2010 Product Catalog

IMCO

Power. Precision. Performance.

What's new in this year's catalog?

At IMCO, we design and manufacture tools to give you the best performance for your dollar. This year, we extended that approach to our catalog and improved it.

1. **We made our tool charts easier to read.**

2. **We added money- and time-saving Tool Tips throughout the catalog.**

3. **We included case studies of shop owners like you.** Each one is a real-life example of how shops reduced costs and increased productivity by using IMCO tools and the technical advice of their IMCO sales representative.

Your IMCO representative can do the same for you.

IMCO

Power. Precision. Performance.

Your IMCO representative is an expert problem solver and your best resource for technical advice on reducing tool costs, beefing up productivity and making sure you're getting optimum output from every machining station.

It's your money. Get the best performance for every dollar. With IMCO.

IMCO

Power. Precision. Performance.

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IMCO

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IMCO

Power. Precision. Performance.

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SPECIAL PURPOSE END MILLS

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PICTORIAL INDEX (cont'd)

DRILLS

REAMERS

BURS

ROUTERS

MISCELLANEOUS

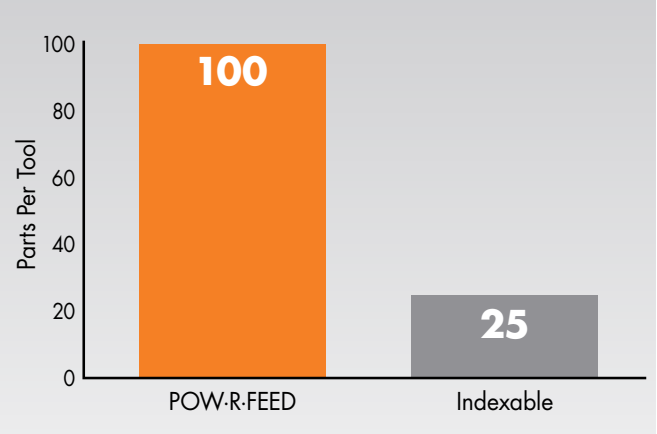
PROFILE

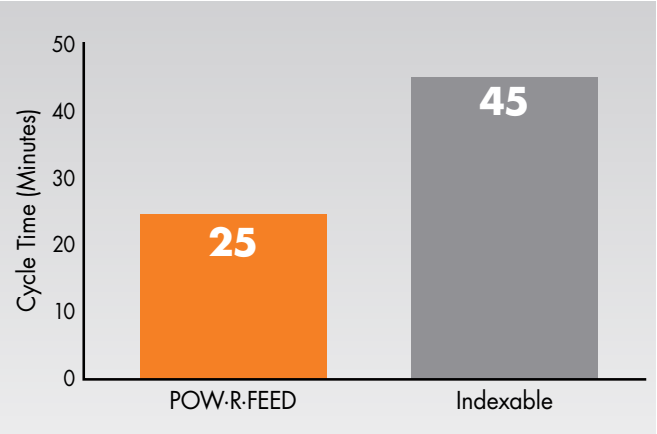
Neal Wilson

IMCO Sales Representative

Arkansas/Louisiana/Mississippi

IMCO representative Neal Wilson along with Josh Cochran, President of JAC, service T & S Machine, a shop specializing in aerospace, medical and industrial parts. T & S has been a user of IMCO Omega-6® and STREAKERS® in hardened steel and aluminum applications. The shop contacted them, looking for a way to reduce cycle time when machining position plates. Using a ½ inch indexable cutter at a .187 depth of cut in A36 hot-rolled steel, T & S was running just 5 in./min. Josh and Neal suggested trying the IMCO POW·R·FEED.® Starting at a .375 depth of cut, T & S was able to:





- **More than triple the chipload from .002 to .007 ipr.**
- **More than double the SFM from 200 to 400.**
- **Tool life increased 300% – 100 parts vs. 25 parts with the indexable. Time spent indexing inserts was eliminated, too, resulting in more uptime.**
- **Reduce the cycle time from 45 minutes to 25.**

"They were very impressed," says Josh. "They didn't believe it was possible."

It's a win-win result at T & S Machine and smiles all around, including Mike Tullos (front, center), Neal Wilson of IMCO (left), Justin Tullos (right), Josh Cochran of JAC (back, left) and James Carter (back, right).

Josh Cochran services Mississippi markets, and Neal Wilson represents IMCO across three states, helping machine shops boost productivity and reduce machining costs.

HIGH PERFORMANCE END MILLS

These families of IMCO high performance end mills deliver metal removal rates many times higher than those of conventional end mills.

Each milling family is designed with unique geometries ground from high-strength carbide substrates and finely tuned through years of results-based research. Chemical coatings are carefully selected for maximum heat resistance, feed rates and metal removal rates in specific workpiece materials.

Results: Significantly increased production rates in machine shops around the world.

POW·R·FEED® M90

- Unique vibration dampening geometry, coated for maximum heat resistance
- For slotting, pocketing, roughing and finishing at high feed rates, wet or dry, in a wide material range – low carbon steels to titanium
- Smooth, silent machining, excellent surface finishes, multi-tasking with a single tool, longer tool life

OMEGA-6® M70

- Advanced geometry, high edge strength, high heat resistance
- For conventional or high speed milling, wet or dry, in harder, difficult to machine materials
- Increased shearing ability, higher feed rates, exceptional surface finishes in light to medium cuts, longer tool life

enDURO® M50

- Specially designed to overcome work hardening and impact resistance common to high strength materials, high heat resistance
- For high-production or high performance milling (roughing or finishing) in hard to machine materials
- Reduced harmonic stresses, longer tool life

STREAKERS® M20

- Three- and two-flute designs, advanced geometries resist clogging on low or high horsepower equipment
- For machining, finishing or roughing all types of aluminum
- Aggressive chip evacuation, chatter free machining, excellent surface finish and long tool life

The Right Tool for Every Job

Powerful Geometries for

- Stainless steel
- Carbon steel
- Inconel®
- Titanium
- Cast iron
- Hardened steels

Powerful Savings through

- Shorter cycle times, lower costs per part
- Higher feed rates at normal depths of cut
- Significant cost savings even for short run manufacturing

Design Features for Every Application

End designs

- Corner radii – a wide variety to meet your part specification requirements
- Square corners for general machining and finishing
- Ball nose styles for contouring

Shank designs

- Precision tolerance shanks fit all collets and conforms to most shrink-fit standards
- Many products are offered as standard with flats for use in end mill holders

Multiple lengths

- Long reach with stub flutes for deep cavity machining
- Long length with extra flute lengths for finishing passes
- Stub length for extra rigidity

The products in this catalog are designed for use in the materials shown below. Refer to the technical icons for each tool model and find the intended application for that product by matching it to the same icon below.

Steel materials
Low carbon steel, free machining steel, medium and high plain carbon steel, alloy and tool steel, ferritic and martensitic stainless steel.

Preferred coatings: AlTiNX, TiAlNX, AlTiN
Optional coatings: TiCN, TiN

Stainless steel materials
Austenitic stainless steel.

Preferred coatings: AlTiNX, TiAlNX, AlTiN
Optional coating: TiCN

Cast iron materials
Ductile (nodular) and malleable cast irons. Grey cast irons.

Preferred coatings: AlTiNX, TiAlNX, AlTiN
Optional coatings: TiCN, TiN

Aluminum and Non-ferrous materials
Free machining and low silicon aluminum alloys. High silicon aluminum alloys. Other non-ferrous materials.

Optional coatings: ZrN, TiCN, TiB2, DLC

Heat resistant super alloys and titanium
Iron based, cobalt based, and nickel based alloys, titanium and titanium alloys.

Preferred coatings: AlTiNX, TiAlNX, AlTiN
Optional coating: TiCN

Hardened materials
Steels and stainless steels over 50 HRc.

Preferred coating: AlTiNX, TiAlNX
Optional coating: AlTiN

In all applications, getting the most from your tooling requires attention to all aspects of good machining practice. Be sure to use proper fixturing, pay attention to recommended speed and feed guidelines, and keep all machinery in good working order. When using coolants, ensure that an adequate coolant flow reaches the cutting edge to prevent thermal cracking of cutting tools.

POW·R·FEED®

When Is a Rougher Not a Rougher?

The POW•R•FEED is designed to achieve a high metal removal rate – the job for a rougher. The unique combination of design, substrate and coating also allows the POW•R•FEED to yield excellent finishes, potentially saving polishing time on parts with critical surface finish requirements.

POW·R·FEED® M90

Results: Smooth, silent machining at high feed rates, excellent surface finishes and significant savings achieved by extended tool life.

With 20% greater hot hardness than conventional TiAlN coating, POW·R·FEED end mills last longer in high heat environments.

Ideal for heavy interrupted cuts and when machining stainless steel, titanium and other metals that generate high temperatures.

Durability

Unique design reduces chatter and enhances tool life. Its advanced multi-layer coating provides maximum heat protection for the carbide core at higher feed rates. With multiple coating layers, thermal cracks travel only down the affected layer, preserving the integrity of the carbide substrate.

Productivity

POW·R·FEED runs at higher feed rates, even on deeper cuts, reducing cycle time and boosting productivity.

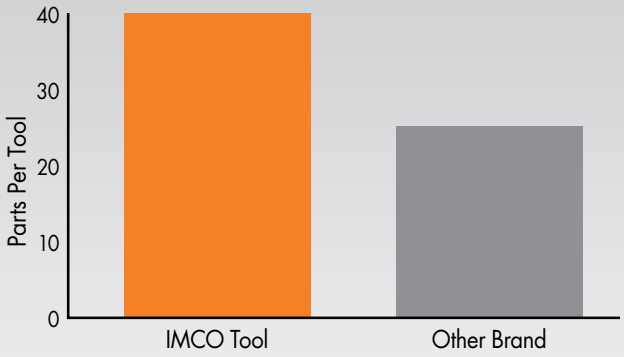
Versatility

One tool for slotting, pocketing, roughing and finishing in a wide range of materials:

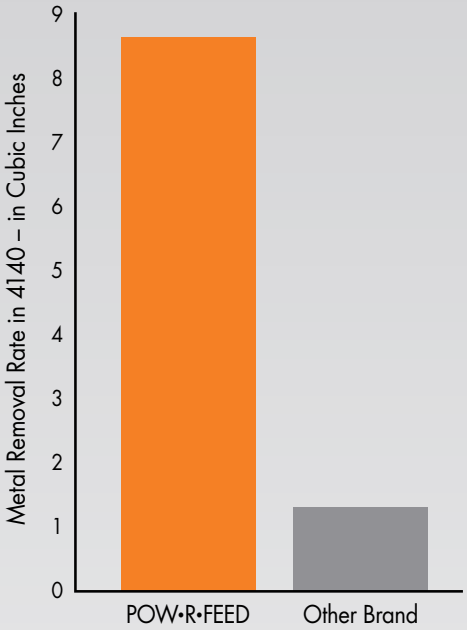
- Stainless steels
- Cast iron
- High-temp alloys
- Inconel®
- Titanium
- Carbon steels

More Parts per Tool

Never underestimate the power of the coating. Tested in 6AL-4V titanium against a tool with a different coating, the POW•R•FEED M90 tool lasted 60% longer, simply due to the advanced AlTiNX coating. That translates into a 60% parts per tool increase and takes a big bite out of the customer's ongoing tool costs.



Higher Metal Removal Rates



Another customer achieved a feed rate more than five times higher with the 4-flute POW·R·FEED M90 than with a similar competitor's tool, as tested in the customer's operation in 1020 hot roll steel. POW·R·FEED M90 not only ran smoothly at a higher speed, it also devoured 450% more material, effectively eating the former tool for lunch.

4 Variable Flutes

For maximum feed rates

M904

M904 • Radius

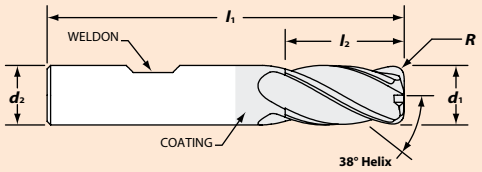
M904 • Square

M904B • Ball

- Chatter free machining with excellent surface finishes
- High strength edge
- Easy to resharpen
- Advanced **AlTiNX** coating

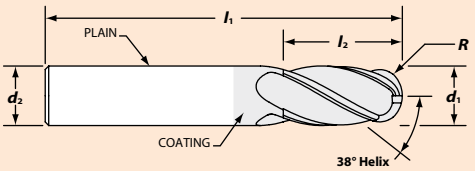
Carbon & tool steels ≤ 48 HRC	✓✓✓
Carbon & tool steels > 48 HRC	✓
Stainless steels	✓✓✓
Super alloys, Inconel® & titanium	✓✓✓
Cast irons	✓✓✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent



Coating:

AlTiNX



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiNX EDP Number	List Price
1/8	1/8	1/4	1-1/2	.015	Plain	SR	63248	15.02
		1/4	2-1/4	.015	Plain	SL	63259	20.63
		1/2	1-1/2	Square	Plain	RR	63010	15.59
		1/2	1-1/2	.015	Plain	RR	63064	16.22
		1/2	1-1/2	Ball	Plain	RR	63139	18.53
5/32	3/16	9/16	2	Square	Plain	RR	63011	23.57
		9/16	2	.015	Plain	RR	63118	24.31
		9/16	2	Ball	Plain	RR	63140	28.19
3/16	3/16	5/16	2	.015	Plain	SR	63249	22.73
		5/16	2-1/2	.015	Plain	SL	63260	29.98
		5/8	2	Square	Plain	RR	63012	22.00
		5/8	2	.015	Plain	RR	63065	22.73
		5/8	2	Ball	Plain	RR	63142	25.52
7/32	1/4	5/8	2-1/2	Square	Plain	RR	63013	28.77
		5/8	2-1/2	.020	Plain	RR	63119	30.24
		5/8	2-1/2	Ball	Plain	RR	63143	32.60
1/4	1/4	3/8	2	Square	Plain	SS	63003	24.41
		3/8	2	.020	Plain	SS	63058	25.52
		3/8	2-1/2	.020	Plain	SR	63250	26.78
		3/8	3	.020	Plain	SL	63261	30.92
		3/8	4	.020	Plain	SX	63272	36.70
		3/4	2-1/2	Square	Plain	RR	63014	26.41
		3/4	2-1/2	.020	Plain	RR	63066	27.88
		3/4	2-1/2	.030	Plain	RR	63466	27.88
		3/4	2-1/2	Ball	Plain	RR	63144	30.03
		1-1/8	3	.020	Plain	LL	63420	33.02
		1-1/2	4	.020	Plain	XX	63425	39.16
5/16	5/16	13/16	2-1/2	Square	Plain	RR	63016	36.64
		13/16	2-1/2	.020	Plain	RR	63067	38.48
		13/16	2-1/2	Ball	Plain	RR	63146	41.37
3/8	3/8	1/2	2	Square	Plain	SS	63004	40.22
		1/2	2	.020	Plain	SS	63059	42.26
		1/2	2-1/2	.020	Plain	SR	63252	44.15
		1/2	3	.020	Plain	SL	63263	48.82
		1/2	4	.020	Plain	SX	63274	58.64
		1/2	6	.020	Plain	SE	63281	75.18

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Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiNX EDP Number	List Price
3/8	3/8	7/8	2-1/2	Square	Plain	RR	63018	42.79
		7/8	2-1/2	Square	Weldon	RR	63043	44.68
		7/8	2-1/2	.020	Plain	RR	63068	45.83
		7/8	2-1/2	.020	Weldon	RR	63083	47.72
		7/8	2-1/2	.030	Plain	RR	63390	45.83
		7/8	2-1/2	.030	Weldon	RR	63400	47.72
		7/8	2-1/2	Ball	Plain	RR	63148	48.56
		7/8	2-1/2	Ball	Weldon	RR	63176	50.45
		1-1/8	3	.020	Plain	LL	63421	54.81
		1-3/4	4	.020	Plain	XX	63426	66.99
7/16	7/16	1	2-3/4	Square	Plain	RR	63020	57.22
		1	2-3/4	Square	Weldon	RR	63044	59.17
		1	2-3/4	.020	Plain	RR	63069	59.96
		1	2-3/4	.020	Weldon	RR	63084	61.90
		1	2-3/4	Ball	Plain	RR	63150	61.69
		1	2-3/4	Ball	Weldon	RR	63178	63.63
1/2	1/2	5/8	2-1/2	Square	Plain	SS	63005	65.73
		5/8	2-1/2	.030	Plain	SS	63060	67.88
		5/8	3	.030	Plain	SR	63254	68.41
		5/8	4	.030	Plain	SL	63265	87.26
		5/8	5	.030	Plain	SX	63276	104.90
		5/8	6	.030	Plain	SX	63283	116.18
		1	3	Square	Plain	RR	63022	69.04
		1	3	Square	Weldon	RR	63045	71.03
		1	3	.030	Plain	RR	63070	72.24
		1	3	.030	Weldon	RR	63085	74.24
		1	3	Ball	Plain	RR	63152	83.58
		1	3	Ball	Weldon	RR	63180	85.58
		1-1/4	3	Square	Plain	RR	63100	69.51
		1-1/4	3	Square	Weldon	RR	63101	71.50
		1-1/4	3	.015	Plain	RR	63467	72.71
		1-1/4	3	.015	Weldon	RR	63473	74.71
		1-1/4	3	.030	Plain	RR	63098	72.71
		1-1/4	3	.030	Weldon	RR	63099	74.71
		1-1/4	3	.060	Plain	RR	63391	72.71
		1-1/4	3	.060	Weldon	RR	63401	74.71
		1-1/4	3	.090	Plain	RR	63392	72.71
		1-1/4	3	.090	Weldon	RR	63402	74.71
		1-1/4	3	.125	Plain	RR	63393	72.71
		1-1/4	3	.125	Weldon	RR	63403	74.71
		1-1/4	3	Ball	Plain	RR	63153	84.05
		1-1/4	3	Ball	Weldon	RR	63181	86.05
		2	4	.030	Plain	LL	63422	92.98
		2-1/2	5	.030	Plain	LX	63427	112.88
		3	6	.030	Plain	XX	63430	125.32
5/8	5/8	3/4	3	Square	Plain	SS	63006	124.27
		3/4	3	.030	Plain	SS	63061	130.94
		3/4	3-1/2	.030	Plain	SR	63255	134.45
		3/4	5	.030	Plain	SL	63266	161.65
		3/4	6	.030	Plain	SX	63277	176.40

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Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiNX EDP Number	List Price
5/8	5/8	1-1/4	3-1/2	Square	Plain	RR	63024	133.51
		1-1/4	3-1/2	Square	Weldon	RR	63046	135.87
		1-1/4	3-1/2	.015	Plain	RR	63468	140.60
		1-1/4	3-1/2	.015	Weldon	RR	63474	142.96
		1-1/4	3-1/2	.030	Plain	RR	63071	140.60
		1-1/4	3-1/2	.030	Weldon	RR	63086	142.96
		1-1/4	3-1/2	.060	Plain	RR	63394	140.60
		1-1/4	3-1/2	.060	Weldon	RR	63404	142.96
		1-1/4	3-1/2	Ball	Plain	RR	63155	148.63
		1-1/4	3-1/2	Ball	Weldon	RR	63183	150.99
3/4	3/4	7/8	3	Square	Plain	SS	63007	181.81
		7/8	3	.030	Plain	SS	63062	191.10
		1	4	.030	Plain	SR	63256	207.58
		1	5	.030	Plain	SL	63267	233.42
		1	6	.030	Plain	SX	63278	255.26
		1	7	.030	Plain	SE	63285	290.32
		1-1/2	4	Square	Plain	RR	63025	194.25
		1-1/2	4	Square	Weldon	RR	63047	197.35
		1-1/2	4	.015	Plain	RR	63469	203.70
		1-1/2	4	.015	Weldon	RR	63475	206.80
		1-1/2	4	.030	Plain	RR	63072	203.70
		1-1/2	4	.030	Weldon	RR	63087	206.80
		1-1/2	4	.060	Plain	RR	63395	203.70
		1-1/2	4	.060	Weldon	RR	63405	206.80
		1-1/2	4	.090	Plain	RR	63396	203.70
		1-1/2	4	.090	Weldon	RR	63406	206.80
		1-1/2	4	.125	Plain	RR	63397	203.70
		1-1/2	4	.125	Weldon	RR	63407	206.80
		1-1/2	4	Ball	Plain	RR	63156	212.31
		1-1/2	4	Ball	Weldon	RR	63184	215.41
		2-1/4	5	.030	Plain	LL	63423	244.65
		3	6	.030	Plain	XX	63428	274.00
		4	7	.030	Plain	EE	63431	324.08
1	1	1-1/8	4	.030	Plain	SR	63257	310.38
		1-1/4	5	.030	Plain	SL	63268	347.02
		1-1/4	6	.030	Plain	SX	63279	374.80
		1-1/4	7	.030	Plain	SE	63286	425.93
		1-1/2	4	Square	Plain	RR	63026	304.50
		1-1/2	4	Square	Weldon	RR	63048	308.12
		1-1/2	4	.030	Plain	RR	63073	309.44
		1-1/2	4	.030	Weldon	RR	63088	313.06
		1-1/2	4	.060	Plain	RR	63398	309.44
		1-1/2	4	.060	Weldon	RR	63408	313.06
		1-1/2	4	Ball	Plain	RR	63158	347.08
		1-1/2	4	Ball	Weldon	RR	63186	350.70
		3	6	.030	Plain	XX	63429	401.89
		4-1/8	7	.030	Plain	EE	63432	460.90

Style Code Reference

EE—Extreme LOC, Extreme OAL
RR—Regular LOC, Regular OAL
SR—Short LOC, Regular OAL
XX—X-Long LOC, X-Long OAL
LL—Long LOC, Long OAL
SE—Short LOC, Extreme OAL
SS—Short LOC, Short OAL
LX—Long LOC, X-Long OAL
SL—Short LOC, Long OAL
SX—Short LOC, X-Long OAL

POW•R•FEED M90 END MILLS

For high performance milling in a broad range of materials

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiNX EDP Number	List Price
3	3	8	38	Square	Plain	RR	63027	15.59
		8	38	0,3	Plain	RR	63102	16.22
		8	38	Ball	Plain	RR	63160	18.53
4	4	11	50	Square	Plain	RR	63028	17.38
		11	50	0,3	Plain	RR	63103	17.96
		11	50	Ball	Plain	RR	63161	22.36
5	5	13	50	Square	Plain	RR	63029	24.41
		13	50	0,3	Plain	RR	63104	25.20
		13	50	Ball	Plain	RR	63162	30.19
6	6	10	54	Square	Plain	SS	63123	24.41
		10	54	0,3	Plain	SS	63108	25.52
		13	57	Square	Plain	RR	63030	26.41
		13	57	0,3	Plain	RR	63074	27.88
		13	57	0,5	Plain	RR	63434	27.88
		13	57	Ball	Plain	RR	63163	30.66
		28	75	0,5	Plain	LL	63455	32.39
8	8	12	58	Square	Plain	SS	63124	34.70
		12	58	0,5	Plain	SS	63109	36.54
		19	63	Square	Plain	RR	63032	36.64
		19	63	0,3	Plain	RR	63435	38.48
		19	63	0,5	Plain	RR	63075	38.48
		19	63	Ball	Plain	RR	63165	44.89
		29	75	0,5	Plain	LL	63456	45.00
10	10	14	66	Square	Plain	SS	63125	48.91
		14	66	0,5	Plain	SS	63110	51.96
		22	72	Square	Plain	RR	63034	53.27
		22	72	0,3	Plain	RR	63436	56.32
		22	72	0,5	Plain	RR	63076	56.32
		22	72	Ball	Plain	RR	63167	63.10
		36	88	0,5	Plain	LL	63457	66.04

continued in next column

Metric • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiNX EDP Number	List Price
12	12	16	73	Square	Plain	SS	63126	63.10
		16	73	1,0	Plain	SS	63111	65.15
		26	83	Square	Plain	RR	63036	74.39
		26	83	0,5	Plain	RR	63437	78.44
		26	83	0,75	Plain	RR	63438	78.44
		26	83	1,0	Plain	RR	63077	78.44
		26	83	Ball	Plain	RR	63169	90.04
		45	100	0,75	Plain	LL	63458	89.98
16	16	22	82	Square	Plain	SS	63128	133.25
		22	82	1,0	Plain	SS	63113	140.75
		32	92	Square	Plain	RR	63038	146.96
		32	92	0,75	Plain	RR	63439	154.46
		32	92	1,0	Plain	RR	63079	154.46
		32	92	Ball	Plain	RR	63171	180.76
		56	125	1,0	Plain	LL	63459	191.77
20	20	26	92	Square	Plain	SS	63130	234.04
		26	92	1,0	Plain	SS	63115	241.54
		38	104	Square	Plain	RR	63040	238.81
		38	104	0,75	Plain	RR	63440	246.31
		38	104	1,0	Plain	RR	63081	246.31
		38	104	Ball	Plain	RR	63173	279.62
		56	125	1,0	Plain	LL	63460	276.62

Style Code Reference

LL—Long LOC, Long OAL *RR—Regular LOC, Regular OAL* *SS—Short LOC, Short OAL*

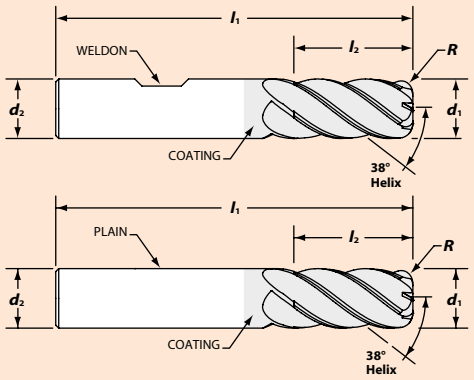
5 Variable Flutes

For maximum feed rates

M905

M905 • Radius

M905 • Square



Coating:

AlTiNX

in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

- High metal removal rates with chatter free machining
- A single tool for roughing and finishing
- Advanced **AlTiNX** coating

Carbon & tool steels ≤ 48 HRC	✓✓✓
Carbon & tool steels > 48 HRC	✓✓
Stainless steels	✓✓
Super alloys, Inconel® & titanium	✓✓✓
Cast irons	✓✓✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiNX EDP Number	List Price
1/4	1/4	3/4	2-1/2	Square	Plain	RR	63338	26.41
		3/4	2-1/2	.020	Plain	RR	63287	27.88
		3/4	2-1/2	.030	Plain	RR	63462	27.88
3/8	3/8	7/8	2-1/2	Square	Plain	RR	63340	42.79
		7/8	2-1/2	Square	Weldon	RR	63354	44.68
		7/8	2-1/2	.020	Plain	RR	63289	45.83
		7/8	2-1/2	.020	Weldon	RR	62976	47.72
		7/8	2-1/2	.030	Plain	RR	63370	45.83
		7/8	2-1/2	.030	Weldon	RR	63380	47.72
1/2	1/2	1-1/4	3	Square	Plain	RR	63342	69.51
		1-1/4	3	Square	Weldon	RR	63356	71.50
		1-1/4	3	.015	Plain	RR	63463	72.71
		1-1/4	3	.015	Weldon	RR	63470	74.71
		1-1/4	3	.030	Plain	RR	63291	72.71
		1-1/4	3	.030	Weldon	RR	62978	74.71
		1-1/4	3	.060	Plain	RR	63371	72.71
		1-1/4	3	.060	Weldon	RR	63381	74.71
		1-1/4	3	.090	Plain	RR	63372	72.71
		1-1/4	3	.090	Weldon	RR	63382	74.71
		1-1/4	3	.125	Plain	RR	63373	72.71
		1-1/4	3	.125	Weldon	RR	63383	74.71
5/8	5/8	1-1/4	3-1/2	Square	Plain	RR	63343	133.51
		1-1/4	3-1/2	Square	Weldon	RR	63357	135.87
		1-1/4	3-1/2	.030	Plain	RR	63292	140.60
		1-1/4	3-1/2	.030	Weldon	RR	62980	142.96
		1-1/4	3-1/2	.060	Plain	RR	63374	140.60
		1-1/4	3-1/2	.060	Weldon	RR	63384	142.96
3/4	3/4	1-1/2	4	Square	Plain	RR	63344	194.25
		1-1/2	4	Square	Weldon	RR	63358	197.35
		1-1/2	4	.030	Plain	RR	63293	203.70
		1-1/2	4	.030	Weldon	RR	62981	206.80
		1-1/2	4	.060	Plain	RR	63375	203.70
		1-1/2	4	.060	Weldon	RR	63385	206.80

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiNX EDP Number	List Price
6	6	13	57	Square	Plain	RR	63346	26.41
		13	57	0,5	Plain	RR	63295	27.88
8	8	19	63	Square	Plain	RR	63347	36.64
		19	63	0,5	Plain	RR	63296	38.48
10	10	22	72	Square	Plain	RR	63348	53.27
		22	72	0,5	Plain	RR	63297	56.32
12	12	26	83	Square	Plain	RR	63349	74.39
		26	83	0,75	Plain	RR	63298	78.44
16	16	32	92	Square	Plain	RR	63350	146.96
		32	92	1,0	Plain	RR	63299	154.46
20	20	38	104	Square	Plain	RR	63351	238.81
		38	104	1,0	Plain	RR	63300	246.31

Style Code Reference
RR—Regular LOC, Regular OAL

Application Guide • Speed & Feed

Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (SFM)	Feed (Inches per Tooth) 1/8	1/4	3/8	1/2	5/8	3/4	1	Speed (m /min)	Feed (mm per Tooth) 3,0	6,0	9,0	12,0	16,0	19,0	25,0
Cast Iron - Gray	Slot	1 x D	1 x D	4	400	.0006	.0012	.0019	.0025	.0031	.0038	.0050	122	.0152	.0305	.0483	.0635	.0787	.0965	.1270
	Rough	1.5 x D	.5 x D	4	500	.0007	.0015	.0023	.0030	.0037	.0046	.0060	152	.0183	.0381	.0579	.0762	.0945	.1158	.1524
	Rough	1.5 x D	.5 x D	5	500	--	.0014	.0021	.0028	.0035	.0043	.0056	152	--	.0356	.0533	.0711	.0889	.1092	.1422
	Finish	1.5 x D	.01 x D	5	650	--	.0014	.0021	.0028	.0035	.0043	.0056	198	--	.0356	.0533	.0711	.0889	.1092	.1422
Cast Iron - Ductile	Slot	1 x D	1 x D	4	300	.0006	.0012	.0018	.0023	.0029	.0035	.0046	91	.0152	.0305	.0483	.0635	.0787	.0965	.1270
	Rough	1.5 x D	.5 x D	4	400	.0007	.0014	.0021	.0028	.0035	.0042	.0056	122	.0183	.0356	.0533	.0711	.0889	.1067	.1422
	Rough	1.5 x D	.5 x D	5	400	--	.0013	.0020	.0027	.0033	.0040	.0054	122	--	.0330	.0508	.0686	.0838	.1016	.1372
	Finish	1.5 x D	.01 x D	5	520	--	.0013	.0020	.0027	.0033	.0040	.0054	158	--	.0330	.0508	.0686	.0838	.1016	.1372
Cast Iron - Malleable	Slot	0.75	1 x D	4	250	.0004	.0008	.0012	.0015	.0019	.0023	.0030	76	.0102	.0203	.0305	.0381	.0483	.0584	.0762
	Rough	1 x D	.75 x D	4	325	.0005	.0011	.0016	.0022	.0027	.0033	.0044	99	.0127	.0279	.0406	.0559	.0686	.0838	.1118
	Rough	1 x D	.75 x D	5	325	--	.0010	.0015	.0021	.0026	.0032	.0042	99	--	.0254	.0381	.0533	.0660	.0813	.1067
	Finish	1.5 x D	.01 x D	5	425	--	.0010	.0015	.0021	.0026	.0032	.0042	130	--	.0254	.0381	.0533	.0660	.0813	.1067
Low Carbon Steel ≤ 38 HRc 1018, 12L14, 8620	Slot	1 x D	1 x D	4	350	.0008	.0016	.0024	.0032	.0040	.0048	.0064	107	.0203	.0406	.0610	.0813	.1016	.1219	.1626
	Rough	1.5 x D	.5 x D	4	425	.0010	.0020	.0030	.0040	.0050	.0060	.0080	130	.0254	.0508	.0762	.1016	.1270	.1524	.2032
	Rough	1.5 x D	.5 x D	5	425	--	.0019	.0028	.0038	. 0047	.0057	.0076	130	--	.0483	.0711	.0965	.1194	.1448	.1930
	Finish	1.5 x D	.01 x D	5	550	--	.0019	.0028	.0038	.0047	.0057	.0076	168	--	.0483	.0711	.0965	.1194	.1448	.1930
Medium Carbon Steels ≤ 38 HRc 4140, 4340	Slot	1 x D	1 x D	4	325	.0006	.0013	.0020	.0027	.0034	.0040	.0054	99	.0152	.0330	.0508	.0686	.0864	.1016	.1372
	Rough	1.5 x D	.5 x D	4	375	.0008	.0017	.0026	.0035	.0044	.0053	.0070	114	.0203	.0432	.0660	.0889	.1118	.1346	.1778
	Rough	1.5 x D	.5 x D	5	375	--	.0016	.0025	.0034	.0042	.0051	.0068	114	--	.0406	.0635	.0864	.1067	.1295	.1727
	Finish	1.5 x D	.01 x D	5	490	--	.0016	.0025	.0034	.0042	.0051	.0068	149	--	.0406	.0635	.0864	.1067	.1295	.1727
Tool & Die Steels ≤ 38 HRc A2, D2, H13, P20	Slot	1 x D	1 x D	4	325	.0006	.0013	.0020	.0027	.0034	.0040	.0054	99	.0152	.0330	.0508	.0686	.0864	.1016	.1372
	Rough	1.5 x D	.5 x D	4	375	.0008	.0017	.0026	.0035	.0044	.0053	.0070	114	.0203	.0432	.0660	.0889	.1118	.1346	.1778
	Rough	1.5 x D	.5 x D	5	375	--	.0016	.0025	.0034	.0042	.0051	.0068	114	--	.0406	.0635	.0864	.1067	.1295	.1727
	Finish	1.5 x D	.01 x D	5	485	--	.0016	.0025	.0034	.0042	.0051	.0068	148	--	.0406	.0635	.0864	.1067	.1295	.1727
Tool Steels - 39 HRc to 48 HRc	Slot	.75 x D	1 x D	4	225	.0005	.0010	.0015	.0020	.0025	.0030	.0040	69	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	1 x D	.5 x D	4	275	.0006	.0012	.0017	.0023	.0029	.0035	.0046	84	.0146	.0292	.0438	.0584	.0730	.0876	.1168
	Rough	1 x D	.5 x D	5	275	--	.0011	.0016	.0022	.0028	.0034	.0044	84	--	.0279	.0406	.0559	.0711	.0864	.1118
	Finish	1.5 x D	.01 x D	5	355	--	.0011	.0016	.0022	.0028	.0034	.0044	108	--	.0279	.0406	.0559	.0711	.0864	.1118
Easy to Machine Stainless Steel 416, 410, 302, 303	Slot	1 x D	1 x D	4	300	.0006	.0012	.0018	.0025	.0031	.0037	.0050	91	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	Rough	1.5 x D	.5 x D	4	375	.0008	.0016	.0024	.0032	.0040	.0048	.0064	114	.0203	.0406	.0610	.0813	.1016	.1219	.1626
	Rough	1.5 x D	.5 x D	5	375	--	.0015	.0022	.0030	.0037	.0045	.0060	114	--	.0381	.0559	.0762	.0940	.1143	.1524
	Finish	1.5 x D	.01 x D	5	485	--	.0015	.0022	.0030	.0037	.0045	.0060	148	--	.0381	.0559	.0762	.0940	.1143	.1524
Moderately Difficult Stainless Steel 304, 316, Invar, Kovar	Slot	.75 x D	1 x D	4	275	.0005	.0011	.0016	.0022	.0027	.0033	.0044	84	.0127	.0279	.0406	.0559	.0686	.0838	.1118
	Rough	1.5 x D	.5 x D	4	350	.0007	.0015	.0023	.0032	.0037	.0045	.0064	107	.0178	.0381	.0584	.0813	.0940	.1143	.1626
	Rough	1.5 x D	.5 x D	5	350	--	.0014	.0022	.0031	.0036	.0044	.0062	107	--	.0356	.0559	.0787	.0914	.1118	.1575
	Finish	1.5 x D	.01 x D	5	450	--	.0014	.0022	.0031	.0036	.0044	.0062	137	--	.0356	.0559	.0787	.0914	.1118	.1575
Difficult to Machine Stainless Steels 316L, 17-4 PH, 15-5 PH, 13-8 PH	Slot	.5 x D	1 x D	4	250	.0004	.0009	.0012	.0018	.0022	.0027	.0036	76	.0102	.0229	.0305	.0457	.0559	.0686	.0914
	Rough	1 x D	.5 x D	4	300	.0005	.0011	.0016	.0022	.0028	.0033	.0044	91	.0127	.0279	.0406	.0559	.0711	.0838	.1118
	Rough	1 x D	.5 x D	5	300	--	.0010	.0015	.0021	.0026	.0031	.0042	91	--	.0254	.0381	.0533	.0660	.0787	.1067
	Finish	1.5 x D	.01 x D	5	390	--	.0010	.0015	.0021	.0026	.0031	.0042	119	--	.0254	.0381	.0533	.0660	.0787	.1067
Titanium Alloys	Slot	.5 x D	1 x D	4	250	.0003	.0007	.0011	.0015	.0018	.0023	.0030	76	.0076	.0178	.0279	.0381	.0457	.0584	.0762
	Rough	1 x D	.5 x D	4	300	.0005	.0010	.0015	.0020	.0025	.0030	.0040	91	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	1 x D	.5 x D	5	300	--	.0009	.0013	.0018	.0023	.0028	.0036	91	--	.0229	.0330	.0457	.0584	.0711	.0914
	Finish	1.5 x D	.01 x D	5	390	--	.0009	.0013	.0018	.0023	.0028	.0036	119	--	.0229	.0330	.0457	.0584	.0711	.0914
High Temperature Alloys	Slot	.25 x D	1 x D	4	70	.0004	.0008	.0012	.0015	.0019	.0024	.0030	21	.0102	.0203	.0305	.0381	.0483	.0610	.0762
	Rough	1 x D	.25 x D	4	95	.0005	.0009	.0014	.0018	.0022	.0028	.0036	29	.0127	.0229	.0356	.0457	.0559	.0711	.0914
	Rough	1 x D	.25 x D	5	95	--	.0009	.0014	.0018	.0022	.0028	.0036	29	--	.0229	.0356	.0457	.0559	.0711	.0914
	Finish	1.5 x D	.01 x D	5	125	--	.0009	.0014	.0018	.0022	.0028	.0036	38	--	.0229	.0356	.0457	.0559	.0711	.0914

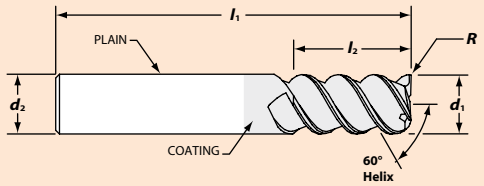
D = tool diameter Reduce feed rates by 20% when using long length tools Starting parameters shown

EXTREME HELIX M60

3 High Helix Flutes

For increased metal removal rates in highly machinable materials

Coating:
AlTiN



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004

M603

Extreme helix angle increases cutting edge engagement and prolongs tool life.

- Excellent for profiling operations
- Heat resistant **AlTiN** coating
- High shear geometry with greater edge strength

Carbon & tool steels ≤ 48 HRC	✓✓
Stainless steels	✓
Cast irons	✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiN EDP Number	List Price
1/8	1/8	1/2	1-1/2	Square	Plain	RR	39599	27.82
3/16	3/16	5/8	2	Square	Plain	RR	39128	26.46
1/4	1/4	3/4	2-1/2	Square	Plain	RR	37527	25.25
3/8	3/8	7/8	2-1/2	Square	Plain	RR	37535	41.58
1/2	1/2	1	3	Square	Plain	RR	37539	65.26
5/8	5/8	1-1/4	3-1/2	Square	Plain	RR	37531	124.74
3/4	3/4	1-1/2	4	Square	Plain	RR	97139	179.50

Style Code Reference
RR—Regular LOC, Regular OAL

Application Guide • Speed & Feed

Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (SFM) AlTiN	TiCN	MG	Feed (Inches Per Tooth) 1/8	1/4	3/8	1/2	5/8	3/4
Cast Iron Gray and Ductile	Slot	.5 x D	1 x D	3	275	275	225	.0012	.0018	.0025	.0030	.0040	.0040
	Rough	1 x D	.5 x D	3	325	325	275	.0014	.0021	.0028	.0035	.0042	.0042
	Finish	1.5 x D	.01 x D	3	375	375	300	.0014	.0021	.0028	.0035	.0042	.0042
Low Carbon Steels ≤ 32 HRc 1018, 12L14, 8620	Slot	.5 x D	1 x D	3	275	250	225	.0012	.0018	.0025	.0030	.0040	.0040
	Rough	1 x D	.5 x D	3	325	300	275	.0014	.0021	.0028	.0035	.0042	.0042
	Finish	1.5 x D	.01 x D	3	375	350	325	.0014	.0021	.0028	.0035	.0042	.0042
Medium Carbon and Tool Steels ≤ 38 HRc	Slot	.5 x D	1 x D	3	275	250	225	.0010	.0015	.0020	.0025	.0030	.0030
	Rough	1 x D	.5 x D	3	325	300	275	.0012	.0018	.0023	.0029	.0035	.0035
	Finish	1.5 x D	.01 x D	3	375	350	325	.0012	.0018	.0025	.0031	.0037	.0037
Carbon and Tool Steels 39 HRc to 48 HRc	Slot	.5 x D	1 x D	3	225	200	175	.0007	.0011	.0015	.0019	.0023	.0023
	Rough	1 x D	.5 x D	3	275	250	225	.0008	.0013	.0018	.0023	.0028	.0028
	Finish	1.5 x D	.01 x D	3	325	300	275	.0008	.0013	.0018	.0023	.0028	.0028
Easy to Machine Stainless Steels 416, 410, 302, 303	Slot	.5 x D	1 x D	3	250	225	200	.0010	.0015	.0020	.0025	.0030	.0030
	Rough	1 x D	.5 x D	3	300	275	250	.0013	.0019	.0025	.0028	.0038	.0038
	Finish	1.5 x D	.01 x D	3	350	325	300	.0014	.0021	.0028	.0035	.0042	.0042
Moderately Difficult Stainless Steels 304, 316, Invar, Kovar	Slot	.5 x D	1 x D	3	250	225	200	.0007	.0011	.0015	.0019	.0023	.0023
	Rough	1 x D	.5 x D	3	275	250	225	.0011	.0017	.0022	.0028	.0035	.0035
	Finish	1.5 x D	.01 x D	3	325	300	275	.0012	.0018	.0025	.0031	.0037	.0037
Difficult to Machine Stainless Steels 316L, 17-4 PH, 15-5 PH, 13-8 PH	Slot	.5 x D	1 x D	3	225	200	175	.0006	.0009	.0012	.0015	.0018	.0018
	Rough	1 x D	.5 x D	3	275	250	225	.0007	.0011	.0015	.0019	.0023	.0023
	Finish	1.5 x D	.01 x D	3	325	300	275	.0011	.0017	.0022	.0028	.0033	.0033

D = tool diameter Reduce feed rates by 20% when using long length tools Starting parameters shown

PROFILE

Sam Turner

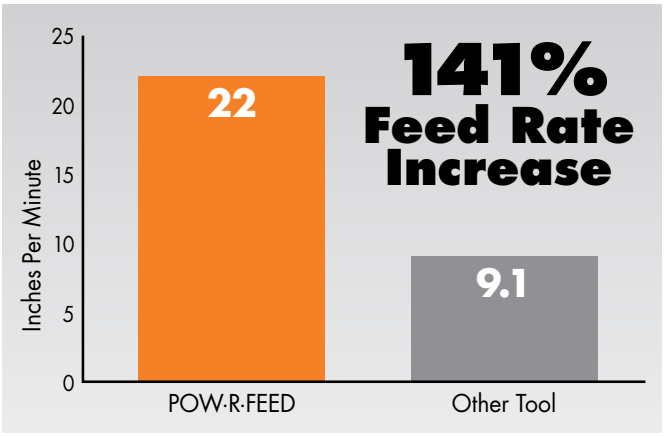
IMCO Sales Representative

Carolinas & Virginia

One of Sam Turner's customers, a high-end rifle manufacturer, said they were looking for better tooling to reduce cycle time. They talked to the right man.

The shop was slotting in 17-4 stainless, taking four passes at a .093 depth of cut with a 250 radial width of cut. The 3-flute end mill they were using had to be replaced every other day. If they couldn't increase production on the existing machine, they'd have to purchase a new machining center to keep up with production, an expense they would rather avoid. Sam had them test a 4-flute POW·R·FEED® at higher rpm.

Kenny Jarrett, owner of Jarrett Rifles, knows true quality when he sees it.



The results, according to the customer:

- **IPM increased by 141%.**
- **Cycle time dropped significantly.**
- **Parts per tool couldn't be calculated because, 30 days later, they were still waiting for the POW·R·FEED tool to wear out.**

Clint Bakeu (left), Jarrett Rifles shop supervisor, checks components for precise specifications; IMCO representative Sam Turner shows the finished product.

After more than 40 years in the business, Sam Turner really knows his stuff. A distributor for many years, Sam became a sales representative 20 years ago. He solves problems for machining operations throughout the Carolinas and Virginia.

OMEGA-6®

Hard Core

The thick core of the Omega-6 makes it an excellent choice for machining difficult materials. Run the Omega-6 dry in high-speed applications on hardened materials. Turn the coolant on for cutting in nickel- and cobalt-based alloys.

OMEGA-6® M70

Results: Great surface finishes, significant coolant savings and increased parts per tool due to extended tool life.

With six high strength flutes, Omega-6 produces superior surface finishes in the most difficult to machine materials.

Ideal for high performance milling in hard, difficult to machine materials.

At high speeds in a variety of difficult to machine alloys, Omega-6 is the high strength tool of choice for light to medium cuts. With its high performance TiAlNX coating, Omega-6 runs dry in many materials and delivers longer tool life.

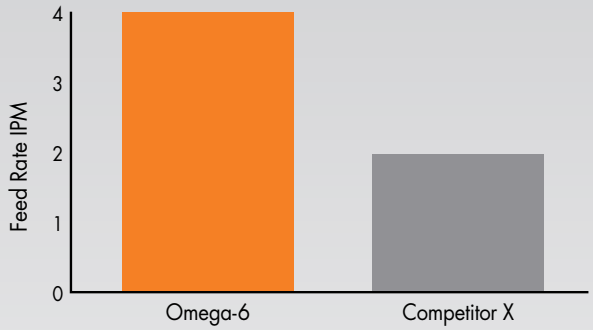
Omega-6 Delivers Maximum Performance in:

- Hardened tool steels
- Heat treated steels
- Titanium
- Inconel®
- Monel®
- Rene-41
- Waspaloy®
- Hastalloy C

Performance Tips

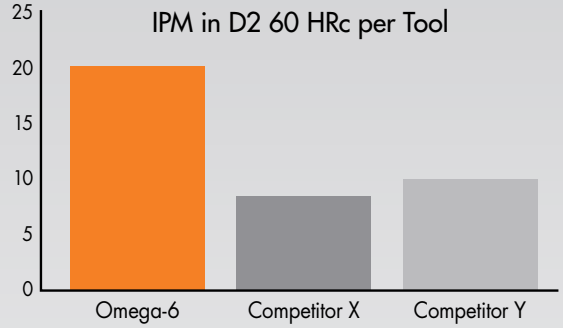
- **Use tools with corner radius whenever possible for maximum tool life.**
- **Tools with flats are NOT recommended for collet or milling chucks, or for use in high speed machining applications.**
- **Our precision located holding flats are the best alternative when using side-lock end mill holders. Don't waste your valuable time grinding flats on tools – let us do it for you!**

Decrease Cycle Time and Increase Tool Life



When working in Inconel® 718, one customer was able to cut his machining time in half vs. a competitor's high performance end mill. The 1/4" Omega-6 cut the .100" deep slot at twice the feed rate as the competitor. The added bonus to cutting the cycle time was that the Omega-6 ran twice as many parts. A double savings!

Improve Productivity and Surface Finish



One customer was having difficulty meeting surface finish and job deadlines on a milling application in D2 steel hardened to 60 HRc. Omega-6 not only outran competitors' 4- and 6-flute tools by a wide margin, it also solved the customer's finish problems. (In this application, the Omega-6 ran without coolant at 460 SFM with an axial cut of .750" and radial cut of .002".)

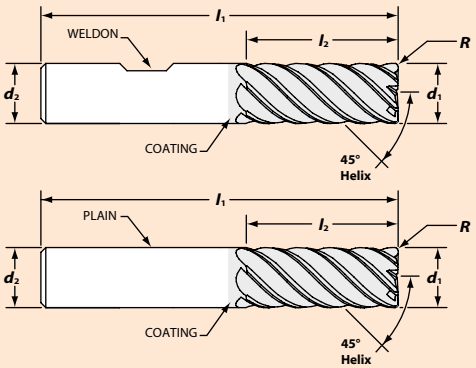
6 High Strength Flutes

For improved surface finish

M706

M706 • Radius

M706 • Square



Coating:

TiAlNX

in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

- High helix for improved chip control
- For light cuts and peripheral finishing
- Superior **TiAlNX** coating

Carbon & tool steels ≤ 48 HRC	✓
Carbon & tool steels > 48 HRC	✓✓✓
Stainless steels	✓
Super alloys, Inconel® & titanium	✓✓✓
Cast irons	✓✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	TiAlNX EDP Number	List Price
1/8	1/8	1/4	1-1/2	Square	Plain	SR	63190	23.89
		1/4	1-1/2	.015	Plain	SR	62983	27.30
		1/2	1-1/2	Square	Plain	RR	62781	27.09
		1/2	1-1/2	.015	Plain	RR	62791	30.50
3/16	3/16	5/16	2	Square	Plain	SR	63192	26.20
		5/16	2	.015	Plain	SR	62984	29.61
		9/16	2	Square	Plain	RR	62782	29.72
		9/16	2	.015	Plain	RR	62792	33.18
1/4	1/4	3/8	2-1/2	Square	Plain	SR	63194	27.56
		3/8	2-1/2	.020	Plain	SR	62985	31.66
		3/4	2-1/2	Square	Plain	RR	62783	35.07
		3/4	2-1/2	Square	Weldon	RR	30491	36.64
		3/4	2-1/2	.020	Plain	RR	62793	39.16
		3/4	2-1/2	.020	Weldon	RR	30568	40.74
		3/4	2-1/2	.030	Plain	RR	62838	39.16
		3/4	2-1/2	.030	Weldon	RR	62847	40.74
		1	4	Square	Plain	LX	63315	88.94
		1	4	.020	Plain	LX	63301	102.32
5/16	5/16	13/16	2-1/2	Square	Plain	RR	62784	44.78
		13/16	2-1/2	Square	Weldon	RR	30492	46.41
		13/16	2-1/2	.030	Plain	RR	62794	49.40
		13/16	2-1/2	.030	Weldon	RR	30569	51.08
3/8	3/8	1/2	2-1/2	Square	Plain	SR	63196	43.26
		1/2	2-1/2	.030	Plain	SR	62986	48.35
		1	2-1/2	Square	Plain	RR	62785	49.14
		1	2-1/2	Square	Weldon	RR	30493	50.92
		1	2-1/2	.030	Plain	RR	62795	54.23
		1	2-1/2	.030	Weldon	RR	30570	55.96
		1	4	Square	Plain	RX	63317	112.98
		1	4	.030	Plain	RX	63303	129.99
1/2	1/2	5/8	3	Square	Plain	SR	63198	66.26
		5/8	3	.030	Plain	SR	62987	73.82
		1	5	Square	Plain	RX	63318	166.69
		1	5	.030	Plain	RX	63304	191.68
		1-1/4	3	Square	Plain	RR	62787	72.56
		1-1/4	3	Square	Weldon	RR	30495	74.66
		1-1/4	3	.030	Plain	RR	62797	80.06
		1-1/4	3	.030	Weldon	RR	30572	82.16
5/8	5/8	3/4	3-1/2	Square	Plain	SR	63199	134.35
		3/4	3-1/2	.030	Plain	SR	62988	145.32
		1-5/8	3-1/2	Square	Plain	RR	62788	150.62
		1-5/8	3-1/2	Square	Weldon	RR	30497	153.04
		1-5/8	3-1/2	.030	Plain	RR	62798	161.54
		1-5/8	3-1/2	.030	Weldon	RR	30574	163.96
3/4	3/4	1	4	Square	Plain	SR	63200	172.46
		1	4	.030	Plain	SR	62989	186.27
		1-5/8	4	Square	Plain	RR	62789	193.57
		1-5/8	4	Square	Weldon	RR	30498	196.66
		1-5/8	4	.030	Plain	RR	62799	207.38
		1-5/8	4	.030	Weldon	RR	30575	210.47
1	1	2	4	Square	Plain	RR	62790	306.18
		2	4	Square	Weldon	RR	30499	309.80
		2	4	.030	Plain	RR	62800	330.02
		2	4	.030	Weldon	RR	62801	333.64

OMEGA-6 M70 END MILLS

For hardened steels and aerospace alloys

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	TiAlNX EDP Number	List Price
3	3	8	38	Square	Plain	RR	62802	23.95
	6	8	57	0,3	Plain	RR	62811	29.47
4	4	11	50	Square	Plain	RR	62803	25.53
	6	11	57	0,3	Plain	RR	62812	32.20
5	5	13	50	Square	Plain	RR	62804	29.04
	6	13	57	0,3	Plain	RR	62813	32.56
6	6	10	57	Square	Plain	SR	62990	26.66
		10	57	0,5	Plain	SR	62996	30.70
		13	57	Square	Plain	RR	62805	34.17
		13	57	0,5	Plain	RR	62814	38.17
		15	100	Square	Plain	RX	63322	89.37
		15	100	0,5	Plain	RX	63308	102.70
8	8	12	63	Square	Plain	SR	62991	45.95
		12	63	0,5	Plain	SR	62997	50.52
		19	63	Square	Plain	RR	62806	46.90
		19	63	0,5	Plain	RR	62815	51.47
		20	100	Square	Plain	RX	63323	104.63
		20	100	0,5	Plain	RX	63309	120.02

continued in next column

Metric • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	TiAlNX EDP Number	List Price
10	10	14	72	Square	Plain	SR	62992	48.67
		14	72	0,5	Plain	SR	62998	53.97
		22	72	Square	Plain	RR	62807	50.82
		22	72	0,5	Plain	RR	62816	57.70
		25	100	Square	Plain	RX	63324	120.54
		25	100	0,5	Plain	RX	63310	137.50
12	12	16	83	Square	Plain	SR	62993	68.59
		16	83	1,0	Plain	SR	62999	76.40
		26	83	Square	Plain	RR	62808	74.89
		26	83	1,0	Plain	RR	62817	78.50
		30	125	Square	Plain	RM	63325	167.46
		30	125	1,0	Plain	RM	63311	175.08
16	16	22	92	Square	Plain	SR	62994	140.49
		22	92	1,0	Plain	SR	63000	153.72
		32	92	Square	Plain	RR	62809	158.97
		32	92	1,0	Plain	RR	62818	162.64
20	20	26	104	Square	Plain	SR	62995	196.88
		26	104	1,0	Plain	SR	63001	210.74
		38	104	Square	Plain	RR	62810	226.43
		38	104	1,0	Plain	RR	62819	240.14

Style Code Reference

LX—Long LOC, X-Long OAL *RM—Regular LOC, Medium OAL* *RR—Regular LOC, Regular OAL*
RX—Regular LOC, X-Long OAL *SR—Short LOC, Regular OAL*

Application Guide • Speed & Feed

Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (SFM)	Feed (Inches per Tooth) 1/8	1/4	3/8	1/2	5/8	3/4	1	Speed (m /min)	Feed (mm per Tooth) 3,0	6,0	9,0	12,0	16,0	19,0	25,0
Titanium Alloys	Slot	.25 x D	1 x D	6	225	.0002	.0005	.0007	.0010	.0013	.0016	.0020	69	.0051	.0127	.0178	.0254	.0330	.0406	.0508
	Rough	1 x D	.25 x D	6	250	.0003	.0006	.0009	.0013	.0016	.0020	.0026	76	.0076	.0152	.0229	.0330	.0406	.0508	.0660
	Finish	1.5 x D	.01 x D	6	350	.0005	.0010	.0015	.0020	.0025	.0030	.0040	107	.0127	.0254	.0381	.0508	.0635	.0762	.1016
High Temperature Alloys, Inconel®, Haynes, Stellite, Hastalloy, Waspaloy®	Slot	.25 x D	1 x D	6	70	.0003	.0007	.0011	.0014	.0017	.0022	.0028	21	.0076	.0178	.0279	.0356	.0432	.0559	.0711
	Rough	1 x D	.25 x D	6	95	.0004	.0009	.0013	.0017	.0022	.0026	.0034	29	.0102	.0229	.0330	.0432	.0559	.0660	.0864
	Finish	1.5 x D	.01 x D	6	110	.0005	.0009	.0014	.0019	.0023	.0028	.0038	34	.0127	.0229	.0356	.0483	.0584	.0711	.0965
Carbon & Tool Steels ≤ 38 HRc	Slot	.5 x D	1 x D	6	275	.0003	.0007	.0010	.0015	.0019	.0024	.0030	84	.0076	.0178	.0254	.0381	.0483	.0610	.0762
	Rough	1 x D	.5 x D	6	325	.0005	.0010	.0015	.0020	.0025	.0030	.0040	99	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Finish	1.5 x D	.01 x D	6	400	.0006	.0012	.0018	.0025	.0031	.0037	.0050	122	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	HSM	1 x D	.1 x D	6	800	.0015	.0030	.0045	.0060	.0075	.0090	.0120	244	.0381	.0762	.1143	.1524	.1905	.2286	.3048
Carbon & Tool Steels 39 HRc to 48 HRc	Slot	.5 x D	1 x D	6	200	.0002	.0005	.0007	.0010	.0013	.0016	.0020	61	.0051	.0127	.0178	.0254	.0330	.0406	.0508
	Rough	1 x D	.5 x D	6	250	.0004	.0007	.0011	.0015	.0019	.0024	.0030	76	.0102	.0178	.0279	.0381	.0483	.0610	.0762
	Finish	1.5 x D	.01 x D	6	325	.0004	.0009	.0013	.0018	.0022	.0027	.0036	99	.0102	.0229	.0330	.0457	.0559	.0686	.0914
	HSM	1 x D	.1 x D	6	600	.0011	.0022	.0033	.0045	.0056	.0068	.0090	183	.0279	.0559	.0838	.1143	.1422	.1727	.2286
Carbon & Tool Steels 49 HRc to 57 HRc	Slot	.25 x D	1 x D	6	150	.0002	.0005	.0007	.0010	.0012	.0015	.0020	46	.0051	.0127	.0178	.0254	.0305	.0381	.0508
	Rough	1 x D	.25 x D	6	200	.0003	.0007	.0011	.0015	.0018	.0022	.0030	61	.0076	.0178	.0279	.0381	.0457	.0559	.0762
	Finish	1.5 x D	.01 x D	6	275	.0003	.0007	.0011	.0015	.0018	.0022	.0030	84	.0076	.0178	.0279	.0381	.0457	.0559	.0762
	HSM	1 x D	.1 x D	6	500	.0006	.0012	.0017	.0023	.0028	.0034	.0046	152	.0152	.0305	.0432	.0584	.0711	.0864	.1168
Carbon & Tool Steels 58 HRc to 62 HRc	Slot	.20 x D	1 x D	6	45	.0002	.0005	.0007	.0010	.0013	.0016	.0020	14	.0051	.0127	.0178	.0254	.0330	.0406	.0508
	Rough	1 x D	.20 x D	6	65	.0004	.0007	.0011	.0015	.0019	.0024	.0030	20	.0102	.0178	.0279	.0381	.0483	.0610	.0762
	Finish	1.5 x D	.01 x D	6	100	.0004	.0007	.0011	.0015	.0019	.0024	.0030	30	.0102	.0178	.0279	.0381	.0483	.0610	.0762
	HSM	1 x D	.1 x D	6	400	.0005	.0010	.0015	.0020	.0025	.0030	.0040	122	.0127	.0254	.0381	.0508	.0635	.0762	.1016

D = tool diameter Reduce feed rates by 20% when using long length tools Starting parameters shown

6 High Strength Flutes

For improved surface finish

M706N

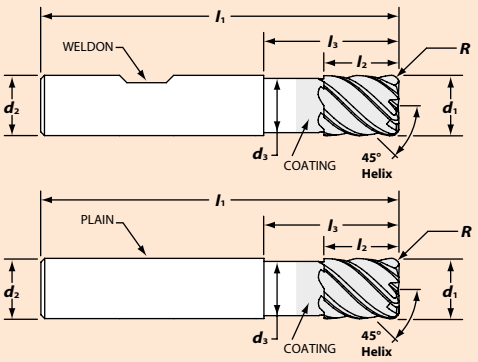
M706N • Radius

M706N • Square

- High helix for improved chip control
- For light cuts and peripheral finishing
- Superior **TiAlNX** coating
- Neck clearance prevents rubbing of parts

Carbon & tool steels ≤ 48 HRC	✓
Carbon & tool steels > 48 HRC	✓✓✓
Stainless steels	✓
Super alloys, Inconel® & titanium	✓✓✓
Cast irons	✓✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Shank Style	Style Code	TiAlNX EDP Number	List Price
1/8	1/8	1/4	1-1/2	1/2	.118	Square	Plain	SR	62820	25.99
		1/4	1-1/2	1/2	.118	.015	Plain	SR	62901	29.50
3/16	3/16	5/16	2	9/16	.176	Square	Plain	SR	62821	28.46
		5/16	2	9/16	.176	.015	Plain	SR	62902	32.02
1/4	1/4	3/8	2-1/2	1-1/8	.235	Square	Plain	SR	62822	33.02
		3/8	2-1/2	1-1/8	.235	Square	Weldon	SR	31079	34.60
		3/8	2-1/2	1-1/8	.235	.020	Plain	SR	62903	37.28
		3/8	2-1/2	1-1/8	.235	.020	Weldon	SR	31099	38.80
		3/8	2-1/2	1-1/8	.235	.030	Plain	SR	62904	37.28
		3/8	2-1/2	1-1/8	.235	.030	Weldon	SR	31100	38.80
5/16	5/16	7/16	2-1/2	1-1/8	.297	Square	Plain	SR	62823	42.16
		7/16	2-1/2	1-1/8	.297	Square	Weldon	SR	31091	43.84
		7/16	2-1/2	1-1/8	.297	.020	Plain	SR	62905	47.04
		7/16	2-1/2	1-1/8	.297	.020	Weldon	SR	31101	48.67
		7/16	2-1/2	1-1/8	.297	.030	Plain	SR	62906	47.04
		7/16	2-1/2	1-1/8	.297	.030	Weldon	SR	31102	48.67
3/8	3/8	1/2	2-1/2	1-1/8	.355	Square	Plain	SR	62824	47.78
		1/2	2-1/2	1-1/8	.355	Square	Weldon	SR	31092	49.46
		1/2	2-1/2	1-1/8	.355	.020	Plain	SR	62907	53.08
		1/2	2-1/2	1-1/8	.355	.020	Weldon	SR	31103	54.81
		1/2	2-1/2	1-1/8	.355	.030	Plain	SR	62908	53.08
		1/2	2-1/2	1-1/8	.355	.030	Weldon	SR	31104	54.81
		1/2	2-1/2	1-1/8	.355	.060	Plain	SR	62909	53.08
		1/2	2-1/2	1-1/8	.355	.060	Weldon	SR	31191	54.81
1/2	1/2	5/8	3	1-3/8	.475	Square	Plain	SR	62825	67.99
		5/8	3	1-3/8	.475	Square	Weldon	SR	31093	70.09
		5/8	3	1-3/8	.475	.020	Plain	SR	62910	75.81
		5/8	3	1-3/8	.475	.020	Weldon	SR	31192	77.91
		5/8	3	1-3/8	.475	.030	Plain	SR	62911	75.81
		5/8	3	1-3/8	.475	.030	Weldon	SR	31193	77.91
		5/8	3	1-3/8	.475	.060	Plain	SR	62912	75.81
		5/8	3	1-3/8	.475	.060	Weldon	SR	31194	77.91

continued on next page

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Shank Style	Style Code	TiAINX EDP Number	List Price
5/8	5/8	3/4	3-1/2	1-1/2	.590	Square	Plain	SR	62826	135.34
		3/4	3-1/2	1-1/2	.590	Square	Weldon	SR	31094	137.76
		3/4	3-1/2	1-1/2	.590	.030	Plain	SR	62913	148.58
		3/4	3-1/2	1-1/2	.590	.030	Weldon	SR	31195	150.99
3/4	3/4	1	4	1-3/4	.715	Square	Plain	SR	62827	173.72
		1	4	1-3/4	.715	Square	Weldon	SR	31095	176.77
		1	4	1-3/4	.715	.030	Plain	SR	62914	193.30
		1	4	1-3/4	.715	.030	Weldon	SR	31197	196.35
		1	4	1-3/4	.715	.060	Plain	SR	62915	193.30
		1	4	1-3/4	.715	.060	Weldon	SR	31198	196.35
1	1	1-1/8	4	1-7/8	.960	Square	Plain	SR	62828	276.20
		1-1/8	4	1-7/8	.960	Square	Weldon	SR	31096	279.88
		1-1/8	4	1-7/8	.960	.030	Plain	SR	62916	306.50
		1-1/8	4	1-7/8	.960	.030	Weldon	SR	31200	310.17
		1-1/8	4	1-7/8	.960	.060	Plain	SR	62917	306.50
		1-1/8	4	1-7/8	.960	.060	Weldon	SR	31201	310.17

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Shank Style	Style Code	TiAINX EDP Number	List Price
3	3	6	38	12	2,8	Square	Plain	SR	62829	25.99
		6	38	12	2,8	0,3	Plain	SR	62918	29.50
4	4	7	50	13	3,8	Square	Plain	SR	62830	27.80
		7	50	13	3,8	0,3	Plain	SR	62919	31.36
5	5	8	50	14	4,7	Square	Plain	SR	62831	29.06
		8	50	14	4,7	0,3	Plain	SR	62920	32.62
6		9	57	20	5,4	Square	Plain	SR	62832	32.49
	6	9	57	20	5,4	0,5	Plain	SR	62921	36.75
8	8	11	63	26	7,2	Square	Plain	SR	62833	43.33
		11	63	26	7,2	0,5	Plain	SR	62922	48.21
10	10	13	72	31	9	Square	Plain	SR	62834	50.71
		13	72	31	9	0,5	Plain	SR	62923	56.01
12	12	15	83	37	10,8	Square	Plain	SR	62835	69.12
		15	83	37	10,8	1,0	Plain	SR	62924	76.94
16	16	20	92	41	14,4	Square	Plain	SR	62836	140.07
		20	92	41	14,4	1,0	Plain	SR	62925	153.31
20	20	24	104	47	18	Square	Plain	SR	62837	198.06
		24	104	47	18	1,0	Plain	SR	62926	217.64

Style Code Reference
SR—Short LOC, Regular OAL

The Hot Corner

Using an end mill with a corner radius greatly extends tool life in most applications, especially roughing cuts and those in materials with low machinability ratings. Corner chipping can lead to tool failure and poor finishes. Adding a corner radius reduces chipping and improves tool life by protecting the weakest part of the end mill.

enDURO®

Race to the Finish

The unique 5-flute design of the M505 enDURO featuring a 40° helix reduces work hardening in stainless steel, titanium and other aerospace alloys. Maximum cutting-edge engagement with the workpiece results in excellent surface finish.

The 3-flute design of the M503 enDURO makes it an excellent choice for pocketing and slotting operations. Three flutes create extra flute clearance for better chip evacuation vs. a 4-flute tool, and gives you 50% more cutting edge than a 2-flute tool.

Whatever the job, high performance enDURO mills go the distance and lets you finish ahead of the pack.

