 240 HB	530	530	500	460	430	0.0033	0.0047	0.0066	0.0078	0.0090

Slotting			SFM					IPT *(BASELINE)				
			Cutting Diameter Engaged					Cutting Diameter				
Material			Hardness	25%	50%	100%	5/16	3/8	1/2	5/8	3/4	
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	800	700	500	0.0010	0.0020	0.0025	0.0030	0.0035	
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	650	550	450	0.0010	0.0020	0.0025	0.0030	0.0035	
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	500	450	400	0.0010	0.0020	0.0025	0.0030	0.0035	
M	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	400	350	325	0.0010	0.0020	0.0025	0.0030	0.0035	
	Stainless Steels	Moderately Difficult to Machine, Nitronic 50, 301, 303, 304, 304L, 316, 316L, 321, 347	≤ 28 Rc	320	275	250	0.0010	0.0020	0.0025	0.0030	0.0035	
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	> 28 Rc	330	275	250	0.0010	0.0020	0.0025	0.0030	0.0035	
S	Super Alloys	High Temp, Nimonics, Inconel, Monel, Hastelloy	≤ 42 Rc	110	100	95	0.0005	0.0010	0.0010	0.0015	0.0020	
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	230	210	195	0.0008	0.0009	0.0011	0.0017	0.0019	
H	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	35-45 Rc	200	180	150	0.0010	0.0020	0.0025	0.0030	0.0035	
	Hardened Steels	Tool Steel, Die Steel: D2, CPM-10V	45-55 Rc	180	150	125	0.0005	0.0010	0.0010	0.0015	0.0020	
K	Cast Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	600	550	500	0.0010	0.0020	0.0025	0.0030	0.0035	
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	> 240 HB	320	275	250	0.0010	0.0020	0.0025	0.0030	0.0035	

**General Purpose End Mills**  
GP End Mills | 2, 3, 4 FL | SQ, CR, BN

Profiling				SFM based on RDOC					IPT					
				Cutting Diameter Engaged					Cutting Diameter					
Material			Hardness	5%	10%	20%	30%	50%	5/16	3/8	1/2	5/8	3/4	1
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	1050	700	385	375	350						
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	630	420	320	250	210	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	525	350	300	275	250						
M	Stainless Steels	Ferritic	≤ 28 Rc	650	600	550	500	450						
	Stainless Steels	Martensitic	≤ 28 Rc	525	400	350	300	250	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	> 28 Rc	525	400	350	300	250						
S	Super Alloys	High Temp, Nimonics, Inconel, Monel, Hastelloy	≤ 42 Rc	265	200	175	150	100	0.0014	0.0016	0.0023	0.0027	0.0032	0.0045
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	230	200	175	150	125						
H	Hardened Steels	34-65 Rc	45-55 Rc 55-65 Rc	250 200	240 180	230 160	210 150	200	0.0018 0.0013	0.0021 0.0014	0.0030 0.0021	0.0036 0.0024	0.0042 0.0029	0.0060 0.0041
K	Cast Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	425	400	375	350	300	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	> 240 HB	320	300	250	225	200						
N	Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics, Graphite	-	1000	960	920	880	840	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090

Slotting				SFM			IPT					
				Cutting Diameter Engaged			Cutting Diameter					
Material			Hardness	25%	50%	100%	5/16	3/8	1/2	5/8	3/4	1
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	385	370	350						
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	245	230	2210	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	210	195	175						
M	Stainless Steels	Ferritic	≤ 28 Rc	385	370	350						
	Stainless Steels	Martensitic	≤ 28 Rc	245	210	175	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316Ti, PH13-8Mo	> 28 Rc	210	195	175						
S	Super Alloys	High Temp, Nimonics, Inconel, Monel, Hastelloy	≤ 42 Rc	125	105	90						
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	100	90	80	0.0008	0.0010	0.0013	0.0016	0.0017	0.0026
H	Hardened Steels	34-65 Rc	34-45 Rc 45-55 Rc 55-65 Rc	245 175 150	230 160 125	210 140 100	0.0016 0.0008 0.0004	0.0019 0.0010 0.0005	0.0025 0.0013 0.0008	0.0031 0.0016 0.0008	0.0038 0.0020 0.0010	0.0050 0.0025 0.0012
K	Cast Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	450	400	350						
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	> 240 HB	300	250	225	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
N	Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics, Graphite	-	750	600	450	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050

**Series 250 - 252, 254 - 256**

GP | Micro End Mills | 2 - 4 FL | SQ, CR, BN

Profiling			Inches Per Tooth (IPT)										
			Cutting Diameter										
Material		Hardness	SFM	0.015	0.031	0.047	0.062	0.078	0.093	0.125	0.187	0.250	
<b>P</b>	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	400									
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28 - 38 Rc	300	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054	0.00081	0.00100
	Die Steels	A2, H13, L6, P20, S7	28 - 44 Rc	200									
<b>M</b>	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	400									
	Stainless Steels	Moderately Difficult to Machine, Nitronic 50, 301, 303, 304, 304L, 316, 316L, 321, 347	≤ 28 Rc	200	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054	0.00081	0.00100
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316Ti, PH13-8Mo	> 28 Rc	150									
<b>S</b>	Super Alloys	High Temp, Nimonics, Inconel, Monel, Hastelloy	≤ 42 Rc	70									
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	150	0.00004	0.00008	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054	0.00080
<b>H</b>	Hardened Steels	Tool Steel, Die Steel: D2, CPM-10V	45-55 Rc	100	0.00010	0.00030	0.00050	0.00140	0.00180	0.00210	0.00300	0.00360	0.00420
<b>K</b>	Cast Iron	Gray: SAE J431, ASTM A48	160-200 HB	400									
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	200-250 HB	250	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054	0.00081	0.00100
<b>N</b>	Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics, Graphite	-	100	0.00004	0.00008	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054	0.00080

Slotting			Inches Per Tooth (IPT)										
			Cutting Diameter										
Material		Hardness	SFM	0.015	0.031	0.047	0.062	0.078	0.093	0.125	0.187	0.250	
<b>P</b>	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	400					0.0003	0.0004	0.0005	0.0007	0.0010
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28 - 38 Rc	300	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004	0.0007	0.0009
	Die Steels	A2, H13, L6, P20, S7	28 - 44 Rc	200					0.0002	0.0003	0.0004	0.0006	0.0008
<b>M</b>	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	400			0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0010
	Stainless Steels	Moderately Difficult to Machine, Nitronic 50, 301, 303, 304, 304L, 316, 316L, 321, 347	≤ 28 Rc	200	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004	0.0007	0.0009
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316Ti, PH13-8Mo	> 28 Rc	150			0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005
<b>S</b>	Super Alloys	High Temp, Nimonics, Inconel, Monel, Hastelloy	≤ 42 Rc	70									
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	150	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005
<b>H</b>	Hardened Steels	Tool Steel, Die Steel: S7, H13, A2	35-45 Rc	100	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004
<b>K</b>	Cast Iron	Gray: SAE J431, ASTM A48	160-200 HB	400						0.0004	0.0005	0.0007	0.0010
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	200-250 HB	250	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004	0.0007	0.0009
<b>N</b>	Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics, Graphite	-	750	0.0002	0.0003	0.0005	0.0006	0.0007	0.0008	0.0011	0.0017	0.0022

**Series 209, 209D**

**GP | Chamfer Mills | 2 - 4 FL | 60° - 90°**

Material		SFM	1/4 – 5/16"	3/8 – 1/2"
<b>P</b>	Free Machining & Low/Med/High Carbon, Tool & Die Steels	25-175	0.0010	0.0020
<b>M</b>	Easy/Moderate/Difficult to Machine	50-150	0.0007	0.0015
<b>S</b>	High Temp, Nimonics, Inconel, Monel, Hastelloy, Titanium	25-125	0.0010	0.0015
<b>H</b>	55 Rc	25-100	0.0010	0.0015
<b>K</b>	Gray, Ductile & Malleable	50-250	0.0014	0.0021
<b>N</b>	Aluminum	50-1000	0.0025	0.0035
	Composites	100-200	0.0060	0.0090
	Copper	400-800	0.0020	0.0030
	Magnesium	400-700	0.0025	0.0035
	Plastics	150-300	0.0030	0.0040

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

**Series 2052, 2053**

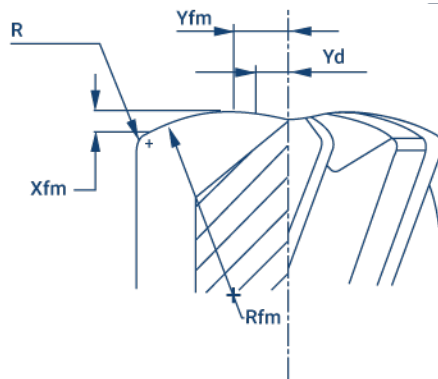
Ti-Feed | 5-7FL | Corner Radius | High Feed

Material		Axial	Radial	SFM	1/4	3/8	1/2	5/8	3/4	1
					IPM	IPM	IPM	IPM	IPM	IPM
M	SS 300 & 400 Series	.05 X D	.40D	210-290	314	333	283	299	300	299
	303, 304, 316, 420, 417									
M	Precipitation SS	.05 X D	.40D	180-225	194	129	195	206	206	206
	15-5, 16-6, 17-4, 17-6									
S	High Temp Alloys	.05 X D	.30D	80-110	72	76	70	68	63	61
	Inconel 718, Hastalloy, A286, Waspally, CoCr									
S	Titanium & Ti Alloys	.05 X D	.40D	120-200	126	132	125	133	133	132
	Ti-6Al4V, Grades (5-38)									

**Part Entry Programming Data**

Tool Geometry							Part Entry Guide						
Dia.	Xfm	R	Rfm	Yfm	YD	FL	Circular Interpolation		Linear Ramping (Length per Angle - inch)				
							Hole Dia. (Min)	Hole Dia. (Max)	1°	2°	3°	4°	5°
1/4	.0125	0.015	.1490	.0563	.0195	5	.3550	.500	.030	.015	.010	.007	.006
3/8	.0188	0.023	.2235	.0844	.0295	5	.5325	.750	.045	.022	.015	.011	.009
1/2	0.250	0.030	.2981	.1125	.0421	7	.7100	1.00	.060	.030	.020	.015	.012
5/8	.0313	0.037	.3726	.1406	.0495	7	.8875	1.25	.075	.037	.025	.019	.015
3/4	.0375	0.040	.4471	.1688	.0595	7	1.065	1.50	.090	.045	.030	.022	.018
1	.0500	0.060	.5961	.2250	.0795	7	1.420	2.00	.120	.060	.040	.030	.024

Recommended Feed Rate: Reduce 10-30%  
Dimensional tool drawings available upon request



# SPECIALTY

*A complete offering of specialty cutting tool solutions including routers, die tools, burrs, engraving tools, carbide square blanks and round blanks.*

*Custom Comes Standard - If we don't have the perfect tool on the shelf, we can build it for you.*





# PERFORMANCE

## STB & STBL Carbide Strips



### FEATURES / DESCRIPTION

#### Carbide Strips - Unground + Grind Stock

- Grind stock (material) allows for the blank to be polished/finished while remaining on-size
- C2 sub-micron grade carbide - unparalleled versatility
- Used as shims or raw material for custom part and tool making
- Thickness: +0.008" | Width: +0.012" | Length: +0.008"

### Series 777

### STB & STBL | Carbide Strips

Style	Thickness (D <sub>1</sub> )	Width (D)	OAL (L)	EDP
STB-12	1/32	1/16	1	777-001038
STB-12A	1/32	1/16	1-1/2	777-001039
STB-13	3/64	3/32	1	777-001040
STB-13A	3/64	3/32	13/16	777-001041
STB-220L	1/16	1/16	6	777-001067B
STB-24A	1/16	1/8	1	777-001047
STB-24B	1/16	1/8	3	777-001047B
STB-24C	1/16	1/8	1-1/4	777-001047E
STB-24D	1/16	1/8	1-1/2	777-001047F
STB-24L	1/16	1/8	6	777-001047G
STB-26A	1/16	3/16	1	777-001048
STB-26C	1/16	3/16	3	777-001048C
STB-26L	1/16	3/16	6	777-001048H
STB-28A	1/16	1/4	1	777-001059
STB-28B	1/16	1/4	1-1/4	777-001059A
STB-28D	1/16	1/4	3	777-001060
STB-28L	1/16	1/4	6	777-001061
STB-210L	1/16	5/16	6	777-001062
STB-212L	1/16	3/8	6	777-001067
STB-216L	1/16	1/2	6	777-001067A
STB-224L	1/16	3/4	6	777-001067C
STB-232L	1/16	1	6	777-001067D
STB-14	5/64	1/8	1-1/8	777-001045
STB-320	3/32	1/16	6	777-001079
STB-320L	3/32	1/16	8	777-001079A
STB-34	3/32	1/8	5	777-001068
STB-34L	3/32	1/8	8	777-001068A
STB-36	3/32	3/16	1-1/8	777-001064
STB-36A	3/32	3/16	1-1/4	777-001069
STB-36L	3/32	3/16	8	777-001069A
STB-38D	3/32	1/4	5	777-001050
STB-38A	3/32	1/4	1	777-001050C
STB-38B	3/32	1/4	1-1/2	777-001050D
STB-38L	3/32	1/4	8	777-001050E
STB-310A	3/32	5/16	2	777-001065
STB-310B	3/32	5/16	3	777-001065A
STB-310C	3/32	5/16	5	777-001066
STB-310L	3/32	5/16	8	777-001066C
STB-312	3/32	3/8	5	777-001070
STB-312L	3/32	3/8	8	777-001070C
STB-312C	3/32	3/8	6	777-001070D
STB-316	3/32	1/2	6	777-001072
STB-316L	3/32	1/2	8	777-001072A
STB-324	3/32	3/4	6	777-001073
STB-328	3/32	7/8	6	777-001074
STB-332	3/32	1	6	777-001076
STB-336	3/32	1-1/8	6	777-001077
STB-340	3/32	1-1/4	6	777-001078
STB-348	3/32	1-1/2	6	777-001080
STB-420	1/8	1/16	6	777-001091
STB-420L	1/8	1/16	12	777-001091A
STB-44L	1/8	1/8	12	777-001083
STB-46	1/8	3/16	6	777-001086
STB-46L	1/8	3/16	12	777-001086A
STB-48A	1/8	1/4	1	777-001052C
STB-48B	1/8	1/4	1-1/4	777-001052D
STB-48F	1/8	1/4	1-1/2	777-001052E
STB-48C	1/8	1/4	2-1/4	777-001052F
STB-48D	1/8	1/4	3	777-001052G

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# PERFORMANCE

STB & STBL Carbide Strips



Series 777		STB & STBL   Carbide Strips		
Style	Thickness (D <sub>1</sub> )	Width (D)	OAL (L)	EDP
STB-48E	1/8	1/4	6	777-001052H
STB-48L	1/8	1/4	12	777-001052I
STB-410	1/8	5/16	6	777-001080B
STB-410A	1/8	5/16	1-1/2	777-001080E
STB-410B	1/8	5/16	3	777-001080F
STB-410L	1/8	5/16	12	777-001080G
STB-412B	1/8	3/8	3	777-001081
STB-412A	1/8	3/8	2	777-001081D
STB-412D	1/8	3/8	1	777-001082
STB-412C	1/8	3/8	6	777-001082A
STB-412L	1/8	3/8	12	777-001082E
STB-416	1/8	1/2	6	777-001084
STB-416L	1/8	1/2	12	777-001084A
STB-416A	1/8	1/2	1	777-001085
STB-416C	1/8	1/2	3	777-001087
STB-416B	1/8	1/2	1-1/2	777-001090
STB-424	1/8	3/4	6	777-001095
STB-424L	1/8	3/4	12	777-001095A
STB-428	1/8	7/8	6	777-001096
STB-432	1/8	1	6	777-001055
STB-432L	1/8	1	12	777-001055A
STB-436	1/8	1-1/8	6	777-010555
STB-440	1/8	1-1/4	6	777-0140554
STB-448	1/8	1-1/2	6	777-010553
STB-456	1/8	1-3/4	6	777-010552
STB-520	5/32	1/16	6	777-010549
STB-512C	5/32	3/8	6	777-010551
STB-516	5/32	1/2	6	777-010550
STB-524	5/32	3/4	6	777-010548
STB-528	5/32	7/8	6	777-010547
STB-532	5/32	1	6	777-010546
STB-536	5/32	1-1/8	6	777-010545
STB-540	5/32	1-1/4	6	777-010544
STB-544	5/32	1-3/8	6	777-010543
STB-548	5/32	1-1/2	6	777-010542
STB-564	5/32	2	6	777-010541
STB-620	3/16	1/16	6	777-001057
STB-620A	3/16	1/16	3	777-001057A
STB-620L	3/16	1/16	12	777-001057B
STB-66L	3/16	3/16	12	777-001056
STB-68	3/16	1/4	6	777-001058
STB-68L	3/16	1/4	12	777-001058A
STB-68A	3/16	1/4	3	777-001058B
STB-610A	3/16	5/16	3	777-001115
STB-610	3/16	5/16	6	777-001116
STB-610L	3/16	5/16	12	777-001117
STB-612	3/16	3/8	6	777-001100
STB-612A	3/16	3/8	3	777-001100A
STB-612L	3/16	3/8	12	777-001100B
STB-616A	3/16	1/2	3	777-001110
STB-616	3/16	1/2	6	777-001110A
STB-616L	3/16	1/2	12	777-001110B
STB-624	3/16	3/4	6	777-001051
STB-624A	3/16	3/4	4	777-001051A
STB-624B	3/16	3/4	2	777-001051B
STB-624L	3/16	3/4	12	777-001051C
STB-628	3/16	7/8	6	777-001151
STB-632L	3/16	1	12	777-001114
STB-632	3/16	1	6	777-001114A
STB-640L	3/16	1-1/4	12	777-001113
STB-640	3/16	1-1/4	6	777-001113A
STB-648	3/16	1-1/2	6	777-010113
STB-820	1/4	1/16	6	777-001210
STB-820L	1/4	1/16	12	777-001210A
STB-820A	1/4	1/16	3	777-001210B
STB-88L	1/4	1/4	12	777-001450
STB-812	1/4	3/8	6	777-001188
STB-812A	1/4	3/8	3	777-001190
STB-812L	1/4	3/8	12	777-001190A
STB-816	1/4	1/2	6	777-001195
STB-816A	1/4	1/2	3	777-001195A
STB-816B	1/4	1/2	4	777-001195B
STB-816C	1/4	1/2	2	777-001195C
STB-816L	1/4	1/2	12	777-001195D
STB-824	1/4	3/4	6	777-001290
STB-824A	1/4	3/4	3	777-001290A

\*bold numbers are EDPs for ordering

# PERFORMANCE

STB & STBL Carbide Strips



Series 777		STB & STBL   Carbide Strips		
Style	Thickness (D <sub>1</sub> )	Width (D)	OAL (L)	EDP
STB-824L	1/4	3/4	12	<b>777-001290B</b>
STB-832	1/4	1	6	<b>777-001350</b>
STB-832L	1/4	1	12	<b>777-001400</b>
STB-840L	1/4	1-1/4	12	<b>777-001420</b>
STB-1010L	5/16	5/16	12	<b>777-001427</b>
STB-1212L	3/8	3/8	12	<b>777-001421</b>
STB-1216L	3/8	1/2	12	<b>777-001422</b>
STB-1224L	3/8	3/4	12	<b>777-001423</b>
STB-1232L	3/8	1	12	<b>777-001424</b>
STB-1616L	1/2	1/2	12	<b>777-001425</b>
STB-1624L	1/2	3/4	12	<b>777-001426</b>
STB-22L	5/8	1/16	6	<b>777-001042</b>

\*bold numbers are EDPs for ordering

INTRO

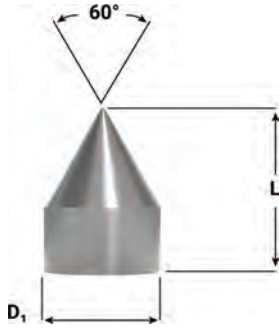
MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



### FEATURES / DESCRIPTION

#### Carbide Center Tips

- C2 sub-micron grade carbide
- 60° included angle
- Diameter Tol.: +0/-0.0005"
- Angle Tol.: +/- 1.0°

### Series 716C

60°

Style	Diameter (D <sub>1</sub> )	Height (L)	EDP
CT-40	1/4	7/16	<b>716-000001</b>
CT-50	5/16	9/16	<b>716-000002</b>
CT-60	3/8	11/16	<b>716-000003</b>
CT-80	1/2	7/8	<b>716-000004</b>
CT-100	5/8	1-1/16	<b>716-000005</b>
CT-120	3/4	1-1/4	<b>716-000006</b>
CT-140	7/8	1-3/8	<b>716-000007</b>
CT-160	1	1-1/2	<b>716-000008</b>
CT-200	1-1/4	1-3/4	<b>716-000009</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Carbide Ground Split Blanks



## FEATURES / DESCRIPTION

### Carbide Split End Blanks

- C2 sub-micron grade carbide
- Ground finish and available in both single and double ends
- Offers a solution for custom engraving and specialized marking
- Diameter Tol.: +0/-0.0005"

## Series 710

## Ground

Diameter (D <sub>1</sub> )	OAL (L)	Split Length (L <sub>1</sub> )	Single End	Double End
1/8	1-1/2	3/8	710-125150	720-125150
1/8	2	3/8	710-125200	720-125200
1/8	3	3/8	710-125300	720-125300
1/8	4	3/8	710-125400	720-125400
1/8	6	3/8	710-125600	720-125600
3/16	2	1/2	710-187200	720-187200
3/16	2-1/2	1/2	710-187250	720-187250
3/16	3	1/2	710-187300	720-187300
3/16	4	1/2	710-187400	720-187400
3/16	6	1/2	710-187600	720-187600
1/4	2	1/2	710-250200	720-250200
1/4	2-1/2	1/2	710-250250	720-250250
1/4	3	1/2	710-250300	720-250300
1/4	4	1/2	710-250400	720-250400
1/4	6	1/2	710-250600	720-250600
5/16	2-1/2	1/2	710-312250	720-312250
5/16	3	1/2	710-312300	720-312300
5/16	4	1/2	710-312400	720-312400
5/16	6	1/2	710-312600	720-312600
3/8	2-1/2	1/2	710-375250	720-375250
3/8	3	1/2	710-375300	720-375300
3/8	4	1/2	710-375400	720-375400
3/8	6	1/2	710-375600	720-375600
7/16	2-1/2	5/8	710-437250	720-437250
7/16	3	5/8	710-437300	720-437300
7/16	4	5/8	710-437400	720-437400
7/16	6	5/8	710-437600	720-437600
1/2	3	5/8	710-500300	720-500300
1/2	4	5/8	710-500400	720-500400
1/2	6	5/8	710-500600	720-500600

\*bold numbers are EDPs for ordering

INTRO

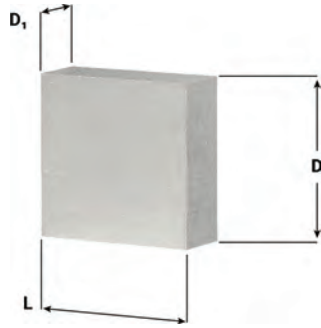
MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



### FEATURES / DESCRIPTION

#### Carbide Square Blanks: Unground + Grind Stock

- Grind stock (material) allows for the blank to be polished/finished while remaining on-size
- C2 and C5 grades available
- Higher TRS versus HSS
- Used as shims or ram material
- Minimum Grind Stock: Thickness  $\leq 5/16$ : +0.004 to +0.015"
- Minimum Grind Stock: Thickness  $\geq 3/8$ : +0.006 to +0.020"

### Series 1000

### C2 10% Grade | C5 8% Grade

Style	Thickness (D <sub>1</sub> )	Width (D)	OAL (L)	C2	C5
1010	1/16	1/8	5/8	700-007001	700-007001A
2010	1/16	1/8	5/8	700-007208A	-
1020	1/16	3/16	1/4	700-007005	700-007005A
2020	1/16	3/16	1/4	700-007209A	700-007209D
1030	1/16	1/4	5/16	700-007010	700-007010A
1040	3/32	3/16	5/16	700-007012	700-007012A
1050	3/32	3/16	1/2	700-007012B	700-007012C
1060	3/32	1/4	3/8	700-007011	700-007011A
1070	3/32	1/4	1/2	700-007013	700-007013A
1080	3/32	5/16	3/8	700-007014	700-007014A
1090	3/32	3/8	3/8	700-007016	700-007017
1100	3/32	3/8	1/2	700-007020	700-007020A
1105	3/32	7/16	1/2	700-007030	700-007032
1110	1/8	3/16	3/4	700-007035	700-007035A
1140	1/8	1/4	3/4	700-007049A	700-007049
1120	1/8	1/4	1/2	700-007055	700-007056
1130	1/8	1/4	5/8	700-007057	700-007057A
1150	1/8	5/16	7/16	700-007050	-
1160	1/8	5/16	1/2	700-007059	700-007060
1170	1/8	5/16	5/8	700-007070	-
1180	1/8	3/8	1/2	700-007080	700-007081
1190	1/8	3/8	3/4	700-007082	700-007083
1200	1/8	1/2	1/2	700-007084	700-007085
1210	1/8	1/2	3/4	700-007086	700-007087
1215	1/8	3/4	3/4	700-007088	700-007088A
1240	5/32	5/8	5/8	700-007099	-
1220	5/32	3/8	9/16	700-007089	-
1230	5/32	3/8	3/4	700-007098A	-
1250	3/16	5/16	7/16	700-007099A	700-007099D
1260	3/16	5/16	5/8	700-007099B	700-007099C
1290	3/16	3/8	3/4	700-007090	700-007100
1270	3/16	3/8	1/2	700-007091	-
1280	3/16	3/8	5/8	700-007092	700-007093
1300	3/16	7/16	5/8	700-007110	-
1310	3/16	7/16	13/16	700-007150	700-007150A
1320	3/16	1/2	1/2	700-007160	700-007160A
1330	3/16	1/2	3/4	700-007180	700-007180A
1340	3/16	3/4	3/4	700-007190	700-007190A
1400	1/4	5/8	5/8	700-007208	-
1350	1/4	3/8	9/16	700-007200	-
1360	1/4	3/8	3/4	700-007200A	-
1370	1/4	7/16	5/8	700-007311	-
1380	1/4	1/2	3/4	700-007203	700-007204
1390	1/4	9/16	1	700-007202	-
1410	1/4	3/4	1	700-007201	700-007206
1405	1/4	3/4	3/4	700-007208B	-
1460	5/16	5/8	1	700-007314	-
1430	5/16	7/16	15/16	700-007312	-
1440	5/16	1/2	3/4	700-007209	-
1450	5/16	1/2	1	700-007313	-
1470	5/16	3/4	3/4	700-007315	-
1480	5/16	3/4	1-1/4	700-007316	-
1475	5/16	3/4	1	700-007317	-
1510	3/8	5/8	1	700-007318	-
1490	3/8	1/2	3/4	700-007209B	-
1500	3/8	1/2	1	700-007209C	-
1520	3/8	3/4	1-1/4	700-007319	-
1525	3/8	3/4	1-1/2	700-007320	-
1530	1/2	3/4	1	700-007321	-

\*bold numbers are EDPs for ordering

# PERFORMANCE

Carbide Unground Square Blanks



Series 1000		C2 10% Grade   C5 8% Grade			
Style	Thickness (D <sub>1</sub> )	Width (D)	OAL (L)	C2	C5
1540	1/2	3/4	1-1/4	<b>700-007322</b>	-
1550	1/2	3/4	1-1/2	<b>700-007323</b>	-

\*bold numbers are EDPs for ordering

INTRO

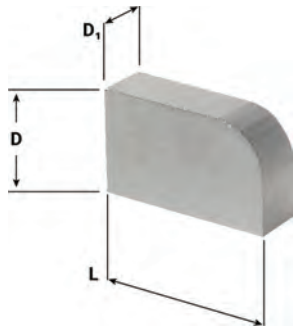
MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



### FEATURES / DESCRIPTION

#### Carbide Radius Blanks - Unground + Grind Stock

- Grind stock (material) allows for the blank to be polished/finished while remaining on-size
- C2 and C5 grades available
- Higher TRS versus HSS
- Used as shims or ram material
- Minimum Grind Stock: Thickness  $\leq 5/16$ : +0.004 to +0.015"
- Minimum Grind Stock: Thickness  $\geq 3/8$ : +0.006 to +0.020"

### Series 2000

### C2 10% Grade | C5 8% Grade

Style	Thickness (D <sub>1</sub> )	Width (D)	OAL (L)	C2	C5
2030	1/16	1/4	5/16	700-007210	700-007210A
2040	3/32	3/16	5/16	700-007211	700-007211A
2050	3/32	3/16	1/2	700-007213	700-007214
2060	3/32	1/4	3/8	700-007215	700-007216
2070	3/32	1/4	1/2	700-007218	700-007219
2080	3/32	5/16	3/8	700-007220	-
2090	3/32	3/8	3/8	700-007221	-
2100	3/32	3/8	1/2	700-007226	700-007226A
2105	3/32	7/16	1/2	700-007228	700-007728.5
2110	1/8	3/16	3/4	700-007230	700-007231
2120	1/8	1/4	1/2	700-007232	700-007232A
2130	1/8	1/4	5/8	700-007233	700-007234
2140	1/8	1/4	3/4	700-007235	700-007235A
2150	1/8	5/16	7/16	700-007236	-
2160	1/8	5/16	1/2	700-007237	-
2170	1/8	5/16	5/8	700-007241	-
2170	1/8	5/16	5/8	-	700-007242
2180	1/8	3/8	1/2	700-007243	700-007244
2190	1/8	3/8	3/4	700-007245B	700-007245A
2200	1/8	1/2	1/2	700-007247	700-007247B
2210	1/8	1/2	3/4	700-007260	700-007265
2215	1/8	3/4	3/4	700-007270	700-007275
2240	5/32	5/8	5/8	700-007282	-
2220	5/32	3/8	9/16	700-007276	-
2230	5/32	3/8	3/4	700-007280	-
2250	3/16	5/16	7/16	700-007284	-
2260	3/16	5/16	5/8	700-007290	-
2270	3/16	3/8	1/2	700-007292	-
2280	3/16	3/8	5/8	700-007294	-
2290	3/16	3/8	3/4	700-007300	-
2300	3/16	7/16	5/8	700-007302	-
2310	3/16	7/16	13/16	700-007304	700-007304A
2320	3/16	1/2	1/2	700-007306	700-007306A
2330	3/16	1/2	3/4	700-007308	700-007308A
2340	3/16	3/4	3/4	700-007310	-

\*bold numbers are EDPs for ordering

# PERFORMANCE

Carbide Ground Round Blanks



## FEATURES / DESCRIPTION

### Carbide Round Tool Blanks

- C2 sub-micron grade carbide - unparalleled versatility and wear resistance
- Centerless ground for premium finish and precision
- Diameter Tol.: +0/-0.0005"

## Series 701

## Ground

Diameter (D <sub>1</sub> )	OAL (L)	EDP
1/32	1-1/2	701-001150
3/64	1-1/2	701-001350
3/64	2	701-001450
1/16	1-1/2	701-001550
1/16	3	701-001595
5/64	1-1/2	701-001740
5/64	2	701-001750
3/32	1-1/2	701-001850
3/32	2	701-001950
3/32	2-1/2	701-002050
3/32	3	701-002055
7/64	2	701-002250
7/64	2-1/2	701-002350
1/8	1	701-002370
1/8	1-1/2	701-002450
1/8	2	701-002550
1/8	2-1/4	701-002650
1/8	2-1/2	701-002750
1/8	3	701-002850
1/8	4	701-002950
5/32	1-1/2	701-003050
5/32	2	701-003053
5/32	2-1/2	701-003066
5/32	3	701-003067
3/16	1-1/2	701-003250
3/16	2	701-003350
3/16	2-1/2	701-003550
3/16	3	701-003650
3/16	4	701-003750
1/4	2	701-003850
1/4	2-1/2	701-004050
1/4	3	701-004150
1/4	4	701-004250
5/16	2	701-004350
5/16	2-1/8	701-004360
5/16	2-1/2	701-004450
5/16	3	701-004550
5/16	3-1/4	701-004551
5/16	4	701-004650
3/8	1-1/2	701-004690
3/8	2	701-004750
3/8	2-1/2	701-004850
3/8	3	701-004950
3/8	3-1/2	701-005050
3/8	4	701-005150
3/8	6	701-005250
7/16	2-1/2	701-005350
7/16	2-3/4	701-005450
7/16	3	701-005490
7/16	4	701-005550
7/16	6	701-005650
1/2	2	701-005750
1/2	2-1/2	701-005850
1/2	3	701-005950
1/2	3	701-005950A
1/2	4	701-006050
1/2	5	701-006080
1/2	6	701-006150
1/2	7	701-006155

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# PERFORMANCE

Carbide Ground Round Blanks



Series 701		Ground	
Diameter (D <sub>1</sub> )	OAL (L)	EDP	
1/2	8	701-006160	
9/16	3-1/2	701-006250	
9/16	4	701-006255	
5/8	3	701-006280	
5/8	3-1/2	701-006350	
5/8	4	701-006355	
5/8	5	701-006450	
5/8	6	701-006550	
5/8	7	701-006555	
5/8	8	701-006556	
5/8	9	701-006557	
3/4	3	701-006690	
3/4	4	701-006750	
3/4	5	701-006850	
3/4	6	701-006950	
3/4	7	701-007050	
3/4	8	701-007057	
3/4	9	701-007058	
7/8	4	701-007150	
7/8	6	701-007155	
1	4	701-007250	
1	5	701-007350	
1	6	701-007450	
1	7	701-007550	

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

## Carbide Ground Round Blanks Short



### FEATURES / DESCRIPTION

#### Carbide Round Tool Blanks - Short

- C2 sub-micron grade carbide - unparalleled versatility
- Centerless ground for premium finish and precision
- Phenomenal shock and heat resistance
- Diameter Tol.: +0/-0.0005"

### Series 702

### Ground

Style	Diameter (D <sub>1</sub> )	OAL (L)	EDP
SR-34	3/32	1/2	<b>702-000200</b>
SR-44	1/8	1/2	<b>702-000300</b>
SR-46	1/8	3/4	<b>702-000400</b>
SR-48	1/8	1	<b>702-000500</b>
SR-55	5/32	5/8	<b>702-000600</b>
SR-63	3/16	3/8	<b>702-000700</b>
SR-64	3/16	1/2	<b>702-000800</b>
SR-65	3/16	5/8	<b>702-000890</b>
SR-66	3/16	3/4	<b>702-000900</b>
SR-68	3/16	1	<b>702-000950</b>
SR-69	3/16	1-1/8	<b>702-001000</b>
SR-77	7/32	7/8	<b>702-001100</b>
SR-84	1/4	1/2	<b>702-001190</b>
SR-86	1/4	3/4	<b>702-001195</b>
SR-88	1/4	1	<b>702-001200</b>
SR-810	1/4	1-1/4	<b>702-001300</b>
SR-812	1/4	1-1/2	<b>702-001400</b>
SR-814	1/4	1-3/4	<b>702-001500</b>
SR-1010	5/16	1-1/4	<b>702-001600</b>
SR-1210	3/8	1-1/2	<b>702-001700</b>
SR-1610	1/2	1-1/2	<b>702-001800</b>

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### 12" Carbide Round Blanks

- C2 sub-micron grade carbide - unparalleled versatility
- Centerless ground for premium finish and precision
- Phenomenal shock and heat resistance
- Diameter Tol.: +0/-0.0005"

### Series 702L Ground And Unground

Diameter (D <sub>1</sub> )	OAL (L)	Ground	Unground
1/32	12	702-100200	-
3/64	12	702-100350	702-100300
1/16	12	702-100450	702-100400
5/64	12	702-100550	-
3/32	12	702-100650	702-100600
7/64	12	702-100750	-
1/8	12	702-100900	-
9/64	12	702-101000	702-100950
5/32	12	702-101100	702-101050
11/64	12	702-101200	-
3/16	12	702-101300	702-101250
13/64	12	702-101450	-
7/32	12	702-101550	-
15/64	12	702-101650	702-101600
1/4	12	702-101750	702-101700
17/64	12	702-101850	702-101800
9/32	12	702-101950	702-101900
5/16	12	702-102150	702-102100
21/64	12	702-102250	-
11/32	12	702-102350	702-102300
23/64	12	702-102450	-
3/8	12	702-102550	702-102500
25/64	12	702-102650	702-102600
13/32	12	702-102750	702-102700
27/64	12	702-102770	702-102760
7/16	12	702-102850	702-102800
29/64	12	702-102890	702-102880
15/32	12	702-102950	702-102900
31/64	12	-	702-102990
1/2	12	702-103050	702-103000
17/32	12	702-103080	702-103070
9/16	12	702-103150	702-103100
5/8	12	702-103250	-
11/16	12	702-103350	-
3/4	12	702-103450	702-103400
13/16	12	702-103550	702-103500
7/8	12	702-103650	702-103600
1	12	702-103850	702-103800

\*bold numbers are EDPs for ordering

# PERFORMANCE

## Carbide Cylinder Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Cylinder Shape - No End Cut</b> <ul style="list-style-type: none"> <li>• Universal surface grinding</li> <li>• L2 = 2" OAL, L3 = 3" OAL</li> <li>• L6 = 6" Shank Length</li> <li>• Single Cut = Finishing</li> <li>• Double Cut = Material Removal</li> <li>• Aluma Cut = Non-Ferrous</li> </ul>		<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">CARBIDE</div> <div style="border: 1px solid black; padding: 2px;">Bright</div> </div> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;">P 217</div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

### Series 310A SA | Cylinder Shape | No End Cut

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Single Cut	Double Cut	Aluma Cut
SA-61	1/16	1/4	3/32	310-001001	310-002001	-
SA-41	1/16	1/4	1/8	310-001002	310-002002	-
SA-41 L2	1/16	1/4	1/8	310-001002B	310-002002B	-
SA-41 L3	1/16	1/4	1/8	310-00100C	310-002002C	-
SA-63	3/32	3/8	3/32	310-001007	310-002007	-
SA-42	3/32	7/16	1/8	310-001004	310-002004	-
SA-42 L3	3/32	7/16	1/8	310-001004A	310-002004A	-
SA-42 L2	3/32	7/16	1/8	310-001004B	310-002004B	-
SA-11	1/8	1/2	1/4	310-001005C	310-002005C	-
SA-43	1/8	9/16	1/8	310-001006	310-002006	-
SA-43 L3	1/8	9/16	1/8	310-002631	310-002006A	-
SA-43 L2	1/8	9/16	1/8	310-006025	310-006050	-
SA-12	1/8	5/8	1/4	310-001005D	310-002005D	-
SA-52	5/32	1/2	1/8	310-001008	310-002008	-
SA-13	5/32	5/8	1/4	310-001009	310-002009C	-
SA-53	3/16	1/2	1/8	310-001010	310-002010	-
SA-81	3/16	5/8	3/16	310-001011	310-002011	-
SA-14	3/16	5/8	1/4	310-001012C	310-002012C	-
SA-1L	1/4	1	1/4	310-001936	310-002936	-
SA-51	1/4	1/2	1/8	310-001015	310-002015	-
SA-1 L6	1/4	1/2	1/4	310-002601	310-002701	-
SA-1	1/4	5/8	1/4	310-001017C	310-002017C	-
SA-1NF	1/4	5/8	1/4	-	-	310-002518
SA-2	5/16	3/4	1/4	310-001018	310-002018	-
SA-3L	3/8	1	1/4	310-001937	310-002937	-
SA-3	3/8	3/4	1/4	310-001019	310-002019	-
SA-3NF	3/8	3/4	1/4	-	-	310-002500
SA-3 L6	3/8	3/4	1/4	310-002602	310-002702A	-
SA-3X	3/8	1-1/2	1/4	310-001702X	310-002702X	-
SA-4	7/16	1	1/4	310-001020	310-002020	-
SA-5	1/2	1	1/4	310-001021	310-002021	-
SA-5NF	1/2	1	1/4	-	-	310-002501
SA-5 L6	1/2	1	1/4	310-002603	310-002703	-
SA-6	5/8	1	1/4	310-001022	310-002022	-
SA-6NF	5/8	1	1/4	-	-	310-002502
SA-7	3/4	1	1/4	310-001025	310-002025	-
SA-7NF	3/4	1	1/4	-	-	310-002539
SA-15	3/4	1/2	1/4	310-001023	310-002023	-
SA-16	3/4	3/4	1/4	310-001024	310-002024	-
SA-8	7/8	1	1/4	310-001025A	310-002025A	-
SA-9	1	1	1/4	310-001026	310-002026	-

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Carbide Cylinder Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Cylinder Shape - End Cut</b></p> <ul style="list-style-type: none"> <li>• Blind holes and inner contours</li> <li>• L2 = 2" OAL, L3 = 3" OAL</li> <li>• L6 = 6" Shank Length</li> <li>• DE = Double End Cut, ECO = End Cut Only</li> <li>• Single Cut = Finishing</li> <li>• Double Cut = Material Removal</li> <li>• Aluma Cut = Non-Ferrous</li> </ul>		<p><b>CARBIDE</b> <b>Bright</b></p> <p><b>P 217</b></p>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 310B** | SB | Cylinder Shape | End Cut

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Single Cut	Double Cut	Aluma Cut
SB-41	1/16	1/4	1/8	310-001031	310-002031	-
SB-41 L2	1/16	1/4	1/8	310-001056	310-002056	-
SB-41 L3	1/16	1/4	1/8	310-001057	310-002057	-
SB-42	3/32	7/16	1/8	310-001033	310-002033	-
SB-42 L2	3/32	7/16	1/8	310-001033A	310-002033A	-
SB-42 L3	3/32	7/16	1/8	310-001033B	310-002033B	-
SB-11	1/8	1/2	1/4	310-001034C	310-002034C	-
SB-43	1/8	9/16	1/8	310-001035	310-002035	-
SB-43 L2	1/8	9/16	1/8	310-001035E	310-002035A	-
SB-43 L3	1/8	9/16	1/8	310-001036A	310-002036A	-
SB-12	1/8	5/8	1/4	310-001029	310-002029	-
SB-13	5/32	5/8	1/4	310-001038C	310-002038C	-
SB-53	3/16	1/2	1/8	310-001039	310-002039	-
SB-81	3/16	5/8	3/16	310-001040	-	-
SB-14	3/16	5/8	1/4	310-001041C	310-002041	-
SB-81	3/16	5/8	3/16	-	310-002040	-
SB-1L	1/4	1	1/4	310-001968	310-002938	-
SB-51	1/4	3/16	1/8	310-001044	310-002044	-
SB-51A	1/4	1/2	1/8	310-001044A	310-002044AA	-
SB-1 L6	1/4	5/8	1/4	310-001027	310-002027A	-
SB-1	1/4	5/8	1/4	310-001046C	310-002046C	-
SB-1NF	1/4	5/8	1/4	-	-	310-002546
SB-2	5/16	3/4	1/4	310-001047	310-002048	-
SB-3L	3/8	1	1/4	310-001939	310-002939	-
SB-3	3/8	3/4	1/4	310-001048	310-002047	-
SB-3NF	3/8	3/4	1/4	-	-	310-002588
SB-3 L6	3/8	3/4	1/4	310-002941	310-002941A	-
SB-3X	3/8	1-1/2	1/4	310-001048A	310-002047X	-
SB-4	7/16	1	1/4	310-001049	310-002049	-
SB-5	1/2	1	1/4	310-001055	310-002055	-
SB-5NF	1/2	1	1/4	-	-	310-002589
SB-5 L6	1/2	1	1/4	310-004299	310-004300	-
SB-6	5/8	1	1/4	310-001050	310-002050	-
SB-6NF	5/8	1	1/4	-	-	310-002590
SB-7	3/4	1	1/4	310-001053	310-002053	-
SB-7NF	3/4	1	1/4	-	-	310-002591
SB-15	3/4	1/2	1/4	310-001051	310-002051	-
SB-16	3/4	3/4	1/4	310-001052	310-002052	-
SB-8	7/8	1	1/4	310-001053A	310-002053A	-
SB-9	1	1	1/4	310-001054	310-002054	-

\*bold numbers are EDPs for ordering

# PERFORMANCE

Carbide Cylinder Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Cylinder Shape - Radius End</b> <ul style="list-style-type: none"> <li>Contouring and bore holes</li> <li>L2 = 2" OAL, L3 = 3" OAL</li> <li>L6 = 6" Shank Length</li> <li>Single Cut = Finishing</li> <li>Double Cut = Material Removal</li> <li>Aluma Cut = Non-Ferrous</li> </ul>		<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">CARBIDE</div> <div style="border: 1px solid black; padding: 2px;">Bright</div> </div> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;">P 217</div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 310C | SC | Cylinder Shape | Radius End

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Single Cut	Double Cut	Aluma Cut
SC-61	3/32	3/8	3/32	310-001060	310-002060	-
SC-41	3/32	7/16	1/8	310-001061	310-002061	-
SC-41 L3	3/32	7/16	1/8	310-001061B	310-002061B	-
SC-11	1/8	1/2	1/4	310-001062C	310-002062C	-
SC-42	1/8	9/16	1/8	310-001063	310-002063	-
SC-42 L3	1/8	9/16	1/8	310-001063A	310-002732	-
SC-42 L2	1/8	9/16	1/8	310-006100	310-006075	-
SC-12	1/8	5/8	1/4	310-001062D	310-002062D	-
SC-52	5/32	1/2	1/8	310-001070	310-002070	-
SC-13	5/32	5/8	1/4	310-001065C	310-002065C	-
SC-53	3/16	1/2	1/8	310-001066	310-002066	-
SC-81	3/16	5/8	3/16	310-001067	310-002067	-
SC-14	3/16	5/8	1/4	310-001068C	310-002068C	-
SC-1L	1/4	1	1/4	310-001250	310-002250	-
SC-51	1/4	1/2	1/8	310-001069	310-002069	-
SC-1 L6	1/4	1/2	1/4	310-002605	310-002705	-
SC-1	1/4	5/8	1/4	310-001071C	310-002072C	-
SC-1NF	1/4	5/8	1/4	-	-	310-002519
SC-2	5/16	3/4	1/4	310-001072	310-002071	-
SC-3L	3/8	1	1/4	310-001940	310-002940	-
SC-3	3/8	3/4	1/4	310-001073	310-002073	-
SC-3NF	3/8	3/4	1/4	-	-	310-002503
SC-3 L6	3/8	3/4	1/4	310-002606	310-002706	-
SC-3x	3/8	1-1/2	1/4	310-001706X	310-002706X	-
SC-4	7/16	1	1/4	310-001074	310-002074	-
SC-4NF	7/16	1	1/4	-	-	310-003008
SC-5	1/2	1	1/4	310-001075	310-002075	-
SC-5NF	1/2	1	1/4	-	-	310-002504
SC-5 L6	1/2	1	1/4	310-002607	310-002707	-
SC-6	5/8	1	1/4	310-001076	310-002076	-
SC-6NF	5/8	1	1/4	-	-	310-002505
SC-7	3/4	1	1/4	310-001077	310-002077	-
SC-7NF	3/4	1	1/4	-	-	310-002525
SC-15	3/4	1/2	1/4	310-001068A	310-002068A	-
SC-16	3/4	3/4	1/4	310-001078A	310-002078A	-
SC-9	1	1	1/4	310-001079	310-002078	-

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

Carbide Ball Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Ball Shape</b> <ul style="list-style-type: none"> <li>Contouring and bore holes</li> <li>L2 = 2" OAL, L3 = 3" OAL</li> <li>L6 = 6" Shank Length</li> <li>Single Cut = Finishing</li> <li>Double Cut = Material Removal</li> <li>Aluma Cut = Non-Ferrous</li> </ul>		<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">CARBIDE</div> <div style="border: 1px solid black; padding: 2px;">Bright</div> </div> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;">P 217</div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 310D SD | Ball Shape

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Single Cut	Double Cut	Aluma Cut
SD-40	1/16	1/16	1/8	310-001079A	310-002079	-
SD-61	3/32	3/32	3/32	310-001080	310-002080	-
SD-41	3/32	3/32	1/8	310-001081	310-002081	-
SD-41 L3	3/32	3/32	1/8	310-001081B	310-002081A	-
SD-41 L2	3/32	3/32	1/8	310-001081C	310-002081C	-
SD-11	1/8	3/32	1/4	310-001083C	310-002083C	-
SD-42	1/8	1/8	1/8	310-001082	310-002082	-
SD-42 L3	1/8	1/8	1/8	310-001082A	310-002733	-
SD-42 L2	1/8	1/8	1/8	310-006150	310-006125	-
SD-52	5/32	5/32	1/8	310-001088	310-002088	-
SD-14	3/16	1/8	1/4	310-001086C	310-002086C	-
SD-53	3/16	5/32	1/8	310-001084	310-002084	-
SD-81	3/16	5/32	3/16	310-001085	310-002085	-
SD-51	1/4	7/32	1/8	310-001087	310-002087	-
SD-1	1/4	7/32	1/4	310-001089C	310-002089C	-
SD-1NF	1/4	7/32	1/4	-	-	310-002520
SD-1 L6	1/4	7/32	1/4	310-002609	310-002709	-
SD-2	5/16	1/4	1/4	310-001090	310-002090	-
SD-2 L6	5/16	1/4	1/4	310-002609A	310-002708	-
SD-3	3/8	5/16	1/4	310-001091	310-002091	-
SD-3NF	3/8	5/16	1/4	-	-	310-002506
SD-3 L6	3/8	5/16	1/4	310-002610	310-002710	-
SD-4	7/16	3/8	1/4	310-001092	310-002092	-
SD-4 L6	7/16	3/8	1/4	310-002610P	310-002710B	-
SD-5	1/2	7/16	1/4	310-001093	310-002093	-
SD-5NF	1/2	7/16	1/4	-	-	310-002507
SD-5 L6	1/2	7/16	1/4	310-002611	310-002711	-
SD-6	5/8	9/16	1/4	310-001094	310-002094	-
SD-6NF	5/8	9/16	1/4	-	-	310-002508
SD-7	3/4	11/16	1/4	310-001095	310-002095	-
SD-7NF	3/4	11/16	1/4	-	-	310-003005
SD-9	1	15/16	1/4	310-001096	310-002096	-

\*bold numbers are EDPs for ordering

# PERFORMANCE

Carbide Oval/Egg Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Oval/Egg Shape</b></p> <ul style="list-style-type: none"> <li>• Molds and fillet welds</li> <li>• L2 = 2" OAL, L3 = 3" OAL</li> <li>• L6 = 6" Shank Length</li> <li>• Single Cut = Finishing</li> <li>• Double Cut = Material Removal</li> <li>• Aluma Cut = Non-Ferrous</li> </ul>		<p><b>CARBIDE</b> <b>Bright</b></p> <p><b>P 217</b></p>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 310E** SE | Oval/Egg Shape

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Single Cut	Double Cut	Aluma Cut
SE-61	3/32	1/8	3/32	310-001108A	310-002108A	-
SE-41	1/8	7/32	1/8	310-001100	310-002100	-
SE-41 L3	1/8	7/32	1/8	310-001100B	310-002100A	-
SE-41 L2	1/8	7/32	1/8	310-006200	310-006175	-
SE-53	3/16	9/32	1/8	310-001101	310-002101	-
SE-81	3/16	9/32	3/16	310-001102	310-002102	-
SE-11	3/16	5/16	1/4	310-004127	310-004128	-
SE-51	1/4	3/8	1/8	310-001103	310-002103	-
SE-1	1/4	3/8	1/4	310-001105C	310-002105C	-
SE-1 L6	1/4	3/8	1/4	310-002613	310-002713	-
SE-3	3/8	5/8	1/4	310-001106	310-002106	-
SE-3NF	3/8	5/8	1/4	-	-	310-002509
SE-3 L6	3/8	5/8	1/4	310-002614	310-002714	-
SE-5	1/2	7/8	1/4	310-001107	310-002107	-
SE-5NF	1/2	7/8	1/4	-	-	310-002510
SE-5 L6	1/2	7/8	1/4	310-005020	310-002715	-
SE-6	5/8	1	1/4	310-001108	310-002108	-
SE-6NF	5/8	1	1/4	-	-	310-002511
SE-7	3/4	1	1/4	310-001109	310-002109	-
SE-7NF	3/4	1	1/4	-	-	310-004302

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS



# PERFORMANCE

Carbide Tree Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Tree Shape - Radius</b> <ul style="list-style-type: none"> <li>Molds and contouring</li> <li>L2 = 2" OAL, L3 = 3" OAL</li> <li>L6 = 6" Shank Length</li> <li>Single Cut = Finishing</li> <li>Double Cut = Material Removal</li> <li>Aluma Cut = Non-Ferrous</li> </ul>		<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">CARBIDE</div> <div style="border: 1px solid black; padding: 2px;">Bright</div> </div> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;">P 217</div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 310F | SF | Tree Shape | Radius

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Single Cut	Double Cut	Aluma Cut
SF-61	3/32	1/4	3/32	310-003702A	310-003702	-
SF-41	1/8	1/4	1/8	310-001110	310-002110	-
SF-42	1/8	1/2	1/8	310-001111	310-002111	-
SF-11	1/8	1/2	1/4	310-001112C	310-002112C	-
SF-42 L3	1/8	1/2	1/8	310-001146	310-002735	-
SF-42 L2	1/8	1/2	1/8	310-006250	310-006225	-
SF-53	3/16	1/2	1/8	310-001113	310-002113	-
SF-81	3/16	1/2	3/16	310-001114	310-002114	-
SF-51	1/4	1/2	1/8	310-001115	310-002115	-
SF-1 L6	1/4	1/2	1/4	310-002617	310-002717	-
SF-1	1/4	5/8	1/4	310-001117C	310-002117C	-
SF-1NF	1/4	5/8	1/4	-	-	310-002521
SF-3	3/8	3/4	1/4	310-001118	310-002118	-
SF-3NF	3/8	3/4	1/4	-	-	310-002512
SF-3 L6	3/8	3/4	1/4	310-002618	310-002718	-
SF-4	7/16	1	1/4	310-001119	310-002119	-
SF-4 L6	7/16	1	1/4	310-002616	-	-
SF-4 L6	7/16	1	1/4	-	310-002774A	-
SF-5	1/2	1	1/4	310-001121	310-002121	-
SF-5NF	1/2	1	1/4	-	-	310-002513
SF-5 L6	1/2	1	1/4	310-002619	310-002719	-
SF-13	1/2	3/4	1/4	310-001120	310-002120	-
SF-6	5/8	1	1/4	310-001122	310-002122	-
SF-6NF	5/8	1	1/4	-	-	310-002514
SF-7	3/4	1	1/4	310-001123	310-002123	-
SF-7NF	3/4	1	1/4	-	-	310-002544
SF-14	3/4	1-1/4	1/4	310-001124	310-002124C	-
SF-14NF	3/4	1-1/4	1/4	-	-	310-003006
SF-15	3/4	1-1/2	1/4	310-001125	310-002125	-

\*bold numbers are EDPs for ordering

# PERFORMANCE

Carbide Tree Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Tree Shape - Pointed</b></p> <ul style="list-style-type: none"> <li>• chamfering and bore holes</li> <li>• L2 = 2" OAL, L3 = 3" OAL</li> <li>• L6 = 6" Shank Length</li> <li>• Single Cut = Finishing</li> <li>• Double Cut = Material Removal</li> </ul>		<p><b>CARBIDE</b> <b>Bright</b></p> <p><b>P 217</b></p>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 310G** | SG | Tree Shape | Pointed

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Single Cut	Double Cut
SG-61	3/32	1/4	3/32	310-002148	310-002147
SG-41	1/8	1/4	1/8	310-001130	310-002130
SG-42	1/8	5/16	1/8	310-001131	310-002131
SG-43	1/8	3/8	1/8	310-001132	310-002132
SG-44	1/8	1/2	1/8	310-001145	310-002145
SG-44 L2	1/8	1/2	1/8	310-006300	310-006275
SG-44 L3	1/8	1/2	1/8	310-006900	310-006875
SG-53	3/16	1/2	1/8	310-001133	310-002133
SG-81	3/16	1/2	3/16	310-001134	310-002134
SG-51	1/4	1/2	1/8	310-001135	310-002135
SG-1 L6	1/4	1/2	1/4	310-002621	310-002721
SG-1	1/4	5/8	1/4	310-001137C	310-002137C
SG-2	5/16	3/4	1/4	310-001138	310-002138
SG-3	3/8	3/4	1/4	310-001139	310-002139
SG-3 L6	3/8	3/4	1/4	310-002622	310-002722
SG-5	1/2	1	1/4	310-001141	310-002141
SG-5 L6	1/2	1	1/4	310-002623	310-002723
SG-13	1/2	3/4	1/4	310-001140	310-002140
SG-6	5/8	1	1/4	310-001142	310-002142
SG-7	3/4	1	1/4	310-001143	310-002143
SG-15	3/4	1-1/2	1/4	310-001144	310-002144

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

## Carbide Flame Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Flame Shape</b> <ul style="list-style-type: none"> <li>Molds and contouring</li> <li>L2 = 2" OAL, L3 = 3" OAL</li> <li>L6 = 6" Shank Length</li> <li>Single Cut = Finishing</li> <li>Double Cut = Material Removal</li> </ul>		<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">CARBIDE</div> <div style="border: 1px solid black; padding: 2px;">Bright</div> </div> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;">P 217</div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

### Series 310H SH | Flame Shape

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Single Cut	Double Cut
SH-41	1/8	1/4	1/8	310-001150	310-002150
SH-41 L3	1/8	1/4	1/8	310-002637	310-002737
SH-41 L2	1/8	1/4	1/8	310-006350	310-006325
SH-53	3/16	3/8	1/8	310-001151	310-002151
SH-81	3/16	3/8	3/16	310-001152	310-002152
SH-1	1/4	5/8	1/4	310-001157C	310-002157C
SH-1 L6	1/4	5/8	1/4	310-002629A	310-002751
SH-2	5/16	3/4	1/4	310-001153	310-002153
SH-2 L6	5/16	3/4	1/4	310-002629	310-002729
SH-5	1/2	1-1/4	1/4	310-001154	310-002154
SH-5 L6	1/2	1-1/4	1/4	310-002630	310-002730
SH-6	5/8	1-7/16	1/4	310-001155	310-002155
SH-7	3/4	1-5/8	1/4	310-001156	310-002156

\*bold numbers are EDPs for ordering

# PERFORMANCE

Carbide Cone Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Cone Shape - 60°</b></p> <ul style="list-style-type: none"> <li>• chamfering, beveling and countersinking</li> <li>• DE = Double End Tool</li> <li>• Single Cut = Finishing</li> <li>• Double Cut = Material Removal</li> </ul>		<p><b>CARBIDE</b> <b>Bright</b></p> <p><b>P 217</b></p>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 310J** | **SJ | Cone Shape | 60°**

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Single Cut	Double Cut
SJ-42	1/8	3/32	1/8	<b>310-001160</b>	<b>310-002160</b>
SJ-81	3/16	9/64	3/16	<b>310-001168</b>	<b>310-002161</b>
SJ-1	1/4	3/16	1/4	<b>310-001162</b>	<b>310-002162</b>
SJ-3	3/8	5/16	1/4	<b>310-001163</b>	<b>310-002163</b>
SJ-5	1/2	7/16	1/4	<b>310-001164</b>	<b>310-002164</b>
SJ-6	5/8	9/16	1/4	<b>310-001165</b>	<b>310-002165</b>
SJ-7	3/4	11/16	1/4	<b>310-001166</b>	<b>310-002166</b>
SJ-9	1	15/16	1/4	<b>310-001167</b>	<b>310-002167</b>

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

Carbide Cone Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Cone Shape - 90°</b></p> <ul style="list-style-type: none"> <li>• Chamfering, beveling and countersinking</li> <li>• DE = Double End Tool</li> <li>• Single Cut = Finishing</li> <li>• Double Cut = Material Removal</li> </ul>		<p><b>CARBIDE</b> <b>Bright</b></p> <p><b>P 217</b></p>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 310K** SK | Cone Shape | 90°

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Single Cut	Double Cut
SK-42 DE	1/8	1/16	1/8	<b>310-001169</b>	<b>310-002169</b>
SK-81 DE	3/16	3/32	3/16	<b>310-001171</b>	<b>310-002171</b>
SK-1 DE	1/4	1/8	1/4	<b>310-001172</b>	<b>310-002172C</b>
SK-3	3/8	3/16	1/4	<b>310-001173</b>	<b>310-002173</b>
SK-5	1/2	1/4	1/4	<b>310-001174</b>	<b>310-002174</b>
SK-6	5/8	5/16	1/4	<b>310-001175</b>	<b>310-002175</b>
SK-7	3/4	3/8	1/4	<b>310-001176</b>	<b>310-002176</b>
SK-9	1	1/2	1/4	<b>310-001177C</b>	<b>310-002177</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Carbide Cone Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Cone Shape - Inverted</b> <ul style="list-style-type: none"> <li>• Inner edges and conical profiles</li> <li>• Single Cut = Finishing</li> <li>• Double Cut = Material Removal</li> </ul>		<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">CARBIDE</div> <div style="border: 1px solid black; padding: 2px;">Bright</div> </div> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;">P 217</div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 310N | SN | Cone Shape | Inverted

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Single Cut	Double Cut
SN-61	3/32	1/8	3/32	310-001220	310-002220
SN-41	3/32	1/8	1/8	310-001221	310-002221
SN-41 L2	3/32	1/8	1/8	310-001221A	310-002221A
SN-41 L3	3/32	1/8	1/8	310-001221B	310-002221B
SN-42 L2	1/8	3/16	1/8	310-001221C	310-002221C
SN-42 L3	1/8	3/16	1/8	310-001221D	310-002221D
SN-42	1/8	3/16	1/8	310-001222	310-002222
SN-53	3/16	1/4	1/8	310-001223	310-002223
SN-81	3/16	1/4	3/16	310-001224	310-002224
SN-51	1/4	1/4	1/8	310-001225	310-002225
SN-1	1/4	5/16	1/4	310-001227	310-002227
SN-2	3/8	3/8	1/4	310-001231	310-002231
SN-2 L6	3/8	3/8	1/4	310-002736	-
SN-4	1/2	1/2	1/4	310-001228	310-002228
SN-4 L6	1/2	1/2	1/4	-	310-002734
SN-6	5/8	3/4	1/4	310-001229	310-002229
SN-7	3/4	5/8	1/4	310-001230	310-002230

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Carbide Cone Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Cone Shape - Pointed</b> <ul style="list-style-type: none"> <li>• Conical holes, grooves, and model building</li> <li>• L2 = 2" OAL, L3 = 3" OAL</li> <li>• L6 = 6" Shank Length</li> <li>• Single Cut = Finishing</li> <li>• Double Cut = Material Removal</li> </ul>		<div style="display: flex; gap: 10px;"> <div style="border: 1px solid black; padding: 2px;">CARBIDE</div> <div style="border: 1px solid black; padding: 2px;">Bright</div> </div> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;">P 217</div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

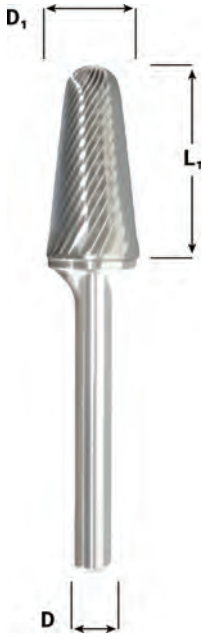
## Series 310M | SM | Cone Shape | Pointed

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Incl. Angle	Single Cut	Double Cut
SM-61	3/32	1/4	3/32	10°	310-001190	310-002190
SM-41	1/8	11/32	1/8	12°	310-001191	310-002191
SM-42	1/8	7/16	1/8	14°	310-001192	310-002192
SM-42 L2	1/8	7/16	1/8	14°	310-001192A	310-002192A
SM-42 L3	1/8	7/16	1/8	14°	310-001192B	310-002192B
SM-43	1/8	5/8	1/8	7°	310-001193	310-002193
SM-43 L2	1/8	5/8	1/8	7°	310-001193A	310-002193A
SM-43 L3	1/8	5/8	1/8	7°	310-001193B	310-002193B
SM-81	3/16	1/4	3/16	12°	310-001195	310-002195
SM-53	3/16	1/2	1/8	16°	310-001194	310-002194
SM-3	1/4	1	1/4	10°	310-001200	310-002200
SM-3 L6	1/4	1	1/4	10°	310-002850	310-002851A
SM-51	1/4	1/2	1/8	22°	310-001196	310-002196
SM-1	1/4	1/2	1/4	22°	310-001198C	310-002198C
SM-1 L6	1/4	1/2	1/4	22°	310-002753	310-002754
SM-2	1/4	3/4	1/4	14°	310-001199	310-002199
SM-4	3/8	5/8	1/4	28°	310-001201	310-002201
SM-4 L6	3/8	5/8	1/4	28°	310-002632	310-002849
SM-5	1/2	7/8	1/4	28°	310-001202	310-002202
SM-5 L6	1/2	7/8	1/4	28°	310-002636	310-002204
SM-6	5/8	1	1/4	31°	310-001203	310-002203

\*bold numbers are EDPs for ordering

# PERFORMANCE

## Carbide Taper Shape Burrs



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Taper Shape - Radius</b> <ul style="list-style-type: none"> <li>Contouring and difficult to access areas</li> <li>14° Included Angle</li> <li>L2 = 2" OAL, L3 = 3" OAL</li> <li>L6 = 6" Shank Length</li> <li>Single Cut = Finishing</li> <li>Double Cut = Material Removal</li> <li>Aluma Cut = Non-Ferrous</li> </ul>		<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">CARBIDE</div> <div style="border: 1px solid black; padding: 2px;">Bright</div> </div> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;">P 217</div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

### Series 310L SL | Taper Shape | Radius

Tool	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	Shank (D)	Single Cut	Double Cut	Aluma Cut
SL-41	1/8	3/8	1/8	310-001180	310-002180	-
SL-42	1/8	1/2	1/8	310-001181	310-002181	-
SL-42 L2	1/8	1/2	1/8	310-001181A	310-002181A	-
SL-42 L3	1/8	1/2	1/8	310-002640	310-002740	-
SL-53	3/16	1/2	1/8	310-001182	310-002182	-
SL-81	3/16	1/2	3/16	310-001183	310-002183	-
SL-1	1/4	5/8	1/4	310-001184	310-002184	-
SL-1NF	1/4	5/8	1/4	-	-	310-002547
SL-1 L6	1/4	5/8	1/4	310-002625	310-002725	-
SL-2	5/16	7/8	1/4	310-001185	310-002185	-
SL-3	3/8	1-1/16	1/4	310-001186	310-002186	-
SL-3NF	3/8	1-1/16	1/4	-	-	310-002515
SL-3 L6	3/8	1-1/16	1/4	310-002626	310-002726	-
SL-4	1/2	1-1/8	1/4	310-001187	310-002187	-
SL-4 L6	1/2	1-1/8	1/4	310-001187B	310-002187B	-
SL-4NF	1/2	1-1/8	1/4	-	-	310-002516
SL-5	5/8	1-3/16	1/4	310-001188	310-002188	-
SL-5NF	5/8	1-3/16	1/4	-	-	310-003007
SL-6	5/8	1-5/16	1/4	310-001179	310-002179	-
SL-6NF	5/8	1-5/16	1/4	-	-	310-002517
SL-7	3/4	1-1/2	1/4	310-001189	310-002189	-
SL-7NF	3/4	1-1/2	1/4	-	-	310-004303

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

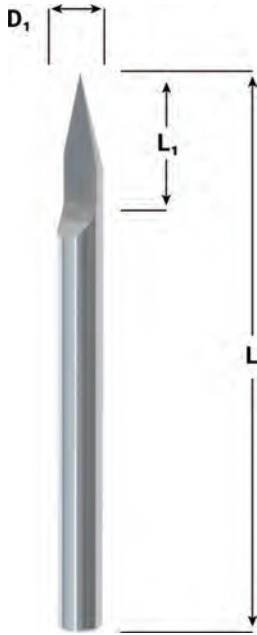
THREADING

INSERTS



# PERFORMANCE

Solid Carbide Conical Engraving Tools



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Conical Engraving Cutters</b></p> <ul style="list-style-type: none"> <li>• Single flute end mills</li> <li>• Economical alternative for cutting non-ferrous materials like plastics and phenolics</li> <li>• Ideal for engraving, marking, and shallow cutting operations</li> <li>• Available in double-end geometry</li> <li>• Diameter Tol.: +0/-0.0005"</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

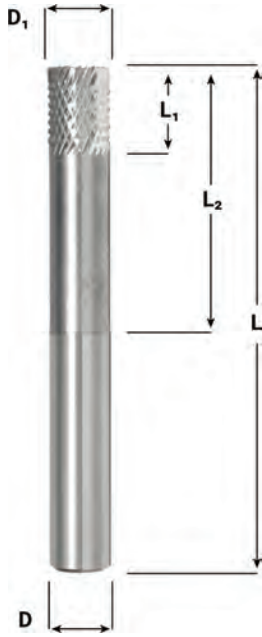
**Series 713** | Engraving | 30°, 60°, 90° | Single End | Double End

Diameter (D <sub>1</sub> )	OAL (L)	Split Length (L <sub>1</sub> )	Style	30°	60°	90°
1/8	1-1/2	3/8	Single End	713-125150	716-125150	719-125150
3/16	2	7/16	Single End	713-187200	716-187200	719-187200
1/4	2-1/2	1/2	Single End	713-250250	716-250250	719-250250
5/16	2-1/2	1/2	Single End	713-312250	716-312250	719-312250
3/8	2-1/2	1/2	Single End	713-375250	716-375250	719-375250
1/2	3	5/8	Single End	713-500300	716-500300	719-500300
1/8	2	3/8	Double End	723-125150	726-125150	729-125150
1/8	3	3/8	Double End	723-125300	726-125300	729-125300
3/16	2	7/16	Double End	723-187200	726-187200	729-187200
3/16	3	7/16	Double End	723-187300	726-187300	729-187300
1/4	2-1/2	1/2	Double End	723-250250	726-250250	729-250250
1/4	4	1/2	Double End	723-250400	726-250400	729-250400
5/16	2-1/2	1/2	Double End	723-312250	726-312250	729-312250
5/16	4	1/2	Double End	723-312400	726-312400	729-312400
3/8	2-1/2	1/2	Double End	723-375250	726-375250	729-375250
3/8	4	1/2	Double End	723-375400	726-375400	729-375400
1/2	3	5/8	Double End	723-500300	726-500300	729-500300
1/2	4	5/8	Double End	723-500400	726-500400	729-500400

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide Deburring/Internal Grind Tools



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Internal Grind Tool</b></p> <ul style="list-style-type: none"> <li>• Internal ID grind tool for deburring</li> <li>• Suited for ferrous materials</li> <li>• Features end cutting and back taper</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• RHC/RHS</li> <li>• &lt; 9/32 = Reduced Neck, &gt; 1/4 = Reduced Shank</li> <li>• Diameter Tol.: +0.002"/-0.000"</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

● Best ○ Good

Series 312		ID Grinding				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	EDP	
.030	3/32	1/8	1-1/2	1/8	<b>312-708030</b>	
.040	3/32	1/8	1-1/2	1/8	<b>312-708040</b>	
.050	1/8	1/4	1-1/2	1/8	<b>312-708050</b>	
1/16	1/8	3/8	1-1/2	1/8	<b>312-708062</b>	
5/64	5/32	3/8	1-1/2	1/8	<b>312-708078</b>	
3/32	5/32	3/8	1-1/2	1/8	<b>312-708093</b>	
7/64	3/16	1/2	1-1/2	1/8	<b>312-708110</b>	
1/8	3/16	1/2	1-1/2	1/8	<b>312-708125</b>	
9/64	7/32	5/8	2	3/16	<b>312-708141</b>	
5/32	7/32	5/8	2	3/16	<b>312-708156</b>	
11/64	1/4	5/8	2	3/16	<b>312-708172</b>	
3/16	1/4	5/8	2	3/16	<b>312-708187</b>	
13/64	9/32	3/4	2	1/4	<b>312-708203</b>	
7/32	9/32	3/4	2	1/4	<b>312-708218</b>	
15/64	5/16	3/4	2	1/4	<b>312-708235</b>	
1/4	5/16	3/4	2	1/4	<b>312-708250</b>	
9/32	11/32	-	2-1/2	1/4	<b>312-708281</b>	
5/16	11/32	-	2-1/2	1/4	<b>312-708312</b>	
11/32	3/8	-	2-1/2	1/4	<b>312-708343</b>	
3/8	3/8	-	2-1/2	1/4	<b>312-708375</b>	
1/2	3/8	-	3-1/2	3/8	<b>312-708500</b>	

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

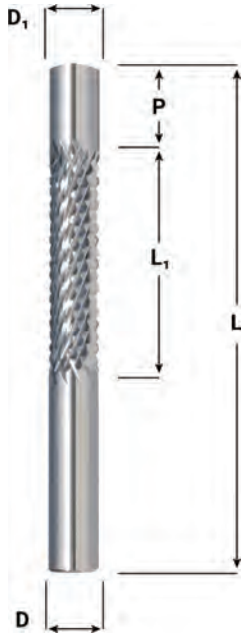
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Piloted Die Trimmers



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Piloted Die Trimmer</b></p> <ul style="list-style-type: none"> <li>• For deburring</li> <li>• The double-cut style allows for easy operator control and rapid material removal</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• RHC/RHS</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

Series 312P		Piloted Die Trimmer				
Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Pilot (D)	EDP	
1/8	1	3	1/8	1/2	<b>310-006997</b>	
1/8	1	2-1/2	1/8	1/2	<b>310-006998</b>	
3/16	1	2-1/2	3/16	1/2	<b>310-006995</b>	
1/4	1	3	1/4	1/2	<b>310-006996</b>	
1/4	1	2-1/2	1/4	1/2	<b>310-006999</b>	
3/8	1	2-1/2	3/8	1/2	<b>310-007001</b>	
1/2	1	2-1/2	1/2	1/2	<b>310-007002</b>	

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

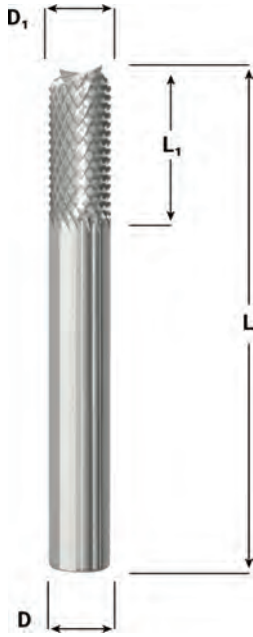
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Diamond Cut Routers



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Diamond Cut Routers</b> <ul style="list-style-type: none"> <li>• Multiple end-types available</li> <li>• Diamond-cut flute geometry for maximum cutting action</li> <li>• Ideal for printed circuit boards, plastics, epoxy resins, and various composite materials</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">CARBIDE</div> <div style="border: 1px solid black; padding: 2px;">Multi</div> </div> <div style="margin-top: 10px; text-align: center;">Bright</div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							○	○			○	

● Best ○ Good

## Series 780 DCR | Style A-F

Style	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
A - No End Cut	1/16	3/16	1-1/2	1/8	780-001001
A - No End Cut	3/32	3/8	1-1/2	1/8	780-001010
A - No End Cut	1/8	1/2	1-1/2	1/8	780-001020
A - No End Cut	3/16	5/8	2	3/16	780-001030
A - No End Cut	3/16	5/8	2	1/4	780-001040
A - No End Cut	1/4	3/4	2	1/4	780-001050
A - No End Cut	1/4	3/4	2-1/2	1/4	780-001060
A - No End Cut	1/4	1	3	1/4	780-001070
A - No End Cut	5/16	1	2-1/2	5/16	780-001080
A - No End Cut	3/8	1	2-1/2	3/8	780-001090
A - No End Cut	1/2	1	3	1/2	780-001100
B - Burr End Cut	1/16	3/16	1-1/2	1/8	781-001001
B - Burr End Cut	3/32	3/8	1-1/2	1/8	781-001010
B - Burr End Cut	3/32	5/16	1-1/2	1/8	781-001012
B - Burr End Cut	1/8	1/2	1-1/2	1/8	781-001020
B - Burr End Cut	1/8	7/16	1-1/2	1/8	781-001022
B - Burr End Cut	3/16	5/8	2	3/16	781-001030
B - Burr End Cut	3/16	5/8	2	1/4	781-001040
B - Burr End Cut	1/4	3/4	2	1/4	781-001050
B - Burr End Cut	1/4	3/4	2-1/2	1/4	781-001060
B - Burr End Cut	1/4	1	3	1/4	781-001070
B - Burr End Cut	5/16	1	2-1/2	5/16	781-001080
B - Burr End Cut	3/8	1	2-1/2	3/8	781-001090
B - Burr End Cut	1/2	1	3	1/2	781-001100
C - End Mill Style	1/16	3/16	1-1/2	1/8	782-001001
C - End Mill Style	3/32	3/8	1-1/2	1/8	782-001010
C - End Mill Style	3/32	5/16	1-1/2	1/8	782-001012
C - End Mill Style	1/8	1/2	1-1/2	1/8	782-001020
C - End Mill Style	1/8	7/16	1-1/2	1/8	782-001022
C - End Mill Style	3/16	5/8	2	3/16	782-001030
C - End Mill Style	3/16	5/8	2	1/4	782-001040
C - End Mill Style	1/4	3/4	2	1/4	782-001050
C - End Mill Style	1/4	3/4	2-1/2	1/4	782-001060
C - End Mill Style	1/4	1	3	1/4	782-001070
C - End Mill Style	5/16	1	2-1/2	5/16	782-001080
C - End Mill Style	3/8	1	2-1/2	3/8	782-001090
C - End Mill Style	1/2	1	3	1/2	782-001100
D - Drill Point	1/16	3/16	1-1/2	1/8	783-001001
D - Drill Point	3/32	3/8	1-1/2	1/8	783-001010
D - Drill Point	3/32	5/16	1-1/2	1/8	783-001012
D - Drill Point	1/8	1/2	1-1/2	1/8	783-001020
D - Drill Point	1/8	7/16	1-1/2	1/8	783-001022
D - Drill Point	3/16	5/8	2	3/16	783-001030
D - Drill Point	3/16	5/8	2	1/4	783-001040
D - Drill Point	1/4	3/4	2	1/4	783-001050

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Diamond Cut Routers



Series 780		DCR   Style A-F			
Style	Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
D - Drill Point	1/4	3/4	2-1/2	1/4	<b>783-001060</b>
D - Drill Point	1/4	1	3	1/4	<b>783-001070</b>
D - Drill Point	5/16	1	2-1/2	5/16	<b>783-001080</b>
D - Drill Point	3/8	1	2-1/2	3/8	<b>783-001090</b>
D - Drill Point	1/2	1	3	1/2	<b>783-001100</b>
F - Fishtail End	1/16	3/16	1-1/2	1/8	<b>784-001001</b>
F - Fishtail End	3/32	3/8	1-1/2	1/8	<b>784-001010</b>
F - Fishtail End	1/8	1/2	1-1/2	1/8	<b>784-001020</b>
F - Fishtail End	3/16	5/8	2	3/16	<b>784-001030</b>
F - Fishtail End	3/16	5/8	2	1/4	<b>784-001040</b>
F - Fishtail End	1/4	3/4	2	1/4	<b>784-001050</b>
F - Fishtail End	1/4	3/4	2-1/2	1/4	<b>784-001060</b>
F - Fishtail End	1/4	1	3	1/4	<b>784-001070</b>
F - Fishtail End	5/16	1	2-1/2	5/16	<b>784-001080</b>
F - Fishtail End	3/8	1	2-1/2	3/8	<b>784-001090</b>
F - Fishtail End	1/2	1	3	1/2	<b>784-001100</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

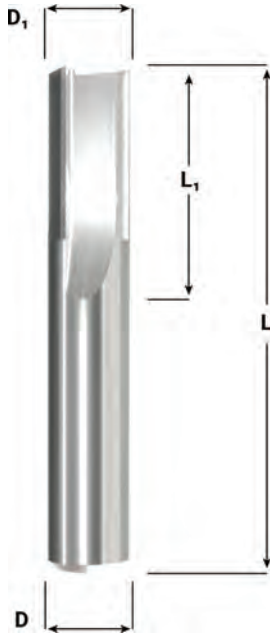
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

## Solid Carbide Straight Flute Routers



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Straight Flute Router</b> <ul style="list-style-type: none"> <li>• Double edge cutting action for supreme top and bottom finishes</li> <li>• End mill point geometry</li> <li>• Straight flute geometry excels in all plastics</li> <li>• Shank Tol.: +0/-0.0005"</li> </ul>		<div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; gap: 5px;"> <div style="border: 1px solid black; padding: 2px;">CARBIDE</div> <div style="border: 1px solid black; padding: 2px;">2FL</div> </div> <div style="display: flex; gap: 5px; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px;">3FL</div> <div style="border: 1px solid black; padding: 2px;">Bright</div> </div> <div style="margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px; border-radius: 50%; display: flex; align-items: center; justify-content: center;"> <span style="font-size: 8px;">P 216</span> </div> </div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							○	○			○	

● Best ○ Good

### Series 787 SFR | Multiple Flute | Straight Flute | Router

Diameter (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	EDP
3/32	3/8	1-1/2	1/8	2	<b>787-920001</b>
1/8	1/2	1-1/2	1/8	2	<b>787-920002</b>
3/16	5/8	2	3/16	2	<b>787-920003</b>
1/4	3/4	2-1/2	1/4	2	<b>787-920004</b>
5/16	13/16	2-1/2	5/16	2	<b>787-920005</b>
3/8	7/8	2-1/2	3/8	2	<b>787-920006</b>
7/16	1	2-1/2	7/16	2	<b>787-920007</b>
1/2	1	3	1/2	2	<b>787-920008</b>
3/32	3/8	1-1/2	1/8	3	<b>787-930001</b>
1/8	1/2	1-1/2	1/8	3	<b>787-930002</b>
3/16	5/8	2	3/16	3	<b>787-930003</b>
1/4	3/4	2-1/2	1/4	3	<b>787-930004</b>
5/16	13/16	2-1/2	5/16	3	<b>787-930005</b>
3/8	7/8	2-1/2	3/8	3	<b>787-930006</b>
7/16	1	2-1/2	7/16	3	<b>787-930007</b>
1/2	1	3	1/2	3	<b>787-930008</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

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HOLEMAKING

THREADING

INSERTS



## Advanced Performance End Mill Sets

- Five Piece Sets - 1/8, 3/16, 1/4, 3/8, & 1/2 sizes
- Regular/standard flute and overall lengths
- Engineered nano-foam cushioning for ultimate tool protection
- Rugged plastic index can be reused to house future tooling
- Uncoated and coated options offered

### FUSION

Flutes	End Style	Bright	FX3
4	Square	284-888881	284-888882

### ALPHA

Flutes	End Style	FX2
4	Corner Radius	294-888881

### ATTACKER

Flutes	End Style	Bright	AlTiN
3	Corner Radius	267-888881	267-888882

### AGGRESSOR

Flutes	Profile	Bright	NF1	FX3
4	Fine Pitch	255-888811	-	255-888812
4	Medium Pitch	256-888881	--	256-888882
3	Coarse Pitch	255-888801	255-888802	-



## Advanced Performance End Mill Sets

- Five Piece Sets - 1/8, 3/16, 1/4, 3/8, & 1/2 sizes
- Regular/standard flute and overall lengths
- Engineered nano-foam cushioning for ultimate tool protection
- Rugged plastic index can be reused to house future tooling
- Uncoated and coated options offered

Flutes	End Style	Bright	TiCN	AlTiN
2	Square	204-888881	204-888882	-
3		205-888881	-	205-888882
4		206-888881	-	206-888882
2	Ballnose	221-888881	221-888882	-
3		222-888881	-	222-888882
4		223-888881	-	223-888882



### Drill Mill Sets

- Five Piece Sets - 1/8, 3/16, 1/4, 3/8, & 1/2 sizes
- Regular/standard flute and overall lengths
- Engineered nano-foam cushioning for ultimate tool protection
- Rugged plastic index can be reused to house future tooling
- Uncoated and coated options offered

#### Drill Mill Sets

Flutes	Included Angle		
2	90°	208-888821	208-888822
4	90°	208-888841	208-888842



#### 5 Spade Drill Set

Included Angle	Diameters Included	
118°	1/8, 3/16, 1/4, 3/8 & 1/2"	400-888881



#### 5 Piece N/C Spot Drill Sets

Drill Style	Diameters Included		
90°	1/8, 3/16, 1/4, 3/8 & 1/2"	402-888801	402-888802
120°	1/8, 3/16, 1/4, 3/8 & 1/2"	402-888811	402-888812
140°	1/8, 3/16, 1/4, 3/8 & 1/2"	402-888821	402-888822





15 Piece Drill Sets

Drill Style	Diameters Included	Bright	AIN
Twist	1/16" - 1/2" x 32nds	450-000015	450-000015B
Screw Machine		460-000015	460-000015B
Straight Flute		470-000015	470-000015B

21 Piece Drill Sets

Drill Style	Diameters Included	Bright	AIN
Twist	1/16" - 3/8" x 64ths	450-000021	450-000021B
Screw Machine		460-000021	460-000021B
Straight Flute		470-000021	470-000021B



24 Piece Drill Sets





Drill Style	Diameters Included	Bright	AIN
Twist	1.0mm - 12.5mm x 0.5mm	450-000024	450-000024B
Screw Machine		460-000024	460-000024B
Straight Flute		470-000024	470-000024B

29 Piece Drill Sets

Drill Style	Diameters Included	Bright	AIN
Twist	1/16" - 1/2" x 64ths	450-000029	450-000029B
Screw Machine		460-000029	460-000029B
Straight Flute		470-000029	470-000029B



### 4 Piece Countersink Sets

Flutes	Diameters Included	Included Angle	
	1/4, 1/2, 3/4 & 1	60°	331-100060
		82°	331-100082
		90°	331-100090
		100°	331-100100
		120°	331-100120
	1/4, 1/2, 3/4 & 1	60°	333-100060
		82°	333-100082
		90°	333-100090
		100°	333-100100
		120°	333-100120
	1/4, 1/2, 3/4 & 1	60°	336-100060
		82°	336-100082
		90°	336-100090
		100°	336-100100
		120°	336-100120



### Aluma Burr Sets



Set Letter	Number Of Pieces	Diameters Included	Burrs Included	Aluma Cut
AL1	10	1/4 & 3/8	SA-1NF, SA-3NF, SB-3NF, SC-1NF, SC-3NF, SD-1NF, SD-3NF, SE-3NF, SF-3NF, SL-3NF	310-130001
AL2	12	1/4, 3/8 & 1/2	SA-1NF, SA-3NF, SA-5NF, SC-1NF, SC-3NF, SC-5NF, SD-1NF, SD-3NF, SD-5NF, SF-1NF, SF-3NF, SF-5NF	310-130002
AL3	12	1/4, 3/8 & 1/2	SA-1NF, SA-3NF, SA-5NF, SB-5NF, SD-1NF, SD-3NF, SD-5NF, SF-1NF, SF-3NF, SF-5NF, SL-3NF, SL-4NF	310-130003
AL4	11	1/4, 3/8 & 1/2	SA-1NF, SA-3NF, SA-5NF, SC-1NF, SC-3NF, SC-5NF, SF-1NF, SF-3NF, SF-5NF, SL-3NF, SL-4NF	310-130004
AL5	8	1/2 & 3/8	SA-5NF, SB-5NF, SC-5NF, SD-5NF, SE-5NF, SF-5NF, SL-3NF, SL-4NF	310-130005
AL6	10	3/8 & 1/2	SA-3NF, SA-5NF, SD-3NF, SD-5NF, SE-3NF, SE-5NF, SF-3NF, SF-5NF, SL-3NF, SL-4NF	310-130006



### Miniature Burr Sets



Set Letter	# of Pieces	Diameters Included	Burrs Included	Single Cut	Double Cut
A	12	3/32 & 1/8	SA-42, SA-43, SC-42, SD-42, SE-41, SF-41, SF-42, SG-41, SL-42, SM-43, SN-41, SN-42	310-130001	310-120001
B	12	1/16, 3/32 & 1/8	SA-41, SA-42, SC-41, SC-42, SD-42, SE-41, SF-41, SF-42, SH-41, SL-41, SL-42, SN-42	310-130002	310-120002
C	11	1/16, 3/32 & 1/8	SA-41, SB-41, SC-41, SD-41, SE-41, SF-41, SG-41, SH-41, SL-41, SM-41, SN-41	310-130003	310-120003
D	11	3/32 & 1/8	SA-42, SB-42, SC-42, SD-42, SF-42, SG-42, SJ-42, SK-42, SL-42, SM-42, SN-42	310-130004	310-120004



### Standard Burr Sets



Set Letter	# of Pieces	Diameters Included	Burrs Included	Single Cut	Double Cut
K	12	1/8, 5/32, 3/16 & 1/4	SA-11, SB-14, SC-13, SD-14, SE-11, SF-11, SG-1, SH-1, SJ-1, SK-1, SM-1, SN-1	310-110011	310-120011
F	12	5/32 & 3/16	SA-52, SA-53, SC-52, SC-53, SD-52, SD-53, SE-53, SF-53, SG-53, SH-53, SM-53, SN-53	310-110006	310-120006
H	12	5/32 & 1/4	SA-51, SA-52, SB-51, SC-51, SC-52, SD-51, SD-52, SE-51, SF-51, SG-51, SM-51, SN-51	310-110008	310-120008
E	10	3/16	SA-53, SC-53, SD-53, SE-53, SF-53, SG-53, SH-53, SL-53, SM-53, SN-53	310-110005	310-120005
L	12	3/16 & 1/4	SA-1, SA-14, SC-1, SC-14, SD-1, SE-1, SF-1, SG-1, SJ-1, SL-1, SH-1, SN-1	310-110012	310-120012
AA	12	1/4	SA-1, SB-1, SC-1, SD-1, SE-1, SF-1, SG-1, SH-1, SJ-1, SK-1, SL-1, SM-1	310-110026	310-120026
G	9	1/4	SA-51, SB-51, SC-51, SD-51, SE-51, SF-51, SG-51, SM-51, SN-51	310-110007	310-120007
I	12	1/4	SA-1, SB-1, SC-1, SD-1, SE-1, SF-1, SG-1, SH-1, SJ-1, SK-1, SM-1, SN-1	310-110009	310-120009
J	12	1/4	SB-1, SC-1, SD-1, SE-1, SF-1, SG-1, SH-1, SJ-1, SK-1, SL-1, SM-1, SN-1	310-110010	310-120010
M	9	1/4 & 3/8	SA-3, SC-3, SD-3, SE-3, SF-3, SG-3, SJ-3, SM-3, SN-2	310-110013	310-120013
N	9	1/4 & 3/8	SB-3, SC-3, SD-3, SE-3, SF-3, SG-3, SK-3, SL-3, SM-3	310-110014	310-120014
O	12	1/4, 3/8 & 1/2	SA-1, SA-3, SA-5, SD-1, SD-3, SD-5, SF-1, SF-3, SF-5, SG-1, SG-3, SG-5	310-110021	310-120021
P	9	1/4, 3/8 & 1/2	SA-1, SA-3, SA-5, SC-1, SC-3, SC-5, SF-1, SF-3, SF-5	310-110015	310-120015
Q	9	1/4, 3/8 & 1/2	SB-1, SB-3, SB-5, SD-1, SD-3, SD-5, SE-1, SE-3, SE-5	310-110016	310-120016
R	9	1/4, 3/8 & 1/2	SA-1, SA-3, SA-5, SE-1, SE-3, SE-5, SN-1, SN-2, SN-4	310-110017	310-120017
S	9	1/4, 3/8 & 1/2	SB-1, SB-3, SB-5, SC-1, SC-3, SC-5, SF-1, SF-3, SF-5	310-110018	310-120018
V	12	1/4, 3/8 & 1/2	SA-1, SA-3, SA-5, SC-1, SC-3, SC-5, SE-1, SE-3, SE-5, SM-1, SM-3, SM-5	310-110022	310-120022
W	12	1/4, 3/8 & 1/2	SB-1, SB-3, SB-5, SD-1, SD-3, SD-5, SF-1, SF-3, SF-5, SN-1, SN-2, SN-4	310-110023	310-120023
X	12	1/4, 3/8 & 1/2	SA-1, SA-3, SA-5, SC-1, SC-3, SC-5, SG-1, SG-3, SG-5, SM-1, SM-3, SM-5	310-110024	310-120024
Y	12	1/4, 3/8 & 1/2	SF-1, SF-3, SF-5, SG-1, SG-3, SG-5, SL-1, SL-3, SL-4, SM-1, SM-3, SM-5	310-110025	310-120025
AB	12	3/8	SA-3, SB-3, SC-3, SD-3, SE-3, SF-3, SG-3, SJ-3, SK-3, SL-3, SM-4, SN-2	310-110027	310-120027
AC	12	1/2	SA-5, SB-5, SC-5, SD-5, SE-5, SF-5, SG-5, SH-5, SJ-5, SK-5, SL-4, SM-5	310-110028	310-120028
T	8	1/2	SA-5, SC-5, SD-5, SE-5, SG-5, SH-5, SK-5, SM-5	310-110019	310-120019
U	8	1/2	SB-5, SC-5, SD-5, SF-5, SG-5, SH-5, SJ-5, SK-5	310-110020	310-120020

# A R M O R Y

*Cutting tools designed specifically for complete CNC processing of defense systems. Our tools are built around MIL-SPEC standards while improving their processing or cutting specific features. Standardized tool offerings are available for the manufacturing of various defense system components.*





# ARMORY TOOLS

## SOLID CARBIDE TOOLS FOR DEFENSE SYSTEMS

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



### EJECTION DOOR KEYWAY

100468	EDP
KW10125-008.26	DESCRIPTION
5000 RPM, 50-60 IPM	TECHNICAL

### GAS TUBE COUNTER BORE DRILL

EDP	118025
DESCRIPTION	DR201845.9X9 3/8SHK
TECHNICAL	5000 RPM, 30 IPM



### CHARGING HANDLE BROACH

118021	EDP
BR-.420-015X2X4	DESCRIPTION
60-300 IPM .005 PER STEP OVER	TECHNICAL

### CHARGING HANDLE KEYWAY

EDP	100472
DESCRIPTION	KW60507.127 5/8SHK
TECHNICAL	6000 RPM, 90 IPM



### CHARGING HANDLE CLEARANCE ENDMILL

100473	EDP
6WASU30420.25	DESCRIPTION
7000 RPM, 65 IPM	TECHNICAL

### CHARGING HANDLE LOCK POSITION FORM

EDP	118024
DESCRIPTION	GWA30300-08X45DC
TECHNICAL	12000 RPM, 60 IPM



### FORWARD ASSIST COMBO FORM DRILL

122266	EDP
SD20315 5/8SHK	DESCRIPTION
5000 RPM, 30 IPM	TECHNICAL

### EJECTOR DOOR DETENT GROOVE CUTTER

EDP	120283
DESCRIPTION	RFC40400-0625 1/2SHK
TECHNICAL	5000 RPM, 60 IPM





### THREAD UNDERCUT CHAMFER

120207	EDP
FT50800.65 1.00SHKFZ	DESCRIPTION
12000 RPM, 200 IPM	TECHNICAL

### BARREL NUT THREADMILL

EDP	1013007
DESCRIPTION	TMM 1-1/4-18 AR-15
TECHNICAL	10000 RPM, 61 IPM



### CHARGING HANDLE SLOT & GROOVE COMBO

123707	EDP
FT30440.678 9/16SHK	DESCRIPTION
6000 RPM, 90 IPM	TECHNICAL



### MAGAZINE WELL ROUGHER

105259	EDP
ARTLSU306025-02	DESCRIPTION
12000 RPM, 250 IPM RAMPING UP TO 45°	TECHNICAL

### MAGAZINE WELL BROACH

EDP	119050
DESCRIPTION	BR-.630X.47
TECHNICAL	60-300 IPM, .005 STEP OVER



### TRIGGER POCKET ROUGHER

105277	EDP
ARTSU30375-015.5	DESCRIPTION
12000 RPM, 200 IPM RAMPING UP TO 45°	TECHNICAL

### LOWER RECEIVER THREADMILL

EDP	109808
DESCRIPTION	TMM 3/4-16 - 4 FL, 30°
TECHNICAL	10000 RPM, 61 IPM



# ARMORY TOOLS

## SOLID CARBIDE TOOLS FOR DEFENSE SYSTEMS

INTRO

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### LOCKING LUG FORM TOOL

EDP	122267
DESCRIPTION	FT60950.312NA
TECHNICAL	1625 RPM, 30 IPM

### FIRING PIN REAMER

EDP	122274
DESCRIPTION	RMR401575RHC/LHSNA
TECHNICAL	200 SFM, .001" IPR



### BEARING SURFACE UNDERCUT FORM TOOL

EDP	122275
DESCRIPTION	FT40914.75X
TECHNICAL	1525 RPM, 37 IPM

### FIRING PIN HOLE & FORM

EDP	122276
DESCRIPTION	SD20068.3X5.4MMSHK
TECHNICAL	200 SFM, .001 IPR



### RAIL PROFILE CUTTER

EDP	100469
DESCRIPTION	FT80940-02STR
TECHNICAL	12000 RPM, 190 IPM 3200 SFM, .002 IPT

### RAIL GROOVE ROUGHER

EDP	118022
DESCRIPTION	RFA30200.25X2
TECHNICAL	12000 RPM, 100 IPM



### RAIL GROOVE FINISHER WITH DEBURR

EDP	104474
DESCRIPTION	FT302125-01 1/4SHK
TECHNICAL	12000 RPM, 150 IPM

### RAIL GROOVE FINISHER

EDP	101043
DESCRIPTION	GWAS30212
TECHNICAL	12000 RPM, 150 IPM





# BUILD THE PERFECT TOOL

## THREE WAYS TO REQUEST CUSTOM

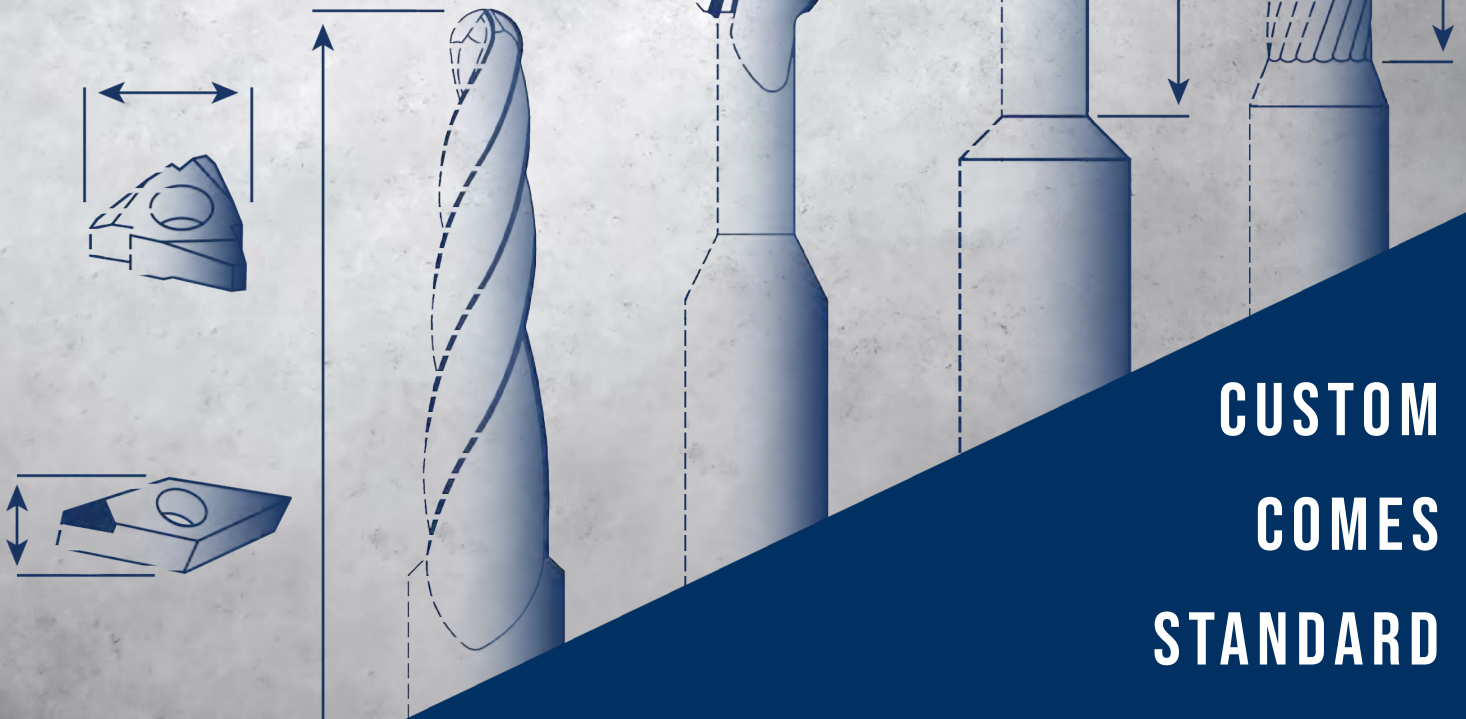
- 1.** Fill out and submit one of our many preformatted custom tool quote forms from our website.
- 2.** Upload a drawing, sketch or file using our drawing upload feature on [gwstoolgroup.com](http://gwstoolgroup.com). An engineer will promptly receive and quote your request.
- 3.** Send an email or call us with your request, and one of our specialists will take care of the rest.



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# **T**ECHNICAL DATA

**SPECIALTY**



## Series 787

### GP | Straight Flute Router

Diameter	RPM	IPM
1/16	20,000 - 35,000	30 - 55
3/32	12,000 - 25,000	25-50
1/8	9,000 - 18,000	23 - 46
3/16	6,000 - 12,000	18 - 36
1/4	5,000 - 10,000	17 - 34
5/16	3,500 - 7,000	15 - 30
3/8	2,500 - 5,000	12-24
1/2	2,000 - 4,000	10 - 20

## Series 713

### GP | Engraving Tool | 30° - 90°

Material		RPM	Inches Per Minute (IPM)
<b>P</b>	Steels	2500-5000	2-8
		5000-10000	8-14
<b>M</b>	Stainless Steels	2500-5000	2-5
		5000-10000	5-10
<b>S</b>	Super Alloys	2500-5000	2-5
		5000-10000	5-10
<b>H</b>	Hardened Steels	2500-5000	2-5
		5000-10000	5-10
<b>K</b>	Cast Iron	2500-5000	3-8
		5000-10000	8-14
<b>N</b>	Non-Ferrous	2500-5000	5-10
		5000-10000	10-15

**Series 310A - 310N**

GP | Carbide Burrs

Burr Diameter	Minimum RPM	Medium RPM	Maximum RPM (Stainless)
1/16	50000	75000	100000
1/8	30000	60000	90000
3/16	25000	50000	75000
1/4	20000	40000	65000
5/16	15000	35000	60000
3/8	15000	35000	60000
7/16	15000	35000	60000
1/2	10000	30000	80000
5/8	10000	30000	50000
3/4	10000	20000	35000
1	5000	15000	30000

Industry Designation	Shape	Application
SA	Cylinder	Universal Surface Grinding
SB	Cylinder with End Cut	Blind holes & Inner Contours
SC	Cylinder with Radius	Contouring & Bore holes
SD	Ball	Contouring & Bore holes
SE	Oval / Egg	Molds & Fillet Welds
SF	Radius Tree	Molds & Contouring
SG	Pointed Tree	Chamfering & Bore Holes
SH	Flame	Molds & Contouring
SJ	60° Cone	Chamfering & Beveling & Countersinking
SK	90° Cone	Chamfering & Beveling & Countersinking
SL	Taper with Radius	Contouring & Difficult to Access Areas
SM	Pointed Cone	Conical Holes & Grooves & Model Building
SN	Inverted Cone	Inner Edges & Conical Profiles

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# BUILD THE PERFECT TOOL

## THREE WAYS TO REQUEST CUSTOM

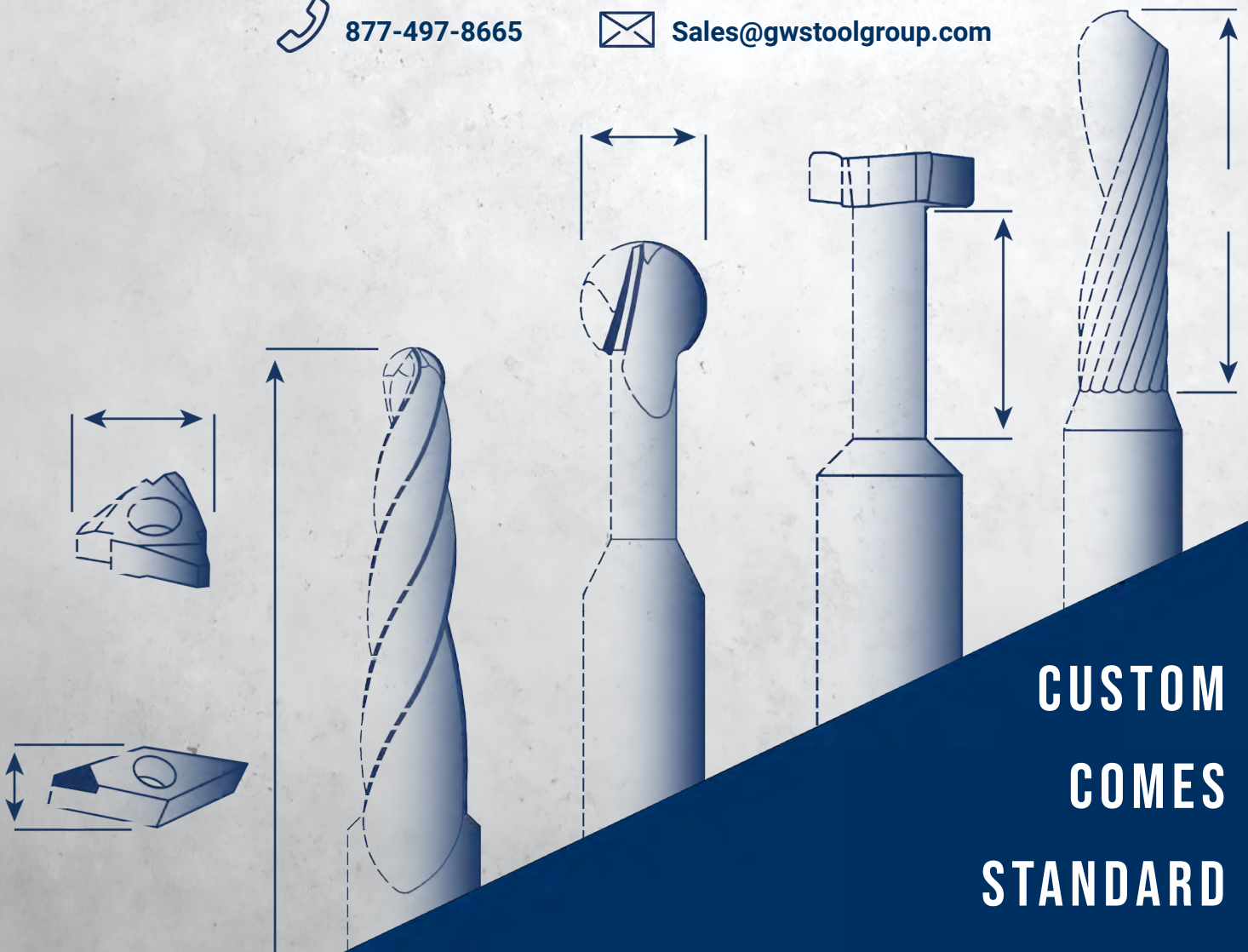
- 1.** Fill out and submit one of our many preformatted custom tool quote forms from our website.
- 2.** Upload a drawing, sketch or file using our drawing upload feature on [gwstoolgroup.com](http://gwstoolgroup.com). An engineer will promptly receive and quote your request.
- 3.** Send an email or call us with your request, and one of our specialists will take care of the rest.



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# HOLEMAKING

*High performance holemaking solutions including carbide drills, PAC reamers, chucking reamers, carbide-tipped drills, PCD drills, aircraft drills and all-purpose holemaking tools for general engineering.*

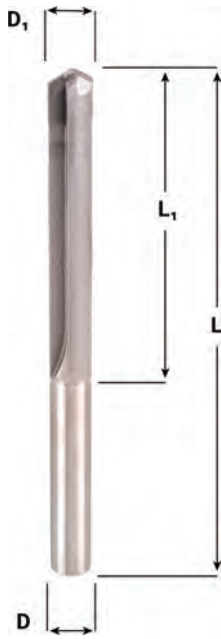
*Custom Comes Standard - If we don't have the perfect tool on the shelf, we can build it for you.*





# PERFORMANCE

Carbide-Tip Drill For Hardened Steel



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Carbide-Tip Drill</b></p> <ul style="list-style-type: none"> <li>• Carbide tipped wear resistance and HSS body for toughness</li> <li>• High temperature braze, extra thick tip and heavy land construction withstand the heavy feed pressure when drilling steels between 38 to 55 Rc</li> <li>• Utility repairs are common use for these die drills</li> <li>• 118° cam relief notch thin point for maximum edge strength</li> </ul>		<div style="display: flex; flex-wrap: wrap;"> <div style="margin: 2px;">CARBIDE TIP</div> <div style="margin: 2px;">2FL</div> <div style="margin: 2px;">0°</div> <div style="margin: 2px;">118°</div> <div style="margin: 2px;">REGULAR</div> <div style="margin: 2px;">Bright</div> <div style="margin: 2px;">P 305</div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
											●	○

● Best ○ Good

**Series 150** | 2FL | Carbide-Tip | 118° | Regular Length | Straight Flute

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
11/64	0.1719	1-1/2	3-1/2	5/32	15001719
3/16	0.1875	1-1/2	3-1/2	11/64	15001875
5.0mm	0.1969	44mm	95mm	4.5mm	15001969
13/64	0.2031	1-3/4	3-3/4	3/16	15002031
5.5mm	0.2165	1-3/4	3-3/4	0.2165	15002165
7/32	0.2188	1-3/4	3-3/4	13/64	15002188
15/64	0.2344	2	4	7/32	15002344
6.0mm	0.2362	51mm	102mm	5.5mm	15002362
1/4	0.2500	2	4	15/64	15002500
6.5mm	0.2559	2-1/4	4-1/4	0.2559	15002559
17/64	0.2656	2-1/4	4-1/4	1/4	15002656
7.0mm	0.2756	57mm	108mm	6.5mm	15002756
9/32	0.2812	2-1/4	4-1/4	17/64	15002812
7.5mm	0.2953	2-1/2	4-1/2	0.2953	15002953
19/64	0.2969	2-1/2	4-1/2	9/32	15002969
5/16	0.3125	2-1/2	4-1/2	19/64	15003125
8.0mm	0.3150	64mm	114mm	7.5mm	15003150
21/64	0.3281	2-3/4	4-3/4	5/16	15003281
8.5mm	0.3346	2-3/4	4-3/4	0.3346	15003346
11/32	0.3438	2-3/4	4-3/4	21/64	15003438
9.0mm	0.3543	76mm	127mm	8.5mm	15003543
23/64	0.3594	3	5	11/32	15003594
9.5mm	0.3740	3	5	3/8	15003740
3/8	0.3750	3	5	23/64	15003750
25/64	0.3906	3	5-1/4	3/8	15003906
10.0mm	0.3937	76mm	133mm	9.5mm	15003937
13/32	0.4062	3	5-1/4	25/64	15004062
10.5mm	0.4134	3	5-1/2	0.4134	15004134
27/64	0.4219	3	5-1/2	13/32	15004219
11.0mm	0.4331	76mm	140mm	10.5mm	15004331
7/16	0.4375	3	5-1/2	27/64	15004375
11.5mm	0.4528	3-1/4	5-3/4	29/64	15004528
29/64	0.4531	3-1/4	5-3/4	7/16	15004531
15/32	0.4688	3-1/4	5-3/4	29/64	15004688
12.0mm	0.4724	83mm	146mm	11.5mm	15004724
31/64	0.4844	3-1/2	6	15/32	15004844
12.5mm	0.4921	3-1/2	6	0.4921	15004921
1/2	0.5000	3-1/2	6	1/2	15005000
13.0mm	0.5118	89mm	152mm	12.5mm	15005118
17/32	0.5312	3-1/2	6	1/2	15005312
13.5mm	0.5315	3-1/2	6	17/32	15005315
14.0mm	0.5512	89mm	152mm	13.0mm	15005512
9/16	0.5625	3-1/2	6	17/32	15005625
15.0mm	0.5906	102mm	178mm	14.0mm	15005906

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS



# PERFORMANCE

Carbide-Tip Drill For Hardened Steel



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

Series 150		2FL   Carbide-Tip   118°   Regular Length   Straight Flute				
Size	Diameter (D <sub>1</sub> )	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
19/32		0.5938	4	7	9/16	<b>15005938</b>
5/8		0.6250	4	7	19/32	<b>15006250</b>
16.0mm		0.6299	102mm	178mm	15.0mm	<b>15006299</b>
21/32		0.6562	4-1/2	7-1/2	5/8	<b>15006562</b>
17.0mm		0.6693	114mm	191mm	16.5mm	<b>15006693</b>
11/16		0.6875	4-1/2	7-1/2	21/32	<b>15006875</b>
18.0mm		0.7087	121mm	203mm	17.5mm	<b>15007087</b>
23/32		0.7188	4-3/4	8	11/16	<b>15007188</b>
19.0mm		0.7480	121mm	203mm	18.0mm	<b>15007480</b>
3/4		0.7500	4-3/4	8	23/32	<b>15007500</b>
2.0mm		0.7874	121mm	203mm	19.5mm	<b>15007874</b>
13/16		0.8125	4-3/4	8	25/32	<b>15008125</b>
21mm		0.8268	121mm	203mm	20.5mm	<b>15008268</b>
22mm		0.8661	121mm	203mm	21.5mm	<b>15008661</b>
7/8		0.8750	4-3/4	8	27/32	<b>15008750</b>
23mm		0.9055	121mm	203mm	22.5mm	<b>15009055</b>
15/16		0.9375	4-3/4	8	29/32	<b>15009375</b>
24mm		0.9449	121mm	203mm	23.5mm	<b>15009449</b>
25mm		0.9843	121mm	203mm	24.5mm	<b>15009843</b>
#1		1.0000	4-3/4	8	1	<b>15010000</b>

\*bold numbers are EDPs for ordering

## Popular Custom Holemaking Options

- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM  
COMES  
STANDARD**



# PERFORMANCE

Solid Carbide Countersinks For Aircraft



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



FEATURES / DESCRIPTION				APPLICATION	FEATURES			
<b>Piloted Countersink</b> <ul style="list-style-type: none"> <li>Brazed Sub-micron grade carbide substrate for wear resistance</li> <li>Piloted Countersink</li> <li>Threaded Shank</li> <li>Ideal for composites and Aluminum</li> <li>For manual or pneumatic drilling operations</li> <li>Adapter = 1/4-28 HSS</li> </ul>								

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							●	●				

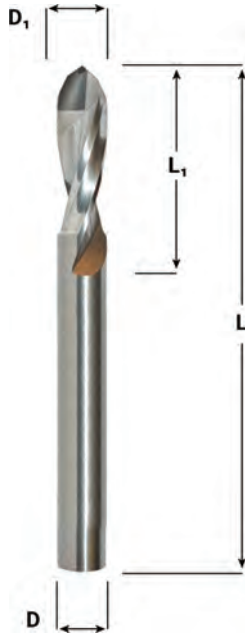
● Best ○ Good

## Series 4215 CS | Threaded Shank | Piloted

Body (D <sub>1</sub> )	Pilot (D)	Incl. Angle	EDP	Body (D <sub>1</sub> )	Pilot (D)	Incl. Angle	EDP
3/8	3/16	100°	421545	3/8	#10	90°	421525
3/8	#11	100°	421546	3/8	5/32	90°	421542
3/8	#10	100°	421547	7/16	3/32	90°	421526
7/16	3/32	100°	421548	7/16	1/8	90°	421527
7/16	1/8	100°	421549	7/16	5/32	90°	421528
7/16	5/32	100°	421550	7/16	3/16	90°	421529
7/16	3/16	100°	421551	1/2	3/32	90°	421530
1/2	3/32	100°	421552	1/2	#40	90°	421531
1/2	#40	100°	421553	1/2	1/8	90°	421532
1/2	1/8	100°	421554	1/2	#30	90°	421533
1/2	#30	100°	421555	1/2	5/32	90°	421534
1/2	5/32	100°	421556	1/2	#21	90°	421535
1/2	#21	100°	421557	1/2	#20	90°	421536
1/2	#20	100°	421558	1/2	3/16	90°	421537
1/2	3/16	100°	421559	1/2	#11	90°	421538
1/2	#11	100°	421560	1/2	#10	90°	421539
1/2	#10	100°	421561	5/8	3/32	90°	421540
5/8	3/32	100°	421562	5/8	1/8	90°	421541
5/8	1/8	100°	421563	5/8	3/16	90°	421543
5/8	5/32	100°	421564	5/8	1/4	90°	421544
5/8	3/16	100°	421565				
5/8	1/4	100°	421566				
3/8	3/16	82°	421501				
3/8	#11	82°	421502				
3/8	#10	82°	421503				
7/16	3/32	82°	421504				
7/16	1/8	82°	421505				
7/16	5/32	82°	421506				
7/16	3/16	82°	421507				
1/2	3/32	82°	421508				
1/2	#40	82°	421509				
1/2	1/8	82°	421510				
1/2	#30	82°	421511				
1/2	5/32	82°	421512				
1/2	#21	82°	421513				
1/2	#20	82°	421514				
1/2	3/16	82°	421515				
1/2	#11	82°	421516				
1/2	1/4	82°	421517				
5/8	3/32	82°	421518				
5/8	1/8	82°	421519				
5/8	5/32	82°	421520				
5/8	3/16	82°	421521				
5/8	1/4	82°	421522				
3/8	3/16	90°	421523				
3/8	#11	90°	421524				

# ADVANCED PERFORMANCE

PCD 8-Facet Drill For Composites For Aircraft



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>PCD Double-Angle Drill</b></p> <ul style="list-style-type: none"> <li>• Polycrystalline Diamond</li> <li>• Double-angle 8-facet</li> <li>• Prevents delamination and uncut fibers in CFRP</li> <li>• PCD extends tool life 10-100X over carbide</li> <li>• Unlike CVD diamond, PCD creates dead-sharp (unrounded) cutting edge ideal for composite materials</li> </ul>		<div style="display: flex; flex-wrap: wrap; gap: 5px;"> <div style="border: 1px solid black; padding: 2px; margin: 2px;">2FL</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">22°</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">8</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">h6</div> <div style="border: 1px solid black; padding: 2px; margin: 2px; background-color: black; color: white;">PCD</div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series 4221**     **D-PCD | 2FL | PCD | Double Angle**

Size	Diameter (D <sub>1</sub> )	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
#40		0.0980	1-1/8	2	#40	<b>422102</b>
1/8		0.1250	1-1/8	2	1/8	<b>422103</b>
#30		0.1285	1-1/8	2	#30	<b>422104</b>
#21		0.1590	1.0	3	#21	<b>422107</b>
#20		0.1610	1.0	3	#20	<b>422108</b>
3/16		0.1875	1.0	3	3/16	<b>422109</b>
#11		0.1910	1.0	3	#11	<b>422110</b>
#10		0.1935	1.0	3	#10	<b>422111</b>
1/4		0.2500	1.0	3	1/4	<b>422115</b>
5/16		0.3125	1-1/2	4	5/16	<b>422117</b>
3/8		0.3750	1-1/2	4	3/8	<b>422118</b>

\*bold numbers are EDPs for ordering

## Popular Custom Holemaking Options

- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM  
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# PERFORMANCE

Solid Carbide Dagger Drills For Aircraft



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Dagger Drill</b> <ul style="list-style-type: none"> <li>Structural aircraft drill for manual or CNC applications</li> <li>Sub-micron grade carbide substrate for wear resistance</li> <li>High shear</li> <li>Ideal for composites</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							●	●				

● Best ○ Good

**Series 4205** | **DGR | 1FL | 4" & 6" OAL**

Size	Diameter (D <sub>1</sub> )	Dec.	OAL (L)	Shank (D)	EDP
3/32		0.0938	4	3/32	<b>420502</b>
3/32		0.0938	6	3/32	<b>420501</b>
#40		0.0980	4	#40	<b>420504</b>
#40		0.0980	6	#40	<b>420503</b>
1/8		0.1250	4	1/8	<b>420506</b>
1/8		0.1250	6	1/8	<b>420505</b>
#30		0.1285	4	#30	<b>420508</b>
#30		0.1285	6	#30	<b>420507</b>
#28		0.1405	4	#28	<b>420510</b>
#28		0.1405	6	#28	<b>420509</b>
#27		0.1440	4	#27	<b>420512</b>
#27		0.1440	6	#27	<b>420511</b>
#26		0.1470	4	#26	<b>420514</b>
#26		0.1470	6	#26	<b>420513</b>
5/32		0.1562	4	5/32	<b>420516</b>
5/32		0.1562	6	5/32	<b>420515</b>
#21		0.1590	4	#21	<b>420518</b>
#21		0.1590	6	#21	<b>420517</b>
#20		0.1610	4	#20	<b>420520</b>
#20		0.1610	6	#20	<b>420519</b>
3/16		0.1875	4	3/16	<b>420522</b>
3/16		0.1875	6	3/16	<b>420521</b>
#11		0.1910	4	#11	<b>420524</b>
#11		0.1910	6	#11	<b>420523</b>
#10		0.1935	4	#10	<b>420526</b>
#10		0.1935	6	#10	<b>420525</b>
#9		0.1960	4	#9	<b>420528</b>
#9		0.1960	6	#9	<b>420527</b>
#8		0.1990	4	#8	<b>420530</b>
#8		0.1990	6	#8	<b>420529</b>
1/4		0.2500	4	1/4	<b>420532</b>
1/4		0.2500	6	1/4	<b>420531</b>
5/16		0.3125	4	5/16	<b>420534</b>
5/16		0.3125	6	5/16	<b>420533</b>
3/8		0.3750	4	3/8	<b>420536</b>
3/8		0.3750	6	3/8	<b>420535</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Dagger Drills For Aircraft



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Dagger Drill</b> <ul style="list-style-type: none"> <li>• Structural aircraft drill</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• High shear</li> <li>• Threaded Shank</li> <li>• Ideal for composites</li> <li>• For manual or pneumatic drilling operations</li> <li>• Adapter = 1/4-28 HSS</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							●	●				

● Best ○ Good

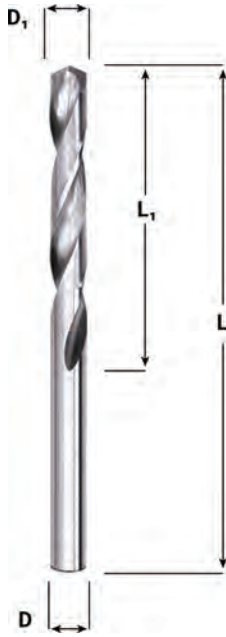
**Series 4206** | DGR | 1FL | 1.5" & 2.5" OAL | Threaded Shank

Size	Diameter (D <sub>1</sub> )	Dec.	OAL (L)	Shank (D)	EDP
3/32	0.0938		1-1/2	3/32	<b>420602</b>
3/32	0.0938		2-1/2	3/32	<b>420601</b>
#40	0.0980		1-1/2	0.098	<b>420604</b>
#40	0.0980		2-1/2	0.098	<b>420603</b>
1/8	0.1250		1-1/2	1/8	<b>420606</b>
1/8	0.1250		2-1/2	1/8	<b>420605</b>
#30	0.1285		1-1/2	#30	<b>420608</b>
#30	0.1285		2-1/2	#30	<b>420607</b>
#28	0.1405		1-1/2	9/64	<b>420610</b>
#28	0.1405		2-1/2	9/64	<b>420609</b>
#27	0.1440		1-1/2	0.144	<b>420612</b>
#27	0.1440		2-1/2	0.144	<b>420611</b>
#26	0.1470		1-1/2	0.147	<b>420614</b>
#26	0.1470		2-1/2	0.147	<b>420613</b>
5/32	0.1562		1-1/2	5/32	<b>420616</b>
5/32	0.1562		2-1/2	5/32	<b>420615</b>
#21	0.1590		1-1/2	0.159	<b>420617</b>
#21	0.1590		2-1/2	0.159	<b>420618</b>
#20	0.1610		1-1/2	0.161	<b>420619</b>
#20	0.1610		2-1/2	0.161	<b>420620</b>
3/16	0.1875		1-1/2	3/16	<b>420621</b>
3/16	0.1875		2-1/2	3/16	<b>420622</b>
#11	0.1910		1-1/2	0.191	<b>420623</b>
#11	0.1910		2-1/2	0.191	<b>420624</b>
#10	0.1935		1-1/2	#10	<b>420625</b>
#10	0.1935		2-1/2	#10	<b>420626</b>
#9	0.1960		1-1/2	0.196	<b>420627</b>
#9	0.1960		2-1/2	0.196	<b>420628</b>
#8	0.1990		1-1/2	0.199	<b>420629</b>
#8	0.1990		2-1/2	0.199	<b>420630</b>
1/4	0.2500		1-1/2	1/4	<b>420631</b>
1/4	0.2500		2-1/2	1/4	<b>420632</b>
5/16	0.3125		1-1/2	5/16	<b>420633</b>
5/16	0.3125		2-1/2	5/16	<b>420634</b>
3/8	0.3750		1-1/2	3/8	<b>420635</b>
3/8	0.3750		2-1/2	3/8	<b>420636</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide 4-Facet Drills For Aircraft



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>4-Facet Drill</b></p> <ul style="list-style-type: none"> <li>• Structural aircraft drill for manual or CNC applications</li> <li>• Sub-micron grade carbide substrate for wear resistance</li> <li>• 4-facet</li> <li>• Ideal for composites and Aluminum</li> <li>• Per NAS 907 specifications</li> </ul>		<div style="display: flex; flex-wrap: wrap;"> <div style="margin: 2px;">CARBIDE</div> <div style="margin: 2px;">2FL</div> <div style="margin: 2px;">30°</div> <div style="margin: 2px;">135°</div> <div style="margin: 2px;">Bright</div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series 4210**     **DRS | 2FL | 4-Facet**

Size	Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
3/32	0.0938		7/8	2-1/8	3/32	<b>421001</b>
#40	0.0980		7/8	2-1/8	#40	<b>421002</b>
1/8	0.1250		7/8	2-1/8	1/8	<b>421003</b>
#30	0.1285		1-1/8	2-1/8	#30	<b>421004</b>
#26	0.1470		1-1/8	2-1/8	#26	<b>421005</b>
5/32	0.1562		1-1/8	2-1/8	5/32	<b>421006</b>
#21	0.1590		1-1/8	2-1/8	#21	<b>421007</b>
#20	0.1610		1-1/8	2-1/8	#20	<b>421008</b>
3/16	0.1875		1-1/8	2-1/8	3/16	<b>421009</b>
#11	0.1910		1-1/8	2-1/8	#11	<b>421010</b>
#10	0.1935		1-1/8	2-1/8	#10	<b>421011</b>
#9	0.1960		1-1/8	2-1/8	#9	<b>421012</b>
#8	0.1990		1-1/8	2-1/8	#8	<b>421013</b>
7/32	0.2188		1-1/8	2-1/8	7/32	<b>421014</b>
1/4	0.2500		1-1/8	2-1/8	1/4	<b>421015</b>
F	0.2570		1-1/8	2-1/8	F	<b>421016</b>
5/16	0.3125		1-1/8	2-1/8	5/16	<b>421017</b>
3/8	0.3750		1-1/8	2-1/8	3/8	<b>421018</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

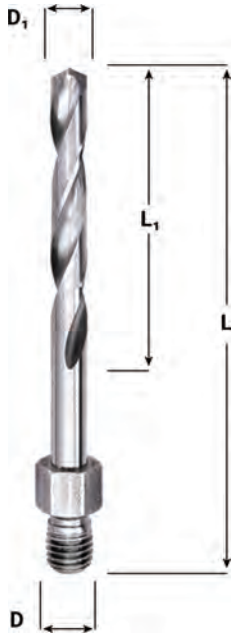
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide 4-Facet Drills For Aircraft



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>4-Facet Drill</b> <ul style="list-style-type: none"> <li>Structural aircraft drill</li> <li>Sub-micron grade carbide substrate for wear resistance</li> <li>4-facet</li> <li>Threaded Shank</li> <li>Ideal for composites and Aluminum</li> <li>For manual or pneumatic drilling operations</li> <li>Adapter = 1/4-28 HSS</li> <li>Per NAS 907 specifications</li> </ul>		<div style="display: flex; flex-wrap: wrap;"> <div style="margin-right: 5px;">CARBIDE</div> <div style="margin-right: 5px;">2FL</div> <div style="margin-right: 5px;">30°</div> <div style="margin-right: 5px;">135°</div> <div style="margin-right: 5px;"></div> <div style="margin-right: 5px;">Bright</div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							●	●				

● Best ○ Good

**Series 4211**     **DRS | 2FL | Threaded Shank**

Size	Diameter (D <sub>1</sub> )	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
3/32		0.0938	7/8	2-1/8	3/32	421101
#40		0.0980	7/8	2-1/8	#40	421102
1/8		0.1250	7/8	2-1/8	1/8	421103
#30		0.1285	1-1/8	2-1/8	#30	421104
#26		0.1470	1-1/8	2-1/8	0.1470	421105
5/32		0.1562	1-1/8	2-1/8	5/32	421106
#21		0.1590	1-1/8	2-1/8	#21	421107
#20		0.1610	1-1/8	2-1/8	#20	421108
3/16		0.1875	1-1/8	2-1/8	3/16	421109
#11		0.1910	1-1/8	2-1/8	#11	421110
#10		0.1935	1-1/8	2-1/8	#10	421111
#9		0.1960	1-1/8	2-1/8	0.1960	421112
#8		0.1990	1-1/8	2-1/8	0.1990	421113
7/32		0.2188	1-1/8	2-1/8	7/32	421114
1/4		0.2500	1-1/8	2-1/8	1/4	421115
F		0.2570	1-1/8	2-1/8	0.2570	421116
5/16		0.3125	1-1/8	2-1/8	5/16	421117
3/8		0.3750	1-1/8	2-1/8	3/8	421118

\*bold numbers are EDPs for ordering

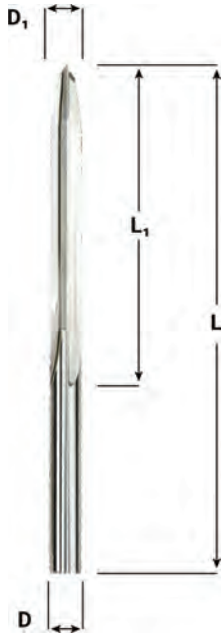
## Popular Custom Holemaking Options

- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM  
COMES  
STANDARD**

# PERFORMANCE

Solid Carbide Drill/Reamers For Aircraft



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Dreamer Drills</b></p> <ul style="list-style-type: none"> <li>Structural aircraft Dreamer drill for manual or CNC applications</li> <li>Sub-micron grade carbide substrate for wear resistance</li> <li>Drill and Reamer In-One</li> <li>Ideal for composites and Aluminum</li> </ul>		<div style="display: flex; flex-wrap: wrap;"> <div style="margin-right: 5px;">CARBIDE</div> <div style="margin-right: 5px;">4FL</div> <div style="margin-right: 5px;">118°</div> <div>Bright</div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							●	●				

● Best ○ Good

**Series 4207** | DRM | 4FL | 4" & 6" OAL

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
3/32	0.0938	1	4	3/32	<b>420702</b>
3/32	0.0938	1	6	3/32	<b>420701</b>
#40	0.0980	1	4	0.098	<b>420704</b>
#40	0.0980	1	6	0.098	<b>420703</b>
1/8	0.1250	1-1/2	4	1/8	<b>420706</b>
1/8	0.1250	1-1/2	6	1/8	<b>420705</b>
#30	0.1285	1-1/2	4	#30	<b>420708</b>
#30	0.1285	1-1/2	6	#30	<b>420707</b>
5/32	0.1562	1-1/2	4	5/32	<b>420710</b>
5/32	0.1562	1-1/2	6	5/32	<b>420709</b>
#21	0.1590	1-1/2	4	#21	<b>420712</b>
#21	0.1590	1-1/2	6	#21	<b>420711</b>
#20	0.1610	1-1/2	4	#20	<b>420714</b>
#20	0.1610	1-1/2	6	#20	<b>420713</b>
3/16	0.1875	1-1/2	4	3/16	<b>420716</b>
3/16	0.1875	1-1/2	6	3/16	<b>420715</b>
#11	0.1910	1-1/2	4	#11	<b>420718</b>
#11	0.1910	1-1/2	6	#11	<b>420717</b>
#10	0.1935	1-1/2	4	#10	<b>420720</b>
#10	0.1935	1-1/2	6	#10	<b>420719</b>
#9	0.1960	1-1/2	4	0.1960	<b>420722</b>
#9	0.1960	1-1/2	6	0.1960	<b>420721</b>
#8	0.1990	1-1/2	4	0.1990	<b>420724</b>
#8	0.1990	1-1/2	6	0.1990	<b>420723</b>
1/4	0.2500	1-1/2	4	1/4	<b>420726</b>
1/4	0.2500	1-1/2	6	1/4	<b>420725</b>
5/16	0.3125	1-1/2	4	5/16	<b>420728</b>
5/16	0.3125	1-1/2	6	5/16	<b>420727</b>
3/8	0.3750	1-1/2	4	3/8	<b>420730</b>
3/8	0.3750	1-1/2	6	3/8	<b>420729</b>

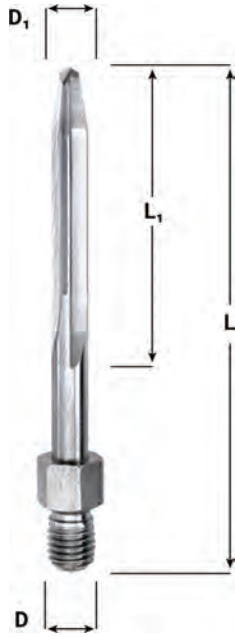
\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS



# PERFORMANCE

Solid Carbide Drill/Reamers For Aircraft



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Dreamer Drills</b> <ul style="list-style-type: none"> <li>Structural aircraft Dreamer drill</li> <li>Sub-micron grade carbide substrate for wear resistance</li> <li>Drill and Reamer In-One</li> <li>Threaded Shank</li> <li>Ideal for composites and Aluminum</li> <li>For manual or pneumatic drilling operations</li> <li>Adapter = 1/4-28 HSS</li> </ul>		<div style="display: flex; flex-wrap: wrap;"> <div style="margin-right: 5px;">CARBIDE</div> <div style="margin-right: 5px;">4FL</div> <div style="margin-right: 5px;">118°</div> <div style="margin-right: 5px;">Bright</div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

## Series 4208 DRMT | 4FL | 1.5" & 2.5" OAL | Threaded Shank

Size	Diameter (D <sub>1</sub> )	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
3/32		0.0938	1	1-1/2	3/32	<b>420802</b>
3/32		0.0938	1	2-1/2	3/32	<b>420801</b>
#40		0.0980	1	1-1/2	#40	<b>420804</b>
#40		0.0980	1	2-1/2	#40	<b>420803</b>
1/8		0.1250	1	1-1/2	1/8	<b>420806</b>
1/8		0.1250	1-1/2	2-1/2	1/8	<b>420805</b>
#30		0.1285	1	1-1/2	#30	<b>420808</b>
#30		0.1285	1-1/2	2-1/2	#30	<b>420807</b>
5/32		0.1562	1	1-1/2	5/32	<b>420810</b>
5/32		0.1562	1-1/2	2-1/2	5/32	<b>420809</b>
#21		0.1590	1	1-1/2	#21	<b>420812</b>
#21		0.1590	1-1/2	2-1/2	#21	<b>420811</b>
#20		0.1610	1	1-1/2	#20	<b>420814</b>
#20		0.1610	1-1/2	2-1/2	#20	<b>420813</b>
3/16		0.1875	1	1-1/2	3/16	<b>420816</b>
3/16		0.1875	1-1/2	2-1/2	3/16	<b>420815</b>
#11		0.1910	1	1-1/2	#11	<b>420818</b>
#11		0.1910	1-1/2	2-1/2	#11	<b>420817</b>
#10		0.1935	1	1-1/2	#10	<b>420820</b>
#10		0.1935	1-1/2	2-1/2	#10	<b>420819</b>
#9		0.1960	1	1-1/2	0.1960	<b>420822</b>
#9		0.1960	1-1/2	2-1/2	0.1960	<b>420821</b>
#8		0.1990	1	1-1/2	0.1990	<b>420824</b>
#8		0.1990	1-1/2	2-1/2	0.1990	<b>420823</b>
1/4		0.2500	1	1-1/2	1/4	<b>420826</b>
1/4		0.2500	1-1/2	2-1/2	1/4	<b>420825</b>
5/16		0.3125	1	1-1/2	5/16	<b>420828</b>
5/16		0.3125	1-1/2	2-1/2	5/16	<b>420827</b>
3/8		0.3750	1	1-1/2	3/8	<b>420830</b>
3/8		0.3750	1-1/2	2-1/2	3/8	<b>420829</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide Reverse Spot Facers For Aircraft



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Reverse Spot Facers</b></p> <ul style="list-style-type: none"> <li>• Solid carbide spot facer</li> <li>• HSS Pilot</li> <li>• Structural aerospace components and rivets</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							●	●				

● Best ○ Good

**Series 4220** | RSF-SC | Carbide Body | HSS Pilots

Diameter (D <sub>1</sub> )	Radius (R)	Pilot (D)	EDP
1/4	0.0300	3/32	422001
1/4	0.0300	1/8	422002
5/16	0.0300	3/32	422003
5/16	0.0300	1/8	422004
3/8	0.0300	5/32	422005
3/8	0.0300	1/8	422006
3/8	0.0300	3/16	422007
7/16	0.0300	1/8	422008
7/16	0.0300	5/32	422009
7/16	0.0300	3/16	422010
1/2	0.0300	3/16	422011
1/2	0.0300	1/4	422012
9/16	0.0300	3/16	422013
9/16	0.0300	1/4	422014
5/8	0.0300	3/16	422015
5/8	0.0300	1/4	422016
5/8	0.0300	3/16	422017
11/16	0.0300	1/4	422018
11/16	0.0300	5/16	422019
3/4	0.0300	1/4	422020
3/4	0.0300	5/16	422021
3/4	0.0300	1/4	422022
7/8	0.0300	5/16	422023
7/8	0.0300	3/8	422024
1.0000	0.0300	5/16	422025
1.0000	0.0300	3/8	422026
1.0000	0.0300	1/2	422027
1-1/4	0.0300	3/8	422028
1-1/4	0.0300	1/2	422029

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

High Speed Steel Reverse Spot Facers For Aircraft



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Reverse Spot Facers</b> <ul style="list-style-type: none"> <li>• HSS Spot Facer</li> <li>• HSS Pilot</li> <li>• Structural aerospace components and rivets</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							●	●				

● Best ○ Good

**Series 4219** | RSF | HSS Body | HSS Pilots

Diameter (D <sub>1</sub> )	Radius (R)	Pilot (D)	EDP
1/4	0.0300	3/32	421901
1/4	0.0300	1/8	421902
5/16	0.0300	3/32	421903
5/16	0.0300	1/8	421904
3/8	0.0300	5/32	421905
3/8	0.0300	1/8	421906
3/8	0.0300	3/16	421907
7/16	0.0300	1/8	421908
7/16	0.0300	5/32	421909
7/16	0.0300	3/16	421910
1/2	0.0300	3/16	421911
1/2	0.0300	1/4	421912
9/16	0.0300	3/16	421913
9/16	0.0300	1/4	421914
5/8	0.0300	3/16	421915
5/8	0.0300	1/4	421916
5/8	0.0300	5/16	421917
11/16	0.0300	1/4	421918
11/16	0.0300	5/16	421919
3/4	0.0300	1/4	421920
3/4	0.0300	5/16	421921
3/4	0.0300	3/8	421922
7/8	0.0300	5/16	421923
7/8	0.0300	3/8	421924
1.0000	0.0300	5/16	421925
1.0000	0.0300	3/8	421926
1.0000	0.0300	1/2	421927
1-1/4	0.0300	3/8	421928
1-1/4	0.0300	1/2	421929

\*bold numbers are EDPs for ordering

# PERFORMANCE

Brazed Carbide Rivet Shavers For Aircraft



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Rivet Shaver</b></p> <ul style="list-style-type: none"> <li>• Brazed Sub-micron grade carbide substrate for wear resistance</li> <li>• Ideal for composites and Aluminum</li> <li>• For manual or pneumatic drilling operations</li> </ul>		<p><b>CARBIDE TIP</b></p> <p><b>Bright</b></p>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
							●	●				

● Best ○ Good

**Series 4218** HT | Threaded Shank | Brazed Carbide

Diameter (D <sub>1</sub> )	Thread	EDP
5/16	1/4-28	<b>421801</b>
3/8	1/4-28	<b>421802</b>
7/16	1/4-28	<b>421803</b>
1/2	1/4-28	<b>421804</b>
9/16	1/4-28	<b>421805</b>
5/8	1/4-28	<b>421806</b>
3/4	1/4-28	<b>421807</b>
7/8	1/4-28	<b>421808</b>
1	1/4-28	<b>421809</b>

\*bold numbers are EDPs for ordering

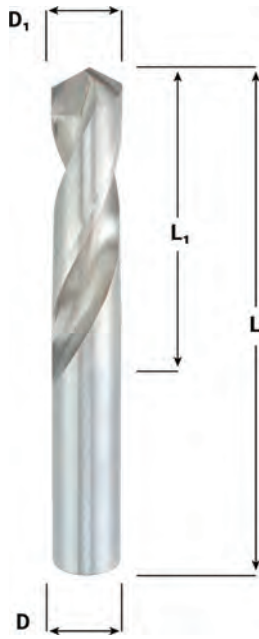
### Popular Custom Holemaking Options

<ul style="list-style-type: none"> <li>○ Material-specific point geometry</li> <li>○ Longer flute lengths</li> <li>○ Internal coolant supply</li> <li>○ Proprietary GWS tool coatings</li> </ul>	<p><b>CUSTOM COMES STANDARD</b></p>
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INTRO  
MILLING  
SPECIALTY  
HOLEMAKING  
THREADING  
INSERTS

# PERFORMANCE

Carbide-Tip Screw Machine Drill



FEATURES / DESCRIPTION				APPLICATION	FEATURES																																				
<b>Carbide-Tip Drill</b> <ul style="list-style-type: none"> <li>Carbide tipped wear resistance and HSS body for toughness</li> <li>General purpose drill for cutting cast iron, ductile iron, bronze, cast aluminum, fiberglass, and plastics</li> <li>Not suited for continuous chip low carbon steels or alloy aluminums</li> <li>118° general purpose cam relief point for maximum edge strength</li> </ul>																																									
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STEEL		STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL																															
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2																													
					●	●		○																																	

● Best ○ Good

## Series 110 | 2FL | Carbide-Tip | 118° | Screw Machine Length

Size	Diameter (D <sub>1</sub> )	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
1/8		0.1250	7/8	1-7/8	1/8	11001250
3.5mm		0.1378	1	2-1/16	0.1378	11001378
9/64		0.1406	1	2-1/16	9/64	11001406
5/32		0.1562	1	2-1/16	5/32	11001562
4.0mm		0.1575	25.0mm	52mm	4.0mm	11001575
11/64		0.1719	1-1/8	2-3/16	11/64	11001719
4.5mm		0.1772	1-1/8	2-3/16	0.1772	11001772
3/16		0.1875	1-1/8	2-3/16	3/16	11001875
5.0mm		0.1969	32mm	60mm	5.0mm	11001969
#7		0.2010	1-1/4	2-3/8	0.201	11002010
13/64		0.2031	1-1/4	2-3/8	13/64	11002031
#3		0.2130	1-1/4	2-3/8	0.213	11002130
5.5mm		0.2165	1-1/4	2-3/8	0.2165	11002165
7/32		0.2188	1-1/4	2-3/8	7/32	11002188
#1		0.2280	1-3/8	2-1/2	0.228	11002280
15/64		0.2344	1-3/8	2-1/2	15/64	11002344
6.0mm		0.2362	35mm	64mm	6.0mm	11002362
D		0.2460	1-3/8	2-1/2	0.246	11002460
1/4		0.2500	1-3/8	2-1/2	1/4	11002500
6.5mm		0.2559	1-1/2	2-11/16	0.2559	11002559
F		0.2570	1-1/2	2-11/16	0.257	11002570
G		0.2610	1-1/2	2-11/16	0.261	11002610
17/64		0.2656	1-1/2	2-11/16	0.2656	11002656
H		0.2660	1-1/2	2-11/16	17/64	11002660
I		0.2720	1-1/2	2-11/16	0.272	11002720
7.0mm		0.2756	38mm	68mm	7.0mm	11002756
9/32		0.2812	1-1/2	2-11/16	9/32	11002812
7.5mm		0.2953	1-5/8	2-13/16	0.2953	11002953
19/64		0.2969	1-5/8	2-13/16	19/64	11002969
5/16		0.3125	1-5/8	2-13/16	5/16	11003125
8.0mm		0.3150	41mm	71mm	8.0mm	11003150
O		0.3160	1-5/8	2-13/16	0.316	11003160
21/64		0.3281	1-11/16	3	21/64	11003281
Q		0.3320	1-11/16	3	0.332	11003320
8.5mm		0.3346	1-11/16	3	0.3346	11003346
R		0.3390	1-11/16	3	0.339	11003390
11/32		0.3438	1-11/16	3	11/32	11003438
9.0mm		0.3543	43mm	79mm	9.0mm	11003543
23/64		0.3594	1-11/16	3	23/64	11003594
U		0.3680	1-13/16	3-1/8	0.368	11003680
9.5mm		0.3740	1-13/16	3-1/8	0.3740	11003740
3/8		0.3750	1-13/16	3-1/8	3/8	11003750
W		0.3860	1-15/16	3-5/16	0.386	11003860
25/64		0.3906	1-15/16	3-5/16	25/64	11003906

\*bold numbers are EDPs for ordering

# PERFORMANCE

Carbide-Tip Screw Machine Drill



**Series 110** | 2FL | Carbide-Tip | 118° | Screw Machine Length

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
10.0mm	0.3937	49mm	84mm	10.0mm	<b>11003937</b>
X	0.3970	1-15/16	3-5/16	0.397	<b>11003970</b>
13/32	0.4062	1-15/16	3-5/16	13/32	<b>11004062</b>
10.5mm	0.4134	2-1/16	3-7/16	0.4134	<b>11004134</b>
27/64	0.4219	2-1/16	3-7/16	27/64	<b>11004219</b>
11.0mm	0.4331	52mm	87mm	11.0mm	<b>11004331</b>
7/16	0.4375	2-1/16	3-7/16	7/16	<b>11004375</b>
11.5mm	0.4528	2-1/8	3-5/8	0.4528	<b>11004528</b>
29/64	0.4531	2-1/8	3-5/8	29/64	<b>11004531</b>
15/32	0.4688	2-1/8	3-5/8	15/32	<b>11004688</b>
12.0mm	0.4724	54mm	92mm	12.0mm	<b>11004724</b>
31/64	0.4844	2-1/4	3-3/4	31/64	<b>11004844</b>
12.5mm	0.4921	2-1/4	3-3/4	0.4921	<b>11004921</b>
1/2	0.5000	2-1/4	3-3/4	1/2	<b>11005000</b>
13.0mm	0.5118	60mm	98mm	13.0mm	<b>11005118</b>
17/32	0.5312	2-3/8	3-7/8	17/32	<b>11005312</b>
13.5mm	0.5315	2-3/8	3-7/8	0.5315	<b>11005315</b>
14.0mm	0.5512	64mm	102mm	14.0mm	<b>11005512</b>
9/16	0.5625	2-1/2	4	9/16	<b>11005625</b>
19/32	0.5938	2-5/8	4-1/8	19/32	<b>11005938</b>
5/8	0.6250	2-3/4	4-1/4	5/8	<b>11006250</b>
21/32	0.6562	2-7/8	4-1/2	21/32	<b>11006562</b>
11/16	0.6875	2-7/8	4-5/8	11/16	<b>11006875</b>
23/32	0.7188	3	4-3/4	23/32	<b>11007188</b>
3/4	0.7500	3-1/8	5	3/4	<b>11007500</b>

\*bold numbers are EDPs for ordering

## Popular Custom Holemaking Options

- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM  
COMES  
STANDARD**



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

## Carbide-Tip Jobber Length Drill



FEATURES / DESCRIPTION				APPLICATION	FEATURES																																					
<b>Carbide-Tip Drill</b> <ul style="list-style-type: none"> <li>Carbide tipped wear resistance and HSS body for toughness</li> <li>General purpose drill for cutting cast iron, ductile iron, bronze, cast aluminum, fiberglass, and plastics</li> <li>Not suited for continuous chip low carbon steels or alloy aluminums</li> <li>118° general purpose cam relief point for maximum edge strength</li> </ul>																																										
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STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL																															
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2																														
					●	●		○																																		

