



PRECISION CARBIDE CUTTING TOOLS

Product Return Policy

Prior to acceptance of any returned products, a Returned Authorization (RA) number must be issued from our Returns Department by calling 888-227-2433 or emailing returns@mtccarbide.com. A list of returned products accompanied with purchase order numbers is required for review and approval prior to issuance of a RA. Only current EDP numbers are considered for return, any discontinued products are non-returnable. All specials, modified tooling, or altered tools cannot be returned for credit unless tools were manufactured incorrectly per the customer's specifications provided. Only tools purchased within 6 months from date of order will be eligible for return. Returned products for credit will be valued at purchase price regardless of current price. All returned products must pass Quality Assurance inspection, be undamaged, unaltered, unused, resalable, manufactured according to current tooling specifications, and in original packaging. No credit will be issued if tools do not pass QA inspection or meet the aforementioned criteria. All products must be received within 21-days of RA issuance. A restocking charge of 20% will apply or an offsetting order of two times (200%) the value of the returned product will apply to all products returned for any reason other than a manufacturer error or defect. Freight charges will be assumed by the customer unless the return is due to manufacturer error or defect. The RA number must be clearly visible on the outside of the box and on the enclosed packing list. Any items shipped and not approved for return will either be returned to the customer or scrapped at the customer's expense. Please return product with approved RA number to: Monster Tool Company, 2470 Ash Street, Bay #2, Vista, CA 92081

Monster Tool Blanket Order Policy

Blanket orders are extremely beneficial for high volume consumers of cutting tools. This order option enables all parties to maximize their logistical planning increasing efficiencies, price security and cost savings for all parties. All blanket orders must be taken within the agreed upon term not to exceed 12-months from date of order. Blanket order releases can be released on a scheduled timely basis or released as needed. No cancellations or returns will be allowed on blanket orders regardless if the products sold are standard catalog items or specials.

Technical Assistance

Any technical assistance or application suggestions made by Monster Tool Company personnel or website tech data information and online calculators are only to assist the customer and in all cases use of such information is solely the customer's responsibility.

Safety Precautions when using Cutting Tools

Monster Tool Company is committed to manufacturing products that can be used safely as directed under recommended machining parameters. Cutting tools can break or shatter when in use due to the extreme forces of the machining environment. Cutting tools will generate chips while engaged in the work piece and can produce dust, swarf, gases and potentially sparks or fire. Caution and safety must be taken into account at all times to include the use of protective eye wear, machine safety guard barriers, proper ventilation, quick access to fire suppression equipment and other safeguards. In no way shall Monster Tool Company be held accountable or liable for any costs, machine down time, injuries, or deaths resulting from cutting tool breakage or emissions.

Limitation of Liability

Under no circumstance shall Monster tool Company be held liable in contract, warranty, tort or otherwise for any special, exemplary, incidental or consequential damages that result from your purchase or use of any Monster Tool Company products. In no event shall our liability exceed the purchase price of the products from Monster Tool Company. It is the customer's responsibility to inspect all products to determine if they are suitable and per specification required by the end user.

Revisions to Marketing Avenues

Monster Tool Company reserves the right to revise listings and specifications in our catalog and website without notice. Monster Tool Company is not responsible for any typographical errors. Please verify the current data at the time of your order.

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2470 Ash Street ■ Vista, CA 92081
Ph: 888-227-2433 ■ Ph: 760-477-1000

DECIMAL CHART

SIZE	DEC IN	SIZE	DEC IN	SIZE	DEC IN	SIZE	DEC IN	SIZE	DEC IN
0.25 mm	0.0098	1.50 mm	0.0591	#26	0.1470	K	0.2810	37/64	0.5781
0.30 mm	0.0118	#53	0.0595	#25	0.1495	9/32	0.2812	15.00 mm	0.5905
#80	0.0135	1/16	0.0625	#24	0.1520	L	0.2900	19/32	0.5938
0.35 mm	0.0138	1.60 mm	0.0630	#23	0.1540	M	0.2950	39/64	0.6094
#79	0.0145	#52	0.0635	5/32	0.1562	7.50 mm	0.2953	15.50 mm	0.6102
1/64	0.0156	1.70 mm	0.0669	#22	0.1570	19/64	0.2969	5/8	0.6250
0.40 mm	0.0157	#51	0.0670	4.00 mm	0.1575	N	0.3020	16.00 mm	0.6299
#78	0.0160	#50	0.0700	#21	0.1590	5/16	0.3125	41/64	0.6406
0.45 mm	0.0177	1.80 mm	0.0709	#20	0.1610	8.00 mm	0.3150	16.50 mm	0.6496
#77	0.0180	#49	0.0730	#19	0.1660	O	0.3160	21/32	0.6562
0.50 mm	0.0197	1.90 mm	0.0748	#18	0.1695	P	0.3230	17.00 mm	0.6693
#76	0.0200	#48	0.0760	11/64	0.1719	21/64	0.3281	43/64	0.6719
#75	0.0210	5/64	0.0781	#17	0.1730	Q	0.3320	11/16	0.6875
0.55 mm	0.0217	#47	0.0785	#16	0.1770	8.50 mm	0.3346	17.50 mm	0.6890
#74	0.0225	2.00 mm	0.0787	4.50 mm	0.1772	R	0.3390	45/64	0.7031
0.60 mm	0.0236	#46	0.0810	#15	0.1800	11/32	0.3438	18.00 mm	0.7087
#73	0.0240	#45	0.0820	#14	0.1820	S	0.3480	23/32	0.7188
#72	0.0250	2.10 mm	0.0827	#13	0.1850	9.00 mm	0.3543	18.50 mm	0.7283
0.65 mm	0.0256	#44	0.0860	3/16	0.1875	T	0.3580	47/64	0.7344
#71	0.0260	2.20 mm	0.0866	#12	0.1890	23/64	0.3594	19.00 mm	0.7480
0.70 mm	0.0276	#43	0.0890	#11	0.1910	U	0.3680	3/4	0.7500
#70	0.0280	2.30 mm	0.0906	#10	0.1935	9.50 mm	0.3740	49/64	0.7656
#69	0.0292	#42	0.0935	#9	0.1960	3/8	0.3750	19.50 mm	0.7677
0.75 mm	0.0295	3/32	0.0938	5.00 mm	0.1968	V	0.3770	25/32	0.7812
#68	0.0310	2.40 mm	0.0945	#8	0.1990	W	0.3860	20.00 mm	0.7874
1/32	0.0312	#41	0.0960	#7	0.2010	25/64	0.3906	51/64	0.7969
0.80 mm	0.0315	#40	0.0980	13/64	0.2031	10.00 mm	0.3937	20.50 mm	0.8071
#67	0.0320	2.50 mm	0.0984	#6	0.2040	X	0.3970	13/16	0.8125
#66	0.0330	#39	0.0995	#5	0.2055	Y	0.4040	21.00 mm	0.8268
0.85 mm	0.0335	#38	0.1015	#4	0.2090	13/32	0.4062	53/64	0.8281
#65	0.0350	2.60 mm	0.1024	#3	0.2130	Z	0.4130	27/32	0.8438
0.90 mm	0.0354	#37	0.1040	5.50 mm	0.2165	10.50 mm	0.4134	21.50 mm	0.8465
#64	0.0360	2.70 mm	0.1063	7/32	0.2188	27/64	0.4219	55/64	0.8594
#63	0.0370	#36	0.1065	#2	0.2210	11.00 mm	0.4331	22.00 mm	0.8661
0.95 mm	0.0374	7/64	0.1094	#1	0.2280	7/16	0.4375	7/8	0.8750
#62	0.0380	#35	0.1100	A	0.2340	11.50 mm	0.4528	22.50 mm	0.8858
#61	0.0390	2.80 mm	0.1102	15/64	0.2344	29/64	0.4531	57/64	0.8906
1.00 mm	0.0394	#34	0.1110	6.00 mm	0.2362	15/32	0.4688	23.00 mm	0.9055
#60	0.0400	#33	0.1130	B	0.2380	12.00 mm	0.4724	29/32	0.9062
#59	0.0410	2.90 mm	0.1142	C	0.2420	31/64	0.4844	59/64	0.9219
#58	0.0420	#32	0.1160	D	0.2460	12.50 mm	0.4921	23.50 mm	0.9252
#57	0.0430	3.00 mm	0.1181	1/4 E	0.2500	1/2	0.5000	15/16	0.9375
1.10 mm	0.0433	#31	0.1200	6.50 mm	0.2559	13.00 mm	0.5118	24.00 mm	0.9449
#56	0.0465	1/8	0.1250	F	0.2570	33/64	0.5156	61/64	0.9531
3/64	0.0469	#30	0.1285	G	0.2610	17/32	0.5312	24.50 mm	0.9646
1.20 mm	0.0472	#29	0.1360	17/64	0.2656	13.50 mm	0.5315	31/32	0.9688
1.30 mm	0.0512	3.50 mm	0.1378	H	0.2660	35/64	0.5469	25.00 mm	0.9842
#55	0.0520	#28	0.1405	I	0.2720	14.00 mm	0.5512	63/64	0.9844
#54	0.0550	9/64	0.1406	7.00 mm	0.2756	9/16	0.5625	1	1.0000
1.40 mm	0.0551	#27	0.1440	J	0.2770	14.50 mm	0.5709		

TOOL SPECIFICATIONS



Center Cutting



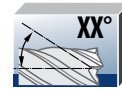
Right Hand Cut



Right Hand Cut & Spiral



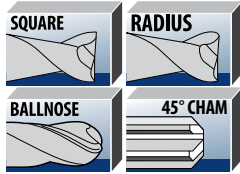
No. of Flutes



Helix Angle



Included Angle



End Styles



Shank Styles



Unequal Flute Spacing



Made in the USA



Speed & Feeds Page Location

COATINGS & FINISHES



TiN: Titanium Nitride
Recommended Materials: General Purpose
Benefits: Increases tool longevity & productivity (higher feed rates)



TiCN: Titanium Carbonitride
Recommended Materials: Carbon & Alloy Steels, Cast Irons, Super Alloys, Copper, Bronze, Brass, High Silicon Aluminum Alloys.
Benefits: Increases edge retention and wear resistance

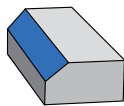


AlTiN: Aluminum Titanium Nitride
Recommended Materials: Alloy Steels, Stainless Steels, Tool Steels, Nickel Alloys & Titaniums
Benefits: Excellent heat resistance is perfectly suited for dry machining

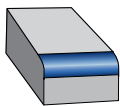


AlTiCrN: Aluminum Titanium Chromium Nitride
Recommended Materials: Cast Irons & Stainless Steels
Benefits: Excellent heat resistance is perfectly suited for dry machining

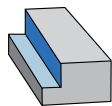
TOOL APPLICATIONS



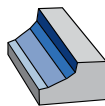
Chamfering



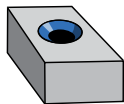
Radius



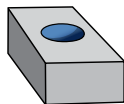
Profiling



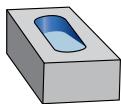
Profile Cutting



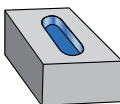
Countersinking



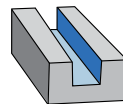
Drilling



Ramping



Plunging

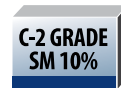


Slotting

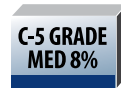


Radius Slotting

TOOL SUBSTRATES



C-2 grade, Sub-Micron grain carbide with 10% cobalt binder



C-5 grade, Medium grain carbide with 8% cobalt binder

ISO MATERIAL GROUPS

P Steels

M Stainless Steels

K Cast Iron

N Non-Ferrous

S Super Alloys

H Hardened Materials

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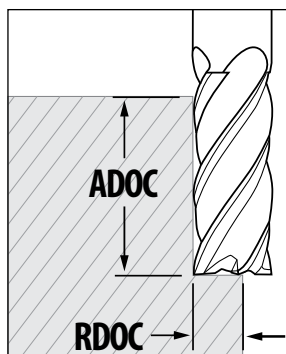
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FORMULAS

INCH	METRIC
Inches Per Minute (IPM) = IPT x T x RPM	Millimeter per minute (MMPM) = RPM x MMPT x T
Inches Per Revolution (IPR) = IPM ÷ RPM	Millimeter per revolution (MMPR) = MMPM ÷ RPM
Inches Per Tooth (IPT) = IPM ÷ (RPM x T)	Millimeter per Tooth (MMPT) = MMPM ÷ RPM x T
Metal Removal Rate (MRR) = ADOC x RDOC x IPM	Metal Removal Rate (MRR) = ADOC x RDOC x MMPM x 1000

NOTE: ALL RECOMMENDATIONS ARE CONSIDERED AS STARTING PARAMETERS ONLY

END MILL CUTTING RECOMMENDATIONS



APPLICATIONS	Flute Count (T)	
	2 & 3 FLUTES	4 FLUTES
Slotting	ADOC: 100% DIA	ADOC: 50% DIA
Light Roughing	ADOC: 100% LOC RDOC: 15-25% DIA	ADOC: 100% LOC RDOC: 15-25% DIA
Heavy Roughing	ADOC: 150% DIA RDOC: 25-50% DIA	ADOC: 150% DIA RDOC: 25-50% DIA
Finishing	ADOC: 100% LOC RDOC: 3-5% DIA	ADOC: 100% LOC RDOC: 3-5% DIA

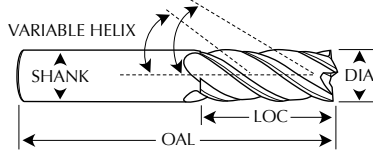
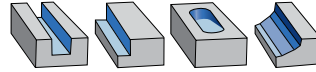
GENERAL GUIDELINES FOR MILLING

- Select the shortest flute length possible for best rigidity and material removal
- Choose the largest diameter possible for optimum strength
- Smaller flute length = Larger SFM
- Larger flute length = Smaller SFM
- Coatings can allow faster feed rates.
Optimal environments support the following increases in SFM:
TiN: 20% AlTiN: 45%
TiCN: 25% ALTiCN: 50%

CHIP THINNING

30%	1.1 x IPT
25%	1.2 x IPT
20%	1.3 x IPT
15%	1.4 x IPT
10%	1.8 x IPT
7%	2 x IPT
5%	2.3 x IPT
3%	3 x IPT
2%	3.5 x IPT
1%	5 x IPT

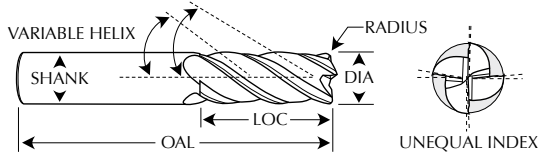
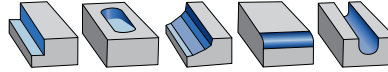
FUSION - 4 FLUTE SQUARE



Diameter Tolerance: +0.000 / -0.002"
Shank Tolerance: +0.0000 / -0.0004"

DIA	Dec In	LOC	Shank	Length	OAL	Bright	AITiCrN
1/8	0.1250	1/4	1/8	Stub	1-1/2	65999	66000
		1/2		Regular		66001	66002
		3/4		Long		66003	66004
		1		X/Long		66005	66006
3/16	0.1875	3/8	3/16	Stub	2	66007	66008
		5/8		Regular		66009	66010
		3/4		Long		66011	66012
		1-1/8		X/Long		66013	66014
1/4	0.2500	1/2	1/4	Stub	2-1/2	66015	66016
		3/4		Regular		66017	66018
		1-1/8		Long		66019	66020
		1-1/2		X/Long		66021	66022
5/16	0.3125	1/2	5/16	Stub	2-1/2	66023	66024
		13/16		Regular		66025	66026
		1-1/8		Long		66027	66028
		1-5/8		X/Long		66029	66030
3/8	0.3750	5/8	3/8	Stub	2-1/2	66031	66032
		1		Regular		66033	66034
		1-1/8		Long		66035	66036
		1-3/4		X/Long		66037	66038
7/16	0.4375	1	7/16	Regular	2-3/4	66039	66040
		2		Long		66041	66042
		3		X/Long		66043	66044
		5/8		Stub		66045	66046
1/2	0.5000	1	1/2	Regular	3	66047	66048
		1-1/4		Regular		66049	66050
		1-1/2		Medium		66051	66052
		2		Long		66053	66054
5/8	0.6250	3	5/8	X/Long	6	66055	66056
		3/4		Stub		66057	66058
		1-1/4		Regular		66059	66060
		2-1/4		Long		66061	66062
3/4	0.7500	3	3/4	X/Long	6	66063	66064
		1		Stub		66065	66066
		1-1/2		Regular		66067	66068
		2-1/4		Long		66069	66070
1	1.0000	3	1	X/Long	7	66071	66072
		4		XX/Long		66073	66074
		1-1/2		Regular		66075	66076
		2-1/4		Long		66077	66078
1	1.0000	3	1	X/Long	6	66079	66080
		4		XX/Long		66081	66082

FUSION - 4 FLUTE CORNER RADIUS



Diameter Tolerance: +0.000 / -0.002"
Shank Tolerance: +0.0000 / -0.0004"

DIA	Dec In	LOC	Shank	Length	OAL	Radius	Bright	AlTiCrN
1/8	0.1250	1/4	1/8	Stub	1-1/2	0.010	66083	66084
						0.015	66085	66086
						0.020	66087	66088
						0.030	66089	66090
1/8	0.1250	1/2	1/8	Regular	1-1/2	0.010	66091	66092
						0.015	66093	66094
						0.020	66095	66096
						0.030	66097	66098
1/8	0.1250	3/4	1/8	Long	2-1/4	0.015	66099	66100
						0.020	66101	66102
						0.030	66103	66104
1/8	0.1250	1	1/8	X/Long	3	0.015	66105	66106
						0.020	66107	66108
						0.030	66109	66110
						0.010	66111	66112
3/16	0.1875	3/8	3/16	Stub	2	0.015	66113	66114
						0.020	66115	66116
						0.030	66117	66118
						0.045	66119	66120
3/16	0.1875	5/8	3/16	Regular	2	0.010	66121	66122
						0.015	66123	66124
						0.020	66125	66126
						0.030	66127	66128
3/16	0.1875	3/4	3/16	Long	2-1/2	0.045	66129	66130
						0.015	66131	66132
						0.020	66133	66134
						0.030	66135	66136
3/16	0.1875	1	3/16	Ext XX/Long	4	0.015	66143	66144
						0.020	66145	66146
						0.030	66147	66148
						0.015	66137	66138
3/16	0.1875	1-1/8	3/16	X/Long	3	0.020	66139	66140
						0.030	66141	66142
						0.015	66149	66150
						0.020	66151	66152
1/4	0.2500	1/2	1/4	Stub	2-1/2	0.030	66153	66154
						0.045	66155	66156
						0.060	66157	66158
						0.015	66159	66160
1/4	0.2500	3/4	1/4	Regular	2-1/2	0.020	66161	66162
						0.030	66163	66164
						0.045	66165	66166
						0.060	66167	66168
1/4	0.2500	1	1/4	X/Long	4	0.015	66179	66180
						0.020	66181	66182
						0.030	66183	66184
						0.045	66185	66186
1/4	0.2500	1-1/8	1/4	Long	3	0.060	66187	66188
						0.015	66169	66170
						0.020	66171	66172
						0.030	66173	66174
1/4	0.2500	1-1/2	1/4	X/Long	4	0.045	66175	66176
						0.060	66177	66178
						0.015	66189	66190
						0.020	66191	66192

FUSION - CORNER RADIUS CONTINUED

DIA	Dec In	LOC	Shank	Length	OAL	Radius	Bright	AlTiCrN
1/4	0.2500	1-1/2	1/4	X/Long	4	0.030	66193	66194
						0.045	66195	66196
						0.060	66197	66198
						0.015	66199	66200
1/4	0.2500	1-1/2	1/4	Ext XX/Long	6	0.020	66201	66202
						0.030	66203	66204
						0.045	66205	66206
						0.060	66207	66208
5/16	0.3125	1/2	5/16	Stub	2-1/2	0.015	66209	66210
						0.020	66211	66212
						0.030	66213	66214
						0.045	66215	66216
5/16	0.3125	13/16	5/16	Regular	2-1/2	0.060	66217	66218
						0.090	66219	66220
						0.015	66221	66222
						0.020	66223	66224
5/16	0.3125	13/16	5/16	Regular	2-1/2	0.030	66225	66226
						0.045	66227	66228
						0.060	66229	66230
						0.090	66231	66232
5/16	0.3125	1-1/8	5/16	Long	3	0.015	66233	66234
						0.020	66235	66236
						0.030	66237	66238
						0.045	66239	66240
5/16	0.3125	1-1/2	5/16	Ext XX/Long	6	0.060	66241	66242
						0.015	66253	66254
						0.020	66255	66256
						0.030	66257	66258
5/16	0.3125	1-5/8	5/16	X/Long	4	0.045	66259	66260
						0.060	66261	66262
						0.015	66243	66244
						0.020	66245	66246
3/8	0.3750	5/8	3/8	Stub	2-1/2	0.030	66247	66248
						0.045	66249	66250
						0.060	66251	66252
						0.015	66263	66264
3/8	0.3750	5/8	3/8	Stub	2-1/2	0.020	66265	66266
						0.030	66267	66268
						0.045	66269	66270
						0.060	66271	66272
3/8	0.3750	1	3/8	Regular	2-1/2	0.090	66273	66274
						0.015	66275	66276
						0.020	66277	66278
						0.030	66279	66280
3/8	0.3750	1	3/8	Regular	2-1/2	0.045	66281	66282
						0.060	66283	66284
						0.090	66285	66286
						0.015	66297	66298
3/8	0.3750	1	3/8	Ext X/Long	4	0.020	66299	66300
						0.030	66301	66302
						0.045	66303	66304
						0.060	66305	66306
3/8	0.3750	1-1/8	3/8	Long	3	0.015	66287	66288
						0.020	66289	66290
						0.030	66291	66292
						0.045	66293	66294
3/8	0.3750	1-1/8	3/8	Long	3	0.060	66295	66296
						0.015	66317	66318
						0.020	66319	66320
						0.030	66321	66322
3/8	0.3750	1-1/2	3/8	Ext XX/Long	6	0.045	66323	66324
						0.060	66325	66326
						0.015	66307	66308
						0.020	66309	66310
3/8	0.3750	1-3/4	3/8	X/Long	4	0.030	66311	66312
						0.045	66313	66314
						0.060	66315	66316
						0.030	66327	66328
7/16	0.4375	1	7/16	Regular	2-3/4	0.045	66329	66330
						0.060	66331	66332
						0.090	66333	66334
						0.125	66335	66336



ADVANCED PERFORMANCE END MILLS

FUSION - CORNER RADIUS CONTINUED

DIA	Dec In	LOC	Shank	Length	OAL	Radius	Bright	AlTiCrN
1/2	0.5000	5/8	1/2	Stub	3	0.015	66337	66338
						0.020	66339	66340
						0.030	66341	66342
						0.045	66343	66344
						0.060	66345	66346
						0.090	66347	66348
						0.125	66349	66350
1/2	0.5000	1	1/2	Sm/Med	4	0.015	66365	66366
						0.020	66367	66368
						0.030	66369	66370
						0.045	66371	66372
						0.060	66373	66374
						0.090	66375	66376
						0.125	66377	66378
1/2	0.5000	1-1/4	1/2	Regular	3	0.015	66351	66352
						0.020	66353	66354
						0.030	66355	66356
						0.045	66357	66358
						0.060	66359	66360
						0.090	66361	66362
						0.125	66363	66364
1/2	0.5000	1-1/2	1/2	Medium	4	0.015	66379	66380
						0.020	66381	66382
						0.030	66383	66384
						0.045	66385	66386
						0.060	66387	66388
						0.090	66389	66390
						0.125	66391	66392
1/2	0.5000	1-1/2	1/2	Ext X/Long	6	0.015	66407	66408
						0.020	66409	66410
						0.030	66411	66412
						0.045	66413	66414
						0.060	66415	66416
						0.090	66417	66418
						0.125	66419	66420
1/2	0.5000	2	1/2	Long	4	0.015	66393	66394
						0.020	66395	66396
						0.030	66397	66398
						0.045	66399	66400
						0.060	66401	66402
						0.090	66403	66404
						0.125	66405	66406
1/2	0.5000	3	1/2	X/Long	6	0.015	66421	66422
						0.020	66423	66424
						0.030	66425	66426
						0.045	66427	66428
						0.060	66429	66430
						0.090	66431	66432
						0.125	66433	66434
5/8	0.6250	3/4	5/8	Stub	3-1/2	0.015	66435	66436
						0.020	66437	66438
						0.030	66439	66440
						0.045	66441	66442
						0.060	66443	66444
						0.090	66445	66446
						0.125	66447	66448
5/8	0.6250	1-1/4	5/8	Regular	3-1/2	0.015	66449	66450
						0.020	66451	66452
						0.030	66453	66454
						0.045	66455	66456
						0.060	66457	66458
						0.090	66459	66460
						0.125	66461	66462
5/8	0.6250	1-1/2	5/8	Ext X/Long	6	0.030	66473	66474
						0.045	66475	66476
						0.060	66477	66478
						0.090	66479	66480
5/8	0.6250	2-1/4	5/8	Long	5	0.125	66481	66482
						0.030	66463	66464
						0.045	66465	66466
						0.060	66467	66468
						0.090	66469	66470
						0.125	66471	66472




FUSION - CORNER RADIUS CONTINUED

DIA	Dec In	LOC	Shank	Length	OAL	Radius	Bright	AlTiCrN
5/8	0.6250	3	5/8	X/Long	6	0.030	66483	66484
						0.045	66485	66486
						0.060	66487	66488
						0.090	66489	66490
						0.125	66491	66492
3/4	0.7500	1	3/4	Stub	4	0.030	66493	66494
						0.045	66495	66496
						0.060	66497	66498
						0.090	66499	66500
						0.125	66501	66502
						0.190	66503	66504
						0.250	66505	66506
3/4	0.7500	1-1/2	3/4	Regular	4	0.030	66507	66508
						0.045	66509	66510
						0.060	66511	66512
						0.090	66513	66514
						0.125	66515	66516
3/4	0.7500	1-1/2	3/4	Ext X/Long	6	0.190	66517	66518
						0.250	66519	66520
						0.030	66533	66534
						0.045	66535	66536
						0.060	66537	66538
3/4	0.7500	2-1/4	3/4	Long	5	0.090	66539	66540
						0.125	66541	66542
						0.250	66543	66544
						0.030	66521	66522
						0.045	66523	66524
3/4	0.7500	3	3/4	X/Long	6	0.060	66525	66526
						0.090	66527	66528
						0.125	66529	66530
						0.250	66531	66532
						0.030	66545	66546
3/4	0.7500	3	3/4	X/Long	6	0.045	66547	66548
						0.060	66549	66550
						0.090	66551	66552
						0.125	66553	66554
						0.250	66555	66556
3/4	0.7500	4	3/4	XX/Long	7	0.030	66557	66558
						0.045	66559	66560
						0.060	66561	66562
						0.090	66563	66564
						0.125	66565	66566
1	1.0000	1-1/2	1	Regular	4	0.250	66567	66568
						0.030	66569	66570
						0.045	66571	66572
						0.060	66573	66574
						0.090	66575	66576
1	1.0000	1-1/2	1	Ext X/Long	6	0.125	66577	66578
						0.190	66579	66580
						0.250	66581	66582
						0.030	66595	66596
						0.045	66597	66598
1	1.0000	2-1/4	1	Long	5	0.060	66599	66600
						0.090	66601	66602
						0.125	66603	66604
						0.250	66605	66606
						0.030	66583	66584
1	1.0000	3	1	X/Long	6	0.045	66585	66586
						0.060	66587	66588
						0.090	66589	66590
						0.125	66591	66592
						0.250	66593	66594
1	1.0000	4	1	XX/Long	7	0.030	66607	66608
						0.045	66609	66610
						0.060	66611	66612
						0.090	66613	66614
						0.125	66615	66616
1	1.0000	4	1	XX/Long	7	0.250	66617	66618
						0.030	66619	66620
						0.045	66621	66622
						0.060	66623	66624
						0.090	66625	66626
						0.125	66627	66628
						0.250	66629	66630

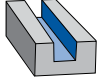


MILLING RECOMMENDATIONS • FUSION END MILLS

PROFILING				Surface Feet Per Minute (SFM)					Inches Per Tooth (IPT)									
				Radial Depth of Cut (RDOC)					IPT *(BASELINE)									
				Workpiece Material Group	Hardness	SFM based on RDOC					Cutting Diameter							
5%	10%	20%	30%			50%	1/8 †	3/16 †	1/4 †	5/16	3/8	1/2	5/8	3/4	1			
Steels	P	≤ 28 Rc	1050	700	385	375	350	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108		
	P	28 - 38 Rc	630	420	320	250	210	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108		
Tool & Die Steels	P	28 - 44 Rc	525	350	300	275	250	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108		
Stainless Steel	M	≤ 28 Rc	650	600	550	500	450	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108		
	M	≤ 28 Rc	525	400	350	300	250	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108		
	M	> 28 Rc	525	400	350	300	250	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108		
Super Alloys	S	≤ 42 Rc	265	200	175	150	100	0.00048	0.00065	0.00096	0.0017	0.0019	0.0028	0.0032	0.0038	0.0054		
	S	≤ 42 Rc	230	200	175	150	125	0.00048	0.00065	0.00096	0.0017	0.0019	0.0028	0.0032	0.0038	0.0054		
Hardened Materials	H		250	240	230	210	200	0.00360	0.00432	0.00504	0.0022	0.0025	0.0036	0.0043	0.0050	0.0072		
Cast-Iron	K	≤ 240 HB	425	400	375	350	300	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108		
	K	> 240 HB	320	300	250	225	200	0.00065	0.00097	0.00120	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108		
Non-Ferrous	N		1000	960	920	880	840	0.00048	0.00065	0.00096	0.0032	0.0038	0.0054	0.0065	0.0076	0.0108		

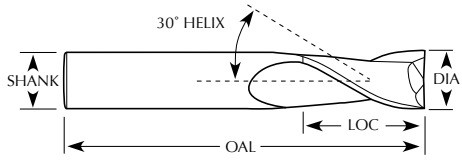
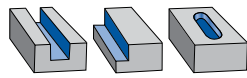
*CHIP THINNING Adjustments	
RDOC	Increase IPT
50%	None
30%	1.1 x
25%	1.2 x
20%	1.3 x
15%	1.4 x
10%	1.8 x
7%	2.0 x
5%	2.3 x
3%	3.0 x
2%	3.5 x
1%	5.0 x

†1/4" AND SMALLER DIAMETERS: Use caution when Profiling more than 50% or Slotting more than 25%

SLOTING				Surface Feet Per Minute (SFM)			Inches Per Tooth (IPT)									
				Radial Depth of Cut (RDOC)			IPT *(BASELINE)									
				Workpiece Material Group	Hardness	Cutting Diameter Engaged			Cutting Diameter							
25%	50%	100%	1/8 †			3/16 †	1/4 †	5/16	3/8	1/2	5/8	3/4	1			
Steels	P	≤ 28 Rc	462	444	420	0.00060	0.00084	0.00120	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060		
	P	28 - 38 Rc	294	276	2652	0.00048	0.00084	0.00108	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060		
Tool & Die Steels	P	28 - 44 Rc	252	234	210	0.00048	0.00072	0.00096	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060		
Stainless Steel	M	≤ 28 Rc	462	444	420	0.00060	0.00084	0.00120	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060		
	M	≤ 28 Rc	294	252	210	0.00048	0.00084	0.00108	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060		
	M	> 28 Rc	252	234	210	0.00036	0.00048	0.00060	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060		
Super Alloys	S	≤ 42 Rc	150	126	108	0.00036	0.00048	0.00060	0.0010	0.0012	0.0016	0.0019	0.0020	0.0031		
	S	≤ 42 Rc	120	108	96	0.00036	0.00048	0.00060	0.0010	0.0012	0.0016	0.0019	0.0020	0.0031		
Hardened Materials	H	≤ 240 HB	294	276	252	0.00024	0.00036	0.00048	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060		
Cast-Iron	K	≤ 240 HB	540	480	420	0.00060	0.00084	0.00120	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060		
	K	> 240 HB	360	300	270	0.00048	0.00084	0.00108	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060		
Non-Ferrous	N		900	720	540	0.00132	0.00204	0.00264	0.0019	0.0023	0.0030	0.0037	0.0046	0.0060		



2 FLUTE - SINGLE END SQUARE



Diameter Tolerance: +0.000 / -0.002" Shank Tolerance: +0.0000 / -0.0005"

DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN	
1/64	0.0156	3/64	1/8	Regular	1-1/2	61184	61182	—	61183	
		1/16		Stub		61001	61002	61003	61004	
1/32	0.0313	1/8	1/8	Regular	1-1/2	61185	61186	61187	61188	
1.0mm	0.0394	4.0mm	3.0mm	Regular	39.0mm	61318	61315	61317	61316	
3/64	0.0469	3/32	1/8	Stub	1-1/2	61005	61006	61007	61008	
		1/8		Regular		61189	61190	61398	61191	
1.5mm	0.0591	5.0mm	3.0mm	Regular	39.0mm	61319	61320	61322	61321	
1/16	0.0625	1/8	1/8	Stub	1-1/2	61009	61010	61011	61012	
		1/4		Regular		61192	61193	61194	61195	
5/64	0.0781	5/32	1/8	Stub	1-1/2	61013	61014	61015	61016	
		1/4		Regular		61196	61197	61198	61199	
2.0mm	0.0787	8.0mm	3.0mm	Regular	39.0mm	61323	75209	75210	61324	
3/32	0.0938	3/16	1/8	Stub	1-1/2	61017	61018	61019	61020	
		3/8		Regular		61200	61201	61202	61203	
2.5mm	0.0984	9.5mm	3.0mm	Regular	39.0mm	61328	61325	61327	61326	
7/64	0.1094	7/32	1/8	Stub	1-1/2	61021	61022	61023	61024	
		3/8		Regular		61205	61206	61399	61207	
3.0mm	0.1181	12.0mm	3.0mm	Regular	39.0mm	61332	61329	61331	61330	
				Stub		61025	61026	61027	61028	
1/8	0.1250	1/2	1/8	Regular	1-1/2	61208	61209	61210	61211	
		3/4		Long		62605	62606	62607	62608	
		1		X/Long		3	62704	62705	62706	62707
3.5mm	0.1378	12.0mm	4.0mm	Regular	51.0mm	61333	61334	61336	61335	
9/64	0.1406	9/32	3/16	Stub	2	61029	61030	61031	61032	
		9/16		Regular		61212	61213	61400	61214	
5/32	0.1563	5/16	3/16	Stub	2	61033	61034	61035	61036	
		9/16		Regular		61215	61216	61217	61218	
		3/4		Long		62609	62610	62611	62612	
		1-1/8		X/Long		3	62708	62709	62710	62711
4.0mm	0.1575	14.0mm	4.0mm	Regular	51.0mm	61337	61338	61340	61339	
11/64	0.1719	5/16	3/16	Stub	2	61037	61038	61039	61040	
		9/16		Regular		61219	61220	61401	61221	
4.5mm	0.1772	16.0mm	5.0mm	Regular	51.0mm	61341	61342	61344	61343	
				Stub		61041	61042	61043	61044	
3/16	0.1875	5/8	3/16	Regular	2	61222	61223	61224	61225	
		3/4		Long		62615	62616	62619	62617	
		1-1/8		X/Long		3	62712	62713	62714	62715
5.0mm	0.1969	16.0mm	5.0mm	Regular	51.0mm	61345	61346	61348	61347	
13/64	0.2031	3/8	1/4	Stub	2	61045	61046	61047	61048	
		5/8		Regular		61226	61227	61402	61228	
7/32	0.2188	7/16	1/4	Stub	2	61049	61050	61051	61052	
		5/8		Regular		61229	61230	61231	61232	
15/64	0.2344	7/16	1/4	Stub	2	61053	61054	61055	61056	
		3/4		Regular		61233	61234	61403	61235	
6.0mm	0.2362	19.0mm	6.0mm	Regular	63.0mm	61349	61350	61352	61351	
				Stub		61057	61058	61059	61060	
1/4	0.2500	3/4	1/4	Regular	2-1/2	61236	61237	61238	61239	
		1-1/8		Long		3	62620	62621	62622	62623
		1-1/2		X/Long		4	62716	62717	62718	62719
		1-1/2		Ext XX/Long		6	62720	62721	62722	62723
17/64	0.2656	3/4	5/16	Regular	2-1/2	61240	61241	61409	61242	



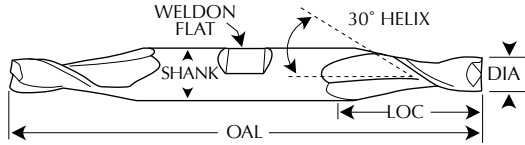
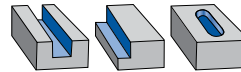
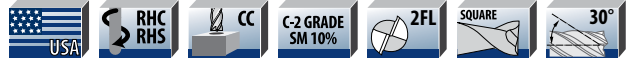
GENERAL PURPOSE END MILLS

2 FLUTE SINGLE END - SQUARE CONTINUED

DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN
7.0mm	0.2756	19.0mm	8.0mm	Regular	63.0mm	61353	61354	61356	61355
9/32	0.2813	1/2	5/16	Stub	2	61061	61062	61063	61064
		3/4		Regular	2-1/2	61243	61244	61245	61246
19/64	0.2969	13/16	5/16	Regular	2-1/2	61247	61248	61404	61414
		1/2		Stub	2	61065	61066	61067	61068
5/16	0.3125	13/16	5/16	Regular	2-1/2	61249	61250	61253	61251
		1-1/8		Long	3	62624	62625	62626	62627
		1-1/2		Ext XX/Long	6	62728	62730	62731	62729
		1-5/8		X/Long	4	62724	62725	62726	62727
8.0mm	0.3150	20.0mm	8.0mm	Regular	63.0mm	61357	61358	61360	61359
21/64	0.3281	1	3/8	Regular	2-1/2	61252	61254	61405	61415
11/32	0.3438	1	3/8	Regular	2-1/2	61255	61256	61257	61258
9.0mm	0.3543	22.0mm	10.0mm	Regular	63.0mm	61361	61362	61364	61363
23/64	0.3594	1	3/8	Regular	2-1/2	61259	61260	61406	61416
		5/8		Stub	2	61069	61070	61071	61072
3/8	0.3750	1	3/8	Regular	2-1/2	61261	61262	61266	61263
		1-1/8		Long	3	62628	62613	62618	62614
		1-1/2		Ext XX/Long	6	62736	62737	62738	62739
		1-3/4		X/Long	4	62732	62733	62734	62735
25/64	0.3906	1	7/16	Regular	2-3/4	61264	61265	61407	61417
10.0mm	0.3937	22.0mm	10.0mm	Regular	76.0mm	61365	61366	61368	61367
13/32	0.4063	1	7/16	Regular	2-3/4	61267	61268	61408	61269
27/64	0.4219	1	7/16	Regular	2-3/4	61270	61271	61410	61418
11.0mm	0.4331	25.0mm	12.0mm	Regular	76.0mm	61369	61370	61372	61371
		5/8		Stub	2-1/2	61073	61074	61075	61076
7/16	0.4375	1	7/16	Regular	2-3/4	61273	61274	61272	61281
		2		Long	4	62629	62630	62632	62631
		3		X/Long	6	62740	62741	62742	62743
29/64	0.4531	1	1/2	Regular	3	61275	61277	61411	61419
15/32	0.4688	1	1/2	Regular	3	61276	61280	61412	61279
12.0mm	0.4724	25.0mm	12.0mm	Regular	76.0mm	61373	61374	61376	61375
31/64	0.4844	1	1/2	Regular	3	61278	61282	61413	61420
1/2	0.5000	5/8	1/2	Stub	2-1/2	61077	61078	61079	61080
		1		Regular	3	61283	61285	61286	61287
		1-1/4		Regular	4	61284	75127	75128	61288
		1-1/2		Medium	4	62634	62633	62637	62638
		1-1/2		Ext X/Long	6	62744	62746	62747	62748
2	Long	4	62635	62636	62640	62639			
3	X/Long	6	62745	62749	62750	62751			
33/64	0.5156	1-1/4	9/16	Regular	3-1/2	61289	75129	75131	75130
17/32	0.5313	1-1/4	9/16	Regular	3-1/2	61290	75132	75134	75133
14.0mm	0.5512	32.0mm	14.0mm	Regular	90.0mm	61377	61378	61380	61379
9/16	0.5625	1-1/4	9/16	Regular	3-1/2	61292	61291	61293	61294
		3/4		Stub	3	61081	61082	61083	61084
5/8	0.6250	1-1/4	5/8	Regular	3-1/2	61295	61296	61298	61297
		1-1/2		Ext X/Long	6	62756	62759	62758	62757
		2-1/4		Long	5	62641	62642	62643	62644
		3		X/Long	6	62752	62753	62754	62755
16.0mm	0.6299	38.0mm	16.0mm	Regular	102.0mm	61381	61382	61384	61383
11/16	0.6875	1-1/2	3/4	Regular	4	61299	61300	61302	61301
18.0mm	0.7087	38.0mm	18.0mm	Regular	102.0mm	61385	61386	61388	61387
		1		Stub	3	61085	61086	61087	61088
		1-1/2		Regular	4	61303	61304	61306	61305
		1-1/2		Ext X/Long	6	62764	62766	62767	62765
		2-1/4		Long	5	62645	62646	62647	62648
		3		X/Long	6	62760	62761	62762	62763
4	XX/Long	7	62768	75165	75167	75166			
20.0mm	0.7874	38.0mm	20.0mm	Regular	102.0mm	61389	61390	61392	61391
22.0mm	0.8661	38.0mm	22.0mm	Regular	102.0mm	61393	—	—	61394
7/8	0.8750	1-1/2	7/8	Regular	4	61307	61308	61309	61310
25.0mm	0.9843	38.0mm	25.0mm	Regular	102.0mm	61395	—	—	61396
		1-1/2		Regular	4	61311	61312	61313	61314
		1-1/2		Ext X/Long	6	62773	62775	62776	62774
		2-1/4		Long	5	62649	62650	62651	62652
		3		X/Long	6	62769	62770	62771	62772
4	XX/Long	7	62777	75168	75170	75169			