5 Shear Flutes

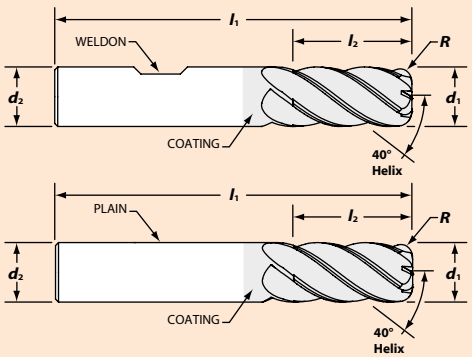
For improved surface finish

M505

M505 • Radius

M505 • Square

- Medium helix for better chip control
- Permits increased chip load at higher feed rates
- Superior **TiAlNX** coating



Coating:

TiAlNX

in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

Carbon & tool steels ≤ 48 HRC	✓✓
Carbon & tool steels > 48 HRC	✓✓
Stainless steels	✓✓
Super alloys, Inconel® & titanium	✓
Cast irons	✓✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	TiAlNX EDP Number	List Price
1/8	1/8	1/4	1-1/2	Square	Plain	SR	62960	23.10
		1/4	1-1/2	.015	Plain	SR	62968	25.99
		1/2	1-1/2	Square	Plain	RR	62880	25.52
		1/2	1-1/2	.015	Plain	RR	62870	28.40
3/16	3/16	5/16	2	Square	Plain	SR	62961	25.36
		5/16	2	.015	Plain	SR	62969	28.30
		9/16	2	Square	Plain	RR	62881	28.24
		9/16	2	.015	Plain	RR	62871	31.18
1/4	1/4	3/8	2	Square	Plain	SS	62962	27.30
		3/8	2	.020	Plain	SS	62970	30.71
		3/4	2-1/2	Square	Plain	RR	62882	30.50
		3/4	2-1/2	.020	Plain	RR	62872	33.92
3/8	3/8	1/2	2	Square	Plain	SS	62963	42.58
		1/2	2	.030	Plain	SS	62971	46.88
		1	2-1/2	Square	Plain	RR	62884	48.09
		1	2-1/2	Square	Weldon	RR	62754	49.88
		1	2-1/2	.030	Plain	RR	62874	52.40
		1	2-1/2	.030	Weldon	RR	62762	54.18
1/2	1/2	5/8	2-1/2	Square	Plain	SS	62964	65.42
		5/8	2-1/2	.030	Plain	SS	62972	72.03
		1-1/4	3	Square	Plain	RR	62886	72.29
		1-1/4	3	Square	Weldon	RR	62756	74.39
		1-1/4	3	.030	Plain	RR	62876	78.64
		1-1/4	3	.030	Weldon	RR	62764	80.74
5/8	5/8	3/4	3	Square	Plain	SS	62965	129.68
		3/4	3	.030	Plain	SS	62973	144.58
		1-5/8	3-1/2	Square	Plain	RR	62887	145.53
		1-5/8	3-1/2	Square	Weldon	RR	62757	147.94
		1-5/8	3-1/2	.030	Plain	RR	62877	160.96
		1-5/8	3-1/2	.030	Weldon	RR	62765	163.38
3/4	3/4	1	3	Square	Plain	SS	62966	166.90
		1	3	.030	Plain	SS	62974	183.38
		1-5/8	4	Square	Plain	RR	62888	187.06
		1-5/8	4	Square	Weldon	RR	62758	190.16
		1-5/8	4	.030	Plain	RR	62878	204.28
		1-5/8	4	.030	Weldon	RR	62766	207.32
1	1	2	4	Square	Plain	RR	62889	295.84
		2	4	Square	Weldon	RR	62759	299.46
		2	4	.030	Plain	RR	62879	315.84
		2	4	.030	Weldon	RR	62767	319.52

Style Code Reference

RR—Regular LOC, Regular OAL *SR—Short LOC, Regular OAL* *SS—Short LOC, Short OAL*

Application Guide • Speed & Feed

Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (SFM)	Feed (Inches per Tooth) 1/8	1/4	3/8	1/2	5/8	3/4	1	Speed (m /min)	Feed (mm per Tooth) 3,0	6,0	9,0	12,0	16,0	19,0	25,0
Easy to Machine Stainless Steels 416, 410, 302, 303	Finish	1.5 x D	.01 x D	5	375	.0007	.0014	.0021	.0028	.0035	.0042	.0056	114	.0178	.0356	.0533	.0711	.0889	.1067	.1422
Medium Difficulty Stainless Steels 304, 316, Invar, Kovar	Finish	1.5 x D	.01 x D	5	350	.0006	.0012	.0018	.0025	.0031	.0037	.0050	107	.0152	.0305	.0457	.0635	.0787	.0940	.1270
Difficult to Machine Stainless Steels 316L, 17-4 PH, 15-5 PH, 13-8 PH	Rough	1 x D	.5 x D	5	275	.0003	.0007	.0011	.0015	.0019	.0023	.0030	84	.0076	.0178	.0279	.0381	.0483	.0584	.0762
	Finish	1.5 x D	.01 x D	5	325	.0005	.0011	.0017	.0022	.0028	.0033	.0044	99	.0127	.0279	.0432	.0559	.0711	.0838	.1118
Low Carbon Steels ≤ 32 HRc, 1018, 12L14, 8620	Finish	1.5 x D	.01 x D	5	450	.0008	.0015	.0023	.0030	.0037	.0045	.0060	137	.0203	.0381	.0584	.0762	.0940	.1143	.1524
Carbon & Tool Steels 33 HRc to 38 HRc	Finish	1.5 x D	.01 x D	5	400	.0006	.0012	.0018	.0025	.0031	.0037	.0050	122	.0152	.0305	.0457	.0635	.0787	.0940	.1270
Carbon & Tool Steels 39 HRc to 48 HRc	Slot	.5 x D	1 x D	5	225	.0002	.0005	.0007	.0010	.0013	.0016	.0020	69	.0051	.0127	.0178	.0254	.0330	.0406	.0508
	Rough	1 x D	.5 x D	5	275	.0004	.0007	.0011	.0015	.0019	.0024	.0030	84	.0102	.0178	.0279	.0381	.0483	.0610	.0762
	Finish	1.5 x D	.01 x D	5	325	.0004	.0009	.0013	.0018	.0022	.0027	.0036	99	.0102	.0229	.0330	.0457	.0559	.0686	.0914
Copper, Brass & Bronze	Finish	1.5 x D	.01 x D	5	600	.0008	.0018	.0026	.0035	.0044	.0053	.0070	183	.0203	.0457	.0660	.0889	.1118	.1346	.1778
Aluminum, Bronze & Beryllium Copper	Finish	1.5 x D	.01 x D	5	375	.0006	.0013	.0020	.0025	.0032	.0039	.0050	114	.0152	.0330	.0508	.0635	.0813	.0991	.1270
Titanium Alloys	Slot	.5 x D	1 x D	5	225	.0003	.0007	.0011	.0015	.0018	.0022	.0030	69	.0076	.0178	.0279	.0381	.0457	.0559	.0762
	Rough	1 x D	.5 x D	5	250	.0005	.0010	.0015	.0020	.0025	.0030	.0040	76	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Finish	1.5 x D	.01 x D	5	350	.0006	.0012	.0017	.0023	.0029	.0034	.0046	107	.0152	.0305	.0432	.0584	.0737	.0864	.1168
High Temperature Alloys, Inconel®, Haynes, Stellite, Hastalloy, Waspaloy®	Slot	.25 x D	1 x D	5	70	.0003	.0007	.0011	.0014	.0017	.0022	.0028	21	.0076	.0178	.0279	.0356	.0432	.0559	.0711
	Rough	1 x D	.25 x D	5	95	.0004	.0009	.0013	.0017	.0022	.0026	.0034	29	.0102	.0229	.0330	.0432	.0559	.0660	.0864
	Finish	1.5 x D	.01 x D	5	110	.0005	.0009	.0014	.0019	.0023	.0028	.0038	34	.0127	.0229	.0356	.0483	.0584	.0711	.0965

D = tool diameter Reduce feed rates by 20% when using long length tools Starting parameters shown

3 High Shear Flutes

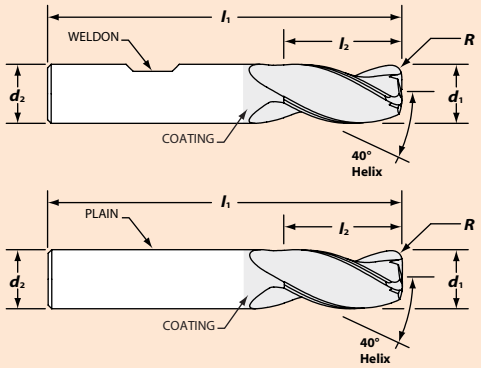
To reduce work hardening

M503

M503 • Radius

M503 • Square

- For slotting and roughing
- Provides excellent surface finishes
- High strength core design
- Superior **AlTiN** coating



Coating:

AlTiN

in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

Carbon & tool steels ≤ 48 HRC	✓✓
Stainless steels	✓✓
Cast irons	✓✓
Aluminum and non-ferrous	✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiN EDP Number	List Price
1/8	1/8	1/4	1-1/2	.015	Plain	SR	62942	23.42
		1/2	1-1/2	Square	Plain	RR	62308	23.26
		1/2	1-1/2	.015	Plain	RR	62208	25.94
3/16	3/16	5/16	2	.015	Plain	SR	62943	25.20
		9/16	2	Square	Plain	RR	62312	25.52
		9/16	2	.015	Plain	RR	62212	27.82
1/4	1/4	3/8	2	.020	Plain	SS	62944	27.30
		3/4	2-1/2	Square	Plain	RR	62316	30.14
		3/4	2-1/2	Square	Weldon	RR	62318	31.66
		3/4	2-1/2	.020	Plain	RR	62216	30.19
		3/4	2-1/2	.020	Weldon	RR	62218	31.76
3/8	3/8	1/2	2	.030	Plain	SS	62945	42.58
		1	2-1/2	Square	Plain	RR	62324	47.51
		1	2-1/2	Square	Weldon	RR	62326	49.30
		1	2-1/2	.030	Plain	RR	62224	46.94
		1	2-1/2	.030	Weldon	RR	62226	48.67
1/2	1/2	5/8	2-1/2	.030	Plain	SS	62946	65.68
		1-1/4	3	Square	Plain	RR	62332	70.40
		1-1/4	3	Square	Weldon	RR	62334	72.50
		1-1/4	3	.030	Plain	RR	62232	72.14
		1-1/4	3	.030	Weldon	RR	62234	74.02

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiN EDP Number	List Price
3	3	5	38	0,3	Plain	SR	62950	23.62
		8	38	Square	Plain	RR	62550	23.31
		8	38	0,3	Plain	RR	62540	26.04
4	4	8	50	0,3	Plain	SR	62951	25.57
		11	50	Square	Plain	RR	62551	25.72
		11	50	0,3	Plain	RR	62541	28.04
5	5	9	50	0,3	Plain	SR	62952	26.04
		13	50	Square	Plain	RR	62552	25.94
		13	50	0,3	Plain	RR	62542	28.19
6	6	10	54	0,5	Plain	SS	62953	30.24
		13	57	Square	Plain	RR	62553	30.92
		13	57	0,5	Plain	RR	62543	30.98
8	8	12	58	0,5	Plain	SS	62954	38.01
		19	63	Square	Plain	RR	62554	40.53
		19	63	0,5	Plain	RR	62544	38.74
10	10	14	66	0,5	Plain	SS	62955	57.17
		22	72	Square	Plain	RR	62555	49.35
		22	72	0,5	Plain	RR	62545	48.72
12	12	16	73	1,0	Plain	SS	62956	72.56
		26	83	Square	Plain	RR	62556	72.24
		26	83	1,0	Plain	RR	62546	73.60

Style Code Reference

RR—Regular LOC, Regular OAL *SR—Short LOC, Regular OAL* *SS—Short LOC, Short OAL*

3 High Shear Flutes

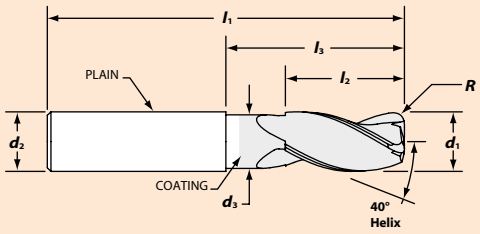
To reduce work hardening

M503N

M503N • Radius

M503N • Square

- Same advanced geometry as our M503 cutter with neck relief to prevent rubbing of parts



Coating:

AlTiN

in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004

mm d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Shank Style	Style Code	AlTiN EDP Number	List Price
1/8	1/8	1/4	1-1/2	1/2	.118	Square	Plain	SR	62108	22.00
		1/4	1-1/2	1/2	.118	.015	Plain	SR	62008	24.94
3/16	3/16	5/16	2	9/16	.176	Square	Plain	SR	62112	24.31
		5/16	2	9/16	.176	.015	Plain	SR	62012	27.25
1/4	1/4	3/8	2-1/2	1-1/8	.235	Square	Plain	SR	62116	28.04
		3/8	2-1/2	1-1/8	.235	.020	Plain	SR	62016	31.50
		3/8	2-1/2	1-1/8	.235	.030	Plain	SR	62028	31.50
3/8	3/8	1/2	2-1/2	1-1/8	.355	Square	Plain	SR	62124	44.36
		1/2	2-1/2	1-1/8	.355	.020	Plain	SR	62030	48.67
		1/2	2-1/2	1-1/8	.355	.030	Plain	SR	62024	48.67
1/2	1/2	5/8	3	1-3/8	.475	Square	Plain	SR	62132	64.05
		5/8	3	1-3/8	.475	.020	Plain	SR	62044	70.35
		5/8	3	1-3/8	.475	.030	Plain	SR	62032	70.35

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Shank Style	Style Code	AlTiN EDP Number	List Price
3	3	6	38	12	2,8	Square	Plain	SR	62530	22.05
		6	38	12	2,8	0,3	Plain	SR	62520	24.99
4	4	7	50	13	3,8	Square	Plain	SR	62531	24.57
		7	50	13	3,8	0,3	Plain	SR	62521	27.40
5	5	8	50	14	4,7	Square	Plain	SR	62532	24.68
		8	50	14	4,7	0,3	Plain	SR	62522	27.51
6	6	9	57	20	5,4	Square	Plain	SR	62533	28.88
		9	57	20	5,4	0,3	Plain	SR	62131	32.34
8	8	11	63	26	7,2	Square	Plain	SR	62534	37.96
		11	63	26	7,2	0,5	Plain	SR	62524	41.84
10	10	13	72	31	9	Square	Plain	SR	62535	46.20
		13	72	31	9	0,5	Plain	SR	62525	50.50
12	12	15	83	37	10,8	Square	Plain	SR	62536	65.89
		15	83	37	10,8	1,0	Plain	SR	62526	72.19

Style Code Reference
SR—Short LOC, Regular OAL

Application Guide • Speed & Feed

Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (SFM)	Feed (Inches per Tooth) 1/8	1/4	3/8	1/2	5/8	3/4	1	Speed (m/min)	Feed (mm per Tooth) 3,0	6,0	9,0	12,0	16,0	19,0	25,0
Easy to Machine Stainless Steels 416, 410, 302, 303	Slot	.5 x D	1 x D	3	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	1 x D	.5 x D	3	350	.0006	.0013	.0019	.0025	.0032	.0038	.0050	107	.0152	.0330	.0483	.0635	.0813	.0965	.1270
Moderately Difficult Stainless Steels 304, 316, Invar, Kovar	Slot	.5 x D	1 x D	3	250	.0003	.0007	.0011	.0015	.0019	.0023	.0030	76	.0076	.0178	.0279	.0381	.0483	.0584	.0762
	Rough	1 x D	.5 x D	3	300	.0006	.0011	.0017	.0022	.0028	.0035	.0045	91	.0152	.0279	.0432	.0559	.0711	.0889	.1143
Difficult to Machine Stainless Steels 316L, 17-4 PH, 15-5 PH, 13-8 PH	Slot	.5 x D	1 x D	3	225	.0003	.0006	.0009	.0012	.0015	.0018	.0024	69	.0076	.0152	.0229	.0305	.0381	.0457	.0610
	Rough	1 x D	.5 x D	3	275	.0003	.0007	.0011	.0015	.0019	.0023	.0030	84	.0076	.0178	.0279	.0381	.0483	.0584	.0762
Low Carbon Steels ≤ 32 HRc 1018, 12L14, 8620	Slot	.5 x D	1 x D	3	325	.0006	.0013	.0021	.0027	.0035	.0042	.0054	99	.0152	.0330	.0533	.0686	.0889	.1067	.1372
	Rough	1 x D	.5 x D	3	375	.0007	.0015	.0023	.0030	.0037	.0045	.0060	114	.0178	.0381	.0584	.0762	.0940	.1143	.1524
Carbon & Tool Steels 33 HRc to 38 HRc	Slot	.5 x D	1 x D	3	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	1 x D	.5 x D	3	325	.0006	.0012	.0018	.0023	.0029	.0035	.0046	99	.0152	.0305	.0457	.0584	.0737	.0889	.1168
Copper, Brass, & Bronze	Slot	.5 x D	1 x D	3	450	.0007	.0015	.0022	.0030	.0037	.0045	.0060	137	.0178	.0381	.0559	.0762	.0940	.1143	.1524
	Rough	1 x D	.5 x D	3	550	.0008	.0018	.0026	.0035	.0044	.0053	.0070	168	.0203	.0457	.0660	.0889	.1118	.1346	.1778
Aluminum, Bronze & Beryllium Copper	Slot	.5 x D	1 x D	3	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	1 x D	.5 x D	3	350	.0006	.0013	.0020	.0025	.0032	.0039	.0050	107	.0152	.0330	.0508	.0635	.0813	.0991	.1270

D = tool diameter Reduce feed rates by 20% when using long length tools Starting parameters shown

STREAKERS® M20

Results: Higher feed rates, faster cycle time, excellent surface finish, higher productivity, lower cost per part and longer tool life.

With the unique design of STREAKERS, you can rough and finish at low or high horsepower in all kinds of aluminum without slowdowns due to clogging or spindle drag.

STREAKERS are high-efficiency tools at speeds as low as 3,000 RPM and begin to achieve peak performance at 10,000 RPM and higher.

IMCO's unique free-cutting flute design creates less drag on the spindle, so it draws less power. Machine tests prove STREAKERS use less horsepower than competitive tools.

STREAKERS Deliver Maximum Performance in:

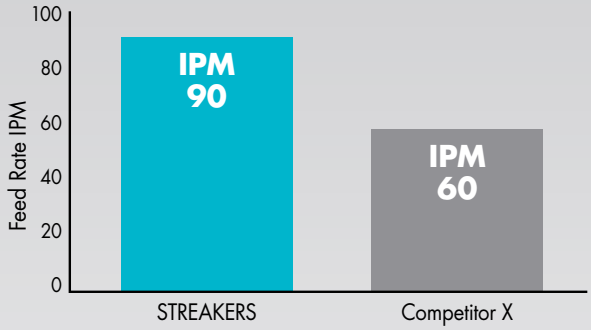
- Aluminum alloys 2024, 6061, 7075
- Copper alloys, brass, bronze
- High silicon aluminum A380, A390
- Composites, plastics and fiberglass
- Die cast aluminum
- Extruded metal parts
- Magnesium alloys
- Nonferrous metals

Application Guide • Speed & Feed

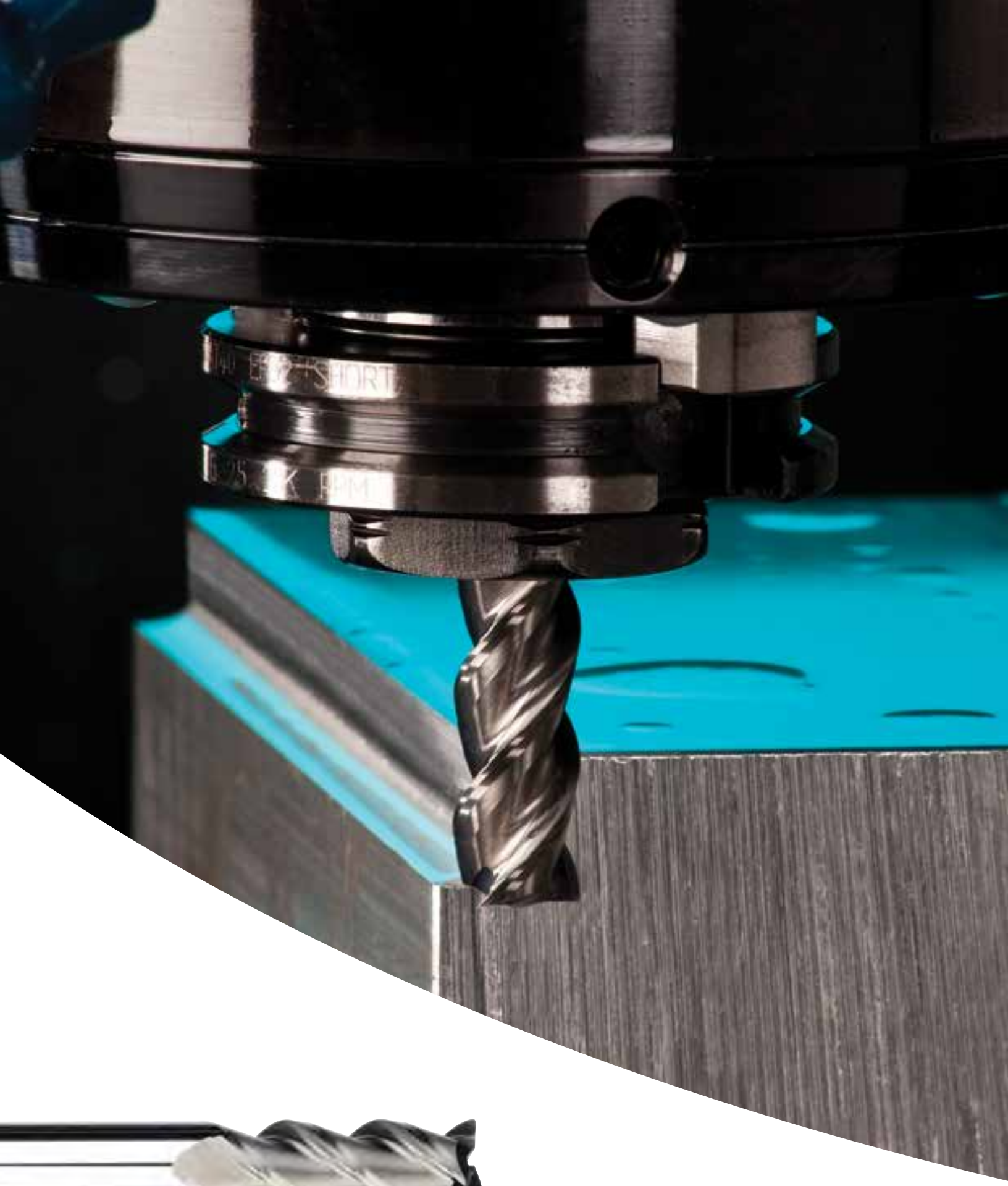
Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (SFM)	Feed (Inches per Tooth) 1/8	1/4	3/8	1/2	5/8	3/4	1	Speed (m /min)	Feed (mm per Tooth) 3,0	6,0	9,0	12,0	16,0	19,0	25,0
Aluminum Alloys 2024, 6061, 7075	Slotting	1 x D	1 x D	2	800	.0020	.0040	.0060	.0080	.0100	.0120	.0160	244	.0508	.1016	.1524	.2032	.2540	.3048	.4064
	Rough	1 x D	.75 x D	3	1000	.0020	.0050	.0075	.0100	.0120	.0150	.0200	305	.0508	.1270	.1905	.2540	.3048	.3810	.5080
	Finish	1.5 x D	.01 x D	3	1200	.0030	.0060	.0090	.0120	.0160	.0200	.0250	366	.0762	.1524	.2286	.3048	.4064	.5080	.6350
High Silicon Aluminum A380, A390	Slotting	.5 x D	1 x D	3	400	.0010	.0020	.0030	.0040	.0050	.0060	.0080	122	.0254	.0508	.0762	.1016	.1270	.1524	.2032
	Rough	1 x D	.5 x D	3	600	.0015	.0030	.0045	.0060	.0075	.0090	.0120	183	.0381	.0762	.1143	.1524	.1905	.2286	.3048
	Finish	1.5 x D	.01 x D	3	800	.0018	.0035	.0055	.0070	.0090	.0110	.0140	244	.0457	.0889	.1397	.1778	.2286	.2794	.3556
Magnesium Alloys	Slotting	1 x D	1 x D	2	800	.0020	.0040	.0060	.0080	.0100	.0120	.0160	244	.0508	.1016	.1524	.2032	.2540	.3048	.4064
	Rough	1 x D	.75 x D	3	1000	.0020	.0050	.0075	.0100	.0120	.0150	.0200	305	.0508	.1270	.1905	.2540	.3048	.3810	.5080
	Finish	1.5 x D	.01 x D	3	1200	.0030	.0060	.0090	.0120	.0160	.0200	.0250	366	.0762	.1524	.2286	.3048	.4064	.5080	.6350
Copper Alloys Brass, Bronze	Slotting	.75 x D	1 x D	2	400	.0010	.0020	.0030	.0040	.0050	.0060	.0080	122	.0254	.0508	.0762	.1016	.1270	.1524	.2032
	Rough	1 x D	.75 x D	3	475	.0012	.0025	.0037	.0050	.0063	.0075	.0100	145	.0305	.0635	.0940	.1270	.1600	.1905	.2540
	Finish	1.5 x D	.01 x D	3	550	.0015	.0030	.0045	.0060	.0075	.0090	.0120	168	.0381	.0762	.114 3	.1524	.1905	.2286	.3048
Composites Plastics, Fiberglass	Slotting	1 x D	1 x D	3	400	.0010	.0020	.0030	.0040	.0050	.0060	.0080	122	.0254	.0508	.0762	.1016	.1270	.1524	.2032
	Rough	1 x D	.75 x D	3	600	.0015	.0030	.0045	.0060	.0075	.0090	.0120	183	.0381	.0762	.1143	.1524	.1905	.2286	.3048
	Finish	1.5 x D	.01 x D	3	800	.0018	.0035	.0055	.0070	.0090	.0110	.0140	244	.0457	.0889	.1397	.1778	.2286	.2794	.3556

D = tool diameter Reduce feed rates by 20% when using long length tools Starting parameters shown

Improved Productivity and Surface Finish



Cycle time was a critical problem for a customer machining aluminum using a competitor's 3-flute end mill at 1,300 SFM and 60 IPM with an axial and radial cut of .125". Switching to a STREAKERS end mill allowed running at 90 IPM and increasing the axial and radial depths of cut to .265". That cut cycle time by 15 minutes – a 50% feed rate increase.



3-FLUTE STREAKERS®

3's a Charm

There are several reasons to use the 3-flute version of the STREAKERS: more stability in the cut, less power draw through the spindle and a great finish. The center cutting design allows the 3-flute STREAKERS to ramp and plunge into parts, and it works great in many non-ferrous materials.

3-FLUTE STREAKERS

M203

3 High Shear Flutes

For rapid chip evacuation

M203 • Radius

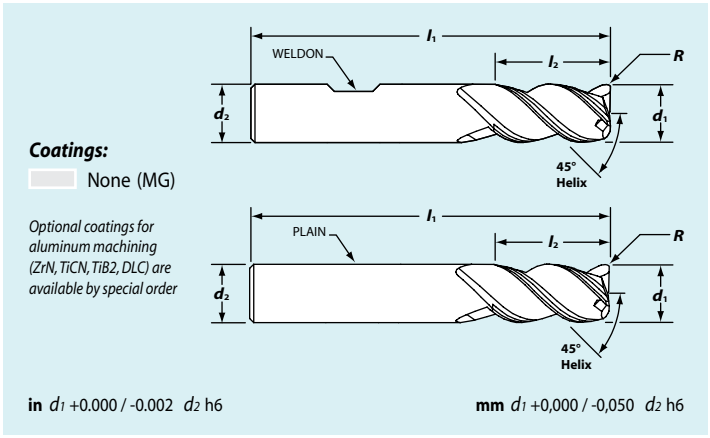
M203 • Square

The unique flute design of the 3-flute STREAKERS allows higher metal removal rates without maxing out the machine's horsepower. It requires less power at the spindle, allowing high metal removal rates even on low HP machines.

- High rake angle for better chip flow
- Reduced chatter over a broad range of speeds
- Cylindrical land for superior part finish
- For high volume metal removal

Aluminum and non-ferrous	✓✓✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent



in d_1 +0.000 / -0.002 d_2 h6 **mm** d_1 +0,000 / -0,050 d_2 h6

Ideal for high performance milling in all types of aluminum including high silicon, die cast and extruded aluminum parts.

End designs

- Available in a wide range of corner radii for aerospace and other industrial applications
- Square end for general machining and finishing
- Center cutting

Shank designs

- h6 tolerance shanks fit all collets and conform to shrink-fit requirements
- Many sizes offered with flats for end mill holders

Multiple lengths

- Stub length for extra rigidity
- Standard, long and extra-long flute length and reach
- With short flute length for extra rigidity in deep pockets and cavities
- With extra flute length for finishing passes
- With stub flutes for deep cavity work

Style Code Reference

EE—Extreme LOC, Extreme OAL	*EX—Extreme LOC, X-Long OAL*	*LL—Long LOC, Long OAL*
LX—Long LOC, X-Long OAL	*RR—Regular LOC, Regular OAL*	*SR—Short LOC, Regular OAL*

STREAKERS M20 END MILLS

For high performance milling in aluminum and non-ferrous

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	MG EDP Number	List Price
1/8	1/8	1/4	1-1/2	Square	Plain	SR	32520	14.64
		3/8	1-1/2	Square	Plain	RR	33246	16.05
		3/8	1-1/2	.015	Plain	RR	34384	23.05
3/16	3/16	5/16	2	Square	Plain	SR	32521	19.45
		9/16	2	Square	Plain	RR	33248	21.71
		9/16	2	.015	Plain	RR	34385	28.71
1/4	1/4	3/8	2-1/2	Square	Plain	SR	32986	24.43
		3/8	2-1/2	.015	Plain	SR	33601	31.43
		3/8	2-1/2	.030	Plain	SR	33602	31.43
		3/4	2-1/2	Square	Plain	RR	32992	26.00
		3/4	2-1/2	Square	Weldon	RR	32634	31.00
		3/4	2-1/2	.015	Plain	RR	34386	33.00
		3/4	2-1/2	.015	Weldon	RR	34387	38.00
		3/4	2-1/2	.030	Plain	RR	34388	33.00
		3/4	2-1/2	.030	Weldon	RR	34389	38.00
		1-1/4	3	Square	Plain	LL	33009	39.95
		1-1/4	3	Square	Weldon	LL	33011	44.95
		1-1/4	3	.015	Plain	LL	34435	46.95
		1-1/4	3	.015	Weldon	LL	34437	51.95
		1-1/4	3	.030	Plain	LL	34438	46.95
		1-1/4	3	.030	Weldon	LL	34447	51.95
5/16	5/16	7/16	2-1/2	Square	Plain	SR	32987	26.90
		13/16	2-1/2	Square	Plain	RR	33250	29.90
		13/16	2-1/2	Square	Weldon	RR	32736	34.90
		13/16	2-1/2	.015	Plain	RR	34450	36.90
		13/16	2-1/2	.015	Weldon	RR	34451	41.90
		13/16	2-1/2	.030	Plain	RR	34452	36.90
		13/16	2-1/2	.030	Weldon	RR	34453	41.90
		13/16	2-1/2	.060	Plain	RR	38258	38.55
		13/16	2-1/2	.060	Weldon	RR	38318	43.55
		1-3/8	3	Square	Plain	LL	34454	51.93
		1-3/8	3	Square	Weldon	LL	34455	56.93
		1-3/8	3	.030	Plain	LL	38031	58.93
		1-3/8	3	.030	Weldon	LL	38319	63.93
		1-3/8	3	.060	Plain	LL	38260	60.58
		1-3/8	3	.060	Weldon	LL	38056	65.58
3/8	3/8	1/2	2-1/2	Square	Plain	SR	32988	31.05
		1/2	2-1/2	.015	Plain	SR	33603	38.05
		1/2	2-1/2	.030	Plain	SR	33604	38.05
		1/2	2-1/2	.060	Plain	SR	33605	39.70
		7/8	2-1/2	Square	Weldon	RR	32635	39.05
		7/8	2-1/2	.015	Weldon	RR	34459	46.05
		7/8	2-1/2	.030	Weldon	RR	34461	46.05
		7/8	2-1/2	.060	Weldon	RR	38320	47.70
		1	2-1/2	Square	Plain	RR	32993	34.05
		1	2-1/2	.015	Plain	RR	34458	41.05
		1	2-1/2	.030	Plain	RR	34460	41.05
		1	2-1/2	.060	Plain	RR	38261	42.70
		1-1/2	3-1/4	Square	Plain	LL	32998	47.50
		1-1/2	3-1/4	Square	Weldon	LL	32702	52.50
		1-1/2	3-1/4	.015	Plain	LL	34462	54.50
		1-1/2	3-1/4	.015	Weldon	LL	34463	59.50

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Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	MG EDP Number	List Price
3/8	3/8	1-1/2	3-1/4	.030	Plain	LL	34480	54.50
		1-1/2	3-1/4	.030	Weldon	LL	34482	59.50
		1-1/2	3-1/4	.060	Plain	LL	38262	56.15
		1-1/2	3-1/4	.060	Weldon	LL	38321	61.15
		2	4	Square	Plain	XX	33003	65.86
		2	4	Square	Weldon	XX	32716	70.86
		2	4	.015	Plain	XX	34484	72.86
		2	4	.015	Weldon	XX	34486	77.86
		2	4	.030	Plain	XX	34488	72.86
		2	4	.030	Weldon	XX	34490	77.86
		2	4	.060	Plain	XX	38263	74.51
		2	4	.060	Weldon	XX	38322	79.51
1/2	1/2	5/8	3	Square	Plain	SR	32989	49.98
		5/8	3	.015	Plain	SR	33606	56.98
		5/8	3	.030	Plain	SR	33607	56.98
		5/8	3	.060	Plain	SR	33608	58.63
		5/8	3	.090	Plain	SR	33609	63.28
		5/8	3	.125	Plain	SR	33610	65.48
		1-1/4	3	Square	Plain	RR	32994	54.50
		1-1/4	3	.015	Plain	RR	34492	61.50
		1-1/4	3	.030	Plain	RR	34522	61.50
		1-1/4	3	.060	Plain	RR	34526	63.15
		1-1/4	3	.090	Plain	RR	38022	67.80
		1-1/4	3	.125	Plain	RR	38025	70.00
		1-1/4	3-1/4	Square	Weldon	RR	32637	64.05
		1-1/4	3-1/4	.015	Weldon	RR	34494	71.05
		1-1/4	3-1/4	.030	Weldon	RR	34523	71.05
		1-1/4	3-1/4	.060	Weldon	RR	34527	72.70
		1-1/4	3-1/4	.090	Weldon	RR	38050	77.35
		1-1/4	3-1/4	.125	Weldon	RR	38051	79.55
		2	4	Square	Plain	LL	32999	84.55
		2	4	Square	Weldon	LL	32703	90.05
		2	4	.015	Plain	LL	34531	91.55
		2	4	.015	Weldon	LL	34533	97.05
		2	4	.030	Plain	LL	34534	91.55
		2	4	.030	Weldon	LL	34535	97.05
		2	4	.060	Plain	LL	34537	93.20
		2	4	.060	Weldon	LL	34538	98.70
		2	4	.090	Plain	LL	38032	97.85
		2	4	.090	Weldon	LL	38057	103.35
		2	4	.125	Plain	LL	38033	100.05
		2	4	.125	Weldon	LL	38058	105.55
		2-1/2	5	Square	Plain	LX	33004	101.48
		2-1/2	5	Square	Weldon	LX	32718	106.98
		2-1/2	5	.030	Plain	LX	34539	108.48
		2-1/2	5	.030	Weldon	LX	34541	113.98
		2-1/2	5	.060	Plain	LX	38038	110.13
		2-1/2	5	.060	Weldon	LX	38063	115.63
		2-1/2	5	.090	Plain	LX	38039	114.78
		2-1/2	5	.090	Weldon	LX	38064	120.28
		2-1/2	5	.125	Plain	LX	38040	116.98
		2-1/2	5	.125	Weldon	LX	38065	122.48

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Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	MG EDP Number	List Price
1/2	1/2	3-1/8	6	Square	Plain	XX	33013	147.26
		3-1/8	6	Square	Weldon	XX	32830	152.76
		3-1/8	6	.030	Plain	XX	34543	154.26
		3-1/8	6	.030	Weldon	XX	34544	159.76
		3-1/8	6	.060	Plain	XX	38045	155.91
		3-1/8	6	.060	Weldon	XX	38070	161.41
		3-1/8	6	.090	Plain	XX	38046	160.56
		3-1/8	6	.090	Weldon	XX	38071	166.06
		3-1/8	6	.125	Plain	XX	38047	162.76
		3-1/8	6	.125	Weldon	XX	38072	168.26
5/8	5/8	3/4	3-1/2	Square	Plain	SR	32990	98.14
		1-1/4	3-1/2	Square	Weldon	RR	32638	115.55
		1-1/4	3-1/2	.030	Weldon	RR	34546	122.55
		1-1/4	3-1/2	.060	Weldon	RR	38323	124.20
		1-1/4	3-1/2	.090	Weldon	RR	38324	128.85
		1-1/4	3-1/2	.125	Weldon	RR	38325	131.05
		1-5/8	3-1/2	Square	Plain	RR	32995	109.07
		1-5/8	3-1/2	.030	Plain	RR	34545	116.07
		1-5/8	3-1/2	.060	Plain	RR	38264	117.72
		1-5/8	3-1/2	.090	Plain	RR	38265	122.37
		1-5/8	3-1/2	.125	Plain	RR	38266	124.57
		2-1/2	5	Square	Plain	LL	33006	159.40
		2-1/2	5	Square	Weldon	LL	32720	165.90
		2-1/2	5	.030	Plain	LL	34549	166.40
		2-1/2	5	.030	Weldon	LL	34550	172.90
		2-1/2	5	.060	Plain	LL	38267	168.05
		2-1/2	5	.060	Weldon	LL	38328	174.55
		2-1/2	5	.090	Plain	LL	38268	172.70
		2-1/2	5	.090	Weldon	LL	38329	179.20
		2-1/2	5	.125	Plain	LL	38269	174.90
		2-1/2	5	.125	Weldon	LL	38330	181.40
		3-3/4	6	Square	Plain	XX	33015	265.24
		3-3/4	6	Square	Weldon	XX	32835	271.74
		3-3/4	6	.030	Plain	XX	34551	272.24
		3-3/4	6	.030	Weldon	XX	34552	278.74
		3-3/4	6	.060	Plain	XX	38270	273.89
		3-3/4	6	.060	Weldon	XX	38332	280.39
		3-3/4	6	.090	Plain	XX	38271	278.54
		3-3/4	6	.090	Weldon	XX	38333	285.04
		3-3/4	6	.125	Plain	XX	38272	280.74
		3-3/4	6	.125	Weldon	XX	38335	287.24
3/4	3/4	1	4	Square	Plain	SR	32991	142.40
		1	4	.030	Plain	SR	33611	149.40
		1	4	.060	Plain	SR	33612	149.40
		1	4	.090	Plain	SR	33613	155.70
		1	4	.125	Plain	SR	33614	157.90
		1	4	.156	Plain	SR	33615	160.05
		1	4	.190	Plain	SR	33616	162.30
		1-5/8	4	Square	Plain	RR	32996	158.26
		1-5/8	4	Square	Weldon	RR	32639	162.56
		1-5/8	4	.030	Plain	RR	34553	165.26
		1-5/8	4	.030	Weldon	RR	34554	169.56

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Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	MG EDP Number	List Price
3/4	3/4	1-5/8	4	.060	Plain	RR	34555	166.91
		1-5/8	4	.060	Weldon	RR	34557	171.21
		1-5/8	4	.090	Plain	RR	38027	171.56
		1-5/8	4	.090	Weldon	RR	38052	175.86
		1-5/8	4	.125	Plain	RR	38028	173.76
		1-5/8	4	.125	Weldon	RR	38053	178.06
		1-5/8	4	.156	Plain	RR	38273	175.91
		1-5/8	4	.156	Weldon	RR	38336	180.21
		1-5/8	4	.190	Plain	RR	38274	178.16
		1-5/8	4	.190	Weldon	RR	38337	182.46
		2-1/2	5	Square	Plain	LL	33001	203.17
		2-1/2	5	Square	Weldon	LL	32704	207.47
		2-1/2	5	.030	Plain	LL	34558	210.17
		2-1/2	5	.030	Weldon	LL	34559	214.47
		2-1/2	5	.060	Plain	LL	38034	211.82
		2-1/2	5	.060	Weldon	LL	38059	216.12
		2-1/2	5	.090	Plain	LL	38035	216.47
		2-1/2	5	.090	Weldon	LL	38060	220.77
		2-1/2	5	.125	Plain	LL	38036	218.67
		2-1/2	5	.125	Weldon	LL	38061	222.97
		2-1/2	5	.156	Plain	LL	38275	220.82
		2-1/2	5	.156	Weldon	LL	38338	225.12
		2-1/2	5	.190	Plain	LL	38276	223.07
		2-1/2	5	.190	Weldon	LL	38340	227.37
		3-1/4	6	Square	Plain	XX	33007	230.52
		3-1/4	6	Square	Weldon	XX	32724	234.82
		3-1/4	6	.030	Plain	XX	34560	237.52
		3-1/4	6	.030	Weldon	XX	34561	241.82
		3-1/4	6	.060	Plain	XX	38041	239.17
		3-1/4	6	.060	Weldon	XX	38066	243.47
		3-1/4	6	.090	Plain	XX	38042	243.82
		3-1/4	6	.090	Weldon	XX	38067	248.12
		3-1/4	6	.125	Plain	XX	38043	246.02
		3-1/4	6	.125	Weldon	XX	38068	250.32
		3-1/4	6	.156	Plain	XX	38277	248.17
		3-1/4	6	.156	Weldon	XX	38341	252.47
		3-1/4	6	.190	Plain	XX	38278	250.42
		3-1/4	6	.190	Weldon	XX	38345	254.72
		4	6-1/2	Square	Plain	EX	33010	376.21
		4	6-1/2	Square	Weldon	EX	32728	380.51
1	1	1-1/4	4	Square	Plain	SR	33137	237.10
		2	4	Square	Plain	RR	32997	260.19
		2	4	.030	Plain	RR	34562	267.19
		2	4	.060	Plain	RR	34563	268.84
		2	4	.090	Plain	RR	38029	273.49
		2	4	.125	Plain	RR	38030	275.69
		2	4	.156	Plain	RR	38279	277.84
		2	4	.190	Plain	RR	38280	280.09
		2	4	.250	Plain	RR	38281	282.34
		2	4-1/2	Square	Weldon	RR	32701	287.95
		2	4-1/2	.030	Weldon	RR	38054	294.95
		2	4-1/2	.060	Weldon	RR	38055	296.60
		2	4-1/2	.090	Weldon	RR	38376	301.25

continued on next page

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	MG EDP Number	List Price
1	1	2	4-1/2	.125	Weldon	RR	38377	303.45
		2	4-1/2	.156	Weldon	RR	38378	305.60
		2	4-1/2	.190	Weldon	RR	38379	307.85
		2	4-1/2	.250	Weldon	RR	38380	310.10
		2-5/8	5	Square	Plain	LL	33002	279.10
		2-5/8	5	Square	Weldon	LL	32714	287.95
		2-5/8	5	.030	Plain	LL	34568	286.10
		2-5/8	5	.030	Weldon	LL	34569	294.95
		2-5/8	5	.060	Plain	LL	38037	287.75
		2-5/8	5	.060	Weldon	LL	38062	296.60
		2-5/8	5	.090	Plain	LL	38282	292.40
		2-5/8	5	.090	Weldon	LL	38346	301.25
		2-5/8	5	.125	Plain	LL	38283	294.60
		2-5/8	5	.125	Weldon	LL	38347	303.45
		2-5/8	5	.156	Plain	LL	38284	296.75
		2-5/8	5	.156	Weldon	LL	38348	305.60
		2-5/8	5	.190	Plain	LL	38285	299.00
		2-5/8	5	.190	Weldon	LL	38349	307.85
		2-5/8	5	.250	Plain	LL	38286	301.25
		2-5/8	5	.250	Weldon	LL	38350	310.10
		3-1/4	6	Square	Plain	XX	33008	339.86
		3-1/4	6	Square	Weldon	XX	32726	348.71
		3-1/4	6	.030	Plain	XX	34584	346.86
		3-1/4	6	.030	Weldon	XX	34586	355.71
		3-1/4	6	.060	Plain	XX	38044	348.51
		3-1/4	6	.060	Weldon	XX	38069	357.36
		3-1/4	6	.090	Plain	XX	38287	353.16
		3-1/4	6	.090	Weldon	XX	38351	362.01
		3-1/4	6	.125	Plain	XX	38288	355.36
		3-1/4	6	.125	Weldon	XX	38352	364.21
		3-1/4	6	.156	Plain	XX	38289	357.51
		3-1/4	6	.156	Weldon	XX	38353	366.36
		3-1/4	6	.190	Plain	XX	38290	359.76
		3-1/4	6	.190	Weldon	XX	38354	368.61
		3-1/4	6	.250	Plain	XX	38291	362.01
		3-1/4	6	.250	Weldon	XX	38355	370.86
		4-1/8	7	Square	Plain	EE	33012	518.76
		4-1/8	7	Square	Weldon	EE	32735	527.61
		4-1/8	7	.030	Plain	EE	38048	525.76
		4-1/8	7	.030	Weldon	EE	38073	534.61
		4-1/8	7	.060	Plain	EE	38049	527.41
		4-1/8	7	.060	Weldon	EE	38074	536.26
		4-1/8	7	.090	Plain	EE	38292	532.06
		4-1/8	7	.090	Weldon	EE	38356	540.91
		4-1/8	7	.125	Plain	EE	38293	534.26
		4-1/8	7	.125	Weldon	EE	38357	543.11
		4-1/8	7	.156	Plain	EE	38294	536.41
		4-1/8	7	.156	Weldon	EE	38358	545.26
		4-1/8	7	.190	Plain	EE	38295	538.66
		4-1/8	7	.190	Weldon	EE	38359	547.51
		4-1/8	7	.250	Plain	EE	38296	540.91
		4-1/8	7	.250	Weldon	EE	38360	549.76

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	MG EDP Number	List Price
3	3	5	38	Square	Plain	SR	32522	15.08
		5	38	0,3	Plain	SR	34857	22.08
4	4	6	50	Square	Plain	SR	32524	19.62
		11	50	Square	Plain	RR	33167	21.95
		11	50	0,3	Plain	RR	34858	28.95
5	5	6	50	Square	Plain	SR	32525	20.40
		13	50	Square	Plain	RR	33169	22.73
		13	50	0,3	Plain	RR	34859	29.73
6	6	7	54	Square	Plain	SS	32526	24.61
		16	57	Square	Plain	RR	33170	26.45
		16	57	0,3	Plain	RR	34860	33.45
		16	57	0,5	Plain	RR	34862	33.45
		29	75	Square	Plain	LL	34302	41.19
		29	75	0,3	Plain	LL	34864	48.19
		29	75	0,5	Plain	LL	34866	48.19
8	8	9	58	Square	Plain	SS	32527	28.06
		19	63	Square	Plain	RR	33172	31.52
		19	63	0,3	Plain	RR	34868	38.52
		19	63	0,5	Plain	RR	34870	38.52
		29	75	Square	Plain	LL	34303	54.35
		29	75	0,5	Plain	LL	34872	61.35
10	10	11	66	Square	Plain	SS	32528	34.39
		22	72	Square	Plain	RR	33174	38.47
		22	72	0,3	Plain	RR	34874	45.47
		22	72	0,5	Plain	RR	34876	45.47
10	10	40	88	Square	Plain	LL	34311	68.02
		40	88	0,3	Plain	LL	34878	75.02
		40	88	0,5	Plain	LL	34880	75.02
12	12	12	73	Square	Plain	SS	32529	50.95
		26	83	Square	Plain	RR	33175	57.58
		26	83	0,5	Plain	RR	34882	64.58
		26	83	0,75	Plain	RR	34884	64.58
		26	83	1,0	Plain	RR	34886	66.23
		50	100	Square	Plain	LL	34305	86.41
		50	100	0,5	Plain	LL	34888	93.41
		50	100	1,0	Plain	LL	34890	95.06
14	14	26	83	Square	Plain	RR	33176	69.03
16	16	16	82	Square	Plain	SS	32530	102.44
		32	92	Square	Plain	RR	33177	117.78
		32	92	0,75	Plain	RR	34892	124.78
		32	92	1,0	Plain	RR	34894	126.43
		57	125	Square	Plain	LL	34306	169.41
		57	125	1,0	Plain	LL	34896	178.06
20	20	20	92	Square	Plain	SS	32502	157.10
		38	104	Square	Plain	RR	33179	178.05
		38	104	0,75	Plain	RR	34898	185.05
		38	104	1,0	Plain	RR	34900	186.70
		57	125	Square	Plain	LL	34307	218.88
		57	125	1,0	Plain	LL	36583	227.53

Style Code Reference

EE—Extreme LOC, Extreme OAL
EX—Extreme LOC, X-Long OAL
LL—Long LOC, Long OAL
RR—Regular LOC, Regular OAL
SR—Short LOC, Regular OAL
SS—Short LOC, Short OAL
XX—X-Long LOC, X-Long OAL

3 High Shear Flutes

For rapid chip evacuation

M203N

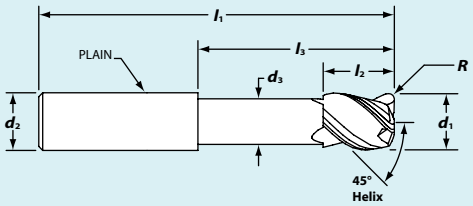
M203N • Radius

M203N • Square

Coatings:

None (MG)

Optional coatings for aluminum machining (ZrN, TiCN, TiB2, DLC) are available by special order



in d_1 +0.000 / -0.002 d_2 h6 **mm** d_1 +0,000 / -0,050 d_2 h6

- High rake angle for better chip flow
- Reduced chatter over a broad range of speeds
- Cylindrical land for superior part finish
- For high volume metal removal
- With neck relief

Aluminum and non-ferrous	✓✓✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Style Code	MG EDP Number	List Price
1/4	1/4	3/8	2-1/2	1-1/8	.235	Square	SR	33034	27.93
		3/8	2-1/2	1-1/8	.235	.015	SR	34782	34.93
		3/8	2-1/2	1-1/8	.235	.030	SR	34784	34.93
		3/8	3	1-5/8	.235	Square	SL	33121	38.47
		3/8	3	1-5/8	.235	.015	SL	34786	45.47
		3/8	3	1-5/8	.235	.030	SL	34788	45.47
		3/8	4	2-1/4	.235	Square	SX	33110	62.81
		3/8	4	2-1/4	.235	.015	SX	34790	69.81
		3/8	4	2-1/4	.235	.030	SX	34792	69.81
3/8	3/8	1/2	2-1/2	1-1/8	.355	Square	SR	33035	41.10
		1/2	2-1/2	1-1/8	.355	.015	SR	34794	48.10
		1/2	2-1/2	1-1/8	.355	.030	SR	34796	48.10
		1/2	2-1/2	1-1/8	.355	.060	SR	38111	49.75
		1/2	3	1-3/4	.355	Square	SL	33122	53.00
		1/2	3	1-3/4	.355	.015	SL	34797	60.00
		1/2	3	1-3/4	.355	.030	SL	34798	60.00
		1/2	3	1-3/4	.355	.060	SL	38112	61.65
		1/2	4	2-1/4	.355	Square	SX	33112	76.98
		1/2	4	2-1/4	.355	.015	SX	34799	83.98
		1/2	4	2-1/4	.355	.030	SX	34800	83.98
		1/2	4	2-1/4	.355	.060	SX	38113	85.63
1/2	1/2	5/8	3	1-3/8	.475	Square	SR	33036	62.81
		5/8	3	1-3/8	.475	.015	SR	34801	69.81
		5/8	3	1-3/8	.475	.030	SR	34802	69.81
		5/8	3	1-3/8	.475	.060	SR	38114	71.46
		5/8	3	1-3/8	.475	.090	SR	38115	76.11
		5/8	3	1-3/8	.475	.125	SR	38116	78.31
		5/8	4	2-1/4	.475	Square	SL	33123	89.33
		5/8	4	2-1/4	.475	.015	SL	34803	96.33
		5/8	4	2-1/4	.475	.030	SL	34804	96.33
		5/8	4	2-1/4	.475	.060	SL	38117	97.98
		5/8	4	2-1/4	.475	.090	SL	38118	102.63
		5/8	4	2-1/4	.475	.125	SL	38119	104.83
		5/8	5	2-3/8	.475	Square	SX	33114	101.86
		5/8	5	2-3/8	.475	.015	SX	34805	108.86
		5/8	5	2-3/8	.475	.030	SX	34806	108.86
		5/8	5	2-3/8	.475	.060	SX	38120	110.51
		5/8	5	2-3/8	.475	.090	SX	38121	115.16
		5/8	5	2-3/8	.475	.125	SX	38122	117.36
		5/8	6	3-3/8	.475	Square	SX	33048	107.40
		5/8	6	3-3/8	.475	.015	SX	34826	114.40
		5/8	6	3-3/8	.475	.030	SX	34827	114.40
		5/8	6	3-3/8	.475	.060	SX	38123	116.05
		5/8	6	3-3/8	.475	.090	SX	38124	120.70
		5/8	6	3-3/8	.475	.125	SX	38125	122.90
5/8	5/8	3/4	3-1/2	1-1/2	.590	Square	SR	33038	118.44
		3/4	3-1/2	1-1/2	.590	.030	SR	34828	125.44
		3/4	3-1/2	1-1/2	.590	.060	SR	38126	127.09
		3/4	3-1/2	1-1/2	.590	.090	SR	38127	131.74
		3/4	3-1/2	1-1/2	.590	.125	SR	38128	133.94

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Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Style Code	MG EDP Number	List Price
5/8	5/8	3/4	5	2-1/4	.590	Square	SL	33124	149.23
		3/4	5	2-1/4	.590	.030	SL	34829	156.23
		3/4	5	2-1/4	.590	.060	SL	38129	157.88
		3/4	5	2-1/4	.590	.090	SL	38130	162.53
		3/4	5	2-1/4	.590	.125	SL	38131	164.73
		3/4	6	3-3/8	.590	Square	SX	33116	186.37
		3/4	6	3-3/8	.590	.030	SX	34830	193.37
		3/4	6	3-3/8	.590	.060	SX	38132	195.02
		3/4	6	3-3/8	.590	.090	SX	38133	199.67
		3/4	6	3-3/8	.590	.125	SX	38134	201.87
3/4	3/4	1	4	1-3/4	.715	Square	SR	33039	184.27
		1	4	1-3/4	.715	.030	SR	34837	191.27
		1	4	1-3/4	.715	.060	SR	38135	192.92
		1	4	1-3/4	.715	.090	SR	38136	197.57
		1	4	1-3/4	.715	.125	SR	38137	199.77
		1	4	1-3/4	.715	.156	SR	38138	201.92
		1	4	1-3/4	.715	.190	SR	38139	204.17
		1	5	2-1/4	.715	Square	SL	33125	219.34
		1	5	2-1/4	.715	.030	SL	34838	226.34
		1	5	2-1/4	.715	.060	SL	38140	227.99
		1	5	2-1/4	.715	.090	SL	38141	232.64
		1	5	2-1/4	.715	.125	SL	38142	234.84
		1	5	2-1/4	.715	.156	SL	38143	236.99
		1	5	2-1/4	.715	.190	SL	38144	239.24
		1	6	3-3/8	.715	Square	SX	33118	254.40
		1	6	3-3/8	.715	.030	SX	34839	261.40
		1	6	3-3/8	.715	.060	SX	38145	263.05
		1	6	3-3/8	.715	.090	SX	38146	267.70
		1	6	3-3/8	.715	.125	SX	38147	269.90
		1	6	3-3/8	.715	.156	SX	38148	272.05
		1	6	3-3/8	.715	.190	SX	38149	274.30
1	1	1-1/8	4	1-7/8	.960	Square	SR	33040	277.11
		1-1/8	4	1-7/8	.960	.030	SR	34840	284.11
		1-1/8	4	1-7/8	.960	.060	SR	38150	285.76
		1-1/8	4	1-7/8	.960	.090	SR	38151	290.41
		1-1/8	4	1-7/8	.960	.125	SR	38152	292.61
		1-1/8	4	1-7/8	.960	.156	SR	38153	294.76
		1-1/8	4	1-7/8	.960	.190	SR	38154	297.01
		1-1/8	4	1-7/8	.960	.250	SR	38155	299.26
		1-1/4	5	2-1/4	.960	Square	SL	33126	319.85
		1-1/4	5	2-1/4	.960	.030	SL	34847	326.85
		1-1/4	5	2-1/4	.960	.060	SL	38156	328.50
		1-1/4	5	2-1/4	.960	.090	SL	38157	333.15
		1-1/4	5	2-1/4	.960	.125	SL	38158	335.35
		1-1/4	5	2-1/4	.960	.156	SL	38159	337.50
		1-1/4	5	2-1/4	.960	.190	SL	38160	339.75
		1-1/4	5	2-1/4	.960	.250	SL	38161	342.00

continued in next column

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Style Code	MG EDP Number	List Price
1	1	1-1/4	6	3-3/8	.960	Square	SX	33120	362.09
		1-1/4	6	3-3/8	.960	.030	SX	34848	369.09
		1-1/4	6	3-3/8	.960	.060	SX	38162	370.74
		1-1/4	6	3-3/8	.960	.090	SX	38163	375.39
		1-1/4	6	3-3/8	.960	.125	SX	38164	377.59
		1-1/4	6	3-3/8	.960	.156	SX	38165	379.74
		1-1/4	6	3-3/8	.960	.190	SX	38166	381.99
		1-1/4	6	3-3/8	.960	.250	SX	38167	384.24
		1-1/4	7	4-3/8	.960	Square	SE	33049	427.38
		1-1/4	7	4-3/8	.960	.030	SE	34849	434.38
		1-1/4	7	4-3/8	.960	.060	SE	38168	436.03
		1-1/4	7	4-3/8	.960	.090	SE	38169	440.68
		1-1/4	7	4-3/8	.960	.125	SE	38170	442.88
		1-1/4	7	4-3/8	.960	.156	SE	38171	445.03
		1-1/4	7	4-3/8	.960	.190	SE	38172	447.28
		1-1/4	7	4-3/8	.960	.250	SE	38173	449.53

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Style Code	MG EDP Number	List Price
6	6	8	57	20	5,4	Square	SR	33041	28.44
		8	57	20	5,4	0,3	SR	37261	35.44
		8	75	40	5,4	Square	SL	37262	39.67
		8	75	40	5,4	0,3	SL	37264	46.67
8	8	10	63	26	7,2	Square	SR	33042	43.05
		10	63	26	7,2	0,5	SR	37266	50.05
10	10	12	72	31	9	Square	SR	33043	57.99
		12	72	31	9	0,5	SR	37268	64.99
		12	100	50	9	Square	SX	33128	81.31
		12	100	50	9	0,5	SX	37274	88.31
12	12	14	83	37	10,8	Square	SR	33044	66.14
		14	83	37	10,8	1,0	SR	37276	74.79
		14	125	70	10,8	Square	SM	33129	105.39
		14	125	70	10,8	1,0	SM	37278	114.04
16	16	18	92	41	14,4	Square	SR	33045	127.43
		18	92	41	14,4	1,0	SR	37280	136.08
		18	150	90	14,4	Square	SX	33131	199.44
		18	150	90	14,4	1,0	SX	37281	208.09
20	20	24	104	47	18	Square	SR	33046	204.84
		24	104	47	18	1,0	SR	37301	213.49
		24	150	90	18	Square	SX	37302	280.82
		24	150	90	18	1,0	SX	37328	289.47

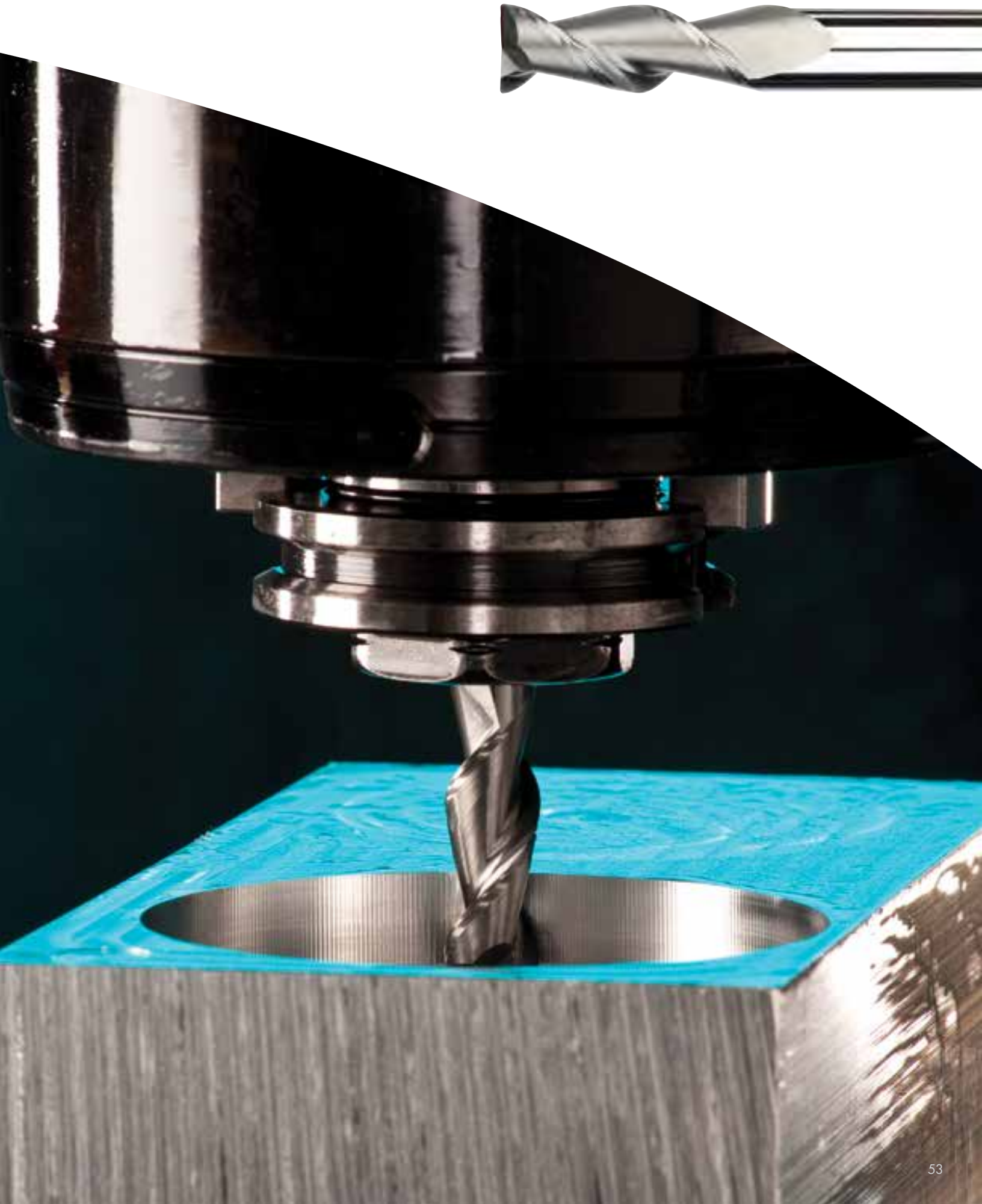
Style Code Reference

SE—Short LOC, Extreme OAL *SL—Short LOC, Long OAL* *SM—Short LOC, Medium OAL*
SR—Short LOC, Regular OAL *SX—Short LOC, X-Long OAL*

2-FLUTE STREAKERS®

Streaking Through Aluminum

The unique design of STREAKERS® mills permit heavy chip loads to be taken without packing up the flutes. The result? High output can be achieved on smaller machines as well as machines equipped with high-speed spindles. Keep the chip load within the horsepower limits of the machine and watch the aluminum chips fly.



2-FLUTE STREAKERS

M202

2 High Shear Flutes

For maximum metal removal

M202 • Radius

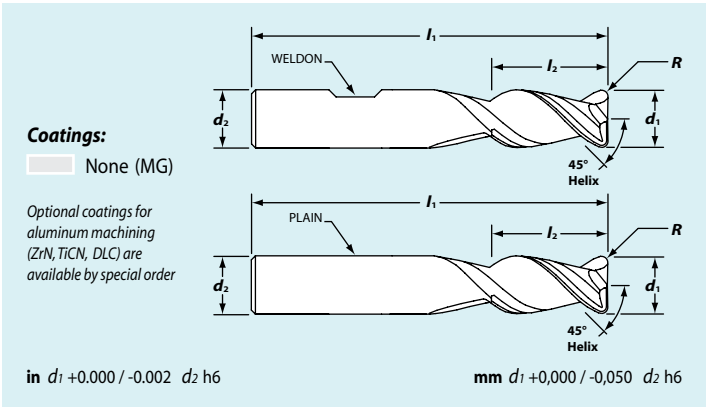
M202 • Square

M202B • Ball

- High rake angle for better chip flow
- Reduced chatter over a broad range of speeds
- Cylindrical land for superior part finish
- For high volume metal removal

Aluminum and non-ferrous	✓✓✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent



Ideal for high performance milling in all types of aluminum including high silicon, die cast and extruded aluminum parts.

The 2-flute design allows maximum flute-to-flute spacing for greater stock removal and effective chip evacuation – ideal when you're going deep into the metal to remove material incrementally.

End designs

- Available in a wide range of corner radii for aerospace and other industrial applications
- Square end for general machining and finishing
- Ball nose styles for contouring
- Center cutting

Shank designs

- h6 tolerance shanks fit all collets and conform to shrink-fit requirements
- Many sizes offered with flats for end mill holders

Multiple lengths

- Stub length for extra rigidity
- Standard, long and extra-long flute length and reach
- With short flute length for extra rigidity in deep pockets and cavities
- With extra flute length for finishing passes
- With stub flutes for deep cavity work

STREAKERS M20 END MILLS

For high performance milling in aluminum and non-ferrous

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	MG EDP Number	List Price
1/8	1/8	1/4	1-1/2	Square	Plain	SR	32941	14.64
		3/8	1-1/2	Square	Plain	RR	32949	16.05
		3/8	1-1/2	.015	Plain	RR	33526	23.05
		3/8	1-1/2	Ball	Plain	RR	33446	18.29
3/16	3/16	5/16	2	Square	Plain	SR	32942	19.45
		9/16	2	Square	Plain	RR	32950	21.71
		9/16	2	.015	Plain	RR	33542	28.71
		9/16	2	Ball	Plain	RR	33448	22.64
1/4	1/4	3/8	2-1/2	Square	Plain	SR	32943	24.43
		3/4	2-1/2	Square	Plain	RR	32951	26.00
		3/4	2-1/2	Square	Weldon	RR	32430	31.00
		3/4	2-1/2	.015	Plain	RR	33544	33.00
		3/4	2-1/2	.015	Weldon	RR	33546	38.00
		3/4	2-1/2	.030	Plain	RR	33548	33.00
		3/4	2-1/2	.030	Weldon	RR	33550	38.00
		3/4	2-1/2	Ball	Plain	RR	32980	28.34
		3/4	2-1/2	Ball	Weldon	RR	32595	33.34
		1-1/4	3	Square	Plain	LL	32957	39.95
		1-1/4	3	Square	Weldon	LL	32444	44.95
		1-1/4	3	.015	Plain	LL	33552	46.95
		1-1/4	3	.015	Weldon	LL	33566	51.95
		1-1/4	3	.030	Plain	LL	34382	46.95
		1-1/4	3	.030	Weldon	LL	34383	51.95
5/16	5/16	7/16	2-1/2	Square	Plain	SR	32944	26.90
		13/16	2-1/2	Square	Plain	RR	32952	29.90
		13/16	2-1/2	Square	Weldon	RR	32431	34.90
		13/16	2-1/2	.015	Plain	RR	33629	36.90
		13/16	2-1/2	.015	Weldon	RR	33630	41.90
		13/16	2-1/2	.030	Plain	RR	34362	36.90
		13/16	2-1/2	.030	Weldon	RR	34363	41.90
		13/16	2-1/2	.060	Plain	RR	38381	38.55
		13/16	2-1/2	.060	Weldon	RR	38382	43.55
		13/16	2-1/2	Ball	Plain	RR	32981	33.19
		13/16	2-1/2	Ball	Weldon	RR	32596	38.19
		1-3/8	3	Square	Plain	LL	32958	51.93
		1-3/8	3	Square	Weldon	LL	32445	56.93
		1-3/8	3	.030	Plain	LL	38079	58.93
		1-3/8	3	.030	Weldon	LL	38098	63.93
		1-3/8	3	.060	Plain	LL	38383	60.58
		1-3/8	3	.060	Weldon	LL	38384	65.58
3/8	3/8	1/2	2-1/2	Square	Plain	SR	32945	31.05
		7/8	2-1/2	Square	Weldon	RR	32432	39.05
		7/8	2-1/2	.015	Weldon	RR	33649	46.05
		7/8	2-1/2	.030	Weldon	RR	33691	46.05
		7/8	2-1/2	.060	Weldon	RR	33692	47.70
		7/8	2-1/2	Ball	Weldon	RR	32597	45.26
		1	2-1/2	Square	Plain	RR	32953	34.05
		1	2-1/2	.015	Plain	RR	33648	41.05
		1	2-1/2	.030	Plain	RR	33689	41.05
		1	2-1/2	.060	Plain	RR	38385	42.70
		1	2-1/2	Ball	Plain	RR	32982	40.26

continued in next column

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	MG EDP Number	List Price
3/8	3/8	1-1/2	3-1/4	Square	Plain	LL	32959	47.50
		1-1/2	3-1/4	Square	Weldon	LL	32446	52.50
		1-1/2	3-1/4	.015	Plain	LL	33693	54.50
		1-1/2	3-1/4	.015	Weldon	LL	33694	59.50
		1-1/2	3-1/4	.030	Plain	LL	33886	54.50
		1-1/2	3-1/4	.030	Weldon	LL	33887	59.50
		1-1/2	3-1/4	.060	Plain	LL	38386	56.15
		1-1/2	3-1/4	.060	Weldon	LL	38387	61.15
		2	4	Square	Plain	XX	32964	65.86
		2	4	Square	Weldon	XX	32510	70.86
		2	4	.015	Plain	XX	34100	72.86
		2	4	.015	Weldon	XX	34101	77.86
		2	4	.030	Plain	XX	34144	72.86
		2	4	.030	Weldon	XX	34145	77.86
		2	4	.060	Plain	XX	38388	74.51
		2	4	.060	Weldon	XX	38389	79.51
1/2	1/2	5/8	3	Square	Plain	SR	32946	49.98
		1	3	Square	Weldon	RR	32434	55.67
		1	3	.030	Weldon	RR	34359	62.67
		1-1/4	3	Square	Plain	RR	90358	54.50
		1-1/4	3	.015	Plain	RR	34146	61.50
		1-1/4	3	.030	Plain	RR	34161	61.50
		1-1/4	3	.060	Plain	RR	34196	63.15
		1-1/4	3	.090	Plain	RR	38075	67.80
		1-1/4	3	.125	Plain	RR	38076	70.00
		1-1/4	3	Ball	Plain	RR	32983	62.82
		1-1/4	3-1/4	Square	Weldon	RR	32606	64.05
		1-1/4	3-1/4	.015	Weldon	RR	34147	71.05
		1-1/4	3-1/4	.030	Weldon	RR	34162	71.05
		1-1/4	3-1/4	.060	Weldon	RR	34197	72.70
		1-1/4	3-1/4	.090	Weldon	RR	38092	77.35
		1-1/4	3-1/4	Ball	Weldon	RR	32598	77.87
		2	4	Square	Plain	LL	32960	84.55
		2	4	Square	Weldon	LL	32447	90.05
		2	4	.015	Plain	LL	34198	91.55
		2	4	.015	Weldon	LL	34199	97.05
		2	4	.030	Plain	LL	34204	91.55
		2	4	.030	Weldon	LL	34205	97.05
		2	4	.060	Plain	LL	34206	93.20
		2	4	.060	Weldon	LL	34207	98.70
		2	4	.090	Plain	LL	38080	97.85
		2	4	.090	Weldon	LL	38099	103.35
		2	4	.125	Plain	LL	38081	100.05
		2	4	.125	Weldon	LL	38100	105.55
		2-1/2	5	Square	Plain	LX	32965	101.48
		2-1/2	5	Square	Weldon	LX	32512	106.98
		2-1/2	5	.030	Plain	LX	34235	108.48
		2-1/2	5	.030	Weldon	LX	34236	113.98

continued on next page

Style Code Reference

LL—Long LOC, Long OAL
LX—Long LOC, X-Long OAL
RR—Regular LOC, Regular OAL
SR—Short LOC, Regular OAL
XX—X-Long LOC, X-Long OAL

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	MG EDP Number	List Price
1/2	1/2	2-1/2	5	.060	Plain	LX	38085	110.13
		2-1/2	5	.060	Weldon	LX	38104	115.63
		2-1/2	5	.090	Plain	LX	38086	114.78
		2-1/2	5	.090	Weldon	LX	38105	120.28
		2-1/2	5	.125	Plain	LX	38087	116.98
		2-1/2	5	.125	Weldon	LX	38106	122.48
		3-1/8	6	Square	Plain	XX	38390	147.26
		3-1/8	6	Square	Weldon	XX	38391	152.76
		3-1/8	6	.030	Plain	XX	38392	154.26
		3-1/8	6	.030	Weldon	XX	38393	159.76
		3-1/8	6	.060	Plain	XX	38394	155.91
		3-1/8	6	.060	Weldon	XX	38395	161.41
		3-1/8	6	.090	Plain	XX	38397	160.56
		3-1/8	6	.090	Weldon	XX	38398	166.06
		3-1/8	6	.125	Plain	XX	38399	162.76
		3-1/8	6	.125	Weldon	XX	38400	168.26
5/8	5/8	3/4	3-1/2	Square	Plain	SR	32947	98.14
		1-1/4	3-1/2	Square	Weldon	RR	32436	115.55
		1-1/4	3-1/2	.030	Weldon	RR	34238	122.55
		1-1/4	3-1/2	.060	Weldon	RR	38485	124.20
		1-1/4	3-1/2	.090	Weldon	RR	38487	128.85
		1-1/4	3-1/2	.125	Weldon	RR	38489	131.05
		1-1/4	3-1/2	Ball	Weldon	RR	32599	129.89
		1-5/8	3-1/2	Square	Plain	RR	32954	109.07
		1-5/8	3-1/2	.030	Plain	RR	34237	116.07
		1-5/8	3-1/2	.060	Plain	RR	38490	117.72
		1-5/8	3-1/2	.090	Plain	RR	38492	122.37
		1-5/8	3-1/2	.125	Plain	RR	38494	124.57
		1-5/8	3-1/2	Ball	Plain	RR	32984	123.39
		2-1/2	5	Square	Plain	LL	32966	159.40
		2-1/2	5	Square	Weldon	LL	32514	165.90
		2-1/2	5	.030	Plain	LL	34243	166.40
		2-1/2	5	.030	Weldon	LL	34244	172.90
		2-1/2	5	.060	Plain	LL	38496	168.05
		2-1/2	5	.060	Weldon	LL	38498	174.55
		2-1/2	5	.090	Plain	LL	38500	172.70
		2-1/2	5	.090	Weldon	LL	38501	179.20
		2-1/2	5	.125	Plain	LL	38502	174.90
		2-1/2	5	.125	Weldon	LL	38503	181.40
		3-3/4	6	Square	Plain	XX	38504	265.24
		3-3/4	6	Square	Weldon	XX	38505	271.74
		3-3/4	6	.030	Plain	XX	38506	272.24
		3-3/4	6	.030	Weldon	XX	38507	278.74
		3-3/4	6	.060	Plain	XX	38508	273.89
		3-3/4	6	.060	Weldon	XX	38509	280.39
		3-3/4	6	.090	Plain	XX	38510	278.54
		3-3/4	6	.090	Weldon	XX	38511	285.04
		3-3/4	6	.125	Plain	XX	38512	280.74
		3-3/4	6	.125	Weldon	XX	38513	287.24

continued in next column

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	MG EDP Number	List Price
3/4	3/4	1	4	Square	Plain	SR	32948	142.40
		1-5/8	4	Square	Plain	RR	32955	158.26
		1-5/8	4	Square	Weldon	RR	32504	162.56
		1-5/8	4	.030	Plain	RR	34245	165.26
		1-5/8	4	.030	Weldon	RR	34246	169.56
		1-5/8	4	.060	Plain	RR	34262	166.91
		1-5/8	4	.060	Weldon	RR	34263	171.21
		1-5/8	4	.090	Plain	RR	38077	171.56
		1-5/8	4	.090	Weldon	RR	38094	175.86
		1-5/8	4	.125	Plain	RR	38078	173.76
		1-5/8	4	.125	Weldon	RR	38095	178.06
		1-5/8	4	.156	Plain	RR	38514	175.91
		1-5/8	4	.156	Weldon	RR	38515	180.21
		1-5/8	4	.190	Plain	RR	38516	178.16
		1-5/8	4	.190	Weldon	RR	38517	182.46
		1-5/8	4	Ball	Plain	RR	32985	184.21
		1-5/8	4	Ball	Weldon	RR	32608	191.36
		2-1/2	5	Square	Plain	LL	32962	203.17
		2-1/2	5	Square	Weldon	LL	32506	207.47
		2-1/2	5	.030	Plain	LL	34343	210.17
		2-1/2	5	.030	Weldon	LL	34344	214.47
		2-1/2	5	.060	Plain	LL	38082	211.82
		2-1/2	5	.060	Weldon	LL	38101	216.12
		2-1/2	5	.090	Plain	LL	38083	216.47
		2-1/2	5	.090	Weldon	LL	38102	220.77
		2-1/2	5	.125	Plain	LL	38084	218.67
		2-1/2	5	.125	Weldon	LL	38103	222.97
		2-1/2	5	.156	Plain	LL	38518	220.82
		2-1/2	5	.156	Weldon	LL	38519	225.12
		2-1/2	5	.190	Plain	LL	38520	223.07
		2-1/2	5	.190	Weldon	LL	38521	227.37
		3-1/4	6	Square	Plain	XX	32968	230.52
		3-1/4	6	Square	Weldon	XX	32516	234.82
		3-1/4	6	.030	Plain	XX	34345	237.52
		3-1/4	6	.030	Weldon	XX	34346	241.82
		3-1/4	6	.060	Plain	XX	38088	239.17
		3-1/4	6	.060	Weldon	XX	38107	243.47
		3-1/4	6	.090	Plain	XX	38089	243.82
		3-1/4	6	.090	Weldon	XX	38108	248.12
		3-1/4	6	.125	Plain	XX	38090	246.02
		3-1/4	6	.125	Weldon	XX	38109	250.32
		3-1/4	6	.156	Plain	XX	38522	248.17
		3-1/4	6	.156	Weldon	XX	38523	252.47
		3-1/4	6	.190	Plain	XX	38524	250.42
		3-1/4	6	.190	Weldon	XX	38525	254.72

continued on next page

STREAKERS M20 END MILLS

For high performance milling in aluminum and non-ferrous

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	MG EDP Number	List Price
		1-1/4	4	Square	Plain	SR	33143	237.10
		2	4	Square	Plain	RR	32956	260.19
		2	4	.030	Plain	RR	34351	267.19
		2	4	.060	Plain	RR	34353	268.84
		2	4	.090	Plain	RR	38526	273.49
		2	4	.125	Plain	RR	38528	275.69
		2	4	.156	Plain	RR	38530	277.84
		2	4	.190	Plain	RR	38532	280.09
		2	4	.250	Plain	RR	38534	282.34
		2	4-1/2	Square	Weldon	RR	32450	287.95
		2	4-1/2	.030	Weldon	RR	38096	294.95
		2	4-1/2	.060	Weldon	RR	38097	296.60
		2	4-1/2	.090	Weldon	RR	38527	301.25
		2	4-1/2	.125	Weldon	RR	38529	303.45
		2	4-1/2	.156	Weldon	RR	38531	305.60
		2	4-1/2	.190	Weldon	RR	38533	307.85
		2	4-1/2	.250	Weldon	RR	38535	310.10
		2-5/8	5	Square	Plain	LL	32963	279.10
		2-5/8	5	Square	Weldon	LL	32508	287.95
		2-5/8	5	.030	Plain	LL	34352	286.10
		2-5/8	5	.030	Weldon	LL	34354	294.95
		2-5/8	5	.060	Plain	LL	34355	287.75
		2-5/8	5	.060	Weldon	LL	34356	296.60
		2-5/8	5	.090	Plain	LL	38536	292.40
1	1	2-5/8	5	.090	Weldon	LL	38537	301.25
		2-5/8	5	.125	Plain	LL	38538	294.60
		2-5/8	5	.125	Weldon	LL	38539	303.45
		2-5/8	5	.156	Plain	LL	38540	296.75
		2-5/8	5	.156	Weldon	LL	38541	305.60
		2-5/8	5	.190	Plain	LL	38542	299.00
		2-5/8	5	.190	Weldon	LL	38543	307.85
		2-5/8	5	.250	Plain	LL	38544	301.25
		2-5/8	5	.250	Weldon	LL	38545	310.10
		3-1/4	6	Square	Plain	XX	32969	339.86
		3-1/4	6	Square	Weldon	XX	32518	348.71
		3-1/4	6	.030	Plain	XX	34357	346.86
		3-1/4	6	.030	Weldon	XX	34358	355.71
		3-1/4	6	.060	Plain	XX	38091	348.51
		3-1/4	6	.060	Weldon	XX	38110	357.36
		3-1/4	6	.090	Plain	XX	38546	353.16
		3-1/4	6	.090	Weldon	XX	38547	362.01
		3-1/4	6	.125	Plain	XX	38548	355.36
		3-1/4	6	.125	Weldon	XX	38549	364.21
		3-1/4	6	.156	Plain	XX	38550	357.51
		3-1/4	6	.156	Weldon	XX	38551	366.36
		3-1/4	6	.190	Plain	XX	38552	359.76
		3-1/4	6	.190	Weldon	XX	38553	368.61
		3-1/4	6	.250	Plain	XX	38554	362.01
		3-1/4	6	.250	Weldon	XX	38555	370.86