● Best ○ Good

### Series 120 2FL | Carbide-Tip | 118° | Jobber Length

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
#40	0.0980	1-5/8	2-3/4	.098	12000980
#39	0.0995	1-5/8	2-3/4	.0995	12000995
#38	0.1015	1-5/8	2-3/4	0.1015	12001015
#37	0.1040	1-5/8	2-3/4	0.104	12001040
#36	0.1065	1-5/8	2-3/4	0.1065	12001065
7/64	0.1094	1-5/8	2-3/4	7/64	12001094
#35	0.1100	1-5/8	2-3/4	7/64	12001100
#34	0.1110	1-5/8	2-3/4	0.111	12001110
#33	0.1130	1-5/8	2-3/4	0.113	12001130
#32	0.1160	1-5/8	2-3/4	0.116	12001160
3.0mm	0.1181	41mm	70mm	3.0mm	12001181
#31	0.1200	1-5/8	2-3/4	0.12	12001200
3.1mm	0.1220	1-5/8	2-3/4	0.1220	12001220
1/8	0.1250	1-5/8	2-3/4	1/8	12001250
3.2mm	0.1260	1-5/8	2-3/4	0.1260	12001260
#30	0.1285	1-5/8	2-3/4	#30	12001285
3.3mm	0.1299	2	3-1/8	0.1299	12001299
3.4mm	0.1339	2	3-1/8	0.1339	12001339
#29	0.1360	2	3-1/8	0.136	12001360
3.5mm	0.1378	2	3-1/8	0.1378	12001378
#28	0.1405	2	3-1/8	9/64	12001405
9/64	0.1406	2	3-1/8	9/64	12001406
3.6mm	0.1417	2	3-1/8	0.1417	12001417
#27	0.1440	2	3-1/8	0.144	12001440
3.7mm	0.1457	2	3-1/8	0.1457	12001457
#26	0.1470	2	3-1/8	0.147	12001470
#25	0.1495	2	3-1/8	0.1495	12001495
3.8mm	0.1496	2	3-1/8	0.1496	12001496
#24	0.1520	2	3-1/8	0.152	12001520
3.9mm	0.1535	2	3-1/8	0.1535	12001535
#23	0.1540	2	3-1/8	0.154	12001540
5/32	0.1562	2	3-1/8	5/32	12001562
#22	0.1570	2	3-1/8	5/32	12001570
4.0mm	0.1575	51mm	79mm	4.0mm	12001575
#21	0.1590	2	3-1/8	0.159	12001590
#20	0.1610	2-5/16	3-1/2	0.161	12001610
4.1mm	0.1614	2-5/16	3-1/2	0.1614	12001614
4.2mm	0.1654	2-5/16	3-1/2	0.1654	12001654
#19	0.1660	2-5/16	3-1/2	0.166	12001660
4.3mm	0.1693	2-5/16	3-1/2	0.1693	12001693
#18	0.1695	2-5/16	3-1/2	0.1695	12001695
11/64	0.1719	2-5/16	3-1/2	11/64	12001719
#17	0.1730	2-5/16	3-1/2	11/64	12001730
4.4mm	0.1732	2-5/16	3-1/2	0.1732	12001732

\*bold numbers are EDPs for ordering

# PERFORMANCE

Carbide-Tip Jobber Length Drill



Series 120		2FL   Carbide-Tip   118°   Jobber Length				
Size	Diameter (D <sub>1</sub> )	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
#16		0.1770	2-5/16	3-1/2	0.177	12001770
4.5mm		0.1772	2-5/16	3-1/2	0.1772	12001772
#15		0.1800	2-5/16	3-1/2	0.18	12001800
4.6mm		0.1811	2-5/16	3-1/2	0.1811	12001811
#14		0.1820	2-5/16	3-1/2	0.182	12001820
#13		0.1850	2-5/16	3-1/2	0.185	12001850
3/16		0.1875	2-5/16	3-1/2	3/16	12001875
#12		0.1890	2-5/16	3-1/2	3/16	12001890
#11		0.1910	2-5/16	3-1/2	0.191	12001910
4.9mm		0.1929	2-1/2	3-3/4	0.1929	12001929
#10		0.1935	2-1/2	3-3/4	#10	12001935
#9		0.1960	2-1/2	3-3/4	0.196	12001960
5.0mm		0.1969	64mm	95mm	5.0mm	12001969
#8		0.1990	2-1/2	3-3/4	0.199	12001990
5.1mm		0.2008	2-1/2	3-3/4	0.2008	12002008
#7		0.2010	2-1/2	3-3/4	0.201	12002010
13/64		0.2031	2-1/2	3-3/4	13/64	12002031
#6		0.2040	2-1/2	3-3/4	13/64	12002040
5.2mm		0.2047	2-1/2	3-3/4	0.2047	12002047
#5		0.2055	2-1/2	3-3/4	0.2055	12002055
5.3mm		0.2087	2-1/2	3-3/4	0.2087	12002087
#4		0.2090	2-1/2	3-3/4	0.209	12002090
5.4mm		0.2126	2-1/2	3-3/4	0.2126	12002126
#3		0.2130	2-1/2	3-3/4	0.213	12002130
5.5mm		0.2165	2-1/2	3-3/4	0.2165	12002165
7/32		0.2188	2-1/2	3-3/4	7/32	12002188
5.6mm		0.2205	2-1/2	3-3/4	0.2205	12002205
#2		0.2210	2-1/2	3-3/4	0.221	12002210
5.7mm		0.2244	2-3/4	4	0.2244	12002244
#1		0.2280	2-3/4	4	0.228	12002280
5.8mm		0.2283	2-3/4	4	0.2283	12002283
5.9mm		0.2323	2-3/4	4	0.2323	12002323
A		0.2340	2-3/4	4	15/64	12002340
15/64		0.2344	2-3/4	4	15/64	12002344
6.0mm		0.2362	70mm	102mm	6.0mm	12002362
B		0.2380	2-3/4	4	0.238	12002380
6.1mm		0.2402	2-3/4	4	0.2402	12002402
C		0.2420	2-3/4	4	0.242	12002420
6.2mm		0.2441	2-3/4	4	0.2441	12002441
D		0.2460	2-3/4	4	0.246	12002460
6.3mm		0.2480	2-3/4	4	0.2480	12002480
1/4		0.2500	2-3/4	4	1/4	12002500
6.4mm		0.2520	2-3/4	4	0.2520	12002520
6.5mm		0.2559	2-15/16	4-1/4	0.2559	12002559
F		0.2570	2-15/16	4-1/4	0.257	12002570
6.6mm		0.2598	2-15/16	4-1/4	0.2598	12002598
G		0.2610	2-15/16	4-1/4	0.261	12002610
6.7mm		0.2638	2-15/16	4-1/4	0.2638	12002638
17/64		0.2656	2-15/16	4-1/4	17/64	12002656
H		0.2660	2-15/16	4-1/4	17/64	12002660
6.8mm		0.2677	2-15/16	4-1/4	0.2677	12002677
6.9mm		0.2717	2-15/16	4-1/4	0.2717	12002717
I		0.2720	2-15/16	4-1/4	0.272	12002720
7.0mm		0.2756	75mm	108mm	7.0mm	12002756
J		0.2770	2-15/16	4-1/4	0.277	12002770
7.1mm		0.2795	2-15/16	4-1/4	0.2795	12002795
K		0.2810	2-15/16	4-1/4	9/32	12002810
9/32		0.2812	2-15/16	4-1/4	9/32	12002812
7.2mm		0.2835	2-15/16	4-1/4	0.2835	12002835
7.3mm		0.2874	3-3/16	4-1/2	0.2874	12002874
L		0.2900	3-3/16	4-1/2	0.29	12002900
7.4mm		0.2913	3-3/16	4-1/2	0.2913	12002913
M		0.2950	3-3/16	4-1/2	0.295	12002950
7.5mm		0.2953	3-3/16	4-1/2	0.2953	12002953
19/64		0.2969	3-3/16	4-1/2	19/64	12002969
7.6mm		0.2992	3-3/16	4-1/2	0.2992	12002992
N		0.3020	3-3/16	4-1/2	0.302	12003020
7.7mm		0.3031	3-3/16	4-1/2	0.3031	12003031
7.8mm		0.3071	3-3/16	4-1/2	0.3071	12003071
7.9mm		0.3110	3-3/16	4-1/2	0.3110	12003110
5/16		0.3125	3-3/16	4-1/2	5/16	12003125
8.0mm		0.3150	81mm	114mm	8.0mm	12003150
O		0.3160	3-3/16	4-1/2	0.316	12003160
8.1mm		0.3189	3-7/16	4-3/4	0.3189	12003189
8.2mm		0.3228	3-7/16	4-3/4	0.3228	12003228

\*bold numbers are EDPs for ordering

INTRO

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SPECIALTY

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# PERFORMANCE

Carbide-Tip Jobber Length Drill



**Series 120** | 2FL | Carbide-Tip | 118° | Jobber Length

Size	Diameter (D <sub>1</sub> )	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
P		0.3230	3-7/16	4-3/4	0.323	12003230
8.3mm		0.3268	3-7/16	4-3/4	0.3268	12003268
21/64		0.3281	3-7/16	4-3/4	21/64	12003281
8.4mm		0.3307	3-7/16	4-3/4	0.3307	12003307
Q		0.3320	3-7/16	4-3/4	0.332	12003320
8.5mm		0.3346	3-7/16	4-3/4	0.3346	12003346
8.6mm		0.3386	3-7/16	4-3/4	0.3386	12003386
R		0.3390	3-7/16	4-3/4	0.339	12003390
8.7mm		0.3425	3-7/16	4-3/4	0.3425	12003425
11/32		0.3438	3-7/16	4-3/4	11/32	12003438
8.8mm		0.3465	3-7/16	4-3/4	0.3465	12003465
S		0.3480	3-5/8	5	0.348	12003480
8.9mm		0.3504	3-5/8	5	0.3504	12003504
9.0mm		0.3543	92mm	127mm	9.0mm	12003543
T		0.3580	3-5/8	5	23/64	12003580
9.1mm		0.3583	3-5/8	5	0.3583	12003583
23/64		0.3594	3-5/8	5	23/64	12003594
9.2mm		0.3622	3-5/8	5	0.3622	12003622
9.3mm		0.3661	3-5/8	5	0.3661	12003661
U		0.3680	3-5/8	5	0.368	12003680
9.4mm		0.3701	3-5/8	5	0.3701	12003701
9.5mm		0.3740	3-5/8	5	0.3740	12003740
3/8		0.3750	3-5/8	5	3/8	12003750
V		0.3770	3-5/8	5	0.377	12003770
9.6mm		0.3780	3-5/8	5	0.3780	12003780
9.7mm		0.3819	3-7/8	5-1/4	0.3819	12003819
9.8mm		0.3858	3-7/8	5-1/4	0.3858	12003858
W		0.3860	3-7/8	5-1/4	0.386	12003860
9.9mm		0.3898	3-7/8	5-1/4	0.3898	12003898
25/64		0.3906	3-7/8	5-1/4	25/64	12003906
10.0mm		0.3937	98mm	133mm	10.0mm	12003937
X		0.3970	3-7/8	5-1/4	0.397	12003970
10.1mm		0.3976	3-7/8	5-1/4	0.3976	12003976
10.2mm		0.4016	3-7/8	5-1/4	0.4016	12004016
Y		0.4040	3-7/8	5-1/4	0.404	12004040
10.3mm		0.4055	3-7/8	5-1/4	0.4055	12004055
13/32		0.4062	3-7/8	5-1/4	13/32	12004062
10.4mm		0.4094	3-7/8	5-1/4	0.4094	12004094
Z		0.4130	4-1/16	5-1/2	0.413	12004130
10.5mm		0.4134	4-1/16	5-1/2	0.4134	12004134
10.6mm		0.4173	4-1/16	5-1/2	0.4173	12004173
10.7mm		0.4213	4-1/16	5-1/2	0.4213	12004213
27/64		0.4219	4-1/16	5-1/2	27/64	12004219
10.8mm		0.4252	4-1/16	5-1/2	0.4252	12004252
10.9mm		0.4291	4-1/16	5-1/2	0.4291	12004291
11.0mm		0.4331	103mm	140mm	11.0mm	12004331
11.1mm		0.4370	4-1/16	5-1/2	0.4370	12004370
7/16		0.4375	4-1/16	5-1/2	7/16	12004375
11.2mm		0.4409	4-1/16	5-1/2	0.4409	12004409
11.3mm		0.4449	4-5/16	5-3/4	0.4449	12004449
11.4mm		0.4488	4-5/16	5-3/4	0.4488	12004488
11.5mm		0.4528	4-5/16	5-3/4	0.4528	12004528
29/64		0.4531	4-5/16	5-3/4	29/64	12004531
11.6mm		0.4567	4-5/16	5-3/4	0.4567	12004567
11.7mm		0.4606	4-5/16	5-3/4	0.4606	12004606
11.8mm		0.4646	4-5/16	5-3/4	0.4646	12004646
11.9mm		0.4685	4-5/16	5-3/4	0.4685	12004685
15/32		0.4688	4-5/16	5-3/4	15/32	12004688
12.0mm		0.4724	110mm	146mm	12.0mm	12004724
12.1mm		0.4764	4-1/2	6	0.4764	12004764
12.2mm		0.4803	4-1/2	6	0.4803	12004803
12.3mm		0.4843	4-1/2	6	0.4843	12004843
31/64		0.4844	4-1/2	6	31/64	12004844
12.4mm		0.4882	4-1/2	6	0.4882	12004882
12.5mm		0.4921	4-1/2	6	0.4921	12004921
12.6mm		0.4961	4-1/2	6	0.4961	12004961
1/2		0.5000	4-1/2	6	1/2	12005000
12.8mm		0.5039	4-1/2	6	0.5039	12005039
12.9mm		0.5079	4-13/16	6-5/8	0.5079	12005079
13.0mm		0.5118	122mm	168mm	13.0mm	12005118
33/64		0.5156	4-13/16	6-5/8	33/64	12005156
17/32		0.5312	4-13/16	6-5/8	17/32	12005312
35/64		0.5469	4-13/16	6-5/8	35/64	12005469
9/16		0.5625	4-13/16	6-5/8	9/16	12005625
37/64		0.5781	5-3/16	6-5/8	37/64	12005781

\*bold numbers are EDPs for ordering

# PERFORMANCE

Carbide-Tip Jobber Length Drill



Series 120

2FL | Carbide-Tip | 118° | Jobber Length

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
19/32	0.5938	5-3/16	7-1/8	19/32	<b>12005938</b>
39/64	0.6094	5-3/16	7-1/8	39/64	<b>12006094</b>
5/8	0.6250	5-3/16	7-1/8	5/8	<b>12006250</b>
41/64	0.6406	5-3/16	7-1/8	41/64	<b>12006406</b>
21/32	0.6562	5-3/16	7-1/8	21/32	<b>12006562</b>
43/64	0.6719	5-5/8	7-5/8	43/64	<b>12006719</b>
11/16	0.6875	5-5/8	7-5/8	11/16	<b>12006875</b>

\*bold numbers are EDPs for ordering

## Popular Custom Holemaking Options

- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM COMES STANDARD**

INTRO

MILLING

SPECIALTY

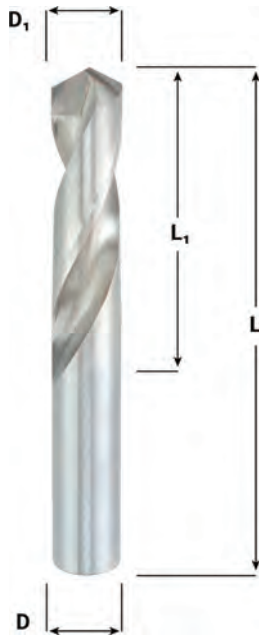
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

135° Carbide-Tip Drill Screw Machine Drill



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Carbide-Tip Drill</b></p> <ul style="list-style-type: none"> <li>• Carbide tipped wear resistance and HSS body for toughness</li> <li>• Performance drill for cutting cast iron, ductile iron, bronze, cast aluminum, fiberglass, and plastics</li> <li>• Not suited for continuous chip low carbon steels or alloy aluminums</li> <li>• 135° four facet split point for best center cutting action and lowest thrust</li> <li>• Stub length ideal for use as starting drill for deep hole drills</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE TIP</li> <li>2FL</li> <li>20°</li> <li>135°</li> <li>STUB</li> <li>Bright</li> <li>P 305</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
					○	○		○		●		

● Best ○ Good

**Series 115** | 2FL | Carbide-Tip | 135° | Screw Machine Length

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
3.5mm	0.1378	1	2-1/16	0.1378	11501378
9/64	0.1406	1	2-1/16	9/64	11501406
4.0mm	0.1575	25.0mm	52mm	4.0mm	11501575
4.5mm	0.1772	1-1/8	2-3/16	0.1772	11501772
3/16	0.1875	1-1/8	2-3/16	3/16	11501875
5.0mm	0.1969	32mm	60mm	5.0mm	11501969
#7	0.2010	1-1/4	2-3/8	0.201	11502010
#3	0.2130	1-1/4	2-3/8	0.213	11502130
5.5mm	0.2165	1-1/4	2-3/8	0.2165	11502165
15/64	0.2344	1-3/8	2-1/2	15/64	11502344
6.0mm	0.2362	35mm	64mm	6.0mm	11502362
D	0.2460	1-3/8	2-1/2	0.246	11502460
6.5mm	0.2559	1-1/2	2-11/16	0.2559	11502559
G	0.2610	1-1/2	2-11/16	0.261	11502610
7.0mm	0.2756	38mm	68mm	7.0mm	11502756
7.5mm	0.2953	1-5/8	2-13/16	0.2953	11502953
19/64	0.2969	1-5/8	2-13/16	19/64	11502969
8.0mm	0.3150	41mm	71mm	8.0mm	11503150
O	0.3160	1-5/8	2-13/16	0.316	11503160
21/64	0.3281	1-11/16	3	21/64	11503281
Q	0.3320	1-11/16	3	0.332	11503320
9.0mm	0.3543	46mm	79mm	9.0mm	11503543
23/64	0.3594	1-13/16	3-1/8	23/64	11503594
9.5mm	0.3740	1-13/16	3-1/8	0.3740	11503740
W	0.3860	1-15/16	3-5/16	0.386	11503860
10.0mm	0.3937	49mm	84mm	10.0mm	11503937
11.0mm	0.4331	52mm	87mm	11.0mm	11504331
11.5mm	0.4528	2-1/8	3-5/8	0.4528	11504528
15/32	0.4688	2-1/8	3-5/8	15/32	11504688
12.0mm	0.4724	54mm	92mm	12.0mm	11504724
31/64	0.4844	2-1/4	3-3/4	31/64	11504844
12.5mm	0.4921	2-1/4	3-3/4	0.4921	11504921
14.0mm	0.5512	64mm	102mm	14.0mm	11505512
5/8	0.6250	2-3/4	4-1/4	5/8	11506250
21/32	0.6562	2-7/8	4-1/2	21/32	11506562
3/4	0.7500	3-1/8	5	3/4	11507500

\*bold numbers are EDPs for ordering

# PERFORMANCE

## 135° Carbide-Tip Jobber Length Drill



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Carbide-Tip Drill</b></p> <ul style="list-style-type: none"> <li>Carbide tipped wear resistance and HSS body for toughness</li> <li>Performance drill for cutting cast iron, ductile iron, bronze, cast aluminum, fiberglass, and plastics</li> <li>Not suited for continuous chip low carbon steels or alloy aluminums</li> <li>135° four facet split point for best center cutting action and lowest thrust</li> <li>Low thrust point can be used on hand and power feed aircraft drilling</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE TIP</li> <li>2FL</li> <li>20°</li> <li>135°</li> <li>JOBBER</li> <li>Bright</li> <li>P 305</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
					○	○		○		●		

● Best ○ Good

### Series 125 | 2FL | Carbide-Tip | 135° | Jobber Length

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
#32	0.1160	1-5/8	2-3/4	0.116	12501160
#31	0.1200	1-5/8	2-3/4	0.12	12501200
1/8	0.1250	1-5/8	2-3/4	1/8	12501250
#30	0.1285	1-5/8	2-3/4	#30	12501285
#29	0.1360	2	3-1/8	0.136	12501360
#28	0.1405	2	3-1/8	9/64	12501405
9/64	0.1406	2	3-1/8	9/64	12501406
#27	0.1440	2	3-1/8	0.144	12501440
#26	0.1470	2	3-1/8	0.147	12501470
#25	0.1495	2	3-1/8	0.1495	12501495
#24	0.1520	2	3-1/8	0.152	12501520
#23	0.1540	2	3-1/8	0.154	12501540
5/32	0.1562	2	3-1/8	5/32	12501562
#22	0.1570	2	3-1/8	5/32	12501570
#21	0.1590	2	3-1/8	0.159	12501590
#20	0.1610	2-5/16	3-1/2	0.161	12501610
#19	0.1660	2-5/16	3-1/2	0.166	12501660
#18	0.1695	2-5/16	3-1/2	0.1695	12501695
11/64	0.1719	2-5/16	3-1/2	11/64	12501719
#17	0.1730	2-5/16	3-1/2	11/64	12501730
#16	0.1770	2-5/16	3-1/2	0.177	12501770
#15	0.1800	2-5/16	3-1/2	0.18	12501800
#14	0.1820	2-5/16	3-1/2	0.182	12501820
#13	0.1850	2-5/16	3-1/2	0.185	12501850
3/16	0.1875	2-5/16	3-1/2	3/16	12501875
#12	0.1890	2-5/16	3-1/2	3/16	12501890
#11	0.1910	2-5/16	3-1/2	0.191	12501910
#10	0.1935	2-1/2	3-3/4	#10	12501935
#9	0.1960	2-1/2	3-3/4	0.196	12501960
#8	0.1990	2-1/2	3-3/4	0.199	12501990
#7	0.2010	2-1/2	3-3/4	0.201	12502010
13/64	0.2031	2-1/2	3-3/4	13/64	12502031
#6	0.2040	2-1/2	3-3/4	13/64	12502040
#5	0.2055	2-1/2	3-3/4	0.2055	12502055
#4	0.2090	2-1/2	3-3/4	0.209	12502090
#3	0.2130	2-1/2	3-3/4	0.213	12502130
7/32	0.2188	2-1/2	3-3/4	7/32	12502188
#2	0.2210	2-1/2	3-3/4	0.221	12502210
#1	0.2280	2-3/4	4	0.228	12502280
A	0.2340	2-3/4	4	15/64	12502340
15/64	0.2344	2-3/4	4	15/64	12502344
B	0.2380	2-3/4	4	0.238	12502380
C	0.2420	2-3/4	4	0.242	12502420
D	0.2460	2-3/4	4	0.246	12502460

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

135° Carbide-Tip Jobber Length Drill



**Series 125** | 2FL | Carbide-Tip | 135° | Jobber Length

Size	Diameter (D <sub>1</sub> )	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
1/4		0.2500	2-3/4	4	1/4	12502500
F		0.2570	2-15/16	4-1/4	0.257	12502570
G		0.2610	2-15/16	4-1/4	0.261	12502610
17/64		0.2656	2-15/16	4-1/4	17/64	12502656
H		0.2660	2-15/16	4-1/4	17/64	12502660
I		0.2720	2-15/16	4-1/4	0.272	12502720
J		0.2770	2-15/16	4-1/4	0.277	12502770
K		0.2810	2-15/16	4-1/4	9/32	12502810
9/32		0.2812	2-15/16	4-1/4	9/32	12502812
L		0.2900	3-3/16	4-1/2	0.29	12502900
M		0.2950	3-3/16	4-1/2	0.295	12502950
19/64		0.2969	3-3/16	4-1/2	19/64	12502969
N		0.3020	3-3/16	4-1/2	0.302	12503020
5/16		0.3125	3-3/16	4-1/2	5/16	12503125
O		0.3160	3-3/16	4-1/2	0.316	12503160
P		0.3230	3-7/16	4-3/4	0.323	12503230
21/64		0.3281	3-7/16	4-3/4	21/64	12503281
Q		0.3320	3-7/16	4-3/4	0.332	12503320
R		0.3390	3-7/16	4-3/4	0.339	12503390
11/32		0.3438	3-7/16	4-3/4	11/32	12503438
S		0.3480	3-5/8	5	0.348	12503480
T		0.3580	3-5/8	5	23/64	12503580
23/64		0.3594	3-5/8	5	23/64	12503594
U		0.3680	3-5/8	5	0.368	12503680
3/8		0.3750	3-5/8	5	3/8	12503750
V		0.3770	3-5/8	5	0.377	12503770
W		0.3860	3-7/8	5-1/4	0.386	12503860
25/64		0.3906	3-7/8	5-1/4	25/64	12503906
X		0.3970	3-7/8	5-1/4	0.397	12503970
Y		0.4040	3-7/8	5-1/4	0.404	12504040
13/32		0.4062	3-7/8	5-1/4	13/32	12504062
Z		0.4130	4-1/16	5-1/2	0.413	12504130
27/64		0.4219	4-1/16	5-1/2	27/64	12504219
7/16		0.4375	4-1/16	5-1/2	7/16	12504375
29/64		0.4531	4-5/16	5-3/4	29/64	12504531
15/32		0.4688	4-5/16	5-3/4	15/32	12504688
31/64		0.4844	4-1/2	6	31/64	12504844
1/2		0.5000	4-1/2	6	1/2	12505000
33/64		0.5156	4-13/16	6-5/8	33/64	12505156
17/32		0.5312	4-13/16	6-5/8	17/32	12505312
35/64		0.5469	4-13/16	6-5/8	35/64	12505469
9/16		0.5625	4-13/16	6-5/8	9/16	12505625
37/64		0.5781	5-3/16	6-5/8	37/64	12505781
19/32		0.5938	5-3/16	7-1/8	19/32	12505938
39/64		0.6094	5-3/16	7-1/8	39/64	12506094
5/8		0.6250	5-3/16	7-1/8	5/8	12506250
41/64		0.6406	5-3/16	7-1/8	41/64	12506406
21/32		0.6562	5-3/16	7-1/8	21/32	12506562
43/64		0.6719	5-5/8	7-5/8	43/64	12506719
11/16		0.6875	5-5/8	7-5/8	11/16	12506875

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Aerospace 135° NAS907 Carbide-Tip Extension Drill



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Carbide-Tip Drill</b></p> <ul style="list-style-type: none"> <li>Carbide tipped wear resistance and HSS body for toughness</li> <li>General purpose drill for cutting cast iron, ductile iron, bronze, cast aluminum, fiberglass, plastics, and titanium stacks</li> <li>135° NAS 907 split point for aggressive center cutting action and low thrust</li> <li>Aircraft extension drills can be used on hand and power feed drilling in airframe drilling</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE TIP</li> <li>2FL</li> <li>20°</li> <li>135°</li> <li>Bright</li> <li>P 305</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
					○	○		○		●		

● Best ○ Good

**Series 129** | 2FL | Carbide-Tip | 135° | 12" OAL

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
#32	0.1160	1-5/8	12	0.116	12901160
#31	0.1200	1-5/8	12	0.12	12901200
1/8	0.1250	1-5/8	12	1/8	12901250
#30	0.1285	1-5/8	12	#30	12901285
#29	0.1360	2	12	0.136	12901360
#28	0.1405	2	12	9/64	12901405
9/64	0.1406	2	12	9/64	12901406
#27	0.1440	2	12	0.144	12901440
#26	0.1470	2	12	0.147	12901470
#25	0.1495	2	12	0.1495	12901495
#24	0.1520	2	12	0.152	12901520
#23	0.1540	2	12	0.154	12901540
5/32	0.1562	2	12	5/32	12901562
#22	0.1570	2	12	5/32	12901570
#21	0.1590	2	12	0.159	12901590
#20	0.1610	2-5/16	12	0.161	12901610
#19	0.1660	2-5/16	12	0.166	12901660
#18	0.1695	2-5/16	12	0.1695	12901695
11/64	0.1719	2-5/16	12	11/64	12901719
#17	0.1730	2-5/16	12	11/64	12901730
#16	0.1770	2-5/16	12	0.177	12901770
#15	0.1800	2-5/16	12	0.18	12901800
#14	0.1820	2-5/16	12	0.182	12901820
#13	0.1850	2-5/16	12	0.185	12901850
3/16	0.1875	2-5/16	12	3/16	12901875
#12	0.1890	2-5/16	12	3/16	12901890
#11	0.1910	2-5/16	12	0.191	12901910
#10	0.1935	2-1/2	12	#10	12901935
#9	0.1960	2-1/2	12	0.196	12901960
#8	0.1990	2-1/2	12	0.199	12901990
#7	0.2010	2-1/2	12	0.201	12902010
13/64	0.2031	2-1/2	12	13/64	12902031
#6	0.2040	2-1/2	12	13/64	12902040
#5	0.2055	2-1/2	12	0.2055	12902055
#4	0.2090	2-1/2	12	0.209	12902090
#3	0.2130	2-1/2	12	0.213	12902130
7/32	0.2188	2-1/2	12	7/32	12902188
#2	0.2210	2-1/2	12	0.221	12902210
#1	0.2280	2-3/4	12	0.228	12902280
A	0.2340	2-3/4	12	15/64	12902340
15/64	0.2344	2-3/4	12	15/64	12902344
B	0.2380	2-3/4	12	0.238	12902380
C	0.2420	2-3/4	12	0.242	12902420
D	0.2460	2-3/4	12	0.246	12902460

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Aerospace 135° NAS907 Carbide-Tip Extension Drill



Series 129

2FL | Carbide-Tip | 135° | 12" OAL

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
1/4	0.2500	2-3/4	12	1/4	<b>12902500</b>
F	0.2570	2-15/16	12	0.257	<b>12902570</b>
G	0.2610	2-15/16	12	0.261	<b>12902610</b>
17/64	0.2656	2-15/16	12	17/64	<b>12902656</b>
H	0.2660	2-15/16	12	17/64	<b>12902660</b>
I	0.2720	2-15/16	12	0.272	<b>12902720</b>
J	0.2770	2-15/16	12	0.277	<b>12902770</b>
K	0.2810	2-15/16	12	9/32	<b>12902810</b>
9/32	0.2812	2-15/16	12	9/32	<b>12902812</b>
L	0.2900	3-3/16	12	0.29	<b>12902900</b>
M	0.2950	3-3/16	12	0.295	<b>12902950</b>
19/64	0.2969	3-3/16	12	19/64	<b>12902969</b>
N	0.3020	3-3/16	12	0.302	<b>12903020</b>
5/16	0.3125	3-3/16	12	5/16	<b>12903125</b>
O	0.3160	3-3/16	12	0.316	<b>12903160</b>
P	0.3230	3-7/16	12	0.323	<b>12903230</b>
21/64	0.3281	3-7/16	12	21/64	<b>12903281</b>
Q	0.3320	3-7/16	12	0.332	<b>12903320</b>
R	0.3390	3-7/16	12	0.339	<b>12903390</b>
11/32	0.3438	3-7/16	12	11/32	<b>12903438</b>
S	0.3480	3-5/8	12	0.348	<b>12903480</b>
T	0.3580	3-5/8	12	23/64	<b>12903580</b>
23/64	0.3594	3-5/8	12	23/64	<b>12903594</b>
U	0.3680	3-5/8	12	0.368	<b>12903680</b>
3/8	0.3750	3-5/8	12	3/8	<b>12903750</b>
V	0.3770	3-5/8	12	0.377	<b>12903770</b>
W	0.3860	3-7/8	12	0.386	<b>12903860</b>
25/64	0.3906	3-7/8	12	25/64	<b>12903906</b>
X	0.3970	3-7/8	12	0.397	<b>12903970</b>
Y	0.4040	3-7/8	12	0.404	<b>12904040</b>
13/32	0.4062	3-7/8	12	13/32	<b>12904062</b>
Z	0.4130	3-7/8	12	0.413	<b>12904130</b>
27/64	0.4219	4-1/16	12	27/64	<b>12904219</b>
7/16	0.4375	4-1/16	12	7/16	<b>12904375</b>
29/64	0.4531	4-5/16	12	29/64	<b>12904531</b>
15/32	0.4688	4-5/16	12	15/32	<b>12904688</b>
31/64	0.4844	4-1/2	12	31/64	<b>12904844</b>
1/2	0.5000	4-1/2	12	1/2	<b>12905000</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

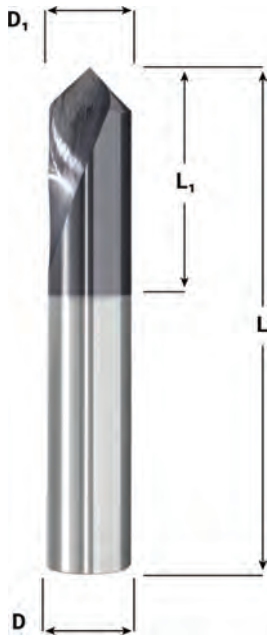
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide N/C Spot Drills



FEATURES / DESCRIPTION	APPLICATION	FEATURES						
<b>Spot Drills</b> <ul style="list-style-type: none"> <li>Sub-micrograin carbide substrate for wear resistance</li> <li>Used for spotting holes to ensure positionality</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>0°</td> </tr> <tr> <td>2FL</td> <td>Bright</td> </tr> <tr> <td>AITiN</td> <td>P 315</td> </tr> </table>	CARBIDE	0°	2FL	Bright	AITiN	P 315
CARBIDE	0°							
2FL	Bright							
AITiN	P 315							

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○			●	●	○	○				

● Best ○ Good

**Series 402** | 2FL | 82°, 90°, 100°, 120°, 140° | Spotting

Diameter (D <sub>1</sub> )	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	Incl. Angle	Bright	AITiN
1/8	5/8	2	1/8	90°	402-125090	402-125090B
1/8	5/8	2	1/8	120°	402-125120	402-125120B
1/8	5/8	2	1/8	140°	402-125140	402-125140B
3/16	3/4	2	3/16	90°	402-187090	402-187090B
3/16	3/4	2	3/16	120°	402-187120	402-187120B
3/16	3/4	2	3/16	140°	402-187140	402-187140B
1/4	3/4	2-1/2	1/4	82°	402-250082	402-250082B
1/4	3/4	2-1/2	1/4	90°	402-250090	402-250090B
1/4	3/4	2-1/2	1/4	100°	402-250100	402-250100B
1/4	3/4	2-1/2	1/4	120°	402-250120	402-250120B
1/4	3/4	2-1/2	1/4	140°	402-250140	402-250140B
5/16	1	2-1/2	5/16	90°	402-312090	402-312090B
5/16	1	2-1/2	5/16	120°	402-312120	402-312120B
5/16	1	2-1/2	5/16	140°	402-312140	402-312140B
3/8	1	2-1/2	3/8	82°	402-375082	402-375082B
3/8	1	2-1/2	3/8	90°	402-375090	402-375090B
3/8	1	2-1/2	3/8	100°	402-375100	402-375100B
3/8	1	2-1/2	3/8	120°	402-375120	402-375120B
3/8	1	2-1/2	3/8	140°	402-375140	402-375140B
1/2	1-1/4	3	1/2	82°	402-500082	402-500082B
1/2	1-1/4	3	1/2	90°	402-500090	402-500090B
1/2	1-1/4	3	1/2	100°	402-500100	402-500100B
1/2	1-1/4	3	1/2	120°	402-500120	402-500120B
1/2	1-1/4	3	1/2	140°	402-500140	402-500140B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

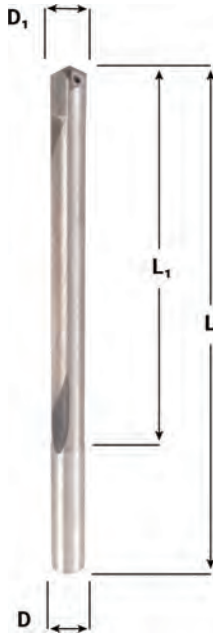
THREADING

INSERTS



# PERFORMANCE

Carbide-Tip Coolant-Through 4-Facet Drill



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Carbide-Tip Drill</b></p> <ul style="list-style-type: none"> <li>• Carbide tipped wear resistance and HSS body for toughness</li> <li>• Extra length tip for increased regrinds</li> <li>• Coolant-through design produces straightest holes to reamer like finish</li> <li>• Not suited for continuous chip low carbon steels or alloy aluminums</li> <li>• Solid steel body allows 2 to 3 times the penetration rate of gun drills on conventional machinery</li> <li>• 125° four facet point is a self-centering point with notch thinning for ease in chisel penetration</li> <li>• Requires on size starting hole with greater point angle</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE TIP</li> <li>2FL</li> <li>0°</li> <li>125°</li> <li>REGULAR</li> <li>THRU</li> <li>Bright</li> <li>P 306</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
	○				●	●		●		○		

● Best ○ Good

**Series 170** | 2FL | Carbide-Tip | 125° | Long Length | Coolant-Through | Straight Flute

Size	Diameter (D <sub>1</sub> )	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
3/16		0.1875	3-3/4	5-3/4	3/16	17001875
5.0mm		0.1969	95mm	146mm	5.0mm	17001969
5.5mm		0.2165	4-1/8	6-1/8	0.2165	17002165
7/32		0.2188	4-1/8	6-1/8	7/32	17002188
15/64		0.2344	4-5/8	6-1/8	15/64	17002344
6.0mm		0.2362	117mm	156mm	6.0mm	17002362
1/4		0.25	4-5/8	6-1/8	1/4	17002500
6.5mm		0.2559	4-5/8	6-1/8	0.2559	17002559
17/64		0.2656	4-3/4	6-1/4	17/64	17002656
7.0mm		0.2756	121mm	159mm	7.0mm	17002756
9/32		0.2812	4-3/4	6-1/4	9/32	17002812
7.5mm		0.2953	4-7/8	6-3/8	0.2953	17002953
19/64		0.2969	4-7/8	6-3/8	19/64	17002969
5/16		0.3125	4-7/8	6-3/8	5/16	17003125
8.0mm		0.315	124mm	162mm	8.0mm	17003150
21/64		0.3281	5	6-1/2	21/64	17003281
8.5mm		0.3346	5	6-1/2	0.3346	17003346
11/32		0.3438	5	6-1/2	11/32	17003438
9.0mm		0.3543	133mm	171mm	9.0mm	17003543
23/64		0.3594	5-1/4	6-3/4	23/64	17003594
9.5mm		0.374	5-1/4	6-3/4	3/8	17003740
3/8		0.375	5-1/4	6-3/4	3/8	17003750
25/64		0.3906	5-1/2	7	25/64	17003906
10.0mm		0.3937	140mm	178mm	10.0mm	17003937
13/32		0.4062	5-1/2	7	13/32	17004062
10.5mm		0.4134	5-3/4	7-1/4	0.4134	17004134
27/64		0.4219	5-3/4	7-1/4	27/64	17004219
11.0mm		0.4331	146mm	184mm	11.0mm	17004331
7/16		0.4375	5-3/4	7-1/4	7/16	17004375
11.5mm		0.4528	5-3/4	7-1/2	29/64	17004528
29/64		0.4531	5-3/4	7-1/2	29/64	17004531
15/32		0.4688	5-3/4	7-1/2	15/32	17004688
12.0mm		0.4724	146mm	191mm	12.0mm	17004724
31/64		0.4844	5-3/4	7-3/4	31/64	17004844
12.5mm		0.4921	5-3/4	7-3/4	0.4921	17004921
1/2		0.5	5-3/4	7-3/4	1/2	17005000

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

## Carbide-Tip Coolant-Through 4-Facet Drill



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Carbide-Tip Drill</b></p> <ul style="list-style-type: none"> <li>• Carbide tipped wear resistance and HSS body for toughness</li> <li>• Extra length tip for increased regrinds</li> <li>• Coolant-through design produces straightest holes to reamer like finish</li> <li>• Not suited for continuous chip low carbon steels or alloy aluminums</li> <li>• Solid steel body allows 2 to 3 times the penetration rate of gun drills on conventional machinery</li> <li>• 125° four facet point is a self-centering point with notch thinning for ease in chisel penetration</li> <li>• Requires on size starting hole with greater point angle</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE TIP</li> <li>2FL</li> <li>0°</li> <li>125°</li> <li>JOBBER</li> <li>THRU</li> <li>Bright</li> <li>P 306</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
	○				●	●		●		○		

● Best ○ Good

### Series 171 | 2FL | Carbide-Tip | 125° | Jobber Length | Coolant-Through | Straight Flute

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
3/16	0.1875	2	4	3/16	17101875
5.0mm	0.1969	51mm	102mm	5.0mm	17101969
5.5mm	0.2165	2-1/4	4-1/4	0.2165	17102165
7/32	0.2188	2-1/4	4-1/4	7/32	17102188
15/64	0.2344	2-1/2	4-29/32	15/64	17102344
6.0mm	0.2362	64mm	125mm	6.0mm	17102362
1/4	0.25	2-1/2	4-29/32	1/4	17102500
6.5mm	0.2559	2-1/2	4-29/32	0.2559	17102559
17/64	0.2656	2-3/4	5-5/32	17/64	17102656
7.0mm	0.2756	70mm	131mm	7.0mm	17102756
9/32	0.2812	2-3/4	5-5/32	9/32	17102812
7.5mm	0.2953	3-3/16	5-19/32	0.2953	17102953
19/64	0.2969	3-3/16	5-19/32	19/64	17102969
5/16	0.3125	3-3/16	5-19/32	5/16	17103125
8.0mm	0.315	81mm	142mm	8.0mm	17103150
21/64	0.3281	3-7/16	5-27/32	21/64	17103281
8.5mm	0.3346	3-7/16	5-27/32	0.3346	17103346
11/32	0.3438	3-7/16	5-27/32	11/32	17103438
9.0mm	0.3543	92mm	154mm	9.0mm	17103543
23/64	0.3594	3-5/8	6-1/32	23/64	17103594
9.5mm	0.374	3-5/8	6-1/32	3/8	17103740
3/8	0.375	3-5/8	6-1/32	3/8	17103750
25/64	0.3906	3-7/8	6-9/32	25/64	17103906
10.0mm	0.3937	98mm	159mm	10.0mm	17103937
13/32	0.4062	3-7/8	6-9/32	13/32	17104062
10.5mm	0.4134	4-1/16	6-15/32	0.4134	17104134
27/64	0.4219	4-1/16	6-15/32	27/64	17104219
11.0mm	0.4331	103mm	164mm	11.0mm	17104331
7/16	0.4375	4-1/16	6-15/32	7/16	17104375
11.5mm	0.4528	4-5/16	6-23/32	29/64	17104528
29/64	0.4531	4-5/16	6-23/32	29/64	17104531
15/32	0.4688	4-5/16	6-23/32	15/32	17104688
12.0mm	0.4724	109mm	171mm	12.0mm	17104724
31/64	0.4844	4-1/2	6-29/32	31/64	17104844
12.5mm	0.4921	4-1/2	6-29/32	0.4921	17104921
1/2	0.5	4-1/2	6-29/32	1/2	17105000

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

## Carbide-Tip Coolant-Through 4-Facet Drill



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Carbide-Tip Drill</b></p> <ul style="list-style-type: none"> <li>Carbide tipped wear resistance and HSS body for toughness</li> <li>Extra length tip for increased regrinds</li> <li>Coolant-through design produces straightest holes to reamer like finish</li> <li>Not suited for continuous chip low carbon steels or alloy aluminums</li> <li>Solid steel body allows 2 to 3 times the penetration rate of gun drills on conventional machinery</li> <li>125° four facet point is a self-centering point with notch thinning for ease in chisel penetration</li> <li>Requires on size starting hole with greater point angle</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE TIP</li> <li>2FL</li> <li>0°</li> <li>125°</li> <li>X-LONG</li> <li>THRU</li> <li>Bright</li> <li>P 306</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
	○				●	●		●		○		

● Best ○ Good

**Series 172** | 2FL | Carbide-Tip | 125° | X-Long Length | Coolant-Through | Straight Flute

Diameter (D <sub>1</sub> )	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
1/4	8	10	1/4	<b>17202500</b>
9/32	8	10	9/32	<b>17202812</b>
5/16	8	10	5/16	<b>17203125</b>
11/32	8	10	11/32	<b>17203438</b>
3/8	9	11	3/8	<b>17203750</b>
13/32	9	11	13/32	<b>17204062</b>
7/16	9	11	7/16	<b>17204375</b>
15/32	9-3/4	12	15/32	<b>17204688</b>
1/2	9-3/4	12	1/2	<b>17205000</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Countersink



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Countersinks</b> <ul style="list-style-type: none"> <li>• Sub-micrograin carbide substrate for wear resistance</li> <li>• General purpose countersinking operations</li> <li>• Single end and double end</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○			●	●	○	○			○	

● Best ○ Good

## Series 331 | 1FL | 60°-120° | Single & Double End

Diameter (D <sub>1</sub> )	Shank (D)	Incl. Angle	Single End	Double End
1/8	1/8	100°	331-001080	331-201080
3/16	3/16	100°	331-002080	331-202080
1/4	1/4	100°	331-003080	331-203080
5/16	1/4	100°	331-004080	331-204080
3/8	1/4	100°	331-005080	331-205080
1/2	1/4	100°	331-006080	331-206080
1/2	3/8	100°	331-006580	331-207080
5/8	1/4	100°	331-007080	331-208080
5/8	3/8	100°	331-007580	-
3/4	3/8	100°	331-008080	-
3/4	1/2	100°	331-008580	-
1	1/2	100°	331-010080	-
1-1/4	3/4	100°	331-011080	-
1-1/2	3/4	100°	331-012080	-
5/16	5/16	110°	-	331-204090
5/8	5/8	110°	-	331-207090
1/8	1/8	120°	331-001090	331-201090
1/8	1/8	120°	-	331-201100
3/16	3/16	120°	331-002090	331-202090
3/16	3/16	120°	-	331-202200
1/4	1/4	120°	331-003090	331-203090
1/4	1/4	120°	-	331-203100
5/16	5/16	120°	-	331-204100
3/8	1/4	120°	331-005090	331-205090
3/8	3/8	120°	-	331-205100
1/2	1/4	120°	331-006090	331-206090
1/2	1/2	120°	-	331-206100
5/8	1/4	120°	331-007090	331-208090
5/8	5/8	120°	-	331-207100
3/4	3/8	120°	331-008090	-
3/4	3/4	120°	-	331-208100
1	1/2	120°	331-010090	-
1-1/4	3/4	120°	331-011090	-
1-1/2	3/4	120°	331-012090	-
1/8	1/8	60°	331-001050	331-201050
3/16	3/16	60°	331-002050	331-202050
1/4	1/4	60°	331-003050	331-203050
5/16	1/4	60°	331-004050	331-204050
3/8	1/4	60°	331-005050	331-205050
1/2	1/4	60°	331-006050	331-206050
1/2	3/8	60°	331-006550	331-207050
5/8	1/4	60°	331-007050	331-208050
5/8	3/8	60°	331-007550	-
3/4	3/8	60°	331-008050	-
3/4	1/2	60°	331-008550	-

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

Solid Carbide Countersink



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

Series 331		1FL   60°-120°   Single & Double End		
Diameter (D <sub>1</sub> )	Shank (D)	Incl. Angle	Single End	Double End
1	1/2	60°	331-010050	-
1-1/4	3/4	60°	331-011050	-
1-1/2	3/4	60°	331-012050	-
1/8	1/8	82°	331-001060	331-201060
3/16	3/16	82°	331-002060	331-202060
1/4	1/4	82°	331-003060	331-203060
5/16	5/16	82°	-	331-204060
3/8	1/4	82°	331-005060	331-205060
1/2	1/4	82°	331-006060	331-206060
1/2	3/8	82°	331-006560	331-207060
5/8	1/4	82°	331-007060	331-208060
5/8	3/8	82°	331-007560	-
3/4	3/8	82°	331-008060	-
3/4	1/2	82°	331-008560	-
1	1/2	82°	331-010060	-
1-1/4	3/4	82°	331-011060	-
1-1/2	3/4	82°	331-012060	-
1/8	1/8	90°	331-001070	331-201070
3/16	3/16	90°	331-002070	331-202070
1/4	1/4	90°	331-003070	331-203070
5/16	5/16	90°	-	331-204070
3/8	1/4	90°	331-005070	331-205070
1/2	1/4	90°	331-006070	331-206070
1/2	3/8	90°	331-006570	331-207070
5/8	1/4	90°	331-007070	331-208070
5/8	3/8	90°	331-007570	-
3/4	3/8	90°	331-008070	-
3/4	1/2	90°	331-008570	-
1	1/2	90°	331-010070	-
1-1/4	3/4	90°	331-011070	-
1-1/2	3/4	90°	331-012070	-

\*bold numbers are EDPs for ordering

## Popular Custom Holemaking Options

- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM  
COMES  
STANDARD**



# PERFORMANCE

Solid Carbide 3-Flute Countersink



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Countersinks</b> <ul style="list-style-type: none"> <li>Sub-micrograin carbide substrate for wear resistance</li> <li>General purpose countersinking operations</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○			●	●	○	○			○	

● Best ○ Good

**Series 333** | 3FL | 60°-120°

Diameter (D <sub>1</sub> )	OAL (L)	Shank (D)	Incl. Angle	EDP
1/8	1-1/2	1/8	100°	333-001080
3/16	2	3/16	100°	333-002080
1/4	2	1/4	100°	333-003080
3/8	2-1/2	1/4	100°	333-005080
1/2	2-1/2	1/4	100°	333-006080
5/8	2-3/4	3/8	100°	333-007080
3/4	3	3/8	100°	333-008080
1	3	1/2	100°	333-010080
1-1/4	3-1/2	3/4	100°	333-011080
1-1/2	3-1/2	3/4	100°	333-012080
1/8	1-1/2	1/8	120°	333-001090
3/16	2	3/16	120°	333-002090
1/4	2	1/4	120°	333-003090
3/8	2-1/2	1/4	120°	333-005090
1/2	2-1/2	1/4	120°	333-006090
5/8	2-3/4	3/8	120°	333-007090
3/4	3	3/8	120°	333-008090
1	3	1/2	120°	333-010090
1-1/4	3-1/2	3/4	120°	333-011090
1-1/2	3-1/2	3/4	120°	333-012090
1/8	1-1/2	1/8	60°	333-001050
3/16	2	3/16	60°	333-002050
1/4	2	1/4	60°	333-003050
5/16	2-9/16	1/4	60°	333-004050
3/8	2-1/2	1/4	60°	333-005050
1/2	2-1/2	1/4	60°	333-006050
1/2	2-7/8	3/8	60°	333-006550
5/8	2-3/4	3/8	60°	333-007050
3/4	3	3/8	60°	333-008050
3/4	3	1/2	60°	333-008550
7/8	3-1/8	1/2	60°	333-009050
1	3	1/2	60°	333-010050
1-1/4	3-1/2	3/4	60°	333-011050
1-1/2	3-1/2	3/4	60°	333-012050
1/8	1-1/2	1/8	82°	333-001060
3/16	2	3/16	82°	333-002060
1/4	2	1/4	82°	333-003060
5/16	2-7/8	1/4	82°	333-004060
3/8	2-1/2	1/4	82°	333-005060
1/2	2-1/2	1/4	82°	333-006060
1/2	2-3/4	3/8	82°	333-006560
5/8	2-3/4	3/8	82°	333-007060
3/4	3	3/8	82°	333-008060
3/4	2-7/8	1/2	82°	333-008560
7/8	2-15/16	1/2	82°	333-009060

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

Solid Carbide 3-Flute Countersink



Series 333		3FL   60°-120°		
Diameter (D <sub>1</sub> )	OAL (L)	Shank (D)	Incl. Angle	EDP
1	3	1/2	82°	<b>333-010060</b>
1-1/4	3-1/2	3/4	82°	<b>333-011060</b>
1-1/2	3-1/2	3/4	82°	<b>333-012060</b>
1/8	1-1/2	1/8	90°	<b>333-001070</b>
3/16	2	3/16	90°	<b>333-002070</b>
1/4	2	1/4	90°	<b>333-003070</b>
5/16	2-7/8	1/4	90°	<b>333-004070</b>
3/8	2-1/2	1/4	90°	<b>333-005070</b>
1/2	2-1/2	1/4	90°	<b>333-006070</b>
1/2	2-3/4	3/8	90°	<b>333-006570</b>
5/8	2-3/4	3/8	90°	<b>333-007070</b>
3/4	3	3/8	90°	<b>333-008070</b>
3/4	2-3/4	1/2	90°	<b>333-008570</b>
7/8	3	1/2	90°	<b>333-009070</b>
1	3	1/2	90°	<b>333-010070</b>
1-1/4	3-1/2	3/4	90°	<b>333-011070</b>
1-1/2	3-1/2	3/4	90°	<b>333-012070</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

## Popular Custom Holemaking Options

- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM  
COMES  
STANDARD**



# PERFORMANCE

Solid Carbide 4-Flute Countersink



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Countersinks</b> <ul style="list-style-type: none"> <li>Sub-micrograin carbide substrate for wear resistance</li> <li>General purpose countersinking operations</li> <li>Single end and double end</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○			●	●	○	○			○	

● Best ○ Good

## Series 334 | 4FL | 60°-120° | Single & Double End

Diameter (D <sub>1</sub> )	OAL (L)	Shank (D)	Drill Point	Incl. Angle	Single End	Double End
1/8	1-1/2	1/8	Yes	100°	-	334-301080
1/8	1-1/2	1/8	No	100°	334-001080	334-201080
3/16	2	3/16	Yes	100°	-	334-302080
1/4	2	1/4	Yes	100°	-	334-303080
1/4	2	1/4	No	100°	334-003080	334-202080
5/16	2-1/8	5/16	Yes	100°	-	334-304080
3/8	2-1/2	3/8	Yes	100°	-	334-305080
3/8	2-1/2	1/4	No	100°	334-005080	334-203080
1/2	3	1/2	Yes	100°	-	334-306080
1/2	2-1/2	3/8	No	100°	334-006080	334-204080
5/8	3-1/4	5/8	Yes	100°	-	334-307080
5/8	2-1/2	3/8	No	100°	334-007080	334-205080
3/4	3-1/2	3/4	Yes	100°	-	334-308080
3/4	3	1/2	No	100°	334-008080	334-206080
1	3	1/2	No	100°	334-010080	334-207080
1/8	1-1/2	1/8	Yes	110°	-	334-301090
3/16	2	3/16	Yes	110°	-	334-302090
1/4	2	1/4	Yes	110°	-	334-303090
5/16	2-1/8	5/16	Yes	110°	-	334-304090
3/8	2-1/2	3/8	Yes	110°	-	334-305090
1/2	3	1/2	Yes	110°	-	334-306090
5/8	3-1/4	5/8	Yes	110°	-	334-307090
3/4	3-1/2	3/4	Yes	110°	-	334-308090
1/8	1-1/2	1/8	No	120°	-	334-201100
1/8	1-1/2	1/8	Yes	120°	-	334-301100
1/8	1-1/2	1/8	No	120°	334-001090	334-201090
3/16	2	3/16	No	120°	-	334-202100
3/16	2	3/16	Yes	120°	-	334-302100
1/4	2	1/4	No	120°	-	334-203100
1/4	2	1/4	Yes	120°	-	334-303100
1/4	2	1/4	No	120°	334-003090	334-202090
5/16	2-1/8	5/16	No	120°	-	334-204100
5/16	2-1/8	5/16	Yes	120°	-	334-304100
3/8	2-1/2	3/8	No	120°	-	334-205100
3/8	2-1/2	3/8	Yes	120°	-	334-305100
3/8	2-1/2	1/4	No	120°	334-005090	334-203090
1/2	3	1/2	No	120°	-	334-206100
1/2	3	1/2	Yes	120°	-	334-306100
1/2	2-1/2	3/8	No	120°	334-006090	334-204090
5/8	3-1/4	5/8	No	120°	-	334-207100
5/8	3-1/4	5/8	Yes	120°	-	334-307100
5/8	2-1/2	3/8	No	120°	334-007090	334-205090
3/4	3-1/2	3/4	No	120°	-	334-208100
3/4	3-1/2	3/4	Yes	120°	-	334-308100
3/4	3	1/2	No	120°	334-008090	334-206090

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# PERFORMANCE

Solid Carbide 4-Flute Countersink



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

Series 334		4FL   60°-120°   Single & Double End				
Diameter (D <sub>1</sub> )	OAL (L)	Shank (D)	Drill Point	Incl. Angle	Single End	Double End
1	3	1/2	No	120°	334-010090	334-207090
1/8	1-1/2	1/8	Yes	60°	-	334-301050
1/8	1-1/2	1/8	No	60°	334-001050	334-201050
3/16	2	3/16	Yes	60°	-	334-302050
1/4	2	1/4	Yes	60°	-	334-303050
1/4	2	1/4	No	60°	334-003050	334-202050
5/16	2-1/8	5/16	Yes	60°	-	334-304050
3/8	2-1/2	3/8	Yes	60°	-	334-305050
3/8	2-1/2	1/4	No	60°	334-005050	334-203050
1/2	3	1/2	Yes	60°	-	334-306050
1/2	2-1/2	3/8	No	60°	334-006050	334-204050
5/8	3-1/4	5/8	Yes	60°	-	334-307050
5/8	2-1/2	3/8	No	60°	334-007050	334-205050
3/4	3-1/2	3/4	Yes	60°	-	334-308050
3/4	3	1/2	No	60°	334-008050	334-206050
1	3	1/2	No	60°	334-010050	334-207050
1/8	1-1/2	1/8	Yes	82°	-	334-301060
1/8	1-1/2	1/8	No	82°	334-001060	334-201060
3/16	2	3/16	Yes	82°	-	334-302060
1/4	2	1/4	Yes	82°	-	334-303060
1/4	2	1/4	No	82°	334-003060	334-202060
5/16	2-1/8	5/16	Yes	82°	-	334-304060
3/8	2-1/2	3/8	Yes	82°	-	334-305060
3/8	2-1/2	1/4	No	82°	334-005060	334-203060
1/2	3	1/2	Yes	82°	-	334-306060
1/2	2-1/2	3/8	No	82°	334-006060	334-204060
5/8	3-1/4	5/8	Yes	82°	-	334-307060
5/8	2-1/2	3/8	No	82°	334-007060	334-205060
3/4	3-1/2	3/4	Yes	82°	-	334-308060
3/4	3	1/2	No	82°	334-008060	334-206060
1	3	1/2	No	82°	334-010060	334-207060
1/8	1-1/2	1/8	Yes	90°	-	334-301070
1/8	1-1/2	1/8	No	90°	334-001070	334-201070
3/16	2	3/16	Yes	90°	-	334-302070
1/4	2	1/4	Yes	90°	-	334-303070
1/4	2	1/4	No	90°	334-003070	334-202070
5/16	2-1/8	5/16	Yes	90°	-	334-304070
3/8	2-1/2	3/8	Yes	90°	-	334-305070
3/8	2-1/2	1/4	No	90°	334-005070	334-203070
1/2	3	1/2	Yes	90°	-	334-306070
1/2	2-1/2	3/8	No	90°	334-006070	334-204070
5/8	3-1/4	5/8	Yes	90°	-	334-307070
5/8	2-1/2	3/8	No	90°	334-007070	334-205070
3/4	3-1/2	3/4	Yes	90°	-	334-308070
3/4	3	1/2	No	90°	334-008070	334-206070
1	3	1/2	No	90°	334-010070	334-207070

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide 6-Flute Countersink



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Countersinks</b> <ul style="list-style-type: none"> <li>• Sub-micrograin carbide substrate for wear resistance</li> <li>• General purpose countersinking operations</li> <li>• Single end and double end</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○			●	●	○	○			○	

● Best ○ Good

## Series 336 6FL | 60°-120° | Single & Double End

Diameter (D <sub>1</sub> )	OAL (L)	Shank (D)	Incl. Angle	Single End	Double End
1/8	1-1/2	1/8	60°	336-001050	336-201050
1/8	1-1/2	1/8	82°	336-001060	336-201060
1/8	1-1/2	1/8	90°	336-001070	336-201070
1/8	1-1/2	1/8	100°	336-001080	-
1/8	1-1/2	1/8	120°	336-001090	-
3/16	2	3/16	60°	336-002050	336-202050
3/16	2	3/16	82°	336-002060	336-202060
3/16	2	3/16	90°	336-002070	336-202070
3/16	2	3/16	100°	336-002080	-
3/16	2	3/16	120°	336-002090	-
1/4	2	1/4	60°	336-003050	336-203050
1/4	2	1/4	82°	336-003060	336-203060
1/4	2	1/4	90°	336-003070	336-203070
1/4	2	1/4	100°	336-003080	-
1/4	2	1/4	120°	336-003090	-
5/16	2	1/4	60°	336-004050	336-204050
5/16	2	1/4	82°	336-004060	336-204060
5/16	2	1/4	90°	336-004070	336-204070
5/16	2	1/4	100°	336-004080	-
5/16	2	1/4	120°	336-004090	-
3/8	2-1/2	1/4	60°	336-005050	336-205050
3/8	2-1/2	1/4	82°	336-005060	336-205060
3/8	2-1/2	1/4	90°	336-005070	336-205070
3/8	2-1/2	1/4	100°	336-005080	-
3/8	2-1/2	1/4	120°	336-005090	-
1/2	2-1/2	1/4	60°	336-006050	336-206050
1/2	2-1/2	1/4	82°	336-006060	336-206060
1/2	2-1/2	1/4	90°	336-006070	336-206070
1/2	2-1/2	1/4	100°	336-006080	-
1/2	2-1/2	1/4	120°	336-006090	-
1/2	2-7/8	3/8	60°	336-006550	336-207050
1/2	2-3/4	3/8	82°	336-006560	336-207060
1/2	2-3/4	3/8	90°	336-006570	336-207070
1/2	2-3/4	3/8	100°	336-006580	-
1/2	2-3/4	3/8	120°	336-006590	-
5/8	2-3/4	3/8	60°	336-007050	336-208050
5/8	2-3/4	3/8	82°	336-007060	336-208060
5/8	2-3/4	3/8	90°	336-007070	336-208070
5/8	2-3/4	3/8	100°	336-007080	-
5/8	2-3/4	3/8	120°	336-007090	-
3/4	3	3/8	60°	336-008050	-
3/4	3	3/8	82°	336-008060	-
3/4	3	3/8	90°	336-008070	-
3/4	3	3/8	100°	336-008080	-
3/4	3	3/8	120°	336-008090	-

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide 6-Flute Countersink



Series 336		6FL   60°-120°   Single & Double End			
Diameter (D <sub>1</sub> )	OAL (L)	Shank (D)	Incl. Angle	Single End	Double End
3/4	2-7/8	1/2	60°	<b>336-008550</b>	-
3/4	2-3/4	1/2	82°	<b>336-008560</b>	-
3/4	2-3/4	1/2	90°	<b>336-008570</b>	-
3/4	2-3/4	1/2	100°	<b>336-008580</b>	-
3/4	2-3/4	1/2	120°	<b>336-008590</b>	-
7/8	3	1/2	60°	<b>336-009050</b>	-
7/8	3	1/2	82°	<b>336-009060</b>	-
7/8	3	1/2	90°	<b>336-009070</b>	-
7/8	3	1/2	100°	<b>336-009080</b>	-
7/8	3	1/2	120°	<b>336-009090</b>	-
1	3	1/2	60°	<b>336-010050</b>	-
1	3	1/2	82°	<b>336-010060</b>	-
1	3	1/2	90°	<b>336-010070</b>	-
1	3	1/2	100°	<b>336-010080</b>	-
1	3	1/2	120°	<b>336-010090</b>	-
1-1/4	3-1/2	3/4	60°	<b>336-011050</b>	-
1-1/4	3-1/2	3/4	82°	<b>336-011060</b>	-
1-1/4	3-1/2	3/4	90°	<b>336-011070</b>	-
1-1/4	3-1/2	3/4	100°	<b>336-011080</b>	-
1-1/4	3-1/2	3/4	120°	<b>336-011090</b>	-
1-1/2	3-1/2	3/4	60°	<b>336-012050</b>	-
1-1/2	3-1/2	3/4	82°	<b>336-012060</b>	-
1-1/2	3-1/2	3/4	90°	<b>336-012070</b>	-
1-1/2	3-1/2	3/4	100°	<b>336-012080</b>	-
1-1/2	3-1/2	3/4	120°	<b>336-012090</b>	-

\*bold numbers are EDPs for ordering

## Popular Custom Holemaking Options

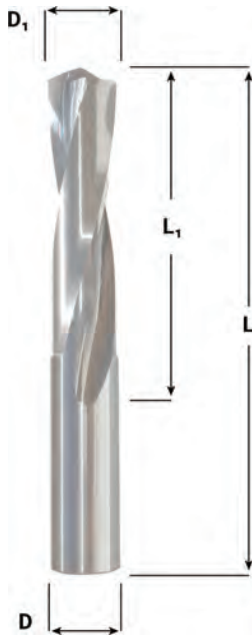
- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM  
COMES  
STANDARD**



# PERFORMANCE

## Solid Carbide Screw Machine Drills



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<b>Screw Machine Drills</b> <ul style="list-style-type: none"> <li>• Sub-micrograin carbide substrate for wear resistance</li> <li>• General purpose drilling operations</li> <li>• 4-facet split point</li> <li>• 15° helix for increased rigidity in demanding jobs</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>2FL</td> </tr> <tr> <td>15°</td> <td>135°</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>AlTiN</td> <td>P 316</td> </tr> </table>	CARBIDE	2FL	15°	135°	Bright	TiN	AlTiN	P 316
CARBIDE	2FL									
15°	135°									
Bright	TiN									
AlTiN	P 316									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○			●	●	○	○			○	

● Best ○ Good

### Series 460 2FL | Screw Machine

Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	AlTiN
Size	Dec.						
1/32	0.0313	1/2	1-1/2	1/32	460-100312	-	460-100312B
3/64	0.0469	1/2	1-1/2	3/64	460-100469	-	460-100469B
1/16	0.0625	5/8	1-5/8	1/16	460-100625	460-100625A	460-100625B
5/64	0.0781	11/16	1-11/16	5/64	460-100781	460-100781A	460-100781B
3/32	0.0938	3/4	1-3/4	3/32	460-100938	460-100938A	460-100938B
7/64	0.1094	13/16	1-13/16	7/64	460-101094	460-101094A	460-101094B
1/8	0.1250	7/8	1-7/8	1/8	460-101250	460-101250A	460-101250B
9/64	0.1406	15/16	1-15/16	9/64	460-101406	460-101406A	460-101406B
5/32	0.1563	1	2-1/16	5/32	460-101562	460-101562A	460-101562B
11/64	0.1719	1-1/16	2-1/8	11/64	460-101719	460-101719A	460-101719B
3/16	0.1875	1-1/8	2-3/16	3/16	460-101875	460-101875A	460-101875B
13/64	0.2031	1-3/16	2-1/4	13/64	460-102031	460-102031A	460-102031B
7/32	0.2188	1-1/4	2-3/8	7/32	460-102188	460-102188A	460-102188B
15/64	0.2344	1-5/16	2-7/16	15/64	460-102344	460-102344A	460-102344B
1/4	0.2500	1-3/8	2-1/2	1/4	460-102500	460-102500A	460-102500B
17/64	0.2656	1-7/16	2-5/8	17/64	460-102656	460-102656A	460-102656B
9/32	0.2813	1-1/2	2-11/16	9/32	460-102812	460-102812A	460-102812B
19/64	0.2969	1-9/16	2-3/4	19/64	460-102969	460-102969A	460-102969B
5/16	0.3125	1-5/8	2-13/16	5/16	460-103125	460-103125A	460-103125B
21/64	0.3281	1-11/16	2-15/16	21/64	460-103281	460-103281A	460-103281B
11/32	0.3438	1-11/16	3	11/32	460-103438	460-103438A	460-103438B
23/64	0.3594	1-3/4	3-1/16	23/64	460-103594	460-103594A	460-103594B
3/8	0.3750	1-13/16	3-1/8	3/8	460-103750	460-103750A	460-103750B
25/64	0.3906	1-7/8	3-1/4	25/64	460-103906	460-103906A	460-103906B
13/32	0.4063	1-15/16	3-5/16	13/32	460-104062	460-104062A	460-104062B
27/64	0.4219	2	3-3/8	27/64	460-104219	460-104219A	460-104219B
7/16	0.4375	2-1/16	3-7/16	7/16	460-104375	460-104375A	460-104375B
29/64	0.4531	2-1/8	3-9/16	29/64	460-104531	460-104531A	460-104531B
15/32	0.4688	2-1/8	3-5/8	15/32	460-104688	460-104688A	460-104688B
31/64	0.4844	2-3/16	3-11/16	31/64	460-104844	460-104844A	460-104844B
1/2	0.5000	2-1/4	3-3/4	1/2	460-105000	460-105000A	460-105000B
33/64	0.5156	2-3/8	3-7/8	33/64	460-105156	-	460-105156B
17/32	0.5313	2-3/8	3-7/8	17/32	460-105312	-	460-105312B
35/64	0.5469	2-1/2	4	35/64	460-105469	-	460-105469B
9/16	0.5625	2-1/2	4	9/16	460-105625	-	460-105625B
5/8	0.6250	2-3/4	4-1/4	5/8	460-106250	-	460-106250B
11/16	0.6875	3	4-5/8	11/16	460-106875	-	460-106875B
3/4	0.7500	3-1/8	5	3/4	460-107500	-	460-107500B
A	0.2340	1-5/16	2-7/16	15/64	460-202340	-	460-202340B
B	0.2380	1-3/8	2-1/2	0.238	460-202380	-	460-202380B
C	0.2420	1-3/8	2-1/2	0.242	460-202420	-	460-202420B
D	0.2460	1-3/8	2-1/2	0.246	460-202460	-	460-202460B
E	0.2500	1-3/8	2-1/2	1/4	460-202500	-	460-202500B
F	0.2570	1-7/16	2-5/8	0.257	460-202570	-	460-202570B

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

Solid Carbide Screw Machine Drills



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

Series 460		2FL   Screw Machine						
Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	AlTiN	
G	0.2610	1-7/16	2-5/8	0.261	460-202610	-	460-202610B	
H	0.2660	1-1/2	2-11/16	17/64	460-202660	-	460-202660B	
I	0.2720	1-1/2	2-11/16	0.272	460-202720	-	460-202720B	
J	0.2770	1-1/2	2-11/16	0.277	460-202770	-	460-202770B	
K	0.2810	1-1/2	2-11/16	9/32	460-202810	-	460-202810B	
L	0.2900	1-9/16	2-3/4	0.29	460-202900	-	460-202900B	
M	0.2950	1-9/16	2-3/4	0.295	460-202950	-	460-202950B	
N	0.3020	1-5/8	2-13/16	0.302	460-203020	-	460-203020B	
O	0.3160	1-11/16	2-15/16	0.316	460-203160	-	460-203160B	
P	0.3230	1-11/16	2-15/16	0.323	460-203230	-	460-203230B	
Q	0.3320	1-11/16	3	0.332	460-203320	-	460-203320B	
R	0.3390	1-11/16	3	0.339	460-203390	-	460-203390B	
S	0.3480	1-3/4	3-1/16	0.348	460-203480	-	460-203480B	
T	0.3580	1-3/4	3-1/16	23/64	460-203580	-	460-203580B	
U	0.3680	1-13/16	3-1/8	0.368	460-203680	-	460-203680B	
V	0.3770	1-7/8	3-1/4	0.377	460-203770	-	460-203770B	
W	0.3860	1-7/8	3-1/4	0.386	460-203860	-	460-203860B	
X	0.3970	1-15/16	3-5/16	0.397	460-203970	-	460-203970B	
Y	0.4040	1-15/16	3-5/16	0.404	460-204040	-	460-204040B	
Z	0.4130	2	3-3/8	0.413	460-204130	-	460-204130B	
#60	0.0400	1/2	1-1/2	0.04	460-300400	-	460-300400B	
#59	0.0410	1/2	1-1/2	0.041	460-300410	-	460-300410B	
#58	0.0420	1/2	1-1/2	0.042	460-300420	-	460-300420B	
#57	0.0430	1/2	1-1/2	0.043	460-300430	-	460-300430B	
#56	0.0465	1/2	1-1/2	3/64	460-300465	-	460-300465B	
#55	0.0520	1/2	1-1/2	0.052	460-300520	-	460-300520B	
#54	0.0550	1/2	1-1/2	0.055	460-300550	-	460-300550B	
#53	0.0595	1/2	1-1/2	0.0595	460-300595	-	460-300595B	
#52	0.0635	11/16	1-11/16	1/16	460-300635	-	460-300635B	
#51	0.0670	11/16	1-11/16	0.067	460-300670	-	460-300670B	
#50	0.0700	11/16	1-11/16	0.07	460-300700	-	460-300700B	
#49	0.0730	11/16	1-11/16	0.073	460-300730	-	460-300730B	
#48	0.0760	11/16	1-11/16	0.076	460-300760	-	460-300760B	
#47	0.0785	3/4	1-3/4	5/64	460-300785	-	460-300785B	
#46	0.0810	3/4	1-3/4	0.081	460-300810	-	460-300810B	
#45	0.0820	3/4	1-3/4	0.082	460-300820	-	460-300820B	
#44	0.0860	3/4	1-3/4	0.086	460-300860	-	460-300860B	
#43	0.0890	3/4	1-3/4	0.089	460-300890	-	460-300890B	
#42	0.0935	3/4	1-3/4	3/32	460-300935	-	460-300935B	
#41	0.0960	13/16	1-13/16	0.096	460-300960	-	460-300960B	
#40	0.0980	13/16	1-13/16	0.098	460-300980	-	460-300980B	
#39	0.0995	13/16	1-13/16	0.0995	460-300995	-	460-300995B	
#38	0.1015	13/16	1-13/16	0.1015	460-301015	-	460-301015B	
#37	0.1040	13/16	1-13/16	0.104	460-301040	-	460-301040B	
#36	0.1065	13/16	1-13/16	0.1065	460-301065	-	460-301065B	
#35	0.1100	7/8	1-7/8	7/64	460-301100	-	460-301100B	
#34	0.1110	7/8	1-7/8	0.111	460-301110	-	460-301110B	
#33	0.1130	7/8	1-7/8	0.113	460-301130	-	460-301130B	
#32	0.1160	7/8	1-7/8	0.116	460-301160	-	460-301160B	
#31	0.1200	7/8	1-7/8	0.12	460-301200	-	460-301200B	
#30	0.1285	15/16	1-15/16	0.1285	460-301285	-	460-301285B	
#29	0.1360	15/16	1-15/16	0.136	460-301360	-	460-301360B	
#28	0.1405	15/16	1-15/16	9/64	460-301405	-	460-301405B	
#27	0.1440	1	2-1/16	0.144	460-301440	-	460-301440B	
#26	0.1470	1	2-1/16	0.147	460-301470	-	460-301470B	
#25	0.1495	1	2-1/16	0.1495	460-301495	-	460-301495B	
#24	0.1520	1	2-1/16	0.152	460-301520	-	460-301520B	
#23	0.1540	1	2-1/16	0.154	460-301540	-	460-301540B	
#22	0.1570	1-1/16	2-1/8	5/32	460-301570	-	460-301570B	
#21	0.1590	1-1/16	2-1/8	0.159	460-301590	-	460-301590B	
#20	0.1610	1-1/16	2-1/8	0.161	460-301610	-	460-301610B	
#19	0.1660	1-1/16	2-1/8	0.166	460-301660	-	460-301660B	
#18	0.1695	1-1/16	2-1/8	0.1695	460-301695	-	460-301695B	
#17	0.1730	1-1/8	2-3/16	11/64	460-301730	-	460-301730B	
#16	0.1770	1-1/8	2-3/16	0.177	460-301770	-	460-301770B	
#15	0.1800	1-1/8	2-3/16	0.18	460-301800	-	460-301800B	
#14	0.1820	1-1/8	2-3/16	0.182	460-301820	-	460-301820B	
#13	0.1850	1-1/8	2-3/16	0.185	460-301850	-	460-301850B	
#12	0.1890	1-3/16	2-1/4	3/16	460-301890	-	460-301890B	
#11	0.1910	1-3/16	2-1/4	0.191	460-301910	-	460-301910B	
#10	0.1935	1-3/16	2-1/4	0.1935	460-301935	-	460-301935B	
#9	0.1960	1-3/16	2-1/4	0.196	460-301960	-	460-301960B	
#8	0.1990	1-3/16	2-1/4	0.199	460-301990	-	460-301990B	
#7	0.2010	1-3/16	2-1/4	0.201	460-302010	-	460-302010B	
#6	0.2040	1-1/4	2-3/8	13/64	460-302040	-	460-302040B	

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide Screw Machine Drills



Series 460		2FL   Screw Machine					
Size	Diameter (D <sub>1</sub> )	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN	AlTiN
	Dec.						
#5	0.2055	1-1/4	2-3/8	0.2055	<b>460-302055</b>	-	<b>460-302055B</b>
#4	0.2090	1-1/4	2-3/8	0.209	<b>460-302090</b>	-	<b>460-302090B</b>
#3	0.2130	1-1/4	2-3/8	0.213	<b>460-302130</b>	-	<b>460-302130B</b>
#2	0.2210	1-5/16	2-7/16	0.221	<b>460-302210</b>	-	<b>460-302210B</b>
#1	0.2280	1-5/16	2-7/16	0.228	<b>460-302280</b>	-	<b>460-302280B</b>
1.0mm	0.0394	13mm	38mm	1mm	<b>460-400394</b>	-	<b>460-400394B</b>
1.5mm	0.0591	13mm	38mm	1.5mm	<b>460-400591</b>	-	<b>460-400591B</b>
2.0mm	0.0787	19mm	45mm	2mm	<b>460-400787</b>	-	<b>460-400787B</b>
2.5mm	0.0984	21mm	46mm	2.5mm	<b>460-400984</b>	-	<b>460-400984B</b>
3.0mm	0.1181	22mm	48mm	3.0mm	<b>460-401181</b>	-	<b>460-401181B</b>
3.5mm	0.1378	24mm	49mm	3.5mm	<b>460-401378</b>	-	<b>460-401378B</b>
4.0mm	0.1575	27mm	54mm	4.0mm	<b>460-401575</b>	-	<b>460-401575B</b>
4.5mm	0.1772	29mm	56mm	4.5mm	<b>460-401772</b>	-	<b>460-401772B</b>
5.0mm	0.1969	30mm	57mm	5.0mm	<b>460-401969</b>	-	<b>460-401969B</b>
5.5mm	0.2165	32mm	60mm	5.5mm	<b>460-402165</b>	-	<b>460-402165B</b>
6.0mm	0.2362	33mm	62mm	6.0mm	<b>460-402362</b>	-	<b>460-402362B</b>
6.5mm	0.2559	35mm	64mm	6.5mm	<b>460-402559</b>	-	<b>460-402559B</b>
7.0mm	0.2756	38mm	68mm	7.0mm	<b>460-402756</b>	-	<b>460-402756B</b>
7.5mm	0.2953	40mm	70mm	7.5mm	<b>460-402953</b>	-	<b>460-402953B</b>
8.0mm	0.3150	41mm	72mm	8.0mm	<b>460-403150</b>	-	<b>460-403150B</b>
8.5mm	0.3346	43mm	76mm	8.5mm	<b>460-403346</b>	-	<b>460-403346B</b>
9.0mm	0.3543	45mm	78mm	9.0mm	<b>460-403543</b>	-	<b>460-403543B</b>
9.5mm	0.3740	46mm	79mm	9.5mm	<b>460-403740</b>	-	<b>460-403740B</b>
1.0mm	0.3937	48mm	83mm	10.0mm	<b>460-403937</b>	-	<b>460-403937B</b>
10.5mm	0.4134	51mm	86mm	10.5mm	<b>460-404134</b>	-	<b>460-404134B</b>
11.0mm	0.4331	51mm	86mm	11.0mm	<b>460-404331</b>	-	<b>460-404331B</b>
11.5mm	0.4528	52mm	88mm	11.5mm	<b>460-404528</b>	-	<b>460-404528B</b>
12.0mm	0.4724	54mm	92mm	12.0mm	<b>460-404724</b>	-	<b>460-404724B</b>
12.5mm	0.4921	56mm	94mm	12.5mm	<b>460-404921</b>	-	<b>460-404921B</b>
13.0mm	0.5118	60mm	98mm	13.0mm	<b>460-405118</b>	-	<b>460-405118B</b>

\*bold numbers are EDPs for ordering

HOLEMAKING

## Popular Custom Holemaking Options

- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM  
COMES  
STANDARD**



INTRO

MILLING

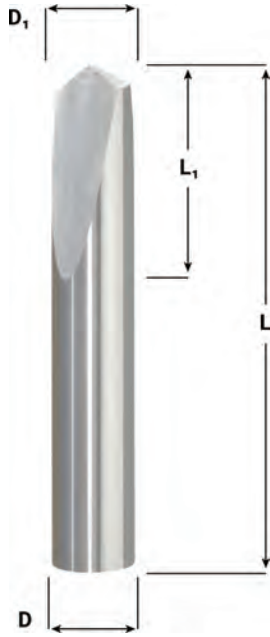
SPECIALTY

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Spade Drills



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Spade Drills</b> <ul style="list-style-type: none"> <li>• Sub-micrograin carbide substrate for wear resistance</li> <li>• Used for spotting or shallow hole drilling utmost strength</li> <li>• Perfect for shallow drilling (less than 2xD)</li> </ul>		<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; justify-content: space-between;"> <div style="background-color: #333; color: white; padding: 2px;">CARBIDE</div> <div style="background-color: #0070c0; color: white; padding: 2px;">0°</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="background-color: #0070c0; color: white; padding: 2px;">2FL</div> <div style="background-color: #ccc; padding: 2px;">Bright</div> </div> <div style="background-color: #0070c0; color: white; padding: 2px;">P 315</div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○			●	●	○	○			○	

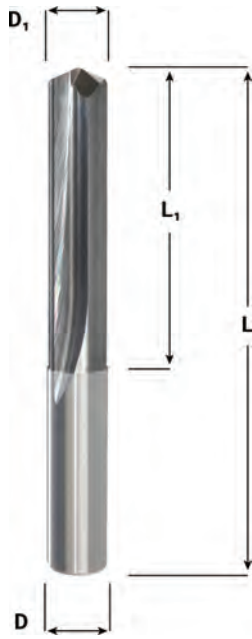
● Best ○ Good

Series 400		2FL   Spade		
Diameter (D <sub>1</sub> )	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
1/32	3/16	1-1/2	1/32	<b>400-001002</b>
3/64	7/32	1-1/2	3/64	<b>400-001005</b>
1/16	5/16	1-1/2	1/16	<b>400-001007</b>
3/32	7/16	1-1/2	3/32	<b>400-001010</b>
7/64	7/16	1-1/2	7/64	<b>400-001011</b>
1/8	1/2	1-1/2	1/8	<b>400-001020</b>
9/64	1/2	2	9/64	<b>400-001021</b>
5/32	9/16	2	5/32	<b>400-001030</b>
11/64	9/16	2	11/64	<b>400-001031</b>
3/16	11/16	2	3/16	<b>400-001040</b>
7/32	19/32	2	7/32	<b>400-001050</b>
1/4	11/16	2	1/4	<b>400-001060</b>
9/32	7/8	2-1/2	9/32	<b>400-001070</b>
5/16	7/8	2-1/2	5/16	<b>400-001080</b>
11/32	15/16	2-1/2	11/32	<b>400-001090</b>
3/8	1-1/8	2-1/2	3/8	<b>400-001100</b>
13/32	1-1/8	2-3/4	13/32	<b>400-001110</b>
7/16	1-3/16	2-3/4	7/16	<b>400-001120</b>
15/32	1-3/16	3	15/32	<b>400-001130</b>
1/2	1-3/16	3	1/2	<b>400-001140</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

## Solid Carbide Straight Flute Drill



FEATURES / DESCRIPTION				APPLICATION	FEATURES			
<b>Straight Flute Drills</b> <ul style="list-style-type: none"> <li>• Sub-micrograin carbide substrate for wear resistance</li> <li>• Capable of producing reamer type finishes in work hardened and abrasive materials</li> <li>• Designed for: chrome alloys, heat alloys, nickel alloys, titanium alloys, steel and stainless steel weldments</li> <li>• 140° split point</li> </ul>					CARBIDE	2FL	0°	140°
					Bright	AlTiN		
					P 316			

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○			●	●	○	○			○	

● Best ○ Good

### Series 470 2FL | Straight Flute

Size	Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AlTiN
	Dec.						
1/32	0.0313		1/2	1-1/2	1/32	470-100312	470-100312B
3/64	0.0469		1/2	1-1/2	3/64	470-100469	470-100469B
1/16	0.0625		5/8	1-5/8	1/16	470-100625	470-100625B
5/64	0.0781		11/16	1-11/16	5/64	470-100781	470-100781B
3/32	0.0938		3/4	1-3/4	3/32	470-100938	470-100938B
7/64	0.1094		13/16	1-13/16	7/64	470-101094	470-101094B
1/8	0.1250		7/8	1-7/8	1/8	470-101250	470-101250B
9/64	0.1406		15/16	1-15/16	9/64	470-101406	470-101406B
5/32	0.1563		1	2-1/16	5/32	470-101562	470-101562B
11/64	0.1719		1-1/16	2-1/8	11/64	470-101719	470-101719B
3/16	0.1875		1-1/8	2-3/16	3/16	470-101875	470-101875B
13/64	0.2031		1-3/16	2-1/4	13/64	470-102031	470-102031B
7/32	0.2188		1-1/4	2-3/8	7/32	470-102188	470-102188B
15/64	0.2344		1-5/16	2-7/16	15/64	470-102344	470-102344B
1/4	0.2500		1-3/8	2-1/2	1/4	470-102500	470-102500B
17/64	0.2656		1-7/16	2-5/8	17/64	470-102656	470-102656B
9/32	0.2813		1-1/2	2-11/16	9/32	470-102812	470-102812B
19/64	0.2969		1-9/16	2-3/4	19/64	470-102969	470-102969B
5/16	0.3125		1-5/8	2-13/16	5/16	470-103125	470-103125B
21/64	0.3281		1-11/16	2-15/16	21/64	470-103281	470-103281B
11/32	0.3438		1-11/16	3	11/32	470-103438	470-103438B
23/64	0.3594		1-3/4	3-1/16	23/64	470-103594	470-103594B
3/8	0.3750		1-13/16	3-1/8	3/8	470-103750	470-103750B
25/64	0.3906		1-7/8	3-1/4	25/64	470-103906	470-103906B
13/32	0.4063		1-15/16	3-5/16	13/32	470-104062	470-104062B
27/64	0.4219		2	3-3/8	27/64	470-104219	470-104219B
7/16	0.4375		2-1/16	3-7/16	7/16	470-104375	470-104375B
29/64	0.4531		2-1/8	3-9/16	29/64	470-104531	470-104531B
15/32	0.4688		2-1/8	3-5/8	15/32	470-104688	470-104688B
31/64	0.4844		2-3/16	3-11/16	31/64	470-104844	470-104844B
1/2	0.5000		2-1/4	3-3/4	1/2	470-105000	470-105000B
33/64	0.5156		1-1/8	3-1/2	33/64	470-105156	470-105156B
17/32	0.5313		1-1/8	3-1/2	17/32	470-105312	470-105312B
35/64	0.5469		1-1/8	3-1/2	35/64	470-105469	470-105469B
9/16	0.5625		1-1/8	4	9/16	470-105625	470-105625B
5/8	0.6250		1-1/4	4	5/8	470-106250	470-106250B
11/16	0.6875		1-1/2	4	11/16	470-106875	470-106875B
3/4	0.7500		1-1/2	4	3/4	470-107500	470-107500B
A	0.2340		1-5/16	2-7/16	0.234	470-202340	470-202340B
B	0.2380		1-3/8	2-1/2	0.238	470-202380	470-202380B
C	0.2420		1-3/8	2-1/2	0.242	470-202420	470-202420B
D	0.2460		1-3/8	2-1/2	0.246	470-202460	470-202460B
E	0.2500		1-3/8	2-1/2	0.25	470-202500	470-202500B
F	0.2570		1-7/16	2-5/8	0.257	470-202570	470-202570B

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS



# PERFORMANCE

Solid Carbide Straight Flute Drill



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

Series 470

2FL | Straight Flute

Size	Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AlTiN
	Dec.						
G	0.2610		1-7/16	2-5/8	0.261	470-202610	470-202610B
H	0.2660		1-1/2	2-11/16	0.266	470-202660	470-202660B
I	0.2720		1-1/2	2-11/16	0.272	470-202720	470-202720B
J	0.2770		1-1/2	2-11/16	0.277	470-202770	470-202770B
K	0.2810		1-1/2	2-11/16	0.281	470-202810	470-202810B
L	0.2900		1-9/16	2-3/4	0.29	470-202900	470-202900B
M	0.2950		1-9/16	2-3/4	0.295	470-202950	470-202950B
N	0.3020		1-5/8	2-13/16	0.302	470-203020	470-203020B
O	0.3160		1-11/16	2-15/16	0.316	470-203160	470-203160B
P	0.3230		1-11/16	2-15/16	0.323	470-203230	470-203230B
Q	0.3320		1-11/16	3	0.332	470-203320	470-203320B
R	0.3390		1-11/16	3	0.339	470-203390	470-203390B
S	0.3480		1-3/4	3-1/16	0.348	470-203480	470-203480B
T	0.3580		1-3/4	3-1/16	0.358	470-203580	470-203580B
U	0.3680		1-13/16	3-1/8	0.368	470-203680	470-203680B
V	0.3770		1-7/8	3-1/4	0.377	470-203770	470-203770B
W	0.3860		1-7/8	3-1/4	0.386	470-203860	470-203860B
X	0.3970		1-15/16	3-5/16	0.397	470-203970	470-203970B
Y	0.4040		1-15/16	3-5/16	0.404	470-204040	470-204040B
Z	0.4130		2	3-3/8	0.413	470-204130	470-204130B
#65	0.0350		1/2	1-1/2	0.035	470-300350	470-300350B
#64	0.0360		1/2	1-1/2	0.036	470-300360	470-300360B
#63	0.0370		1/2	1-1/2	0.037	470-300370	470-300370B
#62	0.0380		1/2	1-1/2	0.038	470-300380	470-300380B
#61	0.0390		1/2	1-1/2	0.039	470-300390	470-300390B
#60	0.0400		1/2	1-1/2	0.04	470-300400	470-300400B
#59	0.0410		1/2	1-1/2	0.041	470-300410	470-300410B
#58	0.0420		1/2	1-1/2	0.042	470-300420	470-300420B
#57	0.0430		1/2	1-1/2	0.043	470-300430	470-300430B
#56	0.0465		1/2	1-1/2	0.0465	470-300465	470-300465B
#55	0.0520		1/2	1-1/2	0.052	470-300520	470-300520B
#54	0.0550		1/2	1-1/2	0.055	470-300550	470-300550B
#53	0.0595		1/2	1-1/2	0.0595	470-300595	470-300595B
#52	0.0635		11/16	1-11/16	0.0635	470-300635	470-300635B
#51	0.0670		11/16	1-11/16	0.067	470-300670	470-300670B
#50	0.0700		11/16	1-11/16	0.07	470-300700	470-300700B
#49	0.0730		11/16	1-11/16	0.073	470-300730	470-300730B
#48	0.0760		11/16	1-11/16	0.076	470-300760	470-300760B
#47	0.0785		3/4	1-3/4	0.0785	470-300785	470-300785B
#46	0.0810		3/4	1-3/4	0.081	470-300810	470-300810B
#45	0.0820		3/4	1-3/4	0.082	470-300820	470-300820B
#44	0.0860		3/4	1-3/4	0.086	470-300860	470-300860B
#43	0.0890		3/4	1-3/4	0.089	470-300890	470-300890B
#42	0.0935		3/4	1-3/4	0.0935	470-300935	470-300935B
#41	0.0960		13/16	1-13/16	0.096	470-300960	470-300960B
#40	0.0980		13/16	1-13/16	0.098	470-300980	470-300980B
#39	0.0995		13/16	1-13/16	0.0995	470-300995	470-300995B
#38	0.1015		13/16	1-13/16	0.1015	470-301015	470-301015B
#37	0.1040		13/16	1-13/16	0.104	470-301040	470-301040B
#36	0.1065		13/16	1-13/16	0.1065	470-301065	470-301065B
#35	0.1100		7/8	1-7/8	0.11	470-301100	470-301100B
#34	0.1110		7/8	1-7/8	0.111	470-301110	470-301110B
#33	0.1130		7/8	1-7/8	0.113	470-301130	470-301130B
#32	0.1160		7/8	1-7/8	0.116	470-301160	470-301160B
#31	0.1200		7/8	1-7/8	0.12	470-301200	470-301200B
#30	0.1285		15/16	1-15/16	0.1285	470-301285	470-301285B
#29	0.1360		15/16	1-15/16	0.136	470-301360	470-301360B
#28	0.1405		15/16	1-15/16	0.1405	470-301405	470-301405B
#27	0.1440		1	2-1/16	0.144	470-301440	470-301440B
#26	0.1470		1	2-1/16	0.147	470-301470	470-301470B
#25	0.1495		1	2-1/16	0.1495	470-301495	470-301495B
#24	0.1520		1	2-1/16	0.152	470-301520	470-301520B
#23	0.1540		1	2-1/16	0.154	470-301540	470-301540B
#22	0.1570		1-1/16	2-1/8	0.157	470-301570	470-301570B
#21	0.1590		1-1/16	2-1/8	0.159	470-301590	470-301590B
#20	0.1610		1-1/16	2-1/8	0.161	470-301610	470-301610B
#19	0.1660		1-1/16	2-1/8	0.166	470-301660	470-301660B
#18	0.1695		1-1/16	2-1/8	0.1695	470-301695	470-301695B
#17	0.1730		1-1/8	2-3/16	0.173	470-301730	470-301730B
#16	0.1770		1-1/8	2-3/16	0.177	470-301770	470-301770B
#15	0.1800		1-1/8	2-3/16	0.18	470-301800	470-301800B
#14	0.1820		1-1/8	2-3/16	0.182	470-301820	470-301820B
#13	0.1850		1-1/8	2-3/16	0.185	470-301850	470-301850B
#12	0.1890		1-3/16	2-1/4	0.189	470-301890	470-301890B
#11	0.1910		1-3/16	2-1/4	0.191	470-301910	470-301910B

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide Straight Flute Drill



Series 470		2FL   Straight Flute					
Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	AITiN	
#10	0.1935	1-3/16	2-1/4	0.1935	<b>470-301935</b>	<b>470-301935B</b>	
#9	0.1960	1-3/16	2-1/4	0.196	<b>470-301960</b>	<b>470-301960B</b>	
#8	0.1990	1-3/16	2-1/4	0.199	<b>470-301990</b>	<b>470-301990B</b>	
#7	0.2010	1-3/16	2-1/4	0.201	<b>470-302010</b>	<b>470-302010B</b>	
#6	0.2040	1-1/4	2-3/8	0.204	<b>470-302040</b>	<b>470-302040B</b>	
#5	0.2055	1-1/4	2-3/8	0.2055	<b>470-302055</b>	<b>470-302055B</b>	
#4	0.2090	1-1/4	2-3/8	0.209	<b>470-302090</b>	<b>470-302090B</b>	
#3	0.2130	1-1/4	2-3/8	0.213	<b>470-302130</b>	<b>470-302130B</b>	
#2	0.2210	1-5/16	2-7/16	0.221	<b>470-302210</b>	<b>470-302210B</b>	
#1	0.2280	1-5/16	2-7/16	0.228	<b>470-302280</b>	<b>470-302280B</b>	
1.0mm	0.0394	13mm	38mm	1mm	<b>470-400394</b>	<b>470-400394B</b>	
1.5mm	0.0591	13mm	38mm	1.5mm	<b>470-400591</b>	<b>470-400591B</b>	
2.0mm	0.0787	19mm	45mm	2mm	<b>470-400787</b>	<b>470-400787B</b>	
2.5mm	0.0984	21mm	46mm	2.5mm	<b>470-400984</b>	<b>470-400984B</b>	
3.0mm	0.1181	22mm	48mm	3.0mm	<b>470-401181</b>	<b>470-401181B</b>	
3.5mm	0.1378	24mm	49mm	3.5mm	<b>470-401378</b>	<b>470-401378B</b>	
4.0mm	0.1575	27mm	54mm	4.0mm	<b>470-401575</b>	<b>470-401575B</b>	
4.5mm	0.1772	29mm	56mm	4.5mm	<b>470-401772</b>	<b>470-401772B</b>	
5.0mm	0.1969	30mm	57mm	5.0mm	<b>470-401969</b>	<b>470-401969B</b>	
5.5mm	0.2165	32mm	60mm	5.5mm	<b>470-402165</b>	<b>470-402165B</b>	
6.0mm	0.2362	33mm	62mm	6.0mm	<b>470-402362</b>	<b>470-402362B</b>	
6.5mm	0.2559	35mm	64mm	6.5mm	<b>470-402559</b>	<b>470-402559B</b>	
7.0mm	0.2756	38mm	68mm	7.0mm	<b>470-402756</b>	<b>470-402756B</b>	
7.5mm	0.2953	38mm	70mm	7.5mm	<b>470-402953</b>	<b>470-402953B</b>	
8.0mm	0.3150	41mm	71mm	8.0mm	<b>470-403150</b>	<b>470-403150B</b>	
8.5mm	0.3346	43mm	76mm	8.5mm	<b>470-403346</b>	<b>470-403346B</b>	
9.0mm	0.3543	45mm	78mm	9.0mm	<b>470-403543</b>	<b>470-403543B</b>	
9.5mm	0.3740	46mm	79mm	9.5mm	<b>470-403740</b>	<b>470-403740B</b>	
1.0mm	0.3937	48mm	83mm	10.0mm	<b>470-403937</b>	<b>470-403937B</b>	
10.5mm	0.4134	51mm	86mm	10.5mm	<b>470-404134</b>	<b>470-404134B</b>	
11.0mm	0.4331	51mm	86mm	11.0mm	<b>470-404331</b>	<b>470-404331B</b>	
11.5mm	0.4528	52mm	87mm	11.5mm	<b>470-404528</b>	<b>470-404528B</b>	
12.0mm	0.4724	54mm	92mm	12.0mm	<b>470-404724</b>	<b>470-404724B</b>	
12.5mm	0.4921	56mm	94mm	12.5mm	<b>470-404921</b>	<b>470-404921B</b>	

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<b>Twist Drills</b> <ul style="list-style-type: none"> <li>Sub-micrograin carbide substrate for wear resistance</li> <li>General purpose drilling operations</li> <li>4-facet 118° split point</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>2FL</td> </tr> <tr> <td>25°</td> <td>118°</td> </tr> <tr> <td>Bright</td> <td>TiN</td> </tr> <tr> <td>AlTiN</td> <td>P 316</td> </tr> </table>	CARBIDE	2FL	25°	118°	Bright	TiN	AlTiN	P 316
CARBIDE	2FL									
25°	118°									
Bright	TiN									
AlTiN	P 316									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○			●	●	○	○			○	

● Best ○ Good

**Series 450** | 2FL | Jobber Length | Twist

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Bright	TiN	AlTiN
1/64	0.0156	3/16	1-1/4	450-100156	450-100156A	450-100156B
1/32	0.0313	5/16	1-1/4	450-100312	450-100312A	450-100312B
3/64	0.0469	3/4	1-1/2	450-100469	450-100469A	450-100469B
1/16	0.0625	3/4	1-1/2	450-100625	450-100625A	450-100625B
5/64	0.0781	7/8	1-3/4	450-100781	450-100781A	450-100781B
3/32	0.0938	1	2	450-100938	450-100938A	450-100938B
7/64	0.1094	1-1/4	2-1/4	450-101094	450-101094A	450-101094B
1/8	0.1250	1-1/4	2-1/4	450-101250	450-101250A	450-101250B
9/64	0.1406	1-3/8	2-1/2	450-101406	450-101406A	450-101406B
5/32	0.1563	1-3/8	2-1/2	450-101562	450-101562A	450-101562B
11/64	0.1719	1-5/8	2-3/4	450-101719	450-101719A	450-101719B
3/16	0.1875	1-5/8	2-3/4	450-101875	450-101875A	450-101875B
13/64	0.2031	1-3/4	3	450-102031	450-102031A	450-102031B
7/32	0.2188	1-3/4	3	450-102188	450-102188A	450-102188B
15/64	0.2344	2	3-1/4	450-102344	450-102344A	450-102344B
1/4	0.2500	2	3-1/4	450-102500	450-102500A	450-102500B
17/64	0.2656	2-1/8	3-1/2	450-102656	450-102656A	450-102656B
9/32	0.2813	2-1/8	3-1/2	450-102812	450-102812A	450-102812B
19/64	0.2969	2-3/8	3-3/4	450-102969	450-102969A	450-102969B
5/16	0.3125	2-3/8	3-3/4	450-103125	450-103125A	450-103125B
21/64	0.3281	2-1/2	4	450-103281	450-103281A	450-103281B
11/32	0.3438	2-1/2	4	450-103438	450-103438A	450-103438B
23/64	0.3594	2-3/4	4-1/4	450-103594	450-103594A	450-103594B
3/8	0.3750	2-3/4	4-1/4	450-103750	450-103750A	450-103750B
25/64	0.3906	2-7/8	4-1/2	450-103906	450-103906A	450-103906B
13/32	0.4063	2-7/8	4-1/2	450-104062	450-104062A	450-104062B
27/64	0.4219	2-7/8	4-1/2	450-104219	450-104219A	450-104219B
7/16	0.4375	2-7/8	4-1/2	450-104375	450-104375A	450-104375B
29/64	0.4531	3	4-3/4	450-104531	450-104531A	450-104531B
15/32	0.4688	3	4-3/4	450-104688	450-104688A	450-104688B
31/64	0.4844	3	4-3/4	450-104844	450-104844A	450-104844B
1/2	0.5000	3	4-3/4	450-105000	450-105000A	450-105000B
A	0.2340	2	3-1/4	450-202340	450-202340A	450-202340B
B	0.2380	2	3-1/4	450-202380	450-202380A	450-202380B
C	0.2420	2	3-1/4	450-202420	450-202420A	450-202420B
D	0.2460	2	3-1/4	450-202460	450-202460A	450-202460B
E	0.2500	2	3-1/4	450-202500	450-202500A	450-202500B
F	0.2570	2	3-1/4	450-202570	450-202570A	450-202570B
G	0.2610	2-1/8	3-1/2	450-202610	450-202610A	450-202610B
H	0.2660	2-1/8	3-1/2	450-202660	450-202660A	450-202660B
I	0.2720	2-1/8	3-1/2	450-202720	450-202720A	450-202720B
J	0.2770	2-1/8	3-1/2	450-202770	450-202770A	450-202770B
K	0.2810	2-1/8	3-1/2	450-202810	450-202810A	450-202810B
L	0.2900	2-1/8	3-1/2	450-202900	450-202900A	450-202900B

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide Twist Drills



## Series 450

2FL | Jobber Length | Twist

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Bright	TiN	AlTiN
M	0.2950	2-3/8	3-3/4	450-202950	450-202950A	450-202950B
N	0.3020	2-3/8	3-3/4	450-203020	450-203020A	450-203020B
O	0.3160	2-3/8	3-3/4	450-203160	450-203160A	450-203160B
P	0.3230	2-3/8	3-3/4	450-203230	450-203230A	450-203230B
Q	0.3320	2-1/2	4	450-203320	450-203320A	450-203320B
R	0.3390	2-1/2	4	450-203390	450-203390A	450-203390B
S	0.3480	2-1/2	4	450-203480	450-203480A	450-203480B
T	0.3580	2-3/4	4-1/4	450-203580	450-203580A	450-203580B
U	0.3680	2-3/4	4-1/4	450-203680	450-203680A	450-203680B
V	0.3770	2-3/4	4-1/4	450-203770	450-203770A	450-203770B
W	0.3860	2-7/8	4-1/2	450-203860	450-203860A	450-203860B
X	0.3970	2-7/8	4-1/2	450-203970	450-203970A	450-203970B
Y	0.4040	2-7/8	4-1/2	450-204040	450-204040A	450-204040B
Z	0.4130	2-7/8	4-1/2	450-204130	450-204130A	450-204130B
#80	0.0135	3/16	1-1/4	450-300135	450-300135A	450-300135B
#79	0.0145	3/16	1-1/4	450-300145	450-300145A	450-300145B
#78	0.0160	3/16	1-1/4	450-300160	450-300160A	450-300160B
#77	0.0180	3/16	1-1/4	450-300180	450-300180A	450-300180B
#76	0.0200	1/4	1-1/4	450-300200	450-300200A	450-300200B
#75	0.0210	1/4	1-1/4	450-300210	450-300210A	450-300210B
#74	0.0225	1/4	1-1/4	450-300225	450-300225A	450-300225B
#73	0.0240	1/4	1-1/4	450-300240	450-300240A	450-300240B
#72	0.0250	5/16	1-1/4	450-300250	450-300250A	450-300250B
#71	0.0260	5/16	1-1/4	450-300260	450-300260A	450-300260B
#70	0.0280	5/16	1-1/4	450-300280	450-300280A	450-300280B
#69	0.0292	5/16	1-1/4	450-300292	450-300292A	450-300292B
#68	0.0310	5/16	1-1/4	450-300310	450-300310A	450-300310B
#67	0.0320	5/16	1-1/4	450-300320	450-300320A	450-300320B
#66	0.0330	5/16	1-1/4	450-300330	450-300330A	450-300330B
#65	0.0350	5/8	1-3/8	450-300350	450-300350A	450-300350B
#64	0.0360	5/8	1-3/8	450-300360	450-300360A	450-300360B
#63	0.0370	5/8	1-3/8	450-300370	450-300370A	450-300370B
#62	0.0380	5/8	1-3/8	450-300380	450-300380A	450-300380B
#61	0.0390	5/8	1-3/8	450-300390	450-300390A	450-300390B
#60	0.0400	3/4	1-1/2	450-300400	450-300400A	450-300400B
#59	0.0410	3/4	1-1/2	450-300410	450-300410A	450-300410B
#58	0.0420	3/4	1-1/2	450-300420	450-300420A	450-300420B
#57	0.0430	3/4	1-1/2	450-300430	450-300430A	450-300430B
#56	0.0465	3/4	1-1/2	450-300465	450-300465A	450-300465B
#55	0.0520	3/4	1-1/2	450-300520	450-300520A	450-300520B
#54	0.0550	3/4	1-1/2	450-300550	450-300550A	450-300550B
#53	0.0595	3/4	1-1/2	450-300595	450-300595A	450-300595B
#52	0.0635	3/4	1-1/2	450-300635	450-300635A	450-300635B
#51	0.0670	3/4	1-1/2	450-300670	450-300670A	450-300670B
#50	0.0700	7/8	1-3/4	450-300700	450-300700A	450-300700B
#49	0.0730	7/8	1-3/4	450-300730	450-300730A	450-300730B
#48	0.0760	7/8	1-3/4	450-300760	450-300760A	450-300760B
#47	0.0785	7/8	1-3/4	450-300785	450-300785A	450-300785B
#46	0.0810	7/8	1-3/4	450-300810	450-300810A	450-300810B
#45	0.0820	7/8	1-3/4	450-300820	450-300820A	450-300820B
#44	0.0860	1	2	450-300860	450-300860A	450-300860B
#43	0.0890	1	2	450-300890	450-300890A	450-300890B
#42	0.0935	1	2	450-300935	450-300935A	450-300935B
#41	0.0960	1	2	450-300960	450-300960A	450-300960B
#40	0.0980	1	2	450-300980	450-300980A	450-300980B
#39	0.0995	1-1/4	2-1/4	450-300995	450-300995A	450-300995B
#38	0.1015	1-1/4	2-1/4	450-301015	450-301015A	450-301015B
#37	0.1040	1-1/4	2-1/4	450-301040	450-301040A	450-301040B
#36	0.1065	1-1/4	2-1/4	450-301065	450-301065A	450-301065B
#35	0.1100	1-1/4	2-1/4	450-301100	450-301100A	450-301100B
#34	0.1110	1-1/4	2-1/4	450-301110	450-301110A	450-301110B
#33	0.1130	1-1/4	2-1/4	450-301130	450-301130A	450-301130B
#32	0.1160	1-1/4	2-1/4	450-301160	450-301160A	450-301160B
#31	0.1200	1-1/4	2-1/4	450-301200	450-301200A	450-301200B
#30	0.1285	1-1/4	2-1/4	450-301285	450-301285A	450-301285B
#29	0.1360	1-3/8	2-1/2	450-301360	450-301360A	450-301360B
#28	0.1405	1-3/8	2-1/2	450-301405	450-301405A	450-301405B
#27	0.1440	1-3/8	2-1/2	450-301440	450-301440A	450-301440B
#26	0.1470	1-3/8	2-1/2	450-301470	450-301470A	450-301470B
#25	0.1495	1-3/8	2-1/2	450-301495	450-301495A	450-301495B
#24	0.1520	1-3/8	2-1/2	450-301520	450-301520A	450-301520B
#23	0.1540	1-3/8	2-1/2	450-301540	450-301540A	450-301540B
#22	0.1570	1-3/8	2-1/2	450-301570	450-301570A	450-301570B
#21	0.1590	1-3/8	2-1/2	450-301590	450-301590A	450-301590B
#20	0.1610	1-3/8	2-1/2	450-301610	450-301610A	450-301610B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Twist Drills



## Series 450

2FL | Jobber Length | Twist

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Bright	TiN	AlTiN
#19	0.1660	1-5/8	2-3/4	450-301660	450-301660A	450-301660B
#18	0.1695	1-5/8	2-3/4	450-301695	450-301695A	450-301695B
#17	0.1730	1-5/8	2-3/4	450-301730	450-301730A	450-301730B
#16	0.1770	1-5/8	2-3/4	450-301770	450-301770A	450-301770B
#15	0.1800	1-5/8	2-3/4	450-301800	450-301800A	450-301800B
#14	0.1820	1-5/8	2-3/4	450-301820	450-301820A	450-301820B
#13	0.1850	1-5/8	2-3/4	450-301850	450-301850A	450-301850B
#12	0.1890	1-5/8	2-3/4	450-301890	450-301890A	450-301890B
#11	0.1910	1-5/8	2-3/4	450-301910	450-301910A	450-301910B
#10	0.1935	1-5/8	2-3/4	450-301935	450-301935A	450-301935B
#9	0.1960	1-3/4	3	450-301960	450-301960A	450-301960B
#8	0.1990	1-3/4	3	450-301990	450-301990A	450-301990B
#7	0.2010	1-3/4	3	450-302010	450-302010A	450-302010B
#6	0.2040	1-3/4	3	450-302040	450-302040A	450-302040B
#5	0.2055	1-3/4	3	450-302055	450-302055A	450-302055B
#4	0.2090	1-3/4	3	450-302090	450-302090A	450-302090B
#3	0.2130	1-3/4	3	450-302130	450-302130A	450-302130B
#2	0.2210	1-3/4	3	450-302210	450-302210A	450-302210B
#1	0.2280	1-3/4	3	450-302280	450-302280A	450-302280B
1.0mm	0.0394	1mm	38mm	450-400394	450-400394A	450-400394B
1.5mm	0.0591	1.5mm	38mm	450-400591	450-400591A	450-400591B
2.0mm	0.0787	2mm	45mm	450-400787	450-400787A	450-400787B
2.5mm	0.0984	2.5mm	51mm	450-400984	450-400984A	450-400984B
3.0mm	0.1181	32mm	57mm	450-401181	450-401181A	450-401181B
3.5mm	0.1378	35mm	64mm	450-401378	450-401378A	450-401378B
4.0mm	0.1575	35mm	64mm	450-401575	450-401575A	450-401575B
4.5mm	0.1772	41mm	70mm	450-401772	450-401772A	450-401772B
5.0mm	0.1969	45mm	76mm	450-401969	450-401969A	450-401969B
5.5mm	0.2165	45mm	76mm	450-402165	450-402165A	450-402165B
6.0mm	0.2362	51mm	83mm	450-402362	450-402362A	450-402362B
6.5mm	0.2559	51mm	83mm	450-402559	450-402559A	450-402559B
7.0mm	0.2756	54mm	89mm	450-402756	450-402756A	450-402756B
7.5mm	0.2953	60mm	95mm	450-402953	450-402953A	450-402953B
8.0mm	0.3150	60mm	95mm	450-403150	450-403150A	450-403150B
8.5mm	0.3346	64mm	102mm	450-403346	450-403346A	450-403346B
9.0mm	0.3543	64mm	102mm	450-403543	450-403543A	450-403543B
9.5mm	0.3740	70mm	108mm	450-403740	450-403740A	450-403740B
1.0mm	0.3937	73mm	114mm	450-403937	450-403937A	450-403937B
10.5mm	0.4134	73mm	114mm	450-404134	450-404134A	450-404134B
11.0mm	0.4331	73mm	114mm	450-404331	450-404331A	450-404331B
11.5mm	0.4528	76mm	121mm	450-404528	450-404528A	450-404528B
12.0mm	0.4724	76mm	121mm	450-404724	450-404724A	450-404724B
12.5mm	0.4921	76mm	121mm	450-404921	450-404921A	450-404921B

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide 3-Flute Twist Drill



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>3-Flute Drills</b> <ul style="list-style-type: none"> <li>• Sub-micrograin carbide substrate for wear resistance</li> <li>• Performs well in short-chip materials</li> <li>• No preliminary drilling or spotting operations needed</li> <li>• Rapid penetration via 3-fluted split point</li> <li>• 150° split drill point with corner breaks resists chipping</li> </ul>		<div style="display: flex; flex-wrap: wrap;"> <div style="margin: 2px;">CARBIDE</div> <div style="margin: 2px;">3FL</div> <div style="margin: 2px;">28°</div> <div style="margin: 2px;">150°</div> <div style="margin: 2px;">Bright</div> <div style="margin: 2px;">TiN</div> <div style="margin: 2px;">P 316</div> </div>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○			●	●	○	○			○	

● Best ○ Good

**Series 453**      **3FL | Twist**

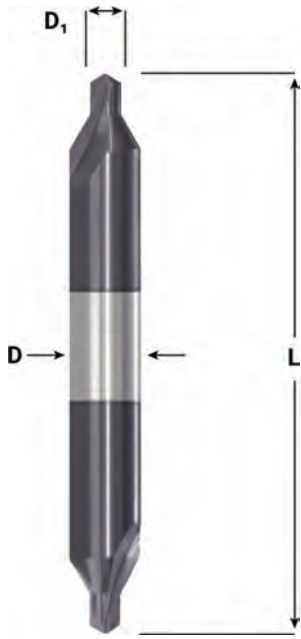
Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	Bright	TiN
1/8	0.1250	1-1/4	2-1/4	1/8	453-101250	453-101250B
9/64	0.1406	1-3/8	2-1/2	9/64	453-101406	453-101406B
5/32	0.1563	1-3/8	2-1/2	5/32	453-101562	453-101562B
11/64	0.1719	1-5/8	2-3/4	11/64	453-101719	453-101719B
3/16	0.1875	1-5/8	2-3/4	3/16	453-101875	453-101875B
13/64	0.2031	1-3/4	3	13/64	453-102031	453-102031B
7/32	0.2188	1-3/4	3	7/32	453-102188	453-102188B
15/64	0.2344	2	3-1/4	15/64	453-102344	453-102344B
1/4	0.2500	2	3-1/4	1/4	453-102500	453-102500B
17/64	0.2656	2-1/8	3-1/2	17/64	453-102656	453-102656B
9/32	0.2813	2-1/8	3-1/2	9/32	453-102812	453-102812B
19/64	0.2969	2-3/8	3-3/4	19/64	453-102969	453-102969B
5/16	0.3125	2-3/8	3-3/4	5/16	453-103125	453-103125B
21/64	0.3281	2-1/2	4	21/64	453-103281	453-103281B
11/32	0.3438	2-1/2	4	11/32	453-103438	453-103438B
23/64	0.3594	2-3/4	4-1/4	23/64	453-103594	453-103594B
3/8	0.3750	2-3/4	4-1/4	3/8	453-103750	453-103750B
25/64	0.3906	2-7/8	4-1/2	25/64	453-103906	453-103906B
13/32	0.4063	2-7/8	4-1/2	13/32	453-104062	453-104062B
27/64	0.4219	2-7/8	4-1/2	27/64	453-104219	453-104219B
7/16	0.4375	2-7/8	4-1/2	7/16	453-104375	453-104375B
29/64	0.4531	3	4-3/4	29/64	453-104531	453-104531B
15/32	0.4688	3	4-3/4	15/32	453-104688	453-104688B
31/64	0.4844	3	4-3/4	31/64	453-104844	453-104844B
1/2	0.5000	3	4-3/4	1/2	453-105000	453-105000B
17/32	0.5313	3	4-3/4	17/32	453-105312	453-105312B
9/16	0.5625	3-1/2	5-3/4	9/16	453-105625	453-105625B
5/8	0.6250	3-1/2	5-3/4	5/8	453-106250	453-106250B
3/4	0.7500	4	5-3/4	3/4	453-107500	453-107500B
3.0mm	0.1181	32mm	57mm	3.0mm	-	453-401181B
4.0mm	0.1575	35mm	64mm	4.0mm	453-401575	453-401575B
5.0mm	0.1969	45mm	76mm	5.0mm	453-401969	453-401969B
6.0mm	0.2362	51mm	83mm	6.0mm	453-402362	453-402362B
7.0mm	0.2756	54mm	89mm	7.0mm	453-402756	453-402756B
8.0mm	0.3150	60mm	95mm	8.0mm	453-403150	453-403150B
9.0mm	0.3543	64mm	102mm	9.0mm	453-403543	453-403543B
1.0mm	0.3937	73mm	114mm	10.0mm	453-403937	453-403937B
11.0mm	0.4331	73mm	114mm	11.0mm	453-404331	453-404331B
12.0mm	0.4724	76mm	121mm	12.0mm	453-404724	453-404724B
14.0mm	0.5512	89mm	146mm	14.0mm	453-405512	453-405512B
16.0mm	0.6299	90mm	146mm	16.0mm	453-406299	453-406299B

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

## Solid Carbide Combination Drill And Countersink



FEATURES / DESCRIPTION	APPLICATION	FEATURES						
<b>Drill/Countersink</b> <ul style="list-style-type: none"> <li>Sub-micrograin carbide substrate for wear resistance</li> <li>Center drills</li> <li>Multipurpose tool: drill, chamfer, deburr and countersink</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>2FL</td> </tr> <tr> <td>Bright</td> <td>AlTiN</td> </tr> <tr> <td>TiN</td> <td>P 315</td> </tr> </table>	CARBIDE	2FL	Bright	AlTiN	TiN	P 315
CARBIDE	2FL							
Bright	AlTiN							
TiN	P 315							

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○			●	●	○	○			○	

● Best ○ Good

**Series 300** 2FL | 60°, 82°, 90° | Combo

Diameter (D <sub>1</sub> ) Size	In.	OAL (L)	Shank (D)	Incl. Angle	Bright	TiN	AlTiN
No. 00	0.0250	1-1/2	1/8	60°	300-001001	300-001501	300-001001B
No. 0	0.0313	1-1/2	1/8	60°	300-001002	300-001502	300-001002B
No. 1	0.0469	1-1/2	1/8	60°	300-001003	300-001503	300-001003B
No. 2	0.0782	1-7/8	3/16	60°	300-001004	300-001504	300-001004B
No. 3	0.1094	2	1/4	60°	300-001005	300-001505	300-001005B
No. 4	0.1250	2-1/8	5/16	60°	300-001006	300-001506	300-001006B
No. 5	0.1875	2-3/4	7/16	60°	300-001007	300-001507	300-001007B
No. 6	0.2188	3	1/2	60°	300-001008	300-001508	300-001008B
No. 7	0.2500	3-1/4	5/8	60°	300-001009	300-001509	300-001009B
No. 8	0.3125	3-1/2	3/4	60°	300-001010	300-001510	300-001010B
No. 00	0.0250	1-1/2	1/8	82°	300-002001	-	300-002001B
No. 0	0.0313	1-1/2	1/8	82°	300-002002	-	300-002002B
No. 1	0.0469	1-1/2	1/8	82°	300-002003	-	300-002003B
No. 2	0.0782	1-7/8	3/16	82°	300-002004	-	300-002004B
No. 3	0.1094	2	1/4	82°	300-002005	-	300-002005B
No. 4	0.1250	2-1/8	5/16	82°	300-002006	-	300-002006B
No. 5	0.1875	2-3/4	7/16	82°	300-002007	-	300-002007B
No. 6	0.2188	3	1/2	82°	300-002008	-	300-002008B
No. 7	0.2500	3-1/4	5/8	82°	300-002009	-	300-002009B
No. 8	0.3125	3-1/2	3/4	82°	300-002010	-	300-002010B
No. 00	0.0250	1-1/2	1/8	90°	300-003001	-	300-003001B
No. 0	0.0313	1-1/2	1/8	90°	300-003002	-	300-003002B
No. 1	0.0469	1-1/2	1/8	90°	300-003003	-	300-003003B
No. 2	0.0782	1-7/8	3/16	90°	300-003004	-	300-003004B
No. 3	0.1094	2	1/4	90°	300-003005	-	300-003005B
No. 4	0.1250	2-1/8	5/16	90°	300-003006	-	300-003006B
No. 5	0.1875	2-3/4	7/16	90°	300-003007	-	300-003007B
No. 6	0.2188	3	1/2	90°	300-003008	-	300-003008B
No. 7	0.2500	3-1/4	5/8	90°	300-003009	-	300-003009B
No. 8	0.3125	3-1/2	3/4	90°	300-003010	-	300-003010B
No. 1	0.0469	4	1/8	60°	300-005001	300-005501	300-005001B
No. 2	0.0782	4	3/16	60°	300-005002	300-005502	300-005002B
No. 3	0.1094	4	1/4	60°	300-005003	300-005503	300-005003B
No. 4	0.1250	4	5/16	60°	300-005004	300-005504	300-005004B
No. 5	0.1875	6	7/16	60°	300-005005	300-005505	300-005005B
No. 6	0.2188	6	1/2	60°	300-005006	300-005506	300-005006B
No. 7	0.2500	6	5/8	60°	300-005007	300-005507	300-005007B
No. 8	0.3125	6	3/4	60°	300-005008	300-005508	300-005008B
No. 1	0.0469	4	1/8	82°	300-006001	-	300-006001B
No. 2	0.0782	4	3/16	82°	300-006002	-	300-006002B
No. 3	0.1094	4	1/4	82°	300-006003	-	300-006003B
No. 4	0.1250	4	5/16	82°	300-006004	-	300-006004B
No. 5	0.1875	6	7/16	82°	300-006005	-	300-006005B
No. 6	0.2188	6	1/2	82°	300-006006	-	300-006006B

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide Combination Drill And Countersink



Series 300		2FL   60°, 82°, 90°   Combo					
Diameter (D <sub>1</sub> ) Size	In.	OAL (L)	Shank (D)	Incl. Angle	Bright	TiN	AlTiN
No. 8	0.3125	6	3/4	82°	<b>300-006008</b>	-	<b>300-006008B</b>
No. 1	0.0469	4	1/8	90°	<b>300-007001</b>	-	<b>300-007001B</b>
No. 2	0.0782	4	3/16	90°	<b>300-007002</b>	-	<b>300-007002B</b>
No. 3	0.1094	4	1/4	90°	<b>300-007003</b>	-	<b>300-007003B</b>
No. 4	0.1250	4	5/16	90°	<b>300-007004</b>	-	<b>300-007004B</b>
No. 5	0.1875	6	7/16	90°	<b>300-007005</b>	-	<b>300-007005B</b>
No. 6	0.2188	6	1/2	90°	<b>300-007006</b>	-	<b>300-007006B</b>
No. 7	0.2500	6	5/8	90°	<b>300-007007</b>	-	<b>300-007007B</b>
No. 8	0.3125	6	3/4	90°	<b>300-007008</b>	-	<b>300-007008B</b>

\*bold numbers are EDPs for ordering

## Popular Custom Holemaking Options

- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM  
COMES  
STANDARD**



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# ADVANCED PERFORMANCE

4D Solid Carbide Drills For Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>APERTURE</h2> <p><b>4xD Drill</b></p> <ul style="list-style-type: none"> <li>Micrograin carbide substrate for wear resistance</li> <li>Proprietary drill point technology produces reduced thrust forces and increases penetration rates</li> <li>Fx2 coating provides unrivaled lubricity and temperature reduction</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>25°</li> <li>2FL</li> <li>140°</li> <li>h6</li> <li>FX2</li> <li>P 315</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

**Series 4001** | 4xD | 2FL | Solid

Size	Diameter (D <sub>1</sub> )	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
3/64		0.0469	9/32	1-1/2	1/8	<b>434-000469B</b>
#55		0.0520	0.309	1-1/2	1/8	<b>434-000520B</b>
#54		0.0550	0.325	1-1/2	1/8	<b>434-000550B</b>
1.5mm		0.0591	8.8mm	38mm	3.0mm	<b>434-000591B</b>
#53		0.0595	0.348	1-1/2	1/8	<b>434-000595B</b>
1/16		0.0625	0.363	1-1/2	1/8	<b>434-000625B</b>
#52		0.0635	0.365	1-1/2	1/8	<b>434-000635B</b>
#50		0.0700	0.399	2	1/8	<b>434-000700B</b>
#49		0.0730	0.412	2	1/8	<b>434-000730B</b>
#48		0.0760	0.426	2	1/8	<b>434-000760B</b>
5/64		0.0781	0.433	2	1/8	<b>434-000781B</b>
2.0mm		0.0787	10.9mm	38mm	3.0mm	<b>434-000787B</b>
#46		0.0810	0.446	2	1/8	<b>434-000810B</b>
#45		0.0820	0.447	2	1/8	<b>434-000820B</b>
#44		0.0860	0.464	2	1/8	<b>434-000860B</b>
#43		0.0890	0.476	2	1/8	<b>434-000890B</b>
#42		0.0935	0.496	2	1/8	<b>434-000935B</b>
3/32		0.0938	0.492	2	1/8	<b>434-000938B</b>
#41		0.0960	1/2	2	1/8	<b>434-000960B</b>
#40		0.0980	0.505	2	1/8	<b>434-000980B</b>
2.5mm		0.0984	12.5mm	38mm	3.0mm	<b>434-000984B</b>
#39		0.0995	0.507	2	1/8	<b>434-000995B</b>
#38		0.1015	0.513	2	1/8	<b>434-001015B</b>
#37		0.1040	0.52	2	1/8	<b>434-001040B</b>
#36		0.1065	0.527	2	1/8	<b>434-001065B</b>
7/64		0.1094	0.536	2	1/8	<b>434-001094B</b>
3.0mm		0.1181	14.1mm	38mm	3.0mm	<b>434-001181B</b>
#31		0.1200	0.582	2	1/8	<b>434-001200B</b>
1/8		0.1250	0.6	2	1/8	<b>434-001250B</b>
#30		0.1285	39/64	2	3/16	<b>434-001285B</b>
#29		0.1360	0.639	2	3/16	<b>434-001360B</b>
3.5mm		0.1378	15.6mm	50mm	4.0mm	<b>434-001378B</b>
#28		0.1405	0.653	2	3/16	<b>434-001405B</b>
9/64		0.1406	0.647	2	3/16	<b>434-001406B</b>
#25		0.1495	0.68	2-1/2	3/16	<b>434-001495B</b>
5/32		0.1563	45/64	2-1/2	3/16	<b>434-001562B</b>
4.0mm		0.1575	16.8mm	50mm	4.0mm	<b>434-001575B</b>
#21		0.1590	0.708	2-1/2	3/16	<b>434-001590B</b>
#20		0.1610	0.644	2-1/2	3/16	<b>434-001610B</b>
11/64		0.1719	11/16	2-1/2	3/16	<b>434-001719B</b>
#16		0.1770	0.708	2-1/2	3/16	<b>434-001770B</b>
4.5mm		0.1772	18.0mm	50mm	5.0mm	<b>434-001772B</b>
3/16		0.1875	3/4	2-1/2	3/16	<b>434-001875B</b>
#11		0.1910	0.764	2-1/2	1/4	<b>434-001910B</b>

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

4D Solid Carbide Drills For Ferrous Materials



Series 4001

4xD | 2FL | Solid

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
#10	0.1935	0.774	2-1/2	1/4	<b>434-001935B</b>
5.0mm	0.1969	20.0mm	50mm	5.0mm	<b>434-001969B</b>
#7	0.2010	0.804	2-1/2	1/4	<b>434-002010B</b>
13/64	0.2031	13/16	2-1/2	1/4	<b>434-002031B</b>
#5	0.2055	0.822	2-1/2	1/4	<b>434-002055B</b>
#3	0.2130	0.852	2-1/2	1/4	<b>434-002130B</b>
7/32	0.2188	7/8	2-1/2	1/4	<b>434-002188B</b>
15/64	0.2344	15/16	2-1/2	1/4	<b>434-002344B</b>
6.0mm	0.2362	24.0mm	63mm	6.0mm	<b>434-002362B</b>
1/4	0.2500	1	2-1/2	1/4	<b>434-002500B</b>
6.5mm	0.2559	26.0mm	75mm	8.0mm	<b>434-002559B</b>
F	0.2570	1.028	3	5/16	<b>434-002570B</b>
17/64	0.2656	1-1/16	3	5/16	<b>434-002656B</b>
I	0.2720	1.088	3	5/16	<b>434-002720B</b>
7.0mm	0.2756	28mm	75mm	8.0mm	<b>434-002756B</b>
9/32	0.2813	1-1/8	3	5/16	<b>434-002812B</b>
7.5mm	0.2953	30mm	75mm	8.0mm	<b>434-002953B</b>
19/64	0.2969	1-3/16	3	5/16	<b>434-002969B</b>
5/16	0.3125	1-1/4	3	5/16	<b>434-003125B</b>
8.0mm	0.3150	32mm	75mm	8.0mm	<b>434-003150B</b>
21/64	0.3281	1-5/16	3	3/8	<b>434-003281B</b>
Q	0.3320	1-21/64	3	3/8	<b>434-003320B</b>
8.5mm	0.3346	34mm	100mm	10.0mm	<b>434-003346B</b>
11/32	0.3438	1-3/8	3	3/8	<b>434-003438B</b>
9.0mm	0.3543	36mm	100mm	10.0mm	<b>434-003543B</b>
23/64	0.3594	1-7/16	3	3/8	<b>434-003594B</b>
U	0.3680	1.472	3	3/8	<b>434-003680B</b>
9.5mm	0.3740	38mm	100mm	10.0mm	<b>434-003740B</b>
3/8	0.3750	1-1/2	3	3/8	<b>434-003750B</b>
25/64	0.3906	1-9/16	4	7/16	<b>434-003906B</b>
10.0mm	0.3937	40mm	100mm	10.0mm	<b>434-003937B</b>
13/32	0.4063	1-5/8	4	7/16	<b>434-004063B</b>
10.5mm	0.4134	42mm	100mm	12.0mm	<b>434-004134B</b>
27/64	0.4219	1-11/16	4	7/16	<b>434-004219B</b>
11.0mm	0.4331	44mm	100mm	12.0mm	<b>434-004331B</b>
7/16	0.4375	1-3/4	4	7/16	<b>434-004375B</b>
11.5mm	0.4528	46mm	100mm	12.0mm	<b>434-004528B</b>
29/64	0.4531	1-13/16	4	1/2	<b>434-004531B</b>
12.0mm	0.4724	48mm	100mm	12.0mm	<b>434-004724B</b>
31/64	0.4844	1-15/16	4	1/2	<b>434-004844B</b>
12.5mm	0.4921	50mm	100mm	14.0mm	<b>434-004921B</b>
1/2	0.5000	2	4	1/2	<b>434-005000B</b>
13.0mm	0.5118	52mm	100mm	14.0mm	<b>434-005118B</b>
33/64	0.5156	2-1/16	4	9/16	<b>434-005156B</b>
17/32	0.5313	2-1/8	4	9/16	<b>434-005313B</b>
13.5mm	0.5315	54mm	100mm	14.0mm	<b>434-005315B</b>
35/64	0.5469	2-3/16	4	9/16	<b>434-005469B</b>
9/16	0.5625	2-1/4	4	9/16	<b>434-005625B</b>
37/64	0.5781	2-5/16	5	5/8	<b>434-005781B</b>
19/32	0.5938	2-3/8	5	5/8	<b>434-005938B</b>
5/8	0.6250	2-1/2	5	5/8	<b>434-006250B</b>
21/32	0.6563	2.428	5	3/4	<b>434-006563B</b>
11/16	0.6875	2.544	5	3/4	<b>434-006875B</b>
3/4	0.7500	2.775	5	3/4	<b>434-007500B</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

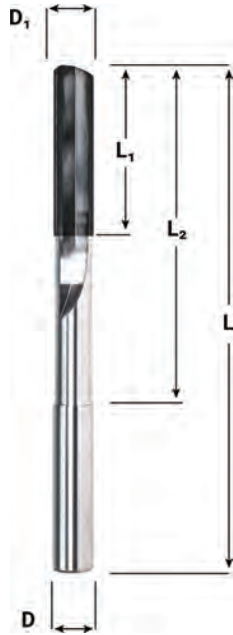
HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Self-Locating Carbide Reamers For Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES						
<b>PACREAMER</b>								
<b>Self-Centering Reamer</b>								
<ul style="list-style-type: none"> <li>Precise - Accurate - Concentric</li> <li>Micrograin carbide substrate for wear resistance</li> <li>Burnishing pad for mirror-like finishes</li> <li>Proprietary geometry ensures perfect straightness</li> <li>Available in stocked sizes for press and slip fit applications</li> <li>&gt;0.6240 has reduced shank</li> </ul>								
<table border="1"> <tr> <td>CARBIDE</td> <td>1FL</td> </tr> <tr> <td>0°</td> <td>h6</td> </tr> <tr> <td>AlTiN</td> <td>P 312</td> </tr> </table>			CARBIDE	1FL	0°	h6	AlTiN	P 312
CARBIDE	1FL							
0°	h6							
AlTiN	P 312							

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	○	●	●	●	●	●	●	○	○

● Best ○ Good

**Series 4050** | PAC | 1FL | Solid Carbide | Inch & Metric | Reamer

Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Pac Drill Size	EDP
Size	Dec.						
3.1496mm	0.1240	1	2	3	1/8	2.5mm	<b>427113</b>
3.1623mm	0.1245	1	2	3	1/8	2.5mm	<b>427115</b>
3.175mm	0.1250	1	2	3	1/8	2.5mm	<b>427118</b>
3.1877mm	0.1255	1	2	3	1/8	2.5mm	<b>427122</b>
3.2004mm	0.1260	1	2	3	1/8	2.5mm	<b>427123</b>
4.7371mm	0.1865	1-1/2	3	4	3/16	4.0mm	<b>427126</b>
4.7498mm	0.1870	1-1/2	3	4	3/16	4.0mm	<b>427127</b>
4.7625mm	0.1875	1-1/2	3	4	3/16	4.0mm	<b>427130</b>
4.7752mm	0.1880	1-1/2	3	4	3/16	4.0mm	<b>427131</b>
4.7879mm	0.1885	1-1/2	3	4	3/16	4.0mm	<b>427134</b>
5.975mm	0.2352	38mm	-	101mm	6.0mm	5.5mm	<b>427136</b>
5.987mm	0.2357	38mm	-	101mm	6.0mm	5.5mm	<b>427137</b>
6.0mm	0.2362	38mm	-	101mm	6.0mm	5.5mm	<b>427141</b>
6.013mm	0.2367	38mm	-	101mm	6.0mm	5.5mm	<b>427142</b>
6.025mm	0.2372	38mm	-	101mm	6.0mm	5.5mm	<b>427145</b>
6.3246mm	0.2490	1-1/2	3	4	1/4	6.0mm	<b>427147</b>
6.3373mm	0.2495	1-1/2	3	4	1/4	6.0mm	<b>427151</b>
6.35mm	0.2500	1-1/2	3	4	1/4	6.0mm	<b>427154</b>
6.3627mm	0.2505	1-1/2	3	4	1/4	6.0mm	<b>427157</b>
6.3754mm	0.2510	1-1/2	3	4	1/4	6.0mm	<b>427161</b>
7.9121mm	0.3115	1-1/2	3	4	5/16	7.5mm	<b>427163</b>
7.9121mm	0.3115	2	4	6	5/16	7.5mm	<b>427164</b>
7.9248mm	0.3120	1-1/2	3	4	5/16	7.5mm	<b>427168</b>
7.9248mm	0.3120	2	4	6	5/16	7.5mm	<b>427170</b>
7.9375mm	0.3125	1-1/2	3	4	5/16	7.5mm	<b>427173</b>
7.9375mm	0.3125	2	4	6	5/16	7.5mm	<b>427177</b>
7.9502mm	0.3130	1-1/2	3	4	5/16	7.5mm	<b>427178</b>
7.9502mm	0.3130	2	4	6	5/16	7.5mm	<b>427179</b>
7.9629mm	0.3135	1-1/2	3	4	5/16	7.5mm	<b>427181</b>
7.9629mm	0.3135	2	4	6	5/16	7.5mm	<b>427182</b>
7.975mm	0.3140	38mm	-	101mm	8.0mm	7.5mm	<b>427185</b>
7.975mm	0.3140	50mm	-	152mm	8.0mm	7.5mm	<b>427188</b>
7.987mm	0.3144	38mm	-	101mm	8.0mm	7.5mm	<b>427192</b>
7.987mm	0.3144	50mm	-	152mm	8.0mm	7.5mm	<b>427196</b>
8.0mm	0.3150	38mm	-	101mm	8.0mm	7.5mm	<b>427198</b>
8.0mm	0.3150	50mm	-	152mm	8.0mm	7.5mm	<b>427199</b>
8.013mm	0.3155	38mm	-	101mm	8.0mm	7.5mm	<b>427202</b>
8.013mm	0.3155	50mm	-	152mm	8.0mm	7.5mm	<b>427204</b>
8.025mm	0.3159	38mm	-	101mm	8.0mm	7.5mm	<b>427206</b>
8.025mm	0.3159	50mm	-	152mm	8.0mm	7.5mm	<b>427207</b>
9.4996mm	0.3740	1-1/2	3	4	3/8	9.0mm	<b>427210</b>
9.4996mm	0.3740	2	4	6	3/8	9.0mm	<b>427214</b>
9.5123mm	0.3745	1-1/2	3	4	3/8	9.0mm	<b>427215</b>
9.5123mm	0.3745	2	4	6	3/8	9.0mm	<b>427219</b>

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Self-Locating Carbide Reamers For Ferrous Materials



Series 4050

PAC | 1FL | Solid Carbide | Inch & Metric | Reamer

Diameter (D <sub>1</sub> ) Size	Dec.	Flute Length (L <sub>1</sub> )	LBS (L <sub>2</sub> )	OAL (L)	Shank (D)	Pac Drill Size	EDP
9.525mm	0.3750	1-1/2	3	4	3/8	9.0mm	427222
9.525mm	0.3750	2	4	6	3/8	9.0mm	427225
9.5377mm	0.3755	1-1/2	3	4	3/8	9.0mm	427226
9.5377mm	0.3755	2	4	6	3/8	9.0mm	427229
9.5504mm	0.3760	1-1/2	3	4	3/8	9.0mm	427231
9.5504mm	0.3760	2	4	6	3/8	9.0mm	427233
9.975mm	0.3927	50mm	-	152mm	10.0mm	9.5mm	427235
9.987mm	0.3932	50mm	-	152mm	10.0mm	9.5mm	427238
10.0mm	0.3937	50mm	-	152mm	10.0mm	9.5mm	427239
10.013mm	0.3942	50mm	-	152mm	10.0mm	9.5mm	427242
10.025mm	0.3947	50mm	-	152mm	10.0mm	9.5mm	427243
11.0871mm	0.4365	2	4	6	7/16	10.5mm	427247
11.0998mm	0.4370	2	4	6	7/16	10.5mm	427250
11.1125mm	0.4375	2	4	6	7/16	10.5mm	427252
11.1252mm	0.4380	2	4	6	7/16	10.5mm	427255
11.1379mm	0.4385	2	4	6	7/16	10.5mm	427256
11.975mm	0.4715	50mm	-	152mm	12.0mm	11.5mm	427257
11.987mm	0.4719	50mm	-	152mm	12.0mm	11.5mm	427258
12.0mm	0.4724	50mm	-	152mm	12.0mm	11.5mm	427262
12.013mm	0.4730	50mm	-	152mm	12.0mm	11.5mm	427266
12.025mm	0.4734	50mm	-	152mm	12.0mm	11.5mm	427269
12.6746mm	0.4990	2	4	6	1/2	12mm	427271
12.6873mm	0.4995	2	4	6	1/2	12mm	427273
12.7mm	0.5000	2	4	6	1/2	12mm	427275
12.7127mm	0.5005	2	4	6	1/2	12mm	427277
12.7254mm	0.5010	2	4	6	1/2	12mm	427279
13.975mm	0.5502	50mm	-	152mm	14.0mm	13.5mm	427281
13.987mm	0.5507	50mm	-	152mm	14.0mm	13.5mm	427285
14.0mm	0.5512	50mm	-	152mm	14.0mm	13.5mm	427289
14.013mm	0.5517	50mm	-	152mm	14.0mm	13.5mm	427293
14.025mm	0.5522	50mm	-	152mm	14.0mm	13.5mm	427297
15.8496mm	0.6240	2	4	6	9/16	15mm	427300
15.8623mm	0.6245	2	4	6	9/16	15mm	427302
15.875mm	0.6250	2	4	6	9/16	15mm	427305
15.8877mm	0.6255	2	4	6	9/16	15mm	427308
15.9004mm	0.6260	2	4	6	9/16	15mm	427312
15.975mm	0.6289	50mm	-	152mm	14.0mm	15.5mm	427316
15.987mm	0.6294	50mm	-	152mm	14.0mm	15.5mm	427320
16.0mm	0.6299	50mm	-	152mm	14.0mm	15.5mm	427324
16.013mm	0.6304	50mm	-	152mm	14.0mm	15.5mm	427325
16.025mm	0.6309	50mm	-	152mm	14.0mm	15.5mm	427329
19.0246mm	0.7490	2	4	6	5/8	18.5mm	427333
19.0373mm	0.7495	2	4	6	5/8	18.5mm	427337
19.05mm	0.7500	2	4	6	5/8	18.5mm	427339
19.0627mm	0.7505	2	4	6	5/8	18.5mm	427341
19.0754mm	0.7510	2	4	6	5/8	18.5mm	427344

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

5D Solid Carbide Drills For Cast Iron, Steel And Other Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>PACDRILL</b>		
<b>Ideal With PAC Reamer</b> <ul style="list-style-type: none"> <li>Precise - Accurate - Concentric</li> <li>AlTiN coating for ultimate wear resistance and lubricity</li> <li>S-Point design reduces thrust force for increased penetration rates</li> </ul>		
		<b>CARBIDE</b> <b>30°</b> <b>2FL</b> <b>140°</b> <b>RAD</b> <b>h6</b> <b>Bright</b> <b>AlTiN</b> <b>P 313</b>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	○	●	●	●	●	○	○		

● Best ○ Good

**Series 4005** | PAC-D | 2FL | 5xD | Solid | Inch & Metric

Size	Diameter (D <sub>1</sub> )	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
2.5mm		0.0984	12.5mm	69mm	3.0mm	<b>427001</b>
4.0mm		0.1575	20.0mm	80mm	4.0mm	<b>427002</b>
5.0mm		0.1969	25.0mm	88mm	6.0mm	<b>427004</b>
5.5mm		0.2165	27.5mm	91mm	6.0mm	<b>427007</b>
6.0mm		0.2362	30mm	95mm	6.0mm	<b>427010</b>
1/4		0.2500	1-1/4"	3-7/8"	1/4"	<b>427014</b>
7.0mm		0.2756	35mm	103mm	8.0mm	<b>427016</b>
7.5mm		0.2953	37.5mm	106mm	8.0mm	<b>427018</b>
5/16		0.3125	1-9/16"	4-11/32"	5/16"	<b>427020</b>
8.0mm		0.3150	40mm	110mm	8.0mm	<b>427021</b>
9.0mm		0.3543	45mm	118mm	10.0mm	<b>427023</b>
9.5mm		0.3740	47.5mm	121mm	10.0mm	<b>427027</b>
3/8		0.3750	1-7/8"	4-13/16"	3/8"	<b>427028</b>
10.0mm		0.3937	50mm	125mm	10.0mm	<b>427029</b>
10.5mm		0.4134	52.5mm	129mm	12.0mm	<b>427032</b>
11.5mm		0.4528	57.5mm	136mm	12.0mm	<b>427034</b>
12.0mm		0.4724	60mm	140mm	12.0mm	<b>427037</b>
1/2		0.5000	2-1/2"	5-3/4"	1/2"	<b>427040</b>
13.5mm		0.5315	67.5mm	151mm	14.0mm	<b>427044</b>
15.0mm		0.5906	75mm	163mm	16.0mm	<b>427045</b>
15.5mm		0.6102	77.5mm	166mm	16.0mm	<b>427047</b>
18.5mm		0.7283	92.5mm	189mm	20.0mm	<b>427048</b>

\*bold numbers are EDPs for ordering

### Popular Custom Holemaking Options

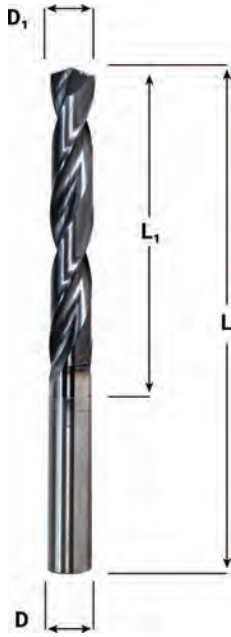
- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM  
COMES  
STANDARD**

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# ADVANCED PERFORMANCE

5D Coolant-Through Carbide Drills For Cast Iron, Steel, Stainless & Other Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<h2>PACDRILL</h2> <p><b>Ideal With PAC Reamer</b></p> <ul style="list-style-type: none"> <li>Precise - Accurate - Concentric</li> <li>FX5 coating for ultimate wear resistance and lubricity</li> <li>S-Point design reduces thrust force for increased penetration rates</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>30°</li> <li>2FL</li> <li>140°</li> <li>h6</li> <li>THRU</li> <li>AlTiN</li> <li>FX5</li> <li>P 314</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	○	●	●	●	●	○	○	○	○

● Best ○ Good

## Series 4105 PAC-D | 2FL | 5xD | Coolant-Through | Inch & Metric

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	AlTiN	FX5
2.5mm	0.0984	12.5mm	69mm	3.0mm	427051	400355
4.0mm	0.1575	20mm	80mm	4.0mm	427055	400357
5.0mm	0.1969	25mm	88mm	6.0mm	427057	400361
5.5mm	0.2165	27.5mm	91mm	6.0mm	427060	400365
6.0mm	0.2362	30mm	95mm	6.0mm	427064	400368
1/4	0.2500	1-1/4	3-7/8	1/4	427065	400369
7.0mm	0.2756	35mm	103mm	8.0mm	427069	400373
7.5mm	0.2953	37.5mm	106mm	8.0mm	427071	400377
8.0mm	0.3150	40mm	110mm	8.0mm	427079	400382
9.0mm	0.3543	45mm	118mm	10.0mm	427082	400385
9.5mm	0.3740	47.5mm	121mm	10.0mm	427084	400386
3/8	0.3750	1-7/8	4-13/16	3/8	427087	400388
10.0mm	0.3937	50mm	125mm	10.0mm	427089	400390
10.5mm	0.4134	52.5mm	129mm	12.0mm	427092	400393
11.5mm	0.4528	57.5mm	136mm	12.0mm	427093	400397
12.0mm	0.4724	60mm	140mm	12.0mm	427096	400399
1/2	0.5000	2-1/2	5-3/4	1/2	427097	400402
13.5mm	0.5315	67.5mm	151mm	14.0mm	427100	400403
15.0mm	0.5906	75mm	163mm	16.0mm	427104	400407
15.5mm	0.6102	77.5mm	166mm	16.0mm	427107	400408
18.5mm	0.7283	92.5mm	189mm	20.0mm	427109	400411

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

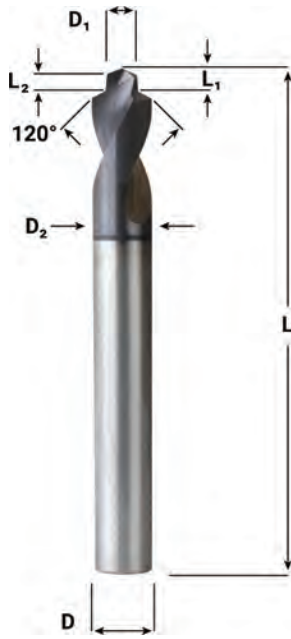
HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Carbide Hexalobe Step Drills For Bone Screws