2 FLUTE - DOUBLE END SQUARE

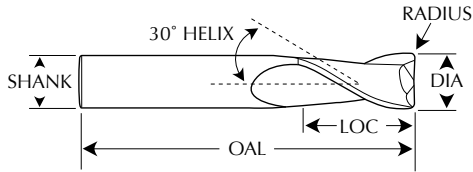
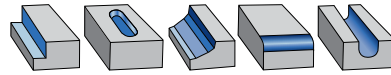


Diameter Tolerance: +0.000 / 0.003"

Shank Tolerance: +0.0000 / -0.0005"

DIA	Dec In	LOC	Shank	Weldon Flat	OAL	Length	Bright	TiN	TiCN	AlTiN
1/32	0.0313	1/16	1/8	No	1-1/2	Stub	63932	63933	63934	63935
3/64	0.0469	3/32	1/8	No	1-1/2	Stub	63936	63937	64011	64017
1/16	0.0625	1/8	1/8	No	1-1/2	Stub	63938	63943	63944	63942
5/64	0.0781	1/8	1/8	No	1-1/2	Stub	63939	63940	63941	63945
3/32	0.0938	3/16	1/8	No	1-1/2	Stub	63946	63947	63948	63949
7/64	0.1094	3/16	1/8	No	1-1/2	Stub	63950	63951	63952	63953
1/8	0.1250	1/4	1/8	No	1-1/2	Stub	63954	63955	64012	63958
		3/8	3/8	Yes	3	Regular	64119	—	—	64120
9/64	0.1406	5/16	3/16	No	2	Stub	63956	63957	63959	63960
		5/16	3/16	No	2	Stub	63961	63962	63963	63964
5/32	0.1563	7/16	3/8	Yes	3	Regular	64121	—	—	64122
		5/16	3/16	No	2	Stub	63965	63966	63967	63968
3/16	0.1875	3/8	3/16	No	2	Stub	63970	63971	64013	63969
		1/2	3/8	Yes	3	Regular	64123	—	—	64124
13/64	0.2031	1/2	1/4	No	2-1/2	Stub	63972	63973	63974	63975
		1/2	1/4	No	2-1/2	Stub	63976	63977	63978	63979
7/32	0.2188	9/16	3/8	Yes	3-1/2	Regular	64125	—	—	64126
		1/2	1/4	No	2-1/2	Stub	63980	63981	63982	63983
1/4	0.2500	1/2	1/4	No	2-1/2	Stub	63984	63985	64014	63989
		5/8	3/8	Yes	3-1/2	Regular	64127	—	—	64129
9/32	0.2813	1/2	5/16	No	2-1/2	Stub	63987	63990	63991	63992
		11/16	3/8	Yes	3-1/2	Regular	64130	—	—	64131
5/16	0.3125	1/2	5/16	No	2-1/2	Stub	63993	63994	63995	63996
		3/4	3/8	Yes	3-1/2	Regular	64132	—	—	64133
11/32	0.3438	9/16	3/8	No	2-1/2	Stub	63997	63998	63999	64000
		3/4	3/8	Yes	3-1/2	Regular	64134	—	—	64135
3/8	0.3750	9/16	3/8	No	2-1/2	Stub	64001	64002	64003	64004
		3/4	3/8	Yes	3-1/2	Regular	64136	64137	—	64138
7/16	0.4375	9/16	7/16	No	2-3/4	Stub	64005	64006	64015	64007
		7/8	1/2	Yes	4	Regular	64139	—	—	64140
1/2	0.5000	5/8	1/2	No	3	Stub	64008	64009	64016	64010
		1	1/2	Yes	4	Regular	64141	—	—	64142

2 FLUTE - SINGLE END CORNER RADIUS



Diameter Tolerance: +0.000 / -0.002"

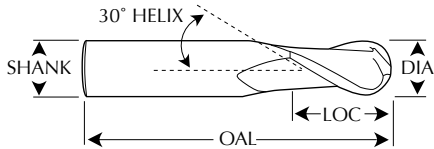
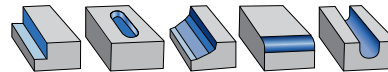
Shank Tolerance: +0.0000 / -0.0005"

DIA	Dec In	LOC	Shank	Length	OAL	Radius	Bright	TiN	TiCN	AlTiN
1/8	0.1250	1/2	1/8	Regular	1-1/2	0.010	61421	61422	61423	61424
						0.015	61425	61426	61427	61428
						0.020	61429	61430	61431	61432
						0.030	61433	61434	61435	61436
						0.010	61437	61438	61439	61440
3/16	0.1875	5/8	3/16	Regular	2	0.015	61441	61442	61443	61444
						0.020	61445	61446	61447	61448
						0.030	61449	61450	61451	61452
						0.045	61453	61454	61455	61456
						0.060	61457	—	—	—
						0.015	61458	61459	61460	61461
						0.020	61462	61463	61464	61465
1/4	0.2500	3/4	1/4	Regular	2-1/2	0.025	61466	61467	61468	61469
						0.030	61470	61471	61472	61473
						0.045	61474	61475	61476	61477
						0.060	61478	61479	61480	61481
						0.015	61483	61484	61485	61486
						0.020	61487	61488	61489	61490
						0.025	61491	61492	61493	61494
5/16	0.3125	13/16	5/16	Regular	2-1/2	0.030	61495	61496	61497	61498
						0.045	61499	61500	61501	61502
						0.060	61503	61504	61505	61506
						0.015	61508	61509	61510	61511
						0.020	61512	61513	61514	61515
						0.025	61516	61517	61518	61519
						0.030	61520	61521	61522	61523
3/8	0.3750	1	3/8	Regular	2-1/2	0.045	61524	61525	61526	61527
						0.060	61528	61529	61530	61531
						0.090	61532	61533	61534	61535
						0.125	61708	—	—	—
						0.015	61536	61537	61538	61539
						0.020	61540	61541	61542	61543
						0.025	61544	61545	61546	61547
7/16	0.4375	1	7/16	Regular	2-3/4	0.030	61548	61549	61550	61551
						0.045	61552	61553	61554	61555
						0.060	61556	61557	61558	61559
						0.090	61560	61561	61562	61563
						0.015	61564	61565	61566	61567
						0.020	61568	61569	61570	61571
						0.025	61572	61573	61574	61575
1/2	0.5000	1	1/2	Regular	3	0.030	61576	61577	61578	61579
						0.045	61580	61581	61582	61583
						0.060	61584	61585	61586	61587
						0.090	61588	61589	61590	61591
						0.125	61592	61593	61594	61595
						0.015	61596	61597	61598	61599
						0.020	61600	61601	61602	61603
5/8	0.6250	1-1/4	5/8	Regular	3-1/2	0.025	61604	61605	61606	61607
						0.030	61608	61609	61610	61611
						0.045	61612	61613	61614	61615
						0.060	61616	61617	61618	61619
						0.090	61620	61621	61622	61623
						0.125	61624	61625	61626	61627
						0.250	61628	—	—	—

2 FLUTE - SINGLE END - CORNER RADIUS CONTINUED

DIA	Dec In	LOC	Shank	Length	OAL	Radius	Bright	TiN	TiCN	AlTiN
3/4	0.7500	1-1/2	3/4	Regular	4	0.015	61629	61630	61631	61632
						0.020	61633	61634	61635	61636
						0.025	61637	61638	61639	61640
						0.030	61641	61642	61643	61644
						0.045	61645	61646	61647	61648
						0.060	61649	61650	61651	61652
						0.090	61653	61654	61655	61656
						0.125	61657	61658	61659	61660
						0.190	61661	61662	61663	61664
						0.250	61665	—	—	—
1	1.0000	1-1/2	1	Regular	4	0.015	61666	61667	61668	61669
						0.020	61670	61671	61672	61673
						0.025	61674	61675	61676	61677
						0.030	61678	61679	61680	61681
						0.045	61682	61683	61684	61685
						0.060	61686	61687	61688	61689
						0.090	61690	61691	61692	61693
						0.125	61694	61695	61696	61697
						0.190	61698	61699	61700	61701
						0.250	61702	61703	61704	61705

2 FLUTE - SINGLE END BALLNOSE



Bright & TiN Coated



TiCN & AlTiN Coated



Diameter Tolerance: +0.000 / -0.002"

Shank Tolerance: +0.0000 / -0.0005"

DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN	
1/64	0.0156	3/64	1/8	Regular	1-1/2	63092	63088	63089	63090	
1/32	0.0313	1/16	1/8	Stub	1-1/2	62918	62919	62920	62921	
				Regular		63096	63097	63299	63108	
1.0mm	0.0394	4.0mm	3.0mm	Regular	39.0mm	63215	63216	63218	63217	
3/64	0.0469	3/32	1/8	Stub	1-1/2	62922	62923	62924	62925	
				Regular		63098	63095	63300	63105	
1.5mm	0.0591	5.0mm	3.0mm	Regular	39.0mm	63219	63220	63222	63221	
1/16	0.0625	1/8	1/8	Stub	1-1/2	62926	62927	62928	62929	
				Regular		63100	63093	63091	63094	
5/64	0.0781	5/32	1/8	Stub	1-1/2	62930	62985	62991	62997	
2.0mm	0.0787	8.0mm	3.0mm	Regular	39.0mm	63223	63224	63226	63225	
				Stub		62931	62932	62933	62934	
3/32	0.0938	3/16	1/8	Stub	1-1/2	63102	63103	63104	63111	
2.5mm	0.0984	9.5mm	3.0mm	Regular	39.0mm	63227	63228	63230	63229	
				Stub		62935	62986	62992	62998	
7/64	0.1094	7/32	1/8	Stub	1-1/2	63106	63107	63302	63109	
3.0mm	0.1181	12.0mm	3.0mm	Regular	39.0mm	63231	63232	63234	63233	
				Stub		62936	62937	62938	62939	
1/8	0.1250	1/4	1/8	Regular	1-1/2	63112	63113	63117	63114	
				Long		2-1/4	63686	63687	63688	63689
				X/Long			3	63782	63783	63784
3.5mm	0.1378	12.0mm	4.0mm	Regular	51.0mm	63235	63236	63238	63237	
9/64	0.1406	9/32	3/16	Stub	2	62940	62987	62993	62999	
				Regular		63115	63116	63303	63118	

GENERAL PURPOSE END MILLS

2 FLUTE - SINGLE END - BALLNOSE CONTINUED

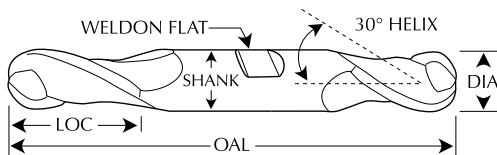
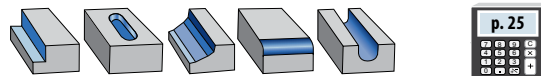
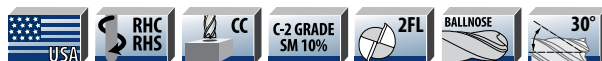
DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN			
5/32	0.1563	5/16	3/16	Stub	2	62941	62942	62943	62944			
		9/16		Regular		63119	63120	63121	63122			
		3/4		Long	63690	63691	63692	63693				
		1-1/8		X/Long	63786	63787	63788	63789				
4.0mm	0.1575	14.0mm	4.0mm	Regular	51.0mm	63239	63240	63242	63241			
11/64	0.1719	5/16	3/16	Stub	2	62945	62988	62994	63000			
		9/16		Regular		63123	63124	63304	63125			
4.5mm	0.1772	16.0mm	5.0mm	Regular	51.0mm	63243	63244	63246	63245			
3/16	0.1875	3/8	3/16	Stub	2	62946	62947	62948	62949			
		5/8		Regular		63126	63127	63128	63129			
		3/4		Long	63694	63695	63696	63697				
		1-1/8		X/Long	63790	63791	63792	63793				
5.0mm	0.1969	16.0mm	5.0mm	Regular	51.0mm	63247	63248	63250	63249			
13/64	0.2031	3/8	1/4	Stub	2	62950	62989	62995	63001			
		5/8		Regular		63130	63131	63305	63132			
7/32	0.2188	7/16	1/4	Stub	2	62951	62952	62953	62954			
15/64	0.2344	5/8	1/4	Regular	2-1/2	63133	63134	63135	63136			
		7/16		Stub	2	62955	62990	62996	63002			
6.0mm	0.2362	3/4	6.0mm	Regular	2-1/2	63137	63138	63306	63139			
		19.0mm		Regular	63.0mm	63251	63252	63254	63253			
1/4	0.2500	1/2	1/4	Stub	2	62956	62957	62958	62959			
		3/4		Regular		63141	63142	63140	63143			
		1-1/8		Long	63698	63699	63700	63701				
		1-1/2		X/Long	63794	63795	63796	63797				
17/64	0.2656	3/4	5/16	Regular	2-1/2	63144	63145	63146	63147			
7.0mm	0.2756	19.0mm	8.0mm	Regular	63.0mm	63255	63256	63258	63257			
9/32	0.2813	3/4	5/16	Regular	2-1/2	63148	63149	63150	63151			
19/64	0.2969	13/16	5/16	Regular	2-1/2	63152	63153	63154	63155			
		1/2		Stub	2	62961	62962	62963	62964			
		13/16		Regular	2-1/2	63157	63158	63159	63156			
		1-1/8		Long	3	63702	63703	63704	63705			
5/16	0.3125	1-1/2	5/16	Ext XX/Long	6	63806	63808	63809	63807			
		1-5/8		X/Long	4	63802	63803	63804	63805			
		8.0mm		0.3150	20.0mm	8.0mm	Regular	63.0mm	63259	63260	63262	63261
		21/64		0.3281	1	3/8	Regular	2-1/2	63160	63161	63307	63317
11/32	0.3438	1	3/8	Regular	2-1/2	63162	63163	63213	63164			
9.0mm	0.3543	22.0mm	10.0mm	Regular	63.0mm	63263	63264	63266	63265			
23/64	0.3594	1	3/8	Regular	2-1/2	63165	63166	63308	63318			
		5/8		Stub	2	62965	62966	62967	62968			
		1		Regular	2-1/2	63167	63171	63214	63168			
		1-1/8		Long	3	63706	63707	63708	63709			
3/8	0.3750	1-1/2	3/8	Ext XX/Long	6	63810	63817	63812	63811			
		1-3/4		X/Long	4	63813	63814	63815	63816			
		25/64		0.3906	1	7/16	Regular	2-3/4	63169	63170	63309	63319
		10.0mm		0.3937	22.0mm	10.0mm	Regular	76.0mm	63267	63268	63270	63269
13/32	0.4063	1	7/16	Regular	2-3/4	63172	63173	63310	63189			
27/64	0.4219	1	7/16	Regular	2-3/4	63174	63175	63311	63320			
11.0mm	0.4331	25.0mm	12.0mm	Regular	76.0mm	63271	—	63274	63273			
		5/8		Stub	2-1/2	62969	62970	62971	62972			
		1		Regular	2-3/4	63176	63177	63180	63190			
		2		Long	4	63710	63711	63712	63713			
29/64	0.4531	1	1/2	X/Long	6	63818	63819	63820	63821			
		3		Regular	3	63178	63179	63312	63321			
15/32	0.4688	1	1/2	Regular	3	63181	63182	63313	63193			
12.0mm	0.4724	25.0mm	12.0mm	Regular	76.0mm	63275	63276	63278	63277			
31/64	0.4844	1	1/2	Regular	3	63183	63184	63314	63322			
		5/8		Stub	2-1/2	62973	62974	62975	62976			
		1		Regular	3	63185	63186	63187	63188			
		1-1/2		Medium	4	63714	63715	63716	63716			
1/2	0.5000	2	1/2	Ext X/Long	6	63822	63824	63825	63826			
		3		Long	4	63718	63719	63720	63721			
		14.0mm		0.5512	32.0mm	14.0mm	Regular	90.0mm	63279	63280	63282	63281
		9/16		0.5625	1-1/4	9/16	Regular	3-1/2	63191	63192	63195	63194
5/8	0.6250	3/4	5/8	Stub	3	62977	62978	62979	62980			
		1-1/4		Regular		3-1/2	63196	63197	63198	63199		
		1-1/2		Ext X/Long	6	63833	63835	63836	63834			
		2-1/4		Long	5	63722	63723	63724	63725			
		3		X/Long	6	63830	63831	63832	63837			



2 FLUTE - SINGLE END - BALLNOSE CONTINUED

DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN
16.0mm	0.6299	32.0mm	16.0mm	Regular	102.0mm	63283	63284	63286	63285
11/16	0.6875	1-1/2	3/4	Regular	4	63200	63201	63315	63323
18.0mm	0.7087	38.0mm	18.0mm	Regular	102.0mm	63287	63288	63290	63289
				Stub	3	62981	62982	62983	62984
				Regular	4	63202	63203	63204	63205
				Ext X/Long	6	63843	63844	63845	63846
				Long	5	63726	63727	63728	63729
3/4	0.7500	1-1/2	3/4	X/Long	6	63838	63840	63841	63842
				3					
20.0mm	0.7874	38.0mm	20.0mm	Regular	102.0mm	63291	63292	63294	63293
22.0mm	0.8661	38.0mm	22.0mm	Regular	102.0mm	63295	—	—	63296
7/8	0.8750	1-1/2	7/8	Regular	4	63206	63207	63316	63208
25.0mm	0.9843	38.0mm	25.0mm	Regular	102.0mm	63297	—	—	63298
				Regular	4	63209	63210	63211	63212
				Ext X/Long	6	63847	63848	63849	63850
1	1.0000	1-1/2	1	Long	5	63730	63731	63732	63733
				X/Long	6	63851	63852	63853	63854
				3					

2 FLUTE - DOUBLE END BALLNOSE



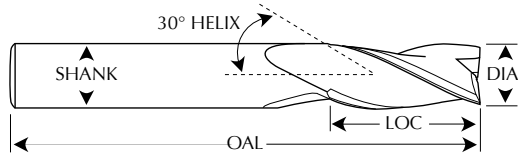
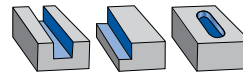
Diameter Tolerance: +0.000 / -0.003"

Shank Tolerance: +0.0000 / -0.0005"

DIA	Dec In	LOC	Shank	Weldon Flat	OAL	Length	Bright	TiN	TiCN	AlTiN
1/32	0.0313	1/16	1/8	No	1-1/2	Stub	64172	64178	64215	64235
3/64	0.0469	3/32	1/8	No	1-1/2	Stub	64173	64179	64219	64239
1/16	0.0625	1/8	1/8	No	1-1/2	Stub	64174	64181	64216	64237
5/64	0.0781	1/8	1/8	No	1-1/2	Stub	64175	64180	64217	64236
3/32	0.0938	3/16	1/8	No	1-1/2	Stub	64176	64182	64220	64240
7/64	0.1094	3/16	1/8	No	1-1/2	Stub	64177	64183	64218	64238
1/8	0.1250	1/4	1/8	No	1-1/2	Stub	64184	64185	64221	64241
		3/8	3/8	Yes	3	Regular	64342	—	—	64343
9/64	0.1406	5/16	3/16	No	2	Stub	64187	64186	64222	64242
		5/16	3/16	No	2	Stub	64188	64189	64223	64243
5/32	0.1563	7/16	3/8	Yes	3	Regular	64344	—	—	64345
		5/16	3/16	No	2	Stub	64190	64191	64192	64244
3/16	0.1875	3/8	3/16	No	2	Stub	64193	64194	64224	64245
		1/2	3/8	Yes	3	Regular	64346	—	—	64347
13/64	0.2031	1/2	1/4	No	2-1/2	Stub	64195	64196	64225	64246
		1/2	1/4	No	2-1/2	Stub	64197	64198	64226	64247
7/32	0.2188	9/16	3/8	Yes	3-1/2	Regular	64348	—	—	64349
		1/2	1/4	No	2-1/2	Stub	64199	64200	64227	64248
15/64	0.2344	1/2	1/4	No	2-1/2	Stub	64201	64202	64228	64249
		5/8	3/8	Yes	3-1/2	Regular	64350	—	—	64351
9/32	0.2813	1/2	5/16	No	2-1/2	Stub	64203	64204	64229	64250
		11/16	3/8	Yes	3-1/2	Regular	64352	—	—	64353
5/16	0.3125	1/2	5/16	No	2-1/2	Stub	64205	64206	64230	64251
		3/4	3/8	Yes	3-1/2	Regular	64354	—	—	64355
11/32	0.3438	9/16	3/8	No	2-1/2	Stub	64207	64208	64231	64252
		3/4	3/8	Yes	3-1/2	Regular	64356	—	—	64357
3/8	0.3750	9/16	3/8	No	2-1/2	Stub	64209	64210	64232	64253
		3/4	3/8	Yes	3-1/2	Regular	64358	—	—	64359
7/16	0.4375	9/16	7/16	No	2-3/4	Stub	64211	64212	64233	64254
		7/8	1/2	Yes	4	Regular	64360	—	—	64361
1/2	0.5000	5/8	1/2	No	3	Stub	64213	64214	64234	64255
		1	1/2	Yes	4	Regular	64362	—	—	64363

GENERAL PURPOSE END MILLS

3 FLUTE - SINGLE END SQUARE



Bright & TiN Coated

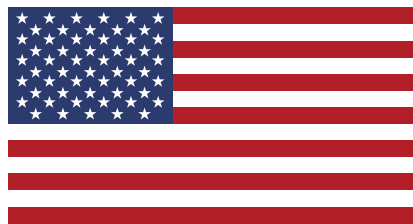
TiCN & AlTiN Coated



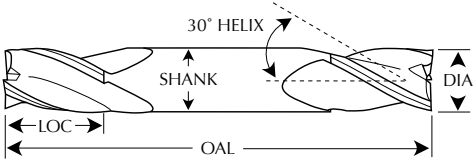
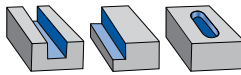
Diameter Tolerance: +0.000 / -0.002"

Shank Tolerance: +0.0000 / -0.0005"

DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN
1/32	0.0313	1/8	1/8	Regular	1-1/2	61709	61710	61711	61712
3/64	0.0469	1/8	1/8	Regular	1-1/2	61713	61714	61715	61716
1/16	0.0625	1/4	1/8	Regular	1-1/2	61717	61718	61719	61720
5/64	0.0781	1/4	1/8	Regular	1-1/2	61721	61722	61723	61724
3/32	0.0938	3/8	1/8	Regular	1-1/2	61725	61727	61728	61729
7/64	0.1094	3/8	1/8	Regular	1-1/2	61730	61731	61732	61733
1/8	0.1250	1/2	1/8	Regular	1-1/2	61734	61735	61736	61737
5/32	0.1563	9/16	3/16	Regular	2	61739	61740	61741	61742
3/16	0.1875	5/8	3/16	Regular	2	61747	61748	61749	61750
7/32	0.2188	5/8	1/4	Regular	2-1/2	61755	61756	61757	61758
1/4	0.2500	3/4	1/4	Regular	2-1/2	61763	61764	61831	61832
9/32	0.2813	3/4	5/16	Regular	2-1/2	61769	61770	61771	61772
5/16	0.3125	13/16	5/16	Regular	2-1/2	61777	61778	61779	61780
3/8	0.3750	1	3/8	Regular	2-1/2	61793	61794	61795	61796
25/64	0.3906	1	7/16	Regular	2-3/4	61798	—	—	—
7/16	0.4375	1	7/16	Regular	2-3/4	61800	61801	61802	61803
1/2	0.5000	1	1/2	Regular	3	61804	61805	61806	61807
9/16	0.5625	1-1/4	9/16	Regular	3-1/2	61809	—	—	61810
5/8	0.6250	1-1/4	5/8	Regular	3-1/2	61811	61812	61813	61814
3/4	0.7500	1-1/2	3/4	Regular	4	61819	61820	61821	61822
1	1.0000	1-1/2	1	Regular	4	61827	61828	61829	61830



3 FLUTE - DOUBLE END SQUARE

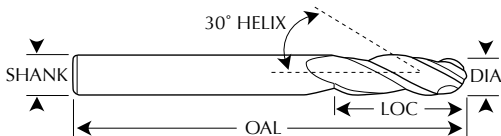
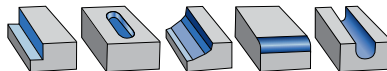


Diameter Tolerance: +0.000 / -0.003"

Shank Tolerance: +0.0000 / -0.0005"

DIA	Dec In	LOC	Shank	Weldon Flat	OAL	Length	Bright
1/32	0.0313	1/16	1/8	No	1-1/2	Stub	64018
3/64	0.0469	3/32	1/8	No	1-1/2	Stub	75174
1/16	0.0625	1/8	1/8	No	1-1/2	Stub	64019
3/32	0.0938	3/16	1/8	No	1-1/2	Stub	64020
1/8	0.1250	1/4	1/8	No	1-1/2	Stub	64021
5/32	0.1563	5/16	3/16	No	2	Stub	64022
3/16	0.1875	3/8	3/16	No	2	Stub	64023
7/32	0.2188	1/2	1/4	No	2-1/2	Stub	64024
1/4	0.2500	1/2	1/4	No	2-1/2	Stub	64025
5/16	0.3125	1/2	5/16	No	2-1/2	Stub	64026
3/8	0.3750	9/16	3/8	No	2-1/2	Stub	64027
7/16	0.4375	9/16	7/16	No	2-3/4	Stub	64028
1/2	0.5000	5/8	1/2	No	3	Stub	64029

3 FLUTE - SINGLE END BALLNOSE



Diameter Tolerance: +0.000 / -0.003"

Shank Tolerance: +0.0000 / -0.0005"

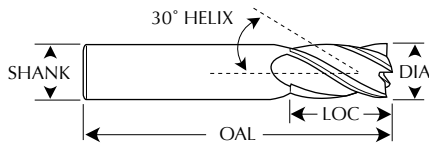
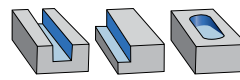
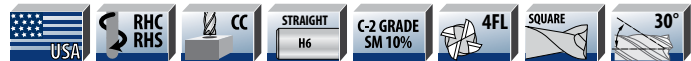
DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN
1/32	0.0313	1/8	1/8	Regular	1-1/2	63326	63327	63328	63329
3/64	0.0469	1/8	1/8	Regular	1-1/2	63330	63331	63332	63333
1/16	0.0625	1/4	1/8	Regular	1-1/2	63334	63335	63336	63337
5/64	0.0781	1/4	1/8	Regular	1-1/2	63338	63339	63340	63341
3/32	0.0938	3/8	1/8	Regular	1-1/2	63342	63343	63344	63345
7/64	0.1094	3/8	1/8	Regular	1-1/2	63346	63347	63348	63349
1/8	0.1250	1/2	1/8	Regular	1-1/2	63350	63351	63352	63353
5/32	0.1563	9/16	3/16	Regular	2	63354	63355	63356	63357
3/16	0.1875	5/8	3/16	Regular	2	63358	63359	63360	63361
7/32	0.2188	5/8	1/4	Regular	2-1/2	63366	63367	63368	63369

GENERAL PURPOSE END MILLS

3 FLUTE - SINGLE END - BALLNOSE CONTINUED

DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN
1/4	0.2500	3/4	1/4	Regular	2-1/2	63374	63375	63376	63377
9/32	0.2813	3/4	5/16	Regular	2-1/2	63382	63383	63384	63385
5/16	0.3125	13/16	5/16	Regular	2-1/2	63390	63391	63392	63393
3/8	0.3750	1	3/8	Regular	2-1/2	63406	63407	63408	63409
7/16	0.4375	1	7/16	Regular	2-3/4	63414	63415	63416	63417
1/2	0.5000	1	1/2	Regular	3	63418	63419	63420	63421
9/16	0.5625	1-1/4	9/16	Regular	3-1/2	63422	63423	63424	63425
5/8	0.6250	1-1/4	5/8	Regular	3-1/2	63426	63427	63428	63429
3/4	0.7500	1-1/2	3/4	Regular	4	63434	63435	63436	63437
1	1.0000	1-1/2	1	Regular	4	63442	63443	63444	63445

4 FLUTE - SINGLE END SQUARE



Diameter Tolerance: +0.000 / -0.002"

Shank Tolerance: +0.0000 / -0.0005"

DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN
1/64	0.0156	3/64	1/8	Regular	1-1/2	61838	61835	61836	61837
1/32	0.0313	1/16	1/8	Stub	1-1/2	61090	61091	61092	61093
		1/8		Regular		61839	61840	61841	61842
1.0mm	0.0394	4.0mm	3.0mm	Regular	39.0mm	61996	61997	61994	61995
		3/32		Stub		61094	61095	61096	61097
3/64	0.0469	1/8	1/8	Regular	1-1/2	61843	61844	61845	61846
		1/8		Regular		61998	61999	62000	62001
1.5mm	0.0591	5.0mm	3.0mm	Regular	39.0mm	61998	61999	62000	62001
		1/8		Stub		61098	61099	61100	61101
1/16	0.0625	1/4	1/8	Regular	1-1/2	61847	61848	61849	61850
		1/4		Regular		61102	61103	61104	61105
5/64	0.0781	5/32	1/8	Stub	1-1/2	61102	61103	61104	61105
		1/4		Regular		61851	61852	61853	61854
2.0mm	0.0787	8.0mm	3.0mm	Regular	39.0mm	62003	62004	62005	62002
		3/16		Stub		61106	61107	61108	61109
3/32	0.0938	3/8	1/8	Regular	1-1/2	61855	61856	61857	61858
		3/8		Regular		62006	62007	62008	62009
2.5mm	0.0984	9.5mm	3.0mm	Regular	39.0mm	62006	62007	62008	62009
		7/32		Stub		61110	61111	61112	61113
7/64	0.1094	3/8	1/8	Regular	1-1/2	61859	61860	61861	61862
		3/8		Regular		62011	—	62012	62013
3.0mm	0.1181	12.0mm	3.0mm	Regular	39.0mm	62011	—	62012	62013
		1/4		Stub		61114	61115	61116	61117
1/8	0.1250	1/2	1/8	Regular	1-1/2	61863	61864	61865	61866
		3/4		Long		62653	62654	62655	62656
		1		X/Long		3	62778	62779	62780
3.5mm	0.1378	12.0mm	4.0mm	Regular	51.0mm	62014	62015	62016	62017
		9/32		Stub		61118	61119	61120	61121
9/64	0.1406	9/16	3/16	Regular	2	61867	61868	61869	61870

4 FLUTE - SINGLE END - SQUARE CONTINUED

DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN	
5/32	0.1563	5/16	3/16	Stub	2	61122	61123	61124	61125	
		9/16		Regular		61871	61872	61873	61874	
		3/4		Long		2-1/2	62657	62658	62659	62660
		1-1/8		X/Long		3	62782	62783	62784	62785
4.0mm	0.1575	14.0mm	4.0mm	Regular	51.0mm	62018	62019	62021	62020	
11/64	0.1719	5/16	3/16	Stub	2	61126	61127	61128	61129	
		9/16		Regular		61875	61876	62078	61877	
4.5mm	0.1772	16.0mm	5.0mm	Regular	51.0mm	62022	62023	62025	62024	
3/16	0.1875	3/8	3/16	Stub	2	61130	61131	61133	61132	
		5/8		Regular		61878	61879	61880	61881	
		3/4		Long		2-1/2	62661	62662	62663	62664
		1		X/Long		4	62790	62791	62792	62793
		1-1/8		X/Long		3	62786	62787	62788	62789
5.0mm	0.1969	16.0mm	5.0mm	Regular	51.0mm	62026	62027	62029	62028	
13/64	0.2031	3/8	1/4	Stub	2	61134	61135	61136	61137	
		5/8		Regular		2-1/2	61882	61883	62079	61884
7/32	0.2188	7/16	1/4	Stub	2	61138	61139	61140	61141	
		5/8		Regular		2-1/2	61885	61886	61887	61888
15/64	0.2344	7/16	1/4	Stub	2	61142	61143	61144	61145	
		3/4		Regular		2-1/2	61889	61890	62080	61891
6.0mm	0.2362	19.0mm	6.0mm	Regular	63.0mm	62030	62031	62033	62032	
1/4	0.2500	1/2	1/4	Stub	2	61146	61147	61148	61149	
		3/4		Regular		2-1/2	61892	61893	61894	61898
		1		Ext X/Long		4	62794	62795	62797	62796
		1-1/8		Long		3	62665	62666	62667	62668
		1-1/2		X/Long		4	62798	62799	62801	62800
		1-1/2		Ext XX/Long		6	62802	62803	62804	62805
17/64	0.2656	3/4	5/16	Regular	2-1/2	61895	61896	62081	61897	
7.0mm	0.2756	19.0mm	8.0mm	Regular	63.0mm	62034	62035	62036	62037	
9/32	0.2813	1/2	5/16	Stub	2	61150	61151	61152	61153	
		3/4		Regular		2-1/2	61899	61900	61901	61902
19/64	0.2969	13/16	5/16	Regular	2-1/2	61904	61903	62082	62090	
5/16	0.3125	1/2	5/16	Stub	2	61154	61155	61156	61157	
		13/16		Regular		2-1/2	61905	61906	61907	61908
		1-1/8		Long		3	62671	62672	62670	62669
		1-1/2		Ext XX/Long		6	62806	62808	62809	62807
		1-5/8		X/Long		4	62810	62811	62812	62813
8.0mm	0.3150	20.0mm	8.0mm	Regular	63.0mm	62038	62039	62041	62040	
21/64	0.3281	1	3/8	Regular	2-1/2	61909	61910	62083	62091	
11/32	0.3438	1	3/8	Regular	2-1/2	61911	61912	61913	61914	
9.0mm	0.3543	22.0mm	10.0mm	Regular	63.0mm	62042	62043	62045	62044	
23/64	0.3594	1	3/8	Regular	2-1/2	61916	61915	62084	62092	
3/8	0.3750	5/8	3/8	Stub	2	61158	61159	61160	61161	
		1		Regular		2-1/2	61917	61918	61920	61921
		1-1/8		X/Long		4	62814	62815	62818	62817
		1-1/2		Long		3	62673	62674	62676	62675
		1-3/4		Ext XX/Long		6	62822	62823	62825	62824
25/64	0.3906	1	7/16	X/Long	4	62821	62820	62816	62819	
10.0mm	0.3937	22.0mm	10.0mm	Regular	2-3/4	61919	61922	62085	62093	
13/32	0.4063	1	7/16	Regular	2-3/4	61923	61924	61925	61926	
27/64	0.4219	1	7/16	Regular	2-3/4	61927	61928	62086	62094	
11.0mm	0.4331	25.0mm	12.0mm	Regular	76.0mm	62050	62051	62052	62053	
7/16	0.4375	5/8	7/16	Stub	2	61162	61163	61164	61165	
		1		Regular		2-3/4	61929	61930	61931	61932
		2		Long		4	62677	62678	62679	62680
		3		X/Long		6	62826	62827	62828	62829
29/64	0.4531	1	1/2	Regular	3	61934	61933	62087	62095	



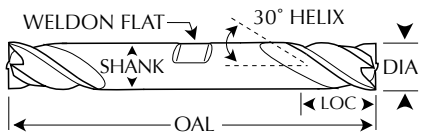
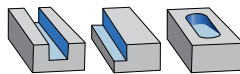
GENERAL PURPOSE END MILLS

4 FLUTE - SINGLE END - SQUARE CONTINUED

DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN
15/32	0.4688	1	1/2	Regular	3	61937	61935	62088	61945
12.0mm	0.4724	25.0mm	12.0mm	Regular	76.0mm	62054	62055	62057	62056
31/64	0.4844	1	1/2	Regular	3	61938	61936	62089	62096
1/2	0.5000	1/2	5/8	Stub	2-1/2	61166	61167	61168	61169
			1	Regular	3	61939	61940	61944	61946
			1-1/4	Regular	3	61941	75135	61943	61942
			1-1/2	Medium	4	62687	62686	62685	62684
			1-1/2	Ext X/Long	6	62830	62836	62837	62835
			2	Long	4	62688	62689	62690	62691
			3	X/Long	6	62831	62832	62833	62834
			4	XXX/Long	7	62870	—	—	62871
5	XXX/Long	8	62872	—	—	62873			
33/64	0.5156	1-1/4	9/16	Regular	3-1/2	61947	75136	75137	61955
17/32	0.5313	1-1/4	9/16	Regular	3-1/2	61948	75138	75139	61956
14.0mm	0.5512	32.0mm	14.0mm	Regular	90.0mm	62058	62059	62061	62060
9/16	0.5625	1-1/4	9/16	Regular	3-1/2	61949	61950	61951	61952
19/32	0.5938	1-1/4	5/8	Regular	3-1/2	61953	75140	75141	61954
5/8	0.6250	5/8	3/4	Stub	3	61170	61171	61172	61173
			1-1/4	Regular	3-1/2	61957	61958	61959	61960
			1-1/2	Ext X/Long	6	62842	62844	62845	62843
			2-1/4	Long	5	62692	62693	62694	62695
			3	X/Long	6	62838	62839	62840	62841
			4	X/Long	7	62874	—	—	62875
			5	XXX/Long	8	62876	—	—	62877
			6	XXX/Long	9	62878	—	—	62879
16.0mm	0.6299	32.0mm	16.0mm	Regular	102.0mm	62062	62063	62064	62065
41/64	0.6406	1-1/2	3/4	Regular	4	61967	75144	75145	61968
21/32	0.6563	1-1/2	3/4	Regular	4	61961	75142	75143	61962
11/16	0.6875	1-1/2	3/4	Regular	4	61963	61964	61965	61966
18.0mm	0.7087	38.0mm	18.0mm	Regular	102.0mm	62066	62067	62068	62069
47/64	0.7344	1-1/2	3/4	Regular	4	61969	75146	75147	61970
3/4	0.7500	3/4	1	Stub	3	61174	61175	61176	61177
			1	Regular	4	61971	—	—	61972
			1-1/2	Regular	4	61973	61974	61975	61976
			1-1/2	Ext X/Long	6	62862	62863	62864	62865
			2-1/4	Long	5	62696	62697	62698	62699
			3	X/Long	6	62847	62849	62852	62846
			4	XX/Long	7	62848	62850	62853	62851
			5	XX/Long	8	62880	—	—	62881
6	XXX/Long	9	62882	—	—	62883			
8	XXX/Long	12	62884	—	—	62885			
20.0mm	0.7874	38.0mm	20.0mm	Regular	102.0mm	62070	62071	62073	62072
13/16	0.8125	1-1/2	7/8	Regular	4	61977	75148	75149	61978
22.0mm	0.8661	38.0mm	22.0mm	Regular	102.0mm	62074	75153	75154	62075
7/8	0.8750	1-1/2	7/8	Regular	4	61979	61980	61981	61982
15/16	0.9375	1-1/2	1	Regular	4	61983	75150	75151	61984
25.0mm	0.9843	38.0mm	25.0mm	Regular	102.0mm	62076	75155	75156	62077
1	1.0000	1	1	Stub	3	61178	61179	61180	61181
			1	Regular	4	61985	—	—	61986
			1-1/2	Regular	4	61987	61988	61989	61990
			1-1/2	Ext X/Long	6	62866	62868	62869	62867
			2-1/4	Long	5	62700	62701	62702	62703
			3	X/Long	6	62856	62854	62860	62858
			4	XX/Long	7	62857	62855	62861	62859
			5	XX/Long	8	62886	—	—	62887
6	XXX/Long	9	62888	—	—	62889			
7	XXX/Long	10	62890	—	—	62891			
8	XXX/Long	12	62892	—	—	62893			
1-1/4	1.2500	2	1-1/4	Regular	4-1/2	61991	75152	61993	61992