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	MG EDP Number	List Price
3	3	5	38	Square	Plain	SR	32971	15.08
		5	38	0,3	Plain	SR	36973	22.08
4	4	6	50	Square	Plain	SR	32972	19.62
		11	50	Square	Plain	RR	36974	21.95
		11	50	0,3	Plain	RR	36975	28.95
5	5	6	50	Square	Plain	SR	32973	20.40
		13	50	Square	Plain	RR	36976	22.73
		13	50	0,3	Plain	RR	36977	29.73
6	6	7	54	Square	Plain	SS	32974	24.61
		16	57	Square	Plain	RR	62402	26.45
		16	57	0,3	Plain	RR	36978	33.45
		16	57	0,5	Plain	RR	36980	33.45
		16	57	Ball	Plain	RR	62412	28.86
8	8	9	58	Square	Plain	SS	32975	28.06
		19	63	Square	Plain	RR	62403	31.52
		19	63	0,3	Plain	RR	36982	38.52
		19	63	0,5	Plain	RR	36984	38.52
		19	63	Ball	Plain	RR	62413	34.91
10	10	11	66	Square	Plain	SS	32976	34.39
		22	72	Square	Plain	RR	62404	38.47
		22	72	0,3	Plain	RR	37043	45.47
		22	72	0,5	Plain	RR	37047	45.47
		22	72	Ball	Plain	RR	62414	46.51
12	12	12	73	Square	Plain	SS	32977	50.95
		26	83	Square	Plain	RR	62406	57.58
		26	83	0,5	Plain	RR	37049	64.58
		26	83	0,75	Plain	RR	37052	64.58
		26	83	1,0	Plain	RR	37084	66.23
		26	83	Ball	Plain	RR	62416	66.15
14	14	26	83	Square	Plain	RR	62407	69.03
16	16	16	82	Square	Plain	SS	32978	102.44
		32	92	Square	Plain	RR	62408	117.78
		32	92	0,75	Plain	RR	37101	124.78
		32	92	1,0	Plain	RR	37161	126.43
		32	92	Ball	Plain	RR	62418	132.53
20	20	20	92	Square	Plain	SS	32979	157.10
		38	104	Square	Plain	RR	62410	178.05
		38	104	0,75	Plain	RR	37170	185.05
		38	104	1,0	Plain	RR	37180	186.70
		38	104	Ball	Plain	RR	62420	204.77

Style Code Reference

LL—Long LOC, Long OAL
LX—Long LOC, X-Long OAL
RR—Regular LOC, Regular OAL
SR—Short LOC, Regular OAL
SS—Short LOC, Short OAL
XX—X-Long LOC, X-Long OAL

2 High Shear Flutes

For maximum metal removal

M202N

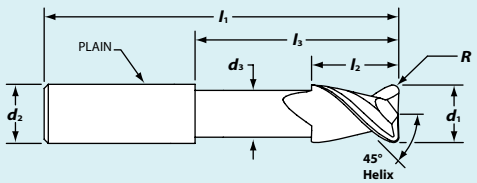
M202N • Radius

M202N • Square

Coatings:

None (MG)

Optional coatings for aluminum machining (ZrN, TiCN, TiB2, DLC) are available by special order



in d_1 +0.000 / -0.002 d_2 h6 **mm** d_1 +0,000 / -0,050 d_2 h6

- High rake angle for better chip flow
- Reduced chatter over a broad range of speeds
- Cylindrical land for superior part finish
- For high volume metal removal
- With neck relief

Aluminum and non-ferrous	✓✓✓

✓Good ✓✓Very Good ✓✓✓Excellent

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Style Code	MG EDP Number	List Price
1/4	1/4	3/8	2-1/2	1-1/8	.235	Square	SR	32935	27.93
		3/8	2-1/2	1-1/8	.235	.015	SR	34622	34.93
		3/8	2-1/2	1-1/8	.235	.030	SR	34623	34.93
		3/8	3	1-5/8	.235	Square	SL	33016	38.47
		3/8	3	1-5/8	.235	.015	SL	34626	45.47
		3/8	3	1-5/8	.235	.030	SL	34627	45.47
		3/8	4	2-1/4	.235	Square	SX	33023	62.81
		3/8	4	2-1/4	.235	.015	SX	34631	69.81
		3/8	4	2-1/4	.235	.030	SX	34633	69.81
3/8	3/8	1/2	2-1/2	1-1/8	.355	Square	SR	32936	41.10
		1/2	2-1/2	1-1/8	.355	.015	SR	34634	48.10
		1/2	2-1/2	1-1/8	.355	.030	SR	34635	48.10
		1/2	2-1/2	1-1/8	.355	.060	SR	38194	49.75
		1/2	3	1-3/4	.355	Square	SL	33018	53.00
		1/2	3	1-3/4	.355	.015	SL	34637	60.00
		1/2	3	1-3/4	.355	.030	SL	34638	60.00
		1/2	3	1-3/4	.355	.060	SL	38195	61.65
		1/2	4	2-1/4	.355	Square	SX	33024	76.98
		1/2	4	2-1/4	.355	.015	SX	34639	83.98
		1/2	4	2-1/4	.355	.030	SX	34643	83.98
		1/2	4	2-1/4	.355	.060	SX	38196	85.63
1/2	1/2	5/8	3	1-3/8	.475	Square	SR	32937	62.81
		5/8	3	1-3/8	.475	.015	SR	34644	69.81
		5/8	3	1-3/8	.475	.030	SR	34645	69.81
		5/8	3	1-3/8	.475	.060	SR	38197	71.46
		5/8	3	1-3/8	.475	.090	SR	38198	76.11
		5/8	3	1-3/8	.475	.125	SR	38199	78.31
		5/8	4	2-1/4	.475	Square	SL	33019	89.33
		5/8	4	2-1/4	.475	.015	SL	34646	96.33
		5/8	4	2-1/4	.475	.030	SL	34647	96.33
		5/8	4	2-1/4	.475	.060	SL	38200	97.98
		5/8	4	2-1/4	.475	.090	SL	38201	102.63
		5/8	4	2-1/4	.475	.125	SL	38202	104.83
		5/8	5	2-3/8	.475	Square	SX	33025	101.86
		5/8	5	2-3/8	.475	.015	SX	34649	108.86
		5/8	5	2-3/8	.475	.030	SX	34650	108.86
		5/8	5	2-3/8	.475	.060	SX	38203	110.51
		5/8	5	2-3/8	.475	.090	SX	38204	115.16
		5/8	5	2-3/8	.475	.125	SX	38205	117.36
		5/8	6	3-3/8	.475	Square	SX	33032	107.40
		5/8	6	3-3/8	.475	.015	SX	34651	114.40
		5/8	6	3-3/8	.475	.030	SX	34652	114.40
		5/8	6	3-3/8	.475	.060	SX	38206	116.05
		5/8	6	3-3/8	.475	.090	SX	38207	120.70
		5/8	6	3-3/8	.475	.125	SX	38208	122.90
5/8	5/8	3/4	3-1/2	1-1/2	.590	Square	SR	32938	118.44
		3/4	3-1/2	1-1/2	.590	.030	SR	34653	125.44
		3/4	3-1/2	1-1/2	.590	.060	SR	38209	127.09
		3/4	3-1/2	1-1/2	.590	.090	SR	38210	131.74
		3/4	3-1/2	1-1/2	.590	.125	SR	38211	133.94

continued on next page

STREAKERS M20 END MILLS

For high performance milling in aluminum and non-ferrous

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Style Code	MG EDP Number	List Price
5/8	5/8	3/4	5	2-1/4	.590	Square	SL	33020	149.23
		3/4	5	2-1/4	.590	.030	SL	34654	156.23
		3/4	5	2-1/4	.590	.060	SL	38212	157.88
		3/4	5	2-1/4	.590	.090	SL	38213	162.53
		3/4	5	2-1/4	.590	.125	SL	38214	164.73
		3/4	6	3-3/8	.590	Square	SX	33026	186.37
		3/4	6	3-3/8	.590	.030	SX	34655	193.37
		3/4	6	3-3/8	.590	.060	SX	38215	195.02
		3/4	6	3-3/8	.590	.090	SX	38216	199.67
		3/4	6	3-3/8	.590	.125	SX	38217	201.87
3/4	3/4	1	4	1-3/4	.715	Square	SR	32939	184.27
		1	4	1-3/4	.715	.030	SR	34657	191.27
		1	4	1-3/4	.715	.060	SR	38218	192.92
		1	4	1-3/4	.715	.090	SR	38219	197.57
		1	4	1-3/4	.715	.125	SR	38220	199.77
		1	4	1-3/4	.715	.156	SR	38221	201.92
		1	4	1-3/4	.715	.190	SR	38222	204.17
		1	5	2-1/4	.715	Square	SL	33021	219.34
		1	5	2-1/4	.715	.030	SL	34658	226.34
		1	5	2-1/4	.715	.060	SL	38223	227.99
		1	5	2-1/4	.715	.090	SL	38224	232.64
		1	5	2-1/4	.715	.125	SL	38225	234.84
		1	5	2-1/4	.715	.156	SL	38226	236.99
		1	5	2-1/4	.715	.190	SL	38227	239.24
		1	6	3-3/8	.715	Square	SX	33027	254.40
		1	6	3-3/8	.715	.030	SX	34659	261.40
		1	6	3-3/8	.715	.060	SX	38228	263.05
		1	6	3-3/8	.715	.090	SX	38229	267.70
		1	6	3-3/8	.715	.125	SX	38230	269.90
		1	6	3-3/8	.715	.156	SX	38231	272.05
		1	6	3-3/8	.715	.190	SX	38232	274.30
1	1	1-1/8	4	1-7/8	.960	Square	SR	32940	277.11
		1-1/8	4	1-7/8	.960	.030	SR	34660	284.11
		1-1/8	4	1-7/8	.960	.060	SR	38233	285.76
		1-1/8	4	1-7/8	.960	.090	SR	38234	290.41
		1-1/8	4	1-7/8	.960	.125	SR	38235	292.61
		1-1/8	4	1-7/8	.960	.156	SR	38236	294.76
		1-1/8	4	1-7/8	.960	.190	SR	38237	297.01
		1-1/8	4	1-7/8	.960	.250	SR	38238	299.26
		1-1/4	5	2-1/4	.960	Square	SL	33022	319.85
		1-1/4	5	2-1/4	.960	.030	SL	34661	326.85
		1-1/4	5	2-1/4	.960	.060	SL	38239	328.50
		1-1/4	5	2-1/4	.960	.090	SL	38240	333.15
		1-1/4	5	2-1/4	.960	.125	SL	38241	335.35
		1-1/4	5	2-1/4	.960	.156	SL	38242	337.50
		1-1/4	5	2-1/4	.960	.190	SL	38243	339.75
		1-1/4	5	2-1/4	.960	.250	SL	38245	342.00

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Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Style Code	MG EDP Number	List Price
1	1	1-1/4	6	3-3/8	.960	Square	SX	33028	362.09
		1-1/4	6	3-3/8	.960	.030	SX	34662	369.09
		1-1/4	6	3-3/8	.960	.060	SX	38246	370.74
		1-1/4	6	3-3/8	.960	.090	SX	38247	375.39
		1-1/4	6	3-3/8	.960	.125	SX	38248	377.59
		1-1/4	6	3-3/8	.960	.156	SX	38249	379.74
		1-1/4	6	3-3/8	.960	.190	SX	38250	381.99
		1-1/4	6	3-3/8	.960	.250	SX	38251	384.24
		1-1/4	7	4-3/8	.960	Square	SE	33033	427.38
		1-1/4	7	4-3/8	.960	.030	SE	34663	434.38
		1-1/4	7	4-3/8	.960	.060	SE	38252	436.03
		1-1/4	7	4-3/8	.960	.090	SE	38253	440.68
		1-1/4	7	4-3/8	.960	.125	SE	38254	442.88
		1-1/4	7	4-3/8	.960	.156	SE	38255	445.03
		1-1/4	7	4-3/8	.960	.190	SE	38256	447.28
		1-1/4	7	4-3/8	.960	.250	SE	38257	449.53

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	R Corner Radius	Style Code	MG EDP Number	List Price
6	6	8	57	20	5,4	Square	SR	32402	28.44
		8	57	20	5,4	0,3	SR	37200	35.44
		8	75	40	5,4	Square	SL	37201	39.67
		8	75	40	5,4	0,3	SL	37202	46.67
8	8	10	63	26	7,2	Square	SR	32404	43.05
		10	63	26	7,2	0,5	SR	37212	50.05
10	10	12	72	31	9	Square	SR	32406	57.99
		12	72	31	9	0,5	SR	37214	64.99
		12	100	50	9	Square	SX	33029	81.31
		12	100	50	9	0,5	SX	37216	88.31
12	12	14	83	37	10,8	Square	SR	32408	66.14
		14	83	37	10,8	1,0	SR	37218	74.79
		14	125	70	10,8	Square	SM	33030	105.39
		14	125	70	10,8	1,0	SM	37220	114.04
16	16	18	92	41	14,4	Square	SR	32410	127.43
		18	92	41	14,4	1,0	SR	37222	136.08
		18	150	90	14,4	Square	SX	33031	199.44
		18	150	90	14,4	1,0	SX	37224	208.09
20	20	24	104	47	18	Square	SR	32412	204.84
		24	104	47	18	1,0	SR	37226	213.49
		24	150	90	18	Square	SX	37228	280.82
		24	150	90	18	1,0	SX	37230	289.47

Style Code Reference

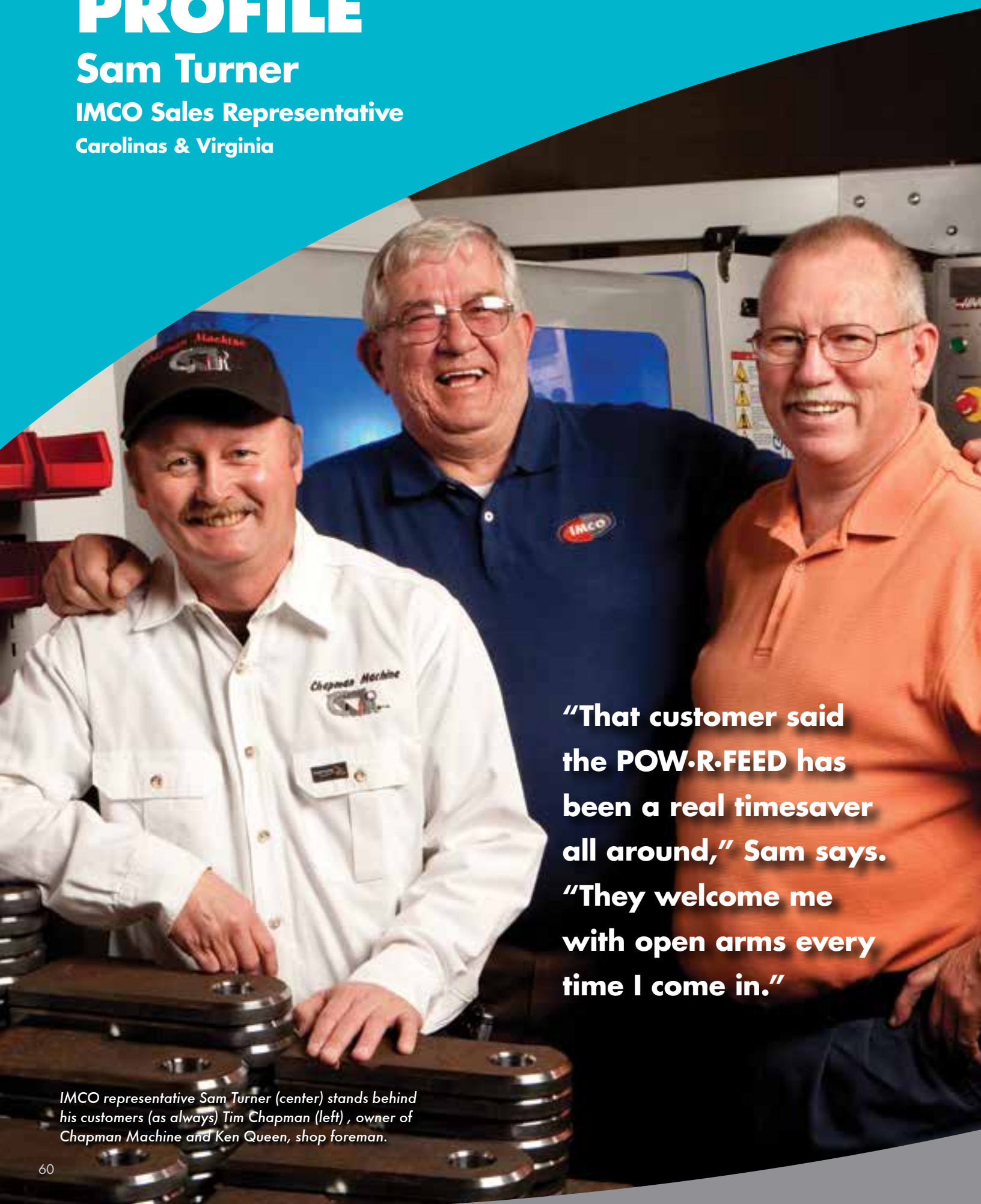
SE—Short LOC, Extreme OAL *SL—Short LOC, Long OAL* *SM—Short LOC, Medium OAL*
SR—Short LOC, Regular OAL *SX—Short LOC, X-Long OAL*

PROFILE

Sam Turner

IMCO Sales Representative

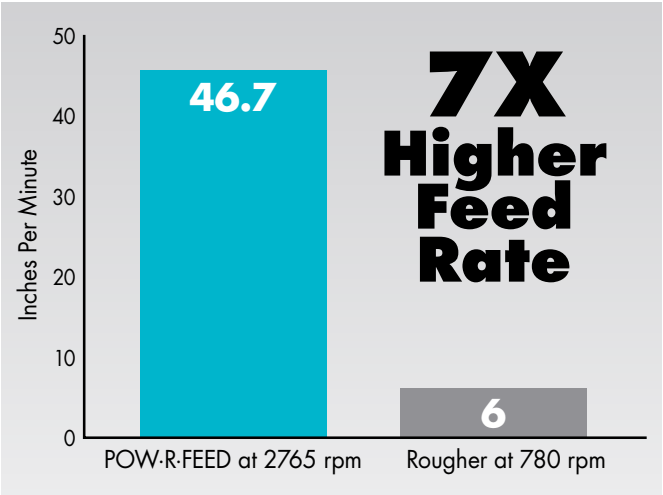
Carolinas & Virginia

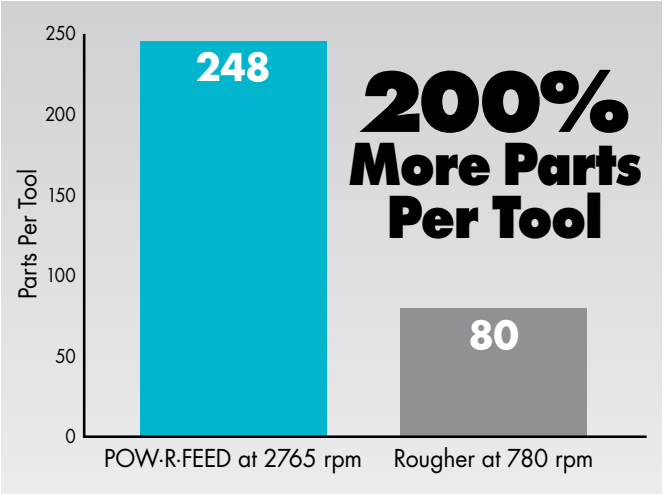


"That customer said the POW·R·FEED has been a real timesaver all around," Sam says. "They welcome me with open arms every time I come in."

IMCO representative Sam Turner (center) stands behind his customers (as always) Tim Chapman (left) , owner of Chapman Machine and Ken Queen, shop foreman.

One of Sam Turner's customers, like most other job shops, was eager to cut tool costs and cycle times. They tested an IMCO 5-flute POW·R·FEED® with advanced AlTiNX coating against a 4-flute rougher for peripheral milling in 4340 tool steel, taking a .380 max. radial cut at a .210 max. depth of cut. Sam knew the POW·R·FEED could handle a higher machine speed (2675 rpm vs. 780 rpm).





The results:

- **More than 3 times the surface feet per minute.**
- **IPM feed rate jumped from 6 to 46.7.**
- **Productivity and tool life jumped 200% – 60 parts/hour vs. 20 parts/hour and 248 parts/tool vs. 78-80 parts/tool.**

After more than 40 years in the business, Sam Turner really knows his stuff. A distributor for many years, Sam became a sales representative 20 years ago. He solves problems for machining operations throughout the Carolinas and Virginia.

ROUGHERS

Chip Control

The small chips generated by our rougher/finisher design promotes better chip evacuation in hogging operations with less power draw through the spindle. This makes it an excellent choice for cutting slots, keyways and pockets, even on smaller CNCs with limited horsepower and coolant pressure. Achieve up to 40% higher feed rates in profiling operations over general purpose tools.

ROUGHER FINISHER M10

Results: Higher metal removal rates and smoother finishes than with traditional roughing end mills, plus more parts per cycle and longer tool life.

Our advanced chipbreaker design creates higher productivity without requiring the latest in high powered machine tools.

Recommended for use in most materials. Provides maximum performance in carbon steels, tool & die steels and cast iron.
NOTE: Not recommended for use in aluminum or stainless steels.

IMCO roughing and finishing tools with unique chipbreaker geometry deliver higher productivity with less horsepower than other high-performance mills. Our exclusive flute design reduces cutting forces, creating smaller chips that can be removed faster and easier thus eliminating the cause of most tool chatter.

Enhanced Performance

Choose IMCO rougher/finisher coated or uncoated:

- Advanced composition Spector (aluminum titanium nitride) coating for high temperature conditions
- Abrasion resistant Accelerator (titanium carbonitride) coating for exceptional performance at moderate speeds and feeds
- Uncoated carbide for general purpose applications

4 Serrated Flutes

With chipbreaking geometry

M104

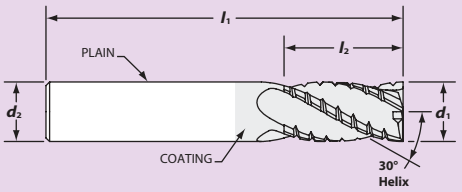
Carbon & tool steels ≤ 48 HRC	✓✓✓
Cast irons	✓✓✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent

Coatings:

- AlTiN
- TiCN
- None (MG)

Any PVD coating may be applied to an uncoated tool in this series. See page 162 for coating options.



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Style Code	AlTiN EDP Number	List Price
6	6	13	57	RR	62464	35.44
		29	75	LL	34280	48.72
8	8	19	63	RR	62465	44.31
		29	75	LL	34281	57.80
10	10	22	72	RR	62466	57.96
		40	88	LL	37515	79.12
12	12	26	83	RR	62467	85.68
		50	100	LL	34283	105.58
16	16	32	92	RR	62468	138.08
		57	125	LL	34284	212.73
20	20	38	104	RR	62469	184.80
		57	125	LL	34285	315.74

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Style Code	AlTiN EDP Number	List Price	TiCN EDP Number	List Price	MG EDP Number	List Price
1/8	1/8	1/4	1-1/2	SR	33290	17.96	33076	17.96	33060	16.48
		1/2	1-1/2	RR	30423	18.38	33130	18.38	33145	16.90
3/16	3/16	3/8	2	SR	33296	26.14	33077	26.14	33061	24.46
		5/8	2	RR	30462	27.35	33132	27.35	33147	25.62
1/4	1/4	1/2	2	SS	91779	29.72	33078	29.72	33062	26.98
		3/4	2-1/2	RR	98991	33.44	33134	33.44	33148	30.29
		1-1/8	3	LL	33299	52.29	33051	52.29	33085	47.93
5/16	5/16	1/2	2	SS	33163	35.70	33079	35.70		
		13/16	2-1/2	RR	30551	41.06	33136	41.06	33150	36.38
		1-1/8	3	LL	33101	59.90	33052	59.90		
3/8	3/8	5/8	2	SS	33103	47.09	33080	47.09	33064	42.58
		1	2-1/2	RR	33153	50.98	33138	50.98	33152	46.10
		1-1/8	3	LL	33300	70.14	33053	70.14	33087	64.05
1/2	1/2	5/8	2-1/2	SS	33181	71.92	33081	71.92		
		1	3	RR	98961	78.02	33140	78.02	33154	71.92
		2	4	LL	30434	107.57	33054	107.57		
5/8	5/8	1-1/4	3-1/2	RR	33157	136.40	33142	136.40	33156	124.69
		2-1/4	5	LL	97343	197.14	33055	197.14		
3/4	3/4	1	3	SS	33297	190.78	33083	190.78		
		1-1/2	4	RR	33159	199.55	33144	199.55	33158	184.43
		2-1/4	5	LL	33301	261.50	33056	261.50		
1	1	1-1/2	4	RR	33161	294.16	33146	294.16		
		2-1/4	5	LL	33302	403.30	33057	403.30		

Style Code Reference

LL—Long LOC, Long OAL RR—Regular LOC, Regular OAL SR—Short LOC, Regular OAL SS—Short LOC, Short OAL

Application Guide • Speed & Feed

Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (SFM)	Feed (Inches Per Tooth) 1/8	1/4	3/8	1/2	5/8	3/4	1	Speed (m/min)	Feed (mm Per Tooth) 3,0	6,0	9,0	12,0	16,0	19,0	25,0
Low Carbon Steels ≤ 38 HRc 1018, 12L14, 8620	Slot	1 x D	1 x D	4	350	.0006	.0012	.0018	.0025	.0031	.0037	.0050	107	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	Rough	1 x D	.5 x D	4	425	.0007	.0015	.0022	.0030	.0037	.0045	.0060	130	.0178	.0381	.0559	.0762	.0940	.1143	.1524
Medium Carbon Steels ≤ 38 HRc 4140, 4340	Slot	.75 x D	1 x D	4	275	.0006	.0012	.0019	.0025	.0032	.0039	.0050	84	.0152	.0305	.0483	.0635	.0813	.0991	.1270
	Rough	1 x D	.5 x D	4	350	.0007	.0015	.0022	.0030	.0038	.0045	.0060	107	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Tool and Die Steels ≤ 38 HRc A2, D2, O1, S7, P20, H13	Slot	.75 x D	1 x D	4	275	.0006	.0012	.0019	.0025	.0032	.0039	.0050	84	.0152	.0305	.0483	.0635	.0813	.0991	.1270
	Rough	1 x D	.5 x D	4	350	.0007	.0015	.0022	.0030	.0038	.0045	.0060	107	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Cast Iron - Gray	Slot	1 x D	1 x D	4	350	.0006	.0012	.0018	.0023	.0029	.0035	.0046	107	.0152	.0305	.0457	.0584	.0737	.0889	.1168
	Rough	1 x D	.5 x D	4	450	.0007	.0014	.0021	.0028	.0035	.0042	.0056	137	.0178	.0356	.0533	.0711	.0889	.1067	.1422
Cast Iron - Ductile	Slot	.75 x D	1 x D	4	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	1 x D	.5 x D	4	375	.0006	.0012	.0018	.0025	.0031	.0038	.0050	114	.0152	.0305	.0457	.0635	.0787	.0965	.1270
Cast Iron - Malleable	Slot	.5 x D	1 x D	4	225	.0003	.0006	.0009	.0012	.0015	.0018	.0024	69	.0076	.0152	.0229	.0305	.0381	.0457	.0610
	Rough	1 x D	.5 x D	4	300	.0005	.0010	.0015	.0020	.0025	.0030	.0040	91	.0127	.0254	.0381	.0508	.0635	.0762	.1016

D = tool diameter Reduce feed rates by 20% when using long length tools Starting parameters shown

2 Helical Flutes

To reduce work hardening

E520B

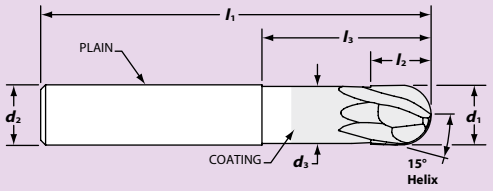
E520B • Ball

- Ball end with extended length
- For contouring of hardened materials
- Neck relief for side clearance
- Designed for hardened materials
- Superior **TiAlNX** coating

Carbon & tool steels ≤ 48 HRC	✓
Carbon & tool steels > 48 HRC	✓✓✓
Cast irons	✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent

Coating:
TiAlNX



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	Style Code	TiAlNX EDP Number	List Price
1/8	1/4	1/8	3	3/8	.118	SL	34288	61.79
3/16	1/4	3/16	3	9/16	.176	SL	34289	60.85
1/4	1/4	1/4	3	1-5/8	.235	SL	34290	59.64
3/8	3/8	3/8	4	2-1/4	.355	SX	34292	80.80
1/2	1/2	1/2	4	2-1/4	.475	SL	34293	117.86

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	d_3 Neck Dia.	Style Code	TiAlNX EDP Number	List Price
3	6	3	75	9	2,8	SL	34295	61.79
4	6	4	75	12	3,8	SL	34296	60.85
6	6	6	75	40	5,4	SL	34298	59.64
10	10	10	100	55	9	SX	34300	87.36
12	12	12	100	55	10,8	SL	34301	105.84

Style Code Reference
SL—Short LOC, Long OAL *SX—Short LOC, X-Long OAL*

Application Guide • Speed & Feed

Work Material Hardness	Type of Cut	Series Code	Axial DOC	Radial DOC	Number of Flutes	Speed (SFM)	Feed (Inches Per Tooth) 1/8	1/4	3/8	1/2	Speed (m/min)	Feed (mm Per Tooth) 3,0	6,0	9,0	12,0
< 28 HRc	Rough	E64B	.1 x D	.2 x D	4	400	0.0010	0.0020	0.0030	0.0040	122	0.0254	0.0508	0.0762	0.1016
	Rough	E520B	.05 x D	.1 x D	2	750	0.0020	0.0038	0.0042	0.0050	229	0.0508	0.0965	0.1067	0.1270
	Finish	E520B	.02 x D	.05 x D	2	850	0.0025	0.0048	0.0053	0.0065	259	0.0635	0.1219	0.1346	0.1651
28 HRc to 38 HRc	Rough	E64B	.1 x D	.2 x D	4	350	0.0010	0.0020	0.0030	0.0040	107	0.0254	0.0508	0.0762	0.1016
	Rough	E520B	.05 x D	.1 x D	2	700	0.0020	0.0038	0.0042	0.0050	213	0.0508	0.0965	0.1067	0.1270
	Finish	E520B	.02 x D	.05 x D	2	800	0.0023	0.0046	0.0051	0.0056	244	0.0584	0.1168	0.1295	0.1422
39 HRc to 48 HRc	Rough	E64B	.1 x D	.2 x D	4	300	0.0008	0.0016	0.0024	0.0032	91	0.0203	0.0406	0.0610	0.0813
	Rough	E520B	.05 x D	.1 x D	2	650	0.0018	0.0036	0.0038	0.0039	198	0.0457	0.0914	0.0965	0.0991
	Finish	E520B	.02 x D	.05 x D	2	750	0.0021	0.0042	0.0047	0.0052	229	0.0533	0.1067	0.1194	0.1321
49 HRc to 57 HRc	Rough	E520B	.02 x D	.1 x D	2	500	0.0016	0.0032	0.0034	0.0036	152	0.0406	0.0813	0.0864	0.0914
	Finish	E520B	.02 x D	.05 x D	2	600	0.0018	0.0036	0.0039	0.0041	183	0.0457	0.0914	0.0991	0.1041
58 HRc to 62 HRc	Rough	E520B	.02 x D	.1 x D	2	400	0.0015	0.0030	0.0032	0.0035	122	0.0381	0.0762	0.0813	0.0889
	Finish	E520B	.02 x D	.05 x D	2	500	0.0017	0.0034	0.0036	0.0038	152	0.0432	0.0864	0.0914	0.0965

2 Helical Flutes

For contouring of hardened materials

E62B

E62B • Ball

4 Helical Flutes

For contouring of hardened materials

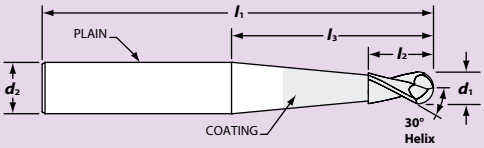
E64B

E64B • Ball

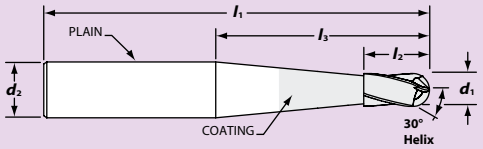
- Ball end with extended length
- Designed for hardened materials
- Superior **AlTiN** coating

Carbon & tool steels ≤ 48 HRC	✓
Carbon & tool steels > 48 HRC	✓
Cast irons	✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent



Coating:
AlTiN



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	Style Code	E62B EDP Number	E64B EDP Number	List Price
3/32	3/16	3/16	2-1/2	1-3/4	SL	33271	33259	34.89
1/8	3/16	1/4	2-1/2	1-3/4	SL	33272	33260	34.89
3/16	1/4	5/16	3	2-1/8	SL	33273	33261	45.40
1/4	3/8	3/8	4	2-1/2	SX	33274	33262	67.76
		3/8	6	2-1/2	SE	33289	33266	116.53
5/16	3/8	1/2	4	2-1/2	SX	33275	33263	67.76
3/8	3/8	5/8	4	2-1/2	SX	33276	33264	67.76
		5/8	6	2-1/2	SE	33291	33268	116.53
1/2	1/2	13/16	4	2-1/2	SL	33277	33265	105.25
		13/16	6	2-1/2	SX	33292	33269	156.42

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	l_3 LBS	Style Code	E62B EDP Number	E64B EDP Number	List Price
2	4	5	63	45	SL	02964	20932	34.25
3	4	6	63	45	SL	02965	20933	34.25
4	6	8	75	54	SL	02966	20934	44.99
6	10	9	100	60	SX	02967	20935	81.40
		9	150	69	SE	02985	20939	121.37
8	10	12	100	60	SX	02968	20936	81.40
		12	150	72	SE	02886	20940	121.37
10	10	16	100	60	SX	02969	20937	81.40
		16	150	76	SE	02887	20941	121.37
12	12	20	100	60	SL	02970	20938	103.83
		20	150	80	SX	02888	20942	154.94

Style Code Reference
SE—Short LOC, Extreme OAL SL—Short LOC, Long OAL SX—Short LOC, X-Long OAL

2 Straight Flutes

For precision slotting & contouring

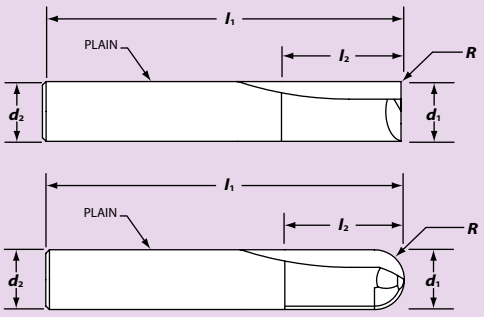
E42 • E42B

E42 • Square

E42B • Ball

Carbon & tool steels ≤ 48 HRC	✓
Carbon & tool steels > 48 HRC	✓
Cast irons	✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent



Coating:
None (MG)

Any PVD coating may be applied to an uncoated tool in this series. See page 162 for coating options.

in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004

- For tight tolerance slots and keyways
- Ball end tool is excellent for contouring operations

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Style Code	MG EDP Number	List Price
1/8	1/8	1/2	1-1/2	Square	RR	32207	12.64
		1/2	1-1/2	Ball	RR	32407	15.18
1/4	1/4	3/4	2-1/2	Square	RR	32215	23.16
		3/4	2-1/2	Ball	RR	32415	27.78
3/8	3/8	1	2-1/2	Square	RR	32219	33.51
		1	2-1/2	Ball	RR	32419	40.31
1/2	1/2	1	3	Square	RR	32223	57.33
		1	3	Ball	RR	32423	68.78

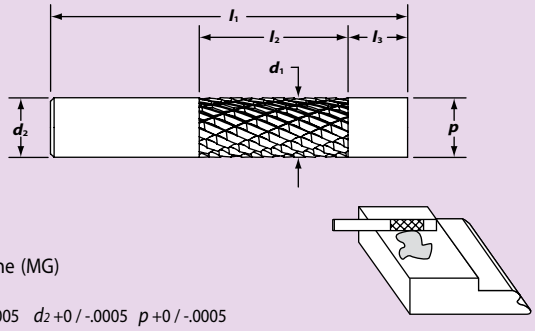
Style Code Reference
RR—Regular LOC, Regular OAL

Piloted Die Trimmer

For die repair

PDT10

- For use in hand-held grinders
- Double cut



Coating:
None (MG)

in d_1 +0 / -.005 d_2 +0 / -.0005 p +0 / -.0005

Inch

d_1 Cutter Dia	p Pilot Dia	d_2 Shank Dia.	l_2 Length of Cut	l_3 Pilot Length	l_1 Overall Length	MG EDP Number	List Price
1/8	1/8	1/8	1	1/2	2-1/2	05634	25.10
3/16	3/16	3/16	1	1/2	2-1/2	05647	26.04
1/4	1/4	1/4	1	1/2	2-1/2	05630	27.25
3/8	3/8	3/8	1	1/2	2-1/2	05643	40.69
1/2	1/2	1/2	1	1/2	2-1/2	05640	59.32

6 Helical Flutes

For finishing operations

E16

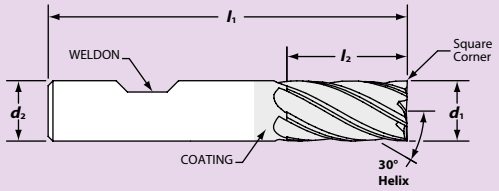
E16 • Square

- Excellent for harder materials
- Commonly used for finishing operations
- Superior **AlTiN** coating

Carbon & tool steels ≤ 48 HRC	✓
Carbon & tool steels > 48 HRC	✓
Super alloys, Inconel® & titanium	✓
Cast irons	✓

✓Good ✓✓Very Good ✓✓✓Excellent

Coating:
AlTiN



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shank Style	Style Code	AlTiN EDP Number	List Price
1/4	1/4	3/4	2-1/2	Plain	RR	37602	22.72
3/8	3/8	1	2-1/2	Plain	RR	37604	38.79
1/2	1/2	1	3	Plain	RR	37605	57.77
3/4	3/4	1-1/2	4	Plain	RR	37519	155.58
1	1	1-1/2	4	Plain	RR	37523	241.96
1-1/4	1-1/4	2	4-1/2	Weldon	RR	34088	568.79
1-3/8	1-1/4	2	4-1/2	Weldon	RR	34089	674.47
1-1/2	1-1/4	2	4-1/2	Weldon	RR	34090	781.83

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shank Style	Style Code	AlTiN EDP Number	List Price
6	6	19	63	Plain	RR	62433	26.34
10	10	25	72	Plain	RR	62435	49.40
12	12	25	76	Plain	RR	62436	65.50
16	16	32	89	Plain	RR	62438	113.62
20	20	38	100	Plain	RR	62440	210.76

Style Code Reference
RR—Regular LOC, Regular OAL

4 LHS/RHC Flutes

For profiling with downward pressure on machined part

E34

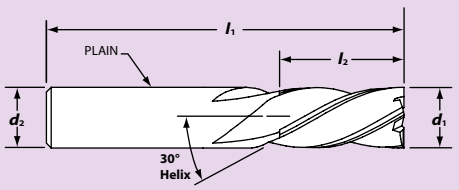
E34 • Square

Carbon & tool steels ≤ 48 HRC	✓
Cast irons	✓

✓Good ✓✓Very Good ✓✓✓Excellent

Coating:
None (MG)

Any PVD coating may be applied to an uncoated tool in this series. See page 162 for coating options.



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shank Style	Style Code	MG EDP Number	List Price
1/8	1/8	1/2	1-1/2	Plain	RR	30208	15.44
1/4	1/4	3/4	2-1/2	Plain	RR	30220	26.89
3/8	3/8	7/8	2-1/2	Plain	RR	30232	38.22
1/2	1/2	1	3	Plain	RR	30244	65.36
5/8	5/8	1-1/4	3-1/2	Plain	RR	30250	124.07
3/4	3/4	1-1/2	4	Plain	RR	30256	183.18

Style Code Reference
RR—Regular LOC, Regular OAL

2 Straight Flutes

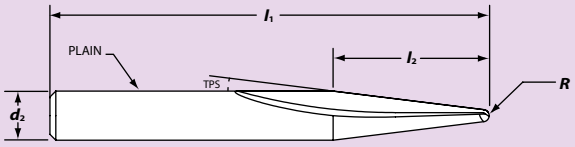
For die & mold machining

E55B

- Full radius on tip
- Available in a variety of side tapers
- Can be used for mold runner cutting

Carbon & tool steels ≤ 48 HRC	✓
Carbon & tool steels > 48 HRC	✓
Cast irons	✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent



Coating:

None (MG)

in R ±.0025 d_2 -0.0001 to -0.0004

Inch • 14° Included angle • Standard flute length

TPS	R Tip Radius	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	MG EDP Number	List Price
7°	1/32	1/8	1/4	1-1/2	30160	24.82
	3/64	3/16	3/8	2	30172	34.32
	1/16	1/4	1/2	2-1/2	30178	43.68
	3/32	3/8	3/4	2-1/2	30190	66.40
	1/8	1/2	1	3	30202	105.32

Inch • Multiple included angles • Extended flute length

TPS	R Tip Radius	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	MG EDP Number	List Price
3°	1/64	1/8	29/32	1-1/2	30162	26.19
	1/32	1/8	19/32	1-1/2	30163	26.19
		3/16	1	2	30164	46.10
		1/4	1	2-1/2	30167	49.28
	1/16	1/4	1	2-1/2	97873	49.28
5°	1/64	1/8	35/64	1-1/2	30176	26.19
	1/32	1/8	23/64	1-1/2	30177	26.19
		3/16	23/32	2	30179	46.10
		1/4	1	2-1/2	30181	49.28
	1/16	1/4	23/32	2-1/2	30182	49.28
7°	1/64	1/8	25/64	1-1/2	30192	26.19
	1/32	1/8	1/4	1-1/2	30218	26.19
		3/16	1/2	2	30193	46.10
		1/4	49/64	2-1/2	30195	49.28
	1/16	1/4	1/2	2-1/2	30219	49.28
10°	1/64	1/8	17/64	1-1/2	30203	26.19
	1/32	1/8	11/64	1-1/2	30204	26.19
		3/16	23/64	2	30205	46.10
		1/4	17/32	2-1/2	30207	49.28
	1/16	1/4	23/64	2-1/2	30209	49.28

3 Constant Helix Flutes

For die & mold machining

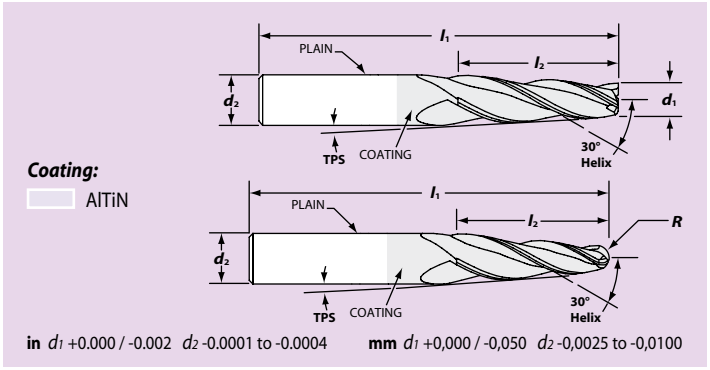
E53 • E53B

E53 • Square

E53B • Ball

Carbon & tool steels ≤ 48 HRC	✓
Stainless steels	✓
Cast irons	✓
Aluminum and non-ferrous	✓

✓ Good ✓✓ Very Good ✓✓✓ Excellent



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

Metric

TPS	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	End Style	d_1 Tip Dia	AlTiN EDP Number	List Price
0,5°	4	20	63	Square	3	37670	34.36
	5	20	63	Square	4	37671	38.30
	6	30	75	Square	5	37672	40.79
	8	30	75	Square	6	37673	50.92
	10	30	75	Square	8	37674	62.83
1°	4	20	63	Square	3	37675	34.36
	5	20	63	Square	4	37676	38.30
	6	25	75	Square	5	37677	40.79
	8	30	75	Square	6	37678	50.92
	10	30	75	Square	8	37679	62.83
2°	5	20	63	Square	3	37685	38.30
	6	20	63	Square	4	37686	39.10
	8	30	75	Square	5	37687	50.92
	8	30	75	Square	6	37688	50.92
	10	28	75	Square	8	37689	62.83
3°	6	25	63	Square	3	37690	39.10
	8	30	75	Square	4	37692	50.92
	8	40	75	Square	3	37691	50.92
	10	30	75	Square	6	37694	62.83
	10	40	75	Square	5	37693	62.83
5°	8	30	75	Square	3	37695	50.92
	10	30	75	Square	4	37698	62.83
	10	40	100	Square	3	37697	78.78

Inch

TPS	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	End Style	d_1/R Tip Dia Radius	AlTiN EDP Number	List Price
1°	1/4	1-1/2	3	Square	1/8	39050	40.09
		1-1/2	3	Ball	1/16 R	30428	43.89
	3/8	1-3/4	3-1/2	Square	3/16	39046	60.01
		1-3/4	3-1/2	Ball	3/32 R	39185	65.88
	1/2	2	4	Square	1/4	39047	91.16
		2	4	Ball	1/8 R	39186	100.26
1.5°	1/4	1-1/2	3	Square	1/8	39049	40.09
		1-1/2	3	Ball	1/16 R	39187	43.89
	3/8	1-3/4	3-1/2	Square	3/16	39151	60.01
		1-3/4	3-1/2	Ball	3/32 R	39188	65.88
2°	1/4	1-1/4	3	Square	1/8	39069	40.09
		1-1/4	3	Ball	1/16 R	39051	43.89
	3/8	1-3/4	3-1/2	Square	3/16	39160	60.01
		1-3/4	3-1/2	Ball	3/32 R	39189	65.88
	1/2	2	4	Square	1/4	39161	91.16
		2	4	Ball	1/8 R	39190	100.26
3°	1/4	1	3	Square	1/8	39070	40.09
		1	3	Ball	1/16 R	39052	43.89
	3/8	1-3/4	3-1/2	Square	5/32	39162	60.01
		1-3/4	3-1/2	Ball	5/64 R	39191	65.88
	1/2	2	4	Square	1/4	39163	91.16
		2	4	Ball	1/8 R	39055	100.26
5	1/4	3/4	3	Square	1/8	39127	40.09
		3/4	3	Ball	1/16 R	39106	43.89
	3/8	1-1/2	3-1/2	Square	1/8	39023	60.01
		1-1/2	3-1/2	Ball	1/16 R	39081	65.88
	1/2	1-1/4	4	Square	1/4	39054	91.16
		1-1/4	4	Ball	1/8 R	30122	100.26
7°	1/4	1/2	3	Square	1/8	39179	40.09
		1/2	3	Ball	1/16 R	39192	43.89
	3/8	1	3-1/2	Square	1/8	39180	60.01
		1	3-1/2	Ball	1/16 R	39193	65.88
	1/2	1-1/4	4	Square	3/16	39181	91.16
		1-1/4	4	Ball	3/32 R	30558	100.26
10°	1/4	1/2	3	Square	3/32	39182	40.09
		1/2	3	Ball	3/64 R	39194	43.89
	3/8	3/4	3-1/2	Square	1/8	39183	60.01
		3/4	3-1/2	Ball	1/16 R	39195	65.88
	1/2	1	4	Square	1/8	39184	91.16
		1	4	Ball	1/16 R	39196	100.26

Which Coating to Use?

Photo courtesy of Oerlikon Balzers

IMCO's high-performance tools are tested for the best combination of geometry, substrate and coating to achieve the desired performance for their targeted applications. But we also offer several coatings on our general-purpose tooling. Most coatings add hardness and lubricity to the cutting tool. So, which one is best for your application?

Overall, Spector® (AlTiN) coating gives the best performance in most materials. Spector's heat resistance (hot hardness rating) allows tools to run at higher spindle speeds than uncoated tools or tools coated with TiN or TiCN. AlTiN-style coatings are also the most effective coatings for running dry in many materials. Faster speeds and improved cycle times can result from making the switch to Spector coating.

Accelerator® (TiCN) coating can be very beneficial in cutting aluminum, when you can't use an aluminum-based coating (like AlTiN). Choose Accelerator coating to add lubricity to the cutting edge in gummy materials.

Photo courtesy of Oerlikon Balzers

GENERAL PURPOSE END MILLS

IMCO general purpose end mills are manufactured on high precision CNC grinders to exacting standards from the highest quality micrograin carbide. Geometries and specifications are fine tuned through extensive real world testing in a wide range of materials.

Chemical coatings applied using the PVD coating process can significantly enhance tool life and IMCO offers a variety of coatings for maximum performance in a wide range of workpiece materials.

SPECTOR®

- Advanced aluminum titanium nitride coating (AlTiN)
- Maintains hardness at high cutting temperatures
- Cutting heat oxidizes the coating to form a highly protective layer of aluminum oxide
- Enables dry machining of many materials
- Recommended for hard steels, stainless steels, carbon steels and other applications generating high cutting temperatures

ACCELERATOR®

- Abrasion resistant titanium carbonitride coating (TiCN)
- Exceptional performance in most materials at moderate speeds and feeds
- Recommended for improved tool life at conventional feeds and speeds. Performs well with low horsepower machinery

auCARB®

- Titanium nitride coating (TiN)
- Improves tool life at conventional feeds and speeds
- Low coefficient of friction for improved chip flow
- Superseded by Accelerator (TiCN) and Spector (AlTiN) coating

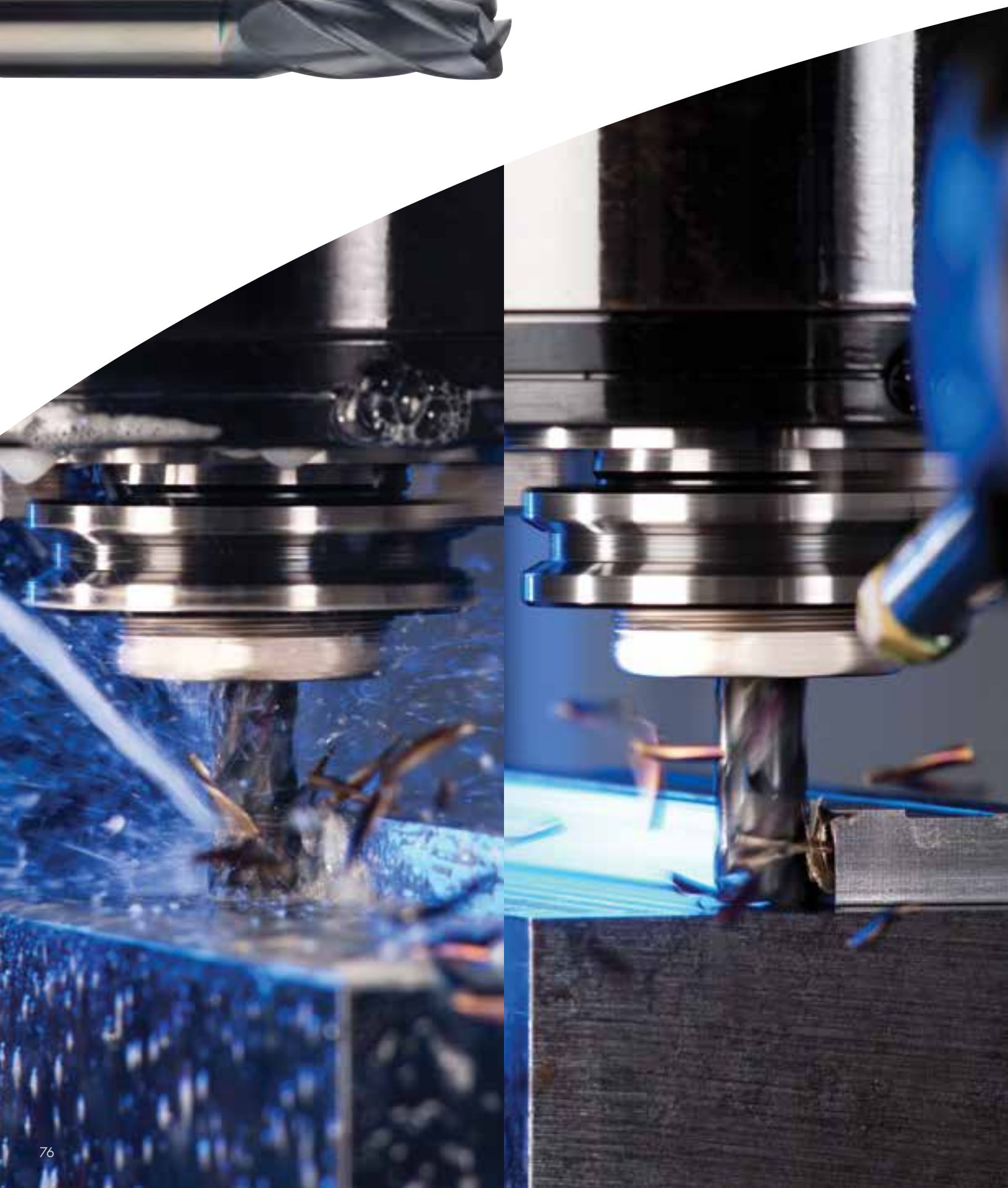
MICROGRAIN®

- Uncoated submicron grain carbide with 10% cobalt for even edge wear (MG)
- High transverse rupture strength for durability
- Proven performance at lower speeds and feeds in easily machined materials

It's your money. Get the best performance for every dollar.

With IMCO.

Your IMCO representative is an expert problem solver and your best resource for technical advice on reducing tool costs, beefing up productivity and making sure you are getting optimum output from every machining station.



Wet or Dry?

Carbon and tool steels machine well when running dry with an air blast. Consider keeping the coolant on when machining stainless steels, aluminum and super alloys.

Running dry can increase tool performance and decrease cycle times. Running dry requires using a heat-resistant coating (such as AlTiN) and an air blast to remove chips from the cutting zone. You not only get increased tool life and improved cycle times, you also get cost savings with lower coolant use. Running dry also eliminates environmental hazards associated with coolant use and disposal.

4-FLUTE END MILLS

E14

4 Helical Flutes

For profiling, slotting, & contouring

E14 • Radius

E14 • Square

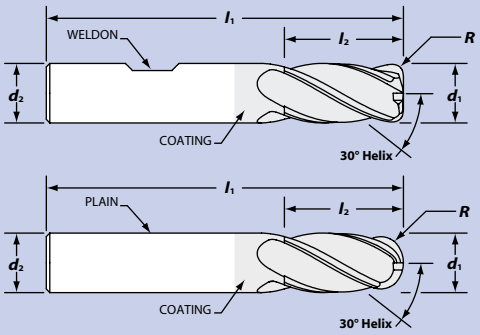
E14B • Ball

Four flute end mills are versatile, general purpose tools for slotting, profiling and contour milling in applications where chip packing is not a problem. The increased core thickness of 4-flute tools results in less tool deflection and improved size accuracy, while the reduced chip load gives improved surface finishes.

Coatings:

- AlTiN
- TiCN
- TIN
- None (MG)

Any PVD coating may be applied to an uncoated tool in this series. See page 162 for coating options.



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

	AlTiN Spector	TiCN Accelerator	MG Uncoated	TiN auCARB
Carbon & tool steels ≤ 48 HRC	✓✓✓	✓✓	✓	✓
Carbon & tool steels > 48 HRC	✓✓✓	✓✓	✓	✓
Stainless steels	✓✓	✓		✓
Cast irons	✓✓✓	✓✓	✓	✓

✓ Suitable ✓✓ Good ✓✓✓ Recommended

End designs

- Wide variety of corner radii available
- Square end for general machining and finishing
- Ball nose styles for contouring
- Center cutting

Shank designs

- Precision shanks fit all collets and most shrink-fit systems
- Many sizes offered with flats for end mill holders

Multiple lengths

- Long, extra long and extreme lengths for deep cavity milling
- Stub length for extra rigidity

E14 Sets

Style	EDP Number	List Price
AlTiN	30522	177.34
TiCN	33659	176.56
MG	33651	144.82

E14B Sets

Style	EDP Number	List Price
AlTiN	39427	210.94
TiCN	33662	209.90
MG	33661	176.56

Contains one each of: 1/8, 3/16, 1/4, 5/16, 3/8, 1/2

GENERAL PURPOSE E14 END MILLS

For general milling applications

E14

Inch sizes

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	Standard: AlTiN EDP Number	Standard: List Price	Standard: TiCN EDP Number	Standard: List Price	Standard: MG EDP Number	Standard: List Price	Obsolete*: TiN EDP Number	Obsolete*: List Price
1/64	1/8	1/32	1-1/2	Square	Plain	SR	90661	14.93			90659	12.24		
		3/64	1-1/2	Square	Plain	RR	90662	14.93			90660	12.24		
1/32	1/8	1/16	1-1/2	Square	Plain	SR	30891	13.83			34698	11.33		
		1/16	1-1/2	Ball	Plain	SR	31774	16.85			31699	14.16		
		3/32	1-1/2	Square	Plain	RR	99345	13.83	34402	13.68	30701	11.33		
		3/32	1-1/2	Ball	Plain	RR	30559	16.85	34502	16.74	30901	14.16		
		1/8	1-1/2	Square	Plain	LR	90693	14.36			90692	11.67		
3/64	1/8	3/32	1-1/2	Square	Plain	SR	30892	13.70	30894	13.68	34701	11.01		
		3/32	1-1/2	Ball	Plain	SR	31775	16.85			31701	14.16		
		9/64	1-1/2	Square	Plain	RR	30537	13.83	34403	13.68	30703	11.33		
		9/64	1-1/2	Ball	Plain	RR	30539	16.85			30903	14.16		
1/16	1/8	1/8	1-1/2	Square	Plain	SR	30529	12.53	31530	12.38	31503	10.13		
		1/8	1-1/2	Ball	Plain	SR	30530	15.34			31703	12.75		
		3/16	1-1/2	Square	Plain	RR	30800	12.69	34404	12.58	30705	10.22	30706	12.58
		3/16	1-1/2	Ball	Plain	RR	97852	15.55	34504	15.39	30905	12.80	30906	15.39
		1/4	1-1/2	Square	Plain	LR	90695	14.36			90694	11.67		
5/64	1/8	1/4	1-1/2	Square	Plain	RR	30506	12.69	34405	12.58	30707	10.22		
		1/4	1-1/2	Ball	Plain	RR	30482	15.55			30907	12.80		
3/32	1/8	3/16	1-1/2	Square	Plain	SR	31545	12.12	31531	12.01	31505	9.71		
		3/16	1-1/2	Ball	Plain	SR	31700	14.61			31705	12.02		
		3/8	1-1/2	Square	Plain	RR	30531	12.27	34406	12.17	30709	9.78	30710	12.17
		3/8	1-1/2	Ball	Plain	RR	30992	14.82	34506	14.66	30909	12.20		
7/64	1/8	3/8	1-1/2	Square	Plain	RR	30458	12.27	34407	12.17	30711	9.78		
		3/8	1-1/2	Ball	Plain	RR	30405	14.82			30911	12.20		
1/8	1/8	1/4	1-1/2	Square	Plain	SR	97871	11.18	31532	11.02	31507	8.78		
		1/4	1-1/2	Ball	Plain	SR	31747	13.73			31707	11.15		
		1/2	1-1/2	Square	Plain	RR	30521	11.23	34408	11.23	30713	9.00	30714	11.23
		1/2	1-1/2	.015	Plain	RR	97662	14.04	39626	13.94	39545	14.50		
		1/2	1-1/2	.020	Plain	RR	90523	14.04	39627	13.94	39546	14.50		
		1/2	1-1/2	Ball	Plain	RR	30997	13.83	34508	13.83	30913	11.46	30914	13.83
		5/8	2	Square	Plain	LL	62107	16.80			62105	13.67		
		5/8	2	Ball	Plain	LL	37897	19.24			37892	15.98		
		3/4	2-1/4	Square	Plain	LL	30417	16.43	37710	16.43	37708	14.22		
		3/4	2-1/4	Ball	Plain	LL	37911	20.07	37910	20.02	37908	17.02		
		1	3	Square	Plain	XX	97847	22.26	34110	22.15	34108	19.33		
		1	3	Ball	Plain	XX	97842	27.09	34310	26.99	34308	23.17		
9/64	3/16	9/16	2	Square	Plain	RR	30500	16.59	34409	16.54	30715	13.44		
		9/16	2	Ball	Plain	RR	31044	20.38			30915	16.92		
5/32	3/16	5/16	2	Square	Plain	SR	39757	15.50	31533	15.50	31509	12.89		
		5/16	2	Ball	Plain	SR	30465	18.25			31709	15.50		
		9/16	2	Square	Plain	RR	30501	16.59	34410	16.54	30717	13.44		
		9/16	2	Ball	Plain	RR	30468	19.76	34510	19.71	30917	16.39		
11/64	3/16	5/8	2	Square	Plain	RR	30507	16.59	34411	16.54	30719	13.44		
3/16	3/16	3/8	2	Square	Plain	SR	31548	14.92	31534	14.92	31511	12.11		
		3/8	2	Ball	Plain	SR	31746	17.58			31711	14.56		
		5/8	2	Square	Plain	RR	30520	15.50	34412	15.50	30721	12.67	30722	15.50
		5/8	2	.015	Plain	RR	39694	18.46	39628	18.46	39547	17.62		
		5/8	2	.020	Plain	RR	39695	18.46	39629	18.46	39548	17.62		
		5/8	2	.030	Plain	RR	39601	18.46	39630	18.46	39549	17.62		
		5/8	2	Ball	Plain	RR	30524	18.10	34512	18.10	30921	15.08	30922	18.10
		3/4	2-1/2	Square	Plain	LL	37793	22.26	37714	22.10	37712	18.22		
		3/4	2-1/2	Ball	Plain	LL	37915	23.97	37914	23.82	37912	21.80		

Style Code Reference
LL—Long LOC, Long OAL
LR—Long LOC, Standard OAL
RR—Regular LOC, Regular OAL
SR—Short LOC, Regular OAL
XX—X-Long LOC, X-Long OAL

continued on next page

** Superseded by AlTiN. Add TiN to any uncoated tool. See page 162.*

GENERAL PURPOSE E14 END MILLS

For general milling applications

E14

Inch sizes

E14 end mills with Weldon® flats are available by request on items not already shown as standard with this feature. See page 160 for modification charges.

Inch • Continued

							Standard						Obsolete*	
d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiN EDP Number	List Price	TiCN EDP Number	List Price	MG EDP Number	List Price	TiN EDP Number	List Price
3/16	3/16	1	4	Square	Plain	LE	62110	30.00			98521	25.67		
		1	4	Ball	Plain	LE	37898	33.85			93336	29.38		
		1-1/8	3	Square	Plain	XX	34115	25.69	34114	25.48	34112	22.00		
		1-1/8	3	Ball	Plain	XX	37938	30.32	34314	30.11	34312	26.35		
13/64	1/4	5/8	2-1/2	Square	Plain	RR	30469	21.06	34413	20.75	30723	16.78		
7/32	1/4	7/16	2	Square	Plain	SS	39759	19.45	31535	19.14	31513	14.49		
		5/8	2-1/2	Square	Plain	RR	30546	21.06	34414	20.75	30725	16.78		
		5/8	2-1/2	Ball	Plain	RR	31046	25.01	34514	24.70	30925	20.50		
15/64	1/4	3/4	2-1/2	Square	Plain	RR	30972	21.06	34415	20.75	30727	16.78		
1/4	1/4	1/2	2	Square	Plain	SS	31595	18.98	31536	18.67	31515	14.22		
		1/2	2	Ball	Plain	SS	31745	20.07			31715	17.11		
		3/4	2-1/2	Square	Plain	RR	98955	18.93	34416	18.93	30729	14.89	30730	18.93
		3/4	2-1/2	Square	Weldon	RR	39788	20.49	39779	20.38	39729	16.57	39730	20.38
		3/4	2-1/2	.015	Plain	RR	30519	23.19	39631	23.04	39504	19.29		
		3/4	2-1/2	.020	Plain	RR	39513	23.19			39505	19.29		
		3/4	2-1/2	.030	Plain	RR	39604	23.19	39633	23.04	39506	19.29		
		3/4	2-1/2	.045	Plain	RR	39696	23.19			39507	19.29		
		3/4	2-1/2	Ball	Plain	RR	30998	23.76	34516	23.76	30929	19.45	30930	23.76
		1	4	Square	Plain	LX	62111	34.68			62106	28.24		
		1	4	Ball	Plain	LX	37899	39.68			37893	33.05		
		1-1/8	3	Square	Plain	LL	99336	27.61	37718	27.61	37716	22.44		
		1-1/8	3	Ball	Plain	LL	37919	34.42	37918	34.37	37916	28.97		
		1-1/2	4	Square	Plain	XX	98978	33.59	34118	33.33	34116	27.33		
		1-1/2	4	Ball	Plain	XX	96411	39.42	34318	39.16	34316	32.52		
		1-1/2	6	Square	Plain	XE	39772	45.03			31163	37.67		
		1-1/2	6	Ball	Plain	XE	97844	50.08			31363	42.43		
17/64	5/16	3/4	2-1/2	Square	Plain	RR	30976	32.19	34417	31.72	30731	26.20		
9/32	5/16	3/4	2-1/2	Square	Plain	RR	96156	32.19	34418	31.72	30733	26.20		
		3/4	2-1/2	Ball	Plain	RR	30464	37.18	34518	36.66	30933	31.03		
19/64	5/16	13/16	2-1/2	Square	Plain	RR	30979	32.19	34439	31.72	30735	26.20		
5/16	5/16	1/2	2	Square	Plain	SS	30534	26.26	31537	25.90	31517	19.42		
		1/2	2	Ball	Plain	SS	31744	29.69			31717	24.28		
		13/16	2-1/2	Square	Plain	RR	30898	26.99	34420	26.94	30737	21.04	30738	26.94
		13/16	2-1/2	Square	Weldon	RR	39789	28.55	39780	28.39	39737	22.80	91803	28.39
		13/16	2-1/2	.015	Plain	RR	39697	30.84	39635	30.47	39509	25.44		
		13/16	2-1/2	.020	Plain	RR	39698	30.84			39510	25.44		
		13/16	2-1/2	.030	Plain	RR	39700	30.84	39637	30.47	39511	25.44		
		13/16	2-1/2	.045	Plain	RR	39701	30.84			39512	25.44		
		13/16	2-1/2	Ball	Plain	RR	30525	31.98	34520	31.93	30937	25.82		
		1	4	Square	Plain	LX	62114	45.92			90696	37.47		
		1	4	Ball	Plain	LX	37900	52.94			37894	44.18		
		1-1/8	3	Square	Plain	LL	30461	37.60	37722	37.60	37720	29.89		
		1-1/8	3	Ball	Plain	LL	34323	43.52	37922	43.52	37920	35.84		
		1-5/8	4	Square	Plain	XX	34123	43.00	34122	42.54	34120	35.56		
		1-5/8	4	Ball	Plain	XX	34361	53.40			34320	43.74		
21/64	3/8	1	2-1/2	Square	Plain	RR	31003	38.90			30739	31.67		
11/32	3/8	1	2-1/2	Square	Plain	RR	30463	38.90	34421	38.43	30741	31.67		
		1	2-1/2	Ball	Plain	RR	30408	43.73			30941	36.15		
23/64	3/8	1	2-1/2	Square	Plain	RR	31004	38.90			30743	31.67		

continued on next page

** Superseded by AlTiN. Add TiN to any uncoated tool. See page 162.*

E14

Inch sizes

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	Standard AlTiN EDP Number	Standard List Price	Standard TiCN EDP Number	Standard List Price	Standard MG EDP Number	Standard List Price	Obsolete* TiN EDP Number	Obsolete* List Price
		5/8	2	Square	Plain	SS	31549	31.62	31538	31.10	31519	24.22		
		5/8	2	Ball	Plain	SS	31749	34.06			31719	28.53		
		1	2-1/2	Square	Plain	RR	98244	32.50	34424	32.24	30745	26.22	30746	32.24
		1	2-1/2	Square	Weldon	RR	39790	33.90	39781	33.90	39745	28.14	39746	33.90
		1	2-1/2	.015	Plain	RR	37443	37.23	37550	37.08	37383	30.34		
		1	2-1/2	.015	Weldon	RR	97665	39.00	39639	38.95	39514	32.26		
		1	2-1/2	.020	Plain	RR	37444	37.23			37384	30.34		
		1	2-1/2	.020	Weldon	RR	39715	39.00			39515	32.26		
		1	2-1/2	.030	Plain	RR	37445	37.23	37552	37.08	37385	30.34		
		1	2-1/2	.030	Weldon	RR	39605	39.00	39641	38.95	39516	32.26		
		1	2-1/2	.045	Plain	RR	37446	37.23			37386	30.34		
		1	2-1/2	.045	Weldon	RR	39598	39.00			39517	32.26		
		1	2-1/2	.060	Plain	RR	37447	37.23			37387	30.34		
3/8	3/8	1	2-1/2	.060	Weldon	RR	39702	39.00			39614	32.26		
		1	2-1/2	.090	Plain	RR	37448	37.23			37388	30.34		
		1	2-1/2	.090	Weldon	RR	39703	39.00			39619	32.26		
		1	2-1/2	Ball	Plain	RR	98262	37.96	34524	37.65	30945	31.39		
		1	4	Square	Plain	RX	62115	50.49			90698	41.09		
		1	4	Ball	Plain	RX	37901	58.14			37895	48.39		
		1-1/8	3	Square	Plain	LL	37727	43.37	37726	42.90	37724	34.89	37725	42.90
		1-1/8	3	Square	Weldon	LL	39168	44.36			39164	36.81		
		1-1/8	3	Ball	Plain	LL	37927	51.38	37926	50.80	37924	44.23	37925	50.80
		1-1/2	6	Square	Plain	LE	97850	69.89			31135	59.80		
		1-1/2	6	Ball	Plain	LE	97845	77.32			31335	67.15		
		1-3/4	4	Square	Plain	XX	34136	49.14	34126	49.09	34124	40.82	34125	49.09
		1-3/4	4	Square	Weldon	XX	39175	51.90			39124	42.74		
		1-3/4	4	Ball	Plain	XX	34335	58.66	34326	58.60	34324	48.39		
25/64	7/16	1	2-3/4	Square	Plain	RR	31024	46.96			30747	38.71		
13/32	7/16	1	2-3/4	Square	Plain	RR	31026	46.96	98261	46.38	30749	38.71		
		1	2-3/4	Ball	Plain	RR	31000	54.24			30949	45.52		
27/64	7/16	1	2-3/4	Square	Plain	RR	31028	46.96			30751	38.71		
		5/8	2-1/2	Square	Plain	SS	39768	42.90			31521	33.60		
		1	2-3/4	Square	Plain	RR	31040	42.38	34430	42.12	30772	33.89	37754	42.12
		1	2-3/4	Ball	Plain	RR	31052	49.24	34530	48.98	30900	40.28		
7/16	7/16	2	4	Square	Plain	LL	37731	68.12	37730	67.50	37728	56.78		
		2	4	Ball	Plain	LL	30485	78.99	37930	78.31	37928	67.26		
		3	6	Square	Plain	XX	34160	87.62	34130	87.05	34128	75.44		
		3	6	Ball	Plain	XX	30487	101.40			34328	87.03		
29/64	1/2	1	3	Square	Plain	RR	30475	61.52			30755	51.22		
15/32	1/2	1	3	Square	Plain	RR	31030	61.52			30757	51.22		
		1	3	Ball	Plain	RR	30481	74.67			30957	63.55		
31/64	1/2	1	3	Square	Plain	RR	99106	61.52			30759	51.22		
		5/8	2-1/2	Square	Plain	SS	31546	50.18	31540	49.56	31523	40.84		
		5/8	2-1/2	Ball	Plain	SS	31743	53.46			31723	48.00		
		1	3	Square	Plain	RR	98245	51.95	34432	51.27	30761	42.89	30762	51.27
		1	3	Square	Weldon	RR	39791	53.92	39782	53.35	39761	45.13	39762	53.35
		1	3	.015	Plain	RR	37449	60.42	37571	60.42	37389	46.47		
		1	3	.015	Weldon	RR	97710	62.30	39643	62.30	39518	48.71		
		1	3	.020	Plain	RR	37450	60.42			37390	46.47		
		1	3	.020	Weldon	RR	30560	62.30			39519	48.71		
		1	3	.030	Plain	RR	37451	60.42	37573	60.42	37391	46.47		
1/2	1/2	1	3	.030	Weldon	RR	39704	62.30	39645	62.30	39520	48.71		

Style Code Reference
LE—Long LOC, Extreme OAL
LL—Long LOC, Long OAL
LX—Long LOC, X-Long OAL
RR—Regular LOC, Regular OAL
RX—Regular LOC, X-Long OAL
SS—Short LOC, Short OAL
XE—X-Long LOC, Extreme OAL
XX—X-Long LOC, X-Long OAL

continued on next page

** Superseded by AlTiN. Add TiN to any uncoated tool. See page 162.*

E14

Inch sizes

E14 end mills with Weldon® flats are available by request on items not already shown as standard with this feature. See page 160 for modification charges.

