2010 Product Catalog

MENLO

Power. Precision. Performance.

What's new in this year's catalog?

At Menlo, 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 Menlo tools and the technical advice of their Menlo sales representative.

Your Menlo representative can do the same for you.

MENLO

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TiD-eXtra
industrial technology
d.o.o.

Your Menlo 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 Menlo.

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MENLO
Power. Precision. Performance.

PICTORIAL INDEX

HIGH PERFORMANCE END MILLS

SPECIAL PURPOSE END MILLS

GENERAL PURPOSE END MILLS

TiD-eXtra
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PICTORIAL INDEX (cont'd)

DRILLS

REAMERS

BURS

ROUTERS

MISCELLANEOUS

TiD-eXtra d.o.o. Industrial Technologies

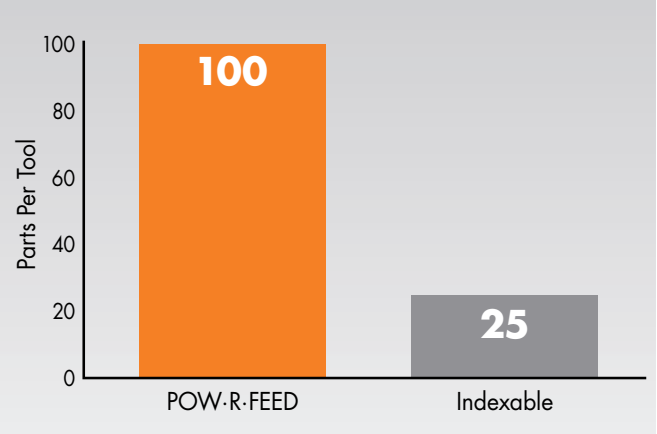
PROFILE

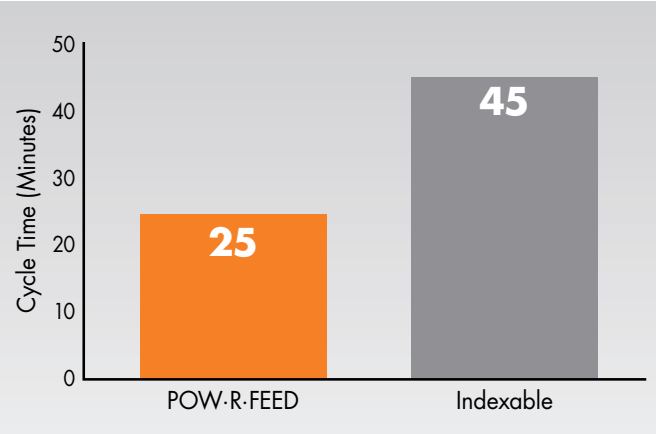
Neal Wilson

Menlo Sales Representative

Arkansas/Louisiana/Mississippi

Menlo 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 Menlo 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 Menlo 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.**

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

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

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

TiD-extra
Industrial Technologies d.o.o.

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HIGH PERFORMANCE END MILLS

These families of Menlo 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

TiD-eXtra Industrial Technologies d.o.o.

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.

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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.

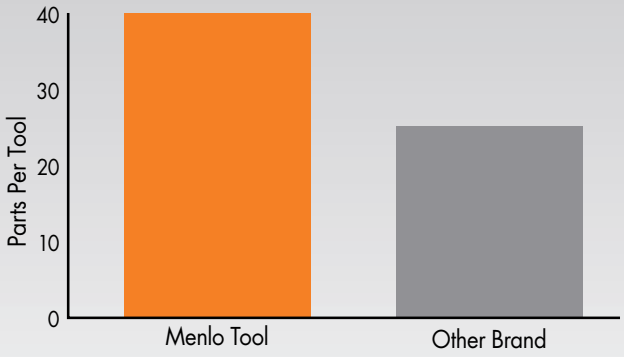
Versatility

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.



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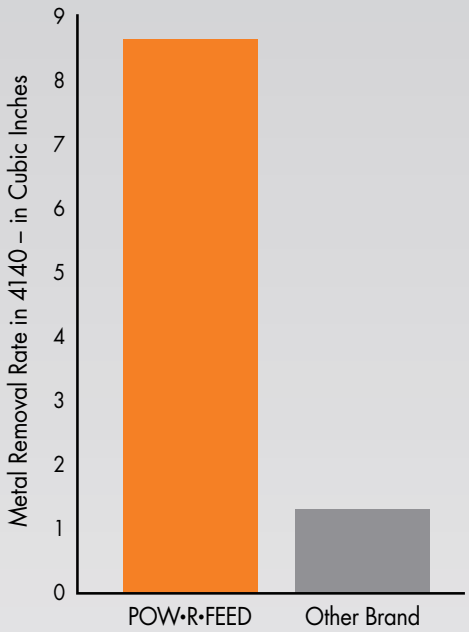
Higher Metal Removal Rates



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.

TiD-eXtra d.o.o.

4 Variable Flutes
For maximum feed rates

M904

M904 • Radius

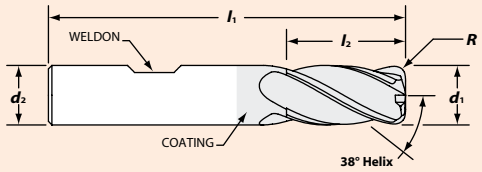
M904 • Square

M904B • Ball

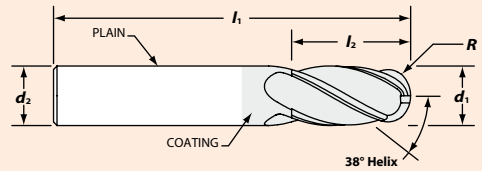
- Chatter free machining with excellent surface finishes
- High strength edge
- Easy to resharpen
- Advanced **AlTiNX** coating

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
1/8	1/8	1/4	1-1/2	.015	Plain	SR	63248
		1/4	2-1/4	.015	Plain	SL	63259
		1/2	1-1/2	Square	Plain	RR	63010
		1/2	1-1/2	.015	Plain	RR	63064
		1/2	1-1/2	Ball	Plain	RR	63139
5/32	3/16	9/16	2	Square	Plain	RR	63011
		9/16	2	.015	Plain	RR	63118
		9/16	2	Ball	Plain	RR	63140
3/16	3/16	5/16	2	.015	Plain	SR	63249
		5/16	2-1/2	.015	Plain	SL	63260
		5/8	2	Square	Plain	RR	63012
		5/8	2	.015	Plain	RR	91027
		5/8	2	Ball	Plain	RR	63142
7/32	1/4	5/8	2-1/2	Square	Plain	RR	63013
		5/8	2-1/2	.020	Plain	RR	63119
		5/8	2-1/2	Ball	Plain	RR	63143
1/4	1/4	3/8	2	Square	Plain	SS	63003
		3/8	2	.020	Plain	SS	63058
		3/8	2-1/2	.020	Plain	SR	63250
		3/8	3	.020	Plain	SL	63261
		3/8	4	.020	Plain	SX	63272
		3/4	2-1/2	Square	Plain	RR	63014
		3/4	2-1/2	.020	Plain	RR	63066
		3/4	2-1/2	.030	Plain	RR	63466
		3/4	2-1/2	Ball	Plain	RR	63144
		1-1/8	3	.020	Plain	LL	63420
		1-1/2	4	.020	Plain	XX	63425
5/16	5/16	13/16	2-1/2	Square	Plain	RR	63016
		13/16	2-1/2	.020	Plain	RR	91024
		13/16	2-1/2	Ball	Plain	RR	63146
3/8	3/8	1/2	2	Square	Plain	SS	63004
		1/2	2	.020	Plain	SS	63059
		1/2	2-1/2	.020	Plain	SR	63252
		1/2	3	.020	Plain	SL	63263
		1/2	4	.020	Plain	SX	63274
		1/2	6	.020	Plain	SE	63281

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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
3/8	3/8	7/8	2-1/2	Square	Plain	RR	63018
		7/8	2-1/2	Square	Weldon	RR	63043
		7/8	2-1/2	.020	Plain	RR	63068
		7/8	2-1/2	.020	Weldon	RR	63083
		7/8	2-1/2	.030	Plain	RR	63390
		7/8	2-1/2	.030	Weldon	RR	63400
		7/8	2-1/2	Ball	Plain	RR	63148
		7/8	2-1/2	Ball	Weldon	RR	63176
		1-1/8	3	.020	Plain	LL	63421
		1-3/4	4	.020	Plain	XX	63426
7/16	7/16	1	2-3/4	Square	Plain	RR	63020
		1	2-3/4	Square	Weldon	RR	63044
		1	2-3/4	.020	Plain	RR	63069
		1	2-3/4	.020	Weldon	RR	63084
		1	2-3/4	Ball	Plain	RR	63150
		1	2-3/4	Ball	Weldon	RR	63178
1/2	1/2	5/8	2-1/2	Square	Plain	SS	63005
		5/8	2-1/2	.030	Plain	SS	63060
		5/8	3	.030	Plain	SR	63254
		5/8	4	.030	Plain	SL	63265
		5/8	5	.030	Plain	SX	63276
		5/8	6	.030	Plain	SX	63283
		1	3	Square	Plain	RR	63022
		1	3	Square	Weldon	RR	63045
		1	3	.030	Plain	RR	63070
		1	3	.030	Weldon	RR	63085
		1	3	Ball	Plain	RR	63152
		1	3	Ball	Weldon	RR	63180
		1-1/4	3	Square	Plain	RR	63100
		1-1/4	3	Square	Weldon	RR	63101
		1-1/4	3	.015	Plain	RR	63467
		1-1/4	3	.015	Weldon	RR	63473
		1-1/4	3	.030	Plain	RR	63098
		1-1/4	3	.030	Weldon	RR	63099
		1-1/4	3	.060	Plain	RR	63391
		1-1/4	3	.060	Weldon	RR	63401
		1-1/4	3	.090	Plain	RR	63392
		1-1/4	3	.090	Weldon	RR	63402
		1-1/4	3	.125	Plain	RR	63393
		1-1/4	3	.125	Weldon	RR	63403
		1-1/4	3	Ball	Plain	RR	63153
		1-1/4	3	Ball	Weldon	RR	63181
		2	4	.030	Plain	LL	63422
		2-1/2	5	.030	Plain	LX	63427
		3	6	.030	Plain	XX	63430
5/8	5/8	3/4	3	Square	Plain	SS	63006
		3/4	3	.030	Plain	SS	63061
		3/4	3-1/2	.030	Plain	SR	63255
		3/4	5	.030	Plain	SL	63266
		3/4	6	.030	Plain	SX	63277

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	AlTiNX EDP Number
5/8	5/8	1-1/4	3-1/2	Square	Plain	RR	63024
		1-1/4	3-1/2	Square	Weldon	RR	63046
		1-1/4	3-1/2	.015	Plain	RR	63468
		1-1/4	3-1/2	.015	Weldon	RR	63474
		1-1/4	3-1/2	.030	Plain	RR	63071
		1-1/4	3-1/2	.030	Weldon	RR	63086
		1-1/4	3-1/2	.060	Plain	RR	63394
		1-1/4	3-1/2	.060	Weldon	RR	63404
		1-1/4	3-1/2	Ball	Plain	RR	63155
		1-1/4	3-1/2	Ball	Weldon	RR	63183
3/4	3/4	7/8	3	Square	Plain	SS	63007
		7/8	3	.030	Plain	SS	63062
		1	4	.030	Plain	SR	63256
		1	5	.030	Plain	SL	63267
		1	6	.030	Plain	SX	63278
		1	7	.030	Plain	SE	63285
		1-1/2	4	Square	Plain	RR	63025
		1-1/2	4	Square	Weldon	RR	91025
		1-1/2	4	.015	Plain	RR	63469
		1-1/2	4	.015	Weldon	RR	63475
		1-1/2	4	.030	Plain	RR	63072
		1-1/2	4	.030	Weldon	RR	63087
		1-1/2	4	.060	Plain	RR	63395
		1-1/2	4	.060	Weldon	RR	63405
		1-1/2	4	.090	Plain	RR	63396
		1-1/2	4	.090	Weldon	RR	63406
		1-1/2	4	.125	Plain	RR	63397
		1-1/2	4	.125	Weldon	RR	63407
		1-1/2	4	Ball	Plain	RR	63156
		1-1/2	4	Ball	Weldon	RR	63184
		2-1/4	5	.030	Plain	LL	63423
		3	6	.030	Plain	XX	63428
		4	7	.030	Plain	EE	63431
1	1	1-1/8	4	.030	Plain	SR	63257
		1-1/4	5	.030	Plain	SL	63268
		1-1/4	6	.030	Plain	SX	63279
		1-1/4	7	.030	Plain	SE	63286
		1-1/2	4	Square	Plain	RR	63026
		1-1/2	4	Square	Weldon	RR	63048
		1-1/2	4	.030	Plain	RR	63073
		1-1/2	4	.030	Weldon	RR	63088
		1-1/2	4	.060	Plain	RR	63398
		1-1/2	4	.060	Weldon	RR	63408
		1-1/2	4	Ball	Plain	RR	63158
		1-1/2	4	Ball	Weldon	RR	63186
		3	6	.030	Plain	XX	63429
		4-1/8	7	.030	Plain	EE	63432

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

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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
3	3	8	38	Square	Plain	RR	63027
		8	38	0,3	Plain	RR	63102
		8	38	Ball	Plain	RR	63160
4	4	11	50	Square	Plain	RR	63028
		11	50	0,3	Plain	RR	63103
		11	50	Ball	Plain	RR	63161
5	5	13	50	Square	Plain	RR	63029
		13	50	0,3	Plain	RR	63104
		13	50	Ball	Plain	RR	63162
6	6	10	54	Square	Plain	SS	63123
		10	54	0,3	Plain	SS	63108
		13	57	Square	Plain	RR	63030
		13	57	0,3	Plain	RR	63074
		13	57	0,5	Plain	RR	63434
		13	57	Ball	Plain	RR	63163
		28	75	0,5	Plain	LL	63455
8	8	12	58	Square	Plain	SS	63124
		12	58	0,5	Plain	SS	63109
		19	63	Square	Plain	RR	63032
		19	63	0,3	Plain	RR	63435
		19	63	0,5	Plain	RR	63075
		19	63	Ball	Plain	RR	63165
		29	75	0,5	Plain	LL	63456
10	10	14	66	Square	Plain	SS	63125
		14	66	0,5	Plain	SS	63110
		22	72	Square	Plain	RR	63034
		22	72	0,3	Plain	RR	63436
		22	72	0,5	Plain	RR	63076
		22	72	Ball	Plain	RR	63167
		36	88	0,5	Plain	LL	63457

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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
12	12	16	73	Square	Plain	SS	63126
		16	73	1,0	Plain	SS	63111
		26	83	Square	Plain	RR	63036
		26	83	0,5	Plain	RR	63437
		26	83	0,75	Plain	RR	63438
		26	83	1,0	Plain	RR	63077
		26	83	Ball	Plain	RR	63169
		45	100	0,75	Plain	LL	63458
16	16	22	82	Square	Plain	SS	63128
		22	82	1,0	Plain	SS	63113
		32	92	Square	Plain	RR	63038
		32	92	0,75	Plain	RR	63439
		32	92	1,0	Plain	RR	63079
		32	92	Ball	Plain	RR	63171
		56	125	1,0	Plain	LL	63459
20	20	26	92	Square	Plain	SS	63130
		26	92	1,0	Plain	SS	63115
		38	104	Square	Plain	RR	63040
		38	104	0,75	Plain	RR	63440
		38	104	1,0	Plain	RR	91026
		38	104	Ball	Plain	RR	63173
		56	125	1,0	Plain	LL	63460

Style Code Reference

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

TiD-eXtra
Industrial Technologies
d.o.o.

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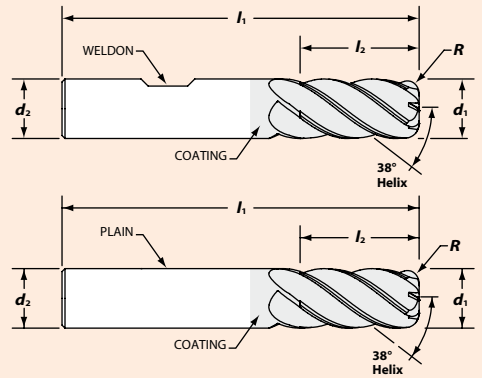
5 Variable Flutes

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
1/4	1/4	3/4	2-1/2	Square	Plain	RR	63338
		3/4	2-1/2	.020	Plain	RR	63287
		3/4	2-1/2	.030	Plain	RR	63462
3/8	3/8	7/8	2-1/2	Square	Plain	RR	63340
		7/8	2-1/2	Square	Weldon	RR	63354
		7/8	2-1/2	.020	Plain	RR	63289
		7/8	2-1/2	.020	Weldon	RR	62976
		7/8	2-1/2	.030	Plain	RR	63370
		7/8	2-1/2	.030	Weldon	RR	63380
1/2	1/2	1-1/4	3	Square	Plain	RR	63342
		1-1/4	3	Square	Weldon	RR	63356
		1-1/4	3	.015	Plain	RR	63463
		1-1/4	3	.015	Weldon	RR	63470
		1-1/4	3	.030	Plain	RR	63291
		1-1/4	3	.030	Weldon	RR	62978
		1-1/4	3	.060	Plain	RR	63371
		1-1/4	3	.060	Weldon	RR	63381
		1-1/4	3	.090	Plain	RR	63372
		1-1/4	3	.090	Weldon	RR	63382
		1-1/4	3	.125	Plain	RR	63373
		1-1/4	3	.125	Weldon	RR	63383
5/8	5/8	1-1/4	3-1/2	Square	Plain	RR	63343
		1-1/4	3-1/2	Square	Weldon	RR	63357
		1-1/4	3-1/2	.030	Plain	RR	63292
		1-1/4	3-1/2	.030	Weldon	RR	62980
		1-1/4	3-1/2	.060	Plain	RR	63374
		1-1/4	3-1/2	.060	Weldon	RR	63384
3/4	3/4	1-1/2	4	Square	Plain	RR	63344
		1-1/2	4	Square	Weldon	RR	63358
		1-1/2	4	.030	Plain	RR	63293
		1-1/2	4	.030	Weldon	RR	62981
		1-1/2	4	.060	Plain	RR	63375
		1-1/2	4	.060	Weldon	RR	63385

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
6	6	13	57	Square	Plain	RR	63346
		13	57	0,5	Plain	RR	63295
8	8	19	63	Square	Plain	RR	63347
		19	63	0,5	Plain	RR	63296
10	10	22	72	Square	Plain	RR	63348
		22	72	0,5	Plain	RR	63297
12	12	26	83	Square	Plain	RR	63349
		26	83	0,75	Plain	RR	63298
16	16	32	92	Square	Plain	RR	63350
		32	92	1,0	Plain	RR	63299
20	20	38	104	Square	Plain	RR	63351
		38	104	1,0	Plain	RR	63300

Style Code Reference
RR—Regular LOC, Regular OAL

TiD-eXtra Industrial Technologies d.o.o.

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

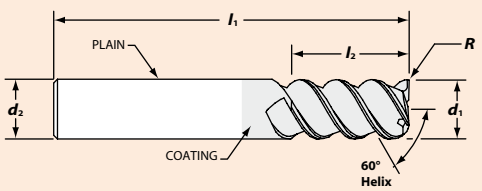
TiD-eXtra Industrial Technologies d.o.o.

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
1/8	1/8	1/2	1-1/2	Square	Plain	RR	39599
3/16	3/16	5/8	2	Square	Plain	RR	39128
1/4	1/4	3/4	2-1/2	Square	Plain	RR	39129
3/8	3/8	7/8	2-1/2	Square	Plain	RR	39130
1/2	1/2	1	3	Square	Plain	RR	39132
5/8	5/8	1-1/4	3-1/2	Square	Plain	RR	39133
3/4	3/4	1-1/2	4	Square	Plain	RR	97139

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

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www.tid-extra.hr

PROFILE

Sam Turner

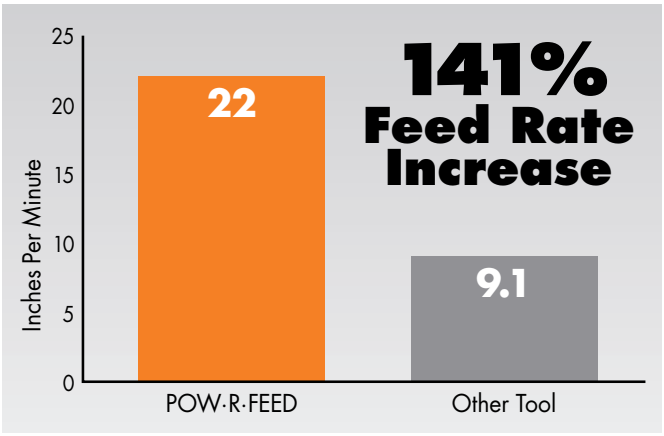
Menlo Sales Representative

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.**

TiD-eXtra
Industrial Technologies
d.o.o.

Clint Baku (left), Jarrett Rifles shop supervisor, checks components for precise specifications; Menlo 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.

TiD - eXtra
Industrial Technologies d.o.o.

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.

TiD-eXtra
Industrial Technologies
d.o.o.

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:

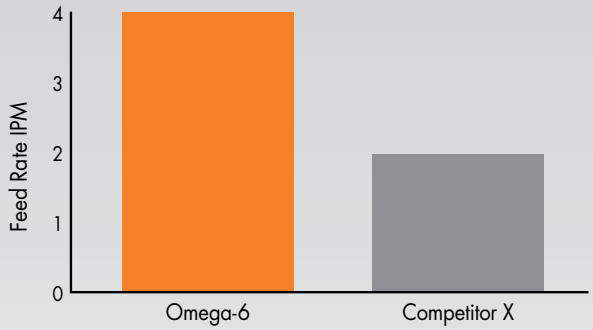
- Hardened tool steels
- Heat treated steels
- Titanium
- Inconel®
- Monel®
- Rene-41
- Waspaloy®
- Hastalloy C

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!**

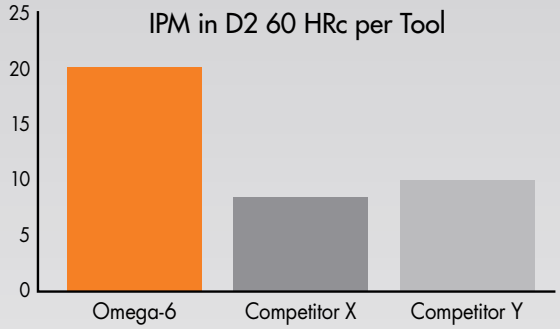
TiD-eXtra Industrial Technologies d.o.o.
www.tid-extra.hr

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".)

OMEGA-6 M70 END MILLS

For hardened steels and aerospace alloys

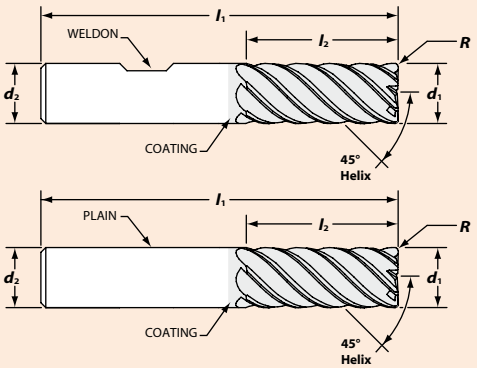
6 High Strength Flutes

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
1/8	1/8	1/4	1-1/2	Square	Plain	SR	63190
		1/4	1-1/2	.015	Plain	SR	62983
		1/2	1-1/2	Square	Plain	RR	62781
		1/2	1-1/2	.015	Plain	RR	62791
3/16	3/16	5/16	2	Square	Plain	SR	63192
		5/16	2	.015	Plain	SR	62984
		9/16	2	Square	Plain	RR	62782
		9/16	2	.015	Plain	RR	62792
1/4	1/4	3/8	2-1/2	Square	Plain	SR	63194
		3/8	2-1/2	.020	Plain	SR	62985
		3/4	2-1/2	Square	Plain	RR	62783
		3/4	2-1/2	Square	Weldon	RR	30491
		3/4	2-1/2	.020	Plain	RR	62793
		3/4	2-1/2	.020	Weldon	RR	30568
		3/4	2-1/2	.030	Plain	RR	62838
		3/4	2-1/2	.030	Weldon	RR	62847
		1	4	Square	Plain	LX	63315
		1	4	.020	Plain	LX	63301
5/16	5/16	13/16	2-1/2	Square	Plain	RR	62784
		13/16	2-1/2	Square	Weldon	RR	30492
		13/16	2-1/2	.030	Plain	RR	62794
		13/16	2-1/2	.030	Weldon	RR	30569
3/8	3/8	1/2	2-1/2	Square	Plain	SR	63196
		1/2	2-1/2	.030	Plain	SR	62986
		1	2-1/2	Square	Plain	RR	62785
		1	2-1/2	Square	Weldon	RR	30493
		1	2-1/2	.030	Plain	RR	62795
		1	2-1/2	.030	Weldon	RR	30570
		1	4	Square	Plain	RX	63317
		1	4	.030	Plain	RX	63303
1/2	1/2	5/8	3	Square	Plain	SR	63198
		5/8	3	.030	Plain	SR	62987
		1	5	Square	Plain	RX	63318
		1	5	.030	Plain	RX	63304
		1-1/4	3	Square	Plain	RR	62787
		1-1/4	3	Square	Weldon	RR	30495
		1-1/4	3	.030	Plain	RR	62797
		1-1/4	3	.030	Weldon	RR	30572
5/8	5/8	3/4	3-1/2	Square	Plain	SR	63199
		3/4	3-1/2	.030	Plain	SR	62988
		1-5/8	3-1/2	Square	Plain	RR	62788
		1-5/8	3-1/2	Square	Weldon	RR	30497
		1-5/8	3-1/2	.030	Plain	RR	62798
		1-5/8	3-1/2	.030	Weldon	RR	30574
3/4	3/4	1	4	Square	Plain	SR	63200
		1	4	.030	Plain	SR	62989
		1-5/8	4	Square	Plain	RR	62789
		1-5/8	4	Square	Weldon	RR	30498
		1-5/8	4	.030	Plain	RR	62799
		1-5/8	4	.030	Weldon	RR	30575
1	1	2	4	Square	Plain	RR	62790
		2	4	Square	Weldon	RR	30499
		2	4	.030	Plain	RR	62800
		2	4	.030	Weldon	RR	62801

TiD-eXtra d.o.o. Industrial Technologies

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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
3	3	8	38	Square	Plain	RR	62802
	6	8	57	0,3	Plain	RR	62811
4	4	11	50	Square	Plain	RR	62803
	6	11	57	0,3	Plain	RR	62812
5	5	13	50	Square	Plain	RR	62804
	6	13	57	0,3	Plain	RR	62813
6	6	10	57	Square	Plain	SR	62990
		10	57	0,5	Plain	SR	62996
		13	57	Square	Plain	RR	62805
		13	57	0,5	Plain	RR	62814
		15	100	Square	Plain	RX	63322
		15	100	0,5	Plain	RX	63308
8	8	12	63	Square	Plain	SR	62991
		12	63	0,5	Plain	SR	62997
		19	63	Square	Plain	RR	62806
		19	63	0,5	Plain	RR	62815
		20	100	Square	Plain	RX	63323
		20	100	0,5	Plain	RX	63309

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
10	10	14	72	Square	Plain	SR	62992
		14	72	0,5	Plain	SR	62998
		22	72	Square	Plain	RR	62807
		22	72	0,5	Plain	RR	62816
		25	100	Square	Plain	RX	63324
		25	100	0,5	Plain	RX	63310
12	12	16	83	Square	Plain	SR	62993
		16	83	1,0	Plain	SR	62999
		26	83	Square	Plain	RR	62808
		26	83	1,0	Plain	RR	62817
		30	125	Square	Plain	RM	63325
		30	125	1,0	Plain	RM	63311
16	16	22	92	Square	Plain	SR	62994
		22	92	1,0	Plain	SR	63000
		32	92	Square	Plain	RR	62809
		32	92	1,0	Plain	RR	62818
20	20	26	104	Square	Plain	SR	62995
		26	104	1,0	Plain	SR	63001
		38	104	Square	Plain	RR	62810
		38	104	1,0	Plain	RR	62819

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*

TiD-eXtra d.o.o. Industrial Technologies

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

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6 High Strength Flutes

For improved surface finish

M706N

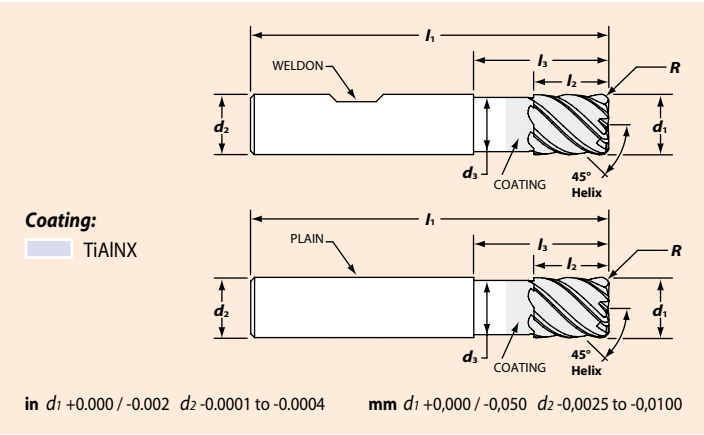
M706N • Radius

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
1/8	1/8	1/4	1-1/2	1/2	.118	Square	Plain	SR	62820
		1/4	1-1/2	1/2	.118	.015	Plain	SR	62901
3/16	3/16	5/16	2	9/16	.176	Square	Plain	SR	62821
		5/16	2	9/16	.176	.015	Plain	SR	62902
1/4	1/4	3/8	2-1/2	1-1/8	.235	Square	Plain	SR	62822
		3/8	2-1/2	1-1/8	.235	Square	Weldon	SR	31079
		3/8	2-1/2	1-1/8	.235	.020	Plain	SR	62903
		3/8	2-1/2	1-1/8	.235	.020	Weldon	SR	31099
		3/8	2-1/2	1-1/8	.235	.030	Plain	SR	62904
		3/8	2-1/2	1-1/8	.235	.030	Weldon	SR	31100
5/16	5/16	7/16	2-1/2	1-1/8	.297	Square	Plain	SR	62823
		7/16	2-1/2	1-1/8	.297	Square	Weldon	SR	31054
		7/16	2-1/2	1-1/8	.297	.020	Plain	SR	62905
		7/16	2-1/2	1-1/8	.297	.020	Weldon	SR	31101
		7/16	2-1/2	1-1/8	.297	.030	Plain	SR	62906
		7/16	2-1/2	1-1/8	.297	.030	Weldon	SR	31102
3/8	3/8	1/2	2-1/2	1-1/8	.355	Square	Plain	SR	62824
		1/2	2-1/2	1-1/8	.355	Square	Weldon	SR	31090
		1/2	2-1/2	1-1/8	.355	.020	Plain	SR	62907
		1/2	2-1/2	1-1/8	.355	.020	Weldon	SR	31103
		1/2	2-1/2	1-1/8	.355	.030	Plain	SR	62908
		1/2	2-1/2	1-1/8	.355	.030	Weldon	SR	31104
		1/2	2-1/2	1-1/8	.355	.060	Plain	SR	62909
		1/2	2-1/2	1-1/8	.355	.060	Weldon	SR	31191
1/2	1/2	5/8	3	1-3/8	.475	Square	Plain	SR	62825
		5/8	3	1-3/8	.475	Square	Weldon	SR	31093
		5/8	3	1-3/8	.475	.020	Plain	SR	62910
		5/8	3	1-3/8	.475	.020	Weldon	SR	31192
		5/8	3	1-3/8	.475	.030	Plain	SR	62911
		5/8	3	1-3/8	.475	.030	Weldon	SR	31193
		5/8	3	1-3/8	.475	.060	Plain	SR	62912
		5/8	3	1-3/8	.475	.060	Weldon	SR	31194

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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	Shank Style	Style Code	TiAlNX EDP Number
5/8	5/8	3/4	3-1/2	1-1/2	.590	Square	Plain	SR	62826
		3/4	3-1/2	1-1/2	.590	Square	Weldon	SR	31058
		3/4	3-1/2	1-1/2	.590	.030	Plain	SR	62913
		3/4	3-1/2	1-1/2	.590	.030	Weldon	SR	31195
3/4	3/4	1	4	1-3/4	.715	Square	Plain	SR	62827
		1	4	1-3/4	.715	Square	Weldon	SR	31095
		1	4	1-3/4	.715	.030	Plain	SR	62914
		1	4	1-3/4	.715	.030	Weldon	SR	31197
		1	4	1-3/4	.715	.060	Plain	SR	62915
		1	4	1-3/4	.715	.060	Weldon	SR	31198
1	1	1-1/8	4	1-7/8	.960	Square	Plain	SR	62828
		1-1/8	4	1-7/8	.960	Square	Weldon	SR	31096
		1-1/8	4	1-7/8	.960	.030	Plain	SR	62916
		1-1/8	4	1-7/8	.960	.030	Weldon	SR	31200
		1-1/8	4	1-7/8	.960	.060	Plain	SR	62917
		1-1/8	4	1-7/8	.960	.060	Weldon	SR	31201

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	TiAlNX EDP Number
3	3	6	38	12	2,8	Square	Plain	SR	62829
		6	38	12	2,8	0,3	Plain	SR	62918
4	4	7	50	13	3,8	Square	Plain	SR	62830
		7	50	13	3,8	0,3	Plain	SR	62919
5	5	8	50	14	4,7	Square	Plain	SR	62831
		8	50	14	4,7	0,3	Plain	SR	62920
6		9	57	20	5,4	Square	Plain	SR	62832
	6	9	57	20	5,4	0,5	Plain	SR	62921
8	8	11	63	26	7,2	Square	Plain	SR	62833
		11	63	26	7,2	0,5	Plain	SR	62922
10	10	13	72	31	9	Square	Plain	SR	62834
		13	72	31	9	0,5	Plain	SR	62923
12	12	15	83	37	10,8	Square	Plain	SR	62835
		15	83	37	10,8	1,0	Plain	SR	62924
16	16	20	92	41	14,4	Square	Plain	SR	62836
		20	92	41	14,4	1,0	Plain	SR	62925
20	20	24	104	47	18	Square	Plain	SR	62837
		24	104	47	18	1,0	Plain	SR	62926

Style Code Reference
SR—Short LOC, Regular OAL

TiD-eXtra
Industrial Technologies
d.o.o.


TiD-eXtra
Industrial Technologies
d.o.o.

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.

TiD-extra d.o.o.

TiD - eXtra
Industrial Technologies d.o.o.

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.

TiD-extra d.o.o.

5 Shear Flutes

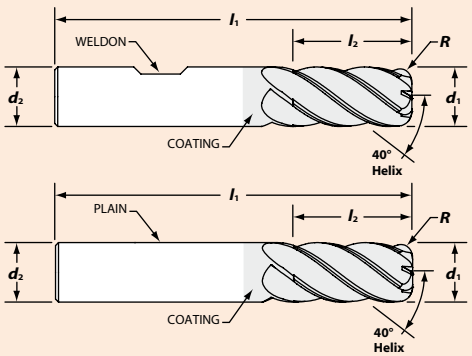
For improved surface finish

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

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
1/8	1/8	1/4	1-1/2	Square	Plain	SR	62960
		1/4	1-1/2	.015	Plain	SR	62968
		1/2	1-1/2	Square	Plain	RR	62880
		1/2	1-1/2	.015	Plain	RR	62870
3/16	3/16	5/16	2	Square	Plain	SR	62961
		5/16	2	.015	Plain	SR	62969
		9/16	2	Square	Plain	RR	62881
		9/16	2	.015	Plain	RR	62871
1/4	1/4	3/8	2	Square	Plain	SS	62962
		3/8	2	.020	Plain	SS	62970
		3/4	2-1/2	Square	Plain	RR	62882
		3/4	2-1/2	.020	Plain	RR	62872
3/8	3/8	1/2	2	Square	Plain	SS	62963
		1/2	2	.030	Plain	SS	62971
		1	2-1/2	Square	Plain	RR	62884
		1	2-1/2	Square	Weldon	RR	62754
		1	2-1/2	.030	Plain	RR	62874
		1	2-1/2	.030	Weldon	RR	62762
1/2	1/2	5/8	2-1/2	Square	Plain	SS	62964
		5/8	2-1/2	.030	Plain	SS	62972
		1-1/4	3	Square	Plain	RR	62886
		1-1/4	3	Square	Weldon	RR	62756
		1-1/4	3	.030	Plain	RR	62876
		1-1/4	3	.030	Weldon	RR	62764
5/8	5/8	3/4	3	Square	Plain	SS	62965
		3/4	3	.030	Plain	SS	62973
		1-5/8	3-1/2	Square	Plain	RR	62887
		1-5/8	3-1/2	Square	Weldon	RR	62757
		1-5/8	3-1/2	.030	Plain	RR	62877
		1-5/8	3-1/2	.030	Weldon	RR	62765
3/4	3/4	1	3	Square	Plain	SS	62966
		1	3	.030	Plain	SS	62974
		1-5/8	4	Square	Plain	RR	62888
		1-5/8	4	Square	Weldon	RR	62758
		1-5/8	4	.030	Plain	RR	62878
		1-5/8	4	.030	Weldon	RR	62766
1	1	2	4	Square	Plain	RR	62889
		2	4	Square	Weldon	RR	62759
		2	4	.030	Plain	RR	62879
		2	4	.030	Weldon	RR	62767

Style Code Reference

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

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

✓ Good ✓✓ Very Good ✓✓✓ Excellent

TiD-eXtra Industrial Technologies d.o.o.

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

TiD-eXtra Industrial Technologies d.o.o.

3 High Shear Flutes

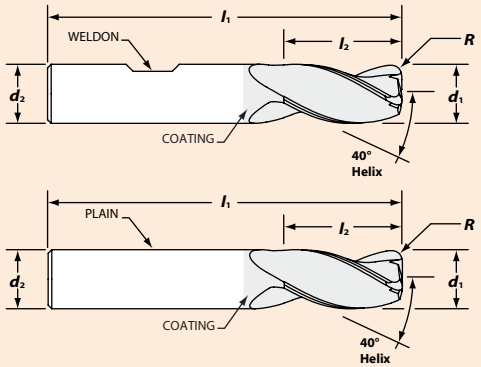
To reduce work hardening

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
1/8	1/8	1/4	1-1/2	.015	Plain	SR	62942
		1/2	1-1/2	Square	Plain	RR	62308
		1/2	1-1/2	.015	Plain	RR	62208
3/16	3/16	5/16	2	.015	Plain	SR	62943
		9/16	2	Square	Plain	RR	62312
		9/16	2	.015	Plain	RR	62212
1/4	1/4	3/8	2	.020	Plain	SS	62944
		3/4	2-1/2	Square	Plain	RR	62316
		3/4	2-1/2	Square	Weldon	RR	62318
		3/4	2-1/2	.020	Plain	RR	62216
		3/4	2-1/2	.020	Weldon	RR	62218
3/8	3/8	1/2	2	.030	Plain	SS	62945
		1	2-1/2	Square	Plain	RR	62324
		1	2-1/2	Square	Weldon	RR	62326
		1	2-1/2	.030	Plain	RR	62224
		1	2-1/2	.030	Weldon	RR	62226
1/2	1/2	5/8	2-1/2	.030	Plain	SS	62946
		1-1/4	3	Square	Plain	RR	62332
		1-1/4	3	Square	Weldon	RR	62334
		1-1/4	3	.030	Plain	RR	62232
		1-1/4	3	.030	Weldon	RR	62234

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
3	3	5	38	0,3	Plain	SR	62950
		8	38	Square	Plain	RR	62550
		8	38	0,3	Plain	RR	62540
4	4	8	50	0,3	Plain	SR	62951
		11	50	Square	Plain	RR	62551
		11	50	0,3	Plain	RR	62541
5	5	9	50	0,3	Plain	SR	62952
		13	50	Square	Plain	RR	62552
		13	50	0,3	Plain	RR	62542
6	6	10	54	0,5	Plain	SS	62953
		13	57	Square	Plain	RR	62553
		13	57	0,5	Plain	RR	62543
8	8	12	58	0,5	Plain	SS	62954
		19	63	Square	Plain	RR	62554
		19	63	0,5	Plain	RR	62544
10	10	14	66	0,5	Plain	SS	62955
		22	72	Square	Plain	RR	62555
		22	72	0,5	Plain	RR	62545
12	12	16	73	1,0	Plain	SS	62956
		26	83	Square	Plain	RR	62556
		26	83	1,0	Plain	RR	62546

Style Code Reference

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

TiD-eXtra d.o.o. Industrial Technologies

3 High Shear Flutes

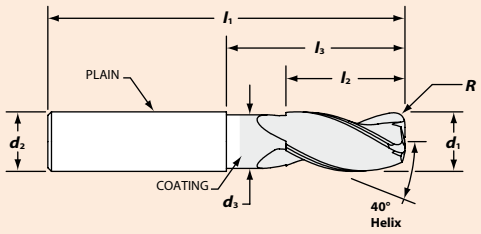
To reduce work hardening

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
1/8	1/8	1/4	1-1/2	1/2	.118	Square	Plain	SR	62108
		1/4	1-1/2	1/2	.118	.015	Plain	SR	62008
3/16	3/16	5/16	2	9/16	.176	Square	Plain	SR	62112
		5/16	2	9/16	.176	.015	Plain	SR	62012
1/4	1/4	3/8	2-1/2	1-1/8	.235	Square	Plain	SR	62116
		3/8	2-1/2	1-1/8	.235	.020	Plain	SR	62016
		3/8	2-1/2	1-1/8	.235	.030	Plain	SR	62028
3/8	3/8	1/2	2-1/2	1-1/8	.355	Square	Plain	SR	62124
		1/2	2-1/2	1-1/8	.355	.020	Plain	SR	62030
		1/2	2-1/2	1-1/8	.355	.030	Plain	SR	62024
1/2	1/2	5/8	3	1-3/8	.475	Square	Plain	SR	62132
		5/8	3	1-3/8	.475	.020	Plain	SR	62044
		5/8	3	1-3/8	.475	.030	Plain	SR	62032

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
3	3	6	38	12	2,8	Square	Plain	SR	62530
		6	38	12	2,8	0,3	Plain	SR	62520
4	4	7	50	13	3,8	Square	Plain	SR	62531
		7	50	13	3,8	0,3	Plain	SR	62521
5	5	8	50	14	4,7	Square	Plain	SR	62532
		8	50	14	4,7	0,3	Plain	SR	62522
6	6	9	57	20	5,4	Square	Plain	SR	62533
		9	57	20	5,4	0,3	Plain	SR	62131
8	8	11	63	26	7,2	Square	Plain	SR	62534
		11	63	26	7,2	0,5	Plain	SR	62524
10	10	13	72	31	9	Square	Plain	SR	62535
		13	72	31	9	0,5	Plain	SR	62525
12	12	15	83	37	10,8	Square	Plain	SR	62536
		15	83	37	10,8	1,0	Plain	SR	62526

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
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
	Rough	1 x D	.5 x D	3	350	.0006	.0013	.0019	.0025	.0032	.0038	.0050
Moderately Difficult Stainless Steels 304, 316, Invar, Kovar	Slot	.5 x D	1 x D	3	250	.0003	.0007	.0011	.0015	.0019	.0023	.0030
	Rough	1 x D	.5 x D	3	300	.0006	.0011	.0017	.0022	.0028	.0035	.0045
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
	Rough	1 x D	.5 x D	3	275	.0003	.0007	.0011	.0015	.0019	.0023	.0030
Low Carbon Steels ≤ 32 HRc 1018, 12L14, 8620	Slot	.5 x D	1 x D	3	325	.0006	.0013	.0021	.0027	.0035	.0042	.0054
	Rough	1 x D	.5 x D	3	375	.0007	.0015	.0023	.0030	.0037	.0045	.0060
Carbon & Tool Steels 33 HRc to 38 HRc	Slot	.5 x D	1 x D	3	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Rough	1 x D	.5 x D	3	325	.0006	.0012	.0018	.0023	.0029	.0035	.0046
Copper, Brass, & Bronze	Slot	.5 x D	1 x D	3	450	.0007	.0015	.0022	.0030	.0037	.0045	.0060
	Rough	1 x D	.5 x D	3	550	.0008	.0018	.0026	.0035	.0044	.0053	.0070
Aluminum, Bronze & Beryllium Copper	Slot	.5 x D	1 x D	3	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Rough	1 x D	.5 x D	3	350	.0006	.0013	.0020	.0025	.0032	.0039	.0050

Speed (m /min)	Feed (mm per Tooth) 3,0	6,0	9,0	12,0	16,0	19,0	25,0
84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
107	.0152	.0330	.0483	.0635	.0813	.0965	.1270
76	.0076	.0178	.0279	.0381	.0483	.0584	.0762
91	.0152	.0279	.0432	.0559	.0711	.0889	.1143
69	.0076	.0152	.0229	.0305	.0381	.0457	.0610
84	.0076	.0178	.0279	.0381	.0483	.0584	.0762
99	.0152	.0330	.0533	.0686	.0889	.1067	.1372
114	.0178	.0381	.0584	.0762	.0940	.1143	.1524
84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
99	.0152	.0305	.0457	.0584	.0737	.0889	.1168
137	.0178	.0381	.0559	.0762	.0940	.1143	.1524
168	.0203	.0457	.0660	.0889	.1118	.1346	.1778
84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
107	.0152	.0330	.0508	.0635	.0813	.0991	.1270

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

TiD-eXtra Industrial Technologies d.o.o.

