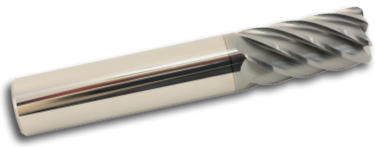
75th ANNIVERSARY CATALOG

COMPLETE PRODUCT LINE

CARR TOOL®

ISO 9001:2015 Certified

TMR



Page 144

ARC



Page 114

1160/1180



Page 17

VRX-6



Page 173

V5-C



Page 160

H-45



Page 178

HUNDREDS OF NEW ITEMS!

V4-B



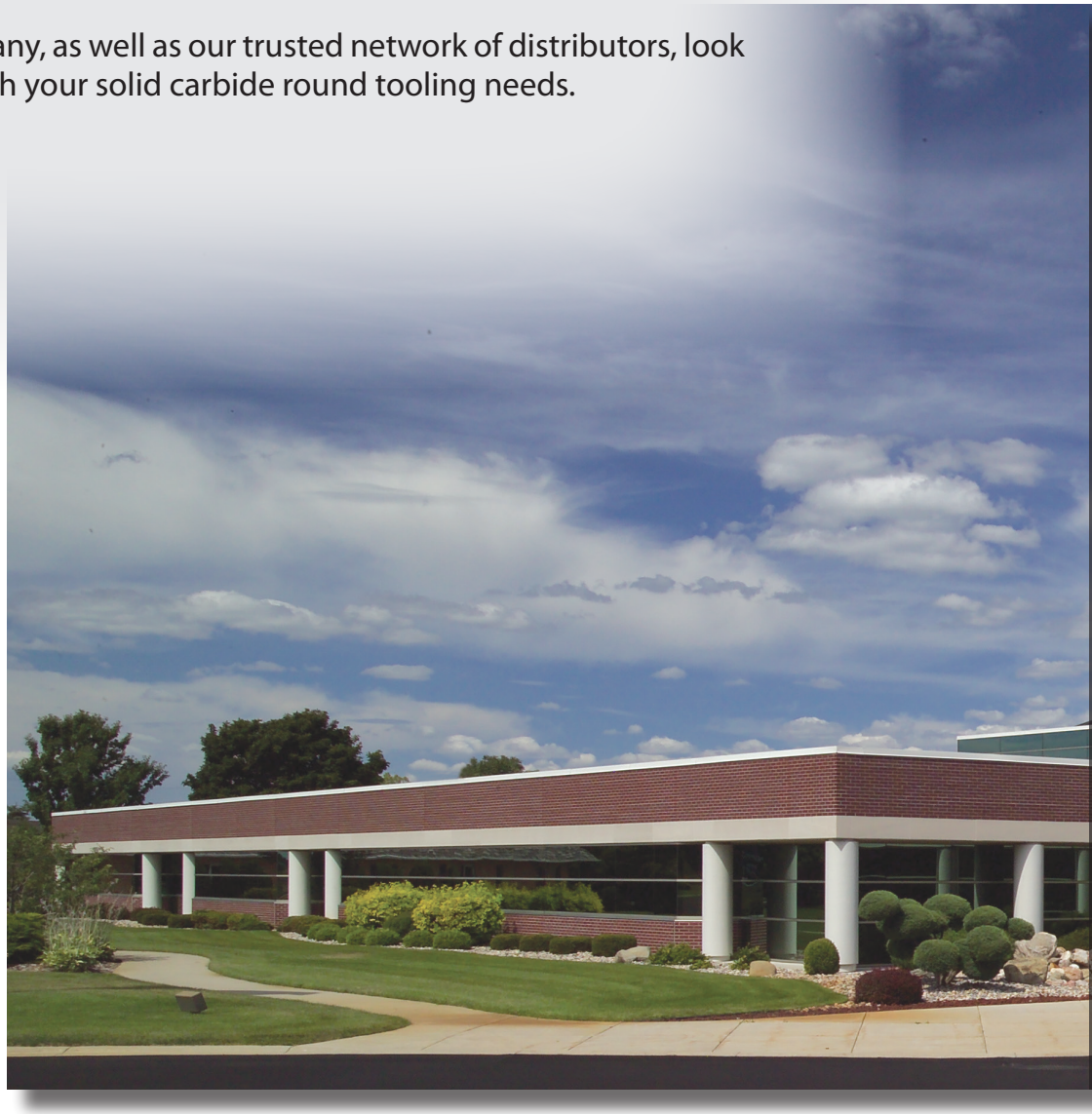
Page 153

Celebrating seventy-five years in the cutting tool industry, Garr Tool Company maintains its commitment to manufacturing the highest quality carbide cutting tools, offering competitive prices and providing unequaled customer service.

Located in Alma, Michigan USA, our current 208,000 square foot facility contains clean, efficient production space. Our state-of-the-art CNC grinding equipment is run by experienced, conscientious operators. Oerlikon Balzers Coating USA manages our in-house coating facility. Garr Tool Company will continue to invest in new technology to meet the future needs of our customers.

With a continued focus on maintaining our fast, reliable service, we operate an inventory and shipping center in England to better service our customers in the UK and throughout Europe. Being your trusted source for carbide tooling is paramount at Garr Tool Company. Standard catalog items are shipped from stock within 24 hours at a 99% fill rate. GARR TOOL continues to introduce new series of standard tools to meet the demands of material specific machining. We also take pride in shipping custom tools within two weeks. We encourage you to visit our website, www.garrtool.com.

All of us at Garr Tool Company, as well as our trusted network of distributors, look forward to helping you with your solid carbide round tooling needs.



GARR TOOL®

Welcome to
Garr Tool Company



TABLE OF CONTENTS

TOOL RECOMMENDATIONS

	PAGE
Aluminum	8
Titanium	9
Stainless Steel	10
Inconel, High Nickel Alloys	11
Brass, Bronze, Copper, Magnesium	12
Hardened Tool Steels	13
Composite Materials	14
Carbon Steels, Medium Alloy Steels	15
Cast Iron	16

DRILLS - HIGH PERFORMANCE

	1550H	2 Flute	3xD	AlTiN-Based Coated	23
	1580HD	2 Flute	3xD	AlTiN-Based Coated	29
	1580H	2 Flute	3xD	AlTiN-Based Coated	33
	1580KD	2 Flute	3xD	Coolant Fed, AlTiN-Based Coated	38
	1580KH	2 Flute	3xD	Coolant Fed, AlTiN-Based Coated	45
	1250H	2 Flute	5xD	AlTiN-Based Coated	23
	1280H	2 Flute	5xD	AlTiN-Based Coated	33
	1280KD	2 Flute	5xD	Coolant Fed, AlTiN-Based Coated	38
	1280KH	2 Flute	5xD	Coolant Fed, AlTiN-Based Coated	45
	1880KH	2 Flute	7xD	Coolant Fed, AlTiN-Based Coated	45
	1850H	2 Flute	12xD	AlTiN-Based Coated	23
NEW SERIES	1160	3 Flute	3xD	ALUMASTAR Coated	17
NEW SIZES	1180	3 Flute	5xD	ALUMASTAR Coated	17