4 FLUTE - DOUBLE END SQUARE



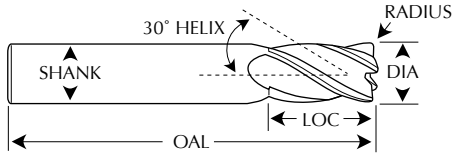
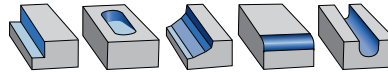
Diameter Tolerance: +0.000 / -0.003" Shank Tolerance: +0.0000 / -0.0005"

DIA	Dec In	LOC	Shank	Weldon Flat	OAL	Length	Bright	TiN	TiCN	AlTiN
1/32	0.0313	1/16	1/8	No	1-1/2	Stub	64030	64034	64031	64032
3/64	0.0469	3/32	1/8	No	1-1/2	Stub	64033	64035	64036	64037
1/16	0.0625	1/8	1/8	No	1-1/2	Stub	64038	64039	64043	64112
5/64	0.0781	1/8	1/8	No	1-1/2	Stub	64040	64041	64105	64042
3/32	0.0938	3/16	1/8	No	1-1/2	Stub	64044	64045	64049	64046
7/64	0.1094	3/16	1/8	No	1-1/2	Stub	64047	64048	64106	64113
1/8	0.1250	1/4	1/8	No	1-1/2	Stub	64050	64051	64054	64055
		3/8	3/8	Yes	3	Regular	64143	64144	—	64145
9/64	0.1406	5/16	3/16	No	2	Stub	64052	64053	64107	64114
		5/16	3/16	No	2	Stub	64056	64057	64058	64059
5/32	0.1563	7/16	3/8	Yes	3	Regular	64146	—	—	64148
		5/16	3/16	No	2	Stub	64060	64061	64108	64062
3/16	0.1875	3/8	3/16	No	2	Stub	64063	64064	64065	64066
		1/2	3/8	Yes	3	Regular	64149	64150	—	64151
13/64	0.2031	1/2	1/4	No	2-1/2	Stub	64067	64068	64109	64115
		1/2	1/4	No	2-1/2	Stub	64069	64070	64071	64072
7/32	0.2188	9/16	3/8	Yes	3-1/2	Regular	64152	—	—	64153
		1/2	1/4	No	2-1/2	Stub	64073	64074	64110	64116
15/64	0.2344	1/2	1/4	No	2-1/2	Stub	64075	64076	64080	64081
		5/8	3/8	Yes	3-1/2	Regular	64154	64155	—	64156
9/32	0.2813	1/2	5/16	No	2-1/2	Stub	64079	64084	64085	64086
		11/16	3/8	Yes	3-1/2	Regular	64157	—	—	64158
5/16	0.3125	1/2	5/16	No	2-1/2	Stub	64087	64089	64091	64092
		3/4	3/8	Yes	3-1/2	Regular	64159	64160	—	64161
11/32	0.3438	9/16	3/8	No	2-1/2	Stub	64090	64093	64094	64117
		3/4	3/8	Yes	3-1/2	Regular	64162	—	—	64163
3/8	0.3750	9/16	3/8	No	2-1/2	Stub	64095	64096	64097	64098
		3/4	3/8	Yes	3-1/2	Regular	64164	—	—	64165
7/16	0.4375	9/16	7/16	No	2-3/4	Stub	64099	64111	64100	64118
		7/8	1/2	Yes	4	Regular	64166	—	—	64167
1/2	0.5000	5/8	1/2	No	3	Stub	64101	64102	64103	64104
		1	1/2	Yes	4	Regular	64168	64169	64170	64171



GENERAL PURPOSE END MILLS

4 FLUTE - SINGLE END CORNER RADIUS



Diameter Tolerance: +0.000 / -0.002"

Shank Tolerance: +0.0000 / -0.0005"

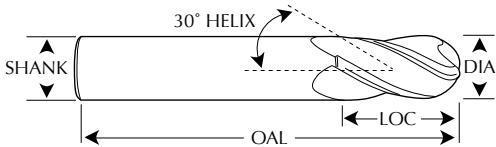
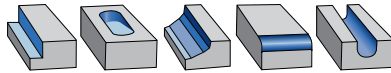
DIA	Dec In	LOC	Shank	Length	OAL	Radius	Bright	TiN	TiCN	AlTiN
1/8	0.1250	1/2	1/8	Regular	1-1/2	0.005	62097	—	—	62098
						0.010	62099	62100	62101	62102
						0.015	62103	62104	62105	62106
						0.020	62107	62108	62109	62110
1/8	0.1250	1/2	1/8	Regular	1-1/2	0.030	62111	62112	62113	62114
						0.010	62115	62116	62117	62118
						0.015	62119	62120	62121	62122
						0.020	62123	62124	62125	62126
3/16	0.1875	5/8	3/16	Regular	2	0.030	62127	62128	62129	62130
						0.045	62131	62132	62133	62134
						0.050	62135	—	—	62137
						0.060	62136	—	—	62138
						0.010	62140	—	—	62141
						0.015	62142	62143	62144	62145
						0.020	62146	62147	62148	62149
						0.025	62150	62151	62152	62153
						0.030	62154	62155	62156	62157
						0.045	62158	62159	62160	62161
1/4	0.2500	3/4	1/4	Regular	2-1/2	0.060	62162	62163	62164	62165
						0.090	62166	—	—	62167
						0.015	62168	62169	62170	62171
						0.020	62172	62173	62174	62175
						0.025	62176	62177	62178	62179
						0.030	62180	62181	62182	62183
						0.045	62184	62185	62186	62187
						0.060	62188	62189	62190	62191
						0.090	62192	—	—	62193
						0.125	62194	—	—	62195
3/8	0.3750	1	3/8	Regular	2-1/2	0.015	62196	62197	62198	62199
						0.020	62200	62201	62202	62203
						0.025	62204	62205	62206	62207
						0.030	62208	62209	62210	62211
						0.045	62212	62213	62214	62215
						0.060	62216	62217	62218	62219
						0.090	62220	62221	62222	62223
						0.125	62224	—	—	62225
						0.015	62226	62227	62228	62229
						0.020	62230	62231	62232	62233
7/16	0.4375	1	7/16	Regular	2-3/4	0.025	62234	62235	62236	62237
						0.030	62238	62239	62240	62241
						0.045	62242	62243	62244	62245
						0.060	62246	62247	62248	62249
						0.090	62250	62251	62252	62253
						0.015	62256	62257	62258	62259
						0.020	62260	62261	62262	62263
						0.025	62264	62265	62266	62267
						0.030	62268	62269	62270	62271
						0.045	62272	62273	62274	62275
1/2	0.5000	1	1/2	Regular	3	0.060	62276	62277	62278	62279
						0.090	62280	62281	62282	62283
						0.125	62284	62285	62286	62287



4 FLUTE - SINGLE END - CORNER RADIUS CONTINUED

DIA	Dec In	LOC	Shank	Length	OAL	Radius	Bright	TiN	TiCN	AlTiN
5/8	0.6250	1-1/4	5/8	Regular	3-1/2	0.015	62288	62289	62290	62291
						0.020	62292	62293	62294	62295
						0.025	62296	62297	62298	62299
						0.030	62300	62301	62302	62303
						0.045	62304	62305	62306	62307
						0.060	62308	62309	62310	62311
						0.090	62312	62313	62314	62315
						0.125	62316	62317	62318	62319
						0.015	62320	62321	62322	62323
						0.020	62324	62325	62326	62327
3/4	0.7500	1-1/2	3/4	Regular	4	0.025	62328	62329	62330	62331
						0.030	62332	62333	62334	62335
						0.045	62336	62337	62338	62339
						0.060	62340	62341	62342	62343
						0.090	62344	62345	62346	62347
						0.125	62348	62349	62350	62351
						0.190	62352	62353	62354	62355
						0.250	62356	—	—	62357
						0.015	62358	62359	62360	62361
						0.020	62362	62363	62364	62365
1	1.0000	1-1/2	1	Regular	4	0.025	62366	62367	62368	62369
						0.030	62370	62371	62372	62373
						0.045	62374	62375	62376	62377
						0.060	62378	62379	62380	62381
						0.090	62382	62383	62384	62385
						0.125	62386	62387	62388	62389
						0.190	62390	62391	62392	62393
						0.250	62394	62395	62396	62397

4 FLUTE - SINGLE END BALLNOSE



Diameter Tolerance: +0.000 / -0.002" Shank Tolerance: +0.0000 / -0.0005"

DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN
1/64	0.0156	3/64	1/8	Regular	1-1/2	63450	63448	63659	63459
1/32	0.0313	1/16	1/8	Stub	1-1/2	63003	63004	63005	63006
		1/8		Regular		63451	63455	63449	63461
1.0mm	0.0394	4.0mm	3.0mm	Regular	39.0mm	63575	63576	63578	63577
3/64	0.0469	3/32	1/8	Stub	1-1/2	63007	63008	63009	63010
		1/8		Regular		63452	63456	63660	63466
1.5mm	0.0591	4.5mm	3.0mm	Regular	39.0mm	63579	63580	63582	63581
1/16	0.0625	1/8	1/8	Stub	1-1/2	63011	63013	63012	63014
		1/4		Regular		63453	63454	63467	63468
5/64	0.0781	5/32	1/8	Stub	1-1/2	63015	63070	63076	63082
		1/4		Regular		63457	63458	63460	63470
2.0mm	0.0787	8.0mm	3.0mm	Regular	39.0mm	63586	—	—	63584
3/32	0.0938	3/16	1/8	Stub	1-1/2	63016	63018	63017	63019
		3/8		Regular		63462	63463	63464	63465
2.5mm	0.0984	9.5mm	3.0mm	Regular	39.0mm	63587	63588	63590	63589



GENERAL PURPOSE END MILLS

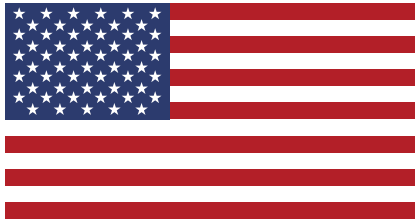
4 FLUTE - SINGLE END - BALLNOSE CONTINUED

DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN
7/64	0.1094	7/32	1/8	Stub	1-1/2	63020	63071	63077	63083
		3/8		Regular		63469	63496	63661	63487
3.0mm	0.1181	12.0mm	3.0mm	Regular	39.0mm	63591	63592	63594	63593
1/8	0.1250	1/4	1/8	Stub	1-1/2	63021	63023	63022	63024
		1/2		Regular		63471	63472	63473	63477
		3/4		Long		63734	63735	63736	63737
		1		X/Long		63855	63856	63857	63858
3.5mm	0.1378	12.0mm	4.0mm	Regular	51.0mm	63595	63596	63598	63597
9/64	0.1406	9/32	3/16	Stub	2	63025	63072	63078	63084
		9/16		Regular		63474	63475	63476	63478
5/32	0.1563	5/16	3/16	Stub	2	63026	63028	63027	63029
		9/16		Regular		63479	63480	63482	63481
		3/4		Long		63738	63739	63741	63740
		1-1/8		X/Long		63859	63860	63861	63862
4.0mm	0.1575	14.0mm	4.0mm	Regular	51.0mm	63599	63600	63602	63601
11/64	0.1719	5/16	3/16	Stub	2	63030	63073	63079	63085
		9/16		Regular		63484	63498	63663	63491
4.5mm	0.1772	16.0mm	5.0mm	Regular	51.0mm	63603	63604	63606	63605
3/16	0.1875	3/8	3/16	Stub	2	63031	63033	63032	63034
		5/8		Regular		63488	63489	63490	63483
		3/4		Long		63742	63743	63744	63745
		1		XX/Long		63867	—	—	—
		1-1/8		X/Long		63863	63864	63865	63866
5.0mm	0.1969	16.0mm	5.0mm	Regular	51.0mm	63607	63608	63610	63609
13/64	0.2031	3/8	1/4	Stub	2	63035	63074	63080	63086
		5/8		Regular		63493	63501	63664	63494
7/32	0.2188	7/16	1/4	Stub	2	63036	63038	63037	63039
		5/8		Regular		63495	63499	63486	63485
15/64	0.2344	7/16	1/4	Stub	2	63040	63075	63081	63087
		3/4		Regular		63497	63500	63662	63492
6.0mm	0.2362	19.0mm	6.0mm	Regular	63.0mm	63611	63612	63614	63613
1/4	0.2500	1/2	1/4	Stub	2	63041	63043	63042	63044
		3/4		Regular		63502	63504	63505	63508
		1		X/Long		63868	—	—	—
		1-1/8		Long		63746	63747	63748	63749
		1-1/2		X/Long		63869	63870	63871	63872
		1-1/2		Ext XX/Long		63873	63874	63875	63876
17/64	0.2656	3/4	5/16	Regular	2-1/2	63503	63506	63665	63676
7.0mm	0.2756	19.0mm	8.0mm	Regular	63.0mm	63615	63616	63618	63617
9/32	0.2813	3/4	5/16	Regular	2-1/2	63511	63507	63509	63510
19/64	0.2969	13/16	5/16	Regular	2-1/2	63512	63513	63666	63677
5/16	0.3125	1/2	5/16	Stub	2	63046	63048	63047	63049
		13/16		Regular		63515	63516	63517	63514
		1-1/8		Long		63750	63751	63752	63753
		1-1/2		Ext XX/Long		63881	63882	63883	63884
		1-5/8		X/Long		63877	63878	63879	63880
8.0mm	0.3150	20.0mm	8.0mm	Regular	63.0mm	63619	63620	63622	63621
21/64	0.3281	1	3/8	Regular	2-1/2	63518	63519	63667	63678
11/32	0.3438	1	3/8	Regular	2-1/2	63520	63521	63574	63546
9.0mm	0.3543	22.0mm	10.0mm	Regular	63.0mm	63623	63624	63626	63625
23/64	0.3594	1	3/8	Regular	2-1/2	63522	63523	63668	63679
3/8	0.3750	5/8	3/8	Stub	2	63050	63051	63052	63053
		1		Regular		63524	63525	63526	63547
		1-1/8		Long		63754	63755	63756	63757
		1-1/2		Ext XX/Long		63889	63891	63892	63890
		1-3/4		X/Long		63885	63886	63887	63888

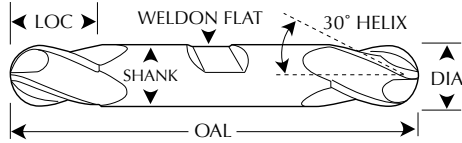
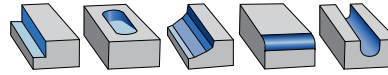


4 FLUTE - SINGLE END - BALLNOSE CONTINUED

DIA	Dec In	LOC	Shank	Length	OAL	Bright	TiN	TiCN	AlTiN
25/64	0.3906	1	7/16	Regular	2-3/4	63527	63529	63669	63680
10.0mm	0.3937	22.0mm	10.0mm	Regular	76.0mm	63627	63628	63630	63629
13/32	0.4063	1	7/16	Regular	2-3/4	63528	63530	63670	63548
27/64	0.4219	1	7/16	Regular	2-3/4	63531	63532	63671	63681
11.0mm	0.4331	25.0mm	12.0mm	Regular	76.0mm	63631	63632	63634	63633
7/16	0.4375	5/8	7/16	Stub	2-1/2	63054	63055	63056	63057
		1		Regular	2-3/4	63533	63534	63535	63549
		2		Long	4	63758	63759	63760	63761
		3		X/Long	6	63893	63894	63895	63896
29/64	0.4531	1	1/2	Regular	3	63536	63537	63672	63682
15/32	0.4688	1	1/2	Regular	3	63538	63539	63552	63550
12.0mm	0.4724	25.0mm	12.0mm	Regular	76.0mm	63635	63636	63638	63637
31/64	0.4844	1	1/2	Regular	3	63541	63540	63673	63683
1/2	0.5000	5/8	1/2	Stub	2-1/2	63058	63059	63060	63061
		1		Regular	3	63542	63543	63544	63545
		1-1/2		Medium	4	63764	63762	63763	63765
		1-1/2		Ext X/Long	6	63897	63899	63900	63901
		2		Long	4	63766	63767	63768	63769
3	X/Long	6	63898	63902	63903	63904			
14.0mm	0.5512	32.0mm	14.0mm	Regular	90.0mm	63639	63640	63642	63641
9/16	0.5625	1-1/4	9/16	Regular	3-1/2	63551	63553	63554	63555
5/8	0.6250	3/4	5/8	Stub	3	63062	63063	63064	63065
		1-1/4		Regular	3-1/2	63556	63557	63558	63559
		1-1/2		Ext X/Long	6	63909	63910	63911	63912
		2-1/4		Long	5	63770	63771	63772	63773
		3		X/Long	6	63905	63906	63907	63908
16.0mm	0.6299	32.0mm	16.0mm	Regular	102.0mm	63643	63644	63646	63645
11/16	0.6875	1-1/2	3/4	Regular	4	63560	63565	63674	63573
18.0mm	0.7087	38.0mm	18.0mm	Regular	102.0mm	63647	63648	63650	63649
3/4	0.7500	1	3/4	Stub	3	63066	63067	63068	63069
		1-1/2		Regular	4	63561	63562	63563	63564
		1-1/2		Ext X/Long	6	63918	63919	63920	63921
		2-1/4		Long	5	63774	63775	63776	63777
		3		X/Long	6	63913	63915	63916	63917
20.0mm	0.7874	38.0mm	20.0mm	Regular	102.0mm	63651	63652	63654	63653
22.0mm	0.8661	38.0mm	22.0mm	Regular	102.0mm	63655	—	—	63656
7/8	0.8750	1-1/2	7/8	Regular	4	63566	63567	63675	63572
25.0mm	0.9843	38.0mm	25.0mm	Regular	102.0mm	63657	—	—	63658
1	1.0000	1-1/2	1	Regular	4	63568	63569	63570	63571
		1-1/2		Ext X/Long	6	63928	63929	63930	63931
		2-1/4		Long	5	63778	63779	63780	63781
		3		X/Long	6	63922	63925	63926	63927



4 FLUTE - DOUBLE END BALLNOSE




Diameter Tolerance: +0.000 / -0.003"

Shank Tolerance: +0.0000 / -0.0005"


DIA	Dec In	LOC	Shank	Weldon Flat	OAL	Length	Bright	TiN	TiCN	AlTiN
1/32	0.0313	1/16	1/8	No	1-1/2	Stub	64256	64259	64327	64329
3/64	0.0469	3/32	1/8	No	1-1/2	Stub	64257	64260	64328	64330
1/16	0.0625	1/8	1/8	No	1-1/2	Stub	64258	64262	64263	64332
5/64	0.0781	1/8	1/8	No	1-1/2	Stub	64261	64264	64265	64331
3/32	0.0938	3/16	1/8	No	1-1/2	Stub	64266	64267	64268	64333
7/64	0.1094	3/16	1/8	No	1-1/2	Stub	64269	64270	64271	64334
1/8	0.1250	1/4	1/8	No	1-1/2	Stub	64272	64273	64274	64275
		3/8	3/8	Yes	3	Regular	64364	64365	—	64366
9/64	0.1406	5/16	3/16	No	2	Stub	64276	64277	64278	64335
5/32	0.1563	5/16	3/16	No	2	Stub	64279	64280	64281	64282
		7/16	3/8	Yes	3	Regular	64367	—	—	64368
11/64	0.1719	5/16	3/16	No	2	Stub	64283	64284	64285	64336
3/16	0.1875	3/8	3/16	No	2	Stub	64286	64287	64288	64289
		1/2	3/8	Yes	3	Regular	64369	—	—	64370
13/64	0.2031	1/2	1/4	No	2-1/2	Stub	64290	64291	64292	64337
7/32	0.2188	1/2	1/4	No	2-1/2	Stub	64293	64294	64295	64338
		9/16	3/8	Yes	3-1/2	Regular	64371	—	—	64372
15/64	0.2344	1/2	1/4	No	2-1/2	Stub	64296	64297	64298	64339
1/4	0.2500	1/2	1/4	No	2-1/2	Stub	64299	64300	64301	64302
		5/8	3/8	Yes	3-1/2	Regular	64373	64374	—	64375
9/32	0.2813	1/2	5/16	No	2-1/2	Stub	64304	64305	64306	64340
		11/16	3/8	Yes	3-1/2	Regular	64376	—	—	64377
5/16	0.3125	1/2	5/16	No	2-1/2	Stub	64307	64308	64310	64311
		3/4	3/8	Yes	3-1/2	Regular	64378	—	—	64379
11/32	0.3438	9/16	3/8	No	2-1/2	Stub	64309	64312	64313	64341
		3/4	3/8	Yes	3-1/2	Regular	64380	—	—	64381
3/8	0.3750	9/16	3/8	No	2-1/2	Stub	64314	64315	64316	64317
		3/4	3/8	Yes	3-1/2	Regular	64382	—	—	64383
7/16	0.4375	9/16	7/16	No	2-3/4	Stub	64318	64319	64320	64321
		7/8	1/2	Yes	4	Regular	64384	—	—	64385
1/2	0.5000	5/8	1/2	No	3	Stub	64322	64323	64324	64325
		1	1/2	Yes	4	Regular	64386	—	—	64387

MILLING RECOMMENDATIONS • GENERAL PURPOSE END MILLS

PROFILING 

Workpiece Material Group	Hardness	Surface Feet Per Minute (SFM)					Inches Per Tooth (IPT)					
		Radial Depth of Cut (RDOC)					IPT * (BASELINE)					
		SFM based on RDOC					Cutting Diameter					
		5%	10%	20%	30%	50%	5/16	3/8	1/2	5/8	3/4	1
Steels	P ≤ 28 Rc	1050	700	385	375	350	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	P 28 - 38 Rc	630	420	320	250	210						
Tool & Die Steels	P 28 - 44 Rc	525	350	300	275	250	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	M ≤ 28 Rc	650	600	550	500	450						
Stainless Steel	M ≤ 28 Rc	525	400	350	300	250	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	M > 28 Rc	525	400	350	300	250						
Super Alloys	S ≤ 42 Rc	265	200	175	150	100	0.0014	0.0016	0.0023	0.0027	0.0032	0.0045
	S ≤ 42 Rc	230	200	175	150	125						
Hardened Materials	H 45-55 Rc	250	240	230	210	200	0.0018	0.0021	0.0030	0.0036	0.0042	0.0060
	H 55-65 Rc	200	180	160	150	100						
Cast-Iron	K ≤ 240 HB	425	400	375	350	300	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	K > 240 HB	320	300	250	225	200						
Non-Ferrous	N	1000	960	920	880	840	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090

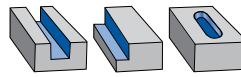
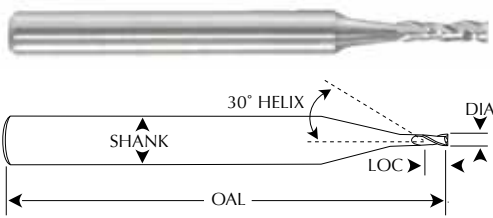
*CHIP THINNING Adjustments	
RDOC	Increase IPT
50%	None
30%	1.1x
25%	1.2x
20%	1.3x
15%	1.4x
10%	1.8x
7%	2.0x
5%	2.3x
3%	3.0x
2%	3.5x
1%	5.0x

SLOTING 

Workpiece Material Group	Hardness	Surface Feet Per Minute (SFM)			Inches Per Tooth (IPT)					
		Radial Depth of Cut (RDOC)			IPT * (BASELINE)					
		SFM			Cutting Diameter					
		25%	50%	100%	5/16	3/8	1/2	5/8	3/4	1
Steels	P ≤ 28 Rc	385	370	350	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	P 28 - 38 Rc	245	230	2210						
Tool & Die Steels	P 28 - 44 Rc	210	195	175	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
Stainless Steel	M ≤ 28 Rc	385	370	350	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	M ≤ 28 Rc	245	210	175						
	M > 28 Rc	210	195	175	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
Super Alloys	S ≤ 42 Rc	125	105	90	0.0008	0.0010	0.0013	0.0016	0.0017	0.0026
	S ≤ 42 Rc	100	90	80						
Hardened Materials	H 34-45 Rc	245	230	210	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	H 45-55 Rc	175	160	140						
	H 55-65 Rc	150	125	100						
Cast-Iron	K ≤ 240 HB	450	400	350	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	K > 240 HB	300	250	225						
Non-Ferrous	N	750	600	450	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050

FOR SIZES UNDER 5/16" - SEE PAGE 36

2 FLUTE SQUARE



Diameter Tolerance: $\pm 0.0005''$ LOC Tolerance: $+0.0000 / +0.0120''$ Shank Tolerance: $+0.0000 / -0.0003''$

All Shank Diameters: 0.125" ■ All OAL: 1.50"

DIA	LOC	Length	Bright	AlTiN
0.005	0.008	Stub	64689	—
	0.015	Regular	64388	—
0.006	0.009	Stub	64690	—
	0.018	Regular	64483	—
0.007	0.011	Stub	64691	—
	0.021	Regular	64484	—
0.008	0.012	Stub	64692	—
	0.024	Regular	64485	—
0.009	0.014	Stub	64693	—
	0.027	Regular	64486	—
0.010	0.015	Stub	64694	64695
	0.030	Regular	64389	64390
0.011	0.017	Stub	64696	64697
	0.033	Regular	64487	64488
0.012	0.018	Stub	64698	64699
	0.036	Regular	64489	64490
0.013	0.020	Stub	64700	64701
	0.039	Regular	64491	64492
0.014	0.021	Stub	64702	64703
	0.042	Regular	64493	64494
0.015	0.023	Stub	64704	64705
	0.045	Regular	64391	64392
0.016	0.024	Stub	64706	64707
	0.048	Regular	64495	64496
0.017	0.026	Stub	64708	64709
	0.051	Regular	64497	64498
0.018	0.027	Stub	64710	64711
	0.054	Regular	64499	64500
0.019	0.029	Stub	64712	64713
	0.057	Regular	64501	64502
0.020	0.030	Stub	64714	64715
	0.060	Regular	64393	64394
0.021	0.032	Stub	64716	64717
	0.063	Regular	64503	64504
0.022	0.033	Stub	64718	64719
	0.066	Regular	64505	64506
0.023	0.035	Stub	64720	64721
	0.069	Regular	64507	64508
0.024	0.036	Stub	64722	64723
	0.072	Regular	64509	64510
0.025	0.038	Stub	64724	64725
	0.075	Regular	64395	64396
0.026	0.039	Stub	64726	64727
	0.078	Regular	64511	64512
0.027	0.041	Stub	64728	64729
	0.081	Regular	64513	64514

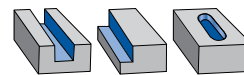
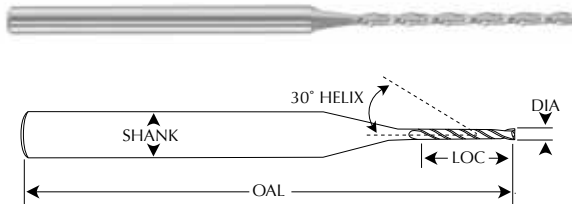
DIA	LOC	Length	Bright	AlTiN
0.028	0.042	Stub	64730	64731
	0.084	Regular	64515	64516
0.029	0.044	Stub	64732	64733
	0.087	Regular	64517	64518
0.030	0.045	Stub	64734	64735
	0.090	Regular	64397	64398
0.031	0.047	Stub	64736	64737
	0.093	Regular	64519	64520
0.032	0.048	Stub	64738	64739
	0.096	Regular	64521	64522
0.033	0.050	Stub	64740	64741
	0.099	Regular	64523	64524
0.034	0.051	Stub	64742	64743
	0.102	Regular	64525	64526
0.035	0.053	Stub	64744	64745
	0.105	Regular	64399	64400
0.036	0.054	Stub	64746	64747
	0.108	Regular	64527	64528
0.037	0.056	Stub	64748	64749
	0.111	Regular	64529	64530
0.038	0.057	Stub	64750	64751
	0.114	Regular	64531	64532
0.039	0.059	Stub	64752	64753
	0.117	Regular	64533	64534
0.040	0.060	Stub	64754	64755
	0.120	Regular	64401	64402
0.041	0.062	Stub	64756	64757
	0.123	Regular	64535	64536
0.042	0.063	Stub	64758	64759
	0.126	Regular	64537	64538
0.043	0.065	Stub	64760	64761
	0.129	Regular	64539	64540
0.044	0.066	Stub	64762	64763
	0.132	Regular	64541	64542
0.045	0.068	Stub	64764	64765
	0.135	Regular	64403	64404
0.046	0.069	Stub	64766	64767
	0.138	Regular	64543	64544
0.047	0.071	Stub	64768	64769
	0.141	Regular	64545	64546
0.048	0.072	Stub	64770	64771
	0.144	Regular	64547	64548
0.049	0.074	Stub	64772	64773
	0.147	Regular	64549	64550
0.050	0.075	Stub	64774	64775
	0.150	Regular	64405	64406

2 FLUTE - SQUARE CONTINUED

DIA	LOC	Length	Bright	AlTiN
0.051	0.077	Stub	64776	64777
	0.153	Regular	64551	64552
0.052	0.078	Stub	64778	64779
	0.156	Regular	64553	64554
0.053	0.080	Stub	64780	64781
	0.159	Regular	64555	64556
0.054	0.081	Stub	64782	64783
	0.162	Regular	64557	64558
0.055	0.083	Stub	64784	64785
	0.165	Regular	64407	64408
0.056	0.084	Stub	64786	64787
	0.168	Regular	64559	64560
0.057	0.086	Stub	64788	64789
	0.171	Regular	64561	64562
0.058	0.087	Stub	64790	64791
	0.174	Regular	64563	64564
0.059	0.089	Stub	64792	64793
	0.177	Regular	64565	64566
0.060	0.090	Stub	64794	64795
	0.180	Regular	64409	64410
0.061	0.092	Stub	64796	64797
	0.183	Regular	64567	64568
0.062	0.093	Stub	64798	64799
	0.186	Regular	64569	64570
0.063	0.095	Stub	64800	64801
	0.189	Regular	64571	64572

DIA	LOC	Length	Bright	AlTiN
0.064	0.096	Stub	64802	64803
	0.192	Regular	64573	64574
0.065	0.098	Stub	64804	64805
	0.195	Regular	64411	64412
0.070	0.105	Stub	64806	64807
	0.210	Regular	64413	64414
0.075	0.113	Stub	64808	64809
	0.225	Regular	64415	64416
0.080	0.120	Stub	64810	64811
	0.240	Regular	64417	64418
0.085	0.128	Stub	64812	64813
	0.255	Regular	64419	64420
0.090	0.135	Stub	64814	64815
	0.270	Regular	64421	64422
0.095	0.143	Stub	64816	64817
	0.285	Regular	64423	64424
0.100	0.150	Stub	64818	64819
	0.300	Regular	64425	64426
0.105	0.158	Stub	64820	64821
	0.315	Regular	64427	64428
0.110	0.165	Stub	64822	64823
	0.330	Regular	64429	64430
0.115	0.173	Stub	64824	64825
	0.345	Regular	64431	64432
0.120	0.180	Stub	64826	64827
	0.360	Regular	64433	64434

2 FLUTE - LONG SQUARE

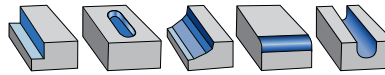
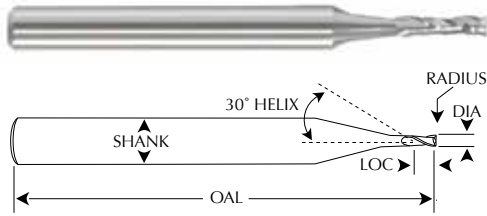


Diameter Tolerance: ±0.0005" LOC Tolerance: +0.0000 / +0.0120" Shank Tolerance: +0.0000 / -0.0003"

All Shank Diameters: 0.125" ■ All OAL: 2.50"

DIA	LOC	Shank	OAL	Bright	AlTiN	
0.0156	1/64	0.125	0.125	2.500	65951	65952
		0.250	0.125	2.500	65953	65954
0.0312	1/32	0.375	0.125	2.500	65955	65956
		0.250	0.125	2.500	65957	65958
		0.375	0.125	2.500	65959	65960
0.0469	3/64	0.500	0.125	2.500	65961	65962
		0.375	0.125	2.500	65963	65964
		0.500	0.125	2.500	65965	65966
0.0625	1/16	0.750	0.125	2.500	65967	65968
		1.000	0.125	2.500	65969	65970
		0.500	0.125	2.500	65971	65972
0.0781	5/64	0.750	0.125	2.500	65973	65974
		0.500	0.125	2.500	65975	65976

2 FLUTE CORNER RADIUS



Diameter Tolerance: $\pm 0.0005''$ LOC Tolerance: $+0.0000 / +0.0120''$ Shank Tolerance: $+0.0000 / -0.0003''$

All Shank Diameters: 0.125" ■ All OAL: 1.50"

DIA	LOC	Length	Radius	Bright	AlTiN
0.010	0.015	Stub	.002	65615	65616
	0.030	Regular	.002	65327	65328
0.015	0.023	Stub	.002	65617	65618
	0.045	Regular	.002	65329	65330
0.020	0.030	Stub	.005	65619	65620
	0.060	Regular	.005	65331	65332
0.025	0.038	Stub	.005	65621	65622
	0.075	Regular	.005	65333	65334
0.030	0.045	Stub	.005	65623	65624
			.010	65625	65626
	0.090	Regular	.005	65335	65336
0.031	0.047	Stub	.005	65627	65628
			.010	65629	65630
	0.093	Regular	.005	65339	65340
0.035	0.053	Stub	.005	65631	65632
			.010	65633	65634
	0.105	Regular	.005	65343	65344
0.040	0.060	Stub	.005	65635	65636
			.010	65637	65638
	0.120	Regular	.005	65347	65348
0.045	0.068	Stub	.005	65639	65640
			.010	65641	65642
			.015	65643	65644
	0.135	Regular	.005	65351	65352
0.047	0.071	Stub	.005	65645	65646
			.010	65647	65648
			.015	65649	65650
	0.141	Regular	.005	65357	65358
0.050	0.075	Stub	.005	65651	65652
			.010	65653	65654
			.015	65655	65656
	0.150	Regular	.005	65363	65364
0.055	0.083	Stub	.005	65657	65658
			.010	65659	65660
			.015	65661	65662
0.055	0.165	Regular	.005	65369	65370
			.010	65371	65372
			.015	65373	65374
0.060	0.090	Stub	.005	65663	65664
			.010	65665	65666
			.015	65667	65668

DIA	LOC	Length	Radius	Bright	AlTiN
0.060	0.180	Regular	.005	65375	65376
			.010	65377	65378
			.015	65379	65380
0.062	0.093	Stub	.005	65669	65670
			.010	65671	65672
			.015	65673	65674
			.005	65381	65382
0.065	0.186	Regular	.010	65383	65384
			.015	65385	65386
			.005	65675	65676
0.070	0.098	Stub	.010	65677	65678
			.015	65679	65680
			.005	65387	65388
0.075	0.195	Regular	.010	65389	65390
			.015	65391	65392
			.005	65681	65682
0.080	0.105	Stub	.010	65683	65684
			.015	65685	65686
			.005	65393	65394
			.010	65395	65396
0.085	0.210	Regular	.015	65397	65398
			.005	65687	65688
			.010	65689	65690
			.015	65691	65692
0.090	0.113	Stub	.005	65399	65400
			.010	65401	65402
			.015	65403	65404
			.005	65693	65694
0.095	0.225	Regular	.010	65405	65406
			.015	65407	65408
			.005	65695	65696
			.015	65697	65698
0.100	0.117	Stub	.005	65409	65410
			.010	65411	65412
			.015	65413	65414
			.005	65699	65700
0.105	0.234	Regular	.010	65701	65702
			.015	65703	65704
			.005	65415	65416
			.010	65417	65418
0.110	0.120	Stub	.005	65705	65706
			.010	65707	65708
			.015	65709	65710
			.005	65419	65420
0.115	0.240	Regular	.015	65421	65422
			.005	65711	65712
			.010	65423	65424
			.015	65425	65426
0.120	0.128	Stub	.005	65427	65428
			.010	65429	65430
			.015	65431	65432
			.005	65713	65714
0.125	0.255	Regular	.015	65433	65434
			.005	65715	65716
			.010	65435	65436
			.015	65437	65438
0.130	0.135	Stub	.005	65717	65718
			.010	65719	65720
			.015	65721	65722
			.005	65439	65440
0.135	0.270	Regular	.015	65441	65442
			.005	65723	65724
			.010	65443	65444
			.015	65445	65446

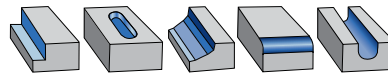
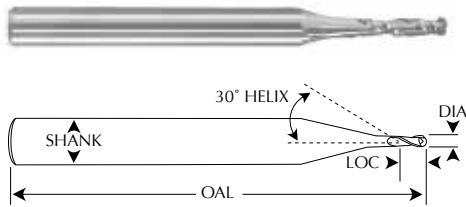
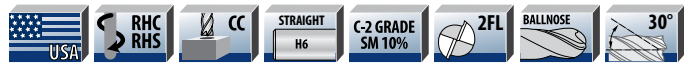


2 FLUTE - CORNER RADIUS CONTINUED

DIA	LOC	Length	Radius	Bright	AlTiN
0.093	0.140	Stub	.005	65717	65718
			.010	65719	65720
			.015	65721	65722
	0.279	Regular	.005	65429	65430
			.010	65431	65432
			.015	65433	65434
0.095	0.143	Stub	.005	65723	65724
			.010	65725	65726
			.015	65727	65728
	0.285	Regular	.005	65435	65436
			.010	65437	65438
			.015	65439	65440
0.100	0.150	Stub	.005	65729	65730
			.010	65731	65732
			.015	65733	65734
0.100	0.300	Regular	.005	65441	65442
			.010	65443	65444
			.015	65445	65446
0.105	0.158	Stub	.010	65735	65736
			.015	65737	65738
			.020	65739	65740

DIA	LOC	Length	Radius	Bright	AlTiN
0.105	0.315	Regular	.010	65447	65448
			.015	65449	65450
			.020	65451	65452
0.110	0.165	Stub	.010	65741	65742
			.015	65743	65744
			.020	65745	65746
	0.330	Regular	.010	65453	65454
			.015	65455	65456
			.020	65457	65458
0.115	0.173	Stub	.010	65747	65748
			.015	65749	65750
			.020	65751	65752
0.120	0.345	Regular	.010	65459	65460
			.015	65461	65462
			.020	65463	65464
0.120	0.180	Stub	.010	65753	65754
			.015	65755	65756
			.020	65757	65758
	0.360	Regular	.010	65465	65466
			.015	65467	65468
			.020	65469	65470

2 FLUTE BALLNOSE



Diameter Tolerance: ±0.0005" LOC Tolerance: +0.0000 / +0.0120" Shank Tolerance: +0.0000 / -0.0003"

All Shank Diameters: 0.125" ■ All OAL: 1.50"

DIA	LOC	Length	Bright	AlTiN
0.010	0.015	Stub	65235	65236
	0.030	Regular	64967	64968
0.011	0.033	Regular	64969	64970
0.012	0.036	Regular	64971	64972
0.013	0.039	Regular	64973	64974
0.014	0.042	Regular	64975	64976
0.015	0.023	Stub	65237	65238
	0.045	Regular	64977	64978
0.016	0.048	Regular	64979	64980
0.017	0.051	Regular	64981	64982
0.018	0.054	Regular	64983	64984
0.019	0.057	Regular	64985	64986
0.020	0.030	Stub	65239	65240
	0.060	Regular	64987	64988
0.021	0.063	Regular	64989	64990
0.022	0.066	Regular	64991	64992
0.023	0.069	Regular	64993	64994
0.024	0.072	Regular	64995	64996
0.025	0.038	Stub	65241	65242
	0.075	Regular	64997	64998