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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.

Menlo'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
- High silicon aluminum A380, A390
- Die cast aluminum
- Magnesium alloys
- Copper alloys, brass, bronze
- Composites, plastics and fiberglass
- Extruded metal parts
- 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
Aluminum Alloys 2024, 6061, 7075	Slotting	1 x D	1 x D	2	800	.0020	.0040	.0060	.0080	.0100	.0120	.0160
	Rough	1 x D	.75 x D	3	1000	.0020	.0050	.0075	.0100	.0120	.0150	.0200
	Finish	1.5 x D	.01 x D	3	1200	.0030	.0060	.0090	.0120	.0160	.0200	.0250
High Silicon Aluminum A380, A390	Slotting	.5 x D	1 x D	3	400	.0010	.0020	.0030	.0040	.0050	.0060	.0080
	Rough	1 x D	.5 x D	3	600	.0015	.0030	.0045	.0060	.0075	.0090	.0120
	Finish	1.5 x D	.01 x D	3	800	.0018	.0035	.0055	.0070	.0090	.0110	.0140
Magnesium Alloys	Slotting	1 x D	1 x D	2	800	.0020	.0040	.0060	.0080	.0100	.0120	.0160
	Rough	1 x D	.75 x D	3	1000	.0020	.0050	.0075	.0100	.0120	.0150	.0200
	Finish	1.5 x D	.01 x D	3	1200	.0030	.0060	.0090	.0120	.0160	.0200	.0250
Copper Alloys Brass, Bronze	Slotting	.75 x D	1 x D	2	400	.0010	.0020	.0030	.0040	.0050	.0060	.0080
	Rough	1 x D	.75 x D	3	475	.0012	.0025	.0037	.0050	.0063	.0075	.0100
	Finish	1.5 x D	.01 x D	3	550	.0015	.0030	.0045	.0060	.0075	.0090	.0120
Composites Plastics, Fiberglass	Slotting	1 x D	1 x D	3	400	.0010	.0020	.0030	.0040	.0050	.0060	.0080
	Rough	1 x D	.75 x D	3	600	.0015	.0030	.0045	.0060	.0075	.0090	.0120
	Finish	1.5 x D	.01 x D	3	800	.0018	.0035	.0055	.0070	.0090	.0110	.0140

Speed (m /min)	Feed (mm per Tooth) 3,0	6,0	9,0	12,0	16,0	19,0	25,0
244	.0508	.1016	.1524	.2032	.2540	.3048	.4064
305	.0508	.1270	.1905	.2540	.3048	.3810	.5080
366	.0762	.1524	.2286	.3048	.4064	.5080	.6350
122	.0254	.0508	.0762	.1016	.1270	.1524	.2032
183	.0381	.0762	.1143	.1524	.1905	.2286	.3048
244	.0457	.0889	.1397	.1778	.2286	.2794	.3556
244	.0508	.1016	.1524	.2032	.2540	.3048	.4064
305	.0508	.1270	.1905	.2540	.3048	.3810	.5080
366	.0762	.1524	.2286	.3048	.4064	.5080	.6350
122	.0254	.0508	.0762	.1016	.1270	.1524	.2032
145	.0305	.0635	.0940	.1270	.1600	.1905	.2540
168	.0381	.0762	.114 3	.1524	.1905	.2286	.3048
122	.0254	.0508	.0762	.1016	.1270	.1524	.2032
183	.0381	.0762	.1143	.1524	.1905	.2286	.3048
244	.0457	.0889	.1397	.1778	.2286	.2794	.3556

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

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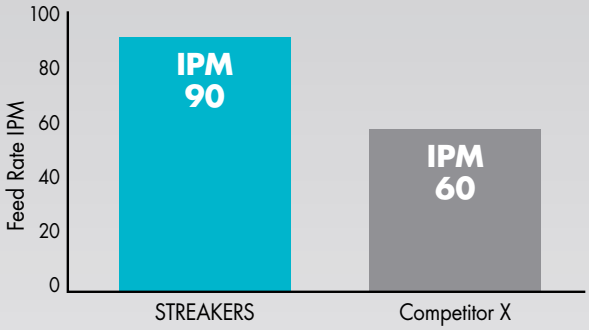
Improved Productivity and Surface Finish



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.

TiD-eXtra
tools


SHORT
K RPM

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.

TiD-extra d.o.o.

3-FLUTE STREAKERS

M203

3 High Shear Flutes

For rapid chip evacuation

M203 • Radius

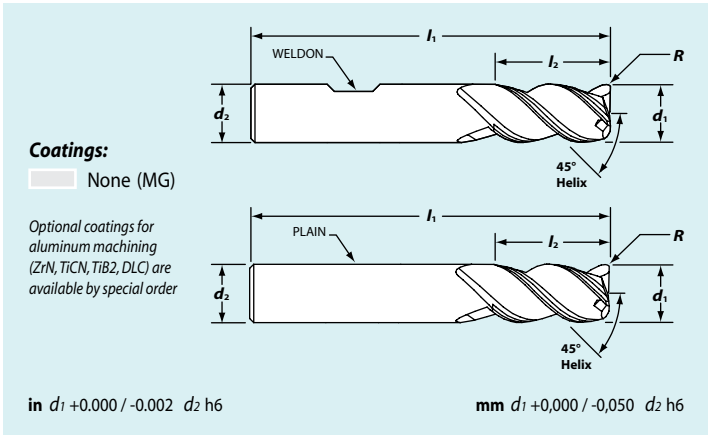
M203 • Square

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



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

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*

TiD-eXtra Industrial Technologies d.o.o.

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
1/8	1/8	1/4	1-1/2	Square	Plain	SR	32520
		3/8	1-1/2	Square	Plain	RR	33246
		3/8	1-1/2	.015	Plain	RR	34384
3/16	3/16	5/16	2	Square	Plain	SR	32521
		9/16	2	Square	Plain	RR	33248
		9/16	2	.015	Plain	RR	34385
1/4	1/4	3/8	2-1/2	Square	Plain	SR	32986
		3/8	2-1/2	.015	Plain	SR	33601
		3/8	2-1/2	.030	Plain	SR	33602
		3/4	2-1/2	Square	Plain	RR	32992
		3/4	2-1/2	Square	Weldon	RR	32634
		3/4	2-1/2	.015	Plain	RR	34386
		3/4	2-1/2	.015	Weldon	RR	34387
		3/4	2-1/2	.030	Plain	RR	34388
		3/4	2-1/2	.030	Weldon	RR	34389
		1-1/4	3	Square	Plain	LL	33009
		1-1/4	3	Square	Weldon	LL	33011
		1-1/4	3	.015	Plain	LL	34435
		1-1/4	3	.015	Weldon	LL	34437
		1-1/4	3	.030	Plain	LL	34438
		1-1/4	3	.030	Weldon	LL	34447
5/16	5/16	7/16	2-1/2	Square	Plain	SR	32987
		13/16	2-1/2	Square	Plain	RR	33250
		13/16	2-1/2	Square	Weldon	RR	32736
		13/16	2-1/2	.015	Plain	RR	34450
		13/16	2-1/2	.015	Weldon	RR	34451
		13/16	2-1/2	.030	Plain	RR	34452
		13/16	2-1/2	.030	Weldon	RR	34453
		13/16	2-1/2	.060	Plain	RR	38258
		13/16	2-1/2	.060	Weldon	RR	38318
		1-3/8	3	Square	Plain	LL	34454
		1-3/8	3	Square	Weldon	LL	34455
		1-3/8	3	.030	Plain	LL	38031
		1-3/8	3	.030	Weldon	LL	38319
		1-3/8	3	.060	Plain	LL	38260
		1-3/8	3	.060	Weldon	LL	38056
3/8	3/8	1/2	2-1/2	Square	Plain	SR	32988
		1/2	2-1/2	.015	Plain	SR	33603
		1/2	2-1/2	.030	Plain	SR	33604
		1/2	2-1/2	.060	Plain	SR	33605
		7/8	2-1/2	Square	Weldon	RR	32635
		7/8	2-1/2	.015	Weldon	RR	34459
		7/8	2-1/2	.030	Weldon	RR	34461
		7/8	2-1/2	.060	Weldon	RR	38320
		1	2-1/2	Square	Plain	RR	32993
		1	2-1/2	.015	Plain	RR	34458
		1	2-1/2	.030	Plain	RR	34460
		1	2-1/2	.060	Plain	RR	38261
		1-1/2	3-1/4	Square	Plain	LL	32998
		1-1/2	3-1/4	Square	Weldon	LL	32702
		1-1/2	3-1/4	.015	Plain	LL	34462
		1-1/2	3-1/4	.015	Weldon	LL	34463

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
3/8	3/8	1-1/2	3-1/4	.030	Plain	LL	90020
		1-1/2	3-1/4	.030	Weldon	LL	91008
		1-1/2	3-1/4	.060	Plain	LL	38262
		1-1/2	3-1/4	.060	Weldon	LL	38321
		2	4	Square	Plain	XX	33003
		2	4	Square	Weldon	XX	32716
		2	4	.015	Plain	XX	90091
		2	4	.015	Weldon	XX	90215
		2	4	.030	Plain	XX	91009
		2	4	.030	Weldon	XX	34490
		2	4	.060	Plain	XX	38263
		2	4	.060	Weldon	XX	38322
1/2	1/2	5/8	3	Square	Plain	SR	32989
		5/8	3	.015	Plain	SR	33606
		5/8	3	.030	Plain	SR	33607
		5/8	3	.060	Plain	SR	33608
		5/8	3	.090	Plain	SR	33609
		5/8	3	.125	Plain	SR	33610
		1-1/4	3	Square	Plain	RR	32994
		1-1/4	3	.015	Plain	RR	34492
		1-1/4	3	.030	Plain	RR	90018
		1-1/4	3	.060	Plain	RR	90019
		1-1/4	3	.090	Plain	RR	38022
		1-1/4	3	.125	Plain	RR	38025
		1-1/4	3-1/4	Square	Weldon	RR	32637
		1-1/4	3-1/4	.015	Weldon	RR	34494
		1-1/4	3-1/4	.030	Weldon	RR	90175
		1-1/4	3-1/4	.060	Weldon	RR	91508
		1-1/4	3-1/4	.090	Weldon	RR	38050
		1-1/4	3-1/4	.125	Weldon	RR	38051
		2	4	Square	Plain	LL	32999
		2	4	Square	Weldon	LL	32703
		2	4	.015	Plain	LL	90021
		2	4	.015	Weldon	LL	90209
		2	4	.030	Plain	LL	90083
		2	4	.030	Weldon	LL	34535
		2	4	.060	Plain	LL	90086
		2	4	.060	Weldon	LL	34538
		2	4	.090	Plain	LL	38032
		2	4	.090	Weldon	LL	38057
		2	4	.125	Plain	LL	38033
		2	4	.125	Weldon	LL	38058
		2-1/2	5	Square	Plain	LX	33004
		2-1/2	5	Square	Weldon	LX	32718
		2-1/2	5	.030	Plain	LX	90102
		2-1/2	5	.030	Weldon	LX	91023
		2-1/2	5	.060	Plain	LX	38038
		2-1/2	5	.060	Weldon	LX	38063
		2-1/2	5	.090	Plain	LX	38039
		2-1/2	5	.090	Weldon	LX	38064
		2-1/2	5	.125	Plain	LX	38040
		2-1/2	5	.125	Weldon	LX	38065

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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
1/2	1/2	3-1/8	6	Square	Plain	XX	33013
		3-1/8	6	Square	Weldon	XX	32830
		3-1/8	6	.030	Plain	XX	91037
		3-1/8	6	.030	Weldon	XX	91047
		3-1/8	6	.060	Plain	XX	38045
		3-1/8	6	.060	Weldon	XX	38070
		3-1/8	6	.090	Plain	XX	38046
		3-1/8	6	.090	Weldon	XX	38071
		3-1/8	6	.125	Plain	XX	38047
		3-1/8	6	.125	Weldon	XX	38072
5/8	5/8	3/4	3-1/2	Square	Plain	SR	32990
		1-1/4	3-1/2	Square	Weldon	RR	32638
		1-1/4	3-1/2	.030	Weldon	RR	91159
		1-1/4	3-1/2	.060	Weldon	RR	38323
		1-1/4	3-1/2	.090	Weldon	RR	38324
		1-1/4	3-1/2	.125	Weldon	RR	38325
		1-5/8	3-1/2	Square	Plain	RR	32995
		1-5/8	3-1/2	.030	Plain	RR	91292
		1-5/8	3-1/2	.060	Plain	RR	38264
		1-5/8	3-1/2	.090	Plain	RR	38265
		1-5/8	3-1/2	.125	Plain	RR	38266
		2-1/2	5	Square	Plain	LL	33006
		2-1/2	5	Square	Weldon	LL	32720
		2-1/2	5	.030	Plain	LL	91200
		2-1/2	5	.030	Weldon	LL	91280
		2-1/2	5	.060	Plain	LL	38267
		2-1/2	5	.060	Weldon	LL	38328
		2-1/2	5	.090	Plain	LL	38268
		2-1/2	5	.090	Weldon	LL	38329
		2-1/2	5	.125	Plain	LL	38269
		2-1/2	5	.125	Weldon	LL	38330
		3-3/4	6	Square	Plain	XX	33015
		3-3/4	6	Square	Weldon	XX	32835
		3-3/4	6	.030	Plain	XX	91282
		3-3/4	6	.030	Weldon	XX	91303
		3-3/4	6	.060	Plain	XX	38270
		3-3/4	6	.060	Weldon	XX	38332
		3-3/4	6	.090	Plain	XX	38271
		3-3/4	6	.090	Weldon	XX	38333
		3-3/4	6	.125	Plain	XX	38272
		3-3/4	6	.125	Weldon	XX	38335
3/4	3/4	1	4	Square	Plain	SR	32991
		1	4	.030	Plain	SR	33611
		1	4	.060	Plain	SR	33612
		1	4	.090	Plain	SR	33613
		1	4	.125	Plain	SR	33614
		1	4	.156	Plain	SR	33615
		1	4	.190	Plain	SR	33616
		1-5/8	4	Square	Plain	RR	32996
		1-5/8	4	Square	Weldon	RR	32639
		1-5/8	4	.030	Plain	RR	91389
		1-5/8	4	.030	Weldon	RR	34554

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
3/4	3/4	1-5/8	4	.060	Plain	RR	91410
		1-5/8	4	.060	Weldon	RR	91423
		1-5/8	4	.090	Plain	RR	38027
		1-5/8	4	.090	Weldon	RR	38052
		1-5/8	4	.125	Plain	RR	38028
		1-5/8	4	.125	Weldon	RR	38053
		1-5/8	4	.156	Plain	RR	38273
		1-5/8	4	.156	Weldon	RR	38336
		1-5/8	4	.190	Plain	RR	38274
		1-5/8	4	.190	Weldon	RR	38337
		2-1/2	5	Square	Plain	LL	33001
		2-1/2	5	Square	Weldon	LL	32704
		2-1/2	5	.030	Plain	LL	91433
		2-1/2	5	.030	Weldon	LL	34559
		2-1/2	5	.060	Plain	LL	38034
		2-1/2	5	.060	Weldon	LL	38059
		2-1/2	5	.090	Plain	LL	38035
		2-1/2	5	.090	Weldon	LL	38060
		2-1/2	5	.125	Plain	LL	38036
		2-1/2	5	.125	Weldon	LL	38061
		2-1/2	5	.156	Plain	LL	38275
		2-1/2	5	.156	Weldon	LL	38338
		2-1/2	5	.190	Plain	LL	38276
		2-1/2	5	.190	Weldon	LL	38340
		3-1/4	6	Square	Plain	XX	33005
		3-1/4	6	Square	Weldon	XX	32724
		3-1/4	6	.030	Plain	XX	34560
		3-1/4	6	.030	Weldon	XX	34561
		3-1/4	6	.060	Plain	XX	38041
		3-1/4	6	.060	Weldon	XX	38066
		3-1/4	6	.090	Plain	XX	38042
		3-1/4	6	.090	Weldon	XX	38067
		3-1/4	6	.125	Plain	XX	38043
		3-1/4	6	.125	Weldon	XX	38068
		3-1/4	6	.156	Plain	XX	38277
		3-1/4	6	.156	Weldon	XX	38341
		3-1/4	6	.190	Plain	XX	38278
		3-1/4	6	.190	Weldon	XX	38345
		4	6-1/2	Square	Plain	EX	33010
		4	6-1/2	Square	Weldon	EX	32728
1	1	1-1/4	4	Square	Plain	SR	33137
		2	4	Square	Plain	RR	32997
		2	4	.030	Plain	RR	34562
		2	4	.060	Plain	RR	34563
		2	4	.090	Plain	RR	38029
		2	4	.125	Plain	RR	38030
		2	4	.156	Plain	RR	38279
		2	4	.190	Plain	RR	38280
		2	4	.250	Plain	RR	38281
		2	4-1/2	Square	Weldon	RR	32701
		2	4-1/2	.030	Weldon	RR	38054
		2	4-1/2	.060	Weldon	RR	38055
		2	4-1/2	.090	Weldon	RR	38376

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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
1	1	2	4-1/2	.125	Weldon	RR	38377
		2	4-1/2	.156	Weldon	RR	38378
		2	4-1/2	.190	Weldon	RR	38379
		2	4-1/2	.250	Weldon	RR	38380
		2-5/8	5	Square	Plain	LL	33002
		2-5/8	5	Square	Weldon	LL	32714
		2-5/8	5	.030	Plain	LL	34568
		2-5/8	5	.030	Weldon	LL	34569
		2-5/8	5	.060	Plain	LL	38037
		2-5/8	5	.060	Weldon	LL	38062
		2-5/8	5	.090	Plain	LL	38282
		2-5/8	5	.090	Weldon	LL	38346
		2-5/8	5	.125	Plain	LL	38283
		2-5/8	5	.125	Weldon	LL	38347
		2-5/8	5	.156	Plain	LL	38284
		2-5/8	5	.156	Weldon	LL	38348
		2-5/8	5	.190	Plain	LL	38285
		2-5/8	5	.190	Weldon	LL	38349
		2-5/8	5	.250	Plain	LL	38286
		2-5/8	5	.250	Weldon	LL	38350
		3-1/4	6	Square	Plain	XX	33008
		3-1/4	6	Square	Weldon	XX	32726
		3-1/4	6	.030	Plain	XX	34584
		3-1/4	6	.030	Weldon	XX	34586
		3-1/4	6	.060	Plain	XX	38044
		3-1/4	6	.060	Weldon	XX	38069
		3-1/4	6	.090	Plain	XX	38287
		3-1/4	6	.090	Weldon	XX	38351
		3-1/4	6	.125	Plain	XX	38288
		3-1/4	6	.125	Weldon	XX	38352
		3-1/4	6	.156	Plain	XX	38289
		3-1/4	6	.156	Weldon	XX	38353
		3-1/4	6	.190	Plain	XX	38290
		3-1/4	6	.190	Weldon	XX	38354
		3-1/4	6	.250	Plain	XX	38291
		3-1/4	6	.250	Weldon	XX	38355
		4-1/8	7	Square	Plain	EE	33012
		4-1/8	7	Square	Weldon	EE	32735
		4-1/8	7	.030	Plain	EE	38048
		4-1/8	7	.030	Weldon	EE	38073
		4-1/8	7	.060	Plain	EE	38049
		4-1/8	7	.060	Weldon	EE	38074
		4-1/8	7	.090	Plain	EE	38292
		4-1/8	7	.090	Weldon	EE	38356
		4-1/8	7	.125	Plain	EE	38293
		4-1/8	7	.125	Weldon	EE	38357
		4-1/8	7	.156	Plain	EE	38294
		4-1/8	7	.156	Weldon	EE	38358
		4-1/8	7	.190	Plain	EE	38295
		4-1/8	7	.190	Weldon	EE	38359
		4-1/8	7	.250	Plain	EE	38296
		4-1/8	7	.250	Weldon	EE	38360

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
3	3	5	38	Square	Plain	SR	32522
		5	38	0,3	Plain	SR	34857
4	4	6	50	Square	Plain	SR	32524
		11	50	Square	Plain	RR	33167
		11	50	0,3	Plain	RR	34858
5	5	6	50	Square	Plain	SR	32525
		13	50	Square	Plain	RR	33169
		13	50	0,3	Plain	RR	34859
6	6	7	54	Square	Plain	SS	32526
		16	57	Square	Plain	RR	33170
		16	57	0,3	Plain	RR	34860
		16	57	0,5	Plain	RR	34862
		29	75	Square	Plain	LL	33185
		29	75	0,3	Plain	LL	34864
		29	75	0,5	Plain	LL	34866
8	8	9	58	Square	Plain	SS	32527
		19	63	Square	Plain	RR	33172
		19	63	0,3	Plain	RR	34868
		19	63	0,5	Plain	RR	34870
		29	75	Square	Plain	LL	33186
		29	75	0,5	Plain	LL	34872
10	10	11	66	Square	Plain	SS	32528
		22	72	Square	Plain	RR	33174
		22	72	0,3	Plain	RR	34874
		22	72	0,5	Plain	RR	34876
10	10	40	88	Square	Plain	LL	34311
		40	88	0,3	Plain	LL	34878
		40	88	0,5	Plain	LL	34880
12	12	12	73	Square	Plain	SS	32529
		26	83	Square	Plain	RR	33175
		26	83	0,5	Plain	RR	34882
		26	83	0,75	Plain	RR	34884
		26	83	1,0	Plain	RR	34886
		50	100	Square	Plain	LL	33188
		50	100	0,5	Plain	LL	34888
		50	100	1,0	Plain	LL	34890
14	14	26	83	Square	Plain	RR	33176
16	16	16	82	Square	Plain	SS	32530
		32	92	Square	Plain	RR	33177
		32	92	0,75	Plain	RR	34892
		32	92	1,0	Plain	RR	34894
		57	125	Square	Plain	LL	33189
		57	125	1,0	Plain	LL	34896
20	20	20	92	Square	Plain	SS	32502
		38	104	Square	Plain	RR	33179
		38	104	0,75	Plain	RR	34898
		38	104	1,0	Plain	RR	34900
		57	125	Square	Plain	LL	33190
		57	125	1,0	Plain	LL	36583

Style Code Reference

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

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3 High Shear Flutes

For rapid chip evacuation

M203N

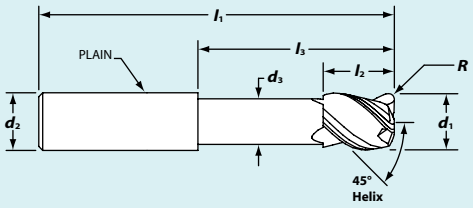
M203N • Radius

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
1/4	1/4	3/8	2-1/2	1-1/8	.235	Square	SR	33034
		3/8	2-1/2	1-1/8	.235	.015	SR	34782
		3/8	2-1/2	1-1/8	.235	.030	SR	34784
		3/8	3	1-5/8	.235	Square	SL	33121
		3/8	3	1-5/8	.235	.015	SL	34786
		3/8	3	1-5/8	.235	.030	SL	34788
		3/8	4	2-1/4	.235	Square	SX	33110
		3/8	4	2-1/4	.235	.015	SX	34790
		3/8	4	2-1/4	.235	.030	SX	34792
3/8	3/8	1/2	2-1/2	1-1/8	.355	Square	SR	33035
		1/2	2-1/2	1-1/8	.355	.015	SR	34794
		1/2	2-1/2	1-1/8	.355	.030	SR	34796
		1/2	2-1/2	1-1/8	.355	.060	SR	38111
		1/2	3	1-3/4	.355	Square	SL	33122
		1/2	3	1-3/4	.355	.015	SL	34797
		1/2	3	1-3/4	.355	.030	SL	34798
		1/2	3	1-3/4	.355	.060	SL	38112
		1/2	4	2-1/4	.355	Square	SX	33112
		1/2	4	2-1/4	.355	.015	SX	34799
		1/2	4	2-1/4	.355	.030	SX	34800
		1/2	4	2-1/4	.355	.060	SX	38113
1/2	1/2	5/8	3	1-3/8	.475	Square	SR	33036
		5/8	3	1-3/8	.475	.015	SR	34801
		5/8	3	1-3/8	.475	.030	SR	34802
		5/8	3	1-3/8	.475	.060	SR	38114
		5/8	3	1-3/8	.475	.090	SR	38115
		5/8	3	1-3/8	.475	.125	SR	38116
		5/8	4	2-1/4	.475	Square	SL	33123
		5/8	4	2-1/4	.475	.015	SL	34803
		5/8	4	2-1/4	.475	.030	SL	34804
		5/8	4	2-1/4	.475	.060	SL	38117
		5/8	4	2-1/4	.475	.090	SL	38118
		5/8	4	2-1/4	.475	.125	SL	38119
		5/8	5	2-3/8	.475	Square	SX	33114
		5/8	5	2-3/8	.475	.015	SX	34805
		5/8	5	2-3/8	.475	.030	SX	34806
		5/8	5	2-3/8	.475	.060	SX	38120
		5/8	5	2-3/8	.475	.090	SX	38121
		5/8	5	2-3/8	.475	.125	SX	38122
		5/8	6	3-3/8	.475	Square	SX	33048
		5/8	6	3-3/8	.475	.015	SX	34826
		5/8	6	3-3/8	.475	.030	SX	34827
		5/8	6	3-3/8	.475	.060	SX	38123
		5/8	6	3-3/8	.475	.090	SX	38124
		5/8	6	3-3/8	.475	.125	SX	38125
5/8	5/8	3/4	3-1/2	1-1/2	.590	Square	SR	33038
		3/4	3-1/2	1-1/2	.590	.030	SR	34828
		3/4	3-1/2	1-1/2	.590	.060	SR	38126
		3/4	3-1/2	1-1/2	.590	.090	SR	38127
		3/4	3-1/2	1-1/2	.590	.125	SR	38128

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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
5/8	5/8	3/4	5	2-1/4	.590	Square	SL	33124
		3/4	5	2-1/4	.590	.030	SL	34829
		3/4	5	2-1/4	.590	.060	SL	38129
		3/4	5	2-1/4	.590	.090	SL	38130
		3/4	5	2-1/4	.590	.125	SL	38131
		3/4	6	3-3/8	.590	Square	SX	33116
		3/4	6	3-3/8	.590	.030	SX	34830
		3/4	6	3-3/8	.590	.060	SX	38132
		3/4	6	3-3/8	.590	.090	SX	38133
		3/4	6	3-3/8	.590	.125	SX	38134
3/4	3/4	1	4	1-3/4	.715	Square	SR	33039
		1	4	1-3/4	.715	.030	SR	34837
		1	4	1-3/4	.715	.060	SR	38135
		1	4	1-3/4	.715	.090	SR	38136
		1	4	1-3/4	.715	.125	SR	38137
		1	4	1-3/4	.715	.156	SR	38138
		1	4	1-3/4	.715	.190	SR	38139
		1	5	2-1/4	.715	Square	SL	33125
		1	5	2-1/4	.715	.030	SL	34838
		1	5	2-1/4	.715	.060	SL	38140
		1	5	2-1/4	.715	.090	SL	38141
		1	5	2-1/4	.715	.125	SL	38142
		1	5	2-1/4	.715	.156	SL	38143
		1	5	2-1/4	.715	.190	SL	38144
		1	6	3-3/8	.715	Square	SX	33118
		1	6	3-3/8	.715	.030	SX	34839
		1	6	3-3/8	.715	.060	SX	38145
		1	6	3-3/8	.715	.090	SX	38146
		1	6	3-3/8	.715	.125	SX	38147
		1	6	3-3/8	.715	.156	SX	38148
		1	6	3-3/8	.715	.190	SX	38149
1	1	1-1/8	4	1-7/8	.960	Square	SR	33040
		1-1/8	4	1-7/8	.960	.030	SR	34840
		1-1/8	4	1-7/8	.960	.060	SR	38150
		1-1/8	4	1-7/8	.960	.090	SR	38151
		1-1/8	4	1-7/8	.960	.125	SR	38152
		1-1/8	4	1-7/8	.960	.156	SR	38153
		1-1/8	4	1-7/8	.960	.190	SR	38154
		1-1/8	4	1-7/8	.960	.250	SR	38155
		1-1/4	5	2-1/4	.960	Square	SL	33126
		1-1/4	5	2-1/4	.960	.030	SL	34847
		1-1/4	5	2-1/4	.960	.060	SL	38156
		1-1/4	5	2-1/4	.960	.090	SL	38157
		1-1/4	5	2-1/4	.960	.125	SL	38158
		1-1/4	5	2-1/4	.960	.156	SL	38159
		1-1/4	5	2-1/4	.960	.190	SL	38160
		1-1/4	5	2-1/4	.960	.250	SL	38161

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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
1	1	1-1/4	6	3-3/8	.960	Square	SX	33120
		1-1/4	6	3-3/8	.960	.030	SX	34848
		1-1/4	6	3-3/8	.960	.060	SX	38162
		1-1/4	6	3-3/8	.960	.090	SX	38163
		1-1/4	6	3-3/8	.960	.125	SX	38164
		1-1/4	6	3-3/8	.960	.156	SX	38165
		1-1/4	6	3-3/8	.960	.190	SX	38166
		1-1/4	6	3-3/8	.960	.250	SX	38167
		1-1/4	7	4-3/8	.960	Square	SE	33049
		1-1/4	7	4-3/8	.960	.030	SE	34849
		1-1/4	7	4-3/8	.960	.060	SE	38168
		1-1/4	7	4-3/8	.960	.090	SE	38169
		1-1/4	7	4-3/8	.960	.125	SE	38170
		1-1/4	7	4-3/8	.960	.156	SE	38171
		1-1/4	7	4-3/8	.960	.190	SE	38172
		1-1/4	7	4-3/8	.960	.250	SE	38173

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
6	6	8	57	20	5,4	Square	SR	33041
		8	57	20	5,4	0,3	SR	37261
		8	75	40	5,4	Square	SL	37262
		8	75	40	5,4	0,3	SL	37264
8	8	10	63	26	7,2	Square	SR	33042
		10	63	26	7,2	0,5	SR	37266
10	10	12	72	31	9	Square	SR	33043
		12	72	31	9	0,5	SR	37268
		12	100	50	9	Square	SX	33128
		12	100	50	9	0,5	SX	37274
12	12	14	83	37	10,8	Square	SR	33044
		14	83	37	10,8	1,0	SR	37276
		14	125	70	10,8	Square	SM	33129
		14	125	70	10,8	1,0	SM	37278
16	16	18	92	41	14,4	Square	SR	33045
		18	92	41	14,4	1,0	SR	37280
		18	150	90	14,4	Square	SX	33131
		18	150	90	14,4	1,0	SX	37281
20	20	24	104	47	18	Square	SR	33046
		24	104	47	18	1,0	SR	37301
		24	150	90	18	Square	SX	37302
		24	150	90	18	1,0	SX	37328

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*

TiD-eXtra Industrial Technology d.o.o.

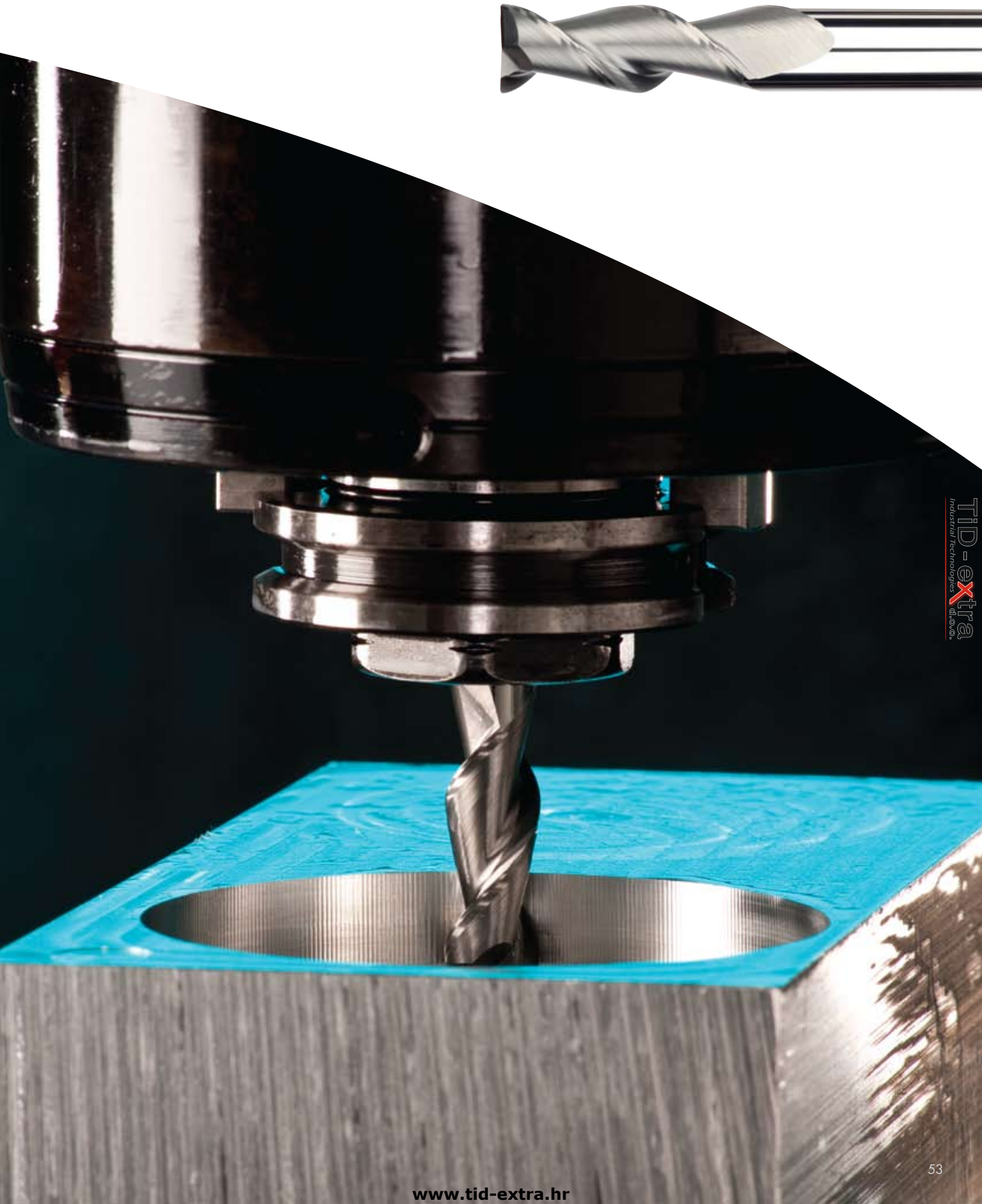
www.tid-extra.hr

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.

TiD-extra d.o.o.



2-FLUTE STREAKERS

M202

2 High Shear Flutes

For maximum metal removal

M202 • Radius

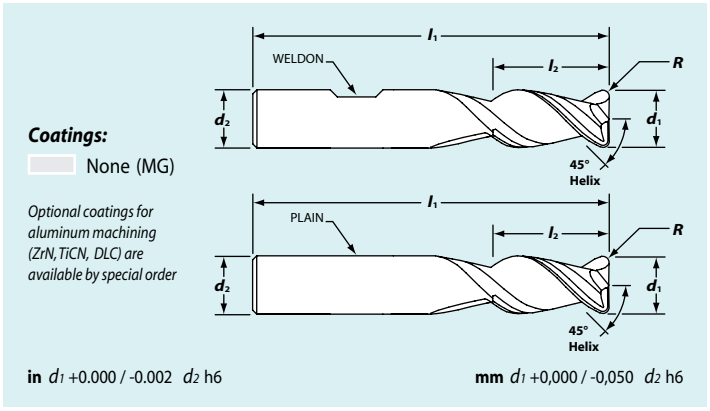
M202 • Square

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

TiD-eXtra Industrial Technologies d.o.o.

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
1/8	1/8	1/4	1-1/2	Square	Plain	SR	32941
		3/8	1-1/2	Square	Plain	RR	32949
		3/8	1-1/2	.015	Plain	RR	90870
		3/8	1-1/2	Ball	Plain	RR	33446
3/16	3/16	5/16	2	Square	Plain	SR	32942
		9/16	2	Square	Plain	RR	32950
		9/16	2	.015	Plain	RR	33542
		9/16	2	Ball	Plain	RR	33448
1/4	1/4	3/8	2-1/2	Square	Plain	SR	32943
		3/4	2-1/2	Square	Plain	RR	32951
		3/4	2-1/2	Square	Weldon	RR	39322
		3/4	2-1/2	.015	Plain	RR	33544
		3/4	2-1/2	.015	Weldon	RR	33546
		3/4	2-1/2	.030	Plain	RR	33548
		3/4	2-1/2	.030	Weldon	RR	33550
		3/4	2-1/2	Ball	Plain	RR	32980
		3/4	2-1/2	Ball	Weldon	RR	32595
		1-1/4	3	Square	Plain	LL	32957
		1-1/4	3	Square	Weldon	LL	39330
		1-1/4	3	.015	Plain	LL	33552
		1-1/4	3	.015	Weldon	LL	33566
		1-1/4	3	.030	Plain	LL	34382
		1-1/4	3	.030	Weldon	LL	34383
5/16	5/16	7/16	2-1/2	Square	Plain	SR	32944
		13/16	2-1/2	Square	Plain	RR	32952
		13/16	2-1/2	Square	Weldon	RR	39323
		13/16	2-1/2	.015	Plain	RR	33629
		13/16	2-1/2	.015	Weldon	RR	33630
		13/16	2-1/2	.030	Plain	RR	34362
		13/16	2-1/2	.030	Weldon	RR	34363
		13/16	2-1/2	.060	Plain	RR	38381
		13/16	2-1/2	.060	Weldon	RR	38382
		13/16	2-1/2	Ball	Plain	RR	32981
		13/16	2-1/2	Ball	Weldon	RR	32596
		1-3/8	3	Square	Plain	LL	32958
		1-3/8	3	Square	Weldon	LL	39331
		1-3/8	3	.030	Plain	LL	38079
		1-3/8	3	.030	Weldon	LL	38098
		1-3/8	3	.060	Plain	LL	38383
		1-3/8	3	.060	Weldon	LL	38384
3/8	3/8	1/2	2-1/2	Square	Plain	SR	32945
		7/8	2-1/2	Square	Weldon	RR	39324
		7/8	2-1/2	.015	Weldon	RR	33649
		7/8	2-1/2	.030	Weldon	RR	90942
		7/8	2-1/2	.060	Weldon	RR	33692
		7/8	2-1/2	Ball	Weldon	RR	32597
		1	2-1/2	Square	Plain	RR	32953
		1	2-1/2	.015	Plain	RR	33648
		1	2-1/2	.030	Plain	RR	90997
		1	2-1/2	.060	Plain	RR	38385
		1	2-1/2	Ball	Plain	RR	32982

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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
3/8	3/8	1-1/2	3-1/4	Square	Plain	LL	32959
		1-1/2	3-1/4	Square	Weldon	LL	39332
		1-1/2	3-1/4	.015	Plain	LL	90943
		1-1/2	3-1/4	.015	Weldon	LL	90983
		1-1/2	3-1/4	.030	Plain	LL	33886
		1-1/2	3-1/4	.030	Weldon	LL	33887
		1-1/2	3-1/4	.060	Plain	LL	38386
		1-1/2	3-1/4	.060	Weldon	LL	38387
		2	4	Square	Plain	XX	32964
		2	4	Square	Weldon	XX	32510
		2	4	.015	Plain	XX	91007
		2	4	.015	Weldon	XX	90984
		2	4	.030	Plain	XX	34144
		2	4	.030	Weldon	XX	34145
		2	4	.060	Plain	XX	38388
		2	4	.060	Weldon	XX	38389
1/2	1/2	5/8	3	Square	Plain	SR	32946
		1	3	Square	Weldon	RR	39329
		1	3	.030	Weldon	RR	34359
		1-1/4	3	Square	Plain	RR	90358
		1-1/4	3	.015	Plain	RR	34146
		1-1/4	3	.030	Plain	RR	34161
		1-1/4	3	.060	Plain	RR	34196
		1-1/4	3	.090	Plain	RR	38075
		1-1/4	3	.125	Plain	RR	38076
		1-1/4	3	Ball	Plain	RR	32983
		1-1/4	3-1/4	Square	Weldon	RR	39325
		1-1/4	3-1/4	.015	Weldon	RR	34147
		1-1/4	3-1/4	.030	Weldon	RR	34162
		1-1/4	3-1/4	.060	Weldon	RR	34197
		1-1/4	3-1/4	.090	Weldon	RR	38092
		1-1/4	3-1/4	Ball	Weldon	RR	32598
		2	4	Square	Plain	LL	32960
		2	4	Square	Weldon	LL	39333
		2	4	.015	Plain	LL	34198
		2	4	.015	Weldon	LL	34199
		2	4	.030	Plain	LL	34204
		2	4	.030	Weldon	LL	34205
		2	4	.060	Plain	LL	34206
		2	4	.060	Weldon	LL	34207
		2	4	.090	Plain	LL	38080
		2	4	.090	Weldon	LL	38099
		2	4	.125	Plain	LL	38081
		2	4	.125	Weldon	LL	38100
		2-1/2	5	Square	Plain	LX	32965
		2-1/2	5	Square	Weldon	LX	32512
		2-1/2	5	.030	Plain	LX	34235
		2-1/2	5	.030	Weldon	LX	34236

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Style Code Reference

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

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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
1/2	1/2	2-1/2	5	.060	Plain	LX	38085
		2-1/2	5	.060	Weldon	LX	38104
		2-1/2	5	.090	Plain	LX	38086
		2-1/2	5	.090	Weldon	LX	38105
		2-1/2	5	.125	Plain	LX	38087
		2-1/2	5	.125	Weldon	LX	38106
		3-1/8	6	Square	Plain	XX	38390
		3-1/8	6	Square	Weldon	XX	38391
		3-1/8	6	.030	Plain	XX	38392
		3-1/8	6	.030	Weldon	XX	38393
		3-1/8	6	.060	Plain	XX	38394
		3-1/8	6	.060	Weldon	XX	38395
		3-1/8	6	.090	Plain	XX	38397
		3-1/8	6	.090	Weldon	XX	38398
		3-1/8	6	.125	Plain	XX	38399
		3-1/8	6	.125	Weldon	XX	38400
5/8	5/8	3/4	3-1/2	Square	Plain	SR	32947
		1-1/4	3-1/2	Square	Weldon	RR	39326
		1-1/4	3-1/2	.030	Weldon	RR	34238
		1-1/4	3-1/2	.060	Weldon	RR	38485
		1-1/4	3-1/2	.090	Weldon	RR	38487
		1-1/4	3-1/2	.125	Weldon	RR	38489
		1-1/4	3-1/2	Ball	Weldon	RR	32599
		1-5/8	3-1/2	Square	Plain	RR	32954
		1-5/8	3-1/2	.030	Plain	RR	34237
		1-5/8	3-1/2	.060	Plain	RR	38490
		1-5/8	3-1/2	.090	Plain	RR	38492
		1-5/8	3-1/2	.125	Plain	RR	38494
		1-5/8	3-1/2	Ball	Plain	RR	32984
		2-1/2	5	Square	Plain	LL	32966
		2-1/2	5	Square	Weldon	LL	32514
		2-1/2	5	.030	Plain	LL	34243
		2-1/2	5	.030	Weldon	LL	34244
		2-1/2	5	.060	Plain	LL	38496
		2-1/2	5	.060	Weldon	LL	38498
		2-1/2	5	.090	Plain	LL	38500
		2-1/2	5	.090	Weldon	LL	38501
		2-1/2	5	.125	Plain	LL	38502
		2-1/2	5	.125	Weldon	LL	38503
		3-3/4	6	Square	Plain	XX	38504
		3-3/4	6	Square	Weldon	XX	38505
		3-3/4	6	.030	Plain	XX	38506
		3-3/4	6	.030	Weldon	XX	38507
		3-3/4	6	.060	Plain	XX	38508
		3-3/4	6	.060	Weldon	XX	38509
		3-3/4	6	.090	Plain	XX	38510
		3-3/4	6	.090	Weldon	XX	38511
		3-3/4	6	.125	Plain	XX	38512
		3-3/4	6	.125	Weldon	XX	38513