DRILLS - GENERAL PURPOSE

	1600	2 Flute	25° Helix	N/C Spotting, Bright Finish	52
	1400	2 Flute	10° Helix	Combined Drill/Countersink, Bright Finish	53
	1500	2 Flute	3xD	Straight	Hard Metal, Bright Finish	54
	1500H	2 Flute	3xD	Straight	Hard Metal, Hardlube Coated	56
	1510	2 Flute	3xD		Slow Spiral, Bright Finish	58
	1510H	2 Flute	3xD		Slow Spiral, Hardlube Coated	61
	1520	2 Flute	3xD		Bright Finish	64
	1520H	2 Flute	3xD		Hardlube Coated	67
	1205	2 Flute	5xD		Bright Finish	72
	1205H	2 Flute	5xD		Hardlube Coated	75
	1200	2 Flute	5xD		Bright Finish	78
	1200H	2 Flute	5xD		Hardlube Coated	81
	1800H	2 Flute	8xD		Parabolic, Hardlube Coated	88
	1100	3 Flute	5xD		Bright Finish	84
	1100H	3 Flute	5xD		Hardlube Coated	86
	1120H	3 Flute	3xD		Hardlube Coated	70

REAMERS

4100	Standard	Bright Finish	90
4100	Standard Metric	Bright Finish	102

DRILL MILLS

152M	2 Flute	Bright Finish - Angle to a Point	104
152MA	2 Flute	TiALN Coated - Angle to a Point	105
152DA	2 Flute	TiALN Coated - 120° Drill Point	108
154M	4 Flute	Bright Finish - Angle to a Point	106
154MA	4 Flute	TiALN Coated - Angle to a Point	107

ROUGHERS

				PAGE
ARC	3 Flute	Chamfer	Staggered, Bright Finish	114
VHM	4 Flute	Chamfer	Staggered, AlTiN Coated	116

END MILLS - HIGH PERFORMANCE

	142M	2 Flute	Square	ALUMASTAR Coated	118
	142R	2 Flute	Radius	ALUMASTAR Coated	119
NEW SIZES	142B	2 Flute	Ball	ALUMASTAR Coated	121
	242M/842M	2 Flute	Square	Bright Finish	127
	350MX/950MX	2 Flute	Ball	AlTiN Coated	179
NEW SIZES	143M	3 Flute	Square	ALUMASTAR Coated	122
NEW SIZES	143R	3 Flute	Radius	ALUMASTAR Coated	124
	253MA/853MA	3 Flute	Square	AlTiN Coated	128
	253M/853M	3 Flute	Square	Bright Finish	130
	253MC	3 Flute	Square	TiCN Coated	132
	263M	3 Flute	Square	Bright Finish	133
	263MC	3 Flute	Square	TiCN Coated	133
	263MA/863MA	3 Flute	Square	AlTiN Coated	133
NEW SIZES	V4-S	4 Flute	Square	AlCrN Coated	149
NEW SIZES	V4-R	4 Flute	Radius	AlCrN Coated	150
NEW SIZES	V4-B	4 Flute	Ball	AlCrN Coated	153
NEW SIZES	VRX	4 Flute	S, R, B	AlTiN Coated	163
	210D	4 Flute	Square	DIAMOND Coated	180
	210RD	4 Flute	Radius	DIAMOND Coated	181
	310D	4 Flute	Ball	DIAMOND Coated	182
	610D	4 Flute	Square	DIAMOND Coated	183
	710D	4 Flute	Ball	DIAMOND Coated	184
	H-45	4 Flute	Radius	AlTiN Coated	178
	545MA	4/5 Flute	Square	AlTiN Coated	175
	545RA	4/5 Flute	Radius	AlTiN Coated	176
	545BA	4/5 Flute	Ball	AlTiN Coated	177
	255MA/855MA	5 Flute	Square	AlTiN Coated	134
	255M/855M	5 Flute	Square	Bright Finish	136
	255MC	5 Flute	Square	TiCN Coated	138
	255RA/855RA	5 Flute	Radius	AlTiN Coated	139
NEW SIZES	V5	5 Flute	S, R	AlCrN Coated	154
NEW SIZES	V5 Chip Splitter	5 Flute	S, R	AlCrN Coated	160
NEW SIZES	VRX-6	6 Flute	S, R	AlTiN Coated	173
	246M/846M	6 Flute	Square	Bright Finish	141
	246MC	6 Flute	Square	TiCN Coated	141
	246MA/846MA	6 Flute	Square	AlTiN Coated	141
	TMS	Multi-Flute	Square	AlCrN Coated	142
	TMR	Multi-Flute	Radius	AlCrN Coated	144

END MILLS - STUB LENGTH - GENERAL PURPOSE

160M/860M	2 Flute	Square	Bright Finish	185
160MA/860MA	2 Flute	Square	TiALN Coated	187
180M/980M	2 Flute	Ball	Bright Finish	188
180MA/980MA	2 Flute	Ball	TiALN Coated	189
170M/870M	4 Flute	Square	Bright Finish	185
170MA/870MA	4 Flute	Square	TiALN Coated	187
190M/990M	4 Flute	Ball	Bright Finish	188
190MA/990MA	4 Flute	Ball	TiALN Coated	189
175M/875M	4 Flute	Square	Double End, Bright Finish	190
175MA/875MA	4 Flute	Square	Double End, TiALN Coated	191
195M/995M	4 Flute	Ball	Double End, Bright Finish	192
195MA/995MA	4 Flute	Ball	Double End, TiALN Coated	193

END MILLS - STANDARD LENGTH - GENERAL PURPOSE

					PAGE
	220M/820M	2 Flute	Square	Bright Finish	194
	220MT	2 Flute	Square	TiN Coated	196
	220MC	2 Flute	Square	TiCN Coated	197
	220MA/820MA	2 Flute	Square	TiALN Coated	198
	220R	2 Flute	Radius	Bright Finish	200
	220RA	2 Flute	Radius	TiALN Coated	202
	320M/920M	2 Flute	Ball	Bright Finish	205
	320MT	2 Flute	Ball	TiN Coated	207
	320MC	2 Flute	Ball	TiCN Coated	208
	320MA/920MA	2 Flute	Ball	TiALN Coated	209
	222M	2 Flute	Square	Straight Flute, Bright Finish	211
	280M	2 Flute	Square	N/C Tolerance, Bright Finish	213
	380M	2 Flute	Ball	N/C Tolerance, Bright Finish	213
	425M	2 Flute	Square	Double End, 3/8" Shank, Bright Finish	214
	425MA	2 Flute	Square	Double End, 3/8" Shank, TiALN Coated	214
	223M/823M	3 Flute	Square	Bright Finish	194
	223MC	3 Flute	Square	TiCN Coated	197
	223MA/823MA	3 Flute	Square	TiALN Coated	198
	323M/923M	3 Flute	Ball	Bright Finish	205
	323MC	3 Flute	Ball	TiCN Coated	208
	323MA/923MA	3 Flute	Ball	TiALN Coated	209
	273M	3 Flute	Square	Tapered, Bright Finish	212
	373M	3 Flute	Ball	Tapered, Bright Finish	212
	230M/830M	4 Flute	Square	Bright Finish	194
	230MT	4 Flute	Square	TiN Coated	196
	230MC	4 Flute	Square	TiCN Coated	197
	230MA/830MA	4 Flute	Square	TiALN Coated	198
	230R	4 Flute	Radius	Bright Finish	200
	230RA/830RA	4 Flute	Radius	TiALN Coated	202
	330M/930M	4 Flute	Ball	Bright Finish	205
	330MT	4 Flute	Ball	TiN Coated	207
	330MC	4 Flute	Ball	TiCN Coated	208
	330MA/930MA	4 Flute	Ball	TiALN Coated	209
	234M	4 Flute	Square	Straight Flute, Bright Finish	211
NEW SIZES	334MA	4 Flute	Ball	Straight Flute, TiALN Coated	211
	290M	4 Flute	Square	N/C Tolerance, Bright Finish	213
	390M	4 Flute	Ball	N/C Tolerance, Bright Finish	213
	435M	4 Flute	Square	Double End, 3/8" Shank, Bright Finish	214
	435MA	4 Flute	Square	Double End, 3/8" Shank, TiALN Coated	214
	535M	4 Flute	Ball	Double End, 3/8" Shank, Bright Finish	215
	535MA	4 Flute	Ball	Double End, 3/8" Shank, TiALN Coated	215
	430M	4 Flute	Square	Double End, Bright Finish	216
	430MA/450MA	4 Flute	Square	Double End, TiALN Coated	217
	530M	4 Flute	Ball	Double End, Bright Finish	218
	530MA	4 Flute	Ball	Double End, TiALN Coated	219