DIA	LOC	Length	Bright	AlTiN
0.026	0.078	Regular	64999	65000
0.027	0.081	Regular	65001	65002
0.028	0.084	Regular	65003	65004
0.029	0.087	Regular	65005	65006
0.030	0.045	Stub	65243	65244
	0.090	Regular	65007	65008
0.031	0.093	Regular	65009	65010
0.032	0.096	Regular	65011	65012
0.033	0.099	Regular	65013	65014
0.034	0.102	Regular	65015	65016
0.035	0.053	Stub	65245	65246
	0.105	Regular	65017	65018
0.036	0.108	Regular	65019	65020
0.037	0.111	Regular	65021	65022
0.038	0.114	Regular	65023	65024
0.039	0.117	Regular	65025	65026
0.040	0.060	Stub	65247	65248
	0.120	Regular	65027	65028
0.041	0.123	Regular	65029	65030
0.042	0.126	Regular	65031	65032

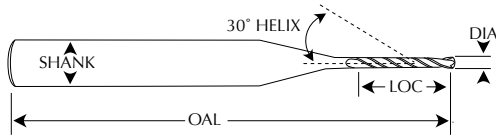
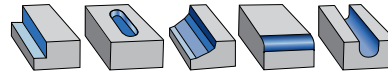
MICRO DECIMAL END MILLS

2 FLUTE - BALLNOSE CONTINUED

DIA	LOC	Length	Bright	AlTiN
0.043	0.129	Regular	65033	65034
0.044	0.132	Regular	65035	65036
0.045	0.068	Stub	65249	65250
	0.135	Regular	65037	65038
0.046	0.138	Regular	65039	65040
0.047	0.141	Regular	65041	65042
0.048	0.144	Regular	65043	65044
0.049	0.147	Regular	65045	65046
0.050	0.075	Stub	65251	65252
	0.150	Regular	65047	65048
0.051	0.153	Regular	65049	65050
0.052	0.156	Regular	65051	65052
0.053	0.159	Regular	65053	65054
0.054	0.162	Regular	65055	65056
0.055	0.083	Stub	65253	65254
	0.165	Regular	65057	65058
0.056	0.168	Regular	65059	65060
0.057	0.171	Regular	65061	65062
0.058	0.174	Regular	65063	65064
0.059	0.177	Regular	65065	65066
0.060	0.090	Stub	65255	65256
0.060	0.180	Regular	65067	65068
0.061	0.183	Regular	65069	65070
0.062	0.186	Regular	65071	65072
0.063	0.189	Regular	65073	65074

DIA	LOC	Length	Bright	AlTiN
0.064	0.192	Regular	65075	65076
	0.098	Stub	65257	65258
0.065	0.195	Regular	65077	65078
	0.105	Stub	65259	65260
0.070	0.210	Regular	65079	65080
	0.113	Stub	65261	65262
0.075	0.225	Regular	65081	65082
	0.120	Stub	65263	65264
0.080	0.240	Regular	65083	65084
	0.128	Stub	65265	65266
0.085	0.255	Regular	65085	65086
	0.135	Stub	65267	65268
0.090	0.270	Regular	65087	65088
	0.143	Stub	65269	65270
0.095	0.285	Regular	65089	65090
	0.150	Stub	65271	65272
0.100	0.300	Regular	65091	65092
	0.158	Stub	65273	65274
0.105	0.315	Regular	65093	65094
	0.165	Stub	65275	65276
0.110	0.330	Regular	65095	65096
	0.173	Stub	65277	65278
0.115	0.345	Regular	65097	65098
	0.180	Stub	65279	65280
0.120	0.360	Regular	65099	65100

2 FLUTE - LONG BALLNOSE



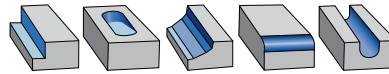
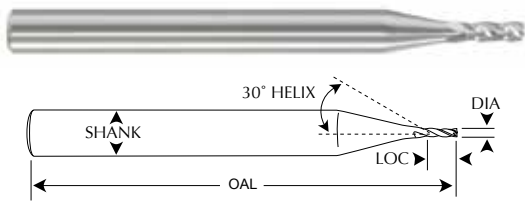
Diameter Tolerance: $\pm 0.0005''$ LOC Tolerance: $+0.0000 / +0.0120''$ Shank Tolerance: $+0.0000 / -0.0003''$

All Shank Diameters: 0.125" ■ All OAL: 2.50"

DIA	LOC	Shank	OAL	Bright	AlTiN	
0.0156	1/64	0.125	0.125	2.500	65927	65928
		0.250	0.125	2.500	65929	65930
0.0312	1/32	0.375	0.125	2.500	65931	65932
		0.250	0.125	2.500	65933	65934
		0.375	0.125	2.500	65935	65936
0.0469	3/64	0.500	0.125	2.500	65937	65938
		0.500	0.125	2.500	65939	65940
		0.750	0.125	2.500	65941	65942
0.0625	1/16	1.000	0.125	2.500	65943	65944
		0.500	0.125	2.500	65945	65946
		0.500	0.125	2.500	65947	65948
0.0781	5/64	0.750	0.125	2.500	65949	65950
		0.750	0.125	2.500	65949	65950



4 FLUTE SQUARE



Diameter Tolerance: $\pm 0.0005''$ LOC Tolerance: $+0.0000 / +0.0120''$ Shank Tolerance: $+0.0000 / -0.0003''$

All Shank Diameters: 0.125" ■ All OAL: 1.50"

DIA	LOC	Length	Bright	AlTiN
0.005	0.008	Stub	64828	—
	0.015	Regular	64435	—
0.006	0.009	Stub	64829	—
	0.018	Regular	64588	—
0.007	0.011	Stub	64830	—
	0.021	Regular	64589	—
0.008	0.012	Stub	64831	—
	0.024	Regular	64590	—
0.009	0.014	Stub	64832	—
	0.027	Regular	64591	—
0.010	0.015	Stub	64833	64834
	0.030	Regular	64436	64437
0.011	0.017	Stub	64835	64836
	0.033	Regular	64592	64593
0.012	0.018	Stub	64837	64838
	0.036	Regular	64594	64595
0.013	0.020	Stub	64839	64840
	0.039	Regular	64596	64597
0.014	0.021	Stub	64841	64842
	0.042	Regular	64598	64599
0.015	0.023	Stub	64843	64844
	0.045	Regular	64438	64439
0.016	0.024	Stub	64845	64846
	0.048	Regular	64600	64601
0.017	0.026	Stub	64847	64848
	0.051	Regular	64602	64603
0.018	0.027	Stub	64849	64850
	0.054	Regular	64604	64605
0.019	0.029	Stub	64851	64852
	0.057	Regular	64606	64607
0.020	0.030	Stub	64853	64854
	0.060	Regular	64440	64441
0.021	0.032	Stub	64855	64856
	0.063	Regular	64608	64609
0.022	0.033	Stub	64857	64858
	0.066	Regular	64610	64611
0.023	0.035	Stub	64859	64860
	0.069	Regular	64612	64613
0.024	0.036	Stub	64861	64862
	0.072	Regular	64614	64615
0.025	0.038	Stub	64863	64864
	0.075	Regular	64442	64443
0.026	0.039	Stub	64865	64866
	0.078	Regular	64616	64617

DIA	LOC	Length	Bright	AlTiN
0.027	0.041	Stub	64867	64868
	0.081	Regular	64618	64619
0.028	0.042	Stub	64869	64870
	0.084	Regular	64620	64621
0.029	0.044	Stub	64871	64872
	0.087	Regular	64622	64623
0.030	0.045	Stub	64873	64874
	0.090	Regular	64444	64445
0.031	0.047	Stub	64875	64876
	0.093	Regular	64624	64625
0.032	0.048	Stub	64877	64878
	0.096	Regular	64626	64627
0.033	0.050	Stub	64879	64880
	0.099	Regular	64628	64629
0.034	0.051	Stub	64881	64882
	0.102	Regular	64630	64631
0.035	0.053	Stub	64883	64884
	0.105	Regular	64446	64447
0.036	0.054	Stub	64885	64886
	0.108	Regular	64632	64633
0.037	0.056	Stub	64887	64888
	0.111	Regular	64634	64635
0.038	0.057	Stub	64889	64890
	0.114	Regular	64636	64637
0.039	0.059	Stub	64891	64892
	0.117	Regular	64638	64639
0.040	0.060	Stub	64893	64894
	0.120	Regular	64448	64449
0.041	0.062	Stub	64895	64896
	0.123	Regular	64640	64641
0.042	0.063	Stub	64897	64898
	0.126	Regular	64642	64643
0.043	0.065	Stub	64899	64900
	0.129	Regular	64644	64645
0.044	0.066	Stub	64901	64902
	0.132	Regular	64646	64647
0.045	0.068	Stub	64903	64904
	0.135	Regular	64451	64452
0.046	0.069	Stub	64905	64906
	0.138	Regular	64648	64649
0.047	0.071	Stub	64907	64908
	0.141	Regular	64650	64651
0.048	0.072	Stub	64909	64910
	0.144	Regular	64652	64653

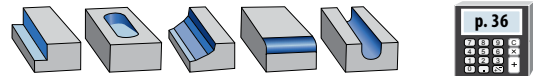
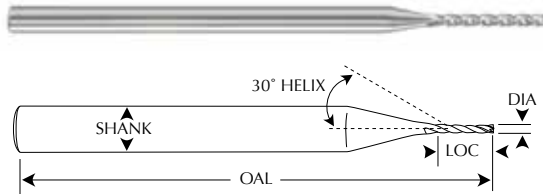
MICRO DECIMAL END MILLS

4 FLUTE - SQUARE CONTINUED

DIA	LOC	Length	Bright	AITiN
0.049	0.074	Stub	64911	64912
	0.147	Regular	64654	64655
0.050	0.075	Stub	64913	64914
	0.150	Regular	64453	64454
0.051	0.077	Stub	64915	64916
	0.153	Regular	64656	64657
0.052	0.078	Stub	64917	64918
	0.156	Regular	64658	64659
0.053	0.080	Stub	64919	64920
	0.159	Regular	64660	64661
0.054	0.081	Stub	64921	64922
	0.162	Regular	64662	64663
0.055	0.083	Stub	64923	64924
	0.165	Regular	64455	64456
0.056	0.084	Stub	64925	64926
	0.168	Regular	64664	64665
0.057	0.086	Stub	64927	64928
	0.171	Regular	64666	64667
0.058	0.087	Stub	64929	64930
	0.174	Regular	64668	64669
0.059	0.089	Stub	64931	64932
	0.177	Regular	64670	64671
0.060	0.090	Stub	64933	64934
	0.180	Regular	64457	64458
0.061	0.092	Stub	64935	64936
	0.183	Regular	64672	64673
0.062	0.093	Stub	64937	64938
	0.186	Regular	64674	64675

DIA	LOC	Length	Bright	AITiN
0.063	0.095	Stub	64939	64940
	0.189	Regular	64676	64677
0.064	0.096	Stub	64941	64942
	0.192	Regular	64678	64679
0.065	0.098	Stub	64943	64944
	0.195	Regular	64459	64460
0.070	0.105	Stub	64945	64946
	0.210	Regular	64461	64462
0.075	0.113	Stub	64947	64948
	0.225	Regular	64463	64464
0.080	0.120	Stub	64949	64950
	0.240	Regular	64465	64466
0.085	0.128	Stub	64951	64952
	0.255	Regular	64467	64468
0.090	0.135	Stub	64953	64954
	0.270	Regular	64469	64470
0.095	0.143	Stub	64955	64956
	0.285	Regular	64471	64472
0.100	0.150	Stub	64957	64958
	0.300	Regular	64473	64474
0.105	0.158	Stub	64959	64960
	0.315	Regular	64475	64476
0.110	0.165	Stub	64961	64962
	0.330	Regular	64477	64478
0.115	0.173	Stub	64963	64964
	0.345	Regular	64479	64480
0.120	0.180	Stub	64965	64966
	0.360	Regular	64481	64482

4 FLUTE - LONG SQUARE



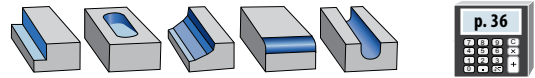
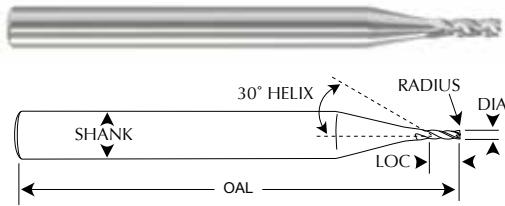
Diameter Tolerance: $\pm 0.0005''$ LOC Tolerance: $+0.0000 / +0.0120''$ Shank Tolerance: $+0.0000 / -0.0003''$

All Shank Diameters: 0.125" ■ All OAL: 2.50"

DIA	LOC	Shank	OAL	Bright	AITiN		
0.0156	1/64	0.125	0.125	2.500	65951	65952	
	0.0312	1/32	0.250	0.125	2.500	65953	65954
0.0469		3/64	0.375	0.125	2.500	65955	65956
	0.250		0.125	2.500	65957	65958	
	0.0625	1/16	0.375	0.125	2.500	65959	65960
			0.500	0.125	2.500	65961	65962
0.0781	5/64	0.500	0.125	2.500	65963	65964	
		0.750	0.125	2.500	65965	65966	
		1.000	0.125	2.500	65967	65968	
0.0938	3/32	0.500	0.125	2.500	65969	65970	
		0.750	0.125	2.500	65971	65972	
					65973	65974	



4 FLUTE CORNER RADIUS



Diameter Tolerance: ±0.0005" LOC Tolerance: +0.0000 / +0.0120" Shank Tolerance: +0.0000 / -0.0003"

All Shank Diameters: 0.125" ■ All OAL: 1.50"

DIA	LOC	Length	Radius	Bright	AlTiN
0.010	0.015	Stub	.002	65759	65760
	0.030	Regular	.002	65471	65472
0.015	0.023	Stub	.002	65761	65762
	0.045	Regular	.002	65473	65474
0.020	0.030	Stub	.005	65763	65764
	0.060	Regular	.005	65475	65476
0.025	0.038	Stub	.005	65765	65766
	0.075	Regular	.005	65477	65478
0.030	0.045	Stub	.005	65767	65768
			.010	65769	65770
	0.090	Regular	.005	65479	65480
0.031			.010	65481	65482
	0.047	Stub	.005	65771	65772
			.010	65773	65774
0.031	0.093	Regular	.005	65483	65484
			.010	65485	65486
			.010	65485	65486
0.035	0.053	Stub	.005	65775	65776
			.010	65777	65778
	0.105	Regular	.005	65487	65488
0.040			.010	65489	65490
	0.060	Stub	.005	65779	65780
			.010	65781	65782
0.040	0.120	Regular	.005	65491	65492
			.010	65493	65494
			.010	65493	65494
0.045	0.068	Stub	.005	65783	65784
			.010	65785	65786
			.015	65787	65788
			.005	65495	65496
	0.135	Regular	.010	65497	65498
0.047			.015	65499	65500
			.005	65789	65790
	0.071	Stub	.010	65791	65792
			.015	65793	65794
			.005	65501	65502
0.047	0.141	Regular	.010	65503	65504
			.015	65505	65506
			.015	65505	65506
0.050			.005	65795	65796
	0.075	Stub	.010	65797	65798
			.015	65799	65800
			.005	65507	65508
	0.150	Regular	.010	65509	65510
0.055			.015	65511	65512
			.005	65801	65802
	0.083	Stub	.010	65803	65804
			.015	65805	65806
			.005	65513	65514
0.055	0.165	Regular	.010	65515	65516
			.015	65517	65518
			.015	65517	65518

DIA	LOC	Length	Radius	Bright	AlTiN
0.060			.005	65807	65808
			.010	65809	65810
			.015	65811	65812
0.060	0.090	Stub	.005	65519	65520
			.010	65521	65522
			.015	65523	65524
0.062	0.180	Regular	.005	65813	65814
			.010	65815	65816
			.015	65817	65818
0.062	0.093	Stub	.005	65819	65820
			.010	65821	65822
			.015	65823	65824
	0.186	Regular	.005	65531	65532
			.010	65533	65534
0.065			.015	65535	65536
			.005	65825	65826
			.010	65827	65828
	0.105	Stub	.005	65829	65830
			.005	65537	65538
0.070	0.210	Regular	.010	65539	65540
			.015	65541	65542
			.005	65831	65832
	0.113	Stub	.010	65833	65834
			.015	65835	65836
0.075			.005	65543	65544
	0.225	Regular	.010	65545	65546
			.015	65547	65548
0.078			.005	65837	65838
	0.117	Stub	.010	65839	65840
			.015	65841	65842
			.005	65549	65550
	0.234	Regular	.010	65551	65552
0.080			.015	65553	65554
			.005	65843	65844
	0.120	Stub	.010	65845	65846
			.015	65847	65848
			.005	65555	65556
0.085	0.240	Regular	.010	65557	65558
			.015	65559	65560
			.005	65849	65850
	0.128	Stub	.010	65851	65852
			.015	65853	65854
0.085			.005	65561	65562
	0.255	Regular	.010	65563	65564
			.015	65565	65566

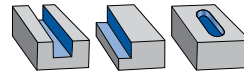
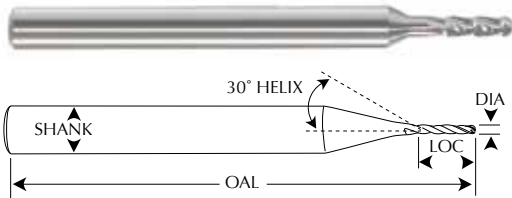
MICRO DECIMAL END MILLS

4 FLUTE - CORNER RADIUS CONTINUED

DIA	LOC	Length	Radius	Bright	AITiN
0.090	0.135	Stub	.005	65855	65856
			.010	65857	65858
			.015	65859	65860
	0.270	Regular	.005	65567	65568
			.010	65569	65570
			.015	65571	65572
0.093	0.140	Stub	.005	65861	65862
			.010	65863	65864
			.015	65865	65866
	0.279	Regular	.005	65573	65574
			.010	65575	65576
			.015	65577	65578
0.095	0.143	Stub	.005	65867	65868
			.010	65869	65870
			.015	65871	65872
	0.285	Regular	.005	65579	65580
			.010	65581	65582
			.015	65583	65584
0.100	0.150	Stub	.005	65873	65874
			.010	65875	65876
			.015	65877	65878
0.100	0.300	Regular	.005	65585	65586
			.010	65587	65588
			.015	65589	65590

DIA	LOC	Length	Radius	Bright	AITiN
0.105	0.158	Stub	.010	65879	65880
			.015	65881	65882
			.020	65883	65884
	0.315	Regular	.010	65591	65592
			.015	65593	65594
			.020	65595	65596
0.110	0.165	Stub	.010	65885	65886
			.015	65887	65888
			.020	65889	65890
	0.330	Regular	.010	65597	65598
			.015	65599	65600
			.020	65601	65602
0.115	0.173	Stub	.010	65891	65892
			.015	65893	65894
			.020	65895	65896
	0.345	Regular	.010	65603	65604
			.015	65605	65606
			.020	65607	65608
0.120	0.180	Stub	.010	65897	65898
			.015	65899	65900
			.020	65901	65902
	0.360	Regular	.010	65609	65610
			.015	65611	65612
			.020	65613	65614

4 FLUTE BALLNOSE



Diameter Tolerance: $\pm 0.0005''$

LOC Tolerance: $+0.0000 / +0.0120''$

Shank Tolerance: $+0.0000 / -0.0003''$

All Shank Diameters: 0.125" ■ All OAL: 1.50"

DIA	LOC	Length	Bright	AITiN
0.010	0.015	Stub	65281	65282
	0.030	Regular	65101	65102
0.011	0.033	Regular	65103	65104
0.012	0.036	Regular	65105	65106
0.013	0.039	Regular	65107	65108
0.014	0.042	Regular	65109	65110
0.015	0.023	Stub	65283	65284
	0.045	Regular	65111	65112
0.016	0.048	Regular	65113	65114
0.017	0.051	Regular	65115	65116
0.018	0.054	Regular	65117	65118
0.019	0.057	Regular	65119	65120
0.020	0.030	Stub	65285	65286
	0.060	Regular	65121	65122
0.021	0.063	Regular	65123	65124
0.022	0.066	Regular	65125	65126
0.023	0.069	Regular	65127	65128

DIA	LOC	Length	Bright	AITiN
0.024	0.072	Regular	65129	65130
	0.038	Stub	65287	65288
0.025	0.075	Regular	65131	65132
	0.078	Regular	65133	65134
0.026	0.078	Regular	65133	65134
0.027	0.081	Regular	65135	65136
0.028	0.084	Regular	65137	65138
0.029	0.087	Regular	65139	65140
0.030	0.045	Stub	65289	65290
	0.090	Regular	65141	65142
0.031	0.093	Regular	65143	65144
0.032	0.096	Regular	65145	65146
0.033	0.099	Regular	65147	65148
0.034	0.102	Regular	65149	65150
0.035	0.053	Stub	65291	65292
	0.105	Regular	65151	65152
0.036	0.108	Regular	65153	65154
0.037	0.111	Regular	65155	65156

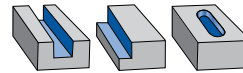
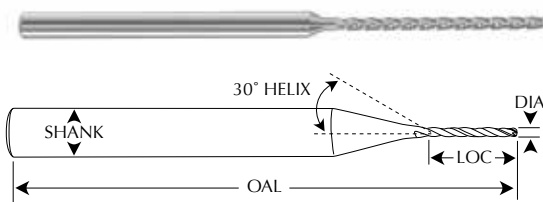


4 FLUTE - BALLNOSE CONTINUED

DIA	LOC	Length	Bright	AlTiN
0.038	0.114	Regular	65157	65158
0.039	0.117	Regular	65159	65160
0.040	0.060	Stub	65293	65294
	0.120	Regular	65161	65162
0.041	0.123	Regular	65163	65164
0.042	0.126	Regular	65165	65166
0.043	0.129	Regular	65167	65168
0.044	0.132	Regular	65169	65170
0.045	0.068	Stub	65295	65296
	0.135	Regular	65171	65172
0.046	0.138	Regular	65173	65174
0.047	0.141	Regular	65175	65176
0.048	0.144	Regular	65177	65178
0.049	0.147	Regular	65179	65180
0.050	0.075	Stub	65297	65298
	0.150	Regular	65181	65182
0.051	0.153	Regular	65183	65184
0.052	0.156	Regular	65185	65186
0.053	0.159	Regular	65187	65188
0.054	0.162	Regular	65189	65190
0.055	0.083	Stub	65299	65300
	0.165	Regular	65191	65192
0.056	0.168	Regular	65193	65194
0.057	0.171	Regular	65195	65196
0.058	0.174	Regular	65197	65198
0.059	0.177	Regular	65199	65200
0.060	0.090	Stub	65301	65302
	0.180	Regular	65201	65202

DIA	LOC	Length	Bright	AlTiN
0.061	0.183	Regular	65203	65204
0.062	0.186	Regular	65205	65206
0.063	0.189	Regular	65207	65208
0.064	0.192	Regular	65209	65210
0.065	0.098	Stub	65303	65304
	0.195	Regular	65211	65212
0.070	0.105	Stub	65305	65306
	0.210	Regular	65213	65214
0.075	0.113	Stub	65307	65308
	0.225	Regular	65215	65216
0.080	0.120	Stub	65309	65310
	0.240	Regular	65217	65218
0.085	0.128	Stub	65311	65312
	0.255	Regular	65219	65220
0.090	0.135	Stub	65313	65314
	0.270	Regular	65221	65222
0.095	0.143	Stub	65315	65316
	0.285	Regular	65223	65224
0.100	0.150	Stub	65317	65318
	0.300	Regular	65225	65226
0.105	0.158	Stub	65319	65320
	0.315	Regular	65227	65228
0.110	0.165	Stub	65321	65322
	0.330	Regular	65229	65230
0.115	0.173	Stub	65323	65324
	0.345	Regular	65231	65232
0.120	0.180	Stub	65325	65326
	0.360	Regular	65233	65234

4 FLUTE - LONG BALLNOSE




Diameter Tolerance: ±0.0005" LOC Tolerance: +0.0000 / +0.0120" Shank Tolerance: +0.0000 / -0.0003"

All Shank Diameters: 0.125" ■ All OAL: 2.50"

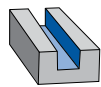
DIA	LOC	Shank	OAL	Bright	AlTiN
0.0156	1/64	0.125	2.500	65975	65976
0.0312	0.250	0.125	2.500	65977	65978
	0.375			65979	65980
	0.250			65981	65982
0.0469	0.375	0.125	2.500	65983	65984
	0.500			65985	65986
	0.500			65987	65988
0.0625	0.750	0.125	2.500	65989	65990
	1.000			65991	65992
	0.500			65993	65994
0.0781	5/64	0.125	2.500	65995	65996
0.0938	0.500	0.125	2.500	65997	65998
	0.750			65999	65999

MILLING RECOMMENDATIONS • MICRO & MINIATURE DECIMAL END MILLS

PROFILING 

Surface Feet Per Minute (SFM)
Radial Depth of Cut (RDOC)

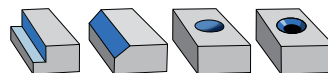
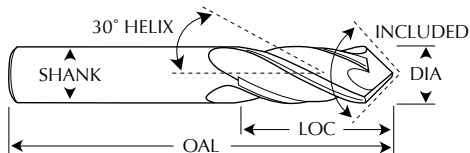
Workpiece Material Group	Hardness	SFM	Inches Per Tooth (IPT)									
			Cutting Diameter									
			0.015	0.031	0.047	0.062	0.078	0.093	0.125	0.187	0.250	
Steels	P	≤ 28 Rc	400									
	P	28 - 38 Rc	300	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054	0.00081	0.00100
Tool & Die Steels	P	28 - 44 Rc	200									
Stainless Steel	M	≤ 28 Rc	400									
	M	≤ 28 Rc	200	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054	0.00081	0.00100
	M	> 28 Rc	150									
Super Alloys	S	≤ 42 Rc	70									
	S	≤ 42 Rc	150	0.00004	0.00008	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054	0.00080
Hardened Materials	H	45-55 Rc	100	0.00010	0.00030	0.00050	0.00140	0.00180	0.00210	0.00300	0.00360	0.00420
Cast-Iron	K	160 - 200 HB	400									
	K	200 - 250 HB	250	0.00007	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054	0.00081	0.00100
Non-Ferrous	N		100	0.00004	0.00008	0.00015	0.00023	0.00027	0.00034	0.00040	0.00054	0.00080

SLOTTING 

Surface Feet Per Minute (SFM)
Radial Depth of Cut (RDOC)

Workpiece Material Group	Hardness	SFM	Inches Per Tooth (IPT)									
			Cutting Diameter									
			0.015	0.031	0.047	0.062	0.078	0.093	0.125	0.187	0.250	
Steels	P	≤ 28 Rc	400					0.0003	0.0004	0.0005	0.0007	0.0010
	P	28 - 38 Rc	300	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004	0.0007	0.0009
Tool & Die Steels	P	28 - 44 Rc	200					0.0002	0.0003	0.0004	0.0006	0.0008
Stainless Steel	M	≤ 28 Rc	400			0.0002	0.0002	0.0003	0.0004	0.0005	0.0007	0.0010
	M	≤ 28 Rc	200	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004	0.0007	0.0009
	M	> 28 Rc	150			0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005
Super Alloys	S	≤ 42 Rc	70					0.0002	0.0002	0.0003	0.0004	0.0005
	S	≤ 42 Rc	150	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005
Hardened Materials	H	35 - 45 Rc	100	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004
Cast-Iron	K	160 - 200 HB	400					0.0003	0.0004	0.0005	0.0007	0.0010
	K	200 - 250 HB	250	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004	0.0007	0.0009
Non-Ferrous	N		750	0.0002	0.0003	0.0005	0.0006	0.0007	0.0008	0.0011	0.0017	0.0022

DRILL MILLS



Diameter Tolerance: +0.000 / -0.002"
 Shank Tolerance: +0.0000 / -0.0005"
 Included Angle ±1.0°

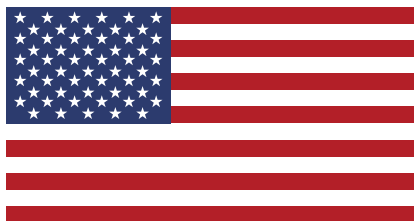


2 FLUTE

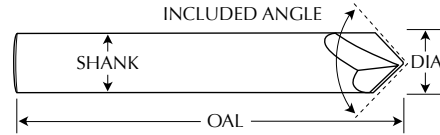
DIA	DEC IN	LOC	SHANK	OAL	INCLUDED ANGLE	Bright	AlTiN
1/8	0.1250	1/2	1/8	1-1/2	60°	62437	62438
					82°	62479	75157
					90°	62400	62409
3/16	0.1875	5/8	3/16	2	60°	62439	62440
					82°	75158	75159
					90°	62401	62410
1/4	0.2500	3/4	1/4	2-1/2	60°	62441	62442
					82°	62480	75160
					90°	62402	62411
5/16	0.3125	13/16	5/16	2-1/2	60°	62443	62444
					90°	62403	62412
					60°	62445	62446
3/8	0.3750	1	3/8	2-1/2	82°	62481	75161
					90°	62404	62413
					60°	62447	62448
7/16	0.4375	1	7/16	2-3/4	90°	62405	62414
					60°	62449	62450
					82°	62482	75162
1/2	0.5000	1	1/2	3	90°	62406	62415
					60°	62451	62452
					90°	62407	62416
5/8	0.6250	1-1/4	5/8	3-1/2	60°	62453	62454
					90°	62408	62417
					60°	62453	62454

4 FLUTE

DIA	DEC IN	LOC	SHANK	OAL	INCLUDED ANGLE	Bright	AlTiN
1/8	0.1250	1/2	1/8	1-1/2	60°	62455	62456
					82°	75163	75164
					90°	62419	62428
3/16	0.1875	5/8	3/16	2	60°	62457	62458
					82°	62483	62484
					90°	62420	62429
1/4	0.2500	3/4	1/4	2-1/2	60°	62459	62460
					82°	62485	62486
					90°	62421	62430
5/16	0.3125	13/16	5/16	2-1/2	120	62473	62474
					60°	62461	62462
					90°	62422	62431
3/8	0.3750	1	3/8	2-1/2	60°	62463	62464
					82°	62487	62488
					90°	62423	62432
7/16	0.4375	1	7/16	2-3/4	120	62475	62476
					60°	62465	62466
					90°	62424	62433
1/2	0.5000	1	1/2	3	60°	62467	62468
					82°	62489	62490
					90°	62425	62434
5/8	0.6250	1-1/4	5/8	3-1/2	120	62477	62478
					60°	62469	62470
					90°	62426	62435
3/4	0.7500	1-1/2	3/4	4	60°	62471	62472
					90°	62427	62436
					60°	62471	62472



CHAMFER MILLS



Diameter Tolerance: +0.0000 / -0.0005"

Shank Tolerance: +0.0000 / -0.0005"

Included Angle $\pm 1.0^\circ$

2 FLUTE

		Bright		AlTiN Coated		60°		82°		90°	
		ISO Material P M K N		ISO Material P M K							
	DIA	DEC IN	SHANK	OAL	Bright	AlTiN	Bright	AlTiN	Bright	AlTiN	
SINGLE END	1/8	0.1250	1/8	1-1/2	62495	62496	62519	62520	62543	62544	
	3/16	0.1875	3/16	2	62497	62498	62521	62522	62545	62546	
	1/4	0.2500	1/4	2-1/2	62499	62500	62523	62524	62547	62548	
	3/8	0.3750	3/8	2-1/2	62501	62502	62525	62526	62549	62550	
	1/2	0.5000	1/2	3	62503	62504	62527	62528	62551	62552	
DOUBLE END	3/4	0.7500	3/4	3	62505	62506	62529	62530	62553	62554	
	1/8	0.1250	1/8	1-1/2	62567	—	—	—	62577	62578	
	3/16	0.1875	3/16	2	62569	—	—	—	62579	62580	
	1/4	0.2500	1/4	2-1/2	62571	—	—	—	62581	62582	
	3/8	0.3750	3/8	2-1/2	62573	—	—	—	62583	62584	
	1/2	0.5000	1/2	3	62575	—	—	—	62585	62586	

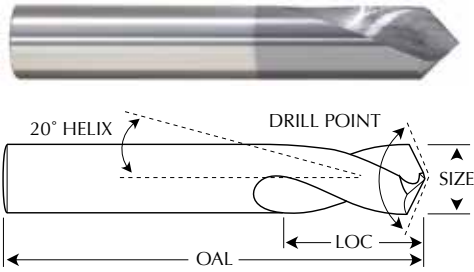
4 FLUTE

		Bright		AlTiN Coated		60°		82°		90°	
		ISO Material P M K S H		ISO Material P M K							
	DIA	DEC IN	SHANK	OAL	Bright	AlTiN	Bright	AlTiN	Bright	AlTiN	
SINGLE END	1/8	0.1250	1/8	1-1/2	62507	62508	62531	62532	62555	62556	
	3/16	0.1875	3/16	2	62509	62510	62533	62534	62557	62558	
	1/4	0.2500	1/4	2-1/2	62511	62512	62535	62536	62559	62560	
	3/8	0.3750	3/8	2-1/2	62513	62514	62537	62538	62561	62562	
	1/2	0.5000	1/2	3	62515	62516	62539	62540	62563	62564	
DOUBLE END	3/4	0.7500	3/4	3	62517	62518	62541	62542	62565	62566	
	1/8	0.1250	1/8	1-1/2	—	—	—	—	62587	62588	
	3/16	0.1875	3/16	2	—	—	—	—	62589	62590	
	1/4	0.2500	1/4	2-1/2	—	—	—	—	62591	62592	
	3/8	0.3750	3/8	2-1/2	—	—	—	—	62593	62594	
	1/2	0.5000	1/2	3	—	—	—	—	62595	62596	

CHAMFERING RECOMMENDATIONS

WORKPIECE MATERIAL GROUP	Surface Feet Per Minute (SFM)	Inches Per Tooth (IPT)			
		(IPT) Chamfer Mill Diameter			
		1/8 – 3/16"	1/4 – 5/16"	3/8 – 1/2"	
Steels Free Machining & Low/Med/High Carbon, Tool & Die Steels P	25 – 175	0.0005	0.0010	0.0020	
Stainless Steel Easy/Moderate/Difficult to Machine M	50 – 150	0.0003	0.0007	0.0015	
Super Alloys High Temp, Nimonic, Inconel, Monel, Hastelloy, Titanium S	25 – 125	0.0005	0.0010	0.0015	
Hardened Materials H	25 – 100	0.0005	0.0010	0.0015	
Cast-Iron Gray, Ductile & Malleable K	50 – 250	0.0007	0.0014	0.0021	
Non-Ferrous	Aluminum	500 – 1000	0.0015	0.0025	0.0035
	Composites	100 – 200	0.0030	0.0060	0.0090
	Copper	400 – 800	0.0010	0.0020	0.0030
	Magnesium	400 – 700	0.0015	0.0025	0.0035
	Plastics	150 – 300	0.0020	0.0030	0.0040

N/C SPOT DRILLS



Diameter Tolerance: +0.0000 / -0.0005"
 Shank Tolerance: +0.0000 / -0.0005"
 Included Angle Tolerance: ±1.0°



POINT	SIZE	DEC IN	LOC	OAL	SHANK	Bright	AlTiN
82°	1/4	0.2500	3/4	2-1/2	1/4	67938	67939
	3/8	0.3750	1	2-1/2	3/8	67954	67955
	1/2	0.5000	1-1/4	3	1/2	67964	67965
90°	1/8	0.1250	5/8	2	1/8	67926	67927
	3/16	0.1875	3/4	2	3/16	67932	67933
	1/4	0.2500	3/4	2-1/2	1/4	67940	67941
100°	5/16	0.3125	1	2-1/2	5/16	67948	67949
	3/8	0.3750	1	2-1/2	3/8	67956	67957
	1/2	0.5000	1-1/4	3	1/2	67966	67967
100°	1/4	0.2500	3/4	2-1/2	1/4	67942	67943
	3/8	0.3750	1	2-1/2	3/8	67958	67959
	1/2	0.5000	1-1/4	3	1/2	67968	67969

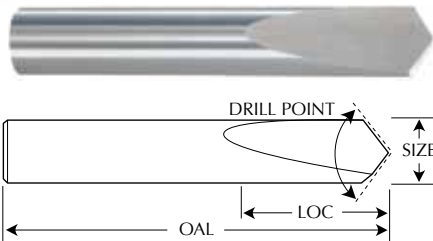
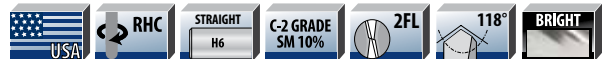


POINT	SIZE	DEC IN	LOC	OAL	SHANK	Bright	AlTiN
120°	1/8	0.1250	5/8	2	1/8	67928	67929
	3/16	0.1875	3/4	2	3/16	67934	67935
120°	1/4	0.2500	3/4	2-1/2	1/4	67944	67945
	5/16	0.3125	1	2-1/2	5/16	67950	67951
120°	3/8	0.3750	1	2-1/2	3/8	67960	67961
	1/2	0.5000	1-1/4	3	1/2	67970	67971



POINT	SIZE	DEC IN	LOC	OAL	SHANK	Bright	AlTiN
140°	1/8	0.1250	5/8	2	1/8	67930	67931
	3/16	0.1875	3/4	2	3/16	67936	67937
140°	1/4	0.2500	3/4	2-1/2	1/4	67946	67947
	5/16	0.3125	1	2-1/2	5/16	67952	67953
140°	3/8	0.3750	1	2-1/2	3/8	67962	67963
	1/2	0.5000	1-1/4	3	1/2	67972	67973

SPADE DRILLS



Diameter Tolerance: +0.0000 / -0.0005"

SIZE	DEC IN	LOC	OAL	Bright
1/32	0.0313	3/16	1-1/2	67905
3/64	0.0469	7/32	1-1/2	67906
1/16	0.0625	5/16	1-1/2	67907
3/32	0.0938	7/16	1-1/2	67908
7/64	0.1094	7/16	1-1/2	67909
1/8	0.1250	1/2	1-1/2	67910
9/64	0.1406	1/2	2	67911
5/32	0.1563	9/16	2	67912
11/64	0.1719	9/16	2	67913
3/16	0.1875	11/16	2	67914

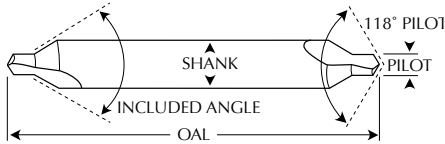
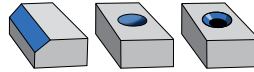
SIZE	DEC IN	LOC	OAL	Bright
7/32	0.2188	19/32	2	67915
1/4	0.2500	11/16	2	67916
9/32	0.2813	7/8	2-1/2	67917
5/16	0.3125	7/8	2-1/2	67918
11/32	0.3438	15/16	2-1/2	67919
3/8	0.3750	1-1/8	2-1/2	67920
13/32	0.4063	1-1/8	2-3/4	67921
7/16	0.4375	1-3/16	2-3/4	67922
15/32	0.4688	1-3/16	3	67923
1/2	0.5000	1-3/16	3	67924

DRILLING RECOMMENDATIONS • N/C SPOT DRILLS • SPADE DRILLS

Drill Point Depth (DPD)			
Drill Point Angle	(DPD) Factor	Drill Point Angle	(DPD) Factor
60°	0.866 x DIA = point depth	118°	0.300 x DIA = point depth
82°	0.575 x DIA = point depth	120°	0.288 x DIA = point depth
90°	0.500 x DIA = point depth	135°	0.207 x DIA = point depth

Workpiece Material Group	Hardness	Surface Feet Per Minute (SFM)	Inches Per Revolution (IPR)					
			(IPR) Cutting Tool Diameter					
			1/32	1/16	1/8	1/4	3/8	1/2
Steels P	≤ 28 Rc	175	0.0005	0.0010	0.0015	0.0030	0.0040	0.0050
	28 - 38 Rc	165						
Tool & Die Steels	28 - 44 Rc	150						
	≤ 28 Rc	125						
Stainless Steel M	> 28 Rc	60						
	≤ 42 Rc	40						
Super Alloys S	≤ 42 Rc	80						
	35 - 45 Rc	50						
Hardened Materials H								

CENTER DRILLS

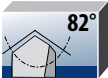
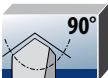