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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
3/4	3/4	1	4	Square	Plain	SR	32948
		1-5/8	4	Square	Plain	RR	32955
		1-5/8	4	Square	Weldon	RR	39327
		1-5/8	4	.030	Plain	RR	34245
		1-5/8	4	.030	Weldon	RR	34246
		1-5/8	4	.060	Plain	RR	34262
		1-5/8	4	.060	Weldon	RR	34263
		1-5/8	4	.090	Plain	RR	38077
		1-5/8	4	.090	Weldon	RR	38094
		1-5/8	4	.125	Plain	RR	38078
		1-5/8	4	.125	Weldon	RR	38095
		1-5/8	4	.156	Plain	RR	38514
		1-5/8	4	.156	Weldon	RR	38515
		1-5/8	4	.190	Plain	RR	38516
		1-5/8	4	.190	Weldon	RR	38517
		1-5/8	4	Ball	Plain	RR	32985
		1-5/8	4	Ball	Weldon	RR	32600
		2-1/2	5	Square	Plain	LL	32962
		2-1/2	5	Square	Weldon	LL	39335
		2-1/2	5	.030	Plain	LL	34343
		2-1/2	5	.030	Weldon	LL	34344
		2-1/2	5	.060	Plain	LL	38082
		2-1/2	5	.060	Weldon	LL	38101
		2-1/2	5	.090	Plain	LL	38083
		2-1/2	5	.090	Weldon	LL	38102
		2-1/2	5	.125	Plain	LL	38084
		2-1/2	5	.125	Weldon	LL	38103
		2-1/2	5	.156	Plain	LL	38518
		2-1/2	5	.156	Weldon	LL	38519
		2-1/2	5	.190	Plain	LL	38520
		2-1/2	5	.190	Weldon	LL	38521
		3-1/4	6	Square	Plain	XX	32968
		3-1/4	6	Square	Weldon	XX	32516
		3-1/4	6	.030	Plain	XX	34345
		3-1/4	6	.030	Weldon	XX	34346
		3-1/4	6	.060	Plain	XX	38088
		3-1/4	6	.060	Weldon	XX	38107
		3-1/4	6	.090	Plain	XX	38089
		3-1/4	6	.090	Weldon	XX	38108
		3-1/4	6	.125	Plain	XX	38090
		3-1/4	6	.125	Weldon	XX	38109
		3-1/4	6	.156	Plain	XX	38522
		3-1/4	6	.156	Weldon	XX	38523
		3-1/4	6	.190	Plain	XX	38524
		3-1/4	6	.190	Weldon	XX	38525

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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
		1-1/4	4	Square	Plain	SR	33143
		2	4	Square	Plain	RR	32956
		2	4	.030	Plain	RR	90105
		2	4	.060	Plain	RR	34353
		2	4	.090	Plain	RR	38526
		2	4	.125	Plain	RR	38528
		2	4	.156	Plain	RR	38530
		2	4	.190	Plain	RR	38532
		2	4	.250	Plain	RR	38534
		2	4-1/2	Square	Weldon	RR	39328
		2	4-1/2	.030	Weldon	RR	38096
		2	4-1/2	.060	Weldon	RR	38097
		2	4-1/2	.090	Weldon	RR	38527
		2	4-1/2	.125	Weldon	RR	38529
		2	4-1/2	.156	Weldon	RR	38531
		2	4-1/2	.190	Weldon	RR	38533
		2	4-1/2	.250	Weldon	RR	38535
		2-5/8	5	Square	Plain	LL	32963
		2-5/8	5	Square	Weldon	LL	39336
		2-5/8	5	.030	Plain	LL	34352
		2-5/8	5	.030	Weldon	LL	34354
		2-5/8	5	.060	Plain	LL	34355
		2-5/8	5	.060	Weldon	LL	34356
		2-5/8	5	.090	Plain	LL	38536
1	1	2-5/8	5	.090	Weldon	LL	38537
		2-5/8	5	.125	Plain	LL	38538
		2-5/8	5	.125	Weldon	LL	38539
		2-5/8	5	.156	Plain	LL	38540
		2-5/8	5	.156	Weldon	LL	38541
		2-5/8	5	.190	Plain	LL	38542
		2-5/8	5	.190	Weldon	LL	38543
		2-5/8	5	.250	Plain	LL	38544
		2-5/8	5	.250	Weldon	LL	38545
		3-1/4	6	Square	Plain	XX	32969
		3-1/4	6	Square	Weldon	XX	39341
		3-1/4	6	.030	Plain	XX	34357
		3-1/4	6	.030	Weldon	XX	34358
		3-1/4	6	.060	Plain	XX	38091
		3-1/4	6	.060	Weldon	XX	38110
		3-1/4	6	.090	Plain	XX	38546
		3-1/4	6	.090	Weldon	XX	38547
		3-1/4	6	.125	Plain	XX	38548
		3-1/4	6	.125	Weldon	XX	38549
		3-1/4	6	.156	Plain	XX	38550
		3-1/4	6	.156	Weldon	XX	38551
		3-1/4	6	.190	Plain	XX	38552
		3-1/4	6	.190	Weldon	XX	38553
		3-1/4	6	.250	Plain	XX	38554
		3-1/4	6	.250	Weldon	XX	38555

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
3	3	5	38	Square	Plain	SR	32971
		5	38	0,3	Plain	SR	36973
4	4	6	50	Square	Plain	SR	32972
		11	50	Square	Plain	RR	36974
		11	50	0,3	Plain	RR	36975
5	5	6	50	Square	Plain	SR	32973
		13	50	Square	Plain	RR	36976
		13	50	0,3	Plain	RR	36977
6	6	7	54	Square	Plain	SS	32974
		16	57	Square	Plain	RR	62402
		16	57	0,3	Plain	RR	36978
		16	57	0,5	Plain	RR	36980
		16	57	Ball	Plain	RR	62412
8	8	9	58	Square	Plain	SS	32975
		19	63	Square	Plain	RR	62403
		19	63	0,3	Plain	RR	36982
		19	63	0,5	Plain	RR	36984
		19	63	Ball	Plain	RR	62413
10	10	11	66	Square	Plain	SS	32976
		22	72	Square	Plain	RR	62404
		22	72	0,3	Plain	RR	37043
		22	72	0,5	Plain	RR	91445
		22	72	Ball	Plain	RR	62414
12	12	12	73	Square	Plain	SS	32977
		26	83	Square	Plain	RR	62406
		26	83	0,5	Plain	RR	91453
		26	83	0,75	Plain	RR	91476
		26	83	1,0	Plain	RR	37084
		26	83	Ball	Plain	RR	62416
14	14	26	83	Square	Plain	RR	62407
16	16	16	82	Square	Plain	SS	32978
		32	92	Square	Plain	RR	62408
		32	92	0,75	Plain	RR	37101
		32	92	1,0	Plain	RR	37161
		32	92	Ball	Plain	RR	62418
20	20	20	92	Square	Plain	SS	32979
		38	104	Square	Plain	RR	62410
		38	104	0,75	Plain	RR	37170
		38	104	1,0	Plain	RR	37180
		38	104	Ball	Plain	RR	62420

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*

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2 High Shear Flutes

For maximum metal removal

M202N

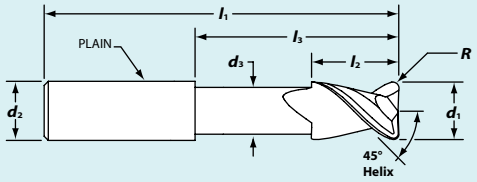
M202N • Radius

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
1/4	1/4	3/8	2-1/2	1-1/8	.235	Square	SR	32935
		3/8	2-1/2	1-1/8	.235	.015	SR	34622
		3/8	2-1/2	1-1/8	.235	.030	SR	34623
		3/8	3	1-5/8	.235	Square	SL	33016
		3/8	3	1-5/8	.235	.015	SL	34626
		3/8	3	1-5/8	.235	.030	SL	34627
		3/8	4	2-1/4	.235	Square	SX	33023
		3/8	4	2-1/4	.235	.015	SX	34631
		3/8	4	2-1/4	.235	.030	SX	34633
3/8	3/8	1/2	2-1/2	1-1/8	.355	Square	SR	32936
		1/2	2-1/2	1-1/8	.355	.015	SR	34634
		1/2	2-1/2	1-1/8	.355	.030	SR	34635
		1/2	2-1/2	1-1/8	.355	.060	SR	38194
		1/2	3	1-3/4	.355	Square	SL	33018
		1/2	3	1-3/4	.355	.015	SL	34637
		1/2	3	1-3/4	.355	.030	SL	34638
		1/2	3	1-3/4	.355	.060	SL	38195
		1/2	4	2-1/4	.355	Square	SX	33024
		1/2	4	2-1/4	.355	.015	SX	34639
		1/2	4	2-1/4	.355	.030	SX	34643
		1/2	4	2-1/4	.355	.060	SX	38196
1/2	1/2	5/8	3	1-3/8	.475	Square	SR	32937
		5/8	3	1-3/8	.475	.015	SR	34644
		5/8	3	1-3/8	.475	.030	SR	34645
		5/8	3	1-3/8	.475	.060	SR	38197
		5/8	3	1-3/8	.475	.090	SR	38198
		5/8	3	1-3/8	.475	.125	SR	38199
		5/8	4	2-1/4	.475	Square	SL	33019
		5/8	4	2-1/4	.475	.015	SL	34646
		5/8	4	2-1/4	.475	.030	SL	34647
		5/8	4	2-1/4	.475	.060	SL	38200
		5/8	4	2-1/4	.475	.090	SL	38201
		5/8	4	2-1/4	.475	.125	SL	38202
		5/8	5	2-3/8	.475	Square	SX	33025
		5/8	5	2-3/8	.475	.015	SX	34649
		5/8	5	2-3/8	.475	.030	SX	34650
		5/8	5	2-3/8	.475	.060	SX	38203
		5/8	5	2-3/8	.475	.090	SX	38204
		5/8	5	2-3/8	.475	.125	SX	38205
		5/8	6	3-3/8	.475	Square	SX	33032
		5/8	6	3-3/8	.475	.015	SX	34651
		5/8	6	3-3/8	.475	.030	SX	34652
		5/8	6	3-3/8	.475	.060	SX	38206
		5/8	6	3-3/8	.475	.090	SX	38207
		5/8	6	3-3/8	.475	.125	SX	38208
5/8	5/8	3/4	3-1/2	1-1/2	.590	Square	SR	32938
		3/4	3-1/2	1-1/2	.590	.030	SR	34653
		3/4	3-1/2	1-1/2	.590	.060	SR	38209
		3/4	3-1/2	1-1/2	.590	.090	SR	38210
		3/4	3-1/2	1-1/2	.590	.125	SR	38211

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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
5/8	5/8	3/4	5	2-1/4	.590	Square	SL	33020
		3/4	5	2-1/4	.590	.030	SL	34654
		3/4	5	2-1/4	.590	.060	SL	38212
		3/4	5	2-1/4	.590	.090	SL	38213
		3/4	5	2-1/4	.590	.125	SL	38214
		3/4	6	3-3/8	.590	Square	SX	33026
		3/4	6	3-3/8	.590	.030	SX	34655
		3/4	6	3-3/8	.590	.060	SX	38215
		3/4	6	3-3/8	.590	.090	SX	38216
		3/4	6	3-3/8	.590	.125	SX	38217
3/4	3/4	1	4	1-3/4	.715	Square	SR	32939
		1	4	1-3/4	.715	.030	SR	34657
		1	4	1-3/4	.715	.060	SR	38218
		1	4	1-3/4	.715	.090	SR	38219
		1	4	1-3/4	.715	.125	SR	38220
		1	4	1-3/4	.715	.156	SR	38221
		1	4	1-3/4	.715	.190	SR	38222
		1	5	2-1/4	.715	Square	SL	33021
		1	5	2-1/4	.715	.030	SL	34658
		1	5	2-1/4	.715	.060	SL	38223
		1	5	2-1/4	.715	.090	SL	38224
		1	5	2-1/4	.715	.125	SL	38225
		1	5	2-1/4	.715	.156	SL	38226
		1	5	2-1/4	.715	.190	SL	38227
		1	6	3-3/8	.715	Square	SX	33027
		1	6	3-3/8	.715	.030	SX	34659
		1	6	3-3/8	.715	.060	SX	38228
		1	6	3-3/8	.715	.090	SX	38229
		1	6	3-3/8	.715	.125	SX	38230
		1	6	3-3/8	.715	.156	SX	38231
		1	6	3-3/8	.715	.190	SX	38232
1	1	1-1/8	4	1-7/8	.960	Square	SR	32940
		1-1/8	4	1-7/8	.960	.030	SR	34660
		1-1/8	4	1-7/8	.960	.060	SR	38233
		1-1/8	4	1-7/8	.960	.090	SR	38234
		1-1/8	4	1-7/8	.960	.125	SR	38235
		1-1/8	4	1-7/8	.960	.156	SR	38236
		1-1/8	4	1-7/8	.960	.190	SR	38237
		1-1/8	4	1-7/8	.960	.250	SR	38238
		1-1/4	5	2-1/4	.960	Square	SL	33022
		1-1/4	5	2-1/4	.960	.030	SL	34661
		1-1/4	5	2-1/4	.960	.060	SL	38239
		1-1/4	5	2-1/4	.960	.090	SL	38240
		1-1/4	5	2-1/4	.960	.125	SL	38241
		1-1/4	5	2-1/4	.960	.156	SL	38242
		1-1/4	5	2-1/4	.960	.190	SL	38243
		1-1/4	5	2-1/4	.960	.250	SL	38245

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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
1	1	1-1/4	6	3-3/8	.960	Square	SX	33028
		1-1/4	6	3-3/8	.960	.030	SX	34662
		1-1/4	6	3-3/8	.960	.060	SX	38246
		1-1/4	6	3-3/8	.960	.090	SX	38247
		1-1/4	6	3-3/8	.960	.125	SX	38248
		1-1/4	6	3-3/8	.960	.156	SX	38249
		1-1/4	6	3-3/8	.960	.190	SX	38250
		1-1/4	6	3-3/8	.960	.250	SX	38251
		1-1/4	7	4-3/8	.960	Square	SE	33033
		1-1/4	7	4-3/8	.960	.030	SE	34663
		1-1/4	7	4-3/8	.960	.060	SE	38252
		1-1/4	7	4-3/8	.960	.090	SE	38253
		1-1/4	7	4-3/8	.960	.125	SE	38254
		1-1/4	7	4-3/8	.960	.156	SE	38255
		1-1/4	7	4-3/8	.960	.190	SE	38256
		1-1/4	7	4-3/8	.960	.250	SE	38257

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
6	6	8	57	20	5,4	Square	SR	32402
		8	57	20	5,4	0,3	SR	37200
		8	75	40	5,4	Square	SL	37201
		8	75	40	5,4	0,3	SL	37202
8	8	10	63	26	7,2	Square	SR	32404
		10	63	26	7,2	0,5	SR	37212
10	10	12	72	31	9	Square	SR	32406
		12	72	31	9	0,5	SR	37214
		12	100	50	9	Square	SX	33029
		12	100	50	9	0,5	SX	37216
12	12	14	83	37	10,8	Square	SR	32408
		14	83	37	10,8	1,0	SR	37218
		14	125	70	10,8	Square	SM	33030
		14	125	70	10,8	1,0	SM	37220
16	16	18	92	41	14,4	Square	SR	32410
		18	92	41	14,4	1,0	SR	37222
		18	150	90	14,4	Square	SX	33031
		18	150	90	14,4	1,0	SX	37224
20	20	24	104	47	18	Square	SR	32412
		24	104	47	18	1,0	SR	37226
		24	150	90	18	Square	SX	37228
		24	150	90	18	1,0	SX	37230

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*

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PROFILE

Sam Turner

Menlo 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."

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

TiD-eXtra d.o.o. Industrial Technology

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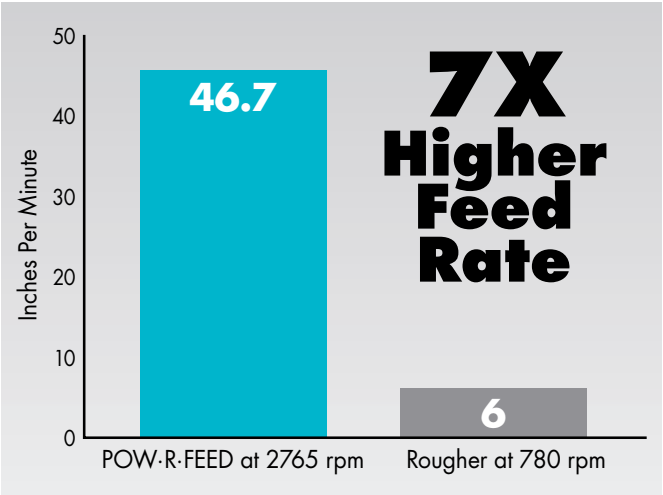
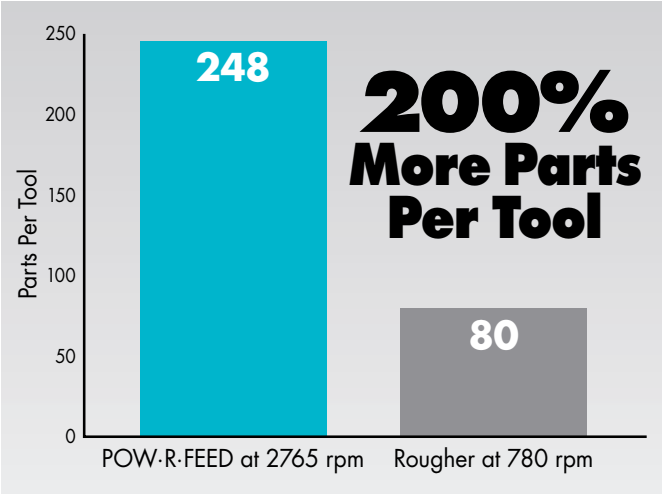
One of Sam Turner's customers, like most other job shops, was eager to cut tool costs and cycle times. They tested an Menlo 5-flute POW·R·FEED® with advanced AlTiNX coating against a 4-flute rougher for peripheral milling in 4340 tool steel, taking a .380 max. radial cut at a .210 max. depth of cut. 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.

TiD-eXtra Industrial Technologies d.o.o.

TiD-eXtra
Industrial Technologies d.o.o.

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.

Menlo 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 Menlo 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

TiD-eXtra Industrial Technologies d.o.o.

4 Serrated Flutes

With chipbreaking geometry

M104

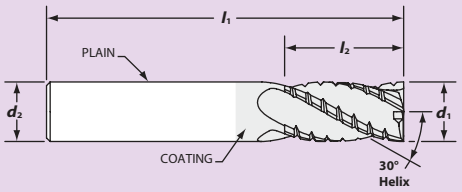
Carbon & tool steels ≤ 48 HRC	✓✓✓
Cast irons	✓✓✓

✓ 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
6	6	13	57	RR	62464
		29	75	LL	34280
8	8	19	63	RR	62465
		29	75	LL	34281
10	10	22	72	RR	62466
		40	88	LL	90109
12	12	26	83	RR	62467
		50	100	LL	34283
16	16	32	92	RR	62468
		57	125	LL	34284
20	20	38	104	RR	62469
		57	125	LL	34285

Inch

d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Style Code	AlTiN EDP Number	TiCN EDP Number	MG EDP Number
1/8	1/8	1/4	1-1/2	SR	91780	33076	33060
		1/2	1-1/2	RR	33149	33130	33145
3/16	3/16	3/8	2	SR	33296	33077	33061
		5/8	2	RR	30462	33132	31427
1/4	1/4	1/2	2	SS	91779	33078	33062
		3/4	2-1/2	RR	98991	33134	31428
		1-1/8	3	LL	33299	33051	33085
5/16	5/16	1/2	2	SS	33163	33079	
		13/16	2-1/2	RR	33151	33136	31430
		1-1/8	3	LL	33101	33052	
3/8	3/8	5/8	2	SS	33103	33080	33064
		1	2-1/2	RR	33153	33138	33152
		1-1/8	3	LL	33300	33053	33087
1/2	1/2	5/8	2-1/2	SS	33181	33081	
		1	3	RR	98961	33140	33154
		2	4	LL	30434	33054	
5/8	5/8	1-1/4	3-1/2	RR	33157	33142	33156
		2-1/4	5	LL	97343	33055	
3/4	3/4	1	3	SS	33297	33083	
		1-1/2	4	RR	33159	33144	33158
		2-1/4	5	LL	33301	33056	
1	1	1-1/2	4	RR	33161	33146	
		2-1/4	5	LL	33302	90801	

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
Low Carbon Steels ≤ 38 HRc 1018, 12L14, 8620	Slot	1 x D	1 x D	4	350	.0006	.0012	.0018	.0025	.0031	.0037	.0050
	Rough	1 x D	.5 x D	4	425	.0007	.0015	.0022	.0030	.0037	.0045	.0060
Medium Carbon Steels ≤ 38 HRc 4140, 4340	Slot	.75 x D	1 x D	4	275	.0006	.0012	.0019	.0025	.0032	.0039	.0050
	Rough	1 x D	.5 x D	4	350	.0007	.0015	.0022	.0030	.0038	.0045	.0060
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
	Rough	1 x D	.5 x D	4	350	.0007	.0015	.0022	.0030	.0038	.0045	.0060
Cast Iron - Gray	Slot	1 x D	1 x D	4	350	.0006	.0012	.0018	.0023	.0029	.0035	.0046
	Rough	1 x D	.5 x D	4	450	.0007	.0014	.0021	.0028	.0035	.0042	.0056
Cast Iron - Ductile	Slot	.75 x D	1 x D	4	275	.0005	.0010	.0015	.0020	.0025	.0030	.0040
	Rough	1 x D	.5 x D	4	375	.0006	.0012	.0018	.0025	.0031	.0038	.0050
Cast Iron - Malleable	Slot	.5 x D	1 x D	4	225	.0003	.0006	.0009	.0012	.0015	.0018	.0024
	Rough	1 x D	.5 x D	4	300	.0005	.0010	.0015	.0020	.0025	.0030	.0040

Speed (m/min)	Feed (mm Per Tooth) 3,0	6,0	9,0	12,0	16,0	19,0	25,0
107	.0152	.0305	.0457	.0635	.0787	.0940	.1270
130	.0178	.0381	.0559	.0762	.0940	.1143	.1524
84	.0152	.0305	.0483	.0635	.0813	.0991	.1270
107	.0178	.0381	.0559	.0762	.0965	.1143	.1524
84	.0152	.0305	.0483	.0635	.0813	.0991	.1270
107	.0178	.0381	.0559	.0762	.0965	.1143	.1524
107	.0152	.0305	.0457	.0584	.0737	.0889	.1168
137	.0178	.0356	.0533	.0711	.0889	.1067	.1422
84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
114	.0152	.0305	.0457	.0635	.0787	.0965	.1270
69	.0076	.0152	.0229	.0305	.0381	.0457	.0610
91	.0127	.0254	.0381	.0508	.0635	.0762	.1016

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

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2 Helical Flutes

To reduce work hardening

E520B

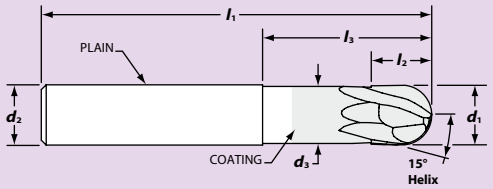
E520B • Ball

- 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
1/8	1/4	1/8	3	3/8	.118	SL	34288
3/16	1/4	3/16	3	9/16	.176	SL	34289
1/4	1/4	1/4	3	1-5/8	.235	SL	34290
3/8	3/8	3/8	4	2-1/4	.355	SX	34292
1/2	1/2	1/2	4	2-1/4	.475	SL	34293

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
3	6	3	75	9	2,8	SL	34295
4	6	4	75	12	3,8	SL	34296
6	6	6	75	40	5,4	SL	34298
10	10	10	100	55	9	SX	34300
12	12	12	100	55	10,8	SL	34301

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

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2 Helical Flutes

For contouring of hardened materials

E62B

E62B • Ball

4 Helical Flutes

For contouring of hardened materials

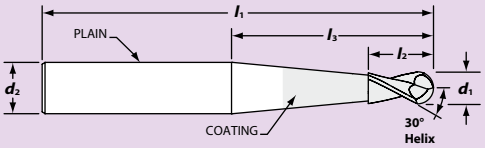
E64B

E64B • Ball

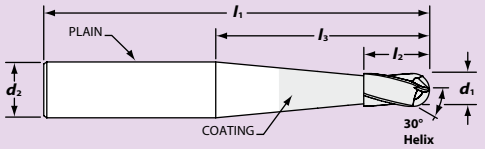
- Ball end with extended length
- Designed for hardened materials
- Superior **AlTiN** coating

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
3/32	3/16	3/16	2-1/2	1-3/4	SL	33271	33259
1/8	3/16	1/4	2-1/2	1-3/4	SL	33272	33260
3/16	1/4	5/16	3	2-1/8	SL	33273	33261
1/4	3/8	3/8	4	2-1/2	SX	33274	33262
		3/8	6	2-1/2	SE	33290	33266
5/16	3/8	1/2	4	2-1/2	SX	33275	33263
3/8	3/8	5/8	4	2-1/2	SX	33276	33264
		5/8	6	2-1/2	SE	33292	33268
1/2	1/2	13/16	4	2-1/2	SL	33277	33265
		13/16	6	2-1/2	SX	33293	33269

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
2	4	5	63	45	SL	02964	20932
3	4	6	63	45	SL	02965	20933
4	6	8	75	54	SL	02966	20934
6	10	9	100	60	SX	02967	20935
		9	150	69	SE	02985	20939
8	10	12	100	60	SX	02968	20936
		12	150	72	SE	02886	20940
10	10	16	100	60	SX	02969	20937
		16	150	76	SE	02887	20941
12	12	20	100	60	SL	02970	20938
		20	150	80	SX	02888	20942

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

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2 Straight Flutes

For precision slotting & contouring

E42 • E42B

E42 • Square

E42B • Ball

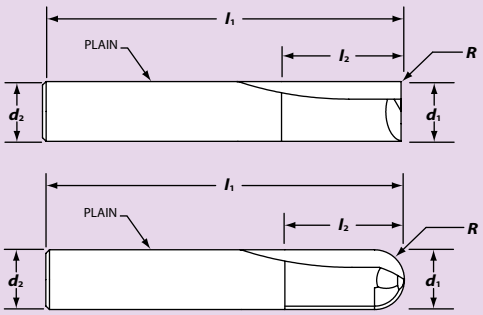
Carbon & tool steels ≤ 48 HRC	✓
Carbon & tool steels > 48 HRC	✓
Cast irons	✓

✓ 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
1/8	1/8	1/2	1-1/2	Square	RR	27101
		1/2	1-1/2	Ball	RR	27130
1/4	1/4	3/4	2-1/2	Square	RR	27103
		3/4	2-1/2	Ball	RR	27132
3/8	3/8	1	2-1/2	Square	RR	27106
		1	2-1/2	Ball	RR	27135
1/2	1/2	1	3	Square	RR	27108
		1	3	Ball	RR	27137

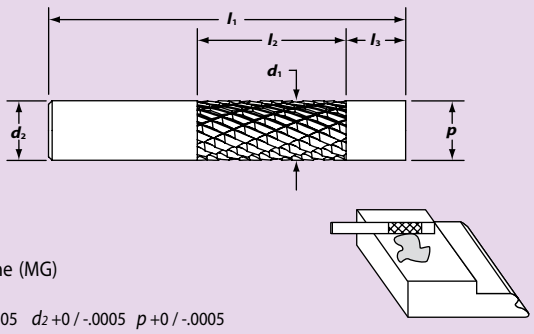
Style Code Reference
RR—Regular LOC, Regular OAL

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
1/8	1/8	1/8	1	1/2	2-1/2	05634
3/16	3/16	3/16	1	1/2	2-1/2	05647
1/4	1/4	1/4	1	1/2	2-1/2	05630
3/8	3/8	3/8	1	1/2	2-1/2	05643
1/2	1/2	1/2	1	1/2	2-1/2	05640

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6 Helical Flutes

For finishing operations

E16

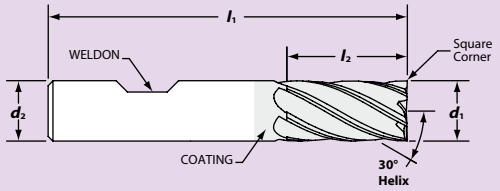
E16 • Square

- 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
1/4	1/4	3/4	2-1/2	Plain	RR	37602
3/8	3/8	1	2-1/2	Plain	RR	37604
1/2	1/2	1	3	Plain	RR	37605
3/4	3/4	1-1/2	4	Plain	RR	90122
1	1	1-1/2	4	Plain	RR	90155
1-1/4	1-1/4	2	4-1/2	Weldon	RR	34088
1-3/8	1-1/4	2	4-1/2	Weldon	RR	34089
1-1/2	1-1/4	2	4-1/2	Weldon	RR	34090

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
6	6	19	63	Plain	RR	62433
10	10	25	72	Plain	RR	62435
12	12	25	76	Plain	RR	62436
16	16	32	89	Plain	RR	62438
20	20	38	100	Plain	RR	62440

Style Code Reference
RR—Regular LOC, Regular OAL

4 LHS/RHC Flutes

For profiling with downward pressure on machined part

E34

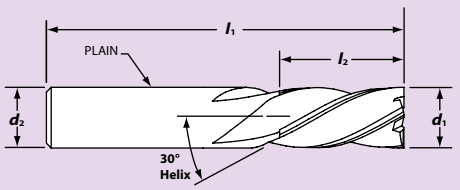
E34 • Square

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
1/8	1/8	1/2	1-1/2	Plain	RR	30208
1/4	1/4	3/4	2-1/2	Plain	RR	30220
3/8	3/8	7/8	2-1/2	Plain	RR	30232
1/2	1/2	1	3	Plain	RR	30244
5/8	5/8	1-1/4	3-1/2	Plain	RR	30250
3/4	3/4	1-1/2	4	Plain	RR	30256

Style Code Reference
RR—Regular LOC, Regular OAL

TiD-eXtra Industrial Technologies d.o.o.

2 Straight Flutes

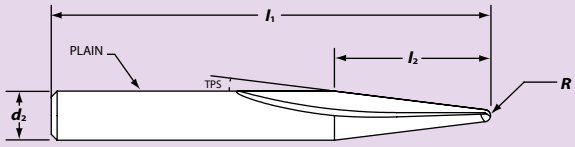
For die & mold machining

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
7°	1/32	1/8	1/4	1-1/2	30201
	3/64	3/16	3/8	2	30202
	1/16	1/4	1/2	2-1/2	30203
	3/32	3/8	3/4	2-1/2	30204
	1/8	1/2	1	3	30205

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
3°	1/64	1/8	29/32	1-1/2	02911
	1/32	1/8	19/32	1-1/2	02912
		3/16	1	2	02913
		1/4	1	2-1/2	02915
	1/16	1/4	1	2-1/2	02916
5°	1/64	1/8	35/64	1-1/2	02931
	1/32	1/8	23/64	1-1/2	02932
		3/16	23/32	2	02933
		1/4	1	2-1/2	02935
	1/16	1/4	23/32	2-1/2	02936
7°	1/64	1/8	25/64	1-1/2	02951
	1/32	1/8	1/4	1-1/2	02952
		3/16	1/2	2	02953
		1/4	49/64	2-1/2	02955
	1/16	1/4	1/2	2-1/2	02956
10°	1/64	1/8	17/64	1-1/2	02971
	1/32	1/8	11/64	1-1/2	02972
		3/16	23/64	2	02973
		1/4	17/32	2-1/2	02975
	1/16	1/4	23/64	2-1/2	02976

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3 Constant Helix Flutes

For die & mold machining

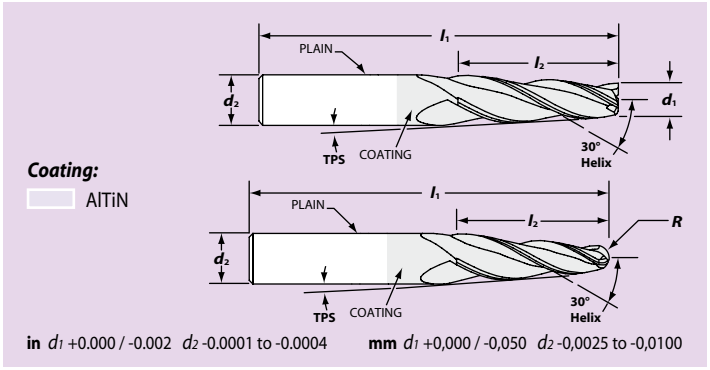
E53 • E53B

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
0,5°	4	20	63	Square	3	37670
	5	20	63	Square	4	37671
	6	30	75	Square	5	37672
	8	30	75	Square	6	37673
	10	30	75	Square	8	37674
1°	4	20	63	Square	3	37675
	5	20	63	Square	4	37676
	6	25	75	Square	5	37677
	8	30	75	Square	6	37678
	10	30	75	Square	8	37679
2°	5	20	63	Square	3	37685
	6	20	63	Square	4	37686
	8	30	75	Square	5	37687
	8	30	75	Square	6	37688
	10	28	75	Square	8	37689
3°	6	25	63	Square	3	37690
	8	30	75	Square	4	37692
	8	40	75	Square	3	37691
	10	30	75	Square	6	37694
	10	40	75	Square	5	37693
5°	8	30	75	Square	3	37695
	10	30	75	Square	4	37698
	10	40	100	Square	3	37697

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
1°	1/4	1-1/2	3	Square	1/8	39050
		1-1/2	3	Ball	1/16 R	30428
	3/8	1-3/4	3-1/2	Square	3/16	39046
		1-3/4	3-1/2	Ball	3/32 R	39185
	1/2	2	4	Square	1/4	39047
		2	4	Ball	1/8 R	39186
1.5°	1/4	1-1/2	3	Square	1/8	39049
		1-1/2	3	Ball	1/16 R	39187
	3/8	1-3/4	3-1/2	Square	3/16	39045
		1-3/4	3-1/2	Ball	3/32 R	39188
2°	1/4	1-1/4	3	Square	1/8	39069
		1-1/4	3	Ball	1/16 R	39051
	3/8	1-3/4	3-1/2	Square	3/16	39048
		1-3/4	3-1/2	Ball	3/32 R	39189
	1/2	2	4	Square	1/4	39161
		2	4	Ball	1/8 R	39190
3°	1/4	1	3	Square	1/8	39070
		1	3	Ball	1/16 R	39052
	3/8	1-3/4	3-1/2	Square	5/32	39162
		1-3/4	3-1/2	Ball	5/64 R	39191
	1/2	2	4	Square	1/4	39163
		2	4	Ball	1/8 R	39055
5	1/4	3/4	3	Square	1/8	39127
		3/4	3	Ball	1/16 R	39106
	3/8	1-1/2	3-1/2	Square	1/8	39023
		1-1/2	3-1/2	Ball	1/16 R	39081
	1/2	1-1/4	4	Square	1/4	39054
		1-1/4	4	Ball	1/8 R	30690
7°	1/4	1/2	3	Square	1/8	39179
		1/2	3	Ball	1/16 R	39192
	3/8	1	3-1/2	Square	1/8	39180
		1	3-1/2	Ball	1/16 R	39193
	1/2	1-1/4	4	Square	3/16	39181
		1-1/4	4	Ball	3/32 R	30558
10°	1/4	1/2	3	Square	3/32	39182
		1/2	3	Ball	3/64 R	39194
	3/8	3/4	3-1/2	Square	1/8	39183
		3/4	3-1/2	Ball	1/16 R	39195
	1/2	1	4	Square	1/8	39184
		1	4	Ball	1/16 R	39196

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Which Coating to Use?

Photo courtesy of Oerlikon Balzers

Menlo'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.

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Photo courtesy of Oerlikon Balzers

GENERAL PURPOSE END MILLS

Menlo 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 Menlo 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

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

With Menlo.

Your Menlo 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.

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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

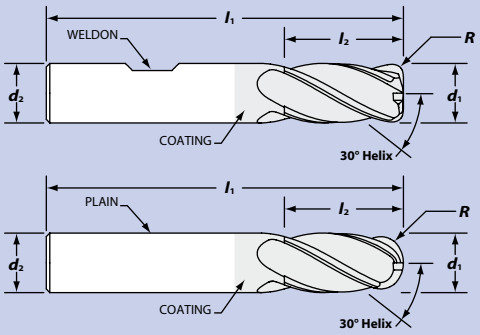
E14B • Ball

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
AlTiN	30522
TiCN	33659
MG	33651

E14B Sets

Style	EDP Number
AlTiN	39427
TiCN	33662
MG	33661

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

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E14

Inch sizes

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

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 TiCN EDP Number	Standard MG EDP Number	Obsolete* TiN EDP Number
1/64	1/8	1/32	1-1/2	Square	Plain	SR	90661		90659	
		3/64	1-1/2	Square	Plain	RR	90662		90660	
1/32	1/8	1/16	1-1/2	Square	Plain	SR	30891		34698	
		1/16	1-1/2	Ball	Plain	SR	31774		31699	
		3/32	1-1/2	Square	Plain	RR	99345	34402	02121	
		3/32	1-1/2	Ball	Plain	RR	30559	34501	02201	
		1/8	1-1/2	Square	Plain	LR	90693		90692	
3/64	1/8	3/32	1-1/2	Square	Plain	SR	30892	30894	34701	
		3/32	1-1/2	Ball	Plain	SR	31775		31701	
		9/64	1-1/2	Square	Plain	RR	36600	34403	02122	
		9/64	1-1/2	Ball	Plain	RR	30539		02202	
1/16	1/8	1/8	1-1/2	Square	Plain	SR	30529	31530	02123	
		1/8	1-1/2	Ball	Plain	SR	31776		02203	
		3/16	1-1/2	Square	Plain	RR	30800	34404	02451	30706
		3/16	1-1/2	Ball	Plain	RR	97852	34504	02571	30906
		1/4	1-1/2	Square	Plain	LR	90695		90694	
5/64	1/8	1/4	1-1/2	Square	Plain	RR	30506	34405	02452	
		1/4	1-1/2	Ball	Plain	RR	30482		02572	
3/32	1/8	3/16	1-1/2	Square	Plain	SR	31545	31531	02124	
		3/16	1-1/2	Ball	Plain	SR	31700		02204	
		3/8	1-1/2	Square	Plain	RR	30530	34406	02453	30710
		3/8	1-1/2	Ball	Plain	RR	30992	34506	02573	
7/64	1/8	3/8	1-1/2	Square	Plain	RR	30458	34407	02454	
		3/8	1-1/2	Ball	Plain	RR	36604		02574	
1/8	1/8	1/4	1-1/2	Square	Plain	SR	97871	31532	02125	
		1/4	1-1/2	Ball	Plain	SR	31747		02205	
		1/2	1-1/2	Square	Plain	RR	30521	34408	02455	30714
		1/2	1-1/2	.015	Plain	RR	97662	39626	39545	
		1/2	1-1/2	.020	Plain	RR	90523	39627	39546	
		1/2	1-1/2	Ball	Plain	RR	30997	34508	02575	30914
		5/8	2	Square	Plain	LL	62107		62105	
		5/8	2	Ball	Plain	LL	37897		37892	
		3/4	2-1/4	Square	Plain	LL	37792	37710	03401	
		3/4	2-1/4	Ball	Plain	LL	37911	37910	03441	
		1	3	Square	Plain	XX	97847	34110	03601	
		1	3	Ball	Plain	XX	97842	34310	03641	
9/64	3/16	9/16	2	Square	Plain	RR	30500	34409	30715	
		9/16	2	Ball	Plain	RR	31050		30915	
5/32	3/16	5/16	2	Square	Plain	SR	39757	31533	02126	
		5/16	2	Ball	Plain	SR	30465		02206	
		9/16	2	Square	Plain	RR	30501	34410	02456	
		9/16	2	Ball	Plain	RR	30468	34541	02576	
11/64	3/16	5/8	2	Square	Plain	RR	30507	34411	30719	
3/16	3/16	3/8	2	Square	Plain	SR	31548	31534	02127	
		3/8	2	Ball	Plain	SR	31746		02207	
		5/8	2	Square	Plain	RR	30520	34412	02457	30722
		5/8	2	.015	Plain	RR	39694	39628	39547	
		5/8	2	.020	Plain	RR	39695	39629	39548	
		5/8	2	.030	Plain	RR	39601	39630	39549	
		5/8	2	Ball	Plain	RR	30524	34542	02577	30922
		3/4	2-1/2	Square	Plain	LL	37793	37714	03402	
		3/4	2-1/2	Ball	Plain	LL	37915	37914	03442	

continued on next page

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

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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	TiCN EDP Number	MG EDP Number	TiN EDP Number
3/16	3/16	1	4	Square	Plain	LE	62110		98521	
		1	4	Ball	Plain	LE	37898		93336	
		1-1/8	3	Square	Plain	XX	34115	34114	03602	
		1-1/8	3	Ball	Plain	XX	37938	34314	03642	
13/64	1/4	5/8	2-1/2	Square	Plain	RR	30469	34413	30723	
7/32	1/4	7/16	2	Square	Plain	SS	39759	31535	02128	
		5/8	2-1/2	Square	Plain	RR	36601	34414	02458	
		5/8	2-1/2	Ball	Plain	RR	36605	34543	02578	
15/64	1/4	3/4	2-1/2	Square	Plain	RR	30972	34415	30727	
1/4	1/4	1/2	2	Square	Plain	SS	31595	31536	02129	
		1/2	2	Ball	Plain	SS	31745		02209	
		3/4	2-1/2	Square	Plain	RR	98955	34416	02459	30730
		3/4	2-1/2	Square	Weldon	RR	39788	39779	39729	39730
		3/4	2-1/2	.015	Plain	RR	30519	39631	39504	
		3/4	2-1/2	.020	Plain	RR	39513		39505	
		3/4	2-1/2	.030	Plain	RR	39604	39633	39506	
		3/4	2-1/2	.045	Plain	RR	39696		39507	
		3/4	2-1/2	Ball	Plain	RR	30998	34544	02579	30930
		1	4	Square	Plain	LX	62111		62106	
		1	4	Ball	Plain	LX	37899		37893	
		1-1/8	3	Square	Plain	LL	99336	37718	03403	
		1-1/8	3	Ball	Plain	LL	37919	37918	03443	
		1-1/2	4	Square	Plain	XX	98978	34118	03603	
		1-1/2	4	Ball	Plain	XX	96411	34318	03643	
		1-1/2	6	Square	Plain	XE	39772		31163	
		1-1/2	6	Ball	Plain	XE	97844		31363	
17/64	5/16	3/4	2-1/2	Square	Plain	RR	30976	34417	30731	
9/32	5/16	3/4	2-1/2	Square	Plain	RR	96156	34418	02460	
		3/4	2-1/2	Ball	Plain	RR	30464	34545	02580	
19/64	5/16	13/16	2-1/2	Square	Plain	RR	30979	34439	30735	
5/16	5/16	1/2	2	Square	Plain	SS	30533	31537	02130	
		1/2	2	Ball	Plain	SS	31751		02210	
		13/16	2-1/2	Square	Plain	RR	30898	34420	02461	30738
		13/16	2-1/2	Square	Weldon	RR	39789	39780	39737	91803
		13/16	2-1/2	.015	Plain	RR	39697	39635	39509	
		13/16	2-1/2	.020	Plain	RR	39698		39510	
		13/16	2-1/2	.030	Plain	RR	39700	39637	39511	
		13/16	2-1/2	.045	Plain	RR	39701		39512	
		13/16	2-1/2	Ball	Plain	RR	30525	34546	02581	
		1	4	Square	Plain	LX	62114		90696	
		1	4	Ball	Plain	LX	37900		37894	
		1-1/8	3	Square	Plain	LL	30461	37722	03404	
		1-1/8	3	Ball	Plain	LL	34323	37922	03444	
		1-5/8	4	Square	Plain	XX	34123	34122	03604	
		1-5/8	4	Ball	Plain	XX	34361		03644	
21/64	3/8	1	2-1/2	Square	Plain	RR	31003		30739	
11/32	3/8	1	2-1/2	Square	Plain	RR	30463	34421	90242	
		1	2-1/2	Ball	Plain	RR	30408		30941	
23/64	3/8	1	2-1/2	Square	Plain	RR	31004		30743	

continued on next page

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

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E14

Inch sizes

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

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 TiCN EDP Number	Standard MG EDP Number	Obsolete* TiN EDP Number
		5/8	2	Square	Plain	SS	31549	31538	02131	
		5/8	2	Ball	Plain	SS	31749		02211	
		1	2-1/2	Square	Plain	RR	98244	34424	02462	30746
		1	2-1/2	Square	Weldon	RR	39790	39781	39745	39746
		1	2-1/2	.015	Plain	RR	37443	37550	37383	
		1	2-1/2	.015	Weldon	RR	97665	39639	39514	
		1	2-1/2	.020	Plain	RR	37444		37384	
		1	2-1/2	.020	Weldon	RR	39715		39515	
		1	2-1/2	.030	Plain	RR	37445	37552	37385	
		1	2-1/2	.030	Weldon	RR	39605	39641	39516	
		1	2-1/2	.045	Plain	RR	37446		37386	
		1	2-1/2	.045	Weldon	RR	39598		39517	
		1	2-1/2	.060	Plain	RR	37447		37387	
3/8	3/8	1	2-1/2	.060	Weldon	RR	39702		39614	
		1	2-1/2	.090	Plain	RR	37448		37388	
		1	2-1/2	.090	Weldon	RR	39703		39619	
		1	2-1/2	Ball	Plain	RR	98262	34547	02582	
		1	4	Square	Plain	RX	62115		90698	
		1	4	Ball	Plain	RX	37901		37895	
		1-1/8	3	Square	Plain	LL	37727	37726	03405	37725
		1-1/8	3	Square	Weldon	LL	39168		39164	
		1-1/8	3	Ball	Plain	LL	37927	37926	03445	37925
		1-1/2	6	Square	Plain	LE	97850		90304	
		1-1/2	6	Ball	Plain	LE	97845		31335	
		1-3/4	4	Square	Plain	XX	34136	34126	03605	34125
		1-3/4	4	Square	Weldon	XX	39175		39124	
		1-3/4	4	Ball	Plain	XX	34335	34326	03645	
25/64	7/16	1	2-3/4	Square	Plain	RR	90013		90269	
13/32	7/16	1	2-3/4	Square	Plain	RR	90016	90172	30749	
		1	2-3/4	Ball	Plain	RR	31000		30949	
27/64	7/16	1	2-3/4	Square	Plain	RR	31028		90296	
		5/8	2-1/2	Square	Plain	SS	39768		02132	
		1	2-3/4	Square	Plain	RR	31040	34430	30772	37754
		1	2-3/4	Ball	Plain	RR	31052	34549	30900	
7/16	7/16	2	4	Square	Plain	LL	37731	37730	03406	
		2	4	Ball	Plain	LL	30485	37930	03446	
		3	6	Square	Plain	XX	34160	34130	03606	
		3	6	Ball	Plain	XX	30487		03646	
29/64	1/2	1	3	Square	Plain	RR	30475		90297	
15/32	1/2	1	3	Square	Plain	RR	31030		30757	
		1	3	Ball	Plain	RR	30481		30957	
31/64	1/2	1	3	Square	Plain	RR	99106		30759	
		5/8	2-1/2	Square	Plain	SS	31546	31540	02133	
		5/8	2-1/2	Ball	Plain	SS	31743		02213	
		1	3	Square	Plain	RR	98245	34432	02464	30762
		1	3	Square	Weldon	RR	39791	39782	39761	39762
		1	3	.015	Plain	RR	37449	37571	37389	
1/2	1/2	1	3	.015	Weldon	RR	97710	39643	39518	
		1	3	.020	Plain	RR	37450		37390	
		1	3	.020	Weldon	RR	30560		39519	
		1	3	.030	Plain	RR	37451	37573	37391	
		1	3	.030	Weldon	RR	39704	39645	39520	