ROTARY FILES

			PAGE
1/4" Diameter	Standard Shape	Steel Shank	236
3/16" Diameter		Solid Carbide	248
1/4" Diameter		1/8" Diameter Steel Shank	249
1/8" Diameter		Solid Carbide	250

END MILLS - EXTRA LENGTH - GENERAL PURPOSE

				PAGE
620M/640M	2 Flute	Square	Bright Finish	220
620MC	2 Flute	Square	TiCN Coated	222
620MA/640MA	2 Flute	Square	TiALN Coated	223
720M/740M	2 Flute	Ball	Bright Finish	231
720MC	2 Flute	Ball	TiCN Coated	233
720MA/740MA	2 Flute	Ball	TiALN Coated	234
623M/643M	3 Flute	Square	Bright Finish	220
623MC	3 Flute	Square	TiCN Coated	222
623MA/643MA	3 Flute	Square	TiALN Coated	223
723M/743M	3 Flute	Ball	Bright Finish	231
723MC	3 Flute	Ball	TiCN Coated	233
723MA/743MA	3 Flute	Ball	TiALN Coated	234
630M/650M	4 Flute	Square	Bright Finish	220
630MC	4 Flute	Square	TiCN Coated	222
630MA/650MA	4 Flute	Square	TiALN Coated	223
630R	4 Flute	Radius	Bright Finish	225
630RA	4 Flute	Radius	TiALN Coated	228
730M/750M	4 Flute	Ball	Bright Finish	231
730MC	4 Flute	Ball	TiCN Coated	233
730MA/750MA	4 Flute	Ball	TiALN Coated	234

TECHNICAL DATA

Tool Coatings	256
General Milling Guide - *fractional*	258
High Performance Milling Guide - *fractional*	259
General Milling Guide - *metric*	260
High Performance Milling Guide - *metric*	261
Alumastar Coated Milling Guide	262
VRX Milling Guide	263
VRX-6 Milling Guide	264
ARC Milling Guide	266
VHM Milling Guide	267
TMS/TMR Milling Guide - *fractional*	268
TMS/TMR Milling Guide - *metric*	269
TMS/TMR Chip Thinning Calculations - *fractional*	270
TMS/TMR Chip Thinning Calculations - *metric*	271
V4 High Speed Milling Guide - *fractional*	272
V4 High Speed Milling Guide - *metric*	273
V5 High Speed Milling Guide - *fractional*	274
V5 High Speed Milling Guide - *metric*	275
High Rc Finisher Milling Guide - *fractional*	276
High Rc Finisher Milling Guide - *metric*	277
Die Mold Cutter Milling Guide - *fractional*	278
Die Mold Cutter Milling Guide - *metric*	279
High Feed Milling Guide	280
Diamond Coated Milling Guide	281
Reaming Guide - *fractional*	282
Reaming Guide - *metric*	283
Drill Mills, Chamfering - *fractional*	284
Drill Mills, Chamfering - *metric*	285
Drill Mills, Through Hole - *fractional*	286
Drill Mills, Through Hole - *metric*	287
Drill Mills, Solids - *fractional*	288
Drill Mills, Solids - *metric*	289
General Drilling Guide - *fractional*	290
General Drilling Guide - *metric*	292
High Performance Mini Drills Guide - *fractional*	294
High Performance Mini Drills Guide - *metric*	295
High Performance Drilling Guide - *fractional*	296
High Performance Drilling Guide - *metric*	297
3-Flute for Aluminum Drilling Guide	298
Length Deviation Chart for Spotting Drills	299

Series / Page Number Search

Series	Page	Series	Page	Series	Page	Series	Page
142B	121	263M	133	640M	220	980M	188
142M	118	263MA	133	640MA	223	980MA	189
142R	119	263MC	133	643M	220	990M	188
143M	122	273M	212	643MA	223	990MA	189
143R	124	280M	213	650M	220	995M	192
152DA	108	290M	213	650MA	223	995MA	193
152M	104	310D	182	710D	184	1100	84
152MA	105	320M	205	720M	231	1100H	86
154M	106	320MA	209	720MA	234	1120H	70
154MA	107	320MC	208	720MC	233	1160	17
160M	185	320MT	207	723M	231	1180	17
160MA	187	323M	205	723MA	234	1200	78
170M	185	323MA	209	723MC	233	1200H	81
170MA	187	323MC	208	730M	231	1205	72
175M	190	330M	205	730MA	234	1205H	75
175MA	191	330MA	209	730MC	233	1250H	23
180M	188	330MC	208	740M	231	1280H	33
180MA	189	330MT	207	740MA	234	1280KD	38
190M	188	334MA	211	743M	231	1280KH	45
190MA	189	350MX	179	743MA	234	1400	53
195M	192	373M	212	750M	231	1500	54
195MA	193	380M	213	750MA	234	1500H	56
210D	180	390M	213	820M	194	1510	58
210RD	181	425M	214	820MA	198	1510H	61
220M	194	425MA	214	823M	194	1520	64
220MA	198	430M	216	823MA	198	1520H	67
220MC	197	430MA	217	830M	194	1550H	23
220MT	196	435M	214	830MA	198	1580H	33
220R	200	435MA	214	830RA	202	1580HD	29
220RA	202	450MA	217	842M	127	1580KD	38
222M	211	530M	218	846M	141	1580KH	45
223M	194	530MA	219	846MA	141	1600	52
223MA	198	535M	215	853M	130	1800H	88
223MC	197	535MA	215	853MA	128	1850H	23
230M	194	545BA	177	855M	136	1880KH	45
230MA	198	545MA	175	855MA	134	4100	90
230MC	197	545RA	176	855RA	139	ARC	114
230MT	196	610D	183	860M	185	BURRS	236
230R	200	620M	220	860MA	187	TMR	144
230RA	202	620MA	223	863MA	133	H-45	178
234M	211	620MC	222	870M	185	TMS	142
242M	127	623M	220	870MA	187	V4B	153
246M	141	623MA	223	875M	190	V4R	150
246MA	141	623MC	222	875MA	191	V4S	149
246MC	141	630M	220	920M	205	V5	154
253M	130	630MA	223	920MA	209	VHM	116
253MA	128	630MC	222	923M	205	VRX	163
253MC	132	630R	225	923MA	209	VRX-6	173
255M	136	630RA	228	930M	205		
255MA	134			930MA	209		
255MC	138			950MX	179		
255RA	139						