Diameter Tolerance: +0.0000 / -0.0005" Included Angle ±1.0°

ANGLE	SIZE	PILOT DIA	SHANK	OAL	LENGTH	Bright	TiN	AlTiN
60°	00	0.0265	1/8	1-1/2	Regular	66631	66651	66632
	0	1/32	1/8	1-1/2	Regular	66633	66652	66634
	1	3/64	1/8	1-1/2	Regular	66635	66653	66636
				4	Long	66701	66717	66702
	2	5/64	3/16	1-7/8	Regular	66637	66654	66638
				4	Long	66703	66718	66704
	3	7/64	1/4	2	Regular	66639	66655	66640
				4	Long	66705	66719	66706
	4	1/8	5/16	2-1/8	Regular	66641	66656	66642
				4	Long	66707	66720	66708
	5	3/16	7/16	2-3/4	Regular	66643	66657	66644
				6	Long	66709	66721	66710
6	7/32	1/2	3	Regular	66645	66658	66646	
			6	Long	66711	66722	66712	
7	1/4	5/8	3-1/4	Regular	66647	66659	66648	
			6	Long	66713	66723	66714	
8	5/16	3/4	3-1/2	Regular	66649	66660	66650	
			6	Long	66715	66724	66716	
82°	00	0.0265	1/8	1-1/2	Regular	66661	—	66662
	0	1/32	1/8	1-1/2	Regular	66663	—	66664
	1	3/64	1/8	1-1/2	Regular	66665	—	66666
				4	Long	66725	—	66726
	2	5/64	3/16	1-7/8	Regular	66667	—	66668
				4	Long	66727	—	66728



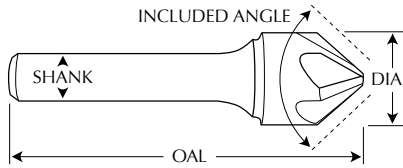
CENTER DRILLS CONTINUED

ANGLE	SIZE	PILOT DIA	SHANK	OAL	LENGTH	Bright	TiN	AlTiN	
	3	7/64	1/4	2	Regular	66669	—	66670	
				4	Long	66729	—	66730	
	4	1/8	5/16	2-1/8	Regular	66671	—	66672	
				4	Long	66731	—	66732	
	5	3/16	7/16	2-3/4	Regular	66673	—	66674	
				6	Long	66733	—	66734	
	6	7/32	1/2	3	Regular	66675	—	66676	
				6	Long	66735	—	66736	
	7	1/4	5/8	3-1/4	Regular	66677	—	66678	
				6	Long	66737	—	66738	
	8	5/16	3/4	3-1/2	Regular	66679	—	66680	
				6	Long	66739	—	66740	
		00	0.0265	1/8	1-1/2	Regular	66681	—	66682
		0	1/32	1/8	1-1/2	Regular	66683	—	66684
		1	3/64	1/8	1-1/2	Regular	66685	—	66686
					4	Long	66741	—	66742
2		5/64	3/16	1-7/8	Regular	66687	—	66688	
				4	Long	66743	—	66744	
3		7/64	1/4	2	Regular	66689	—	66690	
				4	Long	66745	—	66746	
4		1/8	5/16	2-1/8	Regular	66691	—	66692	
				4	Long	66747	—	66748	
5		3/16	7/16	2-3/4	Regular	66693	—	66694	
				6	Long	66749	—	66750	
6		7/32	1/2	3	Regular	66695	—	66696	
				6	Long	66751	—	66752	
7		1/4	5/8	3-1/4	Regular	66697	—	66698	
				6	Long	66753	—	66754	
8	5/16	3/4	3-1/2	Regular	66699	—	66700		
			6	Long	66755	—	66756		

DRILLING RECOMMENDATIONS • CENTER DRILLS

Workpiece Material Group	Hardness	Surface Feet Per Minute (SFM)	Drill Point Depth (DPD)					
			(DPD) Pilot Diameter					
			1/32	1/16	1/8	1/4	3/8	1/2
Steels P	≤ 28 Rc	175	0.0005	0.0010	0.0015	0.0030	0.0040	0.0050
	28 - 38 Rc	165						
Tool & Die Steels P	28 - 44 Rc	150	0.0005	0.0010	0.0015	0.0030	0.0040	0.0050
	Stainless Steel M	≤ 28 Rc						
Stainless Steel M	> 28 Rc	60	0.0005	0.0010	0.0015	0.0030	0.0040	0.0050
	Super Alloys S	≤ 42 Rc						
Super Alloys S		≤ 42 Rc	80	0.0005	0.0010	0.0015	0.0030	0.0040
	Hardened Materials H	35 - 45 Rc	50					
Cast Iron N		≤ 240 HB	275	0.0005	0.0010	0.0015	0.0030	0.0040
	> 240 HB	175						

COUNTERSINKS



Single Flute



3 Flute



4 Flute



6 Flute





SINGLE END

FLUTES	DIA	DEC IN	SHANK	OAL	60°	82°	90°	100°	120°
	1/8	0.1250	1/8	1-1/2	67525	67526	67527	67528	67529
	3/16	0.1875	3/16	2	67530	67531	67532	67533	67534
	1/4	0.2500	1/4	2	67535	67536	67537	67538	67539
	3/8	0.3750	1/4	2-1/2	67542	67543	67544	67545	67546
	1/2	0.5000	1/4	2-1/2	67547	67548	67549	67550	67551
	5/8	0.6250	1/4	2-1/2	67552	67553	67554	67555	67556
	3/4	0.7500	3/8	3	67557	67558	67559	67560	67561
	1	1.0000	1/2	3	67562	67563	67564	67565	67566
	1-1/4	1.2500	3/4	3-1/2	67567	67568	67569	67570	67571
	1-1/2	1.5000	3/4	3-1/2	67572	67573	67574	67575	67576
	1/8	0.1250	1/8	1-1/2	67630	67631	67632	67633	67634
	3/16	0.1875	3/16	2	67635	67636	67637	67638	67639
	1/4	0.2500	1/4	2	67640	67641	67642	67643	67644
	3/8	0.3750	1/4	2-1/2	67645	67646	67647	67648	67649
	1/2	0.5000	1/4	2-1/2	67650	67651	67652	67653	67654
	5/8	0.6250	3/8	2-3/4	67655	67656	67657	67658	67659
	3/4	0.7500	3/8	3	67660	67661	67662	67663	67664
	1	1.0000	1/2	3	67665	67666	67667	67668	67669
	1-1/4	1.2500	3/4	3-1/2	67670	67671	67672	67673	67674
	1-1/2	1.5000	3/4	3-1/2	67675	67676	67677	67678	67679
	1/8	0.1250	1/8	1-1/2	67685	67686	67687	67688	67689
	1/4	0.2500	1/4	2	67690	67691	67692	67693	67694
	3/8	0.3750	1/4	2-1/2	67695	67696	67697	67698	67699
	1/2	0.5000	3/8	2-1/2	67700	67701	67702	67703	67704
	5/8	0.6250	3/8	2-1/2	67705	67706	67707	67708	67709
	3/4	0.7500	1/2	3	67710	67711	67712	67713	67714
	1	1.0000	1/2	3	67715	67716	67717	67718	67719
	1/8	0.1250	1/8	1-1/2	67816	67817	67818	67819	67820
	3/16	0.1875	3/16	2	67821	67822	67823	67824	67825
	1/4	0.2500	1/4	2	67826	67827	67828	67829	67830
	5/16	0.3125	1/4	2	67831	67832	67833	67834	67835
	3/8	0.3750	1/4	2-1/2	67836	67837	67838	67839	67840
	1/2	0.5000	1/4	2-1/2	67841	67842	67843	67844	67845
	5/8	0.6250	3/8	2-3/4	67846	67847	67848	67849	67850
	3/4	0.7500	3/8	3	67851	67852	67853	67854	67855
	7/8	0.8750	1/2	3	67856	67857	67858	67859	67860
	1	1.0000	1/2	3	67861	67862	67863	67864	67865
	1-1/4	1.2500	3/4	3-1/2	67866	67867	67868	67869	67870
	1-1/2	1.5000	3/4	3-1/2	67871	67872	67873	67874	67875

DOUBLE END

FLUTES	DIA	DEC IN	SHANK	OAL	DRILL POINT	60°	82°	90°	100°	110°	120°
	1/8	0.1250	1/8	1-1/2	No	67582	67583	67584	67585	67586	67587
	3/16	0.1875	3/16	2	No	67588	67589	67590	67591	67592	67593
	1/4	0.2500	1/4	2	No	67594	67595	67596	67597	67598	67599
	5/16	0.3125	5/16	2-1/8	No	67600	67601	67602	67603	67604	67605
	3/8	0.3750	3/8	2-1/2	No	67606	67607	67608	67609	67610	67611
	1/2	0.5000	1/2	3	No	67612	67613	67614	67615	67616	67617
	5/8	0.6250	5/8	3-1/4	No	67618	67619	67620	67621	67622	67623
	3/4	0.7500	3/4	3-1/2	No	67624	67625	67626	67627	67628	67629

DOUBLE END CONTINUED

FLUTES	DIA	DEC IN	SHANK	OAL	DRILL POINT	ANGLE					
						60°	82°	90°	100°	110°	120°
	1/8	0.1250	1/8	1-1/2	No	67720	67721	67722	67723	67724	67725
					Yes	67768	67769	67770	67771	67772	67773
	3/16	0.1875	3/16	2	No	67726	67727	67728	67729	67730	67731
					Yes	67774	67775	67776	67777	67778	67779
	1/4	0.2500	1/4	2	No	67732	67733	67734	67735	67736	67737
					Yes	67780	67781	67782	67783	67784	67785
	5/16	0.3125	5/16	2-1/8	No	67738	67739	67740	67741	67742	67743
					Yes	67786	67787	67788	67789	67790	67791
	3/8	0.3750	3/8	2-1/2	No	67744	67745	67746	67747	67748	67749
					Yes	67792	67793	67794	67795	67796	67797
	1/2	0.5000	1/2	3	No	67750	67751	67752	67753	67754	67755
					Yes	67798	67799	67800	67801	67802	67803
5/8	0.6250	5/8	3-1/4	No	67756	67757	67758	67759	67760	67761	
				Yes	67804	67805	67806	67807	67808	67809	
3/4	0.7500	3/4	3-1/2	No	67762	67763	67764	67765	67766	67767	
				Yes	67810	67811	67812	67813	67814	67815	
	1/8	0.1250	1/8	1-1/2	No	67881	67882	67883	—	—	—
	3/16	0.1875	3/16	2	No	67884	67885	67886	—	—	—
	1/4	0.2500	1/4	2	No	67887	67888	67889	—	—	—
	5/16	0.3125	5/16	2-1/8	No	67890	67891	67892	—	—	—
	3/8	0.3750	3/8	2-1/2	No	67893	67894	67895	—	—	—
	1/2	0.5000	1/2	3	No	67896	67897	67898	—	—	—
	5/8	0.6250	5/8	3-1/4	No	67899	67900	67901	—	—	—
	3/4	0.7500	3/4	3-1/2	No	67902	67903	67904	—	—	—

COUNTERSINKING RECOMMENDATIONS

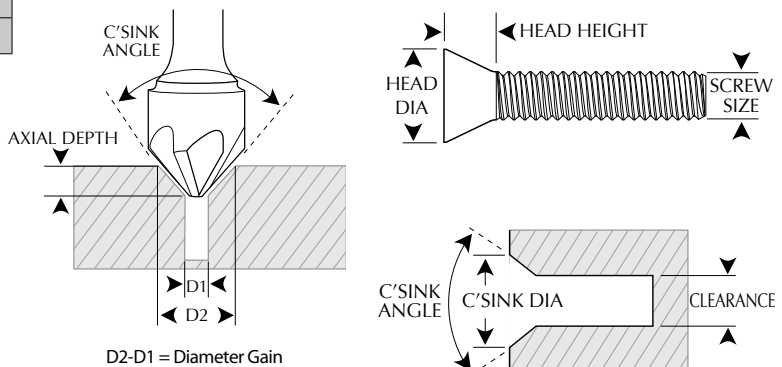
Surface Feet Per Minute (SFM)

Workpiece Material Group	SFM	
Steel	Mild (.2 - .3 carbon)	120-170
	Mild (.4 - .5 carbon)	80-150
	Forgings	50-80
	Alloys (300 - 400 Brinnell)	30-50
		P
Tool & Die Steels	60-100	
Stainless Steels	Free Machining	80-125
	Work Hardening	50-75
Super Alloys	Inconel	23-35
	High Temp, Nimonic, Monel, Hastelloy	50-75
	Titanium	60-90
Hardened Materials	High Tensile (35 - 40 Rc)	40-60
	High Tensile (40 - 45 Rc)	35-55
	High Tensile (45 - 50 Rc)	25-40
	High Tensile (50 - 55 Rc)	15-20
		H
Cast-Iron	Gray	125-225
	Ductile & Malleable	100-175
	Hard Chilled	20-35
Non-Ferrous	Aluminum / Aluminum Alloys	300-500
	Brass / Bronze	150-250
	Magnesium / Magnesium Alloys & Plastics	250-400
	N	

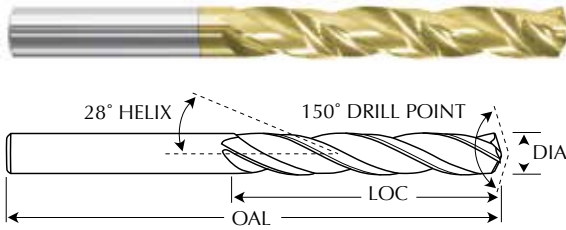
Screw Size	Screw Head		Countersink Diameter	Clearance					
	Diameter	Height		Close	Free				
#2	0.086	0.168	0.064	3/16	0.214	3/32	0.094	# 36	0.106
#4	0.112	0.218	0.083	1/4	0.272	1/8	0.125	# 29	0.136
#6	0.138	0.263	0.097	5/16	0.324	# 23	0.154	# 18	0.170
#8	0.164	0.311	0.112	3/8	0.376	#15	0.180	# 9	0.196
#10	0.190	0.359	0.127	3/8	0.428	# 5	0.206	# 2	0.221
1/4	0.250	0.480	0.161	1/2	0.548	17/64	0.266	9/32	0.281
5/16	0.313	0.600	0.198	5/8	0.673	21/64	0.328	11/32	0.344
3/8	0.375	0.720	0.234	3/4	0.798	25/64	0.391	13/32	0.406
7/16	0.438	0.781	0.234	7/8	0.861	29/64	0.453	15/32	0.469
1/2	0.500	0.872	0.251	1	1.000	33/64	0.516	17/32	0.531
5/8	0.625	1.112	0.324	1-1/4	1.250	41/64	0.641	21/32	0.656
3/4	0.750	1.355	0.396	1-1/2	1.500	49/64	0.766	25/32	0.781
7/8	0.875	1.604	0.468	1-3/4	1.750	57/64	0.891	29/32	0.906
1	1.000	1.841	0.540	2	2.000	1-1/64	1.016	1-1/32	1.031

DIAMETER GAIN FOR AXIAL DEPTH .001"

Included Angle	Diameter Gain
30°	0.0005"
45°	0.0008"
60°	0.0010"
82°	0.0017"
90°	0.0020"
100°	0.0028"
120°	0.0034"



3 FLUTE DRILLS JOBBER LENGTH



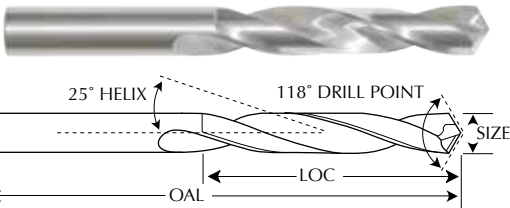
Diameter Tolerance: +0.0000 / -0.0005"

SIZE	DEC IN	LOC	OAL	TiN
3.0mm	0.1181	32mm	57mm	68496
1/8	0.1250	1-1/4	2-1/4	68467
9/64	0.1406	1-3/8	2-1/2	68468
5/32	0.1563	1-3/8	2-1/2	68469
4.0mm	0.1575	35mm	64mm	68497
11/64	0.1719	1-5/8	2-3/4	68470
3/16	0.1875	1-5/8	2-3/4	68471
5.0mm	0.1969	45mm	76mm	68498
13/64	0.2031	1-3/4	3	68472
7/32	0.2188	1-3/4	3	68473
15/64	0.2344	2	3-1/4	68474
6.0mm	0.2362	51mm	83mm	68499
1/4	0.2500	2	3-1/4	68475
17/64	0.2656	2-1/8	3-1/2	68476

SIZE	DEC IN	LOC	OAL	TiN
7.0mm	0.2756	54mm	89mm	68500
9/32	0.2813	2-1/8	3-1/2	68477
19/64	0.2969	2-3/8	3-3/4	68478
5/16	0.3125	2-3/8	3-3/4	68479
8.0mm	0.3150	60mm	95mm	68501
21/64	0.3281	2-1/2	4	68480
11/32	0.3438	2-1/2	4	68481
9.0mm	0.3543	64mm	102mm	68502
23/64	0.3594	2-3/4	4-1/4	68482
3/8	0.3750	2-3/4	4-1/4	68483
25/64	0.3906	2-7/8	4-1/2	68484
10.0mm	0.3937	73mm	114mm	68503
13/32	0.4063	2-7/8	4-1/2	68485
27/64	0.4219	2-7/8	4-1/2	68486

SIZE	DEC IN	LOC	OAL	TiN
11.0mm	0.4331	73mm	114mm	68504
7/16	0.4375	2-7/8	4-1/2	68487
29/64	0.4531	3	4-3/4	68488
15/32	0.4688	3	4-3/4	68489
12.0mm	0.4724	76mm	121mm	68505
31/64	0.4844	3	4-3/4	68490
1/2	0.5000	3	4-3/4	68491
17/32	0.5313	3	4-3/4	68492
14.0mm	0.5512	89mm	146mm	68506
9/16	0.5625	3-1/2	5-3/4	68493
5/8	0.6250	3-1/2	5-3/4	68494
16.0mm	0.6299	90mm	146mm	68507
3/4	0.7500	4	5-3/4	68495

TWIST DRILLS JOBBER LENGTH



Diameter Tolerance: +0.0000 / -0.0005"

SIZE	DEC IN	LOC	OAL	Bright	TiN	AlTiN
#80	0.0135	3/16	1-1/4	68154	68155	68156
#79	0.0145	3/16	1-1/4	68157	68158	68159
1/64	0.0156	3/16	1-1/4	67980	67981	67982
#78	0.0160	3/16	1-1/4	68160	68161	68162
#77	0.0180	3/16	1-1/4	68163	68164	68165
#76	0.0200	1/4	1-1/4	68166	68167	68168
#75	0.0210	1/4	1-1/4	68169	68170	68171
#74	0.0225	1/4	1-1/4	68172	68173	68174
#73	0.0240	1/4	1-1/4	68175	68176	68177
#72	0.0250	5/16	1-1/4	68178	68179	68180
#71	0.0260	5/16	1-1/4	68181	68182	68183
#70	0.0280	5/16	1-1/4	68184	68185	68186
#69	0.0292	5/16	1-1/4	68187	68188	68189
#68	0.0310	5/16	1-1/4	68190	68191	68192
1/32	0.0313	5/16	1-1/4	67983	67984	67985
#67	0.0320	5/16	1-1/4	68193	68194	68195
#66	0.0330	5/16	1-1/4	68196	68197	68198
#65	0.0350	5/8	1-3/8	68199	68200	68201
#64	0.0360	5/8	1-3/8	68202	68203	68204
#63	0.0370	5/8	1-3/8	68205	68206	68207

SIZE	DEC IN	LOC	OAL	Bright	TiN	AlTiN
#62	0.0380	5/8	1-3/8	68208	68209	68210
#61	0.0390	5/8	1-3/8	68211	68212	68213
1mm	0.0394	16mm	38mm	68395	68396	68397
#60	0.0400	3/4	1-1/2	68214	68215	68216
#59	0.0410	3/4	1-1/2	68217	68218	68219
#58	0.0420	3/4	1-1/2	68220	68221	68222
#57	0.0430	3/4	1-1/2	68223	68224	68225
#56	0.0465	3/4	1-1/2	68226	68227	68228
3/64	0.0469	3/4	1-1/2	67986	67987	67988
#55	0.0520	3/4	1-1/2	68229	68230	68231
#54	0.0550	3/4	1-1/2	68232	68233	68234
1.5mm	0.0591	19mm	38mm	68398	68399	68400
#53	0.0595	3/4	1-1/2	68235	68236	68237
1/16	0.0625	3/4	1-1/2	67989	67990	67991
#52	0.0635	3/4	1-1/2	68238	68239	68240
#51	0.0670	3/4	1-1/2	68241	68242	68243
#50	0.0700	7/8	1-3/4	68244	68245	68246
#49	0.0730	7/8	1-3/4	68247	68248	68249
#48	0.0760	7/8	1-3/4	68250	68251	68252
5/64	0.0781	7/8	1-3/4	67992	67993	67994

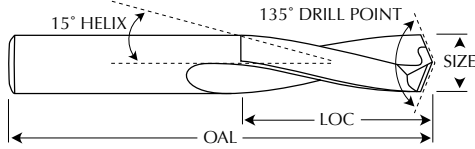
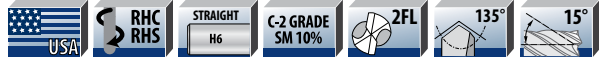


TWIST DRILLS CONTINUED

SIZE	DECIN	LOC	OAL	Bright	TiN	ATiN
#47	0.0785	7/8	1-3/4	68253	68254	68255
2mm	0.0787	22mm	45mm	68401	68402	68403
#46	0.0810	7/8	1-3/4	68256	68257	68258
#45	0.0820	7/8	1-3/4	68259	68260	68261
#44	0.0860	1	2	68262	68263	68264
#43	0.0890	1	2	68265	68266	68267
#42	0.0935	1	2	68268	68269	68270
3/32	0.0938	1	2	67995	67996	67997
#41	0.0960	1	2	68271	68272	68273
#40	0.0980	1	2	68274	68275	68276
2.5mm	0.0984	25mm	51mm	68404	68405	68406
#39	0.0995	1-1/4	2-1/4	68277	68278	68279
#38	0.1015	1-1/4	2-1/4	68280	68281	68282
#37	0.1040	1-1/4	2-1/4	68283	68284	68285
#36	0.1065	1-1/4	2-1/4	68286	68287	68288
7/64	0.1094	1-1/4	2-1/4	67998	67999	68000
#35	0.1100	1-1/4	2-1/4	68289	68290	68291
#34	0.1110	1-1/4	2-1/4	68292	68293	68294
#33	0.1130	1-1/4	2-1/4	68295	68296	68297
#32	0.1160	1-1/4	2-1/4	68298	68299	68300
3mm	0.1181	32mm	57mm	68407	68408	68409
#31	0.1200	1-1/4	2-1/4	68301	68302	68303
1/8	0.1250	1-1/4	2-1/4	68001	68002	68003
#30	0.1285	1-1/4	2-1/4	68304	68305	68306
#29	0.1360	1-3/8	2-1/2	68307	68308	68309
3.5mm	0.1378	35mm	64mm	68410	68411	68412
#28	0.1405	1-3/8	2-1/2	68310	68311	68312
9/64	0.1406	1-3/8	2-1/2	68004	68005	68006
#27	0.1440	1-3/8	2-1/2	68313	68314	68315
#26	0.1470	1-3/8	2-1/2	68316	68317	68318
#25	0.1495	1-3/8	2-1/2	68319	68320	68321
#24	0.1520	1-3/8	2-1/2	68322	68323	68324
#23	0.1540	1-3/8	2-1/2	68325	68326	68327
5/32	0.1563	1-3/8	2-1/2	68007	68008	68009
#22	0.1570	1-3/8	2-1/2	68328	68329	68330
4mm	0.1575	35mm	64mm	68413	68414	68415
#21	0.1590	1-3/8	2-1/2	68331	68332	68333
#20	0.1610	1-3/8	2-1/2	68334	68335	68336
#19	0.1660	1-5/8	2-3/4	68337	68338	68339
#18	0.1695	1-5/8	2-3/4	68340	68341	68342
11/64	0.1719	1-5/8	2-3/4	68010	68011	68012
#17	0.1730	1-5/8	2-3/4	68343	68344	68345
#16	0.1770	1-5/8	2-3/4	68346	68347	68348
4.5mm	0.1772	41mm	70mm	68416	68417	68418
#15	0.1800	1-5/8	2-3/4	68349	68350	68351
#14	0.1820	1-5/8	2-3/4	68352	68353	68354
#13	0.1850	1-5/8	2-3/4	68355	68356	68357
3/16	0.1875	1-5/8	2-3/4	68013	68014	68015
#12	0.1890	1-5/8	2-3/4	68358	68359	68360
#11	0.1910	1-5/8	2-3/4	68361	68362	68363
#10	0.1935	1-5/8	2-3/4	68364	68365	68366
#9	0.1960	1-3/4	3	68367	68368	68369
5mm	0.1969	45mm	76mm	68419	68420	68421
#8	0.1990	1-3/4	3	68370	68371	68372
#7	0.2010	1-3/4	3	68373	68374	68375
13/64	0.2031	1-3/4	3	68016	68017	68018
#6	0.2040	1-3/4	3	68376	68377	68378
#5	0.2055	1-3/4	3	68379	68380	68381
#4	0.2090	1-3/4	3	68382	68383	68384
#3	0.2130	1-3/4	3	68385	68386	68387
5.5mm	0.2165	45mm	76mm	68422	68423	68424

SIZE	DECIN	LOC	OAL	Bright	TiN	ATiN
7/32	0.2188	1-3/4	3	68019	68020	68021
#2	0.2210	1-3/4	3	68388	68389	68390
#1	0.2280	1-3/4	3	68391	68392	68393
A	0.2340	2	3-1/4	68076	68077	68078
15/64	0.2344	2	3-1/4	68022	68023	68024
6mm	0.2362	51mm	83mm	68425	68426	68427
B	0.2380	2	3-1/4	68079	68080	68081
C	0.2420	2	3-1/4	68082	68083	68084
D	0.2460	2	3-1/4	68085	68086	68087
E	0.2500	2	3-1/4	68088	68089	68090
1/4	0.2500	2	3-1/4	68025	68026	68027
6.5mm	0.2559	51mm	83mm	68428	68429	68430
F	0.2570	2	3-1/4	68091	68092	68093
G	0.2610	2-1/8	3-1/2	68094	68095	68096
17/64	0.2656	2-1/8	3-1/2	68028	68029	68030
H	0.2660	2-1/8	3-1/2	68097	68098	68099
I	0.2720	2-1/8	3-1/2	68100	68101	68102
7mm	0.2756	54mm	89mm	68431	68432	68433
J	0.2770	2-1/8	3-1/2	68103	68104	68105
K	0.2810	2-1/8	3-1/2	68106	68107	68108
9/32	0.2813	2-1/8	3-1/2	68031	68032	68033
L	0.2900	2-1/8	3-1/2	68109	68110	68111
M	0.2950	2-3/8	3-3/4	68112	68113	68114
7.5mm	0.2953	60mm	95mm	68434	68435	68436
19/64	0.2969	2-3/8	3-3/4	68034	68035	68036
N	0.3020	2-3/8	3-3/4	68115	68116	68117
5/16	0.3125	2-3/8	3-3/4	68037	68038	68039
8mm	0.3150	60mm	95mm	68437	68438	68439
O	0.3160	2-3/8	3-3/4	68118	68119	68120
P	0.3230	2-3/8	3-3/4	68121	68122	68123
21/64	0.3281	2-1/2	4	68040	68041	68042
Q	0.3320	2-1/2	4	68124	68125	68126
8.5mm	0.3346	64mm	102mm	68440	68441	68442
R	0.3390	2-1/2	4	68127	68128	68129
11/32	0.3438	2-1/2	4	68043	68044	68045
S	0.3480	2-1/2	4	68130	68131	68132
9mm	0.3543	64mm	102mm	68443	68444	68445
T	0.3580	2-3/4	4-1/4	68133	68134	68135
23/64	0.3594	2-3/4	4-1/4	68046	68047	68048
U	0.3680	2-3/4	4-1/4	68136	68137	68138
9.5mm	0.3740	70mm	108mm	68446	68447	68448
3/8	0.3750	2-3/4	4-1/4	68049	68050	68051
V	0.3770	2-3/4	4-1/4	68139	68140	68141
W	0.3860	2-7/8	4-1/2	68142	68143	68144
25/64	0.3906	2-7/8	4-1/2	68052	68053	68054
10mm	0.3937	73mm	114mm	68449	68450	68451
X	0.3970	2-7/8	4-1/2	68145	68146	68147
Y	0.4040	2-7/8	4-1/2	68148	68149	68150
13/32	0.4063	2-7/8	4-1/2	68055	68056	68057
Z	0.4130	2-7/8	4-1/2	68151	68152	68153
10.5mm	0.4134	73mm	114mm	68452	68453	68454
27/64	0.4219	2-7/8	4-1/2	68058	68059	68060
11mm	0.4331	73mm	114mm	68455	68456	68457
7/16	0.4375	2-7/8	4-1/2	68061	68062	68063
11.5mm	0.4528	76mm	121mm	68458	68459	68460
29/64	0.4531	3	4-3/4	68064	68065	68066
15/32	0.4688	3	4-3/4	68067	68068	68069
12mm	0.4724	76mm	121mm	68461	68462	68463
31/64	0.4844	3	4-3/4	68070	68071	68072
12.5mm	0.4921	76mm	121mm	68464	68465	68466
1/2	0.5000	3	4-3/4	68073	68074	68075

STUB DRILLS SCREW MACHINE LENGTH



Bright & TiN Coated

AlTiN Coated



Diameter Tolerance: +0.0000 / -0.0005"

SIZE	DEC IN	LOC	OAL	Bright	TiN	AlTiN
1/32	0.0313	1/2	1-1/2	68508	—	68509
1mm	0.0394	13mm	38mm	68785	—	68786
#60	0.0400	1/2	1-1/2	68665	—	68666
#59	0.0410	1/2	1-1/2	68667	—	68668
#58	0.0420	1/2	1-1/2	68669	—	68670
#57	0.0430	1/2	1-1/2	68671	—	68672
#56	0.0465	1/2	1-1/2	68673	—	68674
3/64	0.0469	1/2	1-1/2	68510	—	68511
#55	0.0520	1/2	1-1/2	68675	—	68676
#54	0.0550	1/2	1-1/2	68677	—	68678
1.5mm	0.0591	13mm	38mm	68787	—	68788
#53	0.0595	1/2	1-1/2	68679	—	68680
1/16	0.0625	5/8	1-5/8	68512	68513	68514
#52	0.0635	11/16	1-11/16	68681	—	68682
#51	0.0670	11/16	1-11/16	68683	—	68684
#50	0.0700	11/16	1-11/16	68685	—	68686
#49	0.0730	11/16	1-11/16	68687	—	68688
#48	0.0760	11/16	1-11/16	68689	—	68690
5/64	0.0781	11/16	1-11/16	68515	68516	68517
#47	0.0785	3/4	1-3/4	68691	—	68692
2mm	0.0787	19mm	45mm	68789	—	68790
#46	0.0810	3/4	1-3/4	68693	—	68694
#45	0.0820	3/4	1-3/4	68695	—	68696
#44	0.0860	3/4	1-3/4	68697	—	68698
#43	0.0890	3/4	1-3/4	68699	—	68700
#42	0.0935	3/4	1-3/4	68701	—	68702
3/32	0.0938	3/4	1-3/4	68518	68519	68520
#41	0.0960	13/16	1-13/16	68703	—	68704
#40	0.0980	13/16	1-13/16	68705	—	68706
2.5mm	0.0984	21mm	46mm	68791	—	68792
#39	0.0995	13/16	1-13/16	68707	—	68708
#38	0.1015	13/16	1-13/16	68709	—	68710
#37	0.1040	13/16	1-13/16	68711	—	68712
#36	0.1065	13/16	1-13/16	68713	—	68714
7/64	0.1094	13/16	1-13/16	68521	68522	68523
#35	0.1100	7/8	1-7/8	68715	—	68716
#34	0.1110	7/8	1-7/8	68717	—	68718
#33	0.1130	7/8	1-7/8	68719	—	68720
#32	0.1160	7/8	1-7/8	68721	—	68722
3mm	0.1181	22mm	48mm	68793	—	68794
#31	0.1200	7/8	1-7/8	68723	—	68724
1/8	0.1250	7/8	1-7/8	68524	68525	68526
#30	0.1285	15/16	1-15/16	68725	—	68726
#29	0.1360	15/16	1-15/16	68727	—	68728
3.5mm	0.1378	24mm	49mm	68795	—	68796
#28	0.1405	15/16	1-15/16	68729	—	68730
9/64	0.1406	15/16	1-15/16	68527	68528	68529
#27	0.1440	1	2-1/16	68731	—	68732
#26	0.1470	1	2-1/16	68733	—	68734

SIZE	DEC IN	LOC	OAL	Bright	TiN	AlTiN
#25	0.1495	1	2-1/16	68735	—	68736
#24	0.1520	1	2-1/16	68737	—	68738
#23	0.1540	1	2-1/16	68739	—	68740
5/32	0.1563	1	2-1/16	68530	68531	68532
#22	0.1570	1-1/16	2-1/8	68741	—	68742
4mm	0.1575	27mm	54mm	68797	—	68798
#21	0.1590	1-1/16	2-1/8	68743	—	68744
#20	0.1610	1-1/16	2-1/8	68745	—	68746
#19	0.1660	1-1/16	2-1/8	68747	—	68748
#18	0.1695	1-1/16	2-1/8	68749	—	68750
11/64	0.1719	1-1/16	2-1/8	68533	68534	68535
#17	0.1730	1-1/8	2-3/16	68751	—	68752
#16	0.1770	1-1/8	2-3/16	68753	—	68754
4.5mm	0.1772	29mm	56mm	68799	—	68800
#15	0.1800	1-1/8	2-3/16	68755	—	68756
#14	0.1820	1-1/8	2-3/16	68757	—	68758
#13	0.1850	1-1/8	2-3/16	68759	—	68760
3/16	0.1875	1-1/8	2-3/16	68536	68537	68538
#12	0.1890	1-3/16	2-1/4	68761	—	68762
#11	0.1910	1-3/16	2-1/4	68763	—	68764
#10	0.1935	1-3/16	2-1/4	68765	—	68766
#9	0.1960	1-3/16	2-1/4	68767	—	68768
5mm	0.1969	30mm	57mm	68801	—	68802
#8	0.1990	1-3/16	2-1/4	68769	—	68770
#7	0.2010	1-3/16	2-1/4	68771	—	68772
13/64	0.2031	1-3/16	2-1/4	68539	68540	68541
#6	0.2040	1-1/4	2-3/8	68773	—	68774
#5	0.2055	1-1/4	2-3/8	68775	—	68776
#4	0.2090	1-1/4	2-3/8	68777	—	68778
#3	0.2130	1-1/4	2-3/8	68779	—	68780
5.5mm	0.2165	32mm	60mm	68803	—	68804
7/32	0.2188	1-1/4	2-3/8	68542	68543	68544
#2	0.2210	1-5/16	2-7/16	68781	—	68782
#1	0.2280	1-5/16	2-7/16	68783	—	68784
A	0.2340	1-5/16	2-7/16	68613	—	68614
15/64	0.2344	1-5/16	2-7/16	68545	68546	68547
6mm	0.2362	33mm	62mm	68805	—	68806
B	0.2380	1-3/8	2-1/2	68615	—	68616
C	0.2420	1-3/8	2-1/2	68617	—	68618
D	0.2460	1-3/8	2-1/2	68619	—	68620
E	0.2500	1-3/8	2-1/2	68621	—	68622
1/4	0.2500	1-3/8	2-1/2	68548	68549	68550
6.5mm	0.2559	35mm	64mm	68807	—	68808
F	0.2570	1-7/16	2-5/8	68623	—	68624
G	0.2610	1-7/16	2-5/8	68625	—	68626
17/64	0.2656	1-7/16	2-5/8	68551	68552	68553
H	0.2660	1-1/2	2-11/16	68627	—	68628
I	0.2720	1-1/2	2-11/16	68629	—	68630
7mm	0.2756	38mm	68mm	68809	—	68810

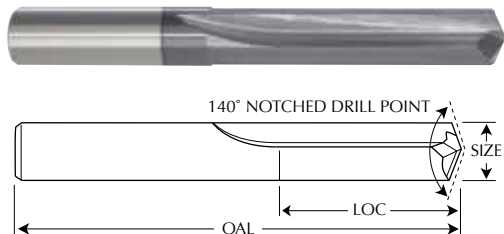


SCREW MACHINE DRILLS CONTINUED

SIZE	DEC IN	LOC	OAL	Bright	TiN	AlTiN
J	0.2770	1-1/2	2-11/16	68631	—	68632
K	0.2810	1-1/2	2-11/16	68633	—	68634
9/32	0.2813	1-1/2	2-11/16	68554	68555	68556
L	0.2900	1-9/16	2-3/4	68635	—	68636
M	0.2950	1-9/16	2-3/4	68637	—	68638
7.5mm	0.2953	40mm	70mm	68811	—	68812
19/64	0.2969	1-9/16	2-3/4	68557	68558	68559
N	0.3020	1-5/8	2-13/16	68639	—	68640
5/16	0.3125	1-5/8	2-13/16	68560	68561	68562
8mm	0.3150	41mm	72mm	68813	—	68814
O	0.3160	1-11/16	2-15/16	68641	—	68642
P	0.3230	1-11/16	2-15/16	68643	—	68644
21/64	0.3281	1-11/16	2-15/16	68563	68564	68565
Q	0.3320	1-11/16	3	68645	—	68646
8.5mm	0.3346	43mm	76mm	68815	—	68816
R	0.3390	1-11/16	3	68647	—	68648
11/32	0.3438	1-11/16	3	68566	68567	68568
S	0.3480	1-3/4	3-1/16	68649	—	68650
9mm	0.3543	45mm	78mm	68817	—	68818
T	0.3580	1-3/4	3-1/16	68651	—	68652
23/64	0.3594	1-3/4	3-1/16	68569	68570	68571
U	0.3680	1-13/16	3-1/8	68653	—	68654
9.5mm	0.3740	46mm	79mm	68819	—	68820
3/8	0.3750	1-13/16	3-1/8	68572	68573	68574
V	0.3770	1-7/8	3-1/4	68655	—	68656

SIZE	DEC IN	LOC	OAL	Bright	TiN	AlTiN
W	0.3860	1-7/8	3-1/4	68657	—	68658
25/64	0.3906	1-7/8	3-1/4	68575	68576	68577
10mm	0.3937	48mm	83mm	68821	—	68822
X	0.3970	1-15/16	3-5/16	68659	—	68660
Y	0.4040	1-15/16	3-5/16	68661	—	68662
13/32	0.4063	1-15/16	3-5/16	68578	68579	68580
Z	0.4130	2	3-3/8	68663	—	68664
10.5mm	0.4134	51mm	86mm	68823	—	68824
27/64	0.4219	2	3-3/8	68581	68582	68583
11mm	0.4331	51mm	86mm	68825	—	68826
7/16	0.4375	2-1/16	3-7/16	68584	68585	68586
11.5mm	0.4528	52mm	88mm	68827	—	68828
29/64	0.4531	2-1/8	3-9/16	68587	68588	68589
15/32	0.4688	2-1/8	3-5/8	68590	68591	68592
12mm	0.4724	54mm	92mm	68829	—	68830
31/64	0.4844	2-3/16	3-11/16	68593	68594	68595
12.5mm	0.4921	56mm	94mm	68831	—	68832
1/2	0.5000	2-1/4	3-3/4	68596	68597	68598
33/64	0.5156	2-3/8	3-7/8	68599	—	68600
17/32	0.5313	2-3/8	3-7/8	68601	—	68602
35/64	0.5469	2-1/2	4	68603	—	68604
9/16	0.5625	2-1/2	4	68605	—	68606
5/8	0.6250	2-3/4	4-1/4	68607	—	68608
11/16	0.6875	3	4-5/8	68609	—	68610
3/4	0.7500	3-1/8	5	68611	—	68612

STRAIGHT FLUTE DRILLS



Diameter Tolerance: +0.0000 / -0.0005"

SIZE	DEC IN	LOC	OAL	Bright	AlTiN
1/32	0.0313	1/2	1-1/2	68834	68835
#65	0.0350	1/2	1-1/2	68958	68959
#64	0.0360	1/2	1-1/2	68960	68961
#63	0.0370	1/2	1-1/2	68962	68963
#62	0.0380	1/2	1-1/2	68964	68965
#61	0.0390	1/2	1-1/2	68966	68967
1mm	0.0394	13mm	38mm	69088	69089
#60	0.0400	1/2	1-1/2	68968	68969
#59	0.0410	1/2	1-1/2	68970	68971
#58	0.0420	1/2	1-1/2	68972	68973
#57	0.0430	1/2	1-1/2	68974	68975
#56	0.0465	1/2	1-1/2	68976	68977
3/64	0.0469	1/2	1-1/2	68836	68837
#55	0.0520	1/2	1-1/2	68978	68979
#54	0.0550	1/2	1-1/2	68980	68981
1.5mm	0.0591	13mm	38mm	69090	69091
#53	0.0595	1/2	1-1/2	68982	68983
1/16	0.0625	5/8	1-5/8	68838	68839
#52	0.0635	11/16	1-11/16	68984	68985
#51	0.0670	11/16	1-11/16	68986	68987