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>HEXADRILL</b></p> <p><b>Drill - Chamfer - Deburr For Torx Screw</b></p> <ul style="list-style-type: none"> <li>Designed for the drilling and deburring of bone screws</li> <li>Standard diameters for pre-hole drilling "Torx" socket from T4 to T30</li> <li>Chrome-free coating</li> <li>Designed for use with Hexamill - Series 2150</li> </ul>		<ul style="list-style-type: none"> <li>CARBIDE</li> <li>30°</li> <li>2FL</li> <li>140°</li> <li>h6</li> <li>FX5</li> <li>P 311</li> </ul>

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	●	●	○	○	○	○	○	●	○	○

● Best ○ Good

Series 4060		HXD   2FL   Metric					
Torx Type	Diameter (D <sub>1</sub> )	L <sub>1</sub>	D (2)	L <sub>2</sub>	Shank (D)	OAL (L)	EDP
T4	0.9	0.70	1.7	0.56	3.0mm	40mm	<b>4060001</b>
T5	1.0	0.87	2.0	0.72	3.0mm	40mm	<b>4060002</b>
T5	1.0	0.75	2.0	0.59	3.0mm	40mm	<b>4060003</b>
T6	1.2	1.06	2.2	0.88	3.0mm	40mm	<b>4060004</b>
T6	1.2	0.86	2.2	0.67	3.0mm	40mm	<b>4060005</b>
T7	1.4	1.05	3.0	0.83	3.0mm	40mm	<b>4060006</b>
T7	1.4	1.01	3.0	0.79	3.0mm	40mm	<b>4060007</b>
T8	1.6	1.40	3.0	1.15	3.0mm	40mm	<b>4060008</b>
T8	1.6	1.05	3.0	0.81	3.0mm	40mm	<b>4060009</b>
T10	1.9	1.42	4.0	1.13	4.0mm	40mm	<b>4060010</b>
T15	2.3	1.78	4.0	1.42	4.0mm	50mm	<b>4060011</b>
T20	2.7	2.12	5.0	1.7	6.0mm	50mm	<b>4060012</b>
T25	3.1	2.84	6.0	2.36	6.0mm	50mm	<b>4060013</b>
T30	3.8	3.52	6.0	2.93	6.0mm	50mm	<b>4060014</b>
T30	3.8	3.04	6.0	2.45	6.0mm	50mm	<b>4060015</b>

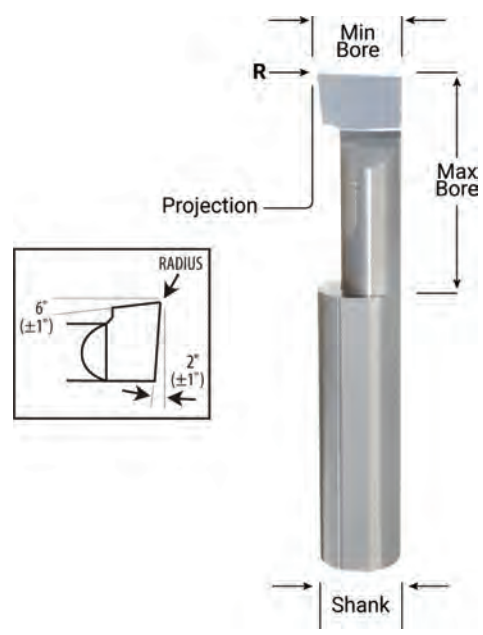
\*bold numbers are EDPs for ordering

## Popular Custom Holemaking Options

<ul style="list-style-type: none"> <li>Material-specific point geometry</li> <li>Longer flute lengths</li> <li>Internal coolant supply</li> <li>Proprietary GWS tool coatings</li> </ul>	<p><b>CUSTOM COMES STANDARD</b></p>
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# PERFORMANCE

## Solid Carbide Boring Bar



FEATURES / DESCRIPTION
<b>Boring Bar</b> <ul style="list-style-type: none"> <li>• Sub-micrograin carbide substrate for wear resistance</li> <li>• Lock-down flat automatically locates the tool on center</li> <li>• World-class finishes for horizontal drilling applications</li> <li>• Shank Diameter Tolerance: +0/-0.0005"</li> </ul>

APPLICATION

FEATURES

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

### Series 601 Lock-Down Flat | Radius

Minimum Bore	Maximum Bore	Projection	Shank (D)	Radius (R)	EDP
0.05	0.15	0.013	1/8	0.004	601-050150
0.05	0.2	0.013	1/8	0.004	601-050200
0.05	0.3	0.013	1/8	0.004	601-050300
0.05	0.4	0.013	1/8	0.004	601-050400
0.06	0.15	0.015	1/8	0.004	601-060150
0.06	0.2	0.015	1/8	0.004	601-060200
0.06	0.3	0.015	1/8	0.004	601-060300
0.06	0.4	0.015	1/8	0.004	601-060400
0.06	0.5	0.015	1/8	0.004	601-060500
0.08	0.15	0.02	1/8	0.004	601-080150
0.08	0.2	0.02	1/8	0.004	601-080200
0.08	0.3	0.02	1/8	0.004	601-080300
0.08	0.4	0.02	1/8	0.004	601-080400
0.08	0.5	0.02	1/8	0.004	601-080500
0.08	0.6	0.02	1/8	0.004	601-080600
0.1	0.15	0.025	1/8	0.004	601-100150
0.1	0.2	0.025	1/8	0.004	601-100200
0.1	0.3	0.025	1/8	0.004	601-100300
0.1	0.4	0.025	1/8	0.004	601-100400
0.1	0.5	0.025	1/8	0.004	601-100500
0.1	0.6	0.025	1/8	0.004	601-100600
0.1	0.7	0.025	1/8	0.004	601-100700
0.11	0.15	0.028	1/8	0.004	601-110150
0.11	0.2	0.028	1/8	0.004	601-110200
0.11	0.3	0.028	1/8	0.004	601-110300
0.11	0.4	0.028	1/8	0.004	601-110400
0.11	0.5	0.028	1/8	0.004	601-110500
0.11	0.6	0.028	1/8	0.004	601-110600
0.11	0.7	0.028	1/8	0.004	601-110700
0.12	0.25	0.03	3/16	0.006	601-120250
0.12	0.35	0.03	3/16	0.006	601-120350
0.12	0.5	0.03	3/16	0.006	601-120500
0.12	0.6	0.03	3/16	0.006	601-120600
0.12	0.7	0.03	3/16	0.006	601-120700
0.12	0.8	0.03	3/16	0.006	601-120800
0.14	0.25	0.035	3/16	0.006	601-140250
0.14	0.4	0.035	3/16	0.006	601-140400
0.14	0.5	0.035	3/16	0.006	601-140500
0.14	0.6	0.035	3/16	0.006	601-140600
0.14	0.7	0.035	3/16	0.006	601-140700
0.14	0.75	0.035	3/16	0.006	601-140750
0.14	0.8	0.035	3/16	0.006	601-140800
0.16	1	0.04	3/16	0.006	601-1601000
0.16	0.25	0.04	3/16	0.006	601-160250
0.16	0.4	0.04	3/16	0.006	601-160400

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS



# PERFORMANCE

Solid Carbide Boring Bar



Series 601		Lock-Down Flat   Radius			
Minimum Bore	Maximum Bore	Projection	Shank (D)	Radius (R)	EDP
0.16	0.5	0.04	3/16	0.006	<b>601-160500</b>
0.16	0.6	0.04	3/16	0.006	<b>601-160600</b>
0.16	0.75	0.04	3/16	0.006	<b>601-160750</b>
0.16	0.9	0.04	3/16	0.006	<b>601-160900</b>
0.18	1	0.045	1/4	0.006	<b>601-1801000</b>
0.18	1.1	0.045	1/4	0.006	<b>601-1801100</b>
0.18	1.25	0.045	1/4	0.006	<b>601-1801250</b>
0.18	1.5	0.045	1/4	0.006	<b>601-1801500</b>
0.18	0.35	0.045	1/4	0.006	<b>601-180350</b>
0.18	0.5	0.045	1/4	0.006	<b>601-180500</b>
0.18	0.6	0.045	1/4	0.006	<b>601-180600</b>
0.18	0.75	0.045	1/4	0.006	<b>601-180750</b>
0.18	0.9	0.045	1/4	0.006	<b>601-180900</b>
0.2	1	0.05	1/4	0.006	<b>601-2001000</b>
0.2	1.1	0.05	1/4	0.006	<b>601-2001100</b>
0.2	1.2	0.05	1/4	0.006	<b>601-2001200</b>
0.2	1.3	0.05	1/4	0.006	<b>601-2001300</b>
0.2	0.4	0.05	1/4	0.006	<b>601-200400</b>
0.2	0.5	0.05	1/4	0.006	<b>601-200500</b>
0.2	0.6	0.05	1/4	0.006	<b>601-200600</b>
0.2	0.7	0.05	1/4	0.006	<b>601-200700</b>
0.2	0.8	0.05	1/4	0.006	<b>601-200800</b>
0.2	0.9	0.05	1/4	0.006	<b>601-200900</b>
0.23	1	0.058	5/16	0.006	<b>601-2301000</b>
0.23	1.1	0.058	5/16	0.006	<b>601-2301100</b>
0.23	1.15	0.058	5/16	0.006	<b>601-2301150</b>
0.23	1.2	0.058	5/16	0.006	<b>601-2301200</b>
0.23	1.25	0.058	5/16	0.006	<b>601-2301250</b>
0.23	1.4	0.058	5/16	0.006	<b>601-2301400</b>
0.23	1.5	0.058	5/16	0.006	<b>601-2301500</b>
0.23	1.6	0.058	5/16	0.006	<b>601-2301600</b>
0.23	0.4	0.058	5/16	0.006	<b>601-230400</b>
0.23	0.5	0.058	5/16	0.006	<b>601-230500</b>
0.23	0.6	0.058	5/16	0.006	<b>601-230600</b>
0.23	0.7	0.058	5/16	0.006	<b>601-230700</b>
0.23	0.8	0.058	5/16	0.006	<b>601-230800</b>
0.23	0.9	0.058	5/16	0.006	<b>601-230900</b>
0.29	1	0.073	5/16	0.006	<b>601-2901000</b>
0.29	1.1	0.073	5/16	0.006	<b>601-2901100</b>
0.29	1.25	0.073	5/16	0.006	<b>601-2901250</b>
0.29	1.35	0.073	5/16	0.006	<b>601-2901350</b>
0.29	1.5	0.073	5/16	0.006	<b>601-2901500</b>
0.29	1.6	0.073	5/16	0.006	<b>601-2901600</b>
0.29	1.75	0.073	5/16	0.006	<b>601-2901750</b>
0.29	0.5	0.073	5/16	0.006	<b>601-290500</b>
0.29	0.6	0.073	5/16	0.006	<b>601-290600</b>
0.29	0.75	0.073	5/16	0.006	<b>601-290750</b>
0.29	0.9	0.073	5/16	0.006	<b>601-290900</b>
0.32	1	0.08	3/8	0.006	<b>601-3201000</b>
0.32	1.1	0.08	3/8	0.006	<b>601-3201100</b>
0.32	1.25	0.08	3/8	0.006	<b>601-3201250</b>
0.32	1.5	0.08	3/8	0.006	<b>601-3201500</b>
0.32	1.6	0.08	3/8	0.006	<b>601-3201600</b>
0.32	1.8	0.08	3/8	0.006	<b>601-3201800</b>
0.32	2	0.08	3/8	0.006	<b>601-3202000</b>
0.32	2.5	0.08	3/8	0.006	<b>601-3202500</b>
0.32	3.0	0.08	3/8	0.006	<b>601-3203000</b>
0.32	0.5	0.08	3/8	0.006	<b>601-320500</b>
0.32	0.6	0.08	3/8	0.006	<b>601-320600</b>
0.32	0.75	0.08	3/8	0.006	<b>601-320750</b>
0.32	0.9	0.08	3/8	0.006	<b>601-320900</b>
0.36	1	0.09	3/8	0.006	<b>601-3601000</b>
0.36	1.15	0.09	3/8	0.006	<b>601-3601150</b>
0.36	1.25	0.09	3/8	0.006	<b>601-3601250</b>
0.36	1.5	0.09	3/8	0.006	<b>601-3601500</b>
0.36	1.6	0.09	3/8	0.006	<b>601-3601600</b>
0.36	1.8	0.09	3/8	0.006	<b>601-3601800</b>
0.36	2	0.09	3/8	0.006	<b>601-3602000</b>
0.36	2.5	0.09	3/8	0.006	<b>601-3602500</b>
0.36	3.0	0.09	3/8	0.006	<b>601-3603000</b>
0.36	0.5	0.09	3/8	0.006	<b>601-360500</b>
0.36	0.6	0.09	3/8	0.006	<b>601-360600</b>
0.36	0.75	0.09	3/8	0.006	<b>601-360750</b>
0.36	0.9	0.09	3/8	0.006	<b>601-360900</b>
0.49	1	0.123	1/2	0.006	<b>601-4901000</b>
0.49	1.25	0.123	1/2	0.006	<b>601-4901250</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Solid Carbide Boring Bar



Series 601		Lock-Down Flat   Radius			
Minimum Bore	Maximum Bore	Projection	Shank (D)	Radius (R)	EDP
0.49	1.5	0.123	1/2	0.006	<b>601-4901500</b>
0.49	2	0.123	1/2	0.006	<b>601-4902000</b>
0.49	2.5	0.123	1/2	0.006	<b>601-4902500</b>
0.49	2.6	0.123	1/2	0.006	<b>601-4902600</b>
0.49	2.75	0.123	1/2	0.006	<b>601-4902750</b>
0.49	3.0	0.123	1/2	0.006	<b>601-4903000</b>
0.49	3.5	0.123	1/2	0.006	<b>601-4903500</b>
0.49	4.0	0.123	1/2	0.006	<b>601-4904000</b>
0.49	4.5	0.123	1/2	0.006	<b>601-4904500</b>
0.49	0.75	0.123	1/2	0.006	<b>601-490750</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

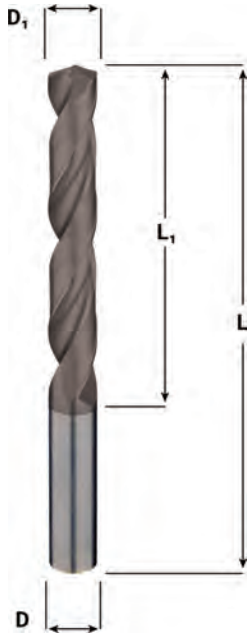
HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide Stub Length Drill



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<ul style="list-style-type: none"> <li>Sub-micrograin carbide grade for wear resistance and edge strength</li> <li>Heavy web allows 3XD drilling depth without spot drilling</li> <li>140° self-centering double split point requires no spotting and reduces chisel pressure</li> <li>Can be used to produce on size starting hole drill before longer deep hole drills</li> <li>Available TiN or TiAlN</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	●	●	●	●	●	●	●	●	●	●	○	○

● Best ○ Good

**Series 114** Durapoint | 2FL | 140° | Stub Length

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	TiN	TiAlN
#40	0.0980	9/16	1-15/16	.098	11400980	11400980A
2.5mm	0.0984	9/16	1-15/16	.0984	11400984	11400984A
#39	0.0995	9/16	1-15/16	.0995	11400995	11400995A
#38	0.1015	9/16	1-15/16	0.1015	11401015	11401015A
#37	0.1040	5/8	2	0.104	11401040	11401040A
#36	0.1065	5/8	2	0.1065	11401065	11401065A
7/64	0.1094	5/8	2	7/64	11401094	11401094A
#35	0.1100	5/8	2	7/64	11401100	11401100A
#34	0.1110	5/8	2	0.111	11401110	11401110A
#33	0.1130	5/8	2	0.113	11401130	11401130A
#32	0.1160	11/16	2-1/16	0.116	11401160	11401160A
3.0mm	0.1181	17.0mm	52mm	3.0mm	11401181	11401181A
#31	0.1200	11/16	2-1/16	0.12	11401200	11401200A
1/8	0.1250	11/16	2-1/16	1/8	11401250	11401250A
3.2mm	0.1260	11/16	2-1/16	0.1260	11401260	11401260A
#30	0.1285	11/16	2-1/16	#30	11401285	11401285A
3.3mm	0.1299	11/16	2-1/16	0.1299	11401299	11401299A
3.4mm	0.1339	11/16	2-1/16	0.1339	11401339	11401339A
#29	0.1360	11/16	2-1/16	0.136	11401360	11401360A
3.5mm	0.1378	25/32	2-5/32	0.1378	11401378	11401378A
#28	0.1405	25/32	2-5/32	9/64	11401405	11401405A
9/64	0.1406	25/32	2-5/32	9/64	11401406	11401406A
3.6mm	0.1417	25/32	2-5/32	0.1417	11401417	11401417A
#27	0.1440	25/32	2-5/32	0.144	11401440	11401440A
#26	0.1470	25/32	2-5/32	0.147	11401470	11401470A
#25	0.1495	25/32	2-5/32	0.1495	11401495	11401495A
#24	0.1520	25/32	2-5/32	0.152	11401520	11401520A
#23	0.1540	27/32	2-7/32	0.154	11401540	11401540A
5/32	0.1562	27/32	2-7/32	5/32	11401562	11401562A
#22	0.1570	27/32	2-7/32	5/32	11401570	11401570A
4.0mm	0.1575	21.0mm	56mm	4.0mm	11401575	11401575A
#21	0.1590	27/32	2-7/32	0.159	11401590	11401590A
#20	0.1610	27/32	2-7/32	0.161	11401610	11401610A
4.1mm	0.1614	27/32	2-7/32	0.1614	11401614	11401614A
4.125mm	0.1624	27/32	2-7/32	0.1624	11401624	11401624A
4.2mm	0.1654	27/32	2-7/32	0.1654	11401654	11401654A
#19	0.1660	27/32	2-7/32	0.166	11401660	11401660A
4.25mm	0.1673	27/32	2-7/32	0.1673	11401673	11401673A
#18	0.1695	27/32	2-7/32	0.1695	11401695	11401695A
11/64	0.1719	27/32	2-7/32	11/64	11401719	11401719A
#17	0.1730	29/32	2-9/32	11/64	11401730	11401730A
#16	0.1770	29/32	2-9/32	0.177	11401770	11401770A
4.5mm	0.1772	29/32	2-9/32	0.1772	11401772	11401772A
#15	0.1800	29/32	2-9/32	0.18	11401800	11401800A

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide Stub Length Drill



## Series 114

Durapoint | 2FL | 140° | Stub Length

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	TiN	TiAlN
#14	0.1820	1	2-3/8	0.182	11401820	11401820A
#13	0.1850	1	2-3/8	0.185	11401850	11401850A
3/16	0.1875	1	2-3/8	3/16	11401875	11401875A
#12	0.1890	1	2-3/8	3/16	11401890	11401890A
#11	0.1910	1	2-3/8	0.191	11401910	11401910A
4.9mm	0.1929	1	2-3/8	0.1929	11401929	11401929A
#10	0.1935	1	2-3/8	#10	11401935	11401935A
#9	0.1960	1	2-3/8	0.196	11401960	11401960A
5.0mm	0.1969	27mm	62mm	5.0mm	11401969	11401969A
#8	0.1990	1-1/16	2-7/16	0.199	11401990	11401990A
#7	0.2010	1-1/16	2-7/16	0.201	11402010	11402010A
13/64	0.2031	1-1/16	2-7/16	13/64	11402031	11402031A
#6	0.2040	1-1/16	2-7/16	13/64	11402040	11402040A
#5	0.2055	1-1/16	2-7/16	0.2055	11402055	11402055A
#4	0.2090	1-1/8	2-1/2	0.209	11402090	11402090A
#3	0.2130	1-1/8	2-1/2	0.213	11402130	11402130A
5.5mm	0.2165	1-1/8	2-1/2	0.2165	11402165	11402165A
7/32	0.2188	1-1/8	2-1/2	7/32	11402188	11402188A
5.6mm	0.2205	1-1/8	2-1/2	0.2205	11402205	11402205A
#2	0.2210	1-1/8	2-1/2	0.221	11402210	11402210A
#1	0.2280	1-1/8	2-1/2	0.228	11402280	11402280A
A	0.2340	1-5/32	2-17/32	15/64	11402340	11402340A
15/64	0.2344	1-5/32	2-17/32	15/64	11402344	11402344A
6.0mm	0.2362	29mm	64mm	6.0mm	11402362	11402362A
B	0.2380	1-5/32	2-17/32	0.238	11402380	11402380A
6.1mm	0.2402	1-5/32	2-17/32	0.2402	11402402	11402402A
C	0.2420	1-5/32	2-17/32	0.242	11402420	11402420A
D	0.2460	1-7/32	2-19/32	0.246	11402460	11402460A
6.3mm	0.2480	1-7/32	2-19/32	0.2480	11402480	11402480A
1/4	0.2500	1-7/32	2-19/32	1/4	11402500	11402500A
6.4mm	0.2520	1-7/32	2-19/32	0.2520	11402520	11402520A
6.5mm	0.2559	1-7/32	2-19/32	0.2559	11402559	11402559A
F	0.2570	1-7/32	2-19/32	0.257	11402570	11402570A
6.6mm	0.2598	1-1/4	2-5/8	0.2598	11402598	11402598A
G	0.2610	1-1/4	2-5/8	0.261	11402610	11402610A
6.68mm	0.2630	1-1/4	2-5/8	0.2630	11402630	11402630A
17/64	0.2656	1-1/4	2-5/8	17/64	11402656	11402656A
H	0.2660	1-1/4	2-5/8	17/64	11402660	11402660A
6.85mm	0.2697	1-1/4	2-5/8	0.2697	11402697	11402697A
I	0.2720	1-1/4	2-5/8	0.272	11402720	11402720A
7.0mm	0.2756	32mm	67mm	7.0mm	11402756	11402756A
J	0.2770	1-5/16	2-11/16	0.277	11402770	11402770A
7.1mm	0.2795	1-5/16	2-11/16	0.2795	11402795	11402795A
K	0.2810	1-5/16	2-11/16	9/32	11402810	11402810A
9/32	0.2812	1-5/16	2-11/16	9/32	11402812	11402812A
7.2mm	0.2835	1-5/16	2-11/16	0.2835	11402835	11402835A
L	0.2900	1-5/16	2-11/16	0.29	11402900	11402900A
M	0.2950	1-3/8	2-3/4	0.295	11402950	11402950A
7.5mm	0.2953	1-3/8	2-3/4	0.2953	11402953	11402953A
19/64	0.2969	1-3/8	2-3/4	19/64	11402969	11402969A
7.6mm	0.2992	1-3/8	2-3/4	0.2992	11402992	11402992A
N	0.3020	1-3/8	2-3/4	0.302	11403020	11403020A
7.8mm	0.3071	1-7/16	2-13/16	0.3071	11403071	11403071A
5/16	0.3125	1-7/16	2-13/16	5/16	11403125	11403125A
8.0mm	0.3150	37mm	71mm	8.0mm	11403150	11403150A
O	0.3160	1-7/16	2-13/16	0.316	11403160	11403160A
8.1mm	0.3189	1-7/16	2-13/16	0.3189	11403189	11403189A
P	0.3230	1-7/16	2-13/16	0.323	11403230	11403230A
21/64	0.3281	1-1/2	2-7/8	21/64	11403281	11403281A
Q	0.3320	1-1/2	2-7/8	0.332	11403320	11403320A
8.5mm	0.3346	1-1/2	2-7/8	0.3346	11403346	11403346A
8.56mm	0.3370	1-9/16	2-15/16	0.3370	11403370	11403370A
R	0.3390	1-9/16	2-15/16	0.339	11403390	11403390A
11/32	0.3438	1-9/16	2-15/16	11/32	11403438	11403438A
S	0.3480	1-9/16	2-15/16	0.348	11403480	11403480A
9.0mm	0.3543	41mm	76mm	9.0mm	11403543	11403543A
T	0.3580	1-5/8	3	23/64	11403580	11403580A
23/64	0.3594	1-5/8	3	23/64	11403594	11403594A
U	0.3680	1-5/8	3	0.368	11403680	11403680A
9.5mm	0.3740	1-3/4	3-1/4	0.3740	11403740	11403740A
3/8	0.3750	1-3/4	3-1/4	3/8	11403750	11403750A
V	0.3770	1-3/4	3-1/4	0.377	11403770	11403770A
9.7mm	0.3819	1-13/16	3-5/16	0.3819	11403819	11403819A
W	0.3860	1-13/16	3-5/16	0.386	11403860	11403860A
25/64	0.3906	1-13/16	3-5/16	25/64	11403906	11403906A

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide Stub Length Drill

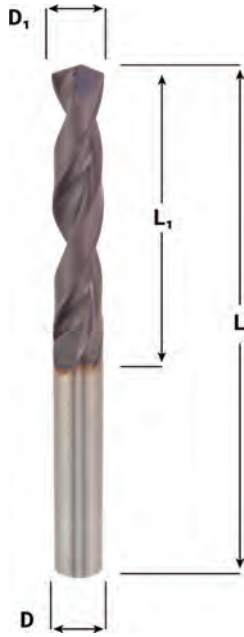


Series 114		Durapoint   2FL   140°   Stub Length				
Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	TiN	TiAlN
10.0mm	0.3937	46mm	84mm	10.0mm	11403937	11403937A
X	0.3970	1-7/8	3-3/8	0.397	11403970	11403970A
Y	0.4040	1-7/8	3-3/8	0.404	11404040	11404040A
13/32	0.4062	1-7/8	3-3/8	13/32	11404062	11404062A
10.4mm	0.4094	1-7/8	3-3/8	0.4094	11404094	11404094A
Z	0.4130	1-7/8	3-3/8	0.413	11404130	11404130A
10.5mm	0.4134	1-7/8	3-3/8	0.4134	11404134	11404134A
10.6mm	0.4173	1-7/8	3-3/8	0.4173	11404173	11404173A
27/64	0.4219	1-15/16	3-7/16	27/64	11404219	11404219A
10.8mm	0.4252	1-15/16	3-7/16	0.4252	11404252	11404252A
10.95mm	0.4311	1-15/16	3-7/16	0.4311	11404311	11404311A
11.0mm	0.4331	49mm	87mm	11.0mm	11404331	11404331A
7/16	0.4375	2	3-1/2	7/16	11404375	11404375A
11.4mm	0.4488	2	3-1/2	0.4488	11404488	11404488A
11.5mm	0.4528	2	3-1/2	0.4528	11404528	11404528A
29/64	0.4531	2	3-1/2	29/64	11404531	11404531A
11.6mm	0.4567	2	3-1/2	0.4567	11404567	11404567A
15/32	0.4688	2-3/16	3-15/16	15/32	11404688	11404688A
12.0mm	0.4724	56mm	100mm	12.0mm	11404724	11404724A
12.1mm	0.4764	2-3/16	3-15/16	0.4764	11404764	11404764A
31/64	0.4844	2-3/16	3-15/16	31/64	11404844	11404844A
12.35mm	0.4862	2-3/16	3-15/16	0.4862	11404862	11404862A
12.4mm	0.4882	2-3/16	3-15/16	0.4882	11404882	11404882A
12.5mm	0.4921	2-3/16	3-15/16	0.4921	11404921	11404921A
12.6mm	0.4961	2-3/8	4-7/16	0.4961	11404961	11404961A
1/2	0.5000	2-3/8	4-7/16	1/2	11405000	11405000A
12.8mm	0.5039	2-3/8	4-7/16	0.5039	11405039	11405039A
12.9mm	0.5079	2-3/8	4-7/16	0.5079	11405079	11405079A
13.0mm	0.5118	60mm	113mm	13.0mm	11405118	11405118A
33/64	0.5156	2-3/8	4-7/16	33/64	11405156	11405156A
17/32	0.5312	2-3/8	4-7/16	17/32	11405312	11405312A
13.5mm	0.5315	2-3/8	4-7/16	0.5315	11405315	11405315A
13.6mm	0.5354	2-1/2	4-1/2	0.5354	11405354	11405354A
13.8mm	0.5433	2-1/2	4-1/2	0.5433	11405433	11405433A
35/64	0.5469	2-1/2	4-1/2	35/64	11405469	11405469A
14.0mm	0.5512	64mm	114mm	14.0mm	11405512	11405512A
14.1mm	0.5551	2-1/2	4-1/2	0.5551	11405551	11405551A
14.15mm	0.5571	2-1/2	4-1/2	0.5571	11405571	11405571A
9/16	0.5625	2-1/2	4-1/2	9/16	11405625	11405625A
14.5mm	0.5709	2-5/8	4-5/8	0.5709	11405709	11405709A
14.6mm	0.5748	2-5/8	4-5/8	0.5748	11405748	11405748A
37/64	0.5781	2-5/8	4-5/8	37/64	11405781	11405781A
15.0mm	0.5906	67mm	117mm	15.0mm	11405906	11405906A
19/32	0.5938	2-5/8	4-5/8	19/32	11405938	11405938A
39/64	0.6094	2-3/4	4-3/4	39/64	11406094	11406094A
15.5mm	0.6102	2-3/4	4-3/4	0.6102	11406102	11406102A
5/8	0.6250	2-3/4	4-3/4	5/8	11406250	11406250A
16.0mm	0.6299	70mm	121mm	16.0mm	11406299	11406299A
41/64	0.6406	3	5	41/64	11406406	11406406A
16.5mm	0.6496	3	5	0.6496	11406496	11406496A
21/32	0.6562	3	5	21/32	11406562	11406562A
16.75mm	0.6594	3	5	0.6594	11406594	11406594A
17.0mm	0.6693	76mm	127mm	17.0mm	11406693	11406693A
43/64	0.6719	3	5	43/64	11406719	11406719A
11/16	0.6875	3	5	11/16	11406875	11406875A
17.5mm	0.6890	3-1/4	5-1/4	0.6890	11406890	11406890A
17.6mm	0.6929	3-1/4	5-1/4	0.6929	11406929	11406929A
45/64	0.7031	3-1/4	5-1/4	45/64	11407031	11407031A
18.0mm	0.7087	83mm	133mm	18.0mm	11407087	11407087A
23/32	0.7188	3-1/4	5-1/4	23/32	11407188	11407188A
18.5mm	0.7283	3-1/4	5-1/4	0.7283	11407283	11407283A
47/64	0.7344	3-1/4	5-1/4	47/64	11407344	11407344A
19.0mm	0.7480	89mm	140mm	19.0mm	11407480	11407480A
3/4	0.7500	3-1/2	5-1/2	3/4	11407500	11407500A

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide Jobber Length Drill



FEATURES / DESCRIPTION	APPLICATION	FEATURES						
<ul style="list-style-type: none"> <li>• Sub-micrograin carbide grade for wear resistance and edge strength</li> <li>• Heavy web allows 4.5XD drilling depth without spot drilling</li> <li>• 140° self-centering double split point requires no spotting and reduces chisel pressure</li> <li>• TiAlN coating is high abrasion and heat resistant</li> <li>• Shank Tol.: +0/- 0.0005"</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>30°</td> </tr> <tr> <td>2FL</td> <td>140°</td> </tr> <tr> <td>TiAlN</td> <td>P 305</td> </tr> </table>	CARBIDE	30°	2FL	140°	TiAlN	P 305
CARBIDE	30°							
2FL	140°							
TiAlN	P 305							

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	●	●	●	●	●	●	●	●	●	●	○	○

● Best ○ Good

## Series 118 Durapoint | 2FL | 140° | Jobber Length

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
1/8	0.1250	7/8	2-1/4	1/8	<b>11801250A</b>
3.5mm	0.1378	31/32	2-11/32	0.1378	<b>11801378A</b>
9/64	0.1406	1	2-3/8	9/64	<b>11801406A</b>
5/32	0.1562	1-1/8	2-15/32	5/32	<b>11801562A</b>
4.0mm	0.1575	29mm	63mm	4.0mm	<b>11801575A</b>
11/64	0.1719	1-1/4	2-5/8	11/64	<b>11801719A</b>
4.5mm	0.1772	1-1/4	2-5/8	0.1772	<b>11801772A</b>
3/16	0.1875	1-5/16	2-11/16	3/16	<b>11801875A</b>
5.0mm	0.1969	35mm	70mm	5.0mm	<b>11801969A</b>
#7	0.2010	1-7/16	2-13/16	0.201	<b>11802010A</b>
13/64	0.2031	1-7/16	2-13/16	13/64	<b>11802031A</b>
5.5mm	0.2165	1-17/32	2-15/16	0.2165	<b>11802165A</b>
7/32	0.2188	1-17/32	2-15/16	7/32	<b>11802188A</b>
15/64	0.2344	1-5/8	3	15/64	<b>11802344A</b>
6.0mm	0.2362	41mm	76mm	6.0mm	<b>11802362A</b>
D	0.2460	1-5/8	3-3/16	0.246	<b>11802460A</b>
1/4	0.2500	1-5/8	3-3/16	1/4	<b>11802500A</b>
6.5mm	0.2559	1-5/8	3-3/16	0.2559	<b>11802559A</b>
F	0.2570	1-5/8	3-3/16	0.257	<b>11802570A</b>
17/64	0.2656	1-23/32	3-1/4	17/64	<b>11802656A</b>
I	0.2720	1-23/32	3-1/4	0.272	<b>11802720A</b>
7.0mm	0.2756	44mm	83mm	7.0mm	<b>11802756A</b>
9/32	0.2812	1-25/32	3-7/16	9/32	<b>11802812A</b>
7.5mm	0.2953	1-25/32	3-7/16	0.2953	<b>11802953A</b>
19/64	0.2969	1-31/32	3-9/16	19/64	<b>11802969A</b>
5/16	0.3125	1-31/32	3-9/16	5/16	<b>11803125A</b>
8.0mm	0.3150	48mm	90mm	8.0mm	<b>11803150A</b>
P	0.3230	2-3/32	3-25/32	0.323	<b>11803230A</b>
21/64	0.3281	2-3/32	3-25/32	21/64	<b>11803281A</b>
Q	0.3320	2-3/32	3-25/32	0.332	<b>11803320A</b>
8.5mm	0.3346	2-3/16	3-7/8	0.3346	<b>11803346A</b>
11/32	0.3438	2-3/16	3-7/8	11/32	<b>11803438A</b>
S	0.3480	2-3/16	3-7/8	0.348	<b>11803480A</b>
9.0mm	0.3543	56mm	98mm	9.0mm	<b>11803543A</b>
23/64	0.3594	2-9/32	4-1/32	23/64	<b>11803594A</b>
U	0.3680	2-9/32	4-1/32	0.368	<b>11803680A</b>
9.5mm	0.3740	2-9/32	4-1/32	0.3740	<b>11803740A</b>
3/8	0.3750	2-9/32	4-1/32	3/8	<b>11803750A</b>
W	0.3860	2-3/8	4-1/8	0.386	<b>11803860A</b>
25/64	0.3906	2-3/8	4-1/8	25/64	<b>11803906A</b>
10.0mm	0.3937	60mm	105mm	10.0mm	<b>11803937A</b>
13/32	0.4062	2-19/32	4-1/8	13/32	<b>11804062A</b>
10.5mm	0.4134	2-19/32	4-1/8	0.4134	<b>11804134A</b>
27/64	0.4219	2-11/16	4-1/2	27/64	<b>11804219A</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide Jobber Length Drill



Series 118

Durapoint | 2FL | 140° | Jobber Length

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
11.0mm	0.4331	68mm	114mm	11.0mm	<b>11804331A</b>
7/16	0.4375	2-13/16	4-21/32	7/16	<b>11804375A</b>
11.5mm	0.4528	2-13/16	4-21/32	0.4528	<b>11804528A</b>
29/64	0.4531	2-13/16	4-21/32	29/64	<b>11804531A</b>
15/32	0.4688	2-7/8	4-25/32	15/32	<b>11804688A</b>
12.0mm	0.4724	73mm	121mm	12.0mm	<b>11804724A</b>
31/64	0.4844	3	5-5/16	31/64	<b>11804844A</b>
12.5mm	0.4921	3-3/32	5-13/32	0.4921	<b>11804921A</b>
1/2	0.5000	3-3/32	5-13/32	1/2	<b>11805000A</b>
13.0mm	0.5118	79mm	137mm	13.0mm	<b>11805118A</b>
33/64	0.5156	3-5/16	5-11/16	33/64	<b>11805156A</b>
17/32	0.5312	3-5/16	5-11/16	17/32	<b>11805312A</b>
13.5mm	0.5315	3-5/16	5-11/16	0.5315	<b>11805315A</b>
35/64	0.5469	3-13/32	5-15/16	35/64	<b>11805469A</b>
14.0mm	0.5512	87mm	151mm	14.0mm	<b>11805512A</b>
9/16	0.5625	3-1/2	5-15/16	9/16	<b>11805625A</b>
14.5mm	0.5709	3-1/2	5-15/16	0.5709	<b>11805709A</b>
37/64	0.5781	3-11/16	6-3/16	37/64	<b>11805781A</b>
15.0mm	0.5906	94mm	157mm	15.0mm	<b>11805906A</b>
19/32	0.5938	3-11/16	6-3/16	19/32	<b>11805938A</b>
39/64	0.6094	3-11/16	6-3/16	39/64	<b>11806094A</b>
15.5mm	0.6102	3-11/16	6-3/16	0.6102	<b>11806102A</b>
5/8	0.6250	3-25/32	6-5/16	5/8	<b>11806250A</b>
16.0mm	0.6299	96mm	160mm	16.0mm	<b>11806299A</b>
16.5mm	0.6496	4-1/8	6-19/32	0.6496	<b>11806496A</b>
21/32	0.6562	4-1/8	6-19/32	21/32	<b>11806562A</b>
17.0mm	0.6693	103mm	167mm	17.0mm	<b>11806693A</b>
43/64	0.6719	4-1/8	6-19/32	43/64	<b>11806719A</b>
11/16	0.6875	4-1/8	6-19/32	11/16	<b>11806875A</b>
17.5mm	0.6890	4-1/8	6-19/32	0.6890	<b>11806890A</b>
45/64	0.7031	4-1/8	6-19/32	45/64	<b>11807031A</b>
18.0mm	0.7087	103mm	167mm	18.0mm	<b>11807087A</b>
18.5mm	0.7283	4-1/2	7-1/16	0.7283	<b>11807283A</b>
47/64	0.7344	4-1/2	7-1/16	47/64	<b>11807344A</b>
19.0mm	0.7480	114mm	179mm	19.0mm	<b>11807480A</b>
3/4	0.7500	4-1/2	7-1/16	3/4	<b>11807500A</b>

\*bold numbers are EDPs for ordering

## Popular Custom Holemaking Options

- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM  
COMES  
STANDARD**



# ADVANCED PERFORMANCE

## Solid Carbide Coolant-Through Jobber Length Drill



INTRO

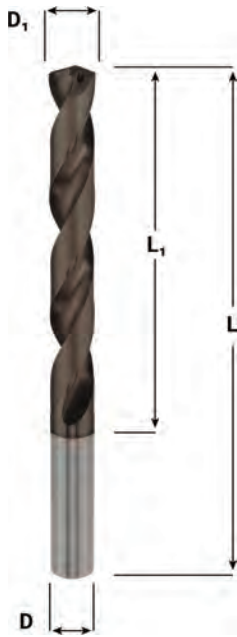
MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



FEATURES / DESCRIPTION				APPLICATION		FEATURES																																												
<ul style="list-style-type: none"> <li>Sub-micrograin carbide grade for wear resistance and edge strength</li> <li>Kooltwist coolant-through drill design allows 7XD drill at high penetration rates</li> <li>Protective flat cutting edge design reduces edge chipping when drilling</li> <li>140° self-centering double split point reduces chisel pressure and clears chips away from point center</li> <li>Offered in TiN coating or TiAlN coating</li> </ul>						CARBIDE		30°																																										
						2FL		140°																																										
		THRU		TiN		TiAlN		P 306																																										
<table border="1"> <thead> <tr> <th colspan="3">STEEL</th> <th colspan="2">STAINLESS</th> <th colspan="2">CAST IRON</th> <th colspan="2">NON-FERROUS</th> <th colspan="2">HRSA</th> <th colspan="2">HARDENED STEEL</th> </tr> <tr> <th>P1</th> <th>P2</th> <th>P3</th> <th>M1</th> <th>M2</th> <th>K1</th> <th>K2</th> <th>N1</th> <th>N2</th> <th>S1</th> <th>S2</th> <th>H1</th> <th>H2</th> </tr> </thead> <tbody> <tr> <td>○</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>●</td> <td>○</td> <td>○</td> </tr> </tbody> </table>				STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL		P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2	○	●	●	●	●	●	●	●	●	●	●	○	○								
STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL																																							
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2																																						
○	●	●	●	●	●	●	●	●	●	●	○	○																																						

● Best ○ Good

### Series 293 Kooltwist | 2FL | Jobber Length | Coolant-Through

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	TiN	TiAlN
1/8	0.1250	1-1/8	3-11/32	1/8	29301250	29301250A
3.2mm	0.1260	1-1/8	3-11/32	1/8	29301260	29301260A
#30	0.1285	1-1/8	3-11/32	0.1285	29301285	29301285A
3.3mm	0.1299	1-13/32	3-5/8	0.1299	29301299	29301299A
3.4mm	0.1339	1-13/32	3-5/8	0.1339	29301339	29301339A
#29	0.1360	1-13/32	3-5/8	0.136	29301360	29301360A
3.5mm	0.1378	1-13/32	3-5/8	0.1378	29301378	29301378A
#28	0.1405	1-13/32	3-5/8	9/64	29301405	29301405A
9/64	0.1406	1-13/32	3-5/8	9/64	29301406	29301406A
3.6mm	0.1417	1-13/32	3-5/8	9/64	29301417	29301417A
#27	0.1440	1-13/32	3-5/8	0.144	29301440	29301440A
#26	0.1470	1-13/32	3-5/8	0.147	29301470	29301470A
#25	0.1495	1-13/32	3-5/8	0.1495	29301495	29301495A
#24	0.1520	1-13/32	3-5/8	0.152	29301520	29301520A
#23	0.1540	1-13/32	3-5/8	0.154	29301540	29301540A
5/32	0.1562	1-13/32	3-5/8	5/32	29301562	29301562A
#22	0.1570	1-13/32	3-5/8	5/32	29301570	29301570A
4.0mm	0.1575	36mm	92mm	4.0mm	29301575	29301575A
#21	0.1590	1-13/32	3-5/8	0.159	29301590	29301590A
#20	0.1610	1-13/32	3-5/8	0.161	29301610	29301610A
4.1mm	0.1614	1-13/32	3-5/8	0.1614	29301614	29301614A
4.125mm	0.1624	1-13/32	3-5/8	0.1624	29301624	29301624A
4.2mm	0.1654	1-13/32	3-5/8	0.1654	29301654	29301654A
#19	0.1660	1-13/32	3-5/8	0.166	29301660	29301660A
4.25mm	0.1673	1-13/32	3-5/8	0.1673	29301673	29301673A
#18	0.1695	1-13/32	3-5/8	0.1695	29301695	29301695A
11/64	0.1719	1-13/32	3-5/8	11/64	29301719	29301719A
#17	0.1730	1-13/32	3-5/8	11/64	29301730	29301730A
#16	0.1770	1-9/16	3-25/32	0.177	29301770	29301770A
4.5mm	0.1772	1-9/16	3-25/32	0.1772	29301772	29301772A
#15	0.1800	1-9/16	3-25/32	0.18	29301800	29301800A
#14	0.1820	1-9/16	3-25/32	0.182	29301820	29301820A
#13	0.1850	1-9/16	3-25/32	0.185	29301850	29301850A
3/16	0.1875	1-9/16	3-25/32	3/16	29301875	29301875A
#12	0.1890	1-9/16	3-25/32	3/16	29301890	29301890A
#11	0.1910	1-9/16	3-25/32	0.191	29301910	29301910A
4.9mm	0.1929	1-23/32	3-15/16	0.1929	29301929	29301929A
#10	0.1935	1-23/32	3-15/16	0.1935	29301935	29301935A
#9	0.1960	1-23/32	3-15/16	0.196	29301960	29301960A
5.0mm	0.1969	44mm	100mm	5.0mm	29301969	29301969A
#8	0.1990	1-23/32	3-15/16	0.199	29301990	29301990A
#7	0.2010	1-23/32	3-15/16	0.201	29302010	29302010A
13/64	0.2031	1-23/32	3-15/16	13/64	29302031	29302031A
#6	0.2040	1-23/32	3-15/16	13/64	29302040	29302040A

\*bold numbers are EDPs for ordering



# ADVANCED PERFORMANCE

Solid Carbide Coolant-Through Jobber Length Drill



INTRO

MILLING

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HOLEMAKING

THREADING

INSERTS

## Series 293

Kooltwist | 2FL | Jobber Length | Coolant-Through

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	TiN	TiAlN
#5	0.2055	1-23/32	3-15/16	0.2055	29302055	29302055A
#4	0.2090	1-23/32	3-15/16	0.209	29302090	29302090A
#3	0.2130	1-29/32	4-1/8	0.213	29302130	29302130A
5.5mm	0.2165	1-29/32	4-1/8	0.2165	29302165	29302165A
7/32	0.2188	1-29/32	4-1/8	7/32	29302188	29302188A
5.6mm	0.2205	1-29/32	4-1/8	0.2205	29302205	29302205A
2	0.2210	1-29/32	4-1/8	0.221	29302210	29302210A
1	0.2280	2-1/8	4-5/16	0.228	29302280	29302280A
A	0.2340	2-1/8	4-5/16	15/64	29302340	29302340A
15/64	0.2344	2-1/8	4-5/16	15/64	29302344	29302344A
6.0mm	0.2362	54mm	110mm	6.0mm	29302362	29302362A
B	0.2380	2-1/8	4-5/16	0.238	29302380	29302380A
6.1mm	0.2402	2-1/8	4-5/16	0.2402	29302402	29302402A
C	0.2420	2-1/8	4-5/16	0.242	29302420	29302420A
D	0.2460	2-1/8	4-5/16	0.246	29302460	29302460A
6.3mm	0.2480	2-1/8	4-5/16	0.248	29302480	29302480A
1/4	0.2500	2-1/8	4-5/16	1/4	29302500	29302500A
6.4mm	0.2520	2-1/8	4-5/16	0.252	29302520	29302520A
6.5mm	0.2559	2-1/8	4-5/16	0.2559	29302559	29302559A
F	0.2570	2-1/4	4-1/2	0.257	29302570	29302570A
6.6mm	0.2598	2-1/4	4-1/2	0.2598	29302598	29302598A
G	0.2610	2-1/4	4-1/2	0.261	29302610	29302610A
6.68mm	0.2630	2-1/4	4-1/2	0.263	29302630	29302630A
17/64	0.2656	2-1/4	4-1/2	17/64	29302656	29302656A
H	0.2660	2-1/4	4-1/2	17/64	29302660	29302660A
6.85mm	0.2697	2-1/4	4-1/2	0.2697	29302697	29302697A
I	0.2720	2-1/4	4-1/2	0.272	29302720	29302720A
7.0mm	0.2756	57mm	114mm	7.0mm	29302756	29302756A
J	0.2770	2-1/4	4-1/2	0.277	29302770	29302770A
7.1mm	0.2795	2-1/4	4-1/2	0.2795	29302795	29302795A
K	0.2810	2-1/4	4-1/2	9/32	29302810	29302810A
9/32	0.2812	2-1/4	4-1/2	9/32	29302812	29302812A
7.2mm	0.2835	2-1/4	4-1/2	0.2835	29302835	29302835A
L	0.2900	2-17/32	4-3/4	0.29	29302900	29302900A
M	0.2950	2-17/32	4-3/4	0.295	29302950	29302950A
7.5mm	0.2953	2-17/32	4-3/4	0.2953	29302953	29302953A
19/64	0.2969	2-17/32	4-3/4	19/64	29302969	29302969A
7.6mm	0.2992	2-17/32	4-3/4	0.2992	29302992	29302992A
N	0.3020	2-17/32	4-3/4	0.302	29303020	29303020A
7.8mm	0.3071	2-17/32	4-3/4	0.3071	29303071	29303071A
5/16	0.3125	2-17/32	4-3/4	5/16	29303125	29303125A
8.0mm	0.3150	64mm	121mm	8.0mm	29303150	29303150A
O	0.3160	2-17/32	4-3/4	0.316	29303160	29303160A
8.1mm	0.3189	2-17/32	4-3/4	0.3189	29303189	29303189A
P	0.3230	2-27/32	5	0.323	29303230	29303230A
21/64	0.3281	2-27/32	5	21/64	29303281	29303281A
Q	0.3320	2-27/32	5	0.332	29303320	29303320A
8.5mm	0.3346	2-27/32	5	0.3346	29303346	29303346A
8.56mm	0.3370	2-27/32	5	0.337	29303370	29303370A
R	0.3390	2-27/32	5	0.339	29303390	29303390A
11/32	0.3438	2-27/32	5	11/32	29303438	29303438A
S	0.3480	3-5/32	5-3/8	0.348	29303480	29303480A
9.0mm	0.3543	80mm	136mm	9.0mm	29303543	29303543A
T	0.3580	3-5/32	5-3/8	23/64	29303580	29303580A
23/64	0.3594	3-5/32	5-3/8	23/64	29303594	29303594A
U	0.3680	3-5/32	5-3/8	0.368	29303680	29303680A
9.5mm	0.3740	3-5/32	5-3/8	3/8	29303740	29303740A
3/8	0.3750	3-5/32	5-3/8	3/8	29303750	29303750A
V	0.3770	3-5/32	5-3/8	0.377	29303770	29303770A
9.7mm	0.3819	3-5/16	5-7/8	0.3819	29303819	29303819A
W	0.3860	3-5/16	5-7/8	0.386	29303860	29303860A
25/64	0.3906	3-5/16	5-7/8	25/64	29303906	29303906A
10.0mm	0.3937	84mm	149mm	10.0mm	29303937	29303937A
X	0.3970	3-5/16	5-7/8	0.397	29303970	29303970A
Y	0.4040	3-5/16	5-7/8	0.404	29304040	29304040A
13/32	0.4062	3-5/16	5-7/8	13/32	29304062	29304062A
10.4mm	0.4094	3-5/16	5-7/8	0.4094	29304094	29304094A
Z	0.4130	3-5/16	5-7/8	0.413	29304130	29304130A
10.5mm	0.4134	3-5/16	5-7/8	0.4134	29304134	29304134A
10.6mm	0.4173	3-5/16	5-7/8	0.4173	29304173	29304173A
27/64	0.4219	3-5/8	6-7/32	27/64	29304219	29304219A
10.8mm	0.4252	3-5/8	6-7/32	0.4252	29304252	29304252A
10.95mm	0.4311	3-5/8	6-7/32	0.4311	29304311	29304311A
11.0mm	0.4331	92mm	158mm	11.0mm	29304331	29304331A
7/16	0.4375	3-5/8	6-7/32	7/16	29304375	29304375A

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide Coolant-Through Jobber Length Drill



## Series 293 Kooltwist | 2FL | Jobber Length | Coolant-Through

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	TiN	TiAIN
11.4mm	0.4488	3-5/8	6-7/32	0.4488	29304488	29304488A
11.5mm	0.4528	3-5/8	6-7/32	29/64	29304528	29304528A
29/64	0.4531	3-25/32	6-7/32	29/64	29304531	29304531A
11.6mm	0.4567	3-25/32	6-7/32	0.4567	29304567	29304567A
15/32	0.4688	3-25/32	6-7/32	15/32	29304688	29304688A
12.0mm	0.4724	96mm	158mm	12.0mm	29304724	29304724A
12.1mm	0.4764	3-25/32	6-7/32	0.4764	29304764	29304764A
31/64	0.4844	4-3/32	6-9/32	31/64	29304844	29304844A
12.4mm	0.4882	4-3/32	6-9/32	0.4882	29304882	29304882A
12.5mm	0.4921	4-3/32	6-9/32	0.4921	29304921	29304921A
12.6mm	0.4961	4-3/32	6-9/32	0.4961	29304961	29304961A
1/2	0.5000	4-3/32	6-9/32	1/2	29305000	29305000A
12.9mm	0.5079	4-7/32	6-9/32	0.5079	29305079	29305079A
13.0mm	0.5118	107mm	160mm	13.0mm	29305118	29305118A
33/64	0.5156	4-7/32	6-9/32	33/64	29305156	29305156A
17/32	0.5312	4-7/32	6-9/32	17/32	29305312	29305312A
13.5mm	0.5315	4-7/32	6-9/32	17/32	29305315	29305315A
13.6mm	0.5354	4-7/32	6-9/32	0.5354	29305354	29305354A
13.8mm	0.5433	4-7/32	6-9/32	0.5433	29305433	29305433A
35/64	0.5469	4-7/32	6-9/32	35/64	29305469	29305469A
14.0mm	0.5512	107mm	160mm	14.0mm	29305512	29305512A
9/16	0.5625	4-7/32	6-9/32	9/16	29305625	29305625A
14.5mm	0.5709	4-7/32	6-9/32	0.5709	29305709	29305709A
14.6mm	0.5748	4-7/32	6-9/32	0.5748	29305748	29305748A
37/64	0.5781	4-7/32	6-9/32	37/64	29305781	29305781A
15.0mm	0.5906	107mm	160mm	15.0mm	29305906	29305906A
19/32	0.5938	4-7/32	6-9/32	19/32	29305938	29305938A

\*bold numbers are EDPs for ordering

### Popular Custom Holemaking Options

- Material-specific point geometry
- Longer flute lengths
- Internal coolant supply
- Proprietary GWS tool coatings

**CUSTOM  
COMES  
STANDARD**



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide Coolant-Through Short Length Drill



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<ul style="list-style-type: none"> <li>Sub-micrograin carbide grade for wear resistance and edge strength</li> <li>Kooltwist coolant-through drill design allows 4XD drill depth without spotting at high penetration rates</li> <li>Protective flat cutting edge design reduces edge chipping when drilling</li> <li>140° self-centering double split point reduces chisel pressure and clears chips away from point center</li> <li>Can be used to produce on size starting hole drill before longer deep hole drills</li> <li>Available with TiN or TiAlN coatings</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	●	●	●	●	●	●	●	●	●	●	○	○

● Best ○ Good

## Series 294 Kooltwist | Stub Length | Coolant-Through

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	TiN	TiAlN
1/8	0.1250	13/16	2-13/16	1/8	29401250	29401250A
3.2mm	0.1260	13/16	2-13/16	1/8	29401260	29401260A
#30	0.1285	13/16	2-13/16	0.1285	29401285	29401285A
3.3mm	0.1299	15/16	3	0.1299	29401299	29401299A
3.4mm	0.1339	15/16	3	0.1339	29401339	29401339A
#29	0.1360	15/16	3	0.136	29401360	29401360A
3.5mm	0.1378	15/16	3	0.1378	29401378	29401378A
#28	0.1405	15/16	3	9/64	29401405	29401405A
9/64	0.1406	15/16	3	9/64	29401406	29401406A
3.6mm	0.1417	15/16	3	9/64	29401417	29401417A
#27	0.1440	15/16	3	0.144	29401440	29401440A
#26	0.1470	15/16	3	0.147	29401470	29401470A
#25	0.1495	15/16	3	0.1495	29401495	29401495A
#24	0.1520	15/16	3	0.152	29401520	29401520A
#23	0.1540	15/16	3	0.154	29401540	29401540A
5/32	0.1562	15/16	3	5/32	29401562	29401562A
#22	0.1570	15/16	3	5/32	29401570	29401570A
4.0mm	0.1575	24.0mm	76mm	4.0mm	29401575	29401575A
#21	0.1590	1	3	0.159	29401590	29401590A
#20	0.1610	1	3	0.161	29401610	29401610A
4.1mm	0.1614	1	3	0.1614	29401614	29401614A
4.125mm	0.1624	1	3	0.1624	29401624	29401624A
4.2mm	0.1654	1	3	0.1654	29401654	29401654A
#19	0.1660	1-1/8	3	0.166	29401660	29401660A
4.25mm	0.1673	1-1/8	3	0.1673	29401673	29401673A
#18	0.1695	1-1/8	3	0.1695	29401695	29401695A
11/64	0.1719	1-1/8	3	11/64	29401719	29401719A
#17	0.1730	1-1/8	3	11/64	29401730	29401730A
#16	0.1770	1-1/8	3	0.177	29401770	29401770A
4.5mm	0.1772	1-1/8	3	0.1772	29401772	29401772A
#15	0.1800	1-1/8	3	0.18	29401800	29401800A
#14	0.1820	1-1/8	3	0.182	29401820	29401820A
#13	0.1850	1-1/8	3	0.185	29401850	29401850A
3/16	0.1875	1-1/8	3	3/16	29401875	29401875A
#12	0.1890	1-1/8	3	3/16	29401890	29401890A
#11	0.1910	1-1/8	3	0.191	29401910	29401910A
4.9mm	0.1929	1-1/8	3	0.1929	29401929	29401929A
#10	0.1935	1-1/8	3	0.1935	29401935	29401935A
#9	0.1960	1-1/8	3	0.196	29401960	29401960A
5.0mm	0.1969	29mm	76mm	5.0mm	29401969	29401969A
#8	0.1990	1-1/8	3	0.199	29401990	29401990A
#7	0.2010	1-1/8	3	0.201	29402010	29402010A
13/64	0.2031	1-1/8	3	13/64	29402031	29402031A
#6	0.2040	1-1/8	3	13/64	29402040	29402040A

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Solid Carbide Coolant-Through Short Length Drill



## Series 294

Kooltwist | Stub Length | Coolant-Through

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	TiN	TiAIN
#5	0.2055	1-1/8	3	0.2055	29402055	29402055A
5.25mm	0.2067	1-1/8	3	0.2067	29402067	29402067A
#4	0.2090	1-1/8	3	0.209	29402090	29402090A
#3	0.2130	1-5/16	3-1/4	0.213	29402130	29402130A
5.5mm	0.2165	1-5/16	3-1/4	0.2165	29402165	29402165A
7/32	0.2188	1-5/16	3-1/4	7/32	29402188	29402188A
5.6mm	0.2205	1-5/16	3-1/4	0.2205	29402205	29402205A
#2	0.2210	1-5/16	3-1/4	0.221	29402210	29402210A
#1	0.2280	1-5/16	3-1/4	0.228	29402280	29402280A
A	0.2340	1-5/16	3-1/4	15/64	29402340	29402340A
15/64	0.2344	1-5/16	3-1/4	15/64	29402344	29402344A
6.0mm	0.2362	33mm	83mm	6.0mm	29402362	29402362A
B	0.2380	1-5/16	3-1/4	0.238	29402380	29402380A
6.1mm	0.2402	1-5/8	3-5/8	0.2402	29402402	29402402A
C	0.2420	1-5/8	3-5/8	0.242	29402420	29402420A
D	0.2460	1-5/8	3-5/8	0.246	29402460	29402460A
6.3mm	0.2480	1-5/8	3-5/8	0.248	29402480	29402480A
1/4	0.2500	1-5/8	3-5/8	1/4	29402500	29402500A
6.4mm	0.2520	1-5/8	3-5/8	0.252	29402520	29402520A
6.5mm	0.2559	1-3/4	3-3/4	0.2559	29402559	29402559A
F	0.2570	1-3/4	3-3/4	0.257	29402570	29402570A
6.6mm	0.2598	1-3/4	3-3/4	0.2598	29402598	29402598A
G	0.2610	1-3/4	3-3/4	0.261	29402610	29402610A
6.68mm	0.2630	1-3/4	3-3/4	0.263	29402630	29402630A
17/64	0.2656	1-3/4	3-3/4	17/64	29402656	29402656A
H	0.2660	1-3/4	3-3/4	17/64	29402660	29402660A
6.85mm	0.2697	1-3/4	3-3/4	0.2697	29402697	29402697A
I	0.2720	1-3/4	3-3/4	0.272	29402720	29402720A
7.0mm	0.2756	44mm	95mm	7.0mm	29402756	29402756A
J	0.2770	1-3/4	3-3/4	0.277	29402770	29402770A
7.1mm	0.2795	1-3/4	3-3/4	0.2795	29402795	29402795A
K	0.2810	1-3/4	3-3/4	9/32	29402810	29402810A
9/32	0.2812	1-3/4	3-3/4	9/32	29402812	29402812A
7.2mm	0.2835	1-3/4	3-3/4	0.2835	29402835	29402835A
L	0.2900	1-3/4	3-3/4	0.29	29402900	29402900A
M	0.2950	1-3/4	3-3/4	0.295	29402950	29402950A
7.5mm	0.2953	1-3/4	3-3/4	0.2953	29402953	29402953A
19/64	0.2969	1-3/4	3-3/4	19/64	29402969	29402969A
7.6mm	0.2992	1-3/4	3-3/4	0.2992	29402992	29402992A
N	0.3020	1-3/4	3-3/4	0.302	29403020	29403020A
7.8mm	0.3071	1-3/4	3-3/4	0.3071	29403071	29403071A
5/16	0.3125	1-3/4	3-3/4	5/16	29403125	29403125A
8.0mm	0.3150	44mm	95mm	8.0mm	29403150	29403150A
O	0.3160	1-3/4	3-3/4	0.316	29403160	29403160A
8.1mm	0.3189	1-7/8	4	0.3189	29403189	29403189A
P	0.3230	1-7/8	4	0.323	29403230	29403230A
21/64	0.3281	1-7/8	4	21/64	29403281	29403281A
Q	0.3320	1-7/8	4	0.332	29403320	29403320A
8.5mm	0.3346	1-7/8	4	0.3346	29403346	29403346A
8.56mm	0.3370	2	4-1/8	0.337	29403370	29403370A
R	0.3390	2	4-1/8	0.339	29403390	29403390A
11/32	0.3438	2	4-1/8	11/32	29403438	29403438A
S	0.3480	2	4-1/8	0.348	29403480	29403480A
9.0mm	0.3543	51mm	105mm	9.0mm	29403543	29403543A
T	0.3580	2-1/8	4-1/4	23/64	29403580	29403580A
23/64	0.3594	2-1/8	4-1/4	23/64	29403594	29403594A
U	0.3680	2-1/8	4-1/4	0.368	29403680	29403680A
9.5mm	0.3740	2-1/8	4-1/4	3/8	29403740	29403740A
3/8	0.3750	2-1/8	4-1/4	3/8	29403750	29403750A
V	0.3770	2-1/4	4-3/8	0.377	29403770	29403770A
9.7mm	0.3819	2-1/4	4-3/8	0.3819	29403819	29403819A
W	0.3860	2-1/4	4-3/8	0.386	29403860	29403860A
25/64	0.3906	2-1/4	4-3/8	25/64	29403906	29403906A
10.0mm	0.3937	57mm	111mm	10.0mm	29403937	29403937A
X	0.3970	2-1/4	4-3/8	0.397	29403970	29403970A
Y	0.4040	2-1/4	4-3/8	0.404	29404040	29404040A
13/32	0.4062	2-1/4	4-3/8	13/32	29404062	29404062A
10.4mm	0.4094	2-1/4	4-3/8	0.4094	29404094	29404094A
Z	0.4130	2-3/8	4-1/2	0.413	29404130	29404130A
10.5mm	0.4134	2-3/8	4-1/2	0.4134	29404134	29404134A
10.6mm	0.4173	2-3/8	4-1/2	0.4173	29404173	29404173A
27/64	0.4219	2-3/8	4-1/2	27/64	29404219	29404219A
10.8mm	0.4252	2-1/2	4-5/8	0.4252	29404252	29404252A
10.95mm	0.4311	2-1/2	4-5/8	0.4311	29404311	29404311A
11.0mm	0.4331	64mm	117mm	11.0mm	29404331	29404331A

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Solid Carbide Coolant-Through Short Length Drill



## Series 294

Kooltwist | Stub Length | Coolant-Through

Size	Diameter (D <sub>1</sub> ) Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	TiN	TiAlN
7/16	0.4375	2-1/2	4-5/8	7/16	29404375	29404375A
11.4mm	0.4488	2-5/8	4-3/4	0.4488	29404488	29404488A
11.5mm	0.4528	2-5/8	4-3/4	29/64	29404528	29404528A
29/64	0.4531	2-5/8	4-3/4	29/64	29404531	29404531A
11.6mm	0.4567	2-5/8	4-3/4	0.4567	29404567	29404567A
15/32	0.4688	2-3/4	5	15/32	29404688	29404688A
12.0mm	0.4724	70mm	127mm	12.0mm	29404724	29404724A
12.1mm	0.4764	2-3/4	5	0.4764	29404764	29404764A
31/64	0.4844	2-3/4	5	31/64	29404844	29404844A
12.35mm	0.4862	2-3/4	5	0.4862	29404862	29404862A
12.4mm	0.4882	2-3/4	5	0.4882	29404882	29404882A
12.5mm	0.4921	3	5-1/4	0.4921	29404921	29404921A
12.6mm	0.4961	3	5-1/4	0.4961	29404961	29404961A
1/2	0.5000	3	5-1/4	1/2	29405000	29405000A
12.9mm	0.5079	3	5-5/16	0.5079	29405079	29405079A
13.0mm	0.5118	76mm	135mm	13.0mm	29405118	29405118A
33/64	0.5156	3	5-5/16	33/64	29405156	29405156A
17/32	0.5312	3	5-5/16	17/32	29405312	29405312A
13.5mm	0.5315	3	5-5/16	17/32	29405315	29405315A
13.6mm	0.5354	3	5-5/16	0.5354	29405354	29405354A
13.8mm	0.5433	3	5-5/16	0.5433	29405433	29405433A
35/64	0.5469	3	5-5/16	35/64	29405469	29405469A
14.0mm	0.5512	76mm	135mm	14.0mm	29405512	29405512A
14.1mm	0.5551	3	5-5/16	0.5551	29405551	29405551A
14.15mm	0.5571	3	5-5/16	0.5571	29405571	29405571A
9/16	0.5625	3	5-5/16	9/16	29405625	29405625A
14.5mm	0.5709	3-1/4	5-5/8	0.5709	29405709	29405709A
14.6mm	0.5748	3-1/4	5-5/8	0.5748	29405748	29405748A
37/64	0.5781	3-1/4	5-5/8	37/64	29405781	29405781A
15.0mm	0.5906	83mm	143mm	15.0mm	29405906	29405906A
19/32	0.5938	3-1/4	5-5/8	19/32	29405938	29405938A
39/64	0.6094	3-3/8	5-5/8	39/64	29406094	29406094A
15.5mm	0.6102	3-3/8	5-5/8	39/64	29406102	29406102A
5/8	0.6250	3-3/8	5-5/8	5/8	29406250	29406250A
16.0mm	0.6299	86mm	143mm	16.0mm	29406299	29406299A
16.08mm	0.6331	3-3/8	5-5/8	0.6331	29406331	29406331A
16.116mm	0.6345	3-3/8	5-5/8	0.6345	29406345	29406345A
41/64	0.6406	3-1/2	5-7/8	41/64	29406406	29406406A
16.5mm	0.6496	3-1/2	5-7/8	0.6496	29406496	29406496A
21/32	0.6562	3-1/2	5-7/8	21/32	29406562	29406562A
16.75mm	0.6594	3-1/2	5-7/8	0.6594	29406594	29406594A
17.0mm	0.6693	92mm	149mm	17.0mm	29406693	29406693A
43/64	0.6719	3-5/8	5-7/8	43/64	29406719	29406719A
11/16	0.6875	3-5/8	5-7/8	11/16	29406875	29406875A
17.5mm	0.6890	3-5/8	5-7/8	11/16	29406890	29406890A
17.6mm	0.6929	3-3/4	6	0.6929	29406929	29406929A
45/64	0.7031	3-3/4	6	45/64	29407031	29407031A
18.0mm	0.7087	95mm	152mm	18.0mm	29407087	29407087A
23/32	0.7188	3-3/4	6	23/32	29407188	29407188A
18.5mm	0.7283	3-3/4	6	0.7283	29407283	29407283A
47/64	0.7344	3-7/8	6-5/32	47/64	29407344	29407344A
19.0mm	0.7480	98mm	156mm	19.0mm	29407480	29407480A
3/4	0.7500	3-7/8	6-5/32	3/4	29407500	29407500A
19.25mm	0.7579	4	6-5/32	0.7579	29407579	29407579A
19.279mm	0.7590	4	6-5/32	0.759	29407590	29407590A

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

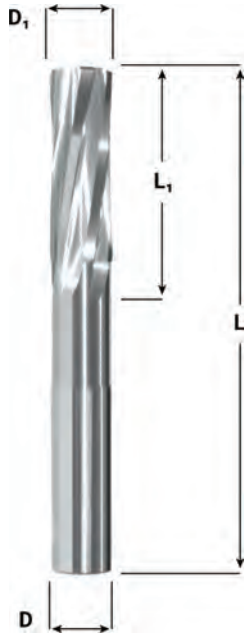
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

## Solid Carbide Spiral Flute Chucking Reamer



FEATURES / DESCRIPTION	APPLICATION	FEATURES								
<b>Helical Reamers</b> <ul style="list-style-type: none"> <li>• ≤1/4 Diameter Tolerance = +0/+0.0002"</li> <li>• &gt;1/4 Diameter Tolerance = +0/+0.0003"</li> <li>• Expand an existing hole to a precise size or create a perfect hole finish</li> <li>• Reduced neck for through-hole clearance</li> <li>• Best suited for blind holes</li> <li>• Helical flute geometry pulls chips up out of the hole</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>10°</td> </tr> <tr> <td>15°</td> <td>CHF</td> </tr> <tr> <td>4FL</td> <td>6FL</td> </tr> <tr> <td>Bright</td> <td>P 317</td> </tr> </table>	CARBIDE	10°	15°	CHF	4FL	6FL	Bright	P 317
CARBIDE	10°									
15°	CHF									
4FL	6FL									
Bright	P 317									

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

### Series 550 | 4 - 6FL | Slow Spiral | 45° Chamfer

Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	Helix	EDP
Size	Dec.						
3/64	0.0468	3/8	1-1/2	3/64	4	15°	<b>550-001003</b>
1/16	0.0625	3/8	1-1/2	1/16	4	15°	<b>550-001004</b>
5/64	0.0781	1/4	1-3/4	5/64	4	15°	<b>550-001005</b>
3/32	3/32	1/2	2	3/32	4	15°	<b>550-001006</b>
7/64	0.1093	5/8	2-1/4	7/64	4	15°	<b>550-001007</b>
1/8	1/8	5/8	2-1/4	1/8	4	15°	<b>550-001008</b>
9/64	0.1406	3/4	2-1/2	9/64	4	10°	<b>550-001009</b>
5/32	5/32	3/4	2-1/2	5/32	4	10°	<b>550-001010</b>
11/64	0.1718	7/8	2-3/4	11/64	4	10°	<b>550-001011</b>
3/16	3/16	7/8	2-3/4	3/16	4	10°	<b>550-001012</b>
9/32	0.2031	1	3	9/32	4	10°	<b>550-001013</b>
7/32	0.2187	1	3	7/32	4	10°	<b>550-001014</b>
15/64	0.2343	1	3	15/64	4	10°	<b>550-001015</b>
1/4	1/4	1	3	1/4	4	10°	<b>550-001016</b>
17/64	0.2656	1-1/8	3-1/4	17/64	6	10°	<b>550-001017</b>
9/32	0.2812	1-1/8	3-1/4	9/32	6	10°	<b>550-001018</b>
5/16	0.3125	1-1/8	3-1/4	5/16	6	10°	<b>550-001020</b>
3/8	0.3750	1-1/4	3-1/2	3/8	6	10°	<b>550-001024</b>
13/32	0.4062	1-1/4	3-1/2	13/32	6	10°	<b>550-001026</b>
7/16	0.4375	1-3/8	4	7/16	6	10°	<b>550-001028</b>
1/2	0.5000	1-1/2	4	1/2	6	10°	<b>550-001032</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

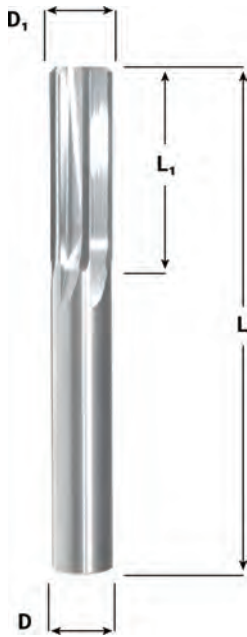
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

## Solid Carbide Straight Flute Chucking Reamer



FEATURES / DESCRIPTION	APPLICATION	FEATURES						
<b>Chucking Reamers</b> <ul style="list-style-type: none"> <li>• ≤1/4 Diameter Tolerance = +0/+0.0002"</li> <li>• &gt;1/4 Diameter Tolerance = +0/+0.0003"</li> <li>• Expand an existing hole to a precise size or create a perfect hole finish</li> <li>• Reduced neck for through-hole clearance</li> <li>• Best suited for through holes</li> <li>• Straight flute geometry pushes chips through the hole</li> </ul>		<table border="1"> <tr> <td>CARBIDE</td> <td>0°</td> </tr> <tr> <td>Multi</td> <td>CHF</td> </tr> <tr> <td>Bright</td> <td>P 317</td> </tr> </table>	CARBIDE	0°	Multi	CHF	Bright	P 317
CARBIDE	0°							
Multi	CHF							
Bright	P 317							

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

### Series 500 4 - 6FL | Straight Flute | 45° Chamfer

Diameter (D <sub>1</sub> ) Size	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP	Diameter (D <sub>1</sub> ) Size	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP		
-	0.0260	1/4	1-1/2	0.0195	500-0000260	-	0.0555	3/8	1-1/2	0.0555	500-0000555
-	0.0265	1/4	1-1/2	0.0200	500-0000265	-	0.0560	3/8	1-1/2	0.0560	500-0000560
-	0.0270	1/4	1-1/2	0.0205	500-0000270	-	0.0565	3/8	1-1/2	0.0565	500-0000565
-	0.0275	1/4	1-1/2	0.0210	500-0000275	-	0.0570	3/8	1-1/2	0.0570	500-0000570
-	0.0285	1/4	1-1/2	0.0220	500-0000285	-	0.0575	3/8	1-1/2	0.0575	500-0000575
-	0.0290	1/4	1-1/2	0.0225	500-0000290	-	0.0580	3/8	1-1/2	0.0580	500-0000580
-	0.0295	1/4	1-1/2	0.0230	500-0000295	-	0.0585	3/8	1-1/2	0.0585	500-0000585
-	0.0300	1/4	1-1/2	0.0235	500-0000300	-	0.0590	3/8	1-1/2	0.0590	500-0000590
-	0.0305	1/4	1-1/2	0.0240	500-0000305	-	0.0600	3/8	1-1/2	0.0600	500-0000600
-	0.0315	1/4	1-1/2	0.0250	500-0000315	-	0.0605	3/8	1-1/2	0.0605	500-0000605
-	0.0325	1/4	1-1/2	0.0260	500-0000325	-	0.0610	3/8	1-1/2	0.0610	500-0000610
-	0.0330	1/4	1-1/2	0.0265	500-0000330	-	0.0615	3/8	1-1/2	0.0615	500-0000615
-	0.0335	1/4	1-1/2	0.0270	500-0000335	-	0.0620	3/8	1-1/2	0.0620	500-0000620
-	0.0340	1/4	1-1/2	0.0275	500-0000340	-	0.0630	3/8	1-1/2	0.0630	500-0000630
-	0.0345	1/4	1-1/2	0.0280	500-0000345	-	0.0640	3/8	1-1/2	0.0640	500-0000640
-	0.0355	1/4	1-1/2	0.0290	500-0000355	-	0.0645	3/8	1-1/2	0.0645	500-0000645
-	0.0365	1/4	1-1/2	0.0300	500-0000365	-	0.0650	3/8	1-1/2	0.0650	500-0000650
-	0.0375	1/4	1-1/2	0.0310	500-0000375	-	0.0655	1/2	1-3/4	0.0655	500-0000655
-	0.0385	1/4	1-1/2	0.0320	500-0000385	-	0.0660	1/2	1-3/4	0.0660	500-0000660
-	0.0395	1/4	1-1/2	0.0330	500-0000395	-	0.0665	1/2	1-3/4	0.0665	500-0000665
-	0.0405	1/4	1-1/2	0.0340	500-0000405	-	0.0675	1/2	1-3/4	0.0675	500-0000675
-	0.0415	1/4	1-1/2	0.0350	500-0000415	-	0.0680	1/2	1-3/4	0.0680	500-0000680
-	0.0425	3/8	1-1/2	0.0360	500-0000425	-	0.0685	1/2	1-3/4	0.0685	500-0000685
-	0.0435	3/8	1-1/2	0.0370	500-0000435	-	0.0690	1/2	1-3/4	0.0690	500-0000690
-	0.0440	3/8	1-1/2	0.0375	500-0000440	-	0.0695	1/2	1-3/4	0.0695	500-0000695
-	0.0445	3/8	1-1/2	0.0380	500-0000445	-	0.0705	1/2	1-3/4	0.0705	500-0000705
-	0.0450	3/8	1-1/2	0.0385	500-0000450	-	0.0710	1/2	1-3/4	0.0710	500-0000710
-	0.0455	3/8	1-1/2	0.0390	500-0000455	-	0.0715	1/2	1-3/4	0.0715	500-0000715
-	0.0460	3/8	1-1/2	0.0395	500-0000460	-	0.0720	1/2	1-3/4	0.0720	500-0000720
-	0.0470	3/8	1-1/2	0.0405	500-0000470	-	0.0725	1/2	1-3/4	0.0725	500-0000725
-	0.0475	3/8	1-1/2	0.0475	500-0000475	-	0.0735	1/2	1-3/4	0.0735	500-0000735
-	0.0480	3/8	1-1/2	0.0415	500-0000480	-	0.0740	1/2	1-3/4	0.0740	500-0000740
-	0.0485	3/8	1-1/2	0.0420	500-0000485	-	0.0745	1/2	1-3/4	0.0745	500-0000745
-	0.0490	3/8	1-1/2	0.0425	500-0000490	-	0.0750	1/2	1-3/4	0.0750	500-0000750
-	0.0495	3/8	1-1/2	0.0430	500-0000495	-	0.0755	1/2	1-3/4	0.0755	500-0000755
-	0.0500	3/8	1-1/2	0.0435	500-0000500	-	0.0765	1/2	1-3/4	0.0765	500-0000765
-	0.0505	3/8	1-1/2	0.0505	500-0000505	-	0.0770	1/2	1-3/4	0.0770	500-0000770
-	0.0510	3/8	1-1/2	0.0510	500-0000510	-	0.0775	1/2	1-3/4	0.0775	500-0000775
-	0.0515	3/8	1-1/2	0.0515	500-0000515	-	0.0780	1/2	1-3/4	0.0780	500-0000780
-	0.0525	3/8	1-1/2	0.0525	500-0000525	-	0.0790	1/2	1-3/4	0.0790	500-0000790
-	0.0530	3/8	1-1/2	0.0530	500-0000530	-	0.0795	1/2	1-3/4	0.0795	500-0000795
-	0.0535	3/8	1-1/2	0.0535	500-0000535	-	0.0800	1/2	1-3/4	0.0800	500-0000800
-	0.0540	3/8	1-1/2	0.0540	500-0000540	-	0.0805	1/2	1-3/4	0.0805	500-0000805
-	0.0545	3/8	1-1/2	0.0545	500-0000545	-	0.0815	1/2	2	0.0815	500-0000815

# PERFORMANCE

Solid Carbide Straight Flute Chucking Reamer



<b>Series 500</b>						<b>4 - 6FL   Straight Flute   45° Chamfer</b>					
<b>Diameter (D<sub>1</sub>)</b>		<b>Flute Length (L<sub>1</sub>)</b>	<b>OAL (L)</b>	<b>Shank (D)</b>	<b>EDP</b>	<b>Diameter (D<sub>1</sub>)</b>		<b>Flute Length (L<sub>1</sub>)</b>	<b>OAL (L)</b>	<b>Shank (D)</b>	<b>EDP</b>
<b>Size</b>	<b>Dec.</b>					<b>Size</b>	<b>Dec.</b>				
-	0.0825	1/2	2	0.0825	500-000825	O/S	0.1260	5/8	2-1/4	0.1260	500-0001260
-	0.0830	1/2	2	0.0830	500-000830	-	0.1265	5/8	2-1/4	0.1265	500-0001265
-	0.0835	1/2	2	0.0835	500-000835	-	0.1270	5/8	2-1/4	0.1270	500-0001270
-	0.0840	1/2	2	0.0840	500-000840	-	0.1275	5/8	2-1/4	0.1275	500-0001275
-	0.0845	1/2	2	0.0845	500-000845	-	0.1280	5/8	2-1/4	0.1280	500-0001280
-	0.0850	1/2	2	0.0850	500-000850	-	0.1290	5/8	2-1/4	0.1290	500-0001290
-	0.0855	1/2	2	0.0855	500-000855	-	0.1295	5/8	2-1/4	0.1295	500-0001295
-	0.0865	1/2	2	0.0865	500-000865	-	0.1300	5/8	2-1/4	0.1300	500-0001300
-	0.0870	1/2	2	0.0870	500-000870	-	0.1305	3/4	2-1/2	0.1305	500-0001305
-	0.0875	1/2	2	0.0875	500-000875	-	0.1310	3/4	2-1/2	0.1310	500-0001310
-	0.0880	1/2	2	0.0880	500-000880	-	0.1315	3/4	2-1/2	0.1315	500-0001315
-	0.0885	1/2	2	0.0885	500-000885	-	0.1320	3/4	2-1/2	0.1320	500-0001320
-	0.0895	1/2	2	0.0895	500-000895	-	0.1325	3/4	2-1/2	0.1325	500-0001325
-	0.0900	1/2	2	0.0900	500-000900	-	0.1330	3/4	2-1/2	0.1330	500-0001330
-	0.0905	1/2	2	0.0905	500-000905	-	0.1335	3/4	2-1/2	0.1335	500-0001335
-	0.0910	1/2	2	0.0910	500-000910	-	0.1340	3/4	2-1/2	0.1340	500-0001340
-	0.0915	1/2	2	0.0915	500-000915	-	0.1345	3/4	2-1/2	0.1345	500-0001345
-	0.0920	1/2	2	0.0920	500-000920	-	0.1350	3/4	2-1/2	0.1350	500-0001350
-	0.0925	1/2	2	0.0925	500-000925	-	0.1355	3/4	2-1/2	0.1355	500-0001355
-	0.0930	1/2	2	0.0930	500-000930	-	0.1365	3/4	2-1/2	0.1365	500-0001365
-	0.0940	1/2	2	0.0940	500-000940	-	0.1370	3/4	2-1/2	0.1370	500-0001370
-	0.0945	1/2	2	0.0945	500-000945	-	0.1375	3/4	2-1/2	0.1375	500-0001375
-	0.0950	1/2	2	0.0950	500-000950	-	0.1380	3/4	2-1/2	0.1380	500-0001380
-	0.0955	1/2	2	0.0955	500-000955	-	0.1385	3/4	2-1/2	0.1385	500-0001385
-	0.0965	1/2	2	0.0965	500-000965	-	0.1390	3/4	2-1/2	0.1390	500-0001390
-	0.0970	5/8	2-1/4	0.0970	500-000970	-	0.1395	3/4	2-1/2	0.1395	500-0001395
-	0.0975	5/8	2-1/4	0.0975	500-000975	-	0.1400	3/4	2-1/2	0.1400	500-0001400
-	0.0985	5/8	2-1/4	0.0985	500-000985	-	0.1410	3/4	2-1/2	0.1410	500-0001410
-	0.0990	5/8	2-1/4	0.0990	500-000990	-	0.1415	3/4	2-1/2	0.1415	500-0001415
-	0.0995	5/8	2-1/4	0.0995	500-000995	-	0.1420	3/4	2-1/2	0.1420	500-0001420
-	0.1000	5/8	2-1/4	0.1000	500-0001000	-	0.1425	3/4	2-1/2	0.1425	500-0001425
-	0.1005	5/8	2-1/4	0.1005	500-0001005	-	0.1430	3/4	2-1/2	0.1430	500-0001430
-	0.1010	5/8	2-1/4	0.1010	500-0001010	-	0.1435	3/4	2-1/2	0.1435	500-0001435
-	0.1015	5/8	2-1/4	0.1015	500-0001015	-	0.1445	3/4	2-1/2	0.1445	500-0001445
-	0.1020	5/8	2-1/4	0.1020	500-0001020	-	0.1450	3/4	2-1/2	0.1450	500-0001450
-	0.1025	5/8	2-1/4	0.1025	500-0001025	-	0.1455	3/4	2-1/2	0.1455	500-0001455
-	0.1030	5/8	2-1/4	0.1030	500-0001030	-	0.1460	3/4	2-1/2	0.1460	500-0001460
-	0.1035	5/8	2-1/4	0.1035	500-0001035	-	0.1465	3/4	2-1/2	0.1465	500-0001465
-	0.1045	5/8	2-1/4	0.1045	500-0001045	-	0.1475	3/4	2-1/2	0.1475	500-0001475
-	0.1050	5/8	2-1/4	0.1050	500-0001050	-	0.1480	3/4	2-1/2	0.1480	500-0001480
-	0.1055	5/8	2-1/4	0.1055	500-0001055	-	0.1485	3/4	2-1/2	0.1485	500-0001485
-	0.1060	5/8	2-1/4	0.1060	500-0001060	-	0.1490	3/4	2-1/2	0.1490	500-0001490
-	0.1070	5/8	2-1/4	0.1070	500-0001070	-	0.1500	3/4	2-1/2	0.1500	500-0001500
-	0.1075	5/8	2-1/4	0.1075	500-0001075	-	0.1505	3/4	2-1/2	0.1505	500-0001505
-	0.1080	5/8	2-1/4	0.1080	500-0001080	-	0.1510	3/4	2-1/2	0.1510	500-0001510
-	0.1085	5/8	2-1/4	0.1085	500-0001085	-	0.1515	3/4	2-1/2	0.1515	500-0001515
-	0.1090	5/8	2-1/4	0.1090	500-0001090	-	0.1525	3/4	2-1/2	0.1525	500-0001525
-	0.1095	5/8	2-1/4	0.1095	500-0001095	-	0.1530	3/4	2-1/2	0.1530	500-0001530
-	0.1100	5/8	2-1/4	0.1100	500-0001100	-	0.1535	3/4	2-1/2	0.1535	500-0001535
-	0.1105	5/8	2-1/4	0.1105	500-0001105	-	0.1545	3/4	2-1/2	0.1545	500-0001545
-	0.1115	5/8	2-1/4	0.1115	500-0001115	-	0.1550	3/4	2-1/2	0.1550	500-0001550
-	0.1120	5/8	2-1/4	0.1120	500-0001120	-	0.1555	3/4	2-1/2	0.1555	500-0001555
-	0.1125	5/8	2-1/4	0.1125	500-0001125	-	0.1560	3/4	2-1/2	0.1560	500-0001560
-	0.1135	5/8	2-1/4	0.1135	500-0001135	-	0.1565	3/4	2-1/2	0.1565	500-0001565
-	0.1140	5/8	2-1/4	0.1140	500-0001140	-	0.1575	3/4	2-1/2	0.1575	500-0001575
-	0.1145	5/8	2-1/4	0.1145	500-0001145	-	0.1580	3/4	2-1/2	0.1580	500-0001580
-	0.1150	5/8	2-1/4	0.1150	500-0001150	-	0.1585	3/4	2-1/2	0.1585	500-0001585
-	0.1155	5/8	2-1/4	0.1155	500-0001155	-	0.1590	3/4	2-1/2	0.1590	500-0001590
-	0.1165	5/8	2-1/4	0.1165	500-0001165	-	0.1595	3/4	2-1/2	0.1595	500-0001595
-	0.1170	5/8	2-1/4	0.1170	500-0001170	-	0.1600	3/4	2-1/2	0.1600	500-0001600
-	0.1175	5/8	2-1/4	0.1175	500-0001175	-	0.1605	3/4	2-1/2	0.1605	500-0001605
-	0.1180	5/8	2-1/4	0.1180	500-0001180	-	0.1615	7/8	2-3/4	0.1615	500-0001615
-	0.1185	5/8	2-1/4	0.1185	500-0001185	-	0.1620	7/8	2-3/4	0.1620	500-0001620
-	0.1190	5/8	2-1/4	0.1190	500-0001190	-	0.1625	7/8	2-3/4	0.1625	500-0001625
-	0.1195	5/8	2-1/4	0.1195	500-0001195	-	0.1630	7/8	2-3/4	0.1630	500-0001630
-	0.1205	5/8	2-1/4	0.1205	500-0001205	-	0.1635	7/8	2-3/4	0.1635	500-0001635
-	0.1210	5/8	2-1/4	0.1210	500-0001210	-	0.1640	7/8	2-3/4	0.1640	500-0001640
-	0.1215	5/8	2-1/4	0.1215	500-0001215	-	0.1645	7/8	2-3/4	0.1645	500-0001645
-	0.1220	5/8	2-1/4	0.1220	500-0001220	-	0.1650	7/8	2-3/4	0.1650	500-0001650
-	0.1225	5/8	2-1/4	0.1225	500-0001225	-	0.1655	7/8	2-3/4	0.1655	500-0001655
D/P	0.1230	5/8	2-1/4	0.1230	500-0001230	-	0.1665	7/8	2-3/4	0.1665	500-0001665
-	0.1235	5/8	2-1/4	0.1235	500-0001235	-	0.1670	7/8	2-3/4	0.1670	500-0001670
U/S	0.1240	5/8	2-1/4	0.1240	500-0001240	-	0.1675	7/8	2-3/4	0.1675	500-0001675
-	0.1245	5/8	2-1/4	0.1245	500-0001245	-	0.1680	7/8	2-3/4	0.1680	500-0001680
D/P	0.1247	5/8	2-1/4	0.1247	500-0001247	-	0.1685	7/8	2-3/4	0.1685	500-0001685
-	0.1255	5/8	2-1/4	0.1255	500-0001255	-	0.1690	7/8	2-3/4	0.1690	500-0001690

INTRO  
MILLING  
SPECIALTY  
HOLEMAKING  
THREADING  
INSERTS



Series 500						4 - 6FL   Straight Flute   45° Chamfer					
Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP	Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
Size	Dec.					Size	Dec.				
-	0.1700	7/8	2-3/4	0.1700	500-0001700	-	0.2155	1	3	0.2155	500-0002155
-	0.1705	7/8	2-3/4	0.1705	500-0001705	-	0.2160	1	3	0.2160	500-0002160
-	0.1710	7/8	2-3/4	0.1710	500-0001710	-	0.2170	1	3	0.2170	500-0002170
-	0.1715	7/8	2-3/4	0.1715	500-0001715	-	0.2175	1	3	0.2175	500-0002175
-	0.1720	7/8	2-3/4	0.1720	500-0001720	-	0.2180	1	3	0.2180	500-0002180
-	0.1725	7/8	2-3/4	0.1725	500-0001725	-	0.2185	1	3	0.2185	500-0002185
-	0.1735	7/8	2-3/4	0.1735	500-0001735	-	0.2190	1	3	0.2190	500-0002190
-	0.1740	7/8	2-3/4	0.1740	500-0001740	-	0.2195	1	3	0.2195	500-0002195
-	0.1745	7/8	2-3/4	0.1745	500-0001745	-	0.2200	1	3	0.2200	500-0002200
-	0.1750	7/8	2-3/4	0.1750	500-0001750	-	0.2205	1	3	0.2205	500-0002205
-	0.1755	7/8	2-3/4	0.1755	500-0001755	-	0.2215	1	3	0.2215	500-0002215
-	0.1760	7/8	2-3/4	0.1760	500-0001760	-	0.2220	1	3	0.2220	500-0002220
-	0.1765	7/8	2-3/4	0.1765	500-0001765	-	0.2225	1	3	0.2225	500-0002225
-	0.1775	7/8	2-3/4	0.1775	500-0001775	-	0.2230	1	3	0.2230	500-0002230
-	0.1780	7/8	2-3/4	0.1780	500-0001780	-	0.2235	1	3	0.2235	500-0002235
-	0.1785	7/8	2-3/4	0.1785	500-0001785	-	0.2240	1	3	0.2240	500-0002240
-	0.1790	7/8	2-3/4	0.1790	500-0001790	-	0.2245	1	3	0.2245	500-0002245
-	0.1795	7/8	2-3/4	0.1795	500-0001795	-	0.2250	1	3	0.2250	500-0002250
-	0.1805	7/8	2-3/4	0.1805	500-0001805	-	0.2255	1	3	0.2255	500-0002255
-	0.1810	7/8	2-3/4	0.1810	500-0001810	-	0.2260	1	3	0.2260	500-0002260
-	0.1815	7/8	2-3/4	0.1815	500-0001815	-	0.2265	1	3	0.2265	500-0002265
-	0.1825	7/8	2-3/4	0.1825	500-0001825	-	0.2270	1	3	0.2270	500-0002270
-	0.1830	7/8	2-3/4	0.1830	500-0001830	-	0.2275	1	3	0.2275	500-0002275
-	0.1835	7/8	2-3/4	0.1835	500-0001835	-	0.2285	1	3	0.2285	500-0002285
-	0.1840	7/8	2-3/4	0.1840	500-0001840	-	0.2290	1	3	0.2290	500-0002290
-	0.1845	7/8	2-3/4	0.1845	500-0001845	-	0.2295	1	3	0.2295	500-0002295
D/P	0.1855	7/8	2-3/4	0.1855	500-0001855	-	0.2300	1	3	0.2300	500-0002300
-	0.1860	7/8	2-3/4	0.1860	500-0001860	-	0.2305	1	3	0.2305	500-0002305
U/S	0.1865	7/8	2-3/4	0.1865	500-0001865	-	0.2310	1	3	0.2310	500-0002310
-	0.1870	7/8	2-3/4	0.1870	500-0001870	-	0.2315	1	3	0.2315	500-0002315
-	0.1880	7/8	2-3/4	0.1880	500-0001880	-	0.2320	1	3	0.2320	500-0002320
O/S	0.1885	7/8	2-3/4	0.1885	500-0001885	-	0.2325	1	3	0.2325	500-0002325
-	0.1895	7/8	2-3/4	0.1895	500-0001895	-	0.2330	1	3	0.2330	500-0002330
-	0.1900	7/8	2-3/4	0.1900	500-0001900	-	0.2335	1	3	0.2335	500-0002335
-	0.1905	7/8	2-3/4	0.1905	500-0001905	-	0.2345	1	3	0.2345	500-0002345
-	0.1915	7/8	2-3/4	0.1915	500-0001915	-	0.2350	1	3	0.2350	500-0002350
-	0.1920	1	3	0.1920	500-0001920	-	0.2355	1	3	0.2355	500-0002355
-	0.1925	1	3	0.1925	500-0001925	-	0.2360	1	3	0.2360	500-0002360
-	0.1930	1	3	0.1930	500-0001930	-	0.2365	1	3	0.2365	500-0002365
-	0.1935	1	3	0.1935	500-0001935	-	0.2370	1	3	0.2370	500-0002370
-	0.1940	1	3	0.1940	500-0001940	-	0.2375	1	3	0.2375	500-0002375
-	0.1945	1	3	0.1945	500-0001945	-	0.2385	1	3	0.2385	500-0002385
-	0.1950	1	3	0.1950	500-0001950	-	0.2390	1	3	0.2390	500-0002390
-	0.1955	1	3	0.1955	500-0001955	-	0.2395	1	3	0.2395	500-0002395
-	0.1965	1	3	0.1965	500-0001965	-	0.2400	1	3	0.2400	500-0002400
-	0.1970	1	3	0.1970	500-0001970	-	0.2405	1	3	0.2405	500-0002405
-	0.1975	1	3	0.1975	500-0001975	-	0.2410	1	3	0.2410	500-0002410
-	0.1980	1	3	0.1980	500-0001980	-	0.2415	1	3	0.2415	500-0002415
-	0.1985	1	3	0.1985	500-0001985	-	0.2425	1	3	0.2425	500-0002425
-	0.1995	1	3	0.1995	500-0001995	-	0.2430	1	3	0.2430	500-0002430
-	0.2000	1	3	0.2000	500-0002000	-	0.2435	1	3	0.2435	500-0002435
-	0.2005	1	3	0.2005	500-0002005	-	0.2440	1	3	0.2440	500-0002440
-	0.2015	1	3	0.2015	500-0002015	-	0.2445	1	3	0.2445	500-0002445
-	0.2020	1	3	0.2020	500-0002020	-	0.2450	1	3	0.2450	500-0002450
-	0.2025	1	3	0.2025	500-0002025	-	0.2455	1	3	0.2455	500-0002455
-	0.2030	1	3	0.2030	500-0002030	-	0.2465	1	3	0.2465	500-0002465
-	0.2035	1	3	0.2035	500-0002035	-	0.2470	1	3	0.2470	500-0002470
-	0.2045	1	3	0.2045	500-0002045	-	0.2475	1	3	0.2475	500-0002475
-	0.2050	1	3	0.2050	500-0002050	-	0.2480	1	3	0.2480	500-0002480
-	0.2060	1	3	0.2060	500-0002060	-	0.2485	1	3	0.2485	500-0002485
-	0.2065	1	3	0.2065	500-0002065	-	0.2490	1	3	0.2490	500-0002490
-	0.2070	1	3	0.2070	500-0002070	-	0.2495	1	3	0.2495	500-0002495
-	0.2075	1	3	0.2075	500-0002075	-	0.2500	1	3	0.2500	500-0002500
-	0.2080	1	3	0.2080	500-0002080	-	0.2505	1	3	0.2505	500-0002505
-	0.2085	1	3	0.2085	500-0002085	-	0.2510	1	3	0.2510	500-0002510
-	0.2095	1	3	0.2095	500-0002095	-	0.2515	1	3	0.2515	500-0002515
-	0.2100	1	3	0.2100	500-0002100	-	0.2520	1	3	0.2520	500-0002520
-	0.2105	1	3	0.2105	500-0002105	-	0.2525	1	3	0.2525	500-0002525
-	0.2110	1	3	0.2110	500-0002110	-	0.2530	1	3	0.2530	500-0002530
-	0.2115	1	3	0.2115	500-0002115	-	0.2535	1	3	0.2535	500-0002535
-	0.2120	1	3	0.2120	500-0002120	-	0.2540	1	3	0.2540	500-0002540
-	0.2125	1	3	0.2125	500-0002125	-	0.2545	1	3	0.2545	500-0002545
-	0.2135	1	3	0.2135	500-0002135	-	0.2550	1	3	0.2550	500-0002550
-	0.2140	1	3	0.2140	500-0002140	-	0.2555	1	3	0.2555	500-0002555
-	0.2145	1	3	0.2145	500-0002145	-	0.2560	1-1/8	3-1/4	0.2560	500-0002560
-	0.2150	1	3	0.2150	500-0002150	-	0.2565	1-1/8	3-1/4	0.2565	500-0002565

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Solid Carbide Straight Flute Chucking Reamer



Series 500		4 - 6FL   Straight Flute   45° Chamfer											
Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP	Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP		
Size	Dec.					Size	Dec.						
-	0.2575	1-1/8	3-1/4	0.2575	500-0002575	-	0.2985	1-1/8	3-1/4	0.2985	500-0002985		
-	0.2580	1-1/8	3-1/4	0.2580	500-0002580	-	0.2990	1-1/8	3-1/4	0.2990	500-0002990		
-	0.2585	1-1/8	3-1/4	0.2585	500-0002585	-	0.2995	1-1/8	3-1/4	0.2995	500-0002995		
-	0.2590	1-1/8	3-1/4	0.2590	500-0002590	-	0.3000	1-1/8	3-1/4	0.3000	500-0003000		
-	0.2595	1-1/8	3-1/4	0.2595	500-0002595	-	0.3005	1-1/8	3-1/4	0.3005	500-0003005		
-	0.2600	1-1/8	3-1/4	0.2600	500-0002600	-	0.3010	1-1/8	3-1/4	0.3010	500-0003010		
-	0.2605	1-1/8	3-1/4	0.2605	500-0002605	-	0.3015	1-1/8	3-1/4	0.3015	500-0003015		
-	0.2615	1-1/8	3-1/4	0.2615	500-0002615	-	0.3025	1-1/8	3-1/4	0.3025	500-0003025		
-	0.2620	1-1/8	3-1/4	0.2620	500-0002620	-	0.3030	1-1/8	3-1/4	0.3030	500-0003030		
-	0.2625	1-1/8	3-1/4	0.2625	500-0002625	-	0.3035	1-1/8	3-1/4	0.3035	500-0003035		
-	0.2630	1-1/8	3-1/4	0.2630	500-0002630	-	0.3040	1-1/8	3-1/4	0.3040	500-0003040		
-	0.2635	1-1/8	3-1/4	0.2635	500-0002635	-	0.3045	1-1/8	3-1/4	0.3045	500-0003045		
-	0.2640	1-1/8	3-1/4	0.2640	500-0002640	-	0.3050	1-1/8	3-1/4	0.3050	500-0003050		
-	0.2645	1-1/8	3-1/4	0.2645	500-0002645	-	0.3055	1-1/8	3-1/4	0.3055	500-0003055		
-	0.2650	1-1/8	3-1/4	0.2650	500-0002650	-	0.3060	1-1/8	3-1/4	0.3060	500-0003060		
-	0.2655	1-1/8	3-1/4	0.2655	500-0002655	-	0.3065	1-1/8	3-1/4	0.3065	500-0003065		
-	0.2665	1-1/8	3-1/4	0.2665	500-0002665	-	0.3070	1-1/8	3-1/4	0.3070	500-0003070		
-	0.2670	1-1/8	3-1/4	0.2670	500-0002670	-	0.3075	1-1/8	3-1/4	0.3075	500-0003075		
-	0.2675	1-1/8	3-1/4	0.2675	500-0002675	-	0.3080	1-1/8	3-1/4	0.3080	500-0003080		
-	0.2680	1-1/8	3-1/4	0.2680	500-0002680	-	0.3085	1-1/8	3-1/4	0.3085	500-0003085		
-	0.2685	1-1/8	3-1/4	0.2685	500-0002685	-	0.3090	1-1/8	3-1/4	0.3090	500-0003090		
-	0.2690	1-1/8	3-1/4	0.2690	500-0002690	-	0.3095	1-1/8	3-1/4	0.3095	500-0003095		
-	0.2695	1-1/8	3-1/4	0.2695	500-0002695	-	0.3100	1-1/8	3-1/4	0.3100	500-0003100		
-	0.2700	1-1/8	3-1/4	0.2700	500-0002700	D/P	0.3105	1-1/8	3-1/4	0.3105	500-0003105		
-	0.2705	1-1/8	3-1/4	0.2705	500-0002705	-	0.3110	1-1/8	3-1/4	0.3110	500-0003110		
-	0.2710	1-1/8	3-1/4	0.2710	500-0002710	-	0.3115	1-1/8	3-1/4	0.3115	500-0003115		
-	0.2715	1-1/8	3-1/4	0.2715	500-0002715	-	0.3120	1-1/8	3-1/4	0.3120	500-0003120		
-	0.2725	1-1/8	3-1/4	0.2725	500-0002725	-	0.3130	1-1/8	3-1/4	0.3130	500-0003130		
-	0.2730	1-1/8	3-1/4	0.2730	500-0002730	-	0.3135	1-1/8	3-1/4	0.3135	500-0003135		
-	0.2735	1-1/8	3-1/4	0.2735	500-0002735	-	0.3140	1-1/8	3-1/4	0.3140	500-0003140		
-	0.2740	1-1/8	3-1/4	0.2740	500-0002740	-	0.3145	1-1/8	3-1/4	0.3145	500-0003145		
-	0.2745	1-1/8	3-1/4	0.2745	500-0002745	-	0.3150	1-1/8	3-1/4	0.3150	500-0003150		
-	0.2750	1-1/8	3-1/4	0.2750	500-0002750	-	0.3155	1-1/8	3-1/4	0.3155	500-0003155		
-	0.2755	1-1/8	3-1/4	0.2755	500-0002755	-	0.3165	1-1/8	3-1/4	0.3165	500-0003165		
-	0.2760	1-1/8	3-1/4	0.2760	500-0002760	-	0.3170	1-1/4	3-1/2	0.3170	500-0003170		
-	0.2765	1-1/8	3-1/4	0.2765	500-0002765	-	0.3175	1-1/4	3-1/2	0.3175	500-0003175		
-	0.2770	1-1/8	3-1/4	0.2770	500-0002770	-	0.3180	1-1/4	3-1/2	0.3180	500-0003180		
-	0.2775	1-1/8	3-1/4	0.2775	500-0002775	-	0.3185	1-1/4	3-1/2	0.3185	500-0003185		
-	0.2780	1-1/8	3-1/4	0.2780	500-0002780	-	0.3190	1-1/4	3-1/2	0.3190	500-0003190		
-	0.2785	1-1/8	3-1/4	0.2785	500-0002785	-	0.3195	1-1/4	3-1/2	0.3195	500-0003195		
-	0.2790	1-1/8	3-1/4	0.2790	500-0002790	-	0.3200	1-1/4	3-1/2	0.3200	500-0003200		
-	0.2795	1-1/8	3-1/4	0.2795	500-0002795	-	0.3205	1-1/4	3-1/2	0.3205	500-0003205		
-	0.2800	1-1/8	3-1/4	0.2800	500-0002800	-	0.3210	1-1/4	3-1/2	0.3210	500-0003210		
-	0.2805	1-1/8	3-1/4	0.2805	500-0002805	-	0.3215	1-1/4	3-1/2	0.3215	500-0003215		
-	0.2815	1-1/8	3-1/4	0.2815	500-0002815	-	0.3220	1-1/4	3-1/2	0.3220	500-0003220		
-	0.2820	1-1/8	3-1/4	0.2820	500-0002820	-	0.3225	1-1/4	3-1/2	0.3225	500-0003225		
-	0.2825	1-1/8	3-1/4	0.2825	500-0002825	-	0.3235	1-1/4	3-1/2	0.3235	500-0003235		
-	0.2830	1-1/8	3-1/4	0.2830	500-0002830	-	0.3240	1-1/4	3-1/2	0.3240	500-0003240		
-	0.2835	1-1/8	3-1/4	0.2835	500-0002835	-	0.3245	1-1/4	3-1/2	0.3245	500-0003245		
-	0.2840	1-1/8	3-1/4	0.2840	500-0002840	-	0.3250	1-1/4	3-1/2	0.3250	500-0003250		
-	0.2845	1-1/8	3-1/4	0.2845	500-0002845	-	0.3255	1-1/4	3-1/2	0.3255	500-0003255		
-	0.2850	1-1/8	3-1/4	0.2850	500-0002850	-	0.3260	1-1/4	3-1/2	0.3260	500-0003260		
-	0.2855	1-1/8	3-1/4	0.2855	500-0002855	-	0.3265	1-1/4	3-1/2	0.3265	500-0003265		
-	0.2860	1-1/8	3-1/4	0.2860	500-0002860	-	0.3270	1-1/4	3-1/2	0.3270	500-0003270		
-	0.2865	1-1/8	3-1/4	0.2865	500-0002865	-	0.3275	1-1/4	3-1/2	0.3275	500-0003275		
-	0.2870	1-1/8	3-1/4	0.2870	500-0002870	-	0.3280	1-1/4	3-1/2	0.3280	500-0003280		
-	0.2875	1-1/8	3-1/4	0.2875	500-0002875	-	0.3285	1-1/4	3-1/2	0.3285	500-0003285		
-	0.2880	1-1/8	3-1/4	0.2880	500-0002880	-	0.3290	1-1/4	3-1/2	0.3290	500-0003290		
-	0.2885	1-1/8	3-1/4	0.2885	500-0002885	-	0.3295	1-1/4	3-1/2	0.3295	500-0003295		
-	0.2890	1-1/8	3-1/4	0.2890	500-0002890	-	0.3300	1-1/4	3-1/2	0.3300	500-0003300		
-	0.2895	1-1/8	3-1/4	0.2895	500-0002895	-	0.3305	1-1/4	3-1/2	0.3305	500-0003305		
-	0.2905	1-1/8	3-1/4	0.2905	500-0002905	-	0.3310	1-1/4	3-1/2	0.3310	500-0003310		
-	0.2910	1-1/8	3-1/4	0.2910	500-0002910	-	0.3315	1-1/4	3-1/2	0.3315	500-0003315		
-	0.2915	1-1/8	3-1/4	0.2915	500-0002915	-	0.3325	1-1/4	3-1/2	0.3325	500-0003325		
-	0.2920	1-1/8	3-1/4	0.2920	500-0002920	-	0.3330	1-1/4	3-1/2	0.3330	500-0003330		
-	0.2925	1-1/8	3-1/4	0.2925	500-0002925	-	0.3335	1-1/4	3-1/2	0.3335	500-0003335		
-	0.2930	1-1/8	3-1/4	0.2930	500-0002930	-	0.3340	1-1/4	3-1/2	0.3340	500-0003340		
-	0.2935	1-1/8	3-1/4	0.2935	500-0002935	-	0.3345	1-1/4	3-1/2	0.3345	500-0003345		
-	0.2940	1-1/8	3-1/4	0.2940	500-0002940	-	0.3350	1-1/4	3-1/2	0.3350	500-0003350		
-	0.2945	1-1/8	3-1/4	0.2945	500-0002945	-	0.3355	1-1/4	3-1/2	0.3355	500-0003355		
-	0.2955	1-1/8	3-1/4	0.2955	500-0002955	-	0.3360	1-1/4	3-1/2	0.3360	500-0003360		
-	0.2960	1-1/8	3-1/4	0.2960	500-0002960	-	0.3365	1-1/4	3-1/2	0.3365	500-0003365		
-	0.2965	1-1/8	3-1/4	0.2965	500-0002965	-	0.3370	1-1/4	3-1/2	0.3370	500-0003370		
-	0.2970	1-1/8	3-1/4	0.2970	500-0002970	-	0.3375	1-1/4	3-1/2	0.3375	500-0003375		
-	0.2975	1-1/8	3-1/4	0.2975	500-0002975	-	0.3380	1-1/4	3-1/2	0.3380	500-0003380		
-	0.2980	1-1/8	3-1/4	0.2980	500-0002980	-	0.3385	1-1/4	3-1/2	0.3385	500-0003385		

INTRO  
MILLING  
SPECIALTY  
HOLEMAKING  
THREADING  
INSERTS

# PERFORMANCE

Solid Carbide Straight Flute Chucking Reamer



Series 500						4 - 6FL   Straight Flute   45° Chamfer					
Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP	Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
Size	Dec.					Size	Dec.				
-	0.3395	1-1/4	3-1/2	0.3395	500-0003395	-	0.3800	1-1/4	3-1/2	0.3800	500-0003800
-	0.3400	1-1/4	3-1/2	0.3400	500-0003400	-	0.3805	1-1/4	3-1/2	0.3805	500-0003805
-	0.3405	1-1/4	3-1/2	0.3405	500-0003405	-	0.3810	1-1/4	3-1/2	0.3810	500-0003810
-	0.3410	1-1/4	3-1/2	0.3410	500-0003410	-	0.3815	1-1/4	3-1/2	0.3815	500-0003815
-	0.3415	1-1/4	3-1/2	0.3415	500-0003415	-	0.3820	1-1/4	3-1/2	0.3820	500-0003820
-	0.3420	1-1/4	3-1/2	0.3420	500-0003420	-	0.3825	1-1/4	3-1/2	0.3825	500-0003825
-	0.3425	1-1/4	3-1/2	0.3425	500-0003425	-	0.3830	1-1/4	3-1/2	0.3830	500-0003830
-	0.3430	1-1/4	3-1/2	0.3430	500-0003430	-	0.3835	1-1/4	3-1/2	0.3835	500-0003835
-	0.3435	1-1/4	3-1/2	0.3435	500-0003435	-	0.3840	1-1/4	3-1/2	0.3840	500-0003840
-	0.3440	1-1/4	3-1/2	0.3440	500-0003440	-	0.3845	1-1/4	3-1/2	0.3845	500-0003845
-	0.3445	1-1/4	3-1/2	0.3445	500-0003445	-	0.3850	1-1/4	3-1/2	0.3850	500-0003850
-	0.3450	1-1/4	3-1/2	0.3450	500-0003450	-	0.3855	1-1/4	3-1/2	0.3855	500-0003855
-	0.3455	1-1/4	3-1/2	0.3455	500-0003455	-	0.3865	1-1/4	3-1/2	0.3865	500-0003865
-	0.3460	1-1/4	3-1/2	0.3460	500-0003460	-	0.3870	1-1/4	3-1/2	0.3870	500-0003870
-	0.3465	1-1/4	3-1/2	0.3465	500-0003465	-	0.3875	1-1/4	3-1/2	0.3875	500-0003875
-	0.3470	1-1/4	3-1/2	0.3470	500-0003470	-	0.3880	1-1/4	3-1/2	0.3880	500-0003880
-	0.3475	1-1/4	3-1/2	0.3475	500-0003475	-	0.3885	1-1/4	3-1/2	0.3885	500-0003885
-	0.3485	1-1/4	3-1/2	0.3485	500-0003485	-	0.3890	1-1/4	3-1/2	0.3890	500-0003890
-	0.3490	1-1/4	3-1/2	0.3490	500-0003490	-	0.3895	1-1/4	3-1/2	0.3895	500-0003895
-	0.3495	1-1/4	3-1/2	0.3495	500-0003495	-	0.3900	1-1/4	3-1/2	0.3900	500-0003900
-	0.3500	1-1/4	3-1/2	0.3500	500-0003500	-	0.3905	1-1/4	3-1/2	0.3905	500-0003905
-	0.3505	1-1/4	3-1/2	0.3505	500-0003505	-	0.3910	1-1/4	3-1/2	0.3910	500-0003910
-	0.3510	1-1/4	3-1/2	0.3510	500-0003510	-	0.3915	1-1/4	3-1/2	0.3915	500-0003915
-	0.3515	1-1/4	3-1/2	0.3515	500-0003515	-	0.3920	1-1/4	3-1/2	0.3920	500-0003920
-	0.3520	1-1/4	3-1/2	0.3520	500-0003520	-	0.3925	1-1/4	3-1/2	0.3925	500-0003925
-	0.3525	1-1/4	3-1/2	0.3525	500-0003525	-	0.3930	1-1/4	3-1/2	0.3930	500-0003930
-	0.3530	1-1/4	3-1/2	0.3530	500-0003530	-	0.3935	1-1/4	3-1/2	0.3935	500-0003935
-	0.3535	1-1/4	3-1/2	0.3535	500-0003535	-	0.3940	1-1/4	3-1/2	0.3940	500-0003940
-	0.3540	1-1/4	3-1/2	0.3540	500-0003540	-	0.3945	1-1/4	3-1/2	0.3945	500-0003945
-	0.3545	1-1/4	3-1/2	0.3545	500-0003545	-	0.3950	1-1/4	3-1/2	0.3950	500-0003950
-	0.3550	1-1/4	3-1/2	0.3550	500-0003550	-	0.3955	1-1/4	3-1/2	0.3955	500-0003955
-	0.3555	1-1/4	3-1/2	0.3555	500-0003555	-	0.3960	1-1/4	3-1/2	0.3960	500-0003960
-	0.3560	1-1/4	3-1/2	0.3560	500-0003560	-	0.3965	1-1/4	3-1/2	0.3965	500-0003965
-	0.3565	1-1/4	3-1/2	0.3565	500-0003565	-	0.3975	1-1/4	3-1/2	0.3975	500-0003975
-	0.3570	1-1/4	3-1/2	0.3570	500-0003570	-	0.3980	1-1/4	3-1/2	0.3980	500-0003980
-	0.3575	1-1/4	3-1/2	0.3575	500-0003575	-	0.3985	1-1/4	3-1/2	0.3985	500-0003985
-	0.3585	1-1/4	3-1/2	0.3585	500-0003585	-	0.3990	1-1/4	3-1/2	0.3990	500-0003990
-	0.3590	1-1/4	3-1/2	0.3590	500-0003590	-	0.3995	1-1/4	3-1/2	0.3995	500-0003995
-	0.3595	1-1/4	3-1/2	0.3595	500-0003595	-	0.4000	1-1/4	3-1/2	0.4000	500-0004000
-	0.3600	1-1/4	3-1/2	0.3600	500-0003600	-	0.4005	1-1/4	3-1/2	0.4005	500-0004005
-	0.3605	1-1/4	3-1/2	0.3605	500-0003605	-	0.4010	1-1/4	3-1/2	0.4010	500-0004010
-	0.3610	1-1/4	3-1/2	0.3610	500-0003610	-	0.4015	1-1/4	3-1/2	0.4015	500-0004015
-	0.3615	1-1/4	3-1/2	0.3615	500-0003615	-	0.4020	1-1/4	3-1/2	0.4020	500-0004020
-	0.3620	1-1/4	3-1/2	0.3620	500-0003620	-	0.4025	1-1/4	3-1/2	0.4025	500-0004025
-	0.3625	1-1/4	3-1/2	0.3625	500-0003625	-	0.4030	1-1/4	3-1/2	0.4030	500-0004030
-	0.3630	1-1/4	3-1/2	0.3630	500-0003630	-	0.4035	1-1/4	3-1/2	0.4035	500-0004035
-	0.3635	1-1/4	3-1/2	0.3635	500-0003635	-	0.4045	1-1/4	3-1/2	0.4045	500-0004045
-	0.3640	1-1/4	3-1/2	0.3640	500-0003640	-	0.4050	1-1/4	3-1/2	0.4050	500-0004050
-	0.3645	1-1/4	3-1/2	0.3645	500-0003645	-	0.4055	1-1/4	3-1/2	0.4055	500-0004055
-	0.3650	1-1/4	3-1/2	0.3650	500-0003650	-	0.4060	1-1/4	3-1/2	0.4060	500-0004060
-	0.3655	1-1/4	3-1/2	0.3655	500-0003655	-	0.4065	1-1/4	3-1/2	0.4065	500-0004065
-	0.3660	1-1/4	3-1/2	0.3660	500-0003660	-	0.4070	1-1/4	3-1/2	0.4070	500-0004070
-	0.3665	1-1/4	3-1/2	0.3665	500-0003665	-	0.4075	1-1/4	3-1/2	0.4075	500-0004075
-	0.3670	1-1/4	3-1/2	0.3670	500-0003670	-	0.4080	1-1/4	3-1/2	0.4080	500-0004080
-	0.3675	1-1/4	3-1/2	0.3675	500-0003675	-	0.4085	1-1/4	3-1/2	0.4085	500-0004085
-	0.3685	1-1/4	3-1/2	0.3685	500-0003685	-	0.4090	1-1/4	3-1/2	0.4090	500-0004090
-	0.3690	1-1/4	3-1/2	0.3690	500-0003690	-	0.4095	1-1/4	3-1/2	0.4095	500-0004095
-	0.3695	1-1/4	3-1/2	0.3695	500-0003695	-	0.4100	1-1/4	3-1/2	0.4100	500-0004100
-	0.3700	1-1/4	3-1/2	0.3700	500-0003700	-	0.4105	1-1/4	3-1/2	0.4105	500-0004105
-	0.3705	1-1/4	3-1/2	0.3705	500-0003705	-	0.4110	1-1/4	3-1/2	0.4110	500-0004110
-	0.3710	1-1/4	3-1/2	0.3710	500-0003710	-	0.4115	1-1/4	3-1/2	0.4115	500-0004115
-	0.3715	1-1/4	3-1/2	0.3715	500-0003715	-	0.4120	1-1/4	3-1/2	0.4120	500-0004120
-	0.3720	1-1/4	3-1/2	0.3720	500-0003720	-	0.4125	1-1/4	3-1/2	0.4125	500-0004125
-	0.3725	1-1/4	3-1/2	0.3725	500-0003725	-	0.4135	1-1/4	3-1/2	0.4135	500-0004135
D/P	0.3730	1-1/4	3-1/2	0.3730	500-0003730	-	0.4140	1-1/4	3-1/2	0.4140	500-0004140
-	0.3735	1-1/4	3-1/2	0.3735	500-0003735	-	0.4145	1-1/4	3-1/2	0.4145	500-0004145
U/S	0.3740	1-1/4	3-1/2	0.3740	500-0003740	-	0.4150	1-1/4	3-1/2	0.4150	500-0004150
D/P	0.3745	1-1/4	3-1/2	0.3745	500-0003745	-	0.4155	1-1/4	3-1/2	0.4155	500-0004155
-	0.3755	1-1/4	3-1/2	0.3755	500-0003755	-	0.4160	1-1/4	3-1/2	0.4160	500-0004160
O/S	0.3760	1-1/4	3-1/2	0.3760	500-0003760	-	0.4165	1-3/8	4	0.4165	500-0004165
-	0.3765	1-1/4	3-1/2	0.3765	500-0003765	-	0.4170	1-3/8	4	0.4170	500-0004170
-	0.3775	1-1/4	3-1/2	0.3775	500-0003775	-	0.4175	1-3/8	4	0.4175	500-0004175
-	0.3780	1-1/4	3-1/2	0.3780	500-0003780	-	0.4180	1-3/8	4	0.4180	500-0004180
-	0.3785	1-1/4	3-1/2	0.3785	500-0003785	-	0.4185	1-3/8	4	0.4185	500-0004185
-	0.3790	1-1/4	3-1/2	0.3790	500-0003790	-	0.4190	1-3/8	4	0.4190	500-0004190
-	0.3795	1-1/4	3-1/2	0.3795	500-0003795	-	0.4195	1-3/8	4	0.4195	500-0004195

# PERFORMANCE

## Solid Carbide Straight Flute Chucking Reamer



### Series 500

### 4 - 6FL | Straight Flute | 45° Chamfer

Diameter (D <sub>1</sub> ) Size	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
-	0.4200	1-3/8	4	0.4200	500-0004200
-	0.4205	1-3/8	4	0.4205	500-0004205
-	0.4210	1-3/8	4	0.4210	500-0004210
-	0.4215	1-3/8	4	0.4215	500-0004215
-	0.4220	1-3/8	4	0.4220	500-0004220
-	0.4225	1-3/8	4	0.4225	500-0004225
-	0.4230	1-3/8	4	0.4230	500-0004230
-	0.4235	1-3/8	4	0.4235	500-0004235
-	0.4240	1-3/8	4	0.4240	500-0004240
-	0.4245	1-3/8	4	0.4245	500-0004245
-	0.4250	1-3/8	4	0.4250	500-0004250
-	0.4255	1-3/8	4	0.4255	500-0004255
-	0.4260	1-3/8	4	0.4260	500-0004260
-	0.4265	1-3/8	4	0.4265	500-0004265
-	0.4270	1-3/8	4	0.4270	500-0004270
-	0.4275	1-3/8	4	0.4275	500-0004275
-	0.4280	1-3/8	4	0.4280	500-0004280
-	0.4285	1-3/8	4	0.4285	500-0004285
-	0.4290	1-3/8	4	0.4290	500-0004290
-	0.4295	1-3/8	4	0.4295	500-0004295
-	0.4300	1-3/8	4	0.4300	500-0004300
-	0.4305	1-3/8	4	0.4305	500-0004305
-	0.4310	1-3/8	4	0.4310	500-0004310
-	0.4315	1-3/8	4	0.4315	500-0004315
-	0.4320	1-3/8	4	0.4320	500-0004320
-	0.4325	1-3/8	4	0.4325	500-0004325
-	0.4330	1-3/8	4	0.4330	500-0004330
-	0.4335	1-3/8	4	0.4335	500-0004335
-	0.4340	1-3/8	4	0.4340	500-0004340
-	0.4345	1-3/8	4	0.4345	500-0004345
-	0.4350	1-3/8	4	0.4350	500-0004350
D/P	0.4355	1-3/8	4	0.4355	500-0004355
-	0.4360	1-3/8	4	0.4360	500-0004360
U/S	0.4365	1-3/8	4	0.4365	500-0004365
-	0.4370	1-3/8	4	0.4370	500-0004370
-	0.4380	1-3/8	4	0.4380	500-0004380
-	0.4385	1-3/8	4	0.4385	500-0004385
-	0.4390	1-3/8	4	0.4390	500-0004390
-	0.4395	1-3/8	4	0.4395	500-0004395
-	0.4400	1-3/8	4	0.4400	500-0004400
-	0.4405	1-3/8	4	0.4405	500-0004405
-	0.4410	1-3/8	4	0.4410	500-0004410
-	0.4415	1-3/8	4	0.4415	500-0004415
-	0.4420	1-3/8	4	0.4420	500-0004420
-	0.4425	1-3/8	4	0.4425	500-0004425
-	0.4430	1-3/8	4	0.4430	500-0004430
-	0.4435	1-3/8	4	0.4435	500-0004435
-	0.4440	1-3/8	4	0.4440	500-0004440
-	0.4445	1-3/8	4	0.4445	500-0004445
-	0.4450	1-3/8	4	0.4450	500-0004450
-	0.4455	1-3/8	4	0.4455	500-0004455
-	0.4460	1-3/8	4	0.4460	500-0004460
-	0.4465	1-3/8	4	0.4465	500-0004465
-	0.4470	1-3/8	4	0.4470	500-0004470
-	0.4475	1-3/8	4	0.4475	500-0004475
-	0.4480	1-3/8	4	0.4480	500-0004480
-	0.4485	1-3/8	4	0.4485	500-0004485
-	0.4490	1-3/8	4	0.4490	500-0004490
-	0.4495	1-3/8	4	0.4495	500-0004495
-	0.4500	1-3/8	4	0.4500	500-0004500
-	0.4505	1-3/8	4	0.4505	500-0004505
-	0.4510	1-3/8	4	0.4510	500-0004510
-	0.4515	1-3/8	4	0.4515	500-0004515
-	0.4520	1-3/8	4	0.4520	500-0004520
-	0.4525	1-3/8	4	0.4525	500-0004525
-	0.4530	1-3/8	4	0.4530	500-0004530
-	0.4535	1-3/8	4	0.4535	500-0004535
-	0.4540	1-3/8	4	0.4540	500-0004540
-	0.4545	1-3/8	4	0.4545	500-0004545
-	0.4550	1-3/8	4	0.4550	500-0004550
-	0.4555	1-3/8	4	0.4555	500-0004555
-	0.4560	1-3/8	4	0.4560	500-0004560
-	0.4565	1-3/8	4	0.4565	500-0004565
-	0.4570	1-3/8	4	0.4570	500-0004570
-	0.4575	1-3/8	4	0.4575	500-0004575
-	0.4580	1-3/8	4	0.4580	500-0004580

Diameter (D <sub>1</sub> ) Size	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
-	0.4585	1-3/8	4	0.4585	500-0004585
-	0.4590	1-3/8	4	0.4590	500-0004590
-	0.4595	1-3/8	4	0.4595	500-0004595
-	0.4600	1-3/8	4	0.4600	500-0004600
-	0.4605	1-3/8	4	0.4605	500-0004605
-	0.4610	1-3/8	4	0.4610	500-0004610
-	0.4615	1-3/8	4	0.4615	500-0004615
-	0.4620	1-3/8	4	0.4620	500-0004620
-	0.4625	1-3/8	4	0.4625	500-0004625
-	0.4630	1-3/8	4	0.4630	500-0004630
-	0.4635	1-3/8	4	0.4635	500-0004635
-	0.4640	1-3/8	4	0.4640	500-0004640
-	0.4645	1-3/8	4	0.4645	500-0004645
-	0.4650	1-3/8	4	0.4650	500-0004650
-	0.4655	1-3/8	4	0.4655	500-0004655
-	0.4660	1-3/8	4	0.4660	500-0004660
-	0.4665	1-3/8	4	0.4665	500-0004665
-	0.4670	1-3/8	4	0.4670	500-0004670
-	0.4675	1-3/8	4	0.4675	500-0004675
-	0.4680	1-3/8	4	0.4680	500-0004680
-	0.4685	1-3/8	4	0.4685	500-0004685
-	0.4690	1-3/8	4	0.4690	500-0004690
-	0.4695	1-3/8	4	0.4695	500-0004695
-	0.4700	1-3/8	4	0.4700	500-0004700
-	0.4705	1-3/8	4	0.4705	500-0004705
-	0.4710	1-3/8	4	0.4710	500-0004710
-	0.4715	1-3/8	4	0.4715	500-0004715
-	0.4720	1-3/8	4	0.4720	500-0004720
-	0.4725	1-3/8	4	0.4725	500-0004725
-	0.4730	1-3/8	4	0.4730	500-0004730
-	0.4735	1-3/8	4	0.4735	500-0004735
-	0.4740	1-3/8	4	0.4740	500-0004740
-	0.4745	1-3/8	4	0.4745	500-0004745
-	0.4750	1-3/8	4	0.4750	500-0004750
-	0.4755	1-3/8	4	0.4755	500-0004755
-	0.4760	1-3/8	4	0.4760	500-0004760
-	0.4765	1-3/8	4	0.4765	500-0004765
-	0.4770	1-3/8	4	0.4770	500-0004770
-	0.4775	1-3/8	4	0.4775	500-0004775
-	0.4780	1-3/8	4	0.4780	500-0004780
-	0.4785	1-1/2	4	0.4785	500-0004785
-	0.4790	1-1/2	4	0.4790	500-0004790
-	0.4795	1-1/2	4	0.4795	500-0004795
-	0.4800	1-1/2	4	0.4800	500-0004800
-	0.4805	1-1/2	4	0.4805	500-0004805
-	0.4810	1-1/2	4	0.4810	500-0004810
-	0.4815	1-1/2	4	0.4815	500-0004815
-	0.4820	1-1/2	4	0.4820	500-0004820
-	0.4825	1-1/2	4	0.4825	500-0004825
-	0.4830	1-1/2	4	0.4830	500-0004830
-	0.4835	1-1/2	4	0.4835	500-0004835
-	0.4840	1-1/2	4	0.4840	500-0004840
-	0.4845	1-1/2	4	0.4845	500-0004845
-	0.4850	1-1/2	4	0.4850	500-0004850
-	0.4855	1-1/2	4	0.4855	500-0004855
-	0.4860	1-1/2	4	0.4860	500-0004860
-	0.4865	1-1/2	4	0.4865	500-0004865
-	0.4870	1-1/2	4	0.4870	500-0004870
-	0.4875	1-1/2	4	0.4875	500-0004875
-	0.4880	1-1/2	4	0.4880	500-0004880
-	0.4885	1-1/2	4	0.4885	500-0004885
-	0.4890	1-1/2	4	0.4890	500-0004890
-	0.4895	1-1/2	4	0.4895	500-0004895
-	0.4900	1-1/2	4	0.4900	500-0004900
-	0.4905	1-1/2	4	0.4905	500-0004905
-	0.4910	1-1/2	4	0.4910	500-0004910
-	0.4915	1-1/2	4	0.4915	500-0004915
-	0.4920	1-1/2	4	0.4920	500-0004920
-	0.4925	1-1/2	4	0.4925	500-0004925
-	0.4930	1-1/2	4	0.4930	500-0004930
-	0.4935	1-1/2	4	0.4935	500-0004935
-	0.4940	1-1/2	4	0.4940	500-0004940
-	0.4945	1-1/2	4	0.4945	500-0004945
-	0.4950	1-1/2	4	0.4950	500-0004950
-	0.4955	1-1/2	4	0.4955	500-0004955
-	0.4960	1-1/2	4	0.4960	500-0004960

INTRO

MILLING

SPECIALTY

HOLEMaking

THREADING

INSERTS

Series 500						4 - 6FL   Straight Flute   45° Chamfer					
Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP	Diameter (D <sub>1</sub> )		Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
Size	Dec.					Size	Dec.				
-	0.4965	1-1/2	4	0.4965	500-0004965	3/16	0.1875	7/8	2-3/4	3/16	500-001012
-	0.4970	1-1/2	4	0.4970	500-0004970	13/64	0.2031	1	3	13/64	500-001013
-	0.4975	1-1/2	4	0.4975	500-0004975	7/32	0.2188	1	3	7/32	500-001014
D/P	0.4980	1-1/2	4	0.4980	500-0004980	15/64	0.2344	1	3	15/64	500-001015
-	0.4985	1-1/2	4	0.4985	500-0004985	1/4	0.2500	1	3	1/4	500-001016
U/S	0.4990	1-1/2	4	0.4990	500-0004990	17/64	0.2656	1-1/8	3-1/4	17/64	500-001017
D/P	0.4995	1-1/2	4	0.4995	500-0004995	9/32	0.2813	1-1/8	3-1/4	9/16	500-001018
-	0.5005	1-1/2	4	0.5005	500-0005005	19/64	0.2969	1-1/8	3-1/4	19/64	500-001019
O/S	0.5010	1-1/2	4	0.5010	500-0005010	5/16	0.3125	1-1/8	3-1/4	5/16	500-001020
-	0.5015	1-1/2	4	0.5015	500-0005015	21/64	0.3281	1-1/4	3-1/2	21/64	500-001021
-	0.5020	1-1/2	4	0.5020	500-0005020	11/32	0.3438	1-1/4	3-1/2	11/32	500-001022
-	0.5025	1-1/2	4	0.5025	500-0005025	23/64	0.3594	1-1/4	3-1/2	23/64	500-001023
-	0.5030	1-1/2	4	0.5030	500-0005030	3/8	0.3750	1-1/4	3-1/2	3/8	500-001024
-	0.5035	1-1/2	4	0.5035	500-0005035	25/64	0.3906	1-1/4	3-1/2	25/64	500-001025
-	0.5040	1-1/2	4	0.5040	500-0005040	13/32	0.4063	1-1/4	3-1/2	13/32	500-001026
-	0.5045	1-1/2	4	0.5045	500-0005045	27/64	0.4219	1-3/8	4	27/64	500-001027
-	0.5050	1-1/2	4	0.5050	500-0005050	7/16	0.4375	1-3/8	4	7/16	500-001028
-	0.5090	1-1/2	4	0.5090	500-0005090	29/64	0.4531	1-3/8	4	29/64	500-001029
-	0.5095	1-1/2	4	0.5095	500-0005095	15/32	0.4688	1-3/8	4	15/32	500-001030
-	0.5100	1-1/2	4	0.5100	500-0005100	31/64	0.4844	1-1/2	4	31/64	500-001031
-	0.5105	1-1/2	4	0.5105	500-0005105	1/2	0.5000	1-1/2	4	1/2	500-001032
-	0.5110	1-1/2	4	0.5110	500-0005110	9/16	0.5625	1-1/2	4	9/16	500-001036
-	0.5115	1-1/2	4	0.5115	500-0005115	5/8	0.6250	1-3/4	4	5/8	500-001040
-	0.5120	1-1/2	4	0.5120	500-0005120	3/4	0.7500	1-3/4	4	3/4	500-001048
-	0.5495	1-1/2	4	0.5495	500-0005495	A	0.2340	1	3	0.2340	500-002000
-	0.5500	1-1/2	4	0.5500	500-0005500	B	0.2380	1	3	0.2380	500-002001
-	0.5505	1-1/2	4	0.5505	500-0005505	C	0.2420	1	3	0.2420	500-002002
-	0.5510	1-1/2	4	0.5510	500-0005510	D	0.2460	1	3	0.2460	500-002003
-	0.5515	1-1/2	4	0.5515	500-0005515	E	0.2500	1	3	0.2500	500-002004
-	0.5600	1-1/2	4	0.5600	500-0005600	F	0.2570	1-1/8	3-1/4	0.2570	500-002005
-	0.5605	1-1/2	4	0.5605	500-0005605	G	0.2610	1-1/8	3-1/4	0.2610	500-002006
-	0.5610	1-1/2	4	0.5610	500-0005610	H	0.2660	1-1/8	3-1/4	0.2660	500-002007
-	0.5615	1-1/2	4	0.5615	500-0005615	I	0.2720	1-1/8	3-1/4	0.2720	500-002008
-	0.5620	1-1/2	4	0.5620	500-0005620	J	0.2770	1-1/8	3-1/4	0.2770	500-002009
-	0.5885	1-3/4	4	0.5885	500-0005885	K	0.2810	1-1/8	3-1/4	0.2810	500-002010
-	0.5890	1-3/4	4	0.5890	500-0005890	L	0.2900	1-1/8	3-1/4	0.2900	500-002011
-	0.5895	1-3/4	4	0.5895	500-0005895	M	0.2950	1-1/8	3-1/4	0.2950	500-002012
-	0.5900	1-3/4	4	0.5900	500-0005900	N	0.3020	1-1/8	3-1/4	0.3020	500-002013
-	0.6210	1-3/4	4	0.6210	500-0006210	O	0.3160	1-1/8	3-1/4	0.3160	500-002014
-	0.6215	1-3/4	4	0.6215	500-0006215	P	0.3230	1-1/4	3-1/2	0.3230	500-002015
-	0.6220	1-3/4	4	0.6220	500-0006220	Q	0.3320	1-1/4	3-1/2	0.3320	500-002016
-	0.6225	1-3/4	4	0.6225	500-0006225	R	0.3390	1-1/4	3-1/2	0.3390	500-002017
-	0.6230	1-3/4	4	0.6230	500-0006230	S	0.3480	1-1/4	3-1/2	0.3480	500-002018
-	0.6235	1-3/4	4	0.6235	500-0006235	T	0.3580	1-1/4	3-1/2	0.3580	500-002019
-	0.6240	1-3/4	4	0.6240	500-0006240	U	0.3680	1-1/4	3-1/2	0.3680	500-002020
-	0.6245	1-3/4	4	0.6245	500-0006245	V	0.3770	1-1/4	3-1/2	0.3770	500-002021
-	0.6255	1-3/4	4	0.6255	500-0006255	W	0.3860	1-1/4	3-1/2	0.3860	500-002022
-	0.6260	1-3/4	4	0.6260	500-0006260	X	0.3970	1-1/4	3-1/2	0.3970	500-002023
-	0.6265	1-3/4	4	0.6265	500-0006265	Y	0.4040	1-1/4	3-1/2	0.4040	500-002024
-	0.6270	1-3/4	4	0.6270	500-0006270	Z	0.4130	1-1/4	3-1/2	0.4130	500-002025
-	0.6275	1-3/4	4	0.6275	500-0006275	#1	0.2280	1	3	0.2280	500-003001
-	0.6280	1-3/4	4	0.6280	500-0006280	#2	0.2210	1	3	0.2210	500-003002
-	0.6285	1-3/4	4	0.6285	500-0006285	#3	0.2130	1	3	0.2130	500-003003
-	0.6290	1-3/4	4	0.6290	500-0006290	#4	0.2090	1	3	0.2090	500-003004
-	0.6295	1-3/4	4	0.6295	500-0006295	#5	0.2055	1	3	0.2055	500-003005
-	0.6300	1-3/4	4	0.6300	500-0006300	#6	0.2040	1	3	0.2040	500-003006
-	0.6305	1-3/4	4	0.6305	500-0006305	#7	0.2010	1	3	0.2010	500-003007
-	0.6310	1-3/4	4	0.6310	500-0006310	#8	0.1990	1	3	0.1990	500-003008
-	0.7470	1-3/4	4	0.7470	500-0007470	#9	0.1960	1	3	0.1960	500-003009
-	0.7475	1-3/4	4	0.7475	500-0007475	#10	0.1935	1	3	0.1935	500-003010
-	0.7480	1-3/4	4	0.7480	500-0007480	#11	0.1910	7/8	2-3/4	0.1910	500-003011
-	0.7485	1-3/4	4	0.7485	500-0007485	#12	0.1890	7/8	2-3/4	0.1890	500-003012
-	0.7490	1-3/4	4	0.7490	500-0007490	#13	0.1850	7/8	2-3/4	0.1850	500-003013
-	0.7495	1-3/4	4	0.7495	500-0007495	#14	0.1820	7/8	2-3/4	0.1820	500-003014
-	0.7505	1-3/4	4	0.7505	500-0007505	#15	0.1800	7/8	2-3/4	0.1800	500-003015
-	0.7510	1-3/4	4	0.7510	500-0007510	#16	0.1770	7/8	2-3/4	0.1770	500-003016
1/32	0.0313	1/4	1-1/2	0.0247	500-001002	#17	0.1730	7/8	2-3/4	0.1730	500-003017
3/64	0.0469	3/8	1-1/2	0.0404	500-001003	#18	0.1695	7/8	2-3/4	0.1695	500-003018
1/16	0.0625	3/8	1-1/2	1/16	500-001004	#19	0.1660	7/8	2-3/4	0.1660	500-003019
5/64	0.0781	1/2	1-3/4	5/64	500-001005	#20	0.1610	7/8	2-3/4	0.1610	500-003020
3/32	0.0938	1/2	2	3/32	500-001006	#21	0.1590	3/4	2-1/2	0.1590	500-003021
7/64	0.1094	5/8	2-1/4	7/64	500-001007	#22	0.1570	3/4	2-1/2	0.1570	500-003022
1/8	0.1250	5/8	2-1/4	1/8	500-001008	#23	0.1540	3/4	2-1/2	0.1540	500-003023
9/64	0.1406	3/4	2-1/2	9/64	500-001009	#24	0.1520	3/4	2-1/2	0.1520	500-003024
5/32	0.1563	3/4	2-1/2	5/32	500-001010	#25	0.1495	3/4	2-1/2	0.1495	500-003025
11/64	0.1719	7/8	2-3/4	11/64	500-001011	#26	0.1470	3/4	2-1/2	0.1470	500-003026

# PERFORMANCE

## Solid Carbide Straight Flute Chucking Reamer



### Series 500

### 4 - 6FL | Straight Flute | 45° Chamfer

Diameter (D <sub>1</sub> ) Size	Dec.	Flute Length (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
#27	0.1440	3/4	2-1/2	0.1440	500-003027
#28	0.1405	3/4	2-1/2	0.1405	500-003028
#29	0.1360	3/4	2-1/2	0.1360	500-003029
#30	0.1285	5/8	2-1/4	0.1285	500-003030
#31	0.1200	5/8	2-1/4	0.1200	500-003031
#32	0.1160	5/8	2-1/4	0.1160	500-003032
#33	0.1130	5/8	2-1/4	0.1130	500-003033
#34	0.1110	5/8	2-1/4	0.1110	500-003034
#35	0.1100	5/8	2-1/4	0.1100	500-003035
#36	0.1065	5/8	2-1/4	0.1065	500-003036
#37	0.1040	5/8	2-1/4	0.1040	500-003037
#38	0.1015	5/8	2-1/4	0.1015	500-003038
#39	0.0995	5/8	2-1/4	0.0995	500-003039
#40	0.0980	5/8	2-1/4	0.0980	500-003040
#41	0.0960	1/2	2	0.0960	500-003041
#42	0.0935	1/2	2	0.0935	500-003042
#43	0.0890	1/2	2	0.0890	500-003043
#44	0.0860	1/2	2	0.0860	500-003044
#45	0.0820	1/2	2	0.0820	500-003045
#46	0.0810	1/2	1-3/4	0.0810	500-003046
#47	0.0785	1/2	1-3/4	0.0785	500-003047
#48	0.0760	1/2	1-3/4	0.0760	500-003048
#49	0.0730	1/2	1-3/4	0.0730	500-003049
#50	0.0700	1/2	1-3/4	0.0700	500-003050
#51	0.0670	1/2	1-3/4	0.0670	500-003051
#52	0.0635	3/8	1-1/2	0.0635	500-003052
#53	0.0595	3/8	1-1/2	0.0595	500-003053
#54	0.0550	3/8	1-1/2	0.0550	500-003054
#55	0.0520	3/8	1-1/2	0.0520	500-003055
#56	0.0465	3/8	1-1/2	0.0400	500-003056
#57	0.0430	3/8	1-1/2	0.0365	500-003057
#58	0.0420	3/8	1-1/2	0.0355	500-003058
#59	0.0410	1/4	1-1/2	0.0345	500-003059
#60	0.0400	1/4	1-1/2	0.0335	500-003060
#61	0.0390	1/4	1-1/2	0.0325	500-003061
#62	0.0380	1/4	1-1/2	0.0315	500-003062
#63	0.0370	1/4	1-1/2	0.0305	500-003063
#64	0.0360	1/4	1-1/2	0.0295	500-003064
#65	0.0350	1/4	1-1/2	0.0285	500-003065
#66	0.0330	1/4	1-1/2	0.0265	500-003066
#67	0.0320	1/4	1-1/2	0.0255	500-003067
#68	0.0310	1/4	1-1/2	0.0245	500-003068
#69	0.0292	1/4	1-1/2	0.0227	500-003069
#70	0.0280	1/4	1-1/2	0.0215	500-003070
1.0mm	0.0394	6.0mm	38mm	1mm	500-004001
1.5mm	0.0591	10.0mm	38mm	1.5mm	500-004001.5
2.0mm	0.0787	13.0mm	44mm	2mm	500-004002
2.5mm	0.0984	16.0mm	57mm	2.5mm	500-004002.5
3.0mm	0.1181	16.0mm	57mm	3.0mm	500-004003
3.5mm	0.1378	19.0mm	64mm	3.5mm	500-004003.5
4.0mm	0.1575	19.0mm	64mm	4.0mm	500-004004
4.5mm	0.1772	22.0mm	70mm	4.5mm	500-004004.5
5.0mm	0.1969	25.0mm	76mm	5.0mm	500-004005
5.5mm	0.2165	25.0mm	76mm	5.5mm	500-004005.5
6.0mm	0.2362	25.0mm	76mm	6.0mm	500-004006
6.5mm	0.2559	29mm	83mm	6.5mm	500-004006.5
7.0mm	0.2756	29mm	83mm	7.0mm	500-004007
7.5mm	0.2953	29mm	83mm	7.5mm	500-004007.5
8.0mm	0.3150	29mm	83mm	8.0mm	500-004008
8.5mm	0.3346	32mm	89mm	8.5mm	500-004008.5
9.0mm	0.3543	32mm	89mm	9.0mm	500-004009
9.5mm	0.3740	32mm	89mm	9.5mm	500-004009.5
1.0mm	0.3937	32mm	89mm	10.0mm	500-004010
10.5mm	0.4134	32mm	89mm	10.5mm	500-004010.5
11.0mm	0.4331	35mm	102mm	11.0mm	500-004011
11.5mm	0.4528	35mm	102mm	11.5mm	500-004011.5
12.0mm	0.4724	35mm	102mm	12.0mm	500-004012
12.5mm	0.4921	38mm	102mm	12.5mm	500-004012.5
13.0mm	0.5118	38mm	102mm	13.0mm	500-004013
14.0mm	0.5512	38mm	102mm	14.0mm	500-004014
15.0mm	0.5906	44mm	102mm	15.0mm	500-004015
16.0mm	0.6299	44mm	102mm	16.0mm	500-004016

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# BUILD THE PERFECT TOOL

## THREE WAYS TO REQUEST CUSTOM

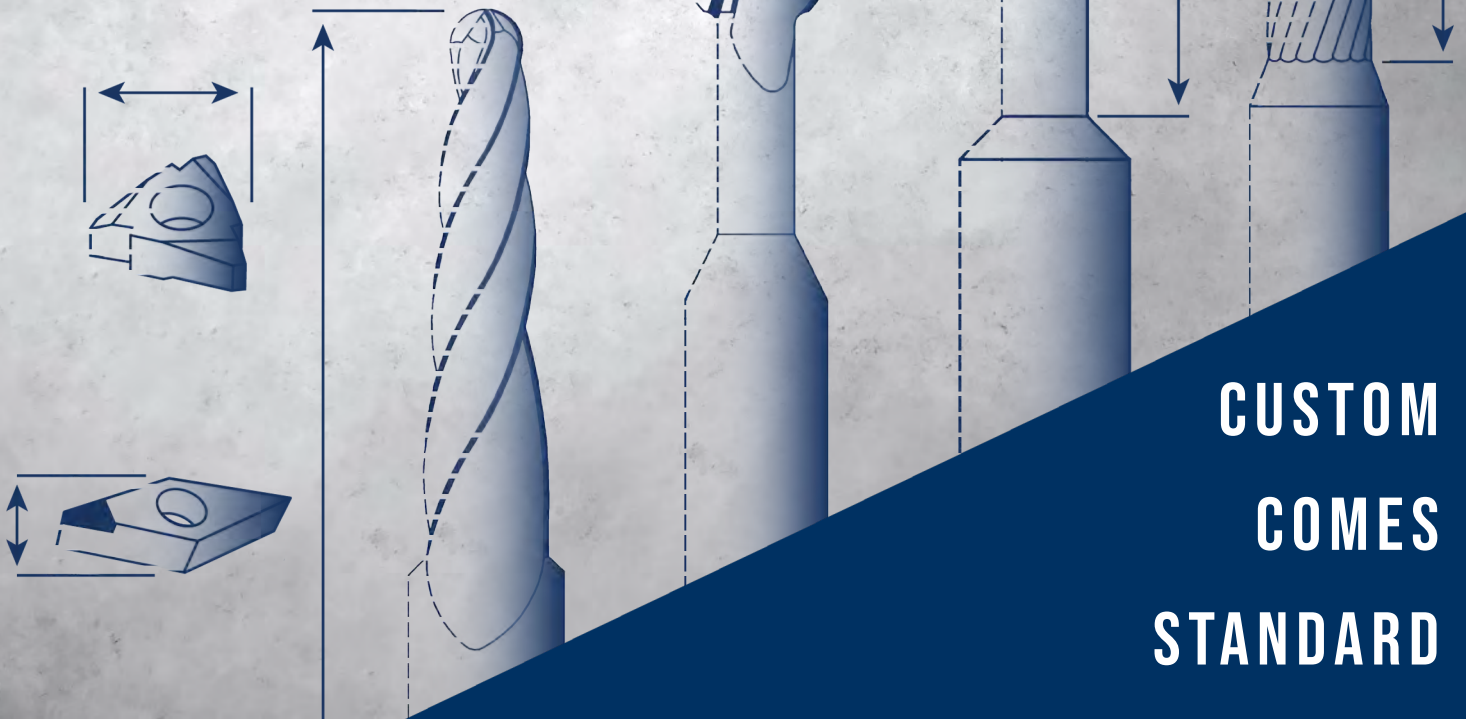
- 1.** Fill out and submit one of our many preformatted custom tool quote forms from our website.
- 2.** Upload a drawing, sketch or file using our drawing upload feature on [gwstoolgroup.com](http://gwstoolgroup.com). An engineer will promptly receive and quote your request.
- 3.** Send an email or call us with your request, and one of our specialists will take care of the rest.