EDP / Page Number Search

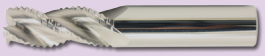
EDP	Page	EDP	Page	EDP	Page	EDP	Page
00***	23	23**0	133	44**0	231	64***	240
01**0	185	23**4	133	44**4	233	65***	241
01**7	187	23**7	133	44**7	234	66***	242
02**0	185	24**7	202	45**0	194	67***	243
02**7	187	24**8	181	45**7	198	68***	244
03**0	188	25**0	213	46***	114	69***	245
03**7	189	25**1, 25**6	45	46**0	194	70***	246
04**0	188	25**5	38	46**7	198	70***	17
04**7	189	26**0	213	46**8	180	71***	247
06**0	190	26**0, 26**5	42	47**0	205	72***	248
06**7	191	26**1, 26**6	45	47**7	209	73***	249
08**0	127	27***	164	48**0	205	74***	250
08**0	192	27**0	213	48**0, 48**5	178	77**0, 77**5	64
08**7	193	27**5	38	48**7	209	77**1, 77**6	67
09**0	127	28***	167	48**8	182	78**1, 78**6	70
10**0	130	28***	165	49***	116	79**0	200
10**7	128	28**0	213	49**0	212	79**7	202
10**8	180	28**5	38	50***	149	80**0	200
11**0	194	29***	41	50***	150	80**7	202
11**3	196	30**0	216	50***	153	80**8	181
11**4	197	30**7	217	50***	154	81**0	211
11**7	198	32**0	218	50***	160	82**0	211
12**0	194	32**7	219	50**0	212	83**0, 83**7	139
12**4	197	33**0	214	51***	154	84**5, 84**7	211
12**7	198	33**7	214	51**0	141	84**0, 84**7	140
13**0	194	34**0	214	51**4	141	85**0	127
13**3	196	34**7	214	51**7	141	85**7	140
13**4	197	36**0	215	52**0	136	86**0	130
13**7	198	36**7	215	52**4	138	86**4	132
13**8	180	37**0	194	52**7	134	86**7	128
14**0	179	37**7	198	54**0	220	89**0, 89**5	72
15**0	179	38**0	205	54**4	222	89**1, 89**6	75
15**8	182	38**7	209	54**7	223	90**0, 90**5	84
16**0	205	38**8	183	55**0	231	90**1, 90**6	86
16**3	207	39***	122	55**4	233	91***	52
16**4	208	39***	124	55**7	234	92**0	220
16**7	209	39**0	54	56**0, 56**5	78	92**7	223
17**0	205	39**1	56	56**1, 56**6	81	93**0	220
17**4	208	39**2	119	57***	106	93**7	223
17**7	209	40***	125	57***	108	94**0	220
18**0	205	40**0	136	57**0	104	94**7	223
18**3	207	40**2	120	57**7	105	94**8	183
18**4	208	40**7	134	58***	106	95***	90
18**7	209	40**8	184	58***	107	96***	97
19**0, 19**5	58	41**0	220	58**0	53	97**0	231
19**1, 19**6	61	41**2	118	59**0, 59**5	54	97**7	234
20***	29	41**3	122	59**1, 59**6	56	98***	142
20**0	225	41**4	222	60***	173	98***	144
20**1, 20**6	33	41**7	223	60***	236	98**0	231
20**7	228	42***	122	61***	163	98**7	234
21***	31	42**0	220	61***	237	99**0	231
21**0	227	42**2	118	62***	167	99**7	234
21**0	175	42**2	121	62***	238	99**8	184
21**2	176	42**3	122	62**7	167		
21**4	177	42**4	222	63***	239		
21**1, 21**6	33	42**7	223	63***	168		
21**7	229	43**0	231				
22**0, 22**5	45	43**2	121				
22**1, 22**6	88	43**4	233				
		43**7	234				

Recommended tools for: **ALUMINUM**

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1160, 1180		17	ALUMASTAR	3 flute, High performance
1520, 1205		64, 72	BRIGHT	2 flute, General purpose
1520H, 1205H		67, 75	HARDLUBE	2 flute, General purpose
1800H		88	HARDLUBE	2 flute, Parabolic

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
143M, 143R		122, 124	ALUMASTAR	High velocity, 3 flute, High metal removal rate
142B		121	ALUMASTAR	High velocity, 2 flute, High metal removal rate
142M, 142R		118, 119	ALUMASTAR	High velocity, 2 flute, High metal removal rate
242M, 842M		127	BRIGHT	High performance, 2 flute, For 3000-8000 RPM
ARC		114	BRIGHT	High performance, 3 flute, Staggered helix rougher
253M, 853M		130	BRIGHT	High performance, 3 flute, Profiling and finishing
253MC		132	TiCN	High performance, 3 flute, Profiling and finishing
220M, 820M		194	BRIGHT	2 flute, General purpose, Square end
220MC		197	TiCN	2 flute, General purpose, Square end
320M, 920M		205	BRIGHT	2 flute, General purpose, Ball end
320MC		208	TiCN	2 flute, General purpose, Ball end

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1510H		61	HARDLUBE	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580H, 1280H		33	AlTiN-Based	2 flute, High performance
1580KD, 1280KD		38	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		45	AlTiN-Based	2 flute, High performance, Coolant fed
1520H, 1205H		67, 75	HARDLUBE	2 flute, General purpose
1160, 1180		17	ALUMASTAR	3 flute, High performance

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V4		149	AlCrN	High performance, 4 flute, Variable helix
V5		154	AlCrN	High performance, 5 flute, Variable helix
VRX		163	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		173	AlTiN	High performance, 6 flute, Staggered flute
TMS, TMR		142, 144	AlCrN	High performance, Multiple flute finisher
VHM		116	AlTiN	High performance, 4 flute, Staggered flute rougher
255MA, 855MA		134	AlTiN	High performance, 5 flute
255RA, 855RA		139	AlTiN	High performance, 5 flute, Corner radius
242M, 842M		127	BRIGHT	High performance, 2 flute, For 3000-8000 RPM
246MA, 846MA		141	AlTiN	High performance, 6 flute, Finisher
253MA, 853MA		128	AlTiN	High performance, 3 flute, Profiling and finishing
223MA, 823MA		198	TiAlN	3 flute, General purpose, Square end
230MA, 830MA		198	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		202	TiAlN	4 flute, General purpose, Corner radius
323MA, 923MA		209	TiAlN	3 flute, General purpose, Ball end
330MA, 930MA		209	TiAlN	4 flute, General purpose, Ball end

Recommended tools for: **STAINLESS STEEL**

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1510H		61	HARDLUBE	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580H, 1280H		33	AlTiN-Based	2 flute, High performance
1580KD, 1280KD		38	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		45	AlTiN-Based	2 flute, High performance, Coolant fed
1520H, 1205H		67, 75	HARDLUBE	2 flute, General purpose
1160, 1180		17	ALUMASTAR	3 flute, High performance