SIZE	DEC IN	LOC	OAL	Bright	AlTiN
#50	0.0700	11/16	1-11/16	68988	68989
#49	0.0730	11/16	1-11/16	68990	68991
#48	0.0760	11/16	1-11/16	68992	68993
5/64	0.0781	11/16	1-11/16	68840	68841
#47	0.0785	3/4	1-3/4	68994	68995
2mm	0.0787	19mm	45mm	69092	69093
#46	0.0810	3/4	1-3/4	68996	68997
#45	0.0820	3/4	1-3/4	68998	68999
#44	0.0860	3/4	1-3/4	69000	69001
#43	0.0890	3/4	1-3/4	69002	69003
#42	0.0935	3/4	1-3/4	69004	69005
3/32	0.0938	3/4	1-3/4	68842	68843
#41	0.0960	13/16	1-13/16	69006	69007
#40	0.0980	13/16	1-13/16	69008	69009
2.5mm	0.0984	21mm	46mm	69094	69095
#39	0.0995	13/16	1-13/16	69010	69011
#38	0.1015	13/16	1-13/16	69012	69013
#37	0.1040	13/16	1-13/16	69014	69015
#36	0.1065	13/16	1-13/16	69016	69017
7/64	0.1094	13/16	1-13/16	68844	68845

SIZE	DEC IN	LOC	OAL	Bright	AlTiN
#35	0.1100	7/8	1-7/8	69018	69019
#34	0.1110	7/8	1-7/8	69020	69021
#33	0.1130	7/8	1-7/8	69022	69023
#32	0.1160	7/8	1-7/8	69024	69025
3mm	0.1181	22mm	48mm	69096	69097
#31	0.1200	7/8	1-7/8	69026	69027
1/8	0.1250	7/8	1-7/8	68846	68847
#30	0.1285	15/16	1-15/16	69028	69029
#29	0.1360	15/16	1-15/16	69030	69031
3.5mm	0.1378	24mm	49mm	69098	69099
#28	0.1405	15/16	1-15/16	69032	69033
9/64	0.1406	15/16	1-15/16	68848	68849
#27	0.1440	1	2-1/16	69034	69035
#26	0.1470	1	2-1/16	69036	69037
#25	0.1495	1	2-1/16	69038	69039
#24	0.1520	1	2-1/16	69040	69041
#23	0.1540	1	2-1/16	69042	69043
5/32	0.1563	1	2-1/16	68850	68851
#22	0.1570	1-1/16	2-1/8	69044	69045
4mm	0.1575	27mm	54mm	69100	69101



STRAIGHT FLUTE DRILLS CONTINUED

SIZE	DEC IN	LOC	OAL	Bright	AlTiN
#21	0.1590	1-1/16	2-1/8	69046	69047
#20	0.1610	1-1/16	2-1/8	69048	69049
#19	0.1660	1-1/16	2-1/8	69050	69051
#18	0.1695	1-1/16	2-1/8	69052	69053
11/64	0.1719	1-1/16	2-1/8	68852	68853
#17	0.1730	1-1/8	2-3/16	69054	69055
#16	0.1770	1-1/8	2-3/16	69056	69057
4.5mm	0.1772	29mm	56mm	69102	69103
#15	0.1800	1-1/8	2-3/16	69058	69059
#14	0.1820	1-1/8	2-3/16	69060	69061
#13	0.1850	1-1/8	2-3/16	69062	69063
3/16	0.1875	1-1/8	2-3/16	68854	68855
#12	0.1890	1-3/16	2-1/4	69064	69065
#11	0.1910	1-3/16	2-1/4	69066	69067
#10	0.1935	1-3/16	2-1/4	69068	69069
#9	0.1960	1-3/16	2-1/4	69070	69071
5mm	0.1969	30mm	57mm	69104	69105
#8	0.1990	1-3/16	2-1/4	69072	69073
#7	0.2010	1-3/16	2-1/4	69074	69075
13/64	0.2031	1-3/16	2-1/4	68856	68857
#6	0.2040	1-1/4	2-3/8	69076	69077
#5	0.2055	1-1/4	2-3/8	69078	69079
#4	0.2090	1-1/4	2-3/8	69080	69081
#3	0.2130	1-1/4	2-3/8	69082	69083
5.5mm	0.2165	32mm	60mm	69106	69107
7/32	0.2188	1-1/4	2-3/8	68858	68859
#2	0.2210	1-5/16	2-7/16	69084	69085
#1	0.2280	1-5/16	2-7/16	69086	69087
A	0.2340	1-5/16	2-7/16	68906	68907
15/64	0.2344	1-5/16	2-7/16	68860	68861
6mm	0.2362	33mm	62mm	69108	69109

SIZE	DEC IN	LOC	OAL	Bright	AlTiN
B	0.2380	1-3/8	2-1/2	68908	68909
C	0.2420	1-3/8	2-1/2	68910	68911
D	0.2460	1-3/8	2-1/2	68912	68913
1/4	0.2500	1-3/8	2-1/2	68862	68863
E	0.2500	1-3/8	2-1/2	68914	68915
6.5mm	0.2559	35mm	64mm	69110	69111
F	0.2570	1-7/16	2-5/8	68916	68917
G	0.2610	1-7/16	2-5/8	68918	68919
17/64	0.2656	1-7/16	2-5/8	68864	68865
H	0.2660	1-1/2	2-11/16	68920	68921
I	0.2720	1-1/2	2-11/16	68922	68923
7mm	0.2756	38mm	68mm	69112	69113
J	0.2770	1-1/2	2-11/16	68924	68925
K	0.2810	1-1/2	2-11/16	68926	68927
9/32	0.2813	1-1/2	2-11/16	68866	68867
L	0.2900	1-9/16	2-3/4	68928	68929
M	0.2950	1-9/16	2-3/4	68930	68931
7.5mm	0.2953	38mm	70mm	69114	69115
19/64	0.2969	1-9/16	2-3/4	68868	68869
N	0.3020	1-5/8	2-13/16	68932	68933
5/16	0.3125	1-5/8	2-13/16	68870	68871
8mm	0.3150	41mm	71mm	69116	69117
O	0.3160	1-11/16	2-15/16	68934	68935
P	0.3230	1-11/16	2-15/16	68936	68937
21/64	0.3281	1-11/16	2-15/16	68872	68873
Q	0.3320	1-11/16	3	68938	68939
8.5mm	0.3346	43mm	76mm	69118	69119
R	0.3390	1-11/16	3	68940	68941
11/32	0.3438	1-11/16	3	68874	68875
S	0.3480	1-3/4	3-1/16	68942	68943
9mm	0.3543	45mm	78mm	69120	69121

SIZE	DEC IN	LOC	OAL	Bright	AlTiN
T	0.3580	1-3/4	3-1/16	68944	68945
23/64	0.3594	1-3/4	3-1/16	68876	68877
U	0.3680	1-13/16	3-1/8	68946	68947
9.5mm	0.3740	46mm	79mm	69122	69123
3/8	0.3750	1-13/16	3-1/8	68878	68879
V	0.3770	1-7/8	3-1/4	68948	68949
W	0.3860	1-7/8	3-1/4	68950	68951
25/64	0.3906	1-7/8	3-1/4	68880	68881
10mm	0.3937	48mm	83mm	69124	69125
X	0.3970	1-15/16	3-5/16	68952	68953
Y	0.4040	1-15/16	3-5/16	68954	68955
13/32	0.4063	1-15/16	3-5/16	68882	68883
Z	0.4130	2	3-3/8	68956	68957
10.5mm	0.4134	51mm	86mm	69126	69127
27/64	0.4219	2	3-3/8	68884	68885
11mm	0.4331	51mm	86mm	69128	69129
7/16	0.4375	2-1/16	3-7/16	68886	68887
11.5mm	0.4528	52mm	87mm	69130	69131
29/64	0.4531	2-1/8	3-9/16	68888	68889
15/32	0.4688	2-1/8	3-5/8	68890	68891
12mm	0.4724	54mm	92mm	69132	69133
31/64	0.4844	2-3/16	3-11/16	68892	68893
12.5mm	0.4921	56mm	94mm	69134	69135
1/2	0.5000	2-1/4	3-3/4	68894	68895
33/64	0.5156	1-1/8	3-1/2	68896	75237
17/32	0.5313	1-1/8	3-1/2	68897	75238
35/64	0.5469	1-1/8	3-1/2	68898	75239
9/16	0.5625	1-1/8	4	68899	68900
5/8	0.6250	1-1/4	4	68901	68902
11/16	0.6875	1-1/2	4	68903	—
3/4	0.7500	1-1/2	4	68904	68905

DRILLING RECOMMENDATIONS

TWIST DRILLS • STUB DRILLS

STRAIGHT FLUTE DRILLS • 3 FLUTE DRILLS

Workpiece Material Group	Surface Feet Per Minute (SFM)		Inches Per Revolution (IPR)								
	Hardness	SFM	Cutting Tool Diameter								
			1/32	1/16	1/8	1/4	3/8	1/2	5/8	3/4	
Steels	P	≤ 28 Rc	175	0.0010	0.0020	0.0030	0.0060	0.0080	0.0100	0.0110	0.0120
		28 - 38 Rc	165								
Tool & Die Steels		28 - 44 Rc	150								
Stainless Steels	M	≤ 28 Rc	140	0.0010	0.0020	0.0030	0.0060	0.0080	0.0100	0.0110	0.0120
		> 28 Rc	60								
Super Alloys	S	≤ 42 Rc	60	0.0003	0.0005	0.0020	0.0040	0.0050	0.0060	0.0080	0.0100
		≤ 42 Rc	80								
Hardened Materials	H	45 to 65 Rc	50	0.0003	0.0010	0.0010	0.0010	0.0020	0.0020	0.0020	0.0030
Cast Iron	K	≤ 240 HB	175	0.0010	0.0020	0.0030	0.0060	0.0080	0.0100	0.0110	0.0120
		> 240 HB	175								
Non-Ferrous	N		300	0.0003	0.0005	0.0020	0.0040	0.0050	0.0060	0.0080	0.0100
			375								



DRILL TROUBLESHOOTING

PROBLEM	POSSIBLE SOLUTIONS															
	SPEEDS & FEEDS					COOLANT			SETUP							
	Reduce Feed or Reduce at Exit	Reduce Feed at Entrance	Consistent Feed rate	Increase Feed	Reduce Speed	Increase Speed	Coolant Mix	Coolant Increase Flow	Coolant Filter	Workpiece Clamp Rigid	Collet Accuracy	Tool Holder fit .0008	Alignment	Peck Drill	Concentricity	Do not Extract Tool During Peck
Flank Wear	■			■	■			■	■							
Margin Wear					■		■			■					■	
Breakage	■	■	■				■	■	■	■	■	■	■	■	■	
Flaking							■		■						■	
Chisel Edge Wear	■			■				■		■						
Corner Chipping	■			■			■		■						■	■
Flute Chipping	■														■	
Cutting Edge Chipping	■						■	■	■	■	■	■				
Cutting Edge Wear				■	■											
Point Center Chipping	■															
Rake Face	■															
Scoring on Tool Body	■						■			■					■	
Long Stringy			■	■												
Varied Chip Form			■													
Blue/Brown Chips								■								
Tool Life	■				■		■	■	■	■						
≤ sized Hole	■	■		■	■		■	■	■							
≥ sized Hole	■			■						■	■	■	■			
Poor Alignment										■					■	
Poor Surface Finish	■	■			■	■	■	■	■						■	
Heavy Burr Breakout	■						■	■	■	■						
Retract Marks															■	
Hole Location		■								■	■	■			■	
Hole Straightness	■									■	■	■			■	
Deflection		■														
Point Deflection															■	
Galling					■											
Vibration			■							■	■				■	
Abnormal Noise					■											
Chip Packing	■	■	■		■		■	■	■							
No Drill Penetration										■				■		

REAMER TROUBLESHOOTING

PROBLEM	POSSIBLE SOLUTIONS																	
	SPEEDS & FEEDS						TOOL GEOMETRY					COOLANT & STOCK REMOVAL						
	Reduce Feed	Increase Feed	Reduce Feed	Increase Speed	Use Larger Reamer	Use Smaller Reamer	Bad Speed and Feed	Worn Tool Margin	Worn Cutting Edge	Uneven Lip Height	Chip Capacity of Reamer	Too Much Clearance	Grind Larger Back Taper	Insufficient Stock	Too Much Stock	Use Coolant	Run Dry	Poor Hole Prep
Burnishing		■									■			■				
Reamer Wear	■		■				■								■	■		■
Hole Quality	■		■				■	■	■					■	■	■		■
Hole ≤ size	■		■		■			■	■	■				■	■	■		
Hole ≥ size		■		■		■		■	■						■	■	■	■
Accuracy	■					■				■						■		
Chatter		■	■							■	■	■		■		■		
Out of Round Hole					■		■	■	■	■				■	■	■		
Hole Taper						■	■	■	■			■		■	■			
Bell Mouth		■					■	■			■	■				■		
Reamer Life		■	■				■			■		■				■		
Scoring in Bore							■	■	■	■				■	■	■		■

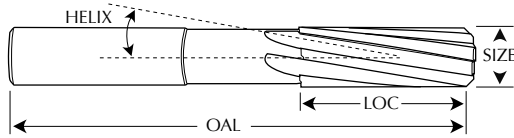
NOTE: ALL RECOMMENDATIONS ARE CONSIDERED AS STARTING PARAMETERS ONLY

CONSIDER THE FOLLOWING VARIABLES WHEN TRYING TO DIAGNOSE TOOL FAILURE:

- 1) MACHINE RIGIDITY
- 2) CONCENTRICITY AT SPINDLE
- 3) WORK PIECE RIGIDITY
- 4) COOLANT TYPE
- 5) RECOMMENDED FEEDS AND SPEEDS
- 6) TOOL SELECTION



CHUCKING REAMERS
SPIRAL FLUTE



Diameter Tolerances:
 ≤ 1/4" DIA: +0.0000 / +0.0002" > 1/4" DIA: +0.0000 / +0.0003"

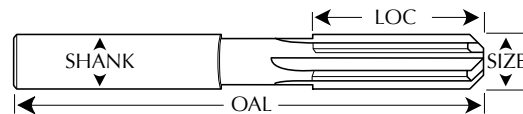
FLUTES	SIZE	DEC IN	LOC	OAL	HELIX	Bright
	3/64	0.0469	3/8	1-1/2	10°	74226
	1/16	0.0625				74227
	5/64	0.0781				74228
	3/32	0.0938	1/2	2	10°	74229
	7/64	0.1094	5/8	2-1/4	10°	74230
	1/8	0.1250				74231
	9/64	0.1406				74232
	5/32	0.1563	3/4	2-1/2	10°	74233
	11/64	0.1719	7/8	2-3/4	10°	74234
	3/16	0.1875				74235
13/64	0.2031	74236				
7/32	0.2188	1	3	10°	74237	
15/64	0.2344				74238	
1/4	0.2500				74239	
17/64	0.2656	1-1/8	3-1/4	10°	74240	
9/32	0.2813				74241	
5/16	0.3125				74242	
	3/8	0.3750	1-1/4	3-1/2	10°	74243
	13/32	0.4063	1-1/4	3-1/2	10°	74244
	7/16	0.4375	1-3/8	4	10°	74245
	1/2	0.5000	1-1/2			74246

CHUCKING REAMERS
STRAIGHT FLUTE



4FL on ≤ .2550" DIA

6FL on ≥ .2551" DIA



Diameter Tolerances:
 ≤ 1/4" DIA: +0.0000 / +0.0002" > 1/4" DIA: +0.0000 / +0.0003"

SIZE	LOC	OAL	Bright
0.0265	1/4	1-1/2	69141
0.0275			69151
0.0280	#70		74169
0.0285			69160
0.0290	1/4	1-1/2	69165
0.0292	#69		74168
0.0295			69169
0.0300	1/4	1-1/2	69174
0.0305			69179
0.0310	#68		74167
0.0313	1/32	1-1/2	74040

SIZE	LOC	OAL	Bright
0.0315	1/4	1-1/2	69187
0.0320	#67		74166
0.0325	1/4	1-1/2	69196
0.0330	#66		74165
0.0335			69206
0.0340	1/4	1-1/2	69211
0.0345			69216
0.0350	#65		74164
0.0355	1/4	1-1/2	69225
0.0360	#64		74163
0.0365	1/4	1-1/2	69234

SIZE	LOC	OAL	Bright	
0.0370	#63	1/4	1-1/2	74162
0.0375				69243
0.0380	#62			74161
0.0385	1/4	1-1/2	69252	
0.0390	#61			74160
0.0394	1.0mm	6mm	38mm	74170
0.0395				69260
0.0400	#60	1/4	1-1/2	74159
0.0405				69269
0.0410	#59	1/4	1-1/2	74158
0.0415				69278

CHUCKING REAMERS

STRAIGHT FLUTE REAMERS CONTINUED

SIZE	LOC	OAL	Bright
0.0420 #58			74157
0.0425	3/8	1-1/2	69287
0.0430 #57			74156
0.0435			69296
0.0440	3/8	1-1/2	69301
0.0445			69306
0.0450			69311
0.0455	3/8	1-1/2	69316
0.0460			69321
0.0465 #56			74155
0.0469 3/64	3/8	1-1/2	74041
0.0470			69329
0.0475			69334
0.0480	3/8	1-1/2	69339
0.0485			69344
0.0490			69349
0.0495	3/8	1-1/2	69354
0.0500			69359
0.0505			69364
0.0510	3/8	1-1/2	69369
0.0515			69374
0.0520 #55			74154
0.0525	3/8	1-1/2	69383
0.0530			69388
0.0535			69393
0.0540	3/8	1-1/2	69398
0.0545			69403
0.0550 #54			74153
0.0555	3/8	1-1/2	69412
0.0560			69417
0.0565			69422
0.0570	3/8	1-1/2	69427
0.0575			69432
0.0580			69437
0.0585	3/8	1-1/2	69442
0.0590			69447
0.0591 1.5mm	10mm	38mm	74173
0.0595 #53			74152
0.0600	3/8	1-1/2	69455
0.0605			69460
0.0610	3/8	1-1/2	69465
0.0615			69470
0.0620			69475
0.0622	3/8	1-1/2	69477
0.0623			69478
0.0625 1/16			74042
0.0630	3/8	1-1/2	69484
0.0635 #52			74151
0.0640			69493
0.0645	3/8	1-1/2	69498
0.0650			69503
0.0655			69508
0.0660	1/2	1-3/4	69513
0.0665			69518
0.0670 #51			74150
0.0675	1/2	1-3/4	69527
0.0680			69532

SIZE	LOC	OAL	Bright
0.0685			69537
0.0690	1/2	1-3/4	69542
0.0695			69547
0.0700 #50			74149
0.0705	1/2	1-3/4	69556
0.0710			69561
0.0715			69566
0.0720	1/2	1-3/4	69571
0.0725			69576
0.0730 #49			74148
0.0735	1/2	1-3/4	69585
0.0740			69590
0.0745			69595
0.0750	1/2	1-3/4	69600
0.0755			69605
0.0760 #48			74147
0.0765	1/2	1-3/4	69614
0.0770			69619
0.0775			69624
0.0780	1/2	1-3/4	69629
0.0781 5/64			74043
0.0785 #47			74146
0.0787 2.0mm	13mm	44mm	74177
0.0790	1/2	1-3/4	69636
0.0795			69641
0.0800	1/2	1-3/4	69646
0.0805			69651
0.0810 #46	1/2	1-3/4	74145
0.0815			69660
0.0820 #45	1/2	2	74144
0.0825			69669
0.0830	1/2	2	69674
0.0835			69679
0.0840			69684
0.0845	1/2	2	69689
0.0850			69694
0.0855			69699
0.0860 #44	1/2	2	74143
0.0865			69708
0.0870			69713
0.0875	1/2	2	69718
0.0880			69723
0.0885			69728
0.0890 #43	1/2	2	74142
0.0895			69737
0.0900			69742
0.0905	1/2	2	69747
0.0910			69752
0.0915			69757
0.0920	1/2	2	69762
0.0925			69767
0.0930			69772
0.0933	1/2	2	69775
0.0935 #42			74141
0.0937			69778
0.0938 3/32	1/2	2	74044
0.0940			69780

SIZE	LOC	OAL	Bright
0.0945			69785
0.0950	1/2	2	69790
0.0955			69795
0.0960 #41			74140
0.0965	1/2	2	69804
0.0970	5/8	2-1/4	69809
0.0975			69814
0.0980 #40	5/8	2-1/4	74139
0.0984 2.5mm	16mm	57mm	74180
0.0985			69822
0.0990	5/8	2-1/4	69827
0.0995 #39			74138
0.0995			69832
0.1000	5/8	2-1/4	69837
0.1005			69842
0.1010			69847
0.1015	5/8	2-1/4	69852
0.1015 #38			74137
0.1020			69857
0.1025	5/8	2-1/4	69862
0.1030			69867
0.1035			69872
0.1040 #37	5/8	2-1/4	74136
0.1045			69881
0.1050			69886
0.1055	5/8	2-1/4	69891
0.1060			69896
0.1065 #36			74135
0.1070	5/8	2-1/4	69905
0.1075			69910
0.1080			69915
0.1085	5/8	2-1/4	69920
0.1090			69925
0.1094 7/64			74045
0.1095	5/8	2-1/4	69929
0.1100 #35			74134
0.1105			69939
0.1110 #34	5/8	2-1/4	74133
0.1115			69948
0.1120			69953
0.1125	5/8	2-1/4	69958
0.1130 #33			74132
0.1135			69967
0.1140	5/8	2-1/4	69972
0.1145			69977
0.1150			69982
0.1155	5/8	2-1/4	69987
0.1160 #32			74131
0.1165			69996
0.1170	5/8	2-1/4	70001
0.1175			70006
0.1180	5/8	2-1/4	70011
0.1181 3.0mm	16mm	57mm	74182
0.1185	5/8	2-1/4	70016
0.1190			70021
0.1195	5/8	2-1/4	70026
0.1200 #31			74130



STRAIGHT FLUTE REAMERS CONTINUED

SIZE	LOC	OAL	Bright	
0.1205			70035	
0.1210	5/8	2-1/4	70040	
0.1215			70045	
0.1220			70050	
0.1225	5/8	2-1/4	70055	
0.1230	D/P		70060	
0.1235			70065	
0.1240	U/S	5/8	2-1/4	70070
0.1245			70075	
0.1247	D/P		70077	
0.1250	1/8	5/8	2-1/4	74046
0.1255			70084	
0.1260	O/S		70089	
0.1265	5/8	2-1/4	70094	
0.1270			70099	
0.1275			70104	
0.1280	5/8	2-1/4	70109	
0.1285	#30		74129	
0.1290			70118	
0.1295	5/8	2-1/4	70123	
0.1300			70128	
0.1305			70133	
0.1310	3/4	2-1/2	70138	
0.1315			70143	
0.1320			70148	
0.1325	3/4	2-1/2	70153	
0.1330			70158	
0.1335			70163	
0.1340	3/4	2-1/2	70168	
0.1345			70173	
0.1350			70178	
0.1355	3/4	2-1/2	70183	
0.1360	#29		74128	
0.1365			70192	
0.1370	3/4	2-1/2	70197	
0.1375			70202	
0.1378	3.5mm	19mm	64mm	74186
0.1380			70206	
0.1385	3/4	2-1/2	70211	
0.1390			70216	
0.1395	3/4	2-1/2	70221	
0.1400			70226	
0.1405	#28		74127	
0.1406	9/64	3/4	2-1/2	74047
0.1410			70234	
0.1415			70239	
0.1420	3/4	2-1/2	70244	
0.1425			70249	
0.1430			70254	
0.1435	3/4	2-1/2	70259	
0.1440	#27		74126	
0.1445			70268	
0.1450	3/4	2-1/2	70273	
0.1455			70278	
0.1460			70283	
0.1465	3/4	2-1/2	70288	
0.1470	#26		74125	

SIZE	LOC	OAL	Bright	
0.1475			70297	
0.1480	3/4	2-1/2	70302	
0.1485			70307	
0.1490			70312	
0.1495	#25	3/4	2-1/2	74124
0.1500			70321	
0.1505			70326	
0.1507	3/4	2-1/2	70328	
0.1510			70331	
0.1515			70336	
0.1520	#24	3/4	2-1/2	74123
0.1525			70345	
0.1530			70350	
0.1535	3/4	2-1/2	70355	
0.1540	#23		74122	
0.1541			70360	
0.1545	3/4	2-1/2	70364	
0.1550			70369	
0.1555			70374	
0.1560	3/4	2-1/2	70379	
0.1563	5/32		74048	
0.1565			70383	
0.1570	#22	3/4	2-1/2	74121
0.1575	4.0mm	19mm	64mm	74189
0.1575			70392	
0.1580	3/4	2-1/2	70397	
0.1585			70402	
0.1590	#21		74120	
0.1595	3/4	2-1/2	70412	
0.1600			70417	
0.1605	3/4	2-1/2	70422	
0.1610	#20		74119	
0.1615	7/8	2-3/4	70431	
0.1620			70436	
0.1625	7/8	2-3/4	70441	
0.1630			70446	
0.1635			70451	
0.1640	7/8	2-3/4	70456	
0.1645			70461	
0.1650			70466	
0.1655	7/8	2-3/4	70471	
0.1660	#19		74118	
0.1665			70480	
0.1670	7/8	2-3/4	70485	
0.1675			70490	
0.1680			70495	
0.1685	7/8	2-3/4	70500	
0.1690			70505	
0.1695	#18		74117	
0.1700	7/8	2-3/4	70514	
0.1705			70519	
0.1710			70524	
0.1715	7/8	2-3/4	70529	
0.1719	11/64		74049	
0.1720			70533	
0.1725	7/8	2-3/4	70538	
0.1730	#17		74116	

SIZE	LOC	OAL	Bright	
0.1735			70547	
0.1740	7/8	2-3/4	70552	
0.1745			70557	
0.1750			70562	
0.1755	7/8	2-3/4	70567	
0.1760			70572	
0.1765			70577	
0.1770	#16	7/8	2-3/4	74115
0.1772	4.5mm	22mm	70mm	74190
0.1775			70585	
0.1780	7/8	2-3/4	70590	
0.1785			70595	
0.1790			70600	
0.1795	7/8	2-3/4	70605	
0.1800	#15		74114	
0.1805			70614	
0.1810	7/8	2-3/4	70619	
0.1814			70623	
0.1815			70624	
0.1820	#14	7/8	2-3/4	74113
0.1825			70633	
0.1830			70638	
0.1835	7/8	2-3/4	70643	
0.1840			70648	
0.1845			70653	
0.1850	#13	7/8	2-3/4	74112
0.1855	D/P		70662	
0.1860			70667	
0.1865	U/S	7/8	2-3/4	70672
0.1867			70674	
0.1870			70677	
0.1872	7/8	2-3/4	70679	
0.1875	3/16		74050	
0.1877			70683	
0.1880	7/8	2-3/4	70686	
0.1885	O/S		70691	
0.1890	#12		74111	
0.1895	7/8	2-3/4	70700	
0.1900			70705	
0.1905			70710	
0.1910	#11	7/8	2-3/4	74110
0.1915			70719	
0.1920			70724	
0.1925	1	3	70729	
0.1930			70734	
0.1935	#10		74109	
0.1935	1	3	70739	
0.1940			70744	
0.1945			70749	
0.1950	1	3	70754	
0.1955			70759	
0.1960	#9	1	3	74108
0.1965	5.0mm	25mm	76mm	70768
0.1969			74192	
0.1970			70772	
0.1975	1	3	70777	
0.1980			70782	

CHUCKING REAMERS

STRAIGHT FLUTE REAMERS CONTINUED

SIZE	LOC	OAL	Bright
0.1985			70787
0.1990 #8	1	3	74107
0.1995			70796
0.2000			70801
0.2005	1	3	70806
0.2010 #7			74106
0.2015			70815
0.2020	1	3	70820
0.2025			70825
0.2030			70830
0.2031 13/64	1	3	74051
0.2035			70834
0.2040 #6			74105
0.2045	1	3	70843
0.2050			70848
0.2055 #5			74104
0.2060	1	3	70857
0.2065			70862
0.2070			70867
0.2075	1	3	70872
0.2080			70877
0.2085			70882
0.2090 #4	1	3	74103
0.2095			70891
0.2100			70896
0.2105	1	3	70901
0.2110			70906
0.2115			70911
0.2120	1	3	70916
0.2125			70921
0.2130 #3			74102
0.2135	1	3	70930
0.2140			70935
0.2145			70940
0.2150	1	3	70945
0.2155			70950
0.2160	1	3	70955
0.2165 5.5mm	25mm	76mm	74193
0.2170	1	3	70964
0.2175			70969
0.2177	1	3	70971
0.2180			70974
0.2185			70979
0.2188 7/32	1	3	74052
0.2190			70983
0.2195			70988
0.2200	1	3	70993
0.2205			70998
0.2210 #2			74101
0.2215	1	3	71007
0.2220			71012
0.2225			71017
0.2230	1	3	71022
0.2235			71027
0.2240			71032
0.2245	1	3	71037
0.2250			71042

SIZE	LOC	OAL	Bright
0.2255			71047
0.2260	1	3	71052
0.2265			71057
0.2270			71062
0.2275	1	3	71067
0.2280 #1			74100
0.2285			71076
0.2290	1	3	71081
0.2295			71086
0.2300			71091
0.2305	1	3	71096
0.2310			71101
0.2315			71106
0.2320	1	3	71111
0.2325			71116
0.2330			71121
0.2335	1	3	71126
0.2340 A			74074
0.2344 15/64			74053
0.2345	1	3	71134
0.2350			71139
0.2355	1	3	71144
0.2360 6.0mm	25mm	76mm	74195
0.2365			71153
0.2370	1	3	71158
0.2375			71163
0.2380 B			74075
0.2385	1	3	71172
0.2390			71177
0.2395			71182
0.2400	1	3	71187
0.2405			71192
0.2410			71197
0.2415	1	3	71202
0.2420 C			74076
0.2425			71211
0.2430	1	3	71216
0.2435			71221
0.2440			71226
0.2445	1	3	71231
0.2450			71236
0.2455			71241
0.2460 D	1	3	74077
0.2465			71250
0.2470			71255
0.2475	1	3	71260
0.2480			71265
0.2485			71270
0.2490	1	3	71275
0.2495			71280
0.2498			71283
0.2500 1/4	1	3	74054
0.2500 E			74078
0.2502			71287
0.2505	1	3	71290
0.2510			71295

SIZE	LOC	OAL	Bright
0.2515			71300
0.2520	1	3	71305
0.2525			71310
0.2530			71315
0.2535	1	3	71320
0.2540			71325
0.2545			71330
0.2550	1	3	71335
0.2555			71340
0.2559 6.5mm	29mm	83mm	74197
0.2560	1-1/8	3-1/4	71344
0.2565	1-1/8	3-1/4	71349
0.2570 F			74079
0.2575	1-1/8	3-1/4	71358
0.2580			71363
0.2585			71368
0.2590	1-1/8	3-1/4	71373
0.2595			71378
0.2600			71382
0.2605	1-1/8	3-1/4	71387
0.2610 G			74080
0.2615			71396
0.2620	1-1/8	3-1/4	71401
0.2625			71406
0.2630			71411
0.2635	1-1/8	3-1/4	71416
0.2640			71421
0.2645			71426
0.2650	1-1/8	3-1/4	71431
0.2655			71436
0.2656 17/64			74055
0.2660 H	1-1/8	3-1/4	74081
0.2665			71444
0.2670			71449
0.2675	1-1/8	3-1/4	71454
0.2680			71459
0.2685			71464
0.2690	1-1/8	3-1/4	71469
0.2695			71474
0.2700			71479
0.2705	1-1/8	3-1/4	71484
0.2710			71489
0.2715			71494
0.2720 I	1-1/8	3-1/4	74082
0.2725			71503
0.2730			71508
0.2735	1-1/8	3-1/4	71513
0.2740			71518
0.2745			71523
0.2750	1-1/8	3-1/4	71528
0.2755			71533
0.2756 7.0mm			74199
0.2760	1-1/8	3-1/4	71537
0.2765			71542
0.2770 J			74083
0.2775	1-1/8	3-1/4	71552
0.2780			71557



STRAIGHT FLUTE REAMERS CONTINUED

SIZE	LOC	OAL	Bright	
0.2785			71562	
0.2790	1-1/8	3-1/4	71567	
0.2795			71572	
0.2800			71577	
0.2805	1-1/8	3-1/4	71582	
0.2810	K		74084	
0.2813	9/32		74056	
0.2815	1-1/8	3-1/4	71590	
0.2818			71593	
0.2820			71595	
0.2825	1-1/8	3-1/4	71600	
0.2830			71605	
0.2835			71610	
0.2840	1-1/8	3-1/4	71615	
0.2845			71620	
0.2850			71625	
0.2855	1-1/8	3-1/4	71630	
0.2860			71635	
0.2865			71640	
0.2870	1-1/8	3-1/4	71645	
0.2875			71650	
0.2880			71655	
0.2885	1-1/8	3-1/4	71660	
0.2890			71665	
0.2895			71670	
0.2900	L	1-1/8	3-1/4	74085
0.2905			71679	
0.2910			71684	
0.2915	1-1/8	3-1/4	71689	
0.2920			71694	
0.2925			71699	
0.2930	1-1/8	3-1/4	71704	
0.2935			71709	
0.2940			71714	
0.2945	1-1/8	3-1/4	71719	
0.2950	M		74086	
0.2953	7.5mm	29mm	83mm	74201
0.2955	1-1/8	3-1/4	71727	
0.2960			71732	
0.2965			71736	
0.2969	19/64	1-1/8	3-1/4	74057
0.2970			71741	
0.2975			71746	
0.2980	1-1/8	3-1/4	71751	
0.2985			71756	
0.2990			71761	
0.2995	1-1/8	3-1/4	71766	
0.3000			71771	
0.3005			71776	
0.3010	1-1/8	3-1/4	71781	
0.3015			71786	
0.3020	N		74087	
0.3025	1-1/8	3-1/4	71795	
0.3030			71800	
0.3035			71805	
0.3040	1-1/8	3-1/4	71810	
0.3045			71815	

SIZE	LOC	OAL	Bright	
0.3050			71820	
0.3055	1-1/8	3-1/4	71825	
0.3060			71830	
0.3065			71835	
0.3070	1-1/8	3-1/4	71840	
0.3075			71845	
0.3080			71850	
0.3085	1-1/8	3-1/4	71855	
0.3090			71860	
0.3095			71865	
0.3100	1-1/8	3-1/4	71870	
0.3105	D/P		71875	
0.3110			71880	
0.3115	1-1/8	3-1/4	71885	
0.3120			71890	
0.3125	5/16		74058	
0.3130	1-1/8	3-1/4	71899	
0.3135			71904	
0.3140			71909	
0.3145	1-1/8	3-1/4	71914	
0.3150	8.0mm	29mm	83mm	74203
0.3155			71924	
0.3160	O	1-1/8	3-1/4	74088
0.3165			71933	
0.3170			71938	
0.3175	1-1/4	3-1/2	71943	
0.3177			71945	
0.3180			71948	
0.3185	1-1/4	3-1/2	71953	
0.3190			71958	
0.3195			71963	
0.3200	1-1/4	3-1/2	71968	
0.3205			71973	
0.3210			71978	
0.3215	1-1/4	3-1/2	71983	
0.3220			71988	
0.3225			71993	
0.3230	P	1-1/4	3-1/2	74089
0.3235			72002	
0.3240			72007	
0.3245	1-1/4	3-1/2	72012	
0.3250			72017	
0.3255			72022	
0.3260	1-1/4	3-1/2	72027	
0.3265			72032	
0.3270			72037	
0.3275	1-1/4	3-1/2	72042	
0.3280			72047	
0.3281	21/64		74059	
0.3285	1-1/4	3-1/2	72051	
0.3290			72056	
0.3295			72061	
0.3300	1-1/4	3-1/2	72066	
0.3305			72071	
0.3310			72076	
0.3315	1-1/4	3-1/2	72081	
0.3320	Q		74090	

SIZE	LOC	OAL	Bright	
0.3325			72090	
0.3330	1-1/4	3-1/2	72095	
0.3335			72100	
0.3340			72105	
0.3345	1-1/4	3-1/2	72110	
0.3346	8.5mm	32mm	89mm	74204
0.3350			72114	
0.3355	1-1/4	3-1/2	72119	
0.3360			72124	
0.3365			72129	
0.3370	1-1/4	3-1/2	72134	
0.3375			72139	
0.3380			72144	
0.3385	1-1/4	3-1/2	72149	
0.3390	R		74091	
0.3395			72158	
0.3400	1-1/4	3-1/2	72163	
0.3405			72168	
0.3410			72173	
0.3415	1-1/4	3-1/2	72178	
0.3420			72183	
0.3425			72188	
0.3430	1-1/4	3-1/2	72193	
0.3435			72198	
0.3438	11/32		74060	
0.3440	1-1/4	3-1/2	72202	
0.3445			72207	
0.3450			72212	
0.3455	1-1/4	3-1/2	72217	
0.3460			72222	
0.3465			72227	
0.3470	1-1/4	3-1/2	72232	
0.3475			72237	
0.3480	S		74092	
0.3485	1-1/4	3-1/2	72246	
0.3490			72251	
0.3495			72256	
0.3500	1-1/4	3-1/2	72261	
0.3505			72266	
0.3510			72271	
0.3515	1-1/4	3-1/2	72276	
0.3520			72281	
0.3525			72286	
0.3530	1-1/4	3-1/2	72291	
0.3535			72296	
0.3540	1-1/4	3-1/2	72301	
0.3543	9.0mm	32mm	89mm	74206
0.3545	1-1/4	3-1/2	72305	
0.3550			72310	
0.3555	1-1/4	3-1/2	72315	
0.3560			72320	
0.3565			72325	
0.3570	1-1/4	3-1/2	72330	
0.3575			72335	
0.3580	T		74093	
0.3585	1-1/4	3-1/2	72344	
0.3590			72349	

CHUCKING REAMERS

STRAIGHT FLUTE REAMERS CONTINUED

SIZE	LOC	OAL	Bright
0.3594 23/64			74061
0.3595	1-1/4	3-1/2	72353
0.3600			72358
0.3605			72363
0.3610	1-1/4	3-1/2	72368
0.3615			72373
0.3620			72378
0.3625	1-1/4	3-1/2	72383
0.3630			72388
0.3635			72393
0.3640	1-1/4	3-1/2	72398
0.3645			72403
0.3650			72408
0.3655	1-1/4	3-1/2	72413
0.3660			72418
0.3665			72423
0.3670	1-1/4	3-1/2	72428
0.3675			72433
0.3680 U			74094
0.3685	1-1/4	3-1/2	72442
0.3690			72447
0.3695			72452
0.3700	1-1/4	3-1/2	72457
0.3705			72462
0.3710			72467
0.3715	1-1/4	3-1/2	72472
0.3720			72477
0.3725			72482
0.3730 D/P	1-1/4	3-1/2	72487
0.3735			72492
0.3740 U/S	1-1/4	3-1/2	72497
0.3740 9.5mm	32mm	89mm	74208
0.3745 D/P	1-1/4	3-1/2	72502
0.3750 3/8			74062
0.3755	1-1/4	3-1/2	72511
0.3760 O/S			72516
0.3765			72521
0.3767	1-1/4	3-1/2	72523
0.3770 V			74095
0.3775			72530
0.3780	1-1/4	3-1/2	72535
0.3785			72540
0.3790			72545
0.3795	1-1/4	3-1/2	72550
0.3800			72555
0.3805			72560
0.3810	1-1/4	3-1/2	72565
0.3815			72570
0.3820			72575
0.3825	1-1/4	3-1/2	72580
0.3830			72585
0.3835			72590
0.3840	1-1/4	3-1/2	72595
0.3845			72600
0.3850			72605
0.3855	1-1/4	3-1/2	72610
0.3860 W			74096