877-497-8665



[Sales@gwstoolgroup.com](mailto:Sales@gwstoolgroup.com)



**CUSTOM  
COMES  
STANDARD**

# TECHNICAL DATA

## HOLEMAKING

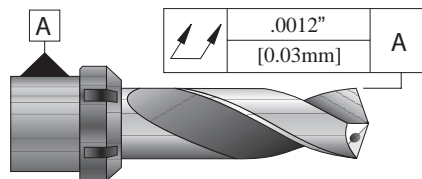




Tool Material	Self Start	
	Entry	Feed Rate
	Up to 100%	Reduce 30 to 50%
Carbide	5.5 x Ø	8.5 x Ø
Carbide Tip	4 x Ø	6 x Ø
HSS, Cobalt	4 x Ø	6 x Ø
Drill Depth		

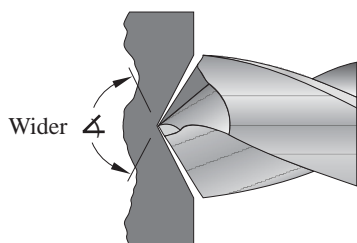
To properly self start a drill use the following:

- Shortened projection
- Rigid part fixturing
- Enter machined surface

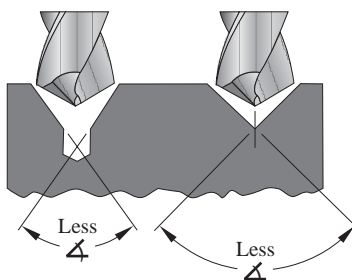


For greater drill depths or better positioning use other starting methods shown.

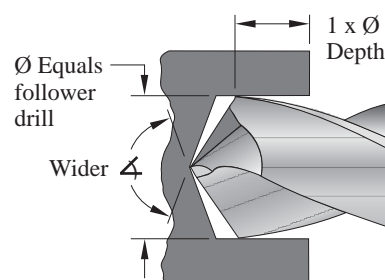
Spot for carbide



Spot for H.S.S.

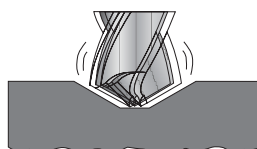


Starting hole\*\* for carbide



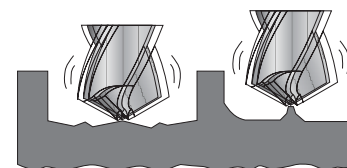
Tool Groups	Spot/Starting Hole Versus Follower Drill		
	Wider $\Delta$ +5° to +10°	Same $\Delta$	Less $\Delta$
HPS Carbide (A, B, M)	●	●	◐
Carbide Standard	●	◐	○*
Carbide Tipped	●	◐	○*
HSS, Cobalt t	◐	◐	●
	● Most Appropriate	◐ Occasionally Appropriate	○ Don't Use

\* If you can not drill first and chamfer the hole afterwards, reducing RPM (up to 60%) and Feed/Rev. (up to 40%) while machining out the difference in point angles may help protect the carbide drill.



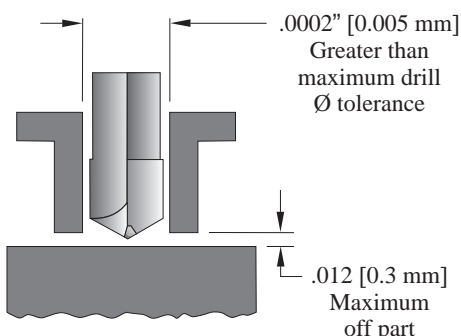
Avoid using a spot drill with a chisel flat. Use Styles 114, 113 and 115 for spotting.

\*\* Accurate position & size control to within .002" (0.05 mm) oversized on the start hole can yield hole accuracy comparable to most bushing starts. DO NOT rotate long tools i.e. #172 & #175 outside starting hole at high RPM or whip-out will occur. Ease the long tool into the starting hole at 200 RPM and .025" (.635 mm) / Rev.

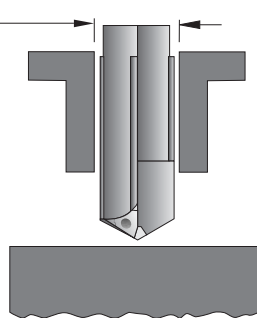


Avoid convex spots from indexable drills or non-center cut tools.

Bushing against



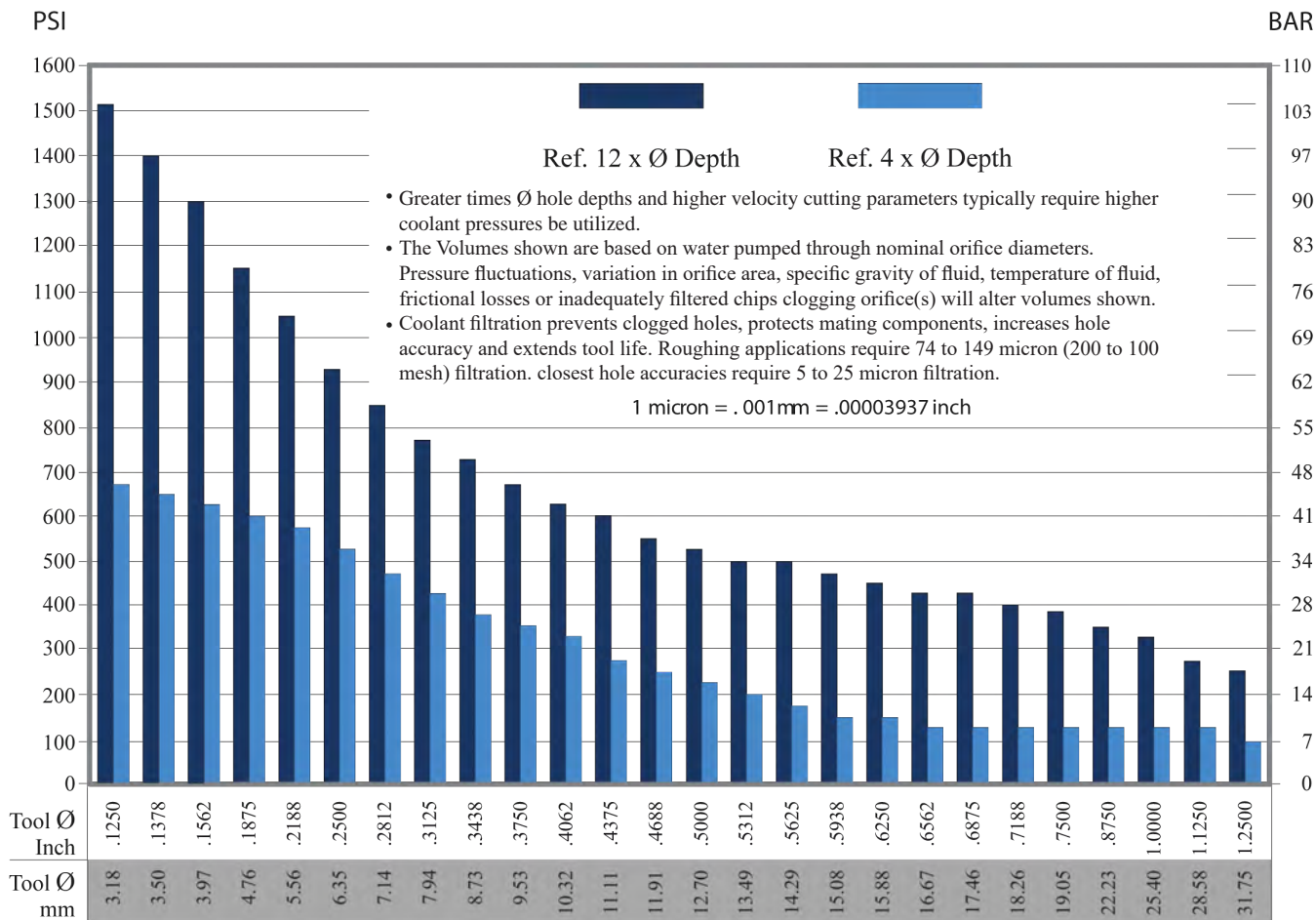
Bushing away



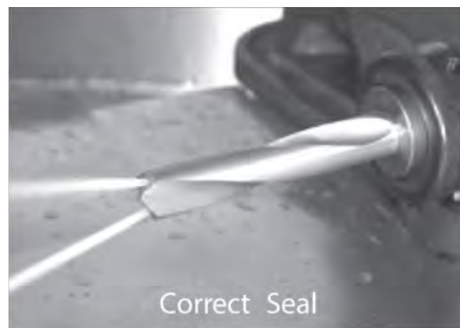
Tool Group Letter(s)	Bushing		
	Against	Away	
A, B, E, M, P, T	◐	○	● Most Appropriate
D, G, J, Q, R	●	◐	◐ Occasionally Appropriate
F, N	●	●	○ Don't Use

Special double margin drills can be made to optimize performance in bushing starts and angular entry/exit applications.

**Correct coolant pressure helps ensure sufficient lubrication and cooling at the cutting zone.**



**Lack of proper holder seal decreases coolant velocity and chip evacuation.**

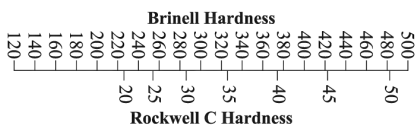


Use of a sealed collet or other coolant sealing system is necessary for optimal tool performance and chip evacuation.

1 US Gallon = 3.785 Liters = 8.337 lbs. Water  
2.2046 lbs. = 1 Kg.

Drill Style	Cutting Diameter Range (inches)	Oil Hole Flow Capacities in GPM at listed pressures 50 psi-1500 psi											
		50 psi	100 psi	200 psi	300 psi	400 psi	500 psi	600 psi	700 psi	800 psi	1000 psi	1200 psi	1500 psi
293 294	.156-.177	0.19	0.27	0.38	0.47	0.54	0.61	0.67	0.72	0.77	0.86	0.94	1.05
	.188-.221	0.27	0.38	0.54	0.66	0.76	0.85	0.94	1.01	1.08	1.21	1.32	1.48
	.234-.339	0.53	0.76	1.07	1.31	1.51	1.69	1.85	2.00	2.14	2.39	2.62	2.93
	.344-.472	0.98	1.39	1.96	2.40	2.78	3.10	3.40	3.67	3.93	4.39	4.81	5.37
	.484-.689	1.56	2.21	3.13	3.83	4.42	4.94	5.42	5.85	6.25	6.99	7.66	8.56
	.703-.350	2.00	2.84	4.01	4.91	5.67	6.34	6.94	7.50	8.02	8.97	9.82	10.98
170 171 172	.188-.201	0.25	0.36	0.51	0.62	0.72	0.80	0.88	0.95	1.01	1.13	1.24	1.39
	.213-.219	0.33	0.47	0.66	0.81	0.94	1.05	1.15	1.24	1.33	1.49	1.63	1.82
	.234-.261	0.44	0.63	0.89	1.09	1.25	1.40	1.54	1.66	1.77	1.98	2.17	2.43
	.266-.281	0.58	0.82	1.17	1.43	1.65	1.84	2.02	2.18	2.33	2.61	2.85	3.19
	.295-.316	0.71	1.01	1.43	1.75	2.02	2.26	2.47	2.67	2.85	3.19	3.49	3.91
	.328-.344	0.80	1.13	1.60	1.95	2.26	2.52	2.76	2.98	3.19	3.57	3.91	4.37
	.354-.375	0.92	1.30	1.84	2.25	2.60	2.90	3.18	3.43	3.67	4.11	4.50	5.03
	.386-.406	1.18	1.67	2.37	2.90	3.35	3.74	4.10	4.43	4.74	5.29	5.80	6.48
	.413-.438	1.33	1.88	2.66	3.26	3.76	4.20	4.61	4.97	5.32	5.95	6.51	7.28
	.453-.472	1.48	2.10	2.97	3.63	4.20	4.69	5.14	5.55	5.93	6.63	7.27	8.13
	.484-.500	1.63	2.31	3.26	4.00	4.62	5.16	5.65	6.11	6.53	7.30	8.00	8.94
	.519-.532	1.93	2.73	3.86	4.72	5.45	6.10	6.68	7.22	7.71	8.62	9.45	10.56
.547-.563	2.04	2.89	4.09	5.00	5.78	6.46	7.08	7.64	8.17	9.14	10.01	11.19	
170 171 172	.571-.594	2.20	3.11	4.40	5.39	6.22	6.95	7.62	8.23	8.80	9.83	10.77	12.04
	.610-.625	2.36	3.33	4.72	5.78	6.67	7.46	8.17	8.82	9.43	10.54	11.55	12.91
	.630-.656	2.52	3.56	5.04	6.17	7.13	7.97	8.73	9.43	10.08	11.27	12.34	13.80
		At listed pressures 50 psi-700psi											
		50 psi	100 psi	200 psi	250 psi	300 psi	350 psi	400 psi	450 psi	500 psi	550 psi	600 psi	700 psi
	.669-.689	2.85	4.03	5.69	6.36	6.97	7.53	8.05	8.54	9.00	9.44	9.86	10.65
	.703-.750	3.21	4.54	6.42	7.18	7.87	8.50	9.08	9.63	10.15	10.65	11.12	12.01
	.767-.813	3.49	4.93	6.98	7.80	8.54	9.23	9.87	10.46	11.03	11.57	12.08	13.05
	.827-.875	3.94	5.57	7.88	8.81	9.65	10.42	11.14	11.82	12.46	13.07	13.65	14.74
	.886-.938	4.30	6.08	8.60	9.61	10.53	11.37	12.16	12.89	13.59	14.26	14.89	16.08
	.945-1.000	4.80	6.78	9.59	10.73	11.75	12.69	13.57	14.39	15.17	15.91	16.62	17.95
	1.125	5.41	7.65	10.82	12.10	13.26	14.32	15.31	16.24	17.12	17.95	18.75	20.25
	1.25	6.00	8.49	12.00	13.42	14.70	15.88	16.97	18.00	18.97	19.90	20.79	22.45

**Series Koolcarb, Kooltwist, Durapoint, Carbide-Tipped**  
2 FL | Carbide | Carbide-Tip | Drills



Material Group No.	Material / Workpiece	Chip Class	Tool Group							
			SOLID CARBIDE NON-COOLANT FED						CARBIDE TIP NON-COOLANT FED	
			High Penetration Spiral Flute TIN TIAIN A	High Penetration Spiral Flute TiCN B	Standard Helix D	3 Flute High Helix C	Str. Flute Heavy Duty E	Bore Drill Straight Flute F	Standard Helix G	Str. Flute Heavy Duty J
1	Aluminum Alloys [<5% Si] 2011 6061 2014 7075 2024	( )	(12) 250-450	○	(6-7) a 150-350	(8-9) 200-400	○	○	○	○
2	Aluminum [>5% Si] AZ61A 356 319 380 355 390	( )	(12) 350-600	○	(6-7) 200-400	(8-9) 300-500	○	(6-7) 200-400	(6-7) 150-350	○
3	Copper - Zinc (Brass) 268-Yellow 464-Naval 380-Free Cut 836-Red	( )	(9) 200-400	○	(5-6) a 150-300	(7-8) 175-350	(4-5) 150-300	(4-5) 150-300	(5-6) 150-300	(4-5) 150-300
4	Copper Alloys (Bronze) 510-Phos. Bronze 614-Alum. Bronze 905-Tin Bronze	( )	(9) 200-400	○	(5-6) 150-250	(6-7) 200-300	(4-5) 150-250	(4-5) 150-300	(5-6) 150-300	(4-5) 150-200
5	Cast (Grey) Iron G3000 G4500 G4000 G5500	( )	(9-10) 150-350	○	(5-7) 150-300	(6-8) 175-325	○	(5-6) 200-350	(5-7) 150-225	○
6	Ductile (Nodular) Iron Powder Metal D4018 80-55-06 60-40-18 100-70-03 65-45-12	( )	(9) 150-300	(9) 150-300	(4-6) 150-250	(6-8) 150-250	○	(3-5) 150-250	(4-6) 125-275	○
7	Carbon Steels [<35C] 1018 5120 4118 1035 5134 4130 1117 8620 516-70 1215 9310 4620	( )	(8) 150-250	(10-11) 200-350	○	○	○	○	○	○
8	Medium Carbon Steels [>35 to 50C] P20 1541 1045 4140 1050 4150 1141 4340 1144 6150	( )	(6-8) 150-250	(6-8) 130-220	○	○	○	○	○	○
9	High Carbon and Tool Steels [>50C] A-2 M-2 D-2 O-1 H-13 S-7	( )	(5-7) 80-140	(5-7) 65-120	○	○	(1-2) 60-125	○	○	(1-2) 60-125
10	Hardened Steels (48 to 65Rc)	( )	(1-2) 40-80	○	○	○	(1) 25-60	○	○	(1) 25-60
11	Free Machining Stainless Steel 303 440F	( )	(5-6) 100-200	○	(3-5) 80-180	(4-6) 80-180	(2-3) 80-180	○	(3-4) 80-160	○
12	Stainless Steel 15-5PH 316 17-4PH 410 440	( )	(5-6) 90-150	(5-6) 90-150	(3-5) 60-140	(4-6) 60-140	(2-3) 60-140	○	○	○
13	High Nickel Stainless Steel Nitronic 50 304 321 13-8	( )	(5-6) 30-70	(5-6) 30-70	○	○	○	○	○	○
14	Titanium 6AL4V Commercially Pure = Type B Tool	( )	(5-6) 60-120	(5-7) 55-110	(3-5) 50-90	(3-5) 50-90	(2-3) 50-100	○	(2-3) 40-80	○
15	Moderate Temperature Alloys Inconel 718	( )	(2-3) 50-100	○	○	○	(1-2) 50-100	○	○	○
16	High Temperature Alloys Rene Hastelloy L605	( )	(2-3) 25-80	○	○	○	(1-2) 25-80	○	○	(1-2) 25-80
17	Hard Plastics, Resin Fiberglass, Graphite and Carbon	( )	○	○	(3-5) 100-200	(4-6) 125-225	○	○	(3-5) 100-200	○

(Feed Curve) Notes

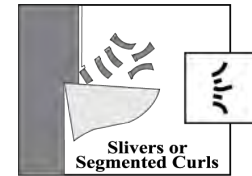
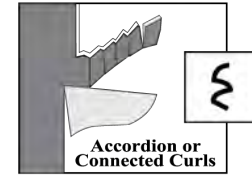
SFM - Surface Feet per Minute

Most Appropriate Occasionally Appropriate Do Not Use



Material Group No.	Chip Class	Tool Group					
		SOLID CARBIDE COOLANT FED		CARBIDE TIP COOLANT FED			OTHER COOLANT FED
		High Penetration Spiral Flute 	Straight Flute	High Performance Spiral Flute 	Spiral Flute Heavy Duty	Straight Flute	PM Cobalt 
	M	N	P	Q	R	T	
1		(11-12) 500-650	(6) 200-400	(8-9) a 250-425	(6-7) a 200-400	(6-7) 200-400	
2		(11-12) 500-650	(6-7) 350-550	(8-9) 300-500	(6-7) 200-400	(6-7) 300-500	
3		(9-11) 400-550	(4-5) 225-300	(5-7) 250-450	(5-7) 225-425	(4-5) 200-400	
4		(9-11) 500-650	(4-5) 175-250	(5-7) 200-400	(5-7) 200-300	(4-5) 200-300	
5		(9-10) 300-400	(4-6) 200-300	(6-8) 225-325	(6-8) 200-260	(5-7) 225-300	(7-9) 75-110
6		(9) 275-350	(4-6) 150-250	(6-7) a 225-275	(6-7) a 200-260	(4-6) 190-250	(7-9) 60-100
7		(8-10) 290-390		(5-7) a 180-250			(7-9) 100-130
8		(6-8) 150-250	(2-3) 110-150	(4-6) 150-200	(3-4) 100-150	(2-3) 100-150	(6-8) 60-100
9		(5-7) 120-225	(2-3) 80-135	(4-6) 135-185	(1-2) 70-100	(2-3) 100-150	(5-7) 50-90
10		(1-2) 50-100		(1-2) b 45-90	(1-2) b 60-90		
11		(4-6) 130-200	(2-3) 120-180	(2-3) 120-170	(2-3) 100-160	(2-3) 70-125	(4-5) 60-90
12		(4-6) 100-150	(1-2) 80-120	(2-3) a 80-120	(2-3) a 60-100		(4-5) 50-85
13		(4-6) 90-150		(1-2) a 40-60			
14		(4-6) 90-150	(1-2) 60-100	(2-3) 50-110	(2-3) 50-100	(1-2) 60-120	
15		(2-3) 70-130		(2) 60-90	(2) 60-90		(2-3) 30-75
16		(2-3) 40-80		(1-2) 40-80	(1-2) b 40-80		(2) 25-60
17			(4-5) 150-225			(4-5) 125-200	

Most Appropriate Occasionally Appropriate Do Not Use



SFM = Surface Feet per Minute

$$RPM = \frac{SFM \times 3.82}{Tool \text{ } \varnothing \text{ Decimal (Inch)}}$$

$$IPR = FM* \times Tool \varnothing$$

Use 4 place inch decimal diameter

$$IPM = \text{Inch per Minute Penetration}$$

$$IPM = RPM \times IPR$$

(Feed Curve)	FM*
(1)	0.004
(2)	0.006
(3)	0.008
(4)	0.010
(5)	0.012
(6)	0.014
(7)	0.016
(8)	0.018
(9)	0.020
(10)	0.024
(11)	0.028
(12)	0.035
(13)	0.045

\*FM is the proportionate Feed Multiplier

$$\text{ie.: } \frac{.0040 \text{ IPR}}{.3346'' \varnothing} = \frac{.012 \text{ IPR}}{1.000'' \varnothing} = \frac{.012 \text{ FM}^*}{1.000'' \varnothing}$$

**Notes**

- a. 1 to 2 x  $\varnothing$  deep holes only.
- b. Use more aggressive points.

(Feed Curve) Notes

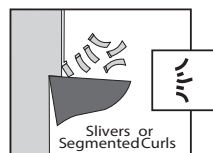
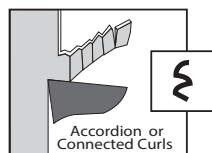
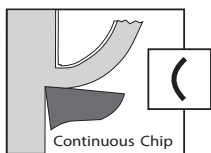
**Series Kooltwist, Durapoint, Carbide-Tipped**

**2 FL | Carbide | Carbide-Tip | Drills**

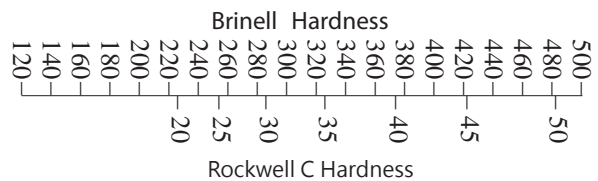
Feed Curve	1	2	3	4	5	6	7	8	9	10	11	12	13	
Feed Multiplier	0.004	0.006	0.008	0.010	0.012	0.014	0.016	0.018	0.020	0.024	0.028	0.035	0.045	
<b>Surface Feet per Minute (SFM)</b>	20	.31	.46	.61	.76	.92	1.07	1.22	1.38	1.53	1.83	2.14	2.67	3.44
	40	.61	.92	1.22	1.53	1.83	2.14	2.44	2.75	3.06	3.67	4.28	5.35	6.88
	60	.92	1.38	1.83	2.29	2.75	3.21	3.67	4.13	4.58	5.50	6.42	8.02	10.31
	80	1.22	1.83	2.44	3.06	3.67	4.28	4.89	5.50	6.11	7.33	8.56	10.70	13.75
	100	1.53	2.29	3.06	3.82	4.58	5.35	6.11	6.88	7.64	9.17	10.70	13.37	17.19
	125	1.91	2.87	3.82	4.78	5.73	6.69	7.64	8.60	9.55	11.46	13.37	16.71	21.49
	150	2.29	3.44	4.58	5.73	6.88	8.02	9.17	10.31	11.46	13.75	16.04	20.06	25.79
	175	2.67	4.01	5.35	6.69	8.02	9.36	10.70	12.03	13.37	16.04	18.72	23.40	30.08
	200	3.06	4.58	6.11	7.64	9.17	10.70	12.22	13.75	15.28	18.34	21.39	26.74	34.38
	225	3.44	5.16	6.88	8.60	10.31	12.03	13.75	15.47	17.19	20.63	24.07	30.08	38.68
	250	3.82	5.73	7.64	9.55	11.46	13.37	15.28	17.19	19.10	22.92	26.74	33.43	42.98
	275	4.20	6.30	8.40	10.51	12.61	14.71	16.81	18.91	21.01	25.21	29.41	36.77	47.27
	300	4.58	6.88	9.17	11.46	13.75	16.04	18.34	20.63	22.92	27.50	32.09	40.11	51.57
	350	5.35	8.02	10.70	13.37	16.04	18.72	21.39	24.07	26.74	32.09	37.44	46.80	60.17
	400	6.11	9.17	12.22	15.28	18.34	21.39	24.45	27.50	30.56	36.67	42.78	53.48	68.76
	450	6.88	10.31	13.75	17.19	20.63	24.07	27.50	30.94	34.38	41.26	48.13	60.17	77.36
500	7.64	11.46	15.28	19.10	22.92	26.74	30.56	34.38	38.20	45.84	53.48	66.85	85.95	
550	8.40	12.61	16.81	21.01	25.21	29.41	33.62	37.82	42.02	50.42	58.83	73.54	94.55	
600	9.17	13.75	18.34	22.92	27.50	32.09	36.67	41.26	45.84	55.01	64.18	80.22	103.14	

\* (Surface Feet per Minute) SFM x .3048 = Surface Meters per Minute

	Chip Class	USA	Germany	United Kingdom	France	Japan
Group 1 Aluminum Alloys up to 5% Silicon	(	2011	AlCuBiPb	FC1	A-U5PbBi	A2011
		2014	AlCuSiMn	L102	A-U4SG	A2014
		2024	AlCuSiMg2	L109	A-U4G1	A2024
		6061	AlMgSiCu	L117	A-GSUC	A6061
		7075	AlMgSiCu1.5	2L88	A-Z5GU	A7075
Group 2 Aluminum Alloys over 5% Silicon and Magnesium	) ) )	AZ61A	MgAl6Zn	3373	G-A6Z1	H4202
		319.0				AC2B
		355.0		LM16	A-S4UG	H2117
		356.0	AlSi7Mg	2L99	A-S7G	H5202
		380.0	AlSi8Cu3	LM24	A-S9U3	H5302
		390.0				
Group 3 Copper - Zinc Alloys (Brass)	) ) )	268 (Yellow)	CuZn36	CZ107	UZ33	C2680
		360 (Free Cut)	CuZn36Pb3	CZ124	UZ36Pb3	C3601
		464 (Naval)	CuZn39Sn	CZ112		
		836 (Red)	CuSn5ZnPb		U-E5Pb5Z5	BCIn6
Group 4 Copper Alloys (Bronze)	) ) )	510 (Phosphur)		PB102	UE5P	C5101
		614 (Aluminum)	CuAl8Fe	c		
		905 (Tin)	CuSn10Zn			BC3C
Group 5 Cast (Grey) Iron	) ) )	G3000	GG20	1452 Gr. 220	Ft20D	FC20
		G4000	GG25	1452 Gr. 260	Ft25D	FC25
		G4500	GG30	1452 Gr. 300	Ft30D	FC30
		G5500	GG35	1452 Gr. 350	Ft35D	FC35
Group 6 Ductile ( Nodular ) Iron and Powder Metal A lloys	) ) )	D4018	GGG 40	420/12	FGS 370-17	FCD 40 FCD
		60-40-18	GGG 40	420/12	FGS 370-17	40
		65-45-12	GGG 50	500/7	FGS 400-12	FCD 50 FCD
		80-55-06	GGG 60	600/3	FGS 600-3	60
		100-70-03	GGG 70	700/2	FGS 700-2	FCD 70
Group 7 Low Carbon Steels up to . 35% Carbon	(	A-36 (Boiler Plate)	13Mn6	150M12	E35-4	S17C
		1018	C16.8	080A17	AF42	S18C
		1035	Ck35	060A35	AF55	S35C
		1117		210A15		SUM31
		1215	9 5Mn 36	240M07	S300	SUM23
		4118	20CrMo5	708H20	18CD4	SCM418H
		4130	30CrMo4	708A30	30CD4	SCM2
		4620		665A19	2ND8	
		5120	76Mn3	080A72	XC75	SCr420H
		5134				
		516-70	C16.8	080A17	AF42	
		8620	21NiCrMoS2	805A20	19NCDB2	SNM220H
9310	14NiCrMo134	832H13	16NCD13			



Chip Classifications



	Chip Class	USA	Germany	United Kingdom	France	Japan
Group 8 Medium Carbon Steels (.35 - .50% Carbon)		P20	40CrMnMo7	4659		
		1045	Ck45	080M46	XC45	S45C
		1050	QSt32-2	045A10	XC12	S50C
		1141		216A42	45MF4	SUM42
		1144	45S20	226M44	45MF6	SUM43
		1541	45SiMn5	150M40	40M6	SMn2
		4140	42CrMo4	708H42	42CD4	SCM4
		4150	50CrMo4		50SCD6	
		4340	40NiCrMo6	2S.119		SNCM8
6150	50CrV4	735A50	50CV4	SUP10		
Group 9 High Carbon and Tool Steels		A-2	X100CrMoV5.1	BA2	Z100CDV5	SKD12
		D-2	X165CrVMo12.1	BD2	Z160CDV12	SKD11
		H-13	X40CrMoV5.1	BH13	Z40CDV5	SKD61
		M-1	S2-9-1	BM1	Z85DCWV08-04-02-01	
		M-2	S6-5-2Si	BM2	Z85WDCV06-05-04	
		M3-2	S6-5-3		Z120WDCV06-05-04-03	SKH51
		M-7	S2-9-2		Z100DCWV09-04-02-02	SKH58
		M35	X85WMoCo6.5.5		Z90WDCKCV06-05-05-04-02	SKH55
		O-1	100MnCrW4	BO1	90MWCV5	SKS21
		S-7	X79WCo18.5	BT4	Z80WKVC18-05-04	SKH3
		T15	X133WCo12.5	BT15	Z160WKVC12-05-05-04	SKH10
52100	100CrMn6	970535A99	A35-552100C6			
Group 10 Hardened Steels (48-65 Rc)						
Group 11 Stainless Steel(Free Machining)		303	X12CrNiS18.8	303S21	Z10CNF18.09	SUS303
		440C	X105CrMo17		Z80CSN20.02	SUS440C
Group 12 Stainless Steel		Nitronic50				
		15-5PH		15Cr5Ni		
		17-4PH	X5CrNiCuNb174	17Cr4Ni	Z6CNU17.04	SCS24
		304	X6CrNi189	970S15	Z5CN18.09	SCS13
		316	X5CrNiMo1812	316S25	Z6CND17.11	SCS14
		321	X8CRNiTi18.10	S-520	Z6CNT18.12	SUSY321
		410	X15Cr13		Z12CN13M	SCS1
440A	X65CrMo14		Z70CD14	SUS440A		
Group 13 Titanium		6AL4V				
Group 14 Soft High Temperature Alloys		Inconel718				
Group 15 Hard High Temperature Alloys		Rene				
		Hastelloy				
		L605				
		A286	X5NiCrTi26.15	HR650	Z6NCTDV25.15B	SUH660
Group 16 Hard Plastics,Resin Fiberglass,Graphite & Carbon		PVC				
		SMC				
		Acrylic				



Inch Frac.	Inch Dec.	Wire #	mm Equiv.	Inch Frac.	Inch Dec.	Wire #	mm Equiv.	Inch Frac.	Inch Dec.	Wire #	mm Equiv.	Inch Frac.	Inch Dec.	mm Equiv.
Micron	0.000039		0.001	9/64	.1406		3.571		.2720	I	6.909	29/64	.4646	11.8
	0.000315		0.008		.1417		3.6		.2756	J	7.0		.4685	11.9
	0.0004		0.010		.1440	27	3.658		.2770		7.036	15/32	.4688	11.908
	0.0039		0.1		.1457		3.7		.2795	K	7.1		.4724	12.0
	0.0135	80	0.343		.1470	26	3.734		.2810		7.137		.4764	12.1
	0.0145	79	0.368		.1495	25	3.797		.2812		7.142		.4803	12.2
1/64	0.0156		0.396		.1496		3.8		.2835		7.2	31/64	.4844	12.304
	0.0160	78	0.406		.1520	24	3.861		.2874	L	7.3		.4882	12.4
	0.0180	77	0.457		.1535		3.9		.2900		7.366		.4921	12.5
	.0197		0.5		.1540	23	3.912		.2913	M	7.4		.4961	12.6
	.0200	76	0.508	5/32	.1562		3.967		.2950		7.493	1/2	.5000	12.7
	.0210	75	0.533		.1570	22	3.988		.2953		7.5		.5039	12.8
	.0225	74	0.572		.1575		4.0		.2969		7.541		.5079	12.9
	.0240	73	0.610		.1590	21	4.039		.2992		7.6		.5118	13.0
	.0250	72	0.635		.1610	20	4.089		.3020	N	7.671	33/64	.5156	13.096
	.0260	71	0.660		.1614		4.1		.3031		7.7	17/32	.5312	13.492
	.0280	70	0.711		.1624		4.125		.3071		7.8		.5315	13.5
	.0292	69	0.742		.1654		4.2		.3110		7.9	35/64	.5469	13.891
	.0310	68	0.787		.1660	19	4.216		.3125		7.938		.5512	14.0
1/32	.0312		0.792		.1693		4.3		.3150		8.0		.5571	14.15
	.0320	67	0.813		.1695	18	4.305		.3160	O	8.026	9/16	.5625	14.288
	.0330	66	0.838	11/64	.1719		4.366		.3189		8.1		.5709	14.5
	.0350	654	0.889		.1730	17	4.394		.3228		8.2	37/64	.5781	14.684
	.0360	64	0.914		.1732		4.4		.3230	P	8.204		.5906	15.0
	.0370	63	0.940		.1770	16	4.496		.3268		8.3	19/32	.5938	15.083
	.0380	62	0.965		.1772		4.5		.3281		8.334	39/64	.6094	15.479
	.0390	61	0.991		.1800	15	4.572		.3307		8.4		.6102	15.5
	.0394		1.0		.1811		4.6		.3320	Q	8.433	5/8	.6250	15.875
	.0400	60	1.016		.1820	14	4.623		.3346		8.5		.6299	16.0
	.0410	59	1.041		.1850	13	4.7		.3370		8.560	41/64	.6406	16.271
	.0420	58	1.067	3/16	.1875		4.763		.3386		8.6		.6496	16.5
	.0430	57	1.092		.1890	12	4.801		.3390	R	8.611	21/32	.6562	16.667
	.0465	56	1.181		.1910	11	4.851		.3425		8.7		.6594	16.75
3/64	.0469		1.191		.1929		4.9		.3438		8.733		.6693	17.0
	.0520	55	1.321		.1935	10	4.915		.3465	S	8.8	43/64	.6719	17.066
	.0550	54	1.397		.1960	9	4.678		.3480		8.839	11/16	.6875	17.463
	.0591		1.5		.1969		5.0		.3504		8.9		.6890	17.5
	.0595	53	1.511		.1990	8	5.055		.3543		9.0	45/64	.7031	17.859
1/16	.0625		1.588		.2008		5.1		.3580	T	9.093		.7087	18.0
	.0635	52	1.613		.2010	7	5.105		.3583		9.1	23/32	.7188	18.258
	.0670	51	1.702	13/64	.2031		5.159		.3594		9.129		.7283	18.5
	.0700	50	1.778		.2040	6	5.182		.3622		9.2	47/64	.7344	18.654
	.0730	49	1.854		.2047		5.2		.3661		9.3		.7480	19.0
	.0760	48	1.93		.2055	5	5.22		.3680	U	9.347	3/4	.7500	19.05
5/64	.0781		1.984		.2067		5.25		.3701		9.4	49/64	.7656	19.446
	.0785	47	1.994		.2087	4	5.3		.3740		9.5		.7677	19.5
	.0787		2.0		.2090		5.309		.3750	V	9.525	25/32	.7812	19.842
	.0810	46	2.057		.2126	3	5.4		.3770		9.576		.7874	20.0
	.0820	45	2.083		.2130		5.41		.3780		9.6	51/64	.7969	20.241
	.0827		2.1		.2165		5.5		.3819		9.7		.8071	20.5
	.0860	44	2.184	7/32	.2188		5.558		.3858		9.8	13/16	.8125	20.638
	.0890	43	2.261		.2205		5.6		.3860	W	9.804		.8268	21.0
	.0925		2.35		.2210	2	5.613		.3898		9.9	53/64	.8281	21.034
	.0935	42	2.375		.2244		5.7		.3906		9.921	27/32	.8438	21.433
3/32	.0938		2.383		.2280	1	5.791		.3937		10.0		.8465	21.5
	.0960	41	2.438		.2283		5.8		.3970	X	10.084	55/64	.8594	21.829
	.0980	40	2.489		.2323		5.9		.3976		10.1		.8661	22.0
	.0984		2.5		.2340	A	5.944		.4040	Y	10.262	7/8	.8750	22.225
	.0995	39	2.527		.2344		5.954		.4055		10.3		.8858	22.5
	.1015	38	2.578	15/64	.2362		6.0		.4062		10.317	57/64	.8906	22.621
	.1040	37	2.642		.2380		6.045		.4094		10.4		.9055	23.0
	.1065	36	2.705		.2402	B	6.1		.4130	Z	10.49	29/32	.9062	23.017
7/64	.1094		2.779		.2420		6.147		.4134		10.5	59/64	.9219	23.416
	.1100	35	2.794		.2441		6.2		.4173		10.6		.9252	23.5
	.1110	34	2.819		.2460	D	6.248		.4213		10.7	15/16	.9375	23.813
	.1130	33	2.87		.2480		6.3		.4219		10.716		.9449	24.0
	.1142		2.9	1/4	.2500		6.35		.4252		10.8		.9531	24.209
	.1160	32	2.946		.2520	E	6.4		.4291		10.9	61/64	.9646	24.5
	.1181		3.0		.2559		6.5		.4311		10.95		.9688	24.608
	.1200	31	3.048		.2570	F	6.528		.4331		11.0	31/32	.9843	25.0
	.1220		3.1		.2598		6.6		.4370		11.1	63/64	.9844	25.004
1/8	.1250		3.175		.2610		6.629		.4375		11.113	1	1.0000	25.4
	.1260		3.2		.2630		6.68		.4409		11.2		1.0039	25.5
	.1285	30	3.264		.2638		6.7		.4449		11.3			
	.1299		3.3	17/64	.2656		6.746		.4488		11.4			
	.1339		3.4		.2660	H	6.756		.4528		11.5			
	.1360	29	3.454		.2677		6.8		.4531		11.509			
	.1378		3.5		.2697		6.85		.4567		11.6			
	.1405	28	3.569		.2717		6.9		.4606		11.7			

**Series 4060**

**Carbide Step Drill for "Torx" Style Bone Screws**

Work Material		M	S2
		316L, X2CrNiMo	Ti6Al4V, ASTM B348
m/min		25 - 35	20 - 30
Torx type	Diameter (mm)	mm/rev	mm/rev
T4	0.9	0.02 - 0.03	0.01 - 0.015
T5	1.0	0.02 - 0.03	0.01 - 0.015
T6	1.2	0.03 - 0.04	0.015 - 0.02
T7	1.4	0.03 - 0.04	0.015 - 0.02
T8	1.6	0.03 - 0.04	0.015 - 0.02
T10	1.9	0.05 - 0.06	0.02 - 0.03
T15	2.3	0.05 - 0.06	0.02 - 0.03
T20	2.7	0.06 - 0.07	0.03 - 0.04
T25	3.1	0.07 - 0.08	0.03 - 0.04
T30	3.8	0.07 - 0.08	0.03 - 0.04

INTRO

MILLING

SPECIALTY

**HOLEMAKING**

THREADING

INSERTS

**Series 4050**

PAC Reamers | 1 FL | Inch & Metric | Solid

Work Material	P						M				K				N	
	Carbon Steel		Alloy Steel		Tool Steel		300 & 400 SS		PH SS		Gray		Ductile		> 10% Si	
SFM	220 - 350		210 - 315		205 - 295		130 - 200		120 - 190		300 - 455		170 - 300		330 - 385	
Drill Dia.	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR
	mm	inch														
1/8	7334	0.0013	6723	0.0013	6418	0.0013	4890	0.0013	4584	0.0013	8404	0.0013	7182	0.0013	10085	0.0013
4	5822	0.0016	5337	0.0016	5094	0.0016	3881	0.0016	3639	0.0016	6671	0.0016	5700	0.0016	8005	0.0016
3/16	4890	0.0019	4482	0.0019	4278	0.0019	3260	0.0019	3056	0.0019	5603	0.0019	4788	0.0019	6723	0.0019
6	3881	0.0024	3558	0.0024	3396	0.0024	2587	0.0024	2426	0.0024	4447	0.0024	3800	0.0024	5337	0.0024
1/4	3667	0.0025	3362	0.0025	3209	0.0025	2445	0.0025	2292	0.0025	4202	0.0025	3591	0.0025	5042	0.0025
8	2911	0.0031	2668	0.0031	2547	0.0031	1941	0.0031	1819	0.0031	3335	0.0031	2850	0.0031	4002	0.0031
3/8	2445	0.0038	2241	0.0038	2139	0.0038	1630	0.0038	1528	0.0038	2801	0.0038	2394	0.0038	3362	0.0038
10	2329	0.0039	2135	0.0039	2038	0.0039	1552	0.0039	1455	0.0039	2668	0.0039	2280	0.0039	3202	0.0039
7/16	2096	0.0044	1921	0.0044	1834	0.0044	1397	0.0044	1310	0.0044	2401	0.0044	2052	0.0044	2881	0.0044
12	1941	0.0047	1779	0.0047	1698	0.0047	1294	0.0047	1213	0.0047	2224	0.0047	1900	0.0047	2668	0.0047
1/2	1834	0.0050	1681	0.0050	1604	0.0050	1222	0.0050	1146	0.0050	2101	0.0050	1795	0.0050	2521	0.0050
14	1663	0.0055	1525	0.0055	1455	0.0055	1109	0.0055	1040	0.0055	1906	0.0055	1629	0.0055	2287	0.0055
5/8	1467	0.0063	1345	0.0063	1284	0.0063	978	0.0063	917	0.0063	1681	0.0063	1436	0.0063	2017	0.0063

**Series 4005**

PAC Drill | 2 FL | 5xD | Solid | Inch & Metric

Work Material	P						M				K				N			
	Carbon Steel		Alloy Steel		Tool Steel		300 & 400 SS		PH SS		Gray		Ductile		6061, 7075		> 10% Si	
SFM	220 - 350		210 - 315		205 - 295		130 - 200		120 - 190		235-390		170 - 300		300 - 460		330 - 385	
Drill Dia. mm inch	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR
	1	23287	0.0008	21346	0.0008	20376	0.0008	15524	0.0006	14554	0.0006	26683	0.0008	22802	0.0008	33960	0.0014	32019
1/16		14669	0.0013	13446	0.0013	12835	0.0013	9779	0.0009	9168	0.0009	16808	0.0013	14363	0.0013	21392	0.0022	20170
2	11643	0.0016	10673	0.0016	10188	0.0016	7762	0.0012	7277	0.0012	13341	0.0016	11401	0.0016	16980	0.0028	16010	0.0028
	3/32	9779	0.0019	8964	0.0019	8557	0.0019	6519	0.0014	6112	0.0014	11205	0.0019	9575	0.0019	14261	0.0033	13446
3	7762	0.0024	7115	0.0024	6792	0.0024	5175	0.0018	4851	0.0018	8894	0.0024	7601	0.0024	11320	0.0041	10673	0.0041
	1/8	7334	0.0025	6723	0.0025	6418	0.0025	4890	0.0019	4584	0.0019	8404	0.0025	7182	0.0025	10696	0.0044	10085
4	5822	0.0031	5337	0.0031	5094	0.0031	3881	0.0024	3639	0.0024	6671	0.0031	5700	0.0031	8490	0.0055	8005	0.0055
	3/16	4890	0.0038	4482	0.0038	4278	0.0038	3260	0.0028	3056	0.0028	5603	0.0038	4788	0.0038	7131	0.0066	6723
6	3881	0.0047	3558	0.0047	3396	0.0047	2587	0.0035	2426	0.0035	4447	0.0047	3800	0.0047	5660	0.0083	5337	0.0083
	1/4	3667	0.0050	3362	0.0050	3209	0.0050	2445	0.0038	2292	0.0038	4202	0.0050	3591	0.0050	5348	0.0088	5042
8	2911	0.0063	2668	0.0063	2547	0.0063	1941	0.0047	1819	0.0047	3335	0.0063	2850	0.0063	4245	0.0110	4002	0.0110
	3/8	2445	0.0075	2241	0.0075	2139	0.0075	1630	0.0056	1528	0.0056	2801	0.0075	2394	0.0075	3565	0.0131	3362
10	2329	0.0079	2135	0.0079	2038	0.0079	1552	0.0059	1455	0.0059	2668	0.0079	2280	0.0079	3396	0.0138	3202	0.0138
	7/16	2096	0.0088	1921	0.0088	1834	0.0088	1397	0.0066	1310	0.0066	2401	0.0088	2052	0.0088	3056	0.0153	2881
12	1941	0.0094	1779	0.0094	1698	0.0094	1294	0.0071	1213	0.0071	2224	0.0094	1900	0.0094	2830	0.0165	2668	0.0165
	1/2	1834	0.0100	1681	0.0100	1604	0.0100	1222	0.0075	1146	0.0075	2101	0.0100	1795	0.0100	2674	0.0175	2521
14	1663	0.0110	1525	0.0110	1455	0.0110	1109	0.0083	1040	0.0083	1906	0.0110	1629	0.0110	2426	0.0193	2287	0.0193
	5/8	1467	0.0125	1345	0.0125	1284	0.0125	978	0.0094	917	0.0094	1681	0.0125	1436	0.0125	2139	0.0219	2017
18	1294	0.0142	1186	0.0142	1132	0.0142	862	0.0106	809	0.0106	1482	0.0142	1267	0.0142	1887	0.0248	1779	0.0248

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

**Series 4105**

PAC Drill | 2 FL | 5xD | Coolant-Through | Inch & Metric

Work Material	P						M				K				N			
	Carbon Steel		Alloy Steel		Tool Steel		300 & 400 SS		PH SS		Gray		Ductile		6061, 7075		> 10% Si	
SFM	220 - 350		210 - 315		205 - 295		130 - 200		120 - 190		235-390		170 - 300		300 - 460		330 - 385	
Drill Dia.	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR	RPM	IPR
	mm	inch																
<b>1</b>	26780	0.0008	24548	0.0008	23432	0.0008	17853	0.0006	16737	0.0006	30685	0.0008	26222	0.0008	39054	0.0014	36822	0.0014
<b>1/16</b>	16869	0.0013	15463	0.0013	14760	0.0013	11246	0.0009	10543	0.0009	19329	0.0013	16518	0.0013	24601	0.0022	23195	0.0022
<b>2</b>	13390	0.0016	12274	0.0016	11716	0.0016	8927	0.0012	8369	0.0012	15343	0.0016	13111	0.0016	19527	0.0028	18411	0.0028
<b>3/32</b>	11246	0.0019	10309	0.0019	9840	0.0019	7497	0.0014	7029	0.0014	12886	0.0019	11012	0.0019	16401	0.0033	15463	0.0033
<b>3</b>	8927	0.0024	8183	0.0024	7811	0.0024	5951	0.0018	5579	0.0018	10228	0.0024	8741	0.0024	13018	0.0041	12274	0.0041
<b>1/8</b>	8435	0.0025	7732	0.0025	7380	0.0025	5623	0.0019	5272	0.0019	9665	0.0025	8259	0.0025	12300	0.0044	11598	0.0044
<b>4</b>	6695	0.0031	6137	0.0031	5858	0.0031	4463	0.0024	4184	0.0024	7671	0.0031	6555	0.0031	9763	0.0055	9206	0.0055
<b>3/16</b>	5623	0.0038	5154	0.0038	4920	0.0038	3749	0.0028	3514	0.0028	6443	0.0038	5506	0.0038	8200	0.0066	7732	0.0066
<b>6</b>	4463	0.0047	4091	0.0047	3905	0.0047	2976	0.0035	2790	0.0035	5114	0.0047	4370	0.0047	6509	0.0083	6137	0.0083
<b>1/4</b>	4217	0.0050	3866	0.0050	3690	0.0050	2812	0.0038	2636	0.0038	4832	0.0050	4129	0.0050	6150	0.0088	5799	0.0088
<b>8</b>	3347	0.0063	3069	0.0063	2929	0.0063	2232	0.0047	2092	0.0047	3836	0.0063	3278	0.0063	4882	0.0110	4603	0.0110
<b>3/8</b>	2812	0.0075	2577	0.0075	2460	0.0075	1874	0.0056	1757	0.0056	3222	0.0075	2753	0.0075	4100	0.0131	3866	0.0131
<b>10</b>	2678	0.0079	2455	0.0079	2343	0.0079	1785	0.0059	1674	0.0059	3069	0.0079	2622	0.0079	3905	0.0138	3682	0.0138
<b>7/16</b>	2410	0.0088	2209	0.0088	2109	0.0088	1607	0.0066	1506	0.0066	2761	0.0088	2360	0.0088	3514	0.0153	3314	0.0153
<b>12</b>	2232	0.0094	2046	0.0094	1953	0.0094	1488	0.0071	1395	0.0071	2557	0.0094	2185	0.0094	3254	0.0165	3069	0.0165
<b>1/2</b>	2109	0.0100	1933	0.0100	1845	0.0100	1406	0.0075	1318	0.0075	2416	0.0100	2065	0.0100	3075	0.0175	2899	0.0175
<b>14</b>	1913	0.0110	1753	0.0110	1674	0.0110	1275	0.0083	1196	0.0083	2192	0.0110	1873	0.0110	2790	0.0193	2630	0.0193
<b>5/8</b>	1687	0.0125	1546	0.0125	1476	0.0125	1125	0.0094	1054	0.0094	1933	0.0125	1652	0.0125	2460	0.0219	2320	0.0219
<b>18</b>	1488	0.0142	1364	0.0142	1302	0.0142	992	0.0106	930	0.0106	1705	0.0142	1457	0.0142	2170	0.0248	2046	0.0248

**Series 4001**

Aperture | 4D | 2 FL | Solid

Material			Hardness	SFM	Inches Per Tooth (IPT)											
					Cutting Diameter											
					3/64	1/16	1/8	5/32	3/16	1/4	5/16	3/8	1/2	9/16	5/8	3/4
<b>P</b>	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	SFM	405	400	390	380	370	360	350	340	320	300	275	265
				IPR	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	SFM	350	340	330	320	310	300	290	280	270	265	260	260
				IPR	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	SFM	210	200	200	190	190	185	185	180	180	175	175	170
				IPR	.0004-.0008	.0008-.0012	.0014-.0030	.0024-.0040	.003-.005	.0035-.0060	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
<b>M</b>	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	SFM	360	355	350	340	330	320	310	300	275	250	225	200
				IPR	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
	Stainless Steels	Moderately Difficult to Machine, Nitronic 50, Nitronic 60, 301, 303 304, 304L Incoloy 27-7Mo, 316 316L, 321, 347	≤ 28 Rc	SFM	150	145	140	135	130	125	120	115	110	105	100	95
				IPR	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	> 28 Rc	SFM	160	150	140	130	120	110	110	105	105	100	100	95
				IPR	.0004-.0012	.001-.002	.0020-.0033	.0024-.0035	.0030-.0043	.0031-.0050	.003-.006	.005-.009	.007-.009	.008-.010	.009-.011	.009-.013
<b>S</b>	Super Alloys	High Temp, Nimonics, Inconel, Monel, Hastelloy	≤ 42 Rc	SFM	100	90	85	80	75	70	65	60	55	50	45	40
				IPR	.0004-.0012	.001-.002	.0014-.0033	.0016-.0035	.002-.004	.0023-.0043	.003-.005	.004-.006	.005-.007	.005-.007	.006-.008	.006-.009
<b>S</b>	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	SFM	150	140	130	125	120	115	110	105	100	100	90	90
				IPR	.0004-.0012	.001-.002	.003-.004	.004-.006	.005-.007	.0055-.0080	.006-.009	.007-.010	.008-.011	.008-.010	.010-.014	.011-.015
<b>K</b>	Cast Iron	Gray: SAE J431, ASTM A48	160-200 HB	SFM	500	490	480	470	460	430	410	400	390	370	360	350
				IPR	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	200-250 HB	SFM	300	290	280	270	260	250	240	230	220	210	200	190
				IPR	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015

**Series 300, 400, 402**

2 FL | Spot Drill | Spade Drill | Combination Drill

Material				Hardness	SFM	(IPR) Cutting Tool Diameter					
						1/32	1/16	1/8	1/4	3/8	1/2
<b>P</b>	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	175	0.0005	0.0010	0.0015	0.0030	0.0040	0.0050	
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	165							
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	150							
<b>M</b>	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	125	0.0005	0.0010	0.0015	0.0030	0.0040	0.0050	
	Stainless Steels	Moderately Difficult to Machine, Nitronic 50, 301, 303, 304, 304L, 316, 316L, 321, 347	≤ 28 Rc	60							
<b>S</b>	Super Alloys	High Temp, Nimonics, Inconel, Monel, Hastelloy	≤ 42 Rc	40	0.0005	0.0010	0.0015	0.0030	0.0040	0.0050	
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	80							
<b>H</b>	Hardened Steels	-	35-45 Rc	50	0.0005	0.0010	0.0015	0.0030	0.0040	0.0050	
<b>K</b>	Cast Iron	Gray: SAE J431, ASTM A48	160-200 HB	275							
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	200-250 HB	175	0.0005	0.0010	0.0015	0.0030	0.0040	0.0050	

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

**Series 450, 453, 460, 470**

**General Purpose Drills | 2 & 3 FL | Twist | Straight**

				(IPR) Cutting Tool Diameter								
Material			Hardness	SFM	1/32	1/16	1/8	1/4	3/8	1/2	5/8	3/4
<b>P</b>	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	175								
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	28-38 Rc	165	0.0010	0.0020	0.0030	0.0060	0.0080	0.0100	0.0110	0.0120
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	150								
<b>M</b>	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	140	0.0010	0.0020	0.0030	0.0060	0.0080	0.0100	0.0110	0.0120
	Stainless Steels	Moderately Difficult to Machine, Nitronic 50, 301, 303, 304, 304L, 316, 316L, 321, 347	≤ 28 Rc	60	0.0003	0.0005	0.0020	0.0040	0.0050	0.0060	0.0080	0.0100
<b>S</b>	Super Alloys	High Temp, Nimonic, Inconel, Monel, Hastelloy	≤ 42 Rc	60	0.0003	0.0005	0.0020	0.0040	0.0050	0.0060	0.0080	0.0100
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	≤ 42 Rc	80								
<b>H</b>	Hardened Steels	4140H, P20, H13	35-45 Rc	50	0.0003	0.0010	0.0010	0.0010	0.0020	0.0020	0.0020	0.0030
<b>K</b>	Cast Iron	Gray: SAE J431, ASTM A48	160-200 HB	175								
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	200-250 HB	175	0.0010	0.0020	0.0030	0.0060	0.0080	0.0100	0.0110	0.0120
<b>N</b>	Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics	-	300								
	Non-Ferrous	Kevlar/Graphite	-	375	0.0003	0.0005	0.0020	0.0040	0.0050	0.0060	0.0080	0.0100

**Series 500, 550**

**Chucking Reamers | 4 - 6 FL | Straight | Helical**

				Inches Per Revolution (IPR)					
				Cutting Diameter					
Material		Hardness	SFM	0.0280-0.0625"	0.0626-0.1250"	0.1251-0.2500"	0.2501-0.5000"	0.5001-0.7500"	
<b>P</b>	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	≤ 28 Rc	200-300	0.0005 - 0.0030	0.0020 - 0.0060	0.0040 - 0.0100	0.0060 - 0.0150	0.0100 - 0.0300
	Steel	Medium/High Carbon, 1030, 4140, 5115	28-38 Rc	125-200	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
	Die Steels	A2, H13, L6, P20, S7	28-44 Rc	50-125	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100
<b>M</b>	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	≤ 28 Rc	120-190	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
	Stainless Steels	Moderately Difficult to Machine, Nitronic 50, 301, 303, 304, 304L, 316, 316L, 321, 347	≤ 28 Rc	80-120	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
	Stainless Steels	Difficult to Machine, 302B, 304B, 309, 310, 316, 316Ti, PH13-8Mo	> 28 Rc	60-100	0.0002 - 0.0020	0.0010 - 0.0040	0.0020 - 0.0060	0.0040 - 0.0100	0.0060 - 0.0100
<b>S</b>	Super Alloys	Inconel	<40 Rc	40-70	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100
	Super Alloys	High Temp, Nimonic, Inconel, Monel, Hastelloy	<40 Rc	30-45	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0200
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	<40 Rc	35-50	0.0002 - 0.0020	0.0010 - 0.0040	0.0020 - 0.0060	0.0040 - 0.0100	0.0060 - 0.0200
<b>H</b>	Hardened Steels	Die Steel, Alloy Steels 23-32 Rc	23-32 Rc	125-200	0.0002 - 0.0020	0.0010 - 0.0040	0.0020 - 0.0060	0.0040 - 0.0100	0.0060 - 0.0200
	Hardened Steels	Die Steel, Alloy Steels 32-43 Rc	32-43 Rc	50-125	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
	Hardened Steels	Die Steel, Alloy Steels 43-52 Rc	43-52 Rc	35-50	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100
	Hardened Steels	Die Steels, Tool Steel	> 50 Rc	15-35	5 0.0005 - 0.0030	0.0020 - 0.0060	0.0040 - 0.0100	0.0060 - 0.0150	0.0100 - 0.0300
<b>K</b>	Cast Iron	Gray: SAE J431, ASTM A48	≤ 240 HB	150-250	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
	Cast Iron	Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220	> 240 HB	125-200	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
	Cast Iron	Martensitic (Hard)	> 240 HB	50-75	5 0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100
<b>N</b>	Non-Ferrous	Aluminum, Aluminum Alloys	> 240 HB	500-1000	0.0005 - 0.0020	0.0020 - 0.0060	0.0040 - 0.0100	0.0060 - 0.0150	0.0100 - 0.0300
	Non-Ferrous	Brass, Bronze (Free Machining)	> 240 HB	250-400	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
	Non-Ferrous	Brass, Bronze (Soft)	> 240 HB	150-250	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100
	Non-Ferrous	Copper, Bronze (Hard)	> 240 HB	100-150	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100
	Non-Ferrous	Magnesium, Magnesium Alloys, Plastics	> 240 HB	500-1000	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100

INTRO  
MILLING  
SPECIALTY  
HOLEMAKING  
THREADING  
INSERTS



**Series 500, 550**

Chucking Reamers | 4 - 6 FL | Straight | Helical

Hole Size Parameters			Drill Diameter								
			0.30135	0.0290/0.0280	0.0550/0.0520	0.1130	0.2380	0.3594	0.4844	0.6094	0.7344
			Reamer Diameter								
Material			TOTAL STOCK ALLOWANCE								
P	Steel	Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36	0.0012	0.0025	0.0049	0.0089	0.0100	0.0120	0.0130	0.0150	0.0170
	Steel	Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX	0.0013	0.0028	0.0055	0.0099	0.0110	0.0130	0.0140	0.0160	
	Die Steels	A2, H13, L6, P20, S7	0.0012	0.0025	0.0049	0.0089	0.0100	0.0120	0.0130	0.0150	
M	Stainless Steels	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	0.0012	0.0025	0.0049	0.0089	0.0100	0.0120	0.0130	0.0150	0.0160
S	Super Alloys	Soft	0.0012	0.0025	0.0049	0.0089	0.0100	0.0110	0.0130	0.0140	0.0160
	Super Alloys	Hard	0.0010	0.0023	0.0044	0.0081	0.0090	0.0100	0.0120	0.0130	0.0140
	Super Alloys	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	0.0013	0.0028	0.0055	0.0099	0.0110	0.0130	0.0140	0.0160	0.0170
H	Hardened Steels	-	0.0009	0.0020	0.0040	0.0072	0.0080	0.0100	0.0110	0.0130	0.0140
K	Cast Iron	Cast	0.0013	0.0028	0.0055	0.0099	0.0110	0.0130	0.0140	0.0160	0.0180
	Cast Iron	Ductile								0.0150	0.0170
N	Non-Ferrous	Magnesium	0.0014	0.0030	0.0060	0.0110	0.0120	0.0150	0.0160	0.0180	0.0200
	Non-Ferrous	Aluminum ≥ 5% Si						0.0130	0.0150	0.0160	0.0180
	Non-Ferrous	Aluminum ≤ 5% Si									
	Non-Ferrous	Brass									
	Non-Ferrous	Bronze, Copper									

**Series 331 - 336**

Countersinks | 1 - 6 FL | 60 - 120°

Material		SFM
P	Carbon Steel - 10XX, 12XX	120-170
	Alloy Steel - 4140, 8620	80-150
	Tool Steel - A2, D2, H11, H13	50-80
	Alloys (300 - 400 Brinnell)	30-50
M	Stainless - 300, 400	80-125
	PH Stainless - 17-4, 15-5	50-75
S	HRSA - Inco718	23-35
	HRSA - Nimonics, Monel, Hastelloy	50-75
	Titanium - Ti 3Al-2.5V, Ti 6Al-4V Ti	60-90
H	Hardened Steel - (35 - 40 Rc)	40-60
	Hardened Steel - (40 - 45 Rc)	35-55
	Hardened Steel - (45 - 50 Rc)	25-40
	Hardened Steel - (50 - 55 Rc)	15-20
K	Gray - SAE J431, ASTM A48	125-225
	Ductile & Malleable - ASTM A536, ASTM 897, ASTM A47	100-175
	Hard Chilled	20-35
N	Aluminum / Aluminum Alloys	300-500
	Brass / Bronze	150-250
	Magnesium / Magnesium Alloys & Plastics	250-400

**Series 601**

**Boring Bars | Radius | Lock-Down Flat**

Material			SFM	Inches Per Tooth (IPT)
<b>P</b>	Steels	Carbon Steel	78-800	0.0005-0.0150
		High-Strength	75-600	0.0005-0.0150
		Heat Treated Alloys	75-250	0.0005-0.0150
		Powdered Metals	75-250	0.0005-0.0150
<b>P</b>	Die Steels	A2, H13, L6, P20, S7	75-500	0.0005-0.0150
<b>M</b>	Stainless Steels	3XX, 4XX, PH	75-500	0.0005-0.0150
<b>S</b>	Super Alloys	Ni Alloys, Ti Alloys	75-300	0.0003-0.0100
<b>H</b>	Hardened Steels	<55 Rc	60-150	0.0001-0.0050
<b>K</b>	Cast-Iron	-	100-850	0.0005-0.0250
<b>N</b>	Non-Ferrous	Aluminum, Brass, Bronze	200-2000	0.0005-0.0300
		Copper	130-400	0.0005-0.0300
		Zinc	150-350	0.0005-0.0300
		Acrylics, Fiberglass, Graphites, Nylons, Phenolics, Plastics	200-1000	0.0005-0.0300

INTRO

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# BUILD THE PERFECT TOOL

## THREE WAYS TO REQUEST CUSTOM

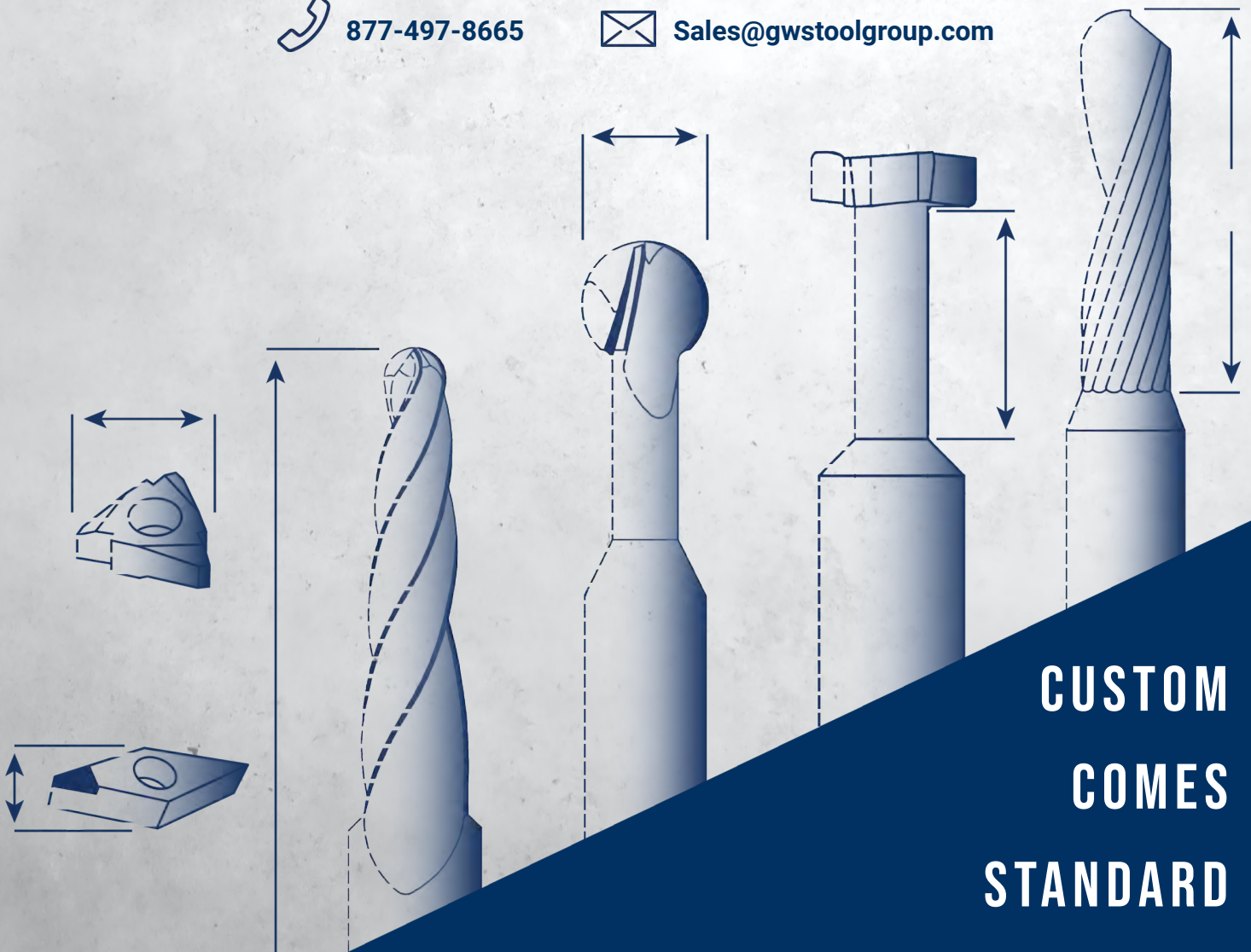
- 1.** Fill out and submit one of our many preformatted custom tool quote forms from our website.
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# T H R E A D I N G

*The complete listing of GWS Popular Specials - taps sizes, thread types, and configurations you often won't find anywhere else. Plus dies, gages, drill/taps, tap extensions, and tapping oil.*

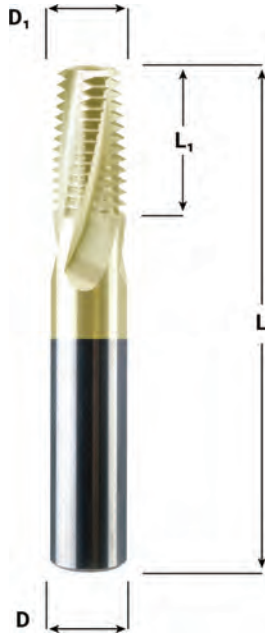
*Custom Comes Standard - If we don't have the perfect tool on the shelf, we can build it for you.*





# ADVANCED PERFORMANCE

Carbide Thread Mills For Aluminum Alloys



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Thread Mills - Pipe</b> <ul style="list-style-type: none"> <li>• Micrograin carbide substrate for wear resistance</li> <li>• NF1 coating for Aluminum Alloys</li> <li>• Helical flute for smooth chatter-free cutting</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series 185** | **TM-PT-AL | Helical | NPT/NPTF | Aluminum**

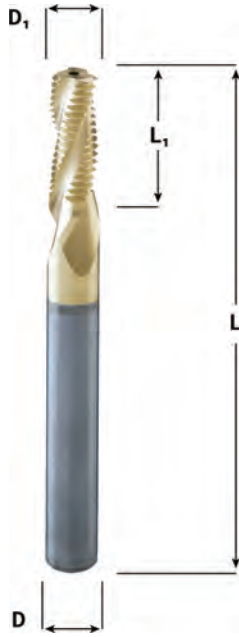
Thread Size	Standard	Cutter Dia. (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	EDP
1/16-27	NPT	0.245	0.481	2-1/2	1/4	3	<b>14520-ZRN</b>
1/8-27	NPT	0.3	0.592	3	5/16	4	<b>14521-ZRN</b>
1/4-18	NPT	0.36	0.611	3.5	3/8	4	<b>14522-ZRN</b>
3/8-18	NPT	0.427	0.722	3.5	1/2	4	<b>14523-ZRN</b>
1/2-14	NPT	0.49	1	3.5	1/2	4	<b>14524-ZRN</b>
1-11-1/2	NPT	0.62	1.13	4	5/8	4	<b>14525-ZRN</b>
2 1/2-8	NPT	0.74	1.5	5	3/4	4	<b>14526-ZRN</b>
1/16-27	NPTF	0.245	0.481	2-1/2	1/4	4	<b>14530-ZRN</b>
1/8-27	NPTF	0.3	0.592	3	5/16	4	<b>14531-ZRN</b>
1/4-18	NPTF	0.36	0.611	3.5	3/8	4	<b>14532-ZRN</b>
1/2-14	NPTF	0.49	1	3.5	1/2	4	<b>14533-ZRN</b>
1-11-1/2	NPTF	0.62	1.13	4	5/8	4	<b>14534-ZRN</b>
2 1/2-8	NPTF	0.74	1.5	5	3/4	4	<b>14535-ZRN</b>

\*bold numbers are EDPs for ordering

INTRO  
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 INSERTS

# ADVANCED PERFORMANCE

Carbide Thread Mills For Aluminum Alloys



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Thread Mills - Aluminum</b> <ul style="list-style-type: none"> <li>• Micrograin carbide substrate for wear resistance</li> <li>• NF1 coating for Aluminum Alloys</li> <li>• Coolant-through improves tool life and performance</li> <li>• Helical flute for smooth chatter-free cutting</li> </ul>	 	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series 186** | **TM-O-AL | Helical | 2xD | Coolant-Through | AL**

Thread Size	Cutter Dia. (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
10-24 NC	0.14	0.396	2-1/2	3/16	<b>14425-ZRN</b>
10-32 NF	0.14	0.391	2-1/2	3/16	<b>14426-ZRN</b>
1/4-20 NC	0.18	0.525	2-1/2	3/16	<b>14427-ZRN</b>
1/4-28 NF	0.18	0.518	2-1/2	3/16	<b>14428-ZRN</b>
5/16-18 NC	0.235	0.639	2-1/2	1/4	<b>14429-ZRN</b>
5/16-24 NF	0.235	0.646	2-1/2	1/4	<b>14430-ZRN</b>
3/8-16 NC	0.3	0.781	3	5/16	<b>14431-ZRN</b>
3/8-24 NF	0.3	0.771	3	5/16	<b>14432-ZRN</b>
7/16-14 NC	0.345	0.893	3.5	3/8	<b>14433-ZRN</b>
7/16-20 NF	0.345	0.875	3.5	3/8	<b>14434-ZRN</b>
1/2-13 NC	0.37	1.038	3.5	3/8	<b>14435-ZRN</b>
9/16-18 NF	0.45	1.139	3.5	1/2	<b>14436-ZRN</b>
5/8-11 NC	0.49	1.318	3.5	1/2	<b>14437-ZRN</b>
3/4-10 NC	0.585	1.55	4	5/8	<b>14438-ZRN</b>
3/4-16 NF	0.585	1.531	4	5/8	<b>14439-ZRN</b>

\*bold numbers are EDPs for ordering

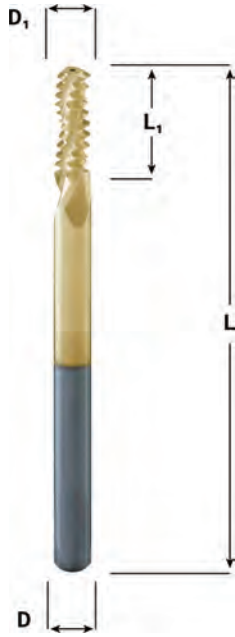
## Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

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# ADVANCED PERFORMANCE

Carbide Thread Mills For Aluminum Alloys



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Thread Mills - Aluminum</b> <ul style="list-style-type: none"> <li>• Micrograin carbide substrate for wear resistance</li> <li>• NF1 coating for Aluminum Alloys</li> <li>• Coolant-through improves tool life and performance</li> <li>• Helical flute for smooth chatter-free cutting</li> </ul>	 	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series 186M** | **TM-O-AL | Helical | 2xD | Coolant-Through | AL | Metric**

Thread Size	Cutter Dia. (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	EDP
M5X0.8	0.145	0.394	2-1/2	3/16	<b>14440-ZRN</b>
M6X0.75	0.17	0.487	2-1/2	3/16	<b>14441-ZRN</b>
M6X1	0.17	0.492	2-1/2	3/16	<b>14442-ZRN</b>
M8X1	0.235	0.65	2-1/2	1/4	<b>14443-ZRN</b>
M8X1.25	0.235	0.664	2-1/2	1/4	<b>14444-ZRN</b>
M10X1	0.3	0.807	3	5/16	<b>14445-ZRN</b>
M10X1.5	0.3	0.797	3	5/16	<b>14446-ZRN</b>
M12X1	0.37	0.965	3.5	3/8	<b>14447-ZRN</b>
M12X1.5	0.37	0.974	3.5	3/8	<b>14448-ZRN</b>
M12X1.75	0.37	0.999	3.5	3/8	<b>14449-ZRN</b>
M14X1.5	0.42	1.152	3.5	1/2	<b>14450-ZRN</b>
M14X2	0.42	1.142	3.5	1/2	<b>14451-ZRN</b>
M16X1.5	0.49	1.27	3.5	1/2	<b>14452-ZRN</b>
M16X2	0.49	1.299	3.5	1/2	<b>14453-ZRN</b>

\*bold numbers are EDPs for ordering

INTRO  
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 INSERTS



# PERFORMANCE

Premium HSS Pipe Taps For Die Cast Aluminum, Cast Iron And Brass



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Straight Pipe, Cutting Tap</b></p> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Pipe tap for NPSF threads</li> <li>ANSI tap blank dimensions</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
					○	○		○				

● Best ○ Good

**Series BX700** | BX700 | Thredshaver | NPSF

Thread Size	Specification	Flutes	Shank (C)	Square Size (D)	OAL (L)	Bright	TiCN	TiN
1/8-27	NPSF	4	.3125	.234	2-1/8	<b>59914-000</b>	<b>59914-00C</b>	<b>59914-00T</b>
1/8-27	NPSF	4	.4375	.328	2-1/8	<b>59924-000</b>	<b>59924-00C</b>	<b>59924-00T</b>
1/4-18	NPSF	4	.5625	.421	2-7/16	<b>59934-000</b>	<b>59934-00C</b>	<b>59934-00T</b>
3/8-18	NPSF	4	.7000	.531	2-9/16	<b>59944-000</b>	<b>59944-00C</b>	<b>59944-00T</b>
1/2-14	NPSF	4	.6875	.515	3-1/8	<b>59954-000</b>	<b>59954-00C</b>	<b>59954-00T</b>

\*bold numbers are EDPs for ordering

INTRO

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# PERFORMANCE

Premium HSS Straight Flute Taps For Die Cast Iron And Aluminum



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Straight Flute, Cutting Tap</b> <ul style="list-style-type: none"> <li>• Straight flute taps designed for Cast Iron and Diecast Aluminum</li> <li>• ANSI tap blank dimensions</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
					●	●		●				

● Best ○ Good

## Series BX600 BX600 | Thredshaver | Hand

Thread Size	Specification	Thread Limit	Flutes	Shank (C)	Square Size (D)	OAL (L)	TiCN	TiN
6-32	UNC	H3	3	.141	.110	2	54003-01C	54003-01T
6-32	UNC	H5	3	.141	.110	2	54005-01C	54005-01T
8-32	UNC	H3	3	.168	.131	2-1/8	54013-01C	54013-01T
8-32	UNC	H5	3	.168	.131	2-1/8	54015-01C	54015-01T
10-24	UNC	H3	4	.194	.152	2-3/8	54023-01C	54023-01T
10-24	UNC	H5	4	.194	.152	2-3/8	54025-01C	54025-01T
10-32	UNF	H3	4	.194	.152	2-3/8	54033-01C	54033-01T
10-32	UNF	H5	4	.194	.152	2-3/8	54035-01C	54035-01T
1/4-20	UNC	H3	4	.255	.191	2-1/2	54043-01C	54043-01T
1/4-20	UNC	H5	4	.255	.191	2-1/2	54045-01C	54045-01T
1/4-28	UNF	H3	4	.255	.191	2-1/2	54053-01C	54053-01T
1/4-28	UNF	H5	4	.255	.191	2-1/2	54055-01C	54055-01T
5/16-18	UNC	H3	4	.318	.238	2-23/32	54063-01C	54063-01T
5/16-18	UNC	H5	4	.318	.238	2-23/32	54065-01C	54065-01T
5/16-24	UNF	H3	4	.318	.238	2-23/32	54073-01C	54073-01T
5/16-24	UNF	H5	4	.318	.238	2-23/32	54075-01C	54075-01T
3/8-16	UNC	H3	4	.381	.286	2-15/16	54083-01C	54083-01T
3/8-16	UNC	H5	4	.381	.286	2-15/16	54085-01C	54085-01T
3/8-24	UNF	H3	4	.381	.286	2-15/16	54093-01C	54093-01T
3/8-24	UNF	H5	4	.381	.286	2-15/16	54095-01C	54095-01T
7/16-14	UNC	H5	4	.323	.242	3-5/32	54105-00C	54105-00T
7/16-20	UNF	H5	4	.323	.242	3-5/32	54115-00C	54115-00T
1/2-13	UNC	H3	4	.367	.275	3-3/8	54123-00C	54123-00T
1/2-13	UNC	H5	4	.367	.275	3-3/8	54125-00C	54125-00T
1/2-20	UNF	H3	4	.367	.275	3-3/8	54133-00C	54133-00T
1/2-20	UNF	H5	4	.367	.275	3-3/8	54135-00C	54135-00T
M6 x 1.0	M	D5	4	.255	.191	-	54605-01C	54605-01T
M8 x 1.25	M	D5	4	.318	.238	-	54615-01C	54615-01T
M10 x 1.5	M	D6	4	.381	.286	-	54626-01C	54626-01T
M12 x 1.75	M	D6	4	.367	.275	-	54636-00C	54636-00T

\*bold numbers are EDPs for ordering

INTRO

MILLING

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INSERTS

# ADVANCED PERFORMANCE

Carbide Inserted Forming Taps For Die Cast Aluminum



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Inlaid Carbide, Cold Forming</b></p> <ul style="list-style-type: none"> <li>• Embedded carbide thread sections</li> <li>• Designed for Diecast Aluminum</li> <li>• These have the torsional strength of a HSS tap body with the exceptional wear resistance of carbide in the areas where all the tapping work is done</li> <li>• ANSI tap blank dimensions</li> </ul>	  	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series BXCI** | BXCI | Thredfloor | Carbide Insert

Thread Size	Specification	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	OAL (L)	EDP
6-32	UNC	H5	0.123	0.126	2	<b>11435-010</b>
8-32	UNC	H5	0.149	0.152	2-1/8	<b>11785-010</b>
10-24	UNC	H5	0.169	0.173	2-3/8	<b>12115-010</b>
10-32	UNF	H5	0.175	0.178	2-3/8	<b>12335-010</b>
1/4-20	UNC	H7	0.225	0.230	2-1/2	<b>12797-010</b>
5/16-18	UNC	H8	0.285	0.290	2-23/32	<b>13198-010</b>
3/8-16	UNC	H8	0.343	0.350	2-15/16	<b>13558-010</b>
M4 x 0.7	M	D7	0.145	0.148	-	<b>18097-010</b>
M5 x 0.8	M	D8	0.183	0.186	-	<b>18298-010</b>
M6 x 1.0	M	D9	0.218	0.222	-	<b>18499-010</b>
M8 x 1.25	M	D10	0.292	0.297	-	<b>18690-010</b>
M10 x 1.5	M	D11	0.366	0.372	-	<b>18871-010</b>
M12 x 1.75	M	D12	0.439	0.446	-	<b>19072-000</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

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# ADVANCED PERFORMANCE

Carbide Inserted Forming Taps For Die Cast Aluminum



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Inlaid Carbide, Cold Forming</b></p> <ul style="list-style-type: none"> <li>• Embedded carbide thread sections</li> <li>• Designed for Diecast Aluminum</li> <li>• These have the torsional strength of a HSS tap body with the exceptional wear resistance of carbide in the areas where all the tapping work is done</li> <li>• DIN tap blank dimensions</li> </ul>	 	

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series BXCID** | BXCID | Thredfloor | Carbide Insert | DIN

Thread Size	Specification	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	OAL (L)	EDP
M6 x 1.0	M	D9	0.218	0.222	80mm	<b>18599-010</b>
M8 x 1.25	M	D10	0.292	0.297	90mm	<b>18700-010</b>
M10 x 1.5	M	D11	0.366	0.372	100mm	<b>18881-000</b>
M12 x 1.75	M	D12	0.439	0.446	110mm	<b>19082-000</b>

\*bold numbers are EDPs for ordering

INTRO

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HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Premium Powdered Metal HSS Forming Taps For Steel



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Powdered Metal, Cold Forming</b></p> <ul style="list-style-type: none"> <li>• Designed for Steel</li> <li>• Stocked with TiCN Coating</li> <li>• Forming tap eliminates chips by displacing material to create threads</li> <li>• Unique forming lobe geometry to provide superior performance</li> <li>• ANSI tap blank dimensions</li> </ul>	 	

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	●	○	●	●	●	●	●	●	●	●

● Best ○ Good

**Series BXS** | BXS | Thredfloer | For Steel

Thread Size	Specification	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	OAL (L)	EDP
4-40	UNC	H5	0.100	0.103	1-7/8	<b>10852-81C</b>
6-32	UNC	H5	0.123	0.126	2	<b>11412-81C</b>
8-32	UNC	H5	0.149	0.152	2-1/8	<b>11752-81C</b>
10-24	UNC	H5	0.169	0.173	2-3/8	<b>12092-91C</b>
10-32	UNF	H5	0.175	0.178	2-3/8	<b>12312-91C</b>
1/4-20	UNC	H8	0.226	0.231	2-1/2	<b>12772-91C</b>
1/4-28	UNF	H7	0.233	0.237	2-1/2	<b>12992-91C</b>
5/16-18	UNC	H9	0.285	0.291	2-23/32	<b>13172-91C</b>
5/16-24	UNF	H8	0.293	0.297	2-23/32	<b>13352-91C</b>
3/8-16	UNC	H9	0.344	0.350	2-15/16	<b>13532-91C</b>
3/8-24	UNF	H8	0.355	0.359	2-15/16	<b>13712-91C</b>
7/16-14	UNC	H9	0.401	0.408	3-5/32	<b>13842-90C</b>
7/16-20	UNF	H7	0.413	0.418	3-5/32	<b>13962-90C</b>
1/2-13	UNC	H9	0.461	0.468	3-3/8	<b>14082-90C</b>
1/2-20	UNF	H7	0.475	0.480	3-3/8	<b>14202-90C</b>
M3 x 0.5	M	D6	0.110	0.112	-	<b>17676-81C</b>
M3.5 x 0.6	M	D7	0.128	0.130	-	<b>17877-81C</b>
M4 x 0.7	M	D7	0.145	0.148	-	<b>18077-81C</b>
M5 x 0.8	M	D8	0.183	0.186	-	<b>18278-91C</b>
M6 x 1.0	M	D9	0.218	0.222	-	<b>18479-91C</b>
M8 x 1.25	M	D10	0.292	0.297	-	<b>18680-91C</b>
M10 x 1.5	M	D11	0.366	0.372	-	<b>18861-91C</b>
M12 x 1.75	M	D12	0.439	0.446	-	<b>19062-90C</b>
4-40	UNC	H5	0.100	0.103	1-7/8	<b>10762-81C</b>
6-32	UNC	H5	0.123	0.126	2	<b>11322-81C</b>
8-32	UNC	H5	0.149	0.152	2-1/8	<b>11662-81C</b>
10-24	UNC	H5	0.169	0.173	2-3/8	<b>12002-91C</b>
10-32	UNF	H5	0.175	0.178	2-3/8	<b>12222-91C</b>
1/4-20	UNC	H8	0.226	0.231	2-1/2	<b>12682-91C</b>
1/4-28	UNF	H7	0.233	0.237	2-1/2	<b>12902-91C</b>
5/16-18	UNC	H9	0.285	0.291	2-23/32	<b>13122-91C</b>
5/16-24	UNF	H8	0.293	0.297	2-23/32	<b>13302-91C</b>
3/8-16	UNC	H9	0.344	0.350	2-15/16	<b>13482-91C</b>
3/8-24	UNF	H8	0.355	0.359	2-15/16	<b>13662-91C</b>
M3 x 0.5	M	D6	0.110	0.112	-	<b>17586-81C</b>
M3.5 x 0.6	M	D7	0.128	0.130	-	<b>17787-81C</b>
M4 x 0.7	M	D7	0.145	0.148	-	<b>17987-81C</b>
M5 x 0.8	M	D8	0.183	0.186	-	<b>18188-91C</b>
M6 x 1.0	M	D9	0.218	0.222	-	<b>18389-91C</b>
M8 x 1.25	M	D10	0.292	0.297	-	<b>18590-91C</b>
M10 x 1.5	M	D11	0.366	0.372	-	<b>18791-91C</b>
M12 x 1.75	M	D12	0.439	0.446	-	<b>18992-90C</b>

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Premium Powdered Metal HSS Forming Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Powdered Metal, Cold Forming</b></p> <ul style="list-style-type: none"> <li>Forming tap eliminates chips by displacing material to create threads</li> <li>Unique forming lobe geometry to provide superior performance</li> <li>ANSI tap blank dimensions</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	○	○	○	○	○

● Best ○ Good

## Series BXHP | Thredfloor

Thread Size	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	Bright	TiCN	Super TiN	Bal-Plus
2-56	H3	0.077	0.079	10383-010	10383-01C	-	-
4-40	H3	0.099	0.102	10853-210	-	-	-
4-40	H4	0.100	0.102	10854-210	-	-	-
4-40	H5	0.100	0.103	10855-210	-	-	-
6-32	H5	0.123	0.126	11412-210	11412-81C	11412-81U	11412-81L
6-32	H3	0.122	0.125	11413-210	-	-	-
6-32	H5	0.123	0.126	11415-210	-	-	-
8-32	H3	0.148	0.151	11753-210	-	-	-
8-32	H4	0.148	0.151	11754-210	-	-	-
8-32	H5	0.149	0.152	11755-210	-	-	-
10-24	H5	0.169	0.173	12095-410	-	-	-
10-32	H3	0.174	0.177	12313-410	-	-	-
10-32	H5	0.175	0.178	12315-410	-	-	-
1/4-20	H8	0.226	0.231	12772-410	12772-91C	12772-91U	12772-91L
1/4-20	H8	0.226	0.231	12778-410	-	-	-
5/16-18	H9	0.285	0.291	13172-410	13172-91C	13172-91U	13172-91L
5/16-18	H9	0.285	0.291	13179-410	-	-	-
3/8-16	H9	0.344	0.350	13539-410	-	-	-
3/8-24	H8	0.355	0.359	13718-410	-	-	-
1/2-13	H9	0.461	0.468	14082-600	14082-90C	14082-90U	14082-90L
M3 x 0.5	D6	0.110	0.112	17676-210	17676-81C	17676-81U	17676-81L
M5 x 0.8	D4	0.181	0.184	18274-410	-	-	-
M5 x 0.8	D8	0.183	0.186	18278-410	18278-91C	18278-91U	18278-91L
M6 x 1.0	D5	0.216	0.220	18475-410	-	-	-
M6 x 1.0	D9	0.218	0.222	18479-410	18479-91C	18479-91U	18479-91L
M8 x 1.25	D10	0.292	0.297	18680-410	18680-91C	18680-91U	18680-91L
M10 x 1.5	D11	0.366	0.372	18861-410	18861-91C	18861-91U	18861-91L

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# ADVANCED PERFORMANCE

Premium Powdered Metal HSS Forming Taps For Die Cast Aluminum



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Powdered Metal, Cold Forming</b></p> <ul style="list-style-type: none"> <li>• Designed for Diecast Aluminum</li> <li>• Stocked with Bal-Plus Coating</li> <li>• Forming tap eliminates chips by displacing material to create threads</li> <li>• Unique forming lobe geometry to provide superior performance</li> <li>• ANSI tap blank dimensions</li> </ul>	 	

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○					●	●				

● Best ○ Good

## Series BXDC

## BXDC | Thredfloor | Die Cast

Thread Size	Specification	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	OAL (L)	EDP
4-40	UNC	H5	0.100	0.103	1-7/8	<b>10852-81L</b>
6-32	UNC	H5	0.123	0.126	2	<b>11412-81L</b>
8-32	UNC	H5	0.149	0.152	2-1/8	<b>11752-81L</b>
10-24	UNC	H5	0.169	0.173	2-3/8	<b>12092-91L</b>
10-32	UNF	H5	0.175	0.178	2-3/8	<b>12312-91L</b>
10-32	UNF	H5	0.175	0.178	2-3/8	<b>12312-9HL</b>
1/4-20	UNC	H8	0.226	0.231	2-1/2	<b>12772-91L</b>
1/4-28	UNF	H7	0.233	0.237	2-1/2	<b>12992-91L</b>
5/16-18	UNC	H9	0.285	0.291	2-23/32	<b>13172-91L</b>
5/16-24	UNF	H8	0.293	0.297	2-23/32	<b>13352-91L</b>
3/8-16	UNC	H9	0.344	0.350	2-15/16	<b>13532-91L</b>
3/8-24	UNF	H8	0.355	0.359	2-15/16	<b>13712-91L</b>
7/16-14	UNC	H9	0.401	0.408	3-5/32	<b>13842-90L</b>
7/16-20	UNF	H7	0.413	0.418	3-5/32	<b>13962-90L</b>
1/2-13	UNC	H9	0.461	0.468	3-3/8	<b>14082-90L</b>
1/2-20	UNF	H7	0.475	0.480	3-3/8	<b>14202-90L</b>
M3 x 0.5	M	D6	0.110	0.112	-	<b>17676-81L</b>
M3.5 x 0.6	M	D7	0.128	0.130	-	<b>17877-81L</b>
M4 x 0.7	M	D7	0.145	0.148	-	<b>18077-81L</b>
M5 x 0.8	M	D8	0.183	0.186	-	<b>18278-91L</b>
M6 x 1.0	M	D9	0.218	0.222	-	<b>18479-91L</b>
M8 x 1.25	M	D10	0.292	0.297	-	<b>18680-91L</b>
M10 x 1.5	M	D11	0.366	0.372	-	<b>18861-91L</b>
M12 x 1.75	M	D12	0.439	0.446	-	<b>19062-90L</b>
4-40	UNC	H5	0.100	0.103	1-7/8	<b>10762-81L</b>
6-32	UNC	H5	0.123	0.126	2	<b>11322-81L</b>
8-32	UNC	H5	0.149	0.152	2-1/8	<b>11662-81L</b>
10-24	UNC	H5	0.169	0.173	2-3/8	<b>12002-91L</b>
10-32	UNF	H5	0.175	0.178	2-3/8	<b>12222-91L</b>
1/4-20	UNC	H8	0.226	0.231	2-1/2	<b>12682-91L</b>
1/4-28	UNF	H7	0.233	0.237	2-1/2	<b>12902-91L</b>
5/16-18	UNC	H9	0.285	0.291	2-23/32	<b>13122-91L</b>
5/16-24	UNF	H8	0.293	0.297	2-23/32	<b>13302-91L</b>
3/8-16	UNC	H9	0.344	0.350	2-15/16	<b>13482-91L</b>
3/8-24	UNF	H8	0.355	0.359	2-15/16	<b>13662-91L</b>
M3 x 0.5	M	D6	0.110	0.112	-	<b>17586-81L</b>
M3.5 x 0.6	M	D7	0.128	0.130	-	<b>17787-81L</b>
M4 x 0.7	M	D7	0.145	0.148	-	<b>17987-81L</b>
M5 x 0.8	M	D8	0.183	0.186	-	<b>18188-91L</b>
M6 x 1.0	M	D9	0.218	0.222	-	<b>18389-91L</b>
M8 x 1.25	M	D10	0.292	0.297	-	<b>18590-91L</b>
M10 x 1.5	M	D11	0.366	0.372	-	<b>18791-91L</b>
M12 x 1.75	M	D12	0.439	0.446	-	<b>18992-90L</b>

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Premium Powdered Metal HSS Forming Taps For Stainless Steel



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Powdered Metal, Cold Forming</b></p> <ul style="list-style-type: none"> <li>• Designed for Stainless Steel</li> <li>• Stocked with Super TiN Coating</li> <li>• Forming tap eliminates chips by displacing material to create threads</li> <li>• Unique forming lobe geometry to provide superior performance</li> <li>• ANSI tap blank dimensions</li> </ul>	 	

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	●	○				●				

● Best ○ Good

## Series BXSS | BXSS | Thredfloer | Stainless Steel

Thread Size	Specification	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	OAL (L)	EDP
4-40	UNC	H5	0.100	0.103	1-7/8	<b>10852-81U</b>
6-32	UNC	H5	0.123	0.126	2	<b>11412-81U</b>
8-32	UNC	H5	0.149	0.152	2-1/8	<b>11752-81U</b>
10-24	UNC	H5	0.169	0.173	2-3/8	<b>12092-91U</b>
10-32	UNF	H5	0.175	0.178	2-3/8	<b>12312-91U</b>
1/4-20	UNC	H8	0.226	0.231	2-1/2	<b>12772-91U</b>
1/4-28	UNF	H7	0.233	0.237	2-1/2	<b>12992-91U</b>
5/16-18	UNC	H9	0.285	0.291	2-23/32	<b>13172-91U</b>
5/16-24	UNF	H8	0.293	0.297	2-23/32	<b>13352-91U</b>
3/8-16	UNC	H9	0.344	0.350	2-15/16	<b>13532-91U</b>
3/8-24	UNF	H8	0.355	0.359	2-15/16	<b>13712-91U</b>
7/16-14	UNC	H9	0.401	0.408	3-5/32	<b>13842-90U</b>
7/16-20	UNF	H7	0.413	0.418	3-5/32	<b>13962-90U</b>
1/2-13	UNC	H9	0.461	0.468	3-3/8	<b>14082-90U</b>
1/2-20	UNF	H7	0.475	0.480	3-3/8	<b>14202-90U</b>
M3 x 0.5	M	D6	0.110	0.112	-	<b>17676-81U</b>
M3.5 x 0.6	M	D7	0.128	0.130	-	<b>17877-81U</b>
M4 x 0.7	M	D7	0.145	0.148	-	<b>18077-81U</b>
M5 x 0.8	M	D8	0.183	0.186	-	<b>18278-91U</b>
M6 x 1.0	M	D9	0.218	0.222	-	<b>18479-91U</b>
M8 x 1.25	M	D10	0.292	0.297	-	<b>18680-91U</b>
M10 x 1.5	M	D11	0.366	0.372	-	<b>18861-91U</b>
M12 x 1.75	M	D12	0.439	0.446	-	<b>19062-90U</b>
4-40	UNC	H5	0.100	0.103	1-7/8	<b>10762-81U</b>
6-32	UNC	H5	0.123	0.126	2	<b>11322-81U</b>
8-32	UNC	H5	0.149	0.152	2-1/8	<b>11662-81U</b>
10-24	UNC	H5	0.169	0.173	2-3/8	<b>12002-91U</b>
10-32	UNF	H5	0.175	0.178	2-3/8	<b>12222-91U</b>
1/4-20	UNC	H8	0.226	0.231	2-1/2	<b>12682-91U</b>
1/4-28	UNF	H7	0.233	0.237	2-1/2	<b>12902-91U</b>
5/16-18	UNC	H9	0.285	0.291	2-23/32	<b>13122-91U</b>
5/16-24	UNF	H8	0.293	0.297	2-23/32	<b>13302-91U</b>
3/8-16	UNC	H9	0.344	0.350	2-15/16	<b>13482-91U</b>
3/8-24	UNF	H8	0.355	0.359	2-15/16	<b>13662-91U</b>
M3 x 0.5	M	D6	0.110	0.112	-	<b>17586-81U</b>
M3.5 x 0.6	M	D7	0.128	0.130	-	<b>17787-81U</b>
M4 x 0.7	M	D7	0.145	0.148	-	<b>17987-81U</b>
M5 x 0.8	M	D8	0.183	0.186	-	<b>18188-91U</b>
M6 x 1.0	M	D9	0.218	0.222	-	<b>18389-91U</b>
M8 x 1.25	M	D10	0.292	0.297	-	<b>18590-91U</b>
M10 x 1.5	M	D11	0.366	0.372	-	<b>18791-91U</b>
M12 x 1.75	M	D12	0.439	0.446	-	<b>18992-90U</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# ADVANCED PERFORMANCE

Premium HSS DIN Forming Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>DIN, Cold Forming</b> <ul style="list-style-type: none"> <li>Forming tap eliminates chips by displacing material to create threads</li> <li>Unique forming lobe geometry to provide superior performance</li> <li>DIN tap blank dimensions</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	○	●	●	●	●	●	●	○	○

● Best ○ Good

## Series BXDIN | BXDIN | Threadfloor | DIN

Thread Size	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	OAL (L)	Bright	TiCN	TiN
M1.6 x 0.35	D3	0.057	0.058	40mm	17023-010	-	17023-01T
M1.6 x 0.35	D5	0.058	0.059	40mm	17025-010	-	17025-01T
M1.7 x 0.35	D3	0.061	0.062	40mm	17163-010	-	-
M1.7 x 0.35	D5	0.062	0.063	40mm	17165-010	-	-
M2 x 0.4	D3	0.071	0.073	45mm	17303-010	-	-
M2 x 0.4	D5	0.072	0.074	45mm	17305-010	17305-01C	17305-01T
M2.5 x 0.45	D3	0.090	0.092	50mm	17443-010	-	17443-01T
M2.5 x 0.45	D6	0.091	0.093	50mm	17446-010	-	17446-01T
M3 x 0.5	D3	0.108	0.110	56mm	17623-010	-	17623-01T
M3 x 0.5	D6	0.110	0.112	56mm	17626-010	-	17626-01T
M3.5 x 0.6	D4	0.126	0.129	56mm	17824-010	-	17824-01T
M3.5 x 0.6	D7	0.128	0.130	56mm	17827-010	17827-01C	17827-01T
M4 x 0.7	D4	0.144	0.147	63mm	18024-010	-	18024-01T
M4 x 0.7	D7	0.145	0.148	63mm	18027-010	-	18027-01T
M5 x 0.8	D8	0.183	0.186	70mm	18228-410	18228-41C	18228-41T
M6 x 1.0	D5	0.216	0.220	80mm	18425-410	18425-41C	-
M6 x 1.0	D9	0.218	0.222	80mm	18429-410	18429-41C	18429-41T
M8 x 1.25	D5	0.289	0.294	90mm	18625-410	18625-41C	-
M8 x 1.25	D10	0.292	0.297	90mm	18630-410	18630-41C	18630-41T
M10 x 1.5	D6	0.363	0.369	100mm	18826-400	18826-40C	-
M10 x 1.5	D11	0.366	0.372	100mm	18831-400	18831-40C	18831-40T

\*bold numbers are EDPs for ordering

# PERFORMANCE

Premium HSS Cleanout Tap For Removing Weld Spatter, Paint And Other Obstructions



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Thread Debris Cleaner</b></p> <ul style="list-style-type: none"> <li>• Used in existing tapped holes</li> <li>• These have a special geometry to prevent recutting of threads, flanks, or cross threading that would result in damage to the part</li> <li>• ANSI tap blank dimensions</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2

● Best ○ Good

**Series BX800** | BX800 | Thredshaver | Cleanout

Thread Size	Specification	Flutes	Shank (C)	Square Size (D)	OAL (L)	EDP
1/4-20	UNC	3	.255	.191	2-1/2	<b>54040-006</b>
5/16-18	UNC	4	.318	.238	2-23/32	<b>54060-006</b>
3/8-16	UNC	4	.381	.286	2-15/16	<b>54080-006</b>
7/16-14	UNC	4	.323	.242	3-5/32	<b>54100-006</b>
1/2-13	UNC	4	.367	.275	3-3/8	<b>54120-006</b>
M6 x 1.0	M	3	.255	.191	-	<b>54600-006</b>
M8 x 1.25	M	4	.318	.238	-	<b>54610-006</b>
M10 x 1.5	M	4	.381	.286	-	<b>54620-006</b>
M11 x 1.5	M	4	.323	.242	-	<b>54625-006</b>
M12 x 1.75	M	4	.367	.275	-	<b>54630-006</b>

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

Premium HSS Miniature Forming Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Miniature, Cold Forming</b></p> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Stocked Bright Finish</li> <li>Forming tap eliminates chips by displacing material to create threads</li> <li>ANSI tap blank dimensions</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	○	○	○	○	○

● Best ○ Good

**Series BXM** | BXM | Thredfloor | Miniature

Thread Size	Spec.	Thread Limit	Min Tap/ Drill Size	Max Tap/ Drill Size	OAL (L)	Bright	TiCN	TiN	Nitride Steam
000-120	UNF	H2	0.0303	0.0311	1-5/8	<b>00102-010</b>	<b>00102-01C</b>	<b>00102-01T</b>	<b>00102-016</b>
00-96	UNF	H2	0.0417	0.0428	1-5/8	<b>00202-010</b>	<b>00202-01C</b>	<b>00202-01T</b>	<b>00202-016</b>
00-90	UNC	H2	0.0420	0.0431	1-5/8	<b>00302-010</b>	<b>00302-01C</b>	<b>00302-01T</b>	<b>00302-016</b>
M0.7 x 0.175	M	H2	0.0247	0.0253	-	<b>00802-010</b>	-	-	-
M0.8 x 0.200	M	H2	0.0280	0.0288	-	<b>00902-010</b>	-	<b>00902-01T</b>	<b>00902-016</b>
M0.9 x 0.225	M	H2	0.0314	0.0323	-	<b>01002-010</b>	-	<b>01002-01T</b>	<b>01002-016</b>
M1.0 x 0.250	M	H2	0.0348	0.0358	-	<b>01102-010</b>	<b>01102-01C</b>	<b>01102-01T</b>	<b>01102-016</b>
M1.1 x 0.250	M	H2	0.0387	0.0397	-	<b>01202-010</b>	-	<b>01202-01T</b>	<b>01202-016</b>
M1.2 x 0.250	M	H2	0.0427	0.0437	-	<b>01302-010</b>	<b>01302-01C</b>	<b>01302-01T</b>	<b>01302-016</b>
M1.4 x 0.300	M	H2	0.0493	0.0505	-	<b>01402-010</b>	<b>01402-01C</b>	<b>01402-01T</b>	<b>01402-016</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Forming Pipe Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Pipe Tap, Cold Forming</b> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Pipe tap for NPT/NPTF threads</li> <li>ANSI tap blank dimensions</li> </ul>	  	

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	○	○	○	○	○

● Best ○ Good

## Series BXPT BXPT | Thredfloer | Tapered Pipe

Thread Size	Specification	Max Tap/Drill Size	Shank (C)	Square Size (D)	OAL (L)	Bright	TiN
1/16-27	NPT	0.274 - 0.276	.3125	.234	2-1/8	<b>02000-000</b>	<b>02000-00T</b>
1/16-27	NPTF	0.274 - 0.276	.3125	.234	2-1/8	<b>02010-000</b>	<b>02010-00T</b>
1/8-27	NPT	0.367 - 0.369	.3125	.234	2-1/8	<b>02100-000</b>	<b>02100-00T</b>
1/8-27	NPTF	0.367 - 0.369	.3125	.234	2-1/8	<b>02110-000</b>	<b>02110-00T</b>
1/8-27	NPT	0.367 - 0.369	.4375	.328	2-1/8	<b>02200-000</b>	<b>02200-00T</b>
1/8-27	NPTF	0.367 - 0.369	.4375	.328	2-1/8	<b>02210-000</b>	<b>02210-00T</b>
1/4-18	NPT	0.478 - 0.481	.5625	.421	2-7/16	<b>02300-000</b>	<b>02300-00T</b>
1/4-18	NPTF	0.478 - 0.481	.5625	.421	2-7/16	<b>02310-000</b>	<b>02310-00T</b>
3/8-18	NPT	0.616 - 0.619	.7000	.531	2-9/16	<b>02400-000</b>	<b>02400-00T</b>
3/8-18	NPTF	0.616 - 0.619	.7000	.531	2-9/16	<b>02410-000</b>	<b>02410-00T</b>
1/2-14	NPT	0.763 - 0.766	.6875	.515	3-1/8	<b>02500-000</b>	<b>02500-00T</b>
1/2-14	NPTF	0.763 - 0.766	.6875	.515	3-1/8	<b>02510-000</b>	<b>02510-00T</b>
3/4-14	NPT	0.974 - 0.978	.9063	.679	3-1/4	<b>02600-000</b>	<b>02600-00T</b>
3/4-14	NPTF	0.974 - 0.978	.9063	.679	3-1/4	<b>02610-000</b>	<b>02610-00T</b>
1"-11.5	NPT	1.221 - 1.225	1.1250	.843	3-3/4	<b>02700-000</b>	<b>02700-00T</b>
1"-11.5	NPTF	1.221 - 1.225	1.1250	.843	3-3/4	<b>02710-000</b>	-

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Forming Pipe Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Pipe Tap, Cold Forming</b></p> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Pipe tap for NPS/NPSC/NPSM/NPSF threads</li> <li>ANSI tap blank dimensions</li> </ul>	  	

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	○	○	○	○	○

● Best ○ Good

## Series BXPS BXPS | Thredfloer | Straight Pipe

Thread Size	Specification	Max Tap/Drill Size	Shank (C)	Square Size (D)	OAL (L)	Bright	TiN
1/16-27	NPSF	0.281 - 0.282	.3125	.234	2-1/8	<b>02030-000</b>	<b>02030-00T</b>
1/8-27	NPS	0.379 - 0.380	.3125	.234	2-1/8	<b>02120-000</b>	<b>02120-00T</b>
1/8-27	NPSF	0.373 - 0.374	.3125	.234	2-1/8	<b>02130-000</b>	<b>02130-00T</b>
1/8-27	NPS	0.379 - 0.380	.4375	.328	2-1/8	<b>02220-000</b>	<b>02220-00T</b>
1/8-27	NPSF	0.373 - 0.374	.4375	.328	2-1/8	<b>02230-000</b>	<b>02230-00T</b>
1/4-18	NPS	0.499 - 0.500	.5625	.421	2-7/16	<b>02320-000</b>	<b>02320-00T</b>
1/4-18	NPSF	0.491 - 0.492	.5625	.421	2-7/16	<b>02330-000</b>	<b>02330-00T</b>
3/8-18	NPS	0.636 - 0.637	.7000	.531	2-9/16	<b>02420-000</b>	<b>02420-00T</b>
3/8-18	NPSF	0.626 - 0.627	.7000	.531	2-9/16	<b>02430-000</b>	<b>02430-00T</b>
1/2-14	NPS	0.780 - 0.790	.6875	.515	3-1/8	<b>02520-000</b>	-
1/2-14	NPSF	0.777 - 0.779	.6875	.515	3-1/8	<b>02530-000</b>	<b>02530-00T</b>
3/4-14	NPS	0.998 - 1.000	.9063	.679	3-1/4	<b>02620-000</b>	<b>02620-00T</b>
3/4-14	NPSF	0.988 - 0.990	.9063	.679	3-1/4	<b>02630-000</b>	<b>02630-00T</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Premium HSS Forming Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>2-2.5P, Cold Forming</b> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Forming tap eliminates chips by displacing material to create threads</li> <li>ANSI tap blank dimensions</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	○	○	○	○	○

● Best ○ Good

## Series BXB BXB | Thredfloor | Bottoming

Thread Size	Spec.	Thread Limit	Min Tap/ Drill Size	Max Tap/ Drill Size	OAL (L)	Bright	TiCN	TiN	Nitride Steam
0-80	UNF	H2	0.0539	0.0552	1-5/8	10002-010	10002-01C	10002-01T	10002-016
0-80	UNF	H3	0.0544	0.0557	1-5/8	10003-010	10003-01C	10003-01T	10003-016
0-80	UNF	H4	0.0549	0.0562	1-5/8	10004-010	10004-01C	10004-01T	-
0-80	UNF	H5	0.0554	0.0567	1-5/8	10005-010	10005-01C	10005-01T	-
0-80	UNF	H6	0.0559	0.0572	1-5/8	10006-010	10006-01C	10006-01T	-
0-80	UNF	H7	0.0564	0.0577	1-5/8	10007-010	10007-01C	10007-01T	-
1-64	UNC	H2	0.064	0.066	1-11/16	10122-010	10122-01C	10122-01T	-
1-64	UNC	H3	0.065	0.066	1-11/16	10123-010	10123-01C	10123-01T	10123-016
1-64	UNC	H4	0.065	0.067	1-11/16	10124-010	-	10124-01T	-
1-64	UNC	H5	0.066	0.067	1-11/16	10125-010	-	-	-
1-64	UNC	H6	0.066	0.068	1-11/16	10126-010	-	10126-01T	-
1-64	UNC	H7	0.067	0.068	1-11/16	10127-010	-	10127-01T	-
1-72	UNF	H2	0.065	0.067	1-11/16	10242-010	10242-01C	10242-01T	10242-016
1-72	UNF	H3	0.066	0.067	1-11/16	10243-010	10243-01C	10243-01T	10243-016
1-72	UNF	H4	0.066	0.068	1-11/16	10244-010	-	10244-01T	-
1-72	UNF	H5	0.067	0.068	1-11/16	10245-010	-	10245-01T	-
1-72	UNF	H6	0.067	0.069	1-11/16	10246-010	-	10246-01T	-
1-72	UNF	H7	0.068	0.069	1-11/16	10247-010	-	10247-01T	-
2-56	UNC	H2	0.077	0.079	1-3/4	10282-010	10282-01C	10282-01T	10282-016
2-56	UNC	H3	0.077	0.079	1-3/4	10283-010	10283-01C	10283-01T	10283-016
2-56	UNC	H4	0.078	0.080	1-3/4	10284-010	10284-01C	10284-01T	-
2-56	UNC	H5	0.078	0.080	1-3/4	10285-010	10285-01C	10285-01T	-
2-56	UNC	H6	0.079	0.081	1-3/4	10286-010	10286-01C	10286-01T	-
2-56	UNC	H7	0.079	0.081	1-3/4	10287-010	10287-01C	10287-01T	-
2-64	UNF	H2	0.078	0.080	1-3/4	10422-010	10422-01C	10422-01T	-
2-64	UNF	H3	0.079	0.080	1-3/4	10423-010	-	10423-01T	10423-016
2-64	UNF	H4	0.079	0.081	1-3/4	10424-010	10424-01C	10424-01T	-
2-64	UNF	H5	0.080	0.081	1-3/4	10425-010	-	10425-01T	-
2-64	UNF	H6	0.080	0.082	1-3/4	10426-010	-	10426-01T	-
2-64	UNF	H7	0.081	0.082	1-3/4	10427-010	-	-	-
3-48	UNC	H2	0.088	0.090	1-13/16	10522-010	10522-01C	10522-01T	-
3-48	UNC	H3	0.089	0.091	1-13/16	10523-010	10523-01C	10523-01T	10523-016
3-48	UNC	H4	0.089	0.091	1-13/16	10524-010	10524-01C	10524-01T	10524-016
3-48	UNC	H5	0.090	0.092	1-13/16	10525-010	10525-01C	10525-01T	-
3-48	UNC	H6	0.090	0.092	1-13/16	10526-010	-	10526-01T	-
3-48	UNC	H7	0.091	0.093	1-13/16	10527-010	-	10527-01T	-
3-56	UNF	H2	0.090	0.092	1-13/16	10622-010	-	10622-01T	-
3-56	UNF	H3	0.090	0.092	1-13/16	10623-010	-	10623-01T	10623-016
3-56	UNF	H4	0.091	0.093	1-13/16	10624-010	-	10624-01T	10624-016
3-56	UNF	H5	0.091	0.093	1-13/16	10625-010	-	10625-01T	-
3-56	UNF	H6	0.092	0.094	1-13/16	10626-010	-	10626-01T	-
3-56	UNF	H7	0.092	0.094	1-13/16	10627-010	-	-	-
4-40	UNC	H2	0.099	0.101	1-7/8	10722-010	10722-01C	10722-01T	-
4-40	UNC	H3	0.099	0.102	1-7/8	10723-010	10723-01C	10723-01T	10723-016

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Forming Taps For Ferrous And Non-Ferrous Materials



Series BXB		BXB   Thredfloer   Bottoming							
Thread Size	Spec.	Thread Limit	Min Tap/ Drill Size	Max Tap/ Drill Size	OAL (L)	Bright	TiCN	TiN	Nitride Steam
4-40	UNC	H4	0.100	0.102	1-7/8	10724-010	10724-01C	10724-01T	10724-016
4-40	UNC	H5	0.100	0.103	1-7/8	10725-010	10725-01C	10725-01T	-
4-40	UNC	H6	0.101	0.103	1-7/8	10726-010	10726-01C	10726-01T	-
4-40	UNC	H7	0.101	0.104	1-7/8	10727-010	10727-01C	10727-01T	-
4-48	UNF	H2	0.101	0.103	1-7/8	10942-010	-	10942-01T	-
4-48	UNF	H3	0.102	0.104	1-7/8	10943-010	10943-01C	10943-01T	10943-016
4-48	UNF	H4	0.102	0.104	1-7/8	10944-010	10944-01C	10944-01T	10944-016
4-48	UNF	H5	0.103	0.105	1-7/8	10945-010	10945-01C	10945-01T	-
4-48	UNF	H6	0.103	0.105	1-7/8	10946-010	10946-01C	10946-01T	-
4-48	UNF	H7	0.104	0.106	1-7/8	10947-010	-	10947-01T	-
5-40	UNC	H2	0.112	0.114	1-15/16	11042-010	-	11042-01T	-
5-40	UNC	H3	0.112	0.115	1-15/16	11043-010	11043-01C	11043-01T	11043-016
5-40	UNC	H4	0.113	0.115	1-15/16	11044-010	11044-01C	11044-01T	11044-016
5-40	UNC	H5	0.113	0.116	1-15/16	11045-010	11045-01C	11045-01T	-
5-40	UNC	H6	0.114	0.116	1-15/16	11046-010	11046-01C	11046-01T	-
5-40	UNC	H7	0.114	0.117	1-15/16	11047-010	-	11047-01T	-
5-44	UNF	H2	0.113	0.115	1-15/16	11162-010	-	-	-
5-44	UNF	H3	0.114	0.116	1-15/16	11163-010	11163-01C	11163-01T	11163-016
5-44	UNF	H4	0.114	0.116	1-15/16	11164-010	-	11164-01T	11164-016
5-44	UNF	H5	0.115	0.117	1-15/16	11165-010	11165-01C	11165-01T	-
5-44	UNF	H6	0.115	0.117	1-15/16	11166-010	-	11166-01T	-
5-44	UNF	H7	0.116	0.118	1-15/16	11167-010	-	-	-
6-32	UNC	H2	0.121	0.124	2	11282-010	-	11282-01T	-
6-32	UNC	H3	0.122	0.125	2	11283-010	11283-01C	11283-01T	11283-016
6-32	UNC	H4	0.122	0.125	2	11284-010	11284-01C	11284-01T	-
6-32	UNC	H5	0.123	0.126	2	11285-010	11285-01C	11285-01T	11285-016
6-32	UNC	H6	0.123	0.126	2	11286-010	11286-01C	11286-01T	-
6-32	UNC	H7	0.124	0.127	2	11287-010	11287-01C	11287-01T	-
6-32	UNC	H8	0.124	0.127	2	11288-010	11288-01C	11288-01T	-
6-32	UNC	H9	0.125	0.128	2	11289-010	11289-01C	11289-01T	-
6-32	UNC	H10	0.125	0.128	2	11290-010	11290-01C	11290-01T	-
6-40	UNF	H2	0.125	0.127	2	11502-010	-	11502-01T	-
6-40	UNF	H3	0.125	0.128	2	11503-010	11503-01C	11503-01T	11503-016
6-40	UNF	H4	0.126	0.128	2	11504-010	11504-01C	11504-01T	11504-016
6-40	UNF	H5	0.126	0.129	2	11505-010	11505-01C	11505-01T	-
6-40	UNF	H6	0.127	0.129	2	11506-010	-	11506-01T	-
6-40	UNF	H7	0.127	0.130	2	11507-010	-	11507-01T	-
6-40	UNF	H8	0.128	0.130	2	11508-010	-	11508-01T	-
6-40	UNF	H9	0.128	0.131	2	11509-010	-	11509-01T	-
6-40	UNF	H10	0.129	0.131	2	11510-010	-	11510-01T	-
8-32	UNC	H2	0.147	0.150	2-1/8	11622-010	11622-01C	11622-01T	-
8-32	UNC	H3	0.148	0.151	2-1/8	11623-010	11623-01C	11623-01T	11623-016
8-32	UNC	H4	0.148	0.151	2-1/8	11624-010	11624-01C	11624-01T	-
8-32	UNC	H5	0.149	0.152	2-1/8	11625-010	11625-01C	11625-01T	11625-016
8-32	UNC	H6	0.149	0.152	2-1/8	11626-010	11626-01C	11626-01T	-
8-32	UNC	H7	0.150	0.153	2-1/8	11627-010	11627-01C	11627-01T	-
8-32	UNC	H8	0.150	0.153	2-1/8	11628-010	11628-01C	11628-01T	-
8-32	UNC	H9	0.151	0.154	2-1/8	11629-010	11629-01C	11629-01T	-
8-32	UNC	H10	0.151	0.154	2-1/8	11630-010	11630-01C	11630-01T	-
8-36	UNF	H2	0.149	0.152	2-1/8	11842-010	-	11842-01T	-
8-36	UNF	H3	0.150	0.153	2-1/8	11843-010	-	11843-01T	11843-016
8-36	UNF	H4	0.150	0.153	2-1/8	11844-010	11844-01C	11844-01T	11844-016
8-36	UNF	H5	0.151	0.154	2-1/8	11845-010	-	11845-01T	-
8-36	UNF	H6	0.151	0.154	2-1/8	11846-010	-	11846-01T	-
8-36	UNF	H7	0.152	0.155	2-1/8	11847-010	-	11847-01T	-
8-36	UNF	H8	0.152	0.155	2-1/8	11848-010	-	-	-
8-36	UNF	H9	0.153	0.156	2-1/8	11849-010	-	-	-
8-36	UNF	H10	0.153	0.156	2-1/8	11850-010	11850-01C	-	-
10-24	UNC	H2	0.167	0.171	2-3/8	11962-010	-	11962-01T	-
10-24	UNC	H3	0.168	0.172	2-3/8	11963-010	-	11963-01T	-
10-24	UNC	H4	0.168	0.172	2-3/8	11964-010	11964-01C	11964-01T	11964-016
10-24	UNC	H5	0.169	0.173	2-3/8	11965-010	11965-01C	11965-01T	-
10-24	UNC	H6	0.169	0.173	2-3/8	11966-010	11966-01C	11966-01T	11966-016
10-24	UNC	H7	0.170	0.174	2-3/8	11967-010	11967-01C	11967-01T	-
10-24	UNC	H8	0.170	0.174	2-3/8	11968-010	11968-01C	11968-01T	-
10-24	UNC	H9	0.171	0.175	2-3/8	11969-010	11969-01C	11969-01T	-
10-24	UNC	H10	0.171	0.175	2-3/8	11970-010	11970-01C	11970-01T	-
10-32	UNF	H2	0.173	0.176	2-3/8	12182-010	12182-01C	12182-01T	-
10-32	UNF	H3	0.174	0.177	2-3/8	12183-010	12183-01C	12183-01T	12183-016
10-32	UNF	H4	0.174	0.177	2-3/8	12184-010	12184-01C	12184-01T	-
10-32	UNF	H5	0.175	0.178	2-3/8	12185-010	12185-01C	12185-01T	12185-016
10-32	UNF	H6	0.175	0.178	2-3/8	12186-010	12186-01C	12186-01T	-
10-32	UNF	H7	0.176	0.179	2-3/8	12187-010	12187-01C	12187-01T	-
10-32	UNF	H8	0.176	0.179	2-3/8	12188-010	12188-01C	12188-01T	-
10-32	UNF	H9	0.177	0.180	2-3/8	12189-010	-	12189-01T	-
10-32	UNF	H10	0.177	0.180	2-3/8	12190-010	12190-01C	12190-01T	-

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# PERFORMANCE

Premium HSS Forming Taps For Ferrous And Non-Ferrous Materials



Series BXB		BXB   Thredfloor   Bottoming							
Thread Size	Spec.	Thread Limit	Min Tap/ Drill Size	Max Tap/ Drill Size	OAL (L)	Bright	TiCN	TiN	Nitride Steam
12-24	UNC	H2	0.193	0.197	2-3/8	12402-010	-	12402-01T	-
12-24	UNC	H3	0.194	0.198	2-3/8	12403-010	12403-01C	12403-01T	-
12-24	UNC	H4	0.194	0.198	2-3/8	12404-010	-	12404-01T	-
12-24	UNC	H5	0.195	0.199	2-3/8	12405-010	12405-01C	12405-01T	-
12-24	UNC	H6	0.195	0.199	2-3/8	12406-010	12406-01C	12406-01T	12406-016
12-24	UNC	H7	0.196	0.200	2-3/8	12407-010	-	12407-01T	-
12-24	UNC	H8	0.196	0.200	2-3/8	12408-010	-	12408-01T	-
12-24	UNC	H9	0.197	0.201	2-3/8	12409-010	-	12409-01T	-
12-24	UNC	H10	0.197	0.201	2-3/8	12410-010	12410-01C	12410-01T	-
12-28	UNF	H2	0.197	0.200	2-3/8	12522-010	-	-	-
12-28	UNF	H3	0.197	0.201	2-3/8	12523-010	-	12523-01T	-
12-28	UNF	H4	0.198	0.201	2-3/8	12524-010	-	12524-01T	-
12-28	UNF	H5	0.198	0.202	2-3/8	12525-010	-	12525-01T	-
12-28	UNF	H6	0.199	0.202	2-3/8	12526-010	-	12526-01T	12526-016
12-28	UNF	H7	0.199	0.203	2-3/8	12527-010	-	12527-01T	-
12-28	UNF	H8	0.200	0.203	2-3/8	12528-010	-	12528-01T	-
12-28	UNF	H9	0.200	0.204	2-3/8	12529-010	-	-	-
12-28	UNF	H10	0.201	0.204	2-3/8	12530-010	-	-	-
1/4-20	UNC	H2	0.223	0.228	2-1/2	12642-010	12642-01C	12642-01T	-
1/4-20	UNC	H3	0.223	0.228	2-1/2	12643-010	12643-01C	12643-01T	-
1/4-20	UNC	H4	0.224	0.229	2-1/2	12644-010	12644-01C	12644-01T	12644-016
1/4-20	UNC	H5	0.224	0.229	2-1/2	12645-010	12645-01C	12645-01T	-
1/4-20	UNC	H6	0.225	0.230	2-1/2	12646-010	12646-01C	12646-01T	-
1/4-20	UNC	H7	0.225	0.230	2-1/2	12647-010	12647-01C	12647-01T	12647-016
1/4-20	UNC	H8	0.226	0.231	2-1/2	12648-010	12648-01C	12648-01T	-
1/4-20	UNC	H9	0.226	0.231	2-1/2	12649-010	12649-01C	12649-01T	-
1/4-20	UNC	H10	0.227	0.232	2-1/2	12650-010	12650-01C	12650-01T	-
1/4-28	UNF	H2	0.231	0.234	2-1/2	12862-010	-	12862-01T	-
1/4-28	UNF	H3	0.231	0.235	2-1/2	12863-010	12863-01C	12863-01T	-
1/4-28	UNF	H4	0.232	0.235	2-1/2	12864-010	12864-01C	12864-01T	12864-016
1/4-28	UNF	H5	0.232	0.236	2-1/2	12865-010	12865-01C	12865-01T	-
1/4-28	UNF	H6	0.233	0.236	2-1/2	12866-010	12866-01C	12866-01T	12866-016
1/4-28	UNF	H7	0.233	0.237	2-1/2	12867-010	12867-01C	12867-01T	-
1/4-28	UNF	H8	0.234	0.237	2-1/2	12868-010	12868-01C	12868-01T	-
1/4-28	UNF	H9	0.234	0.238	2-1/2	12869-010	12869-01C	12869-01T	-
1/4-28	UNF	H10	0.235	0.238	2-1/2	12870-010	12870-01C	12870-01T	-
5/16-18	UNC	H2	0.282	0.287	2-23/32	13082-010	-	13082-01T	-
5/16-18	UNC	H3	0.282	0.288	2-23/32	13083-010	13083-01C	13083-01T	-
5/16-18	UNC	H4	0.283	0.288	2-23/32	13084-010	13084-01C	13084-01T	-
5/16-18	UNC	H5	0.283	0.289	2-23/32	13085-010	13085-01C	13085-01T	13085-016
5/16-18	UNC	H6	0.284	0.289	2-23/32	13086-010	13086-01C	13086-01T	-
5/16-18	UNC	H7	0.284	0.290	2-23/32	13087-010	13087-01C	13087-01T	-
5/16-18	UNC	H8	0.285	0.290	2-23/32	13088-010	13088-01C	13088-01T	13088-016
5/16-18	UNC	H9	0.285	0.291	2-23/32	13089-010	13089-01C	13089-01T	-
5/16-18	UNC	H10	0.286	0.291	2-23/32	13090-010	13090-01C	13090-01T	-
5/16-24	UNF	H2	0.290	0.294	2-23/32	13262-010	-	13262-01T	-
5/16-24	UNF	H3	0.290	0.294	2-23/32	13263-010	13263-01C	13263-01T	-
5/16-24	UNF	H4	0.291	0.295	2-23/32	13264-010	-	13264-01T	13264-016
5/16-24	UNF	H5	0.291	0.295	2-23/32	13265-010	13265-01C	13265-01T	-
5/16-24	UNF	H6	0.292	0.296	2-23/32	13266-010	13266-01C	13266-01T	-
5/16-24	UNF	H7	0.292	0.296	2-23/32	13267-010	13267-01C	13267-01T	13267-016
5/16-24	UNF	H8	0.293	0.297	2-23/32	13268-010	13268-01C	13268-01T	-
5/16-24	UNF	H9	0.293	0.297	2-23/32	13269-010	-	13269-01T	-
5/16-24	UNF	H10	0.294	0.298	2-23/32	13270-010	13270-01C	13270-01T	-
3/8-16	UNC	H4	0.341	0.348	2-15/16	13444-010	13444-01C	13444-01T	-
3/8-16	UNC	H5	0.342	0.348	2-15/16	13445-010	13445-01C	13445-01T	-
3/8-16	UNC	H6	0.342	0.349	2-15/16	13446-010	13446-01C	13446-01T	13446-016
3/8-16	UNC	H7	0.343	0.349	2-15/16	13447-010	13447-01C	13447-01T	-
3/8-16	UNC	H8	0.343	0.350	2-15/16	13448-010	13448-01C	13448-01T	13448-016
3/8-16	UNC	H9	0.344	0.350	2-15/16	13449-010	13449-01C	13449-01T	-
3/8-16	UNC	H10	0.344	0.351	2-15/16	13450-010	-	13450-01T	-
3/8-16	UNC	H11	0.345	0.351	2-15/16	13451-010	13451-01C	13451-01T	-
3/8-16	UNC	H12	0.345	0.352	2-15/16	13452-010	-	13452-01T	-
3/8-24	UNF	H4	0.353	0.357	2-15/16	13624-010	-	13624-01T	-
3/8-24	UNF	H5	0.354	0.358	2-15/16	13625-010	13625-01C	13625-01T	13625-016
3/8-24	UNF	H6	0.354	0.358	2-15/16	13626-010	13626-01C	13626-01T	-
3/8-24	UNF	H7	0.355	0.359	2-15/16	13627-010	13627-01C	13627-01T	13627-016
3/8-24	UNF	H8	0.355	0.359	2-15/16	13628-010	13628-01C	13628-01T	-
3/8-24	UNF	H9	0.356	0.360	2-15/16	13629-010	-	13629-01T	-
3/8-24	UNF	H10	0.356	0.360	2-15/16	13630-010	-	13630-01T	-
3/8-24	UNF	H11	0.357	0.361	2-15/16	13631-010	-	13631-01T	-
3/8-24	UNF	H12	0.357	0.361	2-15/16	13632-010	13632-01C	13632-01T	-
7/16-14	UNC	H4	0.399	0.406	3-5/32	13804-000	-	13804-00T	-
7/16-14	UNC	H5	0.399	0.406	3-5/32	13805-000	13805-00C	13805-00T	-
7/16-14	UNC	H6	0.400	0.407	3-5/32	13806-000	-	13806-00T	13806-006
7/16-14	UNC	H7	0.400	0.407	3-5/32	13807-000	-	13807-00T	-

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Series BXB		BXB   Thredfloor   Bottoming							
Thread Size	Spec.	Thread Limit	Min Tap/ Drill Size	Max Tap/ Drill Size	OAL (L)	Bright	TiCN	TiN	Nitride Steam
7/16-14	UNC	H8	0.401	0.408	3-5/32	13808-000	-	13808-00T	-
7/16-14	UNC	H9	0.401	0.408	3-5/32	13809-000	13809-00C	13809-00T	13809-006
7/16-14	UNC	H10	0.402	0.409	3-5/32	13810-000	13810-00C	13810-00T	-
7/16-14	UNC	H11	0.402	0.409	3-5/32	13811-000	13811-00C	13811-00T	-
7/16-14	UNC	H12	0.403	0.410	3-5/32	13812-000	-	13812-00T	-
7/16-20	UNF	H4	0.411	0.416	3-5/32	13924-000	13924-00C	13924-00T	-
7/16-20	UNF	H5	0.412	0.417	3-5/32	13925-000	13925-00C	13925-00T	13925-006
7/16-20	UNF	H6	0.412	0.417	3-5/32	13926-000	13926-00C	13926-00T	-
7/16-20	UNF	H7	0.413	0.418	3-5/32	13927-000	13927-00C	13927-00T	-
7/16-20	UNF	H8	0.413	0.418	3-5/32	13928-000	13928-00C	13928-00T	13928-006
7/16-20	UNF	H9	0.414	0.419	3-5/32	13929-000	13929-00C	13929-00T	-
7/16-20	UNF	H10	0.414	0.419	3-5/32	13930-000	-	13930-00T	-
7/16-20	UNF	H11	0.415	0.420	3-5/32	13931-000	-	13931-00T	-
7/16-20	UNF	H12	0.415	0.420	3-5/32	13932-000	-	13932-00T	-
1/2-13	UNC	H4	0.458	0.466	3-3/8	14044-000	-	14044-00T	-
1/2-13	UNC	H5	0.459	0.466	3-3/8	14045-000	14045-00C	14045-00T	-
1/2-13	UNC	H6	0.459	0.467	3-3/8	14046-000	-	14046-00T	-
1/2-13	UNC	H7	0.460	0.467	3-3/8	14047-000	-	14047-00T	14047-006
1/2-13	UNC	H8	0.460	0.468	3-3/8	14048-000	14048-00C	14048-00T	-
1/2-13	UNC	H9	0.461	0.468	3-3/8	14049-000	14049-00C	14049-00T	-
1/2-13	UNC	H10	0.461	0.469	3-3/8	14050-000	14050-00C	14050-00T	14050-006
1/2-13	UNC	H11	0.462	0.469	3-3/8	14051-000	14051-00C	14051-00T	-
1/2-13	UNC	H12	0.462	0.470	3-3/8	14052-000	14052-00C	14052-00T	-
1/2-20	UNF	H4	0.474	0.479	3-3/8	14164-000	-	-	-
1/2-20	UNF	H5	0.474	0.479	3-3/8	14165-000	-	14165-00T	-
1/2-20	UNF	H6	0.475	0.480	3-3/8	14166-000	14166-00C	14166-00T	-
1/2-20	UNF	H7	0.475	0.480	3-3/8	14167-000	-	14167-00T	-
1/2-20	UNF	H8	0.476	0.481	3-3/8	14168-000	-	14168-00T	14168-006
1/2-20	UNF	H9	0.476	0.481	3-3/8	14169-000	-	14169-00T	-
1/2-20	UNF	H10	0.477	0.482	3-3/8	14170-000	-	14170-00T	-
1/2-20	UNF	H11	0.477	0.482	3-3/8	14171-000	14171-00C	14171-00T	-
1/2-20	UNF	H12	0.478	0.483	3-3/8	14172-000	14172-00C	14172-00T	-
9/16-12	UNC	H4	0.517	0.525	3-19/32	14284-000	-	-	-
9/16-12	UNC	H5	0.518	0.526	3-19/32	14285-000	-	14285-00T	-
9/16-12	UNC	H6	0.518	0.526	3-19/32	14286-000	-	14286-00T	-
9/16-12	UNC	H7	0.519	0.527	3-19/32	14287-000	-	-	-
9/16-12	UNC	H8	0.519	0.527	3-19/32	14288-000	-	14288-00T	-
9/16-12	UNC	H9	0.520	0.528	3-19/32	14289-000	-	-	-
9/16-12	UNC	H10	0.520	0.528	3-19/32	14290-000	-	14290-00T	-
9/16-12	UNC	H11	0.521	0.529	3-19/32	14291-000	-	-	-
9/16-12	UNC	H12	0.521	0.529	3-19/32	14292-000	-	-	-
9/16-18	UNF	H4	0.533	0.538	3-19/32	14404-000	-	14404-00T	-
9/16-18	UNF	H5	0.533	0.539	3-19/32	14405-000	-	14405-00T	-
9/16-18	UNF	H6	0.534	0.539	3-19/32	14406-000	-	14406-00T	-
9/16-18	UNF	H7	0.534	0.540	3-19/32	14407-000	14407-00C	14407-00T	-
9/16-18	UNF	H8	0.535	0.540	3-19/32	14408-000	14408-00C	14408-00T	14408-006
9/16-18	UNF	H9	0.535	0.541	3-19/32	14409-000	-	14409-00T	-
9/16-18	UNF	H10	0.536	0.541	3-19/32	14410-000	-	14410-00T	-
9/16-18	UNF	H11	0.536	0.542	3-19/32	14411-000	-	-	-
9/16-18	UNF	H12	0.537	0.542	3-19/32	14412-000	-	14412-00T	-
5/8-11	UNC	H4	0.575	0.584	3-13/16	14524-000	-	-	-
5/8-11	UNC	H5	0.576	0.585	3-13/16	14525-000	-	14525-00T	-
5/8-11	UNC	H6	0.576	0.585	3-13/16	14526-000	-	14526-00T	-
5/8-11	UNC	H7	0.577	0.586	3-13/16	14527-000	-	14527-00T	-
5/8-11	UNC	H8	0.577	0.586	3-13/16	14528-000	14528-00C	14528-00T	14528-006
5/8-11	UNC	H9	0.578	0.587	3-13/16	14529-000	-	14529-00T	-
5/8-11	UNC	H10	0.578	0.587	3-13/16	14530-000	14530-00C	14530-00T	-
5/8-11	UNC	H11	0.579	0.588	3-13/16	14531-000	14531-00C	14531-00T	14531-006
5/8-11	UNC	H12	0.579	0.588	3-13/16	14532-000	-	14532-00T	-
5/8-18	UNF	H4	0.595	0.601	3-13/16	14644-000	14644-00C	14644-00T	-
5/8-18	UNF	H5	0.596	0.601	3-13/16	14645-000	14645-00C	14645-00T	-
5/8-18	UNF	H6	0.596	0.602	3-13/16	14646-000	14646-00C	14646-00T	-
5/8-18	UNF	H7	0.597	0.602	3-13/16	14647-000	-	14647-00T	-
5/8-18	UNF	H8	0.597	0.603	3-13/16	14648-000	-	14648-00T	-
5/8-18	UNF	H9	0.598	0.603	3-13/16	14649-000	14649-00C	14649-00T	14649-006
5/8-18	UNF	H10	0.598	0.604	3-13/16	14650-000	14650-00C	14650-00T	-
5/8-18	UNF	H11	0.599	0.604	3-13/16	14651-000	-	14651-00T	-
5/8-18	UNF	H12	0.599	0.605	3-13/16	14652-000	-	-	-
3/4-10	UNC	H6	0.696	0.706	4-1/4	14766-000	14766-00C	14766-00T	-
3/4-10	UNC	H7	0.697	0.707	4-1/4	14767-000	-	14767-00T	-
3/4-10	UNC	H8	0.697	0.707	4-1/4	14768-000	-	14768-00T	-
3/4-10	UNC	H9	0.698	0.708	4-1/4	14769-000	-	14769-00T	-
3/4-10	UNC	H10	0.698	0.708	4-1/4	14770-000	14770-00C	14770-00T	-
3/4-10	UNC	H11	0.699	0.709	4-1/4	14771-000	-	14771-00T	-
3/4-10	UNC	H12	0.699	0.709	4-1/4	14772-000	14772-00C	14772-00T	-

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# PERFORMANCE

Premium HSS Forming Taps For Ferrous And Non-Ferrous Materials



Series BXB		BXB   Thredfloer   Bottoming							
Thread Size	Spec.	Thread Limit	Min Tap/ Drill Size	Max Tap/ Drill Size	OAL (L)	Bright	TiCN	TiN	Nitride Steam
3/4-10	UNC	H13	0.700	0.710	4-1/4	14773-000	-	14773-00T	-
3/4-10	UNC	H14	0.700	0.710	4-1/4	14774-000	-	-	-
3/4-16	UNF	H6	0.717	0.724	4-1/4	14886-000	-	14886-00T	-
3/4-16	UNF	H7	0.718	0.724	4-1/4	14887-000	-	-	-
3/4-16	UNF	H8	0.718	0.725	4-1/4	14888-000	-	14888-00T	-
3/4-16	UNF	H9	0.719	0.725	4-1/4	14889-000	-	14889-00T	-
3/4-16	UNF	H10	0.719	0.726	4-1/4	14890-000	-	14890-00T	14890-006
3/4-16	UNF	H11	0.720	0.726	4-1/4	14891-000	-	14891-00T	-
3/4-16	UNF	H12	0.720	0.727	4-1/4	14892-000	-	-	-
3/4-16	UNF	H13	0.721	0.727	4-1/4	14893-000	-	14893-00T	-
3/4-16	UNF	H14	0.721	0.728	4-1/4	14894-000	-	-	-
7/8-9	UNC	H6	0.815	0.826	4-11/16	15006-000	-	15006-00T	-
7/8-9	UNC	H7	0.815	0.826	4-11/16	15007-000	-	15007-00T	-
7/8-9	UNC	H8	0.816	0.827	4-11/16	15008-000	-	-	-
7/8-9	UNC	H9	0.816	0.827	4-11/16	15009-000	-	15009-00T	15009-006
7/8-9	UNC	H10	0.817	0.828	4-11/16	15010-000	-	15010-00T	-
7/8-9	UNC	H11	0.817	0.828	4-11/16	15011-000	15011-00C	15011-00T	-
7/8-9	UNC	H12	0.818	0.829	4-11/16	15012-000	-	-	-
7/8-9	UNC	H13	0.818	0.829	4-11/16	15013-000	-	15013-00T	-
7/8-9	UNC	H14	0.819	0.830	4-11/16	15014-000	-	-	-
7/8-14	UNF	H6	0.837	0.844	4-11/16	15126-000	15126-00C	15126-00T	-
7/8-14	UNF	H7	0.838	0.845	4-11/16	15127-000	-	-	-
7/8-14	UNF	H8	0.838	0.845	4-11/16	15128-000	-	-	-
7/8-14	UNF	H9	0.839	0.846	4-11/16	15129-000	15129-00C	15129-00T	-
7/8-14	UNF	H10	0.839	0.846	4-11/16	15130-000	-	15130-00T	-
7/8-14	UNF	H11	0.840	0.847	4-11/16	15131-000	-	15131-00T	-
7/8-14	UNF	H12	0.840	0.847	4-11/16	15132-000	-	-	-
7/8-14	UNF	H13	0.841	0.848	4-11/16	15133-000	-	-	-
7/8-14	UNF	H14	0.841	0.848	4-11/16	15134-000	-	-	-
1" -8	UNC	H6	0.932	0.944	5-1/8	15246-000	-	15246-00T	-
1" -8	UNC	H7	0.932	0.945	5-1/8	15247-000	-	-	-
1" -8	UNC	H8	0.933	0.945	5-1/8	15248-000	-	-	-
1" -8	UNC	H9	0.933	0.946	5-1/8	15249-000	-	15249-00T	-
1" -8	UNC	H10	0.934	0.946	5-1/8	15250-000	-	15250-00T	-
1" -8	UNC	H11	0.934	0.947	5-1/8	15251-000	-	-	-
1" -8	UNC	H12	0.935	0.947	5-1/8	15252-000	-	15252-00T	-
1" -8	UNC	H13	0.935	0.948	5-1/8	15253-000	-	15253-00T	-
1" -8	UNC	H14	0.936	0.948	5-1/8	15254-000	15254-00C	-	-
1" -12	UNF	H6	0.956	0.964	5-1/8	15366-000	-	-	-
1" -12	UNF	H7	0.956	0.964	5-1/8	15367-000	-	-	-
1" -12	UNF	H8	0.957	0.965	5-1/8	15368-000	-	-	-
1" -12	UNF	H9	0.957	0.965	5-1/8	15369-000	-	15369-00T	-
1" -12	UNF	H10	0.958	0.966	5-1/8	15370-000	-	-	-
1" -12	UNF	H11	0.958	0.966	5-1/8	15371-000	-	-	-
1" -12	UNF	H12	0.959	0.967	5-1/8	15372-000	-	-	-
1" -12	UNF	H13	0.959	0.967	5-1/8	15373-000	-	-	-
1" -12	UNF	H14	0.960	0.968	5-1/8	15374-000	-	-	-
M1.6 x 0.35	M	D3	0.057	0.058	-	17003-010	17003-01C	17003-01T	17003-016
M1.6 x 0.35	M	D5	0.058	0.059	-	17005-010	17005-01C	17005-01T	17005-016
M1.6 x 0.35	M	D7	0.059	0.060	-	17007-010	-	17007-01T	-
M1.7 x 0.35	M	D3	0.061	0.062	-	17143-010	-	17143-01T	-
M1.7 x 0.35	M	D5	0.062	0.063	-	17145-010	17145-01C	17145-01T	17145-016
M1.7 x 0.35	M	D7	0.063	0.064	-	17147-010	-	17147-01T	-
M2 x 0.4	M	D3	0.071	0.073	-	17283-010	17283-01C	17283-01T	17283-016
M2 x 0.4	M	D5	0.072	0.074	-	17285-010	17285-01C	17285-01T	17285-016
M2 x 0.4	M	D7	0.073	0.075	-	17287-010	17287-01C	17287-01T	-
M2.5 x 0.45	M	D3	0.090	0.092	-	17423-010	17423-01C	17423-01T	17423-016
M2.5 x 0.45	M	D6	0.091	0.093	-	17426-010	17426-01C	17426-01T	17426-016
M2.5 x 0.45	M	D8	0.092	0.094	-	17428-010	-	17428-01T	17428-016
M2.6 x 0.45	M	D3	0.094	0.096	-	17513-010	-	17513-01T	17513-016
M2.6 x 0.45	M	D6	0.095	0.097	-	17516-010	17516-01C	17516-01T	-
M3 x 0.5	M	D3	0.108	0.110	-	17563-010	17563-01C	17563-01T	17563-016
M3 x 0.5	M	D6	0.110	0.112	-	17566-010	17566-01C	17566-01T	17566-016
M3 x 0.5	M	D8	0.111	0.113	-	17568-010	17568-01C	17568-01T	17568-016
M3.5 x 0.6	M	D4	0.126	0.129	-	17744-010	17744-01C	17744-01T	17744-016
M3.5 x 0.6	M	D7	0.128	0.130	-	17747-010	17747-01C	17747-01T	17747-016
M3.5 x 0.6	M	D9	0.129	0.131	-	17749-010	-	17749-01T	-
M4 x 0.7	M	D4	0.144	0.147	-	17944-010	17944-01C	17944-01T	17944-016
M4 x 0.7	M	D7	0.145	0.148	-	17947-010	17947-01C	17947-01T	17947-016
M4 x 0.7	M	D9	0.146	0.149	-	17949-010	17949-01C	17949-01T	17949-016
M5 x 0.8	M	D4	0.181	0.184	-	18144-010	18144-01C	18144-01T	18144-016
M5 x 0.8	M	D8	0.183	0.186	-	18148-010	18148-01C	18148-01T	18148-016
M5 x 0.8	M	D10	0.184	0.187	-	18150-010	18150-01C	18150-01T	18150-016
M6 x 1.0	M	D5	0.216	0.220	-	18345-010	18345-01C	18345-01T	18345-016
M6 x 1.0	M	D9	0.218	0.222	-	18349-010	18349-01C	18349-01T	18349-016
M6 x 1.0	M	D11	0.219	0.223	-	18351-010	18351-01C	18351-01T	18351-016

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# PERFORMANCE

Premium HSS Forming Taps For Ferrous And Non-Ferrous Materials



Series BXB		BXB   Thredfloer   Bottoming							
Thread Size	Spec.	Thread Limit	Min Tap/ Drill Size	Max Tap/ Drill Size	OAL (L)	Bright	TiCN	TiN	Nitride Steam
M8 x 1.25	M	D5	0.289	0.294	-	18545-010	18545-01C	18545-01T	18545-016
M8 x 1.25	M	D10	0.292	0.297	-	18550-010	18550-01C	18550-01T	18550-016
M8 x 1.25	M	D12	0.293	0.298	-	18562-010	18562-01C	18562-01T	18562-016
M10 X 1.0	MF	H9	0.376	0.380	-	19429-010	19429-01C	19429-01T	-
M10 X 1.25	MF	H10	0.371	0.376	-	19450-010	19450-01C	19450-01T	19450-016
M10 x 1.5	M	D6	0.363	0.369	-	18746-010	18746-01C	18746-01T	18746-016
M10 x 1.5	M	D11	0.366	0.372	-	18751-010	18751-01C	18751-01T	18751-016
M10 x 1.5	M	D13	0.367	0.373	-	18753-010	18753-01C	18753-01T	-
M12 x 1.75	M	D6	0.436	0.443	-	18946-000	18946-00C	18946-00T	18946-006
M12 x 1.75	M	D12	0.439	0.446	-	18952-000	18952-00C	18952-00T	18952-006
M14 x 1.5	MF	D6	0.521	0.526	-	19106-000	19106-00C	19106-00T	-
M14 x 1.5	MF	D11	0.523	0.529	-	19111-000	19111-00C	19111-00T	19111-006
M14 x 2	M	D7	0.510	0.518	-	19147-000	-	19147-00T	-
M14 x 2	M	D14	0.513	0.521	-	19154-000	19154-00C	19154-00T	19154-006
M16 x 1.5	MF	D6	0.599	0.605	-	19226-000	-	19226-00T	-
M16 x 1.5	MF	D11	0.602	0.608	-	19231-000	-	19231-00T	-
M16 x 2	M	D7	0.589	0.596	-	19267-000	-	19267-00T	-
M16 x 2	M	D14	0.592	0.600	-	19274-000	19274-00C	19274-00T	19274-006
M18 x 1.5	MF	D6	0.678	0.684	-	19306-000	-	19306-00T	-
M18 x 1.5	MF	D11	0.681	0.686	-	19331-000	19331-00C	19331-00T	-