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V4		149	AlCrN	High performance, 4 flute, Variable helix
V5		154	AlCrN	High performance, 5 flute, Variable helix
VRX		163	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		173	AlTiN	High performance, 6 flute, Staggered flute
253MA, 853MA		128	AlTiN	High performance, 3 flute, Profiling and finishing
255MA, 855MA		134	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		139	AlTiN	High performance, 5 flute, Corner radius
VHM		116	AlTiN	High performance, 4 flute, Staggered flute rougher
ARC		114	BRIGHT	High performance, 3 flute, Staggered helix rougher
TMS, TMR		142, 144	AlCrN	High performance, Multiple flute finisher
253MC		132	TiCN	High performance, 3 flute, Profiling and finishing
246MA, 846MA		141	AlTiN	High performance, 6 flute, Finisher, Square end
223MA, 823MA		198	TiAlN	3 flute, General purpose, Square end
230MA, 830MA		198	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		202	TiAlN	4 flute, General purpose, Corner radius
323MA, 923MA		209	TiAlN	3 flute, General purpose, Ball end
330MA, 930MA		209	TiAlN	4 flute, General purpose, Ball end

Recommended tools for:

INCONEL, HIGH NICKEL ALLOYS

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1510H		61	HARDLUBE	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580H, 1280H		33	AlTiN-Based	2 flute, High performance
1580KD, 1280KD		38	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		45	AlTiN-Based	2 flute, High performance, Coolant fed
1520H, 1205H		67, 75	HARDLUBE	2 flute, General purpose
1120H, 1100H		70, 86	HARDLUBE	3 flute, General purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V5		154	AlCrN	High performance, 5 flute, Variable helix
V4		149	AlCrN	High performance, 4 flute, Variable helix
VRX		163	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		173	AlTiN	High performance, 6 flute, Staggered flute
VHM		116	AlTiN	High performance, 4 flute, Staggered flute rougher
255MA, 855MA		134	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		139	AlTiN	High performance, 5 flute, Corner radius
246MA, 846MA		141	AlTiN	High performance, 6 flute, Finisher, Square end
TMS, TMR		142, 144	AlCrN	High performance, Multiple flute finisher
230MA, 830MA		198	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		202	TiAlN	4 flute, General purpose, Corner radius
330MA, 930MA		209	TiAlN	4 flute, General purpose, Ball end

Recommended tools for: **BRASS, BRONZE, COPPER, MAGNESIUM**

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1160, 1180		17	ALUMASTAR	3 flute, High performance
1510H		61	HARDLUBE	2 flute, General purpose, Slow spiral
1520, 1205		64, 72	BRIGHT	2 flute, General purpose
1520H, 1205H		67, 75	HARDLUBE	2 flute, General purpose
1500H		56	HARDLUBE	2 flute, Straight flute
1800H		88	HARDLUBE	2 flute, Parabolic

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
143M, 143R		122, 124	ALUMASTAR	High velocity, 3 flute, High metal removal rate
142B		121	ALUMASTAR	High velocity, 2 flute, High metal removal rate
142M, 142R		118, 119	ALUMASTAR	High velocity, 2 flute, High metal removal rate
ARC		114	BRIGHT	High performance, 3 flute, Staggered helix rougher
242M, 842M		127	BRIGHT	High performance, 2 flute, For 3000-8000 RPM
253M, 853M		130	BRIGHT	High performance, 3 flute, Profiling and finishing
253MC		132	TiCN	High performance, 3 flute, Profiling and finishing
220M, 820M		194	BRIGHT	2 flute, General purpose, Square end
220MC		197	TiCN	2 flute, General purpose, Square end
320M, 920M		205	BRIGHT	2 flute, General purpose, Ball end
320MC		208	TiCN	2 flute, General purpose, Ball end

Recommended tools for:

HARDENED TOOL STEELS

(generally over 45 Rc)

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1500H		56	HARDLUBE	2 flute, Straight flute
1510H		61	HARDLUBE	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580H, 1280H		33	AlTiN-Based	2 flute, High performance
1580KD, 1280KD		38	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		45	AlTiN-Based	2 flute, High performance, Coolant fed
1520H, 1205H		67, 75	HARDLUBE	2 flute, General purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
H-45		178	AlTiN	High performance, High feed, Ball end
350MX, 950MX		179	AlTiN	High performance, High Rc finisher, Die mold
545MA		175	AlTiN	High performance, High Rc finisher, Square end
545RA		176	AlTiN	High performance, High Rc finisher, Corner radius
545BA		177	AlTiN	High performance, High Rc finisher, Ball end
VRX		163	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		173	AlTiN	High performance, 6 flute, Staggered flute
230MA, 830MA		198	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		202	TiAlN	4 flute, General purpose, Corner radius
330MA, 930MA		209	TiAlN	4 flute, General purpose, Ball end

Recommended tools for:

COMPOSITE MATERIALS

(Graphite, Plastics, Carbon Fiber)

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1160, 1180		17	ALUMASTAR	3 flute, High performance
154MA		107	TiAlN	4 flute, Center cutting angle
1510H		61	HARDLUBE	2 flute, General purpose, Slow spiral
1520H, 1205H		67, 75	HARDLUBE	2 flute, General purpose
1800H		88	HARDLUBE	2 flute, Parabolic
1500H		56	HARDLUBE	2 flute, Straight flute

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
210D		180	DIAMOND	4 flute, Square end
310D		182	DIAMOND	4 flute, Ball end
210RD		181	DIAMOND	4 flute, Corner radius
143M, 143R		122, 124	ALUMASTAR	High velocity, 3 flute, High metal removal rate
142M, 142R		118, 119	ALUMASTAR	High velocity, 2 flute, High metal removal rate
142B		121	ALUMASTAR	High velocity, 2 flute, High metal removal rate
253M, 853M		130	BRIGHT	High performance, 3 flute, Profiling and finishing
253MC		132	TiCN	High performance, 3 flute, Profiling and finishing
255MC		138	TiCN	High performance, 5 flute, Profiling and finishing
220MC		197	TiCN	2 flute, General purpose, Square end
320MC		208	TiCN	2 flute, General purpose, Ball end
154M, 154MA		106, 107	BRIGHT/TiAlN	4 flute, Drill/Mill, Center cutting to a point
152M, 152MA		104, 105	BRIGHT/TiAlN	2 flute, Drill/Mill, Center cutting to a point

Recommended tools for: **CARBON STEELS, MEDIUM ALLOY STEELS**

(generally under 45 Rc)

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580H, 1280H		33	AlTiN-Based	2 flute, High performance
1580KD, 1280KD		38	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		45	AlTiN-Based	2 flute, High performance, Coolant fed
1510H		61	HARDLUBE	2 flute, General purpose, Slow spiral
1520H, 1205H		67, 75	HARDLUBE	2 flute, General purpose
1160, 1180		17	ALUMASTAR	3 flute, High performance

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V4		149	AlCrN	High performance, 4 flute, Variable helix
V5		154	AlCrN	High performance, 5 flute, Variable helix
VRX		163	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		173	AlTiN	High performance, 6 flute, Staggered flute
VHM		116	AlTiN	High performance, 4 flute, Staggered flute rougher
255MA, 855MA		134	AlTiN	High performance, 5 flute
255RA, 855RA		139	AlTiN	High performance, 5 flute, Corner radius
253MA, 853MA		128	AlTiN	High performance, 3 flute, Profiling and finishing
230MA, 830MA		198	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		202	TiAlN	4 flute, General purpose, Corner radius
330MA, 930MA		209	TiAlN	4 flute, General purpose, Ball end