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	Standard AlTiN EDP Number	List Price	TiCN EDP Number	List Price	MG EDP Number	List Price	Obsolete* TiN EDP Number	List Price
		1	3	.045	Plain	RR	37452	60.42			37392	46.47		
		1	3	.045	Weldon	RR	39600	62.30			39521	48.71		
		1	3	.060	Plain	RR	37453	60.42	37575	60.42	37393	46.47		
		1	3	.060	Weldon	RR	39597	62.30	39647	62.30	39522	48.71		
		1	3	.090	Plain	RR	37454	60.42			37394	46.47		
		1	3	.090	Weldon	RR	39705	62.30			96599	48.71		
		1	3	.120	Plain	RR	37455	60.42			37395	46.47		
		1	3	.120	Weldon	RR	39706	62.30			39621	48.71		
		1	3	Ball	Plain	RR	97922	64.74	34532	63.86	30961	55.31	30962	63.86
		1	4	Square	Plain	RL	62160	73.32			97332	60.67		
1/2	1/2	1	4	Ball	Plain	RL	37902	81.48			37896	68.45		
		1-1/2	6	Square	Plain	LX	31150	101.19			31147	87.33		
		1-1/2	6	Ball	Plain	LX	97846	110.66			31347	96.66		
		2	4	Square	Plain	LL	37735	72.49	37734	72.49	37732	60.67	37733	72.49
		2	4	Square	Weldon	LL	39169	75.35			96334	62.91		
		2	4	Ball	Plain	LL	37935	82.26	37934	82.26	37932	68.51		
		3	6	Square	Plain	XX	34135	100.88	34134	100.20	34132	87.33	34133	100.20
		3	6	Square	Weldon	XX	39176	102.91			39132	89.57		
		3	6	Ball	Plain	XX	30473	113.00	34334	112.22	34332	96.96		
		4	6	Square	Weldon	EX	39408	111.59			39400	98.24		
		1-1/4	3-1/2	Square	Plain	RR	30996	89.39	34436	88.19	30763	76.00	30764	88.19
9/16	9/16	1-1/4	3-1/2	Square	Weldon	RR	39792	91.78			39763	78.80		
		1-1/4	3-1/2	Ball	Plain	RR	30409	100.36			30963	86.76		
		3/4	3	Square	Plain	SS	39771	93.29			31525	78.33		
		1-1/4	3-1/2	Square	Plain	RR	30555	97.50	34440	96.30	30765	82.67	30766	96.30
		1-1/4	3-1/2	Square	Weldon	RR	39793	99.84	39784	98.70	39765	85.47	39766	98.70
		1-1/4	3-1/2	.030	Plain	RR	37458	107.28			37398	86.25		
		1-1/4	3-1/2	.030	Weldon	RR	39709	109.72			39524	89.05		
		1-1/4	3-1/2	.060	Plain	RR	37460	107.28			37400	86.25		
		1-1/4	3-1/2	.060	Weldon	RR	39544	109.72			39526	89.05		
		1-1/4	3-1/2	.090	Plain	RR	37461	107.28			37401	86.25		
		1-1/4	3-1/2	.090	Weldon	RR	39608	109.72			39527	89.05		
5/8	5/8	1-1/4	3-1/2	Ball	Plain	RR	30991	109.25	34540	108.00	30965	94.00		
		2	6	Square	Plain	LX	31130	146.80			90160	123.93		
		2	6	Ball	Plain	LX	37868	165.41			31350	141.48		
		2-1/4	5	Square	Plain	LL	30561	141.96	37742	140.87	37740	116.78	37741	140.87
		2-1/4	5	Square	Weldon	LL	39170	144.35			39740	119.58	39166	140.50
		2-1/4	5	Ball	Plain	LL	30486	166.35			37940	147.27		
		3	6	Square	Plain	XX	34143	146.38	34142	145.18	34140	123.93	34141	145.18
		3	6	Square	Weldon	XX	39177	148.77			39173	126.73	39141	144.82
		3	6	Ball	Plain	XX	30488	167.08			34340	141.91		
		4	6	Square	Weldon	EX	39409	164.22			39401	142.18		
11/16	3/4	1-1/2	4	Square	Plain	RR	31032	156.73			30767	131.33		
		1-1/2	4	Ball	Plain	RR	31050	180.70			30967	153.64		
		1	3	Square	Plain	SS	30435	133.74	31542	132.08	31527	111.87		
		1-1/2	4	Square	Plain	RR	98956	142.69	34448	141.02	30769	121.11	30770	141.02
		1-1/2	4	Square	Weldon	RR	39794	145.70	39785	144.09	39769	124.31	39770	144.09
3/4	3/4	1-1/2	4	.015	Plain	RR	37462	151.89			37402	124.41		
		1-1/2	4	.015	Weldon	RR	39711	154.65			39533	127.61		
		1-1/2	4	.020	Plain	RR	37463	151.89			37403	124.41		
		1-1/2	4	.020	Weldon	RR	39712	154.65			39534	127.61		

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** Superseded by AlTiN. Add TiN to any uncoated tool. See page 162.*

E14

Inch sizes

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	Standard						Obsolete*	
							AlTiN EDP Number	List Price	TiCN EDP Number	List Price	MG EDP Number	List Price	TiN EDP Number	List Price
3/4	3/4	1-1/2	4	.030	Plain	RR	37464	151.89			37404	124.41		
		1-1/2	4	.030	Weldon	RR	39603	154.65			39535	127.61		
		1-1/2	4	.045	Plain	RR	37465	151.89			37405	124.41		
		1-1/2	4	.045	Weldon	RR	39602	154.65			39536	127.61		
		1-1/2	4	.060	Plain	RR	37466	151.89			37406	124.41		
		1-1/2	4	.060	Weldon	RR	97575	154.65			39530	127.61		
		1-1/2	4	.090	Plain	RR	37467	151.89			37407	124.41		
		1-1/2	4	.090	Weldon	RR	39713	154.65			39531	127.61		
		1-1/2	4	.120	Plain	RR	37468	151.89			37408	124.41		
		1-1/2	4	.120	Weldon	RR	39714	154.65			39623	127.61		
		1-1/2	4	.125	Plain	RR	37469	151.89			37409	124.41		
		1-1/2	4	.125	Weldon	RR	39732	154.65			39532	127.61		
		1-1/2	4	Ball	Plain	RR	95757	156.31	34548	154.60	30969	137.96		
		2	6	Square	Plain	LX	31132	230.41			31126	192.80		
		2	6	Ball	Plain	LX	37869	266.55			31352	223.13		
		2-1/4	5	Square	Plain	LL	37751	186.21	37750	184.60	37748	155.56	37749	184.60
		2-1/4	5	Square	Weldon	LL	39171	188.34			39748	158.76	96874	181.38
		2-1/4	5	Ball	Plain	LL	37937	224.02			37948	202.21		
		3	6	Square	Plain	XX	34151	224.69	34150	223.03	34148	192.80	34149	223.03
		3	6	Square	Weldon	XX	39178	227.76			39148	196.00	96011	222.09
		3	6	Ball	Plain	XX	30474	256.78			34348	229.50		
		4	6-1/2	Square	Weldon	EX	39410	256.41			39402	224.60		
13/16	7/8	1-1/2	4	Square	Plain	RR	31034	222.35			30771	193.73		
7/8	7/8	1-1/2	4	Square	Plain	RR	30523	206.75	34456	204.78	30773	178.13		
		1-1/2	4	Square	Weldon	RR	39795	210.34			39773	181.73		
		1-1/2	4	Ball	Plain	RR	30527	248.09			30973	217.95		
15/16	1	1-1/2	4	Square	Plain	RR	31038	292.55			30775	258.67		
1	1	1-1/2	4	Square	Plain	RR	98957	215.02	34464	212.89	30777	187.78	30778	212.89
		1-1/2	4	Square	Weldon	RR	39796	218.61			39777	191.46		
		1-1/2	4	.030	Plain	RR	37472	242.89			37412	190.53		
		1-1/2	4	.030	Weldon	RR	39595	246.48			39539	194.21		
		1-1/2	4	.045	Plain	RR	37473	242.89			37413	190.53		
		1-1/2	4	.045	Weldon	RR	39718	246.48			39540	194.21		
		1-1/2	4	.060	Plain	RR	37474	242.89			37414	190.53		
		1-1/2	4	.060	Weldon	RR	39596	246.48			39541	194.21		
		1-1/2	4	.090	Plain	RR	37475	242.89			37415	190.53		
		1-1/2	4	.090	Weldon	RR	39719	246.48			39542	194.21		
		1-1/2	4	.120	Plain	RR	37476	242.89			37416	190.53		
		1-1/2	4	.120	Weldon	RR	39720	246.48			39692	194.21		
		1-1/2	4	.125	Plain	RR	37477	242.89			37417	190.53		
		1-1/2	4	.125	Weldon	RR	39606	246.48			39543	194.21		
		1-1/2	4	Ball	Plain	RR	30528	266.03			30977	237.62		
		2-1/4	5	Square	Plain	LL	37767	346.06	37766	343.98	37764	295.18		
		2-1/4	5	Square	Weldon	LL	39172	349.70			39964	298.86		
		2-1/4	5	Ball	Plain	LL	37967	416.21			37964	369.29		
		3	6	Square	Plain	XX	34167	373.36	34166	371.23	34164	329.11		
		3	6	Square	Weldon	XX	39365	376.95			96625	332.79		
		3	6	Ball	Plain	XX	30476	420.78			34364	382.06		
		4-1/8	7	Square	Weldon	EE	39411	488.20			39403	444.04	34094	480.81
1-1/8	1	2	4-1/2	Square	Weldon	RR	34087	545.38			39412	482.80		
1-1/4	1-1/4	2	4-1/2	Square	Plain	RR					31178	513.87		

Style Code Reference
EE—Extreme LOC, Extreme OAL
EX—Extreme LOC, X-Long OAL
LL—Long LOC, Long OAL
LX—Long LOC, X-Long OAL
RL—Regular LOC, Long OAL
RR—Regular LOC, Regular OAL
SS—Short LOC, Short OAL
XX—X-Long LOC, X-Long OAL

** Superseded by AlTiN. Add TiN to any uncoated tool. See page 162.*

Additional large diameter end mills available with 6-Flutes. Refer to series E16 on page 69.

GENERAL PURPOSE E14 END MILLS

For general milling applications

E14

Metric sizes

Metric E14 end mills with DIN 6535 HB (Weldon®) flats are available by request. See page 160 for modification charges.

Metric — Standard

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiN EDP Number	List Price	TiCN EDP Number	List Price	MG EDP Number	List Price
1	3	2	38	Square	Plain	SR	39722	13.70	32175	13.40	38788	11.01
		2	38	Ball	Plain	SR	39862	18.12			38881	15.96
		3	38	Square	Plain	RR	32202	13.93	32141	13.63	31471	11.24
		3	38	Ball	Plain	RR	39835	18.26			32641	16.10
1,5	3	3	38	Square	Plain	SR	39723	13.70	32177	13.40	38789	11.01
		3	38	Ball	Plain	SR	39863	17.74			38882	15.58
		4,5	38	Square	Plain	RR	32204	13.93	32142	13.63	31472	11.24
		4,5	38	Ball	Plain	RR	39836	17.18			32642	15.02
		6	38	Square	Plain	RR	30252	14.12			38607	11.43
		6	38	Ball	Plain	RR	62570	17.74			38617	15.58
2	3	4	38	Square	Plain	SR	39724	11.94	32178	11.82	38790	9.78
		4	38	Ball	Plain	SR	39864	13.73			38883	11.57
		6,3	38	Square	Plain	RR	32208	12.05	32143	11.93	31473	9.89
		6,3	38	Ball	Plain	RR	39838	13.85			32643	11.69
		9	38	Square	Plain	RR	30253	12.16	32101	12.04	38608	10.00
		9	38	Ball	Plain	RR	62571	15.05			38618	12.89
2,5	3	5	38	Square	Plain	SR	39725	11.49			38791	9.33
		5	38	Ball	Plain	SR	39867	13.12			38884	10.96
		9,5	38	Square	Plain	RR	32212	11.83			31474	9.67
		9,5	38	Ball	Plain	RR	39839	14.73			32644	12.57
3	3	6	38	Square	Plain	SR	39726	10.94			38792	8.78
		6	38	Ball	Plain	SR	39868	12.41			38885	10.25
		9	38	Square	Plain	RR	99284	11.16			36560	9.00
		12	38	Square	Plain	RR	32214	11.38	32145	11.26	31475	9.22
		12	38	0,3	Plain	RR	37478	16.88			37418	14.72
		12	38	Ball	Plain	RR	39841	14.00			32645	11.84
		19	57	Square	Plain	LL	39804	17.42			30125	14.22
		19	57	Ball	Plain	LL	39880	20.09			38894	16.89
		25	75	Square	Plain	XX	32301	23.26			30040	19.22
		25	75	Ball	Plain	XX	39892	26.65			32326	22.61
3,5	4	7	50	Square	Plain	SR	39728	15.80			38793	12.56
		14	50	Square	Plain	RR	32216	16.35			31476	13.11
		14	50	Ball	Plain	RR	39842	19.94			32646	16.70
4	4	8	50	Square	Plain	SR	39731	15.24			38794	12.00
		8	50	Ball	Plain	SR	39871	17.45			38887	14.21
		11	50	Square	Plain	RR	36585	15.80			36561	12.56
		11	50	0,4	Plain	RR	37479	21.02			37419	17.78
		14	50	Square	Plain	RR	32218	16.46	32147	16.26	31477	13.22
		14	50	Ball	Plain	RR	39843	19.18			32647	15.94
		19	63	Square	Plain	LL	39805	21.63			30126	17.67
		19	63	Ball	Plain	LL	39881	24.61			38895	20.65
		31	75	Square	Plain	XX	32302	25.01			30043	20.33
		31	75	Ball	Plain	XX	39893	28.56			32329	23.88
4,5	5	16	50	Square	Plain	RR	32222	17.88			31478	13.56
		16	50	Ball	Plain	RR	39844	21.53			32648	17.21
5	5	10	50	Square	Plain	SR	39736	18.21			38796	13.89
		10	50	Ball	Plain	SR	39873	20.87			38889	16.55
		13	50	Square	Plain	RR	36586	18.43			36563	14.11
		13	50	0,5	Plain	RR	37480	23.38			37420	19.06

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E14

Metric sizes

Metric • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	Standard AlTiN EDP Number	List Price	TiCN EDP Number	List Price	MG EDP Number	List Price
5	5	16	50	Square	Plain	RR	32224	18.76	32149	18.48	31479	14.44
		16	50	Ball	Plain	RR	39847	22.14			32649	17.82
		19	63	Square	Plain	LL	39806	25.17			30127	19.89
		19	63	Ball	Plain	LL	39882	29.20			38896	23.92
		31	100	Square	Plain	XX	32304	33.74			30135	25.78
		31	100	Ball	Plain	XX	39894	38.64			38897	30.68
6	6	12	54	Square	Plain	SS	36839	18.63			38834	14.31
		12	54	Ball	Plain	SS	37361	21.21			39441	16.89
		13	57	Square	Plain	RR	36587	19.12			36565	14.64
		13	57	0,3	Plain	RR	37481	23.80			37421	19.32
		13	57	0,5	Plain	RR	37482	23.80			37422	19.32
		19	63	Square	Plain	RR	32226	20.36	32150	20.08	31480	15.44
		19	63	Ball	Plain	RR	39848	23.88			32650	18.96
		29	75	Square	Plain	LL	39807	27.14			30049	21.42
		29	75	Ball	Plain	LL	39883	30.37			32335	24.65
		38	100	Square	Plain	XX	32306	34.17			30137	26.73
		38	100	Ball	Plain	XX	39895	38.75			38898	31.31
7	7	16	60	Square	Plain	RR	36588	25.78			36567	20.22
	8	19	63	Square	Plain	RR	32227	29.00	32151	28.64	31481	23.04
		19	63	Ball	Plain	RR	39849	34.00			32651	28.04
8	8	14	58	Square	Plain	SS	36849	26.14			38835	20.58
		14	58	Ball	Plain	SS	37362	32.77			39442	27.21
		19	63	Square	Plain	RR	36589	27.52			36569	21.56
		19	63	0,5	Plain	RR	37483	31.92			37423	25.96
		19	63	1,0	Plain	RR	37484	31.92			37424	25.96
		19	63	1,5	Plain	RR	37485	31.92			37425	25.96
		20	63	Square	Plain	RR	32228	29.69	32152	29.33	31482	23.73
		20	63	Ball	Plain	RR	39850	33.73			32652	27.77
		29	75	Square	Plain	LL	39808	37.96			30052	31.04
		29	75	Ball	Plain	LL	39884	42.52			32338	35.60
		41	100	Square	Plain	XX	32308	45.67			30138	36.71
		41	100	Ball	Plain	XX	39896	52.15			38899	43.19
9	9	19	67	Square	Plain	RR	36590	40.12			36571	27.04
	10	22	72	Square	Plain	RR	32229	43.32			31483	32.56
		22	72	Ball	Plain	RR	39851	48.17			32653	37.41
10	10	16	66	Square	Plain	SS	36848	39.89			38836	29.89
		16	66	Ball	Plain	SS	37364	44.45			39443	34.45
		22	72	Square	Plain	RR	36591	41.76			36573	31.00
		22	72	0,5	Plain	RR	37486	45.88			37426	35.12
		22	72	1,0	Plain	RR	37487	45.88			37427	35.12
		22	72	1,5	Plain	RR	37488	45.88			37428	35.12
		25	72	Square	Plain	RR	32230	44.27	32154	43.63	31484	33.51
		25	72	Ball	Plain	RR	39852	49.26			32654	38.50
		25	100	Square	Plain	RX	31891	60.18			31279	45.82
		25	100	Ball	Plain	RX	37296	68.98			37244	54.62
		40	88	Square	Plain	LL	36838	53.57			30079	40.73
		40	88	Ball	Plain	LL	37366	58.93			39444	46.09
		45	100	Square	Plain	XX	32310	61.36			30055	47.00
		45	100	Ball	Plain	XX	39897	67.79			32341	53.43
11	11	26	83	Square	Plain	RR	36592	50.40			36574	40.40

Style Code Reference
LL—Long LOC, Long OAL
RR—Regular LOC, Regular OAL
RX—Regular LOC, X-Long OAL
SR—Short LOC, Regular OAL
SS—Short LOC, Short OAL
XX—X-Long LOC, X-Long OAL

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E14

Metric sizes

Metric E14 end mills with DIN 6535 HB (Weldon®) flats are available by request. See page 160 for modification charges.

Metric • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	Standard AlTiN EDP Number	Standard List Price	TiCN EDP Number	TiCN List Price	MG EDP Number	MG List Price
12	12	19	73	Square	Plain	SS	36847	51.64			38837	41.64
		25	76	Square	Plain	RR	32231	55.03	32155	54.43	31485	44.71
		25	76	Ball	Plain	RR	39853	61.70			32655	51.38
		26	83	Square	Plain	RR	36593	53.94			36575	42.78
		26	83	0,5	Plain	RR	37489	57.52			37429	46.36
		26	83	1,0	Plain	RR	37490	57.52			37430	46.36
		26	83	1,5	Plain	RR	37491	57.52			37431	46.36
		26	83	Ball	Plain	RR	37344	60.63			39446	49.47
		50	100	Square	Plain	LL	39810	73.01			30058	59.89
		50	100	Ball	Plain	LL	39886	80.30			32344	67.18
		75	150	Square	Plain	XX	32312	105.29			30061	86.33
		75	150	Ball	Plain	XX	39898	122.58			32347	103.62
14	14	26	83	Square	Plain	RR	36594	88.41			36577	75.33
		32	83	Square	Plain	RR	32232	92.21			34445	79.13
		32	83	Ball	Plain	RR	39854	102.46			34567	89.38
		57	125	Square	Plain	LL	39811	119.61			30129	100.89
		75	150	Square	Plain	XX	32314	138.97			30064	116.89
16	16	25	82	Square	Plain	SS	39751	96.08			38802	83.00
		32	89	Square	Plain	RR	32234	102.77			31487	88.73
		32	89	Ball	Plain	RR	39865	115.93			32657	101.89
		32	92	Square	Plain	RR	36595	101.28			36579	86.84
		32	92	0,5	Plain	RR	37492	104.86			37432	90.42
		32	92	1,0	Plain	RR	37493	104.86			37433	90.42
		32	92	1,5	Plain	RR	37494	104.86			37434	90.42
		32	92	2,0	Plain	RR	37495	104.86			37435	90.42
		57	125	Square	Plain	LL	39812	145.54			30131	126.62
		57	125	Ball	Plain	LL	39888	170.89			39087	151.97
		75	150	Square	Plain	XX	32318	156.43			30067	134.11
18	18	32	92	Square	Plain	RR	36596	133.96			36580	120.04
		38	100	Square	Plain	RR	32235	147.00			31488	132.04
		38	100	Ball	Plain	RR	39857	165.17			32658	150.21
		57	125	Square	Plain	LL	39813	179.78			30132	161.62
		75	150	Square	Plain	XX	32322	206.44			30070	185.04
20	20	38	100	Square	Plain	RR	32237	178.27			31489	156.71
		38	104	Square	Plain	RR	36597	171.59			36581	149.27
		38	104	0,5	Plain	RR	37496	174.89			37436	152.57
		38	104	1,0	Plain	RR	37497	174.89			37437	152.57
		38	104	1,5	Plain	RR	37498	174.89			37438	152.57
		38	104	2,0	Plain	RR	37499	174.89			37439	152.57
		38	104	Ball	Plain	RR	32672	213.73			32671	192.17
		57	125	Square	Plain	LL	39814	207.82			30133	181.62
		57	125	Ball	Plain	LL	39890	244.13			39090	217.93
		75	150	Square	Plain	XX	32324	248.53			30073	217.69
22	22	38	100	Square	Plain	RR	30255	215.78			31402	195.70
25	25	38	100	Square	Plain	SS	32238	220.58			31490	200.50
		45	120	Square	Plain	RR	36899	284.21			36582	260.73
		45	120	Ball	Plain	RR	37252	265.06			39448	241.58
		57	125	Square	Plain	LL	39815	349.23			30134	324.87
		75	150	Square	Plain	XX	32325	355.62			30076	327.02

Style Code Reference
LL—Long LOC, Long OAL
RR—Regular LOC, Regular OAL
SS—Short LOC, Short OAL
XX—X-Long LOC, X-Long OAL

Application Guide • Speed & Feed

Work Material	Type of Cut	Axial DOC	Radial DOC	Speed (SFM) MG	TiCN	AlTiN	Feed (Inches per Tooth) 1/8	1/4	3/8	1/2	5/8	3/4	1
Composites, Plastics	Slot	.5 x D	1 x D	300	350	350	.0008	.0015	.0022	.0030	.0037	.0047	.0060
	Rough	1 x D	.5 x D	375	450	450	.0009	.0018	.0027	.0035	.0045	.0055	.0070
	Finish	1.5 x D	.01 x D	450	650	650	.0009	.0018	.0027	.0035	.0045	.0055	.0070
Graphite	Slot	.5 x D	1 x D	350	400	450	.0008	.0015	.0023	.0030	.0037	.0045	.0060
	Rough	1 x D	.5 x D	425	475	525	.0009	.0017	.0026	.0035	.0043	.0053	.0070
	Finish	1.5 x D	.01 x D	500	550	600	.0010	.0019	.0028	.0038	.0047	.0057	.0076
Cast Iron - Gray	Slot	.5 x D	1 x D	200	350	350	.0004	.0007	.0011	.0015	.0019	.0023	.0030
	Rough	1 x D	.5 x D	250	400	400	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Finish	1.5 x D	.01 x D	300	450	450	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Cast Iron - Ductile	Slot	.5 x D	1 x D	200	250	250	.0004	.0007	.0011	.0015	.0018	.0023	.0030
	Rough	1 x D	.5 x D	250	275	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Finish	1.5 x D	.01 x D	275	325	325	.0006	.0012	.0018	.0023	.0028	.0034	.0046
Low Carbon Steel ≤ 38 HRc 1018, 12L14, 8620	Slot	.5 x D	1 x D	250	275	300	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Rough	1 x D	.5 x D	275	300	325	.0006	.0012	.0018	.0025	.0031	.0037	.0050
	Finish	1.5 x D	.01 x D	300	325	350	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Medium Carbon Steels ≤ 38 HRc 4140, 4340	Slot	.5 x D	1 x D	225	250	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Rough	1 x D	.5 x D	250	275	300	.0006	.0012	.0018	.0025	.0031	.0037	.0050
	Finish	1.5 x D	.01 x D	275	300	325	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Tool & Die Steels ≤ 38 HRc A2, D2, H13, P20	Slot	.5 x D	1 x D	225	250	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Rough	1 x D	.5 x D	250	275	300	.0006	.0012	.0018	.0025	.0031	.0037	.0050
	Finish	1.5 x D	.01 x D	275	300	325	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Tool & Die Steels 39 - 48 HRc A2, D2, H13, P20	Slot	.25 x D	1 x D	175	200	225	.0002	.0005	.0007	.0010	.0012	.0015	.0020
	Rough	1 x D	.25 x D	200	225	250	.0003	.0007	.0011	.0015	.0019	.0022	.0030
	Finish	1.5 x D	.01 x D	225	250	275	.0004	.0009	.0014	.0018	.0023	.0027	.0036
Easy to Machine Stainless Steel 416, 410, 302, 303	Slot	.5 x D	1 x D	200	250	250	.0003	.0007	.0011	.0015	.0019	.0023	.0030
	Rough	1 x D	.5 x D	250	275	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Finish	1.5 x D	.01 x D	300	325	325	.0006	.0012	.0018	.0025	.0031	.0038	.0050
Moderate Machining Stainless Steels 304, 316, Invar, Kovar	Slot	.5 x D	1 x D	200	225	250	.0003	.0005	.0008	.0010	.0012	.0015	.0020
	Rough	1 x D	.5 x D	250	275	300	.0003	.0007	.0011	.0015	.0019	.0022	.0030
	Finish	1.5 x D	.01 x D	300	325	350	.0004	.0009	.0014	.0018	.0023	.0027	.0036

Work Material	Speed (m/min) MG	TiCN	AlTiN	Feed (mm per Tooth) 3,0	6,0	9,0	12,0	16,0	19,0	25,0
Composites, Plastics	91	107	107	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	114	137	137	.0229	.0457	.0686	.0889	.1143	.1397	.1778
	137	198	198	.0229	.0457	.0686	.0889	.1143	.1397	.1778
Graphite	107	122	137	.0203	.0381	.0584	.0762	.0940	.1143	.1524
	130	145	160	.0229	.0432	.0660	.0889	.1092	.1346	.1778
	152	168	183	.0254	.0483	.0711	.0965	.1194	.1448	.1930
Cast Iron - Gray	61	107	107	.0102	.0178	.0279	.0381	.0483	.0584	.0762
	76	122	122	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	91	137	137	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Cast Iron - Ductile	61	76	76	.0102	.0178	.0279	.0381	.0457	.0584	.0762
	76	84	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	84	99	99	.0152	.0305	.0457	.0584	.0711	.0864	.1168
Low Carbon Steel ≤ 38 HRc 1018, 12L14, 8620	76	84	91	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	84	91	99	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	91	99	107	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Medium Carbon Steels ≤ 38 HRc 4140, 4340	69	76	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	76	84	91	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	84	91	99	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Tool & Die Steels ≤ 38 HRc A2, D2, H13, P20	69	76	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	76	84	91	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	84	91	99	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Tool & Die Steels 39 - 48 HRc A2, D2, H13, P20	53	61	69	.0051	.0127	.0178	.0254	.0305	.0381	.0508
	61	69	76	.0076	.0178	.0279	.0381	.0483	.0559	.0762
	69	76	84	.0102	.0229	.0356	.0457	.0584	.0686	.0914
Easy to Machine Stainless Steel 416, 410, 302, 303	61	76	76	.0076	.0178	.0279	.0381	.0483	.0584	.0762
	76	84	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	91	99	99	.0152	.0305	.0457	.0635	.0787	.0965	.1270
Moderate Machining Stainless Steels 304, 316, Invar, Kovar	61	69	76	.0064	.0127	.0191	.0254	.0305	.0381	.0508
	76	84	91	.0076	.0178	.0279	.0381	.0483	.0559	.0762
	91	99	107	.0102	.0229	.0356	.0457	.0584	.0686	.0914

D = tool diameter Reduce feed rates by 20% when using long length tools Starting parameters shown

4 Helical Flutes

For profiling, slotting, & contouring

E24

E24 • Square

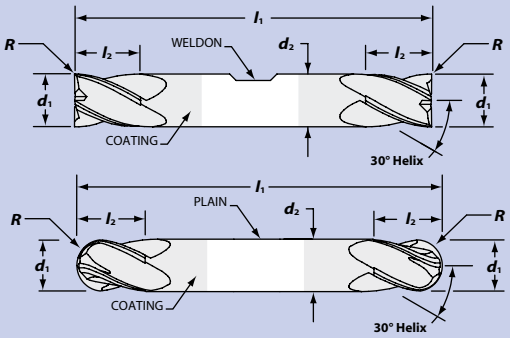
E24B • Ball

- Center cutting
- Designed for minimal tool deflection
- Available in stub and standard length
- Double ended for extra value

Coatings:

- AlTiN
- TiCN
- TIN
- None (MG)

Any PVD coating may be applied to an uncoated tool in this series. See page 162 for coating options.



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

	AlTiN Spector	TiCN Accelerator	MG Uncoated	TiN auCARB
Carbon & tool steels ≤ 48 HRC	✓✓✓	✓✓	✓	✓
Carbon & tool steels > 48 HRC	✓✓✓	✓✓	✓	✓
Stainless steels	✓✓	✓		✓
Cast irons	✓✓✓	✓✓	✓	✓

✓ Suitable ✓✓ Good ✓✓✓ Recommended

Inch

							Standard						Obsolete*	
d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiN EDP Number	List Price	TiCN EDP Number	List Price	MG EDP Number	List Price	TiN EDP Number	List Price
1/32	1/8	1/16	1-1/2	Square	Plain	SR	30410	22.31	31962	22.78	31930	19.91		
		1/16	1-1/2	Ball	Plain	SR	32083	27.61			32125	24.02		
3/64	1/8	3/32	1-1/2	Square	Plain	SR	31900	22.31	31963	22.78	31931	19.91		
		3/32	1-1/2	Ball	Plain	SR	32182	27.61			32127	24.02		
1/16	1/8	1/8	1-1/2	Square	Plain	SR	31985	17.63	31964	18.10	31903	15.04		
		1/8	1-1/2	Ball	Plain	SR	32181	20.80			32103	18.62		
		3/16	2	Square	Plain	RL					33378	22.80		
		3/16	2	Ball	Plain	RL					33578	27.31		
5/64	1/8	1/8	1-1/2	Square	Plain	SR	31949	17.63	31965	18.10	31932	15.04		
		1/8	1-1/2	Ball	Plain	SR	32085	21.42			32129	18.96		
3/32	1/8	3/16	1-1/2	Square	Plain	SR	31927	17.63	31966	18.10	31905	15.04		
		3/16	1-1/2	Ball	Plain	SR	32086	20.80			32105	18.62		
		9/32	2	Square	Plain	RL					33379	22.80		
		9/32	2	Ball	Plain	RL					33579	27.31		
7/64	1/8	3/16	1-1/2	Square	Plain	SR	31957	17.63	31967	18.10	31933	15.04		
		3/16	1-1/2	Ball	Plain	SR	32087	21.42			32131	18.96		
1/8	1/8	1/4	1-1/2	Square	Plain	SR	99125	15.55	31968	15.76	31907	12.64	31908	15.76
		1/4	1-1/2	Ball	Plain	SR	32139	17.94	32168	18.10	32107	15.64		
		3/8	2	Square	Plain	RL					33380	17.09		
		3/8	2	Ball	Plain	RL					33580	20.49		
	3/8	3/8	3-1/16	Square	Weldon	RL	32898	39.26			32705	36.98		

continued on next page

** Superseded by AlTiN. Add TiN to any uncoated tool. See page 162.*

GENERAL PURPOSE E24 END MILLS

For general milling applications

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	Standard: AlTiN EDP Number	Standard: AlTiN List Price	Standard: TiCN EDP Number	Standard: TiCN List Price	Standard: MG EDP Number	Standard: MG List Price	Obsolete*: TiN EDP Number	Obsolete*: TiN List Price
9/64	3/16	5/16	2	Square	Plain	SR	31926	23.40	31969	23.87	31934	19.96		
		5/16	2	Ball	Plain	SR	32089	27.61			32133	25.42		
5/32	3/16	5/16	2	Square	Plain	SR	31995	23.40	31970	23.87	31909	19.96		
		5/16	2	Ball	Plain	SR	32090	27.61			32109	23.71		
		7/16	2-1/2	Square	Plain	RL					33381	24.67		
	3/8	7/16	3-1/8	Square	Weldon	RL					32707	39.16		
11/64	3/16	5/16	2	Square	Plain	SR	31958	23.40			31935	19.96		
3/16	3/16	3/8	2	Square	Plain	SR	99331	22.41	31972	22.52	31911	18.51	31912	22.52
		3/8	2	Ball	Plain	SR	32138	26.05	32172	26.16	32111	22.27		
		1/2	2-1/2	Square	Plain	RL					33382	20.64		
		1/2	2-1/2	Ball	Plain	RL					33582	24.22		
	3/8	1/2	3-1/4	Square	Weldon	RL	98965	43.99			32709	40.64		
7/32	1/4	1/2	2-1/2	Square	Plain	SR	31959	30.68	31974	30.99	31913	24.47		
		1/2	2-1/2	Ball	Plain	SR	32091	35.67			32113	29.24		
	3/8	9/16	3-3/8	Square	Weldon	RL					32711	40.91		
1/4	1/4	1/2	2-1/2	Square	Plain	SR	31990	29.74	31976	30.47	31915	23.51	31916	30.47
		1/2	2-1/2	Ball	Plain	SR	32137	34.32	32176	35.26	32115	28.13		
		5/8	3	Square	Plain	RL					33384	26.44		
		5/8	3	Ball	Plain	RL					33584	30.40		
	3/8	5/8	3-3/8	Square	Weldon	RL	33201	46.90			32713	40.91		
5/16	5/16	1/2	2-1/2	Square	Plain	SR	31991	39.36	31980	40.25	31917	30.33	31918	40.25
		1/2	2-1/2	Ball	Plain	SR	32140	44.93	32180	45.92	32117	36.49		
		3/4	3	Square	Plain	RL					33385	32.67		
	3/8	3/4	3-1/2	Square	Weldon	RL	33225	55.85			32717	47.00		
3/8	3/8	9/16	2-1/2	Square	Plain	SR	31929	40.77	31984	41.96	31919	31.27	31920	41.96
		9/16	2-1/2	Ball	Plain	SR	32200	46.64	32184	48.00	32119	37.62		
		3/4	3-1/2	Square	Plain	RL					33386	42.20		
		3/4	3-1/2	Square	Weldon	RL	33227	53.46			32721	47.00		
		3/4	3-1/2	Ball	Plain	RL					33586	50.36		
1/2	1/2	5/8	3	Square	Plain	SR	31998	66.30	31992	67.86	31923	53.53	31924	67.86
		5/8	3	Ball	Plain	SR	32201	76.28			32123	64.18		
		1	4	Square	Plain	RL					33388	67.38		
		1	4	Square	Weldon	RL	33229	81.02			32725	69.84		
		1	4	Ball	Plain	RL					33588	77.53		
5/8	5/8	1-1/2	6	Square	Weldon	RX					32729	167.53		
3/4	3/4	1-1/2	6	Square	Weldon	RX					32731	230.87		

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	Standard: AlTiN EDP Number	Standard: AlTiN List Price	Standard: TiCN EDP Number	Standard: TiCN List Price	Standard: MG EDP Number	Standard: MG List Price	Obsolete*: TiN EDP Number	Obsolete*: TiN List Price
2	3	3	38	Square	Plain	SR	62374	19.34			30580	17.18		
3	3	6	38	Square	Plain	SR	62376	18.16			30582	16.00		
4	4	8	50	Square	Plain	SR	62378	26.04			30584	22.80		
5	5	10	50	Square	Plain	SR	62380	28.39			30586	24.07		
6	6	12	63	Square	Plain	SR	62381	34.43			30587	29.51		
8	8	12	63	Square	Plain	SR	62382	47.07			30588	41.11		
10	10	14	72	Square	Plain	SR	62383	68.63			30589	57.87		
12	12	16	76	Square	Plain	SR	62384	78.28			30590	67.96		

Style Code Reference
RL—Regular LOC, Long OAL
RR—Regular LOC, Regular OAL
SR—Short LOC, Regular OAL

** Superseded by AlTiN. Add TiN to any uncoated tool. See page 162.*

PROFILE

Bill Kerr

IMCO Sales Representative

Western Michigan

Bill Kerr comes by his expertise in tooling and machining honestly. Before becoming a manufacturer's representative 13 years ago (he's based in Rockford, Michigan), Bill spent a number of years as a machinist for an aerospace manufacturer.

One of Bill's customers, Steeplechase Tool in Lakeview, Michigan, was spending $8,000 or more a month on uncoated carbide tools and needed to cut costs. After relentlessly pushing for lower prices, Bill stood firm.

"I'm not going to sell you uncoated carbide tools," Bill said. "You're doing your shop a disservice using an inferior product."

"I'd been telling him, 'You need to use coated carbide end mills,'" Bill said. But Steeplechase's Mike Garvey just kept replying, "Yeah, yeah, yeah. You guys keep telling me that."

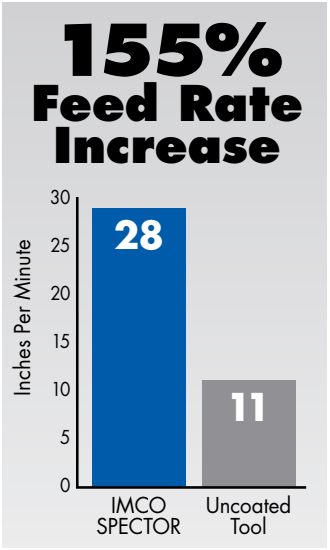
"Are you using uncoated carbide inserts?" Bill asked. When Garvey said, "No," Bill asked, "Well, then why are you using uncoated carbide tools?"

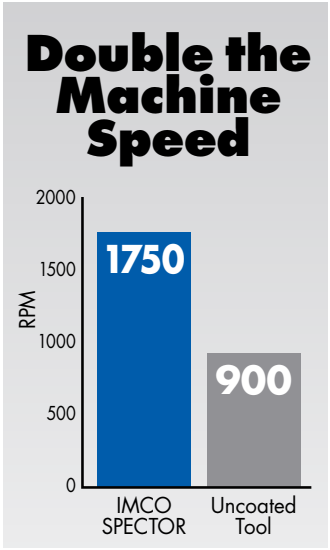
Finally, Garvey agreed to test IMCO SPECTOR® cutting tools against his uncoated tool – same size, same number of flutes, same width and depth of cut.

The results:

Garvey was able to run the machine at nearly double the rpm, got a 155% increase in feed rate and the SPECTOR tool lasted two to three times longer.

Today, Garvey buys IMCO carbide end mills exclusively. And because they had such great results with IMCO SPECTOR tools, when Steeplechase got its first job cutting aluminum for the military, Garvey tested IMCO STREAKERS.® He's very happy with the results.





Pictured are, from left, Steeplechase Tool Plant Manager Mike Garvey, President Mick Baird and IMCO Representative Bill Kerr.

3-FLUTE END MILLS

E13

3 Helical Flutes

For profiling, slotting, & contouring

E13 • Radius

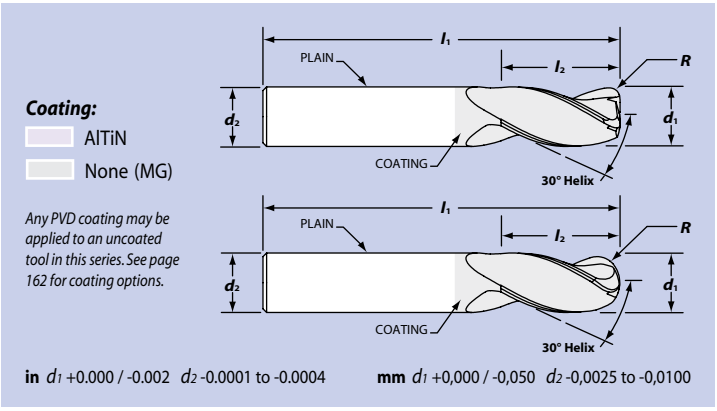
E13 • Square

E13B • Ball

A good compromise between the high flute volume of 2-flute and strength of a 4-flute end mill

	AlTiN Spector	MG Uncoated
Carbon & tool steels ≤ 48 HRC	✓✓	✓
Stainless steels	✓✓✓	
Cast irons	✓✓	✓
Aluminum and non-ferrous	✓	✓

✓ Suitable ✓✓ Good ✓✓✓ Recommended



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

End designs

- Wide variety of corner radii available
- Square end for general machining and finishing
- Ball nose styles for contouring
- Center cutting

Shank designs

- Precision shanks fit all collets and most shrink-fit systems

Multiple lengths

- Long, extra long and extreme lengths for deep cavity milling
- Stub length for extra rigidity

Inch — Standard

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Style Code	AlTiN EDP Number	List Price	MG EDP Number	List Price
1/32	1/8	1/16	1-1/2	Square	SR	34095	13.93	34697	11.24
		3/32	1-1/2	Square	RR	33801	14.02	33802	11.33
		3/32	1-1/2	Ball	RR	62053	16.85	33865	14.16
3/64	1/8	3/32	1-1/2	Square	SR	34096	13.70	34700	11.01
		9/64	1-1/2	Square	RR	33819	14.02	33803	11.33
		9/64	1-1/2	Ball	RR	62054	16.85	33867	14.16
1/16	1/8	1/8	1-1/2	Square	SR	34057	12.53	33773	10.13
		1/8	1-1/2	Ball	SR	62063	15.34	33834	12.75
		3/16	1-1/2	Square	RR	33826	12.69	33804	10.22
		3/16	1-1/2	Ball	RR	62055	15.55	33868	12.80
3/32	1/8	3/16	1-1/2	Square	SR	34011	12.12	33774	9.71
		3/16	1-1/2	Ball	SR	62064	14.61	33835	12.02
		3/8	1-1/2	Square	RR	33827	12.27	33806	9.78
		3/8	1-1/2	Ball	RR	62056	14.82	33869	12.20
1/8	1/8	1/4	1-1/2	Square	SR	33800	11.18	33775	8.78
		1/4	1-1/2	Ball	SR	62065	13.73	33836	11.15
		1/2	1-1/2	Square	RR	33810	11.23	33808	9.00
		1/2	1-1/2	Ball	RR	62057	13.83	33844	11.46

continued on next page

GENERAL PURPOSE E13 END MILLS

For general milling applications

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Style Code	Standard AlTiN EDP Number	List Price	MG EDP Number	List Price
1/8	1/8	3/4	2-1/4	Square	LL	33911	16.43	33782	14.22
		3/4	2-1/4	Ball	LL	62070	20.07	33889	17.02
		1	3	Square	XX	34046	22.26	33791	19.33
		1	3	Ball	XX	62079	27.09	33899	23.17
5/32	3/16	9/16	2	Square	RR	33814	16.59	33811	13.44
3/16	3/16	3/8	2	Square	SR	34058	14.92	33776	12.11
		3/8	2	Ball	SR	62066	17.58	33837	14.56
		5/8	2	Square	RR	33850	15.50	33812	12.67
		5/8	2	Ball	RR	62058	18.10	33845	15.08
		3/4	2-1/2	Square	LL	33913	22.26	33783	18.22
		3/4	2-1/2	Ball	LL	62071	23.97	33890	21.80
		1-1/8	3	Square	XX	34047	25.69	33792	22.00
		1-1/8	3	Ball	XX	62080	30.32	33900	26.35
7/32	1/4	5/8	2-1/2	Square	RR	33851	21.06	33818	16.78
1/4	1/4	1/2	2	Square	SS	34059	18.98	33777	14.22
		1/2	2	Ball	SS	62067	20.07	33838	17.11
		3/4	2-1/2	Square	RR	33852	18.93	33816	14.89
		3/4	2-1/2	Ball	RR	62059	23.76	33846	19.45
		1-1/8	3	Square	LL	33929	27.61	33784	22.44
		1-1/8	3	Ball	LL	62072	34.42	33891	28.97
		1-1/2	4	Square	XX	34051	33.59	33793	27.33
		1-1/2	4	Ball	XX	62081	39.42	33901	32.52
5/16	5/16	1/2	2	Square	SS	34060	26.26	33778	19.42
		13/16	2-1/2	Square	RR	33853	26.99	33820	21.04
		1-5/8	4	Square	XX	34097	43.00	33794	35.56
3/8	3/8	5/8	2	Square	SS	34061	31.62	33779	24.22
		5/8	2	Ball	SS	62068	34.06	33839	28.53
		1	2-1/2	Square	RR	33854	32.50	33824	26.22
		1	2-1/2	Ball	RR	99776	37.96	33847	31.39
		1-1/8	3	Square	LL	33931	43.37	33786	34.89
		1-1/8	3	Ball	LL	62074	51.38	33893	44.23
		1-3/4	4	Square	XX	34052	49.14	33795	40.82
		1-3/4	4	Ball	XX	62083	58.66	33903	48.39
7/16	7/16	1	2-3/4	Square	RR	30422	42.38	33863	33.89
1/2	1/2	5/8	2-1/2	Square	SS	34063	50.18	33781	40.84
		5/8	2-1/2	Ball	SS	62069	53.46	33843	48.00
		1	3	Square	RR	90089	51.95	33832	42.89
		1	3	Ball	RR	62060	64.74	33861	55.31
		2	4	Square	LL	33955	72.49	33787	60.67
		2	4	Ball	LL	62075	82.26	33894	68.51
		3	6	Square	XX	34053	100.88	33796	87.33
		3	6	Ball	XX	62084	113.00	33904	96.96
5/8	5/8	1-1/4	3-1/2	Square	RR	33855	97.50	33840	82.67
		2-1/4	5	Square	LL	34068	141.96	33788	116.78
		3	6	Square	XX	34054	146.38	33797	123.93
3/4	3/4	1-1/2	4	Square	RR	33856	142.69	33848	121.11
		2-1/4	5	Square	LL	34069	186.21	33789	155.56
		3	6	Square	XX	34055	224.69	33798	192.80

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Style Code	Standard AlTiN EDP Number	List Price	MG EDP Number	List Price
1	3	2	38	Square	SR	30897	13.70	38849	11.01
		3	38	Square	RR	62456	13.93	31451	11.24
		3	38	Ball	RR	62460	18.26	32571	16.10
1,5	3	3	38	Square	SR	62272	13.70	38850	11.01
		3	38	Ball	SR	62689	17.74	39057	15.58
		4,5	38	Square	RR	62457	13.93	31452	11.24
		4,5	38	Ball	RR	62461	17.18	32572	15.02
		6	38	Square	RR	37012	13.70	38605	11.01
		6	38	Ball	RR	62601	17.74	38614	15.58
2	3	4	38	Square	SR	62273	11.94	38851	9.78
		4	38	Ball	SR	62690	13.73	39058	11.57
		6,3	38	Square	RR	62458	12.05	31453	9.89
		6,3	38	Ball	RR	62462	13.85	32573	11.69
		9	38	Square	RR	37014	12.16	38606	10.00
		9	38	Ball	RR	62602	15.05	38615	12.89
2,5	3	5	38	Square	SR	62274	11.49	38852	9.33
		9,5	38	Square	RR	37016	11.83	31454	9.67
3	3	6	38	Square	SR	62275	10.94	38853	8.78
		6	38	Ball	SR	62692	12.41	39060	10.25
		9	38	Square	RR	99801	11.16	36732	9.00
		12	38	Square	RR	30247	11.38	31455	9.22
		12	38	0,3	RR	36951	16.88	36785	14.72
		12	38	Ball	RR	62604	14.00	32575	11.84
		12	75	Square	RX	33374	22.71	31280	18.67
		12	75	Ball	RX	37290	26.03	37238	21.99
		19	57	Square	LL	62260	17.42	30139	14.22
		19	57	Ball	LL	62637	20.09	39095	16.89
		25	75	Square	XX	62170	23.26	31631	19.22
		25	75	Ball	XX	62661	26.65	32761	22.61
3,5	4	14	50	Square	RR	37018	16.35	31456	13.11
4	4	8	50	Square	SR	62277	15.24	38855	12.00
		8	50	Ball	SR	62694	17.45	39062	14.21
		11	50	Square	RR	36771	15.80	36734	12.56
		11	50	0,4	RR	36952	21.02	36786	17.78
		14	50	Square	RR	37020	16.46	31457	13.22
		14	50	Ball	RR	62606	19.18	32577	15.94
		19	63	Square	LL	62261	21.63	30140	17.67
		19	63	Ball	LL	62638	24.61	39096	20.65
		31	75	Square	XX	62171	25.01	31632	20.33
		31	75	Ball	XX	62662	28.56	32762	23.88
4,5	5	16	50	Square	RR	37022	17.88	31458	13.56

continued on next page

Style Code Reference
LL—Long LOC, Long OAL
RR—Regular LOC, Regular OAL
RX—Regular LOC, X-Long OAL
SR—Short LOC, Regular OAL
SS—Short LOC, Short OAL
XX—X-Long LOC, X-Long OAL

E13 end mills with Weldon® flats are available by request.
See page 160 for modification charges.

GENERAL PURPOSE E13 END MILLS

For general milling applications

Metric • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Style Code	Standard AlTiN EDP Number	List Price	MG EDP Number	List Price
5	5	10	50	Square	SR	62279	18.21	38858	13.89
		10	50	Ball	SR	62696	20.87	39064	16.55
		13	50	Square	RR	36772	18.43	36736	14.11
		13	50	0,5	RR	36953	23.38	36787	19.06
		16	50	Square	RR	37024	18.76	31459	14.44
		16	50	Ball	RR	62608	22.14	32579	17.82
		19	63	Square	LL	62262	25.17	30141	19.89
		19	63	Ball	LL	62639	29.20	39097	23.92
		31	100	Square	XX	62172	33.74	30150	25.78
		31	100	Ball	XX	62663	38.64	39110	30.68
6	6	12	54	Square	SS	36949	18.63	38841	14.31
		12	54	Ball	SS	37500	21.21	39459	16.89
		13	57	Square	RR	36773	19.12	36738	14.64
		13	57	0,3	RR	36954	23.80	36788	19.32
		13	57	0,5	RR	36955	23.80	36789	19.32
		19	63	Square	RR	37026	20.36	31460	15.44
		19	63	Ball	RR	32591	23.88	32580	18.96
		29	75	Square	LL	62263	27.14	31634	21.42
		29	75	Ball	LL	62640	30.37	32764	24.65
		38	100	Square	XX	62173	34.17	30151	26.73
		38	100	Ball	XX	62664	38.75	39111	31.31
7	7	16	60	Square	RR	36774	25.78	36740	20.22
8	8	14	58	Square	SS	37168	26.14	38842	20.58
		19	63	Square	RR	36775	27.52	36742	21.56
		19	63	0,5	RR	36956	31.92	36790	25.96
		19	63	1,0	RR	36957	31.92	36791	25.96
		19	63	1,5	RR	36958	31.92	36792	25.96
		20	63	Square	RR	37028	29.69	31462	23.73
		20	63	Ball	RR	32592	33.73	32582	27.77
		29	75	Square	LL	62264	37.96	31635	31.04
		29	75	Ball	LL	62641	42.52	32765	35.60
		41	100	Square	XX	62174	45.67	30152	36.71
		41	100	Ball	XX	62665	52.15	39113	43.19
9	9	19	67	Square	RR	36776	40.12	36744	27.04
	10	22	72	Square	RR	37030	43.32	31463	32.56
10	10	16	66	Square	SS	37172	39.89	38843	29.89
		16	66	Ball	SS	37376	44.45	39461	34.45
		22	72	Square	RR	36777	41.76	36746	31.00
		22	72	0,5	RR	36959	45.88	36793	35.12
		22	72	1,0	RR	36960	45.88	36794	35.12
		22	72	1,5	RR	36961	45.88	36795	35.12
		25	72	Square	RR	37031	44.27	31464	33.51
		25	72	Ball	RR	32593	49.26	32584	38.50
		25	100	Square	RX	33373	60.18	31286	45.82
		25	100	Ball	RX	37372	68.98	37272	54.62
		40	88	Square	LL	37166	53.57	31644	40.73
		40	88	Ball	LL	37374	58.93	39462	46.09
		45	100	Square	XX	62175	61.36	31636	47.00
		45	100	Ball	XX	62666	67.79	32766	53.43

continued in next column

Metric • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Style Code	Standard AlTiN EDP Number	List Price	MG EDP Number	List Price
11	11	26	83	Square	RR	36778	50.40	36747	40.40
12	12	19	73	Square	SS	37164	51.64	38844	41.64
		19	73	Ball	SS	37378	53.54	39463	43.54
		25	76	Square	RR	37034	55.03	31465	44.71
		26	83	Square	RR	36779	53.94	36748	42.78
		26	83	0,5	RR	36962	57.52	36796	46.36
		26	83	1,0	RR	36963	57.52	36797	46.36
		26	83	1,5	RR	36964	57.52	36798	46.36
		26	83	Ball	RR	37380	60.63	39464	49.47
		50	100	Square	LL	62266	73.01	31637	59.89
		50	100	Ball	LL	62643	80.30	32767	67.18
		75	150	Square	XX	62176	105.29	31638	86.33
		75	150	Ball	XX	62667	122.58	32768	103.62
14	14	26	83	Square	RR	36780	88.41	36750	75.33
		57	125	Square	LL	62267	119.61	30144	100.89
		75	150	Square	XX	62177	138.97	31639	116.89
16	16	25	82	Square	SS	62287	96.08	38865	83.00
		32	92	Square	RR	36781	101.28	36752	86.84
		57	125	Square	LL	62268	145.54	30145	126.62
		75	150	Square	XX	62178	156.43	31640	134.11
18	18	32	92	Square	RR	36782	133.96	36753	120.04
		57	125	Square	LL	62269	179.78	30146	161.62
		75	150	Square	XX	62179	206.44	31641	185.04
20	20	38	104	Square	RR	36783	171.59	36754	149.27
		57	125	Square	LL	62270	207.82	30147	181.62
		75	150	Square	XX	62180	248.53	31642	217.69

Style Code Reference
LL—Long LOC, Long OAL
RR—Regular LOC, Regular OAL
RX—Regular LOC, X-Long OAL
SR—Short LOC, Regular OAL
SS—Short LOC, Short OAL
XX—X-Long LOC, X-Long OAL

Metric E13 end mills with DIN 6535 HB (Weldon®) flats are available by request. See page 160 for modification charges.

GENERAL PURPOSE 3-FLUTE END MILLS

For general milling applications

Application Guide • Speed & Feed

Work Material	Type of Cut	Axial DOC	Radial DOC	Speed (SFM) MG	TiCN	AlTiN	Feed (Inches per Tooth) 1/8	1/4	3/8	1/2	5/8	3/4	1
Aluminum Alloys 2024, 6061, 7075	Slot	.5 x D	1 x D	350	550	550	.0008	.0015	.0022	.0030	.0037	.0047	.0060
	Rough	1 x D	.5 x D	450	650	650	.0010	.0020	.0030	.0040	.0050	.0060	.0080
	Finish	1.5 x D	.01 x D	550	750	750	.0010	.0020	.0030	.0040	.0050	.0060	.0080
Copper Alloys Brass & Bronze	Slot	.5 x D	1 x D	275	350	350	.0006	.0012	.0018	.0025	.0030	.0039	.0050
	Rough	1 x D	.5 x D	300	400	400	.0008	.0015	.0022	.0030	.0037	.0047	.0060
	Finish	1.5 x D	.01 x D	350	450	450	.0009	.0017	.0026	.0035	.0045	.0055	.0070
Composites, Plastics	Slot	.5 x D	1 x D	300	350	350	.0008	.0015	.0022	.0030	.0037	.0047	.0060
	Rough	1 x D	.5 x D	375	450	450	.0009	.0018	.0027	.0035	.0045	.0055	.0070
	Finish	1.5 x D	.01 x D	450	650	650	.0009	.0018	.0027	.0035	.0045	.0055	.0070
Magnesium Alloys	Slot	.5 x D	1 x D	350	550	550	.0008	.0015	.0022	.0030	.0037	.0047	.0060
	Rough	1 x D	.5 x D	450	650	650	.0010	.0020	.0030	.0040	.0050	.0060	.0080
	Finish	1.5 x D	.01 x D	550	750	750	.0010	.0020	.0030	.0040	.0050	.0060	.0080
Graphite	Slot	.5 x D	1 x D	350	400	450	.0008	.0015	.0023	.0030	.0037	.0045	.0060
	Rough	1 x D	.5 x D	425	475	525	.0009	.0017	.0026	.0035	.0043	.0053	.0070
	Finish	1.5 x D	.01 x D	500	550	600	.0010	.0019	.0028	.0038	.0047	.0057	.0076
Cast Iron - Gray	Slot	.5 x D	1 x D	200	350	350	.0004	.0007	.0011	.0015	.0019	.0023	.0030
	Rough	1 x D	.5 x D	250	400	400	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Finish	1.5 x D	.01 x D	300	450	450	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Cast Iron - Ductile	Slot	.5 x D	1 x D	200	250	250	.0004	.0007	.0011	.0015	.0018	.0023	.0030
	Rough	1 x D	.5 x D	250	275	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Finish	1.5 x D	.01 x D	275	325	325	.0006	.0012	.0018	.0023	.0028	.0034	.0046
Low Carbon Steel ≤ 38 HRc 1018, 12L14, 8620	Slot	.5 x D	1 x D	250	275	300	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Rough	1 x D	.5 x D	275	300	325	.0006	.0012	.0018	.0025	.0031	.0037	.0050
	Finish	1.5 x D	.01 x D	300	325	350	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Medium Carbon Steels ≤ 38 HRc 4140, 4340	Slot	.5 x D	1 x D	225	250	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Rough	1 x D	.5 x D	250	275	300	.0006	.0012	.0018	.0025	.0031	.0037	.0050
	Finish	1.5 x D	.01 x D	275	300	325	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Tool & Die Steels ≤ 38 HRc A2, D2, H13, P20	Slot	.5 x D	1 x D	225	250	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Rough	1 x D	.5 x D	250	275	300	.0006	.0012	.0018	.0025	.0031	.0037	.0050
	Finish	1.5 x D	.01 x D	275	300	325	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Easy to Machine Stainless Steel 416, 410, 302, 303	Slot	.5 x D	1 x D	200	250	250	.0003	.0007	.0011	.0015	.0019	.0023	.0030
	Rough	1 x D	.5 x D	250	275	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Finish	1.5 x D	.01 x D	300	325	325	.0006	.0012	.0018	.0025	.0031	.0038	.0050
Moderate Machining Stainless Steels 304, 316, Invar, Kovar	Slot	.5 x D	1 x D	200	225	250	.0003	.0005	.0008	.0010	.0012	.0015	.0020
	Rough	1 x D	.5 x D	250	275	300	.0003	.0007	.0011	.0015	.0019	.0022	.0030
	Finish	1.5 x D	.01 x D	300	325	350	.0004	.0009	.0014	.0018	.0023	.0027	.0036

Work Material	Type of Cut	Axial DOC	Radial DOC	Speed (m/min) MG	TiCN	AlTiN	Feed (mm per Tooth) 3,0	6,0	9,0	12,0	16,0	19,0	25,0
Aluminum Alloys 2024, 6061, 7075	Slot	.5 x D	1 x D	107	168	168	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	Rough	1 x D	.5 x D	137	198	198	.0254	.0508	.0762	.1016	.1270	.1524	.2032
	Finish	1.5 x D	.01 x D	168	229	229	.0254	.0508	.0762	.1016	.1270	.1524	.2032
Copper Alloys Brass & Bronze	Slot	.5 x D	1 x D	84	107	107	.0152	.0305	.0457	.0635	.0762	.0991	.1270
	Rough	1 x D	.5 x D	91	122	122	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	Finish	1.5 x D	.01 x D	107	137	137	.0229	.0432	.0660	.0889	.1143	.1397	.1778
Composites, Plastics	Slot	.5 x D	1 x D	91	107	107	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	Rough	1 x D	.5 x D	114	137	137	.0229	.0457	.0686	.0889	.1143	.1397	.1778
	Finish	1.5 x D	.01 x D	137	198	198	.0229	.0457	.0686	.0889	.1143	.1397	.1778
Magnesium Alloys	Slot	.5 x D	1 x D	107	168	168	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	Rough	1 x D	.5 x D	137	198	198	.0254	.0508	.0762	.1016	.1270	.1524	.2032
	Finish	1.5 x D	.01 x D	168	229	229	.0254	.0508	.0762	.1016	.1270	.1524	.2032
Graphite	Slot	.5 x D	1 x D	107	122	137	.0203	.0381	.0584	.0762	.0940	.1143	.1524
	Rough	1 x D	.5 x D	130	145	160	.0229	.0432	.0660	.0889	.1092	.1346	.1778
	Finish	1.5 x D	.01 x D	152	168	183	.0254	.0483	.0711	.0965	.1194	.1448	.1930
Cast Iron - Gray	Slot	.5 x D	1 x D	61	107	107	.0102	.0178	.0279	.0381	.0483	.0584	.0762
	Rough	1 x D	.5 x D	76	122	122	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Finish	1.5 x D	.01 x D	91	137	137	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Cast Iron - Ductile	Slot	.5 x D	1 x D	61	76	76	.0102	.0178	.0279	.0381	.0457	.0584	.0762
	Rough	1 x D	.5 x D	76	84	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Finish	1.5 x D	.01 x D	84	99	99	.0152	.0305	.0457	.0584	.0711	.0864	.1168
Low Carbon Steel ≤ 38 HRc 1018, 12L14, 8620	Slot	.5 x D	1 x D	76	84	91	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	1 x D	.5 x D	84	91	99	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	Finish	1.5 x D	.01 x D	91	99	107	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Medium Carbon Steels ≤ 38 HRc 4140, 4340	Slot	.5 x D	1 x D	69	76	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	1 x D	.5 x D	76	84	91	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	Finish	1.5 x D	.01 x D	84	91	99	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Tool & Die Steels ≤ 38 HRc A2, D2, H13, P20	Slot	.5 x D	1 x D	69	76	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	1 x D	.5 x D	76	84	91	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	Finish	1.5 x D	.01 x D	84	91	99	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Easy to Machine Stainless Steel 416, 410, 302, 303	Slot	.5 x D	1 x D	61	76	76	.0076	.0178	.0279	.0381	.0483	.0584	.0762
	Rough	1 x D	.5 x D	76	84	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Finish	1.5 x D	.01 x D	91	99	99	.0152	.0305	.0457	.0635	.0787	.0965	.1270
Moderate Machining Stainless Steels 304, 316, Invar, Kovar	Slot	.5 x D	1 x D	61	69	76	.0064	.0127	.0191	.0254	.0305	.0381	.0508
	Rough	1 x D	.5 x D	76	84	91	.0076	.0178	.0279	.0381	.0483	.0559	.0762
	Finish	1.5 x D	.01 x D	91	99	107	.0102	.0229	.0356	.0457	.0584	.0686	.0914

D = tool diameter Reduce feed rates by 20% when using long length tools Starting parameters shown

Use a Mill to Make Holes

In most materials, helical plunging moves can save money when machining holes. Helical plunging moves eliminate the time to make a tool change and the expense of buying many drills for a variety of hole diameters. All IMCO end mills larger than .060 diameter are center cutting and can run straight plunge (Z-axis) moves or helical interpolation tool paths.

2-FLUTE END MILLS

E12

2 Helical Flutes

For plunging, slotting, contouring and heavy peripheral cuts

E12 • Radius

E12 • Square

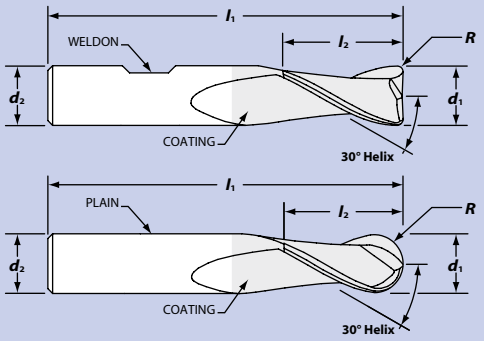
E12B • Ball

Two-flute end mills are center cutting and designed for plunging, slotting, contouring and increased chip clearance at higher feed rates in heavy peripheral cuts.

Coatings:

- AlTiN
- TiCN
- None (MG)

Any PVD coating may be applied to an uncoated tool in this series. See page 162 for coating options.



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

	AlTiN Spector	TiCN Accelerator	MG Uncoated
Carbon & tool steels ≤ 48 HRC	✓✓	✓	✓
Stainless steels	✓	✓	
Cast irons	✓✓	✓	✓
Aluminum and non-ferrous	✓	✓✓✓	✓✓

✓ Suitable ✓✓ Good ✓✓✓ Recommended

End designs

- Variety of corner radii available
- Square end for general machining and finishing
- Ball nose styles for contouring
- Center cutting

Shank designs

- Precision shanks fit all collets and most shrink-fit systems
- Many sizes offered with flats for end mill holders

Multiple lengths

- Long, extra long and extreme lengths for deep cavity milling
- Stub length for extra rigidity

E12 Sets

Style	EDP Number	List Price
AlTiN	33686	177.34
TiCN	33654	176.56
MG	33650	144.82

E12B Sets

Style	EDP Number	List Price
AlTiN	33687	210.94
TiCN	33667	209.90
MG	33660	176.56

Contains one each of: 1/8, 3/16, 1/4, 5/16, 3/8, 1/2

E12

Inch sizes

E12M

Miniature decimal end mills from .001 to .060 in diameter are shown on page 106.

Style Code Reference
LE—Long LOC, Extreme OAL
LL—Long LOC, Long OAL
LR—Long LOC, Standard OAL
RR—Regular LOC, Regular OAL
SR—Short LOC, Regular OAL
XX—X-Long LOC, X-Long OAL

Inch | Standard

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiN EDP Number	List Price	TiCN EDP Number	List Price	MG EDP Number	List Price
1/64	1/8	1/32	1-1/2	Square	Plain	SR	90655	13.16			90638	10.47
		3/64	1-1/2	Square	Plain	RR	90656	13.74			90639	11.05
1/32	1/8	1/16	1-1/2	Square	Plain	SR	38923	11.78			34696	9.09
		1/16	1-1/2	Ball	Plain	SR	30372	16.85			31601	14.16
		3/32	1-1/2	Square	Plain	RR	30509	12.35	34602	12.05	30601	9.66
		3/32	1-1/2	Ball	Plain	RR	30303	16.85			30801	14.16
		1/8	1-1/2	Square	Plain	LR	90657	12.20			90652	9.51
3/64	1/8	3/32	1-1/2	Square	Plain	SR	39093	11.55			34699	8.86
		3/32	1-1/2	Ball	Plain	SR	30373	16.85			31602	14.16
		9/64	1-1/2	Square	Plain	RR	35603	11.97	34603	11.67	30603	9.28
		9/64	1-1/2	Ball	Plain	RR	30302	16.85			30803	14.16
1/16	1/8	1/8	1-1/2	Square	Plain	SR	39104	11.55			31403	8.86
		1/8	1-1/2	Ball	Plain	SR	30374	15.34			31603	12.75
		3/16	1-1/2	Square	Plain	RR	30336	11.97	34604	11.67	30605	9.28
		3/16	1-1/2	Ball	Plain	RR	30433	15.55			30805	12.80
		1/4	1-1/2	Square	Plain	LR	90658	12.20			90653	9.51
5/64	1/8	1/4	1-1/2	Square	Plain	RR	30337	12.35			30607	9.66
		1/4	1-1/2	Ball	Plain	RR	30349	15.55			30807	12.80
3/32	1/8	3/16	1-1/2	Square	Plain	SR	39105	11.55			31405	8.86
		3/16	1-1/2	Ball	Plain	SR	30375	14.61			31605	12.02
		3/8	1-1/2	Square	Plain	RR	30338	11.97	34606	11.67	30609	9.28
		3/8	1-1/2	Ball	Plain	RR	30350	14.82			30809	12.20
7/64	1/8	3/8	1-1/2	Square	Plain	RR	30339	12.35			30611	9.66
		3/8	1-1/2	Ball	Plain	RR	30351	14.82			30811	12.20
1/8	1/8	1/4	1-1/2	Square	Plain	SR	90088	11.18			31407	8.78
		1/4	1-1/2	Ball	Plain	SR	31956	13.73			31607	11.15
		1/2	1-1/2	Square	Plain	RR	96342	11.23	34608	11.23	30613	9.00
		1/2	1-1/2	.015	Plain	RR	34071	14.04			39550	14.50
		1/2	1-1/2	Ball	Plain	RR	30993	13.83	34708	13.83	30813	11.46
		5/8	2	Square	Plain	LL	62093	16.80			96483	13.67
		5/8	2	Ball	Plain	LL	37880	19.24			37876	15.98
		3/4	2-1/4	Square	Plain	LL	36610	16.43			37608	14.22
		3/4	2-1/4	Ball	Plain	LL	30385	20.07			37808	17.02
		1	3	Square	Plain	XX	34015	22.26			34008	19.33
		1	3	Ball	Plain	XX	31291	27.09			34208	23.17
9/64	3/16	9/16	2	Square	Plain	RR	30344	16.59			30615	13.44
		9/16	2	Ball	Plain	RR	90177	20.38			30815	16.92
5/32	3/16	5/16	2	Square	Plain	SR	39129	15.50			31409	12.89
		5/16	2	Ball	Plain	SR	30403	18.25			31609	15.50
		9/16	2	Square	Plain	RR	30503	16.59			30617	13.44
		9/16	2	Ball	Plain	RR	30354	19.76			30817	16.39
11/64	3/16	5/8	2	Square	Plain	RR	30345	16.59			30619	13.44
3/16	3/16	3/8	2	Square	Plain	SR	39131	14.92			31411	12.11
		3/8	2	Ball	Plain	SR	30378	17.58			31611	14.56
		5/8	2	Square	Plain	RR	30554	15.50	34612	15.50	30621	12.67
		5/8	2	.020	Plain	RR	34072	18.46			39553	17.62
		5/8	2	.030	Plain	RR	34073	18.46			39554	17.62
		5/8	2	Ball	Plain	RR	90087	18.10	34712	18.10	30821	15.08
		3/4	2-1/2	Square	Plain	LL	36619	22.26			37612	18.22
		3/4	2-1/2	Ball	Plain	LL	30386	23.97			37812	21.80
		1	4	Square	Plain	LE	62094	30.00			62088	24.67
		1	4	Ball	Plain	LE	37881	33.85			94365	29.38
		1-1/8	3	Square	Plain	XX	34023	25.69			34012	22.00
		1-1/8	3	Ball	Plain	XX	90081	30.32			34212	26.35

continued on next page

E12

Inch sizes

E12 end mills with Weldon® flats are available by request on items not already shown as standard with this feature. See page 160 for modification charges.