SIZE	LOC	OAL	Bright
0.3865			72619
0.3870	1-1/4	3-1/2	72624
0.3875			72629
0.3880			72634
0.3885	1-1/4	3-1/2	72639
0.3890			72644
0.3895			72649
0.3900	1-1/4	3-1/2	72654
0.3905			72659
0.3906 25/64			74063
0.3910	1-1/4	3-1/2	72663
0.3915			72668
0.3920			72673
0.3925	1-1/4	3-1/2	72678
0.3930			72683
0.3935	1-1/4	3-1/2	72688
0.3937 10.0mm	32mm	89mm	74211
0.3940	1-1/4	3-1/2	72692
0.3945			72697
0.3950	1-1/4	3-1/2	72702
0.3955			72707
0.3960			72712
0.3965	1-1/4	3-1/2	72717
0.3970 X			74097
0.3975			72726
0.3980	1-1/4	3-1/2	72731
0.3985			72736
0.3990			72741
0.3995	1-1/4	3-1/2	72746
0.4000			72751
0.4005			72756
0.4010	1-1/4	3-1/2	72761
0.4015			72766
0.4020			72771
0.4025	1-1/4	3-1/2	72776
0.4030			72781
0.4035			72786
0.4040 Y	1-1/4	3-1/2	74098
0.4045			72795
0.4050			72800
0.4055	1-1/4	3-1/2	72805
0.4060			72810
0.4063 13/32			74064
0.4065	1-1/4	3-1/2	72814
0.4070			72819
0.4075			72824
0.4080	1-1/4	3-1/2	72829
0.4085			72834
0.4090			72839
0.4095	1-1/4	3-1/2	72844
0.4100			72849
0.4105			72854
0.4110	1-1/4	3-1/2	72859
0.4115			72864
0.4120			72869
0.4125	1-1/4	3-1/2	72874
0.4130 Z			74099

SIZE	LOC	OAL	Bright
0.4134 10.5mm	32mm	89mm	74214
0.4135	1-1/4	3-1/2	72883
0.4140			72888
0.4145			72893
0.4150	1-1/4	3-1/2	72898
0.4155			72903
0.4160	1-1/4	3-1/2	72908
0.4165			72913
0.4170	1-3/8	4	72918
0.4175			72923
0.4180	1-3/8	4	72928
0.4185			72933
0.4190			72938
0.4195	1-3/8	4	72943
0.4200			72948
0.4205			72953
0.4210	1-3/8	4	72958
0.4215			72963
0.4219 27/64			74065
0.4225	1-3/8	4	72972
0.4230			72977
0.4235			72982
0.4240	1-3/8	4	72987
0.4245			72992
0.4250			72997
0.4255	1-3/8	4	73002
0.4260			73007
0.4265			73012
0.4270	1-3/8	4	73017
0.4275			73022
0.4280			73027
0.4285	1-3/8	4	73032
0.4290			73037
0.4295			73042
0.4300	1-3/8	4	73047
0.4305			73052
0.4310			73057
0.4315	1-3/8	4	73062
0.4320			73067
0.4325			73072
0.4330	1-3/8	4	73077
0.4331 11.0mm	35mm	102mm	74216
0.4335			73081
0.4340	1-3/8	4	73086
0.4345			73091
0.4350			73096
0.4355 D/P	1-3/8	4	73101
0.4360			73106
0.4365 U/S			73111
0.4370	1-3/8	4	73116
0.4375 7/16			74066
0.4380			73125
0.4385	1-3/8	4	73130
0.4390			73135
0.4395			73140
0.4400	1-3/8	4	73145
0.4405			73150



STRAIGHT FLUTE REAMERS CONTINUED

SIZE	LOC	OAL	Bright
0.4410			73155
0.4415	1-3/8	4	73160
0.4420			73165
0.4425			73170
0.4430	1-3/8	4	73175
0.4435			73180
0.4440			73185
0.4445	1-3/8	4	73190
0.4450			73195
0.4455			73200
0.4460	1-3/8	4	73205
0.4465			73210
0.4470			73215
0.4475	1-3/8	4	73220
0.4480			73225
0.4485			73230
0.4490	1-3/8	4	73235
0.4495			73240
0.4500			73245
0.4505	1-3/8	4	73250
0.4510			73255
0.4515			73260
0.4520	1-3/8	4	73265
0.4525			73270
0.4528	11.5mm	35mm 102mm	74217
0.4530			73274
0.4531	29/64	1-3/8	74067
0.4535			73278
0.4540	1-3/8	4	73283
0.4545			73288
0.4550			73293
0.4555	1-3/8	4	73298
0.4560			73303
0.4565			73308
0.4570	1-3/8	4	73313
0.4575			73318
0.4580			73323
0.4585	1-3/8	4	73328
0.4590			73333
0.4595			73338
0.4600	1-3/8	4	73343
0.4605			73348
0.4610			73353
0.4615	1-3/8	4	73358
0.4620			73363
0.4625			73368
0.4630	1-3/8	4	73373
0.4635			73378
0.4640			73383
0.4645	1-3/8	4	73388
0.4650			73393
0.4655			73398
0.4660	1-3/8	4	73403
0.4665			73408
0.4670			73413
0.4675	1-3/8	4	73418
0.4680			73423

SIZE	LOC	OAL	Bright
0.4685			73428
0.4688	15/32	1-3/8	74068
0.4690			73432
0.4695			73437
0.4700	1-3/8	4	73442
0.4705			73447
0.4710			73452
0.4715	1-3/8	4	73457
0.4720			73462
0.4724	12.0mm	35mm 102mm	74219
0.4725			73466
0.4730	1-3/8	4	73471
0.4735			73476
0.4740	1-3/8	4	73481
0.4745			73486
0.4750			73491
0.4755	1-3/8	4	73496
0.4760			73501
0.4765			73506
0.4770	1-3/8	4	73511
0.4775			73516
0.4780	1-3/8	4	73521
0.4785			73526
0.4790	1-1/2	4	73531
0.4795			73536
0.4800	1-1/2	4	73541
0.4805			73546
0.4810			73551
0.4815	1-1/2	4	73556
0.4820			73561
0.4825			73566
0.4830	1-1/2	4	73571
0.4835			73576
0.4840			73581
0.4844	31/64	1-1/2	74069
0.4845			73585
0.4850			73590
0.4855	1-1/2	4	73595
0.4860			73600
0.4865			73605
0.4870	1-1/2	4	73610
0.4875			73615
0.4880			73620
0.4885	1-1/2	4	73624
0.4890			73629
0.4895			73634
0.4900	1-1/2	4	73639
0.4905			73644
0.4910	1-1/2	4	73649
0.4915			73654
0.4921	12.5mm	38mm 102mm	74221
0.4925			73663
0.4930	1-1/2	4	73668
0.4935			73673
0.4940			73678
0.4945	1-1/2	4	73683
0.4950			73688

SIZE	LOC	OAL	Bright
0.4955			73693
0.4960	1-1/2	4	73698
0.4965			73703
0.4970			73708
0.4975	1-1/2	4	73713
0.4980	D/P		73718
0.4985			73723
0.4990	U/S	1-1/2	73728
0.4995	D/P		73733
0.5000	1/2		74070
0.5005	1-1/2	4	73742
0.5010	O/S		73747
0.5015			73752
0.5020	1-1/2	4	73757
0.5025			73762
0.5030			73767
0.5035	1-1/2	4	73772
0.5040			73777
0.5045			73782
0.5050	1-1/2	4	73787
0.5095			73796
0.5105			73806
0.5115	1-1/2	4	73816
0.5118	13.0mm	38mm 102mm	74222
0.5495	1-1/2	4	73826
0.5505			73836
0.5512	14.0mm	38mm 102mm	74223
0.5515			73845
0.5605	1-1/2	4	73851
0.5615			73861
0.5625	9/16	1-1/2	74071
0.5885	1-3/4	4	73874
0.5895			73884
0.5906	15.0mm	44mm 102mm	74224
0.6215			73901
0.6225	1-3/4	4	73911
0.6235			73921
0.6240	1-3/4	4	73926
0.6245			73931
0.6250	5/8		74072
0.6255	1-3/4	4	73940
0.6260			73945
0.6265			73950
0.6270	1-3/4	4	73955
0.6275			73960
0.6285			73970
0.6295	1-3/4	4	73980
0.6299	16.0mm	44mm 102mm	74225
0.6305			73989
0.6310	1-3/4	4	73994
0.7475			74003
0.7485			74013
0.7490	1-3/4	4	74018
0.7495			74023
0.7500	3/4		74073
0.7505	1-3/4	4	74032
0.7510			74037

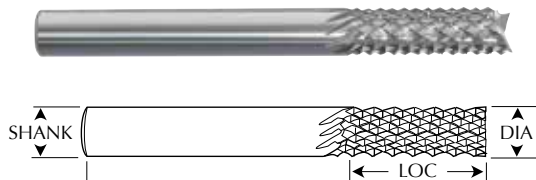
REAMING RECOMMENDATIONS

WORKPIECE MATERIAL GROUP	HARDNESS	Surface Feet Per Minute (SFM)	Inches Per Revolution (IPR)					
		SFM	(IPR) Reamer Diameter					
			0.0280 - 0.0625"	0.0626 - 0.1250"	0.1251 - 0.2500"	0.2501 - 0.5000"	0.5001 - 0.7500"	
Steels	P	≤ 28 Rc	200-300	0.0005 - 0.0030	0.0020 - 0.0060	0.0040 - 0.0100	0.0060 - 0.0150	0.0100 - 0.0300
		28 - 38 Rc	125-200	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
Tool & Die Steels	P	28 - 44 Rc	50-125	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100
Stainless Steels	M	≤ 28 Rc	120-190	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
		≤ 28 Rc	80-120	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
		≤ 28 Rc	60-100	0.0002 - 0.0020	0.0010 - 0.0040	0.0020 - 0.0060	0.0040 - 0.0100	0.0060 - 0.0100
Super Alloys	S	< 40 Rc	40-70	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100
		< 40 Rc	30-45	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0200
		< 40 Rc	35-50	0.0002 - 0.0020	0.0010 - 0.0040	0.0020 - 0.0060	0.0040 - 0.0100	0.0060 - 0.0200
Hardened Materials	H	23 - 32 Rc	125-200	0.0002 - 0.0020	0.0010 - 0.0040	0.0020 - 0.0060	0.0040 - 0.0100	0.0060 - 0.0200
		32 - 43 Rc	50-125	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
		43 - 52 Rc	35-50	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100
		> 50 Rc	15-35	0.0005 - 0.0030	0.0020 - 0.0060	0.0040 - 0.0100	0.0060 - 0.0150	0.0100 - 0.0300
Cast Iron	K	≤ 240 HB	150-250	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
		> 240 HB	50-75	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100
Non-Ferrous	N	> 240 HB	500-1000	0.0005 - 0.0020	0.0020 - 0.0060	0.0040 - 0.0100	0.0060 - 0.0150	0.0100 - 0.0300
		> 240 HB	250-400	0.0005 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100	0.0100 - 0.0200
		> 240 HB	150-250	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100
		> 240 HB	100-150	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100
		> 240 HB	500-1000	0.0002 - 0.0010	0.0010 - 0.0020	0.0020 - 0.0040	0.0040 - 0.0060	0.0060 - 0.0100

WORKPIECE MATERIAL GROUP	Drill Diameter											
	0.0135	0.0290/0.0280	0.0550/0.0520	0.1130	0.2380	0.3594	0.4844	0.6094	0.7344			
	Reamer Diameter											
	0.0150	0.0320	0.0625	0.1250	0.2500	0.3750	0.5000	0.625	0.75			
Total Stock Allowance												
Steels	Low Carbon ≤ 35% C	0.0012	0.0025	0.0049	0.0089	0.0100	0.0120	0.0130	0.0150	0.0170		
	Medium/High Carbon ≥ 35% C	0.0013	0.0028	0.0055	0.0099	0.0110	0.0130	0.0140	0.0160			
Tool & Die Steels		0.0012	0.0025	0.0049	0.0089	0.0100	0.0120	0.0130	0.0150			
Stainless Steels		0.0012	0.0025	0.0049	0.0089	0.0100	0.0120	0.0130	0.0150	0.0160		
Super Alloys	Soft	0.0012	0.0025	0.0049	0.0089	0.0100	0.0110	0.0130	0.0140	0.0160		
	Hard	0.0010	0.0023	0.0044	0.0081	0.0090	0.0100	0.0120	0.0130	0.0140		
	Titanium	0.0013	0.0028	0.0055	0.0099	0.0110	0.0130	0.0140	0.0160	0.0170		
Hardened Materials		0.0009	0.0020	0.0040	0.0072	0.0080	0.0100	0.0110	0.0130	0.0140		
Cast Iron	Cast	0.0013	0.0028	0.0055	0.0099	0.0110	0.0130	0.0140	0.0160	0.0180		
	Ductile								0.0150	0.0170		
Non-Ferrous	Magnesium	0.0014	0.0030	0.0060	0.0110	0.0120	0.0150	0.0160	0.0180	0.0200		
	Aluminum ≥ 5% Si								0.0130	0.0150	0.0160	0.0180
	Aluminum ≤ 5% Si											
	Brass											
Bronze, Copper	0.0140	0.0150	0.0170	0.0190								



DIAMOND CUT ROUTERS

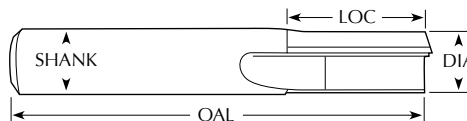


Shank Tolerance: +0.0000/-0.0005"

	DIA	DEC IN	LOC	SHANK	OAL	Bright			
Style A No End Cut	1/16	0.0625	3/16	1/8	1-1/2	75056			
	3/32	0.0938	3/8	1/8	1-1/2	75057			
	1/8	0.1250	1/2	1/8	1-1/2	75058			
	3/16	0.1875	5/8	3/16	2	75059			
				1/4	2	75060			
	1/4	0.2500	3/4	1/4	2	75061			
					2-1/2	75062			
					3	75063			
	5/16	0.3125	1	5/16	2-1/2	75064			
					3/8	3/8	2-1/2	75065	
1/2					1	1/2	3	75066	
1/16					0.0625	3/16	1/8	1-1/2	75067
3/32	0.0938	3/8	1/8	1-1/2	75068				
					1/8	1/2	1/8	1-1/2	75069
3/16	0.1875	5/8	3/16	2	75070				
				1/4	2	75071			
				1/4	0.2500	3/4	1/4	2	75072
								2-1/2	75073
5/16	0.3125	1	5/16	2-1/2	75075				
				3/8	3/8	2-1/2	75076		
1/2	0.5000	1	1/2	3	75077				

	DIA	DEC IN	LOC	SHANK	OAL	Bright
Style C End Mill Style	1/16	0.0625	3/16	1/8	1-1/2	75078
	3/32	0.0938	3/8	1/8	1-1/2	75079
	1/8	0.1250	3/8	1/8	1-1/2	75080
	3/16	0.1875	5/8	3/16	2	75081
				1/4	2	75082
	1/4	0.2500	3/4	1/4	2	75083
					2-1/2	75084
	5/16	0.3125	1	5/16	2-1/2	75086
					3/8	3/8
	1/2	0.5000	1	1/2	3	75088
Style D Drill Point	1/16	0.0625	3/16	1/8	1-1/2	75089
	3/32	0.0938	3/8	1/8	1-1/2	75090
	1/8	0.1250	3/8	1/8	1-1/2	75091
	3/16	0.1875	5/8	3/16	2	75092
				1/4	2	75093
	1/4	0.2500	3/4	1/4	2	75094
					2-1/2	75095
	5/16	0.3125	1	5/16	2-1/2	75097
					3/8	3/8
	1/2	0.5000	1	1/2	3	75099
Style F Fishtail Style	1/16	0.0625	3/16	1/8	1-1/2	75100
	3/32	0.0938	3/8	1/8	1-1/2	75101
	1/8	0.1250	1/2	1/8	1-1/2	75102
	3/16	0.1875	5/8	3/16	2	75103
				1/4	2	75104
	1/4	0.2500	3/4	1/4	2	75105
					2-1/2	75106
	5/16	0.3125	1	5/16	2-1/2	75108
					3/8	3/8
	1/2	0.5000	1	1/2	3	75110

STRAIGHT FLUTE ROUTERS



Shank Tolerance: +0.0000/-0.0005"

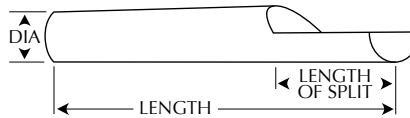
FLUTES	DIA	DEC IN	LOC	SHANK	OAL	Bright
2	3/32	0.0938	3/8	1/8	1-1/2	75111
	1/8	0.1250	1/2	1/8	1-1/2	75112
	3/16	0.1875	5/8	3/16	2	75113
	1/4	0.2500	3/4	1/4	2-1/2	75114
	5/16	0.3125	13/16	5/16	2-1/2	75115
	3/8	0.3750	7/8	3/8	2-1/2	75116
	7/16	0.4375	1	7/16	2-1/2	75117
	1/2	0.5000	1	1/2	3	75118

FLUTES	DIA	DEC IN	LOC	SHANK	OAL	Bright
3	3/32	0.0938	3/8	1/8	1-1/2	75119
	1/8	0.1250	1/2	1/8	1-1/2	75120
	3/16	0.1875	5/8	3/16	2	75121
	1/4	0.2500	3/4	1/4	2-1/2	75122
	5/16	0.3125	13/16	5/16	2-1/2	75123
	3/8	0.3750	7/8	3/8	2-1/2	75124
	7/16	0.4375	1	7/16	2-1/2	75125
	1/2	0.5000	1	1/2	3	75126

ROUTING RECOMMENDATIONS

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

SPLIT END BLANKS



Diameter Tolerance: +0.0000 / -0.0005"

SINGLE END

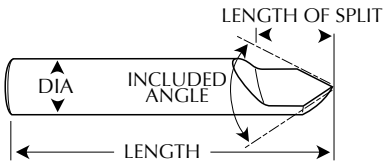
DIA	DECIN	LENGTH	LENGTH OF SPLIT	Single End
1/8	0.1250	1-1/2	3/8	74786
		2		74787
		3		74788
		4		74789
		6		74790
3/16	0.1875	2	1/2	74791
		2-1/2		74792
		3		74793
		4		74794
		6		74795
1/4	0.2500	2	1/2	74796
		2-1/2		74797
		3		74798
		4		74799
		6		74800
5/16	0.3125	2-1/2	1/2	74801
		3		74802
		4		74803
		6		74804
		3/8		0.3750
3	74806			
4	74807			
6	74808			
7/16	0.4375		2-1/2	
		3	74810	
		4	74811	
		6	74812	
		1/2	0.5000	3
4	74814			
6	74815			

DOUBLE END

DIA	DECIN	LENGTH	LENGTH OF SPLIT	Double End
1/8	0.1250	1-1/2	3/8	74843
		2		74844
		3		74845
		4		74846
		6		74847
3/16	0.1875	2	1/2	74848
		2-1/2		74849
		3		74850
		4		74851
		6		74852
1/4	0.2500	2	1/2	74853
		2-1/2		74854
		3		74855
		4		74856
		6		74857
5/16	0.3125	2-1/2	1/2	74858
		3		74859
		4		74860
		6		74861
		3/8		0.3750
3	74863			
4	74864			
6	74865			
7/16	0.4375		2-1/2	
		3	74867	
		4	74868	
		6	74869	
		1/2	0.5000	3
4	74871			
6	74872			



CONICAL ENGRAVING CUTTERS



SINGLE END

DIA	DEC IN	LENGTH	LENGTH OF SPLIT	30°	60°	90°
1/8	0.1250	1-1/2	3/8	74831	74816	74837
3/16	0.1875	2	1/2	74832	74817	74838
1/4	0.2500	2-1/2	1/2	74833	74818	74839
5/16	0.3125	2-1/2	1/2	74834	74819	74840
3/8	0.3750	2-1/2	1/2	74835	74820	74841
1/2	0.5000	3	5/8	74836	74821	74842

DOUBLE END

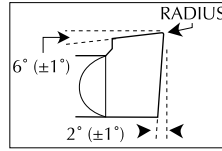
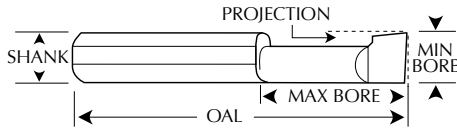
DIA	DEC IN	LENGTH	LENGTH OF SPLIT	30°	60°	90°
1/8	0.1250	1-1/2	3/8	—	—	74897
		2	3/8	74885	74873	—
		3	3/8	74886	74874	74898
3/16	0.1875	2	1/2	74887	74875	74899
		3	1/2	74888	74876	74900
1/4	0.2500	2-1/2	1/2	74889	74877	74901
		4	1/2	74890	74878	74902
5/16	0.3125	2-1/2	1/2	74891	74879	74903
		4	1/2	74892	74880	74904
3/8	0.3750	2-1/2	1/2	74893	74881	74905
		4	1/2	74894	74882	74906
1/2	0.5000	3	5/8	74895	74883	74907
		4	5/8	74896	74884	74908

ENGRAVING RECOMMENDATIONS

WORKPIECE MATERIAL GROUP	RPM	Inches Per Minute (IPM)
Steels P	2500 - 5000	02 - 08
	5000 - 10000	08 - 14
Stainless Steels M	2500 - 5000	02 - 05
	5000 - 10000	05 - 10
Super Alloys S	2500 - 5000	02 - 05
	5000 - 10000	05 - 10
Hardened Materials H	2500 - 5000	02 - 05
	5000 - 10000	05 - 10
Cast Iron K	2500 - 5000	03 - 08
	5000 - 10000	08 - 14
Non-Ferrous N	2500 - 5000	05 - 10
	5000 - 10000	10 - 15



BORING BARS
NC Generation ■ BB Series



Shank Tolerance: +0.0000 / -0.0005"

SHANK	MINIMUM BORE	OAL	MAXIMUM BORE	PROJECTION	RADIUS	Bright
1/8	0.0500	1-1/2	0.1500	.013	0.004	74247
			0.2000			74248
			0.3000			74249
			0.4000			74250
			0.1500			74251
1/8	0.0600	1-1/2	0.2000	.015	0.004	74252
			0.3000			74253
			0.4000			74254
			0.5000			74255
			0.1500			74256
1/8	0.0800	1-1/2	0.2000	.020	0.004	74257
			0.3000			74258
			0.4000			74259
			0.5000			74260
			0.6000			74261
1/8	0.1000	1-1/2	0.1500	.025	0.004	74262
			0.2000			74263
			0.3000			74264
			0.4000			74265
			0.5000			74266
1/8	0.1100	1-1/2	0.6000	.028	0.004	74267
			0.7000			74268
			0.1500			74269
			0.2000			74270
			0.3000			74271
3/16	0.1200	2	0.4000	.030	0.006	74272
			0.5000			74273
			0.6000			74274
			0.7000			74275
			0.8000			74276
3/16	0.1400	2	0.2500	.035	0.006	74277
			0.3500			74278
			0.5000			74279
			0.6000			74280
			0.7000			74281
3/16	0.1400	2	0.8000	.035	0.006	74282
			0.2500			74283
			0.4000			74284
			0.5000			74285
			0.6000			74286
3/16	0.1400	2	0.7000	.035	0.006	74287
			0.7500			74288
			0.8000			74289
			0.8000			74290
			0.8000			74291

SHANK	MINIMUM BORE	OAL	MAXIMUM BORE	PROJECTION	RADIUS	Bright
3/16	0.1600	2	0.2500	.040	0.006	74290
			0.4000			74291
			0.5000			74292
			0.6000			74293
			0.7500			74294
1/4	0.1800	2-1/2	0.9000	.045	0.006	74295
			1.0000			74289
			0.3500			74300
			0.5000			74301
			0.6000			74302
1/4	0.2000	2-1/2	0.7500	.050	0.006	74303
			1.0000			74304
			1.1000			74296
			1.2500			74297
			1.5000			74298
1/4	0.2000	2-1/2	1.2500	.050	0.006	74299
			0.4000			74309
			0.5000			74310
			0.6000			74311
			0.7000			74312
5/16	0.2300	2-1/2	0.8000	.058	0.006	74313
			0.9000			74314
			1.0000			74305
			1.1000			74306
			1.2000			74307
5/16	0.2300	2-1/2	1.3000	.058	0.006	74308
			0.4000			74323
			0.5000			74324
			0.6000			74325
			0.7000			74326
5/16	0.2300	2-1/2	0.8000	.058	0.006	74327
			0.9000			74328
			1.0000			74315
			1.1000			74316
			1.1500			74317
5/16	0.2300	2-1/2	1.2000	.058	0.006	74318
			1.2500			74319
			1.4000			74320
			1.5000			74321
			1.6000			74322



CONTINUED

SHANK	MINIMUM BORE	OAL	MAXIMUM BORE	PROJECTION	RADIUS	Bright
5/16	0.2900	2-1/2	0.5000	.073	0.006	74336
			0.6000			74337
			0.7500			74338
			0.9000			74339
			1.0000			74329
			1.1000			74330
			1.2500			74331
			1.3500			74332
			1.5000			74333
			1.6000			74334
3/8	0.3200	2-1/2	1.7500	.080	0.006	74335
			0.5000			74349
			0.6000			74350
			0.7500			74351
			0.9000			74352
			1.0000			74340
			1.1000			74341
			1.2500			74342
			1.5000			74343
			1.6000			74344
3/8	0.3200	4	1.8000	.080	0.006	74345
			2.0000			74346
			2.5000			74347
			3.0000			74348

SHANK	MINIMUM BORE	OAL	MAXIMUM BORE	PROJECTION	RADIUS	Bright
3/8	0.3600	2-1/2	0.5000	.090	0.006	74362
			0.6000			74363
			0.7500			74364
			0.9000			74365
			1.0000			74353
			1.1500			74354
			1.2500			74355
			1.5000			74356
			1.6000			74357
			1.8000			74358
3/8	0.3600	4	2.0000	.090	0.006	74359
			2.5000			74360
			3.0000			74361
1/2	0.4900	3	0.7500	.123	0.006	74377
			1.0000			74366
			1.2500			74367
			1.5000			74368
1/2	0.4900	4	2.0000	.123	0.006	74369
			2.5000			74370
			2.6000			74371
			2.7500			74372
			3.0000			74373
1/2	0.4900	6	3.5000	.123	0.006	74374
			4.0000			74375
			4.5000			74376

BORING RECOMMENDATIONS

Surface Feet Per Minute (SFM)

WORKPIECE MATERIAL GROUP	SFM	Inches Per Tooth (IPT)
Steels P	78-800	0.0005 - 0.0150
	75-600	0.0005 - 0.0150
	75-250	0.0005 - 0.0150
	75-250	0.0005 - 0.0150
Tool & Die Steels P	75-500	0.0005 - 0.0150
Stainless Steel M	75-500	0.0005 - 0.0150
Super Alloys S	75-300	0.0003 - 0.0100
Hardened Materials H	60-150	0.0001 - 0.0050
Cast-Iron K	100-850	0.0005 - 0.0250
Non-Ferrous N	200-2000	0.0005 - 0.0300
	130-400	0.0005 - 0.0300
	150-350	0.0005 - 0.0300
	200-1000	0.0005 - 0.0300



CARBIDE ROD



GROUND: Diameter Tolerance: +0.0000 / -0.0005"

UNGROUND: Diameter + Grind Stock

SHORT ROUNDS

STYLE	DIA	DEC IN	LENGTH	Ground
SR-44			1/2	74655
SR-46	1/8	0.1250	3/4	74656
SR-48			1	74657
SR-55	5/32	0.1562	5/8	74658
SR-63			3/8	74659
SR-64			1/2	74660
SR-65	3/16	0.1875	5/8	74661
SR-66			3/4	74662
SR-68			1	74663
SR-69			1-1/8	74664
SR-77	7/32	0.2188	7/8	74665
SR-84			1/2	74666
SR-86			3/4	74667
SR-88	1/4	0.2500	1	74668
SR-810			1-1/4	74669
SR-812			1-1/2	74670
SR-814			1-3/4	74671
SR-1010	5/16	0.3125	1-1/4	74672
SR-1210	3/8	0.3750	1-1/2	74673
SR-1610	1/2	0.5000	1-1/2	74675

CUT TO LENGTH ROD

DIA	DEC IN	LENGTH	Ground
1/32	0.0312	1-1/2	74525
3/64	0.0469	1-1/2	74527
		2	74528
1/16	0.0625	1-1/2	74529
		3	74530
5/64	0.0781	2	74532
		1-1/2	74533
3/32	0.0938	2	74534
		2-1/2	74535
		3	74536
7/64	0.1094	2	74537
		2-1/2	74538
1/8	0.1250	1	74542
		1-1/2	74543
		1-3/4	74544
		2	74545
		2-1/8	74546
		2-1/4	74547

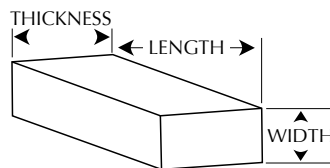
ROUND TOOL BLANKS CONTINUED

DIA	DEC IN	LENGTH	Ground
1/8	0.1250	2-1/2	74548
		3	74550
		4	74551
		6	74676
5/32	0.1562	1-1/2	74552
		2	74553
		2-1/2	74554
3/16	0.1875	1-1/2	74559
		2	74560
		2-1/2	74561
		2-3/4	74562
		3	74563
		4	74564
1/4	0.2500	6	74678
		2	74572
		2-1/2	74573
		3	74574
5/16	0.3125	4	74575
		6	74679
		2	74576
		2-1/8	74577
3/8	0.3750	2-1/2	74578
		3	74579
		3-1/4	74580
		4	74581
		6	74680
		1-1/2	74584
7/16	0.4375	2	74586
		2-1/2	74587
		3	74588
		3-1/8	74589
		3-1/2	74590
		4	74591
		6	74592
		2-1/2	74593
1/2	0.5000	2-3/4	74597
		3	74598
		4	74599
		6	74601
9/16	0.5625	2	74605
		2-1/2	74606
		3	74607
		4	74609
5/8	0.6250	6	74611
		3-1/2	74617
		3	74619
		3-1/2	74620
		4	74624
		5	74625
3/4	0.7500	6	74626
		3	74632
		4	74633
		5	74634
7/8	0.8750	6	74635
		7	74636
		4	74642
1	1.0000	4	74644
		5	74645
		6	74646
		7	74647

12" RANDOM ROD

DIA	DECIN	GROUND	UNGROUND
			+ Grind Stock
1/32	0.0312	74682	74681
3/64	0.0469	74684	74683
1/16	0.0625	74686	74685
5/64	0.0781	74688	74687
3/32	0.0938	74690	74689
7/64	0.1094	74692	74691
1/8	0.1250	74696	74695
9/64	0.1406	74698	74697
5/32	0.1562	74700	74699
11/64	0.1719	74704	74703
3/16	0.1875	74706	74705
13/64	0.2031	74710	74709
7/32	0.2188	74712	74711
15/64	0.2344	74714	74713
1/4	0.2500	74718	74717
17/64	0.2656	74720	74719
9/32	0.2812	74722	74721
19/64	0.2969	74724	74723
5/16	0.3125	74726	74725
21/64	0.3281	74730	74729
11/32	0.3438	74732	74731
23/64	0.3594	74736	74735
3/8	0.3750	74738	74737
25/64	0.3906	74740	74739
13/32	0.4062	74744	74743
27/64	0.4219	74746	74745
7/16	0.4375	74749	74748
29/64	0.4531	74751	74750
15/32	0.4688	74753	74752
31/64	0.4844	74757	74756
1/2	0.5000	74759	74758
17/32	0.5312	74763	74762
9/16	0.5625	74765	74764
5/8	0.6250	74767	74766
11/16	0.6875	74771	74770
3/4	0.7500	74775	74774
13/16	0.8125	74777	74776
7/8	0.8750	74779	74778
1	1.0000	74784	74783

STB & STBL STRIPS



MINIMUM GRIND STOCK;
 Thickness: +0.008"
 Width: +0.012"
 Length: +0.008"

STYLE	THICKNESS	WIDTH	LENGTH	Unground
STB-12	1/32	1/16	1	74909
STB-12A			1-1/2	74910
STB-13A	3/64	3/32	13/16	74912
STB-13			1	74911
STB-22L	1/16	1/16	6	74913
STB-24A			1	74915
STB-24C	1/16	1/8	1-1/4	74917
STB-24D			1-1/2	74918
STB-24B	1/16	3/16	3	74916
STB-24L			6	74919
STB-26A	1/16	3/16	1	74920
STB-26C			3	74921
STB-26L			6	74922

STYLE	THICKNESS	WIDTH	LENGTH	Unground
STB-28A	1/16	1/4	1	74947
STB-28B			1-1/4	74948
STB-28D	1/16	1/4	3	74949
STB-28L			1/4	74950
STB-210L	1/16	5/16	74951	
STB-212L		3/8	74957	
STB-216L	1/16	1/2	6	74958
STB-220L		5/8	74959	
STB-224L	1/16	3/4	74960	
STB-232L		1	74961	
STB-14	5/64	1/8	1-1/8	74914

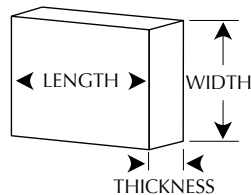


STB STRIPS CONTINUED

STYLE	THICKNESS	WIDTH	LENGTH	Unground
STB-34			5	74962
STB-34L	3/32	1/8	8	74963
STB-36			1-1/8	74952
STB-36A	3/32	3/16	1-1/4	74964
STB-36L			8	74965
STB-38A			1	74924
STB-38B	3/32	1/4	1-1/2	74925
STB-38D			5	74923
STB-38L			8	74926
STB-310A			2	74953
STB-310B	3/32	5/16	3	74954
STB-310C			5	74955
STB-310L			8	74956
STB-312	3/32	3/8	5	74966
STB-312C	3/32	3/8	6	74968
STB-312L	3/32	3/8	8	74967
STB-316	3/32	1/2	6	74969
STB-316L			8	74970
STB-320	3/32	5/8	6	74976
STB-320L			8	74977
STB-324		3/4		74971
STB-328		7/8		74972
STB-332	3/32	1	6	74973
STB-336		1-1/8		74974
STB-340		1-1/4		74975
STB-348		1-1/2		74978
STB-44L	1/8	1/8	12	74988
STB-46	1/8	3/16	6	74992
STB-46L			12	74993
STB-48A			1	74931
STB-48B			1-1/4	74932
STB-48F			1-1/2	74933
STB-48C	1/8	1/4	2-1/4	74934
STB-48D			3	74935
STB-48E			6	74936
STB-48L			12	74937
STB-410A			1-1/2	74980
STB-410B	1/8	5/16	3	74981
STB-410			6	74979
STB-410L			12	74982
STB-412D			1	74985
STB-412A			2	74984
STB-412B	1/8	3/8	3	74983
STB-412C			6	74986
STB-412L			12	74987
STB-416A			1	74991
STB-416B			1-1/2	74995
STB-416C	1/8	1/2	3	74994
STB-416			6	74989
STB-416L			12	74990
STB-420	1/8	5/8	6	74996
STB-420L			12	74997
STB-424	1/8	3/4	6	74998
STB-424L			12	74999
STB-428	1/8	7/8	6	75000
STB-432	1/8	1	6	74938
STB-432L			12	74939
STB-436		1-1/8		75054
STB-440	1/8	1-1/4	6	75055
STB-448		1-1/2		75053
STB-456		1-3/4		75052

STYLE	THICKNESS	WIDTH	LENGTH	Unground
STB-512C		3/8		75051
STB-516		1/2		75050
STB-520		5/8		75049
STB-524		3/4		75048
STB-528		7/8		75047
STB-532	5/32	1	6	75046
STB-536		1-1/8		75045
STB-540		1-1/4		75044
STB-544		1-3/8		75043
STB-548		1-1/2		75042
STB-564		2		75041
STB-66L	3/16	3/16	12	74940
STB-68A			3	74946
STB-68	3/16	1/4	6	74944
STB-68L			12	74945
STB-610A			3	75011
STB-610	3/16	5/16	6	75012
STB-610L			12	75013
STB-612A			3	75002
STB-612	3/16	3/8	6	75001
STB-612L			12	75003
STB-616A			3	75004
STB-616	3/16	1/2	6	75005
STB-616L			12	75006
STB-620A			3	74942
STB-620	3/16	5/8	6	74941
STB-620L			12	74943
STB-624B			2	74929
STB-624A			4	74928
STB-624	3/16	3/4	6	74927
STB-624L			12	74930
STB-628	3/16	7/8	6	75014
STB-632	3/16	1	6	75010
STB-632L			12	75009
STB-640	3/16	1-1/4	6	75008
STB-640L			12	75007
STB-648	3/16	1-1/2	6	75040
STB-88L	1/4	1/4	12	75039
STB-812A			3	75016
STB-812	1/4	3/8	6	75015
STB-812L			12	75017
STB-816C			2	75021
STB-816A			3	75019
STB-816B	1/4	1/2	4	75020
STB-816			6	75018
STB-816L			12	75022
STB-820A			3	75025
STB-820	1/4	5/8	6	75023
STB-820L			12	75024
STB-824A			3	75027
STB-824	1/4	3/4	6	75026
STB-824L			12	75028
STB-832			6	75029
STB-832L	1/4	1	12	75030
STB-840L	1/4	1-1/4	12	75031
STB-1010L	5/16	5/16	12	75038
STB-1212L		3/8		75032
STB-1216L		1/2		75033
STB-1224L	3/8	3/4	12	75034
STB-1232L		1		75035
STB-1616L	1/2	1/2		75036
STB-1624L		3/4	12	75037

**SERIES 1000
UNGROUND BLANKS**



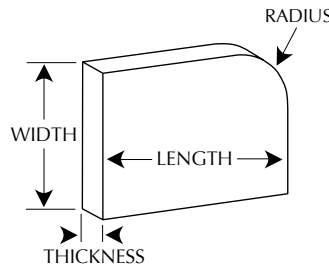
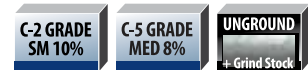
MINIMUM GRIND STOCK;
Thickness from $\leq 5/16$: +0.004 To +0.015"
Thickness $\geq 3/8$: +0.006 To +0.020"

STYLE	THICKNESS	WIDTH	LENGTH	C-2 Grade	C-5 Grade
1010		1/8	5/8	74378	74379
1020	1/16	3/16	1/4	74380	74381
1030		1/4	5/16	74382	74383
1040			5/16	74386	74387
1050	3/32	3/16	1/2	74388	74389
1060			3/8	74384	74385
1070	3/32	1/4	1/2	74390	74391
1080	3/32	5/16	3/8	74392	74393
1090			3/8	74394	74395
1100	3/32	3/8	1/2	74396	74397
1105	3/32	7/16	1/2	74398	74399
1110	1/8	3/16	3/4	74400	74401
1120			1/2	74405	74406
1130	1/8	1/4	5/8	74407	74408
1140			3/4	74403	74402
1150			7/16	74404	—
1160	1/8	5/16	1/2	74409	74410
1170			5/8	74411	—
1180			1/2	74412	74413
1190	1/8	3/8	3/4	74414	74415
1200			1/2	74416	74417
1210	1/8	1/2	3/4	74418	74419
1215	1/8	3/4	3/4	74420	74421
1220			9/16	74422	—
1230	5/32	3/8	3/4	74427	—
1240	5/32	5/8	5/8	74428	—
1250			7/16	74429	74432
1260	3/16	5/16	5/8	74430	74431
1270			1/2	74424	74426
1280	3/16	3/8	5/8	74425	—
1290			3/4	74423	74433
1300			5/8	74434	—
1310	3/16	7/16	13/16	74435	74436
1320			1/2	74437	74438
1330	3/16	1/2	3/4	74439	74440
1340	3/16	3/4	3/4	74441	74442
1350			9/16	74443	—
1360	1/4	3/8	3/4	74444	—
1370	1/4	7/16	5/8	74511	—
1380	1/4	1/2	3/4	74447	74448
1390	1/4	9/16	1	74446	—
1400	1/4	5/8	5/8	74450	—
1405			3/4	74452	—
1410	1/4	3/4	1	74445	74449
1430	5/16	7/16	15/16	74512	—
1440	5/16	1/2	3/4	74453	—
1450	5/16	1/2	1	74513	—

SERIES 1000 BLANKS CONTINUED

STYLE	THICKNESS	WIDTH	LENGTH	C-2 Grade	C-5 Grade
1460	5/16	5/8	1	74514	—
1470			3/4	74515	—
1475	5/16	3/4	1	74517	—
1480			1-1/4	74516	—
1490			3/4	74455	—
1500	3/8	1/2	1	74456	—
1510	3/8	5/8	1	74518	—
1520			1-1/4	74519	—
1525	3/8	3/4	1-1/2	74520	—
1530			1	74521	—
1540	1/2	3/4	1-1/4	74522	—
1550			1-1/2	74523	—

SERIES 2000
UNGROUND BLANKS



MINIMUM GRIND STOCK;
Thickness from ≤ 5/16: +0.004 To +0.015"
Thickness ≥ 3/8: +0.006 To +0.020"