Recommended tools for:

CAST IRON

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1120H, 1100H		70, 86	HARDLUBE	3 flute, General purpose
1520H, 1205H		67, 75	HARDLUBE	2 flute, General purpose
1510H		61	HARDLUBE	2 flute, General purpose, Slow spiral
1580H, 1280H		33	AlTiN-Based	2 flute, High performance
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580KH, 1280KH, 1880KH		45	AlTiN-Based	2 flute, High performance, Coolant fed
1580KD, 1280KD		38	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank

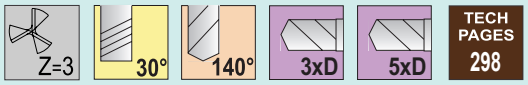
END MILLS

SERIES		PAGE	COATING	DESCRIPTION
VRX		163	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		173	AlTiN	High performance, 6 flute, Staggered flute
V4		149	AlCrN	High performance, 4 flute, Variable helix
V5		154	AlCrN	High performance, 5 flute, Variable helix
255MA, 855MA		134	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		139	AlTiN	High performance, 5 flute, Corner radius
143M, 143R		122, 124	ALUMASTAR	High velocity, 3 flute, High metal removal rate
253MA, 853MA		128	AlTiN	High performance, 3 flute, Profiling and finishing
230MC		197	TiCN	4 flute, General purpose, Square end
230MA, 830MA		198	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		202	TiAlN	4 flute, General purpose, Corner radius

TOLERANCES	
d	+.0000" –.0005" (+.0000 –.0127mm)
l_1	+.125" –.125" (+3.175 –3.175mm)
l_2	+.125" –.125" (+3.175 –3.175mm)

NEW ITEMS

Series 1160, 1180



TECH PAGES 298

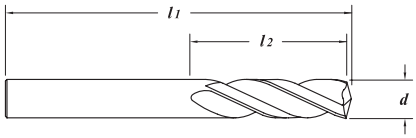
.1562" - .1910"
(3.967mm - 4.851mm)

Recommended for aluminum and other soft materials <40 Rc



Alumastar Coated

High performance solid submicron grain carbide drill
No spot drilling required
Unique point geometry and coating for higher speeds and feeds
Up to 5x longer tool life than Zrn coated drills
High performance drill point
Live tooling recommended on lathe processes



	3xD (1160) EDP#	5xD (1180) EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
NEW	70631		.1562	5/32"	3.967	2-1/16"	9/16"	41.33	39.53	37.74	35.94
NEW		70161	.1562	5/32"	3.967	2-1/2"	1"	42.56	40.71	38.86	37.01
NEW	70633		.1570	#22	3.988	2-1/8"	5/8"	41.72	39.91	38.09	36.28
NEW		70163	.1570	#22	3.988	2-1/2"	1"	42.87	41.01	39.14	37.28
NEW	70635		.1575		4.000	54	16	42.06	40.23	38.40	36.57
		70166	.1575		4.000	65	24	43.19	41.32	39.44	37.56
NEW	70637		.1590	#21	4.039	2-1/8"	5/8"	42.41	40.57	38.72	36.88
NEW		70177	.1590	#21	4.039	2-1/2"	1"	43.49	41.60	39.71	37.82
NEW	70639		.1610	#20	4.089	2-1/8"	5/8"	42.78	40.92	39.06	37.20
NEW		70179	.1610	#20	4.089	2-1/2"	1"	43.85	41.94	40.04	38.13
NEW	70641		.1660	#19	4.216	2-1/8"	5/8"	43.15	41.27	39.40	37.52
NEW		70181	.1660	#19	4.216	2-3/4"	1-1/8"	44.16	42.24	40.32	38.40
NEW	70643		.1695	#18	4.305	2-1/8"	5/8"	43.48	41.59	39.70	37.81
NEW		70183	.1695	#18	4.305	2-3/4"	1-1/8"	44.45	42.52	40.58	38.65
NEW	70645		.1719	11/64"	4.366	2-1/8"	5/8"	43.85	41.94	40.04	38.13
NEW		70185	.1719	11/64"	4.366	2-3/4"	1-1/8"	44.77	42.82	40.88	38.93
NEW	70647		.1730	#17	4.394	2-3/16"	11/16"	44.21	42.29	40.37	38.44
NEW		70187	.1730	#17	4.394	2-3/4"	1-1/8"	45.08	43.12	41.16	39.20
NEW	70649		.1770	#16	4.496	2-3/16"	11/16"	44.52	42.58	40.65	38.71
NEW		70189	.1770	#16	4.496	2-3/4"	1-1/8"	45.43	43.45	41.48	39.50
NEW	70651		.1772		4.500	55	18	44.90	42.95	41.00	39.04
NEW		70191	.1772		4.500	65	25	45.63	43.65	41.66	39.68
NEW	70653		.1800	#15	4.572	2-3/16"	11/16"	45.20	43.23	41.27	39.30
NEW		70196	.1800	#15	4.572	2-3/4"	1-1/4"	46.02	44.02	42.02	40.02
NEW	70655		.1820	#14	4.623	2-3/16"	11/16"	45.61	43.63	41.64	39.66
NEW		70201	.1820	#14	4.623	2-3/4"	1-1/4"	46.33	44.32	42.30	40.29
NEW	70657		.1850	#13	4.700	2-3/16"	11/16"	45.94	43.94	41.95	39.95
NEW		70206	.1850	#13	4.700	2-3/4"	1-1/4"	46.68	44.65	42.62	40.59
NEW	70659		.1875	3/16"	4.763	2-3/16"	11/16"	46.31	44.30	42.28	40.27
		70211	.1875	3/16"	4.763	2-3/4"	1-1/4"	46.83	44.79	42.76	40.72
NEW	70661		.1890	#12	4.801	2-1/4"	3/4"	47.83	45.75	43.67	41.59
		70216	.1890	#12	4.801	2-3/4"	1-1/4"	48.56	46.45	44.34	42.23
NEW	70663		.1910	#11	4.851	2-1/4"	3/4"	48.27	46.17	44.07	41.97
		70221	.1910	#11	4.851	2-3/4"	1-1/4"	48.86	46.74	44.61	42.49

continued ⟶

Series 1160, 1180 *(continued)*

.1935" - .2570"
(4.914mm - 6.528mm)