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

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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	Standard TiCN EDP Number	Standard MG EDP Number	Obsolete* TiN EDP Number
1/2	1/2	1	3	.045	Plain	RR	37452		37392	
		1	3	.045	Weldon	RR	39600		39521	
		1	3	.060	Plain	RR	37453	37575	37393	
		1	3	.060	Weldon	RR	39597	39647	39522	
		1	3	.090	Plain	RR	37454		37394	
		1	3	.090	Weldon	RR	39705		96599	
		1	3	.120	Plain	RR	37455		37395	
		1	3	.120	Weldon	RR	39706		39621	
		1	3	Ball	Plain	RR	97922	34552	02584	90300
		1	4	Square	Plain	RL	62160		97332	
		1	4	Ball	Plain	RL	37902		37896	
		1-1/2	6	Square	Plain	LX	31150		90305	
		1-1/2	6	Ball	Plain	LX	97846		31347	
		2	4	Square	Plain	LL	37735	37734	03407	37733
		2	4	Square	Weldon	LL	39169		96334	
		2	4	Ball	Plain	LL	37935	37934	03447	
		3	6	Square	Plain	XX	34135	34134	03607	34133
		3	6	Square	Weldon	XX	39176		39134	
		3	6	Ball	Plain	XX	30473	34334	03647	
		4	6	Square	Weldon	EX	39408		39400	
9/16	9/16	1-1/4	3-1/2	Square	Plain	RR	30996	34436	02465	30764
		1-1/4	3-1/2	Square	Weldon	RR	39792		39763	
		1-1/4	3-1/2	Ball	Plain	RR	30409		02585	
5/8	5/8	3/4	3	Square	Plain	SS	39771		02134	
		1-1/4	3-1/2	Square	Plain	RR	36602	34440	02466	30766
		1-1/4	3-1/2	Square	Weldon	RR	39793	39784	39765	39766
		1-1/4	3-1/2	.030	Plain	RR	37458		37398	
		1-1/4	3-1/2	.030	Weldon	RR	39709		39524	
		1-1/4	3-1/2	.060	Plain	RR	37460		37400	
		1-1/4	3-1/2	.060	Weldon	RR	39544		39526	
		1-1/4	3-1/2	.090	Plain	RR	37461		37401	
		1-1/4	3-1/2	.090	Weldon	RR	39608		39527	
		1-1/4	3-1/2	Ball	Plain	RR	30991	34557	02586	
		2	6	Square	Plain	LX	31130		90160	
		2	6	Ball	Plain	LX	37868		31350	
		2-1/4	5	Square	Plain	LL	30561	37742	03408	37741
		2-1/4	5	Square	Weldon	LL	39170		39740	39166
		2-1/4	5	Ball	Plain	LL	30486		03448	
		3	6	Square	Plain	XX	34143	34142	03608	34141
		3	6	Square	Weldon	XX	39177		39173	39141
		3	6	Ball	Plain	XX	30488		03648	
		4	6	Square	Weldon	EX	39409		39401	
11/16	3/4	1-1/2	4	Square	Plain	RR	36603		02467	
		1-1/2	4	Ball	Plain	RR	31051		02587	
3/4	3/4	1	3	Square	Plain	SS	30435	31542	02135	
		1-1/2	4	Square	Plain	RR	98956	34448	02468	30770
		1-1/2	4	Square	Weldon	RR	39794	39785	39769	39770
		1-1/2	4	.015	Plain	RR	37462		37402	
		1-1/2	4	.015	Weldon	RR	39711		39533	
		1-1/2	4	.020	Plain	RR	37463		37403	
		1-1/2	4	.020	Weldon	RR	39712		39534	

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

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E14

Inch sizes

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	TiCN EDP Number	MG EDP Number	TiN EDP Number
3/4	3/4	1-1/2	4	.030	Plain	RR	37464		37404	
		1-1/2	4	.030	Weldon	RR	39603		39535	
		1-1/2	4	.045	Plain	RR	37465		37405	
		1-1/2	4	.045	Weldon	RR	39602		39536	
		1-1/2	4	.060	Plain	RR	37466		37406	
		1-1/2	4	.060	Weldon	RR	97575		39530	
		1-1/2	4	.090	Plain	RR	37467		37407	
		1-1/2	4	.090	Weldon	RR	39713		39531	
		1-1/2	4	.120	Plain	RR	37468		37408	
		1-1/2	4	.120	Weldon	RR	39714		39623	
		1-1/2	4	.125	Plain	RR	37469		37409	
		1-1/2	4	.125	Weldon	RR	39732		39532	
		1-1/2	4	Ball	Plain	RR	95757	34548	02588	
		2	6	Square	Plain	LX	90306		31126	
		2	6	Ball	Plain	LX	37869		31352	
		2-1/4	5	Square	Plain	LL	37751	37750	03409	37749
		2-1/4	5	Square	Weldon	LL	39171		39748	96874
		2-1/4	5	Ball	Plain	LL	37937		03449	
		3	6	Square	Plain	XX	34151	34150	03609	34149
		3	6	Square	Weldon	XX	39178		39148	96011
		3	6	Ball	Plain	XX	30474		03649	
		4	6-1/2	Square	Weldon	EX	39410		39402	
13/16	7/8	1-1/2	4	Square	Plain	RR	90017		30771	
7/8	7/8	1-1/2	4	Square	Plain	RR	30523	34456	02469	
		1-1/2	4	Square	Weldon	RR	39795		39773	
		1-1/2	4	Ball	Plain	RR	30527		02589	
15/16	1	1-1/2	4	Square	Plain	RR	31038		30775	
1	1	1-1/2	4	Square	Plain	RR	98957	34464	02470	30778
		1-1/2	4	Square	Weldon	RR	39796		39777	
		1-1/2	4	.030	Plain	RR	37472		37412	
		1-1/2	4	.030	Weldon	RR	39595		39539	
		1-1/2	4	.045	Plain	RR	37473		37413	
		1-1/2	4	.045	Weldon	RR	39718		39540	
		1-1/2	4	.060	Plain	RR	37474		37414	
		1-1/2	4	.060	Weldon	RR	39596		39541	
		1-1/2	4	.090	Plain	RR	37475		37415	
		1-1/2	4	.090	Weldon	RR	39719		39542	
		1-1/2	4	.120	Plain	RR	37476		37416	
		1-1/2	4	.120	Weldon	RR	39720		39692	
		1-1/2	4	.125	Plain	RR	37477		37417	
		1-1/2	4	.125	Weldon	RR	39606		39543	
		1-1/2	4	Ball	Plain	RR	30528		02590	
		2-1/4	5	Square	Plain	LL	37767	37766	03410	
		2-1/4	5	Square	Weldon	LL	39172		39964	
		2-1/4	5	Ball	Plain	LL	37967		03450	
		3	6	Square	Plain	XX	34167	34166	03610	
		3	6	Square	Weldon	XX	39365		96625	
		3	6	Ball	Plain	XX	30476		03650	
		4-1/8	7	Square	Weldon	EE	39411		39403	34094
1-1/8	1	2	4-1/2	Square	Weldon	RR	34087		39412	
1-1/4	1-1/4	2	4-1/2	Square	Plain	RR			31178	

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.

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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

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 TiCN EDP Number	Standard MG EDP Number
1	3	2	38	Square	Plain	SR	39722	32175	28009
		2	38	Ball	Plain	SR	39862		28109
		3	38	Square	Plain	RR	32202	36884	28003
		3	38	Ball	Plain	RR	39835		28103
1,5	3	3	38	Square	Plain	SR	39723	32177	28006
		3	38	Ball	Plain	SR	39863		28106
		4,5	38	Square	Plain	RR	32319	36885	28023
		4,5	38	Ball	Plain	RR	39845		28118
		6	38	Square	Plain	RR	32204		02511
		6	38	Ball	Plain	RR	39836		02631
2	3	4	38	Square	Plain	SR	39724	32178	02161
		4	38	Ball	Plain	SR	39864		02241
		6,3	38	Square	Plain	RR	32320	36886	28026
		6,3	38	Ball	Plain	RR	39846		28121
		9	38	Square	Plain	RR	32208	32118	02512
		9	38	Ball	Plain	RR	39838		02632
2,5	3	5	38	Square	Plain	SR	39725		02162
		5	38	Ball	Plain	SR	39867		02242
		9,5	38	Square	Plain	RR	32212		02513
		9,5	38	Ball	Plain	RR	39839		02633
3	3	6	38	Square	Plain	SR	39726		02163
		6	38	Ball	Plain	SR	39868		02243
		9	38	Square	Plain	RR	99284		36560
		12	38	Square	Plain	RR	32214	32120	02514
		12	38	0,3	Plain	RR	37478		37418
		12	38	Ball	Plain	RR	39841		02634
		19	57	Square	Plain	LL	39804		03421
		19	57	Ball	Plain	LL	39880		03461
		25	75	Square	Plain	XX	32301		03621
		25	75	Ball	Plain	XX	39892		03661
3,5	4	7	50	Square	Plain	SR	39728		02158
		14	50	Square	Plain	RR	32216		02515
		14	50	Ball	Plain	RR	39842		02635
4	4	8	50	Square	Plain	SR	39731		02165
		8	50	Ball	Plain	SR	39871		02245
		11	50	Square	Plain	RR	36585		36561
		11	50	0,4	Plain	RR	37479		37419
		14	50	Square	Plain	RR	32218	32122	02516
		14	50	Ball	Plain	RR	39843		02636
		19	63	Square	Plain	LL	39805		03422
		19	63	Ball	Plain	LL	39881		03462
		31	75	Square	Plain	XX	32302		03622
		31	75	Ball	Plain	XX	39893		03662
4,5	5	16	50	Square	Plain	RR	32061		31478
		16	50	Ball	Plain	RR	39844		32648
5	5	10	50	Square	Plain	SR	39736		02167
		10	50	Ball	Plain	SR	39873		02247
		13	50	Square	Plain	RR	36586		36563
		13	50	0,5	Plain	RR	37480		37420

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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	Standard TiCN EDP Number	Standard MG EDP Number
5	5	16	50	Square	Plain	RR	32062	32124	31479
		16	50	Ball	Plain	RR	39847		32649
		19	63	Square	Plain	LL	39806		03423
		19	63	Ball	Plain	LL	39882		03463
		31	100	Square	Plain	XX	32304		03623
		31	100	Ball	Plain	XX	39894		03663
6	6	12	54	Square	Plain	SS	36839		38834
		12	54	Ball	Plain	SS	37361		39441
		13	57	Square	Plain	RR	36587		36565
		13	57	0,3	Plain	RR	37481		37421
		13	57	0,5	Plain	RR	37482		37422
		19	63	Square	Plain	RR	32063	32125	02519
		19	63	Ball	Plain	RR	39848		02639
		29	75	Square	Plain	LL	39807		03424
		29	75	Ball	Plain	LL	39883		03464
		38	100	Square	Plain	XX	32306		03624
		38	100	Ball	Plain	XX	39895		03664
7	7	16	60	Square	Plain	RR	36588		36567
	8	19	63	Square	Plain	RR	32064	32126	02509
		19	63	Ball	Plain	RR	39849		02652
8	8	14	58	Square	Plain	SS	36849		38835
		14	58	Ball	Plain	SS	37362		39442
		19	63	Square	Plain	RR	36589		36569
		19	63	0,5	Plain	RR	37483		37423
		19	63	1,0	Plain	RR	37484		37424
		19	63	1,5	Plain	RR	37485		37425
		20	63	Square	Plain	RR	32065	32127	02521
		20	63	Ball	Plain	RR	39850		02641
		29	75	Square	Plain	LL	39808		03425
		29	75	Ball	Plain	LL	39884		03465
		41	100	Square	Plain	XX	32308		03625
		41	100	Ball	Plain	XX	39896		03665
9	9	19	67	Square	Plain	RR	36590		36571
	10	22	72	Square	Plain	RR	32066		02510
		22	72	Ball	Plain	RR	39851		02653
10	10	16	66	Square	Plain	SS	36848		38836
		16	66	Ball	Plain	SS	37364		39443
		22	72	Square	Plain	RR	36591		36573
		22	72	0,5	Plain	RR	37486		37426
		22	72	1,0	Plain	RR	37487		37427
		22	72	1,5	Plain	RR	37488		37428
		25	72	Square	Plain	RR	32067	32129	02523
		25	72	Ball	Plain	RR	39852		02643
		25	100	Square	Plain	RX	31891		31279
		25	100	Ball	Plain	RX	37296		37244
		40	88	Square	Plain	LL	36838		30079
		40	88	Ball	Plain	LL	37366		39444
		45	100	Square	Plain	XX	32310		03626
		45	100	Ball	Plain	XX	39897		03666
11	11	26	83	Square	Plain	RR	36592		36574

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 TiCN EDP Number	Standard MG EDP Number
12	12	19	73	Square	Plain	SS	36847		38837
		25	76	Square	Plain	RR	32068	32130	02525
		25	76	Ball	Plain	RR	39853		02645
		26	83	Square	Plain	RR	36593		36575
		26	83	0,5	Plain	RR	37489		37429
		26	83	1,0	Plain	RR	37490		37430
		26	83	1,5	Plain	RR	37491		37431
		26	83	Ball	Plain	RR	37344		39446
		50	100	Square	Plain	LL	39810		03427
		50	100	Ball	Plain	LL	39886		03467
		75	150	Square	Plain	XX	32312		03627
		75	150	Ball	Plain	XX	39898		03667
14	14	26	83	Square	Plain	RR	36594		36577
		32	83	Square	Plain	RR	32069		34445
		32	83	Ball	Plain	RR	39854		34567
		57	125	Square	Plain	LL	39811		03428
		75	150	Square	Plain	XX	32314		03628
16	16	25	82	Square	Plain	SS	39751		02176
		32	89	Square	Plain	RR	32071		02527
		32	89	Ball	Plain	RR	39865		02647
		32	92	Square	Plain	RR	36595		36579
		32	92	0,5	Plain	RR	37492		37432
		32	92	1,0	Plain	RR	37493		37433
		32	92	1,5	Plain	RR	37494		37434
		32	92	2,0	Plain	RR	37495		37435
		57	125	Square	Plain	LL	39812		03429
		57	125	Ball	Plain	LL	39888		03469
		75	150	Square	Plain	XX	32318		03629
18	18	32	92	Square	Plain	RR	36596		36580
		38	100	Square	Plain	RR	32084		02528
		38	100	Ball	Plain	RR	39857		02648
		57	125	Square	Plain	LL	39813		03430
		75	150	Square	Plain	XX	32322		03630
20	20	38	100	Square	Plain	RR	32074		02529
		38	104	Square	Plain	RR	36597		36581
		38	104	0,5	Plain	RR	37496		37436
		38	104	1,0	Plain	RR	37497		37437
		38	104	1,5	Plain	RR	37498		37438
		38	104	2,0	Plain	RR	37499		37439
		38	104	Ball	Plain	RR	32672		32671
		57	125	Square	Plain	LL	39814		03431
		57	125	Ball	Plain	LL	39890		03471
		75	150	Square	Plain	XX	32324		03631
22	22	38	100	Square	Plain	RR	30255		02530
25	25	38	100	Square	Plain	SS	32238		02531
		45	120	Square	Plain	RR	36899		36582
		45	120	Ball	Plain	RR	37252		39448
		57	125	Square	Plain	LL	39815		03432
		75	150	Square	Plain	XX	32325		03632

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

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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	Type of Cut	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	Slot	91	107	107	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	Rough	114	137	137	.0229	.0457	.0686	.0889	.1143	.1397	.1778
	Finish	137	198	198	.0229	.0457	.0686	.0889	.1143	.1397	.1778
Graphite	Slot	107	122	137	.0203	.0381	.0584	.0762	.0940	.1143	.1524
	Rough	130	145	160	.0229	.0432	.0660	.0889	.1092	.1346	.1778
	Finish	152	168	183	.0254	.0483	.0711	.0965	.1194	.1448	.1930
Cast Iron - Gray	Slot	61	107	107	.0102	.0178	.0279	.0381	.0483	.0584	.0762
	Rough	76	122	122	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Finish	91	137	137	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Cast Iron - Ductile	Slot	61	76	76	.0102	.0178	.0279	.0381	.0457	.0584	.0762
	Rough	76	84	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Finish	84	99	99	.0152	.0305	.0457	.0584	.0711	.0864	.1168
Low Carbon Steel ≤ 38 HRc 1018, 12L14, 8620	Slot	76	84	91	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	84	91	99	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	Finish	91	99	107	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Medium Carbon Steels ≤ 38 HRc 4140, 4340	Slot	69	76	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	76	84	91	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	Finish	84	91	99	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Tool & Die Steels ≤ 38 HRc A2, D2, H13, P20	Slot	69	76	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Rough	76	84	91	.0152	.0305	.0457	.0635	.0787	.0940	.1270
	Finish	84	91	99	.0178	.0381	.0559	.0762	.0965	.1143	.1524
Tool & Die Steels 39 - 48 HRc A2, D2, H13, P20	Slot	53	61	69	.0051	.0127	.0178	.0254	.0305	.0381	.0508
	Rough	61	69	76	.0076	.0178	.0279	.0381	.0483	.0559	.0762
	Finish	69	76	84	.0102	.0229	.0356	.0457	.0584	.0686	.0914
Easy to Machine Stainless Steel 416, 410, 302, 303	Slot	61	76	76	.0076	.0178	.0279	.0381	.0483	.0584	.0762
	Rough	76	84	84	.0127	.0254	.0381	.0508	.0635	.0762	.1016
	Finish	91	99	99	.0152	.0305	.0457	.0635	.0787	.0965	.1270
Moderate Machining Stainless Steels 304, 316, Invar, Kovar	Slot	61	69	76	.0064	.0127	.0191	.0254	.0305	.0381	.0508
	Rough	76	84	91	.0076	.0178	.0279	.0381	.0483	.0559	.0762
	Finish	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

TiD-eXtra d.o.o. Industrial Technologies

4 Helical Flutes

For profiling, slotting, & contouring

E24

E24 • Square

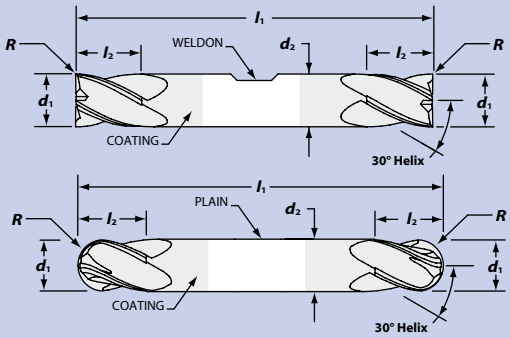
E24B • Ball

- 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	TiCN EDP Number	MG EDP Number	TiN EDP Number
1/32	1/8	1/16	1-1/2	Square	Plain	SR	31984	31962	02281	
		1/16	1-1/2	Ball	Plain	SR	32005		02361	
3/64	1/8	3/32	1-1/2	Square	Plain	SR	31900	31963	02282	
		3/32	1-1/2	Ball	Plain	SR	32006		02362	
1/16	1/8	1/8	1-1/2	Square	Plain	SR	31985	31964	02283	
		1/8	1-1/2	Ball	Plain	SR	32007		02363	
		3/16	2	Square	Plain	RL			33378	
		3/16	2	Ball	Plain	RL			33578	
5/64	1/8	1/8	1-1/2	Square	Plain	SR	31949	31965	31932	
		1/8	1-1/2	Ball	Plain	SR	32008		31636	
3/32	1/8	3/16	1-1/2	Square	Plain	SR	31927	31966	02284	
		3/16	1-1/2	Ball	Plain	SR	32009		02364	
		9/32	2	Square	Plain	RL			33379	
		9/32	2	Ball	Plain	RL			33579	
7/64	1/8	3/16	1-1/2	Square	Plain	SR	31957	31967	31933	
		3/16	1-1/2	Ball	Plain	SR	32010		32131	
1/8	1/8	1/4	1-1/2	Square	Plain	SR	99125	31968	02285	31908
		1/4	1-1/2	Ball	Plain	SR	32011	37051	02365	
		3/8	2	Square	Plain	RL			33380	
		3/8	2	Ball	Plain	RL			33580	
	3/8	3/8	3-1/16	Square	Weldon	RL	36890		02681	

continued on next page

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

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GENERAL PURPOSE E24 END MILLS

For general milling applications

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	TiCN EDP Number	MG EDP Number	TiN EDP Number
9/64	3/16	5/16	2	Square	Plain	SR	31926	31969	31934	
		5/16	2	Ball	Plain	SR	32012		32133	
5/32	3/16	5/16	2	Square	Plain	SR	31995	31970	02286	
		5/16	2	Ball	Plain	SR	32013		02366	
		7/16	2-1/2	Square	Plain	RL			33381	
	3/8	7/16	3-1/8	Square	Weldon	RL			02682	
11/64	3/16	5/16	2	Square	Plain	SR	31958		31935	
3/16	3/16	3/8	2	Square	Plain	SR	99331	31972	02287	31912
		3/8	2	Ball	Plain	SR	32014	37054	02367	
		1/2	2-1/2	Square	Plain	RL			33382	
		1/2	2-1/2	Ball	Plain	RL			33582	
	3/8	1/2	3-1/4	Square	Weldon	RL	98965		02683	
7/32	1/4	1/2	2-1/2	Square	Plain	SR	31959	31974	02288	
		1/2	2-1/2	Ball	Plain	SR	32015		02368	
	3/8	9/16	3-3/8	Square	Weldon	RL			02684	
1/4	1/4	1/2	2-1/2	Square	Plain	SR	31990	31976	02289	31916
		1/2	2-1/2	Ball	Plain	SR	32016	37056	02369	
		5/8	3	Square	Plain	RL			33384	
		5/8	3	Ball	Plain	RL			33584	
	3/8	5/8	3-3/8	Square	Weldon	RL	33201		02685	
5/16	5/16	1/2	2-1/2	Square	Plain	SR	31991	31980	02290	31918
		1/2	2-1/2	Ball	Plain	SR	32017	37057	02370	
		3/4	3	Square	Plain	RL			33385	
	3/8	3/4	3-1/2	Square	Weldon	RL	33225		02687	
3/8	3/8	9/16	2-1/2	Square	Plain	SR	31929	30682	02291	31920
		9/16	2-1/2	Ball	Plain	SR	32018	37058	02371	
		3/4	3-1/2	Square	Plain	RL			33386	
		3/4	3-1/2	Square	Weldon	RL	33227		02689	
		3/4	3-1/2	Ball	Plain	RL			33586	
1/2	1/2	5/8	3	Square	Plain	SR	31998	31992	02293	31924
		5/8	3	Ball	Plain	SR	32020		02373	
		1	4	Square	Plain	RL			33388	
		1	4	Square	Weldon	RL	33229		02691	
		1	4	Ball	Plain	RL			33588	
5/8	5/8	1-1/2	6	Square	Weldon	RX			02693	
3/4	3/4	1-1/2	6	Square	Weldon	RX			02695	

Metric

							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	TiCN EDP Number	MG EDP Number	TiN EDP Number
2	3	3	38	Square	Plain	SR	62374		02321	
3	3	6	38	Square	Plain	SR	62376		02323	
4	4	8	50	Square	Plain	SR	62378		02325	
5	5	10	50	Square	Plain	SR	62380		02327	
6	6	12	63	Square	Plain	SR	62381		02328	
8	8	12	63	Square	Plain	SR	62382		02330	
10	10	14	72	Square	Plain	SR	62383		02332	
12	12	16	76	Square	Plain	SR	62384		02334	

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.*

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PROFILE

Bill Kerr

Menlo 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."

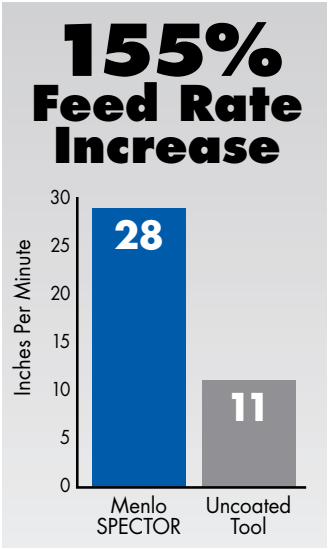
"Are you using uncoated carbide inserts?" Bill asked. When Garvey said, "No," Bill asked, "Well, then why are you using uncoated carbide tools?"

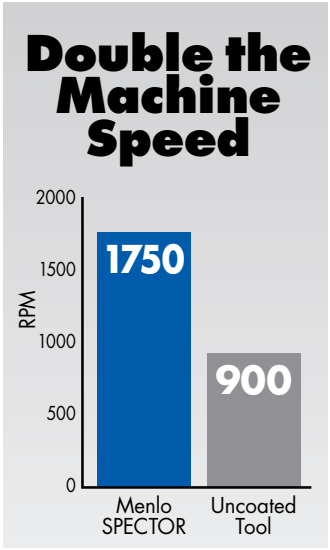
Finally, Garvey agreed to test Menlo SPECTOR® cutting tools against his uncoated tool – same size, same number of flutes, same width and depth of cut.

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





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

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Industrial Technologies d.o.o.

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3-FLUTE END MILLS

E13

3 Helical Flutes

For profiling, slotting, & contouring

E13 • Radius

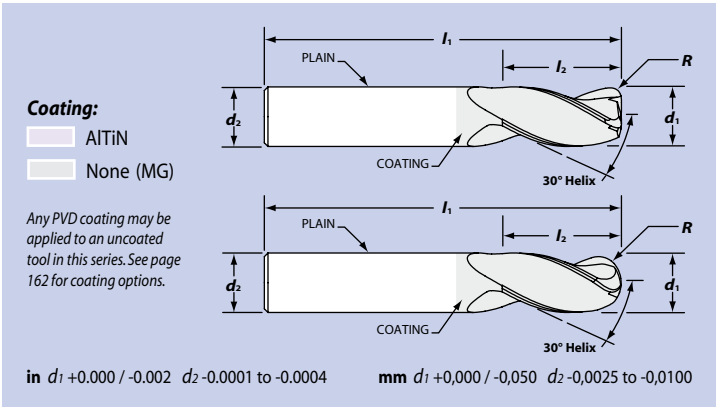
E13 • Square

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

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	Standard MG EDP Number
1/32	1/8	1/16	1-1/2	Square	SR	34095	34697
		3/32	1-1/2	Square	RR	33801	32101
		3/32	1-1/2	Ball	RR	62053	32181
3/64	1/8	3/32	1-1/2	Square	SR	34096	34700
		9/64	1-1/2	Square	RR	33819	32102
		9/64	1-1/2	Ball	RR	62054	32182
1/16	1/8	1/8	1-1/2	Square	SR	34057	32103
		1/8	1-1/2	Ball	SR	62063	32183
		3/16	1-1/2	Square	RR	33826	32421
		3/16	1-1/2	Ball	RR	62055	32541
3/32	1/8	3/16	1-1/2	Square	SR	34011	32104
		3/16	1-1/2	Ball	SR	62064	32184
		3/8	1-1/2	Square	RR	33827	32423
		3/8	1-1/2	Ball	RR	62056	32543
1/8	1/8	1/4	1-1/2	Square	SR	33800	32105
		1/4	1-1/2	Ball	SR	62065	32185
		1/2	1-1/2	Square	RR	33810	32425
		1/2	1-1/2	Ball	RR	62057	32545

continued on next page

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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	Standard MG EDP Number
1/8	1/8	3/4	2-1/4	Square	LL	33911	03301
		3/4	2-1/4	Ball	LL	62070	03341
		1	3	Square	XX	34046	03501
		1	3	Ball	XX	62079	03541
5/32	3/16	9/16	2	Square	RR	33814	32426
3/16	3/16	3/8	2	Square	SR	34058	32107
		3/8	2	Ball	SR	62066	32187
		5/8	2	Square	RR	33850	32427
		5/8	2	Ball	RR	62058	32547
		3/4	2-1/2	Square	LL	33913	03302
		3/4	2-1/2	Ball	LL	62071	03342
		1-1/8	3	Square	XX	34047	03502
		1-1/8	3	Ball	XX	62080	03542
7/32	1/4	5/8	2-1/2	Square	RR	33851	32428
1/4	1/4	1/2	2	Square	SS	34059	32109
		1/2	2	Ball	SS	62067	32189
		3/4	2-1/2	Square	RR	33852	32429
		3/4	2-1/2	Ball	RR	62059	32549
		1-1/8	3	Square	LL	33929	03303
		1-1/8	3	Ball	LL	62072	03343
		1-1/2	4	Square	XX	34051	03503
		1-1/2	4	Ball	XX	62081	03543
5/16	5/16	1/2	2	Square	SS	34060	32110
		13/16	2-1/2	Square	RR	33853	32431
		1-5/8	4	Square	XX	34097	03504
3/8	3/8	5/8	2	Square	SS	34061	32111
		5/8	2	Ball	SS	62068	32191
		1	2-1/2	Square	RR	33854	32432
		1	2-1/2	Ball	RR	99776	32552
		1-1/8	3	Square	LL	33931	03305
		1-1/8	3	Ball	LL	62074	03345
		1-3/4	4	Square	XX	34052	03505
		1-3/4	4	Ball	XX	62083	03545
7/16	7/16	1	2-3/4	Square	RR	30422	33863
1/2	1/2	5/8	2-1/2	Square	SS	34063	32113
		5/8	2-1/2	Ball	SS	62069	32193
		1	3	Square	RR	90089	32434
		1	3	Ball	RR	62060	32554
		2	4	Square	LL	33932	03307
		2	4	Ball	LL	62075	03347
		3	6	Square	XX	34053	03507
		3	6	Ball	XX	62084	03547
5/8	5/8	1-1/4	3-1/2	Square	RR	33855	32436
		2-1/4	5	Square	LL	34068	03308
		3	6	Square	XX	34054	03508
3/4	3/4	1-1/2	4	Square	RR	33856	32438
		2-1/4	5	Square	LL	34069	03309
		3	6	Square	XX	34055	03509

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	Standard MG EDP Number
1	3	2	38	Square	SR	30897	28008
		3	38	Square	RR	62456	28002
		3	38	Ball	RR	62460	28102
1,5	3	3	38	Square	SR	62272	28005
		3	38	Ball	SR	62689	28105
		4,5	38	Square	RR	62457	28022
		4,5	38	Ball	RR	62461	28117
		6	38	Square	RR	37012	32481
		6	38	Ball	RR	62601	32601
2	3	4	38	Square	SR	62273	32141
		4	38	Ball	SR	62690	32221
		6,3	38	Square	RR	62458	28025
		6,3	38	Ball	RR	62462	28120
		9	38	Square	RR	37014	32482
		9	38	Ball	RR	62602	32602
2,5	3	5	38	Square	SR	62274	32142
		9,5	38	Square	RR	37016	32483
3	3	6	38	Square	SR	62275	32143
		6	38	Ball	SR	62692	32223
		9	38	Square	RR	99801	36732
		12	38	Square	RR	30247	32484
		12	38	0,3	RR	36951	36785
		12	38	Ball	RR	62604	32604
		12	75	Square	RX	33374	31280
		12	75	Ball	RX	37290	37238
		19	57	Square	LL	62260	03321
		19	57	Ball	LL	62637	03361
		25	75	Square	XX	62170	03521
		25	75	Ball	XX	62661	03561
3,5	4	14	50	Square	RR	37018	32485
4	4	8	50	Square	SR	62277	32145
		8	50	Ball	SR	62694	32225
		11	50	Square	RR	36771	36734
		11	50	0,4	RR	36952	36786
		14	50	Square	RR	37020	32486
		14	50	Ball	RR	62606	32606
		19	63	Square	LL	62261	03322
		19	63	Ball	LL	62638	03362
		31	75	Square	XX	62171	03522
		31	75	Ball	XX	62662	03562
4,5	5	16	50	Square	RR	37022	31458

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.

TiD-eXtra Industrial Technologies d.o.o.

www.tid-extra.hr

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	Standard MG EDP Number
5	5	10	50	Square	SR	62279	32147
		10	50	Ball	SR	62696	32227
		13	50	Square	RR	36772	36736
		13	50	0,5	RR	36953	36787
		16	50	Square	RR	37024	31459
		16	50	Ball	RR	62608	32579
		19	63	Square	LL	62262	03323
		19	63	Ball	LL	62639	03363
		31	100	Square	XX	62172	03523
		31	100	Ball	XX	62663	03563
6	6	12	54	Square	SS	36949	38841
		12	54	Ball	SS	37500	39459
		13	57	Square	RR	36773	36738
		13	57	0,3	RR	36954	36788
		13	57	0,5	RR	36955	36789
		19	63	Square	RR	37026	32489
		19	63	Ball	RR	32591	32609
		29	75	Square	LL	62263	03324
		29	75	Ball	LL	62640	03364
		38	100	Square	XX	62173	03524
		38	100	Ball	XX	62664	03564
7	7	16	60	Square	RR	36774	36740
8	8	14	58	Square	SS	37168	38842
		19	63	Square	RR	36775	36742
		19	63	0,5	RR	36956	36790
		19	63	1,0	RR	36957	36791
		19	63	1,5	RR	36958	36792
		20	63	Square	RR	37028	32491
		20	63	Ball	RR	32592	32611
		29	75	Square	LL	62264	03325
		29	75	Ball	LL	62641	03365
		41	100	Square	XX	62174	03525
		41	100	Ball	XX	62665	03565
9	9	19	67	Square	RR	36776	36744
	10	22	72	Square	RR	37030	32480
10	10	16	66	Square	SS	37172	38843
		16	66	Ball	SS	37376	39461
		22	72	Square	RR	36777	36746
		22	72	0,5	RR	36959	36793
		22	72	1,0	RR	36960	36794
		22	72	1,5	RR	36961	36795
		25	72	Square	RR	37031	32493
		25	72	Ball	RR	32593	32613
		25	100	Square	RX	33373	31286
		25	100	Ball	RX	37372	37272
		40	88	Square	LL	37166	31644
		40	88	Ball	LL	37374	39462
		45	100	Square	XX	62175	03526
		45	100	Ball	XX	62666	03566

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	Standard MG EDP Number
11	11	26	83	Square	RR	36778	36747
12	12	19	73	Square	SS	37164	38844
		19	73	Ball	SS	37378	39463
		25	76	Square	RR	37034	32495
		26	83	Square	RR	36779	36748
		26	83	0,5	RR	36962	36796
		26	83	1,0	RR	36963	36797
		26	83	1,5	RR	36964	36798
		26	83	Ball	RR	37380	39464
		50	100	Square	LL	62266	03327
		50	100	Ball	LL	62643	03367
		75	150	Square	XX	62176	03527
		75	150	Ball	XX	62667	03567
14	14	26	83	Square	RR	36780	36750
		57	125	Square	LL	62267	03328
		75	150	Square	XX	62177	03528
16	16	25	82	Square	SS	62287	32156
		32	92	Square	RR	36781	36752
		57	125	Square	LL	62268	03329
		75	150	Square	XX	62178	03529
18	18	32	92	Square	RR	36782	36753
		57	125	Square	LL	62269	03330
		75	150	Square	XX	62179	03530
20	20	38	104	Square	RR	36783	36754
		57	125	Square	LL	62270	03331
		75	150	Square	XX	62180	03531

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.

TiD-eXtra Industrial Technologies d.o.o.

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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

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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 Menlo end mills larger than .060 diameter are center cutting and can run straight plunge (Z-axis) moves or helical interpolation tool paths.

TiD-eXtra
Industrial Technologies
d.o.o.

2-FLUTE END MILLS

E12

2 Helical Flutes

For plunging, slotting, contouring and heavy peripheral cuts

E12 • Radius

E12 • Square

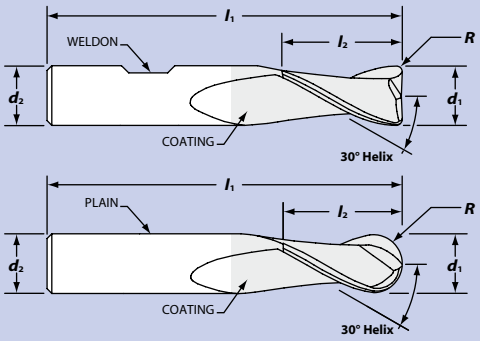
E12B • Ball

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
AlTiN	33686
TiCN	33654
MG	33650

E12B Sets

Style	EDP Number
AlTiN	33687
TiCN	33667
MG	33660

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

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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

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 TiCN EDP Number	Standard MG EDP Number
1/64	1/8	1/32	1-1/2	Square	Plain	SR	90655		90638
		3/64	1-1/2	Square	Plain	RR	90656		90639
1/32	1/8	1/16	1-1/2	Square	Plain	SR	38923		34696
		1/16	1-1/2	Ball	Plain	SR	30385		31601
		3/32	1-1/2	Square	Plain	RR	30509	35602	02101
		3/32	1-1/2	Ball	Plain	RR	30303		02181
		1/8	1-1/2	Square	Plain	LR	90657		90652
3/64	1/8	3/32	1-1/2	Square	Plain	SR	39093		34699
		3/32	1-1/2	Ball	Plain	SR	30373		31602
		9/64	1-1/2	Square	Plain	RR	35603	34603	02102
		9/64	1-1/2	Ball	Plain	RR	30302		02182
1/16	1/8	1/8	1-1/2	Square	Plain	SR	39104		02103
		1/8	1-1/2	Ball	Plain	SR	30374		02183
		3/16	1-1/2	Square	Plain	RR	37994	34604	02421
		3/16	1-1/2	Ball	Plain	RR	30433		02541
		1/4	1-1/2	Square	Plain	LR	90658		90653
5/64	1/8	1/4	1-1/2	Square	Plain	RR	37995		02422
		1/4	1-1/2	Ball	Plain	RR	30349		02542
3/32	1/8	3/16	1-1/2	Square	Plain	SR	39105		02104
		3/16	1-1/2	Ball	Plain	SR	30375		02184
		3/8	1-1/2	Square	Plain	RR	30338	34606	02423
		3/8	1-1/2	Ball	Plain	RR	30350		02543
7/64	1/8	3/8	1-1/2	Square	Plain	RR	30339		02424
		3/8	1-1/2	Ball	Plain	RR	30351		02544
1/8	1/8	1/4	1-1/2	Square	Plain	SR	90088		02105
		1/4	1-1/2	Ball	Plain	SR	31956		02185
		1/2	1-1/2	Square	Plain	RR	96342	34608	02425
		1/2	1-1/2	.015	Plain	RR	34071		39550
		1/2	1-1/2	Ball	Plain	RR	30993	34708	02545
		5/8	2	Square	Plain	LL	62093		96483
		5/8	2	Ball	Plain	LL	37880		37876
		3/4	2-1/4	Square	Plain	LL	36610		03101
		3/4	2-1/4	Ball	Plain	LL	30395		03141
		1	3	Square	Plain	XX	34015		03201
		1	3	Ball	Plain	XX	31290		03241
9/64	3/16	9/16	2	Square	Plain	RR	30344		30615
		9/16	2	Ball	Plain	RR	90177		30815
5/32	3/16	5/16	2	Square	Plain	SR	39151		02106
		5/16	2	Ball	Plain	SR	30386		02186
		9/16	2	Square	Plain	RR	30503		02426
		9/16	2	Ball	Plain	RR	30354		02546
11/64	3/16	5/8	2	Square	Plain	RR	30345		30619
3/16	3/16	3/8	2	Square	Plain	SR	39152		02107
		3/8	2	Ball	Plain	SR	30378		02187
		5/8	2	Square	Plain	RR	37996	34612	02427
		5/8	2	.020	Plain	RR	34072		39553
		5/8	2	.030	Plain	RR	34073		39554
		5/8	2	Ball	Plain	RR	90087	34712	02547
		3/4	2-1/2	Square	Plain	LL	36619		03102
		3/4	2-1/2	Ball	Plain	LL	30398		03142
		1	4	Square	Plain	LE	62094		62088
		1	4	Ball	Plain	LE	37881		94365
		1-1/8	3	Square	Plain	XX	34023		03202
		1-1/8	3	Ball	Plain	XX	90081		03242

continued on next page

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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

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 TiCN EDP Number	Standard MG EDP Number
13/64	1/4	5/8	2-1/2	Square	Plain	RR	97907		30623
7/32	1/4	7/16	2	Square	Plain	SS	39153		02108
		5/8	2-1/2	Square	Plain	RR	30348		02428
		5/8	2-1/2	Ball	Plain	RR	30355		02548
15/64	1/4	3/4	2-1/2	Square	Plain	RR	30510		30627
1/4	1/4	1/2	2	Square	Plain	SS	39154		02109
		1/2	2	Ball	Plain	SS	30563		02189
		3/4	2-1/2	Square	Plain	RR	37997	34616	02429
		3/4	2-1/2	Square	Weldon	RR	39250		39256
		3/4	2-1/2	.020	Plain	RR	34074		39556
		3/4	2-1/2	.030	Plain	RR	34075		39557
		3/4	2-1/2	Ball	Plain	RR	30994	34716	02549
		1	4	Square	Plain	LX	62095		62089
		1	4	Ball	Plain	LX	37882		37877
		1-1/8	3	Square	Plain	LL	36645		03103
		1-1/8	3	Ball	Plain	LL	30399		03143
		1-1/2	4	Square	Plain	XX	34035		03203
		1-1/2	4	Ball	Plain	XX	90082		03243
		1-1/2	6	Square	Plain	XE	39203		31063
		1-1/2	6	Ball	Plain	XE	34168		31263
17/64	5/16	3/4	2-1/2	Square	Plain	RR	30511		30631
9/32	5/16	3/4	2-1/2	Square	Plain	RR	30504		02430
		3/4	2-1/2	Ball	Plain	RR	30356		02550
19/64	5/16	13/16	2-1/2	Square	Plain	RR	30512		30635
5/16	5/16	1/2	2	Square	Plain	SS	39155		02110
		1/2	2	Ball	Plain	SS	30380		02190
		13/16	2-1/2	Square	Plain	RR	37998	34620	02431
		13/16	2-1/2	Square	Weldon	RR	39251		39257
		13/16	2-1/2	.020	Plain	RR	34076		39560
		13/16	2-1/2	.030	Plain	RR	34077		39561
		13/16	2-1/2	Ball	Plain	RR	30562	34720	02551
		1-1/8	3	Square	Plain	LL	36640		03104
		1-1/8	3	Ball	Plain	LL	20561		03144
		1-5/8	4	Square	Plain	XX	34036		03204
		1-5/8	4	Ball	Plain	XX	31292		03244
11/32	3/8	1	2-1/2	Square	Plain	RR	37999		30641
		1	2-1/2	Ball	Plain	RR	30357		30841
3/8	3/8	5/8	2	Square	Plain	SS	39156		02111
		5/8	2	Ball	Plain	SS	30564		02191
		1	2-1/2	Square	Plain	RR	38000	34624	02432
		1	2-1/2	Square	Weldon	RR	39252		39258
		1	2-1/2	.020	Plain	RR	34104		36808
		1	2-1/2	.020	Weldon	RR	34078		39564
		1	2-1/2	.030	Plain	RR	34105		36809
		1	2-1/2	.030	Weldon	RR	34079		39565
		1	2-1/2	Ball	Plain	RR	30995	34724	02552
		1	4	Square	Plain	RX	62097		90301
		1	4	Ball	Plain	RX	37884		37879
		1-1/8	3	Square	Plain	LL	36646		03105
		1-1/8	3	Ball	Plain	LL	30390		03145
		1-1/2	6	Square	Plain	LE	30470		90302
		1-1/2	6	Ball	Plain	LE	34170		31235
		1-3/4	4	Square	Plain	XX	34037		03205
		1-3/4	4	Ball	Plain	XX	31293		03245