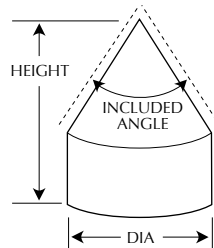
STYLE	THICKNESS	WIDTH	LENGTH	RADIUS	C-2 Grade	C-5 Grade
2010	1/16	1/8	5/8	1/8	74451	—
2020	1/16	3/16	1/4	1/8	74454	74457
2030	1/16	1/4	5/16	1/8	74458	74459
2040			5/16		74460	74461
2050	3/32	3/16	1/2	1/8	74462	74463
2060			3/8		74464	74465
2070	3/32	1/4	1/2	1/8	74466	74467
2080	3/32	5/16	3/8	3/16	74468	—
2090			3/8		74469	—
2100	3/32	3/8	1/2	3/16	74470	74471
2105	3/32	7/16	1/2	1/4	74472	74524
2110	1/8	3/16	3/4	1/8	74473	74474
2120			1/2		74475	74476
2130	1/8	1/4	5/8	1/8	74477	74478
2140			3/4		74479	74480
2150			7/16		74481	—
2160	1/8	5/16	1/2	3/16	74482	—
2170			5/8		74483	74484
2180			1/2		74485	74486
2190	1/8	3/8	3/4	3/16	74488	74487
2200			1/2		74489	74490
2210	1/8	1/2	3/4	1/4	74491	74492
2215	1/8	3/4	3/4	1/4	74493	74494

CARBIDE BLANKS

SERIES 2000 BLANKS CONTINUED

STYLE	THICKNESS	WIDTH	LENGTH	RADIUS	C-2 Grade	C-5 Grade
2220	5/32	3/8	9/16	3/16	74495	—
2230			3/4		74496	—
2240			5/8		74497	—
2250	3/16	5/16	7/16	3/16	74498	—
2260			5/8		74499	—
2270	3/16	3/8	1/2	3/16	74500	—
2280			5/8		74501	—
2290			3/4		74502	—
2300			5/8		74503	—
2310	3/16	7/16	13/16	1/4	74504	74505
2320	3/16	1/2	1/2	1/4	74506	74507
2330	3/16	3/4	3/4	1/4	74508	74509
2340	3/16	3/4	3/4	1/4	74510	—

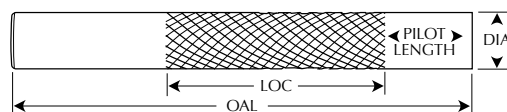
CENTER TIPS



Diameter Tolerance: +0.0000 / -0.0005"
Included Angle $\pm 1.0^\circ$

STYLE	DIA	DEC IN	HEIGHT	Bright
CT-40	1/4	0.2500	7/16	74822
CT-50	5/16	0.3125	9/16	74823
CT-60	3/8	0.3750	11/16	74824
CT-80	1/2	0.5000	7/8	74825
CT-100	5/8	0.6250	1-1/16	74826
CT-120	3/4	0.7500	1-1/4	74827
CT-140	7/8	0.8750	1-3/8	74828
CT-160	1	1.0000	1-1/2	74829
CT-200	1-1/4	1.2500	1-3/4	74830

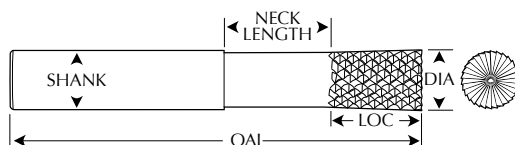
PILOTED DIE TRIMMERS



Shank Tolerance: +0.0000 / -0.0005"

DIA	DEC IN	LOC	SHANK	PILOT LENGTH	OAL	Bright
1/8	0.1250	1	1/8	1/2	2-1/2	67435
					3	67434
3/16	0.1875	1	3/16	1/2	2-1/2	67432
1/4	0.2500	1	1/4	1/2	2-1/2	67436
					3	67433
3/8	0.3750	1	3/8	1/2	2-1/2	67437
1/2	0.5000	1	1/2	1/2	3	67438

INTERNAL GRIND TOOL



Diameter Tolerance: +0.002 / -0.000"
Shank Tolerance: +0.0000 / -0.0005"

§ Reduced Shank

DIA	DEC IN	LOC	SHANK	OAL	NECK LENGTH	Bright
.030	0.0300	3/32	1/8	1-1/2	1/8	67504
.040	0.0400	3/32	1/8	1-1/2	3/16	67505
.050	0.0500	1/8	1/8	1-1/2	1/4	67506
1/16	0.0625	1/8	1/8	1-1/2	3/8	67507
5/64	0.0781	5/32	1/8	1-1/2	3/8	67508
3/32	0.0938	5/32	1/8	1-1/2	3/8	67509
7/64	0.1094	3/16	1/8	1-1/2	1/2	67510
1/8	0.1250	3/16	1/8	1-1/2	1/2	67511
9/64	0.1406	7/32	3/16	2	5/8	67512
5/32	0.1562	7/32	3/16	2	5/8	67513
11/64	0.1719	1/4	3/16	2	5/8	67514
3/16	0.1875	1/4	3/16	2	5/8	67515
13/64	0.2031	9/32	1/4	2	3/4	67516
7/32	0.2188	9/32	1/4	2	3/4	67517
15/64	0.2344	5/16	1/4	2	3/4	67518
1/4	0.2500	5/16	1/4	2	3/4	67519
9/32 §	0.2812	11/32	1/4	2-1/2	—	67520
5/16 §	0.3125	11/32	1/4	2-1/2	—	67521
11/32 §	0.3438	3/8	1/4	2-1/2	—	67522
3/8 §	0.3750	3/8	1/4	2-1/2	—	67523
1/2 §	0.5000	3/8	3/8	3-1/2	—	67524

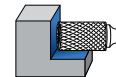
SA BURRS CYLINDER SHAPE - NO END CUT



† Mold, Tool & Die ‡ Long Shank Burr L2 = 2" Overall Length L3 = 3" Overall Length

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut	Aluma Cut
SA-61	1/16	0.0625	1/4	3/32	66757	66998	—
SA-41 †					66758	66999	—
SA-41 L2 †	1/16	0.0625	1/4	1/8	66759	67000	—
SA-41 L3 †					66769	67001	—
SA-63	3/32	0.0938	3/8	3/32	66766	67009	—
SA-42 †					66760	67002	—
SA-42 L2 †	3/32	0.0938	7/16	1/8	66762	67004	—
SA-42 L3 †					66761	67003	—
SA-11	1/8	0.1250	1/2	1/4	66763	67005	—
SA-43 †					66765	67007	—
SA-43 L2 †	1/8	0.1250	9/16	1/8	67410	67411	—
SA-43 L3 †					67312	67008	—
SA-12	1/8	0.1250	5/8	1/4	66764	67006	—
SA-52	5/32	0.1562	1/2	1/8	66767	67010	—
SA-13	5/32	0.1562	5/8	1/4	66768	67011	—
SA-53	3/16	0.1875	1/2	1/8	66770	67012	—
SA-81	3/16	0.1875	5/8	3/16	66771	67013	—
SA-14	3/16	0.1875	5/8	1/4	66772	67014	—
SA-51	1/4	0.2500	1/2	1/8	66773	67015	—
SA-1 L6 ‡			1/2		67280	67321	—
SA-1					66774	67016	—
SA-1NF	1/4	0.2500	5/8	1/4	—	—	67262
SA-1L			1		66992	67382	—
SA-2	5/16	0.3125	3/4	1/4	66775	67017	—
SA-3					66776	67018	—
SA-3 L6 ‡			3/4		67281	67322	—
SA-3NF	3/8	0.3750		1/4	—	—	67236
SA-3L			1		66993	67383	—
SA-3X			1-1/2		66990	67323	—
SA-4	7/16	0.4375	1	1/4	66777	67019	—
SA-5					66778	67020	—
SA-5 L6 ‡	1/2	0.5000	1	1/4	67282	67324	—
SA-5NF					—	—	67237
SA-6					66779	67021	—
SA-6NF	5/8	0.6250	1	1/4	—	—	67238
SA-15	3/4	0.7500	1/2	1/4	66780	67022	—
SA-16	3/4	0.7500	3/4	1/4	66781	67023	—
SA-7					66782	67024	—
SA-7NF	3/4	0.7500	1	1/4	—	—	67270
SA-8	7/8	0.8750	1	1/4	66783	67025	—
SA-9	1	1.0000	1	1/4	66784	67026	—

SB BURRS CYLINDER SHAPE - WITH END CUT



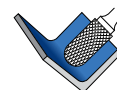
DE Double End † Mold, Tool & Die ‡ Long Shank Burr ECO = End Cut Only L2 = 2" Overall Length L3 = 3" Overall Length

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut	Aluma Cut
SB-41 †					66788	67029	—
SB-41 L2 †	1/16	0.0625	1/4	1/8	66816	67057	—
SB-41 L3 †					66817	67058	—
SB-ECO DE	3/32	0.0938	—	1/8	67233	—	—
SB-42 †					66789	67030	—
SB-42 L2 †	3/32	0.0938	7/16	1/8	66790	67031	—
SB-42 L3 †					66791	67032	—

SB-BURRS CONTINUED

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut	Aluma Cut
SB-11	1/8	0.1250	1/2	1/4	66792	67033	—
SB-43 †					66793	67034	—
SB-43 L2 †	1/8	0.1250	9/16	1/8	66794	67035	—
SB-43 L3 †					66795	67036	—
SB-12	1/8	0.1250	5/8	1/4	66786	67028	—
SB-13	5/32	0.1562	5/8	1/4	66797	67037	—
SB-14	3/16	0.1875	5/8	1/4	66800	67041	—
SB-ECO DE	1/4	0.2500		1/4	67234	—	—
SB-51			3/16		66802	67042	—
SB-51A	1/4	0.2500	1/2	1/8	66803	67043	—
SB-1 L6 †			1/2		66785	67027	—
SB-1			5/8		66804	67044	—
SB-1NF	1/4	0.2500		1/4	—	—	67273
SB-1L			1		66996	67384	—
SB-2	5/16	0.3125	3/4	1/4	66805	67047	—
SB-3					66806	67045	—
SB-3 L6 †			3/4		67387	67388	—
SB-3NF	3/8	0.3750		1/4	—	—	67276
SB-3L			1		66994	67385	—
SB-3X			1-1/2		66807	67046	—
SB-4	7/16	0.4375	1	1/4	66808	67049	—
SB-5					66815	67056	—
SB-5 L6 †	1/2	0.5000	1	1/4	67400	67401	—
SB-5NF					—	—	67277
SB-6					66809	67050	—
SB-6NF	5/8	0.6250	1	1/4	—	—	67278
SB-15	3/4	0.7500	1/2	1/4	66810	67051	—
SB-16	3/4	0.7500	3/4	1/4	66811	67052	—
SB-7					66812	67053	—
SB-7NF	3/4	0.7500	1	1/4	—	—	67279
SB-8	7/8	0.8750	1	1/4	66813	67054	—
SB-9	1	1.0000	1	1/4	66814	67055	—

SC BURRS CYLINDER WITH RADIUS END



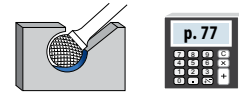
† Mold, Tool & Die ‡ Long Shank Burr L2 = 2" Overall Length L3 = 3" Overall Length

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut	Aluma Cut
SC-61	3/32	0.0938	3/8	3/32	66818	67059	—
SC-41 †					66819	67060	—
SC-41 L3 †	3/32	0.0938	7/16	1/8	66821	67061	—
SC-11	1/8	0.1250	1/2	1/4	66822	67062	—
SC-42 †					66824	67064	—
SC-42 L2 †	1/8	0.1250	9/16	1/8	67412	67413	—
SC-42 L3 †					66825	67362	—
SC-12	1/8	0.1250	5/8	1/4	66823	67063	—
SC-52	5/32	0.1562	1/2	1/8	66834	67073	—
SC-13	5/32	0.1562	5/8	1/4	66826	67065	—
SC-53					66827	67066	—
SC-53 L3	3/16	0.1875	1/2	1/8	66828	67067	—
SC-81	3/16	0.1875	5/8	3/16	66829	67068	—
SC-14	3/16	0.1875	5/8	1/4	66831	67070	—
SC-51					66832	67071	—
SC-51 L3	1/4	0.2500	1/2	1/8	66833	67072	—
SC-1 L6 †			1/2		67283	67326	—
SC-1					66835	67075	—
SC-1NF	1/4	0.2500	5/8	1/4	—	—	67263
SC-1L			1		66989	67232	—
SC-2	5/16	0.3125	3/4	1/4	66836	67074	—

SC-BURRS CONTINUED

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut	Aluma Cut
SC-3					66837	67076	—
SC-3NF			3/4		—	—	67239
SC-3 L6 †	3/8	0.3750		1/4	67284	67327	—
SC-3L			1		66995	67386	—
SC-3X			1-1/2		66991	67329	—
SC-4			1	1/4	66838	67077	—
SC-4NF	7/16	0.4375			—	—	67392
SC-5			1	1/4	66839	67078	—
SC-5 L6 †	1/2	0.5000		1/4	67285	67330	—
SC-5NF					—	—	67240
SC-6			1	1/4	66840	67079	—
SC-6NF	5/8	0.6250			—	—	67241
SC-15	3/4	0.7500	1/2	1/4	66830	67069	—
SC-16	3/4	0.7500	3/4	1/4	66842	67082	—
SC-7			1	1/4	66841	67080	—
SC-7 L6 †	3/4	0.7500		1/4	67286	67332	—
SC-7NF					—	—	67266
SC-9	1	1.0000	1	1/4	66843	67081	—

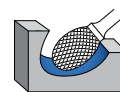
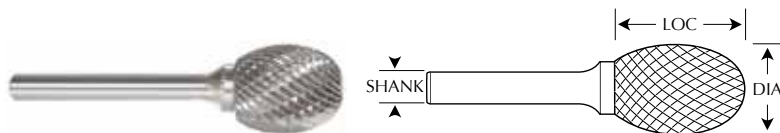
SD BURRS BALL SHAPE



† Mold, Tool & Die ‡ Long Shank Burr L2 = 2" Overall Length L3 = 3" Overall Length

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut	Aluma Cut
SD-40	1/16	0.0625	1/16	1/8	66844	67083	—
SD-61	3/32	0.0938	3/32	3/32	66845	67084	—
SD-41 †					66846	67085	—
SD-41 L2 †	3/32	0.0938	3/32	1/8	66848	67087	—
SD-41 L3 †					66847	67086	—
SD-11	1/8	0.1250	3/32	1/4	66851	67089	—
SD-42 †					66849	67088	—
SD-42 L2 †	1/8	0.1250	1/8	1/8	67414	67415	—
SD-42 L3 †					66850	67363	—
SD-52	5/32	0.1562	5/32	1/8	66857	67096	—
SD-14	3/16	0.1875	1/8	1/4	66854	67093	—
SD-53	3/16	0.1875	5/32	1/8	66852	67090	—
SD-81	3/16	0.1875	5/32	3/16	66853	67092	—
SD-51	1/4	0.2500	7/32	1/8	66855	67094	—
SD-1					66858	67098	—
SD-1 L6 †	1/4	0.2500	7/32	1/4	67287	67334	—
SD-1NF					—	—	67264
SD-2	5/16	0.3125	1/4	1/4	66859	67099	—
SD-3					66860	67100	—
SD-3 L6 †	3/8	0.3750	5/16	1/4	67289	67335	—
SD-3NF					—	—	67242
SD-4	7/16	0.4375	3/8	1/4	66861	67101	—
SD-5					66862	67102	—
SD-5 L6 †	1/2	0.5000	7/16	1/4	67291	67337	—
SD-5NF					—	—	67244
SD-6					66863	67103	—
SD-6NF	5/8	0.6250	9/16	1/4	—	—	67245
SD-7					66864	67104	—
SD-7 L6 †	3/4	0.7500	11/16	1/4	67293	67292	—
SD-7NF					—	—	67389
SD-9	1	1.0000	15/16	1/4	66865	67105	—

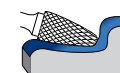
SE BURRS EGG / OVAL SHAPE



† Mold, Tool & Die ‡ Long Shank Burr L2 = 2" Overall Length L3 = 3" Overall Length

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut	Aluma Cut
SE-61	3/32	0.0938	1/8	3/32	66875	67115	—
SE-41 †					66866	67106	—
SE-41 L2 †	1/8	0.1250	7/32	1/8	67416	67417	—
SE-41 L3 †					66867	67107	—
SE-53	3/16	0.1875	9/32	1/8	66868	67108	—
SE-53 L3					67378	67407	—
SE-81	3/16	0.1875	9/32	3/16	66869	67109	—
SE-11	3/16	0.1875	5/16	1/4	67398	67399	—
SE-51					66870	67110	—
SE-51 L3	1/4	0.2500	3/8	1/8	67376	67377	—
SE-1					66871	67111	—
SE-1 L6 ‡	1/4	0.2500	3/8	1/4	67294	67340	—
SE-3					66872	67112	—
SE-3 L6 ‡	3/8	0.3750	5/8	1/4	67295	67341	—
SE-3NF					—	—	67246
SE-5					66873	67113	—
SE-5 L6 ‡	1/2	0.5000	7/8	1/4	67408	67342	—
SE-5NF					—	—	67248
SE-6					66874	67114	—
SE-6 L6 ‡	5/8	0.6250	1	1/4	67409	67319	—
SE-6NF					—	—	67249
SE-7					66876	67116	—
SE-7 L6 ‡	3/4	0.7500	1	1/4	67431	67426	—
SE-7NF					—	—	67402

SF BURRS TREE SHAPE - RADIUS



† Mold, Tool & Die ‡ Long Shank Burr L2 = 2" Overall Length L3 = 3" Overall Length

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut	Aluma Cut
SF-61	3/32	0.0938	1/4	3/32	67397	67396	—
SF-41 †	1/8	0.1250	1/4	1/8	66877	67117	—
SF-42 †					66878	67118	—
SF-42 L2 †	1/8	0.1250	1/2	1/8	67418	67419	—
SF-42 L3 †					66911	67365	—
SF-11	1/8	0.1250	1/2	1/4	66879	67119	—
SF-53	3/16	0.1875	1/2	1/8	66880	67120	—
SF-53 L3					66881	67121	—
SF-81	3/16	0.1875	1/2	3/16	66882	67122	—
SF-51					66883	67123	—
SF-51 L3	1/4	0.2500	1/2	1/8	66884	67124	—
SF-1 L6 ‡	1/4	0.2500	1/2	1/4	67297	67343	—
SF-1	1/4	0.2500	5/8	1/4	66885	67125	—
SF-1NF					—	—	67265
SF-3					66886	67126	—
SF-3 L6 ‡	3/8	0.3750	3/4	1/4	67298	67345	—
SF-3NF					—	—	67251
SF-4					66887	67127	—
SF-4 L6 ‡	7/16	0.4375	1	1/4	67296	67375	—
SF-13	1/2	0.5000	3/4	1/4	66888	67128	—
SF-5					66889	67129	—
SF-5 L6 ‡	1/2	0.5000	1	1/4	67299	67346	—
SF-5NF					—	—	67253

SF-BURRS CONTINUED

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut	Aluma Cut
SF-6					66890	67130	—
SF-6 L6 †	5/8	0.6250	1	1/4	67300	67347	—
SF-6NF					—	—	67255
SF-7					66891	67131	—
SF-7NF	3/4	0.7500	1	1/4	—	—	67271
SF-14					66892	67132	—
SF-14NF	3/4	0.7500	1-1/4	1/4	—	—	67390
SF-15	3/4	0.7500	1-1/2	1/4	66893	67133	—

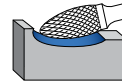
SG BURRS TREE SHAPE - POINTED



† Mold, Tool & Die ‡ Long Shank Burr L2 = 2" Overall Length

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut
SG-61	3/32	0.0938	1/4	3/32	67151	67150
SG-41 †	1/8	0.1250	1/4	1/8	66894	67134
SG-42 †	1/8	0.1250	5/16	1/8	66895	67135
SG-43 †	1/8	0.1250	3/8	1/8	66896	67136
SG-44 †					66910	67149
SG-44 L2 †	1/8	0.1250	1/2	1/8	67420	67421
SG-44 L3 †					67424	67425
SG-53	3/16	0.1875	1/2	1/8	66897	67137
SG-81	3/16	0.1875	1/2	3/16	66899	67139
SG-51	1/4	0.2500	1/2	1/8	66900	67140
SG-1 L6 ‡	1/4	0.2500	1/2	1/4	67301	67349
SG-1	1/4	0.2500	5/8	1/4	66902	67141
SG-2	5/16	0.3125	3/4	1/4	66903	67142
SG-3					66904	67143
SG-3 L6 ‡	3/8	0.3750	3/4	1/4	67302	67351
SG-13	1/2	0.5000	3/4	1/4	66905	67144
SG-5					66906	67145
SG-5 L6 ‡	1/2	0.5000	1	1/4	67303	67352
SG-6	5/8	0.6250	1	1/4	66907	67146
SG-7	3/4	0.7500	1	1/4	66908	67147
SG-15	3/4	0.7500	1-1/2	1/4	66909	67148

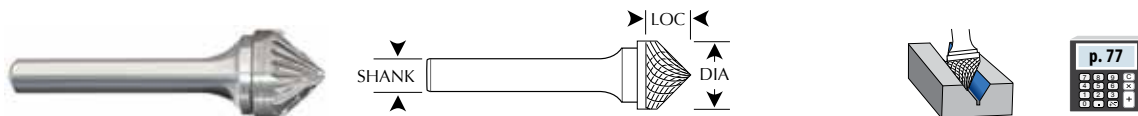
SH BURRS FLAME SHAPE



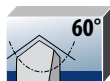
† Mold, Tool & Die ‡ Long Shank Burr L2 = 2" Overall Length L3 = 3" Overall Length

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut
SH-41 †					66912	67152
SH-41 L2 †	1/8	0.1250	1/4	1/8	67422	67423
SH-41 L3 †					67315	67367
SH-53	3/16	0.1875	3/8	1/8	66913	67153
SH-1	1/4	0.2500	5/8	1/4	66920	67160
SH-2					66916	67156
SH-2 L6 ‡	5/16	0.3125	3/4	1/4	67309	67358
SH-5					66917	67157
SH-5 L6 ‡	1/2	0.5000	1-1/4	1/4	67311	67360
SH-6					66918	67158
SH-6 L6 ‡	5/8	0.6250	1-7/16	1/4	67304	67359
SH-7					66919	67159
SH-7 L6 ‡	3/4	0.7500	1-5/8	1/4	67427	67428

SJ & SK BURRS CONE SHAPE



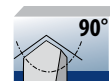
BURR SJ



DE Double End † Mold, Tool & Die

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut
SJ-42 †	1/8	0.1250	3/32	1/8	66921	67162
SJ-42 DE †	1/8	0.1250	3/32	1/8	66922	67163
SJ-81	3/16	0.1875	9/64	3/16	66930	67164
SJ-81 DE	3/16	0.1875	9/64	3/16	66931	—
SJ-1	1/4	0.2500	3/16	1/4	66923	67165
SJ-1 DE	1/4	0.2500	3/16	1/4	66924	67166
SJ-3	3/8	0.3750	5/16	1/4	66925	67167
SJ-5	1/2	0.5000	7/16	1/4	66926	67169
SJ-6	5/8	0.6250	9/16	1/4	66927	67170
SJ-7	3/4	0.7500	11/16	1/4	66928	67171
SJ-9	1	1.0000	15/16	1/4	66929	67172

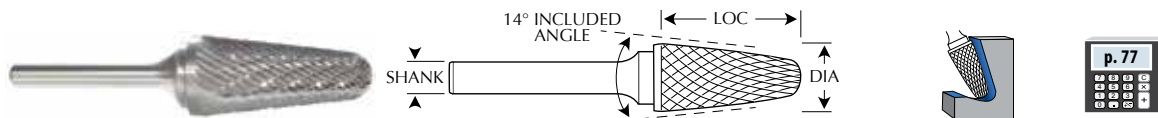
BURR SK



DE Double End † Mold, Tool & Die

TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut
SK-42 †	1/8	0.1250	1/16	1/8	66932	67173
SK-42 DE †	1/8	0.1250	1/16	1/8	66933	67174
SK-81	3/16	0.1875	3/32	3/16	66934	67175
SK-81 DE	3/16	0.1875	3/32	3/16	66935	67176
SK-1	1/4	0.2500	1/8	1/4	66936	67177
SK-3	3/8	0.3750	3/16	1/4	66937	67178
SK-5	1/2	0.5000	1/4	1/4	66938	67179
SK-6	5/8	0.6250	5/16	1/4	66939	67180
SK-7	3/4	0.7500	3/8	1/4	66940	67181
SK-9	1	1.0000	1/2	1/4	66941	67182

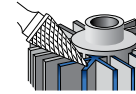
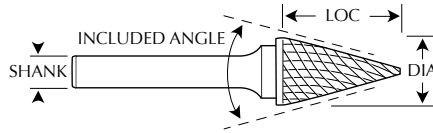
SL BURRS TAPERED SHAPE - RADIUS



† Mold, Tool & Die ‡ Long Shank Burr L2 = 2" Overall Length L3 = 3" Overall Length

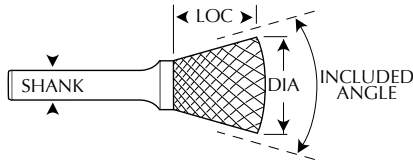
TOOL	DIA	DEC IN	LOC	SHANK	Single Cut	Double Cut	Aluma Cut
SL-41 †	1/8	0.1250	3/8	1/8	66943	67184	—
SL-42 †	1/8	0.1250	1/2	1/8	66944	67185	—
SL-42 L2 †	1/8	0.1250	1/2	1/8	66945	67186	—
SL-42 L3 †	1/8	0.1250	1/2	1/8	67317	67369	—
SL-53	3/16	0.1875	1/2	1/8	66946	67188	—
SL-81	3/16	0.1875	1/2	3/16	66947	67189	—
SL-1	1/4	0.2500	5/8	1/4	66948	67190	—
SL-1 L6 ‡	1/4	0.2500	5/8	1/4	67305	67355	—
SL-1NF	1/4	0.2500	5/8	1/4	—	—	67274
SL-2	5/16	0.3125	7/8	1/4	66949	67191	—
SL-3	3/8	0.3750	1-1/16	1/4	66950	67192	—
SL-3 L6 ‡	3/8	0.3750	1-1/16	1/4	67307	67356	—
SL-3NF	3/8	0.3750	1-1/16	1/4	—	—	67257
SL-4	1/2	0.5000	1-1/8	1/4	66951	67193	—
SL-4 L6 ‡	1/2	0.5000	1-1/8	1/4	66952	67194	—
SL-4NF	1/2	0.5000	1-1/8	1/4	—	—	67258
SL-4NF L6 ‡	1/2	0.5000	1-1/8	1/4	—	—	67259
SL-5	5/8	0.6250	1-3/16	1/4	66953	67195	—
SL-5 L6 ‡	5/8	0.6250	1-3/16	1/4	67308	67357	—
SL-5NF	5/8	0.6250	1-3/16	1/4	—	—	67391
SL-6	5/8	0.6250	1-5/16	1/4	66942	67183	—
SL-6NF	5/8	0.6250	1-5/16	1/4	—	—	67261
SL-7	3/4	0.7500	1-1/2	1/4	66954	67196	—
SL-7 L6 ‡	3/4	0.7500	1-1/2	1/4	—	67429	—
SL-7NF	3/4	0.7500	1-1/2	1/4	—	—	67403

SM BURRS CONE SHAPE - POINTED



TOOL	DIA	DEC IN	L2 = 2" Overall Length		L3 = 3" Overall Length		Single Cut	Double Cut
			LOC	SHANK	INCLUDED ANGLE			
SM-61 †	3/32	0.0938	1/4	3/32	10°	66955	67197	
SM-41 †	1/8	0.1250	11/32	1/8	12°	66956	67198	
SM-42 †	1/8	0.1250	7/16	1/8	14°	66957	67199	
SM-42 L2 †						66958	67200	
SM-42 L3 †						66959	67201	
SM-43 †	1/8	0.1250	5/8	1/8	7°	66960	67202	
SM-43 L2 †						66961	67203	
SM-43 L3 †						66962	67204	
SM-81	3/16	0.1875	1/4	3/16	12	66964	67206	
SM-53	3/16	0.1875	1/2	1/8	16°	66963	67205	
SM-51	1/4	0.2500	1/2	1/8	22°	66965	67207	
SM-1	1/4	0.2500	1/2	1/4	22°	66966	67208	
SM-1 L6 ‡						67371	67372	
SM-2	1/4	0.2500	3/4	1/4	14°	66967	67209	
SM-3	1/4	0.2500	1	1/4	10°	66968	67210	
SM-3 L6 ‡						67380	67381	
SM-4	3/8	0.3750	5/8	1/4	28°	66969	67211	
SM-4 L6 ‡						67313	67379	
SM-5	1/2	0.5000	7/8	1/4	28°	66970	67212	
SM-5 L6 ‡						67314	67214	
SM-6	5/8	0.6250	1	1/4	31°	66971	67213	

SN BURRS CONE SHAPE - INVERTED



TOOL	DIA	DEC IN	L2 = 2" Overall Length		L3 = 3" Overall Length		Single Cut	Double Cut
			LOC	SHANK	INCLUDED ANGLE			
SN-61	3/32	0.0938	1/8	3/32	10°	66972	67215	
SN-41 †	3/32	0.0938	1/8	1/8	10°	66973	67216	
SN-41 L2 †						66974	67217	
SN-41 L3 †						66975	67218	
SN-42 †	1/8	0.1250	3/16	1/8	10°	66980	67223	
SN-42 L2 †						66976	67219	
SN-42 L3 †						66977	67220	
SN-53	3/16	0.1875	1/4	1/8	10°	66981	67224	
SN-81	3/16	0.1875	1/4	3/16	10°	66982	67225	
SN-51	1/4	0.2500	1/4	1/8	10°	66983	67226	
SN-1	1/4	0.2500	5/16	1/4	10°	66984	67227	
SN-2	3/8	0.3750	3/8	1/4	13°	66988	67231	
SN-4	1/2	0.5000	1/2	1/4	28°	66985	67228	
SN-6	5/8	0.6250	3/4	1/4	18°	66986	67229	
SN-7	3/4	0.7500	5/8	1/4	30°	66987	67230	

DEBURRING RECOMMENDATIONS

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



SINGLE CUT
Ideal for Finishing



DOUBLE CUT
Ideal for Material Removal



ALUMA CUT
Ideal for Non-ferrous Materials

BURR DIAMETER	MINIMUM RPM	MEDIUM RPM	MAXIMUM RPM (STAINLESS)
1/16	50000	75000	100000
1/8	30000	60000	90000
3/16	25000	50000	75000
1/4	20000	40000	65000
5/16	15000	35000	60000
3/8	15000	35000	60000
7/16	15000	35000	60000
1/2	10000	30000	50000
5/8	10000	30000	50000
3/4	10000	20000	35000
1	5000	15000	30000

5 PIECE SETS

- Included: 1/8, 3/16, 1/4, 3/8 & 1/2" diameters
- Regular/standard flute and overall lengths
- Rugged plastic index can be reused to house future tooling
- Engineered nano-foam cushioning for ultimate tool protection

FUSION END MILLS

FLUTES	END STYLE	Bright	AlTiCrN
4	SQUARE	75211	75212



GENERAL PURPOSE END MILLS

END STYLE	FLUTES	Bright	TiCN	AlTiN
SQUARE	2	61706	61707	—
	3	61833	—	61834
	4	62398	—	62399
BALLNOSE	2	63324	63325	—
	3	63446	—	63447
	4	63684	—	63685



5 PIECE SETS

- Included: 1/8, 3/16, 1/4, 3/8 & 1/2" diameters
- Regular/standard flute and overall lengths
- Rugged plastic index can be reused to house future tooling
- Engineered nano-foam cushioning for ultimate tool protection

DRILL MILL SETS



FLUTES	INCLUDED ANGLE	Bright	AlTiN
2	90°	62491	62492
4	90°	62493	62494

N/C SPOT DRILL SETS



INCLUDED ANGLE	Bright	AlTiN
90°	67974	67975
120°	67976	67977
140°	67978	67979

SPADE DRILL SETS



INCLUDED ANGLE	Bright
118°	67925

DRILL INDEX SETS



DRILL STYLE	PIECES	SIZES INCLUDED	Bright	AlTiN
TWIST - JOBBER	15	1/16" - 1/2" x 32nds	75213	75214
	21	1/16" - 3/8" x 64ths	75215	75216
	24	1.0 mm - 12.5mm x 0.5mm	75217	75218
	29	1/16" - 1/2" x 64ths	75219	75220
SCREW MACHINE	15	1/16" - 1/2" x 32nds	75221	75222
	21	1/16" - 3/8" x 64ths	75223	75224
	24	1.0 mm - 12.5mm x 0.5mm	75225	75226
STRAIGHT FLUTE	29	1/16" - 1/2" x 64ths	75227	75228
	15	1/16" - 1/2" x 32nds	75229	75230
	21	1/16" - 3/8" x 64ths	75231	75232
	24	1.0 mm - 12.5mm x 0.5mm	75233	75234
	29	1/16" - 1/2" x 64ths	75235	75236

COUNTERSINK 4 PIECE SETS

- Included: 1/4, 1/2, 3/4 & 1" diameters



FLUTES	INCLUDED ANGLE	Bright
1	60°	67577
	82°	67578
	90°	67579
	100°	67580
	120°	67581
3	60°	67680
	82°	67681
	90°	67682
	100°	67683
6	120°	67684
	60°	67876
	82°	67877
	90°	67878
100°	67879	
	120°	67880

ALUMA BURR SETS



SET	# OF PIECES	DIA INCLUDED	BURRS INCLUDED	ALUMA CUT
AL1	10	1/4 & 3/8"	SA-1NF, SA-3NF, SB-3NF, SC-1NF, SC-3NF, SD-1NF, SD-3NF, SE-3NF, SF-3NF, SL-3NF	67498
AL2	12	1/4, 3/8 & 1/2"	SA-1NF, SA-3NF, SA-5NF, SC-1NF, SC-3NF, SC-5NF, SD-1NF, SD-3NF, SD-5NF, SF-1NF, SF-3NF, SF-5NF	67499
AL3	12	1/4, 3/8 & 1/2"	SA-1NF, SA-3NF, SA-5NF, SB-5NF, SD-1NF, SD-3NF, SD-5NF, SF-1NF, SF-3NF, SF-5NF, SL-3NF, SL-4NF	67500
AL4	11	1/4, 3/8 & 1/2"	SA-1NF, SA-3NF, SA-5NF, SC-1NF, SC-3NF, SC-5NF, SF-1NF, SF-3NF, SF-5NF, SL-3NF, SL-4NF	67501
AL5	8	1/2 & 3/8"	SA-5NF, SB-5NF, SC-5NF, SD-5NF, SE-5NF, SF-5NF, SL-3NF, SL-4NF	67502
AL6	10	3/8 & 1/2"	SA-3NF, SA-5NF, SD-3NF, SD-5NF, SE-3NF, SE-5NF, SF-3NF, SF-5NF, SL-3NF, SL-4NF	67503

MINIATURE BURR SETS

SET	# OF PIECES	DIA INCLUDED	BURRS INCLUDED	SINGLE CUT	DOUBLE CUT
A	12	3/32 & 1/8"	SA-42, SA-43, SC-42, SD-42, SE-41, SF-41, SF-42, SG-41, SL-42, SM-43, SN-41, SN-42	67439	67468
B	12	1/16, 3/32 & 1/8"	SA-41, SA-42, SC-41, SC-42, SD-42, SE-41, SF-41, SF-42, SH-41, SL-41, SL-42, SN-42	67440	67469
C	11	1/16, 3/32 & 1/8"	SA-41, SB-41, SC-41, SD-41, SE-41, SF-41, SG-41, SH-41, SL-41, SM-41, SN-41	67441	67471
D	11	3/32 & 1/8"	SA-42, SB-42, SC-42, SD-42, SF-42, SG-42, SJ-42, SK-42, SL-42, SM-42, SN-42	67442	67472



STANDARD BURR SETS



SET	# OF PIECES	DIA INCLUDED	BURRS INCLUDED	SINGLE CUT	DOUBLE CUT
K	12	1/8, 5/32, 3/16 & 1/4"	SA-11, SB-14, SC-13, SD-14, SE-11, SF-11, SG-1, SH-1, SJ-1, SK-1, SM-1, SN-1	67449	67480
F	12	5/32 & 3/16"	SA-52, SA-53, SC-52, SC-53, SD-52, SD-53, SE-53, SF-53, SG-53, SH-53, SM-53, SN-53	67444	67474
H	12	5/32 & 1/4"	SA-51, SA-52, SB-51, SC-51, SC-52, SD-51, SD-52, SE-51, SF-51, SG-51, SM-51, SN-51	67446	67476
E	10	3/16"	SA-53, SC-53, SD-53, SE-53, SF-53, SG-53, SH-53, SL-53, SM-53, SN-53	67443	67473
L	12	3/16 & 1/4"	SA-1, SA-14, SC-1, SC-14, SD-1, SE-1, SF-1, SG-1, SJ-1, SL-1, SH-1, SN-1	67450	67481
AA	12	1/4"	SA-1, SB-1, SC-1, SD-1, SE-1, SF-1, SG-1, SH-1, SJ-1, SK-1, SL-1, SM-1	67464	67495
G	9	1/4"	SA-51, SB-51, SC-51, SD-51, SE-51, SF-51, SG-51, SM-51, SN-51	67445	67475
I	12	1/4"	SA-1, SB-1, SC-1, SD-1, SE-1, SF-1, SG-1, SH-1, SJ-1, SK-1, SM-1, SN-1	67447	67478
J	12	1/4"	SB-1, SC-1, SD-1, SE-1, SF-1, SG-1, SH-1, SJ-1, SK-1, SL-1, SM-1, SN-1	67448	67479
M	9	1/4 & 3/8"	SA-3, SC-3, SD-3, SE-3, SF-3, SG-3, SJ-3, SM-3, SN-2	67451	67482
N	9	1/4 & 3/8"	SB-3, SC-3, SD-3, SE-3, SF-3, SG-3, SK-3, SL-3, SM-3	67452	67483
O	12	1/4, 3/8 & 1/2"	SA-1, SA-3, SA-5, SD-1, SD-3, SD-5, SF-1, SF-3, SF-5, SG-1, SG-3, SG-5	67459	67490
P	9	1/4, 3/8 & 1/2"	SA-1, SA-3, SA-5, SC-1, SC-3, SC-5, SF-1, SF-3, SF-5	67453	67484
Q	9	1/4, 3/8 & 1/2"	SB-1, SB-3, SB-5, SD-1, SD-3, SD-5, SE-1, SE-3, SE-5	67454	67485
R	9	1/4, 3/8 & 1/2"	SA-1, SA-3, SA-5, SE-1, SE-3, SE-5, SN-1, SN-2, SN-4	67455	67486
S	9	1/4, 3/8 & 1/2"	SB-1, SB-3, SB-5, SC-1, SC-3, SC-5, SF-1, SF-3, SF-5	67456	67487
V	12	1/4, 3/8 & 1/2"	SA-1, SA-3, SA-5, SC-1, SC-3, SC-5, SE-1, SE-3, SE-5, SM-1, SM-3, SM-5	67460	67491
W	12	1/4, 3/8 & 1/2"	SB-1, SB-3, SB-5, SD-1, SD-3, SD-5, SF-1, SF-3, SF-5, SN-1, SN-2, SN-4	67461	67492
X	12	1/4, 3/8 & 1/2"	SA-1, SA-3, SA-5, SC-1, SC-3, SC-5, SG-1, SG-3, SG-5, SM-1, SM-3, SM-5	67462	67493
Y	12	1/4, 3/8 & 1/2"	SF-1, SF-3, SF-5, SG-1, SG-3, SG-5, SL-1, SL-3, SL-4, SM-1, SM-3, SM-5	67463	67494
AB	12	3/8"	SA-3, SB-3, SC-3, SD-3, SE-3, SF-3, SG-3, SJ-3, SK-3, SL-3, SM-4, SN-2	67465	67496
AC	12	1/2"	SA-5, SB-5, SC-5, SD-5, SE-5, SF-5, SG-5, SH-5, SJ-5, SK-5, SL-4, SM-5	67466	67497
T	8	1/2"	SA-5, SC-5, SD-5, SE-5, SG-5, SH-5, SK-5, SM-5	67457	67488
U	8	1/2"	SB-5, SC-5, SD-5, SF-5, SG-5, SH-5, SJ-5, SK-5	67458	67489