	3xD (1160) EDP#	5xD (1180) EDP#	Decimal	*d* † Diameter	Metric	*l*1 Overall Length	*l*2 Flute Length	1-11	12-24	25-49	50-100
NEW	70665		.1935	#10	4.914	2-1/4"	3/4"	48.55	46.44	44.33	42.22
		70226	.1935	#10	4.914	2-3/4"	1-1/4"	49.17	47.04	44.90	42.76
NEW	70667		.1960	#9	4.978	2-1/4"	3/4"	48.90	46.77	44.65	42.52
NEW		70229	.1960	#9	4.978	3"	1-5/16"	49.46	47.31	45.16	43.01
NEW	70669		.1969		5.000	57	19	49.16	47.02	44.89	42.75
		70231	.1969		5.000	75	32	49.78	47.62	45.45	43.29
NEW	70671		.1990	#8	5.055	2-1/4"	3/4"	49.62	47.46	45.31	43.15
		70236	.1990	#8	5.055	3"	1-5/16"	50.03	47.85	45.68	43.50
NEW	70673		.2010	#7	5.105	2-1/4"	3/4"	49.77	47.61	45.44	43.28
		70241	.2010	#7	5.105	3"	1-5/16"	50.22	48.04	45.85	43.67
NEW	70675		.2031	13/64"	5.159	2-1/4"	3/4"	50.11	47.93	45.75	43.57
		70246	.2031	13/64"	5.159	3"	1-5/16"	50.58	48.38	46.18	43.98
NEW	70677		.2040	#6	5.182	2-3/8"	7/8"	50.45	48.26	46.06	43.87
		70251	.2040	#6	5.182	3"	1-3/8"	50.92	48.71	46.49	44.28
NEW	70679		.2055	#5	5.220	2-3/8"	7/8"	50.82	48.61	46.40	44.19
		70256	.2055	#5	5.220	3"	1-3/8"	51.26	49.03	46.80	44.57
NEW	70681		.2090	#4	5.309	2-3/8"	7/8"	51.12	48.90	46.67	44.45
		70261	.2090	#4	5.309	3"	1-3/8"	51.54	49.30	47.06	44.82
NEW	70683		.2130	#3	5.410	2-3/8"	7/8"	51.46	49.22	46.99	44.75
		70266	.2130	#3	5.410	3"	1-3/8"	51.89	49.63	47.38	45.12
NEW	70685		.2165		5.500	60	22	51.78	49.53	47.28	45.03
		70271	.2165		5.500	75	35	52.19	49.92	47.65	45.38
NEW	70687		.2188	7/32"	5.558	2-3/8"	7/8"	52.21	49.94	47.67	45.40
		70276	.2188	7/32"	5.558	3"	1-3/8"	52.50	50.22	47.93	45.65
NEW	70689		.2210	#2	5.613	2-7/16"	15/16"	52.59	50.30	48.02	45.73
		70281	.2210	#2	5.613	3"	1-3/8"	53.56	51.23	48.90	46.57
NEW	70691		.2280	#1	5.791	2-7/16"	15/16"	52.99	50.69	48.38	46.08
		70286	.2280	#1	5.791	3"	1-3/8"	53.81	51.47	49.13	46.79
NEW	70693		.2340	A	5.944	2-7/16"	15/16"	53.35	51.03	48.71	46.39
NEW		70294	.2340	A	5.944	3-1/4"	1-1/2"	54.35	51.99	49.62	47.26
NEW	70695		.2344	15/64"	5.954	2-7/16"	15/16"	53.76	51.42	49.09	46.75
		70296	.2344	15/64"	5.954	3-1/4"	1-1/2"	54.89	52.50	50.12	47.73
NEW	70697		.2362		6.000	64	26	54.13	51.78	49.42	47.07
		70301	.2362		6.000	82	38	55.05	52.66	50.26	47.87
NEW	70699		.2380	B	6.045	2-1/2"	1"	54.50	52.13	49.76	47.39
		70306	.2380	B	6.045	3-1/4"	1-5/8"	55.20	52.80	50.40	48.00
NEW	70701		.2420	C	6.147	2-1/2"	1"	54.95	52.56	50.17	47.78
		70311	.2420	C	6.147	3-1/4"	1-5/8"	55.56	53.14	50.73	48.31
NEW	70703		.2460	D	6.248	2-1/2"	1"	55.25	52.85	50.45	48.04
		70316	.2460	D	6.248	3-1/4"	1-5/8"	55.89	53.46	51.03	48.60
NEW	70705		.2500	1/4" / E	6.350	2-1/2"	1"	55.72	53.30	50.87	48.45
		70321	.2500	1/4" / E	6.350	3-1/4"	1-5/8"	56.19	53.75	51.30	48.86
NEW	70707		.2510		6.375	2-1/2"	1"	56.44	53.99	51.53	49.08
NEW		70911	.2510		6.375	3-1/4"	1-5/8"	57.05	54.57	52.09	49.61
NEW	70709		.2559		6.500	66	28	58.63	56.08	53.53	50.98
		70326	.2559		6.500	82	41	59.60	57.01	54.42	51.83
NEW	70711		.2570	F	6.528	2-5/8"	1-1/8"	59.56	56.97	54.38	51.79
		70331	.2570	F	6.528	3-1/4"	1-11/16"	60.50	57.87	55.24	52.61