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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	Standard TiCN EDP Number	Standard MG EDP Number
13/32	7/16	1	2-3/4	Square	Plain	RR	38001		30649
7/16	7/16	1	2-3/4	Square	Plain	RR	99467	34629	30672
		1	2-3/4	Ball	Plain	RR	30362		30879
		2	4	Square	Plain	LL	99468		03106
		2	4	Ball	Plain	LL	30391		03146
		3	6	Square	Plain	XX	34038		03206
		3	6	Ball	Plain	XX	31294		03246
15/32	1/2	1	3	Square	Plain	RR	38002		30657
1/2	1/2	5/8	2-1/2	Square	Plain	SS	39158		02113
		5/8	2-1/2	Ball	Plain	SS	31630		02193
		1	3	Square	Plain	RR	38003	34632	02434
		1	3	Square	Weldon	RR	39253		39259
		1	3	.020	Plain	RR	34106		36810
		1	3	.020	Weldon	RR	34080		39568
		1	3	.030	Plain	RR	34107		36811
		1	3	.030	Weldon	RR	34081		39569
		1	3	.060	Plain	RR	34108		36812
		1	3	.060	Weldon	RR	34082		39571
		1	3	Ball	Plain	RR	97921	34732	02554
		1	4	Square	Plain	RL	62098		62092
		1	4	Ball	Plain	RL	37885		90503
		1-1/2	6	Square	Plain	LX	39205		90303
		1-1/2	6	Ball	Plain	LX	34172		31247
		2	4	Square	Plain	LL	36647		03107
		2	4	Ball	Plain	LL	30392		03147
		3	6	Square	Plain	XX	34039		03207
		3	6	Ball	Plain	XX	31295		03247
9/16	9/16	1-1/4	3-1/2	Square	Plain	RR	30505		02435
		1-1/4	3-1/2	Ball	Plain	RR	30248		02555
5/8	5/8	1-1/4	3-1/2	Square	Plain	RR	38004		02436
		1-1/4	3-1/2	Square	Weldon	RR	39254		39260
		1-1/4	3-1/2	Ball	Plain	RR	30366		02556
		2	6	Square	Plain	LX	39206		39198
		2	6	Ball	Plain	LX	34173		31226
		2-1/4	5	Square	Plain	LL	36648		03108
		2-1/4	5	Ball	Plain	LL	30393		03148
		3	6	Square	Plain	XX	34043		03208
		3	6	Ball	Plain	XX	31296		03248
3/4	3/4	1-1/2	4	Square	Plain	RR	30700		02438
		1-1/2	4	Square	Weldon	RR	39255		39261
		1-1/2	4	Ball	Plain	RR	30371		02558
		2	6	Square	Plain	LX	39207		39199
		2	6	Ball	Plain	LX	34174		31228
		2-1/4	5	Square	Plain	LL	36649		03109
		2-1/4	5	Ball	Plain	LL	30396		03149
		3	6	Square	Plain	XX	34044		03209
		3	6	Ball	Plain	XX	31297		03249
1	1	1-1/2	4	Square	Plain	RR	30679		02440
		1-1/2	4	Ball	Plain	RR	30369		02560
		2-1/4	5	Square	Plain	LL	36650		03110
		2-1/4	5	Ball	Plain	LL	30397		03150
		3	6	Square	Plain	XX	34045		03210
		3	6	Ball	Plain	XX	31298		03250

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

continued on next page

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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	MG EDP Number
0,3	3	0,9	38	Square	RR		27994
0,4	3	1,2	38	Square	RR		27995
0,5	3	1,5	38	Square	RR		27996
0,6	3	1,8	38	Square	RR		27997
0,7	3	2,1	38	Square	RR		27998
0,8	3	2,4	38	Square	RR		27999
0,9	3	2,7	38	Square	RR		28000
1	3	2	38	Square	SR	62288	28007
		2	38	Ball	SR	62673	28107
		3	38	Square	RR	99079	28001
		3	38	Ball	RR	99080	28101
1,5	3	3	38	Square	SR	62289	28004
		3	38	Ball	SR	62674	28104
		4,5	38	Square	RR	62455	28021
		4,5	38	Ball	RR	62459	28116
		6	38	Square	RR	37980	02481
		6	38	Ball	RR	62579	02601
2	3	4	38	Square	SR	62290	02141
		4	38	Ball	SR	62675	02221
		6,3	38	Square	RR	99081	28024
		6,3	38	Ball	RR	99082	28119
		9	38	Square	RR	37981	02482
		9	38	Ball	RR	62580	02602
2,5	3	5	38	Square	SR	62291	02142
		9,5	38	Square	RR	37982	02483
		9,5	38	Ball	RR	62581	02603
3	3	6	38	Square	SR	62292	02143
		6	38	Ball	SR	62677	02223
		9	38	Square	RR	99093	36709
		12	38	Square	RR	38005	02484
		12	38	0,3	RR	38620	37768
		12	38	Ball	RR	30377	02604
		19	57	Square	LL	62194	03121
		19	57	Ball	LL	62625	03161
		25	75	Square	XX	62182	03221
		25	75	Ball	XX	62649	03261
3,5	4	7	50	Square	SR	62293	02137
		14	50	Square	RR	38006	02485
		14	50	Ball	RR	62582	02605
4	4	8	50	Square	SR	62294	02145
		8	50	Ball	SR	62679	02225
		11	50	Square	RR	36756	36711
		11	50	0,4	RR	38621	37769
		14	50	Square	RR	99357	02486
		14	50	Ball	RR	30372	02606
		19	63	Square	LL	62195	03122
		19	63	Ball	LL	62626	03162
		31	75	Square	XX	62183	03222
		31	75	Ball	XX	62650	03262
4,5	5	16	50	Square	RR	37983	34480
		16	50	Ball	RR	62583	34485

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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	Standard MG EDP Number
5	5	10	50	Square	SR	62296	02147
		10	50	Ball	SR	62681	02227
		13	50	Square	RR	36757	36713
		13	50	0,5	RR	38622	37770
		16	50	Square	RR	38007	34481
		16	50	Ball	RR	99083	34486
		19	63	Square	LL	62196	03123
		19	63	Ball	LL	62627	03163
		31	100	Square	XX	62184	03223
		31	100	Ball	XX	62651	03263
6	6	12	54	Square	SS	37176	39240
		12	54	Ball	SS	37501	39466
		13	57	Square	RR	36758	36715
		13	57	0,3	RR	38623	37771
		13	57	0,5	RR	38624	37772
		19	63	Square	RR	37984	02489
		19	63	Ball	RR	62584	02609
		29	75	Square	LL	62197	03124
		29	75	Ball	LL	62628	03164
		38	100	Square	XX	62185	03224
		38	100	Ball	XX	62652	03264
7	7	16	60	Square	RR	36759	36717
	8	19	63	Square	RR	37985	02479
		19	63	Ball	RR	62585	02622
8	8	14	58	Square	SS	37183	39241
		14	58	Ball	SS	37502	39467
		19	63	Square	RR	36760	36719
		19	63	0,5	RR	38625	37773
		19	63	1,0	RR	38626	37774
		19	63	1,5	RR	38627	37775
		20	63	Square	RR	31492	02491
		20	63	Ball	RR	99085	02611
		20	100	Square	RX	31878	30265
		20	100	Ball	RX	37441	37284
		29	75	Square	LL	62198	03125
		29	75	Ball	LL	62629	03165
		41	100	Square	XX	62186	03225
		41	100	Ball	XX	62653	03265
9	9	19	67	Square	RR	36761	36721
	10	22	72	Square	RR	37986	02480
		22	72	Ball	RR	62586	02623
10	10	16	66	Square	SS	37184	39242
		16	66	Ball	SS	37503	39468
		22	72	Square	RR	36762	36723
		22	72	0,5	RR	38628	37776
		22	72	1,0	RR	38629	37777
		22	72	1,5	RR	38630	37778
		25	72	Square	RR	99358	02493
		25	72	Ball	RR	62587	02613
		25	100	Square	RX	31879	30266
		25	100	Ball	RX	37442	37285

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	Standard MG EDP Number
10	10	40	88	Square	LL	37174	30223
		40	88	Ball	LL	37504	39469
		45	100	Square	XX	62187	03226
		45	100	Ball	XX	62654	03266
11	11	26	83	Square	RR	36763	36724
12	12	19	73	Square	SS	37251	39243
		25	76	Square	RR	99359	02495
		25	76	Ball	RR	99356	02615
		26	83	Square	RR	36764	36725
		26	83	0,5	RR	38631	37779
		26	83	1,0	RR	38632	37780
		26	83	1,5	RR	38633	37781
		26	83	Ball	RR	37507	39471
		50	100	Square	LL	62200	03127
		50	100	Ball	LL	62631	03167
		75	150	Square	XX	62188	03227
		75	150	Ball	XX	62655	03267
14	14	26	83	Square	RR	36765	36727
		32	83	Ball	RR	62589	34565
		57	125	Square	LL	62201	03128
		75	150	Square	XX	62189	03228
16	16	25	82	Square	SS	62304	02156
		32	89	Square	RR	37989	02497
		32	89	Ball	RR	62590	02617
		32	92	Square	RR	36766	36729
		57	125	Square	LL	62202	03129
		57	125	Ball	LL	62633	03169
		75	150	Square	XX	62190	03229
18	18	32	92	Square	RR	36767	36730
		57	125	Square	LL	62203	03130
		75	150	Square	XX	62191	03230
20	20	38	100	Square	RR	37991	02499
		38	104	Square	RR	36768	36731
		38	104	Ball	RR	36735	36733
		57	125	Square	LL	62204	03131
		57	125	Ball	LL	62635	03171
		75	150	Square	XX	62192	03231
		75	150	Ball	XX	62659	03271
25	25	45	120	Square	RR	37231	36769
		45	120	Ball	RR	91486	39472
		75	150	Square	XX	62193	03232
		75	150	Ball	XX	62660	03272

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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2 Helical Flutes

For plunging, slotting, contouring and heavy peripheral cuts

E22

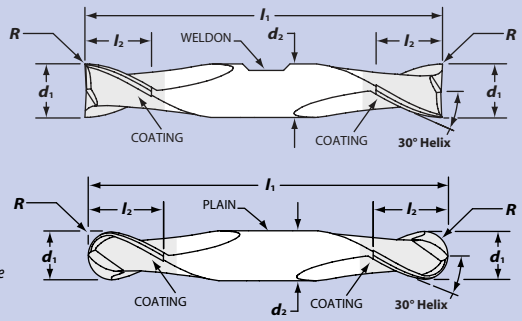
E22 • Square

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	TiCN EDP Number	MG EDP Number	TiN EDP Number
1/32	1/8	1/16	1-1/2	Square	Plain	SR	31802		02261	
		1/16	1-1/2	Ball	Plain	SR	32001		02341	
3/64	1/8	3/32	1-1/2	Square	Plain	SR	31826		02262	
		3/32	1-1/2	Ball	Plain	SR	32002		02342	
1/16	1/8	1/8	1-1/2	Square	Plain	SR	31827	31864	02263	
		1/8	1-1/2	Ball	Plain	SR	32037		02343	
5/64	1/8	1/8	1-1/2	Square	Plain	SR	31828		31832	
3/32	1/8	3/16	1-1/2	Square	Plain	SR	31829	31866	02264	
		3/16	1-1/2	Ball	Plain	SR	30480		02344	
7/64	1/8	3/16	1-1/2	Square	Plain	SR	31849		31833	
1/8	1/8	1/4	1-1/2	Square	Plain	SR	31857	31868	02265	31808
		1/4	1-1/2	Ball	Plain	SR	30579		02345	
		3/8	2	Square	Plain	RL			33280	
		3/8	2	Ball	Plain	RL			33480	
	3/8	3/8	3-1/16	Square	Weldon	RL			02661	
5/32	3/16	5/16	2	Square	Plain	SR	31858	31870	02266	
		5/16	2	Ball	Plain	SR	30578		02346	
	3/8	7/16	3-1/8	Square	Weldon	RL			02662	

continued on next page

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

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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	Standard AlTiN EDP Number	Standard TiCN EDP Number	Standard MG EDP Number	Obsolete* TiN EDP Number
3/16	3/16	3/8	2	Square	Plain	SR	31860	31872	02267	31812
		3/8	2	Ball	Plain	SR	30577		02347	
		1/2	2-1/2	Square	Plain	RL			33282	
		1/2	2-1/2	Ball	Plain	RL			33482	
	3/8	1/2	3-1/4	Square	Weldon	RL			02663	
7/32	1/4	1/2	2-1/2	Square	Plain	SR	31861		02268	
		1/2	2-1/2	Ball	Plain	SR	30586		02348	
	3/8	9/16	3-3/8	Square	Weldon	RL			02664	
1/4	1/4	1/2	2-1/2	Square	Plain	SR	31873	31876	02269	31816
		1/2	2-1/2	Ball	Plain	SR	32082		02349	
		5/8	3	Square	Plain	RL			33284	
		5/8	3	Ball	Plain	RL			33484	
	3/8	5/8	3-3/8	Square	Weldon	RL			02665	
5/16	5/16	1/2	2-1/2	Square	Plain	SR	31882		02270	
	3/8	3/4	3-1/2	Square	Weldon	RL			02667	
3/8	3/8	9/16	2-1/2	Square	Plain	SR	31881	31884	02271	31820
		9/16	2-1/2	Ball	Plain	SR	30589		02351	
		3/4	3-1/2	Square	Plain	RL			33286	
		3/4	3-1/2	Square	Weldon	RL			02669	
		3/4	3-1/2	Ball	Plain	RL			33486	
1/2	1/2	5/8	3	Square	Plain	SR	31885	31892	02273	31824
		5/8	3	Ball	Plain	SR	30590		02353	
		1	4	Square	Plain	RL			33288	
		1	4	Square	Weldon	RL			02671	
		1	4	Ball	Plain	RL			33488	

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 TiCN EDP Number	Standard MG EDP Number	Obsolete* TiN EDP Number
2	3	3	38	Square	Plain	SR	62352		02301	
3	3	6	38	Square	Plain	SR	62354		02303	
4	4	8	50	Square	Plain	SR	62356		02305	
5	5	10	50	Square	Plain	SR	62358		02307	
6	6	12	63	Square	Plain	SR	62359		02308	
8	8	12	63	Square	Plain	SR	62360		02310	
10	10	14	72	Square	Plain	SR	62361		02312	
12	12	16	76	Square	Plain	SR	62362		02314	

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.*

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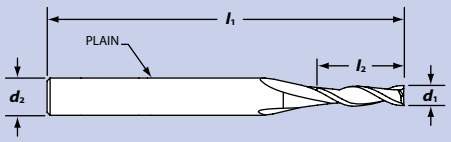
2 Helical Flutes
For micro-machining

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
.002	1/8	.005	1-1/2	SR	90626
.003	1/8	.005	1-1/2	SR	90627
.004	1/8	.006	1-1/2	SR	90628
.005	1/8	.008	1-1/2	SR	90663
		.015	1-1/2	RR	90629
.006	1/8	.009	1-1/2	SR	90664
		.018	1-1/2	RR	90630
.007	1/8	.011	1-1/2	SR	90665
		.021	1-1/2	RR	90631
.008	1/8	.012	1-1/2	SR	90666
		.024	1-1/2	RR	90632
.009	1/8	.014	1-1/2	SR	90667
		.027	1-1/2	RR	90633
.010	1/8	.015	1-1/2	SR	90668
		.030	1-1/2	RR	28131
.011	1/8	.017	1-1/2	SR	90669
		.033	1-1/2	RR	90634
.012	1/8	.018	1-1/2	SR	90670
		.036	1-1/2	RR	90635
.013	1/8	.020	1-1/2	SR	90671
		.039	1-1/2	RR	90636

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
.014	1/8	.021	1-1/2	SR	90672
		.042	1-1/2	RR	90637
.015	1/8	.023	1-1/2	SR	90673
		.045	1-1/2	RR	28132
.016	1/8	.024	1-1/2	SR	90674
		.048	1-1/2	RR	90640
.017	1/8	.026	1-1/2	SR	90675
		.051	1-1/2	RR	90641
.018	1/8	.027	1-1/2	SR	90676
		.054	1-1/2	RR	90642
.019	1/8	.029	1-1/2	SR	90677
		.057	1-1/2	RR	90643
.020	1/8	.030	1-1/2	SR	90678
		.060	1-1/2	RR	28133
.021	1/8	.032	1-1/2	SR	90679
		.063	1-1/2	RR	90644
.022	1/8	.033	1-1/2	SR	90680
		.066	1-1/2	RR	90645
.023	1/8	.035	1-1/2	SR	90681
		.069	1-1/2	RR	90646
.024	1/8	.036	1-1/2	SR	90682
		.072	1-1/2	RR	90647
.025	1/8	.038	1-1/2	SR	90683
		.075	1-1/2	RR	28134
.026	1/8	.039	1-1/2	SR	90684
		.078	1-1/2	RR	90648
.027	1/8	.041	1-1/2	SR	90685
		.081	1-1/2	RR	90649
.028	1/8	.042	1-1/2	SR	90686
		.084	1-1/2	RR	90650
.029	1/8	.044	1-1/2	SR	90687
		.087	1-1/2	RR	90651
.030	1/8	.045	1-1/2	SR	90688
		.090	1-1/2	RR	28135
.040	1/8	.060	1-1/2	SR	90689
		.120	1-1/2	RR	28137
.050	1/8	.075	1-1/2	SR	90690
		.150	1-1/2	RR	28139
.060	1/8	.090	1-1/2	SR	90691
		.180	1-1/2	RR	28141

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.

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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	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	107	168	168	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	137	198	198	.0254	.0508	.0762	.1016	.1270	.1524	.2032
	168	229	229	.0254	.0508	.0762	.1016	.1270	.1524	.2032
Copper Alloys Brass & Bronze	84	107	107	.0152	.0305	.0457	.0635	.0762	.0991	.1270
	91	122	122	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	107	137	137	.0229	.0432	.0660	.0889	.1143	.1397	.1778
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
Magnesium Alloys	107	168	168	.0203	.0381	.0559	.0762	.0940	.1194	.1524
	137	198	198	.0254	.0508	.0762	.1016	.1270	.1524	.2032
	168	229	229	.0254	.0508	.0762	.1016	.1270	.1524	.2032
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
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

TiD-eXtra d.o.o. Industrial Technologies

PROFILE

John Affatati

Menlo Sales Representative

Eastern Michigan

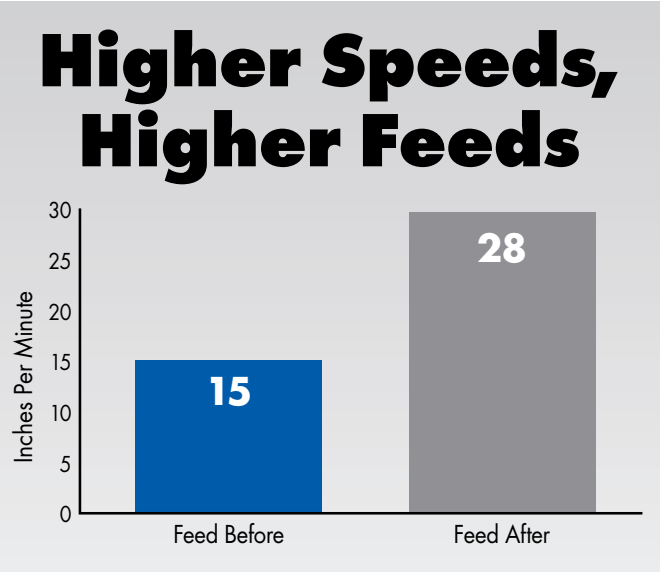
Champagne Grinding & Manufacturing in Canton, Michigan, is one of John Affatati's customers and a very satisfied user of Menlo POW·R·FEED® tools. They were starting a new job in 304 stainless. Because of the size of the piece, they were trying a different approach and having a rough go. John Lapenta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



TiD-eXtra
Industrial Technologies
d.o.o.

"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 Menlo 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 Menlo tools to customers from job shops to Tier 1 suppliers all over Eastern Michigan.

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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.

TiD-extra d.o.o.

DRILLS

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

Menlo 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

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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.

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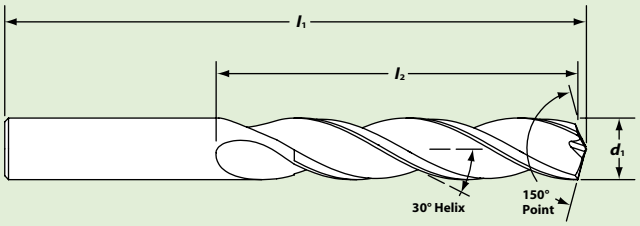
3 Helical Flutes
For improved hole roundness

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
	3	.1181	16	46	44380
	3	.1181	31	57	44217
	3,1	.1220	18	49	44381
	3,1	.1220	31	57	44218
1/8		.1250	1-1/4	2-1/4	44006
	3,2	.1260	18	49	44382
	3,2	.1260	31	57	44219
	3,3	.1299	18	49	63047
	3,3	.1299	31	57	44221

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
	3,4	.1339	20	52	44384
	3,4	.1339	34	63	44222
#29		.1360	1-3/8	2-1/2	44079
	3,5	.1378	20	52	44385
	3,5	.1378	34	63	44223
9/64		.1406	1-3/8	2-1/2	44007
	3,6	.1417	20	52	44386
	3,6	.1417	34	63	44224
	3,7	.1457	20	52	44387
	3,7	.1457	34	63	44225
#25		.1495	1-3/8	2-1/2	44075
	3,8	.1496	22	55	44388
	3,8	.1496	34	63	44227
	3,9	.1535	22	55	44389
	3,9	.1535	34	63	44228
5/32		.1562	1-3/8	2-1/2	44008
	4	.1575	22	55	44390
	4	.1575	34	63	44229
#21		.1590	1-3/8	2-1/2	44071
#20		.1610	1-3/8	2-1/2	44070
	4,1	.1614	22	55	44391
	4,1	.1614	34	63	44230
	4,2	.1654	22	55	44392
	4,2	.1654	41	70	44231
#19		.1660	1-5/8	2-3/4	44069
11/64		.1719	1-5/8	2-3/4	44009
	4,4	.1732	24	58	44394
	4,4	.1732	41	70	44234
	4,5	.1772	24	58	44395
	4,5	.1772	41	70	44235
	4,6	.1811	24	58	44396
	4,6	.1811	41	70	44236
3/16		.1875	1-5/8	2-3/4	44010
	4,8	.1890	26	62	44398
	4,8	.1890	41	70	44239
	4,9	.1929	26	62	44399
	4,9	.1929	41	70	44240
	5	.1969	26	62	44400
	5	.1969	44	76	44241
	5,1	.2008	26	62	44401
	5,1	.2008	44	76	44242
13/64		.2031	1-3/4	3	44011
	5,2	.2047	26	62	44402
	5,2	.2047	44	76	44243
#3		.2130	1-3/4	3	44053
	5,5	.2165	28	66	44404
	5,5	.2165	44	76	44247
7/32		.2188	1-3/4	3	44012
	5,6	.2205	28	66	44405
	5,6	.2205	44	76	44248
	5,8	.2283	28	66	44406
	5,8	.2283	44	76	44251

continued on next page

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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
15/64		.2344	2	3-1/4	44013
	6	.2362	28	66	44407
	6	.2362	51	82	44253
	6,1	.2402	31	70	44408
	6,1	.2402	51	82	44254
	6,2	.2441	31	70	44409
	6,2	.2441	51	82	44255
1/4		.2500	2	3-1/4	44014
	6,4	.2520	31	70	44411
	6,4	.2520	51	82	44258
	6,5	.2559	31	70	44412
	6,5	.2559	51	82	44259
F		.2570	2	3-1/4	44156
	6,6	.2598	31	70	44413
	6,6	.2598	54	89	44260
17/64		.2656	2-1/8	3-1/2	44015
	6,8	.2677	34	74	44415
	6,8	.2677	54	89	44263
	6,9	.2717	34	74	44416
	6,9	.2717	54	89	44264
	7	.2756	34	74	44417
	7	.2756	54	89	44265
9/32		.2812	2-1/8	3-1/2	44016
	7,2	.2835	34	74	44418
	7,2	.2835	54	89	44267
	7,4	.2913	34	74	44420
	7,4	.2913	60	95	44270
	7,5	.2953	34	74	44421
	7,5	.2953	60	95	44271
19/64		.2969	2-3/8	3-3/4	44017
	7,6	.2992	37	79	44422
	7,6	.2992	60	95	44272
	7,8	.3071	37	79	44423
	7,8	.3071	60	95	44275
5/16		.3125	2-3/8	3-3/4	44018
	8	.3150	37	79	63141
	8	.3150	60	95	44277
	8,1	.3189	37	79	44424
	8,1	.3189	60	95	44278
	8,2	.3228	37	79	44425
	8,2	.3228	63	101	44279
21/64		.3281	2-1/2	4	44019
	8,4	.3307	37	79	44427
	8,4	.3307	63	101	44282
Q		.3320	2-1/2	4	44167
	8,5	.3346	37	79	44428
	8,5	.3346	63	101	44283
	8,6	.3386	40	84	44429
	8,6	.3386	63	101	44284
11/32		.3438	2-1/2	4	44020
	8,8	.3465	40	84	44431
	8,8	.3465	63	101	44287

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
	9	.3543	40	84	44432
	9	.3543	70	108	44289
	9,1	.3583	40	84	44433
	9,1	.3583	70	108	44290
23/64		.3594	2-3/4	4-1/4	44021
	9,2	.3622	40	84	44434
	9,2	.3622	70	108	44291
	9,5	.3740	40	84	44435
	9,5	.3740	70	108	44295
3/8		.3750	2-3/4	4-1/4	44022
	9,6	.3780	43	89	44436
	9,6	.3780	70	108	44296
25/64		.3906	2-7/8	4-1/2	44023
	10	.3937	43	89	44438
	10	.3937	73	114	44301
	10,2	.4016	43	89	44440
	10,2	.4016	73	114	44303
13/32		.4062	2-7/8	4-1/2	44024
	10,4	.4094	43	89	44442
	10,4	.4094	73	114	44306
	10,5	.4134	43	89	44443
	10,5	.4134	73	114	44307
27/64		.4219	2-7/8	4-1/2	44025
	10,8	.4252	47	95	44445
	10,8	.4252	73	114	44311
	11	.4331	47	95	44446
	11	.4331	73	114	44313
7/16		.4375	2-7/8	4-1/2	44026
	11,5	.4528	47	95	44448
	11,5	.4528	76	120	44319
29/64		.4531	3	4-3/4	44027
	12	.4724	51	102	44450
	12	.4724	76	120	44325
	12,5	.4921	51	102	44451
	12,5	.4921	76	120	44331
1/2		.5000	3	4-3/4	44030
	13	.5118	51	102	44452
	13	.5118	82	127	44336
	13,5	.5315	54	107	44453
	13,5	.5315	82	127	44337
	14	.5512	54	107	44454
	14	.5512	82	127	44338
9/16		.5625	3-1/4	5	41020
	14,5	.5709	56	111	44455
	14,5	.5709	82	127	44339
	15	.5906	56	111	44456
	15	.5906	82	127	44340
	15,5	.6102	58	115	44457
	15,5	.6102	82	127	44341
5/8		.6250	3-1/4	5	41040
	16	.6299	58	115	44458
	16	.6299	82	127	44342

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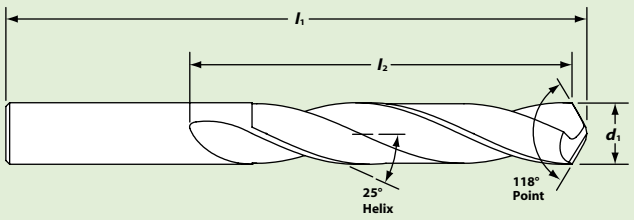
2 Helical Flutes

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
	1	.0394	19	38	04181
#60		.0400	3/4	1-1/2	04110
#59		.0410	3/4	1-1/2	04109
	1,05	.0413	19	38	04182
#58		.0420	3/4	1-1/2	04108
#57		.0430	3/4	1-1/2	04107
	1,1	.0433	19	38	04183
	1,15	.0453	19	38	04184
#56		.0465	3/4	1-1/2	04106
3/64		.0469	3/4	1-1/2	04001
	1,2	.0472	19	38	04185
	1,25	.0492	19	38	04186
	1,3	.0512	19	38	04187
#55		.0520	3/4	1-1/2	04105
	1,35	.0531	19	38	04188
#54		.0550	3/4	1-1/2	04104
	1,4	.0551	19	38	04189
	1,45	.0571	19	38	04190
	1,5	.0591	19	38	04191
#53		.0595	3/4	1-1/2	04103
	1,55	.0610	19	38	04192
1/16		.0625	3/4	1-1/2	04002
	1,6	.0630	19	38	04193
#52		.0635	3/4	1-1/2	04102
	1,65	.0650	19	38	04194
	1,7	.0669	19	38	04195
#51		.0670	3/4	1-1/2	04101
	1,75	.0689	19	38	04196
#50		.0700	7/8	1-3/4	04100
	1,8	.0709	22	44	04197
	1,85	.0728	22	44	04198
#49		.0730	7/8	1-3/4	04099
	1,9	.0748	22	44	04199
#48		.0760	7/8	1-3/4	04098
	1,95	.0768	22	44	04200
5/64		.0781	7/8	1-3/4	04003
#47		.0785	7/8	1-3/4	04097
	2	.0787	22	44	04201
	2,05	.0807	22	44	04202
#46		.0810	7/8	1-3/4	04096
#45		.0820	7/8	1-3/4	04095
	2,1	.0827	22	44	04203
	2,15	.0846	25	50	04204
#44		.0860	1	2	04094
	2,2	.0866	25	50	04205
	2,25	.0886	25	50	04206
#43		.0890	1	2	04093
	2,3	.0906	25	50	04207
	2,35	.0925	25	50	04208
#42		.0935	1	2	04092
3/32		.0938	1	2	04004
	2,4	.0945	25	50	04209
#41		.0960	1	2	04091

continued on next page

TiD-eXtra Industrial Technologies d.o.o.

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
	2,45	.0965	25	50	04210
#40		.0980	1	2	04090
	2,5	.0984	25	50	04211
#39		.0995	1-1/4	2-1/4	04089
#38		.1015	1-1/4	2-1/4	04088
	2,6	.1024	31	57	04212
#37		.1040	1-1/4	2-1/4	04087
	2,7	.1063	31	57	04213
#36		.1065	1-1/4	2-1/4	04086
	2,75	.1083	31	57	04214
7/64		.1094	1-1/4	2-1/4	04005
#35		.1100	1-1/4	2-1/4	04085
	2,8	.1102	31	57	04215
#34		.1110	1-1/4	2-1/4	04084
#33		.1130	1-1/4	2-1/4	04083
	2,9	.1142	31	57	04216
#32		.1160	1-1/4	2-1/4	04082
	3	.1181	31	57	04217
#31		.1200	1-1/4	2-1/4	04081
	3,1	.1220	31	57	04218
1/8		.1250	1-1/4	2-1/4	04006
	3,2	.1260	31	57	04219
	3,25	.1280	31	57	04220
#30		.1285	1-1/4	2-1/4	04080
	3,3	.1299	31	57	04221
	3,4	.1339	34	63	04222
#29		.1360	1-3/8	2-1/2	04079
	3,5	.1378	34	63	04223
#28		.1405	1-3/8	2-1/2	04078
9/64		.1406	1-3/8	2-1/2	04007
	3,6	.1417	34	63	04224
#27		.1440	1-3/8	2-1/2	04077
	3,7	.1457	34	63	04225
#26		.1470	1-3/8	2-1/2	04076
	3,75	.1476	34	63	04226
#25		.1495	1-3/8	2-1/2	04075
	3,8	.1496	34	63	04227
#24		.1520	1-3/8	2-1/2	04074
	3,9	.1535	34	63	04228
#23		.1540	1-3/8	2-1/2	04073
5/32		.1562	1-3/8	2-1/2	04008
#22		.1570	1-3/8	2-1/2	04072
	4	.1575	34	63	04229

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
#21		.1590	1-3/8	2-1/2	04071
#20		.1610	1-3/8	2-1/2	04070
	4,1	.1614	34	63	04230
	4,2	.1654	41	70	04231
#19		.1660	1-5/8	2-3/4	04069
	4,25	.1673	41	70	04232
	4,3	.1693	41	70	04233
#18		.1695	1-5/8	2-3/4	04068
11/64		.1719	1-5/8	2-3/4	04009
#17		.1730	1-5/8	2-3/4	04067
	4,4	.1732	41	70	04234
#16		.1770	1-5/8	2-3/4	04066
	4,5	.1772	41	70	04235
#15		.1800	1-5/8	2-3/4	04065
	4,6	.1811	41	70	04236
#14		.1820	1-5/8	2-3/4	04064
	4,7	.1850	41	70	04237
#13		.1850	1-5/8	2-3/4	04063
	4,75	.1870	41	70	04238
3/16		.1875	1-5/8	2-3/4	04010
	4,8	.1890	41	70	04239
#12		.1890	1-5/8	2-3/4	04062
#11		.1910	1-5/8	2-3/4	04061
	4,9	.1929	41	70	04240
#10		.1935	1-5/8	2-3/4	04060
#9		.1960	1-3/4	3	04059
	5	.1969	44	76	04241
#8		.1990	1-3/4	3	04058
	5,1	.2008	44	76	04242
#7		.2010	1-3/4	3	04057
13/64		.2031	1-3/4	3	04011
#6		.2040	1-3/4	3	04056
	5,2	.2047	44	76	04243
#5		.2055	1-3/4	3	04055
	5,25	.2067	44	76	04244
	5,3	.2087	44	76	04245
#4		.2090	1-3/4	3	04054
	5,4	.2126	44	76	04246
#3		.2130	1-3/4	3	04053
	5,5	.2165	44	76	04247
7/32		.2188	1-3/4	3	04012
	5,6	.2205	44	76	04248
#2		.2210	1-3/4	3	04052

continued on next page

D20 Sets

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

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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
	5,7	.2244	44	76	04249
	5,75	.2264	44	76	04250
#1		.2280	1-3/4	3	04051
	5,8	.2283	44	76	04251
	5,9	.2323	51	82	04252
A		.2340	2	3-1/4	04151
15/64		.2344	2	3-1/4	04013
	6	.2362	51	82	04253
B		.2380	2	3-1/4	04152
	6,1	.2402	51	82	04254
C		.2420	2	3-1/4	04153
	6,2	.2441	51	82	04255
D		.2460	2	3-1/4	04154
	6,25	.2461	51	82	04256
	6,3	.2480	51	82	04257
1/4		.2500	2	3-1/4	04014
	6,4	.2520	51	82	04258
	6,5	.2559	51	82	04259
F		.2570	2	3-1/4	04156
	6,6	.2598	54	89	04260
G		.2610	2-1/8	3-1/2	04157
	6,7	.2638	54	89	04261
17/64		.2656	2-1/8	3-1/2	04015
	6,75	.2657	54	89	04262
H		.2660	2-1/8	3-1/2	04158
	6,8	.2677	54	89	04263
	6,9	.2717	54	89	04264
I		.2720	2-1/8	3-1/2	04159
	7	.2756	54	89	04265
J		.2770	2-1/8	3-1/2	04160
	7,1	.2795	54	89	04266
K		.2810	2-1/8	3-1/2	04161
9/32		.2812	2-1/8	3-1/2	04016
	7,2	.2835	54	89	04267
	7,25	.2854	54	89	04268
	7,3	.2874	54	89	04269
L		.2900	2-1/8	3-1/2	04162
	7,4	.2913	60	95	04270
M		.2950	2-3/8	3-3/4	04163
	7,5	.2953	60	95	04271
19/64		.2969	2-3/8	3-3/4	04017
	7,6	.2992	60	95	04272
N		.3020	2-3/8	3-3/4	04164
	7,7	.3031	60	95	04273
	7,75	.3051	60	95	04274
	7,8	.3071	60	95	04275
	7,9	.3110	60	95	04276
5/16		.3125	2-3/8	3-3/4	04018
	8	.3150	60	95	04277
O		.3160	2-3/8	3-3/4	04165
	8,1	.3189	60	95	04278
	8,2	.3228	60	95	04279

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
P		.3230	2-3/8	3-3/4	04166
	8,25	.3248	63	101	04280
	8,3	.3268	63	101	04281
21/64		.3281	2-1/2	4	04019
	8,4	.3307	63	101	04282
Q		.3320	2-1/2	4	04167
	8,5	.3346	63	101	04283
	8,6	.3386	63	101	04284
R		.3390	2-1/2	4	04168
	8,7	.3425	63	101	04285
11/32		.3438	2-1/2	4	04020
	8,75	.3445	63	101	04286
	8,8	.3465	63	101	04287
S		.3480	2-1/2	4	04169
	8,9	.3504	63	101	04288
	9	.3543	70	108	04289
T		.3580	2-3/4	4-1/4	04170
	9,1	.3583	70	108	04290
23/64		.3594	2-3/4	4-1/4	04021
	9,2	.3622	70	108	04291
	9,25	.3642	70	108	04292
	9,3	.3661	70	108	04293
U		.3680	2-3/4	4-1/4	04171
	9,4	.3701	70	108	04294
	9,5	.3740	70	108	04295
3/8		.3750	2-3/4	4-1/4	04022
V		.3770	2-3/4	4-1/4	04172
	9,6	.3780	70	108	04296
	9,7	.3819	70	108	04297
	9,75	.3839	70	108	04298
	9,8	.3858	70	108	04299
W		.3860	2-7/8	4-1/2	04173
	9,9	.3898	73	114	04300
25/64		.3906	2-7/8	4-1/2	04023
	10	.3937	73	114	04301
X		.3970	2-7/8	4-1/2	04174
	10,1	.3976	73	114	04302
	10,2	.4016	73	114	04303
	10,25	.4035	73	114	04304
Y		.4040	2-7/8	4-1/2	04175
	10,3	.4055	73	114	04305
13/32		.4062	2-7/8	4-1/2	04024
	10,4	.4094	73	114	04306
Z		.4130	2-7/8	4-1/2	04176
	10,5	.4134	73	114	04307
	10,6	.4173	73	114	04308
	10,7	.4213	73	114	04309
27/64		.4219	2-7/8	4-1/2	04025
	10,75	.4232	73	114	04310
	10,8	.4252	73	114	04311
	10,9	.4291	73	114	04312
	11	.4331	73	114	04313
	11,1	.4370	73	114	04314

continued on next page

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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
7/16		.4375	2-7/8	4-1/2	04026
	11,2	.4409	76	120	04315
	11,25	.4429	76	120	04316
	11,3	.4449	76	120	04317
	11,4	.4488	76	120	04318
	11,5	.4528	76	120	04319
29/64		.4531	3	4-3/4	04027
	11,6	.4567	76	120	04320
	11,7	.4606	76	120	04321
	11,75	.4626	76	120	04322
	11,8	.4646	76	120	04323
	11,9	.4685	76	120	04324
15/32		.4688	3	4-3/4	04028
	12	.4724	76	120	04325
	12,1	.4764	76	120	04326
	12,2	.4803	76	120	04327
	12,25	.4823	76	120	04328
	12,3	.4843	76	120	04329
31/64		.4844	3	4-3/4	04029
	12,4	.4882	76	120	04330
	12,5	.4921	76	120	04331
	12,6	.4961	76	120	04332
	12,7	.5000	76	120	04333
1/2		.5000	3	4-3/4	04030

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
	13	.5118	82	127	04334
17/32		.5312	3-1/4	5	91010
	13,5	.5315	82	127	04335
	14	.5512	82	127	04336
9/16		.5625	3-1/4	5	91020
	14,5	.5709	82	127	04337
	15	.5906	82	127	04338
19/32		.5937	3-1/4	5	91030
	15,5	.6102	82	127	04339
5/8		.6250	3-1/4	5	91040
	16	.6299	82	127	04340
	16,5	.6496	89	140	04341
21/32		.6562	3-1/2	5-1/2	91050
	17	.6693	89	140	04342
11/16		.6875	3-1/2	5-1/2	91060
	17,5	.6890	89	140	04343
	18	.7087	89	140	04344
23/32		.7187	3-1/2	5-1/2	91070
	18,5	.7283	89	140	04345
	19	.7480	95	152	04346
3/4		.7500	3-3/4	6	91071
	19,5	.7677	95	152	04347
25/32		.7812	3-3/4	6	91072
	20	.7874	95	152	04348

2 Helical Flutes

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

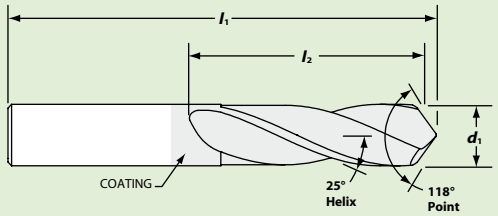
D21

Solid carbide

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

✓ Good ✓✓ Very Good

Coating:
TiN



in d_1 +0.0 / -0.0005

Inch

d_1 Cutter Dia	Dec Equiv	l_2 Flute Length	l_1 Overall Length	TiN EDP Number
1/8	.1250	5/8	2	41408
9/64	.1406	5/8	2	41409
5/32	.1562	3/4	2-1/2	41410
11/64	.1719	3/4	2-1/2	41411
3/16	.1875	3/4	2-1/2	41412
13/64	.2031	3/4	2-1/2	41413
7/32	.2188	1	2-1/2	41414
15/64	.2344	1	2-1/2	41415
1/4	.2500	1	2-1/2	41416
17/64	.2656	1	2-1/2	41417
9/32	.2812	1	2-1/2	41418
19/64	.2969	1-1/4	2-3/4	41419
5/16	.3125	1-1/4	2-3/4	41420

continued in next column

Inch • Continued

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

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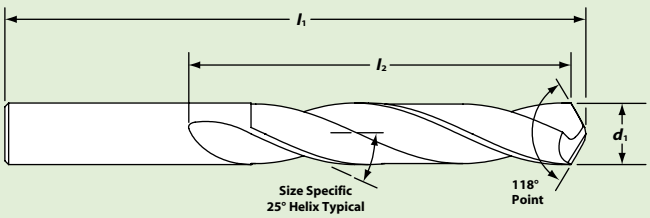
2 Helical Flutes

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
#32		.1160	1-5/8	2-3/4	40898
	3	.1181	41	70	41901
#31		.1200	1-5/8	2-3/4	40897
1/8		.1250	1-5/8	2-3/4	40801
#30		.1285	1-5/8	2-3/4	40896
#29		.1360	2	3-1/8	40895
	3,5	.1378	44	73	41906
#28		.1405	2	3-1/8	40894
9/64		.1406	2	3-1/8	40802
#27		.1440	2	3-1/8	40893
#26		.1470	2	3-1/8	40892
#25		.1495	2	3-1/8	40891
#24		.1520	2	3-1/8	40890
#23		.1540	2	3-1/8	40889
5/32		.1562	2	3-1/8	40803
#22		.1570	2	3-1/8	40888
	4	.1575	54	83	41911
#21		.1590	2	3-1/8	40887
#20		.1610	2-5/16	3-1/2	40886
#19		.1660	2-5/16	3-1/2	40885
#18		.1695	2-5/16	3-1/2	40884
11/64		.1719	2-5/16	3-1/2	40804
#17		.1730	2-5/16	3-1/2	40883
#16		.1770	2-5/16	3-1/2	40882
	4,5	.1772	56	86	41916
#15		.1800	2-5/16	3-1/2	40881
#14		.1820	2-5/16	3-1/2	40880
#13		.1850	2-5/16	3-1/2	40879
3/16		.1875	2-5/16	3-1/2	40805
#12		.1890	2-5/16	3-1/2	40878
#11		.1910	2-5/16	3-1/2	40877
#10		.1935	2-1/2	3-3/4	40876
#9		.1960	2-1/2	3-3/4	40875
	5	.1969	62	92	41919
#8		.1990	2-1/2	3-3/4	40874
#7		.2010	2-1/2	3-3/4	40873
13/64		.2031	2-1/2	3-3/4	40806
#6		.2040	2-1/2	3-3/4	40872
#5		.2055	2-1/2	3-3/4	40871
#4		.2090	2-1/2	3-3/4	40870
#3		.2130	2-1/2	3-3/4	40869
	5,5	.2165	64	95	41924
7/32		.2188	2-1/2	3-3/4	40807
#2		.2210	2-1/2	3-3/4	40868
#1		.2280	2-3/4	4	40867
A		.2340	2-3/4	4	40841
15/64		.2344	2-3/4	4	40808
	6	.2362	70	102	41929
B		.2380	2-3/4	4	40842
C		.2420	2-3/4	4	40843
D		.2460	2-3/4	4	40844
1/4		.2500	2-3/4	4	40809

continued on next page

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Inch • Metric • Continued

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

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
	9	.3543	89	124	41959
T		.3580	3-5/8	5	40860
23/64		.3594	3-5/8	5	40816
U		.3680	3-5/8	5	40861
	9,5	.3740	92	127	41964
3/8		.3750	3-5/8	5	40817
V		.3770	3-5/8	5	40862
W		.3860	3-7/8	5-1/4	40863
25/64		.3906	3-7/8	5-1/4	40818
	10	.3937	95	130	41969
X		.3970	3-7/8	5-1/4	40864
Y		.4040	3-7/8	5-1/4	40865
13/32		.4062	3-7/8	5-1/4	40819
Z		.4130	4-1/16	5-1/2	40866
	10,5	.4134	98	133	41974
27/64		.4219	4-1/16	5-1/2	40820
	11	.4331	103	140	41979
7/16		.4375	4-1/16	5-1/2	40821
	11,5	.4528	106	143	41984
29/64		.4531	4-5/16	5-3/4	40822
15/32		.4688	4-5/16	5-3/4	40823
	12	.4724	111	149	41989
31/64		.4844	4-1/2	6	40824
	12,5	.4921	114	152	41994
1/2		.5000	4-1/2	6	40825