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# PERFORMANCE

Premium HSS Forming Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>1-1.5P, Cold Forming</b> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Forming tap eliminates chips by displacing material to create threads</li> <li>ANSI tap blank dimensions</li> </ul>	 	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	○	○	○	○	○

● Best ○ Good

## Series BXOTL BXOTL | Thredfloor | One Thread Lead

Thread Size	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	Bright	TiCN	TiN	Super TiN	Bal-Plus
0-80	H2	0.0539	0.0552	10032-010	10032-01C	10032-01T	10032-01U	-
0-80	H3	0.0544	0.0557	10033-010	10033-01C	10033-01T	10033-01U	-
1-72	H2	0.065	0.067	10272-010	-	10272-01T	-	-
1-72	H3	0.066	0.067	10273-010	10273-01C	10273-01T	10273-01U	-
2-56	H2	0.077	0.079	10332-010	10332-01C	10332-01T	-	-
2-56	H3	0.077	0.079	10333-010	10333-01C	10333-01T	10333-01U	-
2-56	H4	0.078	0.080	10334-010	10334-01C	10334-01T	-	-
4-40	H5	0.100	0.103	10762-010	10762-81C	-	10762-81U	10762-81L
4-40	H3	0.099	0.102	10763-010	10763-01C	10763-01T	10763-01U	-
4-40	H4	0.100	0.102	10764-010	-	10764-01T	10764-01U	-
4-40	H5	0.100	0.103	10765-010	10765-01C	10765-01T	10765-01U	-
6-32	H5	0.123	0.126	11322-010	11322-81C	-	11322-81U	11322-81L
6-32	H3	0.122	0.125	11323-010	11323-01C	11323-01T	11323-01U	-
6-32	H4	0.122	0.125	11324-010	11324-01C	11324-01T	11324-01U	-
6-32	H5	0.123	0.126	11325-010	11325-01C	11325-01T	11325-01U	-
8-32	H5	0.149	0.152	11662-010	11662-81C	-	11662-81U	11662-81L
8-32	H3	0.148	0.151	11663-010	11663-01C	11663-01T	11663-01U	-
8-32	H4	0.148	0.151	11664-010	11664-01C	11664-01T	11664-01U	-
8-32	H5	0.149	0.152	11665-010	11665-01C	11665-01T	11665-01U	-
10-24	H5	0.169	0.173	12002-010	12002-91C	-	12002-91U	12002-91L
10-24	H3	0.168	0.172	12003-010	-	12003-01T	12003-01U	-
10-24	H4	0.168	0.172	12004-010	-	12004-01T	12004-01U	-
10-24	H5	0.169	0.173	12005-010	-	12005-01T	12005-01U	-
10-32	H5	0.175	0.178	12222-010	12222-91C	-	12222-91U	12222-91L
10-32	H3	0.174	0.177	12223-010	12223-01C	12223-01T	12223-01U	-
10-32	H4	0.174	0.177	12224-010	12224-01C	12224-01T	12224-01U	-
10-32	H5	0.175	0.178	12225-010	12225-01C	12225-01T	12225-01U	-
1/4-20	H8	0.226	0.231	12682-010	12682-91C	12682-01T	12682-91U	12682-91L
1/4-20	H5	0.224	0.229	12685-010	12685-01C	12685-01T	12685-01U	-
1/4-20	H6	0.225	0.230	12686-010	12686-01C	12686-01T	12686-01U	-
1/4-20	H7	0.225	0.230	12687-010	-	12687-01T	12687-01U	-
1/4-20	H8	0.226	0.231	12688-010	12688-01C	12688-01T	12688-01U	-
1/4-28	H7	0.233	0.237	12902-010	12902-91C	-	12902-91U	12902-91L
1/4-28	H4	0.232	0.235	12904-010	-	12904-01T	-	-
1/4-28	H5	0.232	0.236	12905-010	-	12905-01T	12905-01U	-
1/4-28	H6	0.233	0.236	12906-010	-	12906-01T	12906-01U	-
1/4-28	H7	0.233	0.237	12907-010	12907-01C	12907-01T	12907-01U	-
5/16-18	H9	0.285	0.291	13122-010	13122-91C	-	13122-91U	13122-91L
5/16-18	H6	0.284	0.289	13126-010	13126-01C	13126-01T	13126-01U	-
5/16-18	H7	0.284	0.290	13127-010	13127-01C	13127-01T	13127-01U	-
5/16-18	H8	0.285	0.290	13128-010	-	13128-01T	13128-01U	-
5/16-18	H9	0.285	0.291	13129-010	13129-01C	13129-01T	13129-01U	-
5/16-24	H5	0.291	0.295	13305-010	-	13305-01T	13305-01U	-
5/16-24	H6	0.292	0.296	13306-010	-	13306-01T	-	-

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Premium HSS Forming Taps For Ferrous And Non-Ferrous Materials



Series BXOTL		BXOTL   Thredfloor   One Thread Lead						
Thread Size	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	Bright	TiCN	TiN	Super TiN	Bal-Plus
5/16-24	H7	0.292	0.296	<b>13307-010</b>	-	13307-01T	13307-01U	-
5/16-24	H8	0.293	0.297	<b>13308-010</b>	-	13308-01T	13308-01U	-
3/8-16	H9	0.344	0.350	<b>13482-010</b>	<b>13482-91C</b>	13482-01T	13482-91U	<b>13482-91L</b>
3/8-16	H6	0.342	0.349	<b>13486-010</b>	<b>13486-01C</b>	13486-01T	13486-01U	-
3/8-16	H7	0.343	0.349	<b>13487-010</b>	<b>13487-01C</b>	13487-01T	13487-01U	-
3/8-16	H8	0.343	0.350	<b>13488-010</b>	<b>13488-01C</b>	13488-01T	13488-01U	-
3/8-16	H9	0.344	0.350	<b>13489-010</b>	-	13489-01T	13489-01U	-
3/8-24	H5	0.354	0.358	<b>13665-010</b>	<b>13665-01C</b>	13665-01T	13665-01U	-
3/8-24	H6	0.354	0.358	<b>13666-010</b>	-	-	-	-
3/8-24	H7	0.355	0.359	<b>13667-010</b>	-	13667-01T	13667-01U	-
3/8-24	H8	0.355	0.359	<b>13668-010</b>	<b>13668-01C</b>	13668-01T	13668-01U	-
M2 x 0.4	D3	0.071	0.073	<b>17353-010</b>	-	17353-01T	17353-01U	-
M2 x 0.4	D5	0.072	0.074	<b>17355-010</b>	-	17355-01T	-	-
M2.5 x 0.45	D3	0.090	0.092	<b>17493-010</b>	<b>17493-01C</b>	17493-01T	17493-01U	-
M2.5 x 0.45	D6	0.091	0.093	<b>17496-010</b>	-	17496-01T	17496-01U	-
M3 x 0.5	D3	0.108	0.110	<b>17583-010</b>	<b>17583-01C</b>	17583-01T	17583-01U	-
M3 x 0.5	D6	0.110	0.112	<b>17586-010</b>	<b>17586-01C</b>	17586-01T	17586-81U	<b>17586-81L</b>
M3.5 x 0.6	D4	0.126	0.129	<b>17784-010</b>	<b>17784-01C</b>	-	17784-01U	-
M3.5 x 0.6	D7	0.128	0.130	<b>17787-010</b>	<b>17787-81C</b>	17787-01T	17787-81U	<b>17787-81L</b>
M4 x 0.7	D4	0.144	0.147	<b>17984-010</b>	<b>17984-01C</b>	17984-01T	17984-01U	-
M4 x 0.7	D7	0.145	0.148	<b>17987-010</b>	<b>17987-81C</b>	17987-01T	17987-81U	<b>17987-81L</b>
M5 x 0.8	D4	0.181	0.184	<b>18184-010</b>	<b>18184-01C</b>	18184-01T	-	-
M5 x 0.8	D8	0.183	0.186	<b>18188-010</b>	<b>18188-01C</b>	18188-01T	18188-01U	<b>18188-91L</b>
M6 x 1.0	D5	0.216	0.220	<b>18385-010</b>	<b>18385-01C</b>	18385-01T	18385-01U	-
M6 x 1.0	D9	0.218	0.222	<b>18389-010</b>	<b>18389-91C</b>	18389-01T	18389-91U	<b>18389-91L</b>
M8 x 1.25	D5	0.289	0.294	<b>18585-010</b>	<b>18585-01C</b>	18585-01T	18585-01U	-
M8 x 1.25	D10	0.292	0.297	<b>18590-010</b>	<b>18590-91C</b>	18590-01T	18590-91U	<b>18590-91L</b>
M10 x 1.5	D6	0.363	0.369	<b>18786-010</b>	<b>18786-01C</b>	18786-01T	-	-
M10 x 1.5	D11	0.366	0.372	<b>18791-010</b>	<b>18791-91C</b>	18791-01T	18791-91U	<b>18791-91L</b>
M12 x 1.75	D6	0.436	0.443	<b>18986-000</b>	<b>18986-00C</b>	18986-00T	-	-
M12 x 1.75	D12	0.439	0.446	<b>18992-000</b>	<b>18992-90C</b>	18992-00T	18992-90U	<b>18992-90L</b>

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Premium HSS STI Forming Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>STI, Cold Forming</b> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Forming tap eliminates chips by displacing material to create threads</li> <li>Screw thread insert(STI) tap for helicoil threads</li> <li>Spiral flute tap for blind holes</li> <li>ANSI tap blank dimensions</li> </ul>	 	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	○	○	○	○	○

● Best ○ Good

## Series BXSTI | BXSTI | Thredfloor | Screw Thread Insert

Thread Size	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	Bright	TiCN	TiN	Super TiN
2-56	H2	0.100	0.102	10322-010	10322-01C	10322-01T	10322-01U
2-56	H3	0.101	0.102	10323-010	10323-01C	10323-01T	10323-01U
4-40	H2	0.131	0.134	10842-010	10842-01C	10842-01T	10842-01U
4-40	H3	0.132	0.134	10843-010	10843-01C	10843-01T	10843-01U
6-32	H2	0.162	0.165	11402-010	11402-01C	11402-01T	11402-01U
6-32	H3	0.162	0.165	11403-010	11403-01C	11403-01T	11403-01U
8-32	H2	0.188	0.191	11742-010	11742-01C	11742-01T	11742-01U
8-32	H3	0.188	0.191	11743-010	11743-01C	11743-01T	11743-01U
8-32	H4	0.189	0.192	11744-010	11744-01C	11744-01T	11744-01U
10-24	H2	0.221	0.226	12082-010	-	-	-
10-24	H3	0.222	0.226	12083-010	12083-01C	12083-01T	12083-01U
10-24	H4	0.222	0.227	12084-010	-	12084-01T	12084-01U
10-32	H2	0.214	0.217	12302-010	12302-01C	12302-01T	12302-01U
10-32	H3	0.214	0.217	12303-010	12303-01C	12303-01T	12303-01U
10-32	H4	0.215	0.218	12304-010	12304-01C	12304-01T	12304-01U
1/4-20	H2	0.288	0.293	12762-010	-	12762-01T	12762-01U
1/4-20	H3	0.288	0.293	12763-010	12763-01C	12763-01T	12763-01U
1/4-20	H4	0.289	0.294	12764-010	12764-01C	12764-01T	12764-01U
1/4-28	H2	0.277	0.281	12982-010	12982-01C	12982-01T	-
1/4-28	H3	0.278	0.281	12983-010	12983-01C	12983-01T	12983-01U
1/4-28	H4	0.278	0.282	12984-010	12984-01C	12984-01T	12984-01U
5/16-18	H3	0.355	0.360	13183-000	-	13183-00T	13183-00U
5/16-18	H4	0.355	0.361	13184-000	-	13184-00T	13184-00U
5/16-18	H5	0.356	0.361	13185-000	13185-00C	13185-00T	13185-00U
3/8-16	H3	0.422	0.428	13543-000	13543-00C	13543-00T	13543-00U
3/8-16	H4	0.423	0.429	13544-000	-	-	-
3/8-16	H5	0.423	0.429	13545-000	-	13545-00T	13545-00U
M2 x 0.4	D2	0.091	0.093	17342-010	-	17342-01T	-
M2 x 0.4	D3	0.092	0.093	17343-010	-	17343-01T	17343-01U
M2.5 x 0.45	D2	0.112	0.114	17482-010	-	17482-01T	-
M2.5 x 0.45	D3	0.113	0.115	17483-010	17483-01C	17483-01T	17483-01U
M3 x 0.5	D2	0.133	0.135	17662-010	17662-01C	17662-01T	17662-01U
M3 x 0.5	D3	0.134	0.136	17663-010	-	17663-01T	17663-01U
M3.5 x 0.6	D3	0.156	0.159	17863-010	-	-	-
M3.5 x 0.6	D4	0.157	0.159	17864-010	-	-	-
M4 x 0.7	D3	0.179	0.182	18063-010	-	18063-01T	18063-01U
M4 x 0.7	D4	0.180	0.182	18064-010	-	18064-01T	18064-01U
M5 x 0.8	D3	0.221	0.224	18263-010	-	18263-01T	18263-01U
M5 x 0.8	D4	0.222	0.225	18264-010	18264-01C	18264-01T	18264-01U
M6 x 1.0	D4	0.267	0.271	18464-010	-	18464-01T	18464-01U
M6 x 1.0	D5	0.267	0.271	18465-010	-	18465-01T	18465-01U
M8 x 1.25	D5	0.353	0.358	18665-010	-	18665-01T	18665-01U
M8 x 1.25	D6	0.354	0.359	18666-010	-	18666-01T	18666-01U

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS In-Line Forming Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Stub In-Line, Cold Forming</b> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Forming tap eliminates chips by displacing material to create threads</li> <li>Bottoming style taps for sheet metal in-line tapping devices</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	○	○	○	○	○

● Best ○ Good

## Series BXIL BXIL | Thredfloor | In-Line Stub

Thread Size	Specification	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	OAL (L)	Bright	TiCN	TiN
2-56	UNC	H3	0.077	0.079	.850	10343-000	10343-00C	10343-00T
4-40	UNC	H5	0.100	0.103	.850	10865-000	10865-00C	10865-00T
6-32	UNC	H5	0.123	0.126	.850	11425-000	11425-00C	11425-00T
8-32	UNC	H5	0.149	0.152	.850	11765-000	11765-00C	11765-00T
10-24	UNC	H7	0.170	0.174	.850	12107-000	12107-00C	12107-00T
10-32	UNF	H5	0.175	0.178	.850	12325-000	12325-00C	12325-00T
1/4-20	UNC	H6	0.225	0.230	.930	12786-000	12786-00C	12786-00T
1/4-28	UNF	H7	0.233	0.237	.930	13007-000	13007-00C	-
M2 x 0.4	M	D5	0.072	0.074	-	17365-000	17365-00C	17365-00T
M2.5 x 0.45	M	D5	.091	.093	-	17505-000	17505-00C	17505-00T
M3 x 0.5	M	D5	.109	.111	-	17685-000	17685-00C	17685-00T
M3 x 0.5	M	D6	0.110	0.112	-	17686-000	17686-00C	17686-00T
M3.5 x 0.6	M	D6	.128	.130	-	17886-000	-	17886-00T
M4 x 0.7	M	D6	.145	.148	-	18086-000	18086-00C	18086-00T
M4 x 0.7	M	D7	0.145	0.148	-	18087-000	18087-00C	18087-00T
M5 x 0.8	M	D7	.183	.186	-	18287-000	18287-00C	18287-00T
M5 x 0.8	M	D8	0.183	0.186	-	18288-000	18288-00C	18288-00T
M6 x 1.0	M	D8	.218	.222	-	18488-000	18488-00C	18488-00T
M6 x 1.0	M	D9	0.218	0.222	-	18489-000	18489-00C	18489-00T

\*bold numbers are EDPs for ordering

# PERFORMANCE

Premium HSS Extended Forming Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Extended Length, Cold Forming</b> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Forming tap eliminates chips by displacing material to create threads</li> <li>Extended length (3" OAL)</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	○	○	○	○	○

● Best ○ Good

## Series BX3 BX3 | Thredfloer | 3" OAL

Thread Size	Specification	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	OAL (L)	Bright	TiCN	TiN
2-56	UNC	H2	0.077	0.079	3	<b>10362-010</b>	-	-
2-56	UNC	H3	0.077	0.079	3	<b>10363-010</b>	10363-01C	10363-01T
4-40	UNC	H3	0.099	0.102	3	<b>10783-010</b>	10783-01C	10783-01T
4-40	UNC	H4	0.100	0.102	3	<b>10784-010</b>	10784-01C	10784-01T
4-40	UNC	H5	0.100	0.103	3	<b>10785-010</b>	10785-01C	10785-01T
6-32	UNC	H3	0.122	0.125	3	<b>11343-010</b>	11343-01C	11343-01T
6-32	UNC	H4	0.122	0.125	3	<b>11344-010</b>	-	11344-01T
6-32	UNC	H5	0.123	0.126	3	<b>11345-010</b>	11345-01C	11345-01T
6-32	UNC	H6	0.123	0.126	3	<b>11346-010</b>	-	11346-01T
8-32	UNC	H3	0.148	0.151	3	<b>11683-010</b>	11683-01C	11683-01T
8-32	UNC	H4	0.148	0.151	3	<b>11684-010</b>	-	11684-01T
8-32	UNC	H5	0.149	0.152	3	<b>11685-010</b>	11685-01C	11685-01T
8-32	UNC	H6	0.149	0.152	3	<b>11686-010</b>	-	-
M3 x 0.5	M	D3	0.108	0.110	-	<b>17593-010</b>	-	17593-01T
M3 x 0.5	M	D6	0.110	0.112	-	<b>17596-010</b>	17596-01C	17596-01T
M3.5 x 0.6	M	D4	0.126	0.129	-	<b>17794-010</b>	-	-
M3.5 x 0.6	M	D7	0.128	0.130	-	<b>17797-010</b>	-	-
M4 x 0.7	M	D4	0.144	0.147	-	<b>17994-010</b>	17994-01C	17994-01T
M4 x 0.7	M	D7	0.145	0.148	-	<b>17997-010</b>	17997-01C	17997-01T

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# PERFORMANCE

Premium HSS Extended Forming Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Extended Length, Cold Forming</b></p> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Forming tap eliminates chips by displacing material to create threads</li> <li>Extended length (4" OAL)</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	○	○	○	○	○

● Best ○ Good

**Series BX4** BX4 | Thredfloer | 4" OAL

Thread Size	Specification	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	OAL (L)	Bright	TiCN	TiN
2-56	UNC	H2	0.077	0.079	4	10372-010	10372-01C	-
2-56	UNC	H3	0.077	0.079	4	10373-010	-	10373-01T
4-40	UNC	H3	0.099	0.102	4	10803-010	-	10803-01T
4-40	UNC	H4	0.100	0.102	4	10804-010	10804-01C	10804-01T
4-40	UNC	H5	0.100	0.103	4	10805-010	10805-01C	10805-01T
6-32	UNC	H3	0.122	0.125	4	11363-010	-	11363-01T
6-32	UNC	H4	0.122	0.125	4	11364-010	-	11364-01T
6-32	UNC	H5	0.123	0.126	4	11365-010	11365-01C	11365-01T
6-32	UNC	H6	0.123	0.126	4	11366-010	11366-01C	11366-01T
8-32	UNC	H3	0.148	0.151	4	11703-010	-	11703-01T
8-32	UNC	H4	0.148	0.151	4	11704-010	-	-
8-32	UNC	H5	0.149	0.152	4	11705-010	11705-01C	11705-01T
8-32	UNC	H6	0.149	0.152	4	11706-010	11706-01C	11706-01T
10-24	UNC	H3	0.168	0.172	4	12023-010	-	12023-01T
10-24	UNC	H4	0.168	0.172	4	12024-010	-	-
10-24	UNC	H5	0.169	0.173	4	12025-010	12025-01C	12025-01T
10-24	UNC	H6	0.169	0.173	4	12026-010	12026-01C	12026-01T
10-24	UNC	H7	0.170	0.174	4	12027-010	-	-
10-32	UNF	H3	0.174	0.177	4	12243-010	12243-01C	12243-01T
10-32	UNF	H4	0.174	0.177	4	12244-010	-	12244-01T
10-32	UNF	H5	0.175	0.178	4	12245-010	12245-01C	12245-01T
10-32	UNF	H6	0.175	0.178	4	12246-010	12246-01C	12246-01T
1/4-20	UNC	H5	0.224	0.229	4	12705-010	12705-01C	12705-01T
1/4-20	UNC	H6	0.225	0.230	4	12706-010	12706-01C	12706-01T
1/4-20	UNC	H7	0.225	0.230	4	12707-010	12707-01C	12707-01T
1/4-20	UNC	H8	0.226	0.231	4	12708-010	-	12708-01T
1/4-28	UNF	H4	0.232	0.235	4	12924-010	-	-
1/4-28	UNF	H5	0.232	0.236	4	12925-010	12925-01C	12925-01T
1/4-28	UNF	H6	0.233	0.236	4	12926-010	-	12926-01T
1/4-28	UNF	H7	0.233	0.237	4	12927-010	-	12927-01T
5/16-18	UNC	H5	0.283	0.289	4	13145-010	-	13145-01T
5/16-18	UNC	H6	0.284	0.289	4	13146-010	-	13146-01T
5/16-18	UNC	H7	0.284	0.290	4	13147-010	-	13147-01T
5/16-18	UNC	H8	0.285	0.290	4	13148-010	-	13148-01T
5/16-18	UNC	H9	0.285	0.291	4	13149-010	-	13149-01T
5/16-24	UNF	H4	0.291	0.295	4	13324-010	-	13324-01T
5/16-24	UNF	H5	0.291	0.295	4	13325-010	13325-01C	13325-01T
5/16-24	UNF	H6	0.292	0.296	4	13326-010	13326-01C	13326-01T
5/16-24	UNF	H7	0.292	0.296	4	13327-010	13327-01C	13327-01T
5/16-24	UNF	H8	0.293	0.297	4	13328-010	-	-
3/8-16	UNC	H5	0.342	0.348	4	13505-010	13505-01C	13505-01T
3/8-16	UNC	H6	0.342	0.349	4	13506-010	-	13506-01T
3/8-16	UNC	H7	0.343	0.349	4	13507-010	-	13507-01T
3/8-16	UNC	H8	0.343	0.350	4	13508-010	-	13508-01T

\*bold numbers are EDPs for ordering

# PERFORMANCE

Premium HSS Extended Forming Taps For Ferrous And Non-Ferrous Materials



Series BX4		BX4   Thredfloor   4"OAL							
Thread Size	Specification	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	OAL (L)	Bright	TiCN	TiN	
3/8-16	UNC	H9	0.344	0.350	4	<b>13509-010</b>	<b>13509-01C</b>	<b>13509-01T</b>	
3/8-24	UNF	H4	0.353	0.357	4	<b>13684-010</b>	-	-	
3/8-24	UNF	H5	0.354	0.358	4	<b>13685-010</b>	-	<b>13685-01T</b>	
3/8-24	UNF	H6	0.354	0.358	4	<b>13686-010</b>	-	<b>13686-01T</b>	
3/8-24	UNF	H7	0.355	0.359	4	<b>13687-010</b>	-	<b>13687-01T</b>	
3/8-24	UNF	H8	0.355	0.359	4	<b>13688-010</b>	-	<b>13688-01T</b>	
M3 x 0.5	M	D3	0.108	0.110	-	<b>17603-010</b>	-	-	
M3 x 0.5	M	D6	0.110	0.112	-	<b>17606-010</b>	<b>17606-01C</b>	<b>17606-01T</b>	
M3.5 x 0.6	M	D4	0.126	0.129	-	<b>17804-010</b>	-	-	
M3.5 x 0.6	M	D7	0.128	0.130	-	<b>17807-010</b>	-	-	
M4 x 0.7	M	D4	0.144	0.147	-	<b>18004-010</b>	<b>18004-01C</b>	<b>18004-01T</b>	
M4 x 0.7	M	D7	0.145	0.148	-	<b>18007-010</b>	<b>18007-01C</b>	<b>18007-01T</b>	
M5 x 0.8	M	D4	0.181	0.184	-	<b>18204-010</b>	<b>18204-01C</b>	<b>18204-01T</b>	
M5 x 0.8	M	D8	0.183	0.186	-	<b>18208-010</b>	<b>18208-01C</b>	<b>18208-01T</b>	
M6 x 1.0	M	D5	0.216	0.220	-	<b>18405-010</b>	<b>18405-01C</b>	<b>18405-01T</b>	
M6 x 1.0	M	D9	0.218	0.222	-	<b>18409-010</b>	<b>18409-01C</b>	<b>18409-01T</b>	
M8 x 1.25	M	D5	0.289	0.294	-	<b>18595-010</b>	<b>18595-01C</b>	<b>18595-01T</b>	
M8 x 1.25	M	D10	0.292	0.297	-	<b>18600-010</b>	<b>18600-01C</b>	<b>18600-01T</b>	
M10 x 1.5	M	D6	0.363	0.369	-	<b>18796-010</b>	<b>18796-01C</b>	<b>18796-01T</b>	
M10 x 1.5	M	D11	0.366	0.372	-	<b>18801-010</b>	-	<b>18801-01T</b>	
M12 x 1.75	M	D6	0.436	0.443	-	<b>18996-000</b>	<b>18996-00C</b>	<b>18996-00T</b>	
M12 x 1.75	M	D12	0.439	0.446	-	<b>19002-000</b>	-	<b>19002-00T</b>	

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Forming Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>4-4.5P, Cold Forming</b> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Forming tap eliminates chips by displacing material to create threads</li> <li>ANSI tap blank dimensions</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	○	○	○	○	○

● Best ○ Good

## Series BXP BXP | Thredfloor | Plug

Thread Size	Spec.	Thread Limit	Min Tap/ Drill Size	Max Tap/ Drill Size	OAL (L)	Bright	TiCN	TiN	Nitride Steam	Super TiN
4-40	UNC	H2	0.099	0.101	1-7/8	10742-000	-	10742-00T	-	-
4-40	UNC	H3	0.099	0.102	1-7/8	10743-000	10743-00C	10743-00T	10743-006	10743-00U
4-40	UNC	H4	0.100	0.102	1-7/8	10744-000	10744-00C	10744-00T	10744-006	10744-00U
4-40	UNC	H5	0.100	0.103	1-7/8	10745-000	10745-00C	10745-00T	-	10745-00U
4-40	UNC	H6	0.101	0.103	1-7/8	10746-000	-	10746-00T	-	-
4-40	UNC	H7	0.101	0.104	1-7/8	10747-000	-	10747-00T	-	10747-00U
5-40	UNC	H2	0.112	0.114	1-15/16	11062-000	-	11062-00T	-	-
5-40	UNC	H3	0.112	0.115	1-15/16	11063-000	-	11063-00T	-	-
5-40	UNC	H4	0.113	0.115	1-15/16	11064-000	-	11064-00T	11064-006	-
5-40	UNC	H5	0.113	0.116	1-15/16	11065-000	11065-00C	11065-00T	-	-
5-40	UNC	H6	0.114	0.116	1-15/16	11066-000	-	11066-00T	-	11066-00U
5-40	UNC	H7	0.114	0.117	1-15/16	11067-000	11067-00C	11067-00T	-	-
6-32	UNC	H2	0.121	0.124	2	11302-000	11302-00C	11302-00T	-	-
6-32	UNC	H3	0.122	0.125	2	11303-000	11303-00C	11303-00T	11303-006	11303-00U
6-32	UNC	H4	0.122	0.125	2	11304-000	-	11304-00T	-	11304-00U
6-32	UNC	H5	0.123	0.126	2	11305-000	11305-00C	11305-00T	11305-006	11305-00U
6-32	UNC	H6	0.123	0.126	2	11306-000	11306-00C	11306-00T	-	11306-00U
6-32	UNC	H7	0.124	0.127	2	11307-000	11307-00C	11307-00T	-	-
6-32	UNC	H8	0.124	0.127	2	11308-000	11308-00C	11308-00T	-	11308-00U
6-32	UNC	H9	0.125	0.128	2	11309-000	-	11309-00T	-	-
6-32	UNC	H10	0.125	0.128	2	11310-000	11310-00C	11310-00T	-	-
6-40	UNF	H2	0.125	0.127	2	11522-000	-	11522-00T	-	-
6-40	UNF	H3	0.125	0.128	2	11523-000	11523-00C	11523-00T	-	-
6-40	UNF	H4	0.126	0.128	2	11524-000	-	11524-00T	11524-006	-
6-40	UNF	H5	0.126	0.129	2	11525-000	-	11525-00T	-	11525-00U
6-40	UNF	H6	0.127	0.129	2	11526-000	-	11526-00T	-	-
6-40	UNF	H7	0.127	0.130	2	11527-000	-	11527-00T	-	-
6-40	UNF	H8	0.128	0.130	2	11528-000	-	-	-	-
6-40	UNF	H9	0.128	0.131	2	11529-000	-	11529-00T	-	-
6-40	UNF	H10	0.129	0.131	2	11530-000	-	11530-00T	-	-
8-32	UNC	H2	0.147	0.150	2-1/8	11642-000	11642-00C	11642-00T	-	11642-00U
8-32	UNC	H3	0.148	0.151	2-1/8	11643-000	11643-00C	11643-00T	11643-006	11643-00U
8-32	UNC	H4	0.148	0.151	2-1/8	11644-000	11644-00C	11644-00T	-	11644-00U
8-32	UNC	H5	0.149	0.152	2-1/8	11645-000	11645-00C	11645-00T	11645-006	11645-00U
8-32	UNC	H6	0.149	0.152	2-1/8	11646-000	11646-00C	11646-00T	-	11646-00U
8-32	UNC	H7	0.150	0.153	2-1/8	11647-000	11647-00C	11647-00T	-	11647-00U
8-32	UNC	H8	0.150	0.153	2-1/8	11648-000	-	11648-00T	-	-
8-32	UNC	H9	0.151	0.154	2-1/8	11649-000	11649-00C	11649-00T	-	11649-00U
8-32	UNC	H10	0.151	0.154	2-1/8	11650-000	11650-00C	11650-00T	-	-
8-36	UNF	H2	0.149	0.152	2-1/8	11862-000	-	-	-	-
8-36	UNF	H3	0.150	0.153	2-1/8	11863-000	-	11863-00T	11863-006	11863-00U
8-36	UNF	H4	0.150	0.153	2-1/8	11864-000	-	11864-00T	11864-006	-
8-36	UNF	H5	0.151	0.154	2-1/8	11865-000	-	11865-00T	-	11865-00U
8-36	UNF	H6	0.151	0.154	2-1/8	11866-000	-	11866-00T	-	-

\*bold numbers are EDPs for ordering

# PERFORMANCE

Premium HSS Forming Taps For Ferrous And Non-Ferrous Materials



Series BXP		BXP   Thredfloor   Plug								
Thread Size	Spec.	Thread Limit	Min Tap/ Drill Size	Max Tap/ Drill Size	OAL (L)	Bright	TiCN	TiN	Nitride Steam	Super TiN
8-36	UNF	H7	0.152	0.155	2-1/8	<b>11867-000</b>	-	<b>11867-00T</b>	-	-
8-36	UNF	H8	0.152	0.155	2-1/8	<b>11868-000</b>	-	-	-	-
8-36	UNF	H9	0.153	0.156	2-1/8	<b>11869-000</b>	-	-	-	-
8-36	UNF	H10	0.153	0.156	2-1/8	<b>11870-000</b>	<b>11870-00C</b>	-	-	-
10-24	UNC	H2	0.167	0.171	2-3/8	<b>11982-000</b>	-	<b>11982-00T</b>	-	-
10-24	UNC	H3	0.168	0.172	2-3/8	<b>11983-000</b>	-	<b>11983-00T</b>	-	<b>11983-00U</b>
10-24	UNC	H4	0.168	0.172	2-3/8	<b>11984-000</b>	<b>11984-00C</b>	<b>11984-00T</b>	-	<b>11984-00U</b>
10-24	UNC	H5	0.169	0.173	2-3/8	<b>11985-000</b>	<b>11985-00C</b>	<b>11985-00T</b>	-	<b>11985-00U</b>
10-24	UNC	H6	0.169	0.173	2-3/8	<b>11986-000</b>	<b>11986-00C</b>	<b>11986-00T</b>	<b>11986-006</b>	<b>11986-00U</b>
10-24	UNC	H7	0.170	0.174	2-3/8	<b>11987-000</b>	<b>11987-00C</b>	<b>11987-00T</b>	-	-
10-24	UNC	H8	0.170	0.174	2-3/8	<b>11988-000</b>	-	<b>11988-00T</b>	-	-
10-24	UNC	H9	0.171	0.175	2-3/8	<b>11989-000</b>	-	<b>11989-00T</b>	-	-
10-24	UNC	H10	0.171	0.175	2-3/8	<b>11990-000</b>	<b>11990-00C</b>	<b>11990-00T</b>	-	-
10-32	UNF	H2	0.173	0.176	2-3/8	<b>12202-000</b>	<b>12202-00C</b>	<b>12202-00T</b>	-	<b>12202-00U</b>
10-32	UNF	H3	0.174	0.177	2-3/8	<b>12203-000</b>	<b>12203-00C</b>	<b>12203-00T</b>	<b>12203-006</b>	<b>12203-00U</b>
10-32	UNF	H4	0.174	0.177	2-3/8	<b>12204-000</b>	<b>12204-00C</b>	<b>12204-00T</b>	-	<b>12204-00U</b>
10-32	UNF	H5	0.175	0.178	2-3/8	<b>12205-000</b>	<b>12205-00C</b>	<b>12205-00T</b>	<b>12205-006</b>	<b>12205-00U</b>
10-32	UNF	H6	0.175	0.178	2-3/8	<b>12206-000</b>	<b>12206-00C</b>	<b>12206-00T</b>	-	<b>12206-00U</b>
10-32	UNF	H7	0.176	0.179	2-3/8	<b>12207-000</b>	<b>12207-00C</b>	<b>12207-00T</b>	-	-
10-32	UNF	H8	0.176	0.179	2-3/8	<b>12208-000</b>	<b>12208-00C</b>	<b>12208-00T</b>	-	<b>12208-00U</b>
10-32	UNF	H9	0.177	0.180	2-3/8	<b>12209-000</b>	<b>12209-00C</b>	<b>12209-00T</b>	-	<b>12209-00U</b>
10-32	UNF	H10	0.177	0.180	2-3/8	<b>12210-000</b>	-	<b>12210-00T</b>	-	<b>12210-00U</b>
12-24	UNC	H2	0.193	0.197	2-3/8	<b>12422-000</b>	-	<b>12422-00T</b>	-	-
12-24	UNC	H3	0.194	0.198	2-3/8	<b>12423-000</b>	-	<b>12423-00T</b>	-	-
12-24	UNC	H4	0.194	0.198	2-3/8	<b>12424-000</b>	<b>12424-00C</b>	<b>12424-00T</b>	-	-
12-24	UNC	H5	0.195	0.199	2-3/8	<b>12425-000</b>	<b>12425-00C</b>	<b>12425-00T</b>	-	-
12-24	UNC	H6	0.195	0.199	2-3/8	<b>12426-000</b>	<b>12426-00C</b>	<b>12426-00T</b>	<b>12426-006</b>	<b>12426-00U</b>
12-24	UNC	H7	0.196	0.200	2-3/8	<b>12427-000</b>	<b>12427-00C</b>	<b>12427-00T</b>	-	-
12-24	UNC	H8	0.196	0.200	2-3/8	<b>12428-000</b>	-	-	-	-
12-24	UNC	H9	0.197	0.201	2-3/8	<b>12429-000</b>	-	<b>12429-00T</b>	-	<b>12429-00U</b>
12-24	UNC	H10	0.197	0.201	2-3/8	<b>12430-000</b>	<b>12430-00C</b>	<b>12430-00T</b>	-	-
12-28	UNF	H2	0.197	0.200	2-3/8	<b>12542-000</b>	-	<b>12542-00T</b>	-	-
12-28	UNF	H3	0.197	0.201	2-3/8	<b>12543-000</b>	-	<b>12543-00T</b>	-	-
12-28	UNF	H4	0.198	0.201	2-3/8	<b>12544-000</b>	-	-	-	-
12-28	UNF	H5	0.198	0.202	2-3/8	<b>12545-000</b>	-	<b>12545-00T</b>	-	<b>12545-00U</b>
12-28	UNF	H6	0.199	0.202	2-3/8	<b>12546-000</b>	-	<b>12546-00T</b>	<b>12546-006</b>	-
12-28	UNF	H7	0.199	0.203	2-3/8	<b>12547-000</b>	-	-	-	-
12-28	UNF	H8	0.200	0.203	2-3/8	<b>12548-000</b>	-	-	-	-
12-28	UNF	H9	0.200	0.204	2-3/8	<b>12549-000</b>	-	-	-	-
12-28	UNF	H10	0.201	0.204	2-3/8	<b>12550-000</b>	<b>12550-00C</b>	<b>12550-00T</b>	-	-
1/4-20	UNC	H2	0.223	0.228	2-1/2	<b>12662-000</b>	<b>12662-00C</b>	<b>12662-00T</b>	-	-
1/4-20	UNC	H3	0.223	0.228	2-1/2	<b>12663-000</b>	-	<b>12663-00T</b>	-	<b>12663-00U</b>
1/4-20	UNC	H4	0.224	0.229	2-1/2	<b>12664-000</b>	<b>12664-00C</b>	<b>12664-00T</b>	<b>12664-006</b>	<b>12664-00U</b>
1/4-20	UNC	H5	0.224	0.229	2-1/2	<b>12665-000</b>	<b>12665-00C</b>	<b>12665-00T</b>	-	<b>12665-00U</b>
1/4-20	UNC	H6	0.225	0.230	2-1/2	<b>12666-000</b>	<b>12666-00C</b>	<b>12666-00T</b>	-	<b>12666-00U</b>
1/4-20	UNC	H7	0.225	0.230	2-1/2	<b>12667-000</b>	<b>12667-00C</b>	<b>12667-00T</b>	<b>12667-006</b>	<b>12667-00U</b>
1/4-20	UNC	H8	0.226	0.231	2-1/2	<b>12668-000</b>	-	<b>12668-00T</b>	-	<b>12668-00U</b>
1/4-20	UNC	H9	0.226	0.231	2-1/2	<b>12669-000</b>	<b>12669-00C</b>	<b>12669-00T</b>	-	<b>12669-00U</b>
1/4-20	UNC	H10	0.227	0.232	2-1/2	<b>12670-000</b>	<b>12670-00C</b>	<b>12670-00T</b>	-	-
1/4-28	UNF	H2	0.231	0.234	2-1/2	<b>12882-000</b>	-	<b>12882-00T</b>	-	-
1/4-28	UNF	H3	0.231	0.235	2-1/2	<b>12883-000</b>	-	<b>12883-00T</b>	-	-
1/4-28	UNF	H4	0.232	0.235	2-1/2	<b>12884-000</b>	-	<b>12884-00T</b>	<b>12884-006</b>	<b>12884-00U</b>
1/4-28	UNF	H5	0.232	0.236	2-1/2	<b>12885-000</b>	<b>12885-00C</b>	<b>12885-00T</b>	-	<b>12885-00U</b>
1/4-28	UNF	H6	0.233	0.236	2-1/2	<b>12886-000</b>	<b>12886-00C</b>	<b>12886-00T</b>	<b>12886-006</b>	<b>12886-00U</b>
1/4-28	UNF	H7	0.233	0.237	2-1/2	<b>12887-000</b>	<b>12887-00C</b>	<b>12887-00T</b>	-	<b>12887-00U</b>
1/4-28	UNF	H8	0.234	0.237	2-1/2	<b>12888-000</b>	<b>12888-00C</b>	<b>12888-00T</b>	-	<b>12888-00U</b>
1/4-28	UNF	H9	0.234	0.238	2-1/2	<b>12889-000</b>	<b>12889-00C</b>	<b>12889-00T</b>	-	<b>12889-00U</b>
1/4-28	UNF	H10	0.235	0.238	2-1/2	<b>12890-000</b>	-	<b>12890-00T</b>	-	<b>12890-00U</b>
5/16-18	UNC	H2	0.282	0.287	2-23/32	<b>13102-000</b>	-	<b>13102-00T</b>	-	-
5/16-18	UNC	H3	0.282	0.288	2-23/32	<b>13103-000</b>	-	<b>13103-00T</b>	-	-
5/16-18	UNC	H4	0.283	0.288	2-23/32	<b>13104-000</b>	-	<b>13104-00T</b>	-	-
5/16-18	UNC	H5	0.283	0.289	2-23/32	<b>13105-000</b>	<b>13105-00C</b>	<b>13105-00T</b>	<b>13105-006</b>	<b>13105-00U</b>
5/16-18	UNC	H6	0.284	0.289	2-23/32	<b>13106-000</b>	<b>13106-00C</b>	<b>13106-00T</b>	-	<b>13106-00U</b>
5/16-18	UNC	H7	0.284	0.290	2-23/32	<b>13107-000</b>	<b>13107-00C</b>	<b>13107-00T</b>	-	<b>13107-00U</b>
5/16-18	UNC	H8	0.285	0.290	2-23/32	<b>13108-000</b>	<b>13108-00C</b>	<b>13108-00T</b>	<b>13108-006</b>	<b>13108-00U</b>
5/16-18	UNC	H9	0.285	0.291	2-23/32	<b>13109-000</b>	<b>13109-00C</b>	<b>13109-00T</b>	-	<b>13109-00U</b>
5/16-18	UNC	H10	0.286	0.291	2-23/32	<b>13110-000</b>	-	<b>13110-00T</b>	-	-
5/16-24	UNF	H2	0.290	0.294	2-23/32	<b>13282-000</b>	-	<b>13282-00T</b>	-	-
5/16-24	UNF	H3	0.290	0.294	2-23/32	<b>13283-000</b>	-	<b>13283-00T</b>	-	<b>13283-00U</b>
5/16-24	UNF	H4	0.291	0.295	2-23/32	<b>13284-000</b>	<b>13284-00C</b>	<b>13284-00T</b>	-	-
5/16-24	UNF	H5	0.291	0.295	2-23/32	<b>13285-000</b>	<b>13285-00C</b>	<b>13285-00T</b>	-	<b>13285-00U</b>
5/16-24	UNF	H6	0.292	0.296	2-23/32	<b>13286-000</b>	-	<b>13286-00T</b>	-	<b>13286-00U</b>
5/16-24	UNF	H7	0.292	0.296	2-23/32	<b>13287-000</b>	-	<b>13287-00T</b>	-	<b>13287-00U</b>
5/16-24	UNF	H8	0.293	0.297	2-23/32	<b>13288-000</b>	<b>13288-00C</b>	<b>13288-00T</b>	-	<b>13288-00U</b>
5/16-24	UNF	H9	0.293	0.297	2-23/32	<b>13289-000</b>	-	<b>13289-00T</b>	-	-
5/16-24	UNF	H10	0.294	0.298	2-23/32	<b>13290-000</b>	-	<b>13290-00T</b>	-	-

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Forming Taps For Ferrous And Non-Ferrous Materials



Series BXP		BXP   Thredfloor   Plug								
Thread Size	Spec.	Thread Limit	Min Tap/ Drill Size	Max Tap/ Drill Size	OAL (L)	Bright	TiCN	TiN	Nitride Steam	Super TiN
3/8-16	UNC	H4	0.341	0.348	2-15/16	13464-000	-	13464-00T	-	13464-00U
3/8-16	UNC	H5	0.342	0.348	2-15/16	13465-000	13465-00C	13465-00T	-	13465-00U
3/8-16	UNC	H6	0.342	0.349	2-15/16	13466-000	13466-00C	13466-00T	13466-006	-
3/8-16	UNC	H7	0.343	0.349	2-15/16	13467-000	13467-00C	13467-00T	-	13467-00U
3/8-16	UNC	H8	0.343	0.350	2-15/16	13468-000	13468-00C	13468-00T	13468-006	13468-00U
3/8-16	UNC	H9	0.344	0.350	2-15/16	13469-000	13469-00C	13469-00T	-	13469-00U
3/8-16	UNC	H10	0.344	0.351	2-15/16	13470-000	-	13470-00T	-	13470-00U
3/8-16	UNC	H11	0.345	0.351	2-15/16	13471-000	13471-00C	13471-00T	-	-
3/8-16	UNC	H12	0.345	0.352	2-15/16	13472-000	-	13472-00T	-	13472-00U
3/8-24	UNF	H4	0.353	0.357	2-15/16	13644-000	-	13644-00T	-	13644-00U
3/8-24	UNF	H5	0.354	0.358	2-15/16	13645-000	13645-00C	13645-00T	13645-006	13645-00U
3/8-24	UNF	H6	0.354	0.358	2-15/16	13646-000	13646-00C	13646-00T	-	-
3/8-24	UNF	H7	0.355	0.359	2-15/16	13647-000	-	13647-00T	13647-006	13647-00U
3/8-24	UNF	H8	0.355	0.359	2-15/16	13648-000	-	13648-00T	-	13648-00U
3/8-24	UNF	H9	0.356	0.360	2-15/16	13649-000	-	13649-00T	-	-
3/8-24	UNF	H10	0.356	0.360	2-15/16	13650-000	-	13650-00T	-	-
3/8-24	UNF	H11	0.357	0.361	2-15/16	13651-000	-	13651-00T	-	-
3/8-24	UNF	H12	0.357	0.361	2-15/16	13652-000	13652-00C	13652-00T	-	-
7/16-14	UNC	H4	0.399	0.406	3-5/32	13824-000	-	13824-00T	-	-
7/16-14	UNC	H5	0.399	0.406	3-5/32	13825-000	13825-00C	13825-00T	-	13825-00U
7/16-14	UNC	H6	0.400	0.407	3-5/32	13826-000	-	-	-	-
7/16-14	UNC	H7	0.400	0.407	3-5/32	13827-000	-	13827-00T	-	-
7/16-14	UNC	H8	0.401	0.408	3-5/32	13828-000	13828-00C	13828-00T	-	-
7/16-14	UNC	H9	0.401	0.408	3-5/32	13829-000	-	13829-00T	-	-
7/16-14	UNC	H10	0.402	0.409	3-5/32	13830-000	13830-00C	13830-00T	-	-
7/16-14	UNC	H11	0.402	0.409	3-5/32	13831-000	-	13831-00T	-	-
7/16-14	UNC	H12	0.403	0.410	3-5/32	13832-000	-	13832-00T	-	-
7/16-20	UNF	H4	0.411	0.416	3-5/32	13944-000	-	13944-00T	-	-
7/16-20	UNF	H5	0.412	0.417	3-5/32	13945-000	-	13945-00T	13945-006	13945-00U
7/16-20	UNF	H6	0.412	0.417	3-5/32	13946-000	13946-00C	13946-00T	-	-
7/16-20	UNF	H7	0.413	0.418	3-5/32	13947-000	13947-00C	13947-00T	-	13947-00U
7/16-20	UNF	H8	0.413	0.418	3-5/32	13948-000	13948-00C	13948-00T	13948-006	13948-00U
7/16-20	UNF	H9	0.414	0.419	3-5/32	13949-000	-	13949-00T	-	-
7/16-20	UNF	H10	0.414	0.419	3-5/32	13950-000	13950-00C	13950-00T	-	13950-00U
7/16-20	UNF	H11	0.415	0.420	3-5/32	13951-000	13951-00C	13951-00T	-	13951-00U
7/16-20	UNF	H12	0.415	0.420	3-5/32	13952-000	13952-00C	13952-00T	-	-
1/2-13	UNC	H4	0.458	0.466	3-3/8	14064-000	-	14064-00T	-	-
1/2-13	UNC	H5	0.459	0.466	3-3/8	14065-000	14065-00C	14065-00T	-	14065-00U
1/2-13	UNC	H6	0.459	0.467	3-3/8	14066-000	-	14066-00T	-	-
1/2-13	UNC	H7	0.460	0.467	3-3/8	14067-000	-	14067-00T	14067-006	14067-00U
1/2-13	UNC	H8	0.460	0.468	3-3/8	14068-000	-	14068-00T	-	14068-00U
1/2-13	UNC	H9	0.461	0.468	3-3/8	14069-000	14069-00C	14069-00T	-	14069-00U
1/2-13	UNC	H10	0.461	0.469	3-3/8	14070-000	-	14070-00T	14070-006	14070-00U
1/2-13	UNC	H11	0.462	0.469	3-3/8	14071-000	-	14071-00T	-	-
1/2-13	UNC	H12	0.462	0.470	3-3/8	14072-000	-	14072-00T	-	-
1/2-20	UNF	H4	0.474	0.479	3-3/8	14184-000	-	14184-00T	-	-
1/2-20	UNF	H5	0.474	0.479	3-3/8	14185-000	-	14185-00T	-	14185-00U
1/2-20	UNF	H6	0.475	0.480	3-3/8	14186-000	14186-00C	14186-00T	-	-
1/2-20	UNF	H7	0.475	0.480	3-3/8	14187-000	-	14187-00T	-	-
1/2-20	UNF	H8	0.476	0.481	3-3/8	14188-000	-	14188-00T	14188-006	14188-00U
1/2-20	UNF	H9	0.476	0.481	3-3/8	14189-000	-	14189-00T	-	-
1/2-20	UNF	H10	0.477	0.482	3-3/8	14190-000	14190-00C	14190-00T	-	-
1/2-20	UNF	H11	0.477	0.482	3-3/8	14191-000	-	-	-	-
1/2-20	UNF	H12	0.478	0.483	3-3/8	14192-000	-	-	-	-
9/16-12	UNC	H4	0.517	0.525	3-19/32	14304-000	-	-	-	-
9/16-12	UNC	H5	0.518	0.526	3-19/32	14305-000	-	-	-	-
9/16-12	UNC	H6	0.518	0.526	3-19/32	14306-000	-	-	-	-
9/16-12	UNC	H7	0.519	0.527	3-19/32	14307-000	-	-	-	-
9/16-12	UNC	H8	0.519	0.527	3-19/32	14308-000	-	14308-00T	-	-
9/16-12	UNC	H9	0.520	0.528	3-19/32	14309-000	-	-	-	-
9/16-12	UNC	H10	0.520	0.528	3-19/32	14310-000	-	-	-	-
9/16-12	UNC	H11	0.521	0.529	3-19/32	14311-000	-	-	-	-
9/16-12	UNC	H12	0.521	0.529	3-19/32	14312-000	-	-	-	-
9/16-18	UNF	H4	0.533	0.538	3-19/32	14424-000	-	14424-00T	-	-
9/16-18	UNF	H5	0.533	0.539	3-19/32	14425-000	-	14425-00T	-	-
9/16-18	UNF	H6	0.534	0.539	3-19/32	14426-000	-	-	-	-
9/16-18	UNF	H7	0.534	0.540	3-19/32	14427-000	14427-00C	14427-00T	-	-
9/16-18	UNF	H8	0.535	0.540	3-19/32	14428-000	-	14428-00T	14428-006	-
9/16-18	UNF	H9	0.535	0.541	3-19/32	14429-000	-	-	-	14429-00U
9/16-18	UNF	H10	0.536	0.541	3-19/32	14430-000	-	14430-00T	-	-
9/16-18	UNF	H11	0.536	0.542	3-19/32	14431-000	-	-	-	-
9/16-18	UNF	H12	0.537	0.542	3-19/32	14432-000	-	-	-	-
5/8-11	UNC	H4	0.575	0.584	3-13/16	14544-000	14544-00C	14544-00T	-	-
5/8-11	UNC	H5	0.576	0.585	3-13/16	14545-000	-	14545-00T	-	14545-00U
5/8-11	UNC	H6	0.576	0.585	3-13/16	14546-000	-	14546-00T	-	-
5/8-11	UNC	H7	0.577	0.586	3-13/16	14547-000	-	14547-00T	-	14547-00U

\*bold numbers are EDPs for ordering

# PERFORMANCE

Premium HSS Forming Taps For Ferrous And Non-Ferrous Materials



Series BXP		BXP   Thredfloer   Plug								
Thread Size	Spec.	Thread Limit	Min Tap/ Drill Size	Max Tap/ Drill Size	OAL (L)	Bright	TiCN	TiN	Nitride Steam	Super TiN
5/8-11	UNC	H8	0.577	0.586	3-13/16	14548-000	14548-00C	14548-00T	-	-
5/8-11	UNC	H9	0.578	0.587	3-13/16	14549-000	-	14549-00T	-	-
5/8-11	UNC	H10	0.578	0.587	3-13/16	14550-000	-	14550-00T	-	-
5/8-11	UNC	H11	0.579	0.588	3-13/16	14551-000	-	14551-00T	14551-006	14551-00U
5/8-11	UNC	H12	0.579	0.588	3-13/16	14552-000	-	14552-00T	-	-
5/8-18	UNF	H4	0.595	0.601	3-13/16	14664-000	14664-00C	-	-	-
5/8-18	UNF	H5	0.596	0.601	3-13/16	14665-000	14665-00C	14665-00T	-	-
5/8-18	UNF	H6	0.596	0.602	3-13/16	14666-000	14666-00C	-	14666-006	-
5/8-18	UNF	H7	0.597	0.602	3-13/16	14667-000	14667-00C	14667-00T	-	-
5/8-18	UNF	H8	0.597	0.603	3-13/16	14668-000	-	14668-00T	-	-
5/8-18	UNF	H9	0.598	0.603	3-13/16	14669-000	-	14669-00T	14669-006	14669-00U
5/8-18	UNF	H10	0.598	0.604	3-13/16	14670-000	14670-00C	14670-00T	-	14670-00U
5/8-18	UNF	H11	0.599	0.604	3-13/16	14671-000	-	14671-00T	-	-
5/8-18	UNF	H12	0.599	0.605	3-13/16	14672-000	14672-00C	14672-00T	-	14672-00U
3/4-10	UNC	H6	0.696	0.706	4-1/4	14786-000	-	14786-00T	-	-
3/4-10	UNC	H7	0.697	0.707	4-1/4	14787-000	-	14787-00T	-	-
3/4-10	UNC	H8	0.697	0.707	4-1/4	14788-000	-	14788-00T	-	-
3/4-10	UNC	H9	0.698	0.708	4-1/4	14789-000	14789-00C	14789-00T	-	-
3/4-10	UNC	H10	0.698	0.708	4-1/4	14790-000	-	14790-00T	-	-
3/4-10	UNC	H11	0.699	0.709	4-1/4	14791-000	14791-00C	14791-00T	-	14791-00U
3/4-10	UNC	H12	0.699	0.709	4-1/4	14792-000	14792-00C	14792-00T	-	14792-00U
3/4-10	UNC	H13	0.700	0.710	4-1/4	14793-000	-	14793-00T	-	-
3/4-10	UNC	H14	0.700	0.710	4-1/4	14794-000	-	14794-00T	-	14794-00U
3/4-16	UNF	H6	0.717	0.724	4-1/4	14906-000	-	14906-00T	-	-
3/4-16	UNF	H7	0.718	0.724	4-1/4	14907-000	-	14907-00T	-	-
3/4-16	UNF	H8	0.718	0.725	4-1/4	14908-000	-	14908-00T	-	-
3/4-16	UNF	H9	0.719	0.725	4-1/4	14909-000	-	14909-00T	-	-
3/4-16	UNF	H10	0.719	0.726	4-1/4	14910-000	-	14910-00T	14910-006	14910-00U
3/4-16	UNF	H11	0.720	0.726	4-1/4	14911-000	-	14911-00T	-	14911-00U
3/4-16	UNF	H12	0.720	0.727	4-1/4	14912-000	-	14912-00T	-	-
3/4-16	UNF	H13	0.721	0.727	4-1/4	14913-000	-	-	-	14913-00U
3/4-16	UNF	H14	0.721	0.728	4-1/4	14914-000	14914-00C	14914-00T	-	-
7/8-9	UNC	H6	0.815	0.826	4-11/16	15026-000	-	15026-00T	-	-
7/8-9	UNC	H7	0.815	0.826	4-11/16	15027-000	-	-	-	-
7/8-9	UNC	H8	0.816	0.827	4-11/16	15028-000	-	-	-	-
7/8-9	UNC	H9	0.816	0.827	4-11/16	15029-000	-	-	-	-
7/8-9	UNC	H10	0.817	0.828	4-11/16	15030-000	-	-	-	-
7/8-9	UNC	H11	0.817	0.828	4-11/16	15031-000	-	15031-00T	-	-
7/8-9	UNC	H12	0.818	0.829	4-11/16	15032-000	15032-00C	-	-	-
7/8-9	UNC	H13	0.818	0.829	4-11/16	15033-000	-	-	-	-
7/8-9	UNC	H14	0.819	0.830	4-11/16	15034-000	-	-	-	-
7/8-14	UNF	H6	0.837	0.844	4-11/16	15146-000	-	-	-	-
7/8-14	UNF	H7	0.838	0.845	4-11/16	15147-000	-	15147-00T	-	-
7/8-14	UNF	H8	0.838	0.845	4-11/16	15148-000	-	-	-	-
7/8-14	UNF	H9	0.839	0.846	4-11/16	15149-000	-	15149-00T	-	-
7/8-14	UNF	H10	0.839	0.846	4-11/16	15150-000	15150-00C	-	-	-
7/8-14	UNF	H11	0.840	0.847	4-11/16	15151-000	-	15151-00T	-	-
7/8-14	UNF	H12	0.840	0.847	4-11/16	15152-000	-	-	-	-
7/8-14	UNF	H13	0.841	0.848	4-11/16	15153-000	-	-	-	-
7/8-14	UNF	H14	0.841	0.848	4-11/16	15154-000	-	-	-	-
1" -8	UNC	H6	0.932	0.944	5-1/8	15266-000	-	15266-00T	-	-
1" -8	UNC	H7	0.932	0.945	5-1/8	15267-000	-	15267-00T	-	-
1" -8	UNC	H8	0.933	0.945	5-1/8	15268-000	-	-	-	-
1" -8	UNC	H9	0.933	0.946	5-1/8	15269-000	-	-	-	-
1" -8	UNC	H10	0.934	0.946	5-1/8	15270-000	-	-	-	-
1" -8	UNC	H11	0.934	0.947	5-1/8	15271-000	-	-	-	-
1" -8	UNC	H12	0.935	0.947	5-1/8	15272-000	15272-00C	-	-	-
1" -8	UNC	H13	0.935	0.948	5-1/8	15273-000	-	15273-00T	-	15273-00U
1" -8	UNC	H14	0.936	0.948	5-1/8	15274-000	-	-	-	-
1" -12	UNF	H6	0.956	0.964	5-1/8	15386-000	-	-	-	-
1" -12	UNF	H7	0.956	0.964	5-1/8	15387-000	-	-	-	-
1" -12	UNF	H8	0.957	0.965	5-1/8	15388-000	-	-	-	-
1" -12	UNF	H9	0.957	0.965	5-1/8	15389-000	-	-	-	-
1" -12	UNF	H10	0.958	0.966	5-1/8	15390-000	-	-	-	-
1" -12	UNF	H11	0.958	0.966	5-1/8	15391-000	-	15391-00T	-	-
1" -12	UNF	H12	0.959	0.967	5-1/8	15392-000	15392-00C	15392-00T	-	15392-00U
1" -12	UNF	H13	0.959	0.967	5-1/8	15393-000	-	-	-	-
1" -12	UNF	H14	0.960	0.968	5-1/8	15394-000	-	-	-	-
M3.5 x 0.6	M	D4	0.126	0.129	-	17764-000	-	17764-00T	-	-
M3.5 x 0.6	M	D7	0.128	0.130	-	17767-000	17767-00C	17767-00T	-	17767-00U
M4 x 0.7	M	D4	0.144	0.147	-	17964-000	17964-00C	17964-00T	17964-006	17964-00U
M4 x 0.7	M	D7	0.145	0.148	-	17967-000	17967-00C	17967-00T	17967-006	17967-00U
M5 x 0.8	M	D4	0.181	0.184	-	18164-000	18164-00C	18164-00T	-	18164-00U
M5 x 0.8	M	D8	0.183	0.186	-	18168-000	18168-00C	18168-00T	18168-006	18168-00U
M6 x 1.0	M	D5	0.216	0.220	-	18365-000	18365-00C	18365-00T	18365-006	-
M6 x 1.0	M	D9	0.218	0.222	-	18369-000	18369-00C	18369-00T	18369-006	18369-00U

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INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Forming Taps For Ferrous And Non-Ferrous Materials



Series BXP		BXP   Thredfloer   Plug								
Thread Size	Spec.	Thread Limit	Min Tap/ Drill Size	Max Tap/ Drill Size	OAL (L)	Bright	TiCN	TiN	Nitride Steam	Super TiN
M8 x 1.25	M	D5	0.289	0.294	-	<b>18565-000</b>	<b>18565-00C</b>	<b>18565-00T</b>	<b>18565-006</b>	-
M8 x 1.25	M	D10	0.292	0.297	-	<b>18570-000</b>	<b>18570-00C</b>	<b>18570-00T</b>	<b>18570-006</b>	<b>18570-00U</b>
M10 x 1.5	M	D6	0.363	0.369	-	<b>18766-000</b>	<b>18766-00C</b>	<b>18766-00T</b>	<b>18766-006</b>	-
M10 x 1.5	M	D11	0.366	0.372	-	<b>18771-000</b>	<b>18771-00C</b>	<b>18771-00T</b>	<b>18771-006</b>	<b>18771-00U</b>
M12 x 1.75	M	D6	0.436	0.443	-	<b>18966-000</b>	<b>18966-00C</b>	<b>18966-00T</b>	-	-
M12 x 1.75	M	D12	0.439	0.446	-	<b>18972-000</b>	<b>18972-00C</b>	<b>18972-00T</b>	<b>18972-006</b>	<b>18972-00U</b>
M14 x 1.25	MF	D5	0.526	0.531	-	<b>19095-000</b>	<b>19095-00C</b>	<b>19095-00T</b>	-	-
M14 x 1.25	MF	D10	0.528	0.533	-	<b>19100-000</b>	<b>19100-00C</b>	-	-	-
M14 x 1.5	MF	D6	0.521	0.526	-	<b>19126-000</b>	-	<b>19126-00T</b>	-	-
M14 x 1.5	MF	D11	0.523	0.529	-	<b>19131-000</b>	<b>19131-00C</b>	<b>19131-00T</b>	<b>19131-006</b>	-
M14 x 2	M	D7	0.510	0.518	-	<b>19167-000</b>	-	<b>19167-00T</b>	-	-
M14 x 2	M	D14	0.513	0.521	-	<b>19174-000</b>	<b>19174-00C</b>	<b>19174-00T</b>	<b>19174-006</b>	<b>19174-00U</b>
M16 x 1.5	MF	D6	0.599	0.605	-	<b>19246-000</b>	-	<b>19246-00T</b>	-	<b>19246-00U</b>
M16 x 1.5	MF	D11	0.602	0.608	-	<b>19251-000</b>	-	-	-	<b>19251-00U</b>
M16 x 2	M	D7	0.589	0.596	-	<b>19287-000</b>	-	<b>19287-00T</b>	-	-
M16 x 2	M	D14	0.592	0.600	-	<b>19294-000</b>	<b>19294-00C</b>	<b>19294-00T</b>	<b>19294-006</b>	-
M18 x 1.5	MF	D11	0.681	0.686	-	<b>19311-000</b>	-	<b>19311-00T</b>	-	-
M18 x 1.5	MF	D6	0.678	0.684	-	<b>19326-000</b>	-	<b>19326-00T</b>	-	-

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INTRO

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THREADING

INSERTS

# PERFORMANCE

Premium HSS Extended Forming Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Extended Length, Cold Forming</b> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Forming tap eliminates chips by displacing material to create threads</li> <li>Extended length (6" OAL)</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	○	○	○	○	○

● Best ○ Good

## Series BX6 BX6 | Thredfloer | 6" OAL

Thread Size	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	OAL (L)	Bright	TiCN	TiN
10-24	H3	0.168	0.172	6	12043-010	-	12043-01T
10-24	H4	0.168	0.172	6	12044-010	-	-
10-24	H5	0.169	0.173	6	12045-010	-	12045-01T
10-24	H6	0.169	0.173	6	12046-010	-	12046-01T
10-24	H7	0.170	0.174	6	12047-010	-	-
10-32	H3	0.174	0.177	6	12263-010	-	-
10-32	H4	0.174	0.177	6	12264-010	-	12264-01T
10-32	H5	0.175	0.178	6	12265-010	-	12265-01T
10-32	H6	0.175	0.178	6	12266-010	-	12266-01T
1/4-20	H5	0.224	0.229	6	12725-010	-	-
1/4-20	H6	0.225	0.230	6	12726-010	12726-01C	12726-01T
1/4-20	H7	0.225	0.230	6	12727-010	12727-01C	12727-01T
1/4-20	H8	0.226	0.231	6	12728-010	12728-01C	12728-01T
1/4-28	H4	0.232	0.235	6	12944-010	12944-01C	-
1/4-28	H5	0.232	0.236	6	12945-010	12945-01C	-
1/4-28	H6	0.233	0.236	6	12946-010	-	12946-01T
1/4-28	H7	0.233	0.237	6	12947-010	-	-
5/16-18	H5	0.283	0.289	6	13165-010	-	13165-01T
5/16-18	H6	0.284	0.289	6	13166-010	13166-01C	13166-01T
5/16-18	H7	0.284	0.290	6	13167-010	13167-01C	13167-01T
5/16-18	H8	0.285	0.290	6	13168-010	-	13168-01T
5/16-18	H9	0.285	0.291	6	13169-010	-	13169-01T
5/16-24	H4	0.291	0.295	6	13344-010	-	-
5/16-24	H5	0.291	0.295	6	13345-010	-	-
5/16-24	H6	0.292	0.296	6	13346-010	-	-
5/16-24	H7	0.292	0.296	6	13347-010	-	13347-01T
5/16-24	H8	0.293	0.297	6	13348-010	-	-
3/8-16	H5	0.342	0.348	6	13525-010	-	13525-01T
3/8-16	H6	0.342	0.349	6	13526-010	-	13526-01T
3/8-16	H7	0.343	0.349	6	13527-010	-	13527-01T
3/8-16	H8	0.343	0.350	6	13528-010	13528-01C	13528-01T
3/8-16	H9	0.344	0.350	6	13529-010	-	13529-01T
3/8-24	H4	0.353	0.357	6	13704-010	-	13704-01T
3/8-24	H5	0.354	0.358	6	13705-010	-	-
3/8-24	H6	0.354	0.358	6	13706-010	-	13706-01T
3/8-24	H7	0.355	0.359	6	13707-010	-	13707-01T
3/8-24	H8	0.355	0.359	6	13708-010	-	-
M5 x 0.8	D4	0.181	0.184	-	18214-010	-	18214-01T
M5 x 0.8	D8	0.183	0.186	-	18218-010	-	18218-01T
M6 x 1.0	D5	0.216	0.220	-	18415-010	-	18415-01T
M6 x 1.0	D9	0.218	0.222	-	18419-010	18419-01C	18419-01T
M8 x 1.25	D5	0.289	0.294	-	18605-010	18605-01C	18605-01T
M8 x 1.25	D10	0.292	0.297	-	18610-010	18610-01C	18610-01T
M10 x 1.5	D6	0.363	0.369	-	18806-010	18806-01C	18806-01T

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# PERFORMANCE

Premium HSS Extended Forming Taps For Ferrous And Non-Ferrous Materials



Series BX6		BX6   Thredfloor   6"OAL					
Thread Size	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	OAL (L)	Bright	TiCN	TiN
M10 x 1.5	D11	0.366	0.372	-	<b>18811-010</b>	<b>18811-01C</b>	<b>18811-01T</b>
M12 x 1.75	D6	0.436	0.443	-	<b>19006-000</b>	-	<b>19006-00T</b>
M12 x 1.75	D12	0.439	0.446	-	<b>19012-000</b>	<b>19012-00C</b>	-

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Pipe Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Tapered Pipe, Cutting Tap</b> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Pipe tap for NPT/NPTF threads</li> <li>ANSI tap blank dimensions</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	●	●	○	○	○	○

● Best ○ Good

## Series BX710 | BX710 | Thredshaver | Spiral Flute | NPT/NPTF

Thread Size	Spec.	Flutes	Helix	Shank (C)	Square Size (D)	OAL (L)	Bright	TiCN	TiN
1/16-27	NPT	4	15°	.3125	.234	2-1/8	<b>59900-000</b>	<b>59900-00C</b>	<b>59900-00T</b>
1/16-27	NPTF	4	15°	.3125	.234	2-1/8	<b>59902-000</b>	<b>59902-00C</b>	<b>59902-00T</b>
1/8-27	NPT	4	15°	.3125	.234	2-1/8	<b>59910-000</b>	<b>59910-00C</b>	<b>59910-00T</b>
1/8-27	NPTF	4	15°	.3125	.234	2-1/8	<b>59912-000</b>	<b>59912-00C</b>	<b>59912-00T</b>
1/8-27	NPT	4	15°	.4375	.328	2-1/8	<b>59920-000</b>	<b>59920-00C</b>	<b>59920-00T</b>
1/8-27	NPTF	4	15°	.4375	.328	2-1/8	<b>59922-000</b>	<b>59922-00C</b>	<b>59922-00T</b>
1/4-18	NPT	4	15°	.5625	.421	2-7/16	<b>59930-000</b>	<b>59930-00C</b>	<b>59930-00T</b>
1/4-18	NPTF	4	15°	.5625	.421	2-7/16	<b>59932-000</b>	<b>59932-00C</b>	<b>59932-00T</b>
3/8-18	NPT	4	15°	.7000	.531	2-9/16	<b>59940-000</b>	<b>59940-00C</b>	<b>59940-00T</b>
3/8-18	NPTF	4	15°	.7000	.531	2-9/16	<b>59942-000</b>	<b>59942-00C</b>	<b>59942-00T</b>
1/2-14	NPT	4	15°	.6875	.515	3-1/8	<b>59950-000</b>	<b>59950-00C</b>	<b>59950-00T</b>
1/2-14	NPTF	4	15°	.6875	.515	3-1/8	<b>59952-000</b>	<b>59952-00C</b>	<b>59952-00T</b>
3/4-14	NPT	5	15°	.9063	.679	3-1/4	<b>59960-000</b>	<b>59960-00C</b>	<b>59960-00T</b>
3/4-14	NPTF	5	15°	.9063	.679	3-1/4	<b>59962-000</b>	<b>59962-00C</b>	<b>59962-00T</b>

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

Premium HSS Spiral Flute STI Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>STI, Helical Flute, Cutting Tap</b> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Screw thread insert (STI) tap for helicoil threads</li> <li>Spiral flute tap for blind holes</li> <li>ANSI tap blank dimensions</li> </ul>	 	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	●				●	●				

● Best ○ Good

## Series BX300 BX300 | Thredshaver | Spiral Flute | STI

Thread Size	Thread Limit	Flutes	OAL (L)	Bright	TiCN	TiN
2-56	H2	2	1-13/16	<b>44002-010</b>	<b>44002-01C</b>	<b>44002-01T</b>
3-48	H2	3	1-15/16	<b>44012-010</b>	-	<b>44012-01T</b>
4-40	H2	3	2	<b>44022-010</b>	<b>44022-01C</b>	<b>44022-01T</b>
6-32	H2	3	2-3/8	<b>44032-010</b>	<b>44032-01C</b>	<b>44032-01T</b>
6-32	H3	3	2-3/8	<b>44033-010</b>	<b>44033-01C</b>	<b>44033-01T</b>
8-32	H2	3	2-3/8	<b>44042-010</b>	<b>44042-01C</b>	<b>44042-01T</b>
8-32	H3	3	2-3/8	<b>44043-010</b>	<b>44043-01C</b>	<b>44043-01T</b>
10-24	H2	3	2-1/2	<b>44052-010</b>	<b>44052-01C</b>	<b>44052-01T</b>
10-24	H3	3	2-1/2	<b>44053-010</b>	<b>44053-01C</b>	<b>44053-01T</b>
10-32	H2	3	2-1/2	<b>44062-010</b>	<b>44062-01C</b>	<b>44062-01T</b>
10-32	H3	3	2-1/2	<b>44063-010</b>	<b>44063-01C</b>	<b>44063-01T</b>
1/4-20	H2	3	2-23/32	<b>44072-010</b>	<b>44072-01C</b>	<b>44072-01T</b>
1/4-20	H3	3	2-23/32	<b>44073-010</b>	-	<b>44073-01T</b>
1/4-28	H2	3	2-23/32	<b>44082-010</b>	<b>44082-01C</b>	<b>44082-01T</b>
1/4-28	H3	3	2-23/32	<b>44083-010</b>	<b>44083-01C</b>	<b>44083-01T</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Premium HSS Spiral Flute Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Helical Flute, Cutting Tap</b></p> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Spiral flute tap for blind holes</li> <li>Extended length (4" OAL or 6" OAL)</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	●				●	●				

● Best ○ Good

## Series BX220 BX220 | Thredshaver | Spiral Flute | Ext

Thread Size	Thread Limit	Flutes	OAL (L)	Bright	TiCN	TiN
4-40	H2	2	4	<b>46002-010</b>	<b>46002-01C</b>	<b>46002-01T</b>
6-32	H3	3	4	<b>46203-010</b>	-	<b>46203-01T</b>
8-32	H3	3	4	<b>46303-010</b>	-	<b>46303-01T</b>
10-24	H3	3	6	<b>46403-010</b>	-	-
10-32	H3	3	6	<b>46503-010</b>	-	-
1/4-20	H5	3	6	<b>46605-010</b>	-	<b>46605-01T</b>
1/4-28	H4	3	6	<b>46704-010</b>	-	-
5/16-18	H5	3	6	<b>46805-010</b>	<b>46805-01C</b>	<b>46805-01T</b>
5/16-24	H4	3	6	<b>46904-010</b>	-	-
3/8-16	H5	3	6	<b>47005-010</b>	<b>47005-01C</b>	<b>47005-01T</b>
3/8-24	H4	3	6	<b>47104-010</b>	-	<b>47104-01T</b>
M3 x 0.5	D3	3	-	<b>49003-010</b>	<b>49003-01C</b>	<b>49003-01T</b>
M3.5 x 0.6	D4	3	-	<b>49104-010</b>	-	-
M4 x 0.7	D4	3	-	<b>49204-010</b>	<b>49204-01C</b>	-
M5 x 0.8	D4	3	-	<b>49304-010</b>	-	-
M6 x 1.0	D5	3	-	<b>49405-010</b>	<b>49405-01C</b>	<b>49405-01T</b>
M8 x 1.25	D5	3	-	<b>49505-010</b>	<b>49505-01C</b>	<b>49505-01T</b>
M10 x 1.5	D6	3	-	<b>49606-010</b>	<b>49606-01C</b>	-

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Spiral Point Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Gun Style, Cutting Tap</b> <ul style="list-style-type: none"> <li>Gun tap for through holes</li> <li>ANSI tap blank dimensions (USCTI Table 302A)</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	●	○	●	●	●	●	●	●	●	●

● Best ○ Good

## Series BX100 BX100 | Threshaver | Spiral Point

Thread Size	Thread Limit	Flutes	OAL (L)	Bright	TiCN	TiN	Steam Oxide
2-56	H1	2	1-3/4	30001-000	-	30001-00T	30001-00S
2-56	H2	2	1-3/4	30002-000	30002-00C	30002-00T	30002-00S
3-48	H1	2	1-13/16	30011-000	-	30011-00T	30011-00S
3-48	H2	2	1-13/16	30012-000	30012-00C	30012-00T	30012-00S
4-40	H2	3	1-7/8	30022-000	30022-00C	30022-00T	30022-00S
5-40	H2	3	1-15/16	30032-000	30032-00C	30032-00T	30032-00S
6-32	H2	2	2	30042-000	30042-00C	30042-00T	30042-00S
6-32	H3	3	2	30043-000	30043-00C	30043-00T	30043-00S
8-32	H2	3	2-1/8	30052-000	30052-00C	30052-00T	30052-00S
8-32	H3	3	2-1/8	30053-000	30053-00C	30053-00T	30053-00S
10-24	H3	3	2-3/8	30063-000	30063-00C	30063-00T	30063-00S
10-32	H2	3	2-3/8	30072-000	30072-00C	30072-00T	30072-00S
10-32	H3	3	2-3/8	30073-000	30073-00C	30073-00T	30073-00S
1/4-20	H3	3	2-1/2	30083-000	30083-00C	30083-00T	30083-00S
1/4-20	H5	3	2-1/2	30085-000	30085-00C	30085-00T	30085-00S
1/4-28	H3	3	2-1/2	30093-000	30093-00C	30093-00T	30093-00S
1/4-28	H4	3	2-1/2	30094-000	30094-00C	30094-00T	30094-00S
5/16-18	H3	3	2-23/32	30103-000	30103-00C	30103-00T	30103-00S
5/16-18	H5	3	2-23/32	30105-000	30105-00C	30105-00T	30105-00S
5/16-24	H3	3	2-23/32	30113-000	30113-00C	30113-00T	30113-00S
5/16-24	H4	3	2-23/32	30114-000	30114-00C	30114-00T	30114-00S
3/8-16	H3	3	2-15/16	30123-000	30123-00C	30123-00T	30123-00S
3/8-16	H5	3	2-15/16	30125-000	30125-00C	30125-00T	30125-00S
3/8-24	H3	3	2-15/16	30133-000	30133-00C	30133-00T	30133-00S
3/8-24	H4	3	2-15/16	30134-000	30134-00C	30134-00T	30134-00S
7/16-14	H3	3	3-5/32	30143-000	30143-00C	30143-00T	30143-00S
7/16-14	H5	3	3-5/32	30145-000	30145-00C	30145-00T	30145-00S
7/16-20	H3	3	3-5/32	30153-000	30153-00C	30153-00T	30153-00S
7/16-20	H5	3	3-5/32	30155-000	30155-00C	30155-00T	30155-00S
1/2-13	H3	4	3-3/8	30163-000	30163-00C	30163-00T	30163-00S
1/2-13	H5	4	3-3/8	30165-000	30165-00C	30165-00T	30165-00S
1/2-20	H3	4	3-3/8	30173-000	30173-00C	30173-00T	30173-00S
1/2-20	H5	4	3-3/8	30175-000	30175-00C	30175-00T	30175-00S
5/8-11	H3	4	3-13/16	30183-000	30183-00C	30183-00T	30183-00S
5/8-11	H6	4	3-13/16	30186-000	30186-00C	30186-00T	30186-00S
5/8-18	H3	4	3-13/16	30193-000	30193-00C	30193-00T	30193-00S
5/8-18	H5	4	3-13/16	30195-000	30195-00C	30195-00T	30195-00S
3/4-10	H3	4	4-1/4	30203-000	30203-00C	30203-00T	30203-00S
3/4-10	H6	4	4-1/4	30206-000	30206-00C	30206-00T	30206-00S
3/4-16	H3	4	4-1/4	30213-000	30213-00C	30213-00T	30213-00S
3/4-16	H5	4	4-1/4	30215-000	30215-00C	30215-00T	30215-00S
7/8-9	H4	4	4-11/16	30224-000	30224-00C	-	30224-00S
7/8-9	H6	4	4-11/16	30226-000	30226-00C	30226-00T	-
7/8-14	H4	4	4-11/16	30234-000	30234-00C	30234-00T	30234-00S
7/8-14	H6	4	4-11/16	30236-000	30236-00C	30236-00T	30236-00S

\*bold numbers are EDPs for ordering

# PERFORMANCE

Premium HSS Spiral Point Taps For Ferrous And Non-Ferrous Materials



Series BX100		BX100   Thredshaver   Spiral Point					
Thread Size	Thread Limit	Flutes	OAL (L)	Bright	TiCN	TiN	Steam Oxide
1" -8	H4	4	5-1/8	30244-000	30244-00C	30244-00T	30244-00S
1" -8	H6	4	5-1/8	30246-000	-	30246-00T	30246-00S
1" -12	H4	4	5-1/8	30254-000	-	30254-00T	30254-00S
1" -12	H6	4	5-1/8	30256-000	-	30256-00T	30256-00S
M2 x 0.4	D2	2	-	30992-000	-	-	-
M2 x 0.4	D3	2	-	30993-000	30993-00C	30993-00T	30993-00S
M2.5 x 0.45	D2	2	-	31002-000	31002-00C	31002-00T	31002-00S
M2.5 x 0.45	D3	2	-	31003-000	31003-00C	31003-00T	31003-00S
M3 x 0.5	D2	3	-	31012-000	31012-00C	31012-00T	31012-00S
M3 x 0.5	D3	3	-	31013-000	31013-00C	31013-00T	31013-00S
M3.5 x 0.6	D3	3	-	31023-000	-	31023-00T	31023-00S
M3.5 x 0.6	D4	3	-	31024-000	31024-00C	31024-00T	31024-00S
M4 x 0.7	D3	3	-	31033-000	31033-00C	31033-00T	31033-00S
M4 x 0.7	D4	3	-	31034-000	31034-00C	31034-00T	31034-00S
M5 x 0.8	D3	3	-	31043-000	31043-00C	31043-00T	31043-00S
M5 x 0.8	D4	3	-	31044-000	31044-00C	31044-00T	31044-00S
M6 x 1.0	D3	3	-	31053-000	31053-00C	31053-00T	31053-00S
M6 x 1.0	D5	3	-	31055-000	31055-00C	31055-00T	31055-00S
M8 x 1.25	D3	3	-	31063-000	31063-00C	31063-00T	31063-00S
M8 x 1.25	D5	3	-	31065-000	31065-00C	31065-00T	31065-00S
M10 x 1.5	D3	3	-	31073-000	31073-00C	31073-00T	31073-00S
M10 x 1.5	D6	3	-	31076-000	31076-00C	31076-00T	31076-00S
M12 x 1.75	D3	4	-	31083-000	-	31083-00T	31083-00S
M12 x 1.75	D6	4	-	31086-000	31086-00C	31086-00T	31086-00S
M14 x 2	D3	4	-	31093-000	-	-	31093-00S
M14 x 2	D7	4	-	31097-000	31097-00C	-	31097-00S
M16 x 2	D3	4	-	31103-000	-	-	31103-00S
M16 x 2	D7	4	-	31107-000	31107-00C	31107-00T	31107-00S

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Spiral Point Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Gun Style, Cutting Tap</b></p> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Gun tap for through holes</li> <li>Extended length (4" OAL or 6" OAL)</li> </ul>		 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	●				●	●				

● Best ○ Good

## Series BX170 | BX170 | Threshaver | Spiral Point |Ext

Thread Size	Spec.	Thread Limit	Flutes	Shank (C)	Square Size (D)	OAL (L)	Bright	TiCN	TiN
4-40	UNC	H2	3	.141	.110	4	35002-000	-	35002-00T
6-32	UNC	H3	3	.141	.110	4	35203-000	-	35203-00T
8-32	UNC	H3	3	.168	.131	4	35303-000	35303-00C	-
10-24	UNC	H3	3	.194	.152	6	35403-000	35403-00C	35403-00T
10-32	UNF	H3	3	.194	.152	6	35503-000	35503-00C	35503-00T
1/4-20	UNC	H5	3	.255	.191	6	35605-000	35605-00C	35605-00T
1/4-28	UNF	H4	3	.255	.191	6	35704-000	35704-00C	-
5/16-18	UNC	H5	3	.318	.238	6	35805-000	35805-00C	35805-00T
5/16-24	UNF	H4	3	.318	.238	6	35904-000	35904-00C	35904-00T
3/8-16	UNC	H5	3	.381	.286	6	36005-000	36005-00C	36005-00T
3/8-24	UNF	H4	3	.381	.286	6	36104-000	36104-00C	-
M3 x 0.5	M	D3	3	.141	.110	-	38003-000	38003-00C	38003-00T
M3.5 x 0.6	M	D4	3	.141	.110	-	38104-000	-	-
M4 x 0.7	M	D4	3	.168	.131	-	38204-000	38204-00C	38204-00T
M5 x 0.8	M	D4	3	.194	.152	-	38304-000	38304-00C	38304-00T
M6 x 1.0	M	D5	3	.255	.191	-	38405-000	38405-00C	38405-00T
M8 x 1.25	M	D5	3	.318	.238	-	38505-000	38505-00C	38505-00T
M10 x 1.5	M	D6	3	.381	.286	-	38606-000	38606-00C	38606-00T

\*bold numbers are EDPs for ordering

# PERFORMANCE

Premium HSS Spiral Point Taps For Ferrous And Non-Ferrous Materials



INTRO  
MILLING  
SPECIALTY  
HOLEMAKING  
THREADING  
INSERTS



FEATURES / DESCRIPTION				APPLICATION		FEATURES	
<b>Helical Flute, Cutting Tap</b> <ul style="list-style-type: none"> <li>Premium high speed steel</li> <li>Spiral flute tap for blind holes</li> <li>ANSI tap blank dimensions</li> </ul>				 		  	

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	●				●	●				

● Best ○ Good

## Series BX200 BX200 | Thredshaver | Spiral Flute

Thread Size	Thread Limit	Flutes	OAL (L)	Bright	TiCN	TiN	Steam Oxide
2-56	H1	2	1-3/4	40001-010	40001-01C	40001-01T	40001-01S
2-56	H2	2	1-3/4	40002-010	40002-01C	40002-01T	40002-01S
3-48	H1	2	1-13/16	40011-010	-	40011-01T	40011-01S
3-48	H2	2	1-13/16	40012-010	40012-01C	40012-01T	40012-01S
4-40	H2	2	1-7/8	40022-010	40022-01C	40022-01T	40022-01S
5-40	H2	2	1-15/16	40032-010	40032-01C	40032-01T	40032-01S
6-32	H2	3	2	40042-010	40042-01C	40042-01T	40042-01S
6-32	H3	3	2	40043-010	40043-01C	40043-01T	40043-01S
8-32	H2	3	2-1/8	40052-010	40052-01C	40052-01T	40052-01S
8-32	H3	3	2-1/8	40053-010	40053-01C	40053-01T	40053-01S
10-24	H3	3	2-3/8	40063-010	40063-01C	40063-01T	40063-01S
10-32	H2	3	2-3/8	40072-010	40072-01C	40072-01T	40072-01S
10-32	H3	3	2-3/8	40073-010	40073-01C	40073-01T	40073-01S
1/4-20	H3	3	2-1/2	40083-010	40083-01C	40083-01T	40083-01S
1/4-20	H5	3	2-1/2	40085-010	40085-01C	40085-01T	40085-01S
1/4-28	H3	3	2-1/2	40093-010	40093-01C	40093-01T	40093-01S
1/4-28	H4	3	2-1/2	40094-010	40094-01C	40094-01T	40094-01S
5/16-1	H3	3	2-23/32	40103-010	40103-01C	40103-01T	40103-01S
5/16-1	H5	3	2-23/32	40105-010	40105-01C	40105-01T	40105-01S
5/16-2	H3	3	2-23/32	40113-010	40113-01C	40113-01T	40113-01S
5/16-2	H4	3	2-23/32	40114-010	40114-01C	40114-01T	40114-01S
3/8-16	H3	3	2-15/16	40123-010	40123-01C	40123-01T	40123-01S
3/8-16	H5	3	2-15/16	40125-010	40125-01C	40125-01T	40125-01S
3/8-24	H3	3	2-15/16	40133-010	40133-01C	40133-01T	40133-01S
3/8-24	H4	3	2-15/16	40134-010	40134-01C	40134-01T	40134-01S
7/16-14	H3	3	3-5/32	40143-000	40143-00C	40143-00T	40143-00S
7/16-14	H5	3	3-5/32	40145-000	40145-00C	40145-00T	40145-00S
7/16-20	H3	3	3-5/32	40153-000	40153-00C	40153-00T	40153-00S
7/16-20	H5	3	3-5/32	40155-000	40155-00C	40155-00T	40155-00S
1/2-13	H3	3	3-3/8	40163-000	40163-00C	40163-00T	40163-00S
1/2-13	H5	3	3-3/8	40165-000	40165-00C	40165-00T	40165-00S
1/2-20	H3	3	3-3/8	40173-000	40173-00C	40173-00T	40173-00S
1/2-20	H5	3	3-3/8	40175-000	40175-00C	40175-00T	40175-00S
5/8-11	H3	4	3-13/16	40183-000	40183-00C	40183-00T	40183-00S
5/8-11	H6	4	3-13/16	40186-000	40186-00C	40186-00T	40186-00S
5/8-18	H3	4	3-13/16	40193-000	40193-00C	40193-00T	40193-00S
5/8-18	H5	4	3-13/16	40195-000	40195-00C	40195-00T	40195-00S
3/4-10	H3	4	4-1/4	40203-000	40203-00C	40203-00T	40203-00S
3/4-10	H6	4	4-1/4	40206-000	40206-00C	40206-00T	40206-00S
3/4-16	H3	4	4-1/4	40213-000	40213-00C	40213-00T	40213-00S
3/4-16	H5	4	4-1/4	40215-000	40215-00C	40215-00T	40215-00S
7/8-9	H4	4	4-11/16	40224-000	-	40224-00T	40224-00S
7/8-9	H6	4	4-11/16	40226-000	40226-00C	40226-00T	40226-00S
1"-8	H4	4	5-1/8	40244-000	40244-00C	40244-00T	40244-00S
1"-8	H6	4	5-1/8	40246-000	40246-00C	40246-00T	40246-00S

\*bold numbers are EDPs for ordering



# PERFORMANCE

Premium HSS Spiral Point Taps For Ferrous And Non-Ferrous Materials



Series BX200		BX200   Thredshaver   Spiral Flute					
Thread Size	Thread Limit	Flutes	OAL (L)	Bright	TiCN	TiN	Steam Oxide
1" -12	H4	4	5-1/8	<b>40254-000</b>	-	<b>40254-00T</b>	<b>40254-00S</b>
1" -12	H6	4	5-1/8	<b>40256-000</b>	-	<b>40256-00T</b>	<b>40256-00S</b>
M2.5 x 0.45	D2	2	-	<b>43002-010</b>	-	<b>43002-01T</b>	<b>43002-01S</b>
M2.5 x 0.45	D3	2	-	<b>43003-010</b>	<b>43003-01C</b>	<b>43003-01T</b>	<b>43003-01S</b>
M3 x 0.5	D2	3	-	<b>43012-010</b>	<b>43012-01C</b>	<b>43012-01T</b>	<b>43012-01S</b>
M3 x 0.5	D3	3	-	<b>43013-010</b>	<b>43013-01C</b>	<b>43013-01T</b>	<b>43013-01S</b>
M3.5 x 0.6	D3	3	-	<b>43023-010</b>	<b>43023-01C</b>	<b>43023-01T</b>	<b>43023-01S</b>
M3.5 x 0.6	D4	3	-	<b>43024-010</b>	<b>43024-01C</b>	<b>43024-01T</b>	<b>43024-01S</b>
M4 x 0.7	D3	3	-	<b>43033-010</b>	<b>43033-01C</b>	<b>43033-01T</b>	<b>43033-01S</b>
M4 x 0.7	D4	3	-	<b>43034-010</b>	<b>43034-01C</b>	<b>43034-01T</b>	<b>43034-01S</b>
M5 x 0.8	D3	3	-	<b>43043-010</b>	<b>43043-01C</b>	<b>43043-01T</b>	<b>43043-01S</b>
M5 x 0.8	D4	3	-	<b>43044-010</b>	<b>43044-01C</b>	<b>43044-01T</b>	<b>43044-01S</b>
M6 x 1.0	D3	3	-	<b>43053-010</b>	<b>43053-01C</b>	<b>43053-01T</b>	<b>43053-01S</b>
M6 x 1.0	D5	3	-	<b>43055-010</b>	<b>43055-01C</b>	<b>43055-01T</b>	<b>43055-01S</b>
M8 x 1.25	D3	3	-	<b>43063-010</b>	<b>43063-01C</b>	<b>43063-01T</b>	<b>43063-01S</b>
M8 x 1.25	D5	3	-	<b>43065-010</b>	<b>43065-01C</b>	<b>43065-01T</b>	<b>43065-01S</b>
M10 x 1.5	D3	3	-	<b>43073-010</b>	<b>43073-01C</b>	<b>43073-01T</b>	<b>43073-01S</b>
M10 x 1.5	D6	3	-	<b>43076-010</b>	<b>43076-01C</b>	<b>43076-01T</b>	<b>43076-01S</b>
M12 x 1.75	D3	3	-	<b>43083-000</b>	<b>43083-00C</b>	<b>43083-00T</b>	<b>43083-00S</b>
M12 x 1.75	D6	3	-	<b>43086-000</b>	<b>43086-00C</b>	<b>43086-00T</b>	<b>43086-00S</b>
M14 x 2	D3	4	-	<b>43093-000</b>	-	-	<b>43093-00S</b>
M14 x 2	D7	4	-	<b>43097-000</b>	-	-	<b>43097-00S</b>
M16 x 2	D3	4	-	<b>43103-000</b>	-	-	<b>43103-00S</b>
M16 x 2	D7	4	-	<b>43107-000</b>	-	-	<b>43107-00S</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Combination Drill/Tap For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Combo Drill/Tap</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Combination drill and tap in one tool</li> <li>• Stocked Bright finish</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 156 Performance | Combo Drill/Tap

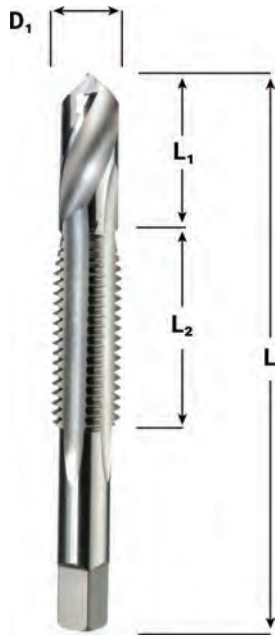
Thread Size	Cutter Dia. (D <sub>1</sub> )	OAL (L)	Drill Len. (L <sub>2</sub> )	Thread Len. (L <sub>2</sub> )	EDP
6-32 NC	0.112	2	5/16	7/16	<b>29004</b>
8-32 NC	0.138	2 1/8	3/8	1/2	<b>29006</b>
10-24 NC	0.155	2 3/8	13/32	5/8	<b>29008</b>
10-32 NF	0.164	2 3/8	13/32	5/8	<b>29009</b>
12-24 NC	0.18	2 3/8	15/32	21/32	<b>29010</b>
1/4-20 NC	0.208	2 1/2	17/32	25/32	<b>29012</b>
1/4-28 NF	0.22	2 1/2	17/32	25/32	<b>29013</b>
5/16-18 NC	0.266	2 23/32	11/16	15/16	<b>29014</b>
5/16-24 NF	0.277	2 23/32	11/16	15/16	<b>29015</b>
3/8-16 NC	0.322	2 15/16	13/16	1-1/8	<b>29016</b>
5/8-11 NC	0.548	5 1/16	1-1/2	1-3/8	<b>29036</b>
3/8-24 NF	0.34	2 15/16	13/16	1-1/8	<b>29017</b>
7/16-14 NC	0.377	3 3/4	1	1-1/4	<b>29018</b>
7/16-20 NF	0.395	3 3/4	1	1-1/4	<b>29019</b>
1/2-13 NC	0.435	4 1/16	1-1/8	1-3/8	<b>29020</b>
1/2-20 NF	0.458	4 1/16	1-1/8	1-3/8	<b>29022</b>
4-40 NC	0.091	1 1/78	1/4	3/8	<b>29000</b>

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

Combination Drill/Tap For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Combo Drill/Tap</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Combination drill and tap in one tool</li> <li>• Stocked Bright finish</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

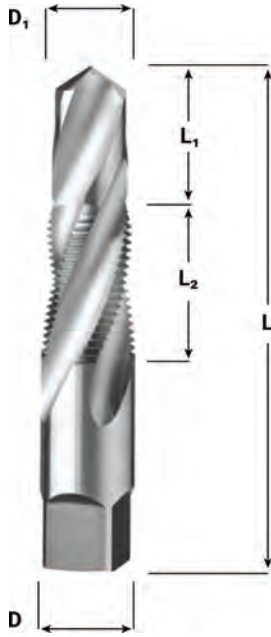
## Series 156M Performance | Combo Drill/Tap | Metric

Thread Size	Cutter Dia. (D <sub>1</sub> )	OAL (L)	Drill Len. (L <sub>2</sub> )	Thread Len. (L <sub>2</sub> )	EDP
M3.5 X.6	0.12	2	5/16	7/16	<b>29025</b>
M4 X.7	0.134	2 1/8	3/8	1/2	<b>29026</b>
M4.5 X.7	0.152	2 3/8	13/32	5/8	<b>29027</b>
M5 X.8	0.172	2 3/8	13/32	5/8	<b>29028</b>
M6 X 1	0.203	2 1/2	17/32	25/32	<b>29029</b>
M7 X 1	0.242	2 23/32	11/16	15/16	<b>29030</b>
M8 X 1.25	0.274	2 23/32	11/16	15/16	<b>29031</b>
M10 X 1.5	0.344	2 15/16	13/16	1-1/8	<b>29032</b>
M12 X1.75	0.414	4 1/16	1-1/8	1-3/8	<b>29033</b>
M3 X.5	0.102	1 15/16	9/32	13/32	<b>29024</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Combination Drill/Tap For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Combo Drill/Tap - NPTF</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Combination drill and tap in one tool</li> <li>• Stocked Bright finish</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

Series 157		Performance   Combo Drill/Tap   NPTF				
Thread Size	Cutter Dia. (D <sub>1</sub> )	OAL (L)	Drill Len. (L <sub>2</sub> )	Thread Len. (L <sub>2</sub> )	EDP	
1/8-27	0.332	2 7/8	3/4	3/4	<b>29041</b>	
1/4-18	0.438	3 5/16	7/8	1-1/16	<b>29042</b>	
3/8-18	0.562	3 1/2	15/16	1-1/16	<b>29043</b>	
1/2-14	0.703	4 3/8	1-1/4	1-3/8	<b>29044</b>	
3/4-14	0.906	4 9/16	1 5/16	1-3/8	<b>29045</b>	
1-11-1/2	1.141	5 3/8	1 5/8	1 3/4	<b>29046</b>	
1/16-27	0.242	2 13/16	11/16	11/16	<b>29040</b>	

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

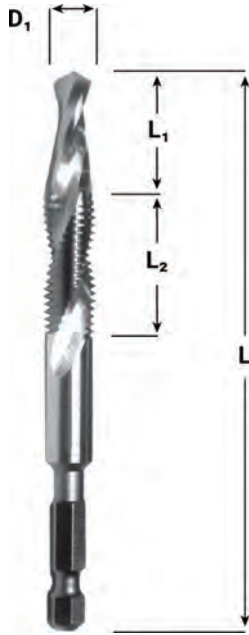
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Combination Drill/Tap For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Combo Drill/Tap - Quick Change</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Combination drill and tap in one tool</li> <li>• Quick change hex adapter</li> <li>• Accessories and adapters available</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 158 Performance | Combo Drill/Tap | Hex

Thread Size	Cutter Dia. (D <sub>1</sub> )	OAL (L)	Drill Len. (L <sub>1</sub> )	Thread Len. (L <sub>2</sub> )	Bright	TiN
4-40 NC	0.091	2 7/8	1/4	3/8	QC29000	QC29000-TiN
6-32 NC	0.112	3	7/16	7/16	QC29004	QC29004-TiN
8-32 NC	0.138	3 1/8	1/2	1/2	QC29006	QC29006-TiN
10-24 NC	0.155	3 3/8	5/8	5/8	QC29008	QC29008-TiN
10-32 NF	0.164	3 3/8	5/8	5/8	QC29009	QC29009-TiN
1/4-20 NC	0.208	3 1/2	25/32	25/32	QC29012	QC29012-TiN
1/4-28 NF	0.22	3 1/2	25/32	25/32	QC29013	QC29013-TiN
5/16-18 NC	0.266	3 23/32	11/16	15/16	QC29014	QC29014-TiN
5/16-24 NF	0.277	3 23/32	11/16	15/16	QC29015	QC29015-TiN
3/8-16 NC	0.322	3 15/16	13/16	1-1/8	QC29016	QC29016-TiN
3/8-24 NF	0.34	3 15/16	13/16	1-1/8	QC29017	QC29017-TiN

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

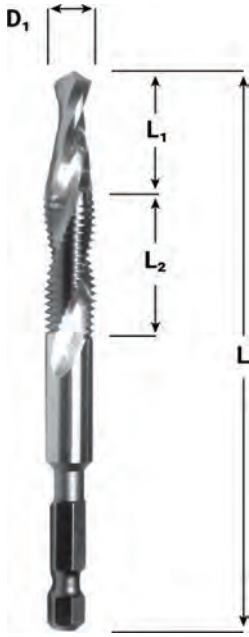
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Combination Drill/Tap For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Combo Drill/Tap - Quick Change</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Combination drill and tap in one tool</li> <li>• Quick change hex adapter</li> <li>• Accessories and adapters available</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

Series 158M		Performance   Combo Drill/Tap   Hex   Metric				
Thread Size	Cutter Dia. (D <sub>1</sub> )	OAL (L)	Drill Len. (L <sub>2</sub> )	Thread Len. (L <sub>2</sub> )	Bright	TiN
M4 X 0.7	0.134	3 1/8	3/8	1/2	<b>QC29026</b>	<b>QC29026-TiN</b>
M4.5 X .75	0.152	3 3/8	13/32	5/8	<b>QC29027</b>	<b>QC29027-TiN</b>
M5 X 0.8	0.172	3 3/8	13/32	5/8	<b>QC29028</b>	<b>QC29028-TiN</b>
M6 X 1.0	0.203	3 1/2	17/32	25/32	<b>QC29029</b>	<b>QC29029-TiN</b>
M7 X 1.0	0.242	3 23/32	11/16	15/16	<b>QC29030</b>	<b>QC29030-TiN</b>
M8 X 1.25	0.274	3 23/32	11/16	15/16	<b>QC29031</b>	<b>QC29031-TiN</b>
M10 X 1.5	0.344	3 15/16	13/16	1-1/8	<b>QC29032</b>	<b>QC29032-TiN</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

HSS Round Dies For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Round Die</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Split-round dies for creating external threads</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○			○	○	○	○			○	

● Best ○ Good

## Series 141 Performance | Round Die

Thread Size	Outside Dia.	EDP
5-40 NC	13/16	13020
6-32 NC	1	13022
6-40 NF	1	13024
6-48 NS	1	13026
8-32 NC	1	13028
8-40 NS	1	13032
10-24 NC	1	13036
10-32 NF	1	13038
10-36 NS	1	13040
10-40 NS	1	13042
10-56 NS	1	13046
12-32 NEF	1	13052
12-36 NS	1	13054
14-24 NS	1	13060
1/4-20 NC	1	13074
1/4-24 NS	1	13076
1/4-27 NS	1	13078
1/4-28 NF	1	13080
1/4-32 NEF	1	13082
1/4-40 NS	1	13084
1/4-48 NS	1	13086
1/4-56 NS	1	13088
1/4-80 NS	1	13090
5/16-18 NC	1	13100
5/16-20 NS	1	13102
5/16-24 NF	1	13104
5/16-27 NS	1	13106
5/16-32 NEF	1	13108
5/16-40 NS	1	13110
3/8-16 NC	1	13116
3/8-18 NS	1	13118
3/8-20 NS	1	13120
3/8-24 NF	1	13122
3/8-27 NS	1	13124
3/8-32 NEF	1	13128
3/8-40 NS	1	13132
7/16-14 NC	1-1/2	13142
7/16-16 NS	1-1/2	13144
7/16-18 NS	1-1/2	13146
7/16-20 NF	1-1/2	13148
7/16-24 NS	1-1/2	13150
7/16-27 NS	1-1/2	13152
7/16-28 NEF	1-1/2	13154
7/16-32 NS	1-1/2	13156
7/16-40 NS	1-1/2	13158
15/32-32 NS	1-1/2	13160

Thread Size	Outside Dia.	EDP
1/2-12 NS	1-1/2	13162
1/2-13 NC	1-1/2	13164
1/2-14 NS	1-1/2	13166
1/2-16 NS	1-1/2	13168
1/2-18 NS	1-1/2	13170
1/2-20 NF	1-1/2	13172
1/2-24 NS	1-1/2	13174
1/2-27 NS	1-1/2	13176
1/2-28 NEF	1-1/2	13178
1/2-32 NS	1-1/2	13180
1/2-40 NS	1-1/2	13182
9/16-12 NC	1-1/2	13188
9/16-16 NS	1-1/2	13190
9/16-18 NF	1-1/2	13192
9/16-20 NS	1-1/2	13194
9/16-24 NEF	1-1/2	13196
9/16-27 NS	1-1/2	13198
9/16-32 NC	1-1/2	13200
5/8-11 NC	1-1/2	13204
5/8-18 NF	1-1/2	13212
5/8-20 NS	1-1/2	13214
5/8-24 NEF	1-1/2	13216
5/8-27 NS	1-1/2	13218
5/8-28 NS	1-1/2	13220
5/8-32 NS	1-1/2	13222
11/16-18 NS	2	13230
11/16-20 NS	2	13232
11/16-24 NEF	2	13234
11/16-32 NS	2	13238
3/4-10 NC	2	13240
3/4-12 NS	2	13242
3/4-16 NF	2	13246
3/4-18 NS	2	13248
3/4-20 NEF	2	13250
3/4-24 NS	2	13252
3/4-27 NS	2	13254
3/4-32 NS	2	13256
13/16-16 NS	2	13264
13/16-18 NS	2	13266
13/16-20 NEF	2	13268
13/16-24 NS	2	13270
7/8-9 NC	2	13272
7/8-12 NS	2	13274
7/8-14 NF	2	13276
7/8-16 NS	2	13278
7/8-18 NS	2	13280

# PERFORMANCE

HSS Round Dies For Ferrous And Non-Ferrous Materials



Series 141		Performance   Round Die	
Thread Size	Outside Dia.	EDP	
7/8-20 NEF	2	13282	
7/8-24 NS	2	13284	
7/8-32 NS	2	13286	
15/16-12 NS	2	13288	
15/16-14 NS	2	13290	
15/16-16 NS	2	13292	
15/16-18 NC	2	13294	
15/16-20 NS	2	13296	
15/16-32 NEF	2	13298	
1-8 NC	2	13300	
1-12 NF	2	13306	
1-14 NS	2	13308	
1-16 NS	2	13310	
1-18 NS	2	13312	
1-20 NEF	2	13314	
1-24 NS	2	13316	
1-27 NS	2	13318	
1-32 NS	2	13320	
1 1/16-12 NS	2	13322	
1 1/16-16 NS	2	13326	
1 1/16-18 NEF	2	13330	
1 1/16-20 NS	2	13332	
1-1/8-7 NC	2-1/2	13334	
1-1/8-1 NF	2-1/2	13336	
1-1/8-1 NS	2-1/2	13340	
1-1/8-1 NEF	2-1/2	13342	
1-1/8-2 NS	2-1/2	13344	
1 3/16-12 NS	2-1/2	13346	
1 3/16-18 NEF	2-1/2	13350	
1-1/4-7 NC	2-1/2	13352	
1-1/4-12 NSF	2-1/2	13354	
1-1/4-16 NS	2-1/2	13356	
1-1/4-18 NEF	2-1/2	13358	
1-1/4-20 NC	2-1/2	13360	
1-1/4-24 NS	2-1/2	13362	
1 5/16-1 NS	2-1/2	13364	
1 5/16-1 NEF	2-1/2	13370	
1 3/8-6 NC	2-1/2	13372	
1 3/8-12 NF	2-1/2	13374	
1 3/8-16 NC	2-1/2	13378	
1 3/8-18 NS	2-1/2	13380	
1 3/8-20 NS	2-1/2	13382	
1-1/2-6 NC	2-1/2	13392	
1-1/2-12 NSF	2-1/2	13394	
1-1/2-16 NS	2-1/2	13398	
1-1/2-18 NS	2-1/2	13400	
1-1/2-20 NF	2-1/2	13402	
1-9/16-1 NEF	3	13408	
1-5/8-12 NS	3	13412	
1-5/8-16 NS	3	13414	
1-5/8-18 NF	3	13416	
1-3/4-5 NC	3	13420	
1-3/4-12 NS	3	13422	
1-3/4-16 NF	3	13426	
1-3/4-18 NS	3	13428	
1-7/8-12 NS	3	13436	
1-7/8-16 NS	3	13438	
2-4 1/2 NC	3	13446	
1/4-36 NS	3	13451	
2-12 NS	3	13452	
2-16 NS	3	13456	
2-20 NS	3	13460	
1-1/8-8 NS	2-1/2	13464	
1-1/4-8 NS	2-1/2	13466	
1 3/8-8 NS	2-1/2	13468	
1-1/2-8 NS	2-1/2	13470	
1-3/4-8 NS	3	13474	
1-7/8-8 NS	3	13476	
2-8 NS	3	13478	

INTRO

MILLING

SPECIALTY

HOLEMAKING

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# PERFORMANCE

HSS Round Dies For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Round Die</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Split-round dies for creating external pipe threads</li> <li>• Various straight and tapered pipe configurations</li> <li>• NPS, NPT, NSPT, NSPT</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 141P** Performance | Round Die | Pipe

Thread Size	Outside Dia.	EDP
1/16-27 NPS	1	<b>13064</b>
1/8-27 NPT	1	<b>13070</b>
1/8-27 NPS	1	<b>13072</b>
1/4-18 NPT	1-1/2	<b>13092</b>
1/4-18 NPS	1-1/2	<b>13094</b>
3/8-18 NPT	1-1/2	<b>13136</b>
3/8-18 NPS	1-1/2	<b>13138</b>
1/2-14 NPT	2	<b>13184</b>
1/2-14 NPS	2	<b>13186</b>
3/4-14 NPT	2	<b>13258</b>
3/4-14 NPS	2	<b>13260</b>
1-11 NPT	2-1/2	<b>13302</b>
1-11 NPS	2-1/2	<b>13304</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

HSS Round Dies For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Round Die</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Split-round dies for creating external threads</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 141M Performance | Round Die | Metric

Thread Size	Outside Dia.	EDP
M3 X.5	13/16	13518
M3.5 X.6	13/16	13522
M4 X.7	13/16	13524
M4.5 X.7	13/16	13528
M5 X.8	13/16	13530
M6 X 0.7	1	13536
M6 X 1.0	1	13538
M7 X 1.0	1	13542
M8 X 1.2	1	13546
M8 X 1.0	1	13548
M10 X 1.0	1-1/2	13554
M10 X 1.5	1	13556
M10 X 1.25	1-1/2	13558
M11 X 1.5	1-1/2	13560
M12 X 1.75	1-1/2	13564
M12 X 1.25	1-1/2	13566
M14 X 1.25	1-1/2	13568
M14 X 2.0	1-1/2	13570
M14 X 1.5	1-1/2	13572
M16 X 2.0	1-1/2	13576
M16 X 1.5	1-1/2	13578
M18 X 2.5	1-1/2	13584
M18 X 1.5	1-1/2	13586
M20 X 2.5	2	13592
M20 X 1.5	2	13594
M22 X 2.5	2	13598
M22 X 1.5	2	13600
M24 X 3.0	2	13604
M24 X 2.0	2	13606
M27 X 3.0	2-1/2	13614
M27 X 2.0	2-1/2	13616
M30 X 3.5	2-1/2	13624
M30 X 2.0	2-1/2	13626
M33 X 2.0	2-1/2	13634
M36 X 4.0	2-1/2	13638
M36 X 3.0	2-1/2	13640
M39 X 3.0	3	13648

\*bold numbers are EDPs for ordering

INTRO

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# PERFORMANCE

HSS Round Dies For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Round Die - Left Hand</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Left hand split-round dies for creating external LH threads</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 142 Performance | Round Die | Left Hand

Thread Size	Outside Dia.	EDP
6-32 NC	1	<b>13023</b>
6-40 NF	1	<b>13025</b>
8-32 NC	1	<b>13029</b>
10-24 NC	1	<b>13037</b>
10-32 NF	1	<b>13039</b>
12-24 NC	1	<b>13049</b>
12-28 NF	1	<b>13051</b>
1/4-20 NC	1	<b>13075</b>
1/4-28 NF	1	<b>13081</b>
5/16-18 NC	1	<b>13101</b>
5/16-24 NF	1	<b>13105</b>
3/8-16 NC	1	<b>13117</b>
3/8-24 NF	1	<b>13123</b>
7/16-14 NC	1-1/2	<b>13143</b>
7/16-20 NF	1-1/2	<b>13149</b>
1/2-13 NC	1-1/2	<b>13165</b>
1/2-20 NF	1-1/2	<b>13173</b>
9/16-12 NC	1-1/2	<b>13189</b>
9/16-18 NF	1-1/2	<b>13193</b>
5/8-11 NC	1-1/2	<b>13205</b>
5/8-18 NF	1-1/2	<b>13213</b>
11/16-16 NS	2	<b>13229</b>
3/4-10 NC	2	<b>13241</b>
3/4-16 NF	2	<b>13247</b>
7/8-9 NC	2	<b>13273</b>
7/8-14 NF	2	<b>13277</b>
1-8 NC	2	<b>13301</b>
1-12 NF	2	<b>13307</b>
1-14 NS	2	<b>13309</b>
1-1/8-7 NC	2-1/2	<b>13335</b>
1-1/8-1 NF	2-1/2	<b>13337</b>
1-1/4-7 NC	2-1/2	<b>13353</b>
1-1/4-12 NS	2-1/2	<b>13355</b>
1 3/8-12 NF	2-1/2	<b>13375</b>
1-1/2-6 NC	2-1/2	<b>13393</b>
1-1/2-12 NS	2-1/2	<b>13395</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Round Dies For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Round Die - Left Hand</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Left hand split-round dies for creating external LH threads</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 142M Performance | Round Die | Metric | Left Hand

Thread Size	Outside Dia.	EDP
M4 X.7	13/16	13525
M5 X.8	13/16	13531
M6 X 1.0	1	13539
M7 X 1.0	1	13543
M8 X 1.2	1	13547
M8 X 1.0	1	13549
M10 X 1.5	1-1/2	13557
M10 X 1.25	1-1/2	13559
M12 X 1.75	1-1/2	13565
M12 X 1.25	1-1/2	13567
M14 X 2.0	1-1/2	13571
M14 X 1.5	1-1/2	13573
M16 X 2.0	1-1/2	13577
M16 X 1.5	1-1/2	13579
M18 X 2.5	1-1/2	13585
M20 X 2.5	2	13593
M20 X 1.5	2	13595
M24 X 3.0	2	13605
M24 X 2.0	2	13607
M30 X 3.5	2	13625

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

HSS Round Dies For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Round Die - BSPT &amp; BSPP</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Split-round dies for creating external British standard threads</li> <li>• BSPT &amp; BSPP</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 143** Performance | Round Die | BSPT & BSPP

Thread Size	Outside Dia.	EDP
1/8-28 BSPT	1	<b>13692</b>
1/4-19 BSPT	1-1/2	<b>13694</b>
3/8-19 BSPT	1-1/2	<b>13696</b>
1/2-14 BSPT	2	<b>13698</b>
3/4-14 BSPT	2	<b>13700</b>
1/8-28 BSPP	1	<b>13693</b>
1/4-19 BSPP	1-1/2	<b>13695</b>
3/8-19 BSPP	1-1/2	<b>13697</b>
1/2-14 BSPP	2	<b>13699</b>
3/4-14 BSPP	2	<b>13701</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Carbide Taps For Cast Iron And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Carbide Taps - Straight Flute</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Stocked Bright finish</li> <li>• ANSI Tap - Refer to USCTI Table 302A for dimensions</li> <li>• Custom carbide taps as fast as 3-6 days pending blank availability</li> </ul>	 	

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 126** Hand Tap | Carbide | Plug & Bottom

Thread Size	Thread Limit	Flutes	Plug	Bottom
0-80 NF	H2	2	41579	41580
4-48 NF	H2	2	41017	41018
5-40 NC	H2	3	41034	41035
6-32 NC	H3	3	41074	41075
8-32 NC	H3	4	41125	41126
10-24 NC	H3	4	41180	41181
10-32 NF	H3	4	41213	41214
12-24 NC	H3	4	41246	41247
12-28 NF	H3	4	41279	41280
1/4-20 NC	H3	4	41312	41313
6-40 NF	H2	3	41092	41093
1/4-28 NF	H3	4	41345	41346
5/16-18 NC	H3	4	41378	41379
5/16-24 NF	H3	4	41411	41412
3/8-16 NC	H3	4	41444	41445
4-40 NC	H2	2	41007	41008
8-36 NF	H2	4	41147	41148
7/16-20 NF	H3	4	41524	41525
1/2-13 NC	H3	4	41528	41529
1/2-20 NF	H3	4	41532	41533
2-56 NC	H2	2	41536	41537
3/8-24 NF	H3	4	41476	41477
7/16-14 NC	H3	4	41520	41521
9/16-12 NC	H3	4	47201	47202
9/16-18 NF	H3	4	47204	47205
5/8-11 NC	H3	4	47207	47208
5/8-18 NF	H3	4	47210	47211
3/4-10 NC	H3	4	47213	47214
3/4-16 NF	H3	4	47216	47217
3/4-10 NC	H5	4	47228	47229
3/4-16 NF	H5	4	47231	47232

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
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 THREADING  
 INSERTS

# PERFORMANCE

Carbide Taps For Cast Iron And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Carbide Taps - Straight Flute</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Stocked Bright finish</li> <li>• ANSI Tap - Refer to USCTI Table 302A for dimensions</li> <li>• Custom carbide taps as fast as 3-6 days pending blank availability</li> </ul>	 	

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 126M** | Hand Tap | Carbide | Metric | Plug & Bottom

Thread Size	Thread Limit	Flutes	Plug	Bottom
M3.5 X 0.6	D4	3	<b>43005</b>	<b>43006</b>
M4 X 0.7	D4	4	<b>43009</b>	<b>43010</b>
M4.5 X 0.75	D4	4	<b>43013</b>	<b>43014</b>
M5 X 0.8	D4	4	<b>43017</b>	<b>43018</b>
M6 X 1.0	D5	4	<b>43021</b>	<b>43022</b>
M7 X 1.0	D5	4	<b>43025</b>	<b>43026</b>
M3 X 0.5	D3	3	<b>43001</b>	<b>43002</b>
M8 X 1.25	D5	4	<b>43029</b>	<b>43030</b>
M8 X 1.0	D5	4	<b>43033</b>	<b>43034</b>
M10 X 1.25	D5	4	<b>43041</b>	<b>43042</b>
M12 X 1.75	D6	4	<b>43045</b>	<b>43046</b>
M10 X 1.5	D6	4	<b>43037</b>	<b>43038</b>

\*bold numbers are EDPs for ordering

## Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

CUSTOM  
COMES  
STANDARD

# PERFORMANCE

## Carbide Taps For Cast Iron And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Carbide Tap - Pipe - NPT/F</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Stocked Bright finish</li> <li>• &gt; 1/4" are CARB-I-SERT brazed style</li> <li>• ANSI Tap - Refer to USCTI Table 311 for dimensions</li> <li>• Custom carbide taps as fast as 3-6 days pending blank availability</li> </ul>	 	

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

### Series 127 Pipe Tap | Carbide | Plug | NPT/F

Thread Size	Flutes	EDP
1/8-27	4	<b>41801</b>
1/16-27	4	<b>41800</b>
1/4-18	4	<b>41802</b>
3/8-18	4	<b>41808</b>
1/2-14	4	<b>41809</b>
3/4-14	4	<b>41810</b>
1-11-1/2	6	<b>41811</b>

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS



# PERFORMANCE

Carbide Taps For Cast Iron And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Carbide Taps - Spiral Point</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Stocked Bright finish</li> <li>• ANSI Tap - Refer to USCTI Table 302A for dimensions</li> <li>• Custom carbide taps as fast as 3-6 days pending blank availability</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 128** | Spiral Point Tap | Carbide | Plug

Thread Size	Thread Limit	Flutes	EDP
5-40 NC	H2	2	41032
2-56 NC	H3	2	41538
4-40 NC	H2	2	41009
3/8-24 NF	H1	3	41001
4-48 NF	H2	2	41019
6-32 NC	H3	2	41072
8-32 NC	H3	2	41120
10-24 NC	H3	2	41175
10-32 NF	H3	2	41208
12-24 NC	H3	2	41241
12-28 NF	H3	2	41274
1/4-20 NC	H3	2	41307
1/4-28 NF	H3	2	41340
5/16-18 NC	H3	2	41373
5/16-24 NF	H3	2	41406
3/8-16 NC	H3	3	41442
7/16-14 NC	H3	3	41522
7/16-20 NF	H3	3	41526
1/2-13 NC	H3	3	41530
1/2-20 NF	H3	3	41534

\*bold numbers are EDPs for ordering

INTRO

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# PERFORMANCE

Carbide Taps For Cast Iron And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Carbide Taps - Spiral Point</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Stocked Bright finish</li> <li>• ANSI Tap - Refer to USCTI Table 302A for dimensions</li> <li>• Custom carbide taps as fast as 3-6 days pending blank availability</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 128M** | Spiral Point Tap | Carbide | Metric | Plug

Thread Size	Thread Limit	Flutes	EDP
M3 X 0.5	D3	2	<b>43003</b>
M3.5 X 0.6	D4	2	<b>43007</b>
M4 X 0.7	D4	2	<b>43011</b>
M4.5 X 0.75	D4	2	<b>43015</b>
M5 X 0.8	D4	2	<b>43019</b>
M6 X 1.0	D5	2	<b>43023</b>
M7 X 1.0	D5	2	<b>43027</b>
M8 X 1.25	D5	2	<b>43031</b>
M10 X 1.5	D6	3	<b>43039</b>
M10 X 1.25	D5	3	<b>43043</b>
M12 X 1.75	D6	3	<b>43047</b>

\*bold numbers are EDPs for ordering

### Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

CUSTOM  
COMES  
STANDARD

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 HOLEMAKING  
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 INSERTS

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Conduit Tap</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Conduit tap</li> <li>• Custom conduit taps in 3-5 days pending blank availability</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 170C Conduit Tap | Metric | PG7 - PG48 | Plug & Bottom

Thread Size	Pipe Size	Flutes	Plug	Bottom
M12.5X1.27	PG7	4	<b>20992</b>	<b>20993</b>
M15.2X1.41	PG9	4	<b>20995</b>	<b>20996</b>
M18.6X1.41	PG11	4	<b>20998</b>	<b>20999</b>
M20.4X1.41	PG13	4	<b>21001</b>	<b>21002</b>
M22.5X1.41	PG16	4	<b>21004</b>	<b>21005</b>
M28.3X1.588	PG21	6	<b>21007</b>	<b>21008</b>
M37X1.588	PG29	6	<b>21010</b>	<b>21011</b>
M47X1.588	PG36	6	<b>21013</b>	<b>21014</b>
M54X1.588	PG42	6	<b>21016</b>	<b>21017</b>
M59.3X1.588	PG48	6	<b>21019</b>	<b>21020</b>

\*bold numbers are EDPs for ordering

### Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

## CUSTOM COMES STANDARD

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Forming Tap</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Forming tap eliminates chips by displacing material to create threads</li> <li>• ANSI Tap - Refer to USCTI Table 302A for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 104 Forming Tap | Plug & Bottom

Thread Size	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	Plug	Bottom
0-80 NF	H2	0.0536	0.0549	-	19000
0-80 NF	H3	0.0536	0.0549	-	19001
1-64 NC	H2	0.065	0.0667	-	19002
1-64 NC	H3	0.065	0.0667	-	19003
1-72 NF	H2	0.0659	0.0673	-	19004
1-72 NF	H3	0.0659	0.0673	-	19005
2-56 NC	H2	0.0769	0.0787	-	19006
2-56 NC	H3	0.0769	0.0787	-	19007
2-64 NF	H2	0.078	0.0796	-	19008
2-64 NF	H3	0.078	0.0796	-	19009
3-48 NC	H2	0.0884	0.0905	-	19010
3-48 NC	H3	0.0884	0.0905	-	19011
3-56 NF	H2	0.0899	0.0917	-	19012
3-56 NF	H3	0.0899	0.0917	-	19013
4-40 NC	H3	0.0993	0.1018	19014	19015
4-40 NC	H5	0.0993	0.1018	19016	19017
4-48 NF	H3	0.1014	0.1035	19018	19019
4-48 NF	H5	0.1014	0.1035	19020	19021
5-40 NC	H3	0.1123	0.1148	19022	19023
5-40 NC	H5	0.1123	0.1148	19024	19025
5-44 NF	H3	0.1135	0.1157	19026	19027
5-44 NF	H5	0.1135	0.1157	19028	19029
6-32 NC	H3	0.1221	0.1253	19030	19031
6-32 NC	H5	0.1221	0.1253	19032	19033
6-32 NC	H10	0.1221	0.1253	19034	19035
6-40 NF	H3	0.1253	0.1278	19036	19037
6-40 NF	H5	0.1253	0.1278	19038	19039
8-32 NC	H3	0.1481	0.1513	19040	19041
8-32 NC	H5	0.1481	0.1513	19042	19043
8-32 NC	H10	0.1481	0.1513	19044	19045
8-36 NF	H3	0.1498	0.1527	19046	19047
8-36 NF	H5	0.1498	0.1527	19048	19049
10-24 NC	H4	0.1688	0.173	19050	19051
10-24 NC	H6	0.1688	0.173	19052	19053
10-24 NC	H10	0.1688	0.173	19054	19055
10-32 NF	H4	0.1741	0.1776	19056	19057
10-32 NF	H6	0.1741	0.1776	19058	19059
10-32 NF	H10	0.1741	0.1776	19060	19061
12-24 NC	H4	0.1948	0.199	19062	19063
12-24 NC	H6	0.1948	0.199	19064	19065
12-28 NF	H4	0.1978	0.2014	19066	19067
12-28 NF	H6	0.1978	0.2014	19068	19069
1/4-20 NC	H4	0.2245	0.2296	19070	19071
1/4-20 NC	H6	0.2245	0.2296	19072	19073
1/4-20 NC	H10	0.2245	0.2296	19074	19075

\*bold numbers are EDPs for ordering

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



Series 104		Forming Tap   Plug & Bottom				
Thread Size	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	Plug	Bottom	
1/4-28 NF	H4	0.2318	0.2354	<b>19076</b>	<b>19077</b>	
1/4-28 NF	H6	0.2318	0.2354	<b>19078</b>	<b>19079</b>	
1/4-28 NF	H10	0.2318	0.2354	<b>19080</b>	<b>19081</b>	
5/16-18 NC	H5	0.2842	0.2898	<b>19082</b>	<b>19083</b>	
5/16-18 NC	H7	0.2842	0.2898	<b>19084</b>	<b>19085</b>	
5/16-18 NC	H10	0.2842	0.2898	<b>19086</b>	<b>19087</b>	
5/16-24 NF	H5	0.2913	0.2955	<b>19088</b>	<b>19089</b>	
5/16-24 NF	H7	0.2913	0.2955	<b>19090</b>	<b>19091</b>	
5/16-24 NF	H10	0.2913	0.2955	<b>19092</b>	<b>19093</b>	
3/8-16 NC	H5	0.3431	0.3495	<b>19094</b>	<b>19095</b>	
3/8-16 NC	H7	0.3431	0.3495	<b>19096</b>	<b>19097</b>	
3/8-16 NC	H10	0.3431	0.3495	<b>19098</b>	<b>19099</b>	
3/8-24 NF	H5	0.3538	0.358	<b>19100</b>	<b>19101</b>	
3/8-24 NF	H7	0.3538	0.358	<b>19102</b>	<b>19103</b>	
3/8-24 NF	H10	0.3538	0.358	<b>19104</b>	<b>19105</b>	
7/16-14 NC	H5	0.4011	0.4084	<b>19106</b>	<b>19107</b>	
7/16-14 NC	H8	0.4011	0.4084	<b>19108</b>	<b>19109</b>	
7/16-20 NF	H5	0.412	0.4171	<b>19144</b>	<b>19145</b>	
7/16-20 NF	H8	0.412	0.4171	<b>19146</b>	<b>19147</b>	
1/2-13 NC	H5	0.4608	0.4686	<b>19110</b>	<b>19111</b>	
1/2-13 NC	H8	0.4608	0.4686	<b>19112</b>	<b>19113</b>	
1/2-20 NF	H5	0.4745	0.4796	<b>19114</b>	<b>19115</b>	
1/2-20 NF	H8	0.4745	0.4796	<b>19116</b>	<b>19117</b>	
1/2-20 NF	H10	0.4745	0.4796	<b>19118</b>	<b>19119</b>	
9/16-12 NC	H7	0.52	0.5285	<b>19120</b>	<b>19121</b>	
9/16-12 NC	H10	0.52	0.5285	<b>19122</b>	<b>19123</b>	
9/16-18 NF	H7	0.5342	0.5398	<b>19124</b>	<b>19125</b>	
9/16-18 NF	H10	0.5342	0.5398	<b>19126</b>	<b>19127</b>	
5/8-11 NC	H7	0.5786	0.5879	<b>19128</b>	<b>19129</b>	
5/8-11 NC	H10	0.5786	0.5879	<b>19130</b>	<b>19131</b>	
5/8-18 NF	H7	0.5967	0.6023	<b>19132</b>	<b>19133</b>	
5/8-18 NF	H10	0.5967	0.6023	<b>19134</b>	<b>19135</b>	
3/4-10 NC	H7	0.699	0.7092	<b>19136</b>	<b>19137</b>	
3/4-10 NC	H10	0.699	0.7092	<b>19138</b>	<b>19139</b>	
3/4-16 NF	H7	0.7181	0.7245	<b>19140</b>	<b>19141</b>	
3/4-16 NF	H10	0.7181	0.7245	<b>19142</b>	<b>19143</b>	

\*bold numbers are EDPs for ordering

INTRO

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Forming Tap - Metric</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Forming tap eliminates chips by displacing material to create threads</li> <li>• ANSI Tap - Refer to USCTI Table 302A for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 104M Forming Tap | Metric | Plug & Bottom

Thread Size	Thread Limit	Min Tap/Drill Size	Max Tap/Drill Size	Plug	Bottom
M3 X 0.5	D5	2.75	2.8	19200	19201
M3.5 X 0.6	D6	3.19	3.26	19202	19203
M4 X 0.7	D6	3.64	3.71	19204	19205
M4.5 X 0.75	D6	4.12	4.17	19206	19207
M5 X 0.8	D7	4.59	4.67	19208	19209
M6 X 1.0	D8	5.5	5.59	19210	19211
M7 X 1.0	D8	6.49	6.56	19212	19213
M8 X 1.25	D9	7.36	7.49	19214	19215
M8 X 1.0	D8	7.49	7.56	19216	19217
M10 X 1.25	D9	9.36	9.45	19220	19221
M10 X 1.5	D10	9.24	9.39	19218	19219
M12 X 1.25	D10	11.36	11.45	19224	19225
M12 X 1.75	D11	11.11	11.29	19222	19223
M14 X 1.5	D11	13.24	13.34	19228	19229
M14 X 2.0	D12	12.98	13.12	19226	19227
M16 X 2.0	D14	14.98	15.12	19230	19231
M18 X 1.5	D12	17.24	17.34	19232	19233

\*bold numbers are EDPs for ordering

### Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

## CUSTOM COMES STANDARD

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Hand Tap</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Hand tap</li> <li>• Stocked Bright finish</li> <li>• ANSI Tap - Refer to USCTI Table 302/303 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 101 Hand Tap | Taper, Plug, Bottom

Thread Size	Thread Limit	Flutes	Taper	Plug	Bottom
2-56 NC	H4	2	17762	17763	17764
4-36 NS	H2	3	-	17946	17947
6-32 NC	H5	3	15121	15122	15123
6-32 NC	H7	3	15127	15128	15129
6-32 NC	H11	3	15133	15134	15135
6-48 NS	H2	3	15157	15158	15159
8-24 NS	H3	4	15163	15164	15165
8-32 NC	H5	4	15181	15182	15183
8-32 NC	H7	4	15187	15188	15189
8-32 NC	H11	4	15193	15194	15195
8-40 NS	H2	4	15217	15218	15219
10-24 NC	H5	4	15235	15236	15237
10-24 NC	H7	4	15241	15242	15243
10-24 NC	H11	4	15247	15248	15249
10-28 NS	H3	4	15265	15266	15267
10-30 NS	H3	4	15271	15272	15273
10-32 NF	H4	4	-	17898	17899
10-32 NF	H5	4	15289	15290	15291
10-32 NF	H7	4	15295	15296	15297
10-32 NF	H11	4	15301	15302	15303
10-36 NS	H2	4	15319	15320	15321
10-40 NS	H2	4	15325	15326	15327
10-48 NS	H2	4	15331	15332	15333
10-56 NS	H2	4	15337	15338	15339
10-64 NS	H2	4	15343	15344	15345
12-32 NEF	H3	4	15385	15386	15387
12-36 NS	H2	4	15391	15392	15393
14-20 NS	H3	4	15397	15398	15399
14-24 NS	H3	4	15403	15404	15405
5/32-32	H3	4	17559	17560	17561
3/16-24 NS	H3	4	15442	15443	15444
3/16-32 NC	H3	4	15448	15449	15450
7/32-32	H3	4	17564	17565	17566
.210-36 NS	H3	4	17645	17646	17647
.210-36 NS	H4	4	-	17901	17902
1/4-20 NC	H7	4	15493	15494	15495
1/4-20 NC	H11	4	15499	15500	15501
1/4-20 NC	H21	4	15505	15506	15507
1/4-24 NS	H3	4	15535	15536	15537
1/4-27 NS	H3	4	15541	15542	15543
1/4-28 NF	H5	4	15553	15554	15555
1/4-28 NF	H7	4	15559	15560	15561
1/4-28 NF	H11	4	15565	15566	15567
1/4-32 NEF	H3	4	15583	15584	15585
1/4-32 NEF	H5	4	15589	15590	15591

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



Series 101		Hand Tap   Taper, Plug, Bottom			
Thread Size	Thread Limit	Flutes	Taper	Plug	Bottom
1/4-36 NS	H2	4	15595	15596	15597
1/4-36 NS	H3	4	17758	17759	17760
1/4-40 NS	H2	4	15601	15602	15603
1/4-48 NS	H2	4	15613	15614	15615
1/4-56 NS	H2	4	15619	15620	15621
1/4-80 NS	H2	4	15637	15638	15639
1/4-40 NS	H3	4	15607	15608	15609
9/32-32 NS	H3	4	17588	17589	17590
5/16-18 NC	H7	4	15649	15650	15651
5/16-18 NC	H11	4	15655	15656	15657
5/16-18 NC	H21	4	15661	15662	15663
5/16-20 NS	H3	4	15683	15684	15685
5/16-24 NF	H5	4	17649	17650	17651
5/16-24 NF	H6	4	17706	17707	17708
5/16-24 NF	H11	4	15707	15708	15709
5/16-27 NS	H3	4	15718	15719	15720
5/16-28 NS	H3	4	15724	15725	15726
5/16-32 NEF	H3	4	15729	15730	15731
5/16-32 NEF	H5	4	15734	15735	15736
5/16-40 NS	H2	4	15739	15740	15741
11/32-32 NS	H3	4	15749	15750	15751
3/8-16 NC	H7	4	15765	15766	15767
3/8-16 NC	H11	4	15770	15771	15772
3/8-16 NC	H21	4	15775	15776	15777
3/8-18 NS	H3	4	15805	15806	15807
3/8-20 NS	H3	4	15837	15838	15839
3/8-24 NF	H5	4	15847	15848	15849
3/8-24 NF	H7	4	15852	15853	15854
3/8-24 NF	H8	4	-	17915	17916
3/8-24 NF	H11	4	15857	15858	15859
3/8-27 NS	H3	4	15867	15868	15869
3/8-28 NS	H3	4	15872	15873	15874
3/8-32 NEF	H3	4	15877	15878	15879
3/8-32 NEF	H5	4	15882	15883	15884
3/8-40 NS	H2	4	15887	15888	15889
3/8-40 NS	H3	4	17614	17615	17616
3/8-48 NS	H2	4	15892	15893	15894
13/32-32 NS	H3	4	15897	15898	15899
7/16-14 NC	H11	4	15907	15908	15909
7/16-16 NS	H3	4	15937	15938	15939
7/16-18 NS	H3	4	15942	15943	15944
7/16-20 NF	H6	4	17740	17741	17742
7/16-20 NF	H11	4	15962	15963	15964
7/16-24 NS	H3	4	15977	15978	15979
7/16-24 NS	H5	4	15982	15983	15984
7/16-27 NS	H3	4	15987	15988	15989
7/16-28 NEF	H3	4	15992	15993	15994
7/16-28 NEF	H5	4	15997	15998	15999
7/16-32 NS	H3	4	16002	16003	16004
7/16-40 NS	H2	4	16007	16008	16009
15/32-32 NS	H3	6	16012	16013	16014
1/2-12 NS	H3	4	16027	16028	16029
1/2-13 NC	H7	4	16042	16043	16044
1/2-13 NC	H11	4	16047	16048	16049
1/2-13 NC	H21	4	16052	16053	16054
1/2-14 NS	H3	4	16114	16115	16116
1/2-16 NS	H3	4	16119	16120	16121
1/2-18 NS	H3	4	16124	16125	16126
1/2-20 NF	H5	4	-	-	17634
1/2-20 NF	H7	4	16134	16135	16136
1/2-20 NF	H11	4	16139	16140	16141
1/2-24 NS	H3	4	16154	16155	16156
1/2-27 NS	H3	4	16159	16160	16161
1/2-28 NEF	H3	4	16164	16165	16166
1/2-28 NEF	H5	4	16169	16170	16171
1/2-32 NS	H3	6	16174	16175	16176
1/2-40 NS	H2	6	16179	16180	16181
33/64-13 NS	H3	4	16184	16185	16186
9/16-16 NS	H3	4	16199	16200	16201
9/16-18 NF	H5	4	-	18375	17769
9/16-18 NF	H11	4	16214	16215	16216
9/16-20 NS	H3	4	16224	16225	16226
9/16-24 NEF	H3	4	16229	16230	16231
9/16-24 NEF	H5	4	16234	16235	16236
9/16-27 NS	H3	6	16239	16240	16241
9/16-32 NC	H3	6	16244	16245	16246

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

Series 101		Hand Tap   Taper, Plug, Bottom				
Thread Size	Thread Limit	Flutes	Taper	Plug	Bottom	
5/8-11 NC	H11	4	16274	16275	16276	
5/8-11 NC	H21	4	16279	16280	16281	
5/8-12 NS	H3	4	16319	16320	16321	
5/8-16 NS	H3	4	16324	16325	16326	
5/8-18 NF	H7	4	17680	17681	17682	
5/8-18 NF	H8	4	-	17904	17905	
5/8-18 NF	H11	4	16334	16335	16336	
5/8-20 NS	H3	4	16348	16349	16350	
5/8-24 NEF	H3	6	16353	16354	16355	
5/8-24 NEF	H5	6	16358	16359	16360	
5/8-27 NS	H3	6	16363	16364	16365	
5/8-28 NS	H3	6	16368	16369	16370	
5/8-32 NS	H3	6	16373	16374	16375	
41/64-11 NS	H4	4	16378	16379	16380	
11/16-18 NS	H3	4	16393	16394	16395	
11/16-20 NS	H3	6	16398	16399	16400	
11/16-24 NEF	H3	6	16403	16404	16405	
11/16-24 NEF	H5	6	16408	16409	16410	
11/16-28 NS	H3	6	16418	16419	16420	
11/16-32 NS	H3	6	16423	16424	16425	
3/4-10 NC	H11	4	16453	16454	16455	
3/4-10 NC	H21	4	16458	16459	16460	
3/4-11 NH	H9	6	16496	16497	16498	
3/4-12 NS	H4	4	16501	16502	16503	
3/4-16 NF	H7	4	17636	17637	17638	
3/4-16 NF	H8	4	17744	17745	17746	
3/4-16 NF	H11	4	16538	16539	16540	
3/4-18 NS	H3	4	16547	16548	16549	
3/4-20 NEF	H3	6	16552	16553	16554	
3/4-20 NEF	H5	6	16557	16558	16559	
3/4-24 NS	H3	6	16562	16563	16564	
3/4-27 NS	H3	6	16567	16568	16569	
3/4-32 NS	H3	6	16572	16573	16574	
3/4-40 NS	H3	6	16577	16578	16579	
49/64-10 NS	H4	4	16582	16583	16584	
13/16-10 NS	H4	4	16596	16597	16598	
13/16-12 NS	H4	4	16601	16602	16603	
13/16-16 NS	H3	4	16606	16607	16608	
13/16-18 NS	H3	4	16611	16612	16613	
13/16-20 NEF	H3	6	16616	16617	16618	
13/16-20 NEF	H5	6	16621	16622	16623	
13/16-24 NS	H3	6	16626	16627	16628	
7/8-9 NC	H11	4	16651	16652	16653	
7/8-10 NS	H4	4	16660	16661	16662	
7/8-12 NS	H4	4	16665	16666	16667	
7/8-14 NF	H5	4	17748	17749	17750	
7/8-14 NF	H6	4	17685	17686	17687	
7/8-14 NF	H11	4	16675	16676	16677	
7/8-16 NS	H3	4	16680	16681	16682	
7/8-18 NS	H3	4	16685	16686	16687	
7/8-20 NEF	H3	6	16690	16691	16692	
7/8-20 NEF	H5	6	16695	16696	16697	
7/8-24 NS	H3	6	16700	16701	16702	
7/8-27 NS	H3	6	16705	16706	16707	
7/8-32 NS	H3	6	16710	16711	16712	
15/16-12 NS	H4	4	16715	16716	16717	
15/16-14 NS	H4	4	16720	16721	16722	
15/16-16 NS	H3	6	16725	16726	16727	
15/16-18 NC	H3	6	16730	16731	16732	
15/16-20 NS	H3	6	16735	16736	16737	
15/16-20 NS	H5	6	16740	16741	16742	
15/16-32 NEF	H3	6	16755	16756	16757	
1-8 NC	H6	4	-	17918	17919	
1-8 NC	H11	4	16784	16785	16786	
1-8 NC	H21	4	17731	17732	17733	
1-10	H4	4	16808	16809	16810	
1-12 NF	H6	4	16833	16834	16835	
1-12 NF	H11	4	16838	16839	16840	
1-14 NS	H6	4	16848	16849	16850	
1-14 NS	H11	4	16853	16854	16855	
1-16 NS	H3	6	16858	16859	16860	
1-18 NS	H3	6	16863	16864	16865	
1-20 NEF	H3	6	16868	16869	16870	
1-20 NEF	H5	6	16873	16874	16875	
1-24 NS	H3	6	16878	16879	16880	
1-27 NS	H3	6	16883	16884	16885	

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



Series 101		Hand Tap   Taper, Plug, Bottom			
Thread Size	Thread Limit	Flutes	Taper	Plug	Bottom
1-32 NS	H3	6	16888	16889	16890
1 1/16-12 NS	H4	4	17713	17714	17715
1 1/16-12 NS	H5	4	16892	16893	16894
1 1/16-12 NS	H7	4	16896	16897	16898
1 1/16-14 NS	H5	6	16900	16901	16902
1 1/16-16 NS	H4	6	16904	16905	16906
1 1/16-16 NS	H6	6	16908	16909	16910
1 1/16-18 NEF	H4	6	16912	16913	16914
1 1/16-18 NEF	H6	6	16916	16917	16918
1 1/16-20 NS	H4	6	16920	16921	16922
1 1/16-24 NS	H4	6	16924	16925	16926
1-1/8-8 NS	H5	4	16942	16943	16944
1-1/8-10 NS	H5	4	16946	16947	16948
1-1/8-12 NF	H6	4	16954	16955	16956
1-1/8-12 NF	H11	4	17775	17776	17777
1-1/8-14 NS	H5	6	16958	16959	16960
1-1/8-16 NS	H4	6	16962	16963	16964
1-1/8-18 NEF	H4	6	16966	16967	16968
1-1/8-18 NEF	H6	6	16970	16971	16972
1-1/8-20 NS	H4	6	16974	16975	16976
1-1/8-24 NS	H4	6	16978	16979	16980
1-1/8-28	H4	6	-	18114	18115
1-1/8-32 NS	H4	8	16986	16987	16988
1 3/16-12 NS	H5	6	16990	16991	16992
1 3/16-14 NS	H5	6	16994	16995	16996
1 3/16-16 NS	H4	6	16998	16999	17000
1 3/16-16 NS	H6	6	17002	17003	17004
1 3/16-18 NEF	H4	6	17006	17007	17008
1 3/16-18 NEF	H6	6	17010	17011	17012
1 3/16-20 NS	H4	6	17014	17015	17016
1-1/4-7 NC	H8	4	17032	17033	17034
1-1/4-7 NC	H11	4	17752	17753	17754
1-1/4-8 NS	H5	4	17044	17045	17046
1-1/4-10 NS	H5	4	17056	17057	17058
1-1/4-12 NS	H6	6	17079	17080	17081
1-1/4-14 NS	H5	6	17083	17084	17085
1-1/4-16 NS	H4	6	17087	17088	17089
1-1/4-18 NEF	H4	6	17091	17092	17093
1-1/4-18 NEF	H6	6	17095	17096	17097
1-1/4-20 NC	H4	6	17099	17100	17101
1-1/4-24 NS	H4	8	17103	17104	17105
1-1/4-32 NEF	H4	10	17107	17108	17109
1 5/16-12 NS	H5	6	17111	17112	17113
1 5/16-12 NS	H8	6	17115	17116	17117
1 5/16-16 NS	H4	6	17123	17124	17125
1 5/16-16 NS	H6	6	17127	17128	17129
1 5/16-18 NC	H4	6	17131	17132	17133
1 5/16-18 NC	H6	6	17135	17136	17137
1 5/16-20 NS	H4	6	17139	17140	17141
1 3/8-8 NS	H5	4	17157	17158	17159
1 3/8-16 NC	H4	6	17169	17170	17171
1 3/8-18 NS	H4	6	17173	17174	17175
1 3/8-18 NS	H6	6	17177	17178	17179
1 3/8-20 NS	H4	6	17181	17182	17183
1 7/16-18 NS	H4	6	17185	17186	17187
1 7/16-18 NS	H6	6	17189	17190	17191
1-1/2-8 NS	H5	6	17215	17216	17217
1-1/2-10 NS	H5	6	17227	17228	17229
1-1/2-12 NS	H6	6	17247	17248	17249
1-1/2-16 NS	H4	6	17251	17252	17253
1-1/2-18 NS	H4	6	17255	17256	17257
1-1/2-18 NS	H6	6	17259	17260	17261
1-1/2-20 NF	H4	6	17263	17264	17265
1-1/2-24 NS	H4	8	17267	17268	17269
1-9/16-16 NS	H5	6	17271	17272	17273
1-9/16-18 NF	H5	6	17275	17276	17277
1-5/8-5 1/2	H7	6	17279	17280	17281
1-5/8-8 NS	H6	6	17283	17284	17285
1-5/8-12	H4	6	-	17908	17909
1-5/8-12 NS	H6	6	17287	17288	17289
1-5/8-16 NS	H5	6	17291	17292	17293
1-5/8-18 NF	H5	6	17295	17296	17297
1-3/4-5 NC	H7	6	17299	17300	17301
1-3/4-8 NS	H6	6	17303	17304	17305
1-3/4-10 NC	H6	6	17307	17308	17309
1-3/4-12 NS	H6	6	17311	17312	17313

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

Series 101		Hand Tap   Taper, Plug, Bottom			
Thread Size	Thread Limit	Flutes	Taper	Plug	Bottom
1-3/4-12 NS	H8	6	17315	17316	17317
1-3/4-16 NF	H5	6	17319	17320	17321
1-3/4-16 NF	H7	6	17323	17324	17325
1-3/4-18 NS	H5	6	17327	17328	17329
1-7/8-5 NS	H7	6	17331	17332	17333
1-7/8-8 NS	H6	6	17335	17336	17337
1-7/8-12 NS	H6	6	17339	17340	17341
1-7/8-12 NS	H8	6	17343	17344	17345
1-7/8-16 NS	H5	6	17347	17348	17349
2-4 1/2	H7	6	17353	17354	17355
2-8 NS	H6	6	17357	17358	17359
2-12	H6	6	17373	17374	17375
2-12	H8	6	17377	17378	17379
2-16 NS	H5	6	17381	17382	17383
2-20 NS	H5	8	17385	17386	17387
2 1/8-8 NS	H6	6	17389	17390	17391
2 1/8-12 NS	H6	6	17393	17394	17395
2 1/8-16 NS	H5	6	17397	17398	17399
2 1/4-4 NC 1/2	H7	6	17401	17402	17403
2 1/4-8 NS	H6	6	17405	17406	17407
2 1/4-12 NS	H6	6	17409	17410	17411
2 1/4-16 NS	H5	6	17413	17414	17415
2 3/8-8 NS	H6	6	17417	17418	17419
2 3/8-12 NS	H6	6	17421	17422	17423
2 3/8-16 NC	H5	6	17425	17426	17427
2 1/2-4 NC	H7	6	17429	17430	17431
2 1/2-8 NS	H6	6	17433	17434	17435
2 1/2-12 NS	H6	6	17443	17444	17445
2 1/2-16 NS	H5	6	17447	17448	17449
2 3/4-12 NS	H7	6	17459	17460	17461
3-4 NC	H9	6	17467	17468	17469
3-8 NS	H8	6	17471	17472	17473
3-12 NS	H7	8	17481	17482	17483
3-16 NS	H7	8	17485	17486	17487
3 1/8-12 NS	H7	8	17489	17490	17491
3 1/4-8 NS	H8	6	17498	17499	17500
3 1/4-12 NS	H7	8	17502	17503	17504
3 1/2-4 NC	H9	6	17506	17507	17508
3 1/2-8 NS	H8	6	17510	17511	17512
3 1/2-12 NS	H7	8	17520	17521	17522
3 3/4-4 NC	H9	6	17524	17525	17526
3 3/4-8 NS	H8	10	17528	17529	17530
3 3/4-12 NS	H7	10	17532	17533	17534
4-4 NC	H9	10	17536	17537	17538
4-8 NS	H8	10	17540	17541	17542
4-12 NS	H7	10	17550	17551	17552