Inch • Continued

							Standard					
d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiN EDP Number	List Price	TiCN EDP Number	List Price	MG EDP Number	List Price
13/64	1/4	5/8	2-1/2	Square	Plain	RR	97907	21.06			30623	16.78
7/32	1/4	7/16	2	Square	Plain	SS	39153	19.45			31413	14.49
		5/8	2-1/2	Square	Plain	RR	30348	21.06			30625	16.78
		5/8	2-1/2	Ball	Plain	RR	30355	25.01			30825	20.50
15/64	1/4	3/4	2-1/2	Square	Plain	RR	30510	21.06			30627	16.78
1/4	1/4	1/2	2	Square	Plain	SS	39154	18.98			31415	14.22
		1/2	2	Ball	Plain	SS	30563	20.07			31615	17.11
		3/4	2-1/2	Square	Plain	RR	30553	18.93	34616	18.93	30629	14.89
		3/4	2-1/2	Square	Weldon	RR	39250	20.49			39256	16.57
		3/4	2-1/2	.020	Plain	RR	34074	23.19			39556	19.29
		3/4	2-1/2	.030	Plain	RR	34075	23.19			39557	19.29
		3/4	2-1/2	Ball	Plain	RR	30994	23.76	34716	23.76	30829	19.45
		1	4	Square	Plain	LX	62095	34.68			62089	28.24
		1	4	Ball	Plain	LX	37882	39.68			37877	33.05
		1-1/8	3	Square	Plain	LL	36645	27.61			37616	22.44
		1-1/8	3	Ball	Plain	LL	30387	34.42			37816	28.97
		1-1/2	4	Square	Plain	XX	34035	33.59			34016	27.33
		1-1/2	4	Ball	Plain	XX	90082	39.42			34216	32.52
		1-1/2	6	Square	Plain	XE	39203	45.03			31063	37.67
		1-1/2	6	Ball	Plain	XE	34168	50.08			31263	42.43
17/64	5/16	3/4	2-1/2	Square	Plain	RR	30511	32.19			30631	26.20
9/32	5/16	3/4	2-1/2	Square	Plain	RR	30504	32.19			30633	26.20
		3/4	2-1/2	Ball	Plain	RR	30356	37.18			30833	31.03
19/64	5/16	13/16	2-1/2	Square	Plain	RR	30512	32.19			30635	26.20
5/16	5/16	1/2	2	Square	Plain	SS	39155	26.26			31417	19.42
		1/2	2	Ball	Plain	SS	30380	29.69			31617	24.28
		13/16	2-1/2	Square	Plain	RR	30557	26.99	34620	26.94	30637	21.04
		13/16	2-1/2	Square	Weldon	RR	39251	28.55			39257	22.80
		13/16	2-1/2	.020	Plain	RR	34076	30.84			39560	25.44
		13/16	2-1/2	.030	Plain	RR	34077	30.84			39561	25.44
		13/16	2-1/2	Ball	Plain	RR	30562	31.98	34720	31.93	30837	25.82
		1-1/8	3	Square	Plain	LL	36640	37.60			37620	29.89
		1-1/8	3	Ball	Plain	LL	20561	43.52			37820	35.84
		1-5/8	4	Square	Plain	XX	34036	43.00			34020	35.56
		1-5/8	4	Ball	Plain	XX	31292	53.40			34220	43.74
11/32	3/8	1	2-1/2	Square	Plain	RR	30331	38.90			30641	31.67
		1	2-1/2	Ball	Plain	RR	30357	43.73			30841	36.15
3/8	3/8	5/8	2	Square	Plain	SS	39156	31.62			31419	24.22
		5/8	2	Ball	Plain	SS	30564	34.06			31619	28.53
		1	2-1/2	Square	Plain	RR	30556	32.50	34624	32.24	30645	26.22
		1	2-1/2	Square	Weldon	RR	39252	33.90			39258	28.14
		1	2-1/2	.020	Plain	RR	34104	37.23			36808	30.34
		1	2-1/2	.020	Weldon	RR	34078	39.00			39564	32.26
		1	2-1/2	.030	Plain	RR	34105	37.23			36809	30.34
		1	2-1/2	.030	Weldon	RR	34079	39.00			39565	32.26
		1	2-1/2	Ball	Plain	RR	30995	37.96	34724	37.65	30845	31.39
		1	4	Square	Plain	RX	62097	50.49			62091	41.09
		1	4	Ball	Plain	RX	37884	58.14			37879	48.39
		1-1/8	3	Square	Plain	LL	36646	43.37			37624	34.89
		1-1/8	3	Ball	Plain	LL	30390	51.38			37824	44.23
		1-1/2	6	Square	Plain	LE	30470	69.89			31035	59.80
		1-1/2	6	Ball	Plain	LE	34170	77.32			31235	67.15
		1-3/4	4	Square	Plain	XX	34037	49.14			34024	40.82
		1-3/4	4	Ball	Plain	XX	31293	58.66			34224	48.39

continued on next page

E12

Inch sizes

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	Standard AlTiN EDP Number	List Price	TiCN EDP Number	List Price	MG EDP Number	List Price
13/32	7/16	1	2-3/4	Square	Plain	RR	30332	46.96			30649	38.71
7/16	7/16	1	2-3/4	Square	Plain	RR	99467	42.38	34629	42.12	30672	33.89
		1	2-3/4	Ball	Plain	RR	30362	49.24			30879	40.28
		2	4	Square	Plain	LL	99468	68.12			37628	56.78
		2	4	Ball	Plain	LL	30391	78.99			37828	67.26
		3	6	Square	Plain	XX	34038	87.62			34028	75.44
		3	6	Ball	Plain	XX	31294	101.40			34228	87.03
15/32	1/2	1	3	Square	Plain	RR	30333	61.52			30657	51.22
1/2	1/2	5/8	2-1/2	Square	Plain	SS	39158	50.18			31423	40.84
		5/8	2-1/2	Ball	Plain	SS	31630	53.46			31623	48.00
		1	3	Square	Plain	RR	30552	51.95	34632	51.27	30661	42.89
		1	3	Square	Weldon	RR	39253	53.92			39259	45.13
		1	3	.020	Plain	RR	34106	60.42			36810	46.47
		1	3	.020	Weldon	RR	34080	62.30			39568	48.71
		1	3	.030	Plain	RR	34107	60.42			36811	46.47
		1	3	.030	Weldon	RR	34081	62.30			39569	48.71
		1	3	.060	Plain	RR	34190	60.42			36812	46.47
		1	3	.060	Weldon	RR	34082	62.30			39571	48.71
		1	3	Ball	Plain	RR	97921	64.74	34732	63.86	30861	55.31
		1	4	Square	Plain	RL	62098	73.32			62092	60.67
		1	4	Ball	Plain	RL	37885	81.48			90503	68.45
		1-1/2	6	Square	Plain	LX	39205	101.19			31047	87.33
		1-1/2	6	Ball	Plain	LX	34172	110.66			31247	96.66
		2	4	Square	Plain	LL	36647	72.49			37632	60.67
		2	4	Ball	Plain	LL	30392	82.26			37832	68.51
		3	6	Square	Plain	XX	34039	100.88			34032	87.33
		3	6	Ball	Plain	XX	31295	113.00			34232	96.96
9/16	9/16	1-1/4	3-1/2	Square	Plain	RR	30505	89.39			30663	76.00
		1-1/4	3-1/2	Ball	Plain	RR	30248	100.36			30863	86.76
5/8	5/8	1-1/4	3-1/2	Square	Plain	RR	30532	97.50			30665	82.67
		1-1/4	3-1/2	Square	Weldon	RR	39254	99.84			39260	85.47
		1-1/4	3-1/2	Ball	Plain	RR	30366	109.25			30865	94.00
		2	6	Square	Plain	LX	39206	146.80			39198	123.93
		2	6	Ball	Plain	LX	34173	165.41			31226	141.48
		2-1/4	5	Square	Plain	LL	36648	141.96			37640	116.78
		2-1/4	5	Ball	Plain	LL	30393	166.35			37840	147.27
		3	6	Square	Plain	XX	34043	146.38			34040	123.93
		3	6	Ball	Plain	XX	31296	167.08			34240	141.91
3/4	3/4	1-1/2	4	Square	Plain	RR	30700	142.69			30669	121.11
		1-1/2	4	Square	Weldon	RR	39255	145.70			39261	124.31
		1-1/2	4	Ball	Plain	RR	30872	156.31			30869	137.96
		2	6	Square	Plain	LX	39207	230.41			39199	192.80
		2	6	Ball	Plain	LX	34174	266.55			31228	223.13
		2-1/4	5	Square	Plain	LL	36649	186.21			37648	155.56
		2-1/4	5	Ball	Plain	LL	30396	224.02			37848	202.21
		3	6	Square	Plain	XX	34044	224.69			34048	192.80
		3	6	Ball	Plain	XX	31297	256.78			34248	229.50
1	1	1-1/2	4	Square	Plain	RR	30679	215.02			30677	187.78
		1-1/2	4	Ball	Plain	RR	30369	266.03			30877	237.62
		2-1/4	5	Square	Plain	LL	36650	346.06			37664	295.18
		2-1/4	5	Ball	Plain	LL	30397	416.21			37864	369.29
		3	6	Square	Plain	XX	34045	373.36			34064	329.11
		3	6	Ball	Plain	XX	31298	420.78			34264	382.06

Style Code Reference
LE—Long LOC, Extreme OAL
LL—Long LOC, Long OAL
LX—Long LOC, X-Long OAL
RL—Regular LOC, Long OAL
RR—Regular LOC, Regular OAL
RX—Regular LOC,X-Long OAL
SS—Short LOC, Short OAL
XE—X-Long LOC, Extreme OAL
XX—X-Long LOC, X-Long OAL

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E12

Metric sizes

Metric E12 end mills with DIN 6535 HB (Weldon®) flats are available by request. See page 160 for modification charges.

Metric						Standard			
d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Style Code	AlTiN EDP Number	List Price	MG EDP Number	List Price
0,3	3	0,9	38	Square	RR			31791	24.10
0,4	3	1,2	38	Square	RR			31792	13.21
0,5	3	1,5	38	Square	RR			31793	12.55
0,6	3	1,8	38	Square	RR			31794	11.09
0,7	3	2,1	38	Square	RR			31795	10.40
0,8	3	2,4	38	Square	RR			31796	10.40
0,9	3	2,7	38	Square	RR			31797	9.51
1	3	2	38	Square	SR	62288	11.78	38866	9.09
		2	38	Ball	SR	62673	18.12	39071	15.96
		3	38	Square	RR	99079	12.20	31431	9.51
		3	38	Ball	RR	99080	18.26	32551	16.10
1,5	3	3	38	Square	SR	62289	11.55	38867	8.86
		3	38	Ball	SR	62674	17.74	39072	15.58
		4,5	38	Square	RR	62455	11.97	31432	9.28
		4,5	38	Ball	RR	62459	17.18	32552	15.02
		6	38	Square	RR	37980	12.20	38602	9.51
		6	38	Ball	RR	62579	17.74	38611	15.58
2	3	4	38	Square	SR	62290	11.55	38868	8.86
		4	38	Ball	SR	62675	13.73	39073	11.57
		6,3	38	Square	RR	99081	11.97	31433	9.28
		6,3	38	Ball	RR	99082	13.85	32553	11.69
		9	38	Square	RR	37981	12.20	38603	9.51
		9	38	Ball	RR	62580	15.05	38612	12.89
2,5	3	5	38	Square	SR	62291	11.55	38869	8.86
		9,5	38	Square	RR	37982	11.97	31434	9.28
		9,5	38	Ball	RR	62581	14.73	32554	12.57
3	3	6	38	Square	SR	62292	10.94	38870	8.78
		6	38	Ball	SR	62677	12.41	39075	10.25
		9	38	Square	RR	99093	11.16	36709	9.00
		12	38	Square	RR	32601	11.38	31435	9.22
		12	38	0,3	RR	38620	16.88	37768	14.72
		12	38	Ball	RR	32600	14.00	32555	11.84
		19	57	Square	LL	62194	17.42	30153	14.22
		19	57	Ball	LL	62625	20.09	39114	16.89
		25	75	Square	XX	62182	23.26	30001	19.22
		25	75	Ball	XX	62649	26.65	32365	22.61
3,5	4	7	50	Square	SR	62293	15.80	38871	12.56
		14	50	Square	RR	32603	16.35	31436	13.11
		14	50	Ball	RR	62582	19.94	32556	16.70
4	4	8	50	Square	SR	62294	15.24	38872	12.00
		8	50	Ball	SR	62679	17.45	39077	14.21
		11	50	Square	RR	36756	15.80	36711	12.56
		11	50	0,4	RR	38621	21.02	37769	17.78
		14	50	Square	RR	99357	16.46	31437	13.22
		14	50	Ball	RR	32602	19.18	32557	15.94
		19	63	Square	LL	62195	21.63	30155	17.67
		19	63	Ball	LL	62626	24.61	39115	20.65
		31	75	Square	XX	62183	25.01	30004	20.33
		31	75	Ball	XX	62650	28.56	32368	23.88
4,5	5	16	50	Square	RR	37983	17.88	31438	13.56
		16	50	Ball	RR	62583	21.53	32558	17.21

continued on next page

GENERAL PURPOSE E12 END MILLS

For general milling applications

Metric • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Style Code	Standard AlTiN EDP Number	List Price	MG EDP Number	List Price
5	5	10	50	Square	SR	62296	18.21	38874	13.89
		10	50	Ball	SR	62681	20.87	39079	16.55
		13	50	Square	RR	36757	18.43	36713	14.11
		13	50	0,5	RR	38622	23.38	37770	19.06
		16	50	Square	RR	32604	18.76	31439	14.44
		16	50	Ball	RR	99083	22.14	32559	17.82
		19	63	Square	LL	62196	25.17	30156	19.89
		19	63	Ball	LL	62627	29.20	39116	23.92
		31	100	Square	XX	62184	33.74	30231	25.78
		31	100	Ball	XX	62651	38.64	39123	30.68
6	6	12	54	Square	SS	37176	18.63	39240	14.31
		12	54	Ball	SS	37501	21.21	39466	16.89
		13	57	Square	RR	36758	19.12	36715	14.64
		13	57	0,3	RR	38623	23.80	37771	19.32
		13	57	0,5	RR	38624	23.80	37772	19.32
		19	63	Square	RR	37984	20.36	31440	15.44
		19	63	Ball	RR	62584	23.88	32560	18.96
		29	75	Square	LL	62197	27.14	30010	21.42
		29	75	Ball	LL	62628	30.37	32374	24.65
		38	100	Square	XX	62185	34.17	30234	26.73
		38	100	Ball	XX	62652	38.75	39125	31.31
7	7	16	60	Square	RR	36759	25.78	36717	20.22
	8	19	63	Square	RR	37985	29.00	31441	23.04
		19	63	Ball	RR	62585	34.00	32561	28.04
8	8	14	58	Square	SS	37183	26.14	39241	20.58
		14	58	Ball	SS	37502	32.77	39467	27.21
		19	63	Square	RR	36760	27.52	36719	21.56
		19	63	0,5	RR	38625	31.92	37773	25.96
		19	63	1,0	RR	38626	31.92	37774	25.96
		19	63	1,5	RR	38627	31.92	37775	25.96
		20	63	Square	RR	31492	29.69	31442	23.73
		20	63	Ball	RR	99085	33.73	32562	27.77
		20	100	Square	RX	31878	47.54	30265	38.58
		20	100	Ball	RX	37441	54.32	37284	45.36
		29	75	Square	LL	62198	37.96	30013	31.04
		29	75	Ball	LL	62629	42.52	32377	35.60
		41	100	Square	XX	62186	45.67	30235	36.71
		41	100	Ball	XX	62653	52.15	39126	43.19
9	9	19	67	Square	RR	36761	40.12	36721	27.04
	10	22	72	Square	RR	37986	43.32	31443	32.56
		22	72	Ball	RR	62586	48.17	32563	37.41
10	10	16	66	Square	SS	37184	39.89	39242	29.89
		16	66	Ball	SS	37503	44.45	39468	34.45
		22	72	Square	RR	36762	41.76	36723	31.00
		22	72	0,5	RR	38628	45.88	37776	35.12
		22	72	1,0	RR	38629	45.88	37777	35.12
		22	72	1,5	RR	38630	45.88	37778	35.12
		25	72	Square	RR	99358	44.27	31444	33.51
		25	72	Ball	RR	62587	49.26	32564	38.50
		25	100	Square	RX	31879	60.18	30266	45.82
		25	100	Ball	RX	37442	68.98	37285	54.62

continued in next column

Metric • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Style Code	Standard AlTiN EDP Number	List Price	MG EDP Number	List Price
10	10	40	88	Square	LL	37174	53.57	30223	40.73
		40	88	Ball	LL	37504	58.93	39469	46.09
		45	100	Square	XX	62187	61.36	30016	47.00
		45	100	Ball	XX	62654	67.79	32380	53.43
11	11	26	83	Square	RR	36763	50.40	36724	40.40
12	12	19	73	Square	SS	37251	51.64	39243	41.64
		25	76	Square	RR	99359	55.03	31445	44.71
		25	76	Ball	RR	99356	61.70	32565	51.38
		26	83	Square	RR	36764	53.94	36725	42.78
		26	83	0,5	RR	38631	57.52	37779	46.36
		26	83	1,0	RR	38632	57.52	37780	46.36
		26	83	1,5	RR	38633	57.52	37781	46.36
		26	83	Ball	RR	37507	60.63	39471	49.47
		50	100	Square	LL	62200	73.01	30019	59.89
		50	100	Ball	LL	62631	80.30	32383	67.18
		75	150	Square	XX	62188	105.29	30022	86.33
		75	150	Ball	XX	62655	122.58	32386	103.62
14	14	26	83	Square	RR	36765	88.41	36727	75.33
		32	83	Ball	RR	62589	102.46	34565	89.38
		57	125	Square	LL	62201	119.61	30158	100.89
		75	150	Square	XX	62189	138.97	30025	116.89
16	16	25	82	Square	SS	62304	96.08	38880	83.00
		32	89	Square	RR	37989	102.77	31447	88.73
		32	89	Ball	RR	62590	115.93	32567	101.89
		32	92	Square	RR	36766	101.28	36729	86.84
		57	125	Square	LL	62202	145.54	30159	126.62
		57	125	Ball	LL	62633	170.89	39119	151.97
		75	150	Square	XX	62190	156.43	30028	134.11
18	18	32	92	Square	RR	36767	133.96	36730	120.04
		57	125	Square	LL	62203	179.78	30228	161.62
		75	150	Square	XX	62191	206.44	30031	185.04
20	20	38	100	Square	RR	37991	178.27	31449	156.71
		38	104	Square	RR	36768	171.59	36731	149.27
		38	104	Ball	RR	36735	213.73	36733	192.17
		57	125	Square	LL	62204	207.82	30229	181.62
		57	125	Ball	LL	62635	244.13	39121	217.93
		75	150	Square	XX	62192	248.53	30034	217.69
		75	150	Ball	XX	62659	275.75	32398	244.91
25	25	45	120	Square	RR	37231	284.21	36769	260.73
		45	120	Ball	RR	37511	265.06	39472	241.58
		75	150	Square	XX	62193	355.62	30037	327.02
		75	150	Ball	XX	62660	404.71	32441	376.11

Style Code Reference
LL—Long LOC, Long OAL
RR—Regular LOC, Regular OAL
RX—Regular LOC, X-Long OAL
SR—Short LOC, Regular OAL
SS—Short LOC, Short OAL
XX—X-Long LOC, X-Long OAL

2 Helical Flutes

For plunging, slotting, contouring and heavy peripheral cuts

E22

E22 • Square

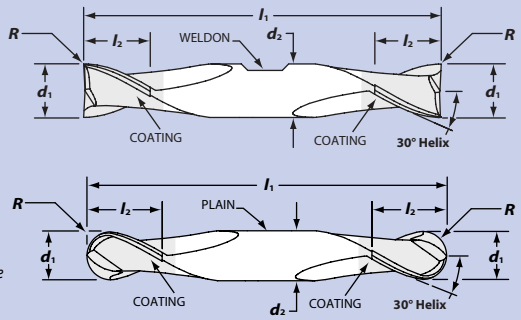
E22B • Ball

- Center cutting
- Available in stub and standard length
- Double ended for extra value

Coatings:

- AlTiN
- TiCN
- TIN
- None (MG)

Any PVD coating may be applied to an uncoated tool in this series. See page 162 for coating options.



in d_1 +0.000 / -0.002 d_2 -0.0001 to -0.0004 **mm** d_1 +0,000 / -0,050 d_2 -0,0025 to -0,0100

	AlTiN Spector	TiCN Accelerator	MG Uncoated	TiN auCARB
Carbon & tool steels ≤ 48 HRC	✓✓	✓	✓	✓
Stainless steels	✓	✓		
Cast irons	✓✓	✓	✓	✓
Aluminum and non-ferrous	✓	✓✓✓	✓✓	✓

✓ Suitable ✓✓ Good ✓✓✓ Recommended

Inch

							Standard						Obsolete*	
d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	AlTiN EDP Number	List Price	TiCN EDP Number	List Price	MG EDP Number	List Price	TiN EDP Number	List Price
1/32	1/8	1/16	1-1/2	Square	Plain	SR	31802	22.31			31830	19.91		
		1/16	1-1/2	Ball	Plain	SR	32001	27.61			32025	24.02		
3/64	1/8	3/32	1-1/2	Square	Plain	SR	31826	22.31			31831	19.91		
		3/32	1-1/2	Ball	Plain	SR	32002	27.61			32027	24.02		
1/16	1/8	1/8	1-1/2	Square	Plain	SR	31827	17.63	31864	18.10	31803	15.04		
		1/8	1-1/2	Ball	Plain	SR	32037	20.80			32003	18.62		
5/64	1/8	1/8	1-1/2	Square	Plain	SR	31828	17.63			31832	15.04		
3/32	1/8	3/16	1-1/2	Square	Plain	SR	31829	17.63	31866	18.10	31805	15.04		
		3/16	1-1/2	Ball	Plain	SR	30480	20.80			32005	18.62		
7/64	1/8	3/16	1-1/2	Square	Plain	SR	31849	17.63			31833	15.04		
1/8	1/8	1/4	1-1/2	Square	Plain	SR	31857	15.55	31868	15.76	31807	12.64	31808	15.76
		1/4	1-1/2	Ball	Plain	SR	30579	17.94			32007	15.64		
		3/8	2	Square	Plain	RL					33280	17.09		
		3/8	2	Ball	Plain	RL					33480	20.49		
	3/8	3/8	3-1/16	Square	Weldon	RL					32605	36.98		
5/32	3/16	5/16	2	Square	Plain	SR	31858	23.40	31870	23.87	31809	19.96		
		5/16	2	Ball	Plain	SR	30578	27.61			32009	23.71		
	3/8	7/16	3-1/8	Square	Weldon	RL					32607	39.16		

continued on next page

** Superseded by AlTiN. Add TiN to any uncoated tool. See page 162.*

GENERAL PURPOSE E22 END MILLS

For general milling applications

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	Standard: AlTiN EDP Number	Standard: List Price	Standard: TiCN EDP Number	Standard: List Price	Standard: MG EDP Number	Standard: List Price	Obsolete*: TiN EDP Number	Obsolete*: List Price
3/16	3/16	3/8	2	Square	Plain	SR	31860	22.41	31872	22.52	31811	18.51	31812	22.52
		3/8	2	Ball	Plain	SR	30577	26.05			32011	22.27		
		1/2	2-1/2	Square	Plain	RL					33282	20.64		
		1/2	2-1/2	Ball	Plain	RL					33482	24.22		
	3/8	1/2	3-1/4	Square	Weldon	RL					32609	40.64		
7/32	1/4	1/2	2-1/2	Square	Plain	SR	31861	30.68			31813	24.47		
		1/2	2-1/2	Ball	Plain	SR	32061	35.67			32013	29.24		
	3/8	9/16	3-3/8	Square	Weldon	RL					32611	40.91		
1/4	1/4	1/2	2-1/2	Square	Plain	SR	31873	29.74	31876	30.47	31815	23.51	31816	30.47
		1/2	2-1/2	Ball	Plain	SR	32082	34.32			32015	28.13		
		5/8	3	Square	Plain	RL					33284	26.44		
		5/8	3	Ball	Plain	RL					33484	30.40		
	3/8	5/8	3-3/8	Square	Weldon	RL					32613	40.91		
5/16	5/16	1/2	2-1/2	Square	Plain	SR	31882	39.36			31817	30.33		
	3/8	3/4	3-1/2	Square	Weldon	RL					32617	47.00		
3/8	3/8	9/16	2-1/2	Square	Plain	SR	31881	40.77	31884	41.96	31819	31.27	31820	41.96
		9/16	2-1/2	Ball	Plain	SR	32095	46.64			32019	37.62		
		3/4	3-1/2	Square	Plain	RL					33286	42.20		
		3/4	3-1/2	Square	Weldon	RL					32621	47.00		
		3/4	3-1/2	Ball	Plain	RL					33486	50.36		
1/2	1/2	5/8	3	Square	Plain	SR	31885	66.30	31892	67.86	31823	53.53	31824	67.86
		5/8	3	Ball	Plain	SR	32097	76.28			32023	64.18		
		1	4	Square	Plain	RL					33288	67.38		
		1	4	Square	Weldon	RL					32625	69.84		
		1	4	Ball	Plain	RL					33488	77.53		

Metric

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	R Corner Radius	Shank Style	Style Code	Standard: AlTiN EDP Number	Standard: List Price	Standard: TiCN EDP Number	Standard: List Price	Standard: MG EDP Number	Standard: List Price	Obsolete*: TiN EDP Number	Obsolete*: List Price
2	3	3	38	Square	Plain	SR	62352	19.34			30880	17.18		
3	3	6	38	Square	Plain	SR	62354	18.16			30882	16.00		
4	4	8	50	Square	Plain	SR	62356	26.04			30884	22.80		
5	5	10	50	Square	Plain	SR	62358	28.39			30886	24.07		
6	6	12	63	Square	Plain	SR	62359	34.43			30887	29.51		
8	8	12	63	Square	Plain	SR	62360	47.07			30888	41.11		
10	10	14	72	Square	Plain	SR	62361	68.63			30889	57.87		
12	12	16	76	Square	Plain	SR	62362	78.28			30890	67.96		

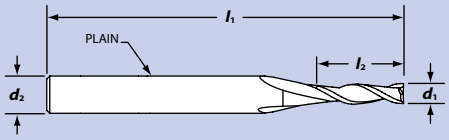
Style Code Reference
RL—Regular LOC, Long OAL
SR—Short LOC, Regular OAL

** Superseded by AlTiN. Add TiN to any uncoated tool. See page 162.*

2 Helical Flutes

For micro-machining

E12M



Coating:

None (MG)

in d_1 +0.0005 / -0.0005
d_2 -0.0002 to -0.0004

Style Code Reference
RR—Regular LOC, Regular OAL
SR—Short LOC, Regular OAL

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Style Code	MG EDP Number	List Price
.001	1/8	.005	1-1/2	SR	90625	54.03
.002	1/8	.005	1-1/2	SR	90626	45.14
.003	1/8	.005	1-1/2	SR	90627	38.94
.004	1/8	.006	1-1/2	SR	90628	33.78
.005	1/8	.008	1-1/2	SR	90663	31.37
		.015	1-1/2	RR	90629	31.37
.006	1/8	.009	1-1/2	SR	90664	31.38
		.018	1-1/2	RR	90630	31.37
.007	1/8	.011	1-1/2	SR	90665	28.30
		.021	1-1/2	RR	90631	28.31
.008	1/8	.012	1-1/2	SR	90666	28.30
		.024	1-1/2	RR	90632	28.31
.009	1/8	.014	1-1/2	SR	90667	26.14
		.027	1-1/2	RR	90633	26.14
.010	1/8	.015	1-1/2	SR	90668	24.10
		.030	1-1/2	RR	30101	24.10
.011	1/8	.017	1-1/2	SR	90669	23.41
		.033	1-1/2	RR	90634	23.42
.012	1/8	.018	1-1/2	SR	90670	23.41
		.036	1-1/2	RR	90635	23.42
.013	1/8	.020	1-1/2	SR	90671	17.59
		.039	1-1/2	RR	90636	17.60

continued in next column

Inch • Continued

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Style Code	MG EDP Number	List Price
.014	1/8	.021	1-1/2	SR	90672	15.32
		.042	1-1/2	RR	90637	15.32
.015	1/8	.023	1-1/2	SR	90673	13.21
		.045	1-1/2	RR	90600	13.21
.016	1/8	.024	1-1/2	SR	90674	13.21
		.048	1-1/2	RR	90640	13.21
.017	1/8	.026	1-1/2	SR	90675	13.21
		.051	1-1/2	RR	90641	13.21
.018	1/8	.027	1-1/2	SR	90676	12.55
		.054	1-1/2	RR	90642	12.56
.019	1/8	.029	1-1/2	SR	90677	12.55
		.057	1-1/2	RR	90643	12.56
.020	1/8	.030	1-1/2	SR	90678	12.55
		.060	1-1/2	RR	90601	12.56
.021	1/8	.032	1-1/2	SR	90679	11.09
		.063	1-1/2	RR	90644	11.08
.022	1/8	.033	1-1/2	SR	90680	11.09
		.066	1-1/2	RR	90645	11.08
.023	1/8	.035	1-1/2	SR	90681	11.09
		.069	1-1/2	RR	90646	11.08
.024	1/8	.036	1-1/2	SR	90682	11.09
		.072	1-1/2	RR	90647	11.08
.025	1/8	.038	1-1/2	SR	90683	11.09
		.075	1-1/2	RR	90602	11.08
.026	1/8	.039	1-1/2	SR	90684	10.63
		.078	1-1/2	RR	90648	10.63
.027	1/8	.041	1-1/2	SR	90685	10.63
		.081	1-1/2	RR	90649	10.63
.028	1/8	.042	1-1/2	SR	90686	10.40
		.084	1-1/2	RR	90650	10.40
.029	1/8	.044	1-1/2	SR	90687	10.40
		.087	1-1/2	RR	90651	10.40
.030	1/8	.045	1-1/2	SR	90688	10.40
		.090	1-1/2	RR	30102	10.40
.040	1/8	.060	1-1/2	SR	90689	9.27
		.120	1-1/2	RR	30104	9.27
.050	1/8	.075	1-1/2	SR	90690	9.28
		.150	1-1/2	RR	30107	9.28
.060	1/8	.090	1-1/2	SR	90691	9.28
		.180	1-1/2	RR	30109	9.28

Carbon & tool steels ≤ 48 HRC	✓
Stainless steels	✓
Super alloys, Inconel® & titanium	✓
Cast irons	✓
Aluminum and non-ferrous	✓

✓ Suitable

- Miniature sizes for precision machining
- Stub and standard flute lengths

Runout control is critical when using micro tools. Check setups carefully before use. Coating is usually not recommended for micro tools, particularly under .030 diameter because of edge rounding. Micran coating (see page 162) is recommended if coating is needed.

Application Guide • Speed & Feed

Work Material	Type of Cut	Axial DOC	Radial DOC	Speed (SFM) MG	TiCN	AlTiN	Feed (Inches per Tooth) 1/8	1/4	3/8	1/2	5/8	3/4	1
Aluminum Alloys 2024, 6061, 7075	Slot	.5 x D	1 x D	350	550	550	.0008	.0015	.0022	.0030	.0037	.0047	.0060
	Rough	1 x D	.5 x D	450	650	650	.0010	.0020	.0030	.0040	.0050	.0060	.0080
	Finish	1.5 x D	.01 x D	550	750	750	.0010	.0020	.0030	.0040	.0050	.0060	.0080
Copper Alloys Brass & Bronze	Slot	.5 x D	1 x D	275	350	350	.0006	.0012	.0018	.0025	.0030	.0039	.0050
	Rough	1 x D	.5 x D	300	400	400	.0008	.0015	.0022	.0030	.0037	.0047	.0060
	Finish	1.5 x D	.01 x D	350	450	450	.0009	.0017	.0026	.0035	.0045	.0055	.0070
Composites, Plastics	Slot	.5 x D	1 x D	300	350	350	.0008	.0015	.0022	.0030	.0037	.0047	.0060
	Rough	1 x D	.5 x D	375	450	450	.0009	.0018	.0027	.0035	.0045	.0055	.0070
	Finish	1.5 x D	.01 x D	450	650	650	.0009	.0018	.0027	.0035	.0045	.0055	.0070
Magnesium Alloys	Slot	.5 x D	1 x D	350	550	550	.0008	.0015	.0022	.0030	.0037	.0047	.0060
	Rough	1 x D	.5 x D	450	650	650	.0010	.0020	.0030	.0040	.0050	.0060	.0080
	Finish	1.5 x D	.01 x D	550	750	750	.0010	.0020	.0030	.0040	.0050	.0060	.0080
Graphite	Slot	.5 x D	1 x D	350	400	450	.0008	.0015	.0023	.0030	.0037	.0045	.0060
	Rough	1 x D	.5 x D	425	475	525	.0009	.0017	.0026	.0035	.0043	.0053	.0070
	Finish	1.5 x D	.01 x D	500	550	600	.0010	.0019	.0028	.0038	.0047	.0057	.0076
Cast Iron - Gray	Slot	.5 x D	1 x D	200	350	350	.0004	.0007	.0011	.0015	.0019	.0023	.0030
	Rough	1 x D	.5 x D	250	400	400	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Finish	1.5 x D	.01 x D	300	450	450	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Cast Iron - Ductile	Slot	.5 x D	1 x D	200	250	250	.0004	.0007	.0011	.0015	.0018	.0023	.0030
	Rough	1 x D	.5 x D	250	275	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Finish	1.5 x D	.01 x D	275	325	325	.0006	.0012	.0018	.0023	.0028	.0034	.0046
Low Carbon Steel ≤ 38 HRc 1018, 12L14, 8620	Slot	.5 x D	1 x D	250	275	300	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Rough	1 x D	.5 x D	275	300	325	.0006	.0012	.0018	.0025	.0031	.0037	.0050
	Finish	1.5 x D	.01 x D	300	325	350	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Medium Carbon Steels ≤ 38 HRc 4140, 4340	Slot	.5 x D	1 x D	225	250	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Rough	1 x D	.5 x D	250	275	300	.0006	.0012	.0018	.0025	.0031	.0037	.0050
	Finish	1.5 x D	.01 x D	275	300	325	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Tool & Die Steels ≤ 38 HRc A2, D2, H13, P20	Slot	.5 x D	1 x D	225	250	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Rough	1 x D	.5 x D	250	275	300	.0006	.0012	.0018	.0025	.0031	.0037	.0050
	Finish	1.5 x D	.01 x D	275	300	325	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Easy to Machine Stainless Steel 416, 410, 302, 303	Slot	.5 x D	1 x D	200	250	250	.0003	.0007	.0011	.0015	.0019	.0023	.0030
	Rough	1 x D	.5 x D	250	275	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Finish	1.5 x D	.01 x D	300	325	325	.0006	.0012	.0018	.0025	.0031	.0038	.0050
Moderate Machining Stainless Steels 304, 316, Invar, Kovar	Slot	.5 x D	1 x D	200	225	250	.0003	.0005	.0008	.0010	.0012	.0015	.0020
	Rough	1 x D	.5 x D	250	275	300	.0003	.0007	.0011	.0015	.0019	.0022	.0030
	Finish	1.5 x D	.01 x D	300	325	350	.0004	.0009	.0014	.0018	.0023	.0027	.0036

Work Material	Type of Cut	Axial DOC	Radial DOC	Speed (m/min) MG	TiCN	AlTiN	Feed (mm per Tooth) 3,0	6,0	9,0	12,0	16,0	19,0	25,0
Aluminum Alloys 2024, 6061, 7075	Slot	.5 x D	1 x D	107	168	168	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	Rough	1 x D	.5 x D	137	198	198	.0254	.0508	.0762	.1016	.1270	.1524	.2032
	Finish	1.5 x D	.01 x D	168	229	229	.0254	.0508	.0762	.1016	.1270	.1524	.2032
Copper Alloys Brass & Bronze	Slot	.5 x D	1 x D	84	107	107	.0152	.0305	.0457	.0635	.0762	.0991	.1270
	Rough	1 x D	.5 x D	91	122	122	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	Finish	1.5 x D	.01 x D	107	137	137	.0229	.0432	.0660	.0889	.1143	.1397	.1778
Composites, Plastics	Slot	.5 x D	1 x D	91	107	107	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	Rough	1 x D	.5 x D	114	137	137	.0229	.0457	.0686	.0889	.1143	.1397	.1778
	Finish	1.5 x D	.01 x D	137	198	198	.0229	.0457	.0686	.0889	.1143	.1397	.1778
Magnesium Alloys	Slot	.5 x D	1 x D	107	168	168	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	Rough	1 x D	.5 x D	137	198	198	.0254	.0508	.0762	.1016	.1270	.1524	.2032
	Finish	1.5 x D	.01 x D	168	229	229	.0254	.0508	.0762	.1016	.1270	.1524	.2032
Graphite	Slot	.5 x D	1 x D	107	122	137	.0203	.0381	.0584	.0762	.0940	.1143	.1524
	Rough	1 x D	.5 x D	130	145	160	.0229	.0432	.0660	.0889	.1092	.1346	.1778
	Finish	1.5 x D	.01 x D	152	168	183	.0254	.0483	.0711	.0965	.1194	.1448	.1930
Cast Iron - Gray	Slot	.5 x D	1 x D	61	107	107	.0102	.0178	.0279	.0381	.0483	.0584	.0762
	Rough	1 x D	.5 x D	76	122	122	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Finish	1.5 x D	.01 x D	91	137	137	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Cast Iron - Ductile	Slot	.5 x D	1 x D	61	76	76	.0102	.0178	.0279	.0381	.0457	.0584	.0762
	Rough	1 x D	.5 x D	76	84	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Finish	1.5 x D	.01 x D	84	99	99	.0152	.0305	.0457	.0584	.0711	.0864	.1168
Low Carbon Steel ≤ 38 HRc 1018, 12L14, 8620	Slot	.5 x D	1 x D	76	84	91	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	1 x D	.5 x D	84	91	99	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	Finish	1.5 x D	.01 x D	91	99	107	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Medium Carbon Steels ≤ 38 HRc 4140, 4340	Slot	.5 x D	1 x D	69	76	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	1 x D	.5 x D	76	84	91	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	Finish	1.5 x D	.01 x D	84	91	99	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Tool & Die Steels ≤ 38 HRc A2, D2, H13, P20	Slot	.5 x D	1 x D	69	76	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	1 x D	.5 x D	76	84	91	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	Finish	1.5 x D	.01 x D	84	91	99	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Easy to Machine Stainless Steel 416, 410, 302, 303	Slot	.5 x D	1 x D	61	76	76	.0076	.0178	.0279	.0381	.0483	.0584	.0762
	Rough	1 x D	.5 x D	76	84	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Finish	1.5 x D	.01 x D	91	99	99	.0152	.0305	.0457	.0635	.0787	.0965	.1270
Moderate Machining Stainless Steels 304, 316, Invar, Kovar	Slot	.5 x D	1 x D	61	69	76	.0064	.0127	.0191	.0254	.0305	.0381	.0508
	Rough	1 x D	.5 x D	76	84	91	.0076	.0178	.0279	.0381	.0483	.0559	.0762
	Finish	1.5 x D	.01 x D	91	99	107	.0102	.0229	.0356	.0457	.0584	.0686	.0914

D = tool diameter Reduce feed rates by 20% when using long length tools Starting parameters shown

PROFILE

John Affatati

IMCO Sales Representative

Eastern Michigan

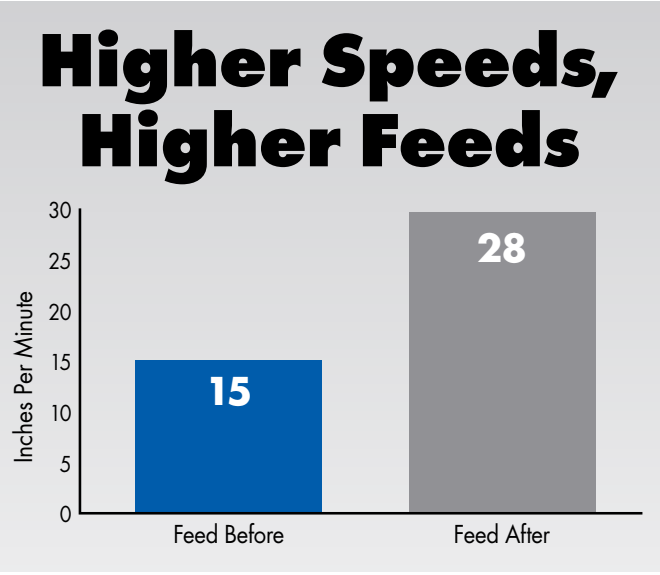
Champagne Grinding & Manufacturing in Canton, Michigan, is one of John Affatati's customers and a very satisfied user of IMCO POW·R·FEED® tools. They were starting a new job in 304 stainless. Because of the size of the piece, they were trying a different approach and having a rough go. John Lapenta at Champagne called on John Affatati for advice.

"They were running too slow," he said (1800 rpm on a 15 hp machine). "We bumped up the speed a couple of times before we found the sweet spot." They also reduced the depth of cut, changed to a different style tool holder and increased the coolant concentration.

The results:

- **33% higher speed (surface feet per minute)**
- **86% increase in feed rate**
- **Double the chip load per tooth**
- **Smooth machine operation, no work stoppage**

"They tried POW·R·FEED® in this very difficult job. The tools worked great and they're extremely happy now."



"It's a combination of the coating and the design," John says. "The customer loves the roughing ability POW·R·FEED outlasted their tool by 25% to 30%."

Pictured are, from left, Champagne Grinding's John Lapenta and IMCO Representative John Affatati.

Continuous demands for cost savings and quality improvement are standard for the automotive industry: John Affatati delivers both. A 30-year veteran in the tool and machining industry, John brings working solutions with quality IMCO tools to customers from job shops to Tier 1 suppliers all over Eastern Michigan.

Which Holder to Use?

Picking the correct holder is as important as picking the right tool. Every holder style has its own advantages. The critical issue is runout: the more the runout, the worse the tool performance. Excessive runout greatly reduces tool life and performance, especially at high spindle speeds. Whatever your choice in holders, always take the time to indicate a new tool in the spindle. A few minutes of time during setup can yield great performance results.

It's common to use collets and collet holders when milling. Make sure the collets are clean and not bell-mouthed from overuse or misuse. The collet holder with the shortest overhang allowable is always the best choice.

Using an end mill holder is great for heavy roughing applications. For best performance, make sure you use a mill with a factory ground flat on the shank.

Shrink-fit and press-fit systems work well at all speeds and feeds but are especially beneficial when running tooling over 8,000 rpm or in deep reaching applications. These systems balance the mill with low TIRs that are critical when running in aggressive applications or less-than-ideal setups.

DRILLS

Results: Significantly increased production rates in machine shops around the world.

IMCO drills perform better and last longer because they are CNC manufactured to exacting standards.

Our commitment to quality begins by selecting only the best quality micrograin carbide which is then machined on high precision grinders utilizing the knowledge and experience of our seasoned craftsmen. We employ a wide range of point geometries and flute designs for drilling workpieces of almost any material. An exhaustive variety of drill diameters and lengths are available.

TWIST DRILLS

- Most effective in drilling cast iron, aluminum and other abrasive but easily machined materials. Precision ground to produce true, accurate holes with an excellent surface finish.

STRAIGHT FLUTE DRILLS

- For drilling hardened steels, stainless steels and other hard and abrasive high-strength materials up to 65 HRc. Precision ground to produce close-tolerance holes with a superior finish, often eliminating secondary reaming operations.

HARD METAL DRILLS

- This style drill has an extremely strong core design for high strength drilling of hardened materials. For shallow hole drilling not to exceed two times the drill diameter.

Troubleshooting Guide

Situation	Causes	Solution
Outer corners break down	Speed (rpm) is too high	Reduce feed and speed
	Incorrect lip relief	Check lip relief
Cutting lips chip	Feed too high	Reduce feed and speed
	High lip relief	Check lip relief
	Running too hot	Make sure adequate coolant is reaching the drill point
Cracks in cutting lips	Running too hot	Repoint drill
		Check feeds and speeds
		Make sure adequate coolant is reaching the drill point
Drill breaks	Improper point	Repoint drill
	Flutes clogging	Check feed
	Excessive pressure	Feed with steady and uniform pressure
Drill splits up center	Feed too high	Reduce feed
	Incorrect lip relief	Correct relief
Rough hole	Dull point	Repoint drill
	No lubricant	Use lubricant
Oversize hole	Unequal length of cutting lips	Repoint drill
Chips change shape / color	Dull point	Repoint drill
Margins chip	Oversize bushing	Change bushing
Premature dullness	Allowing drill to dwell in the hole without cutting	Drills should be fed with steady and uniform pressure

GENERAL PURPOSE DRILLS

For general drilling applications

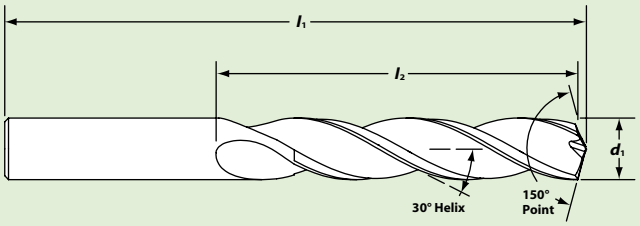
Application Guide • Speed & Feed

Work Material	Drill Series Number	Speed (SFM)	Feed Per Revolution (IPR) 1/16 - 1/8	>1/8 - 1/4	>1/4 - 3/8	>3/8 - 1/2	>1/2 - 3/4	Speed (m/min)	Feed Per Revolution (mm/rev) 1,5 - 3,0	>3,0 - 6,0	>6,0 - 9,0	>9,0 - 12,0	>12,0 - 20,0
Aluminum Alloys	D20	200 - 400	.002 - .003	.003 - .006	.006 - .008	.008 - .010	.010 - .012	61 - 122	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	.2540 - .3048
	D21	200 - 400	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	61 - 122	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
	DT20, DT22, DT21	150 - 350	---	.002 - .004	.004 - .006	.006 - .008	.008 - .012	46 - 107	---	.0508 - .1016	.1016 - .1524	.1524 - .2032	.2032 - .3048
	D10	200 - 400	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	61 - 122	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
Copper Alloys	D20	200 - 275	.002 - .003	.003 - .006	.006 - .008	.008 - .010	.010 - .012	61 - 84	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	.2540 - .3048
	D21	200 - 275	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	61 - 84	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
	DT20, DT22, DT21	150 - 300	---	.002 - .004	.004 - .006	.006 - .008	.008 - .012	46 - 91	---	.0508 - .1016	.1016 - .1524	.1524 - .2032	.2032 - .3048
	D10	200 - 400	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	61 - 122	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
Brass & Bronze	D20	200 - 275	.002 - .003	.003 - .006	.006 - .008	.008 - .010	.010 - .012	61 - 84	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	.2540 - .3048
	D21	200 - 275	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	61 - 84	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
	DT20, DT22, DT21	150 - 300	---	.002 - .004	.004 - .006	.006 - .008	.008 - .012	46 - 91	---	.0508 - .1016	.1016 - .1524	.1524 - .2032	.2032 - .3048
	D10	200 - 400	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	61 - 122	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
Composites, Plastics	D20	200 - 300	.002 - .003	.003 - .006	.006 - .008	.008 - .010	.010 - .012	61 - 91	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	.2540 - .3048
	D21	200 - 300	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	61 - 91	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
	DT20, DT22, DT21	100 - 200	---	.0015 - .003	.003 - .0045	.0045 - .006	.006 - .009	30 - 61	---	.0381 - .0762	.0762 - .1143	.1143 - .1524	.1524 - .2286
	D10	200 - 300	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	61 - 91	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
Magnesium Alloys	D20	200 - 400	.002 - .003	.003 - .006	.006 - .008	.008 - .010	.010 - .012	61 - 122	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	.2540 - .3048
	D21	200 - 400	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	61 - 122	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
	DT20, DT22, DT21	150 - 350	---	.002 - .004	.004 - .006	.006 - .008	.008 - .012	46 - 107	---	.0508 - .1016	.1016 - .1524	.1524 - .2032	.2032 - .3048
	D10	200 - 400	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	61 - 122	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
Cast Iron Gray	D30	300 - 400	.0015 - .003	.003 - .006	.006 - .009	.009 - .012	.012 - .017	91 - 122	.0381 - .0762	.0762 - .1524	.1524 - .2286	.2286 - .3048	.3048 - .4318
	D40	200 - 275	.0012 - .0024	.0016 - .004	.004 - .006	.006 - .008	---	61 - 84	.0305 - .0609	.0406 - .1016	.1016 - .1524	.1524 - .2032	---
	D20	225 - 300	.002 - .003	.003 - .006	.006 - .008	.008 - .010	.010 - .012	69 - 91	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	.2540 - .3048
	D21	225 - 300	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	69 - 91	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
	DT20, DT22, DT21	150 - 300	---	.002 - .004	.004 - .006	.006 - .008	.008 - .012	46 - 91	---	.0508 - .1016	.1016 - .1524	.1524 - .2032	.2032 - .3048
	D10	225 - 300	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	69 - 91	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
Cast Iron Ductile / Malleable	D30	200 - 275	.0015 - .003	.003 - .006	.006 - .009	.009 - .012	.012 - .017	61 - 84	.0381 - .0762	.0762 - .1524	.1524 - .2286	.2286 - .3048	.3048 - .4318
	D40	175 - 225	.0012 - .0024	.0016 - .004	.004 - .006	.006 - .008	---	53 - 69	.0305 - .0609	.0406 - .1016	.1016 - .1524	.1524 - .2032	---
	D20	150-250	.002 - .003	.003 - .006	.006 - .008	.008 - .010	.010 - .012	46 - 76	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	.2540 - .3048
	D21	150 - 250	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	46 - 76	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
	DT20, DT22, DT21	150 - 250	---	.0018 - .0036	.0036 - .005	.005 - .0072	.0072 - .011	46 - 76	---	.0457 - .0914	.0914 - .1270	.1270 - .1828	.1828 - .2794
	D10	150 - 250	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	46 - 76	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
Low Carbon Steel ≤ 38HRc 1018, 12L14, 8620	D30	250 - 400	.0012 - .0025	.0025 - .005	.005 - .007	.007 - .010	.010 - .012	76 - 122	.0305 - .0635	.0635 - .1270	.1270 - .1778	.1778 - .2540	.2540 - .3048
	D20	100 - 175	.002 - .003	.003 - .006	.006 - .008	.008 - .010	.010 - .012	30 - 53	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	.2540 - .3048
	D21	100 - 175	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	30 - 53	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
	D40	100 - 175	.0005 - .002	.002 - .004	.004 - .005	.005 - .006	---	30 - 53	.0127 - .0508	.0508 - .1016	.1016 - .1270	.1270 - .1524	---
	D10	100 - 175	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	30 - 53	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
Medium Carbon Steels ≤ 38HRc 4140, 4340	D30	260 - 330	.0012 - .0025	.0025 - .005	.005 - .007	.007 - .010	.010 - .012	79 - 100	.0305 - .0635	.0635 - .1270	.1270 - .1778	.1778 - .2540	.2540 - .3048
	D40	100 - 175	.0005 - .002	.002 - .004	.004 - .005	.005 - .006	---	30 - 53	.0127 - .0508	.0508 - .1016	.1016 - .1270	.1270 - .1524	---
	D20	75 - 150	.001 - .0015	.0015 - .003	.003 - .004	.004 - .006	.005 - .006	23 - 46	.0254 - .0381	.0381 - .0762	.0762 - .1016	.1016 - .1524	.1270 - .1524
	D21	75 - 150	.001 - .0015	.0015 - .003	.003 - .004	.004 - .006	---	23 - 46	.0254 - .0381	.0381 - .0762	.0762 - .1016	.1016 - .1524	---
	D10	100 - 175	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	30 - 53	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
Tool & Die Steels ≤ 38HRc A2, D2, H13, P20	D30	260 - 330	.0012 - .0025	.0025 - .005	.005 - .007	.007 - .010	.010 - .012	79 - 100	.0305 - .0635	.0635 - .1270	.1270 - .1778	.1778 - .2540	.2540 - .3048
	D40	100 - 175	.0005 - .002	.002 - .004	.004 - .005	.005 - .006	---	30 - 53	.0127 - .0508	.0508 - .1016	.1016 - .1270	.1270 - .1524	---
	DT40	60 - 125	.0004 - .0008	.0008 - .0016	.0016 - .0022	.0022 - .0036	.0036 - .0045	18 - 37	.0101 - .0203	.0203 - .0406	.0406 - .0558	.0558 - .0914	.0914 - .1143
	D10	100 - 175	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	30 - 53	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
Tool & Die Steels 39 - 48 HRc A2, D2, H13, P20	D30	200 - 300	.0007 - .0015	.0015 - .003	.003 - .004	.004 - .006	.006 - .008	61 - 91	.0178 - .0381	.0381 - .0762	.0762 - .1016	.1016 - .1524	.1524 - .2032
	D40	75 - 125	.0005 - .002	.002 - .004	.004 - .005	.005 - .006	---	23 - 37	.0127 - .0508	.0508 - .1016	.1016 - .1270	.1270 - .1524	---
	DT40	60 - 125	.0004 - .0008	.0008 - .0016	.0016 - .0022	.0022 - .0036	.0036 - .0045	18 - 37	.0101 - .0203	.0203 - .0406	.0406 - .0558	.0558 - .0914	.0914 - .1143
Tool Steels > 48 HRc A2, D2	D40	40 - 75	.0008 - .001	.001 - .0015	.0015 - .002	.002 - .003	---	12 - 23	.0203 - .0254	.0254 - .0381	.0381 - .0508	.0508 - .0762	---
	DT40	25 - 60	.0004 - .0008	.0008 - .0016	.0016 - .0022	.0022 - .0036	.0036 - .0045	8 - 18	.0101 - .0203	.0203 - .0406	.0406 - .0558	.0558 - .0914	.0914 - .1143
Easy to Machine Stainless Steel 416, 410, 302, 303	D20	80 - 180	.002 - .003	.003 - .006	.006 - .008	.008 - .010	.010 - .012	24 - 53	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	.2540 - .3048
	D21	80 - 180	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	24 - 53	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
	DT20, DT22, DT21	80 - 180	---	.0012 - .0025	.0025 - .005	.005 - .006	---	24 - 53	---	.0305 - .0635	.0635 - .1270	.1270 - .1524	---
	D10	80 - 180	.002 - .003	.003 - .006	.006 - .008	.008 - .010	---	24 - 53	.0508 - .0762	.0762 - .1524	.1524 - .2032	.2032 - .2540	---
Moderate Machining Stainless Steels 304, 316, Invar, Kovar	D40	75 - 140	.0005 - .001	.001 - .002	.002 - .003	.003 - .004	---	23 - 42	.0127 - .0254	.0254 - .0508	.0508 - .0762	.0762 - .1016	---
	D20	60 - 125	.0003 - .0015	.0015 - .003	.003 - .0045	.0045 - .006	.006 - .009	18 - 37	.0076 - .0381	.0381 - .0762	.0762 - .1143	.1143 - .1524	.1524 - .2286
	D21	60 - 125	.0003 - .0015	.0015 - .003	.003 - .0045	.0045 - .006	---	18 - 37	.0076 - .0381	.0381 - .0762	.0762 - .1143	.1143 - .1524	---
	D10	60 - 125	.0003 - .0015	.0015 - .003	.003 - .0045	.0045 - .006	---	18 - 37	.0076 - .0381	.0381 - .0762	.0762 - .1143	.1143 - .1524	---
Difficult Stainless Steels 316L, 17-4, 15-5, 13-8	D40	50 - 100	.001 - .002	.002 - .004	.004 - .005	.005 - .006	---	15 - 30	.0254 - .0508	.0508 - .1016	.1016 - .1270	.1270 - .1524	---
Titanium	D30	100 - 165	.0007 - .0015	.0015 - .003	.003 - .005	.005 - .007	.007 - .010	30 - 50	.0178 - .0381	.0381 - .0762	.0762 - .1270	.1270 - .1778	.1778 - .2540
	D40	50 - 100	.001 - .002	.002 - .004	.004 - .005	.005 - .006	---	15 - 30	.0254 - .0508	.0508 - .1016	.1016 - .1270	.1270 - .1524	---
High Temp Alloys, Inconel®, Hastalloy	D40	50 - 100	.001 - .002	.002 - .004	.004 - .005	.005 - .006	---	15 - 30	.0254 - .0508	.0508 - .1016	.1016 - .1270	.1270 - .1524	---
	DT40	25 - 60	.0004 - .0008	.0008 - .0016	.0016 - .0022	.0022 - .0036	.0036 - .0045	8 - 18	.0101 - .0203	.0203 - .0406	.0406 - .0558	.0558 - .0914	.0914 - .1143

All recommendations should be considered as a starting point. Material properties, machine capabilities and setup rigidity will affect these values.

3 Helical Flutes
For improved hole roundness

D30



in d_1 +0.0 / -0.0005 **mm** d_1 h7

Three flute twist drills reduce chip load per flute for longer tool life. The self-centering drill point geometry allows easy penetration of the workpiece with minimal deflection and wandering. Three flute drills also improve hole roundness and hole tolerance. The three flute drill can also be used in aluminum by modifying the point geometry. *See page 161.*

Carbon & tool steels ≤ 48 HRC	✓✓
Stainless steels 400 series & PH series only	✓
Cast irons	✓✓

✓ Good ✓✓ Very Good

Inch • Metric

d_1 Cutter Dia Inch	d_1 Cutter Dia Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	3	.1181	16	46	40001	16.28
	3	.1181	31	57	44217	16.80
	3,1	.1220	18	49	40002	16.28
	3,1	.1220	31	57	44218	16.80
1/8		.1250	1-1/4	2-1/4	40003	16.70
	3,2	.1260	18	49	40004	16.49
	3,2	.1260	31	57	44219	17.01
	3,3	.1299	18	49	40006	16.75
	3,3	.1299	31	57	44221	17.22

continued in next column

Inch • Metric • Continued

d_1 Cutter Dia Inch	d_1 Cutter Dia Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	3,4	.1339	20	52	40007	17.17
	3,4	.1339	34	63	44222	17.69
#29		.1360	1-3/8	2-1/2	40008	17.43
	3,5	.1378	20	52	40009	17.27
	3,5	.1378	34	63	44223	17.80
9/64		.1406	1-3/8	2-1/2	40012	17.75
	3,6	.1417	20	52	40015	17.59
	3,6	.1417	34	63	44224	18.17
	3,7	.1457	20	52	40018	18.17
	3,7	.1457	34	63	44225	18.69
#25		.1495	1-3/8	2-1/2	40033	19.01
	3,8	.1496	22	55	40036	19.16
	3,8	.1496	34	63	44227	19.74
	3,9	.1535	22	55	40042	19.90
	3,9	.1535	34	63	44228	20.48
5/32		.1562	1-3/8	2-1/2	40048	21.05
	4	.1575	22	55	40054	20.84
	4	.1575	34	63	44229	21.47
#21		.1590	1-3/8	2-1/2	40057	21.16
#20		.1610	1-3/8	2-1/2	40060	21.47
	4,1	.1614	22	55	40063	21.37
	4,1	.1614	34	63	44230	22.05
	4,2	.1654	22	55	40066	21.74
	4,2	.1654	41	70	44231	22.63
#19		.1660	1-5/8	2-3/4	40072	22.16
11/64		.1719	1-5/8	2-3/4	40078	22.79
	4,4	.1732	24	58	40081	22.47
	4,4	.1732	41	70	44234	23.36
	4,5	.1772	24	58	40084	23.00
	4,5	.1772	41	70	44235	23.94
	4,6	.1811	24	58	40087	23.36
	4,6	.1811	41	70	44236	24.26
3/16		.1875	1-5/8	2-3/4	40090	24.41
	4,8	.1890	26	62	40093	24.20
	4,8	.1890	41	70	44239	25.20
	4,9	.1929	26	62	40099	24.78
	4,9	.1929	41	70	44240	25.73
	5	.1969	26	62	40102	25.52
	5	.1969	44	76	44241	26.51
	5,1	.2008	26	62	40105	26.78
	5,1	.2008	44	76	44242	27.83
13/64		.2031	1-3/4	3	40114	27.72
	5,2	.2047	26	62	40117	27.20
	5,2	.2047	44	76	44243	28.30
#3		.2130	1-3/4	3	40123	29.61
	5,5	.2165	28	66	40126	29.77
	5,5	.2165	44	76	44247	30.98
7/32		.2188	1-3/4	3	40132	31.03
	5,6	.2205	28	66	40135	30.45
	5,6	.2205	44	76	44248	31.66
	5,8	.2283	28	66	40138	30.98
	5,8	.2283	44	76	44251	32.18

continued on next page

TRI-FLUTE D30 DRILLS

For drilling low carbon steel, alloy steel and cast iron

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
15/64		.2344	2	3-1/4	40141	33.55
	6	.2362	28	66	40144	33.23
	6	.2362	51	82	44253	34.55
	6,1	.2402	31	70	40147	33.55
	6,1	.2402	51	82	44254	34.91
	6,2	.2441	31	70	40150	34.28
	6,2	.2441	51	82	44255	35.65
1/4		.2500	2	3-1/4	40156	34.18
	6,4	.2520	31	70	40159	35.02
	6,4	.2520	51	82	44258	36.44
	6,5	.2559	31	70	40165	34.76
	6,5	.2559	51	82	44259	36.17
F		.2570	2	3-1/4	40167	35.70
	6,6	.2598	31	70	40168	37.54
	6,6	.2598	54	89	44260	39.01
17/64		.2656	2-1/8	3-1/2	40174	37.96
	6,8	.2677	34	74	40177	38.06
	6,8	.2677	54	89	44263	39.59
	6,9	.2717	34	74	40179	38.85
	6,9	.2717	54	89	44264	40.37
	7	.2756	34	74	40183	39.59
	7	.2756	54	89	44265	41.16
9/32		.2812	2-1/8	3-1/2	40186	39.85
	7,2	.2835	34	74	40189	41.00
	7,2	.2835	54	89	44267	42.63
	7,4	.2913	34	74	40195	43.79
	7,4	.2913	60	95	44270	45.52
	7,5	.2953	34	74	40197	44.42
	7,5	.2953	60	95	44271	46.20
19/64		.2969	2-3/8	3-3/4	40198	45.68
	7,6	.2992	37	79	40240	44.84
	7,6	.2992	60	95	44272	46.67
	7,8	.3071	37	79	40243	47.88
	7,8	.3071	60	95	44275	49.77
5/16		.3125	2-3/8	3-3/4	40246	47.09
	8	.3150	37	79	40249	47.88
	8	.3150	60	95	44277	49.77
	8,1	.3189	37	79	40252	48.72
	8,1	.3189	60	95	44278	50.72
	8,2	.3228	37	79	40255	49.46
	8,2	.3228	63	101	44279	51.45
21/64		.3281	2-1/2	4	40261	52.19
	8,4	.3307	37	79	40267	51.92
	8,4	.3307	63	101	44282	54.02
Q		.3320	2-1/2	4	40270	53.81
	8,5	.3346	37	79	40273	52.76
	8,5	.3346	63	101	44283	54.97
	8,6	.3386	40	84	40279	53.71
	8,6	.3386	63	101	44284	55.86
11/32		.3438	2-1/2	4	40285	55.28
	8,8	.3465	40	84	40288	56.49
	8,8	.3465	63	101	44287	58.75

continued in next column

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	9	.3543	40	84	40291	60.11
	9	.3543	70	108	44289	62.53
	9,1	.3583	40	84	40294	61.95
	9,1	.3583	70	108	44290	64.47
23/64		.3594	2-3/4	4-1/4	40297	63.05
	9,2	.3622	40	84	40300	62.27
	9,2	.3622	70	108	44291	64.73
	9,5	.3740	40	84	40306	67.25
	9,5	.3740	70	108	44295	69.93
3/8		.3750	2-3/4	4-1/4	40309	66.57
	9,6	.3780	43	89	40312	69.20
	9,6	.3780	70	108	44296	71.87
25/64		.3906	2-7/8	4-1/2	40324	78.86
	10	.3937	43	89	40327	77.44
	10	.3937	73	114	44301	79.80
	10,2	.4016	43	89	40333	80.75
	10,2	.4016	73	114	44303	83.16
13/32		.4062	2-7/8	4-1/2	40339	85.16
	10,4	.4094	43	89	40342	86.00
	10,4	.4094	73	114	44306	88.62
	10,5	.4134	43	89	40345	85.58
	10,5	.4134	73	114	44307	88.15
27/64		.4219	2-7/8	4-1/2	40354	89.36
	10,8	.4252	47	95	40357	92.61
	10,8	.4252	73	114	44311	95.39
	11	.4331	47	95	40360	95.45
	11	.4331	73	114	44313	98.28
7/16		.4375	2-7/8	4-1/2	40363	97.18
	11,5	.4528	47	95	40369	104.90
	11,5	.4528	76	120	44319	108.05
29/64		.4531	3	4-3/4	40372	105.32
	12	.4724	51	102	40378	110.30
	12	.4724	76	120	44325	113.56
	12,5	.4921	51	102	40381	114.03
	12,5	.4921	76	120	44331	117.50
1/2		.5000	3	4-3/4	40384	112.98
	13	.5118	51	102	40387	145.11
	13	.5118	82	127	44336	149.47
	13,5	.5315	54	107	40393	179.97
	13,5	.5315	82	127	44337	185.38
	14	.5512	54	107	40396	172.46
	14	.5512	82	127	44338	177.66
9/16		.5625	3-1/4	5	40399	184.43
	14,5	.5709	56	111	40402	222.65
	14,5	.5709	82	127	44339	229.37
	15	.5906	56	111	40405	213.05
	15	.5906	82	127	44340	219.45
	15,5	.6102	58	115	40408	213.05
	15,5	.6102	82	127	44341	219.45
5/8		.6250	3-1/4	5	40411	208.22
	16	.6299	58	115	40414	192.78
	16	.6299	82	127	44342	198.56

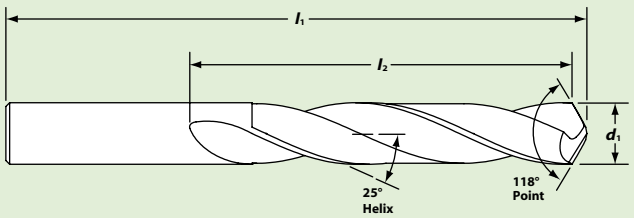
2 Helical Flutes

For use in abrasive and easily machined materials

D20

Solid carbide

Precision ground jobber length twist drills are designed for high feed rates with good chip disposal. Solid carbide construction allows extra rigidity and is especially useful under high drilling temperatures and where greater torsional stresses are encountered.



in d_1 +0.0 / -0.0005 **mm** d_1 h7

- For most general purpose drilling applications
- Excellent in highly abrasive materials
- HARDLUBE coating (page 162) available upon request

Carbon & tool steels ≤ 48 HRC	✓
Stainless steels	✓
Cast irons	✓
Aluminum and non-ferrous	✓✓

✓ Good ✓✓ Very Good

Inch • Metric

d_1 Cutter Dia Inch	d_1 Cutter Dia Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	1	.0394	19	38	40433	12.71
#60		.0400	3/4	1-1/2	40364	10.61
#59		.0410	3/4	1-1/2	40361	10.61
	1,05	.0413	19	38	40427	15.54
#58		.0420	3/4	1-1/2	40358	10.61
#57		.0430	3/4	1-1/2	40355	10.61
	1,1	.0433	19	38	40428	15.65
	1,15	.0453	19	38	40429	15.75
#56		.0465	3/4	1-1/2	40352	10.61
3/64		.0469	3/4	1-1/2	40016	10.61
	1,2	.0472	19	38	40430	15.80
	1,25	.0492	19	38	40432	16.01
	1,3	.0512	19	38	40435	16.12
#55		.0520	3/4	1-1/2	40349	10.61
	1,35	.0531	19	38	40436	16.17
#54		.0550	3/4	1-1/2	40346	10.61
	1,4	.0551	19	38	40437	16.38
	1,45	.0571	19	38	40438	15.44
	1,5	.0591	19	38	40442	12.65
#53		.0595	3/4	1-1/2	40343	10.61
	1,55	.0610	19	38	40439	15.65
1/16		.0625	3/4	1-1/2	40019	10.03
	1,6	.0630	19	38	40440	15.75
#52		.0635	3/4	1-1/2	40340	10.61
	1,65	.0650	19	38	40441	15.80
	1,7	.0669	19	38	40445	16.01
#51		.0670	3/4	1-1/2	40337	10.61
	1,75	.0689	19	38	40446	16.12
#50		.0700	7/8	1-3/4	40334	10.87
	1,8	.0709	22	44	40447	16.17
	1,85	.0728	22	44	40448	16.28
#49		.0730	7/8	1-3/4	40331	11.18
	1,9	.0748	22	44	40449	16.38
#48		.0760	7/8	1-3/4	40328	11.34
	1,95	.0768	22	44	40450	16.49
5/64		.0781	7/8	1-3/4	40022	11.13
#47		.0785	7/8	1-3/4	40325	11.34
	2	.0787	22	44	40451	13.44
	2,05	.0807	22	44	40455	12.08
#46		.0810	7/8	1-3/4	40322	11.34
#45		.0820	7/8	1-3/4	40319	11.50
	2,1	.0827	22	44	40456	13.23
	2,15	.0846	25	50	40457	13.23
#44		.0860	1	2	40316	11.97
	2,2	.0866	25	50	40458	13.23
	2,25	.0886	25	50	40459	13.44
#43		.0890	1	2	40313	11.97
	2,3	.0906	25	50	40462	13.44
	2,35	.0925	25	50	40463	13.55
#42		.0935	1	2	40310	12.02
3/32		.0938	1	2	40025	11.45
	2,4	.0945	25	50	40465	13.65
#41		.0960	1	2	40307	12.08

continued on next page

JOBBER LENGTH D20 DRILLS

For general purpose drilling applications

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	2,45	.0965	25	50	40466	13.86
#40		.0980	1	2	40304	12.18
	2,5	.0984	25	50	40460	13.86
#39		.0995	1-1/4	2-1/4	40301	12.29
#38		.1015	1-1/4	2-1/4	40298	12.34
	2,6	.1024	31	57	40467	14.81
#37		.1040	1-1/4	2-1/4	40295	12.34
	2,7	.1063	31	57	40468	14.81
#36		.1065	1-1/4	2-1/4	40292	12.34
	2,75	.1083	31	57	40471	15.02
7/64		.1094	1-1/4	2-1/4	40028	12.55
#35		.1100	1-1/4	2-1/4	40289	12.55
	2,8	.1102	31	57	40475	15.02
#34		.1110	1-1/4	2-1/4	40286	12.92
#33		.1130	1-1/4	2-1/4	40283	12.92
	2,9	.1142	31	57	40476	15.59
#32		.1160	1-1/4	2-1/4	40280	13.23
	3	.1181	31	57	40469	15.38
#31		.1200	1-1/4	2-1/4	40277	13.39
	3,1	.1220	31	57	40477	16.01
1/8		.1250	1-1/4	2-1/4	40031	13.07
	3,2	.1260	31	57	40480	16.22
	3,25	.1280	31	57	40482	16.38
#30		.1285	1-1/4	2-1/4	40274	13.97
	3,3	.1299	31	57	40483	16.38
	3,4	.1339	34	63	40485	16.38
#29		.1360	1-3/8	2-1/2	40271	14.12
	3,5	.1378	34	63	40478	16.22
#28		.1405	1-3/8	2-1/2	40268	14.44
9/64		.1406	1-3/8	2-1/2	40034	15.49
	3,6	.1417	34	63	40486	16.75
#27		.1440	1-3/8	2-1/2	40265	15.02
	3,7	.1457	34	63	40489	17.43
#26		.1470	1-3/8	2-1/2	40262	15.33
	3,75	.1476	34	63	40490	18.22
#25		.1495	1-3/8	2-1/2	40259	15.38
	3,8	.1496	34	63	40491	18.22
#24		.1520	1-3/8	2-1/2	40256	15.86
	3,9	.1535	34	63	40492	18.95
#23		.1540	1-3/8	2-1/2	40253	16.43
5/32		.1562	1-3/8	2-1/2	40037	16.22
#22		.1570	1-3/8	2-1/2	40250	17.48
	4	.1575	34	63	40487	19.37

continued in next column

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
#21		.1590	1-3/8	2-1/2	40247	17.69
#20		.1610	1-3/8	2-1/2	40244	17.85
	4,1	.1614	34	63	40493	20.00
	4,2	.1654	41	70	40494	20.53
#19		.1660	1-5/8	2-3/4	40241	18.53
	4,25	.1673	41	70	40495	20.53
	4,3	.1693	41	70	40498	20.79
#18		.1695	1-5/8	2-3/4	40238	18.69
11/64		.1719	1-5/8	2-3/4	40040	19.06
#17		.1730	1-5/8	2-3/4	40235	19.06
	4,4	.1732	41	70	40499	21.21
#16		.1770	1-5/8	2-3/4	40232	19.37
	4,5	.1772	41	70	40496	21.47
#15		.1800	1-5/8	2-3/4	40229	19.53
	4,6	.1811	41	70	40500	21.95
#14		.1820	1-5/8	2-3/4	40226	19.43
	4,7	.1850	41	70	40501	22.10
#13		.1850	1-5/8	2-3/4	40223	19.85
	4,75	.1870	41	70	40502	23.52
3/16		.1875	1-5/8	2-3/4	40043	19.11
	4,8	.1890	41	70	40503	22.84
#12		.1890	1-5/8	2-3/4	40220	20.16
#11		.1910	1-5/8	2-3/4	40217	20.53
	4,9	.1929	41	70	40504	23.52
#10		.1935	1-5/8	2-3/4	40214	20.84
#9		.1960	1-3/4	3	40211	21.32
	5	.1969	44	76	40505	23.94
#8		.1990	1-3/4	3	40208	21.84
	5,1	.2008	44	76	40507	25.31
#7		.2010	1-3/4	3	40205	22.10
13/64		.2031	1-3/4	3	40046	23.31
#6		.2040	1-3/4	3	40202	23.00
	5,2	.2047	44	76	40508	25.67
#5		.2055	1-3/4	3	40199	23.31
	5,25	.2067	44	76	40509	27.46
	5,3	.2087	44	76	40510	26.83
#4		.2090	1-3/4	3	40196	23.89
	5,4	.2126	44	76	40512	27.41
#3		.2130	1-3/4	3	40193	24.52
	5,5	.2165	44	76	40514	27.04
7/32		.2188	1-3/4	3	40049	24.10
	5,6	.2205	44	76	40513	28.67
#2		.2210	1-3/4	3	40190	25.46