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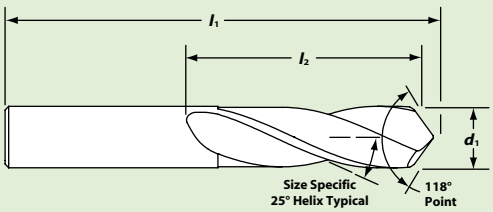
2 Helical Flutes

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



in d_1 +0.0 / -0.0005

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
1/8	.1250	7/8	1-7/8	41308
9/64	.1406	1	2-1/16	41309
5/32	.1562	1	2-1/16	41310
11/64	.1719	1-1/8	2-3/16	41311
3/16	.1875	1-1/8	2-3/16	41312
13/64	.2031	1-1/4	2-3/8	41313
7/32	.2188	1-1/4	2-3/8	41314
15/64	.2344	1-3/8	2-1/2	41315
1/4	.2500	1-3/8	2-1/2	41316
17/64	.2656	1-1/2	2-11/16	41317
9/32	.2812	1-1/2	2-11/16	41318
19/64	.2969	1-5/8	2-13/16	41319

continued in next column

Inch • Continued

d_1 Cutter Dia	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number
5/16	.3125	1-5/8	2-13/16	41320
21/64	.3281	1-11/16	3	41321
11/32	.3438	1-11/16	3	41322
23/64	.3594	1-13/16	3-1/8	41323
3/8	.3750	1-13/16	3-1/8	41324
25/64	.3906	1-15/16	3-5/16	41325
13/32	.4062	1-15/16	3-5/16	41326
27/64	.4219	2-1/16	3-7/16	41327
7/16	.4375	2-1/16	3-7/16	41328
15/32	.4688	2-1/8	3-5/8	41329
1/2	.5000	2-1/4	3-3/4	41330

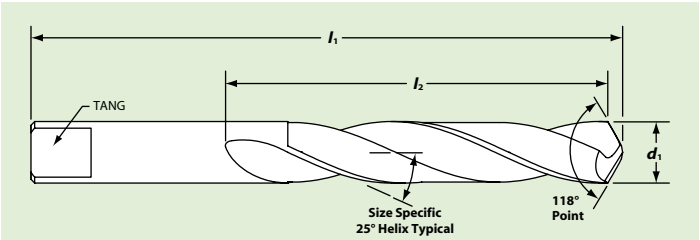
TAPER LENGTH DT22 DRILLS

For general purpose drilling applications

2 Helical Flutes

For use in non-ferrous materials

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



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

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

Inch • Metric

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

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2 Helical Flutes

For spotting and centering

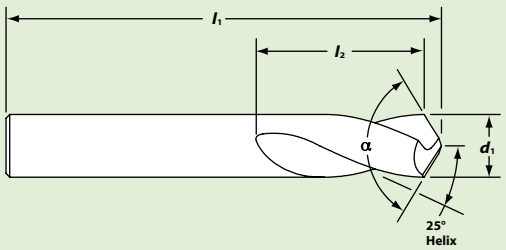
D23

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	α = 120° EDP Number
	3	.118 1	10	50	42020	42120
1/8		.1250	9/16	1-1/2	42001	42101
3/16		.1875	3/4	2	42003	42103
	5	.1969	19	63	42022	42122
	6	.2362	25	63	42023	42123
	6	.2362	25	152	42025	42125
1/4		.2500	1	2-1/2	42005	42105
1/4		.2500	1	6	42007	42107
5/16		.3125	1	2-1/2	42008	42108
5/16		.3125	1	6	42010	42110
	8	.3150	25	63	42026	42126
	8	.3150	25	152	42028	42128
3/8		.3750	1	2-1/2	42011	42111
3/8		.3750	1	6	42013	42113
	10	.3937	25	70	42029	42129
	10	.3937	25	152	42031	42131
	12	.4724	31	76	42032	42132
	12	.4724	31	152	42033	42133
1/2		.5000	1-1/2	3	42014	42114
1/2		.5000	1-1/2	6	42015	42115
5/8		.6250	1-1/2	6	42016	42116
	16	.6299	38	152	42035	42135
3/4		.7500	1-1/2	6	42017	42117
	20	.7874	38	152	42036	42136

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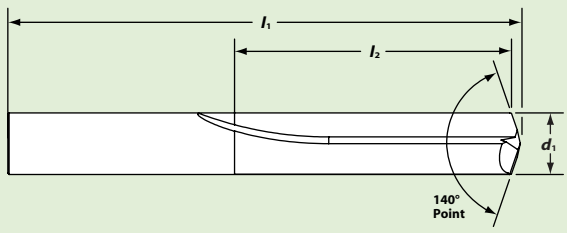
2 Straight Flutes
For shallow drilling of hard materials

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
	1	.0394	9	32	04581
#60		.0400	1/2	1-1/2	04510
#59		.0410	1/2	1-1/2	04509
#58		.0420	1/2	1-1/2	04508
#57		.0430	1/2	1-1/2	04507
	1,1	.0433	9	32	04583
#56		.0465	1/2	1-1/2	04506
3/64		.0469	1/2	1-1/2	04401
	1,2	.0472	9	32	04585
	1,25	.0492	9	32	04586
	1,3	.0512	9	32	04587
#55		.0520	1/2	1-5/8	04505
#54		.0550	1/2	1-5/8	04504
	1,4	.0551	9	32	04589
	1,5	.0591	9	32	04591
#53		.0595	1/2	1-5/8	04503
1/16		.0625	5/8	1-5/8	04402
	1,6	.0630	10	34	04593
#52		.0635	11/16	1-11/16	04502
	1,7	.0669	10	34	04595
#51		.0670	11/16	1-11/16	04501
	1,75	.0689	11	36	04596
#50		.0700	11/16	1-11/16	04500
	1,8	.0709	11	36	04597
#49		.0730	11/16	1-11/16	04499
	1,9	.0748	11	36	04599
5/64		.0781	11/16	1-11/16	04403
#47		.0785	3/4	1-3/4	04497
	2	.0787	12	38	04601
#46		.0810	3/4	1-3/4	04496
#45		.0820	3/4	1-3/4	04495
	2,1	.0827	12	38	04603
#44		.0860	3/4	1-3/4	04494
	2,2	.0866	13	40	04605
#43		.0890	3/4	1-3/4	04493
	2,3	.0906	13	40	04607
#42		.0935	3/4	1-3/4	04492
3/32		.0938	3/4	1-3/4	04404
	2,4	.0945	14	43	04609
#41		.0960	13/16	1-13/16	04491
#40		.0980	13/16	1-13/16	04490
	2,5	.0984	14	43	04611
#39		.0995	13/16	1-13/16	04489
#38		.1015	13/16	1-13/16	04488
	2,6	.1024	14	43	04612
#37		.1040	13/16	1-13/16	04487
	2,7	.1063	16	46	04613
#36		.1065	13/16	1-13/16	04486
7/64		.1094	13/16	1-13/16	04405
	2,8	.1102	16	46	04615
#34		.1110	7/8	1-7/8	04484
#33		.1130	7/8	1-7/8	04483
	2,9	.1142	16	46	04616
#32		.1160	7/8	1-7/8	04482

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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
	3	.1181	16	46	04617
#31		.1200	7/8	1-7/8	04481
	3,1	.1220	18	49	04618
1/8		.1250	7/8	1-7/8	04406
	3,2	.1260	18	49	04619
#30		.1285	15/16	1-15/16	04480
	3,3	.1299	18	49	04621
	3,4	.1339	20	52	04622
#29		.1360	15/16	1-15/16	04479
	3,5	.1378	20	52	04623
9/64		.1406	15/16	1-15/16	04407
	3,6	.1417	20	52	04624
#27		.1440	1	2-1/16	04477
	3,7	.1457	20	52	04625
#26		.1470	1	2-1/16	04476
#25		.1495	1	2-1/16	04475
	3,8	.1496	22	55	04627
5/32		.1562	1	2-1/16	04408
	4	.1575	22	55	04629
#21		.1590	1-1/16	2-1/8	04471
#20		.1610	1-1/16	2-1/8	04470
	4,1	.1614	22	55	04630
	4,2	.1654	22	55	04631
	4,3	.1693	24	58	04633
11/64		.1719	1-1/16	2-1/8	04409
#16		.1770	1-1/8	2-3/16	04466
	4,5	.1772	24	58	04635
	4,6	.1811	24	58	04636
#14		.1820	1-1/8	2-3/16	04464
#13		.1850	1-1/8	2-3/16	04463
3/16		.1875	1-1/8	2-3/16	04410
	4,8	.1890	26	62	04639
#12		.1890	1-1/8	2-3/16	04462
#11		.1910	1-1/8	2-3/16	04461
#10		.1935	1-1/8	2-3/16	04460
#9		.1960	1-3/16	2-1/4	04459
	5	.1969	26	62	04641
	5,1	.2008	26	62	04642
#7		.2010	1-3/16	2-1/4	04457
13/64		.2031	1-3/16	2-1/4	04411
	5,2	.2047	26	62	04643
	5,3	.2087	26	62	04645
#4		.2090	1-1/4	2-3/8	04454
	5,4	.2126	26	62	04646
#3		.2130	1-1/4	2-3/8	04453
	5,5	.2165	28	66	04647
7/32		.2188	1-1/4	2-3/8	04412
	5,6	.2205	28	66	04648
	5,7	.2244	28	66	04649
#1		.2280	1-5/16	2-7/16	04451
	5,8	.2283	28	66	04651
	5,9	.2323	28	66	04652
15/64		.2344	1-5/16	2-7/16	04413
	6	.2362	28	66	04653

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number
	6,1	.2402	31	70	04654
	6,2	.2441	31	70	04655
	6,3	.2480	31	70	04657
1/4		.2500	1-3/8	2-1/2	04414
	6,4	.2520	31	70	04658
	6,5	.2559	31	70	04659
F		.2570	1-7/16	2-5/8	04556
17/64		.2656	1-7/16	2-5/8	04415
	6,8	.2677	34	74	04663
	6,9	.2717	34	74	04664
I		.2720	1-1/2	2-11/16	04559
	7	.2756	34	74	04665
	7,1	.2795	34	74	04666
9/32		.2812	1-1/2	2-11/16	04416
	7,2	.2835	34	74	04667
	7,3	.2874	34	74	04669
	7,4	.2913	34	74	04670
	7,5	.2953	34	74	04671
19/64		.2969	1-9/16	2-3/4	04417
	7,8	.3071	37	79	04675
	7,9	.3110	37	79	04676
5/16		.3125	1-5/8	2-13/16	04418
	8	.3150	37	79	04677
	8,1	.3189	37	79	04678
	8,3	.3268	37	79	04681
21/64		.3281	1-11/16	2-15/16	04419
Q		.3320	1-11/16	3	04567
	8,5	.3346	37	79	04683
11/32		.3438	1-11/16	3	04420
	8,8	.3465	40	84	04687
	9	.3543	40	84	04689
23/64		.3594	1-3/4	3-1/16	04421
	9,3	.3661	40	84	04693
U		.3680	1-13/16	3-1/8	04571
	9,5	.3740	40	84	04695
3/8		.3750	1-13/16	3-1/8	04422
	9,7	.3819	43	89	04697
	9,9	.3898	43	89	04700
25/64		.3906	1-7/8	3-1/4	04423
	10	.3937	43	89	04701
	10,2	.4016	43	89	04703
13/32		.4062	1-15/16	3-5/16	04424
	10,5	.4134	43	89	04707
27/64		.4219	2	3-3/8	04425
	10,8	.4252	47	95	04711
	11	.4331	47	95	04713
7/16		.4375	2-1/16	3-7/16	04426
	11,5	.4528	47	95	04719
15/32		.4688	2-1/8	3-5/8	04428
	12	.4724	51	102	04725
	12,5	.4921	51	102	04731
1/2		.5000	2-1/4	3-3/4	04430

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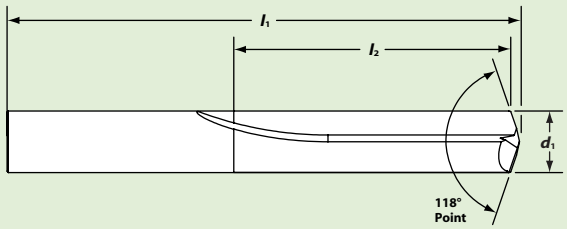
2 Straight Flutes

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	✓

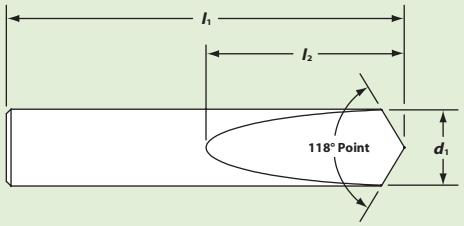
✓Good ✓✓Very Good

Inch

d_1 Cutter Dia	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number
3/16	.1875	1-1/2	3-1/2	41003
13/64	.2031	1-3/4	3-3/4	41004
7/32	.2188	1-3/4	3-3/4	41005
15/64	.2344	2	4	41006
1/4	.2500	2	4	41007
17/64	.2656	2-1/4	4-1/4	41008
9/32	.2812	2-1/4	4-1/4	41009
19/64	.2969	2-1/2	4-1/2	41346
5/16	.3125	2-1/2	4-1/2	41011
21/64	.3281	2-3/4	4-3/4	41012
11/32	.3438	2-3/4	4-3/4	41013
23/64	.3594	3	5	41014
3/8	.3750	3	5	41015
25/64	.3906	3	5-1/4	41016
13/32	.4062	3	5-1/4	41017
27/64	.4219	3	5-1/2	41018
7/16	.4375	3	5-1/2	41019

d_1 Cutter Dia	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number
29/64	.4531	3-1/4	5-3/4	41348
15/32	.4688	3-1/4	5-3/4	41021
31/64	.4844	3-1/2	6	41022
1/2	.5000	3-1/2	6	41023
17/32	.5312	3-1/2	6	41025
9/16	.5625	3-1/2	6	41027
19/32	.5937	4	7	41029
5/8	.6250	4	7	41031
21/32	.6562	4-1/2	7-1/2	41033
11/16	.6875	4-1/2	7-1/2	41035
23/32	.7187	4-3/4	8	41037
3/4	.7500	4-3/4	8	41039
13/16	.8125	4-3/4	8	41041
7/8	.8750	4-3/4	8	41043
15/16	.9375	4-3/4	8	41045
1	1.0000	4-3/4	8	41047

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
1/16	.0625	5/16	1-1/2	04751
3/32	.0938	3/8	1-1/2	04752
1/8	.1250	7/16	1-1/2	04753
5/32	.1562	15/32	2	04754
3/16	.1875	9/16	2	04755
7/32	.2188	19/32	2	04756
1/4	.2500	11/16	2	04757
5/16	.3125	7/8	2-1/2	04759
3/8	.3750	1	2-1/2	04761
1/2	.5000	1-1/8	2-1/2	04765

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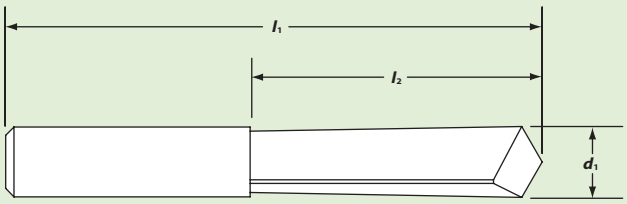
Tap Drill

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
2	.0787	10	38	36372
3	.1181	15	38	36373
4	.1575	20	50	36374
5	.1969	25	50	36375
6	.2362	30	63	36376

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

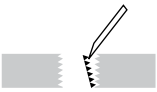
Step 2:

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
D-11	One each of: 2, 3, 4, 5, 6	36377

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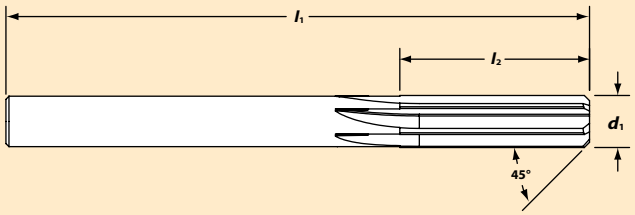
REAMERS

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
	1	.0394	8	35	06314
#60		.0400	5/16	1-3/8	06459
#59		.0410	5/16	1-3/8	06460
#58		.0420	5/16	1-3/8	06461
#57		.0430	5/16	1-3/8	06462
#56		.0465	5/16	1-3/8	06463
3/64		.0469	5/16	1-3/8	06464
	1,2	.0472	8	35	06318
	1,25	.0492	10	38	06319
	1,3	.0512	10	38	06320
#55		.0520	3/8	1-1/2	06465
	1,35	.0531	10	38	06321
#54		.0550	3/8	1-1/2	06466
	1,4	.0551	10	38	06322
	1,45	.0571	10	38	06323
	1,5	.0591	10	38	06324
#53		.0595	3/8	1-1/2	06468
	1,55	.0610	10	38	06325
1/16		.0625	3/8	1-1/2	06469
	1,6	.0630	10	38	06326
#52		.0635	3/8	1-1/2	06470
	1,65	.0650	10	38	06327
	1,7	.0669	11	44	06328
#51		.0670	7/16	1-3/4	06471
	1,75	.0689	11	44	06329
#50		.0700	7/16	1-3/4	06472
	1,8	.0709	11	44	06330
	1,85	.0728	11	44	06331
#49		.0730	7/16	1-3/4	06473
	1,9	.0748	11	44	06332
#48		.0760	7/16	1-3/4	06474
	1,95	.0768	11	44	06333
5/64		.0781	7/16	1-3/4	06475
#47		.0785	7/16	1-3/4	06476
	2	.0787	11	44	06334
	2,05	.0807	13	51	06335
#46		.0810	1/2	2	06478
#45		.0820	1/2	2	06479
	2,1	.0827	13	51	06336
	2,15	.0846	13	51	06337
#44		.0860	1/2	2	06480
	2,2	.0866	13	51	06338
	2,25	.0886	13	51	06339
#43		.0890	1/2	2	06481
	2,3	.0906	13	51	06340
	2,35	.0925	13	51	06341
#42		.0935	1/2	2	06482
3/32		.0938	1/2	2	06483
	2,4	.0945	13	51	06342
#41		.0960	5/8	2-1/4	06484
	2,45	.0965	16	57	06343
#40		.0980	5/8	2-1/4	06485
	2,5	.0984	16	57	06344
#39		.0995	5/8	2-1/4	06487

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Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number
#38		.1015	5/8	2-1/4	06488
	2,6	.1024	16	57	06345
#37		.1040	5/8	2-1/4	06489
	2,7	.1063	16	57	06346
#36		.1065	5/8	2-1/4	06490
	2,75	.1083	16	57	06347
7/64		.1094	5/8	2-1/4	06491
#35		.1100	5/8	2-1/4	06492
	2,8	.1102	16	57	06348
#34		.1110	5/8	2-1/4	06493
#33		.1130	5/8	2-1/4	06494
	2,9	.1142	16	57	06349
#32		.1160	5/8	2-1/4	06495
	3	.1181	16	57	06350
#31		.1200	5/8	2-1/4	06497
	3,1	.1220	16	57	06351
.124		.1240	5/8	2-1/4	43625
.1245		.1245	5/8	2-1/4	43626
1/8		.1250	5/8	2-1/4	06500
.126		.1260	5/8	2-1/4	43627
	3,2	.1260	16	57	06352
	3,25	.1280	16	57	06353
#30		.1285	3/4	2-1/4	06502
	3,3	.1299	19	57	06354
	3,35	.1319	19	57	06355
	3,4	.1339	19	57	06356
	3,45	.1358	19	57	06357
#29		.1360	3/4	2-1/4	06503
	3,5	.1378	19	57	06358
	3,55	.1398	19	57	06359
#28		.1405	3/4	2-1/4	06505
9/64		.1406	3/4	2-1/4	06506
	3,6	.1417	19	57	06360
	3,65	.1437	19	57	06361
#27		.1440	3/4	2-1/4	06507
	3,7	.1457	19	64	06362
#26		.1470	3/4	2-1/2	06508
	3,75	.1476	19	64	06363
#25		.1495	3/4	2-1/2	06509
	3,8	.1496	19	64	06364
#24		.1520	3/4	2-1/2	06510
	3,9	.1535	19	64	06365
#23		.1540	3/4	2-1/2	06511
	3,95	.1555	19	64	06366
5/32		.1562	3/4	2-1/2	06512
#22		.1570	3/4	2-1/2	06513
	4	.1575	19	64	06367
#21		.1590	3/4	2-1/2	06515
	4,05	.1594	19	64	06368
#20		.1610	7/8	2-3/4	06516
	4,1	.1614	22	70	06369
	4,15	.1634	22	70	06370
	4,2	.1654	22	70	06371
#19		.1660	7/8	2-3/4	06517

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number
	4,25	.1673	22	70	06372
	4,3	.1693	22	70	06373
#18		.1695	7/8	2-3/4	06518
	4,35	.1713	22	70	06374
11/64		.1719	7/8	2-3/4	06519
#17		.1730	7/8	2-3/4	06520
	4,4	.1732	22	70	06375
	4,45	.1752	22	70	06376
#16		.1770	7/8	2-3/4	06521
	4,5	.1772	22	70	06377
	4,55	.1791	22	70	06378
#15		.1800	7/8	2-3/4	06523
	4,6	.1811	22	70	06379
#14		.1820	7/8	2-3/4	06524
	4,65	.1831	22	70	06380
	4,7	.1850	22	70	06381
#13		.1850	7/8	2-3/4	06525
	4,75	.1870	22	70	06382
.187		.1870	7/8	2-3/4	43628
3/16		.1875	7/8	2-3/4	06527
.1885		.1885	7/8	2-3/4	43629
	4,8	.1890	22	70	06383
#12		.1890	7/8	2-3/4	06529
	4,85	.1909	22	70	06384
#11		.1910	7/8	2-3/4	06530
	4,9	.1929	25	76	06385
#10		.1935	1	3	06531
	4,95	.1949	25	76	06386
#9		.1960	1	3	06532
	5	.1969	25	76	06387
	5,05	.1988	25	76	06388
#8		.1990	1	3	06534
	5,1	.2008	25	76	06389
#7		.2010	1	3	06535
	5,15	.2028	25	76	06390
13/64		.2031	1	3	06536
#6		.2040	1	3	06537
	5,2	.2047	25	76	06391
#5		.2055	1	3	06538
	5,25	.2067	25	76	06392
	5,3	.2087	25	76	06393
#4		.2090	1	3	06539
	5,35	.2106	25	76	06394
	5,4	.2126	25	76	06395
#3		.2130	1	3	06540
	5,45	.2146	25	76	06396
	5,5	.2165	25	76	06397
	5,55	.2185	25	76	06398
7/32		.2188	1	3	06542
	5,6	.2205	25	76	06399
#2		.2210	1	3	06543
	5,65	.2224	25	76	06400
	5,7	.2244	25	76	06401

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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
	5,75	.2264	25	76	06402
#1		.2280	1	3	06544
	5,8	.2283	25	76	06403
	5,85	.2303	25	76	06404
	5,9	.2323	25	76	06405
A		.2340	1	3	06545
	5,95	.2343	25	76	06406
15/64		.2344	1	3	06546
	6	.2362	25	76	06407
B		.2380	1	3	06548
	6,1	.2402	25	76	06408
C		.2420	1	3	06549
	6,2	.2441	25	76	06409
D		.2460	1	3	06550
	6,25	.2461	25	76	06410
	6,3	.2480	25	76	06411
.2495		.2495	1	3	43630
1/4		.2500	1	3	06412
.251		.2510	1	3	43631
	6,4	.2520	25	76	06413
	6,5	.2559	29	83	06414
F		.2570	1-1/8	3-1/4	06554
G		.2610	1-1/8	3-1/4	06555
17/64		.2656	1-1/8	3-1/4	06556
H		.2660	1-1/8	3-1/4	06557
I		.2720	1-1/8	3-1/4	06558
	7	.2756	29	83	06415
J		.2770	1-1/8	3-1/4	06560
K		.2810	1-1/8	3-1/4	06561
9/32		.2812	1-1/8	3-1/4	06562
L		.2900	1-1/8	3-1/4	06563
M		.2950	1-1/8	3-1/4	06564
	7,5	.2953	29	83	06416
19/64		.2969	1-1/8	3-1/4	06565
N		.3020	1-1/8	3-1/4	06566

Inch • Metric • Continued

d_1 Cutter Dia Inch	Metric	Dec Equiv	l_2 Flute Length	l_1 Overall Length	EDP Number
5/16		.3125	1-1/8	3-1/4	06567
.3135		.3135	1-1/8	3-1/4	43632
	8	.3150	29	83	06417
O		.3160	1-1/8	3-1/4	06570
P		.3230	1-1/4	3-1/2	06571
21/64		.3281	1-1/4	3-1/2	06572
Q		.3320	1-1/4	3-1/2	06573
	8,5	.3346	32	89	06418
R		.3390	1-1/4	3-1/2	06574
11/32		.3438	1-1/4	3-1/2	06575
S		.3480	1-1/4	3-1/2	06576
	9	.3543	32	89	06419
T		.3580	1-1/4	3-1/2	06578
23/64		.3594	1-1/4	3-1/2	06579
U		.3680	1-1/4	3-1/2	06580
	9,5	.3740	32	89	06420
3/8		.3750	1-1/4	3-1/2	06582
.376		.3760	1-1/4	3-1/2	43633
V		.3770	1-1/4	3-1/2	06584
W		.3860	1-1/2	4	06585
25/64		.3906	1-1/2	4	06594
	10	.3937	38	102	06421
X		.3970	1-1/2	4	06587
Y		.4040	1-1/2	4	06588
13/32		.4062	1-1/2	4	06589
Z		.4130	1-1/2	4	06590
	10,5	.4134	38	102	06422
27/64		.4219	1-1/2	4	06595
	11	.4331	38	102	06423
7/16		.4375	1-1/2	4	06591
	11,5	.4528	38	102	06424
29/64		.4531	1-1/2	4	09596
15/32		.4688	1-1/2	4	06592
	12	.4724	38	102	06425
31/64		.4844	1-1/2	4	06597
1/2		.5000	1-1/2	4	06593

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
Aluminum Alloys	200-400	.002-.004	.004-.006	.006-.008	.008-.010	.010-.012
Copper, Brass & Bronze	120-250	.001-.002	.002-.003	.003-.005	.005-.008	.008-.010
Composites, Plastics	200-400	.002-.004	.004-.006	.006-.008	.008-.010	.010-.012
Magnesium Alloys	200-400	.002-.004	.004-.006	.006-.008	.008-.010	.010-.012
Cast Iron - Gray	125-200	.001-.002	.002-.004	.004-.006	.006-.009	.009-.012
Cast Iron - Ductile & Malleable	75-175	.001-.002	.002-.003	.003-.005	.005-.007	.009-.012
Low Carbon Steel ≤ 38 HRc 1018, 12L14, 8620	125-200	.001-.002	.002-.003	.003-.005	.005-.008	.008-.010
Medium Carbon Steels ≤ 38 HRc 4140, 4340	100-175	.001-.002	.002-.003	.003-.005	.005-.008	.008-.010
Tool & Die Steels ≤ 38 HRc A2, D2, H13, P20	60-100	.001-.002	.002-.003	.003-.00 5	.005-.008	.008-.010
Tool & Die Steels 39 - 48 HRc A2, D2, H13, P20	40-75	.001-.002	.002-.003	.003-.004	.004-.006	.006-.008
Tool Steels 49 - 52 HRc A2, D2	30-65	.0005-.001	.001-.002	.002-.003	.003-.004	.004-.006
Easy to Machine Stainless Steel 416, 410, 302, 303	70-150	.001-.002	.002-.003	.003-.005	.005-.008	.008-.010
Moderate Machining Stainless Steels 304, 316, Invar, Kovar	65-110	.001-.002	.002-.003	.003-.005	.005-.008	.008-.010
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
Titanium	30-65	.001-.002	.002-.003	.003-.005	.005-.008	.008-.010
High Temp Alloys, Inconel®, Stellite, Hastalloy, Waspaloy®	20-50	.0005-.001	.001-.002	.002 -.004	.004-.006	.006-.008

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
61-122	.051-.101	.101-.152	.152-.203	.203-.254	.254-.305
35-75	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
61-122	.051-.101	.101-.152	.152-.203	.203-.254	.254-.305
61-122	.051-.101	.101-.152	.152-.203	.203-.254	.254-.305
38-61	.025-.051	.051-.101	.101-.152	.152-.229	.229-.305
23-53	.025-.051	.051-.101	.101-.152	.152-.229	.229-.305
38-61	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
30-53	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
18-30	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
12-23	.025-.051	.051-.076	.076-.101	.101-.152	.152-.203
9-20	.013-.025	.025-.051	.051-.076	.076-.101	.101-.152
21-46	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
20-33	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
15-30	.013-.025	.025-.051	.051-.076	.076-.101	.101-.152
9-20	.025-.051	.051-.076	.076-.127	.127-.203	.203-.254
6-15	.013-.025	.025-.051	.051-.101	.101-.152	.152-.203

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STRAIGHT FLUTE R10 REAMERS

For general purpose reaming applications

R10

Made To Order

- 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
.0300 - .0350	5/16	1-3/8	43751
.0351 - .0410	5/16	1-3/8	43752
.0411 - .0479	5/16	1-3/8	43753
.0480 - .0650	3/8	1-1/2	43754
.0651 - .0800	7/16	1-3/4	43755
.0801 - .0950	1/2	2	43756
.0951 - .1120	5/8	2-1/4	43757
.1121 - .1284	5/8	2-1/4	43758
.1285 - .1444	3/4	2-1/4	43759
.1445 - .1594	3/4	2-1/2	43760
.1595 - .1744	7/8	2-3/4	43761
.1745 - .1914	7/8	2-3/4	43762
.1915 - .2074	1	3	43763
.2075 - .2234	1	3	43764
.2235 - .2394	1	3	43765
.2395 - .2544	1	3	43766
.2545 - .2694	1-1/8	3-1/4	43767
.2695 - .2844	1-1/8	3-1/4	43768
.2845 - .3004	1-1/8	3-1/4	43769
.3005 - .3164	1-1/8	3-1/4	43770
.3165 - .3324	1-1/4	3-1/2	43771
.3325 - .3484	1-1/4	3-1/2	43772
.3485 - .3634	1-1/4	3-1/2	43773
.3635 - .3794	1-1/4	3-1/2	43774
.3795 - .3944	1-1/2	4	43775
.3945 - .4104	1-1/2	4	43776
.4105 - .4254	1-1/2	4	43777
.4255 - .4414	1-1/2	4	43778
.4415 - .4564	1-1/2	4	43779
.4565 - .4724	1-1/2	4	43780
.4725 - .4884	1-1/2	4	43781
.4885 - .5054	1-1/2	4	43782

Metric

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

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.

Code	Tolerance
T3	Standard (+0.0003/ -0.0)
T2	+0.0002/ -0.0
T1	+0.0001/ -0.0

Step 2: Standard tolerance for the R10 reamer will be supplied unless otherwise specified. Append the EDP number with a tolerance code from the chart.

Step 3: Complete the EDP number by adding the exact size of the reamer you require in parenthesis. For our example, 6 pieces of .2530 reamers with a tolerance of +0.0002 the EDP number would be 43766.T2 (.2530).

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Having a Hard Time Deburring?

Sometimes the basic fluting options don't hold up in very hard materials. Try using Menlo'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 Menlo'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.

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BURS AND ROUTERS

Menlo 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

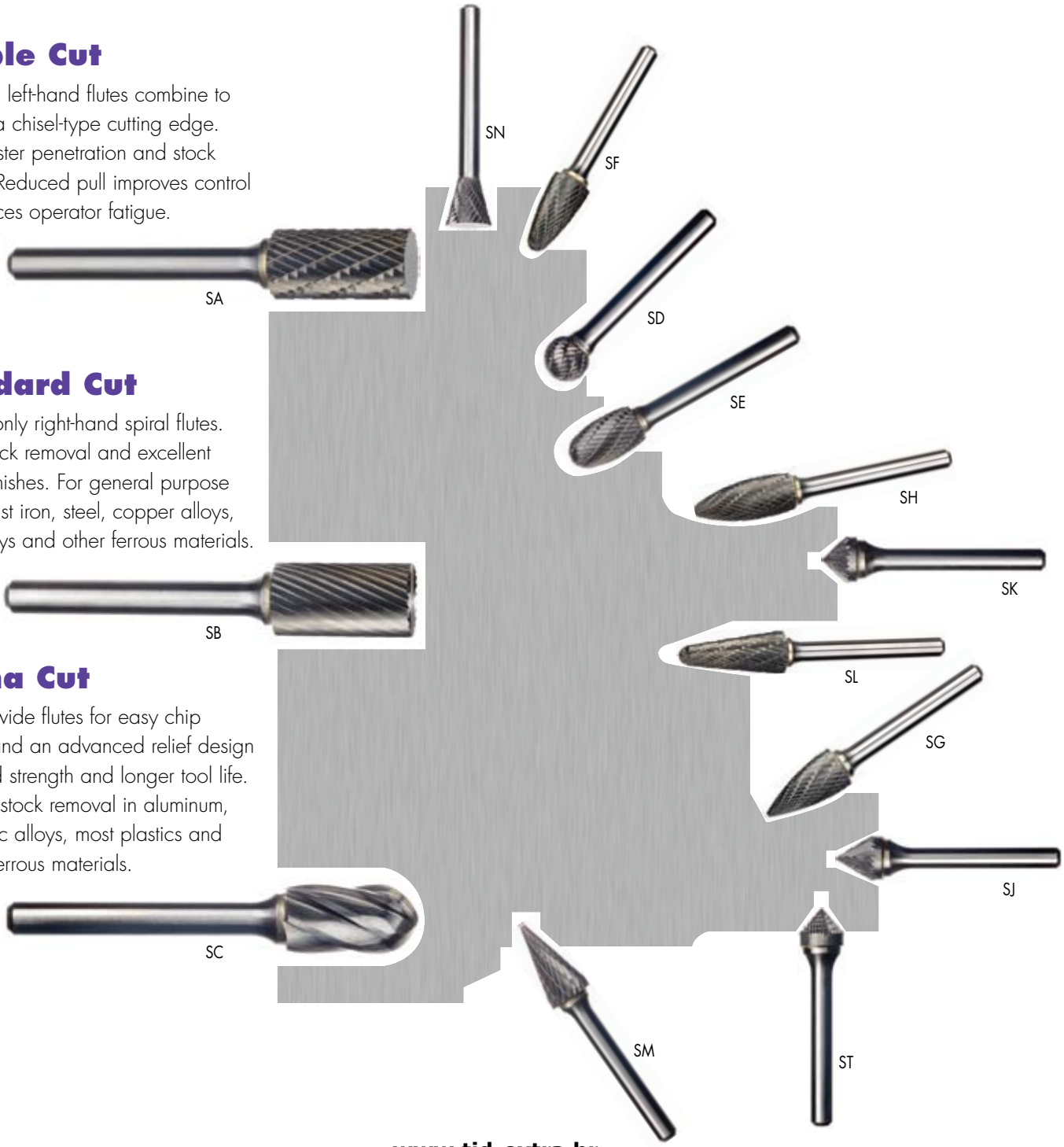
Right- and left-hand flutes combine to produce a chisel-type cutting edge. Permits faster penetration and stock removal. Reduced pull improves control and reduces operator fatigue.

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.



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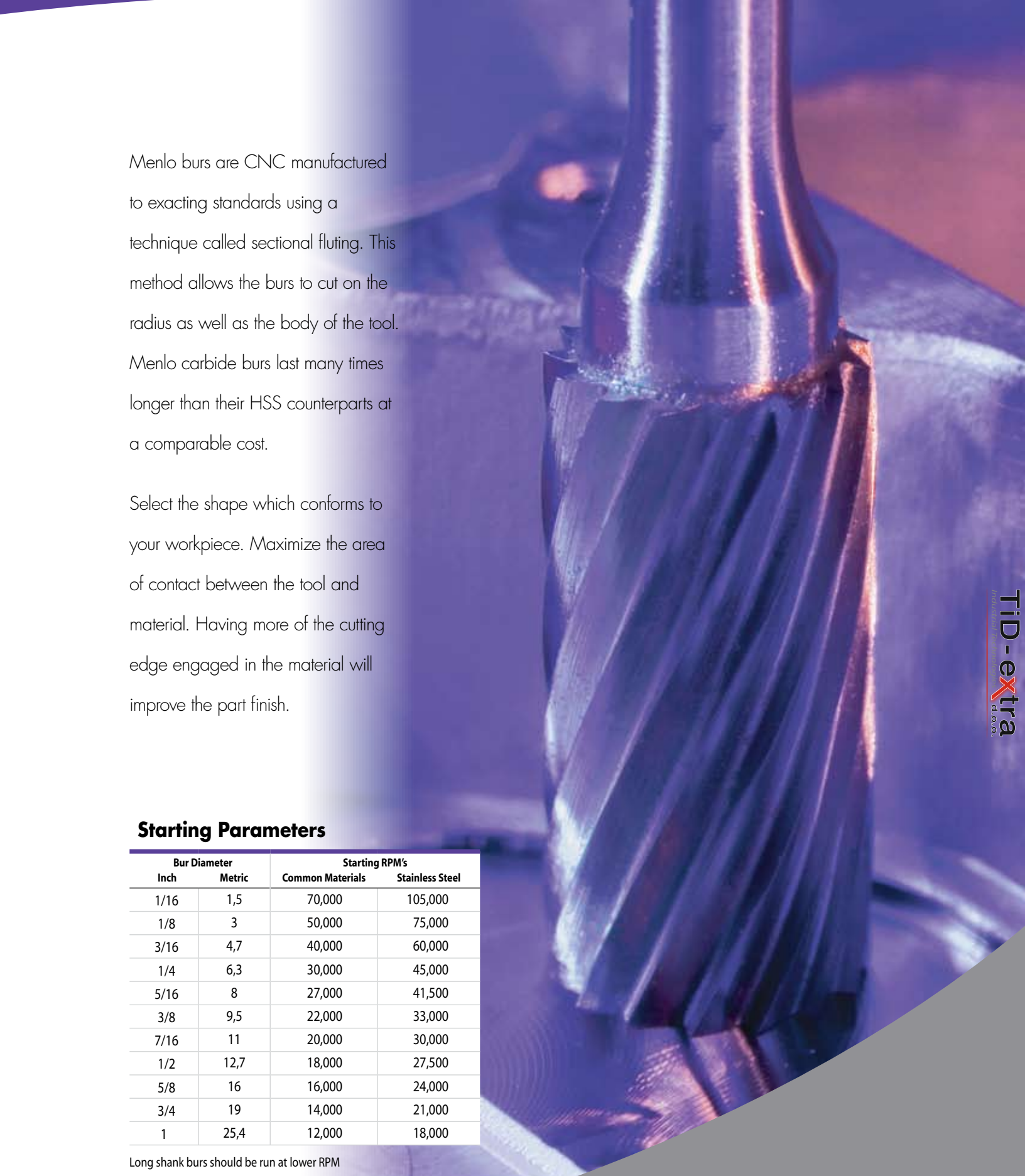
Menlo burs are CNC manufactured to exacting standards using a technique called sectional fluting. This method allows the burs to cut on the radius as well as the body of the tool. Menlo carbide burs last many times longer than their HSS counterparts at a comparable cost.