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Hand Tap - Metric</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Hand tap</li> <li>• ANSI Tap - Refer to USCTI Table 302/303 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 101M Hand Tap | Metric | Taper, Plug, Bottom

Thread Size	Thread Limit	Flutes	Taper	Plug	Bottom
M4 X 0.7	D2	4	20123	20124	20125
M4 X 0.7	D4	4	20129	20130	20131
M4 X 0.7	D11	4	20150	20151	20152
M4 X 0.75	D4	4	21176	21035	21036
M4.5 X 0.75	D2	4	20162	20163	20164
M4.5 X 0.75	D4	4	20168	20169	20170
M4.5 X 0.75	D11	4	20189	20190	20191
M5 X 0.50	D3	4	20909	20910	20911
M5 X 0.8	D2	4	20201	20202	20203
M5 X 0.8	D4	4	20207	20208	20209
M5 X 0.8	D11	4	20228	20229	20230
M5X0.9	D3	4	-	21184	21185
M5.5X0.9	D3	4	-	21189	21190
M6 X 0.50	D3	4	20975	20976	20977
M6 X 0.75	D3	4	20279	20280	20281
M6 X 1.0	D3	4	20240	20241	20242
M6 X 1.0	D5	4	20246	20247	20248
M6 X 1.0	D11	4	20267	20268	20269
M7 X 1.0	D5	4	20289	20290	20291
M7 X 1.0	D11	4	20308	20309	20310
M8 X 0.75	D5	4	20940	20941	20942
M8 X 1.0	D3	4	20352	20353	20354
M8 X 1.0	D5	4	20357	20358	20359
M8 X 1.0	D11	4	20375	20376	20377
M8 X 1.25	D3	4	20318	20319	20320
M8 X 1.25	D5	4	20323	20324	20325
M8 X 1.25	D11	4	20342	20343	20344
M8X0.5	D4	4	-	21024	21025
M9 X 1.0	D5	4	21141	21041	21042
M9 X 1.25	D5	4	21143	21038	21039
M10 X 1.0	D3	4	20447	20448	20449
M10 X 1.0	D5	4	20944	20945	20946
M10 X 1.25	D3	4	20419	20420	20421
M10 X 1.25	D5	4	20424	20425	20426
M10 X 1.25	D11	4	20442	20443	20444
M10 X 1.5	D3	4	20385	20386	20387
M10 X 1.5	D6	4	20390	20391	20392
M10 X 1.5	D11	4	20410	20411	20409
M11 X 1.0	D5	4	20984	20985	20986
M11 X 1.5	D6	4	20452	20453	20454
M12 X 1.0	D5	4	20889	20890	20891
M12 X 1.25	D3	4	20491	20492	20493
M12 X 1.25	D5	4	20496	20497	20498
M12 X 1.25	D11	4	20514	20515	20516
M12 X 1.50	D6	4	20905	20906	20907

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



Series 101M		Hand Tap   Metric   Taper, Plug, Bottom			
Thread Size	Thread Limit	Flutes	Taper	Plug	Bottom
M12 X 1.75	D3	4	20457	20458	20459
M12 X 1.75	D6	4	20462	20463	20464
M12 X 1.75	D11	4	20481	20482	20483
M14 X 1.00	D5	4	20901	20902	20903
M14 X 1.25	D4	4	20555	20556	20557
M14 X 1.5	D3	4	20539	20540	20541
M14 X 1.5	D6	4	20544	20546	20547
M14 X 2	D3	4	20524	20525	20526
M14 X 2	D7	4	20529	20530	20531
M15 X 1.0	D5	4	20988	20989	20990
M16 X 1.0	D5	4	21159	21045	21046
M16 X 1.5	D3	4	20580	20581	20582
M16 X 1.5	D6	4	20585	20586	20587
M16 X 2	D4	4	20560	20561	20562
M16 X 2	D7	4	20565	20566	20567
M16 X 2	D11	4	20575	20576	20577
M18 X 1.0	D5	4	20893	20894	20895
M18 X 1.5	D3	4	20610	20611	20612
M18 X 1.5	D4	4	20615	20616	20617
M18 X 1.5	D6	4	20620	20621	20622
M18 X 2.5	D7	4	20600	20601	20602
M20 X 1.0	D6	4	-	21048	21049
M20 X 1.5	D3	4	20650	20651	20652
M20 X 1.5	D6	4	20655	20656	20657
M20 X 1.5	D11	4	20665	20666	20667
M20 X 2.5	D4	4	20630	20631	20632
M20 X 2.5	D7	4	20635	20636	20637
M20 X 2.5	D11	4	20645	20646	20647
M22 X 1.5	D3	4	20685	20686	20687
M22 X 1.5	D6	4	20690	20691	20692
M22 X 1.5	D11	4	20700	20701	20702
M22 X 2.5	D4	4	20670	20671	20672
M22 X 2.5	D7	4	20675	20676	20677
M24 X 1.5	D6	4	20916	20917	20918
M24 X 2	D4	4	20725	20726	20727
M24 X 2	D7	4	20730	20731	20732
M24 X 3	D4	4	20705	20706	20707
M24 X 3	D8	4	20710	20711	20712
M24 X 3	D11	4	20720	20721	20722
M25X1.5	D6	4	-	21031	21032
M26 X 1.5	D6	6	20980	20981	20982
M27 X 1.5	D6	6	-	21057	21058
M27 X 2	D5	4	20755	20756	20757
M27 X 2	D7	4	20760	20761	20762
M27 X 3	D5	4	20740	20741	20742
M27 X 3	D8	4	20745	20746	20747
M30 X 1.50	D6	6	20897	20898	20899
M30 X 2	D5	4	20785	20786	20787
M30 X 2	D7	4	20790	20791	20792
M30 X 3.5	D5	4	20770	20771	20772
M30 X 3.5	D9	4	20775	20776	20777
M32 X 1.5	D6	6	21200	21060	21061
M32 X 2.0	D7	6	20816	20817	21199
M33 X 2	D5	4	20815	20816	20817
M33 X 2	D7	4	20820	20821	20822
M33 X 3.5	D5	4	20800	20801	20802
M33 X 3.5	D9	4	20805	20806	20807
M35 X 1.5	D6	6	20956	20957	20958
M36 X 1.5	D6	6	20960	20961	20962
M36 X 2.0	D7	6	20920	20921	20922
M36 X 3	D5	4	20845	20846	20847
M36 X 3	D8	4	20850	20851	20852
M36 X 4	D5	4	20830	20831	20832
M36 X 4	D9	4	20835	20836	20837
M39 X 3	D6	6	20875	20876	20877
M39 X 3	D8	6	20880	20881	20882
M39 X 4	D6	6	20860	20861	20862
M39 X 4	D9	6	20865	20866	20867
M40 X 1.5	D6	6	20971	20972	20973
M42 X 1.5	D6	6	-	21063	21064
M42 X 4.5	D10	6	20964	20965	20966
M1.6 X 0.35	D3	2	20009	20010	20011
M1.8 X 0.35	D3	2	20021	20022	20023
M2 X 0.4	D3	3	20033	20034	20035
M2.2 X 0.45	D3	3	20045	20046	20047
M2.5 X 0.45	D1	3	20051	20052	20053

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



Series 101M		Hand Tap   Metric   Taper, Plug, Bottom			
Thread Size	Thread Limit	Flutes	Taper	Plug	Bottom
M2.5 X 0.45	D3	3	<b>20057</b>	<b>20058</b>	<b>20059</b>
M2.6X0.45	D3	3	-	<b>21179</b>	<b>21180</b>
M3 X 0.5	D1	3	<b>20063</b>	<b>20064</b>	<b>20065</b>
M3 X 0.5	D3	3	<b>20069</b>	<b>20070</b>	<b>20071</b>
M3.5 X 0.6	D1	3	<b>20084</b>	<b>20085</b>	<b>20086</b>
M3.5 X 0.6	D11	3	<b>20111</b>	<b>20112</b>	<b>20113</b>
M3.5 X 0.6	D4	3	<b>20090</b>	<b>20091</b>	<b>20092</b>

\*bold numbers are EDPs for ordering

## Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

**CUSTOM COMES STANDARD**

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HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Pulley/Extended Length Tap</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Extended length/pulley hand taps</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○			○	○	○	○			○	

● Best ○ Good

## Series 101L Hand Tap | Pulley/Extended | Taper, Plug, Bottom

Thread Size	Thread Limit	OAL (L)	Shank (D)	Flutes	Taper	Plug	Bottom
6-32 NC	H3	6	0.141	3	15139	15140	15141
8-32 NC	H3	6	0.168	4	15199	15200	15201
10-24 NC	H3	6	0.194	4	15259	15260	15261
10-32 NF	H3	6	0.194	4	15313	15314	15315
1/4-20 NC	H3	6	0.255	4	15517	15518	15519
1/4-20 NC	H3	8	0.255	4	15523	15524	15525
1/4-20 NC	H3	6	0.185	4	-	17570	17571
1/4-28 NF	H3	6	0.255	4	15577	15578	15579
5/16-18 NC	H3	6	0.24	4	-	17608	17609
5/16-18 NC	H3	6	0.318	4	15672	15673	15674
5/16-18 NC	H3	8	0.318	4	15677	15678	15679
5/16-24 NF	H3	6	0.318	4	15712	15713	15714
3/8-16 NC	H3	6	0.381	4	15785	15786	15787
3/8-16 NC	H5	6	0.381	4	17657	17658	17659
3/8-16 NC	H3	8	0.381	4	15790	15791	15792
3/8-16 NC	H3	10	0.381	4	15795	15796	15797
3/8-16 NC	H3	6	0.275	4	15800	15801	15802
3/8-24 NF	H3	6	0.381	4	15862	15863	15864
7/16-14 NC	H3	6	0.323	4	15932	15933	15934
7/16-20 NF	H3	6	0.323	4	15972	15973	15974
7/16-20 NF	H3	6	0.444	4	15967	15968	15969
1/2-13 NC	H3	6	0.367	4	16082	16083	16084
1/2-13 NC	H3	8	0.367	4	-	17973	17974
1/2-13 NC	H3	10	0.367	4	-	17978	17979
1/2-13 NC	H3	12	0.367	4	-	17983	17984
1/2-20 NF	H3	6	0.507	4	16144	16145	16146
1/2-20 NF	H3	6	0.367	4	16149	16150	16151
9/16-12 NC	H3	6	0.429	4	-	17653	17654
9/16-18 NF	H3	6	0.429	4	16219	16220	16221
5/8-11 NC	H3	6	0.48	4	16308	16309	16310
5/8-11 NC	H3	8	0.48	4	16313	16314	16315
5/8-11 NC	H3	10	0.48	4	-	17991	17992
5/8-11 NC	H3	12	0.48	4	-	17996	17997
5/8-18 NF	H3	6	0.48	4	16343	16344	16345
3/4-10 NC	H3	6	0.59	4	16477	16478	16479
3/4-10 NC	H3	8	0.59	4	16482	16483	16484
3/4-10 NC	H3	10	0.59	4	16487	16488	16489
7/8-9 NC	H4	8	0.697	4	17699	17700	17701
1-8 NC	H4	8	0.8	4	16793	16794	16795
1-8 NC	H4	10	0.8	4	16798	16799	16800
1-8 NC	H4	12	0.8	4	-	18109	18110
1-1/4-7 NC	H4	10	1.021	4	17036	17037	17038
1-1/4-7 NC	H4	12	1.021	4	17040	17041	17042
1-1/4-8 NS	H5	10	1.021	4	17048	17049	17050
1-1/4-8 NS	H5	12	1.021	4	17052	17053	17054

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



Series 101L		Hand Tap   Pulley/Extended   Taper, Plug, Bottom					
Thread Size	Thread Limit	OAL (L)	Shank (D)	Flutes	Taper	Plug	Bottom
1-1/2-6 NC	H4	10	1.233	4	<b>17207</b>	<b>17208</b>	<b>17209</b>
1-1/2-6 NC	H4	12	1.233	4	<b>17211</b>	<b>17212</b>	<b>17213</b>
1-1/2-8 NS	H5	10	1.233	4	<b>17219</b>	<b>17220</b>	<b>17221</b>
1-1/2-8 NS	H5	12	1.233	4	<b>17223</b>	<b>17224</b>	<b>17225</b>

\*bold numbers are EDPs for ordering

## Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

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HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Hand Tap - Double Lead</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Double-lead hand tap</li> <li>• Stocked Bright finish</li> <li>• ANSI Tap - Refer to USCTI Table 302/303 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 103** Hand Tap | Dbl Lead | Taper, Plug, Bottom

Thread Size	Thread Limit	Taper	Plug	Bottom
10-24 NC	H3	<b>15253</b>	<b>15254</b>	<b>15255</b>
1/4-20 NC	H3	<b>15511</b>	<b>15512</b>	<b>15513</b>
1/4-28 NF	H3	<b>15571</b>	<b>15572</b>	<b>15573</b>
5/16-18 NC	H3	<b>15667</b>	<b>15668</b>	<b>15669</b>
3/8-16 NC	H3	<b>15760</b>	<b>15761</b>	<b>15762</b>
3/8-16 NC	H3	<b>15780</b>	<b>15781</b>	<b>15782</b>
1/2-13 NC	H3	<b>16057</b>	<b>16058</b>	<b>16059</b>

\*bold numbers are EDPs for ordering

### Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

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HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Hand Tap - Left Hand</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Left hand tap</li> <li>• ANSI Tap - Refer to USCTI Table 302/303 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 164 Hand Tap | Left Hand | Taper, Plug, Bottom

Thread Size	Thread Limit	Flutes	Taper	Plug	Bottom
5/16-18 NC	H3	4	15643	15644	15645
0-80 NF	H1	2	-	17951	17952
2-56 NC	H2	2	15037	15038	15039
3-48 NC	H2	2	15049	15050	15051
4-40 NC	H2	3	15073	15074	15075
4-48 NF	H2	3	15085	15086	15087
5-40 NC	H2	3	15097	15098	15099
6-32 NC	H3	3	15109	15110	15111
6-40 NF	H2	3	15145	15146	15147
8-32 NC	H3	4	15169	15170	15171
8-36 NF	H2	4	15205	15206	15207
10-24 NC	H3	4	15229	15230	15231
10-32 NF	H3	4	15277	15278	15279
12-24 NC	H3	4	15373	15374	15375
12-28 NF	H3	4	15379	15380	15381
1/4-20 NC	H3	4	15487	15488	15489
1/4-28 NF	H3	4	15547	15548	15549
1/4-32 NEF	H3	4	17783	17784	17785
5/16-24 NF	H3	4	15695	15696	15697
3/8-16 NC	H3	4	15755	15756	15757
3/8-24 NF	H3	4	15842	15843	15844
7/16-14 NC	H3	4	15902	15903	15904
7/16-20 NF	H3	4	15947	15948	15949
1/2-13 NC	H3	4	16037	16038	16039
1/2-20 NF	H3	4	16129	16130	16131
9/16-12 NC	H3	4	16189	16190	16191
9/16-18 NF	H3	4	16204	16205	16206
5/8-11 NC	H3	4	16269	16270	16271
5/8-18 NF	H3	4	16329	16330	16331
11/16-11 NS	H3	4	16383	16384	16385
11/16-16 NS	H3	4	16388	16389	16390
11/16-18 NS	H3	4	17575	17576	17577
3/4-10 NC	H3	4	16448	16449	16450
3/4-16 NF	H3	4	16533	16534	16535
3/4-16 NF	H5	4	17787	17788	17789
3/4-20 NEF	H3	6	17662	17663	17664
7/8-9 NC	H4	4	16641	16642	16643
7/8-14 NF	H4	4	16670	16671	16672
1-8 NC	H4	4	16774	16775	16776
1-12 NF	H4	4	16828	16829	16830
1-14 NS	H4	4	16843	16844	16845
1-16 NS	H3	6	17694	17695	17696
1-20 NEF	H3	6	17579	17580	17581
1-1/8-7 NC	H4	4	16938	16939	16940
1-1/8-12 NF	H4	4	16950	16951	16952

\*bold numbers are EDPs for ordering

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



Series 164		Hand Tap   Left Hand   Taper, Plug, Bottom			
Thread Size	Thread Limit	Flutes	Taper	Plug	Bottom
1-1/4-7 NC	H4	4	<b>17028</b>	<b>17029</b>	<b>17030</b>
1-1/4-12 NS	H4	6	<b>17075</b>	<b>17076</b>	<b>17077</b>
1 3/8-6 NC	H4	4	<b>17153</b>	<b>17154</b>	<b>17155</b>
1 3/8-12 NF	H4	6	<b>17165</b>	<b>17166</b>	<b>17167</b>
1-1/2-6 NC	H4	4	<b>17203</b>	<b>17204</b>	<b>17205</b>
1-1/2-12 NS	H4	6	<b>17243</b>	<b>17244</b>	<b>17245</b>

\*bold numbers are EDPs for ordering

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## Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

**CUSTOM COMES STANDARD**

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Hand Tap - Left Hand</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Left hand tap</li> <li>• ANSI Tap - Refer to USCTI Table 302/303 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 164M** | Hand Tap | Left Hand | Metric | Taper, Plug, Bottom

Thread Size	Thread Limit	Flutes	Taper	Plug	Bottom
M4 X 0.7	D4	4	20135	20136	20137
M4.5 X 0.75	D4	4	20174	20175	20176
M5 X 0.8	D4	4	20213	20214	20215
M6 X 1.0	D5	4	20252	20253	20254
M7 X 1.0	D5	4	20294	20295	20296
M8 X 1.25	D5	4	20328	20329	20330
M8 X 1.0	D5	4	20362	20363	20364
M10 X 1.25	D5	4	20429	20430	20431
M10 X 1.5	D6	4	20395	20396	20397
M12 X 1.25	D5	4	20501	20502	20503
M12 X 1.75	D6	4	20467	20468	20469
M14 X 1.5	D6	4	20550	20551	20552
M14 X 2	D7	4	20534	20535	20536
M16 X 1.5	D6	4	20590	20591	20592
M16 X 2	D7	4	20570	20571	20572
M18 X 1.5	D6	4	20625	20626	20627
M18 X 2.5	D7	4	20605	20606	20607
M20 X 1.5	D6	4	20660	20661	20662
M20 X 2.5	D7	4	20640	20641	20642
M22 X 1.5	D6	4	20695	20696	20697
M22 X 2.5	D7	4	20680	20681	20682
M24 X 2	D7	4	20735	20736	20737
M24 X 3	D8	4	20715	20716	20717
M27 X 3	D8	4	20750	20751	20752
M30 X 3.5	D9	4	20780	20781	20782
M10 X 1.0	D5	4	20948	20949	20950

\*bold numbers are EDPs for ordering

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FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Hand Tap - STI</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Screw thread insert (STI) tap for helical threads</li> <li>• ANSI-STI tap dimensions apply</li> <li>• Custom taps as fast as 24hrs</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

### Series 166 Hand Tap | Screw Thread Insert (STI) | Plug & Bottom

Thread Size	Thread Limit	Flutes	Plug	Bottom
4-40 NC	H1	3	17794	17795
4-40 NC	H2	3	17798	17799
6-32 NC	H2	3	17802	17803
6-32 NC	H3	3	17806	17807
8-32 NC	H2	3	17810	17811
8-32 NC	H3	3	17814	17815
10-24 NC	H2	3	17818	17819
10-24 NC	H3	3	17822	17823
10-32 NF	H2	3	17826	17827
10-32 NF	H3	3	17830	17831
1/4-20 NC	H2	3	17834	17835
1/4-20 NC	H3	3	17838	17839
1/4-28 NF	H2	3	17842	17843
1/4-28 NF	H3	3	17846	17847
5/16-18 NC	H3	4	17850	17851
5/16-18 NC	H4	4	17854	17855
5/16-24 NF	H2	4	17858	17859
5/16-24 NF	H3	4	17862	17863
3/8-16 NC	H3	4	17866	17867
3/8-16 NC	H4	4	17870	17871
3/8-24 NF	H2	4	17874	17875
3/8-24 NF	H3	4	17878	17879
7/16-14 NC	H3	4	17882	17883
7/16-20 NF	H3	4	17886	17887
1/2-13 NC	H3	4	17890	17891
1/2-20 NF	H3	4	17894	17895

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>ACME Tap</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• 2G Class of Fit</li> <li>• See ACME table for tap dimensions</li> <li>• For ACME taps, chamfer length designations are approximate and may be shorter or longer than standard</li> <li>• Custom ACME taps in 3-5 days pending blank availability</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 168** | Hand Tap | ACME | Taper, Plug

Thread Size	Class of Fit	Taper	Plug
1/2-10	2G	<b>16016</b>	<b>16017</b>
5/8-8	2G	<b>16248</b>	<b>16249</b>
3/4-5	2G	-	<b>18102</b>
3/4-6	2G	<b>16431</b>	<b>16432</b>
3/4-8	2G	<b>16441</b>	<b>16442</b>
3/4-10	2G	<b>16492</b>	<b>16493</b>
7/8-6	2G	<b>16630</b>	<b>16631</b>
1-5	2G	<b>16759</b>	<b>16760</b>
1-8	2G	<b>16769</b>	<b>16770</b>
1-1/8-5	2G	<b>16928</b>	<b>16929</b>
1-1/4-5	2G	<b>17018</b>	<b>17019</b>
1 3/8-4	2G	<b>17143</b>	<b>17144</b>
1-1/2-4	2G	<b>17193</b>	<b>17194</b>

\*bold numbers are EDPs for ordering

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HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>ACME Tap - Tandem</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• ACME tandem tap</li> <li>• 2G Class of Fit</li> <li>• For ACME taps, chamfer length designations are approximate and may be shorter or longer than standard</li> <li>• Custom ACME taps in 3-5 days pending blank availability</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 168T** | Hand Tap | ACME | Tandem | 2G

Thread Size	Class of Fit	Flutes	EDP
3/8-12	2G	4	15752
1/2-10	2G	4	16023
5/8-8	2G	4	16255
3/4-6	2G	4	16438
3/4-8	2G	4	16444
7/8-6	2G	4	16637
1-5	2G	4	16766
1-1/8-5	2G	4	16935
1-1/4-5	2G	4	17025
1 3/8-4	2G	4	17150
1-1/2-4	2G	4	17200

\*bold numbers are EDPs for ordering

### Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>ACME Tap - Left Hand</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• ACME Left Hand tap</li> <li>• 2G Class of Fit</li> <li>• For ACME taps, chamfer length designations are approximate and may be shorter or longer than standard</li> <li>• Custom ACME taps in 3-5 days pending blank availability</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

● Best ○ Good

**Series 169**      **Hand Tap | ACME | Left Hand | Taper & Plug**

Thread Size	Class of Fit	Flutes	Taper	Plug
1/2-10	2G	4	<b>16020</b>	<b>16021</b>
5/8-8	2G	4	<b>16252</b>	<b>16253</b>
3/4-6	2G	4	<b>16435</b>	<b>16436</b>
7/8-6	2G	4	<b>16634</b>	<b>16635</b>
1-5	2G	4	<b>16763</b>	<b>16764</b>
1-1/8-5	2G	4	<b>16932</b>	<b>16933</b>
1-1/4-5	2G	4	<b>17022</b>	<b>17023</b>
1 3/8-4	2G	4	<b>17147</b>	<b>17148</b>
1-1/2-4	2G	4	<b>17197</b>	<b>17198</b>

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
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 INSERTS



# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>ACME Tap - Tandem LH</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• ACME tandem left handed tap</li> <li>• 2G Class of Fit</li> <li>• For ACME taps, chamfer length designations are approximate and may be shorter or longer than standard</li> <li>• Custom ACME taps in 3-5 days pending blank availability</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 169T** | Hand Tap | ACME | Tandem | Left Hand

Thread Size	Class of Fit	Flutes	EDP
1/2-10	2G	4	<b>16024</b>
5/8-8	2G	4	<b>16256</b>
3/4-6	2G	4	<b>16439</b>
3/4-8	2G	4	<b>16445</b>
7/8-6	2G	4	<b>16638</b>
1-5	2G	4	<b>16767</b>
1-1/8-5	2G	4	<b>16936</b>
1-1/4-5	2G	4	<b>17026</b>
1-1/2-4	2G	4	<b>17201</b>

\*bold numbers are EDPs for ordering

## Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Pulley/Extended Length Tap</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Extended length/pulley hand taps</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 108M** Hand Tap | Pulley/Extended | Metric | Taper, Plug, Bottom

Thread Size	Thread Limit	OAL (L)	Shank (D)	Flutes	Taper	Plug	Bottom
M3.5 X 0.6	D4	6	0.141	3	20117	20118	20119
M4 X 0.7	D4	6	0.168	4	-	20157	20158
M4.5 X 0.75	D4	6	0.194	4	20195	20196	20197
M5 X 0.8	D4	6	0.194	4	-	20235	20236
M6 X 1.0	D5	6	0.255	4	-	20274	20275
M8 X 1.25	D5	6	0.318	4	20347	20348	20349
M10 X 1.5	D6	6	0.381	4	20414	20415	20416
M10X1.5	D6	6	0.323	4	-	21194	21195
M12 X 1.75	D6	6	0.367	4	20486	20487	20488
M16 X 2.0	D7	6	0.48	4	20954	20953	20952
M20 X 2.5	D7	6	0.652	4	20934	20933	20932

\*bold numbers are EDPs for ordering

## Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Pipe Tap - NPT/F</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Pipe tap for NPT/NPTF threads</li> <li>• ANSI Tap - Refer to USCTI Table 311 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 131** Pipe Tap | NPT/F | Extended Length | Plug

Thread Size	OAL (L)	Flutes	EDP
1/16-27	4	4	17665
1/16-27	6	4	15410
1/8-27	4	4	15416
1/8-27	6	4	15419
1/8-27	8	4	17956
1/8-27	10	4	17959
1/8-27	12	4	17962
1/4-18	4	4	15458
1/4-18	6	4	15461
1/4-18	8	4	15467
3/8-18	6	4	15815
3/8-18	8	4	15821
1/2-14	6	4	16092
1/2-14	8	4	16098
1/2-14	10	4	17987
3/4-14	6	5	16511
3/4-14	8	5	16517
3/4-14	10	5	18105
1-11	6	5	16821
1-11	10	5	16824
2 1/2-8	ANSI	7	17437
3-8	ANSI	9	17475
3 1/2-8	ANSI	9	17514
3-8	ANSI	9	17544

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Pipe Tap - NPSF - 6"</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Pipe tap for NPSF threads</li> <li>• ANSI Tap - Refer to USCTI Table 311 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

Series 131F		Pipe Tap   NPSF   6" OAL   Plug				
Thread Size	Standard	OAL (L)	Flutes	EDP		
1/8-27	NPSF	6	4	<b>17710</b>		
1/4-18	NPSF	6	4	<b>17703</b>		
3/8-18	NPSF	6	4	<b>17922</b>		
1/2-14	NPSF	6	4	<b>17720</b>		

\*bold numbers are EDPs for ordering

## Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

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HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Pipe Tap - NPS &amp; NPSI</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Pipe tap for NPSI threads</li> <li>• ANSI Tap - Refer to USCTI Table 311 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 1311** Pipe Tap | NPS, NPSI | Plug

Thread Size	Standard	Flutes	EDP
1/8-27	NPSI	4	<b>15431</b>
1/4-18	NPSI	4	<b>15476</b>
3/8-18	NPSI	4	<b>15827</b>
1/2-14	NPSI	4	<b>16104</b>
3/4-14	NPSI	5	<b>16523</b>
1-1/4-11	NPS	5	<b>17069</b>
1-1/2-11	NPS	7	<b>17240</b>
44603	NPS	7	<b>17370</b>

\*bold numbers are EDPs for ordering

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Pipe Tap - NPT/F</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Spiral flute pipe tap for blind holes</li> <li>• ANSI Tap - Refer to USCTI Table 311 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 132** Pipe Tap | NPT/F | Spiral Flute | Plug

Thread Size	Flutes	EDP
3/4-14	5	<b>16505</b>
1/8-27	4	<b>17554</b>
1/4-18	4	<b>15452</b>
3/8-18	4	<b>15809</b>
1/2-14	4	<b>16086</b>

\*bold numbers are EDPs for ordering

### Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Pipe Tap - Interrupted Thread - NPT/F</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• ANSI Tap - Refer to USCTI Table 311 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 133** Pipe Tap | NPT/F | Interrupted Thread | Plug

Thread Size	OAL (L)	Flutes	EDP
1-11-1/2	6	5	<b>18954</b>
1/16-27	ANSI	5	<b>17677</b>
1/8-27	6	5	<b>15422</b>
1/4-18	6	5	<b>15464</b>
3/8-18	6	5	<b>15818</b>
1/2-14	6	5	<b>16095</b>
3/4-14	6	5	<b>16514</b>
3-8 NS	ANSI	9	<b>17478</b>
3 1/2-8 NS	ANSI	9	<b>17517</b>
4-8 NS	ANSI	9	<b>17547</b>

\*bold numbers are EDPs for ordering

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HSS Taps For Ferrous And Non-Ferrous Materials



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FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Pipe - British Standard - BSPP</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• British standard (Whitworth) 55° pipe tap</li> <li>• Custom taps as fast as 24hrs</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 134** Pipe Tap | British Standard | BSPP | 55° | Modified

Thread Size	Flutes	Plug	Bottom
1/8-28	4	15437	15438
1/4-19	4	15482	15483
3/8-19	4	15833	15834
1/2-14	4	16110	16111
3/4-14	5	16529	16530
1-11	5	16815	16816
1-1/4-11	5	17063	17064
1-1/2-11	7	17234	17235
2-11	7	17364	17365

\*bold numbers are EDPs for ordering

### Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Pipe - British Standard - BSPT</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• British standard (Whitworth) 55° pipe tap</li> <li>• Custom taps as fast as 24hrs</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

● Best ○ Good

**Series 135** | Pipe Tap | British Standard | BSPT | 55° | Modified

Thread Size	Flutes	Plug	Bottom
1/8-28	4	<b>15434</b>	<b>15435</b>
1/4-19	4	<b>15479</b>	<b>15480</b>
3/8-19	4	<b>15830</b>	<b>15831</b>
1/2-14	4	<b>16107</b>	<b>16108</b>
3/4-14	5	<b>16526</b>	<b>16527</b>
1-11	5	<b>16812</b>	<b>16813</b>
1-1/4-11	5	<b>17060</b>	<b>17061</b>
1-1/2-11	7	<b>17231</b>	<b>17232</b>
44603	7	<b>17361</b>	<b>17362</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



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FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Pipe - British Standard - BSPT</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• British standard (Whitworth) 55° pipe tap</li> <li>• Custom taps as fast as 24hrs</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 136** | Pipe Tap | British Standard | BSPT | 55° | Full

Thread Size	Flutes	EDP
1/8-28	4	<b>17932</b>
1/4-19	4	<b>17933</b>
3/8-19	4	<b>17934</b>
1/2-14	4	<b>17935</b>
3/4-14	5	<b>17936</b>
1-11	5	<b>17937</b>
1-1/4-11	5	<b>17938</b>
1-1/2-11	7	<b>17939</b>
44603	7	<b>17940</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Pipe - British Standard - BSPP</b> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• British standard (Whitworth) 55° pipe tap</li> <li>• Custom taps as fast as 24hrs</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 136P Pipe Tap | British Standard | BSPP | 55° | Full

Thread Size	Flutes	Plug	Bottom
1/8-28	4	17923	18117
1/4-19	4	17924	18119
3/8-19	4	17925	18121
1/2-14	4	17926	18123
3/4-14	5	17927	18125
1-11	5	17928	18127
1-1/4-11	5	17929	18129
1-1/2-11	7	17930	18131
44603	7	17931	-

\*bold numbers are EDPs for ordering

### Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

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HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Pipe - British Standard - BSF/BSW</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• British standard (Whitworth) 55° pipe tap</li> <li>• Custom taps as fast as 24hrs</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 137** | Pipe Tap | British Standard | BSF/BSW | 55° | Modified

Thread Size	Standard	Taper	Plug	Bottom
1/4-20	BSW	<b>15529</b>	<b>15530</b>	<b>15531</b>
1/4-26	BSF	<b>17619</b>	<b>17620</b>	<b>17621</b>
5/16-18	BSW	<b>17624</b>	<b>17625</b>	<b>17626</b>
5/16-22	BSF	<b>15689</b>	<b>15690</b>	<b>15691</b>
3/8-20	BSF	<b>17629</b>	<b>17630</b>	<b>17631</b>
1/2-12	BSW	<b>16032</b>	<b>16033</b>	<b>16034</b>
5/8-11	BSW	<b>16264</b>	<b>16265</b>	<b>16266</b>

\*bold numbers are EDPs for ordering

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Spiral Flute Tap</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Spiral flute tap for blind holes</li> <li>• ANSI Tap - Refer to USCTI Table 302/303 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 107 Spiral Flute Tap | Plug & Bottom

Thread Size	Thread Limit	Flutes	Helix	Plug	Bottom
4-40 NC	H3	2	52°	17672	17673
5-40 NC	H5	2	52°	-	18900
5-40 NC	H7	2	52°	-	18901
5-40 NC	H11	2	52°	-	18902
6-32 NC	H5	2	52°	-	18903
6-32 NC	H7	2	52°	-	18904
6-32 NC	H11	2	52°	-	18905
6-40 NF	H3	2	52°	-	18906
6-48 NS	H2	2	52°	-	18907
8-32 NC	H5	2	52°	-	18908
8-32 NC	H7	2	52°	-	18909
8-32 NC	H11	2	52°	-	18910
8-40 NS	H2	2	52°	-	18911
10-24 NC	H5	2	52°	-	18912
10-24 NC	H7	2	52°	-	18913
10-24 NC	H11	2	52°	-	18914
10-32 NF	H4	2	52°	-	18915
10-32 NF	H5	2	52°	-	18916
10-32 NF	H7	2	52°	-	18917
10-32 NF	H11	2	52°	-	18918
10-40 NS	H2	2	52°	-	18919
12-32 NEF	H3	2	52°	-	18920
1/4-20 NC	H5	3	52°	17766	17767
1/4-24 NS	H3	2	52°	-	18921
1/4-28 NF	H5	2	52°	-	18922
1/4-28 NF	H7	2	52°	-	18923
1/4-28 NF	H11	2	52°	-	18924
1/4-32 NEF	H3	2	52°	-	18925
1/4-36 NS	H2	2	52°	-	18926
1/4-36 NS	H3	2	52°	-	18927
1/4-40 NS	H2	3	52°	-	18928
5/16-18 NC	H7	2	52°	-	18929
5/16-18 NC	H11	2	52°	-	18930
5/16-24 NF	H5	2	52°	-	18931
5/16-24 NF	H11	2	52°	-	18932
5/16-32 NEF	H3	2	52°	-	18933
3/8-16 NC	H5	3	30°	17912	17913
3/8-24 NF	H5	3	30°	17724	17725
7/16-14 NC	H11	3	30°	-	18934
7/16-20 NF	H11	3	30°	-	18935
15/32-32 NS	H3	3	30°	-	18936
1/2-13 NC	H11	3	30°	-	18937
1/2-20 NF	H11	3	30°	-	18938
1/2-28 NEF	H3	3	30°	-	18939
5/8-11 NC	H3	4	30°	16284	16285

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



Series 107		Spiral Flute Tap   Plug & Bottom			
Thread Size	Thread Limit	Flutes	Helix	Plug	Bottom
5/8-18 NF	H3	4	30°	<b>16339</b>	<b>16340</b>
5/8-11 NC	H3	4	52°	<b>17717</b>	<b>17718</b>
5/8-18 NF	H3	4	52°	<b>17727</b>	<b>17728</b>
3/4-10 NC	H3	4	30°	<b>16463</b>	<b>16464</b>
3/4-16 NF	H3	4	30°	<b>16543</b>	<b>16544</b>
7/8-9 NC	H4	4	30°	<b>16656</b>	<b>16657</b>
1-8 NC	H4	4	52°	<b>17791</b>	<b>17792</b>
1-8 NC	H4	4	30°	<b>16789</b>	<b>16790</b>

\*bold numbers are EDPs for ordering

## Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

**CUSTOM COMES STANDARD**

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FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Spiral Flute Tap - Metric</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Spiral flute tap for blind holes</li> <li>• ANSI Tap - Refer to USCTI Table 302/303 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>		

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

**Series 107M** | Spiral Flute Tap | Metric | Plug & Bottom

Thread Size	Thread Limit	Flutes	Helix	Plug	Bottom
M3 X 0.5	D3	2	30°	<b>20074</b>	<b>20075</b>
M3 X 0.5	D3	2	52°	<b>20078</b>	<b>20079</b>
M3.5 X 0.6	D4	2	52°	<b>20105</b>	<b>20106</b>
M3.5 X 0.6	D4	2	30°	<b>20101</b>	<b>20102</b>
M4 X 0.7	D4	2	30°	<b>20140</b>	<b>20141</b>
M4 X 0.7	D4	3	52°	<b>20144</b>	<b>20145</b>
M4.5X0.75	D4	2	30°	<b>20179</b>	<b>20180</b>
M4.5 X 0.75	D4	3	52°	<b>20183</b>	<b>20184</b>
M5 X 0.8	D4	2	30°	<b>20218</b>	<b>20219</b>
M5 X 0.8	D4	3	52°	<b>20222</b>	<b>20223</b>
M6 X 1.0	D5	3	30°	<b>20257</b>	<b>20258</b>
M6 X 1.0	D5	3	52°	<b>20261</b>	<b>20262</b>
M8 X 1.0	D5	3	30°	<b>20367</b>	<b>20368</b>
M8 X 1.0	D5	3	52°	<b>20371</b>	<b>20372</b>
M8 X 1.25	D5	3	30°	<b>20333</b>	<b>20334</b>
M8 X 1.25	D5	3	52°	<b>20337</b>	<b>20338</b>
M10 X 1.25	D5	0	30°	<b>20434</b>	<b>20435</b>
M10 X 1.25	D5	3	52°	<b>20438</b>	<b>20439</b>
M10 X 1.5	D6	3	30°	<b>20400</b>	<b>20401</b>
M10 X 1.5	D6	3	52°	<b>20404</b>	<b>20405</b>
M12 X 1.25	D5	3	30°	<b>20506</b>	<b>20507</b>
M12 X 1.25	D5	3	52°	<b>20510</b>	<b>20511</b>
M12 X 1.75	D6	3	30°	<b>20472</b>	<b>20473</b>
M12 X 1.75	D6	3	52°	<b>20476</b>	<b>20477</b>
M14 X 1.50	D6	3	52°	<b>18940</b>	<b>18941</b>
M14 X 2.0	D7	3	52°	<b>18942</b>	<b>18943</b>
M16 X 2.0	D7	3	52°	<b>18944</b>	<b>18945</b>
M16 X 1.50	D6	3	52°	<b>18946</b>	<b>18947</b>
M18 X 2.50	D7	4	52°	<b>18948</b>	<b>18949</b>
M18 X 1.50	D6	4	52°	<b>18950</b>	<b>18951</b>
M20 X 2.5	D7	4	30°	<b>21051</b>	<b>21052</b>
M20 X 1.50	D6	4	52°	<b>18952</b>	<b>18953</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Spiral Point Tap - Left Hand</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Left hand spiral point tap for through holes</li> <li>• ANSI Tap - Refer to USCTI Table 302/303 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>	  	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 165** | Spiral Point Tap | Left Hand | Plug

Thread Size	Thread Limit	Flutes	EDP
5/16-18 NC	H3	2	15642
0-80 NF	H1	0	15012
0-80 NF	H1	2	17953
2-56 NC	H2	2	15036
3-48 NC	H2	2	15048
4-40 NC	H2	2	15072
4-48 NF	H2	2	15083
5-40 NC	H2	2	15096
6-32 NC	H3	2	15108
8-32 NC	H3	2	15168
8-36 NF	H2	2	15204
10-24 NC	H3	2	15228
10-32 NF	H3	2	15276
1/4-20 NC	H3	2	15486
1/4-28 NF	H3	2	15546
5/16-24 NF	H3	2	15694
3/8-16 NC	H3	3	15754
3/8-24 NF	H3	3	15841
7/16-14 NC	H3	3	15901
1/2-13 NC	H3	3	16036
1/2-20 NF	H3	3	16128
5/8-11 NC	H3	3	16268

\*bold numbers are EDPs for ordering

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Spiral Point Tap - STI</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Screw thread insert (STI) tap for helical threads</li> <li>• ANSI-STI tap dimensions apply</li> <li>• Custom taps as fast as 24hrs</li> </ul>		 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

**Series 167** | **Spiral Point Tap | Screw Thread Insert (STI) | Plug**

Thread Size	Thread Limit	Flutes	EDP
4-40 NC	H1	2	17796
4-40 NC	H2	2	17800
6-32 NC	H2	2	17804
6-32 NC	H3	2	17808
8-32 NC	H2	2	17812
8-32 NC	H3	2	17816
10-24 NC	H2	2	17820
10-24 NC	H3	2	17824
10-32 NF	H2	2	17828
10-32 NF	H3	2	17832
1/4-20 NC	H2	2	17836
1/4-20 NC	H3	2	17840
1/4-28 NF	H2	2	17844
1/4-28 NF	H3	2	17848
5/16-18 NC	H3	3	17852
5/16-18 NC	H4	3	17856
5/16-24 NF	H2	3	17860
5/16-24 NF	H3	3	17864
3/8-16 NC	H3	3	17868
3/8-16 NC	H4	3	17872
3/8-24 NF	H2	3	17876
3/8-24 NF	H3	3	17880
7/16-14 NC	H3	3	17884
7/16-20 NF	H3	3	17888
1/2-13 NC	H3	3	17892
1/2-20 NF	H3	3	17896

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Spiral Point Tap</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Gun tap for through holes</li> <li>• ANSI Tap - Refer to USCTI Table 302/303 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>		 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 105 Spiral Point Tap | Plug

Thread Size	Thread Limit	Flutes	EDP
5/16-18 NC	H7	2	15648
00-90 NS	H1	0	15001
00-96 NS	H1	0	15003
0-80 NF	H3	0	15008
1-56 NS	H1	0	15020
2-56 NC	H3	2	17734
2-56 NC	H4	2	17735
2-56 NC	H5	2	17668
2-56 NC	H7	2	17691
4-40 NC	H3	2	15078
4-40 NC	H4	2	17910
4-40 NC	H5	2	17593
4-40 NC	H7	2	17670
4-40 NC	H11	2	17557
5-40 NC	H5	2	17697
5-40 NC	H7	2	17954
5-40 NC	H11	2	17675
6-32 NC	H5	2	15120
6-32 NC	H7	2	15126
6-32 NC	H11	2	15132
6-40 NF	H3	2	15150
6-48 NS	H2	2	15156
8-32 NC	H5	2	15180
8-32 NC	H7	2	15186
8-32 NC	H11	2	15192
8-40 NS	H2	2	15216
10-24 NC	H5	2	15234
10-24 NC	H7	2	15240
10-24 NC	H11	2	15246
10-32 NF	H4	2	15282
10-32 NF	H5	2	15288
10-32 NF	H7	2	15294
10-32 NF	H11	2	15300
10-40 NS	H2	2	15324
12-32 NEF	H3	2	15384
1/4-20 NC	H7	2	15492
1/4-20 NC	H11	2	15498
1/4-24 NS	H3	2	15534
1/4-28 NF	H5	2	15552
1/4-28 NF	H7	2	15558
1/4-28 NF	H11	2	15564
1/4-32 NEF	H3	2	15588
1/4-36 NS	H2	2	15594
1/4-36 NS	H3	2	17572
1/4-40 NS	H2	3	17573

\*bold numbers are EDPs for ordering

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



Series 105		Spiral Point Tap   Plug		
Thread Size	Thread Limit	Flutes	EDP	
5/16-18 NC	H11	2	15654	
5/16-24 NF	H5	2	17737	
5/16-24 NF	H11	2	15706	
5/16-32 NEF	H3	2	15728	
3/8-16 NC	H3	2	17738	
3/8-16 NC	H7	3	15764	
3/8-16 NC	H11	3	15769	
3/8-24 NF	H5	3	15846	
3/8-24 NF	H7	3	15851	
3/8-24 NF	H11	3	15856	
3/8-32 NEF	H3	3	15876	
7/16-14 NC	H11	3	15906	
7/16-20 NF	H11	3	15961	
15/32-32 NS	H3	3	16011	
1/2-13 NC	H11	3	16046	
1/2-20 NF	H11	3	16138	
1/2-28 NEF	H3	3	16163	
9/16-12 NC	H3	3	18331	
9/16-18 NF	H3	3	18337	
9/16-18 NF	H5	3	17655	
9/16-18 NF	H11	3	16213	
9/16-20 NS	H3	3	16223	
5/8-11 NC	H11	3	16273	
5/8-18 NF	H3	3	18353	
5/8-18 NF	H5	3	17683	
3/4-10 NC	H11	3	16452	
3/4-16 NF	H3	3	18374	
3/4-16 NF	H5	3	17692	
7/8-9 NC	H4	3	16645	
7/8-14 NF	H4	3	17656	
1-14 NS	H4	3	17906	
1-8 NC	H4	3	16778	
1-8 NC	H11	3	16783	
1-1/4-7	H4	3	17920	

\*bold numbers are EDPs for ordering

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Pulley/Extended Length Tap</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Extended length/pulley gun taps</li> </ul>		 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

## Series 105L Spiral Point Tap | Pulley/Extended | Plug

Thread Size	Thread Limit	OAL (L)	Shank (D)	Flutes	EDP
6-32 NC	H3	4	0.141	2	17605
6-32 NC	H3	6	0.141	2	15138
8-32 NC	H3	4	0.168	2	17582
8-32 NC	H3	6	0.168	2	15198
10-24 NC	H3	4	0.194	2	17606
10-24 NC	H3	6	0.194	2	15258
10-32 NF	H3	6	0.194	2	15312
10-32 NF	H3	4	0.194	2	17583
1/4-20 NC	H3	4	0.255	2	17584
1/4-20 NC	H3	6	0.185	2	17569
1/4-20 NC	H3	4	0.185	2	17964
1/4-20 NC	H3	6	0.255	2	15516
1/4-28 NF	H3	6	0.255	2	15576
1/4-28 NF	H3	4	0.185	2	17965
1/4-28 NF	H3	6	0.185	2	17607
5/16-18 NC	H3	4	0.318	2	17585
5/16-18 NC	H3	6	0.24	2	17610
5/16-18 NC	H3	4	0.24	2	17966
5/16-18 NC	H3	6	0.318	2	15671
5/16-24 NF	H3	6	0.318	2	15711
5/16-24 NF	H3	6	0.24	2	17611
5/16-24 NF	H3	4	0.24	2	17967
3/8-16 NC	H3	6	0.381	3	15784
3/8-16 NC	H3	6	0.275	3	15799
3/8-16 NC	H5	6	0.381	3	17666
3/8-16 NC	H3	4	0.381	3	17586
3/8-16 NC	H3	4	0.275	3	17969
3/8-24 NF	H3	4	0.275	3	17970
3/8-24 NF	H3	6	0.381	3	15861
7/16-14 NC	H3	6	0.323	3	15931
7/16-20 NF	H3	6	0.323	3	15971
1/2-13 NC	H3	6	0.367	3	16081
1/2-20 NF	H3	6	0.367	3	16148
5/8-11 NC	H3	6	0.48	3	16307
3/4-10 NC	H3	6	0.59	3	17632

\*bold numbers are EDPs for ordering

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HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Spiral Point Tap - Metric</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Gun tap for through holes</li> <li>• ANSI Tap - Refer to USCTI Table 302/303 for dimensions</li> <li>• Custom taps as fast as 24hrs</li> </ul>		 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○			○	○	○	○			○	

● Best ○ Good

**Series 105M** | **Spiral Point Tap | Metric | Plug**

Thread Size	Thread Limit	Flutes	EDP
M1.6 X 0.35	D3	0	20008
M1.8 X 0.35	D3	0	20020
M2 X 0.4	D3	2	20032
M2.5 X 0.45	D1	2	20050
M2.2 X 0.45	D3	2	20044
M2.5 X 0.45	D3	2	20056
M3 X 0.5	D1	2	20062
M3 X 0.5	D3	2	20068
M3 X 0.5	D5	2	21021
M3 X 0.5	D7	2	20938
M3.5 X 0.6	D1	2	20083
M3.5 X 0.6	D4	2	20089
M3.5 X 0.6	D11	2	20110
M4 X 0.7	D2	2	20122
M4 X 0.7	D4	2	20128
M4 X 0.7	D5	2	21033
M4 X 0.70	D7	2	20923
M4 X 0.7	D11	2	20149
M4.5 X .75	D2	2	20161
M4.5 X .75	D4	2	20167
M4.5 X .75	D11	2	20188
M5 X 0.8	D3	2	20912
M5 X 0.8	D2	2	20200
M5 X 0.8	D4	2	20206
M5 X 0.8	D7	2	20924
M5 X 0.8	D11	2	20227
M5 X 0.9	D3	2	21186
M5.5 X 0.9	D3	2	21191
M6 X 0.75	D3	2	20278
M6 X 1.0	D3	2	20239
M6 X 1.0	D5	2	20245
M6 X 1.0	D11	2	20266
M7 X 1.0	D5	2	20288
M7 X 1.0	D11	2	20307
M8 X 1.0	D3	2	20351
M8 X 1.0	D5	2	20356
M8 X 1.0	D11	2	20374
M8 X 1.25	D3	2	20317
M8 X 1.25	D5	2	20322
M8 X 1.25	D11	2	20341
M10 X 1.0	D5	3	20978
M10 X 1.25	D3	3	20418
M10 X 1.25	D5	3	20423
M10 X 1.5	D11	3	20441
M10 X 1.5	D3	3	20384

\*bold numbers are EDPs for ordering

# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



Series 105M	Spiral Point Tap   Metric   Plug		
Thread Size	Thread Limit	Flutes	EDP
M10 X 1.5	D6	3	20389
M10 X 1.5	D7	3	21043
M11 X 1.5	D6	3	20451
M12 X 1.0	D5	3	20914
M12 X 1.25	D3	3	20490
M12 X 1.25	D5	3	20495
M12X1.5	D6	3	21027
M12 X 1.75	D3	3	20456
M12 X 1.75	D6	3	20461
M12 X 1.75	D11	3	20480
M14 X 1.5	D3	3	20538
M14 X 1.5	D6	3	20543
M14 X 2	D3	3	20523
M14 X 2	D7	3	20528
M16 X 1.5	D3	3	20579
M16 X 1.5	D6	3	20584
M16 X 2	D4	3	20559
M16 X 2	D7	3	20564
M16 X 2	D11	3	20574
M18 X 2.5	D7	3	20599
M20 X 2.5	D7	3	20634
M24X3.0	D8	3	21029

\*bold numbers are EDPs for ordering

## Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

**CUSTOM COMES STANDARD**

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# PERFORMANCE

HSS Taps For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<p><b>Pulley/Extended Length Tap</b></p> <ul style="list-style-type: none"> <li>• Popular Specials</li> <li>• High Speed Steel (HSS)</li> <li>• Stocked Bright finish</li> <li>• Extended length/pulley gun taps</li> </ul>		 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	○	○	○	○	○	○	○	○	○	○

● Best ○ Good

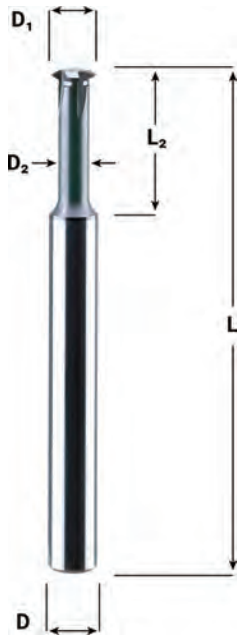
**Series 109M** | Spiral Point Tap | Pulley/Extended | Metric | Plug

Thread Size	Thread Limit	OAL (L)	Shank (D)	Flutes	EDP
M3.5 X 0.6	D4	6	0.141	2	<b>20116</b>
M4 X 0.7	D4	6	0.168	2	<b>20155</b>
M4.5 X .75	D4	6	0.194	2	<b>20194</b>
M5 X 0.8	D4	6	0.194	2	<b>20233</b>
M6 X 1.0	D5	6	0.255	2	<b>20272</b>
M8 X 1.25	D5	6	0.318	2	<b>21022</b>
M10 X 1.5	D6	6	0.381	3	<b>21026</b>
M12 X 1.75	D6	6	0.367	3	<b>20913</b>
M16 X 2	D7	6	0.48	3	<b>21028</b>

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Carbide Thread Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Thread Mills - Single Point</b> <ul style="list-style-type: none"> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Single point design to create any desired TPI needed</li> <li>• Greater versatility to create multiple thread profiles with one tool</li> <li>• Perfect Save-the-Day tool</li> <li>• TPI Range: Indicates thread pitch range the thread mill can achieve</li> </ul>	 	   

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

**Series 187** **TM-SP | Single Point**

Thread Size	Cutter Dia. (D <sub>1</sub> )	Neck Len. (L)	Neck Dia. (L <sub>2</sub> )	OAL (L)	Shank (D)	Flutes	Bright	TiAlN
2-56-80	0.06	0.18	0.034	2-1/2	3/16	3	14550	14550-TIALN
2-56-80	0.06	0.275	0.034	2-1/2	3/16	3	14551	14551-TIALN
3-48-72	0.072	0.2	0.04	2-1/2	3/16	3	14552	14552-TIALN
3-48-72	0.072	0.32	0.04	2-1/2	3/16	3	14553	14553-TIALN
4-40-64	0.08	0.225	0.045	2-1/2	3/16	3	14554	14554-TIALN
4-40-64	0.08	0.36	0.045	2-1/2	3/16	3	14555	14555-TIALN
6-32-64	0.098	0.28	0.049	2-1/2	3/16	3	14556	14556-TIALN
6-32-64	0.098	0.445	0.049	2-1/2	3/16	3	14557	14557-TIALN
8-32-56	0.12	0.33	0.07	2-1/2	3/16	3	14558	14558-TIALN
8-32-56	0.12	0.525	0.07	2-1/2	3/16	3	14559	14559-TIALN
10-24-56	0.135	0.38	0.07	2-1/2	3/16	3	14560	14560-TIALN
10-24-56	0.135	0.61	0.07	2-1/2	3/16	3	14561	14561-TIALN
1/4-20-56	0.18	0.5	0.105	2-1/2	1/4	4	14562	14562-TIALN
1/4-20-56	0.18	0.775	0.105	2-1/2	1/4	4	14563	14563-TIALN
5/16-18-48	0.24	0.625	0.16	2-1/2	1/4	4	14564	14564-TIALN
5/16-18-48	0.24	0.965	0.16	2-1/2	1/4	4	14565	14565-TIALN
3/8-14-40	0.29	0.875	0.19	3	1/4	4	14566	14566-TIALN
3/8-14-40	0.29	1.16	0.19	3	1/4	4	14567	14567-TIALN
1/2-12-32	0.372	1.125	0.24	3	1/4	4	14568	14568-TIALN
1/2-12-32	0.372	1.56	0.24	3	1/4	4	14569	14569-TIALN
5/8-11-32	0.49	1.375	0.35	3.5	3/8	5	14570	14570-TIALN
5/8-12-32	0.49	1.94	0.35	3.5	3/8	5	14571	14571-TIALN
3/4-10-32	0.595	1.625	0.42	4	5/8	6	14572	14572-TIALN
3/4-11-32	0.595	2.31	0.42	4	5/8	6	14573	14573-TIALN
7/8-8-24	0.695	1.75	0.49	5	3/4	6	14574	14574-TIALN
1-6-32	0.74	2	0.49	5	3/4	6	14575	14575-TIALN

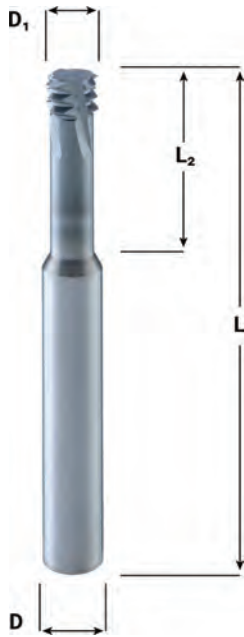
\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS



# ADVANCED PERFORMANCE

Carbide Thread Mills For Difficult-To-Machine Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Thread Mills - LHC/LHS</b> <ul style="list-style-type: none"> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Ideal for exotic materials like stainless steel and HRSA</li> <li>• LHC/LHS for top down milling to maintain climb milling and create a right hand thread</li> </ul>	 	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	●	●	○	○	○	○	●	●	○	○

● Best ○ Good

**Series 189** | **TM-LHC | LHC/LHS | Top/Down | Exotics**

Thread Size	Cutter Dia. (D <sub>1</sub> )	Neck Len. (L)	OAL (L)	Shank (D)	Flutes	EDP
2-56 NC	0.065	0.17	2-1/2	1/4	3	14600-ALCRN
3-48 NC	0.075	0.2	2-1/2	1/4	3	14601-ALCRN
4-40 NC	0.085	0.25	2-1/2	1/4	3	14602-ALCRN
6-32 NC	0.1	0.28	2-1/2	1/4	3	14603-ALCRN
8-32 NC	0.12	0.37	2-1/2	1/4	3	14604-ALCRN
10-24 NC	0.14	0.42	2-1/2	1/4	3	14605-ALCRN
10-32 NF	0.14	0.42	2-1/2	1/4	3	14606-ALCRN
1/4-20 NC	0.18	0.55	2-1/2	1/4	3	14607-ALCRN
1/4-28 NF	0.18	0.55	2-1/2	1/4	3	14608-ALCRN
5/16-18 NC	0.235	0.68	2-1/2	1/4	3	14609-ALCRN
5/16-24 NF	0.235	0.68	2-1/2	1/4	3	14610-ALCRN
3/8-16 NC	0.3	0.84	3	3/8	4	14611-ALCRN
3/8-24 NF	0.3	0.84	3	3/8	4	14612-ALCRN
7/16-14 NC	0.345	0.98	3	3/8	4	14613-ALCRN
7/16-20 NF	0.345	0.98	3	3/8	4	14614-ALCRN
1/2-13 NC	0.37	1.08	3	3/8	4	14615-ALCRN
9/16-18 NF	0.45	1.24	3.5	1/2	4	14616-ALCRN
5/8-11 NC	0.49	1.36	3.5	1/2	4	14617-ALCRN
3/4-10 NC	0.585	1.63	4	5/8	4	14618-ALCRN
3/4-16 NF	0.585	1.63	4	5/8	4	14619-ALCRN

\*bold numbers are EDPs for ordering

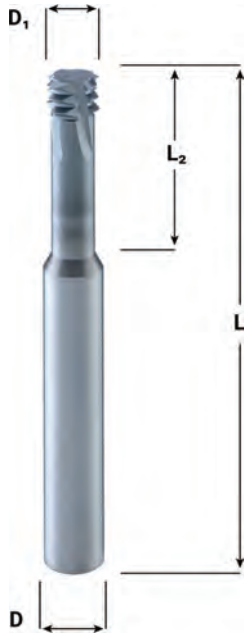
## Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

**CUSTOM  
COMES  
STANDARD**

# ADVANCED PERFORMANCE

Carbide Thread Mills For Difficult-To-Machine Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Thread Mills - LHC/LHS</b> <ul style="list-style-type: none"> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Ideal for exotic materials like stainless steel and HRSA</li> <li>• LHC/LHS for top down milling to maintain climb milling and create a right hand thread</li> </ul>	 	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	●	●	○	○	○	○	●	●	○	○

● Best ○ Good

**Series 189M** | TM-LHC-M | LHC/LHS | Top/Down | Exotics

Thread Size	Cutter Dia. (D <sub>1</sub> )	Neck Len. (L)	OAL (L)	Shank (D)	Flutes	EDP
M2X0.4	0.06	0.18	2-1/2	1/4	3	14620-ALCRN
M2.5X0.45	0.076	0.22	2-1/2	1/4	3	14621-ALCRN
M3X0.5	0.092	0.26	2-1/2	1/4	3	14622-ALCRN
M3.5X0.6	0.108	0.3	2-1/2	1/4	3	14623-ALCRN
M4X0.7	0.122	0.35	2-1/2	1/4	3	14624-ALCRN
M5X0.8	0.15	0.44	2-1/2	1/4	3	14625-ALCRN
M6X0.75	0.182	0.53	2-1/2	1/4	3	14626-ALCRN
M6X1	0.182	0.53	2-1/2	1/4	3	14627-ALCRN
M8X1	0.245	0.7	2-1/2	1/4	3	14628-ALCRN
M8X1.25	0.245	0.7	2-1/2	1/4	3	14629-ALCRN
M10X1	0.308	0.88	3	3/8	4	14630-ALCRN
M10X1.5	0.308	0.88	3	3/8	4	14631-ALCRN
M12X1	0.37	1	3	3/8	4	14632-ALCRN
M12X1.5	0.37	1	3	3/8	4	14633-ALCRN
M12X1.75	0.37	1	3	3/8	4	14634-ALCRN
M14X1.5	0.44	1.18	3.5	1/2	4	14635-ALCRN
M14X2	0.44	1.18	3.5	1/2	4	14636-ALCRN
M16X1.5	0.49	1.36	3.5	1/2	4	14637-ALCRN
M16X2	0.49	1.36	3.5	1/2	4	14638-ALCRN

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# ADVANCED PERFORMANCE

Carbide Thread Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Thread Mills</b> <ul style="list-style-type: none"> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Suitable for wide range of materials up to 2xD</li> <li>• Helical flute for smooth chatter-free cutting</li> </ul>	 	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	●	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

**Series 180** | TM | Helical | 2xD

Thread Size	Cutter Dia. (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	Bright	TiAlN
6-32 NC	0.10	0.297	2	3/16	3	14300	14300-TIALN
8-32 NC	0.12	0.328	2	3/16	3	14301	14301-TIALN
10-24 NC	0.14	0.396	2-1/2	3/16	3	14302	14302-TIALN
10-32 NF	0.14	0.391	2-1/2	3/16	3	14303	14303-TIALN
1/4-20 NC	0.18	0.525	2-1/2	3/16	3	14304	14304-TIALN
1/4-28 NF	0.18	0.518	2-1/2	3/16	3	14305	14305-TIALN
5/16-18 NC	0.24	0.639	2-1/2	1/4	3	14306	14306-TIALN
5/16-24 NF	0.24	0.646	2-1/2	1/4	3	14307	14307-TIALN
3/8-16 NC	0.30	0.781	3	5/16	4	14308	14308-TIALN
3/8-24 NF	0.30	0.771	3	5/16	4	14309	14309-TIALN
7/16-14 NC	0.35	0.893	3.5	3/8	4	14310	14310-TIALN
7/16-20 NF	0.35	0.875	3.5	3/8	4	14311	14311-TIALN
1/2-13 NC	0.37	1.038	3.5	3/8	4	14312	14312-TIALN
1/2-20 NF	0.37	1.025	3.5	3/8	4	14313	14313-TIALN
9/16-12 NC	0.45	1.125	3.5	1/2	4	14314	14314-TIALN
9/16-18 NF	0.45	1.139	3.5	1/2	4	14315	14315-TIALN
5/8-11 NC	0.49	1.318	3.5	1/2	4	14316	14316-TIALN
5/8-16 NS	0.49	1.281	3.5	1/2	4	14317	14317-TIALN
5/8-18 NF	0.49	1.25	3.5	1/2	4	14318	14318-TIALN
3/4-10 NC	0.59	1.55	4	5/8	4	14319	14319-TIALN
3/4-16 NF	0.59	1.531	4	5/8	4	14320	14320-TIALN
7/8-9 NC	0.62	1.833	4	5/8	4	14321	14321-TIALN
7/8-14 NF	0.62	1.75	4	5/8	4	14322	14322-TIALN
1-8 NC	0.74	2.063	5	3/4	4	14323	14323-TIALN
1-12 NF	0.74	2.042	5	3/4	4	14324	14324-TIALN

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Carbide Thread Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Thread Mills</b> <ul style="list-style-type: none"> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Suitable for wide range of materials up to 2xD</li> <li>• Helical flute for smooth chatter-free cutting</li> </ul>	 	    

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

**Series 180M** | TM-M | Helical | 2xD | Metric

Thread Size	Cutter Dia. (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	Bright	TiAlN
M4X0.7	0.12	0.317	2	3/16	3	14375	14375-TIALN
M5X0.8	0.15	0.394	2.5	3/16	3	14376	14376-TIALN
M6X0.75	0.17	0.487	2.5	3/16	3	14377	14377-TIALN
M6X1	0.17	0.492	2.5	3/16	3	14378	14378-TIALN
M8X1	0.24	0.65	2.5	1/4	3	14379	14379-TIALN
M8X1.25	0.24	0.664	2.5	1/4	3	14380	14380-TIALN
M10X1	0.30	0.807	3	5/16	4	14381	14381-TIALN
M10X1.5	0.30	0.797	3	5/16	4	14382	14382-TIALN
M12X1	0.37	0.965	3.5	3/8	4	14383	14383-TIALN
M12X1.5	0.37	0.974	3.5	3/8	4	14384	14384-TIALN
M12X1.75	0.37	0.999	3.5	3/8	4	14385	14385-TIALN
M14X1.5	0.42	1.152	3.5	1/2	4	14386	14386-TIALN
M14X2	0.42	1.142	3.5	1/2	4	14387	14387-TIALN
M16X1.5	0.49	1.27	3.5	1/2	4	14388	14388-TIALN
M16X2	0.49	1.299	3.5	1/2	4	14389	14389-TIALN

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Carbide Thread Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Thread Mills - Pipe</b> <ul style="list-style-type: none"> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Suitable for wide range of materials</li> <li>• For NPT and NPTF threads</li> <li>• Helical flute for smooth chatter-free cutting</li> </ul>	 	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	○	●	●	○	○	○	○	○	○

● Best ○ Good

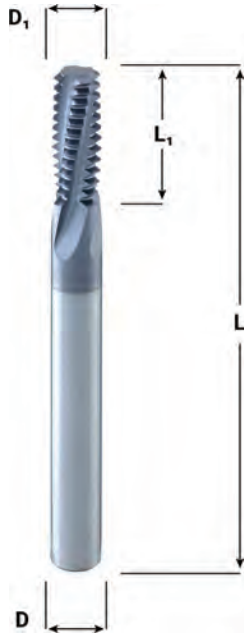
**Series 182** | **TM-PT | Helical | NPT/NPTF**

Thread Size	Standard	Cutter Dia. (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	Bright	TiAlN
1/16-27	NPT	0.245	0.481	2.5	1/4	3	14500	14500-TIALN
1/8-27	NPT	0.3	0.592	3	5/16	4	14501	14501-TIALN
1/4-18	NPT	0.36	0.611	3.5	3/8	4	14502	14502-TIALN
3/8-18	NPT	0.427	0.722	3.5	1/2	4	14503	14503-TIALN
1/2-14	NPT	0.49	1	3.5	1/2	4	14504	14504-TIALN
1-11-1/2	NPT	0.62	1.13	4	5/8	4	14505	14505-TIALN
2 1/2-8	NPT	0.74	1.5	5	3/4	4	14506	14506-TIALN
1/16-27	NPTF	0.245	0.481	2.5	1/4	3	14510	14510-TIALN
1/8-27	NPTF	0.3	0.592	3	5/16	4	14511	14511-TIALN
1/4-18	NPTF	0.36	0.611	3.5	3/8	4	14512	14512-TIALN
1/2-14	NPTF	0.49	1	3.5	1/2	4	14513	14513-TIALN
1-11-1/2	NPTF	0.62	1.13	4	5/8	4	14514	14514-TIALN
2 1/2-8	NPTF	0.74	1.5	5	3/4	4	14515	14515-TIALN

\*bold numbers are EDPs for ordering

# ADVANCED PERFORMANCE

Carbide Thread Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Thread Mills</b> <ul style="list-style-type: none"> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Suitable for wide range of materials up to 2xD</li> <li>• Coolant-through improves tool life and performance</li> </ul>	 	  

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	●	●	●	○	○	○	○	○	○

● Best ○ Good

Series 181		TMO   Helical   2xD   Coolant-Through					
Thread Size	Cutter Dia. (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	Bright	TiAlN
10-24 NC	0.14	0.396	2.5	3/16	3	14350	14350-TIALN
10-32 NF	0.14	0.391	2.5	3/16	3	14351	14351-TIALN
1/4-20 NC	0.18	0.525	2.5	3/16	3	14352	14352-TIALN
1/4-28 NF	0.18	0.518	2.5	3/16	3	14353	14353-TIALN
5/16-18 NC	0.235	0.639	2.5	1/4	3	14354	14354-TIALN
5/16-24 NF	0.235	0.646	2.5	1/4	3	14355	14355-TIALN
3/8-16 NC	0.3	0.781	3	5/16	4	14356	14356-TIALN
3/8-24 NF	0.3	0.771	3	5/16	4	14357	14357-TIALN
7/16-14 NC	0.345	0.893	3.5	3/8	4	14358	14358-TIALN
7/16-20 NF	0.345	0.875	3.5	3/8	4	14359	14359-TIALN
1/2-13 NC	0.37	1.038	3.5	3/8	4	14360	14360-TIALN
9/16-18 NF	0.45	1.139	3.5	1/2	4	14361	14361-TIALN
5/8-11 NC	0.49	1.318	3.5	1/2	4	14362	14362-TIALN
3/4-10 NC	0.585	1.55	4	5/8	4	14363	14363-TIALN
3/4-16 NF	0.585	1.531	4	5/8	4	14364	14364-TIALN

\*bold numbers are EDPs for ordering

## Popular Custom Threading Options

<ul style="list-style-type: none"> <li>Special Pitch Diameter limits</li> <li>Custom thread forms</li> <li>Tailored dimensions and chamfers</li> <li>Variety of enhanced PVD tool coatings</li> </ul>	<p><b>CUSTOM COMES STANDARD</b></p>
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INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ADVANCED PERFORMANCE

Carbide Thread Mills For Ferrous And Non-Ferrous Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Thread Mills</b> <ul style="list-style-type: none"> <li>Micrograin carbide substrate for wear resistance</li> <li>Suitable for wide range of materials up to 2xD</li> <li>Coolant-through improves tool life and performance</li> </ul>	Blind THRU	CARBIDE 15° Multi THRU Bright TiAlN

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
●	●	○	○	●	●	●	○	○	○	○	○	○

● Best ○ Good

**Series 181M** | TMO-M | Helical | 2xD | Coolant-Through | Metric

Thread Size	Cutter Dia. (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	Bright	TiAlN
M5X0.8	0.145	0.394	2.5	3/16	3	14400	14400-TIALN
M6X0.75	0.17	0.487	2.5	3/16	3	14401	14401-TIALN
M6X1	0.17	0.492	2.5	3/16	3	14402	14402-TIALN
M8X1	0.235	0.65	2.5	1/4	3	14403	14403-TIALN
M8X1.25	0.235	0.664	2.5	1/4	3	14404	14404-TIALN
M10X1	0.3	0.807	3	5/16	4	14405	14405-TIALN
M10X1.5	0.3	0.797	3	5/16	4	14406	14406-TIALN
M12X1	0.37	0.965	3.5	3/8	4	14407	14407-TIALN
M12X1.5	0.37	0.974	3.5	3/8	4	14408	14408-TIALN
M12X1.75	0.37	0.999	3.5	3/8	4	14409	14409-TIALN
M14X1.5	0.42	1.152	3.5	1/2	4	14410	14410-TIALN
M14X2	0.42	1.142	3.5	1/2	4	14411	14411-TIALN
M16X1.5	0.49	1.27	3.5	1/2	4	14412	14412-TIALN
M16X2	0.49	1.299	3.5	1/2	4	14413	14413-TIALN

\*bold numbers are EDPs for ordering

## Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

**CUSTOM  
COMES  
STANDARD**

# ADVANCED PERFORMANCE

Carbide Thread Mills For Difficult-To-Machine Materials



FEATURES / DESCRIPTION	APPLICATION	FEATURES
<b>Thread Mills - Pipe</b> <ul style="list-style-type: none"> <li>• Micrograin carbide substrate for wear resistance</li> <li>• Ideal for exotic materials like stainless steel and HRSA</li> <li>• For NPT and NPTF threads</li> <li>• Helical flute for smooth chatter-free cutting</li> </ul>	 	 

STEEL			STAINLESS		CAST IRON		NON-FERROUS		HRSA		HARDENED STEEL	
P1	P2	P3	M1	M2	K1	K2	N1	N2	S1	S2	H1	H2
○	○	○	●	●	○	○	○	○	●	●	○	○

● Best ○ Good

## Series 184 TM-PT-X | Helical | NPT/NPTF | Exotics

Thread Size	Standard	Cutter Dia. (D <sub>1</sub> )	LOC (L <sub>1</sub> )	OAL (L)	Shank (D)	Flutes	EDP
1/16-27	NPT	0.245	0.481	2-1/2	1/4	3	<b>14520-ALCRN</b>
1/8-27	NPT	0.3	0.592	3	5/16	4	<b>14521-ALCRN</b>
1/4-18	NPT	0.36	0.611	3.5	3/8	4	<b>14522-ALCRN</b>
3/8-18	NPT	0.427	0.722	3.5	1/2	4	<b>14523-ALCRN</b>
1/2-14	NPT	0.49	1	3.5	1/2	4	<b>14524-ALCRN</b>
1-11-1/2	NPT	0.62	1.13	4	5/8	4	<b>14525-ALCRN</b>
2 1/2-8	NPT	0.74	1.5	5	3/4	4	<b>14526-ALCRN</b>
1/16-27	NPTF	0.245	0.481	2-1/2	1/4	4	<b>14530-ALCRN</b>
1/8-27	NPTF	0.3	0.592	3	5/16	4	<b>14531-ALCRN</b>
1/4-18	NPTF	0.36	0.611	3.5	3/8	4	<b>14532-ALCRN</b>
1/2-14	NPTF	0.49	1	3.5	1/2	4	<b>14533-ALCRN</b>
1-11-1/2	NPTF	0.62	1.13	4	5/8	4	<b>14534-ALCRN</b>
2 1/2-8	NPTF	0.74	1.5	5	3/4	4	<b>14535-ALCRN</b>

\*bold numbers are EDPs for ordering

### Popular Custom Threading Options

- Special Pitch Diameter limits
- Custom thread forms
- Tailored dimensions and chamfers
- Variety of enhanced PVD tool coatings

## CUSTOM COMES STANDARD

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS



FEATURES / DESCRIPTION

Thread Plug Gage - Taperlock

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction



Series 195

Performance | Plug Gage | Taperlock

Thread Size	Class of Fit	Type	EDP
0-80 NF	2B	NoGo	23001
5/16-20 NS	2B	Go/NoGo	22169
0-80 NF	3B	NoGo	23002
0-80 NF	2B	Go/NoGo	23003
0-80 NF	3B	Go/NoGo	23004
1-64 NC	-	Go	23005
1-64 NC	2B	NoGo	23006
1-64 NC	3B	NoGo	23007
1-64 NC	2B	Go/NoGo	23008
1-64 NC	3B	Go/NoGo	23009
1-72 NF	-	Go	23010
1-72 NF	2B	NoGo	23011
1-72 NF	3B	NoGo	23012
1-72 NF	2B	Go/NoGo	23013
1-72 NF	3B	Go/NoGo	23014
2-56 NC	-	Go	23015
2-56 NC	2B	NoGo	23016
2-56 NC	3B	NoGo	23017
2-56 NC	2B	Go/NoGo	23018
2-56 NC	3B	Go/NoGo	23019
2-64 NF	-	Go	23020
2-64 NF	2B	NoGo	23021
2-64 NF	3B	NoGo	23022
2-64 NF	2B	Go/NoGo	23023
2-64 NF	3B	Go/NoGo	23024
3-48 NC	-	Go	23025
3-48 NC	2B	NoGo	23026
3-48 NC	3B	NoGo	23027
3-48 NC	2B	Go/NoGo	23028
3-48 NC	3B	Go/NoGo	23029
3-56 NF	-	Go	23030
3-56 NF	2B	NoGo	23031
3-56 NF	3B	NoGo	23032
3-56 NF	2B	Go/NoGo	23033
3-56 NF	3B	Go/NoGo	23034
4-40 NC	-	Go	23035
4-40 NC	2B	NoGo	23036
4-40 NC	3B	NoGo	23037
4-40 NC	2B	Go/NoGo	23038
4-40 NC	3B	Go/NoGo	23039
4-48 NF	-	Go	23040
4-48 NF	2B	NoGo	23041
4-48 NF	3B	NoGo	23042
4-48 NF	2B	Go/NoGo	23043
4-48 NF	3B	Go/NoGo	23044
5-40 NC	-	Go	23045
5-40 NC	2B	NoGo	23046
5-40 NC	3B	NoGo	23047
5-40 NC	2B	Go/NoGo	23048
5-40 NC	3B	Go/NoGo	23049
5-44 NF	-	Go	23050
5-44 NF	2B	NoGo	23051
5-44 NF	3B	NoGo	23052
5-44 NF	2B	Go/NoGo	23053
5-44 NF	3B	Go/NoGo	23054
6-32 NC	-	Go	23055
6-32 NC	2B	NoGo	23056
6-32 NC	3B	NoGo	23057
6-32 NC	2B	Go/NoGo	23058

Thread Size	Class of Fit	Type	EDP
6-32 NC	3B	Go/NoGo	23059
6-40 NF	-	Go	23060
6-40 NF	2B	NoGo	23061
6-40 NF	3B	NoGo	23062
6-40 NF	2B	Go/NoGo	23063
6-40 NF	3B	Go/NoGo	23064
8-32 NC	-	Go	23065
8-32 NC	2B	NoGo	23066
8-32 NC	3B	NoGo	23067
8-32 NC	2B	Go/NoGo	23068
8-32 NC	3B	Go/NoGo	23069
8-36 NF	-	Go	23070
8-36 NF	2B	NoGo	23071
8-36 NF	3B	NoGo	23072
8-36 NF	2B	Go/NoGo	23073
8-36 NF	3B	Go/NoGo	23074
10-24 NC	-	Go	23075
10-24 NC	2B	NoGo	23076
10-24 NC	3B	NoGo	23077
10-24 NC	2B	Go/NoGo	23078
10-24 NC	3B	Go/NoGo	23079
10-32 NF	-	Go	23080
10-32 NF	2B	NoGo	23081
10-32 NF	3B	NoGo	23082
10-32 NF	2B	Go/NoGo	23083
10-32 NF	3B	Go/NoGo	23084
12-24 NC	-	Go	23085
12-24 NC	2B	NoGo	23086
12-24 NC	3B	NoGo	23087
12-24 NC	2B	Go/NoGo	23088
12-24 NC	3B	Go/NoGo	23089
12-28 NF	-	Go	23090
12-28 NF	2B	NoGo	23091
12-28 NF	3B	NoGo	23092
12-28 NF	2B	Go/NoGo	23093
12-28 NF	3B	Go/NoGo	23094
12-32 NEF	-	Go	23095
0-80 NF	-	Go	23000
12-32 NEF	2B	NoGo	23096
12-32 NEF	3B	NoGo	23097
12-32 NEF	2B	Go/NoGo	23098
12-32 NEF	3B	Go/NoGo	23099
1/4-20 NC	-	Go	23100
1/4-20 NC	2B	NoGo	23101
1/4-20 NC	3B	NoGo	23102
1/4-20 NC	2B	Go/NoGo	23103
1/4-20 NC	3B	Go/NoGo	23104
1/4-28 NF	-	Go	23105
1/4-28 NF	2B	NoGo	23106
1/4-28 NF	3B	NoGo	23107
1/4-28 NF	2B	Go/NoGo	23108
1/4-28 NF	3B	Go/NoGo	23109
1/4-32 NEF	-	Go	23110
1/4-32 NEF	2B	NoGo	23111
1/4-32 NEF	3B	NoGo	23112
1/4-32 NEF	2B	Go/NoGo	23113
1/4-32 NEF	3B	Go/NoGo	23114
5/16-18 NC	-	Go	23115
5/16-18 NC	2B	NoGo	23116

# PERFORMANCE

Premium HSS Thread Plug Gages



## Series 195 Performance | Plug Gage | Taperlock

Thread Size	Class of Fit	Type	EDP	Thread Size	Class of Fit	Type	EDP
5/16-18 NC	3B	NoGo	23117	9/16-16 NS	3B	Go/NoGo	22290
5/16-18 NC	2B	Go/NoGo	23118	7/16-24 NS	2B	Go/NoGo	22239
5/16-18 NC	3B	Go/NoGo	23119	9/16-18 NF	2B	NoGo	23181
5/16-24 NF	-	Go	23120	9/16-18 NF	3B	NoGo	23182
5/16-20 NS	3B	Go/NoGo	22170	9/16-18 NF	2B	Go/NoGo	23183
5/16-24 NF	2B	NoGo	23121	9/16-18 NF	3B	Go/NoGo	23184
5/16-24 NF	3B	NoGo	23122	9/16-24 NEF	-	Go	23185
5/16-24 NF	2B	Go/NoGo	23123	9/16-20 NS	3B	Go/NoGo	22306
5/16-24 NF	3B	Go/NoGo	23124	9/16-24 NEF	2B	NoGo	23186
5/16-32 NEF	-	Go	23125	9/16-24 NEF	3B	NoGo	23187
5/16-28 NS	3B	Go/NoGo	22184	9/16-24 NEF	2B	Go/NoGo	23188
5/16-32 NEF	2B	NoGo	23126	9/16-24 NEF	3B	Go/NoGo	23189
5/16-32 NEF	3B	NoGo	23127	5/8-11 NC	-	Go	23190
5/16-32 NEF	2B	Go/NoGo	23128	9/16-32 NC	3B	Go/NoGo	22312
5/16-32 NEF	3B	Go/NoGo	23129	5/8-11 NC	2B	NoGo	23191
3/8-16 NC	-	Go	23130	7/16-32 NS	2B	Go/NoGo	22245
3/8-16 NC	2B	NoGo	23131	5/8-11 NC	3B	NoGo	23192
3/8-16 NC	3B	NoGo	23132	5/8-11 NC	2B	Go/NoGo	23193
3/8-16 NC	2B	Go/NoGo	23133	5/8-11 NC	3B	Go/NoGo	23194
3/8-16 NC	3B	Go/NoGo	23134	5/8-18 NF	-	Go	23195
3/8-24 NF	-	Go	23135	1/2-16 NS	2B	Go/NoGo	22259
3/8-20 NS	3B	Go/NoGo	22198	5/8-12 NS	3B	Go/NoGo	22324
3/8-24 NF	2B	NoGo	23136	5/8-16 NS	3B	Go/NoGo	22330
3/8-24 NF	3B	NoGo	23137	5/8-18 NF	2B	NoGo	23196
3/8-24 NF	2B	Go/NoGo	23138	5/8-18 NF	3B	NoGo	23197
3/8-24 NF	3B	Go/NoGo	23139	1 1/16-12 NS	-	Go	24979
3/8-32 NEF	-	Go	23140	5/8-18 NF	2B	Go/NoGo	23198
3/8-28 NS	3B	Go/NoGo	22212	5/8-18 NF	3B	Go/NoGo	23199
3/8-32 NEF	2B	NoGo	23141	5/8-24 NEF	-	Go	23200
3/8-32 NEF	3B	NoGo	23142	5/8-20 NS	3B	Go/NoGo	22344
3/8-32 NEF	2B	Go/NoGo	23143	1/2-32 NS	2B	Go/NoGo	22273
3/8-32 NEF	3B	Go/NoGo	23144	5/8-24 NEF	2B	NoGo	23201
7/16-14 NC	-	Go	23145	5/8-24 NEF	3B	NoGo	23202
7/16-14 NC	2B	NoGo	23146	5/8-24 NEF	2B	Go/NoGo	23203
7/16-14 NC	3B	NoGo	23147	5/8-24 NEF	3B	Go/NoGo	23204
7/16-14 NC	2B	Go/NoGo	23148	11/16-24 NEF	-	Go	23205
7/16-14 NC	3B	Go/NoGo	23149	5/8-28 NS	3B	Go/NoGo	22356
7/16-20 NF	-	Go	23150	5/8-32 NS	3B	Go/NoGo	22362
7/16-16 NS	3B	Go/NoGo	22226	11/16-16 NS	3B	Go/NoGo	22368
5/16-28 NS	2B	Go/NoGo	22183	11/16-20 NS	3B	Go/NoGo	22374
7/16-20 NF	2B	NoGo	23151	11/16-24 NEF	2B	NoGo	23206
7/16-20 NF	3B	NoGo	23152	11/16-24 NEF	3B	NoGo	23207
7/16-20 NF	2B	Go/NoGo	23153	9/16-16 NS	2B	Go/NoGo	22289
3/8-20 NS	2B	Go/NoGo	22197	11/16-24 NEF	2B	Go/NoGo	23208
7/16-20 NF	3B	Go/NoGo	23154	11/16-24 NEF	3B	Go/NoGo	23209
7/16-28 NEF	-	Go	23155	3/4-10 NC	-	Go	23210
7/16-24 NS	3B	Go/NoGo	22240	11/16-28 NS	3B	Go/NoGo	22380
7/16-28 NEF	2B	NoGo	23156	11/16-32 NS	3B	Go/NoGo	22386
7/16-28 NEF	3B	NoGo	23157	3/4-10 NC	2B	NoGo	23211
7/16-28 NEF	2B	Go/NoGo	23158	3/4-10 NC	3B	NoGo	23212
7/16-28 NEF	3B	Go/NoGo	23159	3/4-10 NC	2B	Go/NoGo	23213
1/2-13 NC	-	Go	23160	9/16-20 NS	2B	Go/NoGo	22305
7/16-32 NS	3B	Go/NoGo	22246	3/4-10 NC	3B	Go/NoGo	23214
3/8-28 NS	2B	Go/NoGo	22211	3/4-16 NF	-	Go	23215
1/2-13 NC	2B	NoGo	23161	3/4-12 NS	3B	Go/NoGo	22401
1/2-13 NC	3B	NoGo	23162	3/4-16 NF	2B	NoGo	23216
1/2-13 NC	2B	Go/NoGo	23163	3/4-16 NF	3B	NoGo	23217
7/16-16 NS	2B	Go/NoGo	22225	3/4-16 NF	2B	Go/NoGo	23218
1/2-13 NC	3B	Go/NoGo	23164	3/4-16 NF	3B	Go/NoGo	23219
1/2-20 NF	-	Go	23165	3/4-20 NEF	-	Go	23220
1/2-16 NS	3B	Go/NoGo	22260	3/4-20 NEF	2B	NoGo	23221
1/2-20 NF	2B	NoGo	23166	9/16-32 NC	2B	Go/NoGo	22311
1/2-20 NF	3B	NoGo	23167	3/4-20 NEF	3B	NoGo	23222
1/2-20 NF	2B	Go/NoGo	23168	3/4-20 NEF	2B	Go/NoGo	23223
1/2-20 NF	3B	Go/NoGo	23169	3/4-20 NEF	3B	Go/NoGo	23224
1/2-28 NEF	-	Go	23170	13/16-20 NEF	-	Go	23225
1/2-28 NEF	2B	NoGo	23171	3/4-32 NS	3B	Go/NoGo	22415
1/2-28 NEF	3B	NoGo	23172	1 3/16-12 NS	2B	NoGo	24985
1/2-28 NEF	2B	Go/NoGo	23173	1 3/16-12 NS	3B	NoGo	24986
1/2-28 NEF	3B	Go/NoGo	23174	1 3/16-12 NS	2B	Go/NoGo	24987
9/16-12 NC	-	Go	23175	1 3/16-12 NS	3B	Go/NoGo	24988
1/2-32 NS	3B	Go/NoGo	22274	5/8-12 NS	2B	Go/NoGo	22323
9/16-12 NC	2B	NoGo	23176	1 5/16-12 NS	-	Go	24989
9/16-12 NC	3B	NoGo	23177	13/16-12 NS	3B	Go/NoGo	22421
9/16-12 NC	2B	Go/NoGo	23178	13/16-16 NS	3B	Go/NoGo	22427
9/16-12 NC	3B	Go/NoGo	23179	13/16-20 NEF	2B	NoGo	23226
9/16-18 NF	-	Go	23180	13/16-20 NEF	3B	NoGo	23227

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Thread Plug Gages



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

## Series 195

## Performance | Plug Gage | Taperlock

Thread Size	Class of Fit	Type	EDP
13/16-20 NEF	2B	Go/NoGo	23228
13/16-20 NEF	3B	Go/NoGo	23229
7/8-9 NC	-	Go	23230
5/8-16 NS	2B	Go/NoGo	232329
7/8-9 NC	2B	NoGo	23231
7/8-9 NC	3B	NoGo	23232
7/8-9 NC	2B	Go/NoGo	23233
7/8-9 NC	3B	Go/NoGo	23234
5/8-20 NS	2B	Go/NoGo	232343
7/8-14 NF	-	Go	23235
7/8-12 NS	3B	Go/NoGo	22439
7/8-14 NF	2B	NoGo	23236
7/8-14 NF	3B	NoGo	23237
7/8-14 NF	2B	Go/NoGo	23238
7/8-14 NF	3B	Go/NoGo	23239
7/8-20 NEF	-	Go	23240
7/8-16 NS	3B	Go/NoGo	22451
5/8-28 NS	2B	Go/NoGo	232355
7/8-20 NEF	2B	NoGo	23241
7/8-20 NEF	3B	NoGo	23242
7/8-20 NEF	2B	Go/NoGo	23243
7/8-20 NEF	3B	Go/NoGo	23244
15/16-20 NS	-	Go	23245
7/8-32 NS	3B	Go/NoGo	22457
15/16-12 NS	3B	Go/NoGo	22463
15/16-20 NS	2B	NoGo	23246
5/8-32 NS	2B	Go/NoGo	22361
15/16-20 NS	3B	NoGo	23247
15/16-20 NS	2B	Go/NoGo	23248
15/16-20 NS	3B	Go/NoGo	23249
1-8 NC	-	Go	23250
11/16-16 NS	2B	Go/NoGo	23267
15/16-32 NEF	3B	Go/NoGo	22469
1-8 NC	2B	NoGo	23251
1-8 NC	3B	NoGo	23252
11/16-20 NS	2B	Go/NoGo	23273
1-8 NC	2B	Go/NoGo	23253
1-8 NC	3B	Go/NoGo	23254
1-12 NF	-	Go	23255
1-12 NF	2B	NoGo	23256
11/16-28 NS	2B	Go/NoGo	22379
1-12 NF	3B	NoGo	23257
1-12 NF	2B	Go/NoGo	23258
1-12 NF	3B	Go/NoGo	23259
1-14 NS	-	Go	23260
11/16-32 NS	2B	Go/NoGo	22385
1-14 NS	2B	NoGo	23261
1-14 NS	3B	NoGo	23262
1-14 NS	2B	Go/NoGo	23263
1-14 NS	3B	Go/NoGo	23264
3/4-12 NS	2B	Go/NoGo	22400
1-20 NEF	-	Go	23265
1-16 NS	3B	Go/NoGo	22487
1-20 NEF	2B	NoGo	23266
1-20 NEF	3B	NoGo	23267
1-20 NEF	2B	Go/NoGo	23268
1-20 NEF	3B	Go/NoGo	23269
1 1/16-18 NEF	-	Go	23270
1-32 NS	3B	Go/NoGo	22493
1 1/16-12 NS	2B	NoGo	24980
1 1/16-12 NS	3B	NoGo	24981
1 1/16-12 NS	2B	Go/NoGo	24982
1 1/16-12 NS	3B	Go/NoGo	24983
1 3/16-12 NS	-	Go	24984
1 1/16-16 NS	3B	Go/NoGo	22503
3/4-32 NS	2B	Go/NoGo	22414
1 1/16-18 NEF	2B	NoGo	23271
1 1/16-18 NEF	3B	NoGo	23272
1 1/16-18 NEF	2B	Go/NoGo	23273
1 1/16-18 NEF	3B	Go/NoGo	23274
1-1/8-7 NC	-	Go	23275
1 1/16-20 NS	3B	Go/NoGo	22509
1-1/8-7 NC	2B	NoGo	23276
1-1/8-7 NC	3B	NoGo	23277
1-1/8-7 NC	2B	Go/NoGo	23278
1-1/8-7 NC	3B	Go/NoGo	23279
1-1/8-12 NF	-	Go	23280

Thread Size	Class of Fit	Type	EDP
1-1/8-8 NS	3B	Go/NoGo	22521
1-1/8-12 NF	2B	NoGo	23281
13/16-12 NS	2B	Go/NoGo	22420
1-1/8-12 NF	3B	NoGo	23282
1-1/8-12 NF	2B	Go/NoGo	23283
1-1/8-12 NF	3B	Go/NoGo	23284
1-1/8-18 NEF	-	Go	23285
13/16-16 NS	2B	Go/NoGo	22426
1-1/8-16 NS	3B	Go/NoGo	22533
1-1/8-18 NEF	2B	NoGo	23286
1-1/8-18 NEF	3B	NoGo	23287
7/8-12 NS	2B	Go/NoGo	22438
1-1/8-18 NEF	2B	Go/NoGo	23288
1-1/8-18 NEF	3B	Go/NoGo	23289
1 3/16-18 NEF	-	Go	23290
1-1/8-20 NS	3B	Go/NoGo	22539
1-1/8-28 NS	3B	Go/NoGo	22545
1 3/16-16 NS	3B	Go/NoGo	22555
1 3/16-18 NEF	2B	NoGo	23291
1 3/16-18 NEF	3B	NoGo	23292
1 3/16-18 NEF	2B	Go/NoGo	23293
1 3/16-18 NEF	3B	Go/NoGo	23294
1-1/4-7 NC	-	Go	23295
1 3/16-20 NS	3B	Go/NoGo	22561
7/8-16 NS	2B	Go/NoGo	22450
1-1/4-7 NC	2B	NoGo	23296
1-1/4-7 NC	3B	NoGo	23297
1-1/4-7 NC	2B	Go/NoGo	23298
1-1/4-7 NC	3B	Go/NoGo	23299
1-1/4-12 NS	-	Go	23300
1-1/4-8 NS	3B	Go/NoGo	22573
1-1/4-12 NS	2B	NoGo	23301
1-1/4-12 NS	3B	NoGo	23302
1-1/4-12 NS	2B	Go/NoGo	23303
7/8-32 NS	2B	Go/NoGo	22456
1-1/4-12 NS	3B	Go/NoGo	23304
1-1/4-18 NEF	-	Go	23305
1-1/4-16 NS	3B	Go/NoGo	22585
1-1/4-18 NEF	2B	NoGo	23306
1-1/4-18 NEF	3B	NoGo	23307
1-1/4-18 NEF	2B	Go/NoGo	23308
1-1/4-18 NEF	3B	Go/NoGo	23309
1 5/16-18 NC	-	Go	23310
1-1/4-20 NC	3B	Go/NoGo	22591
15/16-12 NS	2B	Go/NoGo	22462
1 5/16-12 NS	2B	NoGo	24990
1 5/16-12 NS	3B	NoGo	24991
1 5/16-12 NS	2B	Go/NoGo	24992
15/16-32 NEF	2B	Go/NoGo	22468
1 5/16-12 NS	3B	Go/NoGo	24993
1 5/16-16 NS	3B	Go/NoGo	22601
1 5/16-18 NC	2B	NoGo	23311
1 5/16-18 NC	3B	NoGo	23312
1 5/16-18 NC	2B	Go/NoGo	23313
1 5/16-18 NC	3B	Go/NoGo	23314
1 3/8-6 NC	-	Go	23315
1 5/16-20 NS	3B	Go/NoGo	22607
1-16 NS	2B	Go/NoGo	22486
1 3/8-6 NC	2B	NoGo	23316
1 3/8-6 NC	3B	NoGo	23317
1 3/8-6 NC	2B	Go/NoGo	23318
1 3/8-6 NC	3B	Go/NoGo	23319
1 3/8-12 NF	-	Go	23320
1 3/8-8 NS	3B	Go/NoGo	22619
1 3/8-12 NF	2B	NoGo	23321
1 3/8-12 NF	3B	NoGo	23322
1 3/8-12 NF	2B	Go/NoGo	23323
1 3/8-12 NF	3B	Go/NoGo	23324
1 3/8-18 NS	-	Go	23325
1 3/8-16 NC	3B	Go/NoGo	22631
1 3/8-18 NS	2B	NoGo	23326
1 3/8-18 NS	3B	NoGo	23327
1 3/8-18 NS	2B	Go/NoGo	23328
1 3/8-18 NS	3B	Go/NoGo	23329
1 7/16-18 NS	-	Go	23330
1 3/8-20 NS	3B	Go/NoGo	22637
1 7/16-18 NS	2B	NoGo	23331

# PERFORMANCE

Premium HSS Thread Plug Gages



## Series 195 Performance | Plug Gage | Taperlock

Thread Size	Class of Fit	Type	EDP
1 7/16-18 NS	3B	NoGo	23332
1 7/16-18 NS	2B	Go/NoGo	23333
1 7/16-18 NS	3B	Go/NoGo	23334
1-1/2-6 NC	-	Go	23335
1-1/2-8 NS	3B	Go/NoGo	22649
1-3/2 NS	2B	Go/NoGo	22492
1-1/2-16 NS	3B	Go/NoGo	22661
1-1/2-20 NF	3B	Go/NoGo	22667
1-1/2-6 NC	2B	NoGo	23336
1-1/2-6 NC	3B	NoGo	23337
1-1/2-6 NC	2B	Go/NoGo	23338
1 1/16-16 NS	2B	Go/NoGo	22502
1-1/2-6 NC	3B	Go/NoGo	23339
1-1/2-12 NS	-	Go	23340
1-1/2-12 NS	2B	NoGo	23341
1-1/2-12 NS	3B	NoGo	23342
1 1/16-20 NS	2B	Go/NoGo	22508
1-1/2-12 NS	2B	Go/NoGo	23343
1-1/2-12 NS	3B	Go/NoGo	23344
1-1/2-18 NS	-	Go	23345
1-1/2-18 NS	2B	NoGo	23346
1-1/8-8 NS	2B	Go/NoGo	22520
1-1/2-18 NS	3B	NoGo	23347
1-1/2-18 NS	2B	Go/NoGo	23348
1-1/2-18 NS	3B	Go/NoGo	23349
1-3/4-12 NS	3B	Go/NoGo	22679
1-5/8-12 NS	3B	Go/NoGo	22673
1-7/8-12 NS	3B	Go/NoGo	22685
2 1/2-12 NS	3B	Go/NoGo	22703
2 1/4-12 NS	3B	Go/NoGo	22697
2-12	3B	Go/NoGo	22691
1-1/8-16 NS	2B	Go/NoGo	22532
1-1/8-20 NS	2B	Go/NoGo	22538
1-1/8-28 NS	2B	Go/NoGo	22544
1 3/16-16 NS	2B	Go/NoGo	22554
1 3/16-20 NS	2B	Go/NoGo	22560
1-1/4-8 NS	2B	Go/NoGo	22572
1-1/4-16 NS	2B	Go/NoGo	22584
1-1/4-20 NC	2B	Go/NoGo	22590
1 5/16-16 NS	2B	Go/NoGo	22600
1 5/16-20 NS	2B	Go/NoGo	22606
1 3/8-8 NS	2B	Go/NoGo	22618
1 3/8-16 NC	2B	Go/NoGo	22630
1 3/8-20 NS	2B	Go/NoGo	22636
1-1/2-8 NS	2B	Go/NoGo	22648
1-1/2-16 NS	2B	Go/NoGo	22660
1-1/2-20 NF	2B	Go/NoGo	22666
1-5/8-12 NS	2B	Go/NoGo	22672
1-3/4-12 NS	2B	Go/NoGo	22678
1-7/8-12 NS	2B	Go/NoGo	22684
2-12	2B	Go/NoGo	22690
2 1/4-12 NS	2B	Go/NoGo	22696
2 1/2-12 NS	2B	Go/NoGo	22702

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

FEATURES / DESCRIPTION

**Thread Plug Gage - Taperlock - Metric**

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- M39 X 3 gages are Tri-lock style
- Hardened High Speed Steel construction



Series 195M

Performance | Plug Gage | Taperlock | Metric

Thread Size	Class of Fit	Type	EDP
M1.6 X.35	6H	NoGo	25001
M1.8 X.35	-	Go	25005
M1.6 X.35	6H	Go/NoGo	25003
M1.8 X.35	6H	Go/NoGo	25006
M1.8 X.35	6H	NoGo	25008
M2 X.4	-	Go	25010
M2 X.4	6H	NoGo	25011
M2.2 X.45	-	Go	25015
M2 X.4	6H	Go/NoGo	25013
M2.2 X.45	6H	NoGo	25016
M2.5 X.45	-	Go	25020
M2.2 X.45	6H	Go/NoGo	25018
M2.5 X.45	6H	NoGo	25021
M3 X.5	-	Go	25025
M2.5 X.45	6H	Go/NoGo	25023
M3 X.5	6H	NoGo	25026
M3.5 X.6	-	Go	25030
M3 X.5	6H	Go/NoGo	25028
M3.5 X.6	6H	NoGo	25031
M4 X.7	-	Go	25035
M3.5 X.6	6H	Go/NoGo	25033
M4 X.7	6H	NoGo	25036
M4.5 X.75	-	Go	25040
M4 X.7	6H	Go/NoGo	25038
M4.5 X.75	6H	NoGo	25041
M5 X.8	-	Go	25045
M4.5 X.75	6H	Go/NoGo	25043
M6 X 0.75	6H	Go/NoGo	22792
M5 X.8	6H	NoGo	25046
M6 X 1	-	Go	25050
M5 X.8	6H	Go/NoGo	25048
M6 X 1	6H	NoGo	25051
M8 X 0.75	6H	Go/NoGo	22820
M7 X 1	-	Go	25055
M6 X 1	6H	Go/NoGo	25053
M7 X 1	6H	NoGo	25056
M8 X 1.25	-	Go	25060
M7 X 1	6H	Go/NoGo	25058
M8 X 1	6H	NoGo	25066
M8 X 1.25	6H	NoGo	25061
M9 X 1.25	6H	Go/NoGo	22832
M8 X 1	6H	Go	25065
M8 X 1.25	6H	Go/NoGo	25063
M10 X 1.5	-	Go	25070
M8 X 1	6H	Go/NoGo	25068
M10 X 1.25	6H	NoGo	25076
M10 X 1.0	6H	Go/NoGo	22864
M12 X 1.75	-	Go	25080
M10 X 1.25	6H	Go/NoGo	25078
M9 X 1.0	6H	Go/NoGo	22844
M10 X 1.5	6H	NoGo	25071
M10 X 1.25	-	Go	25075
M11 X 1.5	6H	Go/NoGo	22876
M10 X 1.5	6H	Go/NoGo	25073
M27 X 3	-	Go	25155
M12 X 1.25	6H	NoGo	25086
M14 X 2	-	Go	25090
M12 X 1.25	6H	Go/NoGo	25088
M12 X 1.5	-	-	22900

Thread Size	Class of Fit	Type	EDP
M12 X 1.75	6H	NoGo	25081
M12 X 1.25	-	Go	25085
M11 X 1.0	6H	Go/NoGo	22888
M12 X 1.75	6H	Go/NoGo	25083
M14 X 1.2	6H	Go/NoGo	22940
M14 X 1.5	6H	NoGo	25096
M16 X 2	-	Go	25100
M14 X 1.5	6H	Go/NoGo	25098
M14 X 2	6H	NoGo	25091
M12 X 1.0	-	-	22920
M14 X 1.5	-	Go	25095
M14 X 2	6H	Go/NoGo	25093
M16 X 1.5	6H	NoGo	25106
M15 X 1.0	6H	Go/NoGo	22948
M18 X 2.5	-	Go	25110
M16 X 1.5	6H	Go/NoGo	25108
M14 X 1.0	6H	Go/NoGo	22944
M16 X 2	6H	NoGo	25101
M16 X 1.5	-	Go	25105
M16 X 2	6H	Go/NoGo	25103
M18 X 1.5	6H	NoGo	25116
M20 X 2.5	-	Go	25120
M18 X 1.5	6H	Go/NoGo	25118
M18 X 2.5	6H	NoGo	25111
M16 X 1.0	6H	Go/NoGo	22976
M18 X 1.5	-	Go	25115
M18 X 2.5	6H	Go/NoGo	25113
M20 X 1.0	6H	Go/NoGo	21512
M18 X 1.0	6H	Go/NoGo	22988
M20 X 1.5	6H	NoGo	25126
M22 X 2.5	-	Go	25130
M20 X 1.5	6H	Go/NoGo	25128
M20 X 2.5	6H	NoGo	25121
M20 X 1.5	-	Go	25125
M20 X 2.5	6H	Go/NoGo	25123
M22 X 1.5	6H	NoGo	25136
M24 X 3	-	Go	25140
M22 X 1.5	6H	Go/NoGo	25138
M22 X 2.5	6H	NoGo	25131
M22 X 1.5	-	Go	25135
M22 X 2.5	6H	Go/NoGo	25133
M24 X 1.5	6H	Go/NoGo	21545
M24 X 2	6H	NoGo	25146
M24 X 2	6H	Go/NoGo	25148
M24 X 3	6H	NoGo	25141
M24 X 2	-	Go	25145
M24 X 3	6H	Go/NoGo	25143
M25 X 1.5	6H	Go/NoGo	21548
M26 X 1.5	6H	Go/NoGo	21557
M27 X 1.5	6H	Go/NoGo	21578
M27 X 2	6H	NoGo	25161
M30 X 3.5	-	Go	25165
M27 X 2	6H	Go/NoGo	25163
M27 X 3	6H	NoGo	25156
M27 X 2	-	Go	25160
M27 X 3	6H	Go/NoGo	25158
M30 X 1.5	6H	Go/NoGo	21593
M30 X 2	6H	NoGo	25171
M33 X 3.5	-	Go	25175

# PERFORMANCE

Premium HSS Thread Plug Gages



**Series 195M** | Performance | Plug Gage | Taperlock | Metric

Thread Size	Class of Fit	Type	EDP
M30 X 2	6H	Go/NoGo	25173
M30 X 3.5	6H	NoGo	25166
M30 X 2	-	Go	25170
M30 X 3.5	6H	Go/NoGo	25168
M32 X 1.5	6H	Go/NoGo	21611
M32 X 2.0	6H	Go/NoGo	21602
M33 X 2	6H	NoGo	25181
M36 X 4	-	Go	25185
M33 X 2	6H	Go/NoGo	25183
M33 X 3.5	6H	NoGo	25176
M33 X 2	-	Go	25180
M33 X 3.5	6H	Go/NoGo	25178
M35 X 1.5	6H	Go/NoGo	21632
M36 X 1.5	6H	Go/NoGo	21662
M36 X 2.0	6H	Go/NoGo	21653
M36 X 3	6H	NoGo	25191
M39 X 4	-	Go	25195
M36 X 3	6H	Go/NoGo	25193
M36 X 4	6H	NoGo	25186
M36 X 3	-	Go	25190
M36 X 4	6H	Go/NoGo	25188
M39 X 3	6H	NoGo	25201
M39 X 3	6H	Go/NoGo	25203
M39 X 4	6H	NoGo	25196
M39 X 3	-	Go	25200
M39 X 4	6H	Go/NoGo	25198
M1.6 X .35	-	Go	25000
M5 X 0.5	6H	Go/NoGo	22780

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

FEATURES / DESCRIPTION

### Thread Plug Gage - Reversible

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction



Series 190

Performance | Plug Gage | Reversible

Thread Size	Class of Fit	Type	EDP
0-80 NF	2B	-	24192
0-80 NF	3B	-	24193
0-80 NF	2B	Go/NoGo	24194
0-80 NF	3B	Go/NoGo	24195
1-64 NC	-	-	24196
1-64 NC	2B	-	24197
1-64 NC	3B	-	24198
1-64 NC	2B	Go/NoGo	24199
1-64 NC	3B	Go/NoGo	24200
1-72 NF	-	-	24201
1-72 NF	2B	-	24202
1-72 NF	3B	-	24203
1-72 NF	2B	Go/NoGo	24204
1-72 NF	3B	Go/NoGo	24205
2-56 NC	-	-	24206
2-56 NC	2B	-	24207
2-56 NC	3B	-	24208
2-56 NC	2B	Go/NoGo	24209
2-56 NC	3B	Go/NoGo	24210
2-64 NF	-	-	24211
2-64 NF	2B	-	24212
2-64 NF	3B	-	24213
2-64 NF	2B	Go/NoGo	24214
2-64 NF	3B	Go/NoGo	24215
3-48 NC	-	-	24216
3-48 NC	2B	-	24217
3-48 NC	3B	-	24218
3-48 NC	2B	Go/NoGo	24219
3-48 NC	3B	Go/NoGo	24220
3-56 NF	-	-	24221
3-56 NF	2B	-	24222
3-56 NF	3B	-	24223
3-56 NF	2B	Go/NoGo	24224
3-56 NF	3B	Go/NoGo	24225
4-40 NC	-	-	24226
4-40 NC	2B	-	24227
4-40 NC	3B	-	24228
4-40 NC	2B	Go/NoGo	24229
4-40 NC	3B	Go/NoGo	24230
4-48 NF	-	-	24231
4-48 NF	2B	-	24232
4-48 NF	3B	-	24233
4-48 NF	2B	Go/NoGo	24234
4-48 NF	3B	Go/NoGo	24235
5-40 NC	-	-	24236
5-40 NC	2B	-	24237
5-40 NC	3B	-	24238
5-40 NC	2B	Go/NoGo	24239
5-40 NC	3B	Go/NoGo	24240
5-44 NF	-	-	24241
5-44 NF	2B	-	24242
5-44 NF	3B	-	24243
5-44 NF	2B	Go/NoGo	24244
5-44 NF	3B	Go/NoGo	24245
6-32 NC	3B	-	24246
6-32 NC	2B	-	24248
6-32 NC	3B	Go/NoGo	24249
6-32 NC	2B	Go/NoGo	24250
6-40 NF	-	-	24251

Thread Size	Class of Fit	Type	EDP
6-32 NC	-	-	24247
6-40 NF	2B	-	24252
6-40 NF	3B	-	24253
6-40 NF	2B	Go/NoGo	24254
6-40 NF	3B	Go/NoGo	24255
8-32 NC	-	-	24256
8-32 NC	2B	-	24257
8-32 NC	3B	-	24258
8-32 NC	2B	Go/NoGo	24259
8-32 NC	3B	Go/NoGo	24260
8-36 NF	-	-	24261
8-36 NF	2B	-	24262
8-36 NF	3B	-	24263
8-36 NF	2B	Go/NoGo	24264
8-36 NF	3B	Go/NoGo	24265
10-24 NC	-	-	24266
10-24 NC	2B	-	24267
10-24 NC	3B	-	24268
10-24 NC	2B	Go/NoGo	24269
10-24 NC	3B	Go/NoGo	24270
10-32 NF	-	-	24271
10-32 NF	2B	-	24272
10-32 NF	3B	-	24273
10-32 NF	2B	Go/NoGo	24274
10-32 NF	3B	Go/NoGo	24275
12-24 NC	-	-	24276
12-24 NC	2B	-	24277
12-24 NC	3B	-	24278
12-24 NC	2B	Go/NoGo	24279
12-24 NC	3B	Go/NoGo	24280
12-28 NF	-	-	24281
12-28 NF	2B	-	24282
12-28 NF	3B	-	24283
12-28 NF	2B	Go/NoGo	24284
12-28 NF	3B	Go/NoGo	24285
1/4-20 NC	-	-	24286
12-32 NEF	2B	-	24930
12-32 NEF	3B	-	24931
12-32 NEF	2B	Go/NoGo	24932
12-32 NEF	3B	Go/NoGo	24933
1/4-32 NEF	-	-	24934
1/4-20 NC	2B	-	24287
1/4-20 NC	3B	-	24288
1/4-20 NC	2B	Go/NoGo	24289
1/4-20 NC	3B	Go/NoGo	24290
1/4-28 NF	-	-	24291
1/4-28 NF	2B	-	24292
1/4-28 NF	3B	-	24293
1/4-28 NF	2B	Go/NoGo	24294
1/4-28 NF	3B	Go/NoGo	24295
5/16-18 NC	-	-	24296
1/4-32 NEF	2B	-	24935
1/4-32 NEF	3B	-	24936
1/4-32 NEF	2B	Go/NoGo	24937
1/4-32 NEF	3B	Go/NoGo	24938
5/16-32 NEF	-	-	24939
5/16-18 NC	2B	-	24297
5/16-18 NC	3B	-	24298
5/16-18 NC	2B	Go/NoGo	24299

# PERFORMANCE

Premium HSS Thread Plug Gages



Series 190				Performance   Plug Gage   Reversible			
Thread Size	Class of Fit	Type	EDP	Thread Size	Class of Fit	Type	EDP
5/16-18 NC	3B	Go/NoGo	24300	5/8-18 NF	-	-	24351
5/16-24 NF	-	-	24301	5/8-18 NF	2B	-	24352
5/16-24 NF	2B	-	24302	5/8-18 NF	3B	-	24353
5/16-24 NF	3B	-	24303	5/8-18 NF	2B	Go/NoGo	24354
5/16-24 NF	2B	Go/NoGo	24304	5/8-18 NF	3B	Go/NoGo	24355
5/16-24 NF	3B	Go/NoGo	24305	3/4-10 NC	-	-	24356
3/8-16 NC	-	-	24306	5/8-24 NEF	2B	-	24965
12-32 NEF	-	-	24929	5/8-24 NEF	3B	-	24966
5/16-32 NEF	2B	-	24940	5/8-24 NEF	2B	Go/NoGo	24967
5/16-32 NEF	3B	-	24941	5/8-24 NEF	3B	Go/NoGo	24968
5/16-32 NEF	2B	Go/NoGo	24942	11/16-24 NEF	-	-	24969
5/16-32 NEF	3B	Go/NoGo	24943	11/16-24 NEF	2B	-	24970
3/8-32 NEF	-	-	24944	11/16-24 NEF	3B	-	24971
3/8-16 NC	2B	-	24307	11/16-24 NEF	2B	Go/NoGo	24972
3/8-16 NC	3B	-	24308	11/16-24 NEF	3B	Go/NoGo	24973
3/8-16 NC	2B	Go/NoGo	24309	3/4-20 NEF	-	-	24974
3/8-16 NC	3B	Go/NoGo	24310	3/4-10 NC	2B	-	24357
3/8-24 NF	-	-	24311	3/4-10 NC	3B	-	24358
3/8-24 NF	2B	-	24312	3/4-10 NC	2B	Go/NoGo	24359
3/8-24 NF	3B	-	24313	3/4-10 NC	3B	Go/NoGo	24360
3/8-24 NF	2B	Go/NoGo	24314	3/4-16 NF	-	-	24361
3/8-24 NF	3B	Go/NoGo	24315	3/4-16 NF	2B	-	24362
7/16-14 NC	-	-	24316	3/4-16 NF	3B	-	24363
3/8-32 NEF	2B	-	24945	3/4-16 NF	2B	Go/NoGo	24364
3/8-32 NEF	3B	-	24946	3/4-16 NF	3B	Go/NoGo	24365
3/8-32 NEF	2B	Go/NoGo	24947	3/4-20 NEF	2B	-	24975
3/8-32 NEF	3B	Go/NoGo	24948	3/4-20 NEF	3B	-	24976
7/16-28 NEF	-	-	24949	3/4-20 NEF	2B	Go/NoGo	24977
7/16-14 NC	2B	-	24317	3/4-20 NEF	3B	Go/NoGo	24978
7/16-14 NC	3B	-	24318	0-80 NF	-	-	24191
7/16-14 NC	2B	Go/NoGo	24319				
7/16-14 NC	3B	Go/NoGo	24320				
7/16-20 NF	-	-	24321				
7/16-20 NF	2B	-	24322				
7/16-20 NF	3B	-	24323				
7/16-20 NF	2B	Go/NoGo	24324				
7/16-20 NF	3B	Go/NoGo	24325				
1/2-13 NC	-	-	24326				
7/16-28 NEF	2B	-	24950				
7/16-28 NEF	3B	-	24951				
7/16-28 NEF	2B	Go/NoGo	24952				
7/16-28 NEF	3B	Go/NoGo	24953				
1/2-28 NEF	-	-	24954				
1/2-13 NC	2B	-	24327				
1/2-13 NC	3B	-	24328				
1/2-13 NC	2B	Go/NoGo	24329				
1/2-13 NC	3B	Go/NoGo	24330				
1/2-20 NF	-	-	24331				
1/2-20 NF	2B	-	24332				
1/2-20 NF	3B	-	24333				
1/2-20 NF	2B	Go/NoGo	24334				
1/2-20 NF	3B	Go/NoGo	24335				
9/16-12 NC	-	-	24336				
1/2-28 NEF	2B	-	24955				
1/2-28 NEF	3B	-	24956				
1/2-28 NEF	2B	Go/NoGo	24957				
1/2-28 NEF	3B	Go/NoGo	24958				
9/16-24 NEF	-	-	24959				
9/16-12 NC	2B	-	24337				
9/16-12 NC	3B	-	24338				
9/16-12 NC	2B	Go/NoGo	24339				
9/16-12 NC	3B	Go/NoGo	24340				
9/16-18 NF	-	-	24341				
9/16-18 NF	2B	-	24342				
9/16-18 NF	3B	-	24343				
9/16-18 NF	2B	Go/NoGo	24344				
9/16-18 NF	3B	Go/NoGo	24345				
5/8-11 NC	-	-	24346				
9/16-24 NEF	2B	-	24960				
9/16-24 NEF	3B	-	24961				
9/16-24 NEF	2B	Go/NoGo	24962				
9/16-24 NEF	3B	Go/NoGo	24963				
5/8-24 NEF	-	-	24964				
5/8-11 NC	2B	-	24347				
5/8-11 NC	3B	-	24348				
5/8-11 NC	2B	Go/NoGo	24349				
5/8-11 NC	3B	Go/NoGo	24350				

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



FEATURES / DESCRIPTION

**Thread Plug Gage - Reversible - Metric**

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction



**Series 190M**

**Performance | Plug Gage | Reversible | Metric**

Thread Size	Class of Fit	Type	EDP
M1.6 X.35	6H	Go/NoGo	<b>25645</b>
M1.8 X.35	6H	Go/NoGo	<b>25650</b>
M2 X.4	6H	Go/NoGo	<b>25655</b>
M2.2 X.45	6H	Go/NoGo	<b>25660</b>
M2.5 X.45	6H	Go/NoGo	<b>25665</b>
M3 X.5	6H	Go/NoGo	<b>25670</b>
M3.5 X.6	6H	Go/NoGo	<b>25675</b>
M4 X.7	6H	Go/NoGo	<b>25680</b>
M4.5 X.75	6H	Go/NoGo	<b>25685</b>
M5 X.8	6H	Go/NoGo	<b>25690</b>
M6 X 1	6H	Go/NoGo	<b>25695</b>
M7 X 1	6H	Go/NoGo	<b>25700</b>
M8 X 1.25	6H	Go/NoGo	<b>25705</b>
M8 X 1	6H	Go/NoGo	<b>25710</b>
M10 X 1.25	6H	Go/NoGo	<b>25720</b>
M10 X 1.5	6H	Go/NoGo	<b>25715</b>
M12 X 1.25	6H	Go/NoGo	<b>25730</b>
M12 X 1.75	6H	Go/NoGo	<b>25725</b>
M14 X 1.5	6H	Go/NoGo	<b>25740</b>
M14 X 2	6H	Go/NoGo	<b>25735</b>
M16 X 1.5	6H	Go/NoGo	<b>25750</b>
M16 X 2	6H	Go/NoGo	<b>25745</b>
M18 X 1.5	6H	Go/NoGo	<b>25760</b>
M18 X 2.5	6H	Go/NoGo	<b>25755</b>

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### Thread Plug Gage - STI Threads

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- For inspection of screw thread insert (STI) threads
- Hardened High Speed Steel construction

### Series 191

### Performance | Plug Gage | STI

Thread Size	Class of Fit	Type	EDP
2-56 NC	2B	NoGo	24595
2-56 NC	-	Go	24594
2-56 NC	3B	NoGo	24596
2-56 NC	2B	Go/NoGo	24597
2-56 NC	3B	Go/NoGo	24598
4-40 NC	-	Go	24614
4-40 NC	2B	NoGo	24615
4-40 NC	3B	NoGo	24616
4-40 NC	2B	Go/NoGo	24617
4-40 NC	3B	Go/NoGo	24618
4-48 NF	-	Go	24619
4-48 NF	2B	NoGo	24620
4-48 NF	3B	NoGo	24621
4-48 NF	2B	Go/NoGo	24622
4-48 NF	3B	Go/NoGo	24623
5-40 NC	-	Go	24624
5-40 NC	2B	NoGo	24625
5-40 NC	3B	NoGo	24626
5-40 NC	2B	Go/NoGo	24627
5-40 NC	3B	Go/NoGo	24628
6-32 NC	2B	Go	24634
6-32 NC	3B	Go/NoGo	24638
6-32 NC	3B	NoGo	24635
6-32 NC	2B	NoGo	24636
6-32 NC	-	Go/NoGo	24637
6-40 NF	-	Go	24639
6-40 NF	2B	NoGo	24640
6-40 NF	3B	NoGo	24641
6-40 NF	2B	Go/NoGo	24642
6-40 NF	3B	Go/NoGo	24643
8-32 NC	-	Go	24644
8-32 NC	2B	NoGo	24645
8-32 NC	3B	NoGo	24646
8-32 NC	2B	Go/NoGo	24647
8-32 NC	3B	Go/NoGo	24648
8-36 NF	-	Go	24649
8-36 NF	2B	NoGo	24650
8-36 NF	3B	NoGo	24651
8-36 NF	2B	Go/NoGo	24652
8-36 NF	3B	Go/NoGo	24653
10-24 NC	-	Go	24654
10-24 NC	2B	NoGo	24655
10-24 NC	3B	NoGo	24656
10-24 NC	2B	Go/NoGo	24657
10-24 NC	3B	Go/NoGo	24658
10-32 NF	-	Go	24659
10-32 NF	2B	NoGo	24660
10-32 NF	3B	NoGo	24661
10-32 NF	2B	Go/NoGo	24662
10-32 NF	3B	Go/NoGo	24663
12-24 NC	-	Go	24664
12-24 NC	2B	NoGo	24665
12-24 NC	3B	NoGo	24666
12-24 NC	2B	Go/NoGo	24667
12-24 NC	3B	Go/NoGo	24668
1/4-20 NC	-	Go	24674
1/4-20 NC	2B	NoGo	24675
1/4-20 NC	3B	NoGo	24676
1/4-20 NC	2B	Go/NoGo	24677

Thread Size	Class of Fit	Type	EDP
1/4-20 NC	3B	Go/NoGo	24678
1/4-28 NF	-	Go	24679
1/4-28 NF	2B	NoGo	24680
1/4-28 NF	3B	NoGo	24681
1/4-28 NF	2B	Go/NoGo	24682
1/4-28 NF	3B	Go/NoGo	24683
5/16-18 NC	-	Go	24684
5/16-18 NC	2B	NoGo	24685
5/16-18 NC	3B	NoGo	24686
5/16-18 NC	2B	Go/NoGo	24687
5/16-18 NC	3B	Go/NoGo	24688
5/16-24 NF	-	Go	24689
5/16-24 NF	2B	NoGo	24690
5/16-24 NF	3B	NoGo	24691
5/16-24 NF	2B	Go/NoGo	24692
5/16-24 NF	3B	Go/NoGo	24693
3/8-16 NC	-	Go	24694
3/8-16 NC	2B	NoGo	24695
3/8-16 NC	3B	NoGo	24696
3/8-16 NC	2B	Go/NoGo	24697
3/8-16 NC	3B	Go/NoGo	24698
3/8-24 NF	-	Go	24699
3/8-24 NF	2B	NoGo	24700
3/8-24 NF	3B	NoGo	24701
3/8-24 NF	2B	Go/NoGo	24702
3/8-24 NF	3B	Go/NoGo	24703
7/16-14 NC	-	Go	24704
7/16-14 NC	2B	NoGo	24705
7/16-14 NC	3B	NoGo	24706
7/16-14 NC	2B	Go/NoGo	24707
7/16-14 NC	3B	Go/NoGo	24708
7/16-20 NF	-	Go	24709
7/16-20 NF	2B	NoGo	24710
7/16-20 NF	3B	NoGo	24711
7/16-20 NF	2B	Go/NoGo	24712
7/16-20 NF	3B	Go/NoGo	24713
1/2-13 NC	-	Go	24714
1/2-13 NC	2B	NoGo	24715
1/2-13 NC	3B	NoGo	24716
1/2-13 NC	2B	Go/NoGo	24717
1/2-13 NC	3B	Go/NoGo	24718
1/2-20 NF	-	Go	24719
1/2-20 NF	2B	NoGo	24720
1/2-20 NF	3B	NoGo	24721
1/2-20 NF	2B	Go/NoGo	24722
1/2-20 NF	3B	Go/NoGo	24723
5/8-11 NC	-	Go	24734
5/8-11 NC	2B	NoGo	24735
5/8-11 NC	3B	NoGo	24736
5/8-11 NC	2B	Go/NoGo	24737
5/8-11 NC	3B	Go/NoGo	24738
5/8-18 NF	-	Go	24739
5/8-18 NF	2B	NoGo	24740
5/8-18 NF	3B	NoGo	24741
5/8-18 NF	2B	Go/NoGo	24742
5/8-18 NF	3B	Go/NoGo	24743
3/4-10 NC	-	Go	24744
3/4-10 NC	2B	NoGo	24745
3/4-10 NC	3B	NoGo	24746

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Thread Plug Gages



Series 191

Performance | Plug Gage | STI

Thread Size	Class of Fit	Type	EDP
3/4-10 NC	2B	Go/NoGo	24747
3/4-10 NC	3B	Go/NoGo	24748
3/4-16 NF	-	Go	24749
3/4-16 NF	2B	NoGo	24750
3/4-16 NF	3B	NoGo	24751
3/4-16 NF	2B	Go/NoGo	24752
3/4-16 NF	3B	Go/NoGo	24753

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



### FEATURES / DESCRIPTION

#### Plug Thread Gage - NPT & NPTF

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Internal pipe threads inspection
- NPT & NPTF
- With or without taps\_handle

### Series 192

### Performance | Plug Gage | NPT & NPTF

Thread Size	Standard	Handle	Type	EDP
1/16-27	NPT	No	L1	24367
1/16-27	NPT	Yes	L1	24368
1/8-27	NPT	No	L1	24370
1/4-18	NPT	No	L1	24373
1/16-27	NPTF	No	L3	24416
3/8-18	NPT	No	L1	24376
1/16-27	NPTF	Yes	6-Step	24524
1/2-14	NPT	No	L1	24379
1/8-27	NPTF	No	6-Step	24526
3/4-14	NPT	No	L1	24382
1/16-27	NPTF	Yes	L1	24418
1-11-1/2	NPT	No	L1	24385
1/16-27	NPTF	Yes	L3	24420
1-1/4-11	NPT	No	L1	24388
1/8-27	NPTF	No	L1	24422
1/8-27	NPT	Yes	L1	24371
1-1/2-11	NPT	No	L1	24391
2-11-1/2	NPT	No	L1	24394
2 1/2-8	NPT	No	L1	24397
1/8-27	NPTF	No	L3	24424
3-8	NPT	No	L1	24400
1/8-27	NPTF	Yes	L1	24426
3 1/2-8	NPT	No	L1	24403
1/8-27	NPTF	Yes	L3	24428
4-8	NPT	No	L1	24406
1/4-18	NPTF	No	L1	24430
5-8	NPT	No	L1	24409
1/8-27	NPTF	Yes	6-Step	24528
44720	NPT	No	L1	24412
1/4-18	NPTF	No	6-Step	24530
1/4-18	NPT	Yes	L1	24374
1/4-18	NPTF	No	L3	24432
1/4-18	NPTF	Yes	L1	24434
1/4-18	NPTF	Yes	L3	24436
3/8-18	NPTF	No	L1	24438
1/4-18	NPTF	Yes	6-Step	24532
3/8-18	NPTF	No	6-Step	24534
3/8-18	NPT	Yes	L1	24377
3/8-18	NPTF	No	L3	24440
3/8-18	NPTF	Yes	L1	24442
3/8-18	NPTF	Yes	L3	24444
1/2-14	NPTF	No	L1	24446
3/8-18	NPTF	Yes	6-Step	24536
1/2-14	NPTF	No	6-Step	24538
1/2-14	NPT	Yes	L1	24380
1/16-27	NPTF	No	6-Step	24522
1/2-14	NPTF	No	L3	24448
1/2-14	NPTF	Yes	L1	24450
1/2-14	NPTF	Yes	L3	24452
3/4-14	NPTF	No	L1	24454
1/2-14	NPTF	Yes	6-Step	24540
3/4-14	NPTF	No	6-Step	24542
3/4-14	NPT	Yes	L1	24383
3/4-14	NPTF	No	L3	24456
3/4-14	NPTF	Yes	L1	24458
3/4-14	NPTF	Yes	L3	24460
1-11-1/2	NPTF	No	L1	24462
3/4-14	NPTF	Yes	6-Step	24544
1-11-1/2	NPTF	No	6-Step	24546

\*bold numbers are EDPs for ordering

# PERFORMANCE

Premium HSS Thread Plug Gages



Series 192		Performance   Plug Gage   NPT & NPTF			
Thread Size	Standard	Handle	Type	EDP	
1-11-1/2	NPT	Yes	L1	<b>24386</b>	
1-11-1/2	NPTF	No	L3	<b>24464</b>	
1-11-1/2	NPTF	Yes	L1	<b>24466</b>	
1-11-1/2	NPTF	Yes	L3	<b>24468</b>	
1-1/4-11-1/2	NPTF	No	L1	<b>24470</b>	
1-11-1/2	NPTF	Yes	6-Step	<b>24548</b>	
1-1/4-11-1/2	NPTF	No	6-Step	<b>24550</b>	
1-1/2-11	NPT	Yes	L1	<b>24392</b>	
1-1/2-11-1/2	NPTF	Yes	L3	<b>24484</b>	
1-1/2-11-1/2	NPTF	No	L3	<b>24480</b>	
1-1/2-11-1/2	NPTF	Yes	L1	<b>24482</b>	
1-1/2-11-1/2	NPTF	Yes	6-Step	<b>24556</b>	
1-1/4-11-1/2	NPTF	Yes	6-Step	<b>24552</b>	
1-1/2-11-1/2	NPTF	No	6-Step	<b>24554</b>	
1-1/4-11	NPT	Yes	L1	<b>24389</b>	
1-1/4-11-1/2	NPTF	Yes	L3	<b>24476</b>	
1-1/2-11-1/2	NPTF	No	L1	<b>24478</b>	
1-1/4-11-1/2	NPTF	No	L3	<b>24472</b>	
1-1/4-11-1/2	NPTF	Yes	L1	<b>24474</b>	
2 1/2-8	NPT	Yes	L1	<b>24398</b>	
3 1/2-8	NPT	Yes	L1	<b>24404</b>	
2-11-1/2	NPT	Yes	L1	<b>24395</b>	
3-8	NPT	Yes	L1	<b>24401</b>	
4-8	NPT	Yes	L1	<b>24407</b>	
5-8	NPT	Yes	L1	<b>24410</b>	
44720	NPT	Yes	L1	<b>24413</b>	
1/16-27	NPTF	No	L1	<b>24414</b>	

\*bold numbers are EDPs for ordering

INTRO

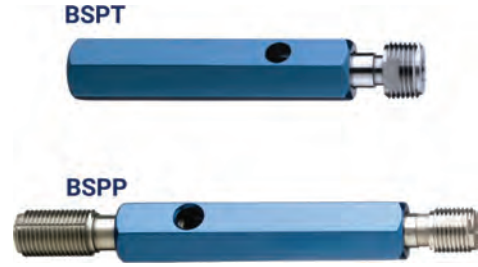
MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



### FEATURES / DESCRIPTION

#### Plug Thread Gage - BSPT & BSPP

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Plug gages for inspection of internal British standard pipe threads
- BSPT = Single End Gage
- BSPP = Double Ended Gage
- Optional Handle
- Hardened High Speed Steel construction

### Series 194

### Performance | Plug Gage | Pipe Thread | BSPT & BSPP

Thread Size	Standard	Handle	Type	EDP
3/4-14	BSPT	Yes	-	<b>27014</b>
1-11	BSPT	No	-	<b>27016</b>
3/4-14	BSPP	No	No Go	<b>27052</b>
3/4-14	BSPP	Yes	Go/NoGo	<b>27053</b>
1-11	BSPP	No	Go	<b>27054</b>
1/8-28	BSPT	Yes	-	<b>27002</b>
1/4-19	BSPT	No	-	<b>27004</b>
1/8-28	BSPP	No	No Go	<b>27040</b>
1/8-28	BSPP	Yes	Go/NoGo	<b>27041</b>
1/4-19	BSPP	No	Go/NoGo	<b>27042</b>
1/4-19	BSPT	Yes	-	<b>27005</b>
3/8-19	BSPT	No	-	<b>27007</b>
1/4-19	BSPP	No	No Go	<b>27043</b>
1/4-19	BSPP	Yes	Go/NoGo	<b>27044</b>
3/8-19	BSPP	No	Go	<b>27045</b>
3/8-19	BSPT	Yes	-	<b>27008</b>
1/2-14	BSPT	No	-	<b>27010</b>
3/8-19	BSPP	No	No Go	<b>27046</b>
3/8-19	BSPP	Yes	Go/NoGo	<b>27047</b>
1/2-14	BSPP	No	Go	<b>27048</b>
1/2-14	BSPT	Yes	-	<b>27011</b>
3/4-14	BSPT	No	-	<b>27013</b>
1/2-14	BSPP	No	No Go	<b>27049</b>
1/2-14	BSPP	Yes	Go/NoGo	<b>27050</b>
3/4-14	BSPP	No	Go	<b>27051</b>
1-11	BSPT	Yes	-	<b>27017</b>
1-1/4-11	BSPT	No	-	<b>27019</b>
1-11	BSPP	No	No Go	<b>27055</b>
1-11	BSPP	Yes	Go/NoGo	<b>27056</b>
1-1/4-11	BSPP	No	Go	<b>27057</b>
1-1/2-11	BSPT	Yes	-	<b>27023</b>
1/8-28	BSPP	No	Go	<b>27039</b>
1-1/2-11	BSPP	No	No Go	<b>27061</b>
1-1/2-11	BSPP	Yes	Go/NoGo	<b>27062</b>
1-1/4-11	BSPT	Yes	-	<b>27020</b>
1-1/2-11	BSPT	No	-	<b>27022</b>
1-1/4-11	BSPP	No	No Go	<b>27058</b>
1-1/4-11	BSPP	Yes	Go/NoGo	<b>27059</b>
1-1/2-11	BSPP	No	Go	<b>27060</b>
1/8-28	BSPT	No	-	<b>27001</b>

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### Gage, Inch

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- Taperlock GO gage members
- Extra length feature

Series GO		GAGE   ANSI   GO			
Thread Size	Specification	Class of Fit	Type	EDP	
0-80	UNF	2B or 3B	Go	<b>90000-000</b>	
1-64	UNC	2B or 3B	Go	<b>90010-000</b>	
1-72	UNF	2B or 3B	Go	<b>90020-000</b>	
2-56	UNC	2B or 3B	Go	<b>90030-000</b>	
2-64	UNF	2B or 3B	Go	<b>90040-000</b>	
3-48	UNC	2B or 3B	Go	<b>90050-000</b>	
3-56	UNF	2B or 3B	Go	<b>90060-000</b>	
4-40	UNC	2B or 3B	Go	<b>90070-000</b>	
4-48	UNF	2B or 3B	Go	<b>90080-000</b>	
5-40	UNC	2B or 3B	Go	<b>90090-000</b>	
5-44	UNF	2B or 3B	Go	<b>90100-000</b>	
6-32	UNC	2B or 3B	Go	<b>90110-000</b>	
6-40	UNF	2B or 3B	Go	<b>90120-000</b>	
8-32	UNC	2B or 3B	Go	<b>90130-000</b>	
8-36	UNF	2B or 3B	Go	<b>90140-000</b>	
10-24	UNC	2B or 3B	Go	<b>90150-000</b>	
10-32	UNF	2B or 3B	Go	<b>90160-000</b>	
12-24	UNC	2B or 3B	Go	<b>90724-000</b>	
12-28	UNF	2B or 3B	Go	<b>90734-000</b>	
1/4-20	UNC	2B or 3B	Go	<b>90170-000</b>	
1/4-28	UNF	2B or 3B	Go	<b>90180-000</b>	
1/4-32	UNEF	2B or 3B	Go	<b>90744-000</b>	
5/16-18	UNC	2B or 3B	Go	<b>90190-000</b>	
5/16-24	UNF	2B or 3B	Go	<b>90200-000</b>	
5/16-32	UNEF	2B or 3B	Go	<b>91000-000</b>	
3/8-16	UNC	2B or 3B	Go	<b>90210-000</b>	
3/8-24	UNF	2B or 3B	Go	<b>90220-000</b>	
3/8-32	UNEF	2B or 3B	Go	<b>91010-000</b>	
7/16-14	UNC	2B or 3B	Go	<b>90230-000</b>	
7/16-20	UNF	2B or 3B	Go	<b>90240-000</b>	
7/16-28	UNEF	2B or 3B	Go	<b>91020-000</b>	
1/2-13	UNC	2B or 3B	Go	<b>90250-000</b>	
1/2-20	UNF	2B or 3B	Go	<b>90260-000</b>	
1/2-28	UNEF	2B or 3B	Go	<b>91030-000</b>	
9/16-12	UNC	2B or 3B	Go	<b>90270-000</b>	
9/16-24	UNEF	2B or 3B	Go	<b>91040-000</b>	
9/16-18	UNF	2B or 3B	Go	<b>90280-000</b>	
5/8-11	UNC	2B or 3B	Go	<b>90290-000</b>	
5/8-18	UNF	2B or 3B	Go	<b>90300-000</b>	
5/8-24	UNEF	2B or 3B	Go	<b>91050-000</b>	
3/4-10	UNC	2B or 3B	Go	<b>90310-000</b>	
3/4-16	UNF	2B or 3B	Go	<b>90320-000</b>	
3/4-20	UNEF	2B or 3B	Go	<b>91060-000</b>	
7/8-9	UNC	2B or 3B	Go	<b>90330-000</b>	
7/8-14	UNF	2B or 3B	Go	<b>90340-000</b>	
7/8-20	UNEF	2B or 3B	Go	<b>91070-000</b>	
1" -8	UNC	2B or 3B	Go	<b>90350-000</b>	
1" -12	UNF	2B or 3B	Go	<b>90360-000</b>	

\*bold numbers are EDPs for ordering

# PERFORMANCE

## Precision Taperlock Thread Gages



### FEATURES / DESCRIPTION

#### Gage, Inch

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- Taperlock 2B NO GO gage members

### Series 2BNG

### GAGE | ANSI | 2B NOGO

Thread Size	Specification	Class of Fit	Type	EDP
0-80	UNF	2B	NoGo	<b>90002-000</b>
1-64	UNC	2B	NoGo	<b>90012-000</b>
1-72	UNF	2B	NoGo	<b>90022-000</b>
2-56	UNC	2B	NoGo	<b>90032-000</b>
2-64	UNF	2B	NoGo	<b>90042-000</b>
3-48	UNC	2B	NoGo	<b>90052-000</b>
3-56	UNF	2B	NoGo	<b>90062-000</b>
4-40	UNC	2B	NoGo	<b>90072-000</b>
4-48	UNF	2B	NoGo	<b>90082-000</b>
5-40	UNC	2B	NoGo	<b>90092-000</b>
5-44	UNF	2B	NoGo	<b>90102-000</b>
6-32	UNC	2B	NoGo	<b>90112-000</b>
6-40	UNF	2B	NoGo	<b>90122-000</b>
8-32	UNC	2B	NoGo	<b>90132-000</b>
8-36	UNF	2B	NoGo	<b>90142-000</b>
10-24	UNC	2B	NoGo	<b>90152-000</b>
10-32	UNF	2B	NoGo	<b>90162-000</b>
12-24	UNC	2B	NoGo	<b>90726-000</b>
12-28	UNF	2B	NoGo	<b>90736-000</b>
1/4-20	UNC	2B	NoGo	<b>90172-000</b>
1/4-28	UNF	2B	NoGo	<b>90182-000</b>
1/4-32	UNEF	2B	NoGo	<b>90746-000</b>
5/16-18	UNC	2B	NoGo	<b>90192-000</b>
5/16-24	UNF	2B	NoGo	<b>90202-000</b>
5/16-32	UNEF	2B	NoGo	<b>91002-000</b>
3/8-16	UNC	2B	NoGo	<b>90212-000</b>
3/8-24	UNF	2B	NoGo	<b>90222-000</b>
3/8-32	UNEF	2B	NoGo	<b>91012-000</b>
7/16-14	UNC	2B	NoGo	<b>90232-000</b>
7/16-20	UNF	2B	NoGo	<b>90242-000</b>
7/16-28	UNEF	2B	NoGo	<b>91022-000</b>
1/2-13	UNC	2B	NoGo	<b>90252-000</b>
1/2-20	UNF	2B	NoGo	<b>90262-000</b>
1/2-28	UNEF	2B	NoGo	<b>91032-000</b>
9/16-12	UNC	2B	NoGo	<b>90272-000</b>
9/16-18	UNF	2B	NoGo	<b>90282-000</b>
9/16-24	UNEF	2B	NoGo	<b>91042-000</b>
5/8-11	UNC	2B	NoGo	<b>90292-000</b>
5/8-18	UNF	2B	NoGo	<b>90302-000</b>
5/8-24	UNEF	2B	NoGo	<b>91052-000</b>
3/4-10	UNC	2B	NoGo	<b>90312-000</b>
3/4-16	UNF	2B	NoGo	<b>90322-000</b>
3/4-20	UNEF	2B	NoGo	<b>91062-000</b>
7/8-9	UNC	2B	NoGo	<b>90332-000</b>
7/8-14	UNF	2B	NoGo	<b>90342-000</b>
7/8-20	UNEF	2B	NoGo	<b>91072-000</b>
1" -8	UNC	2B	NoGo	<b>90352-000</b>
1" -12	UNF	2B	NoGo	<b>90362-000</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS





### FEATURES / DESCRIPTION

#### Gage, Inch

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- Taperlock 3B NO GO gage members

### Series 3BNG

### GAGE | ANSI | 3B NOGO

Thread Size	Specification	Class of Fit	Type	EDP
0-80	UNF	3B	NoGo	<b>90004-000</b>
1-64	UNC	3B	NoGo	<b>90014-000</b>
1-72	UNF	3B	NoGo	<b>90024-000</b>
2-56	UNC	3B	NoGo	<b>90034-000</b>
2-64	UNF	3B	NoGo	<b>90044-000</b>
3-48	UNC	3B	NoGo	<b>90054-000</b>
3-56	UNF	3B	NoGo	<b>90064-000</b>
4-40	UNC	3B	NoGo	<b>90074-000</b>
4-48	UNF	3B	NoGo	<b>90084-000</b>
5-40	UNC	3B	NoGo	<b>90094-000</b>
5-44	UNF	3B	NoGo	<b>90104-000</b>
6-32	UNC	3B	NoGo	<b>90114-000</b>
6-40	UNF	3B	NoGo	<b>90124-000</b>
8-32	UNC	3B	NoGo	<b>90134-000</b>
8-36	UNF	3B	NoGo	<b>90144-000</b>
10-24	UNC	3B	NoGo	<b>90154-000</b>
10-32	UNF	3B	NoGo	<b>90164-000</b>
12-24	UNC	3B	NoGo	<b>90728-000</b>
12-28	UNF	3B	NoGo	<b>90738-000</b>
1/4-20	UNC	3B	NoGo	<b>90174-000</b>
1/4-28	UNF	3B	NoGo	<b>90184-000</b>
1/4-32	UNEF	3B	NoGo	<b>90748-000</b>
5/16-18	UNC	3B	NoGo	<b>90194-000</b>
5/16-24	UNF	3B	NoGo	<b>90204-000</b>
5/16-32	UNEF	3B	NoGo	<b>91004-000</b>
3/8-16	UNC	3B	NoGo	<b>90214-000</b>
3/8-24	UNF	3B	NoGo	<b>90224-000</b>
3/8-32	UNEF	3B	NoGo	<b>91014-000</b>
7/16-14	UNC	3B	NoGo	<b>90234-000</b>
7/16-20	UNF	3B	NoGo	<b>90244-000</b>
7/16-28	UNEF	3B	NoGo	<b>91024-000</b>
1/2-13	UNC	3B	NoGo	<b>90254-000</b>
1/2-20	UNF	3B	NoGo	<b>90264-000</b>
1/2-28	UNEF	3B	NoGo	<b>91034-000</b>
9/16-12	UNC	3B	NoGo	<b>90274-000</b>
9/16-18	UNF	3B	NoGo	<b>90284-000</b>
9/16-24	UNEF	3B	NoGo	<b>91044-000</b>
5/8-11	UNC	3B	NoGo	<b>90294-000</b>
5/8-18	UNF	3B	NoGo	<b>90304-000</b>
5/8-24	UNEF	3B	NoGo	<b>91054-000</b>
3/4-10	UNC	3B	NoGo	<b>90314-000</b>
3/4-16	UNF	3B	NoGo	<b>90324-000</b>
3/4-20	UNEF	3B	NoGo	<b>91064-000</b>
7/8-9	UNC	3B	NoGo	<b>90334-000</b>
7/8-14	UNF	3B	NoGo	<b>90344-000</b>
7/8-20	UNEF	3B	NoGo	<b>91074-000</b>
1" -8	UNC	3B	NoGo	<b>90354-000</b>
1" -12	UNF	3B	NoGo	<b>90364-000</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

## Precision Taperlock Thread Gages



### FEATURES / DESCRIPTION

#### Gage, Inch

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- Taperlock 2B gage sets

### Series 2BSET

### GAGE | ANSI | 2B Set

Thread Size	Specification	Class of Fit	Type	EDP
0-80	UNF	2B	SET	<b>90006-000</b>
1-64	UNC	2B	SET	<b>90016-000</b>
1-72	UNF	2B	SET	<b>90026-000</b>
2-56	UNC	2B	SET	<b>90036-000</b>
2-64	UNF	2B	SET	<b>90046-000</b>
3-48	UNC	2B	SET	<b>90056-000</b>
3-56	UNF	2B	SET	<b>90066-000</b>
4-40	UNC	2B	SET	<b>90076-000</b>
4-48	UNF	2B	SET	<b>90086-000</b>
5-40	UNC	2B	SET	<b>90096-000</b>
5-44	UNF	2B	SET	<b>90106-000</b>
6-32	UNC	2B	SET	<b>90116-000</b>
6-40	UNF	2B	SET	<b>90126-000</b>
8-32	UNC	2B	SET	<b>90136-000</b>
8-36	UNF	2B	SET	<b>90146-000</b>
10-24	UNC	2B	SET	<b>90156-000</b>
10-32	UNF	2B	SET	<b>90166-000</b>
12-24	UNC	2B	SET	<b>90730-000</b>
12-28	UNF	2B	SET	<b>90740-000</b>
1/4-20	UNC	2B	SET	<b>90176-000</b>
1/4-28	UNF	2B	SET	<b>90186-000</b>
1/4-32	UNEF	2B	SET	<b>90750-000</b>
5/16-18	UNC	2B	SET	<b>90196-000</b>
5/16-24	UNF	2B	SET	<b>90206-000</b>
5/16-32	UNEF	2B	SET	<b>91006-000</b>
3/8-16	UNC	2B	SET	<b>90216-000</b>
3/8-24	UNF	2B	SET	<b>90226-000</b>
3/8-32	UNEF	2B	SET	<b>91016-000</b>
7/16-14	UNC	2B	SET	<b>90236-000</b>
7/16-20	UNF	2B	SET	<b>90246-000</b>
7/16-28	UNEF	2B	SET	<b>91026-000</b>
1/2-13	UNC	2B	SET	<b>90256-000</b>
1/2-20	UNF	2B	SET	<b>90266-000</b>
1/2-28	UNEF	2B	SET	<b>91036-000</b>
9/16-12	UNC	2B	SET	<b>90276-000</b>
9/16-18	UNF	2B	SET	<b>90286-000</b>
9/16-24	UNEF	2B	SET	<b>91046-000</b>
5/8-11	UNC	2B	SET	<b>90296-000</b>
5/8-18	UNF	2B	SET	<b>90306-000</b>
5/8-24	UNEF	2B	SET	<b>91056-000</b>
3/4-10	UNC	2B	SET	<b>90316-000</b>
3/4-16	UNF	2B	SET	<b>90326-000</b>
3/4-20	UNEF	2B	SET	<b>91066-000</b>
7/8-9	UNC	2B	SET	<b>90336-000</b>
7/8-14	UNF	2B	SET	<b>90346-000</b>
7/8-20	UNEF	2B	SET	<b>91076-000</b>
1" -8	UNC	2B	SET	<b>90356-000</b>
1" -12	UNF	2B	SET	<b>90366-000</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