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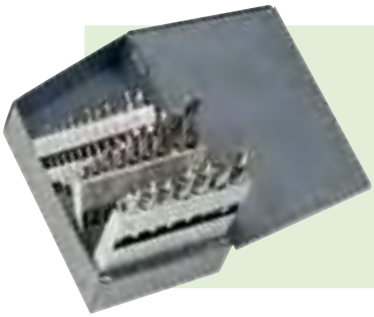


D20 Sets

Set Code	Set Contents	EDP Number	List Price
DS-1	13 pieces 1/16 to 1/4 by 64ths	41590	217.09
DS-2	29 pieces 1/16 to 1/2 by 64ths	41591	1183.77

JOBBER LENGTH D20 DRILLS

For general purpose drilling applications

D20

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	5,7	.2244	44	76	40515	28.61
	5,75	.2264	44	76	40516	30.40
#1		.2280	1-3/4	3	40187	26.83
	5,8	.2283	44	76	40517	29.19
	5,9	.2323	51	82	40518	30.35
A		.2340	2	3-1/4	40109	29.72
15/64		.2344	2	3-1/4	40052	26.72
	6	.2362	51	82	40523	29.93
B		.2380	2	3-1/4	40112	30.50
	6,1	.2402	51	82	40519	32.34
C		.2420	2	3-1/4	40115	30.61
	6,2	.2441	51	82	40520	33.02
D		.2460	2	3-1/4	40118	31.45
	6,25	.2461	51	82	40522	33.02
	6,3	.2480	51	82	40525	33.76
1/4		.2500	2	3-1/4	40055	27.25
	6,4	.2520	51	82	91840	37.01
	6,5	.2559	51	82	40532	35.49
F		.2570	2	3-1/4	40124	33.39
	6,6	.2598	54	89	40526	35.60
G		.2610	2-1/8	3-1/2	40127	33.92
	6,7	.2638	54	89	40527	34.76
17/64		.2656	2-1/8	3-1/2	40058	29.82
	6,75	.2657	54	89	40528	35.86
H		.2660	2-1/8	3-1/2	40130	34.86
	6,8	.2677	54	89	40529	36.65
	6,9	.2717	54	89	40530	37.38
I		.2720	2-1/8	3-1/2	40133	35.54
	7	.2756	54	89	40541	39.74
J		.2770	2-1/8	3-1/2	40136	36.38
	7,1	.2795	54	89	40535	38.38
K		.2810	2-1/8	3-1/2	40139	36.70
9/32		.2812	2-1/8	3-1/2	40061	32.18
	7,2	.2835	54	89	40536	40.58
	7,25	.2854	54	89	40537	41.69
	7,3	.2874	54	89	40538	42.53
L		.2900	2-1/8	3-1/2	40142	38.48
	7,4	.2913	60	95	40539	43.37
M		.2950	2-3/8	3-3/4	40145	39.80
	7,5	.2953	60	95	40550	43.37
19/64		.2969	2-3/8	3-3/4	40064	36.59
	7,6	.2992	60	95	40540	44.47
N		.3020	2-3/8	3-3/4	40148	42.21
	7,7	.3031	60	95	40543	44.94
	7,75	.3051	60	95	40545	45.57
	7,8	.3071	60	95	40546	47.41
	7,9	.3110	60	95	40547	47.41
5/16		.3125	2-3/8	3-3/4	40067	38.90
	8	.3150	60	95	40559	44.10
O		.3160	2-3/8	3-3/4	40151	44.68
	8,1	.3189	60	95	40548	48.25
	8,2	.3228	60	95	40549	48.98

continued in next column

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
P		.3230	2-3/8	3-3/4	40154	46.15
	8,25	.3248	63	101	40555	49.82
	8,3	.3268	63	101	40556	50.72
21/64		.3281	2-1/2	4	40070	42.37
	8,4	.3307	63	101	40557	51.50
Q		.3320	2-1/2	4	40157	48.98
	8,5	.3346	63	101	40568	52.29
	8,6	.3386	63	101	40558	53.18
R		.3390	2-1/2	4	40160	50.51
	8,7	.3425	63	101	40565	53.81
11/32		.3438	2-1/2	4	40073	46.99
	8,75	.3445	63	101	40566	55.07
	8,8	.3465	63	101	40567	55.91
S		.3480	2-1/2	4	40163	55.49
	8,9	.3504	63	101	40570	57.70
	9	.3543	70	108	40577	59.54
T		.3580	2-3/4	4-1/4	40166	57.44
	9,1	.3583	70	108	40575	61.37
23/64		.3594	2-3/4	4-1/4	40076	51.24
	9,2	.3622	70	108	40576	61.37
	9,25	.3642	70	108	40579	62.53
	9,3	.3661	70	108	40580	63.63
U		.3680	2-3/4	4-1/4	40169	58.59
	9,4	.3701	70	108	40582	65.10
	9,5	.3740	70	108	40586	61.64
3/8		.3750	2-3/4	4-1/4	40079	55.60
V		.3770	2-3/4	4-1/4	40172	64.68
	9,6	.3780	70	108	40583	68.51
	9,7	.3819	70	108	40585	70.56
	9,75	.3839	70	108	40588	71.77
	9,8	.3858	70	108	40589	73.40
W		.3860	2-7/8	4-1/2	40175	68.57
	9,9	.3898	73	114	40590	75.02
25/64		.3906	2-7/8	4-1/2	40082	62.90
	10	.3937	73	114	40595	73.29
X		.3970	2-7/8	4-1/2	40178	74.18
	10,1	.3976	73	114	40591	78.28
	10,2	.4016	73	114	40592	80.01
	10,25	.4035	73	114	40593	82.79
Y		.4040	2-7/8	4-1/2	40181	73.66
	10,3	.4055	73	114	40594	83.16
13/32		.4062	2-7/8	4-1/2	40085	69.77
	10,4	.4094	73	114	40597	85.21
Z		.4130	2-7/8	4-1/2	40184	81.32
	10,5	.4134	73	114	40598	83.95
	10,6	.4173	73	114	40599	89.09
	10,7	.4213	73	114	40600	91.14
27/64		.4219	2-7/8	4-1/2	40088	76.34
	10,75	.4232	73	114	40601	92.77
	10,8	.4252	73	114	40602	94.40
	10,9	.4291	73	114	40603	95.97
	11	.4331	73	114	40604	93.61
	11,1	.4370	73	114	40606	99.12

continued on next page

STUB LENGTH D21 DRILLS

For general purpose drilling applications

D20

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
7/16		.4375	2-7/8	4-1/2	40091	82.69
	11,2	.4409	76	120	40607	100.22
	11,25	.4429	76	120	40608	101.85
	11,3	.4449	76	120	40609	103.53
	11,4	.4488	76	120	40610	105.21
	11,5	.4528	76	120	40612	102.22
29/64		.4531	3	4-3/4	40094	89.57
	11,6	.4567	76	120	40615	108.57
	11,7	.4606	76	120	40616	110.15
	11,75	.4626	76	120	40617	111.88
	11,8	.4646	76	120	40618	113.45
	11,9	.4685	76	120	40619	115.13
15/32		.4688	3	4-3/4	40097	96.44
	12	.4724	76	120	40613	108.73
	12,1	.4764	76	120	40620	116.76
	12,2	.4803	76	120	40625	117.55
	12,25	.4823	76	120	40626	118.23
	12,3	.4843	76	120	40627	119.02
31/64		.4844	3	4-3/4	40100	99.28
	12,4	.4882	76	120	40628	119.96
	12,5	.4921	76	120	40629	120.70
	12,6	.4961	76	120	40630	121.59
	12,7	.5000	76	120	40632	122.80
1/2		.5000	3	4-3/4	40103	101.80

continued in next column

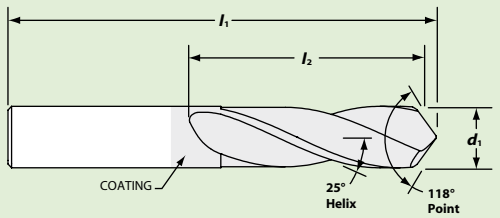
Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	13	.5118	82	127	40633	143.80
17/32		.5312	3-1/4	5	97346	143.80
	13,5	.5315	82	127	40635	188.95
	14	.5512	82	127	40636	181.13
9/16		.5625	3-1/4	5	40106	187.16
	14,5	.5709	82	127	40637	233.78
	15	.5906	82	127	40638	223.70
19/32		.5937	3-1/4	5	97943	223.70
	15,5	.6102	82	127	40639	223.70
5/8		.6250	3-1/4	5	40107	226.12
	16	.6299	82	127	40640	202.44
	16,5	.6496	89	140	40642	303.56
21/32		.6562	3-1/2	5-1/2	40787	303.56
	17	.6693	89	140	40643	303.56
11/16		.6875	3-1/2	5-1/2	40645	282.29
	17,5	.6890	89	140	40646	282.29
	18	.7087	89	140	40647	351.54
23/32		.7187	3-1/2	5-1/2	40788	351.54
	18,5	.7283	89	140	40648	351.54
	19	.7480	95	152	40649	330.23
3/4		.7500	3-3/4	6	40108	274.37
	19,5	.7677	95	152	40719	437.22
25/32		.7812	3-3/4	6	40725	406.93
	20	.7874	95	152	40786	406.93

2 Helical Flutes

- For most general purpose drilling applications
- Excellent in highly abrasive materials
- Stub length for extra rigidity
- **TiN** coated

Coating:
TiN



in d_1 +0.0 / -0.0005

D21

Solid carbide

Carbon & tool steels ≤ 48 HRC	✓
Stainless steels	✓
Cast irons	✓
Aluminum and non-ferrous	✓✓

✓ Good ✓✓ Very Good

Inch

d_1 Cutter Dia	Dec Equiv	l_2 Flute Length	l_1 Overall Length	TiN EDP Number	List Price
1/8	.1250	5/8	2	41408	16.12
9/64	.1406	5/8	2	41409	16.59
5/32	.1562	3/4	2-1/2	41410	18.59
11/64	.1719	3/4	2-1/2	41411	21.21
3/16	.1875	3/4	2-1/2	41412	21.84
13/64	.2031	3/4	2-1/2	41413	23.99
7/32	.2188	1	2-1/2	41414	25.10
15/64	.2344	1	2-1/2	41415	27.62
1/4	.2500	1	2-1/2	41416	28.88
17/64	.2656	1	2-1/2	41417	31.08
9/32	.2812	1	2-1/2	41418	32.50
19/64	.2969	1-1/4	2-3/4	41419	35.91
5/16	.3125	1-1/4	2-3/4	41420	39.11

continued in next column

Inch • Continued

d_1 Cutter Dia	Dec Equiv	l_2 Flute Length	l_1 Overall Length	TiN EDP Number	List Price
21/64	.3281	1-1/4	2-3/4	41421	42.00
11/32	.3438	1-1/4	3	41422	44.78
23/64	.3594	1-1/4	3	41423	48.72
3/8	.3750	1-1/4	3	41424	49.46
25/64	.3906	1-1/4	3	41425	56.54
13/32	.4062	1-1/4	3	41426	63.89
27/64	.4219	1-1/4	3	41427	68.83
7/16	.4375	1-1/4	3	41428	72.35
29/64	.4531	1-1/4	3	41429	82.90
15/32	.4688	1-1/4	3	41430	85.37
31/64	.4844	1-1/4	3	41431	88.31
1/2	.5000	1-1/4	3	41432	90.46

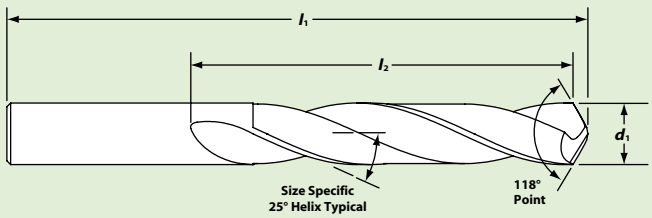
2 Helical Flutes

For use in non-ferrous materials

DT20

Carbide tipped

Jobber length twist drills are designed for production drilling of cast iron, non-ferrous metals, composites, plastics and non-metals. Carbide tips are high-temperature brazed to hardened HSS bodies.



in d_1 ≤1/4 +0.0 / -0.0007 >1/4 +0.0 / -0.0010 **mm** d_1 ≤ 6,35 +0.0 / -0,018 >6,35 +0.0 / -0,025

- Cam relieved point with high strength edge
- Carbide tipped design for economical drilling

Carbon & tool steels ≤ 48 HRC	✓
Stainless steels	✓
Cast irons	✓
Aluminum and non-ferrous	✓✓

✓ Good ✓✓ Very Good

Inch • Metric

d_1 Cutter Dia Inch	d_1 Cutter Dia Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
#32		.1160	1-5/8	2-3/4	40898	11.45
	3	.1181	41	70	41901	13.34
#31		.1200	1-5/8	2-3/4	40897	11.18
1/8		.1250	1-5/8	2-3/4	40801	12.08
#30		.1285	1-5/8	2-3/4	40896	12.08
#29		.1360	2	3-1/8	40895	12.92
	3,5	.1378	44	73	41906	13.44
#28		.1405	2	3-1/8	40894	13.18
9/64		.1406	2	3-1/8	40802	13.02
#27		.1440	2	3-1/8	40893	13.18
#26		.1470	2	3-1/8	40892	12.86
#25		.1495	2	3-1/8	40891	12.86
#24		.1520	2	3-1/8	40890	13.18
#23		.1540	2	3-1/8	40889	12.86
5/32		.1562	2	3-1/8	40803	12.81
#22		.1570	2	3-1/8	40888	14.23
	4	.1575	54	83	41911	13.02
#21		.1590	2	3-1/8	40887	13.65
#20		.1610	2-5/16	3-1/2	40886	13.86
#19		.1660	2-5/16	3-1/2	40885	13.86
#18		.1695	2-5/16	3-1/2	40884	13.86
11/64		.1719	2-5/16	3-1/2	40804	13.86
#17		.1730	2-5/16	3-1/2	40883	13.86
#16		.1770	2-5/16	3-1/2	40882	13.65
	4,5	.1772	56	86	41916	13.86
#15		.1800	2-5/16	3-1/2	40881	14.23
#14		.1820	2-5/16	3-1/2	40880	13.65
#13		.1850	2-5/16	3-1/2	40879	13.65
3/16		.1875	2-5/16	3-1/2	40805	13.65
#12		.1890	2-5/16	3-1/2	40878	14.23
#11		.1910	2-5/16	3-1/2	40877	14.44
#10		.1935	2-1/2	3-3/4	40876	14.23
#9		.1960	2-1/2	3-3/4	40875	14.44
	5	.1969	62	92	41919	14.44
#8		.1990	2-1/2	3-3/4	40874	14.44
#7		.2010	2-1/2	3-3/4	40873	14.44
13/64		.2031	2-1/2	3-3/4	40806	14.91
#6		.2040	2-1/2	3-3/4	40872	14.75
#5		.2055	2-1/2	3-3/4	40871	14.39
#4		.2090	2-1/2	3-3/4	40870	14.75
#3		.2130	2-1/2	3-3/4	40869	14.39
	5,5	.2165	64	95	41924	14.70
7/32		.2188	2-1/2	3-3/4	40807	14.81
#2		.2210	2-1/2	3-3/4	40868	15.54
#1		.2280	2-3/4	4	40867	15.23
A		.2340	2-3/4	4	40841	16.85
15/64		.2344	2-3/4	4	40808	16.07
	6	.2362	70	102	41929	16.38
B		.2380	2-3/4	4	40842	16.85
C		.2420	2-3/4	4	40843	16.85
D		.2460	2-3/4	4	40844	16.54
1/4		.2500	2-3/4	4	40809	16.07

continued on next page

STUB LENGTH DT21 DRILLS

For general purpose drilling applications

Inch • Metric • Continued

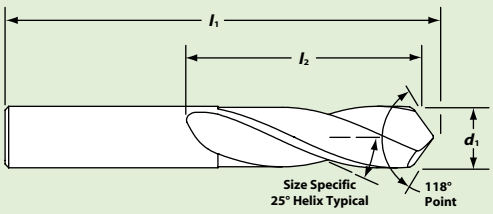
d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	6,5	.2559	73	105	41934	16.38
F		.2570	2-15/16	4-1/4	40846	18.95
G		.2610	2-15/16	4-1/4	40847	19.37
17/64		.2656	2-15/16	4-1/4	40810	18.90
H		.2660	2-15/16	4-1/4	40848	19.79
I		.2720	2-15/16	4-1/4	40849	19.37
	7	.2756	73	105	41939	19.27
J		.2770	2-15/16	4-1/4	40850	19.79
K		.2810	2-15/16	4-1/4	40851	20.53
9/32		.2812	2-15/16	4-1/4	40811	18.90
L		.2900	3-3/16	4-1/2	40852	19.79
M		.2950	3-3/16	4-1/2	40853	22.63
	7,5	.2953	78	111	41944	20.84
19/64		.2969	3-3/16	4-1/2	40812	20.84
N		.3020	3-3/16	4-1/2	40854	21.37
5/16		.3125	3-3/16	4-1/2	40813	20.42
	8	.3150	81	114	41949	20.84
O		.3160	3-3/16	4-1/2	40855	20.95
P		.3230	3-7/16	4-3/4	40856	22.31
21/64		.3281	3-7/16	4-3/4	40814	21.74
Q		.3320	3-7/16	4-3/4	40857	22.79
	8,5	.3346	87	121	41954	22.21
R		.3390	3-7/16	4-3/4	40858	22.31
11/32		.3438	3-7/16	4-3/4	40815	21.74
S		.3480	3-5/8	5	40859	24.10

continued in next column

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	9	.3543	89	124	41959	23.57
T		.3580	3-5/8	5	40860	24.68
23/64		.3594	3-5/8	5	40816	23.15
U		.3680	3-5/8	5	40861	23.63
	9,5	.3740	92	127	41964	23.57
3/8		.3750	3-5/8	5	40817	23.15
V		.3770	3-5/8	5	40862	24.10
W		.3860	3-7/8	5-1/4	40863	26.36
25/64		.3906	3-7/8	5-1/4	40818	25.15
	10	.3937	95	130	41969	25.73
X		.3970	3-7/8	5-1/4	40864	25.36
Y		.4040	3-7/8	5-1/4	40865	26.36
13/32		.4062	3-7/8	5-1/4	40819	25.15
Z		.4130	4-1/16	5-1/2	40866	29.14
	10,5	.4134	98	133	41974	27.77
27/64		.4219	4-1/16	5-1/2	40820	27.25
	11	.4331	103	140	41979	27.77
7/16		.4375	4-1/16	5-1/2	40821	27.25
	11,5	.4528	106	143	41984	31.29
29/64		.4531	4-5/16	5-3/4	40822	31.24
15/32		.4688	4-5/16	5-3/4	40823	30.66
	12	.4724	111	149	41989	35.02
31/64		.4844	4-1/2	6	40824	34.34
	12,5	.4921	114	152	41994	35.02
1/2		.5000	4-1/2	6	40825	34.34

2 Helical Flutes



in d_1 +0.0 / -0.0005

- Cam relieved point with high strength edge
- Stub length for extra rigidity

DT21

Carbide tipped

Carbon & tool steels ≤ 48 HRC	✓
Stainless steels	✓
Cast irons	✓
Aluminum and non-ferrous	✓✓

✓ Good ✓✓ Very Good

Inch

d_1 Cutter Dia	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
1/8	.1250	7/8	1-7/8	41060	13.81
9/64	.1406	1	2-1/16	41061	16.70
5/32	.1562	1	2-1/16	41062	14.70
11/64	.1719	1-1/8	2-3/16	41063	19.85
3/16	.1875	1-1/8	2-3/16	41064	15.38
13/64	.2031	1-1/4	2-3/8	41065	19.85
7/32	.2188	1-1/4	2-3/8	41066	16.49
15/64	.2344	1-3/8	2-1/2	41067	18.48
1/4	.2500	1-3/8	2-1/2	41068	16.49
17/64	.2656	1-1/2	2-11/16	41069	20.53
9/32	.2812	1-1/2	2-11/16	41070	18.95
19/64	.2969	1-5/8	2-13/16	41071	23.42

continued in next column

Inch • Continued

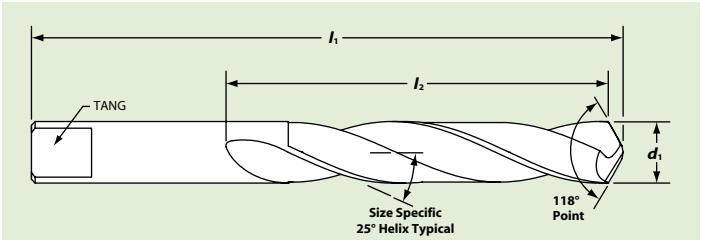
d_1 Cutter Dia	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
5/16	.3125	1-5/8	2-13/16	41072	20.27
21/64	.3281	1-11/16	3	41073	24.94
11/32	.3438	1-11/16	3	41074	23.42
23/64	.3594	1-13/16	3-1/8	41075	25.62
3/8	.3750	1-13/16	3-1/8	41076	24.05
25/64	.3906	1-15/16	3-5/16	41077	28.46
13/32	.4062	1-15/16	3-5/16	41078	28.09
27/64	.4219	2-1/16	3-7/16	41079	32.39
7/16	.4375	2-1/16	3-7/16	41080	31.24
15/32	.4688	2-1/8	3-5/8	41082	43.21
1/2	.5000	2-1/4	3-3/4	41084	39.90

TAPER LENGTH DT22 DRILLS

For general purpose drilling applications

2 Helical Flutes

For use in non-ferrous materials



in d_1 ≤1/4 +0.0 / -0.0010 >1/4 +0.0 / -0.0015 mm d_1 ≤ 6,35 +0.0 / -0,0254 >6,35 +0.0 / -0,0381

- Cam relieved point with high strength edge
- Longer flute length than a jobber length drill
- Supplied with tanged shank

Taper length twist drills are designed for production drilling of cast iron, non-ferrous metals, composites, plastics and non-metals. Carbide tips are high-temperature brazed to hardened HSS bodies.

DT22

Carbide tipped

Carbon & tool steels ≤ 48 HRC	✓
Cast irons	✓
Aluminum and non-ferrous	✓✓

✓ Good ✓✓ Very Good

Inch • Metric

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
1/8		.1250	2-3/4	5-1/8	40910	16.01
9/64		.1406	3	5-3/8	40911	16.85
5/32		.1562	3	5-3/8	40912	16.85
11/64		.1719	3-3/8	5-3/4	40913	17.43
3/16		.1875	3-3/8	5-3/4	40914	17.43
	5	.1969	92	152	41240	18.74
13/64		.2031	3-5/8	6	40915	18.38
	5,5	.2165	92	152	41242	19.53
7/32		.2188	3-5/8	6	40916	18.38
15/64		.2344	3-3/4	6-1/8	40917	20.84
	6	.2362	95	156	41244	21.21
1/4		.2500	3-3/4	6-1/8	40918	20.84
	6,5	.2559	98	159	41246	23.78
17/64		.2656	3-7/8	6-1/4	40919	23.31
	7	.2756	98	159	41248	23.78
9/32		.2812	3-7/8	6-1/4	40920	23.31
	7,5	.2953	102	162	41250	25.73
19/64		.2969	4	6-3/8	40921	25.15
5/16		.3125	4	6-3/8	40922	25.15
	8	.3150	105	165	41252	25.73
21/64		.3281	4-1/8	6-1/2	40923	28.61
	8,5	.3346	105	165	41254	29.14
11/32		.3438	4-1/8	6-1/2	40924	28.98
	9	.3543	108	171	41256	31.97
23/64		.3594	4-1/4	6-3/4	40925	31.29
	9,5	.3740	108	181	41258	31.97
3/8		.3750	4-1/4	6-3/4	40926	31.29
25/64		.3906	4-3/8	7	40927	33.60
	10	.3937	111	178	41260	34.28
13/32		.4062	4-3/8	7	40928	33.60
	10,5	.4134	117	184	41262	37.38
27/64		.4219	4-5/8	7-1/4	40929	38.64
	11	.4331	117	184	41264	39.38
7/16		.4375	4-5/8	7-1/4	40930	38.64
	11,5	.4528	121	190	41266	43.47
29/64		.4531	4-3/4	7-1/2	40931	42.68
15/32		.4688	4-3/4	7-1/2	40932	42.68

Inch • Metric

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	12	.4724	121	197	41268	45.62
31/64		.4844	4-3/4	7-3/4	40933	44.73
	12,5	.4921	121	197	41270	45.62
1/2		.5000	4-3/4	7-3/4	40934	44.73
	13	.5118	121	203	41272	48.14
33/64		.5156	4-3/4	8	40935	47.20
17/32		.5312	4-3/4	8	40936	47.20
	13,5	.5315	121	203	41274	48.14
35/64		.5469	4-7/8	8-1/4	40937	49.61
	14	.5512	124	210	41276	53.39
9/16		.5625	4-7/8	8-1/4	40938	49.61
	14,5	.5709	124	222	41278	57.17
37/64		.5781	4-7/8	8-3/4	40939	52.45
	15	.5906	124	222	41280	57.17
19/32		.5937	4-7/8	8-3/4	40940	52.45
39/64		.6094	4-7/8	8-3/4	40941	60.38
	15,5	.6102	124	222	41282	64.84
5/8		.6250	4-7/8	8-3/4	40942	60.38
	16	.6299	130	229	41284	65.26
41/64		.6406	5-1/8	9	40943	61.48
	16,5	.6496	130	229	41286	65.26
21/32		.6562	5-1/8	9	40944	61.48
	17	.6693	137	235	41288	67.25
43/64		.6719	5-3/8	9-1/4	40945	62.11
11/16		.6875	5-3/8	9-1/4	40946	62.11
	17,5	.6890	143	241	41290	67.25
45/64		.7031	5-5/8	9-1/2	40947	63.26
	18	.7087	143	241	41292	68.67
23/32		.7187	5-5/8	9-1/2	40948	63.89
	18,5	.7283	149	248	41294	70.04
47/64		.7344	5-7/8	9-3/4	40949	64.26
	19	.7480	149	248	41296	70.04
3/4		.7500	5-7/8	9-3/4	40950	65.21
13/16		.8125	6-1/8	10	40954	74.66
7/8		.8750	6-1/8	10	40958	78.96
15/16		.9375	6-1/8	10-3/4	40962	82.90
1		1.0000	6-3/8	11	40966	89.57

2 Helical Flutes

For spotting and centering

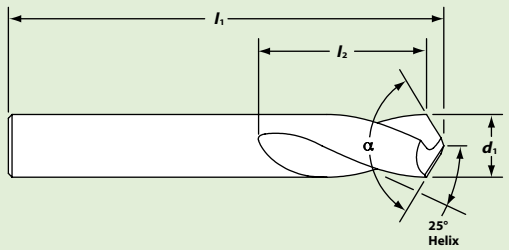
D23

Solid carbide

- Used to create true and accurate starting locations
- Spotting drills do not have body clearance
- Available with 90° or 120° point angle

Carbon & tool steels ≤ 48 HRC	✓
Stainless steels	✓
Cast irons	✓
Aluminum and non-ferrous	✓

✓ Good ✓✓ Very Good



in d_1 ≤1/4 +0.0 / -0.0010 >1/4 +0.0 / -0.0015 **mm** d_1 ≤ 6,35 +0.0 / -0,0254 >6,35 +0.0 / -0,0381

Spot drills have a narrow chisel edge and a small web to assure accurate starting locations. Spot drills are used to improve the accuracy of secondary drill operations but can be used as a chamfering tool if the spot drill diameter is larger than the final hole size. Spot drills are not designed to drill past the depth of the point angle and have no land or body clearance.

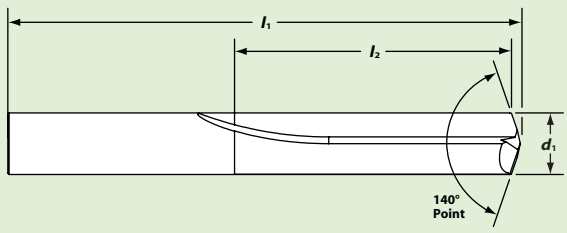
Inch • Metric

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	α = 90° EDP Number	List Price	α = 120° EDP Number	List Price
	3	.118 1	10	50	40680	12.29	40829	12.29
1/8		.1250	9/16	1-1/2	40201	12.29	40789	12.29
3/16		.1875	3/4	2	40204	14.02	40790	14.02
	5	.1969	19	63	40681	15.49	40830	15.49
	6	.2362	25	63	40682	20.84	40831	20.84
	6	.2362	25	152	40683	29.03	40832	29.03
1/4		.2500	1	2-1/2	40207	20.84	40791	20.84
1/4		.2500	1	6	40210	29.03	40792	29.03
5/16		.3125	1	2-1/2	40213	26.99	40793	26.99
5/16		.3125	1	6	40216	39.53	40794	39.53
	8	.3150	25	63	40684	26.99	40833	26.99
	8	.3150	25	152	40685	39.53	40834	39.53
3/8		.3750	1	2-1/2	40219	31.66	40795	31.66
3/8		.3750	1	6	40222	51.98	40796	51.98
	10	.3937	25	70	40686	34.44	40835	34.44
	10	.3937	25	152	40687	55.76	40836	55.76
	12	.4724	31	76	40688	53.60	40837	53.60
	12	.4724	31	152	40689	82.69	40838	82.69
1/2		.5000	1-1/2	3	40225	53.60	40797	53.60
1/2		.5000	1-1/2	6	40228	82.69	40798	82.69
5/8		.6250	1-1/2	6	40231	140.75	40799	140.75
	16	.6299	38	152	40690	140.75	40839	140.75
3/4		.7500	1-1/2	6	40234	207.64	40800	207.64
	20	.7874	38	152	40691	207.64	40840	207.64

2 Straight Flutes
For shallow drilling of hard materials

D40
Solid carbide

AccuHole drills are commonly used in hardened steels, stainless steels, aerospace alloys and other exotic materials. The point geometry allows easy penetration of the workpiece with minimal deflection, reducing heat generation and producing accurate hole sizes without annealing the work material. The extra web thickness of straight flute design gives added toughness needed when drilling hard materials.



in d_1 +0.0 / -0.0005 **mm** d_1 h7

- Thick web for added strength
- Stub length for extra rigidity

Carbon & tool steels ≤ 48 HRC	✓
Carbon & tool steels > 48 HRC	✓✓
Stainless steels	✓
Super alloys, Inconel® & titanium	✓
Cast irons	✓

✓ Good ✓✓ Very Good

Inch • Metric • Continued

d_1 Cutter Dia Inch	d_1 Cutter Dia Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	1	.0394	9	32	41600	11.55
#60		.0400	1/2	1-1/2	41865	11.55
#59		.0410	1/2	1-1/2	41864	11.55
#58		.0420	1/2	1-1/2	41863	11.55
#57		.0430	1/2	1-1/2	41862	11.55
	1,1	.0433	9	32	41601	11.55
#56		.0465	1/2	1-1/2	41861	11.55
3/64		.0469	1/2	1-1/2	41750	11.55
	1,2	.0472	9	32	41602	11.66
	1,25	.0492	9	32	41603	11.66
	1,3	.0512	9	32	41604	11.66
#55		.0520	1/2	1-5/8	41860	11.66
#54		.0550	1/2	1-5/8	41859	11.66
	1,4	.0551	9	32	41605	11.66
	1,5	.0591	9	32	41606	11.66
#53		.0595	1/2	1-5/8	41858	11.66
1/16		.0625	5/8	1-5/8	41751	11.18
	1,6	.0630	10	34	41607	11.92
#52		.0635	11/16	1-11/16	41857	11.87
	1,7	.0669	10	34	41608	12.13
#51		.0670	11/16	1-11/16	41856	11.87
	1,75	.0689	11	36	41609	12.23
#50		.0700	11/16	1-11/16	41855	12.02
	1,8	.0709	11	36	41610	12.34
#49		.0730	11/16	1-11/16	41854	12.23
	1,9	.0748	11	36	41611	12.55
5/64		.0781	11/16	1-11/16	41752	11.76
#47		.0785	3/4	1-3/4	41852	12.50
	2	.0787	12	38	41612	12.55
#46		.0810	3/4	1-3/4	41851	12.50
#45		.0820	3/4	1-3/4	41850	12.92
	2,1	.0827	12	38	41613	12.81
#44		.0860	3/4	1-3/4	41849	13.07
	2,2	.0866	13	40	41614	13.02
#43		.0890	3/4	1-3/4	41848	13.23
	2,3	.0906	13	40	41615	13.34
#42		.0935	3/4	1-3/4	41847	13.44
3/32		.0938	3/4	1-3/4	41753	12.97
	2,4	.0945	14	43	41616	13.65
#41		.0960	13/16	1-13/16	41846	13.65
#40		.0980	13/16	1-13/16	41845	14.12
	2,5	.0984	14	43	41617	14.18
#39		.0995	13/16	1-13/16	41844	13.65
#38		.1015	13/16	1-13/16	41843	14.60
	2,6	.1024	14	43	41618	14.44
#37		.1040	13/16	1-13/16	41842	14.60
	2,7	.1063	16	46	41619	14.81
#36		.1065	13/16	1-13/16	41841	14.60
7/64		.1094	13/16	1-13/16	41754	14.12
	2,8	.1102	16	46	41620	15.44
#34		.1110	7/8	1-7/8	41839	15.65
#33		.1130	7/8	1-7/8	41838	15.65
	2,9	.1142	16	46	41621	15.86
#32		.1160	7/8	1-7/8	41837	15.96

ACCUHOLE D40 DRILLS

For hardened, treated, abrasive materials and stainless steel

Inch • Metric • Continued

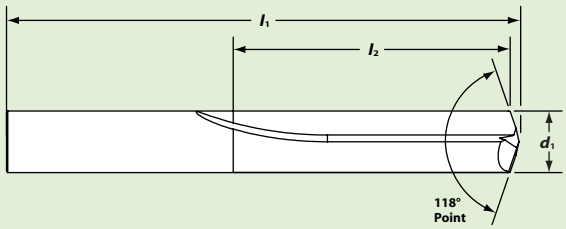
d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	3	.1181	16	46	41622	15.86
#31		.1200	7/8	1-7/8	41836	15.96
	3,1	.1220	18	49	41623	16.75
1/8		.1250	7/8	1-7/8	41755	14.39
	3,2	.1260	18	49	41624	17.54
#30		.1285	15/16	1-15/16	41835	16.17
	3,3	.1299	18	49	41625	19.01
	3,4	.1339	20	52	41626	19.74
#29		.1360	15/16	1-15/16	41834	16.17
	3,5	.1378	20	52	41627	21.32
9/64		.1406	15/16	1-15/16	41756	17.22
	3,6	.1417	20	52	41628	20.48
#27		.1440	1	2-1/16	41832	19.22
	3,7	.1457	20	52	41629	20.53
#26		.1470	1	2-1/16	41831	19.53
#25		.1495	1	2-1/16	41830	19.69
	3,8	.1496	22	55	41630	20.69
5/32		.1562	1	2-1/16	41757	19.01
	4	.1575	22	55	41631	21.42
#21		.1590	1-1/16	2-1/8	41826	21.47
#20		.1610	1-1/16	2-1/8	41825	21.63
	4,1	.1614	22	55	41682	21.74
	4,2	.1654	22	55	41633	21.84
	4,3	.1693	24	58	41634	22.84
11/64		.1719	1-1/16	2-1/8	41758	23.31
#16		.1770	1-1/8	2-3/16	41821	23.68
	4,5	.1772	24	58	41635	23.84
	4,6	.1811	24	58	41683	24.36
#14		.1820	1-1/8	2-3/16	41819	23.99
#13		.1850	1-1/8	2-3/16	41818	24.36
3/16		.1875	1-1/8	2-3/16	41759	21.32
	4,8	.1890	26	62	41637	25.83
#12		.1890	1-1/8	2-3/16	41817	24.68
#11		.1910	1-1/8	2-3/16	41816	25.10
#10		.1935	1-1/8	2-3/16	41815	25.36
#9		.1960	1-3/16	2-1/4	41814	25.94
	5	.1969	26	62	41638	26.88
	5,1	.2008	26	62	41639	27.93
#7		.2010	1-3/16	2-1/4	41812	27.09
13/64		.2031	1-3/16	2-1/4	41760	27.14
	5,2	.2047	26	62	41684	29.09
	5,3	.2087	26	62	41641	31.29
#4		.2090	1-1/4	2-3/8	41809	28.77
	5,4	.2126	26	62	41642	32.34
#3		.2130	1-1/4	2-3/8	41808	29.98
	5,5	.2165	28	66	41643	32.29
7/32		.2188	1-1/4	2-3/8	41761	27.14
	5,6	.2205	28	66	41644	33.60
	5,7	.2244	28	66	41645	33.71
#1		.2280	1-5/16	2-7/16	41806	31.61
	5,8	.2283	28	66	41646	33.92
	5,9	.2323	28	66	41647	34.07
15/64		.2344	1-5/16	2-7/16	41762	34.02
	6	.2362	28	66	41648	30.71

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	6,1	.2402	31	70	41649	35.07
	6,2	.2441	31	70	41650	36.02
	6,3	.2480	31	70	41651	37.91
1/4		.2500	1-3/8	2-1/2	41763	30.61
	6,4	.2520	31	70	41652	38.85
	6,5	.2559	31	70	41653	38.54
F		.2570	1-7/16	2-5/8	41785	45.15
17/64		.2656	1-7/16	2-5/8	41764	38.43
	6,8	.2677	34	74	41654	43.05
	6,9	.2717	34	74	41655	43.84
I		.2720	1-1/2	2-11/16	41788	48.09
	7	.2756	34	74	41656	39.32
	7,1	.2795	34	74	41657	45.89
9/32		.2812	1-1/2	2-11/16	41765	39.53
	7,2	.2835	34	74	41658	47.04
	7,3	.2874	34	74	41659	49.56
	7,4	.2913	34	74	41660	50.77
	7,5	.2953	34	74	41661	42.79
19/64		.2969	1-9/16	2-3/4	41766	42.79
	7,8	.3071	37	79	41662	54.81
	7,9	.3110	37	79	41663	54.92
5/16		.3125	1-5/8	2-13/16	41767	42.68
	8	.3150	37	79	41664	42.68
	8,1	.3189	37	79	41665	55.34
	8,3	.3268	37	79	41666	56.02
21/64		.3281	1-11/16	2-15/16	41768	44.47
Q		.3320	1-11/16	3	41796	61.11
	8,5	.3346	37	79	41667	48.25
11/32		.3438	1-11/16	3	41769	49.30
	8,8	.3465	40	84	41668	70.04
	9	.3543	40	84	41669	55.44
23/64		.3594	1-3/4	3-1/16	41770	54.23
	9,3	.3661	40	84	41670	80.59
U		.3680	1-13/16	3-1/8	41800	75.29
	9,5	.3740	40	84	41685	61.74
3/8		.3750	1-13/16	3-1/8	41771	58.70
	9,7	.3819	43	89	41672	84.11
	9,9	.3898	43	89	41673	85.10
25/64		.3906	1-7/8	3-1/4	41772	65.52
	10	.3937	43	89	41674	65.73
	10,2	.4016	43	89	41675	89.15
13/32		.4062	1-15/16	3-5/16	41773	81.11
	10,5	.4134	43	89	41676	82.37
27/64		.4219	2	3-3/8	41774	81.43
	10,8	.4252	47	95	41677	105.68
	11	.4331	47	95	41678	84.42
7/16		.4375	2-1/16	3-7/16	41775	83.69
	11,5	.4528	47	95	41679	93.29
15/32		.4688	2-1/8	3-5/8	41777	92.82
	12	.4724	51	102	41680	90.72
	12,5	.4921	51	102	41681	134.87
1/2		.5000	2-1/4	3-3/4	41779	90.41

2 Straight Flutes

For drilling of hard materials



in d_1 ≤1/4 +0.0 / -0.0010 >1/4 +0.0 / -0.0015

- Thick web for added strength
- Cam relieved thinned point with high strength edge

DT40

Carbide tipped

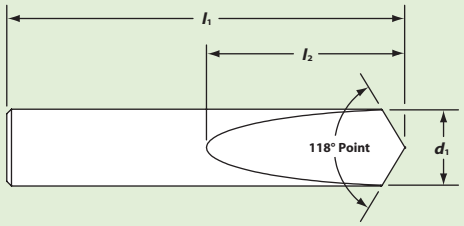
Carbon & tool steels ≤ 48 HRC	✓
Carbon & tool steels > 48 HRC	✓✓
Super alloys, Inconel® & titanium	✓
Cast irons	✓

✓ Good ✓✓ Very Good

Inch

d_1 Cutter Dia	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
3/16	.1875	1-1/2	3-1/2	41003	25.52
13/64	.2031	1-3/4	3-3/4	41004	25.52
7/32	.2188	1-3/4	3-3/4	41005	26.30
15/64	.2344	2	4	41006	27.20
1/4	.2500	2	4	41007	27.20
17/64	.2656	2-1/4	4-1/4	41008	28.72
9/32	.2812	2-1/4	4-1/4	41009	28.72
19/64	.2969	2-1/2	4-1/2	41010	30.03
5/16	.3125	2-1/2	4-1/2	41011	30.03
21/64	.3281	2-3/4	4-3/4	41012	32.03
11/32	.3438	2-3/4	4-3/4	41013	32.03
23/64	.3594	3	5	41014	34.44
3/8	.3750	3	5	41015	34.44
25/64	.3906	3	5-1/4	41016	38.85
13/32	.4062	3	5-1/4	41017	40.27
27/64	.4219	3	5-1/2	41018	43.47
7/16	.4375	3	5-1/2	41019	46.78
29/64	.4531	3-1/4	5-3/4	41020	49.04
15/32	.4688	3-1/4	5-3/4	41021	51.35
31/64	.4844	3-1/2	6	41022	55.86
1/2	.5000	3-1/2	6	41023	60.27
17/32	.5312	3-1/2	6	41025	69.09
9/16	.5625	3-1/2	6	41027	71.45
19/32	.5937	4	7	41029	75.60
5/8	.6250	4	7	41031	77.96
21/32	.6562	4-1/2	7-1/2	41033	82.06
11/16	.6875	4-1/2	7-1/2	41035	84.37
23/32	.7187	4-3/4	8	41037	88.62
3/4	.7500	4-3/4	8	41039	90.93
13/16	.8125	4-3/4	8	41041	162.96
7/8	.8750	4-3/4	8	41043	166.37
15/16	.9375	4-3/4	8	41045	185.33
1	1.0000	4-3/4	8	41047	196.56

2-Flute Spade Drill



in d_1 +0.0 / -0.0005 mm d_1 h7

D10

Solid carbide

Carbon & tool steels ≤ 48 HRC	✓
Carbon & tool steels > 48 HRC	✓
Cast irons	✓
Aluminum and non-ferrous	✓

✓ Good ✓✓ Very Good

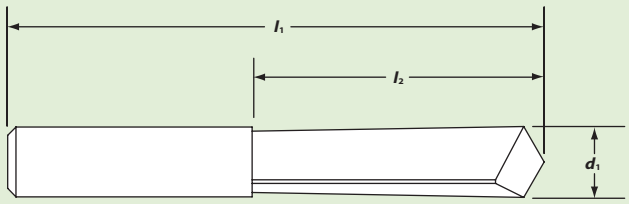
- For shallow hole drilling
- Hole depth limited to 2x diameter
- Strongest drill style for excellent tool life
- Can be used as a spotting drill

Inch

d_1 Cutter Dia	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
1/16	.0625	5/16	1-1/2	41554	9.71
3/32	.0938	3/8	1-1/2	41556	9.71
1/8	.1250	7/16	1-1/2	41558	9.71
5/32	.1562	15/32	2	41560	12.55
3/16	.1875	9/16	2	41562	12.81
7/32	.2188	19/32	2	41564	14.91
1/4	.2500	11/16	2	41566	17.48
5/16	.3125	7/8	2-1/2	41570	24.26
3/8	.3750	1	2-1/2	41574	29.56
1/2	.5000	1-1/8	2-1/2	41582	41.63

Tap Drill
For broken tap removal

D11
Solid carbide



mm d_1 h7

Metric

d_1 Cutter Dia	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
2	.0787	10	38	36554	12.60
3	.1181	15	38	36555	15.38
4	.1575	20	50	36556	21.37
5	.1969	25	50	36557	24.52
6	.2362	30	63	36558	34.70

Using hard metal drills for broken tap removal

Step 1: Select drill size

Use Drill Size	For Tap Range
2,0	3mm, 6BA-4BA
3,0	4mm, 5mm, 3BA, 2BA
4,0	6mm, 1BA, 0BA, 1/4, 5/16
5,0	8mm-10mm, 5/16-3/8
6,0	10mm-12mm, 3/8-1/2

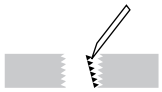
Step 2:

Firmly secure the workpiece.
Center hard metal drill in broken tap.

Step 3:

Using a spindle speed of 1,500-3,500 RPM and no coolant or lubricant, machine the tap away. Apply constant pressure, releasing occasionally to clear the chips. Expect vibration as chips are freed from the hole side.

Step 4:



Using a sharp, hard pointed tool, pick away the remaining tap material.

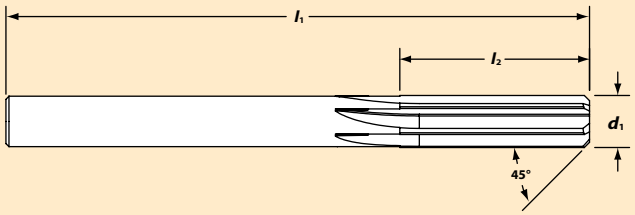
D11 Set

Set Code	Set Contents	EDP Number	List Price
D-11	One each of: 2, 3, 4, 5, 6	36559	108.47

REAMERS

R10

Straight flutes



in d_1 +.0003 / -0 **mm** d_1 H7

For best results, leave the correct amount of stock in a hole to be reamed. Approximately 3% of the reamer diameter should be left in the hole. Too little stock will cause the reamer to wear prematurely, while too much stock will clog the flutes and reduce size accuracy and finish.

- 4-Flutes for diameters up to .2544
- 6-Flutes for diameters greater than .2544

Carbon & tool steels ≤ 48 HRC	✓
Carbon & tool steels > 48 HRC	✓
Stainless steels	✓
Super alloys, Inconel® & titanium	✓
Cast irons	✓
Aluminum and non-ferrous	✓

✓ Suitable for use

Inch • Metric

d_1 Cutter Dia Inch	d_1 Cutter Dia Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	1	.0394	8	35	43600	37.80
#60		.0400	5/16	1-3/8	43436	37.80
#59		.0410	5/16	1-3/8	43435	37.80
#58		.0420	5/16	1-3/8	43434	30.77
#57		.0430	5/16	1-3/8	43433	30.77
#56		.0465	5/16	1-3/8	43432	30.77
3/64		.0469	5/16	1-3/8	43303	30.77
	1,2	.0472	8	35	43530	30.77
	1,25	.0492	10	38	43531	26.99
	1,3	.0512	10	38	43532	26.99
#55		.0520	3/8	1-1/2	43431	26.99
	1,35	.0531	10	38	43533	26.99
#54		.0550	3/8	1-1/2	43430	26.99
	1,4	.0551	10	38	43534	26.99
	1,45	.0571	10	38	43535	26.99
	1,5	.0591	10	38	43601	19.95
#53		.0595	3/8	1-1/2	43429	26.99
	1,55	.0610	10	38	43536	26.99
1/16		.0625	3/8	1-1/2	43304	19.58
	1,6	.0630	10	38	43537	26.99
#52		.0635	3/8	1-1/2	43428	26.99
	1,65	.0650	10	38	43538	26.99
	1,7	.0669	11	44	43539	27.46
#51		.0670	7/16	1-3/4	43427	27.46
	1,75	.0689	11	44	43540	27.46
#50		.0700	7/16	1-3/4	43426	27.46
	1,8	.0709	11	44	43541	27.46
	1,85	.0728	11	44	43542	27.46
#49		.0730	7/16	1-3/4	43425	27.46
	1,9	.0748	11	44	43543	27.46
#48		.0760	7/16	1-3/4	43424	27.46
	1,95	.0768	11	44	43544	27.46
5/64		.0781	7/16	1-3/4	43305	19.37
#47		.0785	7/16	1-3/4	43423	27.46
	2	.0787	11	44	43602	19.79
	2,05	.0807	13	51	43545	28.82
#46		.0810	1/2	2	43422	28.82
#45		.0820	1/2	2	43421	28.82
	2,1	.0827	13	51	43546	28.82
	2,15	.0846	13	51	43547	28.82
#44		.0860	1/2	2	43420	28.82
	2,2	.0866	13	51	43548	28.82
	2,25	.0886	13	51	43549	28.82
#43		.0890	1/2	2	43419	28.82
	2,3	.0906	13	51	43550	28.82
	2,35	.0925	13	51	43551	28.82
#42		.0935	1/2	2	43418	28.82
3/32		.0938	1/2	2	43306	21.42
	2,4	.0945	13	51	43552	28.82
#41		.0960	5/8	2-1/4	43417	29.24
	2,45	.0965	16	57	43553	29.24
#40		.0980	5/8	2-1/4	43416	29.24
	2,5	.0984	16	57	43603	24.68
#39		.0995	5/8	2-1/4	43415	29.24

STRAIGHT FLUTE R10 REAMERS

For general purpose reaming applications

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
#38		.1015	5/8	2-1/4	43414	29.24
	2,6	.1024	16	57	43554	29.24
#37		.1040	5/8	2-1/4	43413	29.24
	2,7	.1063	16	57	43555	29.24
#36		.1065	5/8	2-1/4	43412	29.24
	2,75	.1083	16	57	43556	29.24
7/64		.1094	5/8	2-1/4	43307	24.15
#35		.1100	5/8	2-1/4	43411	29.24
	2,8	.1102	16	57	43557	29.24
#34		.1110	5/8	2-1/4	43410	29.24
#33		.1130	5/8	2-1/4	43409	31.13
	2,9	.1142	16	57	43558	31.13
#32		.1160	5/8	2-1/4	43408	31.13
	3	.1181	16	57	43604	26.04
#31		.1200	5/8	2-1/4	43407	31.13
	3,1	.1220	16	57	43559	31.13
.124		.1240	5/8	2-1/4	43625	31.13
.1245		.1245	5/8	2-1/4	43626	31.13
1/8		.1250	5/8	2-1/4	43308	25.52
.126		.1260	5/8	2-1/4	43627	31.13
	3,2	.1260	16	57	43560	31.13
	3,25	.1280	16	57	43561	31.13
#30		.1285	3/4	2-1/4	43406	32.03
	3,3	.1299	19	57	43562	32.03
	3,35	.1319	19	57	43563	32.03
	3,4	.1339	19	57	43564	32.03
	3,45	.1358	19	57	43565	32.03
#29		.1360	3/4	2-1/4	43405	32.03
	3,5	.1378	19	57	43605	29.19
	3,55	.1398	19	57	43566	32.03
#28		.1405	3/4	2-1/4	43404	32.03
9/64		.1406	3/4	2-1/4	43309	28.61
	3,6	.1417	19	57	43567	32.03
	3,65	.1437	19	57	43568	32.03
#27		.1440	3/4	2-1/4	43403	32.03
	3,7	.1457	19	64	43569	34.70
#26		.1470	3/4	2-1/2	43402	34.02
	3,75	.1476	19	64	43570	34.70
#25		.1495	3/4	2-1/2	43401	34.02
	3,8	.1496	19	64	43571	34.70
#24		.1520	3/4	2-1/2	43400	34.02
	3,9	.1535	19	64	43572	34.70
#23		.1540	3/4	2-1/2	43399	34.02
	3,95	.1555	19	64	43573	34.70
5/32		.1562	3/4	2-1/2	43310	30.77
#22		.1570	3/4	2-1/2	43398	34.02
	4	.1575	19	64	43606	31.40
#21		.1590	3/4	2-1/2	43397	34.02
	4,05	.1594	19	64	43574	34.70
#20		.1610	7/8	2-3/4	43396	38.38
	4,1	.1614	22	70	43575	38.38
	4,15	.1634	22	70	43576	38.38
	4,2	.1654	22	70	43577	38.38
#19		.1660	7/8	2-3/4	43395	38.38

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	4,25	.1673	22	70	43578	38.38
	4,3	.1693	22	70	43579	38.38
#18		.1695	7/8	2-3/4	43394	38.38
	4,35	.1713	22	70	43580	38.38
11/64		.1719	7/8	2-3/4	43311	33.86
#17		.1730	7/8	2-3/4	43393	38.38
	4,4	.1732	22	70	43581	38.38
	4,45	.1752	22	70	43582	41.27
#16		.1770	7/8	2-3/4	43392	41.27
	4,5	.1772	22	70	43607	36.70
	4,55	.1791	22	70	43583	41.27
#15		.1800	7/8	2-3/4	43391	41.27
	4,6	.1811	22	70	43584	41.27
#14		.1820	7/8	2-3/4	43390	41.27
	4,65	.1831	22	70	43585	41.27
	4,7	.1850	22	70	43586	41.27
#13		.1850	7/8	2-3/4	43389	41.27
	4,75	.1870	22	70	43587	41.27
.187		.1870	7/8	2-3/4	43628	41.27
3/16		.1875	7/8	2-3/4	43312	35.96
.1885		.1885	7/8	2-3/4	43629	41.27
	4,8	.1890	22	70	43588	41.27
#12		.1890	7/8	2-3/4	43388	41.27
	4,85	.1909	22	70	43589	41.27
#11		.1910	7/8	2-3/4	43387	41.27
	4,9	.1929	25	76	43590	47.36
#10		.1935	1	3	43386	46.46
	4,95	.1949	25	76	43591	47.36
#9		.1960	1	3	43385	46.46
	5	.1969	25	76	43608	40.43
	5,05	.1988	25	76	43592	47.36
#8		.1990	1	3	43384	46.46
	5,1	.2008	25	76	43593	47.36
#7		.2010	1	3	43383	46.46
	5,15	.2028	25	76	43594	47.36
13/64		.2031	1	3	43313	39.64
#6		.2040	1	3	43382	46.46
	5,2	.2047	25	76	43595	47.36
#5		.2055	1	3	43381	46.46
	5,25	.2067	25	76	43596	47.36
	5,3	.2087	25	76	43597	47.36
#4		.2090	1	3	43380	46.46
	5,35	.2106	25	76	43598	47.36
	5,4	.2126	25	76	43599	47.36
#3		.2130	1	3	43379	46.46
	5,45	.2146	25	76	43635	47.36
	5,5	.2165	25	76	43609	40.43
	5,55	.2185	25	76	43636	47.36
7/32		.2188	1	3	43314	41.74
	5,6	.2205	25	76	43637	47.36
#2		.2210	1	3	43378	46.46
	5,65	.2224	25	76	43638	47.36
	5,7	.2244	25	76	43639	55.18

STRAIGHT FLUTE R10 REAMERS

For general purpose reaming applications

R10

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
	5,75	.2264	25	76	43640	55.18
#1		.2280	1	3	43377	55.18
	5,8	.2283	25	76	43641	55.18
	5,85	.2303	25	76	43642	55.18
	5,9	.2323	25	76	43643	55.18
A		.2340	1	3	43351	55.18
	5,95	.2343	25	76	43644	55.18
15/64		.2344	1	3	43315	44.42
	6	.2362	25	76	43610	45.31
B		.2380	1	3	43352	55.18
	6,1	.2402	25	76	43645	55.18
C		.2420	1	3	43353	55.18
	6,2	.2441	25	76	43646	55.18
D		.2460	1	3	43354	55.18
	6,25	.2461	25	76	43647	55.18
	6,3	.2480	25	76	43648	55.18
.2495		.2495	1	3	43630	55.18
1/4		.2500	1	3	43316	47.51
.251		.2510	1	3	43631	55.18
	6,4	.2520	25	76	43649	55.18
	6,5	.2559	29	83	43611	63.05
F		.2570	1-1/8	3-1/4	43356	63.05
G		.2610	1-1/8	3-1/4	43357	63.05
17/64		.2656	1-1/8	3-1/4	43317	63.05
H		.2660	1-1/8	3-1/4	43358	63.05
I		.2720	1-1/8	3-1/4	43359	63.95
	7	.2756	29	83	43612	53.76
J		.2770	1-1/8	3-1/4	43360	63.95
K		.2810	1-1/8	3-1/4	43361	63.95
9/32		.2812	1-1/8	3-1/4	43318	52.66
L		.2900	1-1/8	3-1/4	43362	71.82
M		.2950	1-1/8	3-1/4	43363	71.82
	7,5	.2953	29	83	43613	71.82
19/64		.2969	1-1/8	3-1/4	43319	71.82
N		.3020	1-1/8	3-1/4	43364	72.87

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number	List Price
5/16		.3125	1-1/8	3-1/4	43320	58.70
.3135		.3135	1-1/8	3-1/4	43632	72.87
	8	.3150	29	83	43614	59.85
O		.3160	1-1/8	3-1/4	43365	72.87
P		.3230	1-1/4	3-1/2	43366	83.69
21/64		.3281	1-1/4	3-1/2	43321	67.99
Q		.3320	1-1/4	3-1/2	43367	83.69
	8,5	.3346	32	89	43615	73.66
R		.3390	1-1/4	3-1/2	43368	83.69
11/32		.3438	1-1/4	3-1/2	43322	72.24
S		.3480	1-1/4	3-1/2	43369	83.69
	9	.3543	32	89	43616	76.49
T		.3580	1-1/4	3-1/2	43370	88.36
23/64		.3594	1-1/4	3-1/2	43323	75.02
U		.3680	1-1/4	3-1/2	43371	88.36
	9,5	.3740	32	89	43617	78.86
3/8		.3750	1-1/4	3-1/2	43324	77.33
.376		.3760	1-1/4	3-1/2	43633	88.36
V		.3770	1-1/4	3-1/2	43372	88.36
W		.3860	1-1/2	4	43373	105.89
25/64		.3906	1-1/2	4	94013	105.89
	10	.3937	38	102	93323	105.89
X		.3970	1-1/2	4	43374	105.89
Y		.4040	1-1/2	4	43375	105.89
13/32		.4062	1-1/2	4	43326	105.89
Z		.4130	1-1/2	4	43376	115.76
	10,5	.4134	38	102	43619	116.13
27/64		.4219	1-1/2	4	20831	115.76
	11	.4331	38	102	43620	115.76
7/16		.4375	1-1/2	4	43328	115.76
	11,5	.4528	38	102	43621	129.83
29/64		.4531	1-1/2	4	20832	128.52
15/32		.4688	1-1/2	4	43330	128.52
	12	.4724	38	102	43622	128.52
31/64		.4844	1-1/2	4	20833	136.97
1/2		.5000	1-1/2	4	43332	136.97

Application Guide • Speed & Feed

Work Material	Speed (SFM)	Feed Per Revolution (IPR) 1/32-1/16	>1/16-1/8	>1/8-1/4	>1/4-3/8	>3/8-1/2	Speed (m/min)	Feed Per Revolution (mm/rev) 1,0-1,5	>1,5-3,0	>3,0-6,0	>6,0-9,0	>9,0-12,0
Aluminum Alloys	200-400	.002-.004	.004-.006	.006-.008	.008-.010	.010-.012	61-122	.051-.101	.101-.152	.152-.203	.203-.254	.254-.305
Copper, Brass & Bronze	120-250	.001-.002	.002-.003	.003-.005	.005-.008	.008-.010	35-75	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
Composites, Plastics	200-400	.002-.004	.004-.006	.006-.008	.008-.010	.010-.012	61-122	.051-.101	.101-.152	.152-.203	.203-.254	.254-.305
Magnesium Alloys	200-400	.002-.004	.004-.006	.006-.008	.008-.010	.010-.012	61-122	.051-.101	.101-.152	.152-.203	.203-.254	.254-.305
Cast Iron - Gray	125-200	.001-.002	.002-.004	.004-.006	.006-.009	.009-.012	38-61	.025-.051	.051-.101	.101-.152	.152-.229	.229-.305
Cast Iron - Ductile & Malleable	75-175	.001-.002	.002-.003	.003-.005	.005-.007	.009-.012	23-53	.025-.051	.051-.101	.101-.152	.152-.229	.229-.305
Low Carbon Steel ≤ 38 HRc 1018, 12L14, 8620	125-200	.001-.002	.002-.003	.003-.005	.005-.008	.008-.010	38-61	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
Medium Carbon Steels ≤ 38 HRc 4140, 4340	100-175	.001-.002	.002-.003	.003-.005	.005-.008	.008-.010	30-53	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
Tool & Die Steels ≤ 38 HRc A2, D2, H13, P20	60-100	.001-.002	.002-.003	.003-.00 5	.005-.008	.008-.010	18-30	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
Tool & Die Steels 39 - 48 HRc A2, D2, H13, P20	40-75	.001-.002	.002-.003	.003-.004	.004-.006	.006-.008	12-23	.025-.051	.051-.076	.076-.101	.101-.152	.152-.203
Tool Steels 49 - 52 HRc A2, D2	30-65	.0005-.001	.001-.002	.002-.003	.003-.004	.004-.006	9-20	.013-.025	.025-.051	.051-.076	.076-.101	.101-.152
Easy to Machine Stainless Steel 416, 410, 302, 303	70-150	.001-.002	.002-.003	.003-.005	.005-.008	.008-.010	21-46	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
Moderate Machining Stainless Steels 304, 316, Invar, Kovar	65-110	.001-.002	.002-.003	.003-.005	.005-.008	.008-.010	20-33	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
Difficult to Machine Stainless Steels 316L, 17-4 PH, 15-5 PH, 13-8 PH	50-100	.0005-.001	.001-.002	.002-.003	.003-.004	.004-.006	15-30	.013-.025	.025-.051	.051-.076	.076-.101	.101-.152
Titanium	30-65	.001-.002	.002-.003	.003-.005	.005-.008	.008-.010	9-20	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
High Temp Alloys, Inconel®, Stellite, Hastalloy, Waspaloy®	20-50	.0005-.001	.001-.002	.002 -.004	.004-.006	.006-.008	6-15	.013-.025	.025-.051	.051-.101	.101-.152	.152-.203

STRAIGHT FLUTE R10 REAMERS

For general purpose reaming applications

R10

Made To Order

Quantity discounts are available for Made To Order reamers as shown in the chart below.

Quantity	Discount Per Tool
2	$28.75
3	38.50
4	43.15
5-7	48.00
8-14	52.00
15+	57.60

- 4-Flutes for diameters up to .2544
- 6-Flutes for diameters greater than .2544

Inch

d_1 Cutter Dia Min-Max Range	l_2 Length of Cut	l_1 Overall Length	EDP Number	List Price
.0300 - .0350	5/16	1-3/8	43751	109.46
.0351 - .0410	5/16	1-3/8	43752	96.13
.0411 - .0479	5/16	1-3/8	43753	88.99
.0480 - .0650	3/8	1-1/2	43754	85.16
.0651 - .0800	7/16	1-3/4	43755	85.63
.0801 - .0950	1/2	2	43756	86.94
.0951 - .1120	5/8	2-1/4	43757	87.41
.1121 - .1284	5/8	2-1/4	43758	89.36
.1285 - .1444	3/4	2-1/4	43759	90.25
.1445 - .1594	3/4	2-1/2	43760	92.30
.1595 - .1744	7/8	2-3/4	43761	96.76
.1745 - .1914	7/8	2-3/4	43762	99.70
.1915 - .2074	1	3	43763	104.95
.2075 - .2234	1	3	43764	104.95
.2235 - .2394	1	3	43765	113.82
.2395 - .2544	1	3	43766	113.82
.2545 - .2694	1-1/8	3-1/4	43767	121.91
.2695 - .2844	1-1/8	3-1/4	43768	122.85
.2845 - .3004	1-1/8	3-1/4	43769	130.83
.3005 - .3164	1-1/8	3-1/4	43770	131.93
.3165 - .3324	1-1/4	3-1/2	43771	142.96
.3325 - .3484	1-1/4	3-1/2	43772	142.96
.3485 - .3634	1-1/4	3-1/2	43773	147.68
.3635 - .3794	1-1/4	3-1/2	43774	147.68
.3795 - .3944	1-1/2	4	43775	165.59
.3945 - .4104	1-1/2	4	43776	165.59
.4105 - .4254	1-1/2	4	43777	175.72
.4255 - .4414	1-1/2	4	43778	175.72
.4415 - .4564	1-1/2	4	43779	187.43
.4565 - .4724	1-1/2	4	43780	187.43
.4725 - .4884	1-1/2	4	43781	195.98
.4885 - .5054	1-1/2	4	43782	195.98

Metric

d_1 Cutter Dia Min-Max Range	l_2 Length of Cut	l_1 Overall Length	EDP Number	List Price
0,76 - 0,89	8	35	43851	109.46
0,891 - 1,04	8	35	43852	96.13
1,041 - 1,22	8	35	43853	88.99
1,221 - 1,65	10	38	43854	85.16
1,651 - 2,03	11	44	43855	85.63
2,031 - 2,41	13	51	43856	86.94
2,411 - 2,84	16	57	43857	87.41
2,841 - 3,26	16	57	43858	89.36
3,261 - 3,67	19	57	43859	90.25
3,671 - 4,05	19	64	43860	92.30
4,051 - 4,43	22	70	43861	96.76
4,431 - 4,86	22	70	43862	99.70
4,861 - 5,27	25	76	43863	104.95
5,271 - 5,67	25	76	43864	104.95
5,671 - 6,08	25	76	43865	113.82
6,081 - 6,46	25	76	43866	113.82
6,461 - 6,84	29	83	43867	121.91
6,841 - 7,22	29	83	43868	122.85
7,221 - 7,63	29	83	43869	130.83
7,631 - 8,04	29	83	43870	131.93
8,041 - 8,44	32	89	43871	142.96
8,441 - 8,85	32	89	43872	142.96
8,851 - 9,23	32	89	43873	147.68
9,231 - 9,64	32	89	43874	147.68
9,641 - 10,02	38	102	43875	165.59
10,021 - 10,42	38	102	43876	165.59
10,421 - 10,81	38	102	43877	175.72
10,811 - 11,21	38	102	43878	175.72
11,211 - 11,59	38	102	43879	187.43
11,591 - 12,00	38	102	43880	187.43
12,001 - 12,21	38	102	43881	195.98
12,211 - 12,84	38	102	43882	195.98

How to price a Made To Order reamer

Step 1: In the chart, find the size range for the reamer diameter you want in the far left column. Find the five digit EDP number to the right of your chosen diameter. For example, the EDP number for a .2530 diameter reamer would be 43766. Follow the row further to the right and locate the list price for the part. The base price for 1 reamer with .2530 diameter is $113.82.

Step 2: A discount from list price is available for quantities greater than one piece. Select your quantity discount from the chart below and deduct it from the list price determined in step one above. For example, the discount for 6 reamers would be $48.00.

Quantity	Discount Per Tool
2	$28.75
3	38.50
4	43.15
5-7	48.00
8-14	52.00
15+	57.60

Step 3: Standard tolerance for the R10 reamer will be supplied unless otherwise specified. Append the EDP number with a tolerance code from the chart below and add the specified charge when ordering special tolerance reamers.

Code	Tolerance	Charge
T3	Standard (+0.0003/ -0.0)	None
T2	+0.0002/ -0.0	$3.75
T1	+0.0001/ -0.0	6.30

Step 4: Complete the EDP number by adding the exact size of the reamer you require in parenthesis. For our example of 6 pieces of .2530 reamers with a tolerance of +0.0002 the EDP number would be 43766.T2 (.2530).

Step 5: Calculate the list price for your Made To Order reamer. In our example, the list price would be computed in the following way: ($113.82 - $48.00 + $3.75) or $69.57.

Having a Hard Time Deburring?

Sometimes the basic fluting options don't hold up in very hard materials. Try using IMCO's fine cut flute style. The increased number of flutes in combination with the shallow flute depth of the fine cut design improves edge strength. This stronger tool design extends tool life by reducing edge chipping and tool chatter while also leaving a better part finish.

In aerospace materials such as titanium and nickel based alloys, try IMCO's coarse cut burs. This "open" fluting style allows for better chip evacuation while retaining cutting edge strength. Try this when working in materials with low machinability ratings.

Material packing can be an issue in ferrous materials. Special order burs with negative rake in standard, double or fine cut fluting styles may help. The negative rake keeps material from being pulled into the flute, eliminating evacuation issues. Please note: The negative rake does reduce the shearing action of the bur and should only be considered for applications in which chip packing is an issue.

BURS AND ROUTERS

IMCO carbide burs are offered in an array of shapes, fluting patterns and lengths suitable for all types of deburring applications. Precision flute grinding assures chatterless operation and long tool life.

Results: Smooth deburring operations using fewer tools produce exceptional savings and lower part costs.

Double Cut

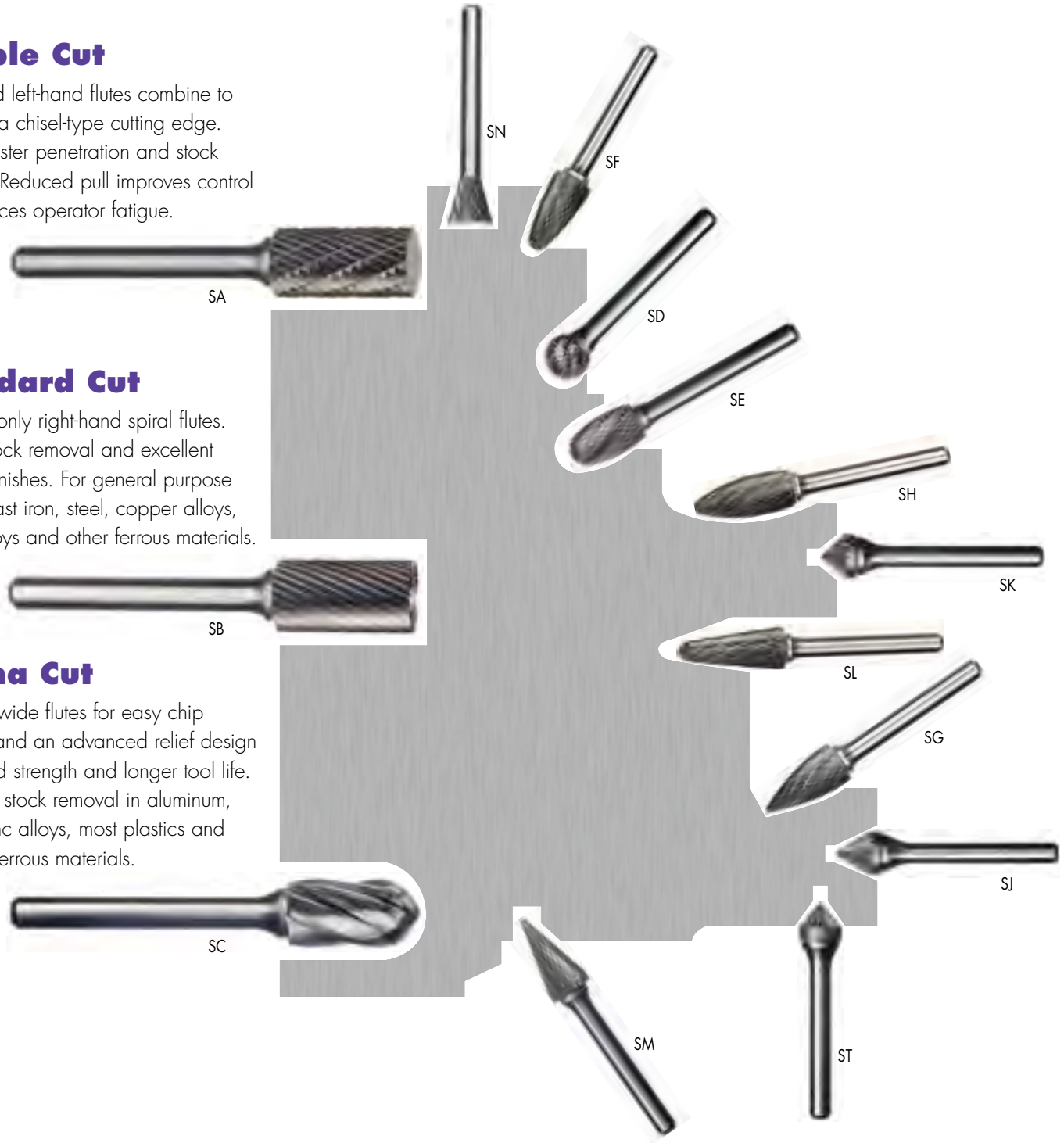
Right- and left-hand flutes combine to produce a chisel-type cutting edge. Permits faster penetration and stock removal. Reduced pull improves control and reduces operator fatigue.