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

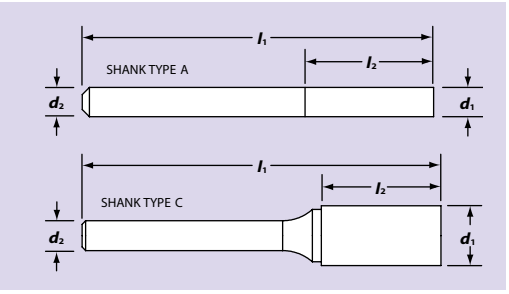
SA

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	Double Cut	Aluma Cut
SA-41	1/16	1/8	1/4	1-1/2	A	00101	00104	
SA-42	3/32	1/8	7/16	1-1/2	A	00111	00114	
SA-43	1/8	1/8	9/16	1-1/2	A	00121	00124	
SA-43L2	1/8	1/8	9/16	2	A	40011	40014	
SA-43L3	1/8	1/8	9/16	3	A	40021	40024	
SA-11	1/8	1/4	1/2	2	A	00131	00134	
SA-52	5/32	1/8	1/2	1-1/2	A	20221	20224	
SA-53	3/16	1/8	1/2	1-1/2	A	20231	20234	
SA-14	3/16	1/4	5/8	2	A	00141	00144	
SA-50	1/4	1/8	3/16	1-11/16	C	20771	20774	
SA-51	1/4	1/8	1/2	2	C	00171	00174	
SA-1	1/4	1/4	5/8	2	A	00161	00164	
SA-1	1/4	1/4	3/4	2	A			01216
SA-1A	1/4	1/4	1	2	A	00181	00184	
SA-1L4	1/4	1/4	1/2	4-1/2	C	40031	40034	
SA-1L6	1/4	1/4	1/2	6-1/2	C	40041	40044	
SA-2	5/16	1/4	3/4	2-3/4	C	00191	00194	
SA-3	3/8	1/4	3/4	2-3/4	C	00201	00204	01217
SA-3A	3/8	1/4	1	3	C	05201	05204	
SA-3L4	3/8	1/4	3/4	4-3/4	C	40051	40054	
SA-3L6	3/8	1/4	3/4	6-3/4	C	40061	40064	
SA-4	7/16	1/4	1	3	C	00211	00214	
SA-5	1/2	1/4	1	3	C	00221	00224	01218
SA-5L4	1/2	1/4	1	5	C	40071	40074	
SA-5L6	1/2	1/4	1	7	C	40081	40084	
SA-6	5/8	1/4	1	3	C	00231	00234	01219
SA-7	3/4	1/4	1	3	C	00251	00254	01220
SA-9	1	1/4	1	3	C	00261	00264	

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Fine Cut
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Piloted Style

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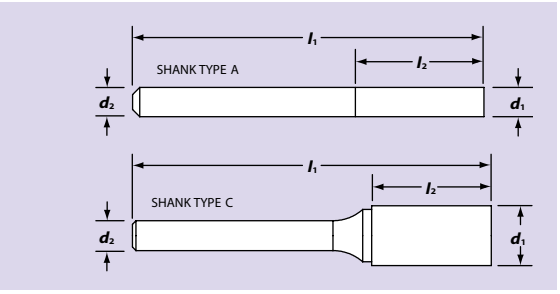
SA

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

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	Double Cut	Aluma Cut
SA-41M	1,5	3	6	38	A	30101	30104	
SA-42M	2,5	3	11	38	A	30111	30114	
SA-43M	3	3	14	38	A	30121	30124	
SA-43ML2	3	3	14	50	A	43011	43014	
SA-43ML3	3	3	14	76	A	43021	43024	
SA-11M	3	6	12	50	A	60131	60134	
SA-52M	4	3	12,7	38	A	20101	20104	
SA-53M	4,7	3	12,7	38	A	20111	20114	
SA-14M	4,7	6	16	50	A	60141	60144	
SA-1M	6	6	16	50	A	60161	60164	
SA-1M	6	6	19	50	A			61216
SA-1ML4	6	6	12,7	114	C	46031	46034	
SA-1ML6	6	6	12,7	163	C	46041	46044	
SA-51M	6,3	3	12,7	50	C	30171	30174	
SA-2M	8	6	20	63	C	60191	60194	
SA-3M	9,5	6	19	63	C	60201	60204	61217
SA-3ML4	9,5	6	19	120	C	46051	46054	
SA-3ML6	9,5	6	19	171	C	46061	46064	
SA-4M	11	6	25	68	C	60211	60214	
SA-5M	12,7	6	25	68	C	60221	60224	61218
SA-5ML4	12,7	6	25	127	C	46071	46074	
SA-5ML6	12,7	6	25	177	C	46081	46084	
SA-6M	16	6	25	68	C	60231	60234	61219
SA-7M	19	6	25	68	C	60251	60254	61220
SA-9M	25,4	6	25	68	C	60261	60264	

Chipbreaker Cut
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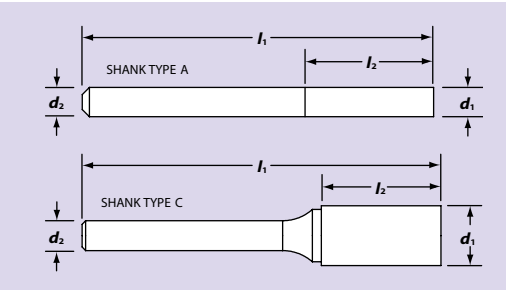
SB

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	Double Cut	Aluma Cut
SB-41	1/16	1/8	1/4	1-1/2	A	90101	90104	
SB-42	3/32	1/8	7/16	1-1/2	A	90111	90114	
SB-43	1/8	1/8	9/16	1-1/2	A	90121	90124	
SB-43L2	1/8	1/8	9/16	2	A	70011	70014	
SB-43L3	1/8	1/8	9/16	3	A	70021	70024	
SB-11	1/8	1/4	1/2	2	A	90131	90134	
SB-52	5/32	1/8	1/2	1-1/2	A	29221	29224	
SB-53	3/16	1/8	1/2	1-1/2	A	29231	29234	
SB-14	3/16	1/4	5/8	2	A	90141	90144	
SB-50	1/4	1/8	3/16	1-11/16	C	90181	90184	
SB-51	1/4	1/8	1/2	2	C	90171	90174	
SB-1	1/4	1/4	5/8	2	A	90161	90164	
SB-1	1/4	1/4	3/4	2	A			01211
SB-1A	1/4	1/4	1	2	A	35156	91104	
SB-1L4	1/4	1/4	1/2	4-1/2	C	70031	70034	
SB-1L6	1/4	1/4	1/2	6-1/2	C	70041	70044	
SB-2	5/16	1/4	3/4	2-3/4	C	90191	90194	
SB-3	3/8	1/4	3/4	2-3/4	C	90201	90204	01212
SB-3A	3/8	1/4	1	3	C	35206	91114	
SB-3L4	3/8	1/4	3/4	4-3/4	C	70051	70054	
SB-3L6	3/8	1/4	3/4	6-3/4	C	70061	70064	
SB-4	7/16	1/4	1	3	C	90211	90214	
SB-5	1/2	1/4	1	3	C	90221	90224	01213
SB-5L4	1/2	1/4	1	5	C	70071	70074	
SB-5L6	1/2	1/4	1	7	C	70081	70084	
SB-6	5/8	1/4	1	3	C	90231	90234	01214
SB-7	3/4	1/4	1	3	C	90251	90254	01215

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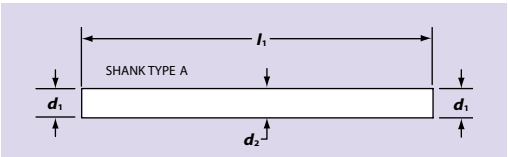
	Standard	Double	Aluma
Carbon & tool steels ≤ 48 HRC	✓	✓✓	
Carbon & tool steels > 48 HRC	✓	✓✓	
Stainless steels	✓	✓✓	
Super alloys, Inconel®, titanium	✓	✓✓	
Cast irons	✓	✓✓	
Aluminum and non-ferrous			✓✓

✓ Suitable ✓✓ Recommended

Cylindrical shape
End cut only • Double end



Inch

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_1 Overall Length	Shk Type	EDP Number
SB-40	1/8	1/8	1-1/2	A	90001
SB-0	1/4	1/4	2	A	90002

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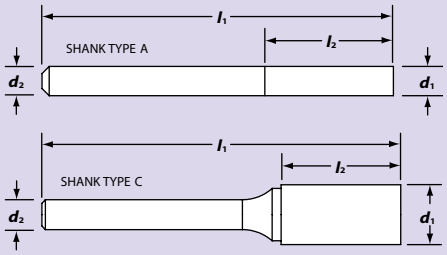
SB

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	Double Cut	Aluma Cut
SB-41M	1,5	3	6	38	A	93101	93104	
SB-42M	2,5	3	11	38	A	93111	93114	
SB-43M	3	3	14	38	A	93121	93124	
SB-43ML2	3	3	14	50	A	83011	83014	
SB-43ML3	3	3	14	76	A	83021	83024	
SB-11M	3	6	12	50	A	96131	96134	
SB-52M	4	3	12,7	38	A	29101	29104	
SB-53M	4,7	3	12,7	38	A	29111	29114	
SB-14M	4,7	6	16	50	A	96141	96144	
SB-1M	6	6	16	50	A	96161	96164	
SB-1M	6	6	19	50	A			61211
SB-1ML4	6	6	12,7	114	C	86031	86034	
SB-1ML6	6	6	12,7	163	C	86041	86044	
SB-50M	6,3	3	5	43	C	93181	93184	
SB-51M	6,3	3	12,7	50	C	93171	93174	
SB-2M	8	6	20	63	C	96191	96194	
SB-3M	9,5	6	19	63	C	96201	96204	61212
SB-3ML4	9,5	6	19	120	C	86051	86054	
SB-3ML6	9,5	6	19	171	C	86061	86064	
SB-4M	11	6	25	68	C	96211	96214	
SB-5M	12,7	6	25	68	C	96221	96224	61213
SB-5ML4	12,7	6	25	127	C	86071	86074	
SB-5ML6	12,7	6	25	177	C	86081	86084	
SB-6M	16	6	25	68	C	96231	96234	61214
SB-7M	19	6	25	68	C	96251	96254	61215

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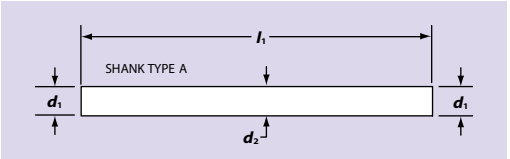
	Standard	Double	Aluma
Carbon & tool steels ≤ 48 HRC	✓	✓✓	
Carbon & tool steels > 48 HRC	✓	✓✓	
Stainless steels	✓	✓✓	
Super alloys, Inconel®, titanium	✓	✓✓	
Cast irons	✓	✓✓	
Aluminum and non-ferrous			✓✓

✓ 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
SB-40M	3	3	38	A	93001

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SC CYLINDRICAL RADIUS END SHAPE BURS

For general purpose deburring operations

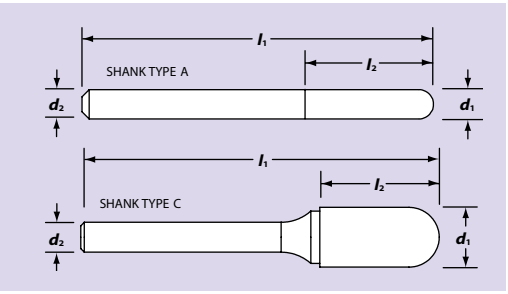
SC

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
Coarse Cut
Fine Cut
Diamond 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	Double Cut	Aluma Cut
SC-41	3/32	1/8	7/16	1-1/2	A	00271	00274	
SC-42	1/8	1/8	9/16	1-1/2	A	00281	00284	
SC-42L2	1/8	1/8	9/16	2	A	40111	40114	
SC-42L3	1/8	1/8	9/16	3	A	40121	40124	
SC-11	1/8	1/4	1/2	2	A	00291	00294	
SC-52	5/32	1/8	1/2	1-1/2	A	20241	20244	
SC-53	3/16	1/8	1/2	1-1/2	A	20251	20254	
SC-14	3/16	1/4	5/8	2	A	00301	00304	
SC-51	1/4	1/8	1/2	2	C	00331	00334	
SC-1	1/4	1/4	5/8	2	A	00321	00324	
SC-1	1/4	1/4	3/4	2	A			01221
SC-1A	1/4	1/4	1	2	A	05321	05324	
SC-1L4	1/4	1/4	1/2	4-1/2	C	40131	40134	
SC-1L6	1/4	1/4	1/2	6-1/2	C	40141	40144	
SC-2	5/16	1/4	3/4	2-3/4	C	00341	00344	
SC-3	3/8	1/4	3/4	2-3/4	C	00351	00354	01222
SC-3A	3/8	1/4	1	3	C	35336	05354	
SC-3L4	3/8	1/4	3/4	4-3/4	C	40151	40154	
SC-3L6	3/8	1/4	3/4	6-3/4	C	40161	40164	
SC-4	7/16	1/4	1	3	C	00361	00364	
SC-5	1/2	1/4	1	3	C	00371	00374	01223
SC-5L4	1/2	1/4	1	5	C	40171	40174	
SC-5L6	1/2	1/4	1	7	C	40181	40184	
SC-6	5/8	1/4	1	3	C	00381	00384	01224
SC-7	3/4	1/4	1	3	C	00391	00394	01225

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	Double Cut	Aluma Cut
SC-41M	2,5	3	11	38	A	30271	30274	
SC-42M	3	3	14	38	A	30281	30284	
SC-42ML2	3	3	14	50	A	43111	43114	
SC-42ML3	3	3	14	76	A	43121	43124	
SC-11M	3	6	12	50	A	60291	60294	
SC-52M	4	3	12,7	38	A	20121	20124	
SC-53M	4,7	3	12,7	38	A	20131	20134	
SC-14M	4,7	6	16	50	A	60301	60304	
SC-1M	6	6	16	50	A	60321	60324	
SC-1M	6	6	19	50	A			61221
SC-1ML4	6	6	12,7	114	C	46131	46134	
SC-1ML6	6	6	12,7	163	C	46141	46144	
SC-51M	6,3	3	12,7	50	C	30331	30334	
SC-2M	8	6	20	63	C	60341	60344	
SC-3M	9,5	6	19	63	C	60351	60354	61222
SC-3ML4	9,5	6	19	120	C	46151	46154	
SC-3ML6	9,5	6	19	171	C	46161	46164	
SC-4M	11	6	25	68	C	60361	60364	
SC-5M	12,7	6	25	68	C	60371	60374	61223
SC-5ML4	12,7	6	25	127	C	46171	46174	
SC-5ML6	12,7	6	25	177	C	46181	46184	
SC-6M	16	6	25	68	C	60381	60384	61224
SC-7M	19	6	25	68	C	60391	60394	61225

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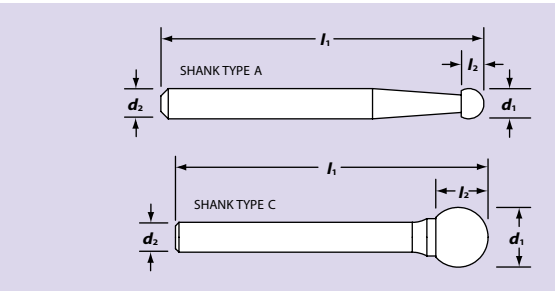
SD

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	Double Cut	Aluma Cut
SD-41	3/32	1/8	1/16	1-1/2	A	00741	00744	
SD-42	1/8	1/8	3/32	1-1/2	A	00751	00754	
SD-42L2	1/8	1/8	3/32	2	A	40511	40514	
SD-42L3	1/8	1/8	3/32	3	A	40521	40524	
SD-11	1/8	1/4	3/32	2	A	00761	00764	
SD-53	3/16	1/8	1/8	1-1/2	A	20261	20264	
SD-14	3/16	1/4	5/32	2	A	00771	00774	
SD-51	1/4	1/8	7/32	1-11/16	C	00801	00804	
SD-1	1/4	1/4	7/32	2	A	00791	00794	01261
SD-1L4	1/4	1/4	7/32	4-1/8	C	40531	40534	
SD-1L6	1/4	1/4	7/32	6-1/8	C	40541	40544	
SD-2	5/16	1/4	1/4	2-1/4	C	00811	00814	
SD-3	3/8	1/4	5/16	2-5/16	C	00821	00824	01262
SD-3L4	3/8	1/4	5/16	4-1/4	C	40551	40554	
SD-3L6	3/8	1/4	5/16	6-1/4	C	40561	40564	
SD-4	7/16	1/4	3/8	2-3/8	C	70831	70834	
SD-5	1/2	1/4	7/16	2-7/16	C	00831	00834	01263
SD-5L4	1/2	1/4	7/16	4-3/8	C	40571	40574	
SD-5L6	1/2	1/4	7/16	6-3/8	C	40581	40584	
SD-6	5/8	1/4	9/16	2-9/16	C	00841	00844	01264
SD-7	3/4	1/4	11/16	2-11/16	C	00851	00854	01265
SD-9	1	1/4	15/16	2-15/16	C	00861	00864	

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	Double Cut	Aluma Cut
SD-41M	2,3	3	2	38	A	30741	30744	
SD-42M	3	3	2	38	A	30751	30754	
SD-42ML2	3	3	2	50	A	43511	43514	
SD-42ML3	3	3	2	76	A	43521	43524	
SD-11M	3	6	2	50	A	60761	60764	
SD-53M	4,7	3	4,5	38	A	20141	20144	
SD-14M	4,7	6	4,5	50	A	60771	60774	
SD-1M	6	6	5	50	A	60791	60794	61261
SD-51M	6,3	3	5	43	C	30801	30804	
SD-1ML4	6,3	6	5	107	C	46531	46534	
SD-1ML6	6,3	6	5	157	C	46541	46544	
SD-2M	8	6	7	50	C	60811	60814	
SD-3M	9,5	6	8	52	C	60821	60824	61262
SD-3ML4	9,5	6	8	108	C	46551	46554	
SD-3ML6	9,5	6	8	161	C	46561	46564	
SD-4M	11	6	9,5	52	C	76831	76834	
SD-5M	12,7	6	11	54	C	60831	60834	61263
SD-5ML4	12,7	6	11	111	C	46571	46574	
SD-5ML6	12,7	6	11	164	C	46581	46584	
SD-6M	16	6	14	58	C	60841	60844	61264
SD-7M	19	6	16	60	C	60851	60854	61265
SD-9M	25,4	6	24	68	C	60861	60864	

Chipbreaker Cut
Coarse Cut
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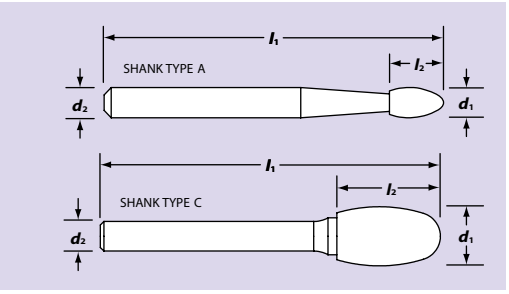
SE

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	Double Cut	Aluma Cut
SE-41	1/8	1/8	7/32	1-1/2	A	00661	00664	
SE-41L2	1/8	1/8	7/32	2	A	40411	40414	
SE-41L3	1/8	1/8	7/32	3	A	40421	40424	
SE-53	3/16	1/8	9/32	1-1/2	A	20271	20274	
SE-51	1/4	1/8	3/8	1-7/8	C	00691	00694	
SE-1	1/4	1/4	3/8	2	A	00681	00684	01241
SE-1L4	1/4	1/4	3/8	4-3/8	C	40431	40434	
SE-1L6	1/4	1/4	3/8	6-3/8	C	40441	40444	
SE-3	3/8	1/4	5/8	2-5/8	C	00701	00704	01242
SE-3L4	3/8	1/4	5/8	4-5/8	C	40451	40454	
SE-3L6	3/8	1/4	5/8	6-5/8	C	40461	40464	
SE-5	1/2	1/4	7/8	2-7/8	C	00711	00714	01243
SE-5L4	1/2	1/4	7/8	4-7/8	C	40471	40474	
SE-5L6	1/2	1/4	7/8	6-7/8	C	40481	40484	
SE-6	5/8	1/4	1	3	C	00721	00724	01244
SE-7	3/4	1/4	1	3	C	00731	00734	01245

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	Double Cut	Aluma Cut
SE-41M	3	3	5	38	A	30661	30664	
SE-41ML2	3	3	5	50	A	43411	43414	
SE-41ML3	3	3	5	76	A	43421	43424	
SE-53M	4,7	3	7,1	38	A	20151	20154	
SE-1M	6	6	10	50	A	60681	60684	61241
SE-51M	6,3	3	9,5	47	C	30691	30694	
SE-1ML4	6,3	6	10	111	C	46431	46434	
SE-1ML6	6,3	6	10	163	C	46441	46444	
SE-3M	9,5	6	16	60	C	60701	60704	61242
SE-3ML4	9,5	6	16	117	C	46451	46454	
SE-3ML6	9,5	6	16	168	C	46461	46464	
SE-5M	12,7	6	22	66	C	60711	60714	61243
SE-5ML4	12,7	6	22	123	C	46471	46474	
SE-5ML6	12,7	6	22	177	C	46481	46484	
SE-6M	16	6	25	68	C	60721	60724	61244
SE-7M	19	6	25	68	C	60731	60734	61245

Chipbreaker Cut
Coarse Cut
Fine Cut
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SF RADIUS END TREE SHAPE BURS

For general purpose deburring operations

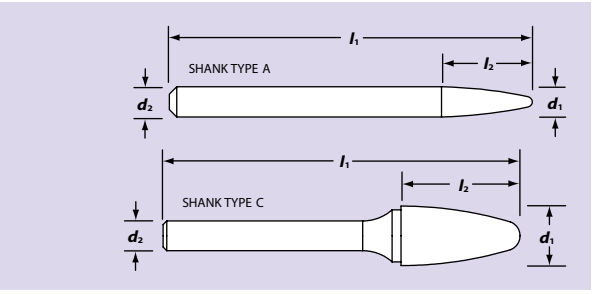
SF

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	Double Cut	Aluma Cut
SF-41	1/8	1/8	1/4	1-1/2	A	00411	00414	
SF-42	1/8	1/8	1/2	1-1/2	A	00401	00404	
SF-42L2	1/8	1/8	1/2	2	A	40211	40214	
SF-42L3	1/8	1/8	1/2	3	A	40221	40224	
SF-11	1/8	1/4	1/2	2	A	00421	00424	
SF-53	3/16	1/8	1/2	1-1/2	A	20281	20284	
SF-51	1/4	1/8	1/2	2	C	00451	00454	
SF-1	1/4	1/4	3/4	2	A	00441	00444	01231
SF-1L4	1/4	1/4	1/2	4-1/2	C	40231	40234	
SF-1L6	1/4	1/4	1/2	6-1/2	C	40241	40244	
SF-3	3/8	1/4	3/4	2-3/4	C	00461	00464	01232
SF-3L4	3/8	1/4	3/4	4-3/4	C	40251	40254	
SF-3L6	3/8	1/4	3/4	6-3/4	C	40261	40264	
SF-4	7/16	1/4	1	3	C	00471	00474	
SF-13	1/2	1/4	3/4	2-3/4	C	70481	70484	
SF-5	1/2	1/4	1	3	C	00481	00484	01233
SF-5L4	1/2	1/4	1	5	C	40271	40274	
SF-5L6	1/2	1/4	1	7	C	40281	40284	
SF-6	5/8	1/4	1	3	C	00491	00494	01234
SF-7	3/4	1/4	1	3	C	00501	00504	
SF-14	3/4	1/4	1-1/4	3-1/4	C	00511	00514	01235
SF-15	3/4	1/4	1-1/2	3-1/2	C	00521	00524	

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	Double Cut	Aluma Cut
SF-41M	3	3	6,3	38	A	30411	30414	
SF-42M	3	3	13	38	A	30401	30404	
SF-42ML2	3	3	13	50	A	43211	43214	
SF-42ML3	3	3	13	76	A	43221	43224	
SF-11M	3	6	13	50	A	60421	60424	
SF-53M	4,7	3	13	38	A	20161	20164	
SF-1M	6	6	19	50	A	60441	60444	61231
SF-1ML4	6	6	13	114	C	46231	46234	
SF-1ML6	6	6	13	163	C	46241	46244	
SF-51M	6,3	3	13	50	C	30451	30454	
SF-3M	9,5	6	19	63	C	60461	60464	61232
SF-3ML4	9,5	6	19	120	C	46251	46254	
SF-3ML6	9,5	6	19	171	C	46261	46264	
SF-4M	11	6	25	68	C	60471	60474	
SF-13M	12,7	6	19	63	C	76481	76484	
SF-5M	12,7	6	25	68	C	60481	60484	61233
SF-5ML4	12,7	6	25	127	C	46271	46274	
SF-5ML6	12,7	6	25	177	C	46281	46284	
SF-6M	16	6	25	68	C	60491	60494	61234
SF-7M	19	6	25	68	C	60501	60504	
SF-14M	19	6	32	76	C	60511	60514	61235
SF-15M	19	6	38	82	C	60521	60524	

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SG POINTED END TREE SHAPE BURS

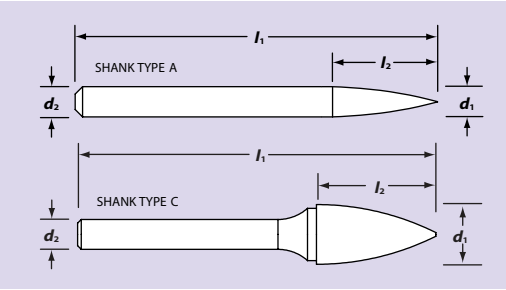
For general purpose deburring operations

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	Double Cut
SG-41	1/8	1/8	1/4	1-1/2	A	00531	00534
SG-42	1/8	1/8	5/16	1-1/2	A	35706	35707
SG-43	1/8	1/8	3/8	1-1/2	A	00541	00544
SG-44	1/8	1/8	1/2	1-1/2	A	00551	00554
SG-44L2	1/8	1/8	1/2	2	A	40311	40314
SG-44L3	1/8	1/8	1/2	3	A	40321	40324
SG-53	3/16	1/8	1/2	1-1/2	A	20291	20294
SG-51	1/4	1/8	1/2	2	C	00581	00584
SG-1	1/4	1/4	3/4	2	A	00571	00574
SG-1L4	1/4	1/4	1/2	4-1/2	C	40331	40334
SG-1L6	1/4	1/4	1/2	6-1/2	C	40341	40344
SG-2	5/16	1/4	3/4	2-3/4	C	00591	00594
SG-3	3/8	1/4	3/4	2-3/4	C	00601	00604
SG-3L4	3/8	1/4	3/4	4-3/4	C	40351	40354
SG-3L6	3/8	1/4	3/4	6-3/4	C	40361	40364
SG-13	1/2	1/4	3/4	2-3/4	C	00611	00614
SG-5	1/2	1/4	1	3	C	00621	00624
SG-5L4	1/2	1/4	1	5	C	40371	40374
SG-5L6	1/2	1/4	1	7	C	40381	40384
SG-6	5/8	1/4	1	3	C	00631	00634
SG-7	3/4	1/4	1	3	C	00641	00644
SG-15	3/4	1/4	1-1/2	3-1/2	C	00651	00654

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	Double Cut
SG-41M	3	3	6,3	38	A	30531	30534
SG-43M	3	3	9,5	38	A	30541	30544
SG-44M	3	3	13	38	A	30551	30554
SG-44ML2	3	3	13	50	A	43311	43314
SG-44ML3	3	3	13	76	A	43321	43324
SG-53M	4,7	3	13	38	A	20171	20174
SG-1M	6	6	19	50	A	60571	60574
SG-1ML4	6	6	13	114	C	46331	46334
SG-1ML6	6	6	13	163	C	46341	46344
SG-51M	6,3	3	13	50	C	30581	30584
SG-2M	8	6	19	63	C	60591	60594
SG-3M	9,5	6	19	63	C	60601	60604
SG-3ML4	9,5	6	19	120	C	46351	46354
SG-3ML6	9,5	6	19	171	C	46361	46364
SG-13M	12,7	6	19	63	C	60611	60614
SG-5M	12,7	6	25	68	C	60621	60624
SG-5ML4	12,7	6	25	127	C	46371	46374
SG-5ML6	12,7	6	25	177	C	46381	46384
SG-6M	16	6	25	68	C	60631	60634
SG-7M	19	6	25	68	C	60641	60644
SG-15M	19	6	38	82	C	60651	60654

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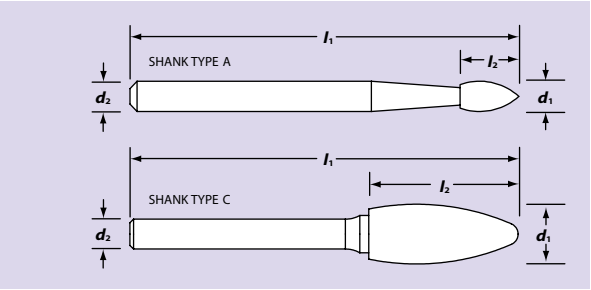
SH

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	Double Cut
SH-41	1/8	1/8	1/4	1-1/2	A	00961	00964
SH-41L2	1/8	1/8	1/4	2	A	40611	40614
SH-41L3	1/8	1/8	1/4	3	A	40621	40624
SH-53	3/16	1/8	3/8	1-1/2	A	20301	20304
SH-1	1/4	1/4	5/8	2	A	70981	70984
SH-2	5/16	1/4	3/4	2-3/4	C	00981	00984
SH-2L4	5/16	1/4	3/4	4-3/4	C	40631	40634
SH-2L6	5/16	1/4	3/4	6-3/4	C	40641	40644
SH-5	1/2	1/4	1-1/4	3-1/4	C	00991	00994
SH-5L4	1/2	1/4	1-1/4	5-1/4	C	40651	40654
SH-5L6	1/2	1/4	1-1/4	7-1/4	C	40661	40664
SH-6	5/8	1/4	1-7/16	3-7/16	C	01001	01004
SH-7	3/4	1/4	1-5/8	3-5/8	C	01011	01014

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Shk Type	Standard Cut	Double Cut
SH-41M	3	3	6	38	A	30961	30964
SH-41ML2	3	3	6	50	A	43611	43614
SH-41ML3	3	3	6	76	A	43621	43624
SH-53M	4,7	3	9,5	38	A	20181	20184
SH-1M	6	6	16	50	A	76981	76984
SH-2M	8	6	19	63	C	60981	60984
SH-2ML4	8	6	19	120	C	46631	46634
SH-2ML6	8	6	19	171	C	46641	46644
SH-5M	12,7	6	31	75	C	60991	60994
SH-5ML4	12,7	6	31	132	C	46651	46654
SH-5ML6	12,7	6	31	183	C	46661	46664
SH-6M	16	6	36	79	C	61001	61004
SH-7M	19	6	41	84	C	61011	61014

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SL TAPER SHAPE BURS

For general purpose deburring operations

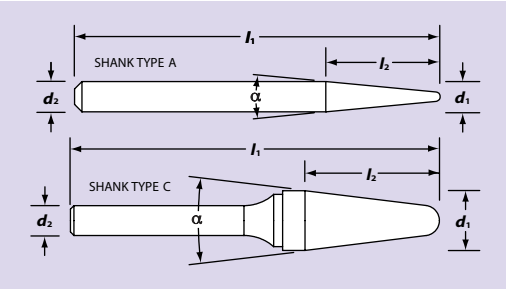
SL

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	Double Cut	Aluma Cut
SL-41	1/8	1/8	3/8	1-1/2	10°	A	00871	00874	
SL-42	1/8	1/8	1/2	1-1/2	8°	A	00881	00884	
SL-42L2	1/8	1/8	1/2	2	8°	A	40711	40714	
SL-42L3	1/8	1/8	1/2	3	8°	A	40721	40724	
SL-53	3/16	1/8	1/2	1-1/2	14°	A	20311	20314	
SL-1	1/4	1/4	5/8	2	14°	A	00901	00904	01251
SL-1L4	1/4	1/4	5/8	4-5/8	14°	C	40731	40734	
SL-1L6	1/4	1/4	5/8	6-5/8	14°	C	40741	40744	
SL-2	5/16	1/4	7/8	2-7/8	14°	C	00911	00914	
SL-3	3/8	1/4	1-1/16	3-1/16	14°	C	00921	00924	01252
SL-3L4	3/8	1/4	1-1/16	5	14°	C	40751	40754	
SL-3L6	3/8	1/4	1-1/16	7	14°	C	40761	40764	
SL-4	1/2	1/4	1-1/8	3-1/8	14°	C	00931	00934	01253
SL-4L4	1/2	1/4	1-1/8	5-1/8	14°	C	40771	40774	
SL-4L6	1/2	1/4	1-1/8	7-1/8	14°	C	40781	40784	
SL-6	5/8	1/4	1-5/16	3-5/16	14°	C	00941	00944	01254
SL-7	3/4	1/4	1-1/2	3-1/2	14°	C	00951	00954	01255

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	Double Cut	Aluma Cut
SL-41M	3	3	9,5	38	10°	A	30871	30874	
SL-42M	3	3	12	38	8°	A	30881	30884	
SL-42ML2	3	3	12	50	8°	A	43711	43714	
SL-42ML3	3	3	12	76	8°	A	43721	43724	
SL-53M	4,7	3	12	38	14°	A	20191	20194	
SL-1M	6	6	16	50	14°	A	60901	60904	61251
SL-1ML4	6	6	16	117	14°	C	46731	46734	
SL-1ML6	6	6	16	168	14°	C	46741	46744	
SL-2M	8	6	22	66	14°	C	60911	60914	
SL-3M	9,5	6	27	71	14°	C	60921	60924	61252
SL-3ML4	9,5	6	27	127	14°	C	46751	46754	
SL-3ML6	9,5	6	27	179	14°	C	46761	46764	
SL-4M	12,7	6	28	72	14°	C	60931	60934	61253
SL-4ML4	12,7	6	28	129	14°	C	46771	46774	
SL-4ML6	12,7	6	28	180	14°	C	46781	46784	
SL-6M	16	6	30	76	14°	C	60941	60944	61254
SL-7M	19	6	38	82	14°	C	60951	60954	61255

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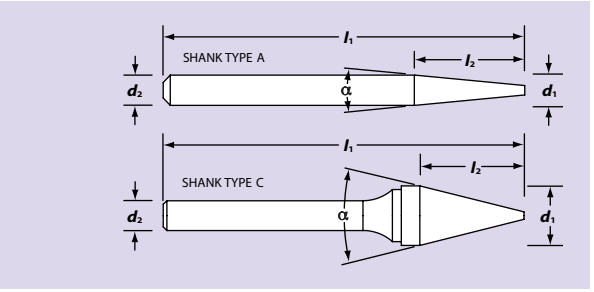
SM

Cone shape

SM • Standard Cut

SM • 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	Double Cut
SM-41	1/8	1/8	11/32	1-1/2	12°	A	01021	01024
SM-42	1/8	1/8	7/16	1-1/2	14°	A	01031	01034
SM-43	1/8	1/8	5/8	1-1/2	7°	A	01041	01044
SM-53	3/16	1/8	1/2	1-1/2	16°	A	20321	20324
SM-51	1/4	1/8	1/2	2	22°	C	01091	01094
SM-1	1/4	1/4	1/2	2	22°	A	01061	01064
SM-2	1/4	1/4	3/4	2	14°	A	01071	01074
SM-3	1/4	1/4	1	2	10°	A	01081	01084
SM-4	3/8	1/4	5/8	2-5/8	28°	C	01101	01104
SM-5	1/2	1/4	7/8	2-7/8	28°	C	01111	01114
SM-6	5/8	1/4	1	3	31°	C	01121	01124

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	Double Cut
SM-41M	3	3	8,7	38	12°	A	31021	31024
SM-42M	3	3	11	38	14°	A	31031	31034
SM-43M	3	3	16	38	7°	A	31041	31044
SM-53M	4,7	3	12,7	38	16°	A	20201	20204
SM-1M	6	6	12,7	50	22°	A	61061	61064
SM-2M	6	6	18	50	14°	A	61071	61074
SM-3M	6	6	25	50	10°	A	61081	61084
SM-51M	6,3	3	12,7	50	22°	C	31091	31094
SM-4M	9,5	6	16	60	28°	C	61101	61104
SM-5M	12,7	6	22	66	28°	C	61111	61114
SM-6M	16	6	25	68	31°	C	61121	61124

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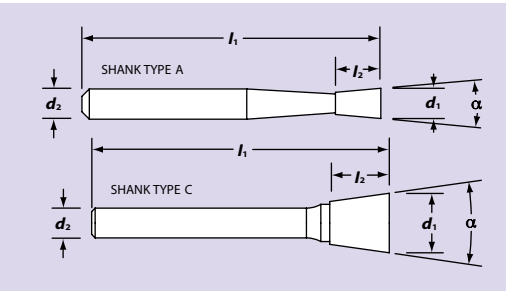
SN

Inverted Cone shape

SN • Standard Cut

SN • 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	Double Cut
SN-41	3/32	1/8	1/8	1-1/2	10°	A	01131	01134
SN-42	1/8	1/8	3/16	1-1/2	10°	A	01141	01144
SN-53	3/16	1/8	1/4	1-1/2	10°	A	20331	20334
SN-51	1/4	1/8	1/4	1-3/4	10°	C	01171	01174
SN-1	1/4	1/4	5/16	2	10°	A	01161	01164
SN-2	3/8	1/4	3/8	2-3/8	13°	C	71181	71184
SN-3	1/2	1/4	1/2	2-1/2	16°	C	01181	01184
SN-4	1/2	1/4	1/2	2-1/2	28°	C	72181	72184
SN-5	5/8	1/4	5/8	2-5/8	19°	C	01191	01194
SN-6	5/8	1/4	3/4	2-3/4	18°	C	72191	72194
SN-8	3/4	1/4	3/4	2-3/4	21°	C	01201	01204

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	Double Cut
SN-41M	2,3	3	3	38	10°	A	31131	31134
SN-42M	3	3	5	38	10°	A	31141	31144
SN-53M	4,7	3	6,3	38	10°	A	20211	20214
SN-1M	6	6	8	50	10°	A	61161	61164
SN-51M	6,3	3	6,3	44	10°	C	31171	31174
SN-2M	9,5	6	9,5	52	13°	C	76181	76184
SN-3M	12,7	6	12,7	56	16°	C	61181	61184
SN-4M	12,7	6	12,7	56	28°	C	61131	61134
SN-5M	16	6	16	60	19°	C	61191	61194
SN-6M	16	6	19	63	18°	C	61171	61174
SN-8M	19	6	19	63	21°	C	61201	61204

	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
Coarse Cut
Fine Cut
Diamond Cut

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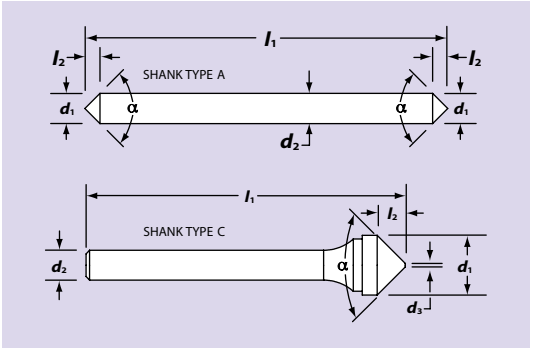
TiD-eXtra Industrial Technologies d.o.o.

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
1/8	1/8	To Point	A	SJ-42	3/32	1-1/2	01331	41331	ST-42	1/16	1-1/2	01341	01641	SK-42	1/16	1-1/2	01351	64351
1/4	1/4	To Point	A	SJ-1	3/16	2	01333	41333	ST-1	1/8	2	01343	01643	SK-1	1/8	2	01353	64353
3/8	1/4	1/32	C	SJ-3	5/16	2-7/16	01334	41334	ST-3	3/16	2-5/16	01344	01644	SK-3	3/16	2-5/16	01354	64354
1/2	1/4	1/32	C	SJ-5	7/16	2-9/16	01335	41335	ST-5	1/4	2-3/8	01345	01645	SK-5	1/4	2-3/8	01355	64355
5/8	1/4	1/16	C	SJ-6	9/16	2-11/16	01336	41336	ST-6	5/16	2-1/2	01346	01646	SK-6	5/16	2-1/2	01356	64356
3/4	1/4	1/16	C	SJ-7	11/16	2-13/16	01337	41337	ST-7	3/8	2-9/16	01347	01647	SK-7	3/8	2-9/16	01357	64357
1	1/4	1/8	C	SJ-9	15/16	2-15/16	01338	41338	ST-9	1/2	2-11/16	01348	01648	SK-9	1/2	2-11/16	01358	64358

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
3	3	To Point	A	SJ-42M	2	38	31331	34331						SK-42M	1	38	31351	34351
6	6	To Point	A	SJ-1M	5	50	61333	64333						SK-1M	3	50	61353	65353
9,5	6	1	C	SJ-3M	8	55	61334	64334						SK-3M	4,7	52	61354	65354
12,7	6	1	C	SJ-5M	11	58	61335	64335						SK-5M	6,3	52	61355	65355
16	6	1,5	C	SJ-6M	14	60	61336	64336						SK-6M	8	56	61356	65356
19	6	1,5	C	SJ-7M	16	64	61337	64337						SK-7M	9	58	61357	65357
25,4	6	3	C	SJ-9M	23	68	61338	64338						SK-9M	12,7	60	61358	65358

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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	Double Cut
A031403	ZYA031403	3	3	14	38	A	64001	64101
A061606	ZYA061606	6	6	16	50	A	64002	64102
A082006	ZYA082006	8	6	20	63	C	64003	64103
A102006	ZYA102006	10	6	20	64	C	64004	64104
A122506	ZYA122506	12	6	25	68	C	64005	64105
A162506	ZYA162506	16	6	25	68	C	64006	64106

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	Double Cut
B031403	ZYB031403	3	3	14	38	A	64009	64109
B061606	ZYB061606	6	6	16	50	A	64010	64110
B082006	ZYB082006	8	6	20	63	C	64011	64111
B102006	ZYB102006	10	6	20	64	C	64012	64112
B122506	ZYB122506	12	6	25	68	C	64013	64113
B162506	ZYB162506	16	6	25	68	C	64014	64114

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	Double Cut
C031403	WRC031403	3	3	14	38	A	64017	64117
C061606	WRC061606	6	6	16	50	A	64018	64118
C082006	WRC082006	8	6	20	63	C	64019	64119
C102006	WRC102006	10	6	20	64	C	64020	64120
C122506	WRC122506	12	6	25	68	C	64021	64121
C162506	WRC162506	16	6	25	68	C	64022	64122

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	Double Cut
D030203	KUD030203	3	3	2	38	A	64044	64144
D060506	KUD060506	6	6	5	50	A	64045	64145
D080706	KUD080706	8	6	7	50	C	64046	64146
D100906	KUD100906	10	6	9	52	C	64047	64147
D121006	KUD121006	12	6	10	54	C	64048	64148
D161406	KUD161406	16	6	14	58	C	64049	64149

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	Double Cut
E030503	TRE030503	3	3	5	38	A	64038	64138
E061006	TRE061006	6	6	10	50	A	64039	64139
E122006	TRE122006	12	6	20	64	C	64040	64140
E162506	TRE162506	16	6	25	68	C	64041	64141

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	Double Cut
F031303	RBF031303	3	3	13	38	A	64025	64125
F061906	RBF061906	6	6	19	50	A	64026	64126
F122506	RBF122506	12	6	25	68	C	64027	64127
F162506	RBF162506	16	6	25	68	C	64028	64128

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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	Double Cut
G031303	SPG031303	3	3	13	38	N/A	A	64031	64131
G061906	SPG061906	6	6	19	50	N/A	A	64032	64132
G081906	SPG081906	8	6	19	63	N/A	C	64030	64130
G102006	SPG102006	10	6	20	64	N/A	C	64033	64133
G122506	SPG122506	12	6	25	68	N/A	C	64034	64134
G162506	SPG162506	16	6	25	68	N/A	C	64035	64135

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
H030603	---	3	3	6	38	N/A	A	64059	64159
H061606	---	6	6	16	50	N/A	A	64060	64160
H081906	---	8	6	19	63	N/A	C	64061	64161
H163606	---	16	6	36	79	N/A	C	64062	64162

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	Double Cut
J030203	KSJ030203	3	3	2	38	To Point	A	64077	64177
J060506	KSJ060506	6	6	5	50	To Point	A	64078	64178
J161306	KSJ161306	16	6	13	60	1,5	C	64079	64179

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	Double Cut
K030103	KSK030103	3	3	1	38	To Point	A	64082	64182
K060306	KSK060306	6	6	3	50	To Point	A	64083	64183
K160806	KSK160806	16	6	8	56	1,5	C	64084	64184

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	Double Cut
L031203	KEL031203	3	3	12	38	8°	A	64052	64152
L061606	KEL061606	6	6	16	50	14°	A	64053	64153
L082206	KEL082206	8	6	22	66	14°	C	64054	64154
L123006	KEL123006	12	6	30	74	14°	C	64055	64155
L163006	KEL163006	16	6	30	76	14°	C	64056	64156

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	Double Cut
M031103	SKM031103	3	3	11	38	14°	A	64065	64165
M061806	SKM061806	6	6	18	50	14°	A	64066	64166
M102006	SKM102006	10	6	20	64	28°	C	64067	64167
M122506	SKM122506	12	6	25	68	28°	C	64068	64168
M162506	SKM162506	16	6	25	68	31°	C	64069	64169

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	Double Cut
N030503	WKN030503	3	3	5	38	10°	A	64072	64172
N060806	WKN060806	6	6	8	50	10°	A	64073	64173
N161606	WKN161606	16	6	16	60	19°	C	64074	64174

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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	Double Cut
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	01451	01454
Set #2	1/8	9	SA-51, SA-50, SC-51, SD-51, SE-51, SF-51, SG-51, SM-51, SN-51	36201	36202
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	36212
Set #5	1/4	8	SA-1, SC-1, SD-1, SE-1, SF-1, SG-1, SL-1, SM-2	01481	01484
Set #6	1/4	8	SA-5, SC-3, SC-5, SD-5, SF-3, SF-5, SG-3, SL-4	01461	01464
Set #7	1/4	9	SA-1, SA-3, SA-5, SC-1, SC-3, SC-5, SF-1, SF-3, SF-5	36216	36217
Set #9	1/8	9	SA-43, SC-42, SD-42, SE-41, SF-42, SH-41, SL-42, SM-43, SN-42	36221	36222

Metric

Bur Set No.	d_2 Shank Size	No. of Pieces	Bur Set Contains	Standard Cut	Double Cut
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	01411	01414
Set #2M	3	9	SA-51M, SB-50M, SC-51M, SD-51M, SE-51M, SF-51M, SG-51M, SM-51M, SN-51M	36206	36207
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	36214
Set #5M	6	8	SA-1M, SC-1M, SD-1M, SE-1M, SF-1M, SG-1M, SL-1M, SM-2M	36209	36215
Set #6M	6	8	SA-5M, SC-3M, SC-5M, SD-5M, SF-3M, SF-5M, SG-3M, SL-4M	01421	01424
Set #7M	6	9	SA-1M, SA-3M, SA-5M, SC-1M, SC-3M, SC-5M, SF-1M, SF-3M, SF-5M	36218	36219
Set #9M	3	9	SA-43M, SC-42M, SD-42M, SE-41M, SF-42M, SH-41M, SL-42M, SM-43M, SN-42M	36223	36224

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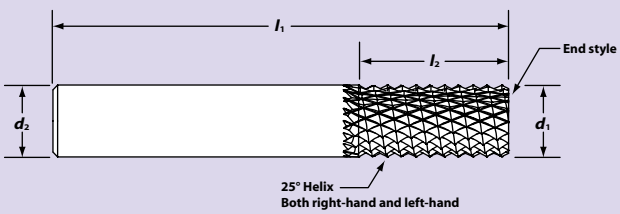
FR10

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

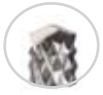
Plain End – Used for edge routing or when the end of the router does not come in contact with the workpiece. Plain end routers are also referred to as 'safe end' tools.