### FEATURES / DESCRIPTION

#### Gage, Inch

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- Taperlock 3B gage sets

### Series 3BSET

### GAGE | ANSI | 3B Set

Thread Size	Specification	Class of Fit	Type	EDP
0-80	UNF	3B	SET	<b>90008-000</b>
1-64	UNC	3B	SET	<b>90018-000</b>
1-72	UNF	3B	SET	<b>90028-000</b>
2-56	UNC	3B	SET	<b>90038-000</b>
2-64	UNF	3B	SET	<b>90048-000</b>
3-48	UNC	3B	SET	<b>90058-000</b>
3-56	UNF	3B	SET	<b>90068-000</b>
4-40	UNC	3B	SET	<b>90078-000</b>
4-48	UNF	3B	SET	<b>90088-000</b>
5-40	UNC	3B	SET	<b>90098-000</b>
5-44	UNF	3B	SET	<b>90108-000</b>
6-32	UNC	3B	SET	<b>90118-000</b>
6-40	UNF	3B	SET	<b>90128-000</b>
8-32	UNC	3B	SET	<b>90138-000</b>
8-36	UNF	3B	SET	<b>90148-000</b>
10-24	UNC	3B	SET	<b>90158-000</b>
10-32	UNF	3B	SET	<b>90168-000</b>
12-24	UNC	3B	SET	<b>90732-000</b>
12-28	UNF	3B	SET	<b>90742-000</b>
1/4-20	UNC	3B	SET	<b>90178-000</b>
1/4-28	UNF	3B	SET	<b>90188-000</b>
1/4-32	UNEF	3B	SET	<b>90752-000</b>
5/16-18	UNC	3B	SET	<b>90198-000</b>
5/16-24	UNF	3B	SET	<b>90208-000</b>
5/16-32	UNEF	3B	SET	<b>91008-000</b>
3/8-16	UNC	3B	SET	<b>90218-000</b>
3/8-24	UNF	3B	SET	<b>90228-000</b>
3/8-32	UNEF	3B	SET	<b>91018-000</b>
7/16-14	UNC	3B	SET	<b>90238-000</b>
7/16-20	UNF	3B	SET	<b>90248-000</b>
7/16-28	UNEF	3B	SET	<b>91028-000</b>
1/2-13	UNC	3B	SET	<b>90258-000</b>
1/2-20	UNF	3B	SET	<b>90268-000</b>
1/2-28	UNEF	3B	SET	<b>91038-000</b>
9/16-12	UNC	3B	SET	<b>90278-000</b>
9/16-18	UNF	3B	SET	<b>90288-000</b>
9/16-24	UNEF	3B	SET	<b>91048-000</b>
5/8-11	UNC	3B	SET	<b>90298-000</b>
5/8-18	UNF	3B	SET	<b>90308-000</b>
5/8-24	UNEF	3B	SET	<b>91058-000</b>
3/4-10	UNC	3B	SET	<b>90318-000</b>
3/4-16	UNF	3B	SET	<b>90328-000</b>
3/4-20	UNEF	3B	SET	<b>91068-000</b>
7/8-9	UNC	3B	SET	<b>90338-000</b>
7/8-14	UNF	3B	SET	<b>90348-000</b>
7/8-20	UNEF	3B	SET	<b>91078-000</b>
1" -8	UNC	3B	SET	<b>90358-000</b>
1" -12	UNF	3B	SET	<b>90368-000</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

## Precision Taperlock Thread Gages



### FEATURES / DESCRIPTION

#### Gage, Metric

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- Taperlock GO gage members
- Extra length feature

### Series GO-M

### GAGE | Metric | GO

Thread Size	Specification	Class of Fit	Type	EDP
M1.6 x 0.35	M	4H or 6H	Go	<b>90370-000</b>
M1.7 x 0.35	M	4H or 6H	Go	<b>90371-000</b>
M2 x 0.4	M	4H or 6H	Go	<b>90380-000</b>
M2.5 x 0.45	M	4H or 6H	Go	<b>90390-000</b>
M2.6 x 0.45	M	4H or 6H	Go	<b>90400-000</b>
M3 x 0.5	M	4H or 6H	Go	<b>90410-000</b>
M3.5 x 0.6	M	4H or 6H	Go	<b>90420-000</b>
M4 x 0.7	M	4H or 6H	Go	<b>90430-000</b>
M5 x 0.8	M	4H or 6H	Go	<b>90440-000</b>
M6 x 1.0	M	4H or 6H	Go	<b>90450-000</b>
M8 x 1.25	M	4H or 6H	Go	<b>90460-000</b>
M10 x 1.5	M	4H or 6H	Go	<b>90470-000</b>
M10 X 1.25	MF	4H or 6H	Go	<b>91200-000</b>
M12 x 1.25	MF	4H or 6H	Go	<b>91210-000</b>
M12 x 1.5	MF	4H or 6H	Go	<b>91220-000</b>
M12 x 1.75	M	4H or 6H	Go	<b>90481-000</b>
M14 x 1.5	MF	4H or 6H	Go	<b>91230-000</b>
M14 x 2	M	4H or 6H	Go	<b>91240-000</b>
M16 x 1.5	MF	4H or 6H	Go	<b>91250-000</b>
M16 x 2	M	4H or 6H	Go	<b>91260-000</b>
M18 x 1.5	MF	4H or 6H	Go	<b>91270-000</b>
M18 x 2.5	M	4H or 6H	Go	<b>91280-000</b>
M20 x 1.5	MF	4H or 6H	Go	<b>91290-000</b>
M20 x 2.5	M	4H or 6H	Go	<b>91300-000</b>
M22 x 1.5	MF	4H or 6H	Go	<b>91310-000</b>
M22 x 2.5	M	4H or 6H	Go	<b>91320-000</b>
M24 x 2	MF	4H or 6H	Go	<b>91330-000</b>
M24 x 3	M	4H or 6H	Go	<b>91340-000</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



### FEATURES / DESCRIPTION

#### Gage, Metric

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- Taperlock 6H NO GO gage members

### Series 6HNG

### GAGE | Metric | 6H NOGO

Thread Size	Specification	Class of Fit	Type	EDP
M1.6 x 0.35	M	6H	NoGo	<b>90372-000</b>
M1.7 x 0.35	M	6H	NoGo	<b>90373-000</b>
M2 x 0.4	M	6H	NoGo	<b>90382-000</b>
M2.5 x 0.45	M	6H	NoGo	<b>90392-000</b>
M2.6 x 0.45	M	6H	NoGo	<b>90402-000</b>
M3 x 0.5	M	6H	NoGo	<b>90412-000</b>
M3.5 x 0.6	M	6H	NoGo	<b>90422-000</b>
M4 x 0.7	M	6H	NoGo	<b>90432-000</b>
M5 x 0.8	M	6H	NoGo	<b>90442-000</b>
M6 x 1.0	M	6H	NoGo	<b>90452-000</b>
M8 x 1.25	M	6H	NoGo	<b>90462-000</b>
M10 X 1.25	MF	6H	NoGo	<b>91202-000</b>
M10 x 1.5	M	6H	NoGo	<b>90472-000</b>
M12 x 1.25	MF	6H	NoGo	<b>91212-000</b>
M12 x 1.5	MF	6H	NoGo	<b>91222-000</b>
M12 x 1.75	M	6H	NoGo	<b>90483-000</b>
M14 x 1.5	MF	6H	NoGo	<b>91232-000</b>
M14 x 2	M	6H	NoGo	<b>91242-000</b>
M16 x 1.5	MF	6H	NoGo	<b>91252-000</b>
M16 x 2	M	6H	NoGo	<b>91262-000</b>
M18 x 1.5	MF	6H	NoGo	<b>91272-000</b>
M18 x 2.5	M	6H	NoGo	<b>91282-000</b>
M20 x 1.5	MF	6H	NoGo	<b>91292-000</b>
M20 x 2.5	M	6H	NoGo	<b>91302-000</b>
M22 x 1.5	MF	6H	NoGo	<b>91312-000</b>
M22 x 2.5	M	6H	NoGo	<b>91322-000</b>
M24 x 2	MF	6H	NoGo	<b>91332-000</b>
M24 x 3	M	6H	NoGo	<b>91342-000</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

## Precision Taperlock Thread Gages



### FEATURES / DESCRIPTION

#### Gage, Metric

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- Taperlock 4H NO GO gage members

### Series 4HNG

### GAGE | Metric | 4H NOGO

Thread Size	Class of Fit	Type	EDP
M1.6 x 0.35	4H	NoGo	<b>90374-000</b>
M1.7 x 0.35	4H	NoGo	<b>90375-000</b>
M2 x 0.4	4H	NoGo	<b>90384-000</b>
M2.5 x 0.45	4H	NoGo	<b>90394-000</b>
M2.6 x 0.45	4H	NoGo	<b>90404-000</b>
M3 x 0.5	4H	NoGo	<b>90414-000</b>
M3.5 x 0.6	4H	NoGo	<b>90424-000</b>
M4 x 0.7	4H	NoGo	<b>90434-000</b>
M5 x 0.8	4H	NoGo	<b>90444-000</b>
M6 x 1.0	4H	NoGo	<b>90454-000</b>
M8 x 1.25	4H	NoGo	<b>90464-000</b>
M10 x 1.5	4H	NoGo	<b>90474-000</b>
M12 x 1.75	4H	NoGo	<b>90485-000</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

### FEATURES / DESCRIPTION

#### Gage, Metric

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- Taperlock 6H gage sets



### Series 6HSET

### GAGE | Metric | 6H Set

Thread Size	Specification	Class of Fit	Type	EDP
M1.6 x 0.35	M	6H	SET	<b>90376-000</b>
M1.7 x 0.35	M	6H	SET	<b>90377-000</b>
M2 x 0.4	M	6H	SET	<b>90386-000</b>
M2.5 x 0.45	M	6H	SET	<b>90396-000</b>
M2.6 x 0.45	M	6H	SET	<b>90406-000</b>
M3 x 0.5	M	6H	SET	<b>90416-000</b>
M3.5 x 0.6	M	6H	SET	<b>90426-000</b>
M4 x 0.7	M	6H	SET	<b>90436-000</b>
M5 x 0.8	M	6H	SET	<b>90446-000</b>
M6 x 1.0	M	6H	SET	<b>90456-000</b>
M8 x 1.25	M	6H	SET	<b>90466-000</b>
M10 X 1.25	MF	6H	SET	<b>91206-000</b>
M10 x 1.5	M	6H	SET	<b>90476-000</b>
M12 x 1.25	MF	6H	SET	<b>91216-000</b>
M12 x 1.5	MF	6H	SET	<b>91226-000</b>
M12 x 1.75	M	6H	SET	<b>90487-000</b>
M14 x 1.5	MF	6H	SET	<b>91236-000</b>
M14 x 2	M	6H	SET	<b>91246-000</b>
M16 x 1.5	MF	6H	SET	<b>91256-000</b>
M16 x 2	M	6H	SET	<b>91266-000</b>
M18 x 1.5	MF	6H	SET	<b>91276-000</b>
M18 x 2.5	M	6H	SET	<b>91286-000</b>
M20 x 1.5	MF	6H	SET	<b>91296-000</b>
M20 x 2.5	M	6H	SET	<b>91306-000</b>
M22 x 1.5	MF	6H	SET	<b>91316-000</b>
M22 x 2.5	M	6H	SET	<b>91326-000</b>
M24 x 2	MF	6H	SET	<b>91336-000</b>
M24 x 3	M	6H	SET	<b>91346-000</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

## Precision Taperlock Thread Gages



### FEATURES / DESCRIPTION

#### Gage, Metric

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- Taperlock 4H gage sets

### Series 4HSET

### GAGE | Metric | 4H Set

Thread Size	Class of Fit	Type	EDP
M1.6 x 0.35	4H	SET	<b>90378-000</b>
M1.7 x 0.35	4H	SET	<b>90624-000</b>
M2 x 0.4	4H	SET	<b>90388-000</b>
M2.5 x 0.45	4H	SET	<b>90398-000</b>
M2.6 x 0.45	4H	SET	<b>90408-000</b>
M3 x 0.5	4H	SET	<b>90418-000</b>
M3.5 x 0.6	4H	SET	<b>90428-000</b>
M4 x 0.7	4H	SET	<b>90438-000</b>
M5 x 0.8	4H	SET	<b>90448-000</b>
M6 x 1.0	4H	SET	<b>90458-000</b>
M8 x 1.25	4H	SET	<b>90468-000</b>
M10 x 1.5	4H	SET	<b>90478-000</b>
M12 x 1.75	4H	SET	<b>90489-000</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS





### FEATURES / DESCRIPTION

#### Gage, Screw Thread Insert

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- For inspection of screw thread insert (STI) threads
- Hardened High Speed Steel construction
- Taperlock STI GO gage members
- Extra length feature

Series GSTI		GAGE   ANSI   GO STI		
Thread Size	Class of Fit	Type	EDP	
2-56	STI 2B or 3B	Go	<b>90480-000</b>	
3-48	STI 2B or 3B	Go	<b>91110-000</b>	
4-40	STI 2B or 3B	Go	<b>90486-000</b>	
5-40	STI 2B or 3B	Go	<b>90754-000</b>	
6-32	STI 2B or 3B	Go	<b>90492-000</b>	
6-40	STI 2B or 3B	Go	<b>90848-000</b>	
8-32	STI 2B or 3B	Go	<b>90498-000</b>	
10-24	STI 2B or 3B	Go	<b>90504-000</b>	
10-32	STI 2B or 3B	Go	<b>90510-000</b>	
12-24	STI 2B or 3B	Go	<b>90760-000</b>	
1/4-20	STI 2B or 3B	Go	<b>90516-000</b>	
1/4-28	STI 2B or 3B	Go	<b>90522-000</b>	
5/16-18	STI 2B or 3B	Go	<b>90700-000</b>	
5/16-24	STI 2B or 3B	Go	<b>90706-000</b>	
3/8-16	STI 2B or 3B	Go	<b>90712-000</b>	
3/8-24	STI 2B or 3B	Go	<b>90718-000</b>	
7/16-14	STI 2B or 3B	Go	<b>91080-000</b>	
7/16-20	STI 2B or 3B	Go	<b>91090-000</b>	
1/2-13	STI 2B or 3B	Go	<b>91100-000</b>	
1/2-20	STI 2B or 3B	Go	<b>90854-000</b>	

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### Gage, Screw Thread Insert

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- For inspection of screw thread insert (STI) threads
- Hardened High Speed Steel construction
- Taperlock 2B STI NO GO gage members

### Series 2BSTING

### GAGE | ANSI | 2B NOGO STI

Thread Size	Class of Fit	Type	EDP
2-56	STI 2B	NoGo	<b>90482-000</b>
3-48	STI 2B	NoGo	<b>91112-000</b>
4-40	STI 2B	NoGo	<b>90488-000</b>
5-40	STI 2B	NoGo	<b>90756-000</b>
6-32	STI 2B	NoGo	<b>90494-000</b>
6-40	STI 2B	NoGo	<b>90850-000</b>
8-32	STI 2B	NoGo	<b>90500-000</b>
10-24	STI 2B	NoGo	<b>90506-000</b>
10-32	STI 2B	NoGo	<b>90512-000</b>
12-24	STI 2B	NoGo	<b>90762-000</b>
1/4-20	STI 2B	NoGo	<b>90518-000</b>
1/4-28	STI 2B	NoGo	<b>90524-000</b>
5/16-18	STI 2B	NoGo	<b>90702-000</b>
5/16-24	STI 2B	NoGo	<b>90708-000</b>
3/8-16	STI 2B	NoGo	<b>90714-000</b>
3/8-24	STI 2B	NoGo	<b>90720-000</b>
1/2-20	STI 2B	NoGo	<b>90856-000</b>
7/16-14	STI 2B	NoGo	<b>91082-000</b>
7/16-20	STI 2B	NoGo	<b>91092-000</b>
1/2-13	STI 2B	NoGo	<b>91102-000</b>

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### Gage, Screw Thread Insert

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- For inspection of screw thread insert (STI) threads
- Hardened High Speed Steel construction
- Taperlock 3B STI NO GO gage members

### Series 2BSTISET

### GAGE | ANSI | 2B STI SET

Thread Size	Class of Fit	Type	EDP
2-56	STI 2B	SET	<b>90484-000</b>
3-48	STI 2B	SET	<b>91116-000</b>
4-40	STI 2B	SET	<b>90490-000</b>
5-40	STI 2B	SET	<b>90758-000</b>
6-32	STI 2B	SET	<b>90496-000</b>
6-40	STI 2B	SET	<b>90852-000</b>
8-32	STI 2B	SET	<b>90502-000</b>
10-24	STI 2B	SET	<b>90508-000</b>
10-32	STI 2B	SET	<b>90514-000</b>
12-24	STI 2B	SET	<b>90764-000</b>
1/4-20	STI 2B	SET	<b>90520-000</b>
1/4-28	STI 2B	SET	<b>90526-000</b>
5/16-18	STI 2B	SET	<b>90704-000</b>
5/16-24	STI 2B	SET	<b>90710-000</b>
3/8-16	STI 2B	SET	<b>90716-000</b>
3/8-24	STI 2B	SET	<b>90722-000</b>
7/16-14	STI 2B	SET	<b>91086-000</b>
7/16-20	STI 2B	SET	<b>91096-000</b>
1/2-13	STI 2B	SET	<b>91106-000</b>
1/2-20	STI 2B	SET	<b>90858-000</b>

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### Gage, Screw Thread Insert

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- For inspection of screw thread insert (STI) threads
- Hardened High Speed Steel construction
- Taperlock 2B STI gage sets

### Series 3BSTISET

### GAGE | ANSI | 2B Set STI

Thread Size	Class of Fit	Type	EDP
2-56	STI 3B	SET	<b>90767-000</b>
3-48	STI 3B	SET	<b>91118-000</b>
4-40	STI 3B	SET	<b>90491-000</b>
5-40	STI 3B	SET	<b>90759-000</b>
6-32	STI 3B	SET	<b>90497-000</b>
6-40	STI 3B	SET	<b>90853-000</b>
8-32	STI 3B	SET	<b>90503-000</b>
10-24	STI 3B	SET	<b>90509-000</b>
10-32	STI 3B	SET	<b>90515-000</b>
12-24	STI 3B	SET	<b>90765-000</b>
1/4-20	STI 3B	SET	<b>90521-000</b>
1/4-28	STI 3B	SET	<b>90527-000</b>
5/16-18	STI 3B	SET	<b>90705-000</b>
5/16-24	STI 3B	SET	<b>90711-000</b>
3/8-16	STI 3B	SET	<b>90717-000</b>
3/8-24	STI 3B	SET	<b>90723-000</b>
7/16-14	STI 3B	SET	<b>91088-000</b>
7/16-20	STI 3B	SET	<b>91098-000</b>
1/2-13	STI 3B	SET	<b>91108-000</b>
1/2-20	STI 3B	SET	<b>90859-000</b>

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### Gage, Screw Thread Insert

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- For inspection of screw thread insert (STI) threads
- Hardened High Speed Steel construction
- Taperlock 3B STI gage sets

### Series 3BSTING

### GAGE | ANSI | 3B Set STI

Thread Size	Class of Fit	Type	EDP
2-56	STI 3B	NoGo	<b>90766-000</b>
3-48	STI 3B	NoGo	<b>91114-000</b>
4-40	STI 3B	NoGo	<b>90493-000</b>
5-40	STI 3B	NoGo	<b>90757-000</b>
6-32	STI 3B	NoGo	<b>90495-000</b>
6-40	STI 3B	NoGo	<b>90851-000</b>
8-32	STI 3B	NoGo	<b>90501-000</b>
10-24	STI 3B	NoGo	<b>90507-000</b>
10-32	STI 3B	NoGo	<b>90513-000</b>
12-24	STI 3B	NoGo	<b>90763-000</b>
1/4-20	STI 3B	NoGo	<b>90519-000</b>
1/4-28	STI 3B	NoGo	<b>90525-000</b>
5/16-18	STI 3B	NoGo	<b>90703-000</b>
5/16-24	STI 3B	NoGo	<b>90709-000</b>
3/8-16	STI 3B	NoGo	<b>90715-000</b>
3/8-24	STI 3B	NoGo	<b>90721-000</b>
7/16-14	STI 3B	NoGo	<b>91084-000</b>
7/16-20	STI 3B	NoGo	<b>91094-000</b>
1/2-13	STI 3B	NoGo	<b>91104-000</b>
1/2-20	STI 3B	NoGo	<b>90857-000</b>

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### Gage, Mini

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- GO gage members

### Series MING

### GAGE | Miniature | GO

Thread Size	Specification	Class of Fit	Type	EDP
000-120	UNF	Miniature	Go	<b>90558-000</b>
00-96	UNF	Miniature	Go	<b>90564-000</b>
00-90	UNC	Miniature	Go	<b>90570-000</b>
M0.9 x 0.225	M	UNM	Go	<b>90528-000</b>
M0.8 x 0.200	M	UNM	Go	<b>90533-000</b>
M1.0 x 0.250	M	UNM	Go	<b>90534-000</b>
M0.7 x 0.175	M	UNM	Go	<b>90539-000</b>
M1.1 x 0.250	M	UNM	Go	<b>90540-000</b>
M1.2 x 0.250	M	UNM	Go	<b>90546-000</b>
M1.4 x 0.300	M	UNM	Go	<b>90552-000</b>

\*bold numbers are EDPs for ordering

### FEATURES / DESCRIPTION

#### Gage, Mini

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- UNM NO GO gage members



### Series MINNG

### GAGE | Miniature | NOGO

Thread Size	Specification	Class of Fit	Type	EDP
000-120	UNF	Miniature	NoGo	<b>90560-000</b>
00-96	UNF	Miniature	NoGo	<b>90566-000</b>
00-90	UNC	Miniature	NoGo	<b>90572-000</b>
M0.7 x 0.175	M	UNM	NoGo	<b>90529-000</b>
M0.9 x 0.225	M	UNM	NoGo	<b>90530-000</b>
M0.8 x 0.200	M	UNM	NoGo	<b>90535-000</b>
M1.0 x 0.250	M	UNM	NoGo	<b>90536-000</b>
M1.1 x 0.250	M	UNM	NoGo	<b>90542-000</b>
M1.2 x 0.250	M	UNM	NoGo	<b>90548-000</b>
M1.4 x 0.300	M	UNM	NoGo	<b>90554-000</b>

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### Gage, Mini

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Hardened High Speed Steel construction
- UNM gage sets

### Series MINSET

### GAGE | Miniature | Set

Thread Size	Specification	Class of Fit	Type	EDP
000-120	UNF	Miniature	SET	<b>90562-000</b>
00-96	UNF	Miniature	SET	<b>90568-000</b>
00-90	UNC	Miniature	SET	<b>90574-000</b>
M0.7 x 0.175	M	UNM	SET	<b>90531-000</b>
M0.9 x 0.225	M	UNM	SET	<b>90532-000</b>
M0.8 x 0.200	M	UNM	SET	<b>90537-000</b>
M1.0 x 0.250	M	UNM	SET	<b>90538-000</b>
M1.1 x 0.250	M	UNM	SET	<b>90544-000</b>
M1.2 x 0.250	M	UNM	SET	<b>90550-000</b>
M1.4 x 0.300	M	UNM	SET	<b>90556-000</b>

\*bold numbers are EDPs for ordering



FEATURES / DESCRIPTION

Gage, Pre-Plate

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Machine screw and fractional pre-plate gages are designed for a 2B class of fit with a .0003" plating thickness
- Metric pre-plate gages are designed to a 6G tolerance
- Hardened High Speed Steel construction
- Taperlock GO gage members
- Extra length feature



Series PPG		GAGE   Pre-Plate   GO			
Thread Size	Specification	Class of Fit	Type	EDP	
0-80	UNF	2B+.0012"	Go	90576-000	
1-72	UNF	2B+.0012"	Go	90578-000	
2-56	UNC	2B+.0012"	Go	90580-000	
4-40	UNC	2B+.0012"	Go	90582-000	
6-32	UNC	2B+.0012"	Go	90584-000	
8-32	UNC	2B+.0012"	Go	90586-000	
10-24	UNC	2B+.0012"	Go	90588-000	
10-32	UNF	2B+.0012"	Go	90590-000	
1/4-20	UNC	2B+.0012"	Go	90592-000	
1/4-28	UNF	2B+.0012"	Go	90594-000	
M1.6 x 0.35	M	6G	Go	90596-000	
M2 x 0.4	M	6G	Go	90598-000	
M2.5 x 0.45	M	6G	Go	90600-000	
M3 x 0.5	M	6G	Go	90602-000	
M3.5 x 0.6	M	6G	Go	90604-000	
M4 x 0.7	M	6G	Go	90606-000	
M5 x 0.8	M	6G	Go	90608-000	
M6 x 1.0	M	6G	Go	90610-000	
M8 x 1.25	M	6G	Go	90612-000	
M10 x 1.5	M	6G	Go	90614-000	

\*bold numbers are EDPs for ordering

# PERFORMANCE

## Precision Taperlock Thread Gages



### FEATURES / DESCRIPTION

#### Gage, Pre-Plate

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- For inspection of screw thread insert (STI) threads
- Hardened High Speed Steel construction
- Taperlock 2B STI NO GO gage members

Series PPNG		GAGE   Pre-Plate   NOGO			
Thread Size	Specification	Class of Fit	Type	EDP	
0-80	UNF	2B+.0012"	NoGo	<b>90577-000</b>	
1-72	UNF	2B+.0012"	NoGo	<b>90579-000</b>	
2-56	UNC	2B+.0012"	NoGo	<b>90581-000</b>	
4-40	UNC	2B+.0012"	NoGo	<b>90583-000</b>	
6-32	UNC	2B+.0012"	NoGo	<b>90585-000</b>	
8-32	UNC	2B+.0012"	NoGo	<b>90587-000</b>	
10-24	UNC	2B+.0012"	NoGo	<b>90589-000</b>	
10-32	UNF	2B+.0012"	NoGo	<b>90591-000</b>	
1/4-20	UNC	2B+.0012"	NoGo	<b>90593-000</b>	
1/4-28	UNF	2B+.0012"	NoGo	<b>90595-000</b>	
M1.6 x 0.35	M	6G	NoGo	<b>90597-000</b>	
M2 x 0.4	M	6G	NoGo	<b>90599-000</b>	
M2.5 x 0.45	M	6G	NoGo	<b>90601-000</b>	
M3 x 0.5	M	6G	NoGo	<b>90603-000</b>	
M3.5 x 0.6	M	6G	NoGo	<b>90605-000</b>	
M4 x 0.7	M	6G	NoGo	<b>90607-000</b>	
M5 x 0.8	M	6G	NoGo	<b>90609-000</b>	
M6 x 1.0	M	6G	NoGo	<b>90611-000</b>	
M8 x 1.25	M	6G	NoGo	<b>90613-000</b>	
M10 x 1.5	M	6G	NoGo	<b>90615-000</b>	

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### Gage, Pre-Plate

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- For inspection of screw thread insert (STI) threads
- Hardened High Speed Steel construction
- Taperlock 3B STI NO GO gage members

### Series PPSET

### GAGE | Pre-Plate | Set

Thread Size	Specification	Class of Fit	Type	EDP
0-80	UNF	2B+.0012"	SET	<b>90976-000</b>
1-72	UNF	2B+.0012"	SET	<b>90978-000</b>
2-56	UNC	2B+.0012"	SET	<b>90980-000</b>
4-40	UNC	2B+.0012"	SET	<b>90982-000</b>
6-32	UNC	2B+.0012"	SET	<b>90984-000</b>
8-32	UNC	2B+.0012"	SET	<b>90986-000</b>
10-24	UNC	2B+.0012"	SET	<b>90988-000</b>
10-32	UNF	2B+.0012"	SET	<b>90990-000</b>
1/4-20	UNC	2B+.0012"	SET	<b>90992-000</b>
1/4-28	UNF	2B+.0012"	SET	<b>90994-000</b>
M1.6 x 0.35	M	6G	SET	<b>90996-000</b>
M2 x 0.4	M	6G	SET	<b>90998-000</b>
M2.5 x 0.45	M	6G	SET	<b>90900-000</b>
M3 x 0.5	M	6G	SET	<b>90902-000</b>
M3.5 x 0.6	M	6G	SET	<b>90904-000</b>
M4 x 0.7	M	6G	SET	<b>90906-000</b>
M5 x 0.8	M	6G	SET	<b>90908-000</b>
M6 x 1.0	M	6G	SET	<b>90910-000</b>
M8 x 1.25	M	6G	SET	<b>90912-000</b>
M10 x 1.5	M	6G	SET	<b>90914-000</b>

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### Gage, Screw Thread Insert

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- For inspection of screw thread insert (STI) threads
- Hardened High Speed Steel construction
- Taperlock STI GO gage members
- Extra length feature

### Series GSTI-M

### GAGE | Metric | GO STI

Thread Size	Class of Fit	Type	EDP
M2 x 0.4	STI 4H or 5H	Go	<b>90788-000</b>
M2.5 x 0.45	STI 4H or 5H	Go	<b>90794-000</b>
M3 x 0.5	STI 4H or 5H	Go	<b>90800-000</b>
M3.5 x 0.6	STI 4H or 5H	Go	<b>90806-000</b>
M4 x 0.7	STI 4H or 5H	Go	<b>90812-000</b>
M5 x 0.8	STI 4H or 5H	Go	<b>90818-000</b>
M6 x 1.0	STI 4H or 5H	Go	<b>90824-000</b>
M8 x 1.25	STI 4H or 5H	Go	<b>90830-000</b>
M10 x 1.5	STI 4H or 5H	Go	<b>90836-000</b>
M12 x 1.75	STI 4H or 5H	Go	<b>90842-000</b>

\*bold numbers are EDPs for ordering

FEATURES / DESCRIPTION

**Gage, Screw Thread Insert**

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- For inspection of screw thread insert (STI) threads
- Hardened High Speed Steel construction
- Taperlock 4H STI NO GO gage members



**Series 4HSTING**

**GAGE | Metric | 4H NOGO STI**

Thread Size	Class of Fit	Type	EDP
M2 x 0.4	STI 4H	NoGo	<b>90790-000</b>
M2.5 x 0.45	STI 4H	NoGo	<b>90796-000</b>
M3 x 0.5	STI 4H	NoGo	<b>90802-000</b>
M3.5 x 0.6	STI 4H	NoGo	<b>90808-000</b>
M4 x 0.7	STI 4H	NoGo	<b>90814-000</b>
M5 x 0.8	STI 4H	NoGo	<b>90820-000</b>
M6 x 1.0	STI 4H	NoGo	<b>90826-000</b>
M8 x 1.25	STI 4H	NoGo	<b>90832-000</b>
M10 x 1.5	STI 4H	NoGo	<b>90838-000</b>
M12 x 1.75	STI 4H	NoGo	<b>90844-000</b>

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### Gage, Screw Thread Insert

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- For inspection of screw thread insert (STI) threads
- Hardened High Speed Steel construction
- Taperlock 4H STI NO GO gage sets

### Series 4HSTISET GAGE | Metric | 4H Set STI

Thread Size	Class of Fit	Type	EDP
M2 x 0.4	STI 4H	SET	<b>90792-000</b>
M2.5 x 0.45	STI 4H	SET	<b>90798-000</b>
M3 x 0.5	STI 4H	SET	<b>90804-000</b>
M3.5 x 0.6	STI 4H	SET	<b>90810-000</b>
M4 x 0.7	STI 4H	SET	<b>90816-000</b>
M5 x 0.8	STI 4H	SET	<b>90822-000</b>
M6 x 1.0	STI 4H	SET	<b>90828-000</b>
M8 x 1.25	STI 4H	SET	<b>90834-000</b>
M10 x 1.5	STI 4H	SET	<b>90840-000</b>
M12 x 1.75	STI 4H	SET	<b>90846-000</b>

\*bold numbers are EDPs for ordering



### FEATURES / DESCRIPTION

#### Gage, Pipe Threads

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Internal pipe threads inspection
- NPT
- With Handle
- Hardened High Speed Steel construction

Series NPTSET		GAGE   NPT Set			
Thread Size	Specification	Class of Fit	Type	EDP	
1/16-27	NPT L1	NPT L1	SET	<b>91122-000</b>	
1/8-27	NPT L1	NPT L1	SET	<b>91126-000</b>	
1/4-18	NPT L1	NPT L1	SET	<b>91130-000</b>	
3/8-18	NPT L1	NPT L1	SET	<b>91134-000</b>	
1/2-14	NPT L1	NPT L1	SET	<b>91138-000</b>	
3/4-14	NPT L1	NPT L1	SET	<b>91142-000</b>	
1"-11.5	NPT L1	NPT L1	SET	<b>91146-000</b>	
1 1/4"-11.5	NPT L1	NPT L1	SET	<b>91150-000</b>	
1 1/2"-11.5	NPT L1	NPT L1	SET	<b>91154-000</b>	

\*bold numbers are EDPs for ordering

# PERFORMANCE

## Precision Taperlock Thread Gages



### FEATURES / DESCRIPTION

#### Gage, Pipe Threads

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerances
- Internal pipe threads inspection
- NPT
- Without Handle
- Hardened High Speed Steel construction

### Series NPTELE

### GAGE | NPT ELEMENT

Thread Size	Specification	Type	EDP
1/16-27	NPT L1	GO	<b>91120-000</b>
1/8-27	NPT L1	GO	<b>91124-000</b>
1/4-18	NPT L1	GO	<b>91128-000</b>
3/8-18	NPT L1	GO	<b>91132-000</b>
1/2-14	NPT L1	GO	<b>91136-000</b>
3/4-14	NPT L1	GO	<b>91140-000</b>
1"-11.5	NPT L1	GO	<b>91144-000</b>
1 1/4"-11.5	NPT L1	GO	<b>91148-000</b>
1 1/2"-11.5	NPT L1	GO	<b>91152-000</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS





### FEATURES / DESCRIPTION

#### Thread Ring Gage

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerance
- Ring gages for inspection of external threads
- Hardened High Speed Steel construction

### Series 196

### Performance | Ring Gage

Thread Size	Class of Fit	Handle	Type	EDP
0-80 NF	3A	No	Go	23351
0-80 NF	2A	No	NoGo	23352
0-80 NF	3A	No	NoGo	23353
0-80 NF	2A	Yes	Go/NoGo	23354
0-80 NF	3A	Yes	Go/NoGo	23355
1-64 NC	2A	No	Go	23356
1-64 NC	3A	No	Go	23357
1-64 NC	2A	No	NoGo	23358
1-64 NC	3A	No	NoGo	23359
1-64 NC	2A	Yes	Go/NoGo	23360
1-64 NC	3A	Yes	Go/NoGo	23361
1-72 NF	2A	No	Go	23362
1-72 NF	3A	No	Go	23363
1-72 NF	2A	No	NoGo	23364
1-72 NF	3A	No	NoGo	23365
1-72 NF	2A	Yes	Go/NoGo	23366
1-72 NF	3A	Yes	Go/NoGo	23367
2-56 NC	2A	No	Go	23368
2-56 NC	3A	No	Go	23369
2-56 NC	2A	No	NoGo	23370
2-56 NC	3A	No	NoGo	23371
2-56 NC	2A	Yes	Go/NoGo	23372
2-56 NC	3A	Yes	Go/NoGo	23373
2-64 NF	2A	No	Go	23374
2-64 NF	3A	No	Go	23375
2-64 NF	2A	No	NoGo	23376
2-64 NF	3A	No	NoGo	23377
2-64 NF	2A	Yes	Go/NoGo	23378
2-64 NF	3A	Yes	Go/NoGo	23379
3-48 NC	2A	No	Go	23380
3-48 NC	3A	No	Go	23381
3-48 NC	2A	No	NoGo	23382
3-48 NC	3A	No	NoGo	23383
3-48 NC	2A	Yes	Go/NoGo	23384
3-48 NC	3A	Yes	Go/NoGo	23385
3-56 NF	2A	No	Go	23386
3-56 NF	3A	No	Go	23387
3-56 NF	2A	No	NoGo	23388
3-56 NF	3A	No	NoGo	23389
3-56 NF	2A	Yes	Go/NoGo	23390
3-56 NF	3A	Yes	Go/NoGo	23391
4-40 NC	2A	No	Go	23392
4-40 NC	3A	No	Go	23393
4-40 NC	2A	No	NoGo	23394
4-40 NC	3A	No	NoGo	23395
4-40 NC	2A	Yes	Go/NoGo	23396
4-40 NC	3A	Yes	Go/NoGo	23397
4-48 NF	2A	No	Go	23398
4-48 NF	3A	No	Go	23399
4-48 NF	2A	No	NoGo	23400
4-48 NF	3A	No	NoGo	23401
4-48 NF	2A	Yes	Go/NoGo	23402
4-48 NF	3A	Yes	Go/NoGo	23403
5-40 NC	2A	No	Go	23404
5-40 NC	3A	No	Go	23405
5-40 NC	2A	No	NoGo	23406
5-40 NC	3A	No	NoGo	23407
5-40 NC	2A	Yes	Go/NoGo	23408
5-40 NC	3A	Yes	Go/NoGo	23409

Thread Size	Class of Fit	Handle	Type	EDP
5-44 NF	2A	No	Go	23410
5-44 NF	3A	No	Go	23411
5-44 NF	2A	No	NoGo	23412
5-44 NF	3A	No	NoGo	23413
5-44 NF	2A	Yes	Go/NoGo	23414
5-44 NF	3A	Yes	Go/NoGo	23415
6-32 NC	2A	No	Go	23416
6-32 NC	3A	No	Go	23417
6-32 NC	2A	No	NoGo	23418
6-32 NC	3A	No	NoGo	23419
6-32 NC	2A	Yes	Go/NoGo	23420
6-32 NC	3A	Yes	Go/NoGo	23421
6-40 NF	2A	No	Go	23422
6-40 NF	3A	No	Go	23423
6-40 NF	2A	No	NoGo	23424
6-40 NF	3A	No	NoGo	23425
6-40 NF	2A	Yes	Go/NoGo	23426
6-40 NF	3A	Yes	Go/NoGo	23427
8-32 NC	2A	No	Go	23428
8-32 NC	3A	No	Go	23429
8-32 NC	2A	No	NoGo	23430
8-32 NC	3A	No	NoGo	23431
8-32 NC	2A	Yes	Go/NoGo	23432
8-32 NC	3A	Yes	Go/NoGo	23433
8-36 NF	2A	No	Go	23434
8-36 NF	3A	No	Go	23435
8-36 NF	2A	No	NoGo	23436
8-36 NF	3A	No	NoGo	23437
8-36 NF	2A	Yes	Go/NoGo	23438
8-36 NF	3A	Yes	Go/NoGo	23439
10-24 NC	2A	No	Go	23440
10-24 NC	3A	No	Go	23441
10-24 NC	2A	No	NoGo	23442
10-24 NC	3A	No	NoGo	23443
10-24 NC	2A	Yes	Go/NoGo	23444
10-24 NC	3A	Yes	Go/NoGo	23445
10-32 NF	2A	No	Go	23446
10-32 NF	3A	No	Go	23447
10-32 NF	2A	No	NoGo	23448
10-32 NF	3A	No	NoGo	23449
10-32 NF	2A	Yes	Go/NoGo	23450
10-32 NF	3A	Yes	Go/NoGo	23451
12-24 NC	2A	No	Go	23452
12-24 NC	3A	No	Go	23453
12-24 NC	2A	No	NoGo	23454
12-24 NC	3A	No	NoGo	23455
12-24 NC	2A	Yes	Go/NoGo	23456
12-24 NC	3A	Yes	Go/NoGo	23457
12-28 NF	2A	No	Go	23458
12-28 NF	3A	No	Go	23459
12-28 NF	2A	No	NoGo	23460
12-28 NF	3A	No	NoGo	23461
12-28 NF	2A	Yes	Go/NoGo	23462
12-28 NF	3A	Yes	Go/NoGo	23463
12-32 NEF	2A	No	Go	23464
12-32 NEF	3A	No	Go	23465
12-32 NEF	2A	No	NoGo	23466
12-32 NEF	3A	No	NoGo	23467
12-32 NEF	2A	Yes	Go/NoGo	23468

# PERFORMANCE

Premium HSS Thread Ring Gages



Series 196					Performance   Ring Gage				
Thread Size	Class of Fit	Handle	Type	EDP	Thread Size	Class of Fit	Handle	Type	EDP
12-32 NEF	3A	Yes	Go/NoGo	23469	1/2-13 NC	2A	Yes	Go/NoGo	23546
1/4-20 NC	2A	No	Go	23470	1/2-13 NC	3A	Yes	Go/NoGo	23547
1/4-20 NC	3A	No	Go	23471	1/2-20 NF	2A	No	Go	23548
1/4-20 NC	2A	No	NoGo	23472	1/2-20 NF	3A	No	Go	23549
1/4-20 NC	3A	No	NoGo	23473	1/2-20 NF	2A	No	NoGo	23550
1/4-20 NC	2A	Yes	Go/NoGo	23474	1/2-20 NF	3A	No	NoGo	23551
1/4-20 NC	3A	Yes	Go/NoGo	23475	1/2-20 NF	2A	Yes	Go/NoGo	23552
1/4-28 NF	2A	No	Go	23476	1/2-20 NF	3A	Yes	Go/NoGo	23553
1/4-28 NF	3A	No	Go	23477	1/2-28 NEF	2A	No	Go	23554
1/4-28 NF	2A	No	NoGo	23478	1/2-28 NEF	3A	No	Go	23555
1/4-28 NF	3A	No	NoGo	23479	1/2-28 NEF	2A	No	NoGo	23556
1/4-28 NF	2A	Yes	Go/NoGo	23480	1/2-28 NEF	3A	No	NoGo	23557
1/4-28 NF	3A	Yes	Go/NoGo	23481	1/2-28 NEF	2A	Yes	Go/NoGo	23558
1/4-32 NEF	2A	No	Go	23482	1/2-28 NEF	3A	Yes	Go/NoGo	23559
1/4-32 NEF	3A	No	Go	23483	9/16-12 NC	2A	No	Go	23560
1/4-32 NEF	2A	No	NoGo	23484	9/16-12 NC	3A	No	Go	23561
1/4-32 NEF	3A	No	NoGo	23485	9/16-12 NC	2A	No	NoGo	23562
1/4-32 NEF	2A	Yes	Go/NoGo	23486	9/16-12 NC	3A	No	NoGo	23563
1/4-32 NEF	3A	Yes	Go/NoGo	23487	9/16-12 NC	2A	Yes	Go/NoGo	23564
5/16-18 NC	2A	No	Go	23488	9/16-12 NC	3A	Yes	Go/NoGo	23565
5/16-18 NC	3A	No	Go	23489	9/16-18 NF	2A	No	Go	23566
5/16-18 NC	2A	No	NoGo	23490	9/16-18 NF	3A	No	Go	23567
5/16-18 NC	3A	No	NoGo	23491	9/16-18 NF	2A	No	NoGo	23568
5/16-18 NC	2A	Yes	Go/NoGo	23492	9/16-18 NF	3A	No	NoGo	23569
5/16-18 NC	3A	Yes	Go/NoGo	23493	9/16-18 NF	2A	Yes	Go/NoGo	23570
5/16-24 NF	2A	No	Go	23494	9/16-18 NF	3A	Yes	Go/NoGo	23571
5/16-24 NF	3A	No	Go	23495	9/16-24 NEF	2A	No	Go	23572
5/16-24 NF	2A	No	NoGo	23496	9/16-24 NEF	3A	No	Go	23573
5/16-24 NF	3A	No	NoGo	23497	9/16-24 NEF	2A	No	NoGo	23574
5/16-24 NF	2A	Yes	Go/NoGo	23498	9/16-24 NEF	3A	No	NoGo	23575
5/16-24 NF	3A	Yes	Go/NoGo	23499	9/16-24 NEF	2A	Yes	Go/NoGo	23576
5/16-32 NEF	2A	No	Go	23500	9/16-24 NEF	3A	Yes	Go/NoGo	23577
5/16-32 NEF	3A	No	Go	23501	5/8-11 NC	2A	No	Go	23578
5/16-32 NEF	2A	No	NoGo	23502	5/8-11 NC	3A	No	Go	23579
5/16-32 NEF	3A	No	NoGo	23503	5/8-11 NC	2A	No	NoGo	23580
5/16-32 NEF	2A	Yes	Go/NoGo	23504	5/8-11 NC	3A	No	NoGo	23581
5/16-32 NEF	3A	Yes	Go/NoGo	23505	5/8-11 NC	2A	Yes	Go/NoGo	23582
3/8-16 NC	2A	No	Go	23506	5/8-11 NC	3A	Yes	Go/NoGo	23583
3/8-16 NC	3A	No	Go	23507	5/8-18 NF	2A	No	Go	23584
3/8-16 NC	2A	No	NoGo	23508	5/8-18 NF	3A	No	Go	23585
3/8-16 NC	3A	No	NoGo	23509	5/8-18 NF	2A	No	NoGo	23586
3/8-16 NC	2A	Yes	Go/NoGo	23510	5/8-18 NF	3A	No	NoGo	23587
3/8-16 NC	3A	Yes	Go/NoGo	23511	5/8-18 NF	2A	Yes	Go/NoGo	23588
3/8-24 NF	2A	No	Go	23512	5/8-18 NF	3A	Yes	Go/NoGo	23589
3/8-24 NF	3A	No	Go	23513	5/8-24 NEF	2A	No	Go	23590
3/8-24 NF	2A	No	NoGo	23514	5/8-24 NEF	3A	No	Go	23591
3/8-24 NF	3A	No	NoGo	23515	5/8-24 NEF	2A	No	NoGo	23592
3/8-24 NF	2A	Yes	Go/NoGo	23516	5/8-24 NEF	3A	No	NoGo	23593
3/8-24 NF	3A	Yes	Go/NoGo	23517	5/8-24 NEF	2A	Yes	Go/NoGo	23594
3/8-32 NEF	2A	No	Go	23518	5/8-24 NEF	3A	Yes	Go/NoGo	23595
3/8-32 NEF	3A	No	Go	23519	11/16-24 NEF	2A	No	Go	23596
3/8-32 NEF	2A	No	NoGo	23520	11/16-24 NEF	3A	No	Go	23597
3/8-32 NEF	3A	No	NoGo	23521	11/16-24 NEF	2A	No	NoGo	23598
3/8-32 NEF	2A	Yes	Go/NoGo	23522	11/16-24 NEF	3A	No	NoGo	23599
3/8-32 NEF	3A	Yes	Go/NoGo	23523	11/16-24 NEF	2A	Yes	Go/NoGo	23600
7/16-14 NC	2A	No	Go	23524	11/16-24 NEF	3A	Yes	Go/NoGo	23601
7/16-14 NC	3A	No	Go	23525	3/4-16 NF	2A	Yes	Go/NoGo	23612
7/16-14 NC	2A	No	NoGo	23526	3/4-16 NF	3A	Yes	Go/NoGo	23613
7/16-14 NC	3A	No	NoGo	23527	3/4-20 NEF	2A	Yes	Go/NoGo	23618
7/16-14 NC	2A	Yes	Go/NoGo	23528	3/4-20 NEF	3A	Yes	Go/NoGo	23619
7/16-14 NC	3A	Yes	Go/NoGo	23529	13/16-20 NEF	2A	Yes	Go/NoGo	23624
7/16-20 NF	2A	No	Go	23530	13/16-20 NEF	3A	Yes	Go/NoGo	23625
7/16-20 NF	3A	No	Go	23531	7/8-9 NC	2A	Yes	Go/NoGo	23630
7/16-20 NF	2A	No	NoGo	23532	7/8-9 NC	3A	Yes	Go/NoGo	23631
7/16-20 NF	3A	No	NoGo	23533	7/8-14 NF	2A	Yes	Go/NoGo	23636
7/16-20 NF	2A	Yes	Go/NoGo	23534	7/8-14 NF	3A	Yes	Go/NoGo	23637
7/16-20 NF	3A	Yes	Go/NoGo	23535	7/8-20 NEF	2A	Yes	Go/NoGo	23642
7/16-28 NEF	2A	No	Go	23536	7/8-20 NEF	3A	Yes	Go/NoGo	23643
7/16-28 NEF	3A	No	Go	23537	15/16-20 NS	2A	Yes	Go/NoGo	23648
7/16-28 NEF	2A	No	NoGo	23538	15/16-20 NS	3A	Yes	Go/NoGo	23649
7/16-28 NEF	3A	No	NoGo	23539	1-8 NC	2A	Yes	Go/NoGo	23654
7/16-28 NEF	2A	Yes	Go/NoGo	23540	1-8 NC	3A	Yes	Go/NoGo	23655
7/16-28 NEF	3A	Yes	Go/NoGo	23541	1-12 NF	2A	Yes	Go/NoGo	23660
1/2-13 NC	2A	No	Go	23542	1-12 NF	3A	Yes	Go/NoGo	23661
1/2-13 NC	3A	No	Go	23543	1-14 NS	2A	Yes	Go/NoGo	23666
1/2-13 NC	2A	No	NoGo	23544	1-14 NS	3A	Yes	Go/NoGo	23667
1/2-13 NC	3A	No	NoGo	23545	1-20 NEF	2A	Yes	Go/NoGo	23672

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS

# PERFORMANCE

Premium HSS Thread Ring Gages



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

## Series 196

## Performance | Ring Gage

Thread Size	Class of Fit	Handle	Type	EDP
1-20 NEF	3A	Yes	Go/NoGo	23673
0-80 NF	2A	No	Go	23350
1 1/16-18 NEF	2A	Yes	Go/NoGo	23678
1 1/16-18 NEF	3A	Yes	Go/NoGo	23679
1-1/8-7 NC	2A	Yes	Go/NoGo	23684
1-1/8-7 NC	3A	Yes	Go/NoGo	23685
1-1/8-12 NF	2A	Yes	Go/NoGo	23690
1-1/8-12 NF	3A	Yes	Go/NoGo	23691
1-1/8-18 NEF	2A	Yes	Go/NoGo	23696
1-1/8-18 NEF	3A	Yes	Go/NoGo	23697
1 3/16-18 NEF	2A	No	NoGo	23700
1 3/16-18 NEF	3A	No	NoGo	23701
1 3/16-18 NEF	2A	Yes	Go/NoGo	23702
1 3/16-18 NEF	3A	Yes	Go/NoGo	23703
1-1/4-7 NC	2A	No	Go	23704
1-1/4-7 NC	3A	No	Go	23705
1-1/4-7 NC	2A	No	NoGo	23706
1-1/4-7 NC	3A	No	NoGo	23707
1-1/4-7 NC	2A	Yes	Go/NoGo	23708
1-1/4-7 NC	3A	Yes	Go/NoGo	23709
1-1/4-12 NS	2A	No	Go	23710
1-1/4-12 NS	3A	No	Go	23711
1-1/4-12 NS	2A	No	NoGo	23712
1-1/4-12 NS	3A	No	NoGo	23713
1-1/4-12 NS	2A	Yes	Go/NoGo	23714
1-1/4-12 NS	3A	Yes	Go/NoGo	23715
1-1/4-18 NEF	2A	No	Go	23716
1-1/4-18 NEF	3A	No	Go	23717
1-1/4-18 NEF	2A	No	NoGo	23718
1-1/4-18 NEF	3A	No	NoGo	23719
1-1/4-18 NEF	2A	Yes	Go/NoGo	23720
1-1/4-18 NEF	3A	Yes	Go/NoGo	23721
1 5/16-18 NC	2A	No	Go	23722
1 5/16-18 NC	3A	No	Go	23723
1 5/16-18 NC	2A	No	NoGo	23724
1 5/16-18 NC	3A	No	NoGo	23725
1 5/16-18 NC	2A	Yes	Go/NoGo	23726
1 5/16-18 NC	3A	Yes	Go/NoGo	23727
1 3/8-6 NC	2A	No	Go	23728
1 3/8-6 NC	3A	No	Go	23729
1 3/8-6 NC	2A	No	NoGo	23730
1 3/8-6 NC	3A	No	NoGo	23731
1 3/8-6 NC	2A	Yes	Go/NoGo	23732
1 3/8-6 NC	3A	Yes	Go/NoGo	23733
1 3/8-12 NF	2A	No	Go	23734
1 3/8-12 NF	3A	No	Go	23735
1 3/8-12 NF	2A	No	NoGo	23736
1 3/8-12 NF	3A	No	NoGo	23737
1 3/8-12 NF	2A	Yes	Go/NoGo	23738
1 3/8-12 NF	3A	Yes	Go/NoGo	23739
1 3/8-18 NS	2A	No	Go	23740
1 3/8-18 NS	3A	No	Go	23741
1 3/8-18 NS	2A	No	NoGo	23742
1 3/8-18 NS	3A	No	NoGo	23743
1 3/8-18 NS	2A	Yes	Go/NoGo	23744
1 3/8-18 NS	3A	Yes	Go/NoGo	23745
1 7/16-18 NS	2A	No	Go	23746
1 7/16-18 NS	3A	No	Go	23747
1 7/16-18 NS	2A	No	NoGo	23748
1 7/16-18 NS	3A	No	NoGo	23749
1 7/16-18 NS	2A	Yes	Go/NoGo	23750
1 7/16-18 NS	3A	Yes	Go/NoGo	23751
1-1/2-6 NC	2A	No	Go	23752
1-1/2-6 NC	3A	No	Go	23753
1-1/2-6 NC	2A	No	NoGo	23754
1-1/2-6 NC	3A	No	NoGo	23755
1-1/2-6 NC	2A	Yes	Go/NoGo	23756
1-1/2-6 NC	3A	Yes	Go/NoGo	23757
1-1/2-12 NS	2A	No	Go	23758
1-1/2-12 NS	3A	No	Go	23759
1-1/2-12 NS	2A	No	NoGo	23760
1-1/2-12 NS	3A	No	NoGo	23761
1-1/2-12 NS	2A	Yes	Go/NoGo	23762
1-1/2-12 NS	3A	Yes	Go/NoGo	23763
1-1/2-18 NS	2A	No	Go	23764
1-1/2-18 NS	3A	No	Go	23765
1-1/2-18 NS	2A	No	NoGo	23766

Thread Size	Class of Fit	Handle	Type	EDP
1-1/2-18 NS	3A	No	NoGo	23767
1-1/2-18 NS	2A	Yes	Go/NoGo	23768
1-1/2-18 NS	3A	Yes	Go/NoGo	23769

# PERFORMANCE

Premium HSS Thread Ring Gages



## FEATURES / DESCRIPTION

### Thread Ring Gage - Metric

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerance
- Ring gages for inspection of external threads
- Hardened High Speed Steel construction

## Series 196M

## Performance | Ring Gage | Metric

Thread Size	Class of Fit	Handle	Type	EDP
M1.8 X.35	6G	No	Go	25210
M1.6 X.35	6G	Yes	Go/NoGo	25208
M1.6 X.35	6G	No	NoGo	25206
M2 X.4	6G	No	Go	25215
M1.8 X.35	6G	Yes	Go/NoGo	25213
M1.8 X.35	6G	No	NoGo	25211
M2.2 X.45	6G	No	Go	25220
M2 X.4	6G	Yes	Go/NoGo	25218
M2 X.4	6G	No	NoGo	25216
M2.5 X.45	6G	No	Go	25225
M2.2 X.45	6G	Yes	Go/NoGo	25223
M2.2 X.45	6G	No	NoGo	25221
M3 X.5	6G	No	Go	25230
M2.5 X.45	6G	Yes	Go/NoGo	25228
M2.5 X.45	6G	No	NoGo	25226
M3.5 X.6	6G	No	Go	25235
M3 X.5	6G	Yes	Go/NoGo	25233
M3 X.5	6G	No	NoGo	25231
M4 X.7	6G	No	Go	25240
M3.5 X.6	6G	Yes	Go/NoGo	25238
M3.5 X.6	6G	No	NoGo	25236
M4.5 X.75	6G	No	Go	25245
M4 X.7	6G	Yes	Go/NoGo	25243
M4 X.7	6G	No	NoGo	25241
M5 X.8	6G	No	Go	25250
M4.5 X.75	6G	Yes	Go/NoGo	25248
M4.5 X.75	6G	No	NoGo	25246
M5 X 0.5	6G	No	Go	22782
M5 X 0.5	6G	No	NoGo	22783
M6 X 1	6G	No	Go	25255
M5 X.8	6G	Yes	Go/NoGo	25253
M6 X 0.75	6G	No	Go	22794
M5 X.8	6G	No	NoGo	25251
M6 X 0.75	6G	No	NoGo	22795
M7 X 1	6G	No	Go	25260
M6 X 1	6G	Yes	Go/NoGo	25258
M6 X 1	6G	No	NoGo	25256
M8 X 1.25	6G	No	Go	25265
M8 X 0.75	6G	No	NoGo	22822
M7 X 1	6G	Yes	Go/NoGo	25263
M7 X 1	6G	No	NoGo	25261
M8 X 0.75	6G	No	NoGo	22823
M10 X 1.5	6G	No	Go	25275
M8 X 1	6G	Yes	Go/NoGo	25273
M8 X 1	6G	No	NoGo	25271
M9 X 1.0	6G	No	Go	22846
M8 X 1	6G	No	Go	25270
M9 X 1.25	6G	No	Go	22834
M8 X 1.25	6G	Yes	Go/NoGo	25268
M10 X 1.0	6G	No	Go	22866
M8 X 1.25	6G	No	NoGo	25266
M9 X 1.0	6G	No	NoGo	22847
M9 X 1.25	6G	No	NoGo	22835
M10 X 1.0	6G	No	NoGo	22867
M11 X 1.0	6G	No	Go	22890
M11 X 1.5	6G	No	Go	22878
M10 X 1.25	6G	Yes	Go/NoGo	25153
M12 X 1.0	6G	No	Go	22922
M10 X 1.25	6G	No	NoGo	25151

Thread Size	Class of Fit	Handle	Type	EDP
M12 X 1.75	6G	No	Go	25280
M10 X 1.5	6G	Yes	Go/NoGo	25278
M10 X 1.5	6G	No	NoGo	25276
M11 X 1.0	6G	No	NoGo	22891
M12 X 1.5	6G	No	Go	22902
M11 X 1.5	6G	No	NoGo	22879
M12 X 1.0	6G	No	NoGo	22923
M14 X 1.2	6G	No	Go	22942
M14 X 1.0	6G	No	Go	22946
M14 X 2	6G	No	Go	25290
M12 X 1.25	6G	Yes	Go/NoGo	25288
M12 X 1.25	6G	No	NoGo	25286
M12 X 1.5	6G	No	NoGo	22903
M15 X 1.0	6G	No	Go	22950
M12 X 1.25	6G	No	Go	25285
M16 X 1.0	6G	No	Go	22978
M12 X 1.75	6G	Yes	Go/NoGo	25283
M12 X 1.75	6G	No	NoGo	25281
M14 X 1.0	6G	No	NoGo	22947
M14 X 1.2	6G	No	NoGo	22943
M16 X 2	6G	No	Go	25300
M18 X 1.0	6G	No	Go	22990
M14 X 1.5	6G	Yes	Go/NoGo	25298
M14 X 1.5	6G	No	NoGo	25296
M14 X 1.5	6G	No	Go	25295
M14 X 2	6G	Yes	Go/NoGo	25293
M14 X 2	6G	No	NoGo	25291
M15 X 1.0	6G	No	NoGo	22951
M16 X 1.0	6G	No	NoGo	22979
M18 X 2.5	6G	No	Go	25310
M16 X 1.5	6G	Yes	Go/NoGo	25308
M16 X 1.5	6G	No	NoGo	25306
M16 X 1.5	6G	No	Go	25305
M16 X 2	6G	Yes	Go/NoGo	25303
M16 X 2	6G	No	NoGo	25301
M18 X 1.0	6G	No	NoGo	22991
M20 X 2.5	6G	No	Go	25320
M18 X 1.5	6G	Yes	Go/NoGo	25318
M18 X 1.5	6G	No	NoGo	25316
M18 X 1.5	6G	No	Go	25315
M18 X 2.5	6G	Yes	Go/NoGo	25313
M18 X 2.5	6G	No	NoGo	25311
M20 X 1.0	6G	No	Go	21513
M10 X 1.25	6G	No	Go	25150
M20 X 1.0	6G	No	NoGo	21514
M22 X 2.5	6G	No	Go	25330
M20 X 1.5	6G	Yes	Go/NoGo	25328
M20 X 1.5	6G	No	NoGo	25326
M20 X 1.5	6G	No	Go	25325
M20 X 2.5	6G	Yes	Go/NoGo	25323
M20 X 2.5	6G	No	NoGo	25321
M24 X 3	6G	No	Go	25340
M22 X 1.5	6G	Yes	Go/NoGo	25338
M22 X 1.5	6G	No	NoGo	25336
M22 X 1.5	6G	No	Go	25335
M22 X 2.5	6G	Yes	Go/NoGo	25333
M22 X 2.5	6G	No	NoGo	25331
M24 X 1.5	6G	No	Go	21546
M24 X 1.5	6G	No	NoGo	21547

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Thread Ring Gages



## Series 196M

## Performance | Ring Gage | Metric

Thread Size	Class of Fit	Handle	Type	EDP
M27 X 3	6G	No	Go	25350
M24 X 2	6G	Yes	Go/NoGo	25348
M24 X 2	6G	No	NoGo	25346
M24 X 2	6G	No	Go	25345
M24 X 3	6G	Yes	Go/NoGo	25343
M24 X 3	6G	No	NoGo	25341
M25 X 1.5	6G	No	Go	21549
M25 X 1.5	6G	No	NoGo	21550
M26 X 1.5	6G	No	Go	21558
M26 X 1.5	6G	No	NoGo	21559
M27 X 1.5	6G	No	Go	21579
M27 X 1.5	6G	No	NoGo	21580
M30 X 3.5	6G	No	Go	25360
M27 X 2	6G	Yes	Go/NoGo	25358
M27 X 2	6G	No	NoGo	25356
M27 X 2	6G	No	Go	25355
M27 X 3	6G	Yes	Go/NoGo	25353
M27 X 3	6G	No	NoGo	25351
M30 X 1.5	6G	No	Go	21594
M30 X 1.5	6G	No	NoGo	21595
M33 X 3.5	6G	No	Go	25370
M30 X 2	6G	Yes	Go/NoGo	25368
M30 X 2	6G	No	NoGo	25366
M1.6 X.35	6G	No	Go	25205
M30 X 2	6G	No	Go	25365
M30 X 3.5	6G	Yes	Go/NoGo	25363
M30 X 3.5	6G	No	NoGo	25361
M32 X 1.5	6G	No	Go	21612
M32 X 1.5	6G	No	NoGo	21613
M32 X 2.0	6G	No	Go	21603
M32 X 2.0	6G	No	NoGo	21604
M36 X 4	6G	No	Go	25380
M33 X 2	6G	Yes	Go/NoGo	25378
M33 X 2	6G	No	NoGo	25376
M33 X 2	6G	No	Go	25375
M33 X 3.5	6G	Yes	Go/NoGo	25373
M33 X 3.5	6G	No	NoGo	25371
M35 X 1.5	6G	No	Go	21633
M35 X 1.5	6G	No	NoGo	21634
M36 X 1.5	6G	No	Go	21663
M36 X 1.5	6G	No	NoGo	21664
M36 X 2.0	6G	No	Go	21654
M36 X 2.0	6G	No	NoGo	21655
M39 X 4	6G	No	Go	25390
M36 X 3	6G	Yes	Go/NoGo	25388
M36 X 3	6G	No	NoGo	25386
M36 X 3	6G	No	Go	25385
M36 X 4	6G	Yes	Go/NoGo	25383
M36 X 4	6G	No	NoGo	25381
M39 X 3	6G	No	NoGo	25396
M39 X 4	6G	No	NoGo	25391
M39 X 3	6G	No	Go	25395

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Premium HSS Thread Ring Gages



## FEATURES / DESCRIPTION

### Thread Ring Gage - NPT & NPTF

- A mechanical thread inspection tool used to check a work piece against its allowed thread tolerance
- Ring gages for inspection of external pipe threads
- Hardened High Speed Steel construction

## Series 197

## Performance | Ring Gage | NPT & NPTF

Thread Size	Standard	Type	EDP
1/8-27	NPT	L1	24369
1/4-18	NPT	L1	24372
1/16-27	NPTF	L2	24488
3/8-18	NPT	L1	24375
1/8-27	NPTF	L1	24490
1/8-27	NPTF	L2	24492
1/4-18	NPTF	L1	24494
1/4-18	NPTF	L2	24496
3/8-18	NPTF	L1	24498
3/8-18	NPTF	L2	24500
1/2-14	NPTF	L1	24502
1/2-14	NPTF	L2	24504
1/2-14	NPT	L1	24378
3/4-14	NPTF	L1	24506
3/4-14	NPTF	L2	24508
1-11-1/2	NPTF	L1	24510
1-11-1/2	NPTF	L2	24512
1-1/4-11-1/2	NPTF	L1	24514
1-1/4-11-1/2	NPTF	L2	24516
1-1/2-11-1/2	NPTF	L1	24518
1-1/2-11-1/2	NPTF	L2	24520
3/4-14	NPT	L1	24381
1-11-1/2	NPT	L1	24384
1-1/4-11	NPT	L1	24387
2-11-1/2	NPT	L1	24393
1/16-27	NPTF	L1	24486
1-1/2-11	NPT	L1	24390
3-8	NPT	L1	24399
4-8	NPT	L1	24405
2 1/2-8	NPT	L1	24396
3 1/2-8	NPT	L1	24402
5-8	NPT	L1	24408
44720	NPT	L1	24411
1/16-27	NPT	L1	24366

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



### FEATURES / DESCRIPTION

#### Thread Ring Gage - 6 Step - NPTF

- A mechanical inspection tool used to check a work piece against its allowed tolerances
- Ring gages for inspection of external features
- Hardened High Speed Steel construction

### Series 193P

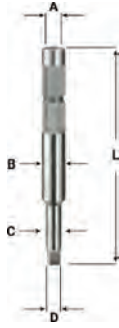
### Performance | Ring Gage | 6 Step | NPTF

Thread Size	Standard	EDP
1-1/2-11-1/2	NPTF	<b>24590</b>
1/8-27	NPTF	<b>24562</b>
1/4-18	NPTF	<b>24566</b>
3/8-18	NPTF	<b>24570</b>
1/2-14	NPTF	<b>24574</b>
3/4-14	NPTF	<b>24578</b>
1-11-1/2	NPTF	<b>24582</b>
1-1/4-11-1/2	NPTF	<b>24586</b>
1/16-27	NPTF	<b>24558</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Tap Extensions For Long Reach Applications



## FEATURES / DESCRIPTION

### Tap Extensions - ANSI

- HSS
- Increase reach of your tap with extensions
- 5", 6" and 9" Lengths
- Internal square drive for taps
- Compression cap for easy tightening, no wrench needed
- Slim profile provides better reach vs. standard extensions
- Available in Sets

## Series 117

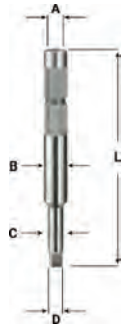
## Performance | ANSI | Inch

Tap Size	Tap Dia. (A)	Body Dia. (B)	OAL (L)	Shank (C)	Square Size (D)	Depth Tap Enters	EDP
#0-6	0.141	1/4	5	0.194	0.152	7/8	21700
#8	0.168	5/16	9	0.194	0.152	7/8	21710
9/16	0.429	3/4	6	0.429	0.32	1-1/4	21719
#8	0.168	5/16	5	0.194	0.152	7/8	21701
5/8	0.48	3/4	6	0.48	0.36	1-1/4	21721
#10	0.194	3/8	9	0.194	0.152	1	21711
3/4	0.59	7/8	6	0.59	0.44	1-3/8	21724
#10	0.194	3/8	5	0.194	0.152	1	21702
#12	0.22	3/8	9	0.194	0.152	1	21712
#12	0.22	3/8	5	0.194	0.152	1	21703
1/4	0.255	7/16	9	0.255	0.191	1	21713
1/4	0.255	7/16	5	0.255	0.191	1	21704
5/16	0.318	1/2	9	0.318	0.238	1-1/16	21714
3/8	0.381	9/16	9	0.381	0.286	1-1/8	21715
5/16	0.318	1/2	5	0.318	0.238	1-1/16	5/16
7/16	0.323	1/2	5	0.323	0.242	1-1/16	21707
7/16	0.323	1/2	9	0.323	0.242	1-1/16	21716
1/2	0.367	9/16	5	0.367	0.275	1-1/8	21708
1/2	0.367	9/16	9	0.367	0.275	1-1/8	21717
11/16	0.542	7/8	6	0.542	0.406	1-1/4	21722
1	0.8	1	6	0.8	0.6	1/2	21798
7/8	0.697	1	6	0.697	0.52	1-3/8	21725
#0-6	0.141	1/4	9	0.194	0.152	7/8	21805
3/8	0.381	9/16	5	0.381	0.286	1-1/8	21706

\*bold numbers are EDPs for ordering

INTRO  
 MILLING  
 SPECIALTY  
 HOLEMAKING  
 THREADING  
 INSERTS





### FEATURES / DESCRIPTION

#### Tap Extensions - ANSI - Coolant

- HSS
- Coolant-through
- Increase reach with extensions
- 5", 6" and 9" Lengths
- Internal square drive for taps
- Compression cap for easy tightening
- Slim profile provides better reach vs. standard extensions
- Available in Sets

### Series 117H

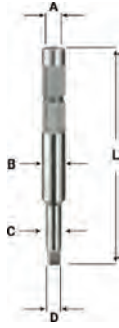
### Performance | ANSI | Coolant | Inch

Tap Size	Tap Dia. (A)	Body Dia. (B)	OAL (L)	Shank (C)	Square Size (D)	Depth Tap Enters	EDP
#8	0.168	5/16	5	0.194	0.152	7/8	<b>21729</b>
#8	0.168	5/16	9	0.194	0.152	7/8	<b>21738</b>
#10	0.194	3/8	5	0.194	0.152	1	<b>21730</b>
5/8	0.48	3/4	6	0.48	0.36	1-1/4	<b>21748</b>
#10	0.194	3/8	9	0.194	0.152	1	<b>21739</b>
3/4	0.59	7/8	6	0.59	0.44	1-3/8	<b>21751</b>
#12	0.22	3/8	5	0.194	0.152	1	<b>21731</b>
#0-6	0.141	1/4	5	0.194	0.152	7/8	<b>21728</b>
#12	0.22	3/8	9	0.194	0.152	1	<b>21740</b>
1	0.8	1	6	0.8	0.6	1-1/2	<b>21755</b>
1/4	0.255	7/16	5	0.255	0.191	1	<b>21732</b>
1/4	0.255	7/16	9	0.255	0.191	1	<b>21741</b>
5/16	0.318	1/2	5	0.318	0.238	1-1/16	<b>21733</b>
5/16	0.318	1/2	9	0.318	0.238	1-1/16	<b>21742</b>
3/8	0.381	9/16	5	0.381	0.286	1-1/8	<b>21734</b>
3/8	0.381	9/16	9	0.381	0.286	1-1/8	<b>21743</b>
7/16	0.323	1/2	5	0.323	0.242	1-1/16	<b>21735</b>
7/16	0.323	1/2	9	0.323	0.242	1-1/16	<b>21744</b>
1/2	0.367	9/16	5	0.367	0.275	1-1/8	<b>21736</b>
1/2	0.367	9/16	9	0.367	0.275	1-1/8	<b>21745</b>
#0-6	0.141	1/4	9	0.194	0.152	7/8	<b>21737</b>
9/16	0.429	3/4	6	0.429	0.32	1-1/4	<b>21746</b>
11/16	0.542	7/8	6	0.542	0.406	2-1/4	<b>21749</b>
7/8	0.697	1	6	0.697	0.52	1-3/8	<b>21752</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Tap Extensions For Long Reach Applications



## FEATURES / DESCRIPTION

### Tap Extensions - NPT

- HSS
- Increase reach of your tap with extensions
- 5", 6" and 9" Lengths
- Internal square drive for taps
- Compression cap for easy tightening, no wrench needed
- Slim profile provides better reach vs. standard extensions

## Series 119

## Performance | ANSI | NPT

Pipe Size	Tap Dia. (A)	Body Dia. (B)	OAL (L)	Shank (C)	Square Size (D)	Depth Tap Enters	EDP
1/2	0.687	1	6	0.687	0.515	1-1/4	<b>21727</b>
1/16	0.312	1/2	5	0.312	0.234	1	<b>21709</b>
1/16	0.312	1/2	9	0.312	0.234	1	<b>21718</b>
1/8	0.437	3/4	6	0.437	0.328	1	<b>21720</b>
1/4	0.562	7/8	6	0.562	0.42	1	<b>21723</b>
3/8	0.7	1	6	0.7	0.53	1-3/16	<b>21726</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

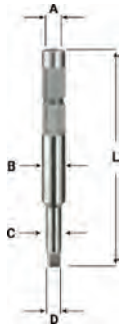
HOLEMAKING

THREADING

INSERTS

# PERFORMANCE

Tap Extensions For Long Reach Applications



## FEATURES / DESCRIPTION

### Tap Extensions - NPT - Coolant

- HSS
- Coolant-through
- Increase reach of your tap with extensions
- 5", 6" and 9" Lengths
- Internal square drive for taps
- Compression cap for easy tightening, no wrench needed
- Slim profile provides better reach vs. standard extensions

## Series 119H

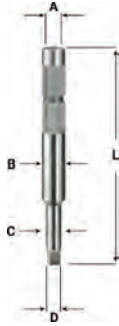
## Performance | ANSI | NPT | Coolant

Pipe Size	Tap Dia. (A)	Body Dia. (B)	OAL (L)	Shank (C)	Square Size (D)	Depth Tap Enters	EDP
1/16	0.312	1/2	9	0.312	0.234	1	<b>21800</b>
1/2	0.687	1	6	0.687	0.515	1-1/4	<b>21754</b>
1/8	0.437	3/4	6	0.437	1	0.328	<b>21747</b>
1/4	0.562	7/8	6	0.562	0.42	1	<b>21750</b>
3/8	0.7	1	6	0.7	0.53	1-3/16	<b>21753</b>
1/16	0.312	1/2	5	0.312	0.234	1	<b>21799</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Tap Extensions For Long Reach Applications



## FEATURES / DESCRIPTION

### Tap Extensions - DIN

- HSS
- Increase reach of your tap with extensions
- 5", 6" and 9" Lengths
- Internal square drive for taps
- Compression cap for easy tightening, no wrench needed
- Slim profile provides better reach vs. standard extensions

## Series 118S

## Performance | DIN Taps

Tap Dia. (A)	Body Dia. (B)	OAL (L)	Tap Size	Shank (C)	Square Size (D)	Depth Tap Enters	EDP
3.5mm	5/16	5	M3/M5	6mm	4.9mm	7/8	<b>21757</b>
3.5mm	5/16	9	M3.5	6mm	4.9mm	7/8	<b>21768</b>
11.0mm	3/4	5	M12/M16	11mm	9mm	1-3/8	<b>21801</b>
4.0mm	3/8	5	M3.5	6mm	4.9mm	7/8	<b>21758</b>
4.0mm	3/8	9	M4/M6	6mm	4.9mm	7/8	<b>21769</b>
4.5mm	3/8	5	M4/M6	6mm	4.9mm	7/8	<b>21759</b>
4.5mm	3/8	9	M4.5/M8	6mm	4.9mm	7/8	<b>21770</b>
6.0mm	7/16	5	M4.5-M8	7mm	5.5mm	1	<b>21760</b>
6.0mm	7/16	9	M7/M10	7mm	5.5mm	1	<b>21771</b>
7.0mm	1/2	5	M7/M10	7mm	5.5mm	1	<b>21761</b>
7.0mm	1/2	9	M8/M11	7mm	5.5mm	1	<b>21772</b>
8.0mm	1/2	5	M8/M11	8mm	6.2mm	1-1/8	<b>21762</b>
8.0mm	1/2	9	M9/M12	8mm	6.2mm	1-1/8	<b>21773</b>
9.0mm	5/8	5	M9/M12	9mm	7mm	1-3/16	<b>21763</b>
9.0mm	5/8	9	M10	9mm	7mm	1-3/16	<b>21774</b>
10.0mm	5/8	5	M10	10mm	8mm	1-1/4	<b>21764</b>
10.0mm	5/8	9	M11/M14	10mm	8mm	1-1/4	<b>21775</b>
11.0mm	3/4	5	M11/M14	11mm	9mm	1-3/8	<b>21765</b>
12.0mm	3/4	9	M2/M4	12mm	9mm	1-3/8	<b>21766</b>
12.0mm	3/4	9	M12/M16	12mm	9mm	1-3/8	<b>21802</b>
2.8mm	1/4	9	M3/M5	6mm	4.9mm	7/8	<b>21767</b>
2.8mm	1/4	5	M2/M4	6mm	4.9mm	7/8	<b>21756</b>

\*bold numbers are EDPs for ordering

INTRO

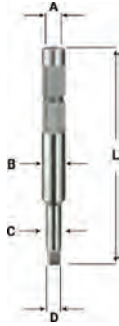
MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



### FEATURES / DESCRIPTION

#### Tap Extensions - Coolant & Solid - DIN

- HSS
- Coolant-through & Solid
- Increase reach of your tap with extensions
- 5", 6" and 9" Lengths
- Internal square drive for taps
- Compression cap for easy tightening, no wrench needed
- Slim profile provides better reach vs. standard extensions

### Series 118H

### Performance | DIN Taps | Coolant & Solid

Tap Dia. (A)	Body Dia. (B)	OAL (L)	Tap Size	Shank (C)	Square Size (D)	Depth Tap Enters	EDP
3.5mm	5/16	5	M3/M5	6mm	4.9mm	7/8	<b>21777</b>
3.5mm	5/16	9	M3/M5	6mm	4.9mm	7/8	<b>21787</b>
4mm	3/8	5	M3.5	6mm	4.9mm	7/8	<b>21778</b>
4mm	3/8	9	M3.5	6mm	4.9mm	7/8	<b>21788</b>
4.5mm	3/8	5	M4/M6	6mm	4.9mm	7/8	<b>21779</b>
4.5mm	3/8	9	M4/M6	6mm	4.9mm	7/8	<b>21789</b>
6mm	7/16	5	M4.5/M8	7mm	5.5mm	1	<b>21780</b>
6mm	7/16	9	M4.5/M8	7mm	5.5mm	1	<b>21790</b>
7mm	1/2	5	M7/M10	7mm	5.5mm	1	<b>21781</b>
7mm	1/2	9	M7/M10	7mm	5.5mm	1	<b>21791</b>
8mm	1/2	5	M8/M11	8mm	6.2mm	1-1/8	<b>21782</b>
8mm	1/2	9	M8/M11	8mm	6.2mm	1-1/8	<b>21792</b>
9mm	5/8	5	M9/M12	9mm	7mm	1-3/16	<b>21783</b>
9mm	5/8	9	M9/M12	9mm	7mm	1-3/16	<b>21793</b>
10mm	5/8	5	M10	10mm	8mm	1-1/4	<b>21784</b>
10mm	5/8	9	M10	10mm	8mm	1-1/4	<b>21794</b>
11mm	3/4	5	M14	11mm	9mm	1-3/8	<b>21785</b>
2.8mm	1/4	5	M2/M4	6mm	4.9mm	7/8	<b>21776</b>
11mm	3/4	9	M11/M14	11mm	3/4	1-3/8	<b>21795</b>
2.8mm	1/4	9	M2/M4	6mm	4.9mm	7/8	<b>21786</b>
12mm	3/4	5	M12/M16	12mm	9mm	1-3/8	<b>21803</b>
12mm	3/4	9	M12/M16	12mm	9mm	1-3/8	<b>21804</b>

\*bold numbers are EDPs for ordering

# PERFORMANCE

Tapping Fluid For Internal And External Threading Applications



## FEATURES / DESCRIPTION

### Tapping Oil

- Premium tapping fluid for internal and external threading
- Provides ideal mechanical lubricity critical to threading applications
- Available in multiple volume sizes
- Hardened High Speed Steel construction

## Series Smart Cut Tapping Oil

Description	Amount	EDP
SMART CUT 1 GAL(4/CS) TAP FLUID	1 GAL	<b>FI125</b>
SMART CUT 5(GAL) TAP FLUID	5 GAL	<b>FI130</b>
SMART CUT 16(OZ) TAP FLUID	16 OZ	<b>FI110</b>
SMART CUT 16 OZ (12/CS) TAP FLUID	16 OZ	<b>FI115</b>
SMART CUT 1(GAL) TAP FLUID	1 GAL	<b>FI120</b>
SMART CUT 1 OZ(50/CS) TAP FLUID	1 OZ	<b>FI105</b>

\*bold numbers are EDPs for ordering

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



FEATURES / DESCRIPTION

- Extended tap life
- Improved part surface finish
- Faster tapping speeds
- CFC Trichloroethane-free composition
- Adherence to the wall of the part for improved tap lubrication
- Maintains its EP film strength under extreme pressure and temperature

Series Bal-Tap

Description	Amount	EDP
BAL-TAP "S" Pint Bottle	16 OZ	<b>00002</b>
BAL-TAP "S" Case of Pint Bottles	16 OZ	<b>00003</b>
BAL-TAP "S" 5-Gallon Pail	5 GAL	<b>00004</b>
BAL-TAP "S" 55-Gallon Drum	55 GAL	<b>00005</b>
BAL-TAP "S" Case of Gallon Bottles	1 GAL	<b>00006</b>

\*bold numbers are EDPs for ordering

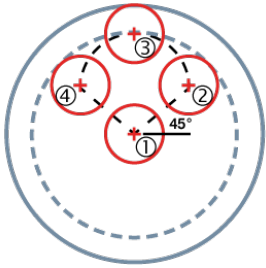
# **T**ECHNICAL DATA

## **THREADING**





## Thread Mill Programming Example

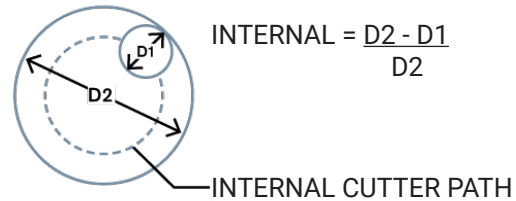


**This example will produce an internal right hand thread**

- Position to ① (centerline of thread)
- GO 1 to desired Z depth
- GO 1 to ②
- GO 3 to ③ (while Z moves up 1/8 pitch)
- GO 3 to ③ (while Z moves up 1 pitch)
- GO 3 to ④ (while Z moves up 1/8 pitch)
- GO 1 to ①
- Retract from hole

## Feed Rate Compensation

To obtain the correct feed rate for the centerline of the tool, multiply the desired feed rate at the cutting edge by the appropriate factor.



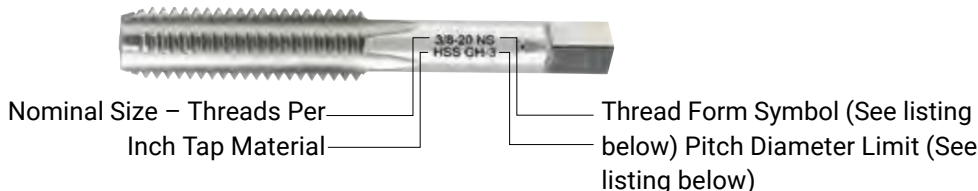
D1 = TOOL CUTTING DIAMETER  
D2 = THREAD DIAMETER

## Recommended Speeds & Feeds

	SFM				Feed (Inches/Tooth)						
	Uncoated	TiALN	ALCrN	ZrN	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
<b>Aluminum</b>	400-800	-	-	600-1400	0.0005	0.0008	0.0012	0.0015	0.0020	0.0025	0.0030
<b>Brass</b>	200-400	-	-	400-800	0.0005	0.0008	0.0012	0.0015	0.0020	0.0025	0.0030
<b>Cast Iron</b>	150-250	200-400	220-440	-	0.0004	0.0005	0.0006	0.0007	0.0010	0.0015	0.0020
<b>Carbon Steel</b>	150-250	250-500	275-550	-	0.0004	0.0005	0.0006	0.0007	0.0010	0.0015	0.0020
<b>Stainless Steel</b>	100-150	150-400	165-440	-	0.0004	0.0005	0.0006	0.0007	0.0010	0.0015	0.0020
<b>High Temp Alloy</b>	50-100	80-150	90-165	-	0.0004	0.0006	0.0007	0.0008	0.0009	0.0010	0.0012
<b>Titanium</b>	50-125	80-250	90-275	-	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0010

### STANDARD SYSTEM OF TAP MARKING

Taps, dies and other types of threading tools are marked according to the Standard System of Marking Ground Thread Taps. Tools are marked with the nominal size, number of threads per inch (pitch), and the appropriate thread form symbol and pitch diameter symbol. Symbols typically used are listed.



### PITCH DIAMETER LIMIT SYMBOLS

All standard ground thread taps are marked with the letter "G" to designate Ground Thread. The letter G will be followed by the letter "H" to designate above basic; or the letter "L" to designate below basic. The number following H or L signifies the number of .0005" steps above or below the basic pitch diameter. For instance, the tap pictured above is a 3/8" dia. tap with 20 threads per inch (pitch), and has a NS (American National Special Thread) thread form. The tap is made from High Speed Steel, and the GH-3 pitch diameter limit symbol indicates a Ground Thread tap with pitch diameter limits .0010 to .0015 over basic.

Pitch Diameter Limits for taps to 1" diameter inclusive:

- L1 = Basic to Basic minus .0005
- H1 = Basic to Basic plus .0005
- H2 = Basic plus .0005 to Basic plus .0010
- H3 = Basic plus .0010 to Basic plus .0015
- H4 = Basic plus .0015 to Basic plus .0020
- H5 = Basic plus .0020 to Basic plus .0025
- H6 = Basic plus .0025 to Basic plus .0030

Taps larger than 1" dia. are ground to a .0010" tolerance on the pitch diameter and are, for example, H4 (Basic plus .0010" to Basic plus .0020").

### THREAD FORM SYMBOLS

ACME-C	Acme Thread-Centralizing
ACME-G	Acme Thread-General Purpose
AMO	American Standard Microscope Objective Thread
ANPT	Aeronautical National Form Taper Pipe Thread (Ground thread tap marked NPT)
BA	British Association Standard Thread
BSF	British Standard Fine Thread Series
BSP	British Standard Pipe
BSPP	British Standard Pipe (Parallel) Thread
BSPT	British Standard Taper Pipe Thread
BSW	British Standard Whitworth Coarse Thread Series
M	Metric Screw Thread Series
N	American National 8, 12 and 16 Thread Series (8N, 12N, 16N)
NBUTT	American Buttress Screw Thread
NC	American National Coarse Thread Series
NEF	American National Extra Fine Thread Series
NF	American National Fine Thread Series
NGO	National Gas Outlet Thread
NGT	National Gas Taper Thread (see "SGT")
NH	American National Hose Coupling and Fire Hose Coupling Threads
NPS	For tap marking only (See NPSC, NPSM)
NPSC	American National Standard Straight Pipe Thread in Pipe Couplings (Tap marked NPS)
NPSF	Dryseal American National Standard Fuel Internal Straight Pipe Thread
NPSH	American National Standard Straight Pipe Thread for Hose Couplings
NPSI	Dryseal American National Standard Intermediate Internal Straight Pipe Thread
NPSL	American National Standard Straight Pipe Thread for Loose Fitting Mechanical Joints with Locknuts
NPSM	American National Standard Straight Pipe Threads for Free-Fitting Mechanical Joints for Fixtures (Tap marked NPS)
NPT	American National Standard Taper Pipe Thread (See ANPT, NPTR)

NPTF	Dryseal American National Standard Taper Pipe Thread
NPTR	American National Standard Taper Pipe Thread for Railing Joints (Tap marked NPT)
NS	American National Thread-Special
PG	Panzer Gewinde
PTF	Dryseal SAE Short Taper Pipe Thread
SGT	Special Gas Taper Thread
SPL-PTF	Dryseal Special Taper Pipe Thread
STI	Special Thread for Helical Coil Wire Screw Thread Inserts
Stub Acme	Stub Acme Thread
*UN	Unified Constant Pitch Thread Series
*UNC	Unified Coarse Thread Series
*UNEF	Unified Extra Fine Thread Series
*UNF	Unified Fine Thread Series
UNJ**	Unified Thread Series with a 0.15011P to 0.18042P Controlled Root Radius on External Thread only.
UNJC	Unified Coarse Thread Series with a 0.15011P to 0.18042P Controlled Root Radius on External Thread only.
UNJF	Unified Fine Thread Series with a 0.15011P to 0.18042P Controlled Root Radius on External Thread only.
UNM	Unified Miniature Thread Series
UNR	Unified Constant Pitch Thread Series with a 0.108P to 0.144P Controlled Root Radius; Ext. thread only.
UNRC	Unified Coarse Thread Series with a 0.108P to 0.144P Controlled Root Radius; Ext. thread only.
UNRF	Unified Fine Thread Series with a 0.108P to 0.144P Controlled Root Radius; External thread only. Unified Thread-Special
*UNS	A 60° "V" thread with Truncated Crest and Root. The theoretical "V" Form is usually flatted to the user's specifications.
V	
WHIT	British Standard Whitworth Special Thread

\* Taps are not marked with "U" but with the symbol for the corresponding American Standard thread form with which it is compatible.

**INCH SCREW THREADS - UNJ PROFILE**  
**CONTROLLED ROOT RADIUS WITH INCREASED MINOR DIAMETER**

The UNJ thread standard (ASME B1.15) defines a system of threads for highly stressed applications requiring high fatigue strength. It was derived from a military specification (MIL-S-8879). MIL-S-8879 was primarily thought of and used for aerospace fastener and threaded component applications. Due to the increase in both its use and types of applications, the American Society of Mechanical Engineers developed and published ASME B1.15 in 1995.

**FORM.** UNJ screw threads are of the same form as Unified Screw Threads to ASME/ANSI B1.1 except:

*External threads:* the root has a maximum and minimum prescribed continuous radius, and is not merely rounded due to tool wear.

*Internal threads:* the minor diameter is increased to accommodate the maximum root radius of the external thread. There is no radius requirement for either the crest or the root of the internal thread.

**Designation.** UNJ product threads are identified by the letter "J" in the thread symbol, and a thread class symbol including an "A" for external threads or a "B" for internal threads.

**Use of Unified Tooling.** Many of the UNJ thread form characteristics are the same as for UN threads. Therefore, some of the tooling used to produce one form can be used to produce the other.

*External UNJ threads* must be produced with a prescribed root radius; therefore, standard Unified Screw Thread (UN) tooling may not be used.

*Internal UNJ threads* are not required to have a root radius; therefore, ground thread taps designed to produce Unified Screw Threads of the proper class of fit may be used. The letter "J" need not be marked on the tap. The larger product minor diameter of the UNJ internal thread requires the use of a larger tap drill than is used when producing Unified Screw Threads.

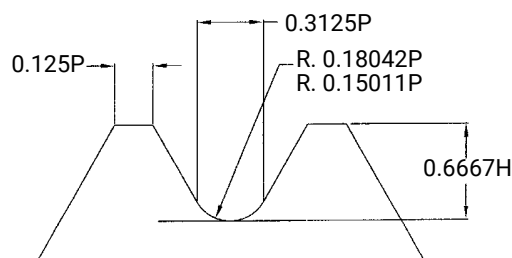
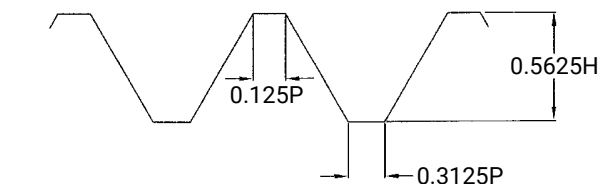
- UNJ Thread Form: Unified Thread Series with a 0.15011P to 0.18042P controlled root radius on external thread only. (As defined by MIL-S-8879C)

- UNJ internal threads do not require radius; only external thread requires radius on root.

- UNJ external thread assembles only with UNJ internal thread.

- UNJ tap is standard 2B or 3B class of fit.

**UNJ INTERNAL THREAD**  
**ROOT TO CLEAR 0.125P WIDTH-FLAT OR ROUNDED ASSEMBLES WITH ALL UN EXTERNAL THREADS**



**UNJ EXTERNAL THREAD ASSEMBLES ONLY WITH UNJ INTERNAL**



### CLASSES OF THREADS AND TAP SIZE:

There is a direct relationship between the size of a tap and the size of the thread that it cuts. Size refers to pitch diameter and its relationship to the class of fit required. If two threaded parts are assembled, the looseness or tightness of the fit is determined by contact on the flanks of the threads only. This contact is controlled by the pitch diameters of each part.

### CLASSES OF THREAD:

When threaded parts are mated, the two parts must assemble with a degree of tightness dictated by the use of the fastener. In addition, the internal thread must be large enough to allow the external thread to enter it for the required length of engagement. A system of thread classes, each representing a comparative degree of tightness, has been established and universally adopted, to provide manufacturers and users of threaded products with a common language of specification. The thread classes designate minimum and maximum pitch diameters for internal and external threads. It is important to remember that classes of thread actually represents manufacturing tolerances. The closer the tolerance required, the higher the cost involved in producing the parts. Therefore, designers and engineers should always try to select the class of thread with the widest permissible tolerance.

### TAP SIZE:

Due to material variability and machining conditions, taps rarely cut their own size. The thread size produced is usually larger, but can be smaller due to shrinkage. Tap manufacturers realized that to tap a specified class of thread, several different ground thread tap limits would be required. These limits represent small, defined variations in tap size. A numbering system was developed to designate each series of

limits, but these limit numbers are not to be confused with the classes of threads. Ground thread tap limits are designated by the letter H (high) above basic pitch diameter, or L (low) below basic pitch diameter, and these numbers establish the tolerance range in relation to basic pitch diameter. As an example, in sizes 1" and smaller, an H1 tap has a tolerance range of from basic to .0005" over basic; an H2 tap from .0005" over basic to .001" over basic, (see chart 1A on this page). In addition, metric threads are also designated in much the same way. The thread tap limits are designated by the letter D (ground, high) above basic pitch diameter, or U (ground, low) below basic pitch diameter. As an example, in sizes M25 and smaller, a D1 tap has a size of .0005" over basic to tap max. P.D.; a D2 tap has a size of .001" over basic to tap max. P.D., (see Chart 1B). The Tables on pages 115-117 list recommended limit numbers for different classes of thread. Several different limit numbers are available for each diameter and pitch combination. Consequently, it is possible to select the "H" or "L" limit, or the "D" or "U" limit most suitable for the required tapping operation. Please contact our Customer Service Dept. for questions regarding tap limits and their relation to classes of fit.

#### CHART 1A

Pitch Diameter Limits for taps to 1" diameter inclusive:

- L1 = Basic to Basic minus .0005
- H1 = Basic to Basic plus .0005
- H2 = Basic plus .0005 to Basic plus .0010
- H3 = Basic plus .0010 to Basic plus .0015
- H4 = Basic plus .0015 to Basic plus .0020
- H5 = Basic plus .0020 to Basic plus .0025
- H6 = Basic plus .0025 to Basic plus .0030

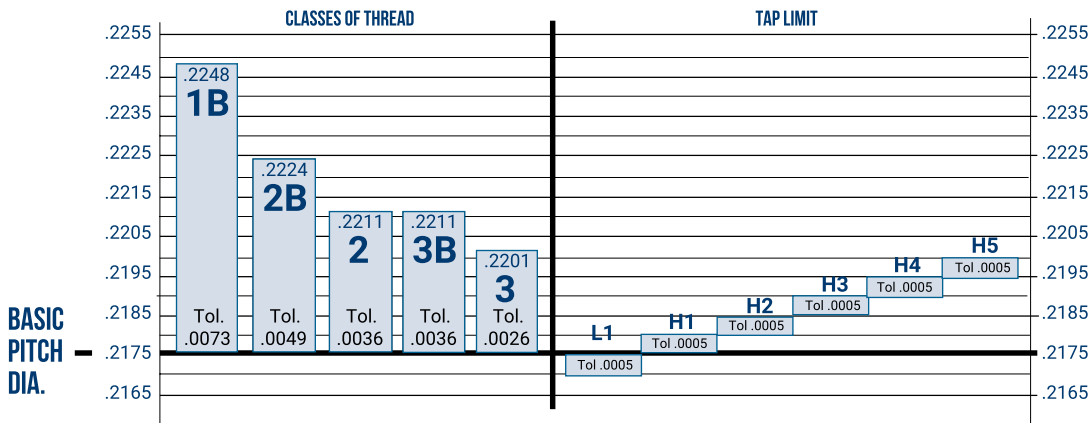
Taps larger than 1" dia. are ground to a .0010" tolerance on the pitch diameter and are, for example, H4 (Basic plus .0010" to Basic plus .0020").

#### CHART 1B

Pitch Diameter Limits for taps to 1" diameter inclusive: (Metric taps generally have more manufacturing tolerance than .0005 to the minus side.)

- U1 = Basic minus .0005 = min. tap P.D.
- D1 = Basic plus .0005 = max. tap P.D.
- D2 = Basic plus .0010 = max. tap P.D.
- D3 = Basic plus .0015 = max. tap P.D.
- D4 = Basic plus .0020 = max. tap P.D.
- D5 = Basic plus .0025 = max. tap P.D.
- D6 = Basic plus .0030 = max. tap P.D.

**CHART 2A** COMPARISON OF PITCH DIAMETER LIMITS TO CLASS OF FIT



On Charts 2A and 2B (below), examples of the relationship of Class of Fit to various tap limit sizes is shown for both Imperial and Metric sizes. In chart 2A, using a 1/4"-20NC or UNC thread size, it is obvious that an H5 limit (+.0025" over basic pitch diameter) can be used to cut the tightest class of thread in most machining situations, as can the H1 limit (+.0005" over basic P.D.). However, tool wear would force the discarding of the H1 tap long before the H5 would be worn to an undersize condition. The rule is obvious: always select the largest "H" limit possible to achieve proper class of fit, and maximum tool life.

**CHART 2B** COMPARISON OF PITCH DIAMETER LIMITS TO CLASS OF FIT

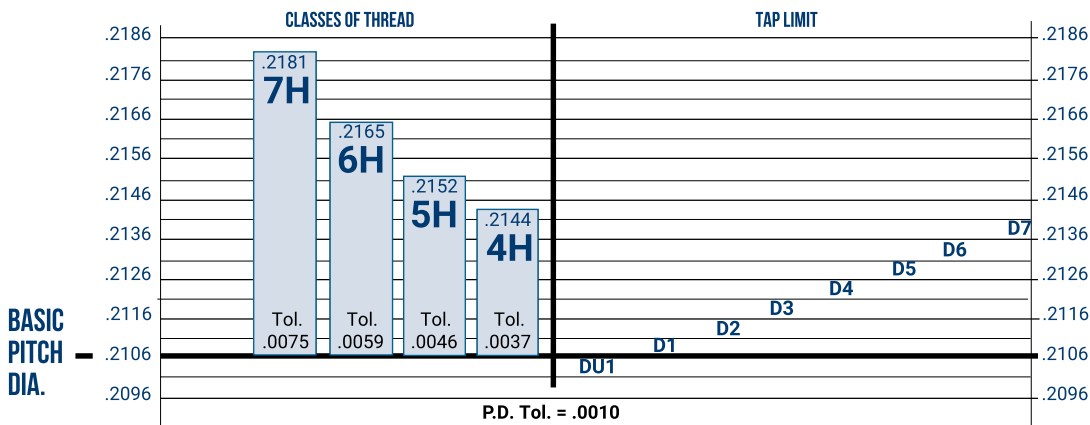


Chart 2B shows the same relationship with a metric thread. Using a M6 X 1.0, it is obvious that a D5 limit (+.0025" over basic pitch diameter) can be used to cut the standard class of thread in most machining situations, as can the D1 limit (+.0005" over basic P.D.). However, tool wear would force the discarding of the D1 tap long before the D5 would be worn to an undersize condition. The rule is obvious: always select the largest "D" limit possible to achieve proper class of fit, and maximum tool life.

**SCREW THREAD CLASSES OVERVIEW:** Screw thread classes are distinguished from each other by the amount of tolerance and allowance.

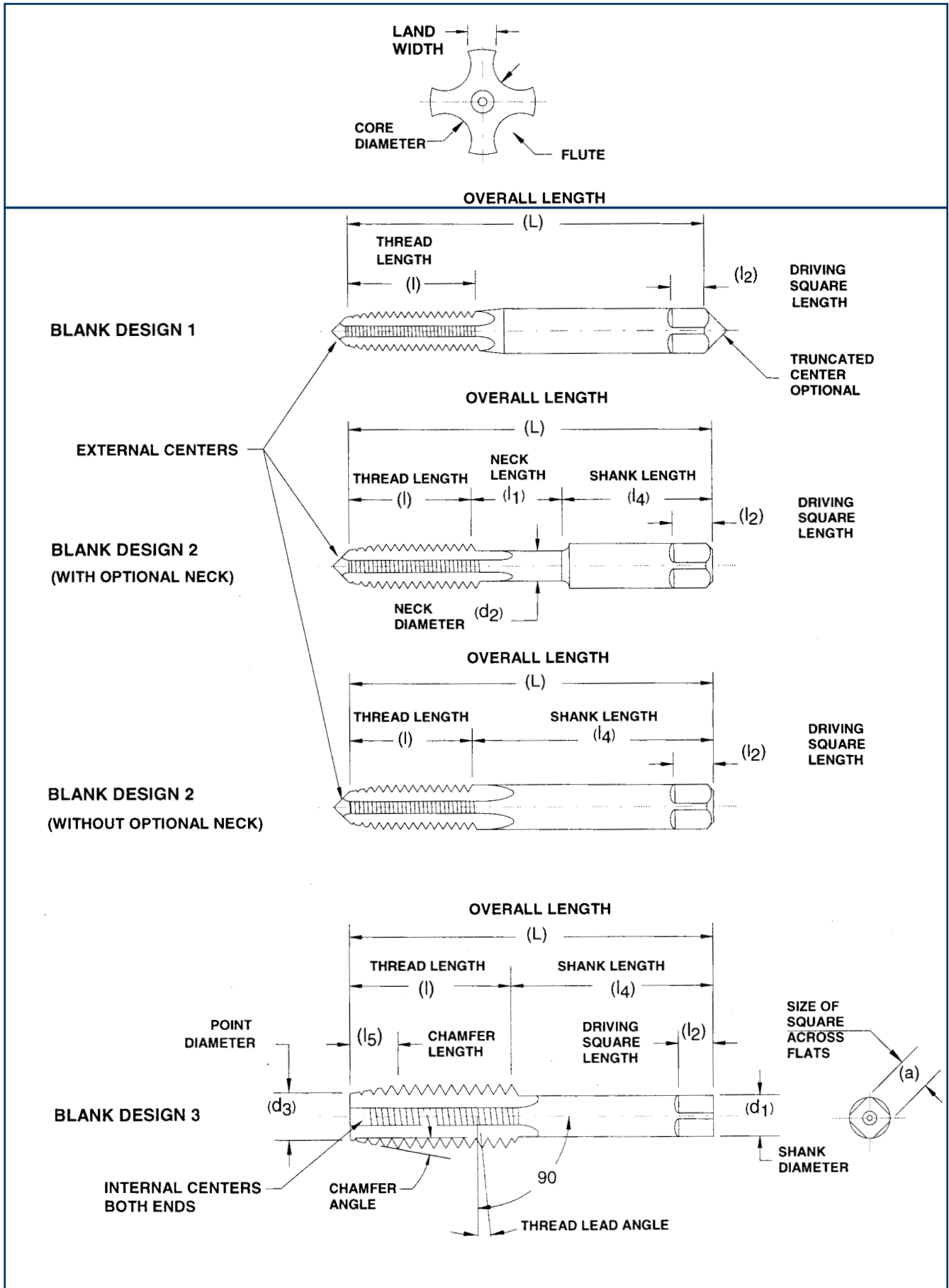
**Class 1A and Class 1B:** The combination of Class 1A for external threads and Class 1B for internal threads is intended to cover the manufacture of threaded parts where quick and easy assembly is necessary or desired, and an allowance is provided to permit ready assembly.

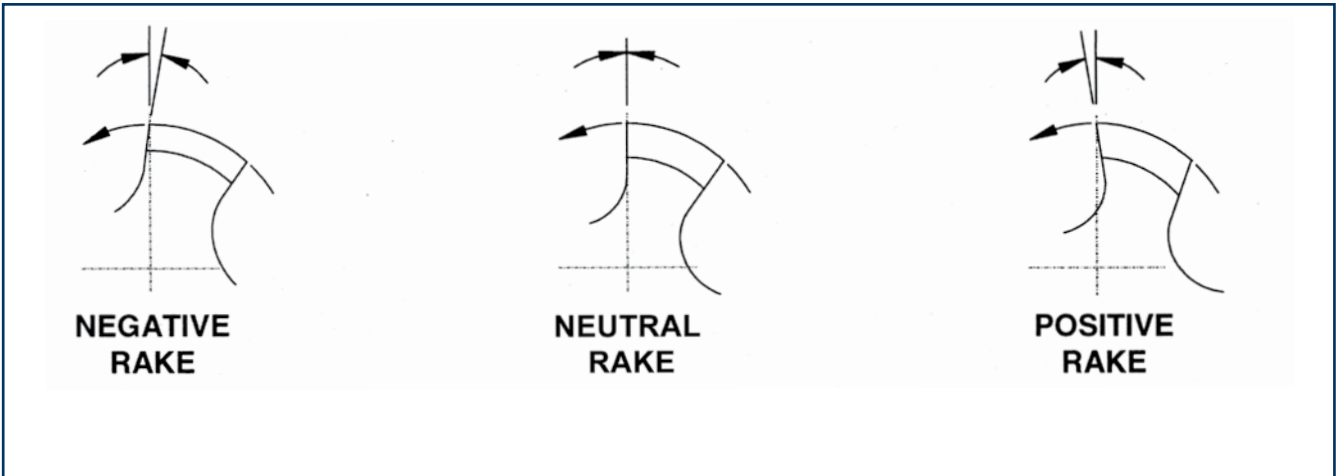
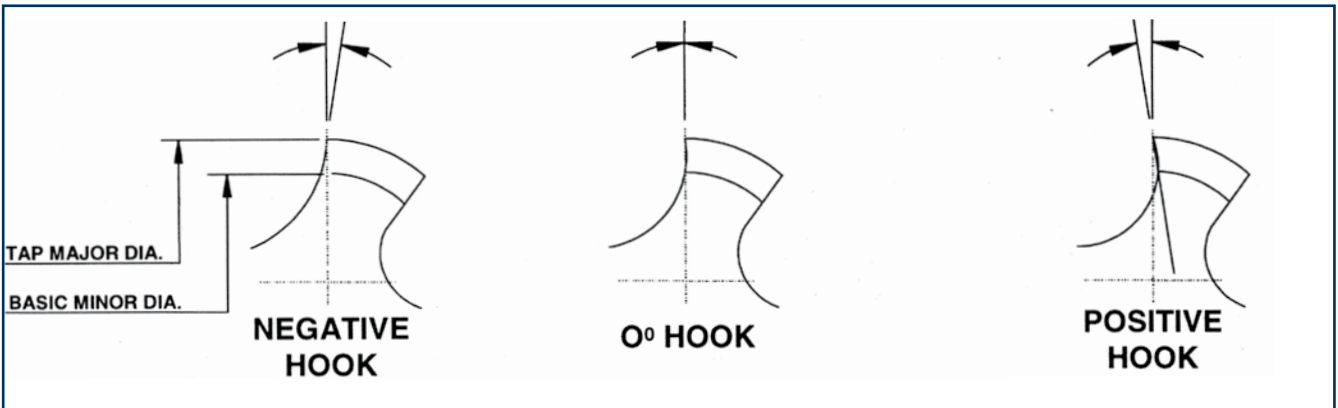
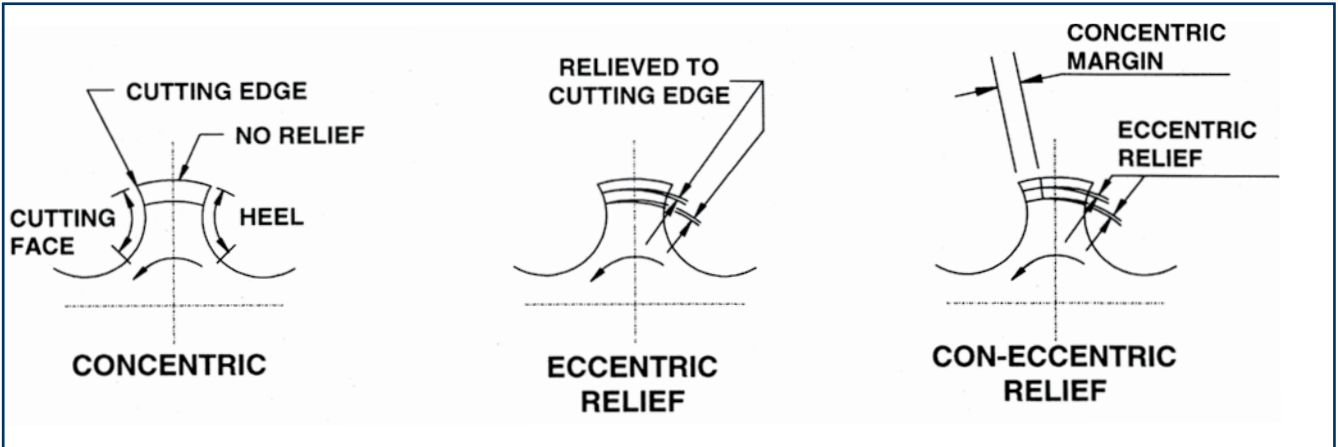
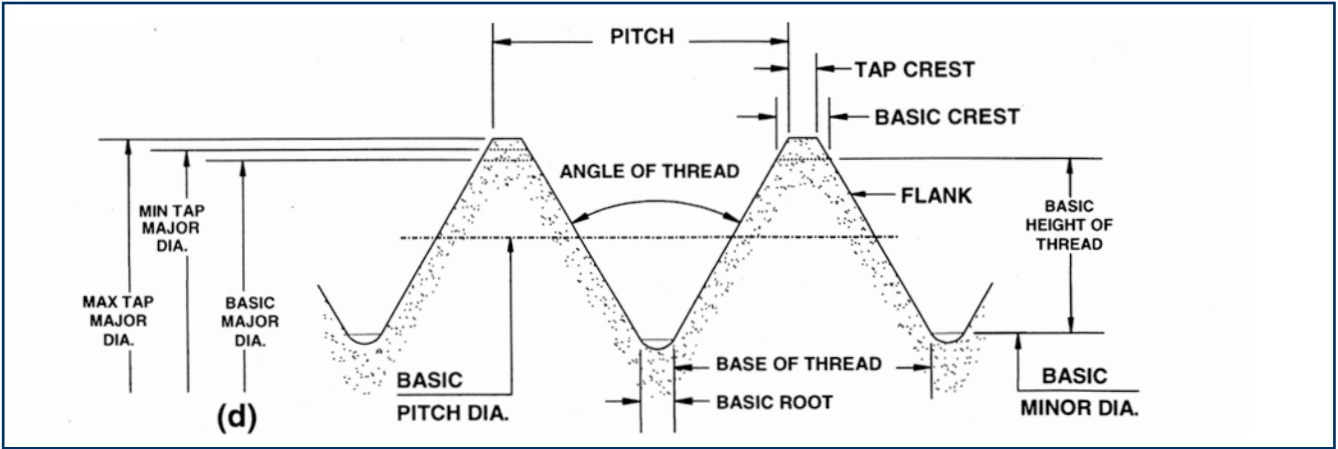
**Class 2A and Class 2B:** The combination of Class 2A for external threads and Class 2B for internal threads designed for screws, bolts and nuts, is also suitable for a variety of other applications. A similar allowance

is provided which minimizes galling and seizure encountered in assembly and use. It also accommodates, to a limited extent, plating, finishes or coatings.

**Class 3A and 3B:** The combination of Class 3A for external threads and Class 3B for internal threads is provided for those applications where closeness of fit and accuracy of lead and angle of thread are important. These threads are obtained consistently only by use of high quality production equipment supported by a very efficient system of gauging and inspection.

No allowance is provided.





### ANGLE OF THREAD

The angle included between the sides of the thread measured in an axial plane.

### AXIS

The imaginary straight line that forms the longitudinal centerline of the tool or threaded part.

### BACK TAPER

A gradual decrease in the diameter of the thread form on a tap from the chamfered end of the land towards the back which creates a slight radial relief in the threads.

### BASE OF THREAD

The bottom section of the thread; the greatest section between the two adjacent roots.

### BASIC SIZE

The theoretical or nominal standard size from which all variations are derived by application of allowances and tolerances.

### CHAMFER

The tapering of the threads at the front end of each land of a tap by cutting away and relieving the crest of the first few teeth to distribute the cutting action over several teeth; Taper taps are chamfered 7-10 threads; plug taps are chamfered 3-5 threads; semi bottoming taps are chamfered 2-2.5 threads; bottoming taps are chamfered 1-2 threads; taper pipe taps are chamfered 2-3.5 threads.

### CHAMFER RELIEF

The gradual decrease in land height from cutting edge to heel on the chamfered portion, to provide clearance for the cutting action as the tap advances.

### CREST

The top surface joining the two sides or flanks of the thread; the crest of an external thread is at its major diameter, while the crest of an internal thread is at its minor diameter.

### CUTTING FACE

The leading side of the land in the direction of cutting rotation on which the chip forms.

### FLUTE

The longitudinal channels formed in a tap to create cutting edges on the thread profile, and to provide chip spaces and cutting fluid passages.

### HEEL

The edge of the land opposite the cutting edge.

### HELIX ANGLE

The angle made by the advance of the thread as it wraps around an imaginary cylinder.

### HOOK

The undercut on the face of the teeth.

### HOOK ANGLE

The inclination of a concave cutting face, usually specified either as Chordal Hook or Tangential Hook.

**Chordal Hook Angle:** The angle between the chord passing through the root and crest of a thread form at the cutting face, and a radial line through the crest at the cutting edge.

**Tangential Hook Angle:** The angle between a line tangent to a hook cutting face at the cutting edge and a radial line to the same point.

### INTERRUPTED THREAD TAP

A tap having an odd number of lands with alternate teeth along the thread helix removed. In some cases alternate teeth are removed only for a portion of the thread length.

### LAND

The part of the tap body which remains after the flutes are cut, and on which the threads are finally ground. The threaded section between the flutes of a tap.

### LEAD

The axial distance a tap will advance along its axis in one complete turn. On a single start, the lead and the pitch are identical; on a double start, the lead is twice the pitch.

### MAJOR DIAMETER

Commonly known as the "outside diameter." It is the largest diameter of the thread.

### MINOR DIAMETER

Commonly known as the "root diameter." It is the smallest diameter of the thread.

### PERCENT OF THREAD

One-half the difference between the basic major diameter and the actual minor diameter of an internal thread, divided by the basic thread height, expressed as a percentage.

### PITCH

The distance from any point on a screw thread to a corresponding point on the next thread, measured parallel to the axis and on the same side of the axis. The pitch equals one divided by the number of threads per inch.



### PITCH DIAMETER

On a straight thread, the pitch diameter is the diameter of the imaginary co-axial cylinder...the surface of which would pass through the thread profiles at such points as to make the width of the groove equal to one-half of the basic pitch. On a perfect thread this occurs at the point where the widths of the thread and groove are equal. On a taper thread, the pitch diameter at a given position on the thread axis is the diameter of the pitch cone at that position.

### RAKE

The angular relationship of the straight cutting face of a tooth with respect to a radial line through the crest of the tooth at the cutting edge. Positive rake means that the crest of the cutting face is angularly ahead of the balance of the cutting face of the tooth. Negative rake means that the crest of the cutting face is angularly behind the balance of the cutting face of the tooth. Zero rake means that the cutting face is directly on a radial line.

### RELIEF (OR THREAD RELIEF)

The removal of metal from behind the cutting edge to provide clearance and reduce friction between the part being threaded and the threaded land.

## CHAMFERS FOR THREAD CUTTING TAPS

The tap chamfer is the tapering of the threads to distribute cutting action over several teeth. The type of hole to be tapped has much to do with the chamfer style of that tap that's best suited. Some holes go all the way through; some, while not through-holes, are relatively deep; some are quite shallow (a little deeper than diameter). Each of these three kinds of holes - through, deep-bottoming blind, and shallow bottoming - has a tap chamfer best suited to threading requirements.



**TAPER TAPS** - This style, with a **7-10 thread chamfer**, has the longest chamfer of the three to distribute action over the maximum number of teeth; and the taper also acts as a guide in starting the cutting action in the hole.

Taper style taps start the thread square with the workpiece. Taper taps are commonly used in through holes and in materials where a tapered guide is necessary.

### ROOT

The bottom surface joining the sides of two adjacent threads, and is identical with or immediately adjacent to the cylinder or cone from which the thread projects.

### SPIRAL FLUTE

A flute with uniform axial lead in a spiral path around the axis of a tap.

### SPIRAL POINT

The angular fluting in the cutting face of the land at the chamfered end; formed at an angle with respect to the tap axis of opposite hand to that of rotation. Its length is usually greater than the chamfer length and its angle with respect to the tap axis is usually made great enough to direct the chips ahead of the taps cutting action.

### STRAIGHT FLUTE

A flute that forms a cutting edge lying in an axial plane.

### TOLERANCE

In producing a tap to given specifications, tolerance is: (a.) the total permissible variation of a size; (b.) the difference between the limits of size.



**PLUG TAPS** - This style, with a **3-5 thread chamfer**, is most widely used in through holes and where there is sufficient room at the bottom in blind holes.

**SEMI-BOTTOMING TAPS** - This style, with a **2 to 2.5 thread chamfer**, should be used whenever possible in difficult material applications in blind holes, when threads are not required to the bottom of the hole.



**BOTTOMING TAPS** - This style, designed with a **1 to 2 thread chamfer**, is made with just enough chamfer for starting in the hole; as the name implies, it is designed to thread blind holes to the bottom.

**NOTE:** Taper, plug and bottoming taps as a set, in a given size (for example: 1/4-20 NC) are identical as to size, length and vital measurements; the difference is in the chamfered threaded portion at the point. As a rule, such taps when used by hand are furnished in sets of three of a given size...namely, taper, plug and bottoming (and should be used in that order).

### HAND TAP



These standard style taps have straight flutes of a number specified as either standard or optional. Hand taps are for general purpose applications such as production tapping or hand tapping operations. Taper, plug and bottoming styles provide versatility in tough materials, blind and through holes.

### SPIRAL POINT TAP



As to general physical dimensions, spiral point taps are identical with the standard hand tap. However, the spiral point tap has the cutting face of the first few threads cut at a predetermined angle relative to the tap's axis angle to force the evacuation of chips ahead of the cutting action. This feature, plus the excellent shearing action of the flute, make spiral pointed taps ideal for production tapping of through holes. Typically, this type of tap has a shallower flute passage than conventional taps. This gives the spiral point tap more cross-sectional area, which means greater strength, allows higher tapping speeds, and requires less power to drive.

### SPIRAL FLUTED TAP



Regular (or Slow) Spiral



Fast Spiral

These taps, as the name implies, are made with spiral flutes instead of straight flutes. This spiral fluting feature aids in drawing chips out of a hole, or serves to bridge a gap inside the hole such as a keyway or cross-hole. Commonly available in slow spiral (18-30° helix angle) or fast spiral (45-52°). Spiral flute taps are available in left hand style.

### INTERRUPTED THREAD TAP



These taps have an odd number of lands with alternate teeth in the thread helix removed. The removal of every other tooth helps to break the chip and allows a greater supply of lubrication to reach the cutting teeth, reducing the incidence of torn threads. Ideal for tapping non-ferrous metals and low carbon steel; as well as use in titanium and high hardness alloys.

### THREAD FORMING TAP (TRU-FLO™)



These taps are fluteless except as optionally designed with one or more lubrication grooves. The thread form is lobed so there is a finite number of points contacting the work. This tap does not cut, so it is 'chipless', and consequently will not cause a chip problem. The tool forms the thread by extrusion, thus thread size can be closely maintained. The fluteless design allows high quality threads, faster tapping speeds, higher production, and generates no chips which simplifies tapping of blind bottoming holes (threads can be formed the full depth of the hole).

### PIPE TAP



Straight Pipe Tap



Taper Pipe Tap

These taps are for producing standard straight or tapered pipe threads in a wide range of pipe connections. Manufactured with the appropriate design variations to cut specified pipe thread forms.

### COMBINED DRILL & TAP (COST CUTTER™)



This high production tool is specially designed to drill and tap in one pass only. By design, this value-added tool reduces machining operations and subsequent parts handling. The drill end features a split point, and the tool shank and square fit standard tap holders.

### ACME THREAD TAP



Acme screw threads were devised to allow rotary and transversing motion on machines; and are also used in jacks, valves, presses and other mechanisms where heavy loads are encountered. The acme thread is characterized by a 29° included angle. Acme taps typically require specialized engineering and design due to the nature and severity of cut required in producing Acme threads.

### TANDEM ACME TAP



These taps combine the initial roughing cut with the final finishing cut, in one pass, to achieve an acme screw thread. These taps are economical and enhance production levels by saving on the operation of two tools. Since acme thread pitches are generally coarse relative to diameters, these taps are subjected to heavy chip loads. To achieve a high quality acme thread in a cost-effective manner, roughing and finishing operations are recommended.

### EXTENSION TAPS (INCL. NUT & PULLEY TAPS)



**Extension Tap** - These taps are made to conventional tap dimensions, except that they have an extended shank in order to tap hard to reach holes. Thread length, shank diameter, and shank square are made to standard specifications listed in Table 302. Extension taps are available in both hand and spiral point styles, and in small shank style.



**Pulley Tap** - The hub portion of pulley parts contain oil cups and set screw holes, most of which cannot be reached with ordinary hand taps. Pulley taps have the same basic thread dimensions as hand taps, but pulley taps differ in that they have a longer shank which is of the same basic major diameter as the threaded portion. When tapping pulley hub holes, the taps are inserted through holes in the rims which are slightly larger than the shanks of the taps. These holes serve as guides or bushings for the taps to assure proper alignment when tapping. Pulley taps can also be used for general tapping in parts where an extra long length is required to reach the holes being tapped.



**Nut Tap** - Nut taps feature a long chamfer which assists in entering the drilled hole, and distributes the cutting action over several teeth. These taps were initially designed for tapping nuts and have a long thread length. The shank diameter is smaller than the tap's minor diameter to allow the accumulation of several nuts after tapping. Nut taps also feature an extended square length.

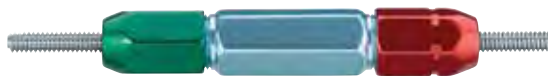
## THREAD PLUG & RING GAGES

- Thread Plug Gages - UNC, UNF & UNEF  
Class 2B - 3B, Taperlock & Reversible,  
+ Metric Sizes - Class 6H
- Thread Ring Gages - UNC, UNF, UNEF  
Class 2A-3A  
+ Metric Sizes - Class 6g
- Truncated Thread Setting Plug Gages  
Class 2A-3A  
+ Metric Sizes - Class 6g
- Thread Plug Gages - STI  
Screw Thread Insert
- BSP Plug Gages  
(BSPT, BSPP)
- Taper Pipe Gages - Plugs & Rings NPT-  
L1, L1 & L2 Rings,  
NPTF L1 & L3 Plugs,  
NPTF Crest Check Plugs & Rings

... contact GWS Tool Group for your special gaging requirements.



Thread Plug Gage



Reversible Thread Plug Gage



Thread Ring Gage

**THREAD FORMING TAP ENTRY LENGTHS:** Entry taper length is measured on the full diameter of the thread forming lobes and is the axial distance from the entry diameter position to the theoretical intersection of tap major diameter and entry taper angle.

Whenever entry taper length is specified in terms of number of threads, this length is measured in number of pitches (p).

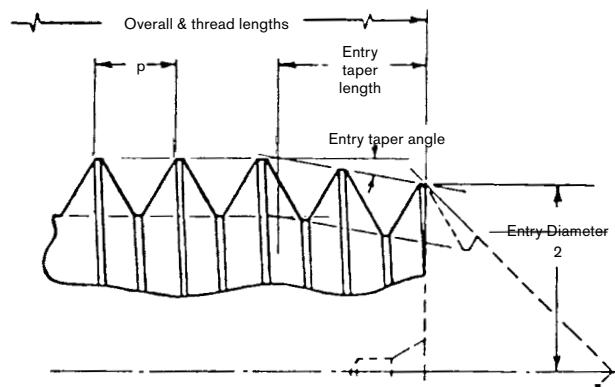
**BOTTOMING LENGTH = 1-1/2 to 2-1/2 PITCHES**

**PLUG LENGTH = 3 to 5 PITCHES**

The chamfer on Tru-Flo BOTTOM taps is approximately 2 threads long and requires a drilled hole depth 3-4 pitches beyond the full thread required. When a controlled maximum chamfer shorter than 2 threads is required, an additional charge will apply. We will not guarantee the performance of taps with the shorter chamfer.

Entry diameter, measured at the thread crest nearest the front of the tap, is an appropriate amount smaller than the diameter of the hole drilled for tapping. See below for tap/drill size formulas, and formulas to determine maximum and minimum drill hole sizes for appropriate percent of thread.

**TAPPING SPEEDS:** TRU-FLO taps operate most efficiently at spindle speeds 1-1/2 to 2 times faster than those recommended for conventional cutting taps, especially



in softer materials and/or with fine pitch TRU-FLO taps. As higher speeds are attained, adequate lubrication is essential for prolonged tap life and thread quality.

**LUBRICATION:** Since it is more important to 'lubricate' the cold-forming tap than to 'cool' the tap, TRU-FLO taps should be used with conventional lubricating cutting oils or EP (extreme pressure) rated oil...soluble oils and similar coolants are not recommended.

**PRE-TAPPED HOLE SIZE:** TRU-FLO cold forming taps require a larger pre-tapped hole size than conventional cutting taps. To insure a properly tapped (cold formed) hole, adhere to the following:

### FORMULA FOR TAP/DRILL SIZES FOR DECIMAL/INCH TRU-FLO TAPS:

$$\text{HOLE SIZE} = \text{Basic Tap O.D.} - \left( \frac{.0068 \times \% \text{ of Thread}^*}{\text{Threads per Inch}} \right)$$

**For example:**

To determine drill size for a 1/4-20 thread forming tap at 65% of thread: .250 -

$$\left( \frac{.0068 \times 65}{20} \right) = .2279$$

### FORMULA FOR TAP/DRILL SIZES FOR METRIC TRU-FLO TAPS:

$$\text{HOLE SIZE (mm)} = \text{Basic Tap O.D.(mm)} - \left( \frac{\% \text{ of Thread} \times \text{mm Pitch}}{147.06} \right)$$

\* Use whole number for % of thread...for 65%, use 65 (not .65).

There is no true method of predicting percent of thread that will be obtained when tapping with forming taps due to the many variables involved. As a starting point, however, 55% for maximum drill size and 75% for minimum drill size can be used as a guide. Any desired percent of thread can be approximated by using drill sizes in between. To determine theoretical maximum and minimum drill sizes (for average operating conditions), see formulas below.

#### FOR UNIFIED INCH THREADS:

**Max. Drill Size** = Basic Major Diameter -  $\frac{3}{8N}$

**Min. Drill Size** = Basic Major Diameter -  $\frac{1}{2N}$

-N = T.P.I. (Threads per Inch)

#### FOR 60° METRIC THREADS:

**Max. Drill Size** = Basic Major Diameter - 0.375P

**Min. Drill Size** = Basic Major Diameter - 0.5P  
P = Pitch

Note: For Basic Major Diameter and Pitch, use millimeter value to obtain drill size in mm. To convert mm to inch value, divide by 25.4:  
 $\frac{\text{mm Value}}{25.4} = \text{Inch Value}$

TAP SIZE		CUTTING TAPS		TRU-FLO™ FORMING TAPS	
INCH	METRIC	DRILL SIZE	DECIMAL EQUIVALENT	DRILL SIZE	DECIMAL EQUIVALENT
0-80		3/64	.0469	54	.0550
	M1.6 X 0.35	1.25mm	.0492	1.45mm	.0571
	M1.8 X 0.35	1.45mm	.0571	1.65mm	.0650
1-64		53	.0595	51	.0650
1-72		53	.0595	51	.0650
	M2 X 0.40	1.60mm	.0630	1.80mm	.0709
2-56		50	.0700	5/64	.0781
2-64		50	.0700	47	.0785
	M2.2 X 0.45	1.75mm	.0689	2.00mm	.0787
	M2.5 X 0.45	2.05mm	.0807	2.30mm	.0906
3-48		47	.0785	43	.0890
3-56		46	.0810	2.30mm	.0905
4-40		43	.0890	38	.1015
4-48		42	.0935	2.60mm	.1024
	M3 X 0.50	2.50mm	.0984	7/64	.1094
5-40		38	.1015	33	.1130
5-44		37	.1040	2.90mm	.1142
	M3.5 X 0.60	2.90mm	.1142	3.20mm	.1260
6-32		36	.1065	1/8	.1250
6-40		33	.1130	3.25mm	.1280
	M4 X 0.70	3.30mm	.1299	3.70mm	.1457
8-32		29	.1360	25	.1495
8-36		29	.1360	24	.1520
	M4.5 X 0.75	3.70mm	.1476	4.10mm	.1614
10-24		26	.1470	11/64	.1719
10-32		21	.1590	16	.1770
	M5 X 0.80	4.20mm	.1654	14	.1820
12-24		16	.1770	5mm	.1969
12-28		15	.1800	7	.2010
	M6 X 1.00	5.00mm	.1969	7/32	.2188
1/4-20		7	.2010	1	.2280
1/4-28		3	.2130	15/64	.2340
	M7 X 1.00	6.00mm	.2362	F	.2570
5/16-18		F	.2570	L	.2900
5/16-24		I	.2720	M	.2950
	M8 X 1.25	6.70mm	.2638	7.40mm	.2913
	M8 X 1.0	7.00mm	.2756	19/64	.2969
3/8-16		5/16	.3125	S	.3480
3/8-24		Q	.3320	T	.3580
	M10 X 1.50	8.50mm	.3346	U	.3680
	M10 X 1.25	8.70mm	.3425	9.40mm	.3701
7/16-14		U	.3680	Y	.4040
7/16-20		25/64	.3906	Z	.4130
	M12 X 1.75	10.20mm	.4016	11.20mm	.4409
	M12 X 1.25	10.80mm	.4252	11.50mm	.4528
1/2-13		27/64	.4219	15/32	.4682
1/2-20		29/64	.4531	12.25mm	.4823
	M14 X 2.00	12.00mm	.4224	33/64	.5156
9/16-12		31/64	.4844	17/32	.5312
9/16-18		33/64	.5156	13.50mm	.5315
5/8-11		17/32	.5312	14.75mm	.5807
5/8-18		37/64	.5781	15.25mm	.6004
	M16 X 2.00	14.00mm	.5512	19/32	.5938
	M16 X 1.50	14.50mm	.5906	15.25mm	.6004
	M18 X 2.50	15.50mm	.6102	39/64	.6094
	M18 X 1.50	16.50mm	.6496	17.25mm	.6791

Drill sizes given are the 'closest' drill size.

TAP SIZE		CUTTING TAPS		TRU-FLO™ FORMING TAPS	
INCH	METRIC	DRILL SIZE	DECIMAL EQUIVALENT	DRILL SIZE	DECIMAL EQUIVALENT
3/4-10		21/32	.6562	45/64	.7031
3/4-16		11/16	.6875	23/32	.7188
	M20 X 2.50	17.50mm	.6890		
	M20 X 1.50	18.50mm	.7283		
	M22 X 2.50	19.50mm	.7677		
	M22 X 1.50	20.50mm	.8071		
7/8-9		49/64	.7656		
7/8-14		13/16	.8125		
	M24 X 3.00	21.00mm	.8268		
	M24 X 2.00	22.00mm	.8661		
1-8		7/8	.8750		
1-12		59/64	.9219		
	M27 X 3.00	24.00mm	.9449		
	M27 X 2.00	25.00mm	.9843		
1-1/8-7		63/64	.9844		
1-1/8-12		1-3/64	1.0469		
	M30 X 3.50	26.50mm	1.0433		
	M30 X 2.00	28.00mm	1.1024		
1-1/4-7		1-7/64	1.1094		
1-1/4-12		1-11/64	1.1719		
	M33 X 3.50	29.50mm	1.1614		
	M33 X 2.00	31.00mm	1.2205		
1-3/8-6		1-7/32	1.2188		
1-3/8-12		1-19/64	1.2969		
	M36 X 4.00	32.00mm	1.2598		
	M36 X 3.00	33.00mm	1.2992		
1-1/2-6		1-11/32	1.3438		
1-1/2-12		1-27/64	1.4219		
	M39 X 4.00	35.00mm	1.3780		
	M39 X 3.00	36.00mm	1.4173		

### PIPE THREAD DRILLED HOLE SIZES

NOMINAL SIZE	NPT	NPTF	NPSC	NPSM	NPSF	NPSI	BSPT	BSPP
1/16 - 27	D (0.246)	D (0.246)	.250		.250	.250		
1/8 - 27	Q (0.332)	Q (0.332)	.3437	.3593	.3437	.3437		
1/8 - 28							.3281	.3437
1/4 - 18	.4375	.4375	.4375	.4687	.4375	.4375		
1/4 - 19							.4375	.4531
3/8 - 18	.5625	.5781	.5781	.6093	.5781	.5781		
3/8 - 19							.5781	.5937
1/2 - 14	.7031	.7031	.7187	.750	.7187	.7187	.7187	.7343
5/8 - 14								.8125
3/4 - 14	.9062	.9218	.9218	.9646			.9380	.9650
7/8 - 14								1.1093
1 - 11							1.1718	1.1875
1 - 11-1/2	1.1406	1.1562	1.1562	1.2031				
1-1/4 - 11							1.500	1.5468
1-1/4 - 11-1/2	1.4843	1.500	1.500	1.5468				
1-1/2 - 11							1.750	1.7656
1-1/2 - 11-1/2	1.7343	1.7343	1.750	1.7913				
1-3/4 - 11								2.000
2 - 11							2.2187	2.250
2 - 11-1/2	2.2031	2.2187	2.2187	2.2638				

Drill sizes given are the 'closest' drill size.

### FORMULA FOR TAP/DRILL SIZES (INCH)

#### METHOD 1:

$$\text{Drilled Hole Size (in.)} = \text{Basic Major Dia. Of Thread (in.)} - \frac{.013 \times \% \text{ of Full Thread}^*}{\# \text{ of Threads per Inch (T.P.I.)}$$

\*Use whole numbers for % of thread...for 65% (not .65).

#### METHOD 2:

$$\text{Nominal O.D. - (Dbl. Thread Depth X \% of Full Thread)} = \text{Drilled Hole Size}$$

EXAMPLE: To find the hole size for obtaining 75% of thread in a 1/4-20 tapped hole, follow first column down to 20 threads, then across to 75% of thread. This figure (.0485), when subtracted from the .250 diameter, is .2015, which is the required diameter of hole. See equation: .250 - .0485 = .2015

To figure whether or not pitch is too coarse for diameter: (Double thread depth) X 3 = x  
x = the smallest diameter possible for that T.P.I.

THREADS PER INCH	DOUBLE THREAD DEPTH	50% THREAD	55% THREAD	60% THREAD	RECOMMENDED RANGE			80% THREAD	85% THREAD
					65% THREAD	70% THREAD	75% THREAD		
6	.21651	.1083	.1192	.1300	.1408	.1517	.1625	.1733	.1842
7	.18558	.0929	.1021	.1114	.1207	.1300	.1393	.1486	.1579
8	.16238	.0813	.0894	.0975	.1056	.1138	.1219	.1300	.1381
9	.14434	.0722	.0794	.0866	.0939	.1011	.1083	.1156	.1228
10	.12990	.0649	.0714	.0779	.0844	.0909	.0974	.1039	.1105
11	.11809	.0590	.0649	.0708	.0767	.0826	.0885	.0944	.1005
12	.10825	.0541	.0595	.0649	.0702	.0755	.0808	.0861	.0921
13	.09992	.0499	.0549	.0599	.0649	.0699	.0749	.0799	.0850
14	.09278	.0464	.0510	.0556	.0602	.0648	.0694	.0740	.0789
16	.08119	.0406	.0446	.0486	.0526	.0566	.0606	.0646	.0691
18	.07217	.0361	.0396	.0431	.0466	.0501	.0536	.0571	.0614
20	.06495	.0325	.0357	.0389	.0421	.0453	.0485	.0517	.0553
24	.05412	.0270	.0298	.0326	.0354	.0382	.0410	.0438	.0460
27	.04811	.0240	.0264	.0288	.0312	.0336	.0360	.0384	.0409
28	.04639	.0232	.0254	.0276	.0298	.0324	.0347	.0370	.0395
30	.04330	.0216	.0238	.0260	.0282	.0304	.0326	.0348	.0368
32	.04059	.0203	.0223	.0243	.0263	.0283	.0303	.0323	.0345
36	.03608	.0180	.0198	.0216	.0234	.0252	.0270	.0288	.0307
40	.03247	.0162	.0178	.0194	.0210	.0226	.0242	.0258	.0276
44	.02952	.0147	.0162	.0177	.0192	.0207	.0222	.0237	.0251
48	.02706	.0135	.0148	.0161	.0174	.0187	.0200	.0213	.0230
56	.02319	.0116	.0127	.0138	.0149	.0160	.0171	.0182	.0197
64	.02029	.0101	.0111	.0121	.0131	.0141	.0151	.0161	.0173
72	.01804	.0090	.0099	.0107	.0115	.0123	.0131	.0139	.0153
80	.01623	.0081	.0089	.0097	.0105	.0113	.0121	.0129	.0138

Figures in table show amount to subtract from O.D. of screw to obtain specific percentages of thread. Select nearest size commercial stock drill.

### FORMULA FOR TAP/DRILL SIZES (METRIC)

#### METHOD 1:

$$\text{Drilled Hole Size (mm)} = \text{Basic Major Dia. Of Thread (mm)} - \frac{\% \text{ of Full Thread} \times \text{mm Pitch}}{76.98}$$

\*Use whole numbers for % of thread...for 65%, use 65 (not .65).

#### METHOD 2:

$$\text{Nominal O.D.} - (\text{Dbl. Thread Depth} \times \% \text{ of Full Thread}) = \text{Drilled Hole Size}$$

EXAMPLE: To find the hole size for obtaining 75% of thread in a (M6) 6mm x 1.00 tapped hole, follow first column down to 1.00 threads, then across to 75% of thread. This figure (.9743), when subtracted from 6mm diameter, is 5.0257, which is the required diameter of hole. See equation:  $M6 - (1.2990 \times 75) = (6 - .9743) = 5.0257\text{mm}$

To figure whether or not pitch is too coarse for diameter: (Double thread depth) X 3 = x  
x = the smallest diameter possible for that T.P.I.

MM PITCH	DOUBLE THREAD DEPTH	50% THREAD	55% THREAD	60% THREAD	RECOMMENDED RANGE		75% THREAD	80% THREAD	85% THREAD
					65% THREAD	70% THREAD			
4.0	5.1963	2.5982	2.8580	3.1178	3.3776	3.6374	3.8972	4.1570	4.4169
3.50	4.5466	2.2733	2.5006	2.7280	2.9553	3.1826	3.4100	3.6373	3.8646
3.00	3.8969	1.9485	2.1433	2.3381	2.5330	2.7278	2.9227	3.1175	3.3124
2.50	3.2476	1.6238	1.7862	1.9486	2.1109	2.2733	2.4357	2.5981	2.7605
2.00	2.5979	1.2990	1.4288	1.5587	1.6886	1.8185	1.9484	2.0783	2.2082
1.75	2.2733	1.1367	1.2503	1.3640	1.4776	1.5913	1.7050	1.8186	1.9323
1.50	1.9487	.9744	1.0718	1.1692	1.2667	1.3641	1.4615	1.5590	1.6564
1.25	1.6236	.8118	.8930	.9742	1.0553	1.1365	1.2177	1.2989	1.3801
1.00	1.2990	.6495	.7145	.7794	.8444	.9093	.9743	1.0392	1.1042
.90	1.1687	.5844	.6428	.7012	.7597	.8181	.8765	.9350	.9934
.80	1.0394	.5197	.5717	.6236	.6756	.7276	.7796	.8315	.8835
.75	.9743	.4871	.5359	.5846	.6333	.6820	.7307	.7794	.8282
.70	.9093	.4547	.5001	.5456	.5910	.6365	.6820	.7274	.7729
.60	.7793	.3897	.4286	.4676	.5065	.5455	.5845	.6234	.6624
.50	.6421	.3211	.3532	.3853	.4174	.4495	.4816	.5137	.5458
.45	.5847	.2924	.3216	.3508	.3801	.4093	.4385	.4678	.4970
.40	.5197	.2599	.2858	.3118	.3378	.3638	.3898	.4158	.4417
.35	.4547	.2274	.2501	.2728	.2956	.3183	.3410	.3638	.3865
.30	.3896	.1948	.2143	.2338	.2532	.2727	.2922	.3117	.3312
.25	.3246	.1663	.1785	.1948	.2110	.2272	.2434	.2597	.2759

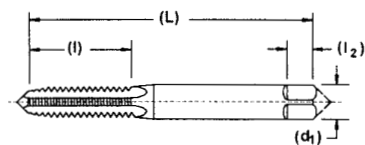
Figures in table show amount to subtract from O.D. of screw to obtain specific percentages of thread. Select nearest size commercial stock drill.

INTRO  
MILLING  
SPECIALTY  
HOLEMAKING  
THREADING  
INSERTS

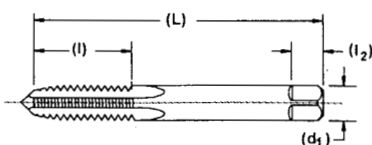


### STANDARD TAP DIMENSIONS • GROUND THREAD (REF. USCTI TABLE 302)

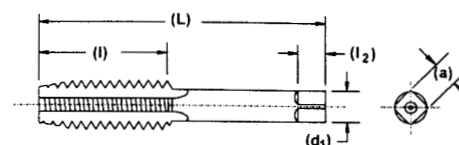
#### GENERAL DIMENSIONS



BLANK DESIGN 1



BLANK DESIGN 2



BLANK DESIGN 3

NOMINAL DIAMETER RANGE - INCHES		MACHINE SCREW SIZE NO.	NOMINAL FRACTIONAL DIAMETER INCHES	NOMINAL METRIC DIAMETER MILLIMETERS, (INCHES)	BLANK DESIGN NO.	TAP DIMENSIONS - INCHES				
OVER	TO (INC.)					OVERALL LENGTH L	THREAD LENGTH l	SQUARE LENGTH l <sub>2</sub>	SHANK DIAMETER d <sub>1</sub>	SIZE OF SQUARE a
.052	.065	0 (.0600)		M1.6 (.0630)	1	1.63	.31	.19	.1410	.110
.065	.078	1 (.0730)		M1.8 (.0709)	1	1.69	.38	.19	.1410	.110
.078	.091	2 (.0860)		M2 (.0787), M2.2 (.0866)	1	1.75	.44	.19	.1410	.110
.091	.104	3 (.0990)		M2.5 (.0984)	1	1.81	.50	.19	.1410	.110
.104	.117	4 (.1120)			1	1.88	.56	.19	.1410	.110
.117	.130	5 (.1250)		M3 (.1181)	1	1.94	.63	.19	.1410	.110
.130	.145	6 (.1380)		M3.5 (.1378)	1	2.00	.69	.19	.1410	.110
.145	.171	8 (.1640)		M4 (.1575)	1	2.13	.75	.25	.1680	.131
.171	.197	10 (.1900)		M4.5 (.1772), M5 (.1969)	1	2.38	.88	.25	.1940	.152
.197	.223	12 (.2160)			1	2.38	.94	.28	.2200	.165
.223	.260		1/4 (.2500)	M6 (.2362)	2	2.50	1.00	.31	.2550	.191
.260	.323		5/16 (.3125)	M7 (.2756), M8 (.3150)	2	2.72	1.13	.38	.3180	.238
.323	.395		3/8 (.3750)	M10 (.3937)	2	2.94	1.25	.44	.3810	.286
.395	.448		7/16 (.4375)		3	3.16	1.44	.41	.3230	.242
.448	.510		1/2 (.5000)	M12 (.4724)	3	3.38	1.66	.44	.3670	.275
.510	.573		9/16 (.5625)	M14 (.5512)	3	3.59	1.66	.50	.4290	.322
.573	.635		5/8 (.6250)	M16 (.6299)	3	3.81	1.81	.56	.4800	.360
.635	.709		11/16 (.6875)	M18 (.7087)	3	4.03	1.81	.63	.5420	.406
.709	.760		3/4 (.7500)		3	4.25	2.00	.69	.5900	.442
.760	.823		13/16 (.8125)	M20 (.7874)	3	4.47	2.00	.69	.6520	.489
.823	.885		7/8 (.8750)	M22 (.8661)	3	4.69	2.22	.75	.6970	.523
.885	.948		15/16 (.9375)	M24 (.9449)	3	4.91	2.22	.75	.7600	.570
.948	1.010		1 (1.0000)	M25 (.9843)	3	5.13	2.50	.81	.8000	.600
1.010	1.073		1 - 1/16 (1.0625)	M27 (1.0630)	3	5.13	2.50	.88	.8960	.672
1.073	1.135		1 - 1/8 (1.1250)		3	5.44	2.56	.88	.8960	.672
1.135	1.198		1 - 3/16 (1.1875)	M30 (1.1811)	3	5.44	2.56	1.00	1.0210	.766
1.198	1.260		1 - 1/4 (1.2500)		3	5.75	2.56	1.00	1.0210	.766
1.260	1.323		1 - 5/16 (1.3125)	M33 (1.2992)	3	5.75	2.56	1.06	1.1080	.831
1.323	1.385		1 - 3/8 (1.3750)		3	6.06	3.00	1.06	1.1080	.831
1.385	1.448		1 - 7/16 (1.4375)	M36 (1.4173)	3	6.06	3.00	1.13	1.2330	.925
1.448	1.510		1 - 1/2 (1.5000)		3	6.38	3.00	1.13	1.2330	.925
1.510	1.635		1 - 5/8 (1.6250)	M39 (1.5354)	3	6.69	3.19	1.13	1.3050	.979
1.635	1.760		1 - 3/4 (1.7500)	M42 (1.6535)	3	7.00	3.19	1.25	1.4300	1.072
1.760	1.885		1 - 7/8 (1.8750)		3	7.31	3.56	1.25	1.5190	1.139
1.885	2.010		2 (2.0000)	M48 (1.8898)	3	7.63	3.56	1.38	1.6440	1.233

cont.

### STANDARD TAP DIMENSIONS • GROUND THREAD (REF. USCTI TABLE 302) CONT.

#### GENERAL DIMENSIONS

NOMINAL DIAMETER RANGE - INCHES		MACHINE SCREW SIZE NO.	NOMINAL FRACTIONAL DIAMETER INCHES	NOMINAL METRIC DIAMETER MILLIMETERS, (INCHES)	BLANK DESIGN NO.	TAP DIMENSIONS - INCHES				
OVER	TO (INC.)					OVERALL LENGTH L	THREAD LENGTH l	SQUARE LENGTH l <sub>2</sub>	SHANK DIAMETER d <sub>1</sub>	SIZE OF SQUARE a
2.010	2.135		2 1/8 (2.1250)		3	8.00	3.56	1.38	1.7690	1.327
2.135	2.260		2 1/4 (2.2500)	M56 (2.2047)	3	8.25	3.56	1.44	1.8940	1.420
2.260	2.385		2 3/8 (2.3750)		3	8.50	4.00	1.44	2.0190	1.514
2.385	2.510		2 1/2 (2.5000)		3	8.75	4.00	1.50	2.1000	1.575
2.510	2.635		2 5/8 (2.6250)	M64 (2.5197)	3	8.75	4.00	1.50	2.2250	1.669
2.635	2.760		2 3/4 (2.7500)		3	9.25	4.00	1.56	2.3500	1.762
2.760	2.885		2 7/8 (2.8750)	M72 (2.8346)	3	9.25	4.00	1.56	2.4750	1.856
2.885	3.010		3 (3.0000)		3	9.75	4.56	1.63	2.5430	1.907
3.010	3.135		3 1/8 (3.1250)		3	9.75	4.56	1.63	2.6680	2.001
3.135	3.260		3 1/4 (3.2500)	M80 (3.1496)	3	10.00	4.56	1.75	2.7930	2.095
3.260	3.385		3 3/8 (3.3750)		3	10.00	4.56	1.75	2.8830	2.162
3.385	3.510		3 1/2 (3.5000)		3	10.25	4.94	2.00	3.0080	2.256
3.510	3.635		3 5/8 (3.6250)	M90 (3.5433)	3	10.25	4.94	2.00	3.1330	2.350
3.635	3.760		3 3/4 (3.7500)		3	10.50	5.31	2.13	3.2170	2.413
3.760	3.885		3 7/8 (3.8750)		3	10.50	5.31	2.13	3.3420	2.506
3.885	4.010		4 (4.0000)	M100 (3.9370)	3	10.75	5.31	2.25	3.4670	2.600

#### SPECIAL TAPS

Unless otherwise specified:

Special taps over 1.010" to 1.510" diameter inclusive, having 14 or more threads per inch or 1.75 millimeter pitch and finer, and sizes over 1.510" diameter with 10 or more threads per inch or 2.5 millimeter pitch and finer, are made to general dimensions shown in Table 303.