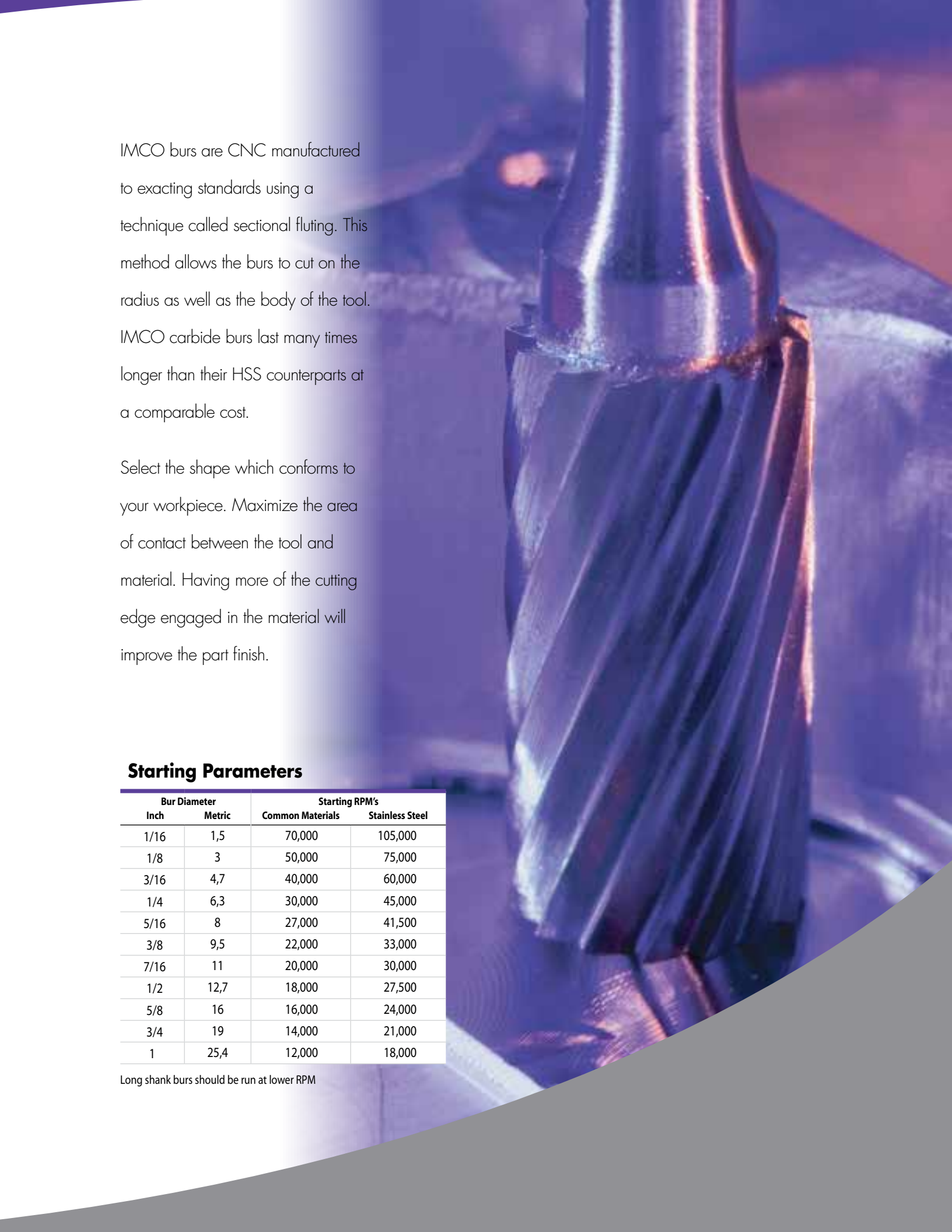
Standard Cut

Features only right-hand spiral flutes. Good stock removal and excellent surface finishes. For general purpose use on cast iron, steel, copper alloys, brass alloys and other ferrous materials.

Aluma Cut

Features wide flutes for easy chip removal and an advanced relief design for added strength and longer tool life. For rapid stock removal in aluminum, brass, zinc alloys, most plastics and soft, nonferrous materials.





IMCO burs are CNC manufactured to exacting standards using a technique called sectional fluting. This method allows the burs to cut on the radius as well as the body of the tool. IMCO carbide burs last many times longer than their HSS counterparts at a comparable cost.

Select the shape which conforms to your workpiece. Maximize the area of contact between the tool and material. Having more of the cutting edge engaged in the material will improve the part finish.

Starting Parameters

Bur Diameter		Starting RPM's	
Inch	Metric	Common Materials	Stainless Steel
1/16	1,5	70,000	105,000
1/8	3	50,000	75,000
3/16	4,7	40,000	60,000
1/4	6,3	30,000	45,000
5/16	8	27,000	41,500
3/8	9,5	22,000	33,000
7/16	11	20,000	30,000
1/2	12,7	18,000	27,500
5/8	16	16,000	24,000
3/4	19	14,000	21,000
1	25,4	12,000	18,000

Long shank burs should be run at lower RPM

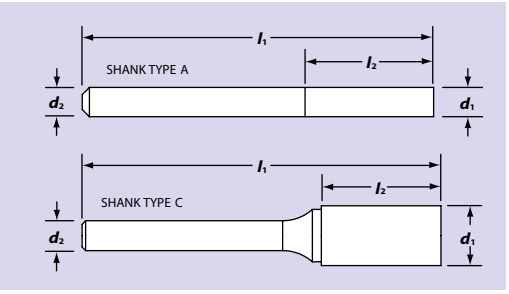
SA

Cylindrical shape

SA • Standard Cut

SA • Double Cut

SA • Aluma Cut



	Standard	Double	Aluma
Carbon & tool steels ≤ 48 HRC	✓	✓✓	
Carbon & tool steels > 48 HRC	✓	✓✓	
Stainless steels	✓	✓✓	
Super alloys, Inconel®, titanium	✓	✓✓	
Cast irons	✓	✓✓	
Aluminum and non-ferrous			✓✓

✓ Suitable ✓✓ Recommended

Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SA-41	1/16	1/8	1/4	1-1/2	A	35066	6.14	35067	6.14		
SA-42	3/32	1/8	7/16	1-1/2	A	35071	6.14	35072	6.14		
SA-43	1/8	1/8	9/16	1-1/2	A	35076	6.14	35077	6.14		
SA-43L2	1/8	1/8	9/16	2	A	34906	8.14	34907	8.14		
SA-43L3	1/8	1/8	9/16	3	A	34909	10.13	90232	10.13		
SA-11	1/8	1/4	1/2	2	A	35011	11.29	35012	11.29		
SA-52	5/32	1/8	1/2	1-1/2	A	35096	16.70	35097	16.70		
SA-53	3/16	1/8	1/2	1-1/2	A	35101	16.70	35102	16.70		
SA-14	3/16	1/4	5/8	2	A	35021	11.29	35022	11.29		
SA-50	1/4	1/8	3/16	1-11/16	C	35086	10.24	35087	10.24		
SA-51	1/4	1/8	1/2	2	C	35091	10.24	35092	10.24		
SA-1	1/4	1/4	5/8	2	A	35001	10.40	35002	10.40		
SA-1	1/4	1/4	3/4	2	A					36230	13.44
SA-1A	1/4	1/4	1	2	A	35006	15.07	35007	15.07		
SA-1L4	1/4	1/4	1/2	4-1/2	C	35028	13.23	35030	13.23		
SA-1L6	1/4	1/4	1/2	6-1/2	C	34901	15.70	91185	15.70		
SA-2	5/16	1/4	3/4	2-3/4	C	35046	13.76	35047	13.76		
SA-3	3/8	1/4	3/4	2-3/4	C	35051	14.75	35052	14.75	36231	20.16
SA-3A	3/8	1/4	1	3	C	35056	17.38	35057	17.38		
SA-3L4	3/8	1/4	3/4	4-3/4	C	35033	18.64	35034	18.64		
SA-3L6	3/8	1/4	3/4	6-3/4	C	34903	22.10	34904	22.10		
SA-4	7/16	1/4	1	3	C	35061	21.26	35062	21.26		
SA-5	1/2	1/4	1	3	C	35081	22.68	35082	22.68	36232	29.56
SA-5L4	1/2	1/4	1	5	C	35038	29.66	35040	29.66		
SA-5L6	1/2	1/4	1	7	C	34911	31.66	91186	31.66		
SA-6	5/8	1/4	1	3	C	35106	29.09	35107	29.09	36233	36.28
SA-7	3/4	1/4	1	3	C	35121	44.10	35122	44.10	36234	49.72
SA-9	1	1/4	1	3	C	35136	62.11	35137	62.11		

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SA CYLINDRICAL SHAPE BURS

For general purpose deburring operations

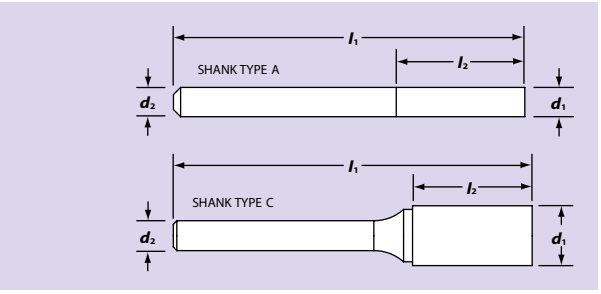
SA

Cylindrical shape

SA • Standard Cut

SA • Double Cut

SA • Aluma Cut



Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SA-41M	1,5	3	6	38	A	60040	6.14	60080	6.14		
SA-42M	2,5	3	11	38	A	60041	6.14	60081	6.14		
SA-43M	3	3	14	38	A	60042	6.14	60082	6.14		
SA-43ML2	3	3	14	50	A	60065	8.14	60097	8.14		
SA-43ML3	3	3	14	76	A	60069	10.13	60101	10.13		
SA-11M	3	6	12	50	A	60043	11.29	60083	11.29		
SA-52M	4	3	12,7	38	A	60044	16.70	60084	16.70		
SA-53M	4,7	3	12,7	38	A	60045	16.70	60085	16.70		
SA-14M	4,7	6	16	50	A	60046	11.29	60086	11.29		
SA-1M	6	6	16	50	A	60048	10.40	60088	10.40		
SA-1M	6	6	19	50	A					60105	13.44
SA-1ML4	6	6	12,7	114	C	60066	13.23	60098	13.23		
SA-1ML6	6	6	12,7	163	C	60070	15.70	60102	15.70		
SA-51M	6,3	3	12,7	50	C	60047	10.24	60087	10.24		
SA-2M	8	6	20	63	C	60049	13.76	60089	13.76		
SA-3M	9,5	6	19	63	C	60058	14.75	60090	14.75	60106	20.16
SA-3ML4	9,5	6	19	120	C	60067	18.64	60099	18.64		
SA-3ML6	9,5	6	19	171	C	60071	22.10	60103	22.10		
SA-4M	11	6	25	68	C	60059	21.26	60091	21.26		
SA-5M	12,7	6	25	68	C	60060	22.68	60092	22.68	60107	29.56
SA-5ML4	12,7	6	25	127	C	60068	29.66	60100	29.66		
SA-5ML6	12,7	6	25	177	C	60072	31.66	60104	31.66		
SA-6M	16	6	25	68	C	60061	29.09	60093	29.09	60108	36.28
SA-7M	19	6	25	68	C	60063	44.10	60095	44.10	60109	49.72
SA-9M	25,4	6	25	68	C	60064	62.11	60096	62.11		

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	Standard	Double	Aluma
Carbon & tool steels ≤ 48 HRC	✓	✓✓	
Carbon & tool steels > 48 HRC	✓	✓✓	
Stainless steels	✓	✓✓	
Super alloys, Inconel®, titanium	✓	✓✓	
Cast irons	✓	✓✓	
Aluminum and non-ferrous			✓✓

✓ Suitable ✓✓ Recommended

SB CYLINDRICAL END CUT BURS

For general purpose deburring operations

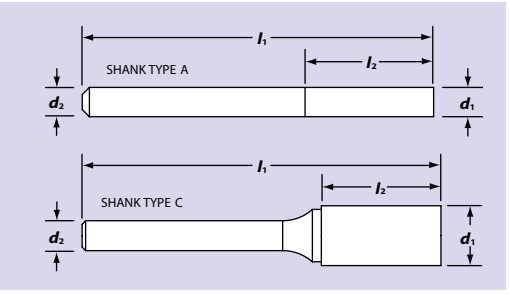
SB

Cylindrical shape
End cut

SB • Standard Cut

SB • Double Cut

SB • Aluma Cut



Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SB-41	1/16	1/8	1/4	1-1/2	A	35216	6.14	35217	6.14		
SB-42	3/32	1/8	7/16	1-1/2	A	35221	6.14	35222	6.14		
SB-43	1/8	1/8	9/16	1-1/2	A	35226	6.14	35227	6.14		
SB-43L2	1/8	1/8	9/16	2	A	35803	8.98	95234	8.98		
SB-43L3	1/8	1/8	9/16	3	A	96806	11.18	98586	11.18		
SB-11	1/8	1/4	1/2	2	A	35161	12.23	35162	12.23		
SB-52	5/32	1/8	1/2	1-1/2	A	35246	18.38	35247	18.38		
SB-53	3/16	1/8	1/2	1-1/2	A	35251	18.38	35252	18.38		
SB-14	3/16	1/4	5/8	2	A	35171	12.23	35172	12.23		
SB-50	1/4	1/8	3/16	1-11/16	C	35236	11.29	35237	11.29		
SB-51	1/4	1/8	1/2	2	C	35241	11.29	35242	11.29		
SB-1	1/4	1/4	5/8	2	A	35151	11.45	35152	11.45		
SB-1	1/4	1/4	3/4	2	A					36264	14.81
SB-1A	1/4	1/4	1	2	A	35156	16.59	35157	16.59		
SB-1L4	1/4	1/4	1/2	4-1/2	C	35820	14.54	35805	14.54		
SB-1L6	1/4	1/4	1/2	6-1/2	C	35831	17.27	35813	17.27		
SB-2	5/16	1/4	3/4	2-3/4	C	35196	15.17	35197	15.17		
SB-3	3/8	1/4	3/4	2-3/4	C	35201	16.28	35202	16.28	36265	22.16
SB-3A	3/8	1/4	1	3	C	35206	19.11	35207	19.11		
SB-3L4	3/8	1/4	3/4	4-3/4	C	35823	20.53	35808	20.53		
SB-3L6	3/8	1/4	3/4	6-3/4	C	35828	24.31	35815	24.31		
SB-4	7/16	1/4	1	3	C	35211	23.42	35212	23.42		
SB-5	1/2	1/4	1	3	C	35231	24.99	35232	24.99	36266	32.45
SB-5L4	1/2	1/4	1	5	C	35825	32.66	35810	32.66		
SB-5L6	1/2	1/4	1	7	C	35830	34.86	35818	34.86		
SB-6	5/8	1/4	1	3	C	35256	32.03	35257	32.03	36267	39.90
SB-7	3/4	1/4	1	3	C	35271	48.51	35272	48.51	36268	54.76

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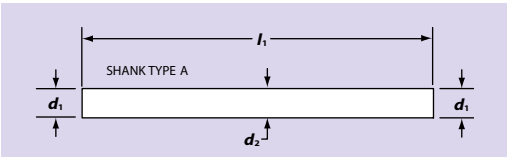
	Standard	Double	Aluma
Carbon & tool steels ≤ 48 HRC	✓	✓✓	
Carbon & tool steels > 48 HRC	✓	✓✓	
Stainless steels	✓	✓✓	
Super alloys, Inconel®, titanium	✓	✓✓	
Cast irons	✓	✓✓	
Aluminum and non-ferrous			✓✓

✓ Suitable ✓✓ Recommended

Cylindrical shape
End cut only • Double end



Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_1 Overall Length	Shk Type	EDP Number	List Price
SB-40	1/8	1/8	1-1/2	A	36161	6.14
SB-0	1/4	1/4	2	A	36156	11.45

SB CYLINDRICAL END CUT BURS

For general purpose deburring operations

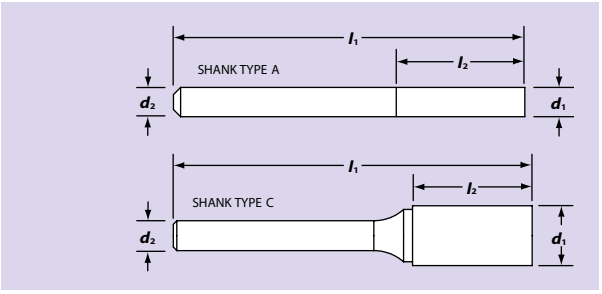
SB

Cylindrical shape
End cut

SB • Standard Cut

SB • Double Cut

SB • Aluma Cut



Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SB-41M	1,5	3	6	38	A	60121	6.14	60140	6.14		
SB-42M	2,5	3	11	38	A	60122	6.14	60141	6.14		
SB-43M	3	3	14	38	A	60123	6.14	60142	6.14		
SB-43ML2	3	3	14	50	A	60578	8.98	60579	8.98		
SB-43ML3	3	3	14	76	A	60586	11.18	60587	11.18		
SB-11M	3	6	12	50	A	60124	12.23	60143	12.23		
SB-52M	4	3	12,7	38	A	60125	18.38	60144	18.38		
SB-53M	4,7	3	12,7	38	A	60126	18.38	60145	18.38		
SB-14M	4,7	6	16	50	A	60127	12.23	60146	12.23		
SB-1M	6	6	16	50	A	60130	11.45	60149	11.45		
SB-1M	6	6	19	50	A					60160	14.81
SB-1ML4	6	6	12,7	114	C	60580	14.54	60581	14.54		
SB-1ML6	6	6	12,7	163	C	60588	17.27	60589	17.27		
SB-50M	6,3	3	5	43	C	60128	11.29	60147	11.29		
SB-51M	6,3	3	12,7	50	C	60129	11.29	60148	11.29		
SB-2M	8	6	20	63	C	60131	15.17	60150	15.17		
SB-3M	9,5	6	19	63	C	60132	16.28	60151	16.28	60161	22.16
SB-3ML4	9,5	6	19	120	C	60582	20.53	60583	20.53		
SB-3ML6	9,5	6	19	171	C	60590	24.31	60591	24.31		
SB-4M	11	6	25	68	C	60133	23.42	60152	23.42		
SB-5M	12,7	6	25	68	C	60134	24.99	60153	24.99	60162	32.45
SB-5ML4	12,7	6	25	127	C	60584	32.66	60585	32.66		
SB-5ML6	12,7	6	25	177	C	60592	34.86	60593	34.86		
SB-6M	16	6	25	68	C	60135	32.03	60154	32.03	60163	39.90
SB-7M	19	6	25	68	C	60137	48.51	60156	48.51	60164	54.76

Chipbreaker Cut
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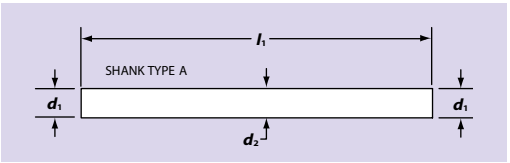
	Standard	Double	Aluma
Carbon & tool steels ≤ 48 HRC	✓	✓✓	
Carbon & tool steels > 48 HRC	✓	✓✓	
Stainless steels	✓	✓✓	
Super alloys, Inconel®, titanium	✓	✓✓	
Cast irons	✓	✓✓	
Aluminum and non-ferrous			✓✓

✓ Suitable ✓✓ Recommended

Cylindrical shape
End cut only • Double end



Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_1 Overall Length	Shk Type	EDP Number	List Price
SB-40M	3	3	38	A	60120	6.14

SC CYLINDRICAL RADIUS END SHAPE BURS

For general purpose deburring operations

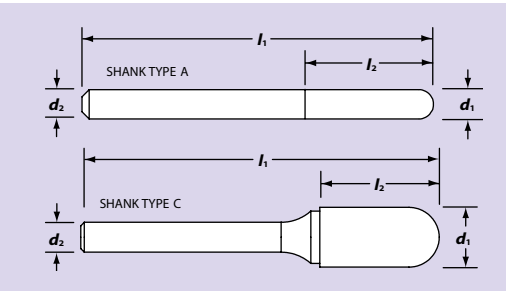
SC

Cylindrical shape
Radius end

SC • Standard Cut

SC • Double Cut

SC • Aluma Cut



	Standard	Double	Aluma
Carbon & tool steels ≤ 48 HRC	✓	✓✓	
Carbon & tool steels > 48 HRC	✓	✓✓	
Stainless steels	✓	✓✓	
Super alloys, Inconel®, titanium	✓	✓✓	
Cast irons	✓	✓✓	
Aluminum and non-ferrous			✓✓

✓ Suitable ✓✓ Recommended

Chipbreaker Cut
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Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SC-41	3/32	1/8	7/16	1-1/2	A	35346	6.14	35347	6.14		
SC-42	1/8	1/8	9/16	1-1/2	A	35351	6.14	35352	6.14		
SC-42L2	1/8	1/8	9/16	2	A	34919	8.14	34920	8.14		
SC-42L3	1/8	1/8	9/16	3	A	34922	10.13	34923	10.13		
SC-11	1/8	1/4	1/2	2	A	35311	12.86	35312	12.86		
SC-52	5/32	1/8	1/2	1-1/2	A	35366	16.70	35367	16.70		
SC-53	3/16	1/8	1/2	1-1/2	A	35371	16.70	35372	16.70		
SC-14	3/16	1/4	5/8	2	A	35321	12.86	35322	12.86		
SC-51	1/4	1/8	1/2	2	C	35361	10.24	35362	10.24		
SC-1	1/4	1/4	5/8	2	A	35301	12.13	35302	12.13		
SC-1	1/4	1/4	3/4	2	A					36236	15.07
SC-1A	1/4	1/4	1	2	A	35306	16.54	35307	16.54		
SC-1L4	1/4	1/4	1/2	4-1/2	C	35410	13.23	35411	13.23		
SC-1L6	1/4	1/4	1/2	6-1/2	C	34913	16.17	34914	16.17		
SC-2	5/16	1/4	3/4	2-3/4	C	35326	15.33	35327	15.33		
SC-3	3/8	1/4	3/4	2-3/4	C	35331	16.75	35332	16.75	36237	20.16
SC-3A	3/8	1/4	1	3	C	35336	19.43	35337	19.43		
SC-3L4	3/8	1/4	3/4	4-3/4	C	35412	21.79	35413	21.79		
SC-3L6	3/8	1/4	3/4	6-3/4	C	34916	23.78	34917	23.78		
SC-4	7/16	1/4	1	3	C	35341	24.05	35342	24.05		
SC-5	1/2	1/4	1	3	C	35356	26.15	35357	26.15	36238	29.56
SC-5L4	1/2	1/4	1	5	C	35414	34.49	35415	34.49		
SC-5L6	1/2	1/4	1	7	C	34925	36.49	34926	36.49		
SC-6	5/8	1/4	1	3	C	35376	33.23	35377	33.23	36239	44.99
SC-7	3/4	1/4	1	3	C	35386	47.72	35387	47.72	36240	61.79

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SC-41M	2,5	3	11	38	A	60170	6.14	60192	6.14		
SC-42M	3	3	14	38	A	60171	6.14	60193	6.14		
SC-42ML2	3	3	14	50	A	60184	8.14	60206	8.14		
SC-42ML3	3	3	14	76	A	60188	10.13	60210	10.13		
SC-11M	3	6	12	50	A	60172	12.86	60194	12.86		
SC-52M	4	3	12,7	38	A	60173	16.70	60195	16.70		
SC-53M	4,7	3	12,7	38	A	60174	16.70	60196	16.70		
SC-14M	4,7	6	16	50	A	60175	12.86	60197	12.86		
SC-1M	6	6	16	50	A	60177	12.13	60199	12.13		
SC-1M	6	6	19	50	A					60215	15.07
SC-1ML4	6	6	12,7	114	C	60185	13.23	60207	13.23		
SC-1ML6	6	6	12,7	163	C	60189	16.17	60211	16.17		
SC-51M	6,3	3	12,7	50	C	60176	10.24	60198	10.24		
SC-2M	8	6	20	63	C	60178	15.33	60200	15.33		
SC-3M	9,5	6	19	63	C	60179	16.75	60201	16.75	60216	20.16
SC-3ML4	9,5	6	19	120	C	60186	21.79	60208	21.79		
SC-3ML6	9,5	6	19	171	C	60190	23.78	60212	23.78		
SC-4M	11	6	25	68	C	60180	24.05	60202	24.05		
SC-5M	12,7	6	25	68	C	60181	26.15	60203	26.15	60217	29.56
SC-5ML4	12,7	6	25	127	C	60187	34.49	60209	34.49		
SC-5ML6	12,7	6	25	177	C	60191	36.49	60213	36.49		
SC-6M	16	6	25	68	C	60182	33.23	60204	33.23	60218	44.99
SC-7M	19	6	25	68	C	60183	47.72	60205	47.72	60219	61.79

SD BALL SHAPE BURS

For general purpose deburring operations

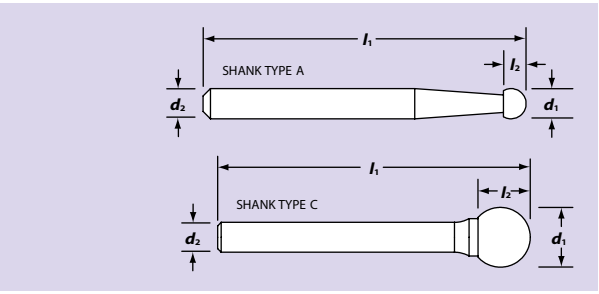
SD

Ball shape

SD • Standard Cut

SD • Double Cut

SD • Aluma Cut



	Standard	Double	Aluma
Carbon & tool steels ≤ 48 HRC	✓	✓✓	
Carbon & tool steels > 48 HRC	✓	✓✓	
Stainless steels	✓	✓✓	
Super alloys, Inconel®, titanium	✓	✓✓	
Cast irons	✓	✓✓	
Aluminum and non-ferrous			✓✓

✓ Suitable ✓✓ Recommended

Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SD-41	3/32	1/8	1/16	1-1/2	A	35446	6.14	35447	6.14		
SD-42	1/8	1/8	3/32	1-1/2	A	35451	6.14	35452	6.14		
SD-42L2	1/8	1/8	3/32	2	A	34934	8.14	34935	8.14		
SD-42L3	1/8	1/8	3/32	3	A	34937	10.13	34938	10.13		
SD-11	1/8	1/4	3/32	2	A	35421	11.92	35422	11.92		
SD-53	3/16	1/8	1/8	1-1/2	A	35466	16.70	35467	16.70		
SD-14	3/16	1/4	5/32	2	A	35426	11.92	35427	11.92		
SD-51	1/4	1/8	7/32	1-11/16	C	35461	10.24	35462	10.24		
SD-1	1/4	1/4	7/32	2	A	35416	11.50	35417	11.50	36242	14.91
SD-1L4	1/4	1/4	7/32	4-1/8	C	35505	13.23	35506	13.23		
SD-1L6	1/4	1/4	7/32	6-1/8	C	34928	16.17	34929	16.17		
SD-2	5/16	1/4	1/4	2-1/4	C	35431	12.34	35432	12.34		
SD-3	3/8	1/4	5/16	2-5/16	C	35436	13.86	35437	13.86	36243	16.59
SD-3L4	3/8	1/4	5/16	4-1/4	C	35507	16.75	35508	16.75		
SD-3L6	3/8	1/4	5/16	6-1/4	C	34931	18.74	34932	18.74		
SD-4	7/16	1/4	3/8	2-3/8	C	35441	16.38	35442	16.38		
SD-5	1/2	1/4	7/16	2-7/16	C	35456	17.90	35457	17.90	36244	23.78
SD-5L4	1/2	1/4	7/16	4-3/8	C	35509	22.79	35510	22.79		
SD-5L6	1/2	1/4	7/16	6-3/8	C	34940	24.73	34941	24.73		
SD-6	5/8	1/4	9/16	2-9/16	C	35471	22.68	35472	22.68	36245	43.00
SD-7	3/4	1/4	11/16	2-11/16	C	35481	32.03	35482	32.03	36246	72.66
SD-9	1	1/4	15/16	2-15/16	C	35496	52.97	35497	52.97		

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SD-41M	2,3	3	2	38	A	60220	6.14	60242	6.14		
SD-42M	3	3	2	38	A	60221	6.14	60243	6.14		
SD-42ML2	3	3	2	50	A	60234	8.14	60256	8.14		
SD-42ML3	3	3	2	76	A	60238	10.13	60260	10.13		
SD-11M	3	6	2	50	A	60222	11.92	60244	11.92		
SD-53M	4,7	3	4,5	38	A	60223	16.70	60245	16.70		
SD-14M	4,7	6	4,5	50	A	60224	11.92	60246	11.92		
SD-1M	6	6	5	50	A	60226	11.50	60248	11.50	60265	14.91
SD-51M	6,3	3	5	43	C	60225	10.24	60247	10.24		
SD-1ML4	6,3	6	5	107	C	60235	13.23	60257	13.23		
SD-1ML6	6,3	6	5	157	C	60239	16.17	60261	16.17		
SD-2M	8	6	7	50	C	60227	12.34	60249	12.34		
SD-3M	9,5	6	8	52	C	60228	13.86	60250	13.86	60266	16.59
SD-3ML4	9,5	6	8	108	C	60236	16.75	60258	16.75		
SD-3ML6	9,5	6	8	161	C	60240	18.74	60262	18.74		
SD-4M	11	6	9,5	52	C	60229	16.38	60251	16.38		
SD-5M	12,7	6	11	54	C	60230	17.90	60252	17.90	60267	23.78
SD-5ML4	12,7	6	11	111	C	60237	22.79	60259	22.79		
SD-5ML6	12,7	6	11	164	C	60241	24.73	60263	24.73		
SD-6M	16	6	14	58	C	60231	22.68	60253	22.68	60268	43.00
SD-7M	19	6	16	60	C	60232	32.03	60254	32.03	60269	72.66
SD-9M	25,4	6	24	68	C	60233	52.97	60255	52.97		

Chipbreaker Cut
Coarse Cut
Fine Cut
Diamond Cut
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SE OVAL SHAPE BURS

For general purpose deburring operations

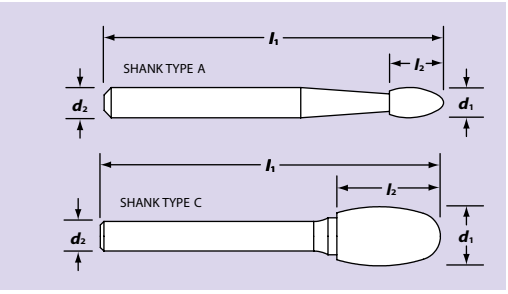
SE

Oval shape

SE • Standard Cut

SE • Double Cut

SE • Aluma Cut



	Standard	Double	Aluma
Carbon & tool steels ≤ 48 HRC	✓	✓✓	
Carbon & tool steels > 48 HRC	✓	✓✓	
Stainless steels	✓	✓✓	
Super alloys, Inconel®, titanium	✓	✓✓	
Cast irons	✓	✓✓	
Aluminum and non-ferrous			✓✓

✓ Suitable ✓✓ Recommended

Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SE-41	1/8	1/8	7/32	1-1/2	A	35521	6.14	35522	6.14		
SE-41L2	1/8	1/8	7/32	2	A	34949	8.14	34950	8.14		
SE-41L3	1/8	1/8	7/32	3	A	91340	10.13	34952	10.13		
SE-53	3/16	1/8	9/32	1-1/2	A	35536	16.70	35537	16.70		
SE-51	1/4	1/8	3/8	1-7/8	C	35531	10.24	35532	10.24		
SE-1	1/4	1/4	3/8	2	A	35511	14.02	35512	14.02	36247	19.53
SE-1L4	1/4	1/4	3/8	4-3/8	C	35557	13.23	35558	13.23		
SE-1L6	1/4	1/4	3/8	6-3/8	C	34943	16.17	34944	16.17		
SE-3	3/8	1/4	5/8	2-5/8	C	35516	16.75	35517	16.75	36248	21.84
SE-3L4	3/8	1/4	5/8	4-5/8	C	35559	20.74	35560	20.74		
SE-3L6	3/8	1/4	5/8	6-5/8	C	34946	22.68	34947	22.68		
SE-5	1/2	1/4	7/8	2-7/8	C	35526	24.52	35527	24.52	36249	26.88
SE-5L4	1/2	1/4	7/8	4-7/8	C	35563	30.77	35565	30.77		
SE-5L6	1/2	1/4	7/8	6-7/8	C	90292	32.76	11332	32.76		
SE-6	5/8	1/4	1	3	C	35541	33.13	35542	33.13	36250	48.46
SE-7	3/4	1/4	1	3	C	35551	44.99	35552	44.99	36251	64.58

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SE-41M	3	3	5	38	A	60270	6.14	60286	6.14		
SE-41ML2	3	3	5	50	A	60278	8.14	60304	8.14		
SE-41ML3	3	3	5	76	A	60282	10.13	60308	10.13		
SE-53M	4,7	3	7,1	38	A	60271	16.70	60287	16.70		
SE-1M	6	6	10	50	A	60273	14.02	60289	14.02	60312	19.53
SE-51M	6,3	3	9,5	47	C	60272	10.24	60288	10.24		
SE-1ML4	6,3	6	10	111	C	60279	13.23	60305	13.23		
SE-1ML6	6,3	6	10	163	C	60283	16.17	60309	16.17		
SE-3M	9,5	6	16	60	C	60274	16.75	60300	16.75	60313	21.84
SE-3ML4	9,5	6	16	117	C	60280	20.74	60306	20.74		
SE-3ML6	9,5	6	16	168	C	60284	22.68	60310	22.68		
SE-5M	12,7	6	22	66	C	60275	24.52	60301	24.52	60314	26.88
SE-5ML4	12,7	6	22	123	C	60281	30.77	60307	30.77		
SE-5ML6	12,7	6	22	177	C	60285	32.76	60311	32.76		
SE-6M	16	6	25	68	C	60276	33.13	60302	33.13	60315	48.46
SE-7M	19	6	25	68	C	60277	44.99	60303	44.99	60316	64.58

Chipbreaker Cut
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SF RADIUS END TREE SHAPE BURS

For general purpose deburring operations

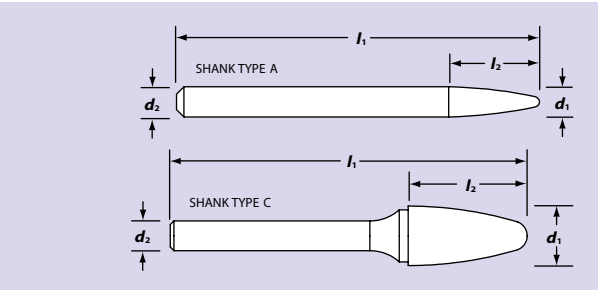
SF

Tree shape
Radius end

SF • Standard Cut

SF • Double Cut

SF • Aluma Cut



		Standard	Double	Aluma
●	Carbon & tool steels ≤ 48 HRC	✓	✓✓	
●	Carbon & tool steels > 48 HRC	✓	✓✓	
●	Stainless steels	✓	✓✓	
●	Super alloys, Inconel®, titanium	✓	✓✓	
●	Cast irons	✓	✓✓	
●	Aluminum and non-ferrous			✓✓

✓ Suitable ✓✓ Recommended

Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SF-41	1/8	1/8	1/4	1-1/2	A	35616	6.14	35617	6.14		
SF-42	1/8	1/8	1/2	1-1/2	A	35621	6.14	35622	6.14		
SF-42L2	1/8	1/8	1/2	2	A	34961	8.14	34962	8.14		
SF-42L3	1/8	1/8	1/2	3	A	91343	10.13	11326	10.13		
SF-11	1/8	1/4	1/2	2	A	35576	13.86	35577	13.86		
SF-53	3/16	1/8	1/2	1-1/2	A	35636	16.70	35637	16.70		
SF-51	1/4	1/8	1/2	2	C	35631	10.24	35632	10.24		
SF-1	1/4	1/4	3/4	2	A	35571	13.02	35572	13.02	36253	17.12
SF-1L4	1/4	1/4	1/2	4-1/2	C	35592	13.23	35593	13.23		
SF-1L6	1/4	1/4	1/2	6-1/2	C	34955	16.17	34956	16.17		
SF-3	3/8	1/4	3/4	2-3/4	C	35606	15.75	35607	15.75	36254	21.32
SF-3L4	3/8	1/4	3/4	4-3/4	C	35594	20.63	35595	20.63		
SF-3L6	3/8	1/4	3/4	6-3/4	C	34958	22.58	34959	22.58		
SF-4	7/16	1/4	1	3	C	35611	22.84	35612	22.84		
SF-13	1/2	1/4	3/4	2-3/4	C	35581	23.89	35582	23.89		
SF-5	1/2	1/4	1	3	C	35626	23.89	35627	23.89	36255	29.93
SF-5L4	1/2	1/4	1	5	C	35598	29.61	35600	29.61		
SF-5L6	1/2	1/4	1	7	C	34965	31.61	34966	31.61		
SF-6	5/8	1/4	1	3	C	35641	33.71	35642	33.71	36256	43.00
SF-7	3/4	1/4	1	3	C	35651	44.21	35652	44.21		
SF-14	3/4	1/4	1-1/4	3-1/4	C	35586	54.76	35587	54.76	36257	60.27
SF-15	3/4	1/4	1-1/2	3-1/2	C	35596	65.10	35597	65.10		

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SF-41M	3	3	6,3	38	A	60320	6.14	60342	6.14		
SF-42M	3	3	13	38	A	60321	6.14	60343	6.14		
SF-42ML2	3	3	13	50	A	60334	8.14	60356	8.14		
SF-42ML3	3	3	13	76	A	60338	10.13	60360	10.13		
SF-11M	3	6	13	50	A	60322	13.86	60344	13.86		
SF-53M	4,7	3	13	38	A	60323	16.70	60345	16.70		
SF-1M	6	6	19	50	A	60325	13.02	60347	13.02	60365	17.12
SF-1ML4	6	6	13	114	C	60335	13.23	60357	13.23		
SF-1ML6	6	6	13	163	C	60339	16.17	60361	16.17		
SF-51M	6,3	3	13	50	C	60324	10.24	60346	10.24		
SF-3M	9,5	6	19	63	C	60326	15.75	60348	15.75	60366	21.32
SF-3ML4	9,5	6	19	120	C	60336	20.63	60358	20.63		
SF-3ML6	9,5	6	19	171	C	60340	22.58	60362	22.58		
SF-4M	11	6	25	68	C	60327	22.84	60349	22.84		
SF-13M	12,7	6	19	63	C	60328	23.89	60350	23.89		
SF-5M	12,7	6	25	68	C	60329	23.89	60351	23.89	60367	29.93
SF-5ML4	12,7	6	25	127	C	60337	29.61	60359	29.61		
SF-5ML6	12,7	6	25	177	C	60341	31.61	60363	31.61		
SF-6M	16	6	25	68	C	60330	33.71	60352	33.71	60368	43.00
SF-7M	19	6	25	68	C	60331	44.21	60353	44.21		
SF-14M	19	6	32	76	C	60332	54.76	60354	54.76	60369	60.27
SF-15M	19	6	38	82	C	60333	65.10	60355	65.10		

Chipbreaker Cut
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Fine Cut
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SG POINTED END TREE SHAPE BURS

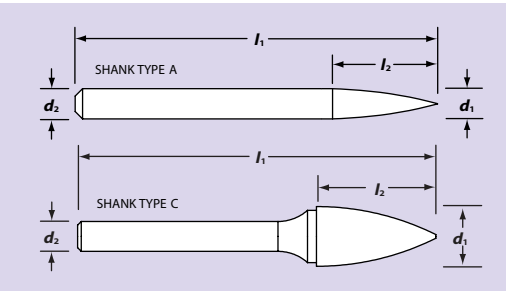
For general purpose deburring operations

SG

Tree shape
Pointed end

SG • Standard Cut

SG • Double Cut



	Standard	Double
Carbon & tool steels ≤ 48 HRC	✓	✓✓
Carbon & tool steels > 48 HRC	✓	✓✓
Stainless steels	✓	✓✓
Super alloys, Inconel®, titanium	✓	✓✓
Cast irons	✓	✓✓
Aluminum and non-ferrous		

✓ Suitable ✓✓ Recommended

Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price
SG-41	1/8	1/8	1/4	1-1/2	A	35701	6.14	35702	6.14
SG-42	1/8	1/8	5/16	1-1/2	A	35706	6.14	35707	6.14
SG-43	1/8	1/8	3/8	1-1/2	A	35711	6.14	35712	6.14
SG-44	1/8	1/8	1/2	1-1/2	A	36155	6.14	93853	6.14
SG-44L2	1/8	1/8	1/2	2	A	34974	8.14	34975	8.14
SG-44L3	1/8	1/8	1/2	3	A	34977	10.13	34978	10.13
SG-53	3/16	1/8	1/2	1-1/2	A	11320	16.70	11602	16.70
SG-51	1/4	1/8	1/2	2	C	35721	10.24	35722	10.24
SG-1	1/4	1/4	3/4	2	A	35671	13.02	35672	13.02
SG-1L4	1/4	1/4	1/2	4-1/2	C	35738	13.23	35740	13.23
SG-1L6	1/4	1/4	1/2	6-1/2	C	34968	16.17	34969	16.17
SG-2	5/16	1/4	3/4	2-3/4	C	35691	15.17	35692	15.17
SG-3	3/8	1/4	3/4	2-3/4	C	35696	16.22	35697	16.22
SG-3L4	3/8	1/4	3/4	4-3/4	C	35700	20.63	35743	20.63
SG-3L6	3/8	1/4	3/4	6-3/4	C	34971	22.58	34972	22.58
SG-13	1/2	1/4	3/4	2-3/4	C	35676	22.89	35677	22.89
SG-5	1/2	1/4	1	3	C	35716	23.89	35717	23.89
SG-5L4	1/2	1/4	1	5	C	35713	29.61	35745	29.61
SG-5L6	1/2	1/4	1	7	C	91029	31.61	90426	31.61
SG-6	5/8	1/4	1	3	C	35726	33.02	35727	33.02
SG-7	3/4	1/4	1	3	C	35736	43.10	35737	43.10
SG-15	3/4	1/4	1-1/2	3-1/2	C	35681	65.10	35682	65.10

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price
SG-41M	3	3	6,3	38	A	60370	6.14	60391	6.14
SG-43M	3	3	9,5	38	A	60371	6.14	60392	6.14
SG-44M	3	3	13	38	A	60372	6.14	60393	6.14
SG-44ML2	3	3	13	50	A	60383	8.14	60404	8.14
SG-44ML3	3	3	13	76	A	60387	10.13	60408	10.13
SG-53M	4,7	3	13	38	A	60373	16.70	60394	16.70
SG-1M	6	6	19	50	A	60375	13.02	60396	13.02
SG-1ML4	6	6	13	114	C	60384	13.23	60405	13.23
SG-1ML6	6	6	13	163	C	60388	16.17	60409	16.17
SG-51M	6,3	3	13	50	C	60374	10.24	60395	10.24
SG-2M	8	6	19	63	C	60376	15.17	60397	15.17
SG-3M	9,5	6	19	63	C	60377	16.22	60398	16.22
SG-3ML4	9,5	6	19	120	C	60385	20.63	60406	20.63
SG-3ML6	9,5	6	19	171	C	60389	22.58	60410	22.58
SG-13M	12,7	6	19	63	C	60378	22.89	60399	22.89
SG-5M	12,7	6	25	68	C	60379	23.89	60400	23.89
SG-5ML4	12,7	6	25	127	C	60386	29.61	60407	29.61
SG-5ML6	12,7	6	25	177	C	60390	31.61	60411	31.61
SG-6M	16	6	25	68	C	60380	33.02	60401	33.02
SG-7M	19	6	25	68	C	60381	43.10	60402	43.10
SG-15M	19	6	38	82	C	60382	65.10	60403	65.10

Chipbreaker Cut
Coarse Cut
Fine Cut
Diamond Cut
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SH FLAME SHAPE BURS

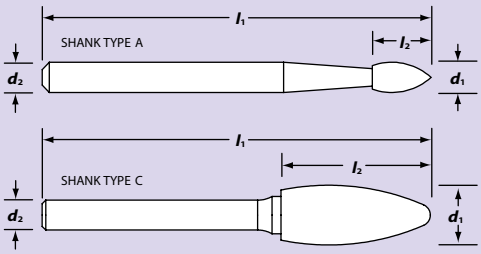
For general purpose deburring operations

SH

Flame shape

SH • Standard Cut

SH • Double Cut



		Standard	Double
●	Carbon & tool steels ≤ 48 HRC	✓	✓✓
●	Carbon & tool steels > 48 HRC	✓	✓✓
●	Stainless steels	✓	✓✓
●	Super alloys, Inconel®, titanium	✓	✓✓
●	Cast irons	✓	✓✓
●	Aluminum and non-ferrous		

✓ Suitable ✓✓ Recommended

Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price
SH-41	1/8	1/8	1/4	1-1/2	A	35766	6.14	35767	6.14
SH-41L2	1/8	1/8	1/4	2	A	34984	8.14	34985	8.14
SH-41L3	1/8	1/8	1/4	3	A	34987	10.13	34988	10.13
SH-53	3/16	1/8	3/8	1-1/2	A	35776	16.70	35777	16.70
SH-1	1/4	1/4	5/8	2	A	35756	14.75	35757	14.75
SH-2	5/16	1/4	3/4	2-3/4	C	35761	15.91	35762	15.91
SH-2L4	5/16	1/4	3/4	4-3/4	C	35800	21.74	35794	21.74
SH-2L6	5/16	1/4	3/4	6-3/4	C	34981	23.63	34982	23.63
SH-5	1/2	1/4	1-1/4	3-1/4	C	35771	34.39	35772	34.39
SH-5L4	1/2	1/4	1-1/4	5-1/4	C	35832	45.36	35798	45.36
SH-5L6	1/2	1/4	1-1/4	7-1/4	C	34990	47.36	34991	47.36
SH-6	5/8	1/4	1-7/16	3-7/16	C	35781	49.35	35782	49.35
SH-7	3/4	1/4	1-5/8	3-5/8	C	35786	67.52	35787	67.52

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price
SH-41M	3	3	6	38	A	60414	6.14	60427	6.14
SH-41ML2	3	3	6	50	A	60421	8.14	60434	8.14
SH-41ML3	3	3	6	76	A	60424	10.13	60437	10.13
SH-53M	4,7	3	9,5	38	A	60415	16.70	60428	16.70
SH-1M	6	6	16	50	A	60416	14.75	60429	14.75
SH-2M	8	6	19	63	C	60417	15.91	60430	15.91
SH-2ML4	8	6	19	120	C	60422	21.74	60435	21.74
SH-2ML6	8	6	19	171	C	60425	23.63	60438	23.63
SH-5M	12,7	6	31	75	C	60418	34.39	60431	34.39
SH-5ML4	12,7	6	31	132	C	60423	45.36	60436	45.36
SH-5ML6	12,7	6	31	183	C	60426	47.36	60439	47.36
SH-6M	16	6	36	79	C	60419	49.35	60432	49.35
SH-7M	19	6	41	84	C	60420	67.52	60433	67.52

Chipbreaker Cut
Coarse Cut
Fine Cut
Diamond Cut
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SL TAPER SHAPE BURS

For general purpose deburring operations

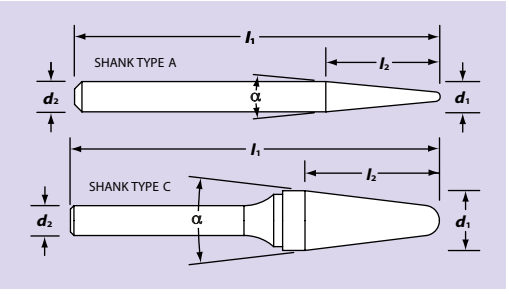
SL

Taper shape

SL • Standard Cut

SL • Double Cut

SL • Aluma Cut



	Standard	Double	Aluma
Carbon & tool steels ≤ 48 HRC	✓	✓✓	
Carbon & tool steels > 48 HRC	✓	✓✓	
Stainless steels	✓	✓✓	
Super alloys, Inconel®, titanium	✓	✓✓	
Cast irons	✓	✓✓	
Aluminum and non-ferrous			✓✓

✓ Suitable ✓✓ Recommended

Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	α Incl. Angle	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SL-41	1/8	1/8	3/8	1-1/2	10°	A	35921	6.14	35922	6.14		
SL-42	1/8	1/8	1/2	1-1/2	8°	A	35926	6.14	35927	6.14		
SL-42L2	1/8	1/8	1/2	2	8°	A	34815	8.14	34816	8.14		
SL-42L3	1/8	1/8	1/2	3	8°	A	34818	10.13	34819	10.13		
SL-53	3/16	1/8	1/2	1-1/2	14°	A	35931	16.70	35932	16.70		
SL-1	1/4	1/4	5/8	2	14°	A	35901	13.34	35902	13.34	36258	17.69
SL-1L4	1/4	1/4	5/8	4-5/8	14°	C	35947	13.23	35948	13.23		
SL-1L6	1/4	1/4	5/8	6-5/8	14°	C	34807	16.17	34808	16.17		
SL-2	5/16	1/4	7/8	2-7/8	14°	C	35906	17.54	35907	17.54		
SL-3	3/8	1/4	1-1/16	3-1/16	14°	C	35911	20.58	35912	20.58	36259	27.35
SL-3L4	3/8	1/4	1-1/16	5	14°	C	35949	27.62	35950	27.62		
SL-3L6	3/8	1/4	1-1/16	7	14°	C	34810	29.61	34811	29.61		
SL-4	1/2	1/4	1-1/8	3-1/8	14°	C	35916	25.67	35917	25.67	36260	37.70
SL-4L4	1/2	1/4	1-1/8	5-1/8	14°	C	35953	32.55	35955	32.55		
SL-4L6	1/2	1/4	1-1/8	7-1/8	14°	C	91028	34.49	34813	34.49		
SL-6	5/8	1/4	1-5/16	3-5/16	14°	C	35936	46.62	35937	46.62	36261	62.16
SL-7	3/4	1/4	1-1/2	3-1/2	14°	C	35941	66.99	35942	66.99	36262	80.43

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	α Incl. Angle	Shk Type	Standard Cut	List Price	Double Cut	List Price	Aluma Cut	List Price
SL-41M	3	3	9,5	38	10°	A	60440	6.14	60458	6.14		
SL-42M	3	3	12	38	8°	A	60441	6.14	60460	6.14		
SL-42ML2	3	3	12	50	8°	A	60449	8.14	60469	8.14		
SL-42ML3	3	3	12	76	8°	A	60453	10.13	60473	10.13		
SL-53M	4,7	3	12	38	14°	A	60442	16.70	60461	16.70		
SL-1M	6	6	16	50	14°	A	60443	13.34	60462	13.34	60478	17.69
SL-1ML4	6	6	16	117	14°	C	60450	13.23	60470	13.23		
SL-1ML6	6	6	16	168	14°	C	60454	16.17	60474	16.17		
SL-2M	8	6	22	66	14°	C	60444	17.54	60463	17.54		
SL-3M	9,5	6	27	71	14°	C	60445	20.58	60464	20.58	60479	27.35
SL-3ML4	9,5	6	27	127	14°	C	60451	27.62	60471	27.62		
SL-3ML6	9,5	6	27	179	14°	C	60455	29.61	60475	29.61		
SL-4M	12,7	6	28	72	14°	C	60446	25.67	60465	25.67	60480	37.70
SL-4ML4	12,7	6	28	129	14°	C	60452	32.55	60472	32.55		
SL-4ML6	12,7	6	28	180	14°	C	60456	34.49	60477	34.49		
SL-6M	16	6	30	76	14°	C	60447	46.62	60466	46.62	60481	62.16
SL-7M	19	6	38	82	14°	C	60448	66.99	60467	66.99	60482	80.43

Chipbreaker Cut
Coarse Cut
Fine Cut
Diamond Cut
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SM CONE SHAPE BURS

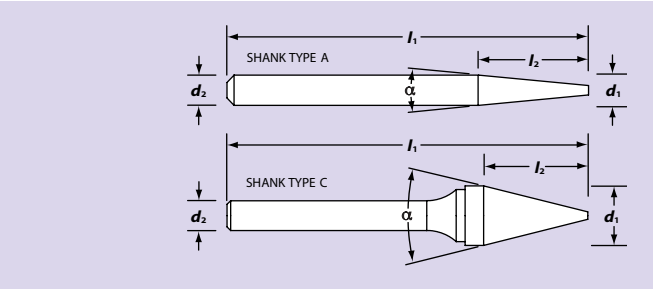
For general purpose deburring operations

SM

Cone shape

SM • Standard Cut

SM • Double Cut



Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	α Incl. Angle	Shk Type	Standard Cut	List Price	Double Cut	List Price
SM-41	1/8	1/8	11/32	1-1/2	12°	A	35976	6.14	35977	6.14
SM-42	1/8	1/8	7/16	1-1/2	14°	A	35981	6.14	35982	6.14
SM-43	1/8	1/8	5/8	1-1/2	7°	A	35986	6.14	35987	6.14
SM-53	3/16	1/8	1/2	1-1/2	16°	A	36001	16.70	36002	16.70
SM-51	1/4	1/8	1/2	2	22°	C	35996	10.24	35997	10.24
SM-1	1/4	1/4	1/2	2	22°	A	35956	12.60	35957	12.60
SM-2	1/4	1/4	3/4	2	14°	A	35961	13.39	35962	13.39
SM-3	1/4	1/4	1	2	10°	A	35966	14.28	35967	14.28
SM-4	3/8	1/4	5/8	2-5/8	28°	C	35971	19.95	35972	19.95
SM-5	1/2	1/4	7/8	2-7/8	28°	C	35991	25.04	35992	25.04
SM-6	5/8	1/4	1	3	31°	C	36006	35.28	36007	35.28

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	α Incl. Angle	Shk Type	Standard Cut	List Price	Double Cut	List Price
SM-41M	3	3	8,7	38	12°	A	60485	6.14	60496	6.14
SM-42M	3	3	11	38	14°	A	60486	6.14	60497	6.14
SM-43M	3	3	16	38	7°	A	60487	6.14	60498	6.14
SM-53M	4,7	3	12,7	38	16°	A	60488	16.70	60499	16.70
SM-1M	6	6	12,7	50	22°	A	60490	12.60	60501	12.60
SM-2M	6	6	18	50	14°	A	60491	13.39	60502	13.39
SM-3M	6	6	25	50	10°	A	60492	14.28	60503	14.28
SM-51M	6,3	3	12,7	50	22°	C	60489	10.24	60500	10.24
SM-4M	9,5	6	16	60	28°	C	60493	19.95	60504	19.95
SM-5M	12,7	6	22	66	28°	C	60494	25.04	60505	25.04
SM-6M	16	6	25	68	31°	C	60495	35.28	60506	35.28

	Standard	Double
Carbon & tool steels ≤ 48 HRC	✓	✓✓
Carbon & tool steels > 48 HRC	✓	✓✓
Stainless steels	✓	✓✓
Super alloys, Inconel®, titanium	✓	✓✓
Cast irons	✓	✓✓
Aluminum and non-ferrous		

✓ Suitable ✓✓ Recommended

Chipbreaker Cut
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SN INVERTED CONE SHAPE BURS

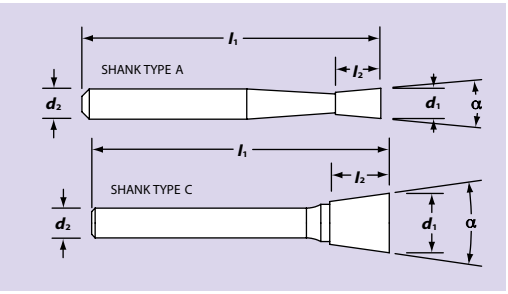
For general purpose deburring operations

SN

Inverted Cone shape

SN • Standard Cut

SN • Double Cut



		Standard	Double
●	Carbon & tool steels ≤ 48 HRC	✓	✓✓
●	Carbon & tool steels > 48 HRC	✓	✓✓
●	Stainless steels	✓	✓✓
●	Super alloys, Inconel®, titanium	✓	✓✓
●	Cast irons	✓	✓✓
●	Aluminum and non-ferrous		

✓ Suitable ✓✓ Recommended

Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	α Incl. Angle	Shk Type	Standard Cut	List Price	Double Cut	List Price
SN-41	3/32	1/8	1/8	1-1/2	10°	A	36041	6.14	36042	6.14
SN-42	1/8	1/8	3/16	1-1/2	10°	A	36046	6.14	36047	6.14
SN-53	3/16	1/8	1/4	1-1/2	10°	A	36056	16.70	36057	16.70
SN-51	1/4	1/8	1/4	1-3/4	10°	C	36051	10.24	36052	10.24
SN-1	1/4	1/4	5/16	2	10°	A	36026	12.29	36027	12.29
SN-2	3/8	1/4	3/8	2-3/8	13°	C	36031	18.64	36032	18.64
SN-3	1/2	1/4	1/2	2-1/2	16°	C	36035	25.67	36038	25.67
SN-4	1/2	1/4	1/2	2-1/2	28°	C	36036	25.67	36037	25.67
SN-5	5/8	1/4	5/8	2-5/8	19°	C	36068	33.71	36069	33.71
SN-6	5/8	1/4	3/4	2-3/4	18°	C	36061	33.71	36062	33.71
SN-8	3/4	1/4	3/4	2-3/4	21°	C	36075	39.95	36076	39.95

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	α Incl. Angle	Style Code	Standard Cut	List Price	Double Cut	List Price
SN-41M	2,3	3	3	38	10°	A	60556	6.14	60566	6.14
SN-42M	3	3	5	38	10°	A	60557	6.14	60567	6.14
SN-53M	4,7	3	6,3	38	10°	A	60558	16.70	60568	16.70
SN-1M	6	6	8	50	10°	A	60560	12.29	60570	12.29
SN-51M	6,3	3	6,3	44	10°	C	60559	10.24	60569	10.24
SN-2M	9,5	6	9,5	52	13°	C	60561	18.64	60571	18.64
SN-3M	12,7	6	12,7	56	16°	C	60562	25.67	60572	25.67
SN-4M	12,7	6	12,7	56	28°	C	60563	25.67	60573	25.67
SN-5M	16	6	16	60	19°	C	60564	33.71	60574	33.71
SN-6M	16	6	19	63	18°	C	60577	33.71	60575	33.71
SN-8M	19	6	19	63	21°	C	60565	39.95	60576	39.95

Chipbreaker Cut
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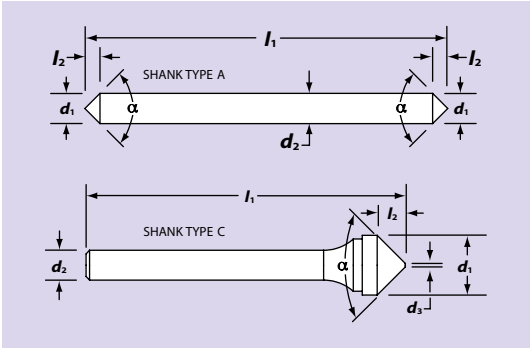
SJ • 60°
ST • 82°
SK • 90°

Cone shapes

Standard Cut

Double Cut



- Often referred to as multi-flute countersinks
- For improved finish and closer tolerance countersinking
- May be used in high production equipment

		Standard	Double
●	Carbon & tool steels ≤ 48 HRC	✓	✓✓
●	Carbon & tool steels > 48 HRC	✓	✓✓
●	Stainless steels	✓	✓✓
●	Super alloys, Inconel®, titanium	✓	✓✓
●	Cast irons	✓	✓✓
●	Aluminum and non-ferrous		

✓ Suitable ✓✓ Recommended

Inch

				SJ • 60° included angle (α)					ST• 82° included angle (α)					SK • 90° included angle (α)					
d_1 Cutter Dia	d_2 Shank Dia	d_3 Max Tip	Shk Type	Tool Code	l_2 Length of Cut	l_1 Overall Length	Standard Cut	Double Cut	Tool Code	l_2 Length of Cut	l_1 Overall Length	Standard Cut	Double Cut	Tool Code	l_2 Length of Cut	l_1 Overall Length	Standard Cut	Double Cut	List Price
1/8	1/8	To Point	A	SJ-42	3/32	1-1/2	35811	35812	ST-42	1/16	1-1/2	36164	36165	SK-42	1/16	1-1/2	35861	35862	6.14
1/4	1/4	To Point	A	SJ-1	3/16	2	35801	35802	ST-1	1/8	2	36166	36167	SK-1	1/8	2	35851	35852	12.13
3/8	1/4	1/32	C	SJ-3	5/16	2-7/16	35806	35807	ST-3	3/16	2-5/16	36171	36172	SK-3	3/16	2-5/16	35856	35857	14.75
1/2	1/4	1/32	C	SJ-5	7/16	2-9/16	35816	35817	ST-5	1/4	2-3/8	36176	36177	SK-5	1/4	2-3/8	35866	35867	19.85
5/8	1/4	1/16	C	SJ-6	9/16	2-11/16	35821	35822	ST-6	5/16	2-1/2	36181	36182	SK-6	5/16	2-1/2	35871	35872	25.83
3/4	1/4	1/16	C	SJ-7	11/16	2-13/16	35826	35827	ST-7	3/8	2-9/16	36186	36187	SK-7	3/8	2-9/16	35876	35877	32.76
1	1/4	1/8	C	SJ-9	15/16	2-15/16	35841	35842	ST-9	1/2	2-11/16	36191	36192	SK-9	1/2	2-11/16	35891	35892	52.87

Metric

d_1 Cutter Dia	d_2 Shank Dia	d_3 Max Tip	Shk Type	Tool Code	l_2 Length of Cut	l_1 Overall Length	Standard Cut	Double Cut	Tool Code	l_2 Length of Cut	l_1 Overall Length	Standard Cut	Double Cut	Tool Code	l_2 Length of Cut	l_1 Overall Length	Standard Cut	Double Cut	List Price
3	3	To Point	A	SJ-42M	2	38	60508	60532						SK-42M	1	38	60524	60548	6.14
6	6	To Point	A	SJ-1M	5	50	60510	60534						SK-1M	3	50	60526	60550	12.13
9,5	6	1	C	SJ-3M	8	55	60511	60535						SK-3M	4,7	52	60527	60551	14.75
12,7	6	1	C	SJ-5M	11	58	60512	60536						SK-5M	6,3	52	60528	60552	19.85
16	6	1,5	C	SJ-6M	14	60	60513	60537						SK-6M	8	56	60529	60553	25.83
19	6	1,5	C	SJ-7M	16	64	60514	60538						SK-7M	9	58	60530	60554	32.76
25,4	6	3	C	SJ-9M	23	68	60515	60539						SK-9M	12,7	60	60531	60555	52.87

Chipbreaker Cut
Coarse Cut
Fine Cut
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ISO • DIN STANDARD BURS

For general purpose deburring operations

A • ZYA

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price
A031403	ZYA031403	3	3	14	38	A	64001	6.14	64101	6.14
A061606	ZYA061606	6	6	16	50	A	64002	10.40	64102	10.40
A082006	ZYA082006	8	6	20	63	C	64003	13.76	64103	13.76
A102006	ZYA102006	10	6	20	64	C	64004	15.54	64104	15.54
A122506	ZYA122506	12	6	25	68	C	64005	23.84	64105	23.84
A162506	ZYA162506	16	6	25	68	C	64006	29.09	64106	29.09

B • ZYB

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price
B031403	ZYB031403	3	3	14	38	A	64009	6.14	64109	6.14
B061606	ZYB061606	6	6	16	50	A	64010	11.45	64110	11.45
B082006	ZYB082006	8	6	20	63	C	64011	15.17	64111	15.17
B102006	ZYB102006	10	6	20	64	C	64012	17.12	64112	17.12
B122506	ZYB122506	12	6	25	68	C	64013	26.20	64113	26.20
B162506	ZYB162506	16	6	25	68	C	64014	32.03	64114	32.03

C • WRC

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price
C031403	WRC031403	3	3	14	38	A	64017	6.14	64117	6.14
C061606	WRC061606	6	6	16	50	A	64018	12.13	64118	12.13
C082006	WRC082006	8	6	20	63	C	64019	15.33	64119	15.33
C102006	WRC102006	10	6	20	64	C	64020	17.59	64120	17.59
C122506	WRC122506	12	6	25	68	C	64021	27.46	64121	27.46
C162506	WRC162506	16	6	25	68	C	64022	33.23	64122	33.23

D • KUD

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price
D030203	KUD030203	3	3	2	38	A	64044	6.14	64144	6.14
D060506	KUD060506	6	6	5	50	A	64045	11.50	64145	11.50
D080706	KUD080706	8	6	7	50	C	64046	12.34	64146	12.34
D100906	KUD100906	10	6	9	52	C	64047	14.49	64147	14.49
D121006	KUD121006	12	6	10	54	C	64048	18.85	64148	18.85
D161406	KUD161406	16	6	14	58	C	64049	22.68	64149	22.68

E • TRE

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price
E030503	TRE030503	3	3	5	38	A	64038	6.14	64138	6.14
E061006	TRE061006	6	6	10	50	A	64039	17.59	64139	17.59
E122006	TRE122006	12	6	20	64	C	64040	25.78	64140	25.78
E162506	TRE162506	16	6	25	68	C	64041	33.13	64141	33.13

F • RBF

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	List Price	Double Cut	List Price
F031303	RBF031303	3	3	13	38	A	64025	6.14	64125	6.14
F061906	RBF061906	6	6	19	50	A	64026	13.02	64126	13.02
F122506	RBF122506	12	6	25	68	C	64027	25.10	64127	25.10
F162506	RBF162506	16	6	25	68	C	64028	33.71	64128	33.71

ISO • DIN STANDARD BURS

For general purpose deburring operations

G • SPG

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	d_3 Tip Max	Shk Type	Standard Cut	List Price	Double Cut	List Price
G031303	SPG031303	3	3	13	38	N/A	A	64031	6.14	64131	6.14
G061906	SPG061906	6	6	19	50	N/A	A	64032	13.02	64132	13.02
G081906	SPG081906	8	6	19	63	N/A	C	64030	15.17	64130	15.17
G102006	SPG102006	10	6	20	64	N/A	C	64033	16.96	64133	16.96
G122506	SPG122506	12	6	25	68	N/A	C	64034	25.10	64134	25.10
G162506	SPG162506	16	6	25	68	N/A	C	64035	33.02	64135	33.02

H

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	d_3 Tip Max	Shk Type	Standard Cut	List Price	Double Cut	List Price
H030603	---	3	3	6	38	N/A	A	64059	6.14	64159	6.14
H061606	---	6	6	16	50	N/A	A	64060	14.75	64160	14.75
H081906	---	8	6	19	63	N/A	C	64061	15.91	64161	15.91
H163606	---	16	6	36	79	N/A	C	64062	49.35	64162	49.35

J • KSJ

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	d_3 Tip Max	Shk Type	Standard Cut	List Price	Double Cut	List Price
J030203	KSJ030203	3	3	2	38	To Point	A	64077	6.14	64177	6.14
J060506	KSJ060506	6	6	5	50	To Point	A	64078	12.13	64178	12.13
J161306	KSJ161306	16	6	13	60	1,5	C	64079	25.83	64179	25.83

K • KSK

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	d_3 Tip Max	Shk Type	Standard Cut	List Price	Double Cut	List Price
K030103	KSK030103	3	3	1	38	To Point	A	64082	6.14	64182	6.14
K060306	KSK060306	6	6	3	50	To Point	A	64083	12.13	64183	12.13
K160806	KSK160806	16	6	8	56	1,5	C	64084	25.83	64184	25.83

L • KEL

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	α Incl. Angle	Shk Type	Standard Cut	List Price	Double Cut	List Price
L031203	KEL031203	3	3	12	38	8°	A	64052	6.14	64152	6.14
L061606	KEL061606	6	6	16	50	14°	A	64053	13.34	64153	13.34
L082206	KEL082206	8	6	22	66	14°	C	64054	17.54	64154	17.54
L123006	KEL123006	12	6	30	74	14°	C	64055	26.99	64155	26.99
L163006	KEL163006	16	6	30	76	14°	C	64056	46.62	64156	46.62

M • SKM

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	α Incl. Angle	Shk Type	Standard Cut	List Price	Double Cut	List Price
M031103	SKM031103	3	3	11	38	14°	A	64065	6.14	64165	6.14
M061806	SKM061806	6	6	18	50	14°	A	64066	13.39	64166	13.39
M102006	SKM102006	10	6	20	64	28°	C	64067	20.95	64167	20.95
M122506	SKM122506	12	6	25	68	28°	C	64068	26.30	64168	26.30
M162506	SKM162506	16	6	25	68	31°	C	64069	35.28	64169	35.28

N • WKN

Metric

ISO	DIN	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	α Incl. Angle	Shk Type	Standard Cut	List Price	Double Cut	List Price
N030503	WKN030503	3	3	5	38	10°	A	64072	6.14	64172	6.14
N060806	WKN060806	6	6	8	50	10°	A	64073	12.29	64173	12.29
N161606	WKN161606	16	6	16	60	19°	C	64074	33.71	64174	33.71

BUR SETS

- Our most popular burs offered in convenient sets
- Assortment of bur shapes
- Standard and double cut available

Inch

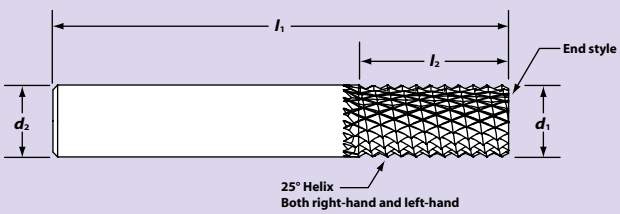
Bur Set No.	d_2 Shank Size	No. of Pieces	Bur Set Contains	Standard Cut	List Price	Double Cut	List Price
Set #1	1/8	12	SA-42, SA-43, SC-41, SC-42, SD-42, SE-41, SF-42, SG-44, SH-41, SL-42, SM-43, SN-42	36196	88.67	36197	88.67
Set #2	1/8	9	SA-51, SA-50, SC-51, SD-51, SE-51, SF-51, SG-51, SM-51, SN-51	36201	110.67	36202	110.67
Set #4	1/4	12	SA-1, SA-14, SC-14, SC-1, SD-14, SD-1, SE-1, SF-1, SG-1, SM-2, SN-1	36211	151.73	36212	151.73
Set #5	1/4	8	SA-1, SC-1, SD-1, SE-1, SF-1, SG-1, SL-1, SM-2	36225	115.92	36226	115.92
Set #6	1/4	8	SA-5, SC-3, SC-5, SD-5, SF-3, SF-5, SG-3, SL-4	36227	181.23	36228	181.23
Set #7	1/4	9	SA-1, SA-3, SA-5, SC-1, SC-3, SC-5, SF-1, SF-3, SF-5	36216	171.73	36217	171.73
Set #9	1/8	9	SA-43, SC-42, SD-42, SE-41, SF-42, SH-41, SL-42, SM-43, SN-42	36221	61.01	36222	61.01

Metric

Bur Set No.	d_2 Shank Size	No. of Pieces	Bur Set Contains	Standard Cut	List Price	Double Cut	List Price
Set #1M	3	12	SA-42M, SA-43M, SC-41M, SC-42M, SD-42M, SE-41M, SF-42M, SG-44M, SH-41M, SL-42M, SM-42M, SN-42M	36203	88.67	36205	88.67
Set #2M	3	9	SA-51M, SB-50M, SC-51M, SD-51M, SE-51M, SF-51M, SG-51M, SM-51M, SN-51M	36206	110.67	36207	110.67
Set #4M	6	12	SA-1M, SA-14M, SC-14M, SC-1M, SD-14M, SD-1M, SE-1M, SF-1M, SG-1M, SM-2M, SN-1M	36213	151.73	36214	151.73
Set #5M	6	8	SA-1M, SC-1M, SD-1M, SE-1M, SF-1M, SG-1M, SL-1M, SM-2M	36209	115.92	36215	115.92
Set #6M	6	8	SA-5M, SC-3M, SC-5M, SD-5M, SF-3M, SF-5M, SG-3M, SL-4M	36208	181.23	36210	181.23
Set #7M	6	9	SA-1M, SA-3M, SA-5M, SC-1M, SC-3M, SC-5M, SF-1M, SF-3M, SF-5M	36218	171.73	36219	171.73
Set #9M	3	9	SA-43M, SC-42M, SD-42M, SE-41M, SF-42M, SH-41M, SL-42M, SM-43M, SN-42M	36223	61.01	36224	61.01

FR10

Diamond pattern flutes



in d_1 +0 / -.005 d_2 +0 / -.0005 **mm** d_1 +0 / -0,127 d_2 +0 / -0,0127

No End Cut

Plain End – Used for edge routing or when the end of the router does not come in contact with the workpiece. Plain end routers are also referred to as 'safe end' tools.

Bur End Cut

Bur End – Used for bottom cutting. This design will leave a smooth and even bottom surface with a square corner.

End Mill End Cut

End Mill End – Used for bottom cutting. This style produces a smooth bottom surface with a square corner.

135° Drill Point

Drill Point End – Used to plunge through the workpiece before beginning the routing operation. Care must be taken to ensure that the end of the router does not come into contact with the work holding after plunging through the workpiece.

The up cut geometry of the FR10 router pulls the workpiece tightly against the template resulting in clean, smooth cuts. Use the FR10 router in polyester glass-reinforced products such as printed circuit boards, phenolic-expoxy parts, graphite composite laminates, some grades of Kevlar® and other highly abrasive materials. Down cut routers available by quotation.

Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Plain End EDP Number	Plain End List Price	Bur End EDP Number	Bur End List Price	End Mill End EDP Number	End Mill End List Price	Drill Point End EDP Number	Drill Point End List Price
FR-2	1/8	1/8	1/2	1-1/2	36621	7.56	36622	8.40	36623	9.14	36624	9.66
FR-3	3/16	3/16	5/8	2	36631	12.13	36632	13.39	36633	14.65	36634	15.23
FR-5	1/4	1/4	3/4	2	36641	13.23	36642	14.75	36643	15.70	36644	16.96
FR-6	1/4	1/4	1	2-1/2	36651	13.86	36652	15.70	36653	16.54	36654	17.17
FR-6-1	1/4	1/4	1	3	36661	17.64	36662	19.16	36663	20.06	36664	20.74
FR-7	5/16	5/16	1	2-1/2	36671	27.25	36672	29.09	36673	30.14	36674	31.08
FR-8	3/8	3/8	1	2-1/2	36681	33.92	36682	36.91	36683	38.33	36684	39.80
FR-9	1/2	1/2	1	3	36701	47.78	36702	52.50	36703	55.07	36704	57.59

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Plain End EDP Number	Plain End List Price	Bur End EDP Number	Bur End List Price	End Mill End EDP Number	End Mill End List Price	Drill Point End EDP Number	Drill Point End List Price
MFR-2	3	3	12	38	36615	7.56	36616	8.40	36617	9.14	36618	9.66
MFR-3	4	4	16	50	36625	12.13	36626	13.39	36627	14.65	36628	15.23
MFR-6	6	6	25	63	36655	13.86	36656	15.70	36657	16.54	36658	17.17
MFR-6-1	6	6	25	76	36675	17.64	36676	19.16	36677	20.06	36678	20.74
MFR-7	8	8	25	63	36685	27.25	36686	29.09	36687	30.14	36688	31.08
MFR-8	10	10	25	70	36695	33.92	36696	36.91	36697	38.33	36698	39.80
MFR-9	12	12	25	76	36705	47.78	36706	52.50	36707	55.07	36708	57.59

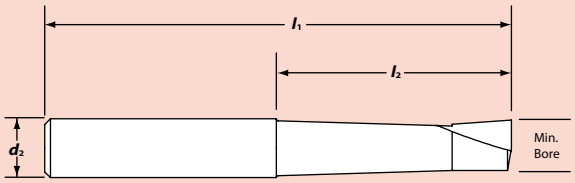
Application Guide • Speed & Feed

Tool Dia. Inch	Speed (SFM) Min.	Speed (SFM) Max.	Feed Rate IPR	Tool Dia. mm	Speed (SFM) Min.	Speed (SFM) Max.	Feed Rate IPR
1/16	600	900	0.002	2	183	274	0.051
1/8	600	900	0.002	3	183	274	0.051
3/16	600	900	0.002	4	183	274	0.051
1/4	600	900	0.002	6	183	274	0.051
5/16	600	900	0.002	8	183	274	0.051
3/8	600	900	0.002	10	183	274	0.051
1/2	600	900	0.002	12	183	274	0.051

Boring Tool

For jig boring applications

BT10



in d_2 +0/-.0005
Min. Bore ±.005

mm d_2 +0/-0,0127
Min. Bore ±0,127

- Used for jig boring
- Makes accurate and precise holes
- May be used in difficult to machine materials
- Leaves good part finishes

Steel materials	✓
Stainless steel materials	✓
Heat resistant super alloys, titanium	✓
Cast iron materials	✓
Aluminum and non-ferrous	✓

✓ Suitable for use

Inch

Tool Code	Min Bore	d_2 Shank Dia	l_2 Max Hole Depth	l_1 Overall Length	EDP Number	List Price
IB-1	.060	1/8	3/16	1-1/2	69001	18.85
IB-2	.090	1/8	1/2	1-1/2	69002	16.91
IB-3	.120	1/8	5/8	1-1/2	69003	17.54
IB-4	.150	3/16	3/4	2	69004	23.31
IB-5	.180	3/16	1	2	69005	24.26
IB-6	.210	1/4	1-1/4	2	69006	29.87
IB-7	.240	1/4	1-1/4	2	69007	30.87
IB-8	.270	5/16	1-1/4	2-1/2	69008	40.79
IB-9	.300	5/16	1-1/4	2-1/2	69009	42.00
IB-10	.330	3/8	1-1/2	2-1/2	69010	48.88
IB-11	.360	3/8	1-1/2	2-1/2	69011	51.35

Metric

Tool Code	Min Bore	d_2 Shank Dia	l_2 Max Hole Depth	l_1 Overall Length	EDP Number	List Price
IB-1M	1,5	3	5	38	69031	18.85
IB-2M	2	3	9	38	69032	18.85
IB-3M	2,5	3	12	38	69033	18.85
IB-4M	3	3	16	38	69034	17.54
IB-5M	4	4	19	50	69035	24.26
IB-6M	5	6	25	50	69036	30.61
IB-7M	6	6	31	50	69037	30.87
IB-8M	7	8	31	63	69038	40.79
IB-9M	8	8	31	63	69039	42.00
IB-10M	9	10	38	70	69040	48.88
IB-11M	10	10	38	70	69041	51.35

Keyseat cutter

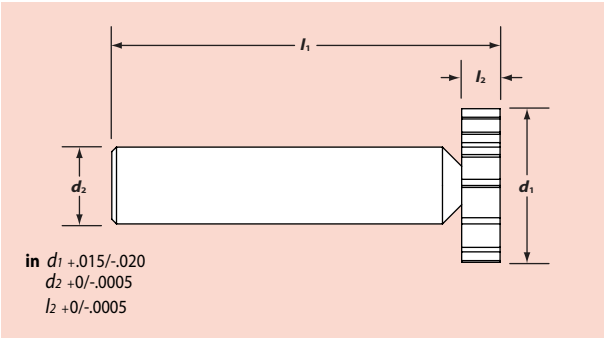
For milling precision keyways

KC10

- Solid carbide head
- High speed steel shank

Steel materials	✓
Hardened materials	✓
Stainless steel materials	✓
Cast iron materials	✓

✓ Suitable for use



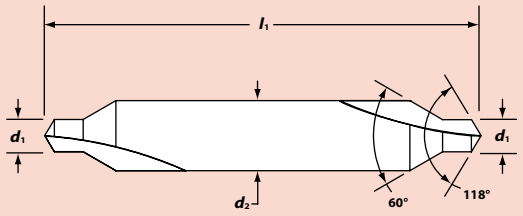
in d_1 +.015/-.020
d_2 +0/-.0005
l_2 +0/-.0005

Inch

d_1 Cutter Dia	Tool Code	l_2 Face Width	d_2 Shank Dia	l_1 Overall Length	z Number of Flutes	EDP Number	List Price
3/8	No. 203	1/16	1/2	2-1/16	8	30314	74.45
	No. 303	3/32	1/2	2-3/32	8	30316	69.04
	No. 403	1/8	1/2	2-1/8	8	30322	72.71
1/2	No. 204	1/16	1/2	2-1/16	10	30328	86.31
	No. 304	3/32	1/2	2-3/32	10	30334	90.46
	No. 404	1/8	1/2	2-1/8	10	30340	92.24
5/8	No. 305	3/32	1/2	2-3/32	10	30346	110.57
	No. 405	1/8	1/2	2-1/8	10	30352	113.45
	No. 505	5/32	1/2	2-5/32	10	30358	115.66
	No. 605	3/16	1/2	2-3/16	10	30364	117.13
3/4	No. 406	1/8	1/2	2-1/8	10	30370	139.02
	No. 506	5/32	1/2	2-5/32	10	30376	141.75
	No. 606	3/16	1/2	2-3/16	10	30382	145.16
	No. 806	1/4	1/2	2-1/4	10	30388	147.21
7/8	No. 507	5/32	1/2	2-5/32	12	30394	166.16
	No. 607	3/16	1/2	2-3/16	12	30400	169.31
	No. 707	7/32	1/2	2-7/32	12	30406	171.15
	No. 807	1/4	1/2	2-1/4	12	30412	172.20
1	No. 608	3/16	1/2	2-3/16	12	30418	185.75
	No. 708	7/32	1/2	2-7/32	12	30424	189.00
	No. 808	1/4	1/2	2-1/4	12	30430	190.79
1-1/4	No. 610	3/16	1/2	2-3/16	14	30436	209.74
	No. 710	7/32	1/2	2-7/32	14	30442	204.80
	No. 810	1/4	1/2	2-1/4	14	30448	201.55

CD10

Drill & countersink



in d_1 +.003/-0
d_2 +0/-.0005

mm d_1 +0,075/-0
d_2 +0/-0,0127

- 2-Flutes, double end
- Used to make center holes with a 60° countersink

Steel materials	✓
Stainless steel materials	✓
Heat resistant super alloys, titanium	✓
Cast iron materials	✓
Aluminum and non-ferrous	✓

✓ Suitable for use

Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_1 Overall Length	EDP Number	List Price
No. 0	1/32	1/8	1-1/2	36325	17.43
No. 1	3/64	1/8	1-1/2	36326	15.70
No. 1 x 4	3/64	1/8	4	97202	21.74
No. 1 x 6	3/64	1/8	6	36336	24.68
No. 2	5/64	3/16	2	36327	22.94
No. 2 x 4	5/64	3/16	4	97203	42.26
No. 2 x 6	5/64	3/16	6	36337	44.26
No. 3	7/64	1/4	2	36328	25.46
No. 3 x 4	7/64	1/4	4	97204	51.35
No. 3 x 6	7/64	1/4	6	36338	53.60
No. 4	1/8	5/16	2-1/2	36329	35.60
No. 4 x 4	1/8	5/16	4	93680	61.53
No. 4 x 6	1/8	5/16	6	36339	66.94
No. 5	3/16	7/16	2-3/4	36330	53.97
No. 5 x 6	3/16	7/16	6	36342	103.79
No. 6	7/32	1/2	3	36331	74.13
No. 6 x 6	7/32	1/2	6	36345	134.93
No. 7	1/4	5/8	3-1/2	36332	125.58
No. 8	5/16	3/4	4	36333	165.06

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_1 Overall Length	EDP Number	List Price
125	1,25	3,15	38	36495	19.01
160	1,6	4	50	36496	28.77
200	2	5	50	36497	30.40
250	2,5	6,3	50	36498	32.08
315	3,15	8	50	36499	41.79
400	4	10	66	36500	83.63
500	5	12,5	75	36501	91.40
630	6,3	16	82	36502	194.88

CD10 Set

Set Code	Set Contents	EDP Number	List Price
CD10	One each of Nos. 1-6 with case	36334	235.52

COUNTERSINKS

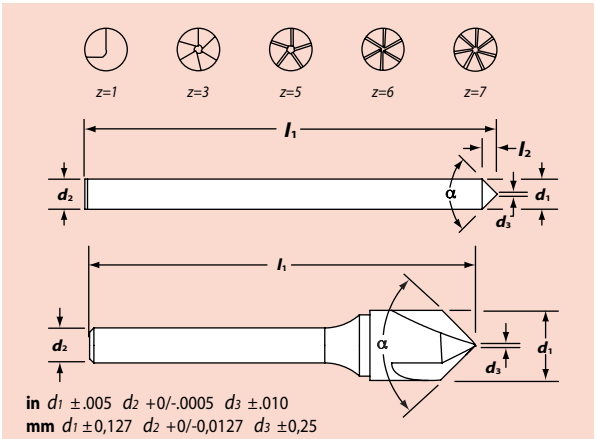
For general purpose countersinking operations

CS10

Single flute countersink

CS20

Multi-flute countersink



in d_1 ±.005 d_2 +0/-.0005 d_3 ±.010
mm d_1 ±0,127 d_2 +0/-0,0127 d_3 ±0,25

- Available with 60°, 82°, 90° included angle
- Chatterless design eliminates part tearing
- CS10 not recommended for hardened steel

Steel materials	✓
Hardened materials	✓
Stainless steel materials	✓
Heat resistant super alloys, titanium	✓
Cast iron materials	✓
Aluminum and non-ferrous	✓

✓ Suitable for use

Inch

d_1 Body Dia	d_2 Shank Dia	d_3 Tip Dia	l_1 60° OAL	l_1 82°/90° OAL	Z Flute Count	α = 60° EDP Number	α = 82° EDP Number	α = 90° EDP Number	List Price
1/8	1/8	To Point	1-1/2	1-1/2	1	36360	36361	36362	10.13
					3	36402	36403	36404	11.45
					6	36444	36445	36446	11.60
3/16	3/16	To Point	2	2	1	36363	36364	36365	11.97
					3	36417	36418	36419	12.97
					6	36489	36490	36491	13.07
1/4	1/4	To Point	2	2	1	36366	36367	36368	15.44
					3	36408	36409	36410	15.75
					6	36450	36451	36452	16.01
3/8	1/4	1/32	2-13/16	2-11/16	1	36372	36373	36374	26.04
					3	36414	36415	36416	24.41
					6	36456	36457	36458	24.73
1/2	1/4	1/32	2-7/8	2-3/4	1	36378	36379	36380	36.80
					3	36420	36421	36422	34.91
					5	36453	36454	36455	33.97
					6	36462	36463	36464	33.97
5/8	3/8	1/16	3	2-7/8	1	36384	36385	36386	48.98
					3	36426	36427	36428	44.57
					5	36465	36466	36467	45.78
					6	36468	36469	36470	45.78
3/4	1/2	1/16	3	2-7/8	1	36390	36391	36392	67.15
					3	36432	36433	36434	60.01
					6	36474	36475	36476	70.56
					7	36477	36478	36479	70.56
1	1/2	1/16	3-1/4	3	1	36396	36397	36398	106.00
					3	36438	36439	36440	85.31
					6	36480	36481	36482	95.60
					7	36483	36484	36485	95.60

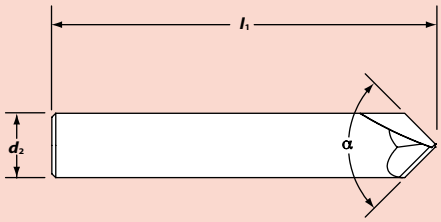
Metric

d_1 Body Dia	d_2 Shank Dia	d_3 Tip Dia	l_1 60° OAL	l_1 82°/90° OAL	Z Flute Count	α = 60° EDP Number	α = 82° EDP Number	α = 90° EDP Number	List Price
3	3	To Point	38	38	1	36312		36383	10.13
					3	36405		36437	11.45
5	5	To Point	50	50	1	36313		36387	11.97
					3	36406		36441	12.97
6	6	To Point	50	50	1	36314		36388	15.44
					3	36407		36442	15.75
9,5	6	1	64	51	1	36315		36389	26.04
					3	36411		36443	24.41
12,7	6	1	66	63	1	36316		36393	36.80
					5	36487		36512	33.97
16	10	1,5	75	72	1	36317		36394	48.98
					5	36493		36513	45.78
19	12	1,5	75	72	1	36318		36395	67.15
					7	36503		36514	70.56
25	12	1,5	81	75	1	36319		36399	106.00
					7	36504		36515	95.60

2 Straight Flutes

For workpiece edge chamfering

- Available in 60°, 90°, 120° included angles
- Single ended



in d_2 +0/-.0005 **mm** d_1 +0/-0,0127

CT12

Chamfer tool

Steel materials	✓
Cast iron materials	✓
Aluminum and non-ferrous	✓

✓ Suitable for use

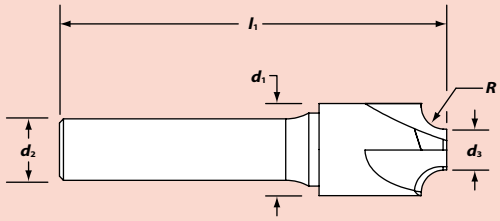
Inch

d_2 Shank Dia	l_1 Overall Length	α Included Angle	EDP Number	List Price
1/8	1-1/2	90°	36303	27.35
3/16	2	90°	36304	37.12
1/4	2-1/2	60°	36300	43.00
		90°	36305	43.00
		120°	36309	43.00
3/8	2-1/2	60°	36301	58.70
		90°	36306	58.70
		120°	36310	58.70
1/2	3	60°	36302	78.23
		90°	36307	78.23
		120°	36311	78.23
3/4	4	90°	36308	135.03

Metric

d_2 Shank Dia	l_1 Overall Length	α Included Angle	EDP Number	List Price
6	57	60°	36667	43.00
		90°	36320	43.00
		120°	36815	43.00
8	63	60°	36668	50.09
		90°	36321	50.09
		120°	36816	50.09
10	72	60°	36669	58.70
		90°	36322	58.70
		120°	36817	58.70
12	83	60°	36670	78.23
		90°	36323	78.23
		120°	36818	78.23

4 Straight Flutes



mm d_1 ±0,025
d_2 +0/-0,0127
R ±0,25

CRC10

Corner Rounding cutter

Steel materials	✓
Hardened materials	✓
Stainless steel materials	✓
Cast iron materials	✓

✓ Suitable for use

Metric

R Radius	d_1 Head Dia	d_2 Shank Dia	d_3 Pilot Dia	l_1 Overall Length	EDP Number	List Price
1,0	8	8	5	63	24001	77.70
1,25	8	8	5	63	24003	77.70
1,5	10	10	5,5	70	24005	89.25
2,0	12	12	6	76	24009	118.02
2,5	12	12	6	76	24013	118.02
3,0	14	12	7	76	24015	124.48
3,5	16	12	7	76	24017	136.82
4,0	16	12	7	76	24019	136.82
4,5	18	12	8	76	24021	149.15
5,0	20	16	9	76	24023	167.95
6,0	22	16	9	76	24025	266.65
8,0	25	20	8	76	24027	266.65

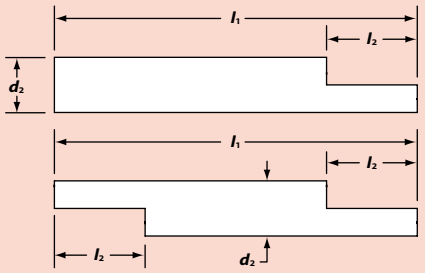
Engraving Tool Blank

SET

Single end

DET

Double end



in d_2 +0/-.0005 mm d_1 +0/-0,0127

Inch

d_2 Rod Dia	l_2 Split Length	l_1 Overall Length	SET EDP Number	List Price	DET EDP Number	List Price
1/8	3/8	1-1/2	75080	4.40	75092	6.38
		2	75081	6.22	75093	8.25
		4	75104	11.61	75112	13.92
3/16	1/2	2	75082	8.47	75094	11.50
		3	75083	13.59	75095	16.67
		4	75105	18.21	75113	21.73
1/4	1/2	2	75084	11.88	75096	16.67
		2-1/2	75085	12.98	75097	17.71
		3	75086	17.66	75098	23.27
		4	75106	28.82	75114	34.38
5/16	1/2	2-1/2	75087	19.31	75099	24.20
	5/8	2-1/2	75107	19.31	75115	24.20
	1/2	3	75088	26.73	75100	31.68
3/8	1/2	2-1/2	75089	24.81	75101	31.85
	5/8	2-1/2	75108	24.81	75116	31.85
	1/2	3	75090	30.91	75102	37.73
	5/8	6	75109	62.59	75117	70.62
1/2	5/8	3	75091	39.49	75103	49.78
	3/4	3	75110	39.49	75118	49.78
		6	75111	89.60	75119	101.53

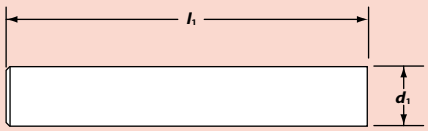
Metric

d_2 Rod Dia	l_2 Split Length	l_1 Overall Length	SET EDP Number	List Price	DET EDP Number	List Price
3	9	38	75170	4.51	75175	6.33
6	12	50	75171	12.82	75176	16.45
8	16	63	75172	22.99	75177	28.27
10	16	70	75173	35.31	75178	42.13
12	19	76	75174	59.40	75179	69.52

GM

Ground rod

- Micrograin carbide
- Precision ground
- Chamfer on one end



in d_2 +0/-.0005 mm d_1 +0/-0,0127

Inch

d_1 Rod Dia	l_1 Overall Length	EDP Number	List Price
1/8	1-1/2	76016	2.43
	2	76020	4.53
	2-1/2	76028	7.46
	3	76032	7.22
	4	76033	13.15
3/16	2	76048	6.62
	2-1/2	76052	8.39
	3	76056	10.49
	4	76060	14.45
1/4	2	76068	9.09
	2-1/2	76072	11.19
	3	76076	13.89
	4	76080	18.97
	6	76084	29.88
5/16	2	76088	14.18
	2-1/2	76092	15.38
	3	76096	20.79
	4	76100	28.39
	6	76104	44.29
3/8	2	76108	18.19
	2-1/2	76112	21.07
	3	76116	25.74
	4	76124	35.10
	6	76128	57.90
1/2	2-1/2	76144	35.52
	3	76148	41.92
	4	76156	59.63
	6	76160	87.64
5/8	3-1/2	76168	79.02
	6	76172	136.36
3/4	4	76176	127.42
	6	76180	199.63
1	4	76184	223.40
	6	76188	355.19

Metric

d_1 Rod Dia	l_1 Overall Length	EDP Number	List Price
3	38	77201	2.27
	75	77202	6.89
	100	77279	12.78
4	50	77206	6.29
	75	77203	8.50
	100	77280	12.38
5	50	77207	6.62
	63	77260	8.39
	100	77261	14.45
6	50	77249	8.73
	63	77209	10.74
	75	77208	13.34
	100	76900	18.22
	150	77269	28.69
8	63	77210	15.54
	75	77211	21.00
	100	76901	28.68
	150	77244	44.73
10	70	77266	26.55
	72	77215	27.69
	75	77251	28.82
	100	77217	37.99
	150	77243	58.45
12	76	77252	39.93
	100	77221	52.16
	150	77222	83.87
14	83	77225	60.25
16	89	77254	83.02
	150	77232	142.75
18	100	77255	120.11
	150	77237	173.12
20	100	77256	145.58
	150	77242	217.54
25	100	77257	213.15
	150	77247	312.89

TOOL MODIFICATIONS

Calculating Modification Charges

1. Locate the tool in this catalog that you wish to modify and note the price.
2. Add the cost for modification as shown in the applicable chart. Quantity pricing applies and quantities are based upon individual items ordered, not the quantity of your entire order. Multiply the modification charge by 2 for double ended tools.
3. The total is your new list price for the modified tool.

Delivery

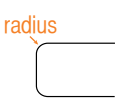
Allow 3 working days to modify tools available from stock in quantities up to 25 pieces. If tool coating is required allow 7-10 additional working days for shipment.

Performance & Standards

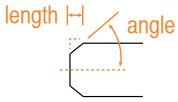
Product modifications may affect tool performance. Tolerances for dimensions altered are detailed in the charts. Dimensions that are not altered or are incidental to your order will conform to our original product specifications.

Important Note

Modified products are non-returnable. Modifications are not available for miniature tools (less than 1/16 in. or 1.5 mm).



Corner Radius
Specify radius



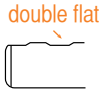
Corner Chamfer
Specify angle and length

Add Corner Radius or Corner Chamfer

Inch Tools Radius / Length Range	Inch Tools Diameter Restriction	Metric Tools Radius / Length Range	Metric Tools Diameter Restriction	Additional Price by Quantity (Per Item Ordered) 1	2-5	6-11	12-23	24+
.015 to .031	1/8 & up	0,30 to 0,75	3,0 & up	54.30	19.70	12.45	10.90	10.05
.032 to .047	3/16 & up	0,76 to 1,25	5,0 & up	54.60	20.00	12.75	11.25	10.35
.048 to .063	1/4 & up	1,26 to 1,5	6,0 & up	54.90	20.30	13.05	11.55	10.60
.064 to .078	5/16 & up	1,51 to 2,0	8,0 & up	55.30	20.65	13.40	11.90	10.95
.079 to .094	3/8 & up	2,01 to 2,5	10,0 & up	55.80	21.20	13.95	12.45	11.45
.095 to .125	1/2 & up	2,51 to 3,0	12,0 & up	56.55	21.95	14.70	13.20	12.15
.126 to .156	5/8 & up	3,01 to 4,0	16,0 & up	60.20	25.60	18.40	16.85	15.50
.157 to .190	3/4 & up	4,01 to 5,0	20,0 & up	61.35	26.80	19.55	18.00	16.60
.191 to .250	1 & up	5,01 to 6,25	25,0 & up	62.55	27.90	20.65	19.15	17.65

- Prices only apply to radius or length range shown
- Maximum radius or length is 25% of tool dia.
- Add 50% for radii or chamfer less than .015 inches
- Prices are for 2-4 flute tools. Add 50% for 5 or 6 flute

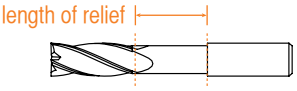
For corner radius: Radius Tolerance ± .005 • Tangency ± .002
For corner chamfer: Chamfer Tolerance ± .005



Add Weldon® Flat to Shank

Diameter Range Inch Tools	Diameter Range Metric Tools	Additional Price by Quantity (Per Item Ordered) 1	2-5	6-11	12-23	24+
Up to 1/4	Up to 6,0	9.80	9.80	4.80	3.45	2.50
17/64 to 1/2	6,1 to 12,0	11.35	11.35	6.30	5.00	4.00
33/64 to 5/8	12,1 to 16,0	12.95	12.95	7.90	6.50	5.55
41/64 to 3/4	16,1 to 20,0	12.95	12.95	7.90	6.50	5.55
49/64 to 1-1/4	20,1 to 32,0	15.80	15.80	10.75	9.45	8.50
49/64 to 1-1/4* Double	20,1 to 32,0 Double	19.65	19.65	14.60	11.95	11.05

*Optional double flat available for this diameter range only.



Specify length of relief if not standard

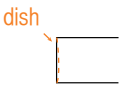
Add Neck Relief

Inch Tools Diameter Range	Depth of Relief	Length of Relief	Metric Tools Diameter Range	Depth of Relief	Length of Relief	Additional Price by Quantity (Per Item Ordered) 1	2-5	6-11	12-23	24+
1/16 to 1/8	.007	1/4	1,5 to 3,0	0,2	6,0	24.10	10.55	6.00	4.90	4.50
9/64 to 3/16	.012	3/8	3,01 to 5,0	0,3	10,0	24.10	10.55	6.00	4.90	4.50
13/64 to 1/4	.015	3/4	5,01 to 6,0	0,4	19,0	26.35	11.30	6.50	5.45	5.05
17/64 to 5/16	.015	3/4	6,01 to 8,0	0,4	19,0	26.35	11.30	6.50	5.45	5.05
21/64 to 3/8	.020	3/4	8,01 to 10,0	0,5	19,0	26.35	11.30	6.50	5.45	5.05
25/64 to 1/2	.025	3/4	10,01 to 12,0	0,6	19,0	26.35	11.30	6.50	5.45	5.05
33/64 to 5/8	.035	3/4	12,01 to 16,0	0,9	19,0	27.10	11.75	7.00	6.00	5.55
41/64 to 3/4	.035	3/4	16,01 to 20,0	0,9	19,0	27.10	11.75	7.00	6.00	5.55
49/64 to 1	.040	3/4	20,01 to 25,0	1,0	19,0	27.10	11.75	7.00	6.00	5.55

- Add 20% for longer neck relief lengths

Special tooling requirements can often be met through one or more simple modifications of standard, off-the-shelf products. Modifications include coating, adding corner radius or chamfer, flats and more. You can order more than one modification for the same tool as long as they do not depend on or conflict with each other. For example, you cannot choose both a corner radius and a corner chamfer.

Remove End Dish and Resharpen



Diameter Range		Additional Price by Quantity (Per Item Ordered)				
Inch Tools	Metric Tools	1	2-5	6-11	12-23	24+
Up to 1/4	Up to 6,0	55.55	19.45	12.20	9.20	7.55
17/64 to 1/2	6,1 to 12,0	58.60	22.00	13.25	9.85	8.20
33/64 to 5/8	12,1 to 16,0	60.30	22.75	13.65	10.15	8.45
41/64 to 3/4	16,1 to 20,0	62.10	23.35	14.05	10.40	8.70
49/64 to 1	20,1 to 25,4	63.95	24.10	14.50	10.70	9.00

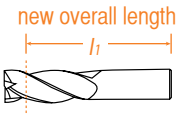
Add Set Screw Flat or Whistle Notch


Set Screw


Whistle Notch

Diameter Range		Additional Price by Quantity (Per Item Ordered)				
Inch Tools	Metric Tools	1	2-5	6-11	12-23	24+
Up to 1/4	Up to 6,0	34.30	12.75	6.25	4.60	4.30
17/64 to 1/2	6,1 to 12,0	34.30	12.75	6.25	4.60	4.30
33/64 to 5/8	12,1 to 16,0	35.45	13.90	7.30	5.80	5.35
41/64 to 3/4	16,1 to 20,0	35.45	13.90	7.30	5.80	5.35
49/64 to 1	20,1 to 25,4	35.45	13.90	7.30	5.80	5.35

Shorten Flute Length*
Cut Off End & Resharpen



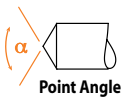
Specify either new flute or overall length

Diameter Range		Additional Price by Quantity (Per Item Ordered)				
Inch Tools	Metric Tools	1	2-5	6-11	12-23	24+
Up to 1/4	Up to 6,0	67.45	27.05	13.50	10.30	9.55
17/64 to 1/2	6,1 to 12,0	70.25	29.55	16.00	12.25	11.35
33/64 to 5/8	12,1 to 16,0	72.90	32.20	18.55	15.45	14.25
41/64 to 3/4	16,1 to 20,0	77.10	36.60	23.00	19.80	18.40
49/64 to 1	20,1 to 25,4	80.35	39.70	26.15	23.00	21.20

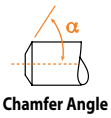
• Applies to end mills, drills and reamers only

l_1 <1/4: +0.062 / -0.0
l_1 ≥1/4: +0.125 / -0.0

Change Reamer Chamfer
Change Drill Point
Add Drill Point to End Mills



Point Angle



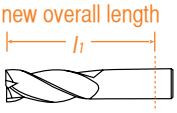
Chamfer Angle

Specify point or chamfer angle

Diameter Range		Additional Price by Quantity (Per Item Ordered)				
Inch Tools	Metric Tools	1	2-5	6-11	12-23	24+
Up to 1/4	Up to 6,0	55.55	19.45	12.20	9.20	7.55
17/64 to 1/2	6,1 to 12,0	58.60	22.00	13.25	9.85	8.20
33/64 to 5/8	12,1 to 16,0	60.30	22.75	13.65	10.15	8.45
41/64 to 3/4	16,1 to 20,0	62.10	23.35	14.05	10.40	8.70
49/64 to 1	20,1 to 25,4	63.95	24.10	14.50	10.70	9.00

• When adding points to end mills, a 90° drill point will be supplied unless otherwise specified
• Also used to modify tri-flute drills for use in aluminum

Shorten Overall Length
Cut Off Shank & Add Chamfer

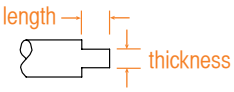


Specify new overall length

Diameter Range		Additional Price by Quantity (Per Item Ordered)				
Inch Tools	Metric Tools	1	2-5	6-11	12-23	24+
Up to 1/4	Up to 6,0	23.55	8.55	5.55	5.00	4.50
17/64 - 1/2	6,1 to 12,0	25.55	9.85	6.85	6.25	5.80
33/64 - 5/8	12,1 to 16,0	30.90	12.20	9.15	8.55	8.10
41/64 - 3/4	16,1 to 20,0	35.30	14.25	11.25	10.65	10.20
49/64 - 1	20,1 to 25,4	39.25	16.20	13.20	12.60	12.20

l_1 <1/4: +0.062 / -0.0
l_1 ≥1/4: +0.125 / -0.0

Add Tang to Shank



Specify tang thickness and length

Diameter Range		Additional Price by Quantity (Per Item Ordered)				
Inch Tools	Metric Tools	1	2-5	6-11	12-23	24+
Up to 25/64	Up to 10,0	35.45	13.90	7.30	5.80	5.40
13/32 to 5/8	10,1 to 16,0	36.80	15.50	8.70	7.20	6.65
41/64 to 1	16,1 to 25,4	39.95	18.55	11.80	10.20	9.45

• Solid carbide tools only

Calculating Coating Charges

1. Locate an uncoated tool in this catalog that you wish to coat and note the list price.
2. Increase the list price by the coating charge shown in the adjacent chart. Quantity pricing applies for DLC coating and quantities are based upon individual items ordered, not the quantity of your entire order. Multiply the coating charge by 2 for double ended tools.
3. The total is your new list price for the coated tool.

Delivery

Coating cycle times vary by chamber load and coating type. Allow 7-10 working days for shipment.

Important Note

Coating thickness is not a controlled manufacturing characteristic and may increase the cutting diameter of the tool. Minor color variation from tool to tool is normal and will not affect tool performance. Coating of tools may alter the size and geometry of cutting edges and affect tool performance. This is particularly true of reamers and small diameter tooling. Micran coating is recommended for these products. Modified products are non-returnable.

PVD Tool Coating

See page 74 for AlTiN, TiCN and TiN coating application. AlTiNX and TiAlNX are used for high performance machining of steels and ferrous metals. ZrN is used for machining aluminum and aluminum alloys. Micran is a super thin layer of TiAlN coating designed for use on miniature tools and reamers. HARDLUBE is used in drilling applications.

Decimal Range	Inch Range	Metric Range	AlTiNX	TiAlNX AlTiN HARDLUBE	ZrN	TiCN TiAlN Micran	TiN
Up to .1250	Up to 1/8	Up to 3,1	4.25	3.80	2.85	2.65	1.90
.1251 - .1969	9/64 to 3/16	3,2 to 5,0	6.45	5.70	4.35	4.00	2.90
.1970 - .2500	13/64 to 1/4	5,1 to 6,3	8.40	7.45	5.65	5.25	3.75
.2501 - .3150	17/64 to 5/16	6,4 to 8,0	10.35	9.20	6.90	6.45	4.60
.3151 - .3937	21/64 to 3/8	8,1 to 10,0	11.10	9.80	7.45	6.90	4.95
.3938 - .4750	25/64 to 7/16	10,1 to 11,0	15.95	14.20	10.65	9.85	7.10
.4751 - .5000	29/64 to 1/2	11,1 to 12,7	15.95	14.20	10.65	9.85	7.10
.5001 - .6300	33/64 to 5/8	12,8 to 16,0	26.00	23.15	17.35	16.20	11.55
.6301 - .7874	41/64 to 3/4	16,1 to 20,0	27.70	24.70	18.55	17.25	12.35
.7875 - .8750	49/64 to 7/8	20,1 to 22,0	39.90	35.50	26.65	24.85	17.75
.8751 - 1.000	57/64 to 1	22,1 to 25,4	39.90	35.50	26.65	24.85	17.75
1.001 - 1.260	1-1/64 to 1-1/4	25,5 to 32,0	58.50	52.05	39.00	36.40	26.00
1.261 - 1.500	1-17/64 to 1-1/2	32,1 to 38,0	65.30	58.05	43.60	40.70	29.05

TiB2 Coating

For machining aluminum, aluminum alloys and titanium. Not recommended for general purpose machining. Cannot be applied over other coatings. Low affinity for aluminum prevents built-up edge when machining aluminum parts.

Decimal Range	Inch Range	Metric Range	Additional Price by Overall Length (Per Item Ordered) 2"	3"	4"	5"	6"	7"	8"
Up to .1250	Up to 1/8	Up to 3,1	4.92	6.27	7.56	8.92	10.61	11.94	13.13
.1251 - .1969	9/64 to 3/16	3,2 to 5,0	9.68	12.93	15.05	18.29	21.32	23.66	26.88
.1970 - .2500	13/64 to 1/4	5,1 to 6,3	9.68	12.93	15.05	18.29	21.32	23.66	26.88
.2501 - .3150	17/64 to 5/16	6,4 to 8,0	10.39	14.24	18.24	21.80	24.87	27.95	35.41
.3151 - .3937	21/64 to 3/8	8,1 to 10,0	10.39	14.24	18.24	21.80	24.87	27.95	35.41
.3938 - .4750	25/64 to 7/16	10,1 to 11,0	12.71	17.59	22.87	27.22	32.13	37.21	46.67
.4751 - .5000	29/64 to 1/2	11,1 to 12,7	12.71	17.59	22.87	27.22	32.13	37.21	46.67
.5001 - .6300	33/64 to 5/8	12,8 to 16,0	14.06	18.84	23.49	29.36	34.85	40.72	49.39
.6301 - .7874	41/64 to 3/4	16,1 to 20,0	17.22	22.47	27.75	34.00	40.26	46.16	55.08
.7875 - .8750	49/64 to 7/8	20,1 to 22,0	21.60	29.56	37.35	42.89	47.92	53.22	59.52
.8751 - 1.000	57/64 to 1	22,1 to 25,4	21.60	29.56	37.35	42.89	47.92	53.22	59.52
1.001 - 1.260	1-1/64 to 1-1/4	25,5 to 32,0	34.33	43.76	54.86	63.16	70.89	78.94	87.65
1.261 - 1.500	1-17/64 to 1-1/2	32,1 to 38,0	34.33	43.76	54.86	63.16	70.89	78.94	87.65

Thin Film Diamond Coating (DLC)

For machining graphite, aluminum, composites and plastics. Not recommended for general purpose machining. Cannot be applied over other coatings. Prices only apply within the OAL range shown. Add 15% for longer overall lengths.

Inch Tools Diameter Range	OAL Range	Metric Tools Diameter Range	OAL Range	1-50	51-100	101-500	501-1000	1000+
Up to 1/8	0 - 1.5	Up to 3,1	0 - 38	28.60	25.75	22.90	17.15	Quote
9/64 to 3/16	0 - 4.0	3,2 to 5,0	0 - 101	34.30	28.60	25.75	20.00	Quote
13/64 to 1/4	0 - 4.0	5,1 to 6,3	0 - 101	42.90	34.30	28.60	22.90	Quote
17/64 to 5/16	0 - 4.5	6,4 to 8,0	0 - 114	54.30	45.80	37.15	28.60	Quote
21/64 to 3/8	0 - 4.5	8,1 to 10,0	0 - 114	54.30	45.80	37.15	28.60	Quote
25/64 to 7/16	0 - 5	10,1 to 11,0	0 - 127	100.05	85.80	71.45	57.15	Quote
29/64 to 1/2	0 - 5	11,1 to 12,7	0 - 127	100.05	85.80	71.45	57.15	Quote
33/64 to 5/8	0 - 6	12,8 to 16,0	0 - 152	200.15	185.80	142.95	128.65	Quote
41/64 to 3/4	0 - 6	16,1 to 20,0	0 - 152	200.15	185.80	142.95	128.65	Quote
49/64 to 7/8	0 - 6	20,1 to 22,0	0 - 152	271.55	257.25	Quote	Quote	Quote
57/64 to 1	0 - 6	22,1 to 25,4	0 - 152	271.55	257.25	Quote	Quote	Quote
1-1/64 to 1-1/4	0 - 6	25,5 to 32,0	0 - 152	457.35	Quote	Quote	Quote	Quote
1-17/64 to 1-1/2	0 - 6	32,1 to 38,0	0 - 152	514.50	Quote	Quote	Quote	Quote

BUR MODIFICATION

Special flute pattern charges

Calculating Modification Charges

1. Find a bur in this catalog with the shape, diameter and length of cut needed and note the tool code, cut style and list price.
2. Increase the list price by the percentage or charge provided in the chart, if one is shown.
3. Add the cost for modification shown in the adjacent chart. Quantity pricing applies and quantities are based upon individual items ordered, not the quantity of your entire order. Multiply the charge by 2 for double ended tools.
4. The total is your new list price for the modified tool.

Combining Modifications

Typically, only one Additional Price by Quantity charge is applied to each tool. For example, when ordering two modifications such as a fine cut bur having a special shank (3/8 x 2" OAL), only one Additional Price by Quantity charge will be added. The 15% charge for fine cut and $1.75 charge for the shank size change would also be included in the computed price.

Delivery

Turnaround time for burs with special flute patterns depends on the flute pattern ordered. In general, allow 2 - 4 weeks for shipment.

Important Note

Modified products are non-returnable.

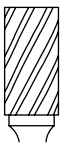
Fine Cut Style

Use when better surface finish is required. Recommended for materials with a 55-60 Rockwell C hardness.

Add to List Price	Additional Price by Quantity (Per Item Ordered) 1	2-5	6-11	12-23	24+
15%	131.25	63.00	21.00	10.50	None

Also for: fine double cut, fine chipbreaker cuts

Coarse Cut Style



Offers rapid stock removal in materials such as copper, brass, plastics and rubber.

Add to List Price	Additional Price by Quantity (Per Item Ordered) 1	2-5	6-11	12-23	24+
10%	131.25	63.00	21.00	10.50	None

Also for: coarse double cut, coarse chipbreaker cuts

Diamond Cut Style

For use on heat-treated and tough alloy steels. Balanced cutting action provides better operator control. Stock removal is increased; finish is sacrificed.

Add to List Price	Charge applies to list price applicable to these fluting styles
20%	Standard, fine, coarse cuts

Chipbreaker Cut Style

Increases tool control when added to any standard cut, coarse cut or fine cut bur. Finish quality will be slightly reduced due to flute pattern.

Add to List Price	Charge applies to list price applicable to these fluting styles
10%	Standard, fine, coarse cuts

Additional Bur and Router Modifications

Modification description	Add to List Price	Additional Price by Quantity (Per Item Ordered) 1	2-5	6-11	12-23	24+
Add 1/4, 3/8 or 8mm x 2" shank to bur	1.75	131.25	63.00	21.00	10.50	None
Add 1/4, 3/8 or 8mm x 4" shank to bur	10.15	131.25	63.00	21.00	10.50	None
Add 1/4, 3/8 or 8mm x 6" shank to bur	11.35	131.25	63.00	21.00	10.50	None
Add 1/2 or 12mm x 2" shank to bur	3.25	131.25	63.00	21.00	10.50	None
Add end cut to SN style bur	20%	None	None	None	None	None
Negative rake flutes - standard, fine, double cuts only	10%	131.25	63.00	21.00	10.50	None
Down cut style fiberglass routers (FR10)	None	131.25	63.00	21.00	10.50	None
Cut-off shank	Refer to Shorten Overall Length pricing on page 161.					

Restoring Burs Saves Money

We will resharpen or recondition any carbide bur that still shows some tool life. Reconditioning is needed when burs require more than simple resharpening.

Resharpen and Recondition Burs

Bur Diameter Inch	Bur Diameter Metric	Standard Cut Double Cut Chipbreaker Cut Sharpen	Standard Cut Double Cut Chipbreaker Cut Condition	Coarse Cut Coarse Double Coarse Chipbreaker Sharpen	Coarse Cut Coarse Double Coarse Chipbreaker Condition	Fine Cut Fine Double Fine Chipbreaker Sharpen	Fine Cut Fine Double Fine Chipbreaker Condition	Diamond Cut Fine Diamond Coarse Diamond Sharpen	Diamond Cut Fine Diamond Coarse Diamond Condition	Aluma Cut Sharpen	Aluma Cut Condition
1/8	3,0	2.65	4.05	2.65	4.05	3.05	4.55	3.15	4.75	---	---
3/16	4,7 - 5,0	4.35	6.55	4.35	6.55	5.05	7.50	5.30	7.90	---	---
1/4	6,0	4.45	6.70	4.45	6.70	5.20	7.75	5.40	8.05	7.90	11.75
5/16	8,0	6.00	9.00	6.00	9.00	6.90	10.35	7.25	10.80	---	---
3/8	9,5 - 10,0	6.20	9.25	6.20	9.25	7.20	10.75	7.45	11.15	10.90	16.30
7/16	11,0	8.85	13.30	8.85	13.30	10.20	15.30	10.70	15.90	---	---
1/2	12,0 -12,7	9.50	14.20	9.50	14.20	10.90	16.35	11.35	17.00	16.55	24.85
5/8	16,0	12.85	19.30	12.85	19.30	14.75	22.15	15.40	23.10	22.40	33.70
3/4	19,0	19.00	28.55	19.00	28.55	21.90	32.85	22.90	34.30	33.35	49.95
1	25,4	23.85	35.70	23.85	35.70	27.40	41.05	28.55	42.90	---	---
1-1/4	32,0	37.05	55.60	37.05	55.60	42.65	63.90	44.40	66.75	---	---

OLD SERIES CODE REFERENCE

End Mills

Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
1232	mm	E12	None	Plain	RR	98
1232CR	in/mm	E12	None	Plain	RR	98
1233	mm	E13	None	Plain	RR	92
1233CR	mm	E13	None	Plain	RR	92
1234	mm	E14	None	Plain	RR	78
1234CR	in/mm	E14	None	Plain	RR	78
1236	Discontinued - Use E13 with flat modification					92
1237	in/mm	E12	None	Weldon	RR	98
1241	in	M202	None	Plain	SR	54
1241	mm	M202	None	Plain	SS, SR	54
1242	in/mm	M202	None	Plain	RR	54
1242B	in	M202B	None	Plain	RR	54
1242B	mm	M202B	None	Plain	RS, RR	54
1243	in	M202	None	Plain	LL	54
1244	in	M202	None	Plain	LL, LM, XX	54
1245	in/mm	M202	None	Plain	SR	54
1246	in	M202	None	Plain	SL	54
1247	in/mm	M202	None	Plain	SM, SX	54
1248	in	M202	None	Plain	SX, SE	54
1250	Discontinued - Use M104 with AlTiN coating					65
1254	in	M104	TiCN	Plain	SS, SR	65
1255	in	M104	TiCN	Plain	RR	65
1256	in	M104	None	Plain	SS, SR	65
1257	in/mm	M104	None	Plain	RR	65
1258	in/mm	M104	None	Plain	LL	65
1259	in	M104	TiCN	Plain	LL	65
1260	in	M203	None	Plain	SR	46
1260	mm	M203	None	Plain	SS, SR	46
1261	in/mm	M203	None	Plain	RR	46
1262	in/mm	M203	None	Plain	LL	46
1263	in	M203	None	Plain	LL, LM, XX	46
1264	in	M203	None	Plain	XX, EX, EE	46
1265	in/mm	M203	None	Plain	SR	46
1266	in	M203	None	Plain	SL	46
1267	in/mm	M203	None	Plain	SM, SX	46
1268	in	M203	None	Plain	SX, SE	46
1270	in/mm	M202	None	Weldon	RR	54
1270B	in/mm	M202B	None	Weldon	RR	54
1271	in	M202	None	Weldon	LL	54
1272	in	M202	None	Weldon	LL, LM, XX	54
1274	in/mm	M203	None	Weldon	RR	46
1275	in/mm	M203	None	Weldon	LL	46
1276	in	M203	None	Weldon	LL, LM, XX	46
1277	in	M203	None	Weldon	XX, EX, EE	46
1280	in	E12	None	Weldon	RR	98
1285	in	E14	None	Weldon	RR	78
1290	in/mm	E14	None	Weldon	RR	78
1293	in	E14	None	Weldon	LL	78

End Mills • continued

Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
1294	in	E14	None	Weldon	XX	78
1295	in	E14	None	Weldon	EX, EE	78
1300	in	E12	TiCN	Plain	RR, LR	98
1300B	in	E12B	TiCN	Plain	RR, LR	98
1301	Discontinued - Use E13 with AlTiN coating					92
1303	Discontinued - Use E13 with AlTiN coating					92
1305	Discontinued - Use E12 with AlTiN coating					98
1305B	Discontinued - Use E12B with AlTiN coating					98
1310	Discontinued - Use E12 with AlTiN coating					98
1310B	Discontinued - Use E12B with AlTiN coating					98
1320	Discontinued - Use E13 with AlTiN coating					92
1320B	Discontinued - Use E13B with AlTiN coating					92
1325	in	E22	TiCN	Plain	SR	104
1332	Discontinued - Use E12 with AlTiN coating					98
1333	Discontinued - Use E13 with AlTiN coating					92
1334	Discontinued - Use E14 with AlTiN coating					78
1334CR	in	E14	TiCN	Plain	RR	78
1335	in	E14	TiCN	Plain	SS, SR	78
1335	mm	E14	TiCN	Plain	SR	78
1335B	Discontinued - Use E14B with AlTiN coating					78
1336	Discontinued - Use E13 with flat modification					92
1337	Discontinued - Use E12 with flat modification					98
1340	Discontinued - Use E12 with AlTiN coating					98
1340B	Discontinued - Use E12B with AlTiN coating					98
1350	in	E14	TiCN	Plain	RR, LR	78
1350	mm	E14	TiCN	Plain	RS, RR, RM, LR	78
1350B	in	E14B	TiCN	Plain	RR, LR	78
1352	Discontinued - Use E12 with AlTiN coating					98
1352B	Discontinued - Use E12B with AlTiN coating					98
1353	Discontinued - Use E13 with AlTiN coating					92
1353B	Discontinued - Use E13B with AlTiN coating					92
1354	mm	E14	TiCN	Plain	RR	78
1354B	Discontinued - Use E14B with AlTiN coating					78
1355	in/mm	E14	TiCN	Plain	LL	78
1355B	in	E14B	TiCN	Plain	LL	78
1360	in/mm	E14	TiCN	Plain	XX	78
1360B	in	E14B	TiCN	Plain	XX	78
1363	Discontinued - Use E13 with AlTiN coating					92
1375	in	E24	TiCN	Plain	SR	88
1375	mm	E24	TiCN	Plain	SS, SR, SM	88
1375B	in	E24B	TiCN	Plain	SR	88
1385	in	E14	TiCN	Weldon	RR	78
1390	in/mm	E14	TiCN	Weldon	RR	78
1395	Discontinued - Use E14 with flat modification					78
1400	Discontinued - Use E12 with AlTiN coating					98
1400B	Discontinued - Use E12B with AlTiN coating					98
1405	Discontinued - Use E12 with AlTiN coating					98

End Mills • continued

Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
1410	Discontinued - Use E12 with AlTiN coating					98
1425	in	E22	TiN	Plain	SR	104
1435	Discontinued - Use E14 with AlTiN coating					78
1435B	Discontinued - Use E14B with AlTiN coating					78
1450	in	E14	TiN	Plain	RR, LR	78
1450B	in	E14B	TiN	Plain	RR, LR	78
1455	in	E14	TiN	Plain	LL	78
1455B	in	E14B	TiN	Plain	LL	78
1460	in	E14	TiN	Plain	XX	78
1460B	Discontinued - Use E14 with AlTiN coating					78
1475	in	E24	TiN	Plain	SR	88
1475B	Discontinued - Use E24B with AlTiN coating					88
1490	in	E14	TiN	Weldon	RR	78
1493	in	E14	TiN	Weldon	LL	78
1494	in	E14	TiN	Weldon	XX	78
1495	in	E14	TiN	Weldon	EX, EE	78
1520	in/mm	E520B	TiAlN	Plain	SL, SX	66
1521	Discontinued - Use E520B					66
1560	in/mm	M503	AlTiN	Plain	SR	40
1562	Discontinued - Use M503N with flat modification					41
1564	in/mm	M503	AlTiN	Plain	SS, SR	40
1565	in/mm	M503	AlTiN	Plain	SR	40
1567	Discontinued - Use M503N with flat modification					41
1570	in/mm	M503	AlTiN	Plain	RR	40
1572	in/mm	M503	AlTiN	Weldon	RR	40
1575	in/mm	M503	AlTiN	Plain	RR	40
1577	in/mm	M503	AlTiN	Weldon	RR	40
1670	in/mm	M505	TiAlN	Plain	RR	38
1671	in/mm	M505	TiAlN	Plain	RR	38
1672	in/mm	M505	TiAlN	Weldon	RR	38
1673	in/mm	M505	TiAlN	Weldon	RR	38
1674	Discontinued - Use M505 with neck modification					38
1676	Discontinued - Use M505 with neck modification					38
1678	in	M505	TiAlN	Plain	SS, SR	38
1679	in	M505	TiAlN	Plain	SS, SR	38
1700	in	E42	None	Plain	RR	68
1700B	in	E42B	None	Plain	RR	68
1703	in/mm	E13	AlTiN	Plain	LL	92
1703B	in/mm	E13B	AlTiN	Plain	LL	92
1705	in/mm	E12	AlTiN	Plain	LL	98
1705B	in/mm	E12B	AlTiN	Plain	LL	98
1710B	Discontinued					
1720	in	E14	AlTiN	Plain	RR, LR	78
1720	mm	E14	AlTiN	Plain	RS, RR, RM, LR	78
1720B	in	E14B	AlTiN	Plain	RR, LR	78
1720B	mm	E14B	AlTiN	Plain	RS, RR, RM, LR	78

continued on next page

OLD SERIES CODE REFERENCE

End Mills • continued

Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
1722	in	E22	AlTiN	Plain	SR	104
1722	mm	E22	AlTiN	Plain	SS, SR, SM	104
1722B	in	E22B	AlTiN	Plain	SR	104
1722B	mm	E22B	AlTiN	Plain	SR, SM	104
1723	Discontinued					
1724	in	E24	AlTiN	Plain	SR	88
1724	mm	E24	AlTiN	Plain	SS, SR, SM	88
1724B	in	E24B	AlTiN	Plain	SR	88
1724B	mm	E24B	AlTiN	Plain	SR, SM	88
1725	in	E12	AlTiN	Plain	RR, LR	98
1725	mm	E12	AlTiN	Plain	RS, RR, RM, LR	98
1725B	in	E12B	AlTiN	Plain	RR, LR	98
1725B	mm	E12B	AlTiN	Plain	RS, RR, RM, LR	98
1730	in	E13	AlTiN	Plain	RR, LR	92
1730	mm	E13	AlTiN	Plain	RS, RR, RM, LR	92
1730B	in	E13B	AlTiN	Plain	RR, LR	92
1730B	mm	E13B	AlTiN	Plain	RR, RM, LR	92
1732	mm	E12	AlTiN	Plain	RR	98
1732CR	in/mm	E12	AlTiN	Plain	RR	98
1733	mm	E13	AlTiN	Plain	RR	92
1733CR	mm	E13	AlTiN	Plain	RR	92
1734	mm	E14	AlTiN	Plain	RR	78
1734CR	in/mm	E14	AlTiN	Plain	RR	78
1735	in	E14	AlTiN	Plain	SS, SR, RR	78
1735	mm	E14	AlTiN	Plain	SS, SR	78
1735B	in	E14B	AlTiN	Plain	SS, SR	78
1735B	mm	E14B	AlTiN	Plain	SR	78
1736	Discontinued - Use E13 with flat modi cation					92
1737	in/mm	E12	AlTiN	Weldon	RR	98
1740	in	E12	AlTiN	Plain	SS, SR, RR, LR	98
1740	mm	E12	AlTiN	Plain	SS, SR	
1740B	in	E12B	AlTiN	Plain	SS, SR	98
1740B	mm	E12B	AlTiN	Plain	SR	98
1745	in/mm	E13	AlTiN	Plain	SS, SR	92
1745B	in	E13B	AlTiN	Plain	SS, SR	92
1745B	mm	E13B	AlTiN	Plain	SR	92
1751 4 FL	in	E14	AlTiN	Weldon	RR	78
1751 6 FL	in	E16	AlTiN	Weldon	RR	69
1752	mm	E12	AlTiN	Plain	RR	98
1752B	mm	E12B	AlTiN	Plain	RR	98
1753	mm	E13	AlTiN	Plain	RR	92
1753B	mm	E13B	AlTiN	Plain	RR	92
1754	mm	E14	AlTiN	Plain	RR	78
1754B	mm	E14B	AlTiN	Plain	RR	78

End Mills • continued

Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
1755	in/mm	E14	AlTiN	Plain	LL	78
1755B	in/mm	E14B	AlTiN	Plain	LL	78
1756 6 FL	in	E16	AlTiN	Plain	RR	69
1756 6 FL	mm	E16	AlTiN	Plain	RS, RR, RM	69
1756 8 FL	Discontinued					
1758	in/mm	M706	TiAlN	Plain	SR	30
1759	in/mm	M706	TiAlN	Plain	SR	30
1760	in/mm	E14	AlTiN	Plain	XX	78
1760B	in/mm	E14B	AlTiN	Plain	XX	78
1762	in/mm	E12	AlTiN	Plain	XX	98
1762B	in/mm	E12B	AlTiN	Plain	XX	98
1763	in/mm	E13	AlTiN	Plain	XX	92
1763B	in/mm	E13B	AlTiN	Plain	XX	92
1765	in/mm	M706	TiAlN	Plain	RR	30
1766	in/mm	M706	TiAlN	Plain	RR	30
1767	in	E53	AlTiN	Plain	TL	71
1767	mm	E53	AlTiN	Plain	TR, TM, TL, TX	71
1768	in	E53B	AlTiN	Plain	TL	71
1769	in	M706	TiAlN	Plain	RM, RX, LX	30
1769	mm	M706	TiAlN	Plain	RM, RX, LX	30
1770	in/mm	M706	TiAlN	Weldon	RR	30
1771	in/mm	M706	TiAlN	Weldon	RR	30
1772	in/mm	E64B	AlTiN	Plain	SL, SX	67
1773	in/mm	M706	TiAlN	Plain	SR	30
1774	in/mm	E64B	AlTiN	Plain	SX, SE	67
1775	in/mm	M706	TiAlN	Weldon	SR	30
1776	in/mm	E62B	AlTiN	Plain	SL, SX	67
1777	in/mm	M706	TiAlN	Weldon	SR	30
1778	in/mm	E62B	AlTiN	Plain	SX, SE	67
1779	in	M706	TiAlN	Plain	RM, RX, LX	30
1779	mm	M706	TiAlN	Plain	RM, RX	30
1780	in	E12	AlTiN	Weldon	RR	98
1783	in/mm	M706	TiAlN	Plain	SR	30
1784	mm	E13	AlTiN	Plain	RX	92
1784B	mm	E13B	AlTiN	Plain	RX	92
1785	in	E14	AlTiN	Weldon	RR	78
1786	mm	E13	AlTiN	Plain	RX, RE, LX	92
1786B	mm	E13B	AlTiN	Plain	RX, RE, LX	92
1787	in	M104	AlTiN	Plain	SS, SR	64
1788	in/mm	M104	AlTiN	Plain	RR	64
1789	in/mm	M104	AlTiN	Plain	LL	64
1790	in/mm	E14	AlTiN	Weldon	RR	78
1791	in	E12	AlTiN	Plain	RL, RX, MM, LX, LE	98
1791	mm	E12	AlTiN	Plain	RX	98
1791B	in	E12B	AlTiN	Plain	RL, RX, MM, LX, LE	98

End Mills • continued

Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
1791B	mm	E12B	AlTiN	Plain	RX	98
1792	in	E12	AlTiN	Plain	LX, LE, XE	98
1792	mm	E12	AlTiN	Plain	RX, RE, LX	98
1792B	in	E12B	AlTiN	Plain	LX, LE, XE	98
1792B	mm	E12B	AlTiN	Plain	RX, RE, LX	98
1793	in	E14	AlTiN	Weldon	LL	78
1794	in	E14	AlTiN	Weldon	XX	78
1795	in	E14	AlTiN	Weldon	EX, EE	78
1797	in	E14	AlTiN	Plain	RL, RX, MM, LX, LE	78
1797	mm	E14	AlTiN	Plain	RX	78
1797B	in	E14B	AlTiN	Plain	RL, RX, MM, LX, LE	78
1797B	mm	E14B	AlTiN	Plain	RX	78
1798	in	E14	AlTiN	Plain	LX, LE, XE	78
1798	mm	E14	AlTiN	Plain	RX, RE, LX	78
1798B	in	E14B	AlTiN	Plain	LX, LE, XE	78
1798B	mm	E14B	AlTiN	Plain	RX, RE, LX	78
1800	in	E12	None	Plain	RR, LR	98
1800	mm	E12	None	Plain	RS, RR, RM, LR	98
1800B	in	E12B	None	Plain	RR, LR	98
1800B	mm	E12B	None	Plain	RS, RR, RM, LR	98
1820	in	E13	None	Plain	RR, LR	92
1820	mm	E13	None	Plain	RS, RR, RM, LR	92
1820B	in	E13B	None	Plain	RR, LR	92
1820B	mm	E13B	None	Plain	RR, RM, LR	92
1850	in	E14	None	Plain	RR, LR	78
1850	mm	E14	None	Plain	RS, RR, RM, LR	78
1850B	in	E14B	None	Plain	RR, LR	78
1850B	mm	E14B	None	Plain	RS, RR, RM, LR	78
1851 4 FL	in	E14	None	Weldon	RR	78
1851 6 FL	in	E16	None	Weldon	RR	69
1852	in	E12	None	Plain	SR, RR	98
1852	mm	E12	None	Plain	RR	98
1852B	mm	E12B	None	Plain	RR	98
1853	mm	E13	None	Plain	RR	92
1853B	mm	E13B	None	Plain	RR	92
1854	in/mm	E14	None	Plain	RR	78
1854	dec	Discontinued				
1854B	mm	E14B	None	Plain	RR	78
1855 6 FL	Discontinued - Use E16 with AlTiN coating					69
1855 8 FL	Discontinued					
1856 6 FL	Discontinued - Use E16 with AlTiN coating					69

continued on next page

OLD SERIES CODE REFERENCE

End Mills • continued

Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
1856 8 FL	Discontinued					
1865	in	E55B	None	Plain	TR	70
1866	in	E55B	None	Plain	TR	70
1866	mm	E55B	None	Plain	TR, TM	70
1867	Discontinued - Use E53 with AlTiN coating					71
1868	Discontinued - Use E53B with AlTiN coating					71
1870	in/mm	E34	None	Plain	RR	69
1872	Discontinued - Use E64B with AlTiN coating					67
1874	Discontinued - Use E64B with AlTiN coating					67
1876	Discontinued - Use E62B with AlTiN coating					67
1878	Discontinued - Use E62B with AlTiN coating					67
1880	in/mm	E12	None	Plain	LL	98
1880B	in/mm	E12B	None	Plain	LL	98
1883	in/mm	E13	None	Plain	LL	92
1883B	in/mm	E13B	None	Plain	LL	92
1884	mm	E13	None	Plain	RX	92
1884B	mm	E13B	None	Plain	RX	92
1885	in/mm	E14	None	Plain	LL	78
1885B	in/mm	E14B	None	Plain	LL	78
1886	mm	E13	None	Plain	RX, RE, LX	92
1886B	mm	E13B	None	Plain	RX, RE, LX	92
1890	in/mm	E12	None	Plain	XX	98
1890B	in/mm	E12B	None	Plain	XX	98
1891	in	E12	None	Plain	RL, RX, MM, LX, LE	98
1891	mm	E12	None	Plain	RX	98
1891B	in	E12B	None	Plain	RL, RX, MM, LX, LE	98
1891B	mm	E12B	None	Plain	RX	98
1892	in	E12	None	Plain	LX, LE, XE	98
1892	mm	E12	None	Plain	RX, RE, LX	98
1892B	in	E12B	None	Plain	LX, LE, XE	98
1892B	mm	E12B	None	Plain	RX, RE, LX	98
1893	in/mm	E13	None	Plain	XX	92
1893B	in/mm	E13B	None	Plain	XX	92
1894	Discontinued					
1895	in/mm	E14	None	Plain	XX	78
1895B	in/mm	E14B	None	Plain	XX	78
1896	Discontinued					
1897	in	E14	None	Plain	RL, RX, MM, LX, LE	78
1897	mm	E14	None	Plain	RX	78
1897B	in	E14B	None	Plain	RL, RX, MM, LX, LE	78
1897B	mm	E14B	None	Plain	RX	78
1898	in	E14	None	Plain	LX, LE, XE	78
1898	mm	E14	None	Plain	RX, RE, LX	78
1898B	in	E14B	None	Plain	LX, LE, XE	78
1898B	mm	E14B	None	Plain	RX, RE, LX	78
1899	Discontinued					

End Mills • continued

Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
1900	in	E22	None	Plain	SR	104
1900	mm	E22	None	Plain	SS, SR, SM	104
1900B	in	E22B	None	Plain	SR	104
1900B	mm	E22B	None	Plain	SR, SM	104
1930	Discontinued					
1942	in	E22	None	Plain	RM, RL	104
1942B	in	E22B	None	Plain	RM, RL	104
1944	in	E24	None	Plain	RM, RL	88
1944B	in	E24B	None	Plain	RM, RL	88
1950	in	E24	None	Plain	SR	88
1950	mm	E24	None	Plain	SS, SR, SM	88
1950B	in	E24B	None	Plain	SR	88
1950B	mm	E24B	None	Plain	SR, SM	88
1967	in/mm	M904	AlTiNX	Plain	LL	18
1968	in	M904	AlTiNX	Plain	LM, XX	18
1969	in	M904	AlTiNX	Plain	XX, EE	18
1970	in/mm	M904	AlTiNX	Plain	RR	18
1971	in/mm	M904	AlTiNX	Plain	RR	18
1971B	in/mm	M904B	AlTiNX	Plain	RR	18
1972	in/mm	M904	AlTiNX	Weldon	RR	18
1973	in/mm	M904	AlTiNX	Weldon	RR	18
1973B	in/mm	M904B	AlTiNX	Weldon	RR	18
1974	in	M904	AlTiNX	Plain	SR	18
1975	in	M904	AlTiNX	Plain	SL	18
1976	in	M904	AlTiNX	Plain	SM, SX	18
1977	in	M904	AlTiNX	Plain	SX, SE	18
1978	in/mm	M904	AlTiNX	Plain	SS	18
1979	in/mm	M904	AlTiNX	Plain	SS	18
1980	in/mm	M905	AlTiNX	Plain	RR	21
1981	in/mm	M905	AlTiNX	Plain	RR	21
1982	in/mm	M905	AlTiNX	Weldon	RR	21
1983	in/mm	M905	AlTiNX	Weldon	RR	21
2000	in	E24	None	Weldon	RL, RX	88
2001	Discontinued - Use E24 with AlTiN coating					88
2003	in	E24	AlTiN	Weldon	RL	88
2210	Discontinued - Use M603 with AlTiN coating					23
2215	Discontinued - Use M603 with AlTiN coating					23
2225	Discontinued - Use M603 with AlTiN coating					23
2226	in/mm	M603	AlTiN	Plain	RR	23
2400	in/mm	E13	None	Plain	SS, SR	92
2400B	in	E13B	None	Plain	SS, SR	92
2400B	mm	E13B	None	Plain	SR	92
2500	in/mm	E12	None	Plain	SS, SR	98
2500B	in	E12B	None	Plain	SS, SR	98
2500B	mm	E12B	None	Plain	SR	98
2600	in/mm	E14	None	Plain	SS, SR	78
2600B	in	E14B	None	Plain	SS, SR	78
2600B	mm	E14B	None	Plain	SR	78
3000	in	E22	None	Weldon	RL	104

Drills • Reamers • Miscellaneous

Old Series	New Series	Page #
1200	BT10	154
1288	CRC10	158
1547	FR10 - No End Cut	153
1548	FR10 - Bur End Cut	153
1549	FR10 - End Mill End Cut	153
1550	FR10 - Drill Point	153
1805	D40	124
1810	D20	116
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1817D	D30	114
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1818L	D23 - 90°	123
1819	D23 - 120°	123
1819L	D23 - 120°	123
1830	CD10	156
1831	CD10	156
1835	Discontinued	- - -
1837	CT12 - 60°	158
1838	CT12 - 90°	158
1839	CT12 - 120°	158
1840	CS10 - 60°	157
1841	CS10 - 82°	157
1842	CS10 - 90°	157
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1844	CS20 - 3 FL - 82°	157
1845	CS20 - 3 FL - 90°	157
1846	CS20 - 6 FL - 60°	157
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1847	CS20 - 6 FL - 82°	157
1847-5	CS20 - 5 FL - 82°	157
1847-7	CS20 - 7 FL - 82°	157
1848	CS20 - 6 FL - 90°	157
1848-5	CS20 - 5 FL - 90°	157
1848-7	CS20 - 7 FL - 90°	157
1901	Discontinued	- - -
1910	PDT10	68
2850	DT20	120
3850	DT22	122
4000	D10	126
4050	D11	127
4100	KC10	155
4850	DT40	126
5850	DT21	121
8000	Discontinued	- - -
8001	Discontinued	- - -
9000	R10	128

DECIMAL EQUIVALENT CHART

Tool Size	Decimal Equiv.
80	.0135
0.35	.0138
79	.0145
1/64	.0156
0.40	.0158
78	.0160
0.45	.0177
77	.0180
0.50	.0197
76	.0200
75	.0210
0.55	.0217
74	.0225
0.60	.0236
73	.0240
72	.0250
0.65	.0256
71	.0260
0.70	.0276
70	.0280
69	.0292
0.75	.0295
68	.0310
1/32	.0312
0.80	.0315
67	.0320
66	.0330
0.85	.0335
65	.0350
0.90	.0354
64	.0360
63	.0370
0.95	.0374
62	.0380
61	.0390
1.00	.0394
60	.0400
59	.0410
1.05	.0413
58	.0420
57	.0430
1.10	.0433
1.15	.0453
56	.0465
3/64	.0469
1.20	.0472
1.25	.0492
1.30	.0512
55	.0520
1.35	.0531
54	.0550
1.40	.0551
1.45	.0571
1.50	.0591
53	.0595
1.55	.0610
1/16	.0625
1.60	.0630
52	.0635
1.65	.0650
1.70	.0669
51	.0670
1.75	.0689
50	.0700
1.80	.0709
1.85	.0728
49	.0730
1.90	.0748
48	.0760
1.95	.0768
5/64	.0781
47	.0785
2.00	.0787
2.05	.0807
46	.0810
45	.0820
2.10	.0827
2.15	.0846
44	.0860
2.20	.0866
2.25	.0886
43	.0890
2.30	.0906
2.35	.0925
42	.0935
3/32	.0938
2.40	.0945
41	.0960
2.45	.0965
40	.0980
2.50	.0984
39	.0995
38	.1015
2.60	.1024
37	.1040
2.70	.1063
36	.1065
2.75	.1083
7/64	.1094
35	.1100
2.80	.1102
34	.1110
33	.1130
2.90	.1142
.32	.1160
3.00	.1181
31	.1200
3.10	.1220
1/8	.1250
3.20	.1260
3.25	.1280
30	.1285
3.30	.1299
3.40	.1339
29	.1360
3.50	.1378
28	.1405
9/64	.1406
3.60	.1417
27	.1440
3.70	.1457
26	.1470
3.75	.1476
25	.1495
3.80	.1496
24	.1520
3.90	.1535
23	.1540
5/32	.1562
22	.1570
4.00	.1575
21	.1590
20	.1610
4.10	.1614
4.20	.1654
19	.1660
4.25	.1673
4.30	.1693
18	.1695
11/64	.1719
17	.1730
4.40	.1732
16	.1770
4.50	.1772
15	.1800
4.60	.1811
14	.1820
13	.1850
4.70	.1850
4.75	.1870
3/16	.1875
4.80	.1890
12	.1890
11	.1910
4.90	.1929
10	.1935
9	.1960
5.00	.1969
8	.1990
5.10	.2008
7	.2010
13/64	.2031
6	.2040
5.20	.2047
5	.2055
5.25	.2067
5.30	.2087
4	.2090
5.40	.2126
3	.2130
5.50	.2165
7/32	.2188
5.60	.2205
2	.2210
5.70	.2244
5.75	.2264
1	.2280
5.80	.2283
5.90	.2323
A	.2340
15/64	.2344
6.00	.2362
B	.2380
6.10	.2402
C	.2420
6.20	.2441
D	.2460
6.25	.2461
6.30	.2480
1/4	.2500
E	.2500
6.40	.2520
6.50	.2559
F	.2570
6.60	.2598
G	.2610
6.70	.2638
17/64	.2656
6.75	.2657
H	.2660
6.80	.2677
6.90	.2717
I	.2720
7.00	.2756
J	.2770
7.10	.2795
K	.2810
9/32	.2812
7.20	.2835
7.25	.2854
7.30	.2874
L	.2900
7.40	.2913
M	.2950
7.50	.2953
19/64	.2969
7.60	.2992
N	.3020
7.70	.3031
7.75	.3051
7.80	.3071
7.90	.3110
5/16	.3125
8.00	.3150
O	.3160
8.10	.3189
8.20	.3228
P	.3230
8.25	.3248
8.30	.3268
21/64	.3281
8.40	.3307
Q	.3320
8.50	.3346
8.60	.3386
R	.3390
8.70	.3425
11/32	.3438
8.75	.3445
8.80	.3465
S	.3480
8.90	.3504
9.00	.3543
T	.3580
9.10	.3583
23/64	.3594
9.20	.3622
9.25	.3642
9.30	.3661
U	.3680
9.40	.3701
9.50	.3740
3/8	.3750
V	.3770
9.60	.3780
9.70	.3819
9.75	.3839
9.80	.3858
W	.3860
9.90	.3898
25/64	.3906
10.00	.3937
X	.3970
Y	.4040
13/32	.4062
Z	.4130
10.50	.4134
27/64	.4219
11.00	.4331
7/16	.4375
11.50	.4528
29/64	.4531
15/32	.4688
12.00	.4724
31/64	.4844
12.50	.4921
1/2	.5000
13.00	.5118
33/64	.5156
17/32	.5312
13.50	.5315
35/64	.5469
14.00	.5512
9/16	.5625
14.50	.5709
37/64	.5781
15.00	.5906
19/32	.5938
39/64	.6094
15.50	.6102
5/8	.6250
16.00	.6299
41/64	.6406
16.50	.6496
21/32	.6562
17.00	.6693
43/64	.6719
11/16	.6875
17.50	.6890
45/64	.7031
18.00	.7087
23/32	.7188
18.50	.7283
47/64	.7344
19.00	.7480
3/4	.7500
49/64	.7656
19.50	.7677
25/32	.7812
20.00	.7874
51/64	.7969
20.50	.8071
13/16	.8125
21.00	.8268
53/64	.8281
27/32	.8438
21.50	.8465
55/64	.8594
22.00	.8661
7/8	.8750
22.50	.8858
57/64	.8906
23.00	.9055
29/32	.9062
59/64	.9219
23.50	.9252
15/16	.9375
24.00	.9449
61/64	.9531
24.50	.9646
31/32	.9688
25.00	.9843
63/64	.9844
1	1.000

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Over / Under Allowance	1	2	3	4	5%

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- Purchase order number
- Description of damage
- Quantity/item evaluation

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General Purpose End Mills

Drills & Reamers

Burs

Miscellaneous

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