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	Bur End EDP Number	End Mill End EDP Number	Drill Point End EDP Number
FR-2	1/8	1/8	1/2	1-1/2	05002	05022	05042	05062
FR-3	3/16	3/16	5/8	2	05003	05023	05043	05063
FR-5	1/4	1/4	3/4	2	36641	36642	36643	36644
FR-6	1/4	1/4	1	2-1/2	05004	05024	05044	05064
FR-6-1	1/4	1/4	1	3	05083	05084	05085	05086
FR-7	5/16	5/16	1	2-1/2	05005	05025	05045	05065
FR-8	3/8	3/8	1	2-1/2	05006	05026	05046	05066
FR-9	1/2	1/2	1	3	05007	05027	05047	05067

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_2 Length of Cut	l_1 Overall Length	Plain End EDP Number	Bur End EDP Number	End Mill End EDP Number	Drill Point End EDP Number
MFR-2	3	3	12	38	05012	05032	05052	05072
MFR-3	4	4	16	50	05013	05033	05053	05073
MFR-6	6	6	25	63	05014	05034	05054	05074
MFR-6-1	6	6	25	76	05087	05088	05089	05090
MFR-7	8	8	25	63	05015	05035	05055	05075
MFR-8	10	10	25	70	05016	05036	05056	05076
MFR-9	12	12	25	76	05017	05037	05057	05077

Application Guide • Speed & Feed

Tool Dia. Inch	Speed (SFM) Min.	Max.	Feed Rate IPR	Tool Dia. mm	Speed (SFM) Min.	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

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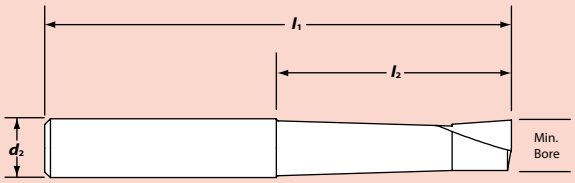
Boring Tool

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
IB-1	.060	1/8	3/16	1-1/2	85005
IB-2	.090	1/8	1/2	1-1/2	85008
IB-3	.120	1/8	5/8	1-1/2	85009
IB-4	.150	3/16	3/4	2	85010
IB-5	.180	3/16	1	2	85011
IB-6	.210	1/4	1-1/4	2	85012
IB-7	.240	1/4	1-1/4	2	85013
IB-8	.270	5/16	1-1/4	2-1/2	85014
IB-9	.300	5/16	1-1/4	2-1/2	85015
IB-10	.330	3/8	1-1/2	2-1/2	85016
IB-11	.360	3/8	1-1/2	2-1/2	85017

Metric

Tool Code	Min Bore	d_2 Shank Dia	l_2 Max Hole Depth	l_1 Overall Length	EDP Number
IB-1M	1,5	3	5	38	85104
IB-2M	2	3	9	38	85105
IB-3M	2,5	3	12	38	85106
IB-4M	3	3	16	38	85107
IB-5M	4	4	19	50	85108
IB-6M	5	6	25	50	85109
IB-7M	6	6	31	50	85110
IB-8M	7	8	31	63	85111
IB-9M	8	8	31	63	85112
IB-10M	9	10	38	70	85113
IB-11M	10	10	38	70	85114

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Keyseat cutter

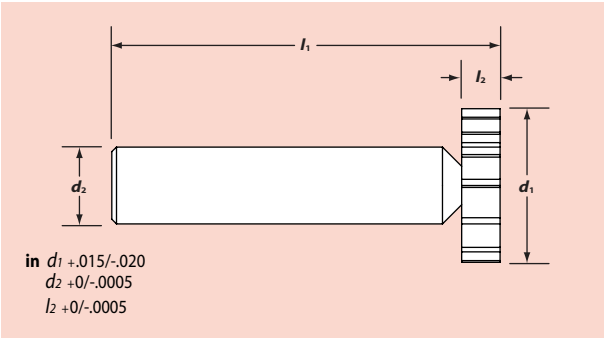
For milling precision keyways

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
3/8	No. 203	1/16	1/2	2-1/16	8	30314
	No. 303	3/32	1/2	2-3/32	8	30316
	No. 403	1/8	1/2	2-1/8	8	30322
1/2	No. 204	1/16	1/2	2-1/16	10	30328
	No. 304	3/32	1/2	2-3/32	10	30333
	No. 404	1/8	1/2	2-1/8	10	30340
5/8	No. 305	3/32	1/2	2-3/32	10	30346
	No. 405	1/8	1/2	2-1/8	10	30352
	No. 505	5/32	1/2	2-5/32	10	30358
	No. 605	3/16	1/2	2-3/16	10	30364
3/4	No. 406	1/8	1/2	2-1/8	10	30370
	No. 506	5/32	1/2	2-5/32	10	30376
	No. 606	3/16	1/2	2-3/16	10	30382
	No. 806	1/4	1/2	2-1/4	10	30388
7/8	No. 507	5/32	1/2	2-5/32	12	30394
	No. 607	3/16	1/2	2-3/16	12	30400
	No. 707	7/32	1/2	2-7/32	12	30410
	No. 807	1/4	1/2	2-1/4	12	30413
1	No. 608	3/16	1/2	2-3/16	12	30418
	No. 708	7/32	1/2	2-7/32	12	30424
	No. 808	1/4	1/2	2-1/4	12	30430
1-1/4	No. 610	3/16	1/2	2-3/16	14	30436
	No. 710	7/32	1/2	2-7/32	14	30442
	No. 810	1/4	1/2	2-1/4	14	30448

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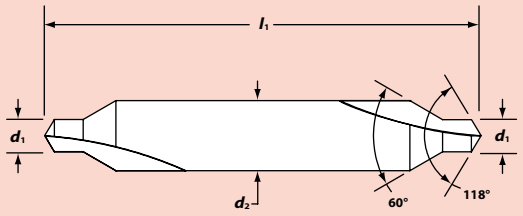
CD10

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
No. 0	1/32	1/8	1-1/2	04800
No. 1	3/64	1/8	1-1/2	04801
No. 1 x 4	3/64	1/8	4	64809
No. 1 x 6	3/64	1/8	6	64801
No. 2	5/64	3/16	2	04802
No. 2 x 4	5/64	3/16	4	64810
No. 2 x 6	5/64	3/16	6	64802
No. 3	7/64	1/4	2	04803
No. 3 x 4	7/64	1/4	4	64811
No. 3 x 6	7/64	1/4	6	64803
No. 4	1/8	5/16	2-1/2	04804
No. 4 x 4	1/8	5/16	4	64812
No. 4 x 6	1/8	5/16	6	64804
No. 5	3/16	7/16	2-3/4	04805
No. 5 x 6	3/16	7/16	6	64805
No. 6	7/32	1/2	3	04806
No. 6 x 6	7/32	1/2	6	64806
No. 7	1/4	5/8	3-1/2	04807
No. 8	5/16	3/4	4	04808

Metric

Tool Code	d_1 Cutter Dia	d_2 Shank Dia	l_1 Overall Length	EDP Number
125	1,25	3,15	38	04811
160	1,6	4	50	04812
200	2	5	50	04813
250	2,5	6,3	50	04814
315	3,15	8	50	04815
400	4	10	66	04816
500	5	12,5	75	04817
630	6,3	16	82	04818

CD10 Set

Set Code	Set Contents	EDP Number
CD10	One each of Nos. 1-6 with case	04809

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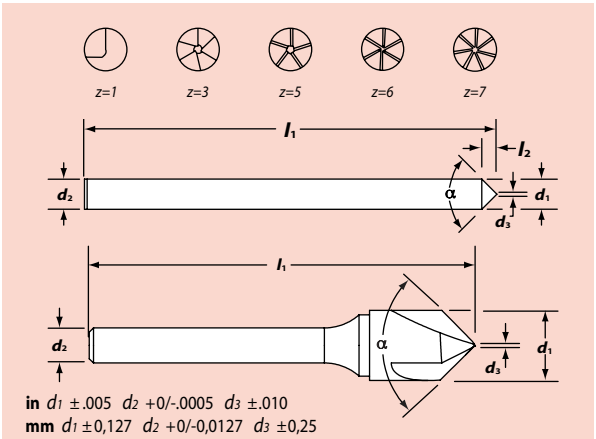
CS10
Single flute countersink

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
1/8	1/8	To Point	1-1/2	1-1/2	1	01271	01281	01291
					3	01301	01311	01321
					6	61280	61310	61360
3/16	3/16	To Point	2	2	1	01272	01282	01292
					3	01302	01312	01322
					6	61281	61311	61361
1/4	1/4	To Point	2	2	1	01273	01283	01293
					3	01303	01313	01323
					6	61282	61312	61362
3/8	1/4	1/32	2-13/16	2-11/16	1	01274	01284	01294
					3	01304	01314	01324
					6	61283	61313	61363
1/2	1/4	1/32	2-7/8	2-3/4	1	01275	01285	01295
					3	36420	36421	36422
					5	01305	01315	01325
					6	61284	61314	61364
5/8	3/8	1/16	3	2-7/8	1	01276	01286	01296
					3	36426	01319	01330
					5	01306	01316	01326
					6	61285	61315	61365
3/4	1/2	1/16	3	2-7/8	1	01277	01287	01297
					3	01309	01320	01339
					6	61286	61316	61366
					7	01307	01317	01327
1	1/2	1/16	3-1/4	3	1	01278	01288	01298
					3	01310	01329	01340
					6	61287	61317	61367
					7	01308	01318	01328

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
3	3	To Point	38	38	1	31271		31291
					3	31301		31321
5	5	To Point	50	50	1	51272		51292
					3	51302		51322
6	6	To Point	50	50	1	61273		61293
					3	61303		61323
9,5	6	1	64	51	1	61274		61294
					3	61304		61324
12,7	6	1	66	63	1	61275		61295
					5	61305		61325
16	10	1,5	75	72	1	61276		61296
					5	61306		61326
19	12	1,5	75	72	1	61277		61297
					7	61307		61327
25	12	1,5	81	75	1	61278		61298
					7	61308		61328

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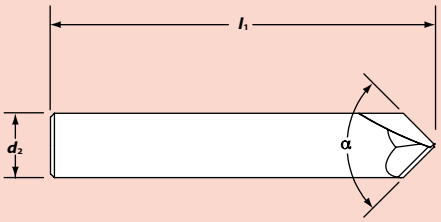
2 Straight Flutes

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
1/8	1-1/2	90°	36303
3/16	2	90°	36304
1/4	2-1/2	60°	36300
		90°	36305
		120°	36309
3/8	2-1/2	60°	36301
		90°	36306
		120°	36310
1/2	3	60°	36302
		90°	36307
		120°	36311
3/4	4	90°	36308

Metric

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

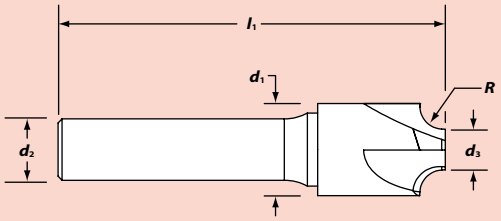
4 Straight Flutes

CRC10

Corner Rounding cutter

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

✓ Suitable for use



mm d_1 ±0,025
d_2 +0/-0,0127
R ±0,25

Metric

R Radius	d_1 Head Dia	d_2 Shank Dia	d_3 Pilot Dia	l_1 Overall Length	ED?P Number
1,0	8	8	5	63	24001
1,25	8	8	5	63	24003
1,5	10	10	5,5	70	24005
2,0	12	12	6	76	24009
2,5	12	12	6	76	24013
3,0	14	12	7	76	24015
3,5	16	12	7	76	24017
4,0	16	12	7	76	24019
4,5	18	12	8	76	24021
5,0	20	16	9	76	24023
6,0	22	16	9	76	24025
8,0	25	20	8	76	24027

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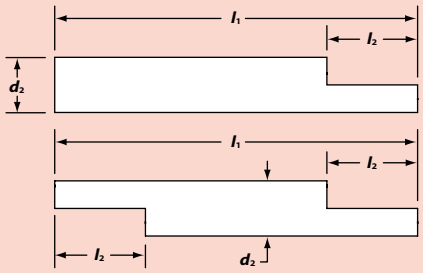
Engraving Tool Blank

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	DET EDP Number
1/8	3/8	1-1/2	92003	92023
		2	92002	92022
		4	92013	92123
3/16	1/2	2	92005	92025
		3	92004	92024
		4	92015	92125
1/4	1/2	2	92006	92026
		2-1/2	92012	92032
		3	92014	92034
		4	92016	92126
5/16	1/2	2-1/2	92011	92036
	5/8	2-1/2	92007	92027
	1/2	3	92009	92029
3/8	1/2	2-1/2	92017	92038
	5/8	2-1/2	92008	92028
	1/2	3	92019	92021
	5/8	6	92018	92128
1/2	5/8	3	92020	92039
	3/4	3	92010	92030
		6	92110	92130

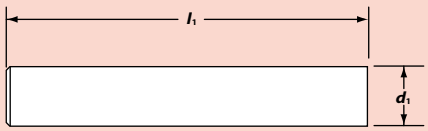
Metric

d_2 Rod Dia	l_2 Split Length	l_1 Overall Length	SET EDP Number	DET EDP Number
3	9	38	92050	92060
6	12	50	92053	92063
8	16	63	92054	92064
10	16	70	92055	92065
12	19	76	92056	92066

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
1/8	1-1/2	80001
	2	80002
	2-1/2	80063
	3	80003
	4	80004
3/16	2	80005
	2-1/2	80064
	3	80006
	4	80007
1/4	2	80008
	2-1/2	80009
	3	80010
	4	80011
	6	80055
5/16	2	80065
	2-1/2	80012
	3	80013
	4	80014
	6	80056
3/8	2	80066
	2-1/2	80015
	3	80016
	4	80017
	6	80057
1/2	2-1/2	80067
	3	80018
	4	80019
	6	80058
5/8	3-1/2	80020
	6	80060
3/4	4	80021
	6	80061
1	4	80022
	6	80062

Metric

d_1 Rod Dia	l_1 Overall Length	EDP Number
3	38	80046
	75	80024
	100	80025
4	50	80026
	75	80027
	100	80028
5	50	80029
	63	80047
	100	80031
6	50	80032
	63	80071
	75	80033
	100	80034
	150	80072
8	63	80035
	75	80036
	100	80037
	150	80073
10	70	80038
	72	80048
	75	80049
	100	80039
	150	80074
12	76	80040
	100	80041
	150	80075
14	83	80050
16	89	80042
	150	80076
18	100	80043
	150	80077
20	100	80044
	150	80078
25	100	80045
	150	80079

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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

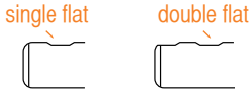
Add Corner Radius or Corner Chamfer

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					
.032 to .047	3/16 & up	0,76 to 1,25	5,0 & up					
.048 to .063	1/4 & up	1,26 to 1,5	6,0 & up					
.064 to .078	5/16 & up	1,51 to 2,0	8,0 & up					
.079 to .094	3/8 & up	2,01 to 2,5	10,0 & up					
.095 to .125	1/2 & up	2,51 to 3,0	12,0 & up					
.126 to .156	5/8 & up	3,01 to 4,0	16,0 & up					
.157 to .190	3/4 & up	4,01 to 5,0	20,0 & up					
.191 to .250	1 & up	5,01 to 6,25	25,0 & up					

REFER TO CURRENT PRICE LIST

- 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					
17/64 to 1/2	6,1 to 12,0					
33/64 to 5/8	12,1 to 16,0					
41/64 to 3/4	16,1 to 20,0					
49/64 to 1-1/4	20,1 to 32,0					
49/64 to 1-1/4* Double	20,1 to 32,0 Double					

REFER TO CURRENT PRICE LIST

*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					
9/64 to 3/16	.012	3/8	3,01 to 5,0	0,3	10,0					
13/64 to 1/4	.015	3/4	5,01 to 6,0	0,4	19,0					
17/64 to 5/16	.015	3/4	6,01 to 8,0	0,4	19,0					
21/64 to 3/8	.020	3/4	8,01 to 10,0	0,5	19,0					
25/64 to 1/2	.025	3/4	10,01 to 12,0	0,6	19,0					
33/64 to 5/8	.035	3/4	12,01 to 16,0	0,9	19,0					
41/64 to 3/4	.035	3/4	16,01 to 20,0	0,9	19,0					
49/64 to 1	.040	3/4	20,01 to 25,0	1,0	19,0					

REFER TO CURRENT PRICE LIST

- Add 20% for longer neck relief lengths

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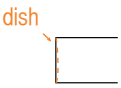
Special tooling requirements can often be met through one or more simple modifications of standard, off-the-shelf products. Modifications include coating, adding corner radius or chamfer, flats and more. You can order more than one modification for the same tool as long as they do not depend on or conflict 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					
17/64 to 1/2	6,1 to 12,0					
33/64 to 5/8	12,1 to 16,0					
41/64 to 3/4	16,1 to 20,0					
49/64 to 1	20,1 to 25,4					

REFER TO CURRENT PRICE LIST

Add Set Screw Flat or Whistle Notch

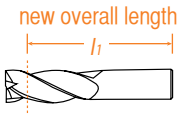

Set Screw


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					
17/64 to 1/2	6,1 to 12,0					
33/64 to 5/8	12,1 to 16,0					
41/64 to 3/4	16,1 to 20,0					
49/64 to 1	20,1 to 25,4					

REFER TO CURRENT PRICE LIST

Shorten Flute Length*
Cut Off End & Resharpen



Specify either new flute or overall length

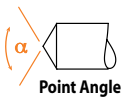
Diameter Range		Additional Price by Quantity (Per Item Ordered)				
Inch Tools	Metric Tools	1	2-5	6-11	12-23	24+
Up to 1/4	Up to 6,0					
17/64 to 1/2	6,1 to 12,0					
33/64 to 5/8	12,1 to 16,0					
41/64 to 3/4	16,1 to 20,0					
49/64 to 1	20,1 to 25,4					

REFER TO CURRENT PRICE LIST

• 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

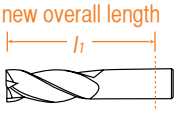
Specify point or chamfer angle

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					
17/64 to 1/2	6,1 to 12,0					
33/64 to 5/8	12,1 to 16,0					
41/64 to 3/4	16,1 to 20,0					
49/64 to 1	20,1 to 25,4					

REFER TO CURRENT PRICE LIST

• 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



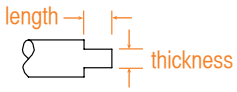
Specify new overall length

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					
17/64 - 1/2	6,1 to 12,0					
33/64 - 5/8	12,1 to 16,0					
41/64 - 3/4	16,1 to 20,0					
49/64 - 1	20,1 to 25,4					

REFER TO CURRENT PRICE LIST

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					
13/32 to 5/8	10,1 to 16,0					
41/64 to 1	16,1 to 25,4					

REFER TO CURRENT PRICE LIST

• 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					
.1251 - .1969	9/64 to 3/16	3,2 to 5,0					
.1970 - .2500	13/64 to 1/4	5,1 to 6,3					
.2501 - .3150	17/64 to 5/16	6,4 to 8,0					
.3151 - .3937	21/64 to 3/8	8,1 to 10,0					
.3938 - .4750	25/64 to 7/16	10,1 to 11,0					
.4751 - .5000	29/64 to 1/2	11,1 to 12,7					
.5001 - .6300	33/64 to 5/8	12,8 to 16,0					
.6301 - .7874	41/64 to 3/4	16,1 to 20,0					
.7875 - .8750	49/64 to 7/8	20,1 to 22,0					
.8751 - 1.000	57/64 to 1	22,1 to 25,4					
1.001 - 1.260	1-1/64 to 1-1/4	25,5 to 32,0					
1.261 - 1.500	1-17/64 to 1-1/2	32,1 to 38,0					

REFER TO CURRENT PRICE LIST

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							
.1251 - .1969	9/64 to 3/16	3,2 to 5,0							
.1970 - .2500	13/64 to 1/4	5,1 to 6,3							
.2501 - .3150	17/64 to 5/16	6,4 to 8,0							
.3151 - .3937	21/64 to 3/8	8,1 to 10,0							
.3938 - .4750	25/64 to 7/16	10,1 to 11,0							
.4751 - .5000	29/64 to 1/2	11,1 to 12,7							
.5001 - .6300	33/64 to 5/8	12,8 to 16,0							
.6301 - .7874	41/64 to 3/4	16,1 to 20,0							
.7875 - .8750	49/64 to 7/8	20,1 to 22,0							
.8751 - 1.000	57/64 to 1	22,1 to 25,4							
1.001 - 1.260	1-1/64 to 1-1/4	25,5 to 32,0							
1.261 - 1.500	1-17/64 to 1-1/2	32,1 to 38,0							

REFER TO CURRENT PRICE LIST

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					
9/64 to 3/16	0 - 4.0	3,2 to 5,0	0 - 101					
13/64 to 1/4	0 - 4.0	5,1 to 6,3	0 - 101					
17/64 to 5/16	0 - 4.5	6,4 to 8,0	0 - 114					
21/64 to 3/8	0 - 4.5	8,1 to 10,0	0 - 114					
25/64 to 7/16	0 - 5	10,1 to 11,0	0 - 127					
29/64 to 1/2	0 - 5	11,1 to 12,7	0 - 127					
33/64 to 5/8	0 - 6	12,8 to 16,0	0 - 152					
41/64 to 3/4	0 - 6	16,1 to 20,0	0 - 152					
49/64 to 7/8	0 - 6	20,1 to 22,0	0 - 152					
57/64 to 1	0 - 6	22,1 to 25,4	0 - 152					
1-1/64 to 1-1/4	0 - 6	25,5 to 32,0	0 - 152					
1-17/64 to 1-1/2	0 - 6	32,1 to 38,0	0 - 152					

REFER TO CURRENT PRICE LIST

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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 the 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.

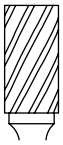
Fine Cut Style

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%	REFER TO CURRENT PRICE LIST				

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%	REFER TO CURRENT PRICE LIST				

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						
Add 1/4, 3/8 or 8mm x 4" shank to bur						
Add 1/4, 3/8 or 8mm x 6" shank to bur						
Add 1/2 or 12mm x 2" shank to bur						
Add end cut to SN style bur						
Negative rake flutes - standard, fine, double cuts only						
Down cut style fiberglass routers (FR10)						
Cut-off shank	Refer to Shorten Overall Length pricing on page 161.					

REFER TO CURRENT PRICE LIST

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	Metric	Standard Cut Double Cut Chipbreaker Cut Sharpen	Condition	Coarse Cut Coarse Double Coarse Chipbreaker Sharpen	Condition	Fine Cut Fine Double Fine Chipbreaker Sharpen	Condition	Diamond Cut Fine Diamond Coarse Diamond Sharpen	Condition	Aluma Cut Sharpen	Condition
1/8	3,0										
3/16	4,7 - 5,0										
1/4	6,0										
5/16	8,0										
3/8	9,5 - 10,0										
7/16	11,0										
1/2	12,0 -12,7										
5/8	16,0										
3/4	19,0										
1	25,4										
1-1/4	32,0										

REFER TO CURRENT PRICE LIST

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OLD SERIES CODE REFERENCE

End Mills

Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
M232	mm	E12	None	Plain	RR	98
M232CR	in/mm	E12	None	Plain	RR	98
M233	mm	E13	None	Plain	RR	92
M233CR	mm	E13	None	Plain	RR	92
M234	mm	E14	None	Plain	RR	78
M234CR	in/mm	E14	None	Plain	RR	78
M236	Discontinued - Use E13 with flat modification					92
M237	in/mm	E12	None	Weldon	RR	98
M241	in	M202	None	Plain	SR	54
M241	mm	M202	None	Plain	SS, SR	54
M242	in/mm	M202	None	Plain	RR	54
M242R	in	M202B	None	Plain	RR	54
M242R	mm	M202B	None	Plain	RS, RR	54
M243	in	M202	None	Plain	LL	54
M244	in	M202	None	Plain	LL, LM, XX	54
M245	in/mm	M202	None	Plain	SR	54
M246	in	M202	None	Plain	SL	54
M247	in/mm	M202	None	Plain	SM, SX	54
M248	in	M202	None	Plain	SX, SE	54
M250	Discontinued - Use M104 with AlTiN coating					65
M254	in	M104	TiCN	Plain	SS, SR	65
M255	in	M104	TiCN	Plain	RR	65
M256	in	M104	None	Plain	SS, SR	65
M257	in/mm	M104	None	Plain	RR	65
M258	in/mm	M104	None	Plain	LL	65
M259	in	M104	TiCN	Plain	LL	65
M260	in	M203	None	Plain	SR	46
M260	mm	M203	None	Plain	SS, SR	46
M261	in/mm	M203	None	Plain	RR	46
M262	in/mm	M203	None	Plain	LL	46
M263	in	M203	None	Plain	LL, LM, XX	46
M264	in	M203	None	Plain	XX, EX, EE	46
M265	in/mm	M203	None	Plain	SR	46
M266	in	M203	None	Plain	SL	46
M267	in/mm	M203	None	Plain	SM, SX	46
M268	in	M203	None	Plain	SX, SE	46
M270	in/mm	M202	None	Weldon	RR	54
M270R	in/mm	M202B	None	Weldon	RR	54
M271	in	M202	None	Weldon	LL	54
M272	in	M202	None	Weldon	LL, LM, XX	54
M274	in/mm	M203	None	Weldon	RR	46
M275	in/mm	M203	None	Weldon	LL	46
M276	in	M203	None	Weldon	LL, LM, XX	46
M277	in	M203	None	Weldon	XX, EX, EE	46
M280	in	E12	None	Weldon	RR	98
M285	in	E14	None	Weldon	RR	78
M290	in/mm	E14	None	Weldon	RR	78
M293	in	E14	None	Weldon	LL	78

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Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
M294	in	E14	None	Weldon	XX	78
M295	in	E14	None	Weldon	EX, EE	78
M300	in	E12	TiCN	Plain	RR, LR	98
M300R	in	E12B	TiCN	Plain	RR, LR	98
M301	Discontinued - Use E13 with AlTiN coating					92
M303	Discontinued - Use E13 with AlTiN coating					92
M305	Discontinued - Use E12 with AlTiN coating					98
M305R	Discontinued - Use E12B with AlTiN coating					98
M310	Discontinued - Use E12 with AlTiN coating					98
M310R	Discontinued - Use E12B with AlTiN coating					98
M320	Discontinued - Use E13 with AlTiN coating					92
M320R	Discontinued - Use E13B with AlTiN coating					92
M325	in	E22	TiCN	Plain	SR	104
M332	Discontinued - Use E12 with AlTiN coating					98
M333	Discontinued - Use E13 with AlTiN coating					92
M334	Discontinued - Use E14 with AlTiN coating					78
M334R	in	E14	TiCN	Plain	RR	78
M335	in	E14	TiCN	Plain	SS, SR	78
M335	mm	E14	TiCN	Plain	SR	78
M335R	Discontinued - Use E14B with AlTiN coating					78
M336	Discontinued - Use E13 with flat modification					92
M337	Discontinued - Use E12 with flat modification					98
M340	Discontinued - Use E12 with AlTiN coating					98
M340R	Discontinued - Use E12B with AlTiN coating					98
M350	in	E14	TiCN	Plain	RR, LR	78
M350	mm	E14	TiCN	Plain	RS, RR, RM, LR	78
M350R	in	E14B	TiCN	Plain	RR, LR	78
M352	Discontinued - Use E12 with AlTiN coating					98
M352R	Discontinued - Use E12B with AlTiN coating					98
M353	Discontinued - Use E13 with AlTiN coating					92
M353R	Discontinued - Use E13B with AlTiN coating					92
M354	mm	E14	TiCN	Plain	RR	78
M354R	Discontinued - Use E14B with AlTiN coating					78
M355	in/mm	E14	TiCN	Plain	LL	78
M355R	in	E14B	TiCN	Plain	LL	78
M360	in/mm	E14	TiCN	Plain	XX	78
M360R	in	E14B	TiCN	Plain	XX	78
M363	Discontinued - Use E13 with AlTiN coating					92
M375	in	E24	TiCN	Plain	SR	88
M375	mm	E24	TiCN	Plain	SS, SR, SM	88
M375R	in	E24B	TiCN	Plain	SR	88
M385	in	E14	TiCN	Weldon	RR	78
M390	in/mm	E14	TiCN	Weldon	RR	78
M395	Discontinued - Use E14 with flat modification					78
M400	Discontinued - Use E12 with AlTiN coating					98
M400R	Discontinued - Use E12B with AlTiN coating					98
M405	Discontinued - Use E12 with AlTiN coating					98

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Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
M410	Discontinued - Use E12 with AlTiN coating					98
M425	in	E22	TiN	Plain	SR	104
M435	Discontinued - Use E14 with AlTiN coating					78
M435R	Discontinued - Use E14B with AlTiN coating					78
M450	in	E14	TiN	Plain	RR, LR	78
M450R	in	E14B	TiN	Plain	RR, LR	78
M455	in	E14	TiN	Plain	LL	78
M455R	in	E14B	TiN	Plain	LL	78
M460	in	E14	TiN	Plain	XX	78
M460R	Discontinued - Use E14 with AlTiN coating					78
M475	in	E24	TiN	Plain	SR	88
M475R	Discontinued - Use E24B with AlTiN coating					88
M490	in	E14	TiN	Weldon	RR	78
M493	in	E14	TiN	Weldon	LL	78
M494	in	E14	TiN	Weldon	XX	78
M495	in	E14	TiN	Weldon	EX, EE	78
M520	in/mm	E520B	TiAlN	Plain	SL, SX	66
M521	Discontinued - Use E520B					66
M560	in/mm	M503	AlTiN	Plain	SR	40
M562	Discontinued - Use M503N with flat modification					41
M564	in/mm	M503	AlTiN	Plain	SS, SR	40
M565	in/mm	M503	AlTiN	Plain	SR	40
M567	Discontinued - Use M503N with flat modification					41
M570	in/mm	M503	AlTiN	Plain	RR	40
M572	in/mm	M503	AlTiN	Weldon	RR	40
M575	in/mm	M503	AlTiN	Plain	RR	40
M577	in/mm	M503	AlTiN	Weldon	RR	40
M670	in/mm	M505	TiAlN	Plain	RR	38
M671	in/mm	M505	TiAlN	Plain	RR	38
M672	in/mm	M505	TiAlN	Weldon	RR	38
M673	in/mm	M505	TiAlN	Weldon	RR	38
M674	Discontinued - Use M505 with neck modification					38
M676	Discontinued - Use M505 with neck modification					38
M678	in	M505	TiAlN	Plain	SS, SR	38
M679	in	M505	TiAlN	Plain	SS, SR	38
M700	in	E42	None	Plain	RR	68
M700R	in	E42B	None	Plain	RR	68
M703	in/mm	E13	AlTiN	Plain	LL	92
M703R	in/mm	E13B	AlTiN	Plain	LL	92
M705	in/mm	E12	AlTiN	Plain	LL	98
M705R	in/mm	E12B	AlTiN	Plain	LL	98
M710R	Discontinued					
M720	in	E14	AlTiN	Plain	RR, LR	78
M720	mm	E14	AlTiN	Plain	RS, RR, RM, LR	78
M720R	in	E14B	AlTiN	Plain	RR, LR	78
M720R	mm	E14B	AlTiN	Plain	RS, RR, RM, LR	78

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M722	in	E22	AlTiN	Plain	SR	104
M722	mm	E22	AlTiN	Plain	SS, SR, SM	104
M722R	in	E22B	AlTiN	Plain	SR	104
M722R	mm	E22B	AlTiN	Plain	SR, SM	104
M723	Discontinued					
M724	in	E24	AlTiN	Plain	SR	88
M724	mm	E24	AlTiN	Plain	SS, SR, SM	88
M724R	in	E24B	AlTiN	Plain	SR	88
M724R	mm	E24B	AlTiN	Plain	SR, SM	88
M725	in	E12	AlTiN	Plain	RR, LR	98
M725	mm	E12	AlTiN	Plain	RS, RR, RM, LR	98
M725R	in	E12B	AlTiN	Plain	RR, LR	98
M725R	mm	E12B	AlTiN	Plain	RS, RR, RM, LR	98
M730	in	E13	AlTiN	Plain	RR, LR	92
M730	mm	E13	AlTiN	Plain	RS, RR, RM, LR	92
M730R	in	E13B	AlTiN	Plain	RR, LR	92
M730R	mm	E13B	AlTiN	Plain	RR, RM, LR	92
M732	mm	E12	AlTiN	Plain	RR	98
M732CR	in/mm	E12	AlTiN	Plain	RR	98
M733	mm	E13	AlTiN	Plain	RR	92
M733CR	mm	E13	AlTiN	Plain	RR	92
M734	mm	E14	AlTiN	Plain	RR	78
M734CR	in/mm	E14	AlTiN	Plain	RR	78
M735	in	E14	AlTiN	Plain	SS, SR, RR	78
M735	mm	E14	AlTiN	Plain	SS, SR	78
M735R	in	E14B	AlTiN	Plain	SS, SR	78
M735R	mm	E14B	AlTiN	Plain	SR	78
M736	Discontinued - Use E13 with flat modi cation					92
M737	in/mm	E12	AlTiN	Weldon	RR	98
M740	in	E12	AlTiN	Plain	SS, SR, RR, LR	98
M740	mm	E12	AlTiN	Plain	SS, SR	
M740R	in	E12B	AlTiN	Plain	SS, SR	98
M740R	mm	E12B	AlTiN	Plain	SR	98
M745	in/mm	E13	AlTiN	Plain	SS, SR	92
M745R	in	E13B	AlTiN	Plain	SS, SR	92
M745R	mm	E13B	AlTiN	Plain	SR	92
M751 4 FL	in	E14	AlTiN	Weldon	RR	78
M751 6 FL	in	E16	AlTiN	Weldon	RR	69
M752	mm	E12	AlTiN	Plain	RR	98
M752R	mm	E12B	AlTiN	Plain	RR	98
M753	mm	E13	AlTiN	Plain	RR	92
M753R	mm	E13B	AlTiN	Plain	RR	92
M754	mm	E14	AlTiN	Plain	RR	78
M754R	mm	E14B	AlTiN	Plain	RR	78

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Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
M755	in/mm	E14	AlTiN	Plain	LL	78
M755R	in/mm	E14B	AlTiN	Plain	LL	78
M756 6 FL	in	E16	AlTiN	Plain	RR	69
M756 6 FL	mm	E16	AlTiN	Plain	RS, RR, RM	69
M756 8 FL	Discontinued					
M758	in/mm	M706	TiAlN	Plain	SR	30
M759	in/mm	M706	TiAlN	Plain	SR	30
M760	in/mm	E14	AlTiN	Plain	XX	78
M760R	in/mm	E14B	AlTiN	Plain	XX	78
M762	in/mm	E12	AlTiN	Plain	XX	98
M762R	in/mm	E12B	AlTiN	Plain	XX	98
M763	in/mm	E13	AlTiN	Plain	XX	92
M763R	in/mm	E13B	AlTiN	Plain	XX	92
M765	in/mm	M706	TiAlN	Plain	RR	30
M766	in/mm	M706	TiAlN	Plain	RR	30
M767	in	E53	AlTiN	Plain	TL	71
M767	mm	E53	AlTiN	Plain	TR, TM, TL, TX	71
M768	in	E53B	AlTiN	Plain	TL	71
M769	in	M706	TiAlN	Plain	RM, RX, LX	30
M769	mm	M706	TiAlN	Plain	RM, RX, LX	30
M770R	in/mm	M706	TiAlN	Weldon	RR	30
M771	in/mm	M706	TiAlN	Weldon	RR	30
M772R	in/mm	E64B	AlTiN	Plain	SL, SX	67
M773	in/mm	M706	TiAlN	Plain	SR	30
M774R	in/mm	E64B	AlTiN	Plain	SX, SE	67
M775	in/mm	M706	TiAlN	Weldon	SR	30
M776R	in/mm	E62B	AlTiN	Plain	SL, SX	67
M777R	in/mm	M706	TiAlN	Weldon	SR	30
M778R	in/mm	E62B	AlTiN	Plain	SX, SE	67
M779	in	M706	TiAlN	Plain	RM, RX, LX	30
M779	mm	M706	TiAlN	Plain	RM, RX	30
M780	in	E12	AlTiN	Weldon	RR	98
M783	in/mm	M706	TiAlN	Plain	SR	30
M784	mm	E13	AlTiN	Plain	RX	92
M784R	mm	E13B	AlTiN	Plain	RX	92
M785	in	E14	AlTiN	Weldon	RR	78
M786	mm	E13	AlTiN	Plain	RX, RE, LX	92
M786R	mm	E13B	AlTiN	Plain	RX, RE, LX	92
M787	in	M104	AlTiN	Plain	SS, SR	64
M788	in/mm	M104	AlTiN	Plain	RR	64
M789	in/mm	M104	AlTiN	Plain	LL	64
M790	in/mm	E14	AlTiN	Weldon	RR	78
M761	in	E12	AlTiN	Plain	RL, RX, MM, LX, LE	98
M761	mm	E12	AlTiN	Plain	RX	98
M761R	in	E12B	AlTiN	Plain	RL, RX, MM, LX, LE	98

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Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
M761R	mm	E12B	AlTiN	Plain	RX	98
M764	in	E12	AlTiN	Plain	LX, LE, XE	98
M764	mm	E12	AlTiN	Plain	RX, RE, LX	98
M764R	in	E12B	AlTiN	Plain	LX, LE, XE	98
M764R	mm	E12B	AlTiN	Plain	RX, RE, LX	98
M793	in	E14	AlTiN	Weldon	LL	78
M794	in	E14	AlTiN	Weldon	XX	78
M795	in	E14	AlTiN	Weldon	EX, EE	78
M797	in	E14	AlTiN	Plain	RL, RX, MM, LX, LE	78
M797	mm	E14	AlTiN	Plain	RX	78
M797R	in	E14B	AlTiN	Plain	RL, RX, MM, LX, LE	78
M797R	mm	E14B	AlTiN	Plain	RX	78
M798	in	E14	AlTiN	Plain	LX, LE, XE	78
M798	mm	E14	AlTiN	Plain	RX, RE, LX	78
M798R	in	E14B	AlTiN	Plain	LX, LE, XE	78
M798R	mm	E14B	AlTiN	Plain	RX, RE, LX	78
M800	in	E12	None	Plain	RR, LR	98
M800	mm	E12	None	Plain	RS, RR, RM, LR	98
M800R	in	E12B	None	Plain	RR, LR	98
M800R	mm	E12B	None	Plain	RS, RR, RM, LR	98
M820	in	E13	None	Plain	RR, LR	92
M820	mm	E13	None	Plain	RS, RR, RM, LR	92
M820R	in	E13B	None	Plain	RR, LR	92
M820R	mm	E13B	None	Plain	RR, RM, LR	92
M850	in	E14	None	Plain	RR, LR	78
M850	mm	E14	None	Plain	RS, RR, RM, LR	78
M850R	in	E14B	None	Plain	RR, LR	78
M850R	mm	E14B	None	Plain	RS, RR, RM, LR	78
M851 4 FL	in	E14	None	Weldon	RR	78
M851 6 FL	in	E16	None	Weldon	RR	69
M852	in	E12	None	Plain	SR, RR	98
M852	mm	E12	None	Plain	RR	98
M852R	mm	E12B	None	Plain	RR	98
M853	mm	E13	None	Plain	RR	92
M853R	mm	E13B	None	Plain	RR	92
M854	in/mm	E14	None	Plain	RR	78
M854	dec	Discontinued				
M854R	mm	E14B	None	Plain	RR	78
M855 6 FL	Discontinued - Use E16 with AlTiN coating					69
M855 8 FL	Discontinued					
M856 6 FL	Discontinued - Use E16 with AlTiN coating					69

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M856 8 FL	Discontinued					
M865	in	E55B	None	Plain	TR	70
M865R	in	E55B	None	Plain	TR	70
M865R	mm	E55B	None	Plain	TR, TM	70
M867	Discontinued - Use E53 with AlTiN coating					71
M868	Discontinued - Use E53B with AlTiN coating					71
M870	in/mm	E34	None	Plain	RR	69
M872R	Discontinued - Use E64B with AlTiN coating					67
M874R	Discontinued - Use E64B with AlTiN coating					67
M876R	Discontinued - Use E62B with AlTiN coating					67
M878R	Discontinued - Use E62B with AlTiN coating					67
M880	in/mm	E12	None	Plain	LL	98
M880R	in/mm	E12B	None	Plain	LL	98
M883	in/mm	E13	None	Plain	LL	92
M883R	in/mm	E13B	None	Plain	LL	92
M884	mm	E13	None	Plain	RX	92
M884R	mm	E13B	None	Plain	RX	92
M885	in/mm	E14	None	Plain	LL	78
M885R	in/mm	E14B	None	Plain	LL	78
M886	mm	E13	None	Plain	RX, RE, LX	92
M886R	mm	E13B	None	Plain	RX, RE, LX	92
M890	in/mm	E12	None	Plain	XX	98
M890R	in/mm	E12B	None	Plain	XX	98
M861	in	E12	None	Plain	RL, RX, MM, LX, LE	98
M861	mm	E12	None	Plain	RX	98
M861R	in	E12B	None	Plain	RL, RX, MM, LX, LE	98
M861R	mm	E12B	None	Plain	RX	98
M864	in	E12	None	Plain	LX, LE, XE	98
M864	mm	E12	None	Plain	RX, RE, LX	98
M864R	in	E12B	None	Plain	LX, LE, XE	98
M864R	mm	E12B	None	Plain	RX, RE, LX	98
M893	in/mm	E13	None	Plain	XX	92
M893R	in/mm	E13B	None	Plain	XX	92
M894	Discontinued					
M895	in/mm	E14	None	Plain	XX	78
M895R	in/mm	E14B	None	Plain	XX	78
M896	Discontinued					
M897	in	E14	None	Plain	RL, RX, MM, LX, LE	78
M897	mm	E14	None	Plain	RX	78
M897R	in	E14B	None	Plain	RL, RX, MM, LX, LE	78
M897R	mm	E14B	None	Plain	RX	78
M898	in	E14	None	Plain	LX, LE, XE	78
M898	mm	E14	None	Plain	RX, RE, LX	78
M898R	in	E14B	None	Plain	LX, LE, XE	78
M898R	mm	E14B	None	Plain	RX, RE, LX	78
M891	Discontinued					

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Old Series	in/mm	New Series	Coating	Shank	Style Code	Page #
M900	in	E22	None	Plain	SR	104
M900	mm	E22	None	Plain	SS, SR, SM	104
M900R	in	E22B	None	Plain	SR	104
M900R	mm	E22B	None	Plain	SR, SM	104
M930	Discontinued					
M942	in	E22	None	Plain	RM, RL	104
M942R	in	E22B	None	Plain	RM, RL	104
M944	in	E24	None	Plain	RM, RL	88
M944R	in	E24B	None	Plain	RM, RL	88
M950	in	E24	None	Plain	SR	88
M950	mm	E24	None	Plain	SS, SR, SM	88
M950R	in	E24B	None	Plain	SR	88
M950R	mm	E24B	None	Plain	SR, SM	88
M967	in/mm	M904	AlTiNX	Plain	LL	18
M968	in	M904	AlTiNX	Plain	LM, XX	18
M969	in	M904	AlTiNX	Plain	XX, EE	18
M970	in/mm	M904	AlTiNX	Plain	RR	18
M971	in/mm	M904	AlTiNX	Plain	RR	18
M971R	in/mm	M904B	AlTiNX	Plain	RR	18
M972	in/mm	M904	AlTiNX	Weldon	RR	18
M973	in/mm	M904	AlTiNX	Weldon	RR	18
M973R	in/mm	M904B	AlTiNX	Weldon	RR	18
M974	in	M904	AlTiNX	Plain	SR	18
M975	in	M904	AlTiNX	Plain	SL	18
M976	in	M904	AlTiNX	Plain	SM, SX	18
M977	in	M904	AlTiNX	Plain	SX, SE	18
M978	in/mm	M904	AlTiNX	Plain	SS	18
M979	in/mm	M904	AlTiNX	Plain	SS	18
M980	in/mm	M905	AlTiNX	Plain	RR	21
M981	in/mm	M905	AlTiNX	Plain	RR	21
M982	in/mm	M905	AlTiNX	Weldon	RR	21
M983	in/mm	M905	AlTiNX	Weldon	RR	21
M200	in	E24	None	Weldon	RL, RX	88
M201	Discontinued - Use E24 with AlTiN coating					88
M203	in	E24	AlTiN	Weldon	RL	88
M210	Discontinued - Use M603 with AlTiN coating					23
M215	Discontinued - Use M603 with AlTiN coating					23
M225	Discontinued - Use M603 with AlTiN coating					23
M226	in/mm	M603	AlTiN	Plain	RR	23
M400	in/mm	E13	None	Plain	SS, SR	92
M400R	in	E13B	None	Plain	SS, SR	92
M400R	mm	E13B	None	Plain	SR	92
M500	in/mm	E12	None	Plain	SS, SR	98
M500R	in	E12B	None	Plain	SS, SR	98
M500R	mm	E12B	None	Plain	SR	98
M600	in/mm	E14	None	Plain	SS, SR	78
M600R	in	E14B	None	Plain	SS, SR	78
M600R	mm	E14B	None	Plain	SR	78
M100	in	E22	None	Weldon	RL	104

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Old Series	New Series	Page #
B200	BT10	154
M288R	CRC10	158
F547	FR10 - No End Cut	153
F548	FR10 - Bur End Cut	153
F549	FR10 - End Mill End Cut	153
F550	FR10 - Drill Point	153
D805	D40	124
D810	D20	116
D815	D21	119
D817	D30	114
D817D	D30	114
D818	D23 - 90°	123
D818L	D23 - 90°	123
D819	D23 - 120°	123
D819L	D23 - 120°	123
C830	CD10	156
C831	CD10	156
C835	Discontinued	---
M837	CT12 - 60°	158
M838	CT12 - 90°	158
M839	CT12 - 120°	158
C840	CS10 - 60°	157
C841	CS10 - 82°	157
C842	CS10 - 90°	157
C843	CS20 - 3 FL - 60°	157
C844	CS20 - 3 FL - 82°	157
C845	CS20 - 3 FL - 90°	157
C846	CS20 - 6 FL - 60°	157
C849	CS20 - 5 FL - 60°	157
C852	CS20 - 7 FL - 60°	157
C847	CS20 - 6 FL - 82°	157
C851	CS20 - 5 FL - 82°	157
C853	CS20 - 7 FL - 82°	157
C848	CS20 - 6 FL - 90°	157
C850	CS20 - 5 FL - 90°	157
C854	CS20 - 7 FL - 90°	157
G901	Discontinued	---
M910	PDT10	68
D285	DT20	120
D385	DT22	122
D400	D10	126
D405	D11	127
K100	KC10	155
D485	DT40	126
D585	DT21	121
R800	Discontinued	---
R801	Discontinued	---
R900	R10	128

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DECIMAL EQUIVALENT CHART

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

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Special items or tools manufactured to specifications other than those provided in this catalog are subject to quotation. Dimensions and tolerances not detailed will be furnished to our standard manufacturing specifications. Quotations are valid for 30 days unless otherwise stated and agreed to in writing. As a safeguard, all orders for special tooling must be confirmed in writing before manufacturing can begin. Special items cannot be canceled or returned for exchange or credit.

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Use this chart to determine the Over and Under allowance applied

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- Purchase order number
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