Special tap thread limits are determined by using the formulas shown in Table 331 for Unified Inch Screw Threads and Table 341 for Metric M-Profile Screw Threads.

#### NOTES

Tap sizes .395" and smaller have an external center on the threadend (may be removed on bottoming taps). Sizes .223" and smaller have an external center on the shank end. Sizes .224" thru .395" have truncated partial cone centers on the shank end (length of cone approx. 1/4 of diameter of shank). Sizes over .395" have internal centers on both the thread and shank ends.

For standard thread limits and tolerances for Unified Inch Screw Threads see table 327 and for Metric Threads see Table 337.

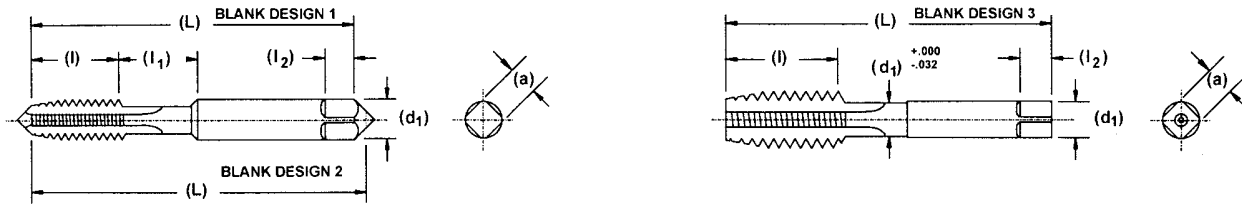
For eccentricity tolerances of tap elements see Table 317.

#### TOLERANCES

ELEMENT	NOMINAL DIAMETER RANGE IN INCHES		DIRECTION	TOLERANCE (INCHES)
	OVER	TO (INC.)		
Length Overall - L	.0520	1.0100	Plus or Minus	.031
	1.0100	4.0100	Plus or Minus	.063
Length of Thread - l	.0520	.2230	Plus or Minus	.047
	.2230	.5100	Plus or Minus	.063
	.5100	1.5100	Plus or Minus	.094
	1.5100	4.0100	Plus or Minus	.125
Length of square - l <sub>2</sub>	.0520	1.0100	Plus or Minus	.031
	1.0100	4.0100	Plus or Minus	.063
Diameter of shank - d <sub>1</sub>	.0520	.2230	Minus	.0015
	.2230	.6350	Minus	.0015
	.6350	1.0100	Minus	.0020
	1.0100	1.5100	Minus	.0020
Size of square - a	1.5100	2.0100	Minus	.0030
	2.0100	4.0100	Minus	.0030
	.0520	.5100	Minus	.004
	.5100	1.0100	Minus	.006
	1.0100	2.0100	Minus	.008
	2.0100	4.0100	Minus	.010

### OPTIONAL NECK AND OPTIONAL SHORTENED THREAD LENGTH TAP DIMENSIONS, GROUND THREAD (REF. USCTI TABLE 302-A)

#### GENERAL DIMENSIONS



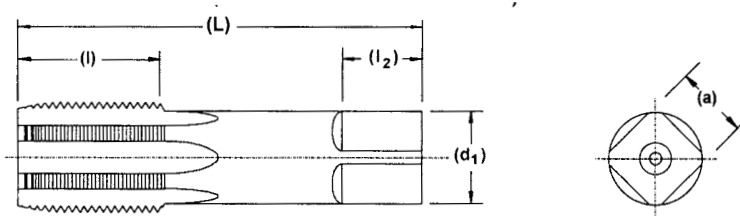
NOMINAL DIAMETER RANGE - INCHES		MACHINE SCREW SIZE NO.	NOMINAL FRACTIONAL DIAMETER INCHES	NOMINAL METRIC DIAMETER MILLIMETERS, (INCHES)	BLANK DESIGN NO.	TAP DIMENSIONS - INCHES					
						OVERALL LENGTH L	THREAD LENGTH l	NECK LENGTH l <sub>1</sub>	SQUARE LENGTH l <sub>2</sub>	SHANK DIAMETER d <sub>1</sub>	SIZE OF SQUARE a
.104	.117	4 (.1120)			1	1.88	.31	.25	.19	.1410	.110
.117	.130	5 (.1250)		M3 (.1181)	1	1.94	.31	.31	.19	.1410	.110
.130	.145	6 (.1380)		M3.5 (.1378)	1	2.00	.38	.31	.19	.1410	.110
.145	.171	8 (.1640)		M4 (.1575)	1	2.13	.38	.38	.25	.1680	.131
.171	.197	10 (.1900)		M4.5 (.1772), M5 (.1969)	1	2.38	.50	.38	.25	.1940	.152
.197	.223	12 (.2160)			1	2.38	.50	.44	.28	.2200	.165
.223	.260		1/4 (.2500)	M6 (.2362)	2	2.50	.63	.38	.31	.2550	.191
.260	.323		5/16 (.3125)	M7 (.2756), M8 (.3150)	2	2.72	.69	.44	.38	.3180	.238
.323	.395		3/8 (.3750)	M10 (.3937)	2	2.94	.75	.50	.44	.3810	.286
.395	.448		7/16 (.4375)		3	3.16	.88	-	.41	.3230	.242
.448	.510		1/2 (.5000)	M12 (.4724)	3	3.38	.94	-	.44	.3670	.275
.510	.573		9/16 (.5625)	M14 (.5512)	3	3.59	1.00	-	.50	.4290	.322
.573	.635		5/8 (.6250)	M16 (.6299)	3	3.81	1.09	-	.56	.4800	.360
.635	.709		11/16 (.6875)	M18 (.7087)	3	4.03	1.09	-	.63	.5420	.406
.709	.760		3/4 (.7500)		3	4.25	1.22	-	.69	.5900	.442
.760	.823		13/16 (.8125)	M20 (.7874)	3	4.47	1.22	-	.69	.6520	.489
.823	.885		7/8 (.8750)	M22 (.8661)	3	4.69	1.34	-	.75	.6970	.523
.885	.948		15/16 (.9375)	M24 (.9449)	3	4.91	1.34	-	.75	.7600	.570
.948	1.010		1 (1.0000)	M25 (.9843)	3	5.13	1.50	-	.81	.8000	.600

#### NOTES

1. Thread Length "l" is based on a length of 12 pitches of the UNC thread series.
2. Thread Length "l" is a minimum value and has no tolerance.
3. When Thread Length "l" is added to Neck Length "l<sub>1</sub>" the total shall be no less than the minimum Table 302 Thread Length "l".
4. Unless otherwise specified, all tolerances are in accordance with Table 302.
5. For eccentricity tolerances, see Table 317.

### SPECIAL FINE PITCH TAPS, SHORT SERIES, GROUND THREAD (REF. USCTI TABLE 303)

#### GENERAL DIMENSIONS



Unless otherwise specified, special taps 1.010" to 1.510" diameter inclusive, having 14 or more threads per inch or 1.75 millimeter pitch and finer, and sizes over 1.510" diameter with 10 or more threads per inch, or 2.5 millimeter pitch and finer, will be made to the general dimensions shown below:

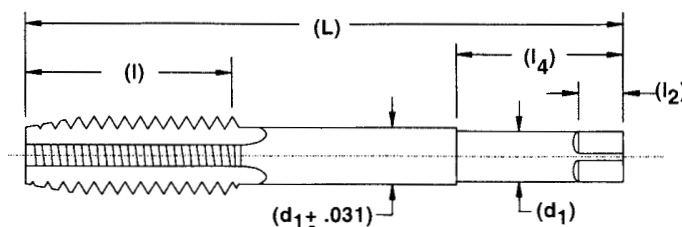
NOMINAL DIAMETER RANGE - INCHES		NOMINAL FRACTIONAL DIAMETER INCHES	NOMINAL METRIC DIAMETER MILLIMETERS	TAP DIMENSIONS - INCHES				
OVER	TO (INCL.)			OVERALL LENGTH L	THREAD LENGTH l	SQUARE LENGTH l <sub>2</sub>	SHANK DIAMETER d <sub>1</sub>	SIZE OF SQUARE a
1.010	1.073	1 1/16	M27	4.00	1.50	.88	.8960	.672
1.073	1.135	1 1/8		4.00	1.50	.88	.8960	.672
1.135	1.198	1 3/16	M30	4.00	1.50	1.00	1.0210	.766
1.198	1.260	1 1/4		4.00	1.50	1.00	1.0210	.766
1.260	1.323	1 5/16	M33	4.00	1.50	1.00	1.1080	.831
1.323	1.385	1 3/8		4.00	1.50	1.00	1.1080	.831
1.385	1.448	1 7/16	M36	4.00	1.50	1.00	1.2330	.925
1.448	1.510	1 1/2		4.00	1.50	1.00	1.2330	.925
1.510	1.635	1 5/8	M39	5.00	2.00	1.13	1.3050	.979
1.635	1.760	1 3/4	M42	5.00	2.00	1.25	1.4300	1.072
1.760	1.885	1 7/8		5.00	2.00	1.25	1.5190	1.139
1.885	2.010	2	M48	5.00	2.00	1.38	1.6440	1.233
2.010	2.135	2 1/8		5.25	2.00	1.38	1.7690	1.327
2.135	2.260	2 1/4	M56	5.25	2.00	1.44	1.8940	1.420
2.260	2.385	2 3/8		5.25	2.00	1.44	2.0190	1.514
2.385	2.510	2 1/2		5.25	2.00	1.50	2.1000	1.575
2.510	2.635	2 5/8	M64	5.50	2.00	1.50	2.1000	1.575
2.635	2.760	2 3/4		5.50	2.00	1.50	2.1000	1.575
2.760	2.885	2 7/8	M72	5.50	2.00	1.50	2.1000	1.575
2.885	3.010	3		5.50	2.00	1.50	2.1000	1.575
3.010	3.135	3 1/8		5.75	2.00	1.50	2.1000	1.575
3.135	3.260	3 1/4	M80	5.75	2.00	1.50	2.1000	1.575
3.260	3.385	3 3/8		5.75	2.00	1.50	2.1000	1.575
3.385	3.510	3 1/2		5.75	2.00	1.50	2.1000	1.575
3.510	3.635	3 5/8	M90	6.00	2.00	1.75	2.1000	1.575
3.635	3.760	3 3/4		6.00	2.00	1.75	2.1000	1.575
3.760	3.885	3 7/8		6.00	2.00	1.75	2.1000	1.575
3.885	4.010	4	M100	6.00	2.00	1.75	2.1000	1.575

#### NOTES

For tolerances see Table 302.

For standard thread limits and tolerances for Unified Inch Screw Threads see Table 327A. For standard thread limits and tolerances for Metric Threads see Tables 337 and 341. For eccentricity tolerances of tap elements see Table 317.

**SPECIAL EXTENSION TAPS, GROUND THREAD (REF. USCTI TABLE 303-A)**



Unless otherwise specified, special extension taps will be furnished with dimensions and tolerances as shown for Machine Screw and Fractional taps in Tables 302 and 303, and for Pipe taps in Table 311.

**Exceptions:**

1. Types of centers are optional with manufacturer.
2. Tolerances on shank diameter  $d_1$  for  $l_4$  length as shown in the following table.
3. Shank eccentricity tolerance in Table 317 applies only to the  $l_4$  length shown in the following table.
4. Length of Close Tolerance Shank, ( $L_4$ ) is minimum.

NOMINAL TAP SIZE		l THREAD LENGTH	d <sub>1</sub> SHANK DIAMETER	l <sub>2</sub> SQUARE LENGTH	SQUARE SIZE	l <sub>4</sub> GROUND SHANK LENGTH
FRACTIONAL	MACHINE SCREW					
	6	0.69	0.1410	0.19	.110	1.13
	8	0.75	0.1680	0.25	.131	1.25
	10 - 12	0.88	0.1940	0.25	.152	1.38
1/4	14	1.00	0.2550	0.31	.191	1.50
1/4*		1.00	0.1850	0.25	.138	Full Length
5/16		1.13	0.3180	0.38	.238	1.56
5/16*		1.13	0.2400	0.28	.180	Full Length
3/8		1.25	0.3810	0.44	.286	1.63
3/8*		1.25	0.2750	0.38	.206	Full Length
7/16		1.44	0.3230	0.41	.242	1.69
1/2		1.66	0.3670	0.44	.275	1.69
9/16		1.66	0.4290	0.50	.322	1.88
5/8		1.81	0.4800	0.56	.360	2.00
3/4		2.00	0.5900	0.69	.442	2.25
7/8		2.22	0.6970	0.75	.523	2.50
1"		2.50	0.8000	0.81	.600	2.63
1-1/8		2.56	0.8960	0.88	.672	2.75
1-1/4		2.56	1.0210	1.00	.766	2.88
1-3/8		3.00	1.1080	1.06	.831	3.00
1-1/2		3.00	1.2330	1.13	.925	3.00

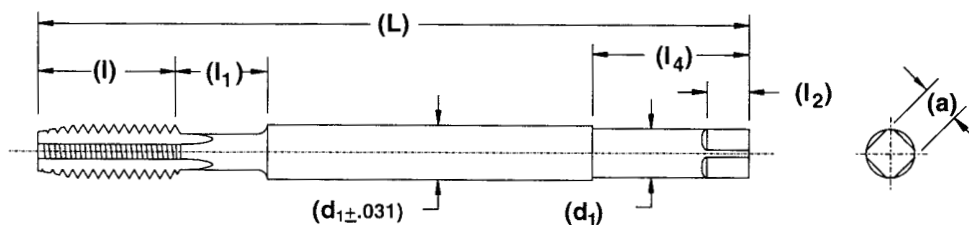
\* Small Shank

**TOLERANCES FOR SHANK DIAMETER,  $d_1$  AND  $l_4$  LENGTH**

SIZE RANGE		DIRECTION	TOLERANCES
FRACTIONAL	MACHINE SCREW		
1/4 to 5/8 incl.	0 - 14 incl.	Minus	.003
11/16 to 1-1/2 incl.		Minus	.004

### PULLEY TAP DIMENSIONS • GROUND THREAD (REF. USCTI TABLE 310)

#### GENERAL DIMENSIONS



NOMINAL FRACTION DIAMETER INCHES	TAP DIMENSIONS - INCHES						
	OVERALL LENGTH $L$	THREAD LENGTH $l$	NECK LENGTH $l_1$	SQUARE LENGTH $l_2$	LENGTH OF SHANK CLOSE TOL. SECTION $l_4$	SHANK DIAMETER $d_1$	SIZE OF SQUARE $a$
1/4 (.2500)	6,8	1.00	.38	.31	1.50	.2550	.191
5/16 (.3125)	6,8	1.13	.38	.38	1.56	.3180	.238
3/8 (.3750)	6,8,10	1.25	.38	.44	1.63	.3810	.286
7/16 (.4375)	6,8	1.44	.44	.50	1.69	.4440	.333
1/2 (.5000)	6,8,10,12	1.66	.50	.56	1.69	.5070	.380
5/8 (.6250)	6,8,10,12	1.81	.63	.69	2.00	.6330	.475
3/4 (.7500)	10,12	2.00	.75	.75	2.25	.7590	.569

#### TOLERANCES

ELEMENT	SIZE RANGE	DIRECTION	TOLERANCE
Overall Length - $L$	1/4 to 3/4 included	Plus or Minus	.063
Thread Length - $l$	1/4 to 3/4 included	Plus or Minus	.063
Neck Length - $l_1$	1/4 to 3/4 included	See Note - 1	See Note - 1
Square Length - $l_2$	1/4 to 3/4 included	Plus or Minus	.031
Length of Shank (close tol.) $l_4$	1/4 to 3/4 included	See Note - 2	See Note - 2
Size of Diameter - $d_1$	1/4 to 3/4 included	Minus	.0050
Size of Square - $a$	1/4 to 1/2 included	Minus	.004
	5/8 to 3/4 included	Minus	.006

#### NOTES

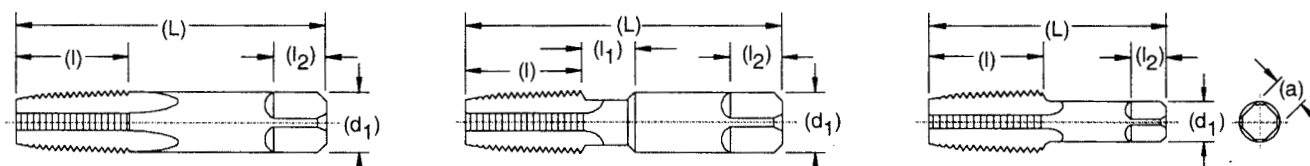
1.  $l_1$ , (Neck Length); neck and its length is optional with manufacturer.
2.  $l_4$ , (Length of Close Tolerance Shank) is minimum length which is held to eccentricity tolerances per Table 317.

#### GENERAL NOTES

- a. These taps have an internal center in the thread end.
- b. These taps are made to the H3 limits shown in Table 327.
- c. For eccentricity tolerances of taps elements see Table 317.
- d.  $d_1$ , (Shank diameter) is approximately the same as the maximum major diameter for that size.
- e.  $a$ , (Size of Square) is equal to  $.75 \times d_1$  to the nearest .001 inch.

### STANDARD PIPE TAP DIMENSIONS • STRAIGHT AND TAPER, GROUND THREAD (REF. USCTI TABLE 311)

#### GENERAL DIMENSIONS



NOMINAL SIZE INCHES	LENGTH OVERALL L	LENGTH OF THREAD l	LENGTH OF SQUARE l <sub>2</sub>	DIA. OF SHANK d <sub>1</sub>	SIZE OF SQUARE a	LENGTH OPTIONAL NECK l <sub>1</sub>
1/16	2.13	.69	.38	.3125	.234	.375
1/8*	2.13	.75	.38	.3125	.234	...
1/8	2.13	.75	.38	.4375	.328	.375
1/4	2.44	1.06	.44	.5625	.421	.375
3/8	2.56	1.06	.50	.7000	.531	.375
1/2	3.13	1.38	.63	.6875	.515	...
3/4	3.25	1.38	.69	.9063	.679	...
1"	3.75	1.75	.81	1.1250	.843	...
1 - 1/4	4.00	1.75	.94	1.3125	.984	...
1 - 1/2	4.25	1.75	1.00	1.5000	1.125	...
2"	4.50	1.75	1.13	1.8750	1.406	...
2 - 1/2	5.50	2.56	1.25	2.2500	1.687	...
3"	6.00	2.63	1.38	2.6250	1.968	...
3 - 1/2	6.50	2.69	1.50	2.8125	2.108	...
4"	6.75	2.75	1.56	3.0000	2.250	...

\* Small Shank

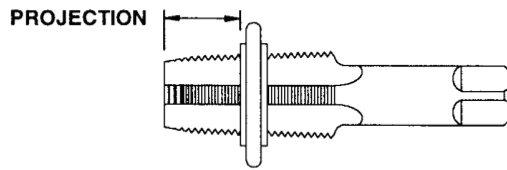
#### TOLERANCES

ELEMENT	RANGE	DIRECTION	TOLERANCE
Length Overall - L	1/16 to 3/4 inc.	Plus or Minus	.031
	1" to 4" inc.	Plus or Minus	.063
Length of Thread - l	1/16 to 3/4 inc.	Plus or Minus	.063
	1" to 1 - 1/4 inc.	Plus or Minus	.094
	1 - 1/2 to 4"	Plus or Minus	.125
Length of Square - l <sub>2</sub>	1/16 to 3/4 inc.	Plus or Minus	.031
	1" to 4" inc.	Plus or Minus	.063
Diameter of Shank - d <sub>1</sub>	1/16 to 1/8	Minus	.0015
	1/4 to 1" inc.	Minus	.0020
	1 - 1/4 to 4" inc.	Minus	.0030
Size of Square - a	1/16 to 1/8	Minus	.004
	1/4 to 3/4 inc.	Minus	.006
	1" to 4" inc.	Minus	.008

#### NOTE

For thread limits and tolerances see USCTI Tables 335, 335A and 338. For eccentricity tolerances of taps see Table 317.

**TAPER PIPE TAP, THREAD LIMITS, GROUND THREAD (REF. USCTI TABLE 338)**



- American National Standard Taper Pipe Thread Form (NPT)
- Aeronautical National Taper Pipe Thread Form (ANPT)
- Dryseal American National Standard Taper Pipe Thread Form (NPTF)

NOMINAL SIZE INCHES	THREADS PER INCH	THREAD TAP LIMITS				L <sub>1</sub> LENGTH
		PROJECTION* INCHES	PROJECTION TOLERANCE + OR -	TAPER PER FOOT LIMITS		
				MINIMUM	MAXIMUM	
1/16	27	.312	.063	.719	.781	.160
1/8	27	.312	.063	.719	.781	.1615
1/4	18	.459	.063	.719	.781	.2278
3/8	18	.454	.063	.719	.781	.240
1/2	14	.579	.063	.719	.781	.320
3/4	14	.565	.063	.719	.781	.339
1"	11-1/2	.678	.094	.719	.781	.400
1-1/4	11-1/2	.686	.094	.719	.781	.420
1-1/2	11-1/2	.699	.094	.719	.781	.420
2"	11-1/2	.667	.094	.719	.781	.436
2-1/2	8	.925	.094	.734	.781	.682
3"	8	.925	.094	.734	.781	.766
3-1/2	8	.938	.125	.734	.781	.821
4	8	.950	.125	.734	.781	.844

**NOTES**

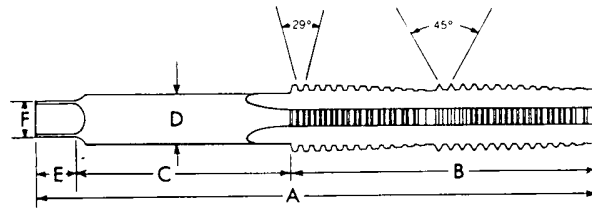
- \* Distance small end of tap projects through L<sub>1</sub> Taper Thread Ring Gage.  
See page 114 for pipe tap drill sizes.

**LEAD TOLERANCE**

A maximum lead deviation of plus or minus .0005" within any two threads not farther than 1" is permitted.



### TANDEM ACME TAP DIMENSIONS

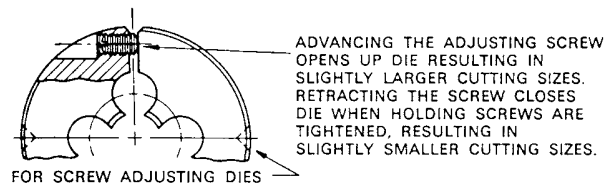
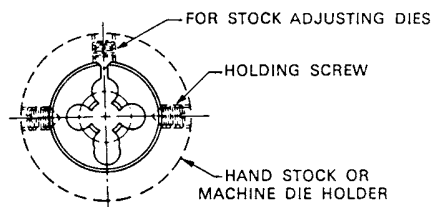
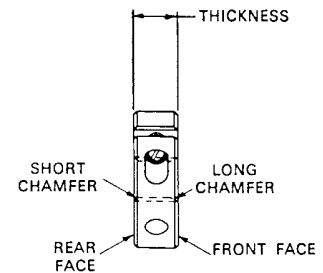
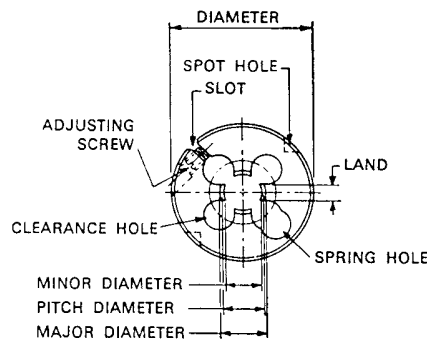


SIZE & PITCH	A OVERALL LENGTH	B LENGTH THREAD END	ROUND SHANK		SQUARE		MAXIMUM DEPTH OF NUT	
			C LENGTH	D DIA.	E LENGTH	F ACROSS FLATS	BRONZE & STEEL	BRASS & CAST IRON
1/4 -16	3"	1 3/4	1"	.185	1/4	.138	1/2	3/4
5/16 -14	3 13/32	1 7/8	1 1/4	.220	9/32	.165	5/8	7/8
3/8 -12	4 1/16	2 1/8	1 5/8	.255	5/16	.191	5/8	1"
1/2 -10	5"	2 9/16	2"	.367	7/16	.275	1"	1 1/2
5/8 -8	6 1/4	3 3/16	2 1/2	.480	9/16	.360	1 1/4	1 7/8
3/4 -6	7 15/16	4 5/16	3"	.542	5/8	.406	1 1/2	2 1/4
3/4 -8	7 15/16	4 5/16	3"	.542	5/8	.406	1 1/2	2 1/4
7/8 -6	8 5/8	4 3/8	3 1/2	.697	3/4	.523	1 3/4	2 5/8
1" -5	10 1/8	5 1/4	4"	.697	3/4	.523	2"	3"
1 1/8 -5	10 3/4	5 1/4	4 1/2	.800	13/16	.600	2 1/4	3 3/8
1 1/4 -5	11 1/8	5 1/4	4 3/4	.896	7/8	.672	2 1/2	3 3/4
1 3/8 -4	12 1/4	5 7/8	5 1/8	1.108	1 1/4	.831	2 3/4	4 1/8
1 1/2 -4	12 5/8	5 7/8	5 1/2	1.233	1 1/4	.925	3"	4 1/2
1 3/4 -4	13 3/8	5 7/8	6 1/4	1.430	1 1/4	1.072	3 1/2	5"
2" -4	14 7/8	6 1/2	7"	1.644	1 3/8	1.233	4"	6"

### ROUND ADJUSTABLE DIES TECHNICAL DATA

#### DIE THICKNESS CHART

O.D.(INCH)	O.D.(MM)	THICKNESS
13/16	20.6 mm	1/4
1"	25.4 mm	3/8
1-1/2	38.1 mm	1/2
2"	50.8 mm	5/8
2-1/2	63.5 mm	3/4
3" (10 pitch & coarser)	76.2 mm	1"
3" (11 pitch & finer)	76.2 mm	3/4

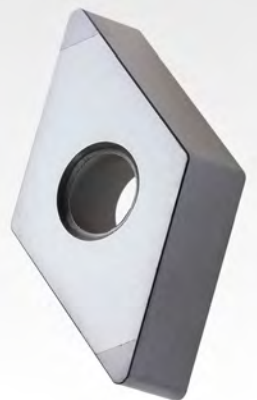
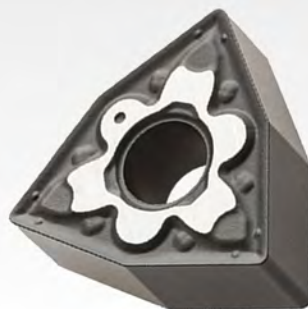
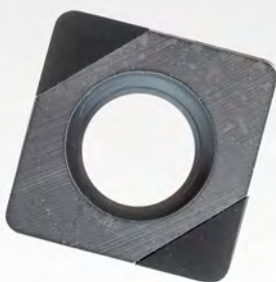
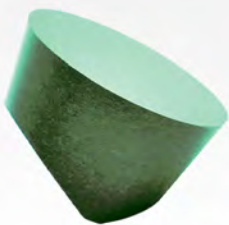


# I N S E R T S

*A wide array of high performance PCD, CBN and patented Ceramic inserts grades, available from stock in standard and other ISO configurations.*

*Custom Comes Standard - If we don't have the perfect tool on the shelf, we can build it for you.*





# ULTIMATE PERFORMANCE

Polycrystalline Diamond (PCD) Inserts For Milling And Turning



GWS EDP Creator

C N G A 4 3 2 T 008 20 + Grade  
Shape Clearance Tolerance Type Size Thickness Radius Edges Width Angle GWS

Work Material	Grade	Type	PCD (Vol.%)	Grain Size	Application
<b>N</b> <b>Non-Ferrous Materials</b> Aluminum Alloys, Aluminum >12% Si, Brass, Copper, Fiberglass, Plastics, Composite.	PCD	Carbide Backed	92	10	General purpose grade, good surface finish, good wear resistance
	PCD3	Carbide Backed	94	30	Superior wear resistance, strong diamond bond
	PCD - F	Carbide Backed	90	4	Good surface finishing
	PCD - UF	Carbide Backed	90	2	Excellent surface finish
	PCD - XUF	Carbide Backed	90	0.5	Excellent surface finish, good wear resistance, suited for woodworking applications

## Series 6500 Single Tipped Inserts | PCD | ISO

CCMW	Insert Number	Thickness	Hole	IC	Radius	ISO Designation
	CCMW 21.51	0.094	0.110	0.250	0.016	CCMW 06 02 04
	CCMW 21.52	0.094	0.110	0.250	0.032	CCMW 06 02 08
	CCMW 32.51	0.156	0.173	0.375	0.016	CCMW 09 T3 04
	CCMW 32.52	0.156	0.173	0.375	0.032	CCMW 09 T3 08
	CCMW 431	0.188	0.216	0.500	0.016	CCMW 12 04 04
	CCMW 432	0.188	0.216	0.500	0.032	CCMW 12 04 08
CNGA	Insert Number	Thickness	Hole	IC	Radius	ISO Designation
	CNGA 431	0.188	0.203	0.500	0.016	CNGA 12 04 04
	CNGA 432	0.188	0.203	0.500	0.032	CNGA 12 04 08
	CNGA 433	0.188	0.203	0.500	0.047	CNGA 12 04 12
CPMW	Insert Number	Thickness	Hole	IC	Radius	ISO Designation
	CPMW 21.51	0.094	0.110	0.250	0.016	CPMW 06 02 04
	CPMW 21.52	0.094	0.110	0.250	0.032	CPMW 06 02 08
	CPMW 32.51	0.156	0.173	0.375	0.016	CPMW 09 T3 04
	CPMW 32.52	0.156	0.173	0.375	0.032	CPMW 09 T3 08
	CPMW 431	0.188	0.216	0.500	0.016	CPMW 12 04 04
	CPMW 432	0.188	0.216	0.500	0.032	CPMW 12 04 08
DCMW	Insert Number	Thickness	Hole	IC	Radius	ISO Designation
	DCMW 21.51	0.094	0.110	0.250	0.016	DCMW 07 02 04
	DCMW 21.52	0.094	0.110	0.250	0.032	DCMW 07 02 08
	DCMW 32.51	0.156	0.173	0.375	0.016	DCMW 11 T3 04
	DCMW 32.52	0.156	0.173	0.375	0.032	DCMW 11 T3 08
DNGA	Insert Number	Thickness	Hole	IC	Radius	ISO Designation
	DNGA 431	0.188	0.203	0.500	0.016	DNGA 15 04 04
	DNGA 432	0.188	0.203	0.500	0.032	DNGA 15 04 08
DPMW	Insert Number	Thickness	Hole	IC	Radius	ISO Designation
	DPMW 21.51	0.094	0.110	0.250	0.016	DPMW 07 02 04
	DPMW 21.52	0.094	0.110	0.250	0.032	DPMW 07 02 08
	DPMW 32.51	0.156	0.173	0.375	0.016	DPMW 11 T3 04
	DPMW 32.52	0.156	0.173	0.375	0.032	DPMW 11 T3 08

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ULTIMATE PERFORMANCE

Polycrystalline Diamond (PCD) Inserts For Milling And Turning



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

Series 6500		Single Tipped Inserts   PCD   ISO					
<b>SNGA</b>		<b>Insert Number</b>	<b>Thickness</b>	<b>Hole</b>	<b>IC</b>	<b>Radius</b>	<b>ISO Designation</b>
		SNGA 431	0.188	0.203	0.500	0.016	SNGA 12 04 04
		SNGA 432	0.188	0.203	0.500	0.032	SNGA 12 04 08
		SNGA 433	0.188	0.203	0.500	0.047	SNGA 12 04 12
<b>SNGN</b>		<b>Insert Number</b>	<b>Thickness</b>	<b>Hole</b>	<b>IC</b>	<b>Radius</b>	<b>ISO Designation</b>
		SNGN 431	0.188	-	0.500	0.016	SNGN 12 04 04
		SNGN 432	0.188	-	0.500	0.032	SNGN 12 04 08
		SNGN 433	0.188	-	0.500	0.047	SNGN 12 04 12
<b>SPGN</b>		<b>Insert Number</b>	<b>Thickness</b>	<b>Hole</b>	<b>IC</b>	<b>Radius</b>	<b>ISO Designation</b>
		SPGN 431	0.188	-	0.500	0.016	SPGN 12 04 04
		SPGN 432	0.188	-	0.500	0.032	SPGN 12 04 08
		SPGN 433	0.188	-	0.500	0.047	SPGN 12 04 12
<b>TCGW</b>		<b>Insert Number</b>	<b>Thickness</b>	<b>Hole</b>	<b>IC</b>	<b>Radius</b>	<b>ISO Designation</b>
		TCGW 1.81.51	0.094	0.188	0.219	0.016	TCGW 09 02 04
		TCGW 21.51	0.094	0.110	0.250	0.016	TCGW 11 02 04
		TCGW 21.52	0.094	0.110	0.250	0.032	TCGW 11 02 08
		TCGW 32.51	0.156	0.173	0.375	0.016	TCGW 16 T3 04
		TCGW 32.52	0.156	0.173	0.375	0.032	TCGW 16 T3 08
<b>TNG</b>		<b>Insert Number</b>	<b>Thickness</b>	<b>Hole</b>	<b>IC</b>	<b>Radius</b>	<b>ISO Designation</b>
		TNG 221	0.125	-	0.250	0.016	TNGN 11 03 04
		TNG 222	0.125	-	0.250	0.032	TNGN 11 03 08
		TNG 321	0.125	-	0.375	0.016	TNGN 16 03 04
		TNG 322	0.125	-	0.375	0.032	TNGN 16 03 08
		TNG 331	0.188	-	0.375	0.016	TNGN 16 04 04
		TNG 332	0.188	-	0.375	0.032	TNGN 16 04 08
		TNG 431	0.188	-	0.500	0.016	TNGN 22 04 04
		TNG 432	0.188	-	0.500	0.032	TNGN 22 04 08
		TNG 433	0.188	-	0.500	0.047	TNGN 22 04 12
<b>TNMA</b>		<b>Insert Number</b>	<b>Thickness</b>	<b>Hole</b>	<b>IC</b>	<b>Radius</b>	<b>ISO Designation</b>
		TNMA 331	0.188	0.125	0.375	0.016	TNMA 16 04 04
		TNMA 332	0.188	0.125	0.375	0.032	TNMA 16 04 08
		TNMA 431	0.188	0.203	0.500	0.016	TNMA 22 04 04
		TNMA 432	0.188	0.203	0.500	0.032	TNMA 22 04 08
		TNMA 433	0.188	0.203	0.500	0.047	TNMA 22 04 12
<b>TPGW</b>		<b>Insert Number</b>	<b>Thickness</b>	<b>Hole</b>	<b>IC</b>	<b>Radius</b>	<b>ISO Designation</b>
		TPGW 1.81.51	0.094	0.188	0.219	0.016	TPGW 09 02 04
		TPGW 21.51	0.094	0.110	0.250	0.016	TPGW 11 02 04

# ULTIMATE PERFORMANCE

Polycrystalline Diamond (PCD) Inserts For Milling And Turning



Series 6500		Single Tipped Inserts   PCD   ISO				
TPGW	Insert Number	Thickness	Hole	IC	Radius	ISO Designation
	TPGW 21.52	0.094	0.110	0.250	0.032	TPGW 11 02 08
	TPGW 32.51	0.156	0.173	0.375	0.016	TPGW 16 T3 04
	TPGW 32.52	0.156	0.173	0.375	0.032	TPGW 16 T3 08
VBMW	Insert Number	Thickness	Hole	IC	Radius	ISO Designation
	VBMW 21.51	0.094	-	0.250	0.016	VBMW 11 02 04
	VBMW 331	0.188	-	0.375	0.016	VBMW 16 04 04
	VBMW 332	0.188	-	0.375	0.032	VBMW 16 04 08
VCMW	Insert Number	Thickness	Hole	IC	Radius	ISO Designation
	VCMW 21.51	0.094	-	0.250	0.016	VCMW 11 02 04
	VCMW 331	0.188	-	0.375	0.016	VCMW 16 04 04
	VCMW 332	0.188	-	0.375	0.032	VCMW 16 04 08
VNMA	Insert Number	Thickness	Hole	IC	Radius	ISO Designation
	VNMA 331	0.188	0.150	0.375	0.016	VNMA 16 04 04
	VNMA 332	0.188	0.150	0.375	0.032	VNMA 16 04 08
VPMW	Insert Number	Thickness	Hole	IC	Radius	ISO Designation
	VPMW 21.51	0.094	-	0.250	0.016	VPMW 11 02 04
	VPMW 331	0.188	-	0.375	0.016	VPMW 16 04 04
	VPMW 332	0.188	-	0.375	0.032	VPMW 16 04 08
WNGA	Insert Number	Thickness	Hole	IC	Radius	ISO Designation
	WNGA 431	0.188	0.203	0.500	0.016	WNGA 08 04 04
	WNGA 432	0.188	0.203	0.500	0.032	WNGA 08 04 08

## Popular Custom Insert Options

- Specialty forms including top notch and grooving
- Single and double-lead thread whirling inserts
- Additional PCD, PCBN and Ceramic grades
- Specialized steel body constructions for turning, milling and holmaking

**CUSTOM  
COMES  
STANDARD**

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

# ULTIMATE PERFORMANCE

Cubic Boron Nitride (PCBN) Inserts For For Milling And Turning



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

GWS EDP Creator

C N G A 4 3 2 T 008 20 + Grade  
Shape Clearance Tolerance Type Size Thickness Radius Edges Width Angle GWS

Work Material	Grade	Type	CBN (Vol,%)	Grain Size	Major Binder	Application
<b>H</b> Hardened Steels >45 RC	CBN 45	Carbide Backed	45	< 1	Titanium Nitride	Low thermal conductivity, strong edge due to low edge compressiveness
	CBN 50	Carbide Backed	50	2	Titanium Carbide	Good thermal stability and crater resistance, high-speed continuous machining of hardened steel
	CBN 60	Carbide Backed	60	2	Titanium Nitride	Combination of wear resistance and impact strength, general usage in continuous and interrupted cutting of hardened steel
	CBN 70	Carbide Backed	70	2	Titanium Carbonitride	High degree of toughness due to fine microstructure of CBN and ceramic binder, rough and interrupted machining of hardened steel
<b>S1</b> HRSA Hastelloy, Inconel, Stellite, INVAR	CBN 80	Carbide Backed	80	3	Titanium Nitride	Combination of wear resistance and thermal properties, superior to other grades in machining superalloy
<b>K</b> Cast Irons Ductile Iron, Gray Cast, Nodular, CGI, Powdered Metal	CBN 90	Carbide Backed	90	3	Titanium Nitride	Higher toughness and heat resistance as an alternative to CBN 95, machining non-homogenous cast iron and powdered metal alloys
	CBN 95	Carbide Backed	95	3	Titanium Alloy	Extreme wear resistance due to high content CBN and metal binder, excellent at machining various cast irons
	CBN 100	Solid Form	93	10	Aluminum Nitride	Extreme wear resistance due to coarser CBN and high content, rough machining of cast iron and powdered metal alloys

**Series 6800 Full Top Inserts | PCBN | ISO**

CNG	Insert Number	Thickness	IC	Radius	ISO Designation
	CNG 321	0.125	0.375	0.016	CNG 09 03 04
	CNG 322	0.125	0.375	0.032	CNG 09 03 08
	CNG 431	0.188	0.500	0.016	CNG 12 04 04
	CNG 432	0.188	0.500	0.032	CNG 12 04 08
	CNG 433	0.188	0.500	0.047	CNG 12 04 12
CNGA	Insert Number	Thickness	IC	Radius	ISO Designation
	CNGA 431	0.188	0.500	0.016	CNGA 12 04 04
	CNGA 432	0.188	0.500	0.032	CNGA 12 04 08
	CNGA 433	0.188	0.500	0.047	CNGA 12 04 12
	CNGA 434	0.188	0.500	0.062	CNGA 12 04 16
DNGA	Insert Number	Thickness	IC	Radius	ISO Designation
	DNGA 431	0.188	0.500	0.016	DNGA 12 04 04
	DNGA 432	0.188	0.500	0.032	DNGA 12 04 08
	DNGA 433	0.188	0.500	0.047	DNGA 12 04 12
	DNGA 434	0.188	0.500	0.062	DNGA 12 04 16
RNG	Insert Number	Thickness	IC	Radius	ISO Designation
	RNG 22	0.125	0.250	-	RNGN 06 03 00
	RNG 32	0.125	0.375	-	RNGN 09 03 00
	RNG 42	0.125	0.500	-	RNGN 12 03 00
	RNG 43	0.188	0.500	-	RNGN 12 04 00
RNGA	Insert Number	Thickness	IC	Radius	ISO Designation
	RNGA 43	0.188	0.500	-	RNGA 12 04 00
	RNGA 53	0.188	0.625	-	RNGA 15 04 00
	RNGA 83	0.188	1.000	-	RNGA 25 04 00

# ULTIMATE PERFORMANCE

Cubic Boron Nitride (PCBN) Inserts For For Milling And Turning



Series 6800		Full Top Inserts   PCBN   ISO			
SNG	Insert Number	Thickness	IC	Radius	ISO Designation
	SNG 321	0.125	0.375	0.016	SNGN 09 03 04
	SNG 322	0.125	0.375	0.032	SNGN 09 03 08
	SNG 431	0.188	0.500	0.016	SNGN 12 04 04
	SNG 432	0.188	0.500	0.032	SNGN 12 04 08
	SNG 433	0.188	0.500	0.047	SNGN 12 04 12
	SNG 434	0.188	0.500	0.062	SNGN 12 04 16
SNGA	Insert Number	Thickness	IC	Radius	ISO Designation
	SNGA 431	0.188	0.500	0.016	SNGA 12 04 04
	SNGA 432	0.188	0.500	0.032	SNGA 12 04 08
	SNGA 433	0.188	0.500	0.047	SNGA 12 04 12
	SNGA 434	0.188	0.500	0.062	SNGA 12 04 16
	SNGA 832	0.188	1.000	0.032	SNGA 25 04 08
	SNGA 833	0.188	1.000	0.047	SNGA 25 04 12
SNGA 834	0.188	1.000	0.062	SNGA 25 04 16	
TNG	Insert Number	Thickness	IC	Radius	ISO Designation
	TNG 221	0.125	0.250	0.016	TNGN 11 03 04
	TNG 222	0.125	0.250	0.032	TNGN 11 03 08
	TNG 321	0.125	0.375	0.016	TNGN 16 03 04
	TNG 322	0.125	0.375	0.032	TNGN 16 03 08
	TNG 331	0.188	0.375	0.016	TNGN 16 04 04
	TNG 332	0.188	0.375	0.032	TNGN 16 04 08
TNG 432	0.188	0.500	0.032	TNGN 22 04 08	
TNG 433	0.188	0.500	0.047	TNGN 22 04 12	
TNGA	Insert Number	Thickness	IC	Radius	ISO Designation
	TNGA 331	0.188	0.375	0.016	TNGA 16 04 04
	TNGA 332	0.188	0.375	0.032	TNGA 16 04 08
	TNGA 333	0.188	0.375	0.047	TNGA 16 04 12

INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



Series 6800		Solid Inserts   PCBN   ISO			
CNG	Insert Number	Thickness	IC	Radius	ISO Designation
	CNG 321	0.125	0.375	0.016	CNG 09 03 04
	CNG 322	0.125	0.375	0.032	CNG 09 03 08
	CNG 431	0.188	0.500	0.016	CNG 12 04 04
	CNG 432	0.188	0.500	0.032	CNG 12 04 08
	CNG 433	0.188	0.500	0.047	CNG 12 04 12
CNGA	Insert Number	Thickness	IC	Radius	ISO Designation
	CNGA 431	0.188	0.500	0.016	CNGA 12 04 04
	CNGA 432	0.188	0.500	0.032	CNGA 12 04 08
	CNGA 433	0.188	0.500	0.047	CNGA 12 04 12
	CNGA 434	0.188	0.500	0.062	CNGA 12 04 16
DNGA	Insert Number	Thickness	IC	Radius	ISO Designation
	DNGA 431	0.188	0.500	0.016	DNGA 12 04 04
	DNGA 432	0.188	0.500	0.032	DNGA 12 04 08
	DNGA 433	0.188	0.500	0.047	DNGA 12 04 12
	DNGA 434	0.188	0.500	0.062	DNGA 12 04 16
RNG	Insert Number	Thickness	IC	Radius	ISO Designation
	RNG 22	0.125	0.250	-	RNGN 06 03 00
	RNG 32	0.125	0.375	-	RNGN 09 03 00
	RNG 42	0.125	0.500	-	RNGN 12 03 00
	RNG 43	0.188	0.500	-	RNGN 12 04 00
RNGA	Insert Number	Thickness	IC	Radius	ISO Designation
	RNGA 43	0.188	0.500	-	RNGA 12 04 00
	RNGA 53	0.188	0.625	-	RNGA 15 04 00
	RNGA 83	0.188	1.000	-	RNGA 25 04 00
SNG	Insert Number	Thickness	IC	Radius	ISO Designation
	SNG 321	0.125	0.375	0.016	SNGN 09 03 04
	SNG 322	0.125	0.375	0.032	SNGN 09 03 08
	SNG 431	0.188	0.500	0.016	SNGN 12 04 04
	SNG 432	0.188	0.500	0.032	SNGN 12 04 08
	SNG 433	0.188	0.500	0.047	SNGN 12 04 12

### Popular Custom Insert Options

- Specialty forms including top notch and grooving
- Single and double-lead thread whirling inserts
- Additional PCD, PCBN and Ceramic grades
- Specialized steel body constructions for turning, milling and holemaking

**CUSTOM  
COMES  
STANDARD**

# ULTIMATE PERFORMANCE

## Cubic Boron Nitride (PCBN) Inserts For Turning

Series 6800		Solid Inserts   PCBN   ISO				
SNG	Insert Number	Thickness	IC	Radius	ISO Designation	
	SNG 434	0.188	0.500	0.062	SNGN 12 04 16	
SNGA	Insert Number	Thickness	IC	Radius	ISO Designation	
	SNGA 431	0.188	0.500	0.016	SNGA 12 04 04	
	SNGA 432	0.188	0.500	0.032	SNGA 12 04 08	
	SNGA 433	0.188	0.500	0.047	SNGA 12 04 12	
	SNGA 434	0.188	0.500	0.062	SNGA 12 04 16	
	SNGA 832	0.188	1.000	0.032	SNGA 25 04 08	
	SNGA 833	0.188	1.000	0.047	SNGA 25 04 12	
	SNGA 834	0.188	1.000	0.062	SNGA 25 04 16	
TNG	Insert Number	Thickness	IC	Radius	ISO Designation	
	TNG 221	0.125	0.250	0.016	TNGN 11 03 04	
	TNG 222	0.125	0.250	0.032	TNGN 11 03 08	
	TNG 321	0.125	0.375	0.016	TNGN 16 03 04	
	TNG 322	0.125	0.375	0.032	TNGN 16 03 08	
	TNG 331	0.188	0.375	0.016	TNGN 16 04 04	
	TNG 332	0.188	0.375	0.032	TNGN 16 04 08	
	TNG 432	0.188	0.500	0.032	TNGN 22 04 08	
	TNG 433	0.188	0.500	0.047	TNGN 22 04 12	
TNGA	Insert Number	Thickness	IC	Radius	ISO Designation	
	TNGA 331	0.188	0.375	0.016	TNGA 16 04 04	
	TNGA 332	0.188	0.375	0.032	TNGA 16 04 08	
	TNGA 333	0.188	0.375	0.047	TNGA 16 04 12	

INTRO

MILLING

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THREADING

INSERTS

Series 6800		Cartridge Inserts   PCBN/PCD			
	EDR	Thickness	Width	Radius	ISO Designation
		0.250	0.375	0.030	EDR-100-031-E1
		0.250	0.375	0.030	EDR-100-031-E3
		0.250	0.375	0.030	EDR-100-031-E4
		0.250	0.375	0.030	EDR-100-031-E5
		0.250	0.375	0.030	EDR-102-031-E1W2
		0.250	0.375	0.030	EDR-102-031-E3W2
		0.250	0.375	0.030	EDR-102-031-E4W2
		0.250	0.375	0.030	EDR-102-031-E5W2
	SDL	Thickness	Width	Radius	ISO Designation
		0.250	0.375	0.020	SDL-200-020-E1
		0.250	0.375	0.020	SDL-200-020-E3
		0.250	0.375	0.020	SDL-200-020-E5
		0.250	0.375	0.031	SDL-200-031-E1
		0.250	0.375	0.031	SDL-200-031-E3
		0.250	0.375	0.031	SDL-200-031-E5
		0.250	0.375	0.020	SDL-202-020-E1W1
		0.250	0.375	0.020	SDL-202-020-E1W2
		0.250	0.375	0.020	SDL-202-020-E3W1
		0.250	0.375	0.020	SDL-202-020-E3W2
		0.250	0.375	0.020	SDL-202-020-E5W1
		0.250	0.375	0.020	SDL-202-020-E5W2
		0.250	0.375	0.030	SDL-202-031-E1W1
		0.250	0.375	0.030	SDL-202-031-E1W2
		0.250	0.375	0.030	SDL-202-031-E3W1
		0.250	0.375	0.030	SDL-202-031-E3W2
		0.250	0.375	0.030	SDL-202-031-E5W1
		0.250	0.375	0.030	SDL-202-031-E5W2
	SDR	Thickness	Width	Radius	ISO Designation
		0.250	0.375	0.020	SDR-100-020-E1
		0.250	0.375	0.020	SDR-100-020-E3
		0.250	0.375	0.020	SDR-100-020-E5
		0.250	0.375	0.031	SDR-100-031-E1
		0.250	0.375	0.031	SDR-100-031-E3
		0.250	0.375	0.031	SDR-100-031-E5
		0.250	0.375	0.020	SDR-102-020-E1W1
		0.250	0.375	0.020	SDR-102-020-E1W2
		0.250	0.375	0.020	SDR-102-020-E3W1
		0.250	0.375	0.020	SDR-102-020-E3W2
		0.250	0.375	0.020	SDR-102-020-E5W1
		0.250	0.375	0.020	SDR-102-020-E5W2
		0.250	0.375	0.030	SDR-102-031-E1W1
		0.250	0.375	0.030	SDR-102-031-E1W2
		0.250	0.375	0.030	SDR-102-031-E3W1
		0.250	0.375	0.030	SDR-102-031-E3W2
		0.250	0.375	0.030	SDR-102-031-E5W1
		0.250	0.375	0.030	SDR-102-031-E5W2
	UCDR	Thickness	Width	Radius	ISO Designation
		0.600	0.750	0.010	UCDR-11-00
		0.600	0.750	0.010	UCDR-11-01
		0.600	0.750	0.030	UCDR-20-00
	0.600	0.750	0.030	UCDR-22-00	

# ULTIMATE PERFORMANCE

Ceramic Inserts For Milling And Turning Applications




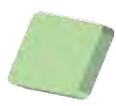
GWS EDP Creator

C N G A 4 3 2 T 008 20 + Grade  
Shape Clearance Tolerance Type Size Thickness Radius Edges Width Angle GWS

Work Material		Operation	I-50	I-100	MW37*	MW43*	MW43B*	TITAN2*	MWW*	CG-88
P	Steels (<40 RC)	Turning	●							
		Milling		●						●
P	Steels (>40 RC)	Turning		●						●
		Milling		●				●		●
S	High Temperature Alloys Inconel 718, Inconel 625, Hastelloy	Turning			●				●	●
		Milling			●					●
K	Cast Irons (>300 BHN)	Turning	●	●		●	●			
		Milling		●			●	●		
	Cast Irons (>300 BHN)	Turning		●		●	●			
		Milling					●	●		
N	Brass, Bronze, Carbon, Plastics	Turning								
		Milling								
Is Coolant Tolerated?			No	Yes	Yes	No	Yes	Yes	Yes	Yes

\*Features GWS patented MicroWear microwave sintering technology, for finer and more uniform grain structure that improves toughness and wear resistance.

## Series 6000 Ceramic Inserts | ISO

CDH	Insert Number	Thickness	IC	Radius	ISO Designation
	CDH 33	0.375	0.750	-	RCMA 19 09 00
	CDH 43	0.375	1.000	-	RCMA 25 19 00
	CDH 53	0.375	1.250	-	RCMA 31 19 00
CNG	Insert Number	Thickness	IC	Radius	ISO Designation
	CNG 431	0.188	0.500	0.016	CNGN 12 04 04
	CNG 432	0.188	0.500	0.031	CNGN 12 04 08
	CNG 433	0.188	0.500	0.047	CNGN 12 04 12
	CNG 434	0.188	0.500	0.063	CNGN 12 04 16
	CNG 441	0.250	0.500	0.016	CNGN 12 06 04
	CNG 442	0.250	0.500	0.031	CNGN 12 06 08
	CNG 443	0.250	0.500	0.047	CNGN 12 06 12
	CNG 444	0.250	0.500	0.063	CNGN 12 06 16
	CNG 451	0.313	0.500	0.016	CNGN 12 07 04
	CNG 452	0.313	0.500	0.031	CNGN 12 07 08
	CNG 453	0.313	0.500	0.047	CNGN 12 07 12
	CNG 454	0.313	0.500	0.063	CNGN 12 07 16
	CNG 531	0.188	0.625	0.016	CNGN 16 04 04
	CNG 532	0.188	0.625	0.031	CNGN 16 04 08
	CNG 533	0.188	0.625	0.047	CNGN 16 04 12
	CNG 534	0.188	0.625	0.063	CNGN 16 04 16
	CNG 541	0.250	0.625	0.016	CNGN 16 06 04
	CNG 542	0.250	0.625	0.031	CNGN 16 06 08
	CNG 543	0.250	0.625	0.047	CNGN 16 06 12
	CNG 544	0.250	0.625	0.063	CNGN 16 06 16
	CNG 551	0.313	0.625	0.016	CNGN 16 07 04
	CNG 552	0.313	0.625	0.031	CNGN 16 07 08
	CNG 553	0.313	0.625	0.047	CNGN 16 07 12
	CNG 554	0.313	0.625	0.063	CNGN 16 07 16
	CNG 631	0.188	0.750	0.016	CNGN 19 04 04
	CNG 632	0.188	0.750	0.031	CNGN 19 04 08
	CNG 633	0.188	0.750	0.047	CNGN 19 04 12
	CNG 634	0.188	0.750	0.063	CNGN 19 04 16
	CNG 641	0.250	0.750	0.016	CNGN 19 06 04
	CNG 642	0.250	0.750	0.031	CNGN 19 06 08
CNG 643	0.250	0.750	0.047	CNGN 19 06 12	
CNG 644	0.250	0.750	0.063	CNGN 19 06 16	
CNG 651	0.313	0.750	0.016	CNGN 19 07 04	
CNG 652	0.313	0.750	0.031	CNGN 19 07 08	
CNG 653	0.313	0.750	0.047	CNGN 19 07 12	
CNG 654	0.313	0.750	0.063	CNGN 19 07 16	

INTRO

MILLING

SPECIALTY

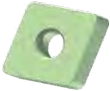



HOLEMAKING

THREADING

INSERTS

# ULTIMATE PERFORMANCE








## Ceramic Inserts For Milling And Turning Applications

Series 6000		Ceramic Inserts   ISO			
CNGA	Insert Number	Thickness	IC	Radius	ISO Designation
	CNGA 431	0.188	0.500	0.016	CNGA 12 04 04
	CNGA 432	0.188	0.500	0.031	CNGA 12 04 08
	CNGA 433	0.188	0.500	0.047	CNGA 12 04 12
	CNGA 434	0.188	0.500	0.063	CNGA 12 04 16
	CNGA 441	0.250	0.500	0.016	CNGA 12 06 04
	CNGA 442	0.250	0.500	0.031	CNGA 12 06 08
	CNGA 443	0.250	0.500	0.047	CNGA 12 06 12
	CNGA 444	0.250	0.500	0.063	CNGA 12 06 16
	CNGA 451	0.313	0.500	0.016	CNGA 12 07 04
	CNGA 452	0.313	0.500	0.031	CNGA 12 07 08
	CNGA 453	0.313	0.500	0.047	CNGA 12 07 12
	CNGA 454	0.313	0.500	0.063	CNGA 12 07 16
	CNGA 531	0.188	0.625	0.016	CNGA 16 04 04
	CNGA 532	0.188	0.625	0.031	CNGA 16 04 08
	CNGA 533	0.188	0.625	0.047	CNGA 16 04 12
	CNGA 534	0.188	0.625	0.063	CNGA 16 04 16
	CNGA 541	0.250	0.625	0.016	CNGA 16 06 04
	CNGA 542	0.250	0.625	0.031	CNGA 16 06 08
	CNGA 543	0.250	0.625	0.047	CNGA 16 06 12
	CNGA 544	0.250	0.625	0.063	CNGA 16 06 16
	CNGA 551	0.313	0.625	0.016	CNGA 16 07 04
	CNGA 552	0.313	0.625	0.031	CNGA 16 07 08
	CNGA 553	0.313	0.625	0.047	CNGA 16 07 12
	CNGA 554	0.313	0.625	0.063	CNGA 16 07 16
	CNGA 631	0.188	0.750	0.016	CNGA 19 04 04
	CNGA 632	0.188	0.750	0.031	CNGA 19 04 08
	CNGA 633	0.188	0.750	0.047	CNGA 19 04 12
	CNGA 634	0.188	0.750	0.063	CNGA 19 04 16
	CNGA 641	0.250	0.750	0.016	CNGA 19 06 04
	CNGA 642	0.250	0.750	0.031	CNGA 19 06 08
	CNGA 643	0.250	0.750	0.047	CNGA 19 06 12
	CNGA 644	0.250	0.750	0.063	CNGA 19 06 16
	CNGA 651	0.313	0.750	0.016	CNGA 19 07 04
	CNGA 652	0.313	0.750	0.031	CNGA 19 07 08
CNGA 653	0.313	0.750	0.047	CNGA 19 07 12	
CNGA 654	0.313	0.750	0.063	CNGA 19 07 16	
CNGX	Insert Number	Thickness	IC	Radius	ISO Designation
	CNGX 452	0.313	0.500	0.031	CNGX 12 07 08
	CNGX 453	0.313	0.500	0.047	CNGX 12 07 12
	CNGX 454	0.313	0.500	0.063	CNGX 12 07 16
CNMA	Insert Number	Thickness	IC	Radius	ISO Designation
	CNMA 434	0.188	0.500	0.063	CNMA 12 04 16
	CNMA 454	0.313	0.500	0.063	CNMA 12 07 16
CNMN	Insert Number	Thickness	IC	Radius	ISO Designation
	CNMN 434	0.188	0.500	0.063	CNMN 12 04 16

# ULTIMATE PERFORMANCE

Ceramic Inserts For Milling And Turning Applications



Series 6000		Ceramic Inserts   ISO			
CNMM	Insert Number	Thickness	IC	Radius	ISO Designation
	CNMM 454	0.313	0.500	0.063	CNMM 12 07 16
CNMX	Insert Number	Thickness	IC	Radius	ISO Designation
	CNMX 453	0.313	0.500	0.047	CNMX 12 07 12
	CNMX 454	0.313	0.500	0.063	CNMX 12 07 16
DNG	Insert Number	Thickness	IC	Radius	ISO Designation
	DNG 431	0.188	0.500	0.016	DNGN 15 04 04
	DNG 432	0.188	0.500	0.031	DNGN 15 04 08
	DNG 433	0.188	0.500	0.047	DNGN 15 04 12
	DNG 434	0.188	0.500	0.063	DNGN 15 04 16
	DNG 441	0.250	0.500	0.016	DNGN 15 06 04
	DNG 442	0.250	0.500	0.031	DNGN 15 06 08
	DNG 443	0.250	0.500	0.047	DNGN 15 06 12
	DNG 444	0.250	0.500	0.063	DNGN 15 06 16
	DNG 451	0.313	0.500	0.016	DNGN 15 07 04
	DNG 452	0.313	0.500	0.031	DNGN 15 07 08
	DNG 453	0.313	0.500	0.047	DNGN 15 07 12
	DNG 454	0.313	0.500	0.063	DNGN 15 07 16
DNGA	Insert Number	Thickness	IC	Radius	ISO Designation
	DNGA 431	0.188	0.500	0.016	DNGA 15 04 04
	DNGA 432	0.188	0.500	0.031	DNGA 15 04 08
	DNGA 433	0.188	0.500	0.047	DNGA 15 04 12
	DNGA 434	0.188	0.500	0.063	DNGA 15 04 16
	DNGA 441	0.250	0.500	0.016	DNGA 15 06 04
	DNGA 442	0.250	0.500	0.031	DNGA 15 06 08
	DNGA 443	0.250	0.500	0.047	DNGA 15 06 12
	DNGA 444	0.250	0.500	0.063	DNGA 15 06 16
	DNGA 451	0.313	0.500	0.016	DNGA 15 07 04
	DNGA 452	0.313	0.500	0.031	DNGA 15 07 08
	DNGA 453	0.313	0.500	0.047	DNGA 15 07 12
	DNGA 454	0.313	0.500	0.063	DNGA 15 07 16
DNGX	Insert Number	Thickness	IC	Radius	ISO Designation
	DNGX 351	0.313	0.375	0.016	DNGX 12 07 04
	DNGX 352	0.313	0.375	0.031	DNGX 12 07 08
	DNGX 353	0.313	0.375	0.047	DNGX 12 07 12
	DNGX 354	0.313	0.375	0.063	DNGX 12 07 16
	DNGX 451	0.313	0.500	0.016	DNGX 15 07 04
	DNGX 452	0.313	0.500	0.031	DNGX 15 07 08
	DNGX 453	0.313	0.500	0.047	DNGX 15 07 12
	DNGX 454	0.313	0.500	0.063	DNGX 15 07 16
DNMX	Insert Number	Thickness	IC	Radius	ISO Designation
	DNMX 353	0.313	0.375	0.047	DNMX 12 07 12
	DNMX 354	0.313	0.375	0.063	DNMX 12 07 16
	DNMX 454	0.313	0.500	0.063	DNMX 15 07 16
IGK	Insert Number	Thickness	IC	Radius	ISO Designation
	IGK 8250-2T	0.328	0.250	0.031	-
	IGK 8250-3T	0.328	0.250	0.047	-
	IGK 8250-4T	0.328	0.250	0.063	-
	IGK 8312-2T	0.328	0.3125	0.031	-

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Series 6000		Ceramic Inserts   ISO			
IGK	Insert Number	Thickness	IC	Radius	ISO Designation
	IGK 8312-4T	0.328	0.3125	0.063	-
	IGK 8375-2T	0.328	0.375	0.031	-
	IGK 8375-4T	0.328	0.375	0.063	-
	IGK 9250-2T	0.328	0.250	0.031	-
	IGK 9250-4T	0.328	0.250	0.063	-
	IGK 9375-2T	0.328	0.375	0.031	-
	IGK 9375-4T	0.328	0.375	0.063	-
IGW	Insert Number	Thickness	IC	Radius	ISO Designation
	IGW 4187-1T	0.1875	0.1875	0.031	-
	IGW 4187-2T	0.1875	0.1875	0.047	-
	IGW 4187-4T	0.1875	0.1875	0.063	-
	IGW 6250-2T	0.250	0.250	0.031	-
	IGW 6250-3T	0.250	0.250	0.063	-
	IGW 6250-4T	0.250	0.250	0.031	-
	IGW 8312-2T	0.337	0.3125	0.063	-
	IGW 8312-3T	0.337	0.3125	0.031	-
	IGW 8312-4T	0.337	0.3125	0.063	-
	IGW 8375-2T	0.337	0.375	0.031	-
IGW 8375-4T	0.337	0.375	0.063	-	
LNU	Insert Number	Thickness	IC	Radius	ISO Designation
	LNU 6688	0.500	0.750	0.125	LNUN 66 88
ONC	Insert Number	Thickness	IC	Radius	ISO Designation
	ONC 631	0.188	0.750	0.016	ONCN 19 04 04
	ONC 632	0.188	0.750	0.031	ONCN 19 04 08
	ONC 633	0.188	0.750	0.047	ONCN 19 04 12
	ONC 634	0.188	0.750	0.063	ONCN 19 04 16
RCGX	Insert Number	Thickness	IC	Radius	ISO Designation
	RCGX 35	0.313	0.375	-	RCGX 09 07 00
	RCGX 45	0.313	0.500	-	RCGX 12 07 00
	RCGX 55	0.313	0.625	-	RCGX 15 07 00
	RCGX 66	0.375	0.750	-	RCGX 19 09 00
	RCGX 88	0.465	1.000	-	RCGX 25 12 00
RNG	Insert Number	Thickness	IC	Radius	ISO Designation
	RNG 32	0.125	0.375	-	RNGN 09 03 00
	RNG 33	0.188	0.375	-	RNGN 09 04 00
	RNG 35	0.313	0.375	-	RNGN 09 07 00
	RNG 42	0.125	0.500	-	RNGN 12 03 00
	RNG 43	0.188	0.500	-	RNGN 12 04 00
	RNG 44	0.250	0.500	-	RNGN 12 06 00
	RNG 45	0.313	0.500	-	RNGN 12 07 00
	RNG 54	0.250	0.625	-	RNGN 15 06 00
	RNG 55	0.313	0.625	-	RNGN 15 07 00
	RNG 64	0.250	0.750	-	RNGN 19 06 00
	RNG 65	0.313	0.750	-	RNGN 19 07 00
	RNG 86	0.375	0.375	-	RNGN 25 09 00
	RNGX	Insert Number	Thickness	IC	Radius
	RNGX 43	0.188	0.500	-	RNGX 12 04 00
	RNGX 45	0.313	0.500	-	RNGX 12 07 00

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Series 6000		Ceramic Inserts   ISO			
RPG	Insert Number	Thickness	IC	Radius	ISO Designation
	RPG 32	0.125	0.375	-	RPGN 09 03 00
	RPG 33	0.188	0.375	-	RPGN 09 04 00
	RPG 43	0.188	0.500	-	RPGN 12 04 00
	RPG 44	0.250	0.500	-	RPGN 12 06 00
	RPG 45	0.313	0.500	-	RPGN 12 07 00
	RPG 54	0.250	0.625	-	RPGN 15 06 00
	RPG 55	0.313	0.625	-	RPGN 15 07 00
	RPG 64	0.250	0.750	-	RPGN 19 06 00
	RPG 65	0.313	0.750	-	RPGN 19 07 00
	RPG 85	0.313	1.000	-	RPGN 25 07 00
RPG 86	0.375	1.000	-	RPGN 25 09 00	
RPGX	Insert Number	Thickness	IC	Radius	ISO Designation
	RPGX 35	0.313	0.375	-	RPGX 09 07 00
	RPGX 45	0.313	0.500	-	RPGX 12 07 00
	RPGX 55	0.313	0.625	-	RPGX 15 07 00
SCG	Insert Number	Thickness	IC	Radius	ISO Designation
	SCG 331	0.188	0.375	0.016	SCGN 09 04 04
	SCG 332	0.188	0.375	0.031	SCGN 09 04 08
	SCG 333	0.188	0.375	0.047	SCGN 09 04 12
	SCG 334	0.188	0.375	0.063	SCGN 09 04 16
SEAN	Insert Number	Thickness	IC	Radius	ISO Designation
	SEAN 42AFTN	0.125	0.500	-	SEAN 12 03 AFTN
	SEAN 43AFTN	0.188	0.500	-	SEAN 12 04 AFTN
SEMN	Insert Number	Thickness	IC	Radius	ISO Designation
	SEMN 43AZ	0.188	0.500	-	SEMN 12 04 AZ
SNC	Insert Number	Thickness	IC	Radius	ISO Designation
	SNC 431	0.188	0.500	0.016	SNCN 12 04 04
	SNC 432	0.188	0.500	0.031	SNCN 12 04 08
	SNC 433	0.188	0.500	0.047	SNCN 12 04 12
	SNC 434	0.188	0.500	0.063	SNCN 12 04 16
SNE	Insert Number	Thickness	IC	Radius	ISO Designation
	SNE 431	0.188	0.500	0.016	SNE 12 04 04
	SNE 432	0.188	0.500	0.031	SNE 12 04 08
	SNE 433	0.188	0.500	0.047	SNE 12 04 12
	SNE 434	0.188	0.500	0.063	SNE 12 04 16
	SNE 63A	0.188	0.750	-	SNE 19 04 00
SNG	Insert Number	Thickness	IC	Radius	ISO Designation
	SNG 321	0.125	0.375	0.016	SNGN 09 03 04
	SNG 322	0.125	0.375	0.031	SNGN 09 03 08
	SNG 323	0.125	0.375	0.047	SNGN 09 03 12
	SNG 324	0.125	0.375	0.063	SNGN 09 03 16
	SNG 331	0.188	0.375	0.016	SNGN 09 04 04
	SNG 332	0.188	0.375	0.031	SNGN 09 04 08
	SNG 333	0.188	0.375	0.047	SNGN 09 04 12
	SNG 334	0.188	0.375	0.063	SNGN 09 04 16
	SNG 421	0.125	0.500	0.016	SNGN 12 03 04
	SNG 422	0.125	0.500	0.031	SNGN 12 03 08
	SNG 423	0.125	0.500	0.047	SNGN 12 03 12
	SNG 424	0.125	0.500	0.063	SNGN 12 03 16

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Series 6000		Ceramic Inserts   ISO			
SNG	Insert Number	Thickness	IC	Radius	ISO Designation
	SNG 431	0.188	0.500	0.016	SNGN 12 04 04
	SNG 432	0.188	0.500	0.031	SNGN 12 04 08
	SNG 433	0.188	0.500	0.047	SNGN 12 04 12
	SNG 434	0.188	0.500	0.063	SNGN 12 04 16
	SNG 436	0.188	0.500	0.094	SNGN 12 04 24
	SNG 438	0.188	0.500	0.125	SNGN 12 04 32
	SNG 441	0.250	0.500	0.016	SNGN 12 06 04
	SNG 442	0.250	0.500	0.031	SNGN 12 06 08
	SNG 443	0.250	0.500	0.047	SNGN 12 06 12
	SNG 444	0.250	0.500	0.063	SNGN 12 06 16
	SNG 451	0.313	0.500	0.016	SNGN 12 07 04
	SNG 452	0.313	0.500	0.031	SNGN 12 07 08
	SNG 453	0.313	0.500	0.047	SNGN 12 07 12
	SNG 454	0.313	0.500	0.063	SNGN 12 07 16
	SNG 531	0.188	0.625	0.016	SNGN 15 04 04
	SNG 532	0.188	0.625	0.031	SNGN 15 04 08
	SNG 533	0.188	0.625	0.047	SNGN 15 04 12
	SNG 534	0.188	0.625	0.063	SNGN 15 04 16
	SNG 541	0.250	0.625	0.016	SNGN 15 06 04
	SNG 542	0.250	0.625	0.031	SNGN 15 06 08
	SNG 543	0.250	0.625	0.047	SNGN 15 06 12
	SNG 544	0.250	0.625	0.063	SNGN 15 06 16
	SNG 551	0.313	0.625	0.016	SNGN 15 07 04
	SNG 552	0.313	0.625	0.031	SNGN 15 07 08
	SNG 553	0.313	0.625	0.047	SNGN 15 07 12
	SNG 554	0.313	0.625	0.063	SNGN 15 07 16
	SNG 561	0.375	0.625	0.016	SNGN 15 08 04
	SNG 562	0.375	0.625	0.031	SNGN 15 08 08
	SNG 563	0.375	0.625	0.047	SNGN 15 08 12
	SNG 564	0.375	0.625	0.063	SNGN 15 08 16
	SNG 631	0.188	0.750	0.016	SNGN 19 04 04
	SNG 632	0.188	0.750	0.031	SNGN 19 04 08
	SNG 633	0.188	0.750	0.047	SNGN 19 04 12
	SNG 634	0.188	0.750	0.063	SNGN 19 04 16
	SNG 641	0.250	0.750	0.016	SNGN 19 06 04
	SNG 642	0.250	0.750	0.031	SNGN 19 06 08
	SNG 643	0.250	0.750	0.047	SNGN 19 06 12
	SNG 644	0.250	0.750	0.063	SNGN 19 06 16
	SNG 651	0.3130	0.750	0.016	SNGN 19 07 04
	SNG 652	0.3130	0.750	0.031	SNGN 19 07 08
	SNG 653	0.3130	0.750	0.047	SNGN 19 07 12
	SNG 654	0.3130	0.750	0.063	SNGN 19 07 16



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Series 6000		Ceramic Inserts   ISO			
SNG	Insert Number	Thickness	IC	Radius	ISO Designation
	SNG 656	0.3130	0.750	0.094	SNGN 19 07 24
	SNG 661	0.3750	0.750	0.016	SNGN 19 08 04
	SNG 662	0.3750	0.750	0.031	SNGN 19 08 08
	SNG 663	0.3750	0.750	0.047	SNGN 19 08 12
	SNG 664	0.3750	0.750	0.063	SNGN 19 08 16
SNGA	Insert Number	Thickness	IC	Radius	ISO Designation
	SNGA 321	0.125	0.375	0.016	SNGA 09 03 04
	SNGA 322	0.125	0.375	0.031	SNGA 09 03 08
	SNGA 323	0.125	0.375	0.047	SNGA 09 03 12
	SNGA 324	0.125	0.375	0.063	SNGA 09 03 16
	SNGA 431	0.188	0.500	0.016	SNGA 12 04 04
	SNGA 432	0.188	0.500	0.031	SNGA 12 04 08
	SNGA 433	0.188	0.500	0.047	SNGA 12 04 12
	SNGA 434	0.188	0.500	0.063	SNGA 12 04 16
	SNGA 436	0.188	0.500	0.094	SNGA 12 04 24
	SNGA 441	0.250	0.500	0.016	SNGA 12 06 04
	SNGA 442	0.250	0.500	0.031	SNGA 12 06 08
	SNGA 443	0.250	0.500	0.047	SNGA 12 06 12
	SNGA 444	0.250	0.500	0.063	SNGA 12 06 16
	SNGA 451	0.313	0.500	0.016	SNGA 12 07 04
	SNGA 452	0.313	0.500	0.031	SNGA 12 07 08
	SNGA 453	0.313	0.500	0.047	SNGA 12 07 12
	SNGA 454	0.313	0.500	0.063	SNGA 12 07 16
	SNGA 531	0.188	0.625	0.016	SNGA 15 04 04
	SNGA 532	0.188	0.625	0.031	SNGA 15 04 08
	SNGA 533	0.188	0.625	0.047	SNGA 15 04 12
	SNGA 534	0.188	0.625	0.063	SNGA 15 04 16
	SNGA 536	0.188	0.625	0.094	SNGA 15 04 24
	SNGA 541	0.250	0.625	0.016	SNGA 15 06 04
	SNGA 542	0.250	0.625	0.031	SNGA 15 06 08
	SNGA 543	0.250	0.625	0.047	SNGA 15 06 12
	SNGA 544	0.250	0.625	0.063	SNGA 15 06 16
	SNGA 551	0.313	0.625	0.016	SNGA 15 07 04
	SNGA 552	0.313	0.625	0.031	SNGA 15 07 08
	SNGA 553	0.313	0.625	0.047	SNGA 15 07 12
	SNGA 554	0.313	0.625	0.063	SNGA 15 07 16
	SNGA 631	0.188	0.750	0.016	SNGA 19 04 04
	SNGA 632	0.188	0.750	0.031	SNGA 19 04 08
SNGA 633	0.188	0.750	0.047	SNGA 19 04 12	
SNGA 634	0.188	0.750	0.063	SNGA 19 04 16	
SNGA 641	0.250	0.750	0.016	SNGA 19 06 04	
SNGA 642	0.250	0.750	0.031	SNGA 19 06 08	
SNGA 643	0.250	0.750	0.047	SNGA 19 06 12	

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Series 6000		Ceramic Inserts   ISO				
	SNGA	Insert Number	Thickness	IC	Radius	ISO Designation
		SNGA 644	0.250	0.750	0.063	SNGA 19 0616
		SNGA 651	0.313	0.750	0.016	SNGA 19 07 04
		SNGA 652	0.313	0.750	0.031	SNGA 19 07 08
		SNGA 653	0.313	0.750	0.047	SNGA 19 07 12
		SNGA 654	0.313	0.750	0.063	SNGA 19 07 16
	SNGX	Insert Number	Thickness	IC	Radius	ISO Designation
		SNGX 451	0.313	0.500	0.016	SNGX 12 07 04
		SNGX 452	0.313	0.500	0.031	SNGX 12 07 08
		SNGX 453	0.313	0.500	0.047	SNGX 12 07 12
		SNGX 454	0.313	0.500	0.063	SNGX 12 07 16
	SNMX	Insert Number	Thickness	IC	Radius	ISO Designation
		SNMX 453	0.313	0.500	0.047	SNMX 12 07 12
		SNMX 454	0.313	0.500	0.063	SNMX 12 07 16
	SNMX 554	0.313	0.625	0.063	SNMX 15 07 16	
	SPG	Insert Number	Thickness	IC	Radius	ISO Designation
		SPG 321	0.125	0.375	0.016	SPGN 09 03 04
		SPG 322	0.125	0.375	0.031	SPGN 09 03 08
		SPG 323	0.125	0.375	0.047	SPGN 09 03 12
		SPG 324	0.125	0.375	0.063	SPGN 09 03 16
		SPG 331	0.188	0.375	0.016	SPGN 09 04 04
		SPG 332	0.188	0.375	0.031	SPGN 09 04 08
		SPG 333	0.188	0.375	0.047	SPGN 09 04 12
		SPG 334	0.188	0.375	0.063	SPGN 09 04 16
		SPG 421	0.125	0.500	0.016	SPGN 12 03 04
		SPG 422	0.125	0.500	0.031	SPGN 12 03 08
		SPG 423	0.125	0.500	0.047	SPGN 12 03 12
		SPG 424	0.125	0.500	0.063	SPGN 12 03 16
		SPG 431	0.188	0.500	0.016	SPGN 12 04 04
		SPG 432	0.188	0.500	0.031	SPGN 12 04 08
		SPG 433	0.188	0.500	0.047	SPGN 12 04 12
		SPG 434	0.188	0.500	0.063	SPGN 12 04 16
		SPG 441	0.250	0.500	0.016	SPGN 12 06 04
		SPG 442	0.250	0.500	0.031	SPGN 12 06 08
		SPG 443	0.250	0.500	0.047	SPGN 12 06 12
		SPG 444	0.250	0.500	0.063	SPGN 12 06 16
		SPG 451	0.313	0.500	0.016	SPGN 12 07 04
		SPG 452	0.313	0.500	0.031	SPGN 12 07 08
		SPG 453	0.313	0.500	0.047	SPGN 12 07 12
		SPG 454	0.313	0.500	0.063	SPGN 12 07 16
		SPG 531	0.188	0.625	0.016	SPGN 15 04 04
		SPG 532	0.188	0.625	0.031	SPGN 15 04 08
		SPG 533	0.188	0.625	0.047	SPGN 15 04 12
	SPG 534	0.188	0.625	0.063	SPGN 15 04 16	
	SPG 541	0.250	0.625	0.016	SPGN 15 06 04	
	SPG 542	0.250	0.625	0.031	SPGN 15 06 08	

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Series 6000		Ceramic Inserts   ISO			
SPG	Insert Number	Thickness	IC	Radius	ISO Designation
	SPG 543	0.250	0.625	0.047	SPGN 15 06 12
	SPG 544	0.250	0.625	0.063	SPGN 15 06 16
	SPG 551	0.313	0.625	0.016	SPGN 15 07 04
	SPG 552	0.313	0.625	0.031	SPGN 15 07 08
	SPG 553	0.313	0.625	0.047	SPGN 15 07 12
	SPG 554	0.313	0.625	0.063	SPGN 15 07 16
	SPG 631	0.188	0.750	0.016	SPGN 19 04 04
	SPG 632	0.188	0.750	0.031	SPGN 19 04 08
	SPG 633	0.188	0.750	0.047	SPGN 19 04 12
	SPG 634	0.188	0.750	0.063	SPGN 19 04 16
	SPG 63A	0.188	0.750	-	SPGN 19 04 00
	SPG 641	0.250	0.750	0.016	SPGN 19 06 04
	SPG 642	0.250	0.750	0.031	SPGN 19 06 08
	SPG 643	0.250	0.750	0.047	SPGN 19 06 12
	SPG 644	0.250	0.750	0.063	SPGN 19 06 16
	SPG 651	0.313	0.750	0.016	SPGN 19 07 04
	SPG 652	0.313	0.750	0.031	SPGN 19 07 08
	SPG 653	0.313	0.750	0.047	SPGN 19 07 12
	SPG 654	0.313	0.750	0.063	SPGN 19 07 16
	SPG 661	0.375	0.750	0.016	SPGN 19 08 04
SPG 662	0.375	0.750	0.031	SPGN 19 08 08	
SPG 663	0.375	0.750	0.047	SPGN 19 08 12	
SPG 664	0.375	0.750	0.063	SPGN 19 08 16	
SPK	Insert Number	Thickness	IC	Radius	ISO Designation
	SPK 42ZR	0.125	0.500	-	SPKN 12 03 ZR
	SPK 43ZR	0.188	0.500	-	SPKN 12 04 ZR
TNG	Insert Number	Thickness	IC	Radius	ISO Designation
	TNG 221	0.125	0.250	0.016	TNGN 11 03 04
	TNG 222	0.125	0.250	0.031	TNGN 11 03 08
	TNG 223	0.125	0.250	0.047	TNGN 11 03 12
	TNG 224	0.125	0.250	0.063	TNGN 11 03 16
	TNG 321	0.125	0.375	0.016	TNGN 16 03 04
	TNG 322	0.125	0.375	0.031	TNGN 16 03 08
	TNG 323	0.125	0.375	0.047	TNGN 16 03 12
	TNG 324	0.125	0.375	0.063	TNGN 16 03 16
	TNG 331	0.188	0.375	0.016	TNGN 16 04 04
	TNG 332	0.188	0.375	0.031	TNGN 16 04 08
	TNG 333	0.188	0.375	0.047	TNGN 16 04 12
	TNG 334	0.188	0.375	0.063	TNGN 16 04 16
	TNG 341	0.250	0.375	0.016	TNGN 16 06 04
	TNG 342	0.250	0.375	0.031	TNGN 16 06 08
	TNG 343	0.250	0.375	0.047	TNGN 16 06 12
	TNG 344	0.250	0.375	0.063	TNGN 16 06 16
	TNG 431	0.188	0.500	0.016	TNGN 22 04 04

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Series 6000		Ceramic Inserts   ISO			
TNG	Insert Number	Thickness	IC	Radius	ISO Designation
	TNG 432	0.188	0.500	0.031	TNGN 22 04 08
	TNG 433	0.188	0.500	0.047	TNGN 22 04 12
	TNG 434	0.188	0.500	0.063	TNGN 22 04 16
	TNG 441	0.250	0.500	0.016	TNGN 22 06 04
	TNG 442	0.250	0.500	0.031	TNGN 22 06 08
	TNG 443	0.250	0.500	0.047	TNGN 22 06 12
	TNG 444	0.250	0.500	0.063	TNGN 22 06 16
	TNG 451	0.313	0.500	0.016	TNGN 22 07 04
	TNG 452	0.313	0.500	0.031	TNGN 22 07 08
	TNG 453	0.313	0.500	0.047	TNGN 22 07 12
	TNG 454	0.313	0.500	0.063	TNGN 22 07 16
	TNG 531	0.188	0.625	0.016	TNGN 27 04 04
	TNG 532	0.188	0.625	0.031	TNGN 27 04 08
	TNG 533	0.188	0.625	0.047	TNGN 27 04 12
	TNG 534	0.188	0.625	0.063	TNGN 27 04 16
TNGA	Insert Number	Thickness	IC	Radius	ISO Designation
	TNGA 321	0.125	0.375	0.016	TNGA 16 03 04
	TNGA 322	0.125	0.375	0.031	TNGA 16 03 08
	TNGA 323	0.125	0.375	0.047	TNGA 16 03 12
	TNGA 324	0.125	0.375	0.063	TNGA 16 03 16
	TNGA 326	0.125	0.375	0.094	TNGA 16 03 24
	TNGA 331	0.188	0.375	0.016	TNGA 16 04 04
	TNGA 332	0.188	0.375	0.031	TNGA 16 04 08
	TNGA 333	0.188	0.375	0.047	TNGA 16 04 12
	TNGA 334	0.188	0.375	0.063	TNGA 16 04 16
	TNGA 336	0.188	0.375	0.094	TNGA 16 04 24
	TNGA 338	0.188	0.375	0.125	TNGA 16 04 32
	TNGA 431	0.188	0.500	0.016	TNGA 22 04 04
	TNGA 432	0.188	0.500	0.031	TNGA 22 04 08
	TNGA 433	0.188	0.500	0.047	TNGA 22 04 12
	TNGA 434	0.188	0.500	0.063	TNGA 22 04 16
	TNGA 438	0.188	0.500	0.125	TNGA 22 04 32
	TNGA 441	0.250	0.500	0.016	TNGA 22 06 04
	TNGA 442	0.250	0.500	0.031	TNGA 22 06 08
	TNGA 443	0.250	0.500	0.047	TNGA 22 06 12
	TNGA 444	0.250	0.500	0.063	TNGA 22 06 16
TPG	Insert Number	Thickness	IC	Radius	ISO Designation
	TPG 221	0.125	0.250	0.016	TPGN 11 03 04
	TPG 222	0.125	0.250	0.031	TPGN 11 03 08
	TPG 223	0.125	0.250	0.047	TPGN 11 03 12
	TPG 224	0.125	0.250	0.063	TPGN 11 03 16
	TPG 321	0.125	0.375	0.016	TPGN 16 03 04
	TPG 322	0.125	0.375	0.031	TPGN 16 03 08
	TPG 323	0.125	0.375	0.047	TPGN 16 03 12

# ULTIMATE PERFORMANCE

## Ceramic Inserts For Milling And Turning Applications



Series 6000		Ceramic Inserts   ISO				
TPG	Insert Number	Thickness	IC	Radius	ISO Designation	
	TPG 324	0.125	0.375	0.063	TPGN 16 03 16	
	TPG 331	0.188	0.375	0.016	TPGN 16 04 04	
	TPG 332	0.188	0.375	0.031	TPGN 16 04 08	
	TPG 333	0.188	0.375	0.047	TPGN 16 04 12	
	TPG 334	0.188	0.375	0.063	TPGN 16 04 16	
	TPG 341	0.250	0.375	0.016	TPGN 16 06 04	
	TPG 342	0.250	0.375	0.031	TPGN 16 06 08	
	TPG 343	0.250	0.375	0.047	TPGN 16 06 12	
	TPG 344	0.250	0.375	0.063	TPGN 16 06 16	
	TPG 431	0.188	0.500	0.016	TPGN 22 04 04	
	TPG 432	0.188	0.500	0.031	TPGN 22 04 08	
	TPG 433	0.188	0.500	0.047	TPGN 22 04 12	
	TPG 434	0.188	0.500	0.063	TPGN 22 04 16	
	TPG 441	0.250	0.500	0.016	TPGN 22 06 04	
	TPG 442	0.250	0.500	0.031	TPGN 22 06 08	
	TPG 443	0.250	0.500	0.047	TPGN 22 06 12	
	TPG 444	0.250	0.500	0.063	TPGN 22 06 16	
	TPG 451	0.313	0.500	0.016	TPGN 22 07 04	
	TPG 452	0.313	0.500	0.031	TPGN 22 07 08	
	TPG 453	0.313	0.500	0.047	TPGN 22 07 12	
	TPG 454	0.313	0.500	0.063	TPGN 22 07 16	
	TPG 531	0.188	0.625	0.016	TPGN 27 04 04	
	TPG 532	0.188	0.625	0.031	TPGN 27 04 08	
	TPG 533	0.188	0.625	0.047	TPGN 27 04 08	
TPG 534	0.188	0.625	0.063	TPGN 27 04 16		
TPGA	Insert Number	Thickness	IC	Radius	ISO Designation	
	TPGA 321	0.125	0.375	0.016	TPGA 16 03 04	
	TPGA 322	0.125	0.375	0.031	TPGA 16 03 08	
	TPGA 323	0.125	0.375	0.047	TPGA 16 03 12	
	TPGA 324	0.125	0.375	0.063	TPGA 16 03 16	
	TPGA 331	0.188	0.375	0.016	TPGA 16 04 04	
	TPGA 332	0.188	0.375	0.031	TPGA 16 04 08	
	TPGA 333	0.188	0.375	0.047	TPGA 16 04 12	
	TPGA 334	0.188	0.375	0.063	TPGA 16 04 16	
	TPGA 431	0.188	0.500	0.016	TPGA 22 04 04	
	TPGA 432	0.188	0.500	0.031	TPGA 22 04 08	
	TPGA 433	0.188	0.500	0.047	TPGA 22 04 12	
	TPGA 434	0.188	0.500	0.063	TPGA 22 04 16	
	TPGA 441	0.250	0.500	0.016	TPGA 22 06 04	
	TPGA 442	0.250	0.500	0.031	TPGA 22 06 08	
	TPGA 443	0.250	0.500	0.047	TPGA 22 06 12	
	TPGA 444	0.250	0.500	0.063	TPGA 22 06 16	
VNGA	Insert Number	Thickness	IC	Radius	ISO Designation	
	VNGA 331	0.188	0.375	0.016	VNGA 16 04 04	

INTRO




MILLING

SPECIALTY

HOLEMAKING

THREADING


INSERTS

Series 6000		Ceramic Inserts   ISO			
<b>VNGA</b>	<b>Insert Number</b>	<b>Thickness</b>	<b>IC</b>	<b>Radius</b>	<b>ISO Designation</b>
	VNGA 332	0.188	0.375	0.031	VNGA 16 04 08
	VNGA 333	0.188	0.375	0.047	VNGA 16 04 12
	VNGA 334	0.188	0.375	0.063	VNGA 16 04 16
<b>VNGX</b>	<b>Insert Number</b>	<b>Thickness</b>	<b>IC</b>	<b>Radius</b>	<b>ISO Designation</b>
	VNGX 352	0.313	0.375	0.031	VNGX 16 07 08
	VNGX 353	0.313	0.375	0.047	VNGX 16 07 12
	VNGX 354	0.313	0.375	0.063	VNGX 16 07 16
<b>WNGA</b>	<b>Insert Number</b>	<b>Thickness</b>	<b>IC</b>	<b>Radius</b>	<b>ISO Designation</b>
	WNGA 431	0.188	0.500	0.016	WNGA 08 04 04
	WNGA 432	0.188	0.500	0.031	WNGA 08 04 08
	WNGA 433	0.188	0.500	0.047	WNGA 08 04 12
	WNGA 434	0.188	0.500	0.063	WNGA 08 04 16

### Popular Custom Insert Options

- Specialty forms including top notch and grooving
- Single and double-lead thread whirling inserts
- Additional PCD, PCBN and Ceramic grades
- Specialized steel body constructions for turning, milling and holemaking

**CUSTOM  
COMES  
STANDARD**



# ULTIMATE PERFORMANCE

Ceramic Inserts For Milling And Turning Applications




Series 6000		Indexafeed Wiper   Ceramic   ISO				
CNG	Insert Number	Thickness	IC	Radius	ISO Designation	
	CNG 43 IF	0.188	0.500	-	CNGN 12 04 ZZ	
CNGA	Insert Number	Thickness	IC	Radius	ISO Designation	
	CNGA 43 IF	0.188	0.500	-	CNGA 12 04 ZZ	
SCG	Insert Number	Thickness	IC	Radius	ISO Designation	
	SCG 33 IF	0.188	0.375	-	SCGN 09 04 ZZ	
SNG	Insert Number	Thickness	IC	Radius	ISO Designation	
	SNG 43 IF	0.188	0.500	-	SNGN 12 04 ZZ	

## Popular Custom Insert Options

- Specialty forms including top notch and grooving
- Single and double-lead thread whirling inserts
- Additional PCD, PCBN and Ceramic grades
- Specialized steel body constructions for turning, milling and holmaking

**CUSTOM  
COMES  
STANDARD**



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS



# ULTIMATE PERFORMANCE

Whiskered Ceramic Inserts For Turning Nickel Alloys



INTRO

MILLING

SPECIALTY

HOLEMAKING

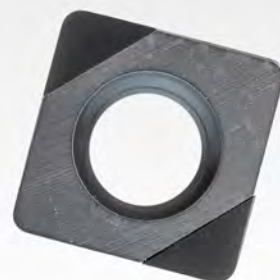
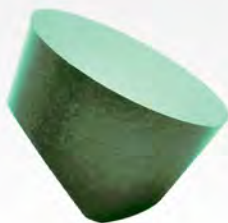
THREADING

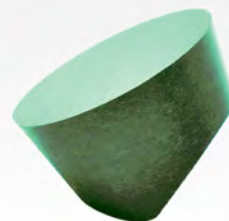
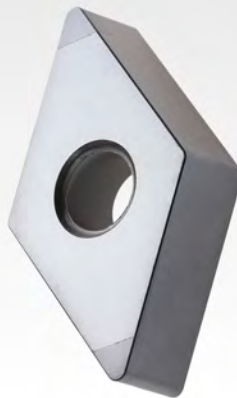
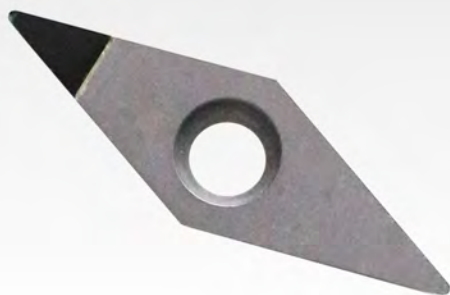
INSERTS

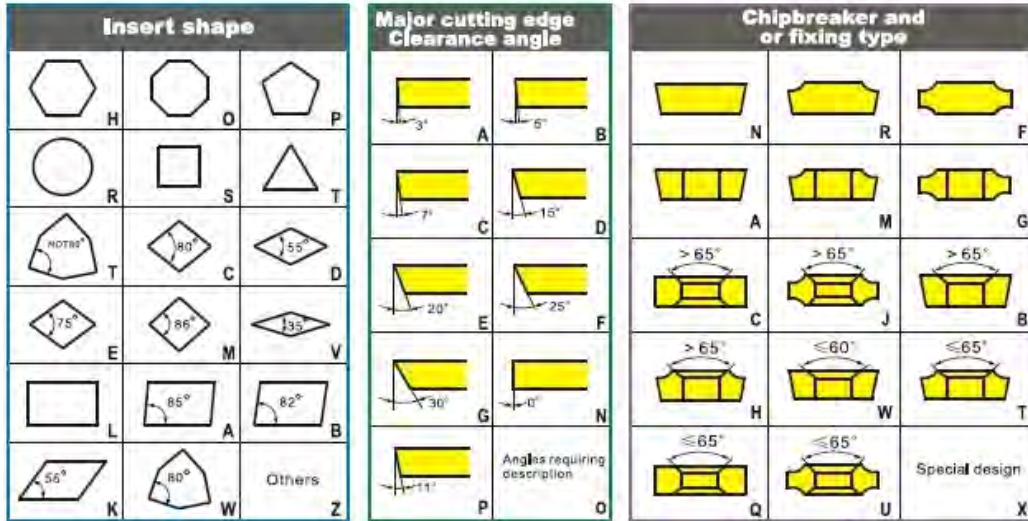
Series 6100		AlloyCat   CG88   Whiskered Ceramic					
RNGN	EDP	Thickness	Width	IC	Radius	Edge Prep	ISO Designation
	600001	0.125	-	0.375	-	T1	RNGN-090300
	600002	0.125	-	0.375	-	T1A	RNGN-090300
	600003	0.125	-	0.375	-	T2A	RNGN-090300
	600004	0.187	-	0.375	-	T1	RNGN-090400
	600005	0.187	-	0.375	-	T1A	RNGN-090400
	600006	0.187	-	0.375	-	T2A	RNGN-090400
	600007	0.187	-	0.500	-	T1	RNGN-120400
	600008	0.187	-	0.500	-	T1A	RNGN-120400
	600009	0.187	-	0.500	-	T2	RNGN-120400
	600010	0.187	-	0.500	-	T2A	RNGN-120400
	600011	0.312	-	0.500	-	T1	RNGN-120700
	600012	0.312	-	0.500	-	T1A	RNGN-120700
	600013	0.312	-	0.500	-	T2	RNGN-120700
	600014	0.312	-	0.500	-	T2A	RNGN-120700
	600015	0.312	-	0.500	-	A	RNGN-120700
RPGN	EDP	Thickness	Width	IC	Radius	Edge Prep	ISO Designation
	600101	0.187	-	0.250	-	T1	RPGX-060400
	600102	0.187	-	0.250	-	T2A	RPGX-060400
	600103	0.312	-	0.375	-	T1	RPGX-090700
	600104	0.312	-	0.375	-	T2A	RPGX-090700
	600105	0.312	-	0.500	-	T1	RPGX-120700
	600106	0.312	-	0.500	-	T1A	RPGX-120700
	600107	0.312	-	0.500	-	T2A	RPGX-120700
RCGN	EDP	Thickness	Width	IC	Radius	Edge Prep	ISO Designation
	600201	0.187	-	0.250	-	T1	RCGX-060400
	600202	0.187	-	0.250	-	T2A	RCGX-060400
	600203	0.312	-	0.375	-	T1	RCGX-090700
	600204	0.312	-	0.375	-	T1A	RCGX-090700
	600205	0.312	-	0.375	-	T2A	RCGX-090700
	600206	0.312	-	0.375	-	T4B	RCGX-090700
	600207	0.312	-	0.500	-	T1	RCGX-120700
	600208	0.312	-	0.500	-	T1A	RCGX-120700
	600209	0.312	-	0.500	-	T2A	RCGX-120700
	600210	0.312	-	0.500	-	T2A	RCGX-120700
	600211	0.312	-	0.500	-	T5A	RCGX-120700
	600212	0.312	-	0.500	-	T5B	RCGX-120700
	600213	0.312	-	0.500	-	A	RCGX-120700
6003	EDP	Thickness	Width	IC	Radius	Edge Prep	ISO Designation
	600301	-	0.125	-	0.125	A	-
	600302	-	0.156	-	0.125	A	-
	600303	-	0.187	-	0.125	A	-
	600304	-	0.218	-	0.187	A	-
	600305	-	0.250	-	0.187	A	-
6004	EDP	Thickness	Width	IC	Radius	Edge Prep	ISO Designation
	600401	-	0.125	-	0.015	A	-
	600402	-	0.125	-	0.031	A	-
	600403	-	0.156	-	0.015	A	-
	600404	-	0.187	-	0.031	A	-
	600405	-	0.187	-	0.015	A	-
	600406	-	0.187	-	0.031	A	-
	600407	-	0.218	-	0.015	A	-
	600408	-	0.218	-	0.031	A	-
	600409	-	0.250	-	0.015	A	-
	600410	-	0.250	-	0.031	A	-
	600411	-	0.250	-	0.046	A	-
	600412	-	0.250	-	0.062	A	-

# TECHNICAL DATA

## INSERTS





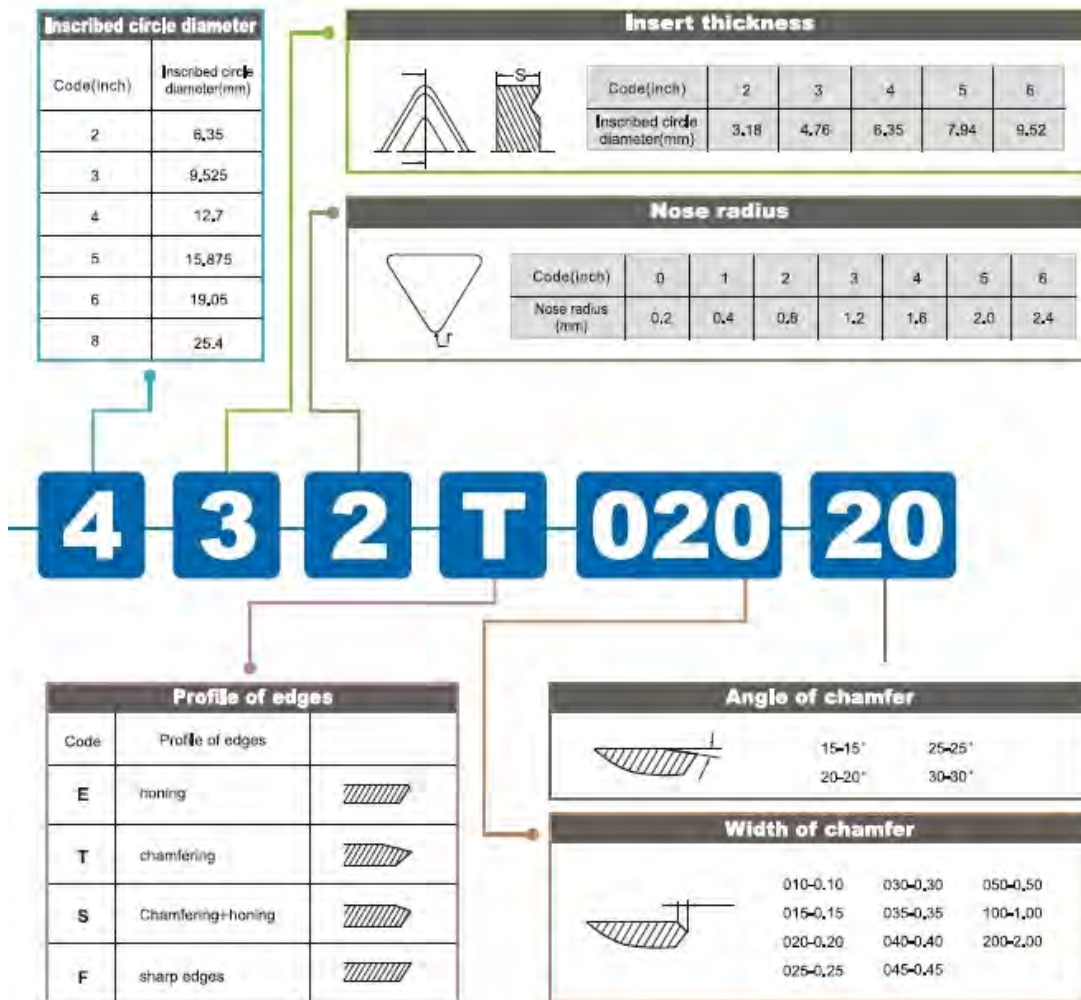


**C N G A**

Tolerances, inch							
Letter Symbol	Tolerances in inches			Letter Symbol	Tolerances in inches		
	m	s	d		m	s	d
<b>A</b>	±0.0002	±0.001	±0.0010	<b>J</b>	±0.0002	±0.001	±0.002 ±0.005
<b>F</b>	±0.0002	±0.001	±0.0005	<b>K</b>	±0.0005	±0.001	±0.002 ±0.005
<b>C</b>	±0.0005	±0.001	±0.0010	<b>L</b>	±0.0010	±0.001	±0.002 ±0.005
<b>H</b>	±0.0005	±0.001	±0.0005	<b>M</b>	±0.003 ±0.007	±0.005	±0.002 ±0.005
<b>E</b>	±0.0010	±0.001	±0.0010	<b>N</b>	±0.003 ±0.007	±0.001	±0.002 ±0.005
<b>G</b>	±0.0010	±0.005	±0.0010	<b>U</b>	±0.005 ±0.015	±0.005	±0.003 ±0.010

Inscribed circle diameter	Tolerances for M		Tolerances for d	
	Class M	Class U	Class M, L, K, L	Class U
0.250	±0.003	±0.005	±0.002	±0.003
0.375	±0.003	±0.005	±0.002	±0.003
0.500	±0.005	±0.008	±0.003	±0.005
0.625	±0.006	±0.011	±0.004	±0.007
0.750	±0.006	±0.011	±0.004	±0.007
1.000	±0.007	±0.015	±0.005	±0.010

Insert shape D			Insert shape V		
Inscribed circle diameter	Tolerances for M	Tolerances for M	Inscribed circle diameter	Tolerances for M	Tolerances for M
0.250	±0.004	±0.002	0.250	±0.006	±0.002
0.375	±0.004	±0.002	0.375	±0.006	±0.002
0.500	±0.006	±0.003	0.500	±0.008	±0.003
0.625	±0.007	±0.004	0.625	±0.011	±0.004
0.750	±0.007	±0.004	0.750	±0.011	±0.004



# TECHNICAL DATA

## Ceramic Grade Applications

Grade	TRS (psi)	Hardness (Ra)	Toughness	Characteristics	General Applications
I-50	105,000	93.1	3.8	<ul style="list-style-type: none"> <li>Toughened by ZrO<sub>2</sub></li> <li>High chemical stability</li> </ul>	<ul style="list-style-type: none"> <li>Finish/semi-finish/roughing of cast irons</li> <li>Finish/semi-finish cutting for steel</li> </ul>
I-100	130,000	94.5	-	<ul style="list-style-type: none"> <li>Excellent wear resistance</li> <li>High thermal shock resistance</li> </ul>	<ul style="list-style-type: none"> <li>Roughing and semi-finishing of cast iron</li> <li>Can run with flood coolant</li> <li>Excellent milling grade</li> </ul>
MW37	110,000	93	7.7	<ul style="list-style-type: none"> <li>Excellent thermal shock resistance</li> <li>High fracture strength</li> </ul>	<ul style="list-style-type: none"> <li>Suited for nickel based alloy material, High velocity rough machining</li> </ul>
MW43	168,000	94.9	6.5	<ul style="list-style-type: none"> <li>Exceptionally high resistance to fracture and thermal cracking</li> <li>Excellent wear resistance</li> </ul>	<ul style="list-style-type: none"> <li>Designed for machining cast irons at high surface speeds</li> <li>Excellent finishing grade</li> <li>Coolant is not recommended with this grade</li> </ul>
MW43B	-	94.2	7	<ul style="list-style-type: none"> <li>Increased toughness over MW43</li> <li>Compatible with coolant</li> </ul>	<ul style="list-style-type: none"> <li>For general purpose machining of cast iron with or without coolant</li> <li>Excellent grade for nodular iron</li> <li>More forgiving to inclusions and other casting</li> </ul>
TITAN	-	93.2	7.2	<ul style="list-style-type: none"> <li>Exceptionally tough</li> <li>Excellent wear resistance</li> </ul>	<ul style="list-style-type: none"> <li>Developed specifically for milling cast iron</li> <li>Suitable for rough turning nodular iron</li> </ul>
MWW	-	94.4	-	<ul style="list-style-type: none"> <li>Excellent wear resistance</li> <li>Whisker reinforced</li> <li>Resistant to cracking</li> </ul>	<ul style="list-style-type: none"> <li>Developed for high productivity machining of hardened steels</li> <li>Ni and cobalt based alloys</li> <li>Excellent wear and notch resistance</li> </ul>

Grade	Information
I-50	I-50 is an Al <sub>2</sub> O <sub>3</sub> grade, which is enhanced with Zirconia. This is a very stable grade and can be used for general machining and finish cutting of cast iron.
I-100	Shows excellent thermal shock and wear resistance. A general purpose machining grade for hardened steel. It can be used for finish and semi-finish cutting of soft cast iron without interruption.
MW37	Developed specifically for the high speed machining of nickel based alloys. It is capable of machining materials such as Inconel 718 (45HRC) at speeds up to 10 times faster than carbide.
MW43	Specifically for high speed general and finishing turning cast iron, MW43 offers enhanced hardness, toughness and high temperature strength. Because of this, MW43 has very high wear resistance, promoting longer tool life. This grade also displays increased chipping resistance as well as higher speeds and feeds over competitor's grades. We recommend to NOT use coolant with this grade, as the exceptional red-hardness of MW43 allows it to maintain stable life without the risk of premature wear due to heat.
MW43B	A modified version of our highly successful MW43 grade. MW43B has been engineered to provide a tougher cutting edge, specifically for applications that require a more forgiving substrate. This grade also works with or without coolant depending on your application requirements. MW43B is also successful in finish turning of nodular iron providing dependable tool life and toughness.
TITAN	GWS Tool Group's TITAN was developed for milling applications involving cast irons. Titan offers high shock and impact resistance. Titan has proven exceptional at rough turning nodular irons.
MWW	Our whisker reinforced grade offers longer and more stable tool life over other competitor's grades, with reduced chipping and notch wear. Specifically for machining hardened steels, nickel and cobalt based refractory alloys with greatly increased speeds and feeds over carbide.

# TECHNICAL DATA

## Ceramic Insert Grade Comparison Chart

	GWS	GREENLEAF	ISCAR	KENNAMETAL	KYOCERA	MITSUBISHI	NTK	ROMAY	SANDVIK	SPK	SSANGYONG	SUMIOTOMO	TAEGUTECH	TUNGALOY
CAST IRON	I-50	GEM19	IN11	-	KA30	MH1	HC1, HW2	CC10	-	-	SZ200, SZ300	-	AW20, AB120	-
	I-100, I-150	GEM7	IN22, IN23	KO90, KY1615	A65, A66N, PT600M	MH2, MH3	HC2, HC5, HC6	CC20, CC30	CC620, CC650	SH2	ST100, ST300, ST500, SD200, TC300, TA300	NB90S	AB30 AB30	LX11, LX21, CX710
		CSN200, CSN100	IS8, IS80	KYK25, KYK35, KY3000, KY3400, KY3500	CS7050, KS6000, KS6050	MK1, MK2, MK3	SX1, SX6, SP9	CC510, CC513, CC514,	CC6190, CC1690	SL506, SL508, SL554C, SL808, SL550C, SL654, SL854C	SN26, SN300, SN400, SN500, SN600, SN700, SN800	SN2000K, NS260, NS260C, SN2100K	AS10, SC10, AS500	FX105
HEAT RESISTANT ALLOY	MWW	WG300, WG600	IW7	KY4300	-	MSW	WA1	CC600	CC670	-	SW400, SW500, SW700	WX2000	TC430	-
		SIAIOX	-	KYS25, KYS30, KY2100, KY1525, KY1540	CF1	MS1	SX5, SX7, SX9		CC6060, CC6065	-	SN900	SN1000H	AS20	-
HARDENED MATERIAL	I-100, I-150	GEN7	IN22	KY4400	A65, KT66, A66N, PT600M	MH2, MH3	HC4, ZC4, HC7, ZC7		CC6050	-	-	NB90S	AB20	LX11
	MWW	WG300, WG600	IW7	KYS25, KY4300	-	MSW	WA1	-	CC670	-	SW400, SW500, SW700	-	-	-

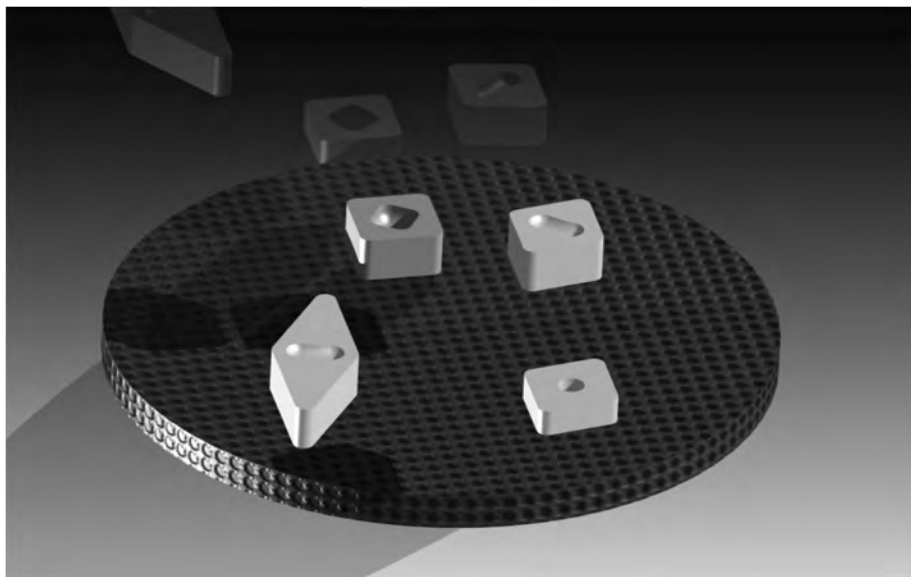
The application of T-lands (edge chamfers), hones, or both is generally required to increase the strength of ceramic cutting edges. Negative T-lands redirect the cutting forces into the body of the insert, thereby reducing the tensile stresses on the cutting edge. Honing or edge rounding eliminates the sharp edges at which chipping can occur in the early stages of use.

Selecting the proper edge preparation is often the most important factor affecting the performance of ceramic inserts. The size and type of the edge preparation required are related primarily to the feed rate and the severity of the operation. Light feed rates demand small T-lands and/or hones; heavy feed rates require larger T-lands and hones. The ideal edge preparation is the smallest which consistently provides adequate edge strength and resistance to chipping in a given operation.

As a general rule, the feed rate (in inches/revolution) should be 1 - 1.5 times the width of the T-land. GWS Tool Group's standard edge preparations have been selected to provide a high degree of edge security over a wide range of applications and machining conditions. These standards and corresponding general application guidelines are listed in the table below.

Designation	Land	Operation
T1	.002" X 30°	Precision Finishing Operations
T2	.004" X 30°	Finishing Operations
T3	.006" X 30°	Milling Operations
T4	.008" X 30°	Roughing & Finishing Operations
T5	.012" X 30°	High Speed Roughing
T6	.004" X 20°	Light Finishing
T7	.008" X 20°	Roughing & Finishing
T8	.012" X 20°	High Speed Roughing
T9	.060" X 10°	Steel Roll Applications
T10	.060" X 20°	Steel Roll Applications
T11	.060" X 30°	Steel Roll Applications
Designation	Hone Radius	Operation
A	.001" - .003"	Light Hone
B	.003" - .005"	Medium Hone
C	.006" - .008"	Heavy Hone

To add a hone size to the above edge preparations, the above letter should be used.





## Relap/Resize/Retipping of PCD/PCBN Inserts and Cartridges

When considering any insert from this catalog, remember that a majority of these can be reconditioned. GWS offers 3 different ways to recondition your insert or cartridge to optimize the cost effectiveness of this tooling.

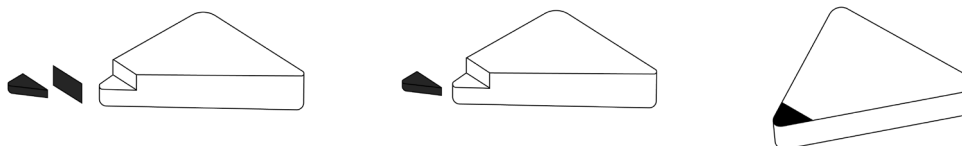
### Relapping

This is accomplished by using CNC grinding technology to obtain the correct cutting edge quality desired. Insert or cartridge is reduced in size, and, if more than .015" (.381MM) needs to be ground, the tool will be rejected. It may be reconditioned using another of GWS' PCD/PCBN reconditioning processes if applicable. This is by far the most economical process available.



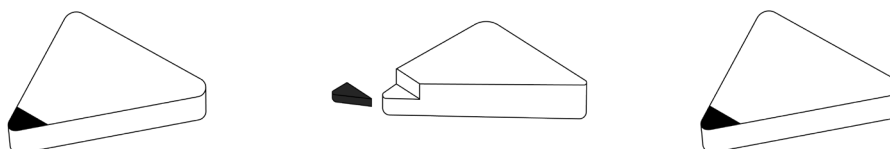
### Resizing

Resizing the insert or cartridge is accomplished by removing the segment, preparing the pocket, and inserting a shim between the body and segment. This allows the tool to be returned to its original size, through CNC grinding technology. If more than .020" (.508MM) has to be removed, the tip is not acceptable, and must be retipped. If resizing is a viable option, it allows for an economical way to return the tooling to like-new standards.



### Retipping

Once the tool can't be relapped or resized, retipping the tool becomes an option. Retipping allows the body of the insert to be retained, and a new PCD/PCBN tip is applied, CNC ground and returned to new tool quality and standards. Retipping is also an option when the segment has suffered severe fracture, but the tool body is not damaged.



# TECHNICAL DATA

## Speed & Feed Guide

Material	Hardness Bhn	Depth of Cut (in.)	Recommended Speed Range (sfm)					
			I-50	I-100	MW37	MW43	Titan2	MWW
Carbon Steels AISI Series 1000, 1100, 1200	150-200	.025	2000-3000	1800-2500	-	-	-	-
		.075	1800-2200	1500-2000	-	-	-	-
		.150		1200-1600	-	-	-	-
	200-250	.025	1600-2400	1200-1800	-	-	-	-
		.075	1200-1800	1000-1500	-	-	-	-
		.150		800-1200	-	-	-	-
	250-350	.020	1000-1500	1000-1500	-	-	-	-
		.060	800-1200	800-1200	-	-	-	-
		.125	-	700-1000	-	-	-	-
	40-50 Rc	.015	-	500-1000	-	-	-	-
		.030	-	400-800	-	-	-	-
		.060	-	350-600	-	-	-	-
50-60 Rc	.010	-	350-600	-	-	-	-	
	.020	-	300-500	-	-	-	-	
	.040	-	250-400	-	-	-	-	
Alloy Steels AISI Series 1300, 4000, 5000, 6000, 8000, 9000	130-200	.025	1600-2200	1500-2000	-	-	-	-
		.075	1400-1800	1200-1800	-	-	-	-
		.150	-	1000-1500	-	-	-	-
	200-250	.025	1200-1600	1000-1500	-	-	-	-
		.075	1000-1400	900-1300	-	-	-	-
		.150	-	800-1200	-	-	-	-
	250-350	.020	900-1300	800-1200	-	-	-	-
		.060	800-1200	700-1000	-	-	-	-
		.125	-	600-900	-	-	-	-
	40-50 Rc	.015	-	500-800	-	-	-	-
		.030	-	400-600	-	-	-	-
		.060	-	300-500	-	-	-	-
50-60 Rc	.010	-	300-500	-	-	-	-	
	.020	-	250-450	-	-	-	-	
	.040	-	200-400	-	-	-	-	
Tool Steels Bearing Steels	250-350	.025		1000-1500	-	-	-	-
		.075		800-1200	-	-	-	-
		.150		600-900	-	-	-	-
	45-50 Rc	.020		600-900	-	-	-	-
		.040		500-800	-	-	-	-
		.080		400-700	-	-	-	-
	50-55 Rc	.010		400-600	-	-	-	-
		.020		350-550	-	-	-	-
		.040		300-500	-	-	-	-
	55-60 Rc	.010		300-500	-	-	-	-
.020			250-450	-	-	-	-	
.040			200-400	-	-	-	-	

Material	Hardness Bhn	Depth of Cut (in.)	Recommended Speed Range (sfm)					
			I-50	I-100	MW37	MW43	Titan	MWW
Stainless Steels Austenitic Series 200, 300	130-180	.025	-	1000-1500	-	-	-	-
		.075	-	800-1200	-	-	-	-
		.150	-	700-1000	-	-	-	-
	180-250	.020	-	700-1000	-	-	-	-
		.060	-	600-900	-	-	-	-
		.125	-	500-800	-	-	-	-
Stainless Steels Martensitic and Ferritic Series 400, 500 Precipitation Hardened (PH) Stainless Steels	130-180	.025	-	1000-15000	-	-	-	-
		.075	-	900-1300	-	-	-	-
		.150	-	800-1200	-	-	-	-
	180-250	.025	-	800-1200	-	-	-	-
		.075	-	700-1000	-	-	-	-
		.125	-	600-900	-	-	-	-
	40-50 Rc	.015	-	500-700	-	-	-	-
		.030	-	400-600	-	-	-	-
		.060	-	300-500	-	-	-	-
	50-55 Rc	.010	-	300-500	-	-	-	-
		.020	-	250-350	-	-	-	-
		.040	-	200-300	-	-	-	-
Gray Cast Iron	150-200	.020	2400-3200	2000-3000	-	3000-4200	2500	-
		.080	2000-2800	1800-2400	-	2500-3500	2000	-
		AS CAST	1800-2400	1600-2000	-	2300-3300	1500	-
	200-250	.020	1600-2400	1400-1800	-	2000-3000	2000	-
		.040	1200-1800	1200-1600	-	1800-2800	1500	-
		.100	1000-1500	1000-1400	-	1500-2500	1500	-
Alloy Cast Irons	200-250	.020	1600-2400	1600-2400	-	2000-3000	-	-
		.060	1200-1800	1200-1800	-	2000-3000	-	-
		AS CAST	1000-1400	1000-1400	-	2000-3000	-	-
	250-300	.020	1200-1800	1000-1500	-	1500-2500	-	-
		.060	1000-1400	900-1300	-	1500-2500	-	-
		AS CAST	900-1300	800-1200	-	1500-2500	-	-
Chilled Irons	400-500	.020	-	500-800	-	-	-	-
		.060	-	500-800	500	500	-	-
		.125	-	400-600	500	500	-	-
	500-600	.015	-	300-450	-	-	-	-
		.030	-	250-400	-	-	-	-
		.060	-	200-300	300	300	-	-
Ni-resist Iron	130-200	.025	1500-2000	1500-2000	-	-	-	-
		.050	1200-1800	1200-1800	-	2000	-	-
		.075	-	-	-	1500	-	-
Nickel and Iron Base Alloys, Inconel, Waspaloy, Hastelloy	35-40 Rc	.010	-	800-1000	800-1000	-	-	950-1650
		.020	-	700-900	700-1000	-	-	800-1300
		.040	-	-	800	-	-	800-1000
	40-45 Rc	.020	-	700-900	650-1000	-	-	750-1000
		.040	-	600-800	600-800	-	-	750-1000
		.080	-	-	600-700	-	-	700-900
	50-60 Rc	.015	-	600-800	-	-	-	650-900
		.030	-	400-600	-	-	-	650-900
		.060	-	-	-	-	-	650-800

PCD Cutting Recommendations			
MATERIAL	SPEED (SF/M)	DOC	FEED
Aluminum <12%	1000-6000	.002 - .125	.004 - .015
Aluminum <18%	500-2500	.002 - .125	.002 - .010
Copper	1200-3500	.005 - .100	.005 - .020
Brass	1200-3500	.005 - .125	.005 - .020
Sintered Carbide	40-90	.005 - .125	.004 - .020
Unsintered Carbide	400-1200	.005 - .100	.004 - .025
Pressed Ceramics	200-800	.001 - .005	.001 - .005
Fiberglass	300-9000	.005 - .020	.001 - .010
Nylons and Acrylics	550-10000	.002 - .100	.005 - .020
Hard Rubber	550-2500	.005 - .125	.004 - .020
PCBN Cutting Recommendations			
Carbon Steel	200-500	.008	.020
Bearing Material	200-500	.008	.020
Alloy Steels	200-500	.008	.020
Tool/Die Steel	160-350	.008	.020
High Tensile Cast Irons	200-500	.060	.020
Chilled Cast Iron	130-260	.032	.020
Grey Cast Iron	2000-4000	.020	.020
Powered Metal	500-650	.016	.020
Inconel	500-650	.006	.020
Rene 42	500-650	.006	.020
Rene 77	450-550	.006	.020
Incoloy	750-900	.006	.020
Monel	550-650	.006	.020

INTRO  
 MILLING  
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 HOLEMAKING  
 THREADING  
 INSERTS

**Compressive stress: T-Land or Honing**

It is important to maintain the cutting edge of PCBN tools under a compressive stress. In order to achieve this, most applications for PCBN require a t-land or honed edge.

Honing and t-lands are cutting edge shapes that maintain cutting edge strength.

Edge geometry is largely dependant on DOC, cutting mode (continuous or interrupted), surface condition and work piece, etc.

Effect of t-land or honing

Enlarging the t-land or hone increases cutting edge strength and reduces fracturing.

Enlarging t-land or hone size increases flank wear occurrence and shortens tool life.

Enlarging the t-land or hone size increases cutting resistance and chatter.

**When to decrease t-land size**

In finishing with a small depth of cut and small feed.

When work material is malleable.

When workpiece and/or the machine have poor rigidity.

**When to increase t-land size**

When workpiece material is hard.

When cutting edge strength is required, such as in an uncut surface or interrupted cutting.

When the machine has high rigidity.

Material	High % PCBN		Low % PCBN	
	Rough	Finish	Rough	Finish
Hardened Steel	20°X.008-.010 (0.2-0.25MM)		-	25°X.004 (0.1MM)
Hard Faced Alloys	20°X.008 (0.2MM)	20°X.008 (0.2MM)	-	25°X.004 (0.1MM)
Soft Gray Cast Iron	20°X.008 (0.2MM)	20°X.008 (0.2MM)/0.010(.25MM) HONE	-	-
Superalloy	20°X.008 (0.2MM)	20°X.008 (0.2MM)/0.010(.25MM) HONE	-	-

According To Depth Of Cut		
Material	Roughing >0.020" DOC (0.5MM DOC)	Finish <0.020" DOC (0.5MM DOC)
Hardened Steel	20°X.008-.010 (0.2-0.25MM)	25°X.004 (0.1MM)
Power Metal	20°X.008 (0.2MM)	20°X.008 (0.2MM)
Soft Gray Cast Iron	20°X.008 (0.2MM)	20°X.008-.010 (0.2-0.25MM)
Superalloy	20°X.008-.010 (0.2-0.25MM)	20°X.008 (0.2MM)

Grade	Type	CBN (Vol.%)	Grain Size	Major Binder	Application
CBN 45	Carbide Backed	45	<1	Titanium Nitride	Low thermal conductivity, strong edge due to low edge compressiveness
CBN 50	Carbide Backed	50	2	Titanium Carbide	Good thermal stability and crater resistance, high-speed continuous machining of hardened steel
CBN 60	Carbide Backed	60	2	Titanium Nitride	Combination of wear resistance and impact strength, general usage in continuous and interrupted cutting of hardened steel
CBN 70	Carbide Backed	70	2	Titanium Carbonitride	High degree of toughness due to fine microstructure of CBN and ceramic binder, rough and interrupted machining of hardened steel
CBN 80	Carbide Backed	80	3	Titanium Nitride	Combination of wear resistance and thermal properties, superior to other grades in machining superalloy
CBN 90	Carbide Backed	90	3	Titanium Nitride	Higher toughness and heat resistance as an alternative to CBN 95, machining non-homogenous cast iron and power metal alloys
CBN 95	Carbide Backed	95	3	Titanium Alloy	Extreme wear resistance due to high content CBN and metal binder, excellent at machining various cast irons
CBN 100	Solid Form	93	10	Aluminum Nitride	Extreme wear resistance due to coarser CBN and high content, rough machining of cast iron and power metal alloys

**PCD**

Grain Size	Particle	GWS Tool Group	GE	E6	Sumitomo	Tomei	Megadiamond	
Coarse	50				DA90			
	30	PCD 3		CTM302		TDC-E	C30X	
	25		COMPAX1800	CTH025				
			COMPAX1500	CTB025				
Medium	12					TDC-H		
	10	PCD		CTB010			M10	
	8							
	7					TDC-S		
	5		COMPAX1300			DA150		F05/HM20
Fine	4	PCD-F	COMPAX1600					
	3					TDC-G		
	2	PCD-UF		CTB002				
				CTC002				
	1					TDC-F		
	0.5	PCD-XUF				DA200	98FIIM	
PCD-XUF					DA2200			

**PCBN**

Tool Maker													
-	GWS Tool Group	Sumitomo	Mega	Mitsubishi	Toshiba	Seco	Dijet	Kyocera	Kennametal	SPK	DI	E6	Showa Denko
Cast Iron/Ni-hard/Superalloy													
Solid Type	CBN100	BNS800	N100	MB940	-	CBN300	JBN10	KBN900	-	WBN100	BZN7000S	AMB90	-
General Machining	CBN95	BN600	N90	MB710	BX950	CBN300, CBN20	JBN500	KBN60G	KD120	WBN100	BZN6000	DBA80	KT10
-	CBN80, CBN80D	BN600, BN100	N90	MB710, MB730	BX950, BX850	CBN300, CBN20	JBN500	KBN60G	KD200	WBN750	BZN6000	DBA80	KT10, KT10C
Hard Machining	CBN95, CBN90	BN500	N90	MB730	BX950, BX930, BX450	CBN300	JBN500	KBN60G	KD200	WBN700	BZN6000	DBA80	KT20C
Hardened Steel													
Interrupted Cutting	CBN45	BN300		MB835	BX380	CBN150	-	-	KD200	WBN500	-	-	-
-	CBN60, CBN70	BN250, BNX25	N50	MB835, MB825	BX380, BX360	CBN150	JBN300	KBN25B	KD200	WBN550	BZN8100, BZN8200	DBN45	KT30X, KT25
-	CBN60, CBN70	BN250, BNX20	N50	MB825, MB820, MB8025	BX360, BX330	CBN10, CBN100	JBN300, JBN330	KBN25B, KBN10B	KD05	WBN600	BZN8100, BZN8200	DBN45	KT30N, KT30
Continuous Cutting	CBN50	BNX10, BNC80	NT50	MB810, MB8025	BX310	CBN10, CBN100	JBN330	KBN10B	KD05	WBN650	HTC2000	DBC50	-

INTRO  
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# BUILD THE PERFECT TOOL

## THREE WAYS TO REQUEST CUSTOM

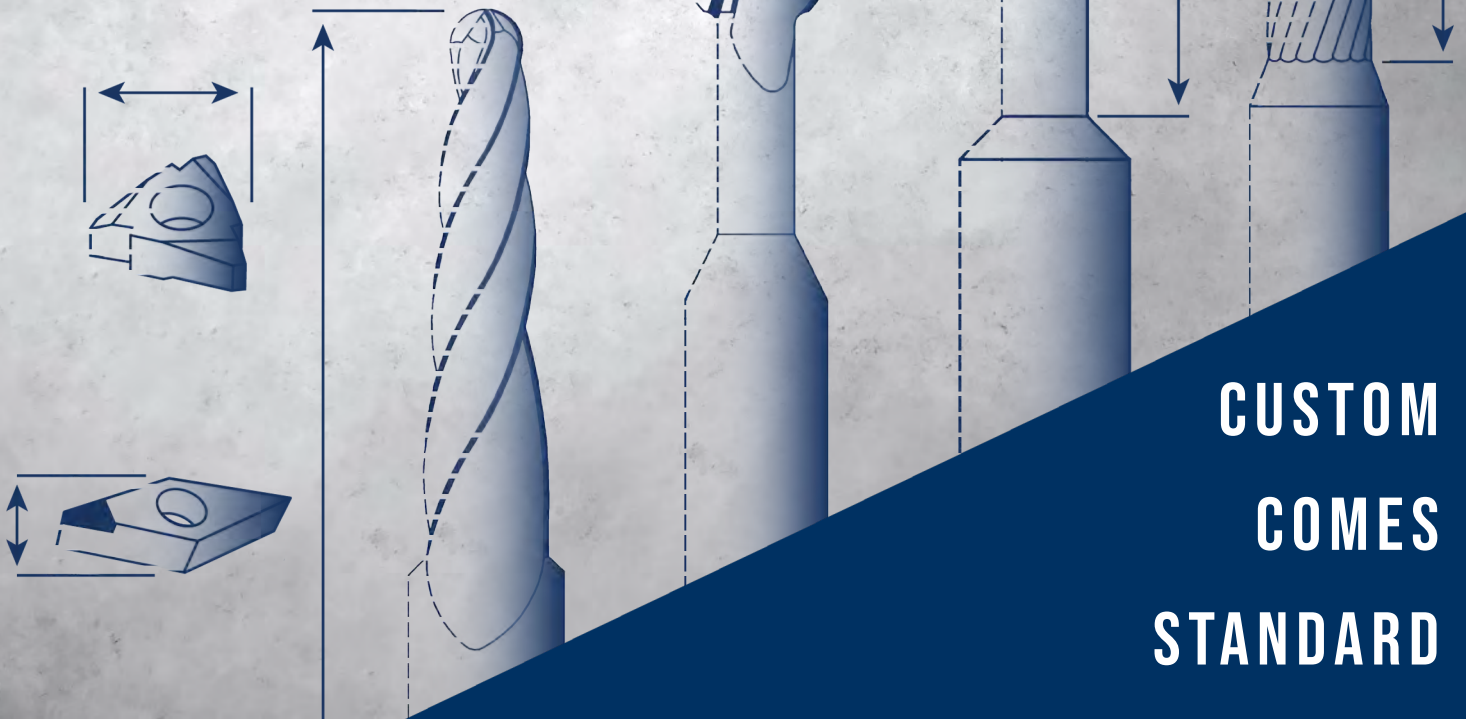
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# TERMS AND CONDITIONS



## CONDITIONS OF SALE

YOU AGREE THAT THE FOLLOWING TERMS AND CONDITIONS CONSTITUTE THE COMPLETE AND FINAL AGREEMENT BETWEEN BUYER AND SELLER IN RESPECT OF THE APPLICABLE ORDER. NONE OF THE TERMS AND CONDITIONS CONTAINED IN THIS ACKNOWLEDGEMENT MAY BE ADDED TO, MODIFIED, SUPERSEDED OR OTHERWISE ALTERED EXCEPT BY A WRITTEN INSTRUMENT SIGNED BY AN AUTHORIZED REPRESENTATIVE OF SELLER, AND THE PRODUCTS RECEIVED BY BUYER FROM SELLER SHALL BE DEEMED TO BE DELIVERED ONLY UPON THE TERMS AND CONDITIONS CONTAINED HEREIN.

### 1. Acceptance

The acceptance of your ("Buyer") order by Seller for the products set forth on the front side hereof (the "Products") is EXPRESSLY MADE CONDITIONAL UPON BUYER'S ASSENT TO THE TERMS AND CONDITIONS OF THIS ORDER ACKNOWLEDGEMENT, and these constitute the only binding terms and conditions between the parties, even if these terms and conditions differ from or are in addition to those on any purchase order or other document sent to Seller by Buyer. Any terms of sale requested by Buyer which are in any way inconsistent with or in addition to these terms and conditions are rejected and will not be binding upon Seller. In the event that a written sales agreement between the parties applies to the Products, such agreement shall control and supersede any terms or conditions hereof in conflict therewith, but all other terms and conditions hereof shall apply. For purposes of these terms and conditions, "Seller" shall mean GWS Tool Group, LLC.

### 2. Prices

Except as expressly set forth herein, all prices are F.O.B., Seller's shipping point, are exclusive of taxes and subject to correction for error. Seller may change pricing without notice, and the applicable price for an order will be the price in effect at the time of shipment. Price quotations are valid for thirty (30) days unless otherwise noted by Seller. Buyer shall pay each invoice within thirty (30) days of the date of invoice. Buyer shall make all payments when due without offset, deduction or counterclaim regardless of any claim by Buyer. Amounts not paid when due will bear interest from the invoice date at the rate of 1.5% per month or the maximum rate allowed by law, whichever is less. Buyer shall pay to Seller all costs and expenses (including reasonable attorneys' fees) incurred in collecting any amounts due hereunder. If the financial responsibility of Buyer becomes impaired or unsatisfactory to Seller, advance cash payments or satisfactory security shall be given by Buyer upon demand by Seller, and shipments may be withheld until such payment or security is received.

### 3. Taxes

The amount of any sales, use ad valorem, property or other tax or duty, however designated, levied or based on the Products, or the sale or delivery thereof, shall be added to the price quoted and billed to and paid by Buyer. If Seller is required to pay any such tax or duty, Buyer shall reimburse Seller therefore, or provide Seller with an appropriate exemption certificate or other documents acceptable to the taxing or customs authorities.

### 4. Shipping

All Products shall be shipped via a carrier designated by Seller at Buyer's expense. Buyer shall pay all costs incurred by Seller in connection with shipping such Products, including, without limitation all insurance, freight, cartage, warehousing, and all other charges in connection with loading and shipping the Products to Buyer. All shipping dates are approximate and tentative, and are based on prompt receipt from the Buyer of all necessary information. Requests for proof of delivery must be made within sixty (60) days of the date of shipment. If Buyer fails to accept delivery, Buyer shall nonetheless make payment to Seller. Claims for shortage, damage or non-delivery shall be made directly to carrier. Seller's responsibility ceases upon delivery to the carrier at the stated shipping point, and risk of loss, damage, injury or destruction to any of the Products shall pass to Buyer upon such delivery to the carrier. In no event shall any loss, damage, injury or destruction operate in any manner to release Buyer from the obligation to make payments required herein. Seller reserves the right to make partial shipments and to submit invoices for partial shipments. Seller reserves the right to allocate available products among its customers at its discretion.

### 5. Delays in Delivery

Seller shall be excused for delay in delivery, may suspend performance and shall under no circumstances be responsible for failure to fill any order or orders, or any portion thereof, when due to: acts of God or the public enemy, fires, floods, riots, strikes, freight embargoes or transportation delays, inability to procure labor, fuel, material supplies, or power at current prices or on account of shortages thereof, any existing or future law or governmental act affecting the conduct of Seller's business, or any cause beyond the reasonable control of Seller.

### 6. Order Size and Variation

Orders for Products (other than specially manufactured products) must be for a quantity that is a whole-number multiple of Seller's standard lot-size for such products. Any order for a quantity that is not a whole-number multiple of Seller's standard lot-size will be deemed to be for a quantity that is the nearest whole-number multiple of such lot size. In the case of orders for altered or modified products, the quantity actually shipped may be less than the quantity ordered based on products that are damaged in the alteration or modification process. In the case of orders for altered or modified products, the quantity actually shipped may be less than the quantity ordered based on products that are damaged in the alteration or modification process. In the case of orders for special products, or products ordered by weight or length, the quantity of products actually shipped and invoiced by Seller may be up to ten percent (10%) higher or lower than the quantity ordered. Without limiting the foregoing, all products furnished by Seller shall be subject to Seller's standard manufacturing variations and practices with the limits and sizes that Seller produces, and all products purchased are subject to customary quality variations and tolerances recognized within the trade.

### 7. Electronic Data Interchange (EDI)

Buyer may electronically submit orders to Seller using Seller's EDI process. Electronic orders submitted by Buyer to Seller shall contain all key data, including, without limitation, purchase order number, pricing information, and quantity. Buyer acknowledges and agrees that any software, service provider, and interface used by Buyer to enable EDI transactions are the sole responsibility of Buyer. All costs and expenses incurred by Buyer in connection with implementing and enabling EDI shall be borne by Buyer, including all internal and external resources, equipment and software costs and expenses and all interface and connectivity costs and expenses. In the event Buyer's order contains pricing information that is not within the defined price range established by Seller for such Products, such order is hereby rejected. Any variation in a Product's pricing information proposed by Buyer via Seller's EDI process is rejected and any such purported variation will not be binding on Seller.

### 8. Limited Warranty

Seller warrants that the Products will conform to Seller's published specifications therefore, or such other specifications as the parties may agree in writing, provided that the Products are subjected to only the usage for which they were intended. The warranty shall commence on the date of shipment and continue for a period of ninety (90) days. In the event that any Product fails to comply with the foregoing limited warranty, Buyer must promptly (but no later than expiration of the applicable warranty period) contact Seller to obtain a return materials authorization. Products must be returned to Seller, freight prepaid by Buyer, for determination by Seller that such Products are defective. Such Products shall be accompanied by a written description of the circumstances under which the applicable Products purportedly failed. Seller shall replace or repair, at its sole option and expense, any defective Products for parts thereof that prove to be defective during the warranty period, and return such repaired/replacement Products to Buyer, freight prepaid by Seller, or refund the purchase price paid therefore. THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY AVAILABLE TO BUYER. If Seller determines in its sole discretion that the defect is attributable to any cause other than poor workmanship or defective materials supplied by Seller, then Seller shall have no obligation whatsoever with respect to repair or replacement of the defective Products. Seller shall return the Products to Buyer, freight to be paid by Buyer, and the warranty described herein shall be void. This limited warranty does not cover defects caused by normal deterioration and wear and tear, and does not apply if Products have been subject to modification, or to misuse, mishandling, misapplication, operation outside rated capacities, negligence (including, without limitation, improper maintenance), or accident or if any adjustments or repair has been performed by anyone other than Seller or an authorized service representative of Seller. THIS WARRANTY IS IN LIEU OF ANY OTHER WARRANTIES, AND SELLER HEREBY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE OR NONINFRINGEMENT. UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE FOR ANY INDIRECT, SPECIAL, EXEMPLARY, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS), WHETHER BASED ON TORT, WARRANTY, CONTRACT OR ANY OTHER LEGAL THEORY, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE LIABILITY OF SELLER SHALL BE LIMITED TO THE PRICE ALLOCABLE TO THE PRODUCTS WHICH GAVE RISE TO THE CLAIM AND SHALL TERMINATE ONE YEAR AFTER SHIPMENT OF THE APPLICABLE PRODUCTS TO BUYER. THE FOREGOING LIMITATIONS SHALL APPLY NOTWITHSTANDING THE FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY.

### 9. Indemnification

Buyer agrees to indemnify and hold harmless Seller, its officers, agents, employees and authorized representatives from and against any and all costs or damages arising out of or related to any claim or lawsuit alleging personal injury or death to any person which may result from or arise in connection with its use of Products in any products of any kind.



## 10. Cancellation

Any order for specially manufactured products, or altered or modified versions of standard products that is canceled after such order is accepted by Seller shall be subject to a cancellation fee determined appropriate by Seller based on the work performed and expenses incurred as a result of such order.

## 11. Drawings and Technical Documents

All drawings and technical documents delivered by either of the parties to the other party remain the property of the delivering party, and the receiving party may not improperly use, reproduce, or otherwise disclose such materials to third parties. Tooling, setup, drawing, design information and partial preparation charges, when invoiced to Buyer, cover only part of the cost thereof of Seller. Buyer does not acquire any right, title or interest in any tooling, setup, drawings, design information, or invention resulting there from. All drawings, techniques, inventions or improvements (whether or not patentable) made or conceived in the course of fulfilling any order, including any intellectual property rights pertaining thereto, shall be the sole property of Seller.

## 12. Quality

Seller shall manufacture all Products in accordance with Buyer specifications and applicable ISO 9001 quality assurance requirements. Upon reasonable notice and during normal business hours, Buyer may conduct quality audits at Seller's facilities to ensure compliance with these specifications and requirements. Buyer agrees that it will share all results of quality audits of Seller's facility or facilities with Seller.

## 13. General Provisions

Buyer may not assign its order, these terms and conditions or any right or interest therein or any other obligation arising hereunder without the prior written consent of Seller. The contract resulting from Seller's acknowledgement and acceptance of Buyer's order shall be governed by the laws of the state in which the Buyer's principal place of business is located. Buyer hereby consents to the jurisdiction of such state for all disputes arising hereunder. Buyer further consents that service of process may be made upon Buyer by certified mail, return receipt requested, at Buyer's last known address and that such service shall be deemed valid personal service. No failure of Seller to insist upon strict compliance by Buyer shall impair Seller's rights in case Buyer's default continues or in case of any subsequent default by Buyer. Waiver by Seller of any breach shall not be construed as a waiver of any other existing or future breach(es).

## 14. Limitation of Liability

No claims of any kind whatsoever by Buyer, regardless of the theory on which a claim may be made including, without limitation, negligence, breach of contract, breach of warranty, absolute liability in tort, misrepresentation or otherwise, with respect to any Products delivered or for failure to deliver any Products, shall be greater in amount than the purchase price attributable to such Products in respect of which damages are claimed.

SELLER WILL NOT BE LIABLE TO BUYER FOR ANY INDIRECT, SPECIAL, EXEMPLARY OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING BUSINESS INTERRUPTION, LOSS OF PROFIT, LOSS OF REVENUES, AND PRODUCTION LOSS, HOWSOEVER CAUSED, REGARDLESS OF WHETHER SUCH DAMAGES OR LOSSES ARISE OR RESULT, IN WHOLE OR IN PART, FROM NEGLIGENCE (WHETHER SUCH NEGLIGENCE BE SOLE, JOINT AND/OR CONCURRENT, ACTIVE OR PASSIVE), STRICT LIABILITY, CONTRACT BREACH, BREACH OF WARRANTY, OR ANY OTHER THEORY OF LEGAL LIABILITY ATTRIBUTABLE TO SELLER, UNLESS SUCH LOSSES ARE CAUSED BY THE GROSS NEGLIGENCE, FRAUDULENT CONDUCT OR WILLFUL MISCONDUCT OF SELLER.

## 15. Global Trade Compliance

For the purpose of these terms and conditions, "Global Trade Laws and Regulations" means the customs, import, export, re-export, trade control and sanctions laws, regulations and orders applicable to a transaction including but not limited to the customs and export control laws and regulations of the United States, EU, UK, UN, Switzerland, China or any other country in which the Products are manufactured, received and used. Buyer hereby agrees to observe and comply fully with all applicable Global Trade Laws and Regulations. Buyer agrees that no Products provided by GWS covered by any applicable Global Trade Laws and Regulations shall be transferred to any person or entity unless such transfer is in accordance with applicable Global Trade Laws and Regulations or expressly permitted by applicable government license or authorization. Buyer shall not take any actions in furtherance of this contract that would cause GWS to violate any global trade laws or regulations to which it is subject.

Buyer shall not use, export, re-export, transfer or retransfer the Products for any purpose connected with chemical biological or nuclear weapons, or missiles capable of delivering such weapons, or for any nuclear explosive or unsafeguarded nuclear fuel cycle activity. Buyer shall not, directly, or indirectly, sell, export, re-export, transfer, retransfer or otherwise release or dispose of any Products to or via a sanctioned person or territory, without having obtained a license or authorization from the relevant government authority responsible for enforcing any applicable Global Trade Law and Regulation. If Buyer breaches any certification, representation or undertaking described in this Section or, in Seller's reasonable opinion any such breach is likely to occur, the Buyer agrees that Seller shall not be liable toward Buyer or any third party for any subsequent non-performance by Seller under these terms of sale and that Buyer shall defend, indemnify and hold Seller harmless from any claims or losses relating to such non-performance.

## 16. RETURN POLICY:

Prior to acceptance of any returned products, a Returned Material Authorization (RMA) number must be issued from our Returns Department by calling 877-497-8665 or emailing sales@gwstoolgroup.com. A list of returned products accompanied with purchase order numbers is required for review and approval prior to issuance of an RMA. Only current EDP numbers are considered for return, any discontinued products are non-returnable. All specials, modified tooling, or altered tools cannot be returned for credit unless tools were manufactured incorrectly per the customer's specifications provided. Only tools purchased within 1 year from date of order will be eligible for return. Returned products for credit will be valued at purchase price regardless of current price. All returned products must pass Quality Assurance inspection, be undamaged, unaltered, unused, resalable, manufactured according to current tooling specifications, and in original packaging. No credit will be issued if tools do not pass QA inspection or meet the aforementioned criteria. All products must be received within 21-days of RMA issuance. A restocking charge of 25% will apply or an offsetting order of two times (200%) the value of the returned product will apply to all products returned for any reason other than a manufacturer error or defect. Freight charges will be assumed by the customer unless the return is due to manufacturer error or defect. The RMA number must be clearly visible on the outside of the box and on the enclosed packing list. Any items shipped and not approved for return will either be returned to the customer or scrapped at the customer's expense. No returns after 1 year period. Please return the product with the approved RMA number to the address specified by GWS.

## 17. Safety Precautions when using Cutting Tools

GWS Tool Group is committed to manufacturing products that can be used safely as directed under recommended machining parameters. Cutting tools can break or shatter when in use due to the extreme forces of the machining environment. Cutting tools will generate chips while engaged in the workpiece and can produce dust, swarf, gasses and potentially sparks or fire. Caution and safety must be considered at all times to include the use of protective eyewear, machine safety guard barriers, proper ventilation, quick access to fire suppression equipment and other safeguards. In no way shall GWS Tool Group be held accountable or liable for any costs, machine down time, injuries, or deaths resulting from cutting tool breakage or emissions.

## 18. Revisions to Marketing Avenues

GWS Tool Group reserves the right to revise listings and specifications in our catalog and website without notice. GWS Tool Group is not responsible for any typographical errors. Please verify the current data at the time of your order.

## 19. Copyright Protection and Trademarks

All content on the GWS website (or affiliate companies) and catalogs to include product images, logos, text, graphics, videos, and digital downloads are the exclusive property of GWS Tool Group and protected by the United States and International copyright laws. Our logos and trademarks may not be used in connection with any product or service that is not owned by GWS Tool Group in any manner that constitutes confusion, defamation, or disparagement. All other trademarks not owned by GWS Tool Group that appear on our website or catalogs are the property of their respective owners.



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