† *Metric equivalents are for reference only*

	3xD (1160) EDP#	5xD (1180) EDP#	Decimal	*d* † Diameter	Metric	*l*1 Overall Length	*l*2 Flute Length	1-11	12-24	25-49	50-100
NEW	70713		.2610	G	6.629	2-5/8"	1-1/8"	60.47	57.84	55.21	52.58
		70336	.2610	G	6.629	3-1/2"	1-11/16"	61.42	58.75	56.08	53.41
NEW	70715		.2656	17/64"	6.746	2-5/8"	1-1/8"	61.38	58.71	56.04	53.37
		70341	.2656	17/64"	6.746	3-1/2"	1-11/16"	62.33	59.62	56.91	54.20
NEW	70717		.2660	H	6.756	2-11/16"	1-3/16"	62.28	59.57	56.86	54.16
		70346	.2660	H	6.756	3-1/2"	1-11/16"	63.28	60.53	57.78	55.03
NEW	70719		.2720	I	6.909	2-11/16"	1-3/16"	62.43	59.72	57.00	54.29
		70351	.2720	I	6.909	3-1/2"	1-11/16"	64.19	61.40	58.61	55.82
NEW	70721		.2756		7.000	68	30	63.34	60.59	57.83	55.08
		70356	.2756		7.000	88	43	65.10	62.27	59.44	56.61
NEW	70723		.2770	J	7.036	2-11/16"	1-3/16"	64.23	61.44	58.64	55.85
		70361	.2770	J	7.036	3-1/2"	1-11/16"	66.02	63.15	60.28	57.41
NEW	70725		.2812	9/32"	7.142	2-11/16"	1-3/16"	66.06	63.19	60.32	57.44
		70371	.2812	9/32"	7.142	3-1/2"	1-3/4"	67.88	64.93	61.98	59.03
NEW	70727		.2900	L	7.366	2-3/4"	1-1/4"	66.95	64.04	61.13	58.22
		70376	.2900	L	7.366	3-1/2"	1-3/4"	68.74	65.75	62.76	59.77
NEW	70728		.2950	M	7.493	2-3/4"	1-1/4"	68.25	65.28	62.31	59.35
NEW		70378	.2950	M	7.493	3-3/4"	1-7/8"	69.63	66.61	63.58	60.55
NEW	70729		.2953		7.500	70	32	68.25	65.28	62.31	59.35
		70381	.2953		7.500	95	44	69.63	66.61	63.58	60.55
NEW	70731		.2969	19/64"	7.541	2-3/4"	1-1/4"	68.86	65.87	62.87	59.88
		70386	.2969	19/64"	7.541	3-3/4"	1-7/8"	70.24	67.19	64.13	61.08
NEW	70733		.3020	N	7.671	2-15/16"	1-7/16"	71.07	67.98	64.89	61.80
		70391	.3020	N	7.671	3-3/4"	1-7/8"	72.80	69.63	66.47	63.30
NEW	70735		.3125	5/16"	7.938	2-15/16"	1-7/16"	71.32	68.22	65.12	62.02
		70396	.3125	5/16"	7.938	3-3/4"	1-7/8"	72.98	69.81	66.63	63.46
NEW	70737		.3150		8.000	76	36	75.28	72.01	68.73	65.46
		70401	.3150		8.000	95	48	77.02	73.67	70.32	66.97
NEW	70739		.3160	O	8.026	2-15/16"	1-7/16"	75.28	72.01	68.73	65.46
		70406	.3160	O	8.026	3-3/4"	1-7/8"	77.02	73.67	70.32	66.97
NEW	70741		.3230	P	8.204	2-15/16"	1-7/16"	75.82	72.52	69.23	65.93
		70411	.3230	P	8.204	3-3/4"	2-3/32"	77.27	73.91	70.55	67.19
NEW	70743		.3281	21/64"	8.334	2-15/16"	1-7/16"	77.21	73.85	70.50	67.14
		70416	.3281	21/64"	8.334	4"	2-3/32"	77.94	74.55	71.16	67.77
NEW	70745		.3320	Q	8.433	3"	1-7/16"	78.60	75.18	71.76	68.35
		70421	.3320	Q	8.433	4"	2-3/32"	79.36	75.91	72.46	69.01
NEW	70747		.3346		8.500	76	36	78.94	75.51	72.08	68.64
		70426	.3346		8.500	100	53	79.90	76.43	72.95	69.48
NEW	70749		.3390	R	8.611	3"	1-7/16"	81.06	77.54	74.01	70.49
		70431	.3390	R	8.611	4"	2-3/32"	81.89	78.33	74.77	71.21
NEW	70751		.3438	11/32"	8.733	3"	1-7/16"	82.83	79.23	75.63	72.03
		70436	.3438	11/32"	8.733	4"	2-3/16"	84.57	80.89	77.22	73.54
NEW	70753		.3480	S	8.839	3-1/16"	1-1/2"	86.63	82.86	79.10	75.33
		70441	.3480	S	8.839	4"	2-3/16"	89.44	85.55	81.66	77.77
NEW	70755		.3543		9.000	78	38	88.83	84.97	81.11	77.24
		70446	.3543		9.000	100	55	89.92	86.01	82.10	78.19
NEW	70757		.3580	T	9.093	3-1/16"	1-1/2"	93.44	89.38	85.31	81.25
		70451	.3580	T	9.093	4-1/4"	2-9/32"	94.75	90.63	86.51	82.39
NEW	70759		.3594	23/64"	9.129	3-1/16"	1-1/2"	94.02	89.93	85.84	81.76
		70456	.3594	23/64"	9.129	4-1/4"	2-9/32"	95.25	91.11	86.97	82.83

continued →

Series 1160, 1180 *(continued)*

.3680" - .5118"
(9.347mm - 13.000mm)

	3xD (1160) EDP#	5xD (1180) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
NEW	70761		.3680	U	9.347	3-1/8"	1-9/16"	94.82	90.70	86.57	82.45
		70461	.3680	U	9.347	4-1/4"	2-9/32"	99.73	95.39	91.06	86.72
NEW	70763		.3740		9.500	79	39	95.60	91.44	87.29	83.13
		70466	.3740		9.500	108	58	100.61	96.24	91.86	87.49
NEW	70765		.3750	3/8"	9.525	3-1/8"	1-9/16"	96.17	91.99	87.81	83.63
		70471	.3750	3/8"	9.525	4-1/4"	2-3/8"	101.51	97.10	92.68	88.27
NEW	70767		.3760		9.550	3-1/8"	1-9/16"	98.01	93.75	89.49	85.23
NEW		70913	.3760		9.550	4-1/4"	2-3/8"	102.87	98.40	93.92	89.45
NEW	70769		.3770	V	9.576	3-1/4"	1-5/8"	99.87	95.53	91.19	86.84
		70476	.3770	V	9.576	4-1/4"	2-3/8"	104.21	99.68	95.15	90.62
NEW	70771		.3860	W	9.804	3-1/4"	1-5/8"	101.61	97.19	92.77	88.36
		70481	.3860	W	9.804	4-1/2"	2-3/8"	105.87	101.27	96.66	92.06
NEW	70773		.3906	25/64"	9.921	3-1/4"	1-5/8"	102.89	98.42	93.94	89.47
		70486	.3906	25/64"	9.921	4-1/2"	2-3/8"	107.05	102.40	97.74	93.09
NEW	70775		.3937		10.000	84	43	106.01	101.40	96.79	92.18
		70491	.3937		10.000	114	60	109.95	105.17	100.39	95.61
NEW	70777		.3970	X	10.084	3-5/16"	1-11/16"	107.46	102.79	98.12	93.44
		70496	.3970	X	10.084	4-1/2"	2-1/2"	111.08	106.25	101.42	96.59
NEW	70779		.4040	Y	10.262	3-5/16"	1-11/16"	108.16	103.46	98.75	94.05
		70501	.4040	Y	10.262	4-1/2"	2-9/16"	114.15	109.19	104.22	99.26
NEW	70781		.4062	13/32"	10.317	3-5/16"	1-11/16"	111.49	106.64	101.79	96.95
		70506	.4062	13/32"	10.317	4-1/2"	2-9/16"	115.03	110.03	105.03	100.03
NEW	70783		.4134		10.500	85	43	112.53	107.64	102.74	97.85
		70511	.4134		10.500	114	67	116.00	110.96	105.91	100.87
NEW	70785		.4219	27/64"	10.716	3-3/8"	1-11/16"	113.60	108.66	103.72	98.78
		70516	.4219	27/64"	10.716	4-1/2"	2-11/16"	116.97	111.88	106.80	101.71
NEW	70787		.4331		11.000	87	45	121.59	116.30	111.02	105.73
		70521	.4331		11.000	114	68	124.80	119.37	113.95	108.52
NEW	70789		.4375	7/16"	11.113	3-7/16"	1-3/4"	121.92	116.62	111.32	106.02
		70526	.4375	7/16"	11.113	4-3/4"	2-13/16"	125.26	119.81	114.37	108.92
NEW	70791		.4528		11.500	90	47	129.29	123.67	118.05	112.43
		70531	.4528		11.500	120	70	133.20	127.41	121.62	115.83
NEW	70793		.4531	29/64"	11.509	3-9/16"	1-13/16"	129.29	123.67	118.05	112.43
		70536	.4531	29/64"	11.509	4-3/4"	2-7/8"	133.20	127.41	121.62	115.83
NEW	70795		.4688	15/32"	11.909	3-11/16"	2-1/16"	135.85	129.94	124.04	118.13
		70541	.4688	15/32"	11.909	4-3/4"	2-7/8"	139.41	133.35	127.29	121.23
NEW	70797		.4724		12.000	93	53	136.25	130.33	124.40	118.48
		70546	.4724		12.000	120	73	139.78	133.71	127.63	121.55
NEW	70799		.4844	31/64"	12.304	3-11/16"	2-1/16"	137.20	131.23	125.27	119.31
		70551	.4844	31/64"	12.304	5-5/16"	3"	142.26	136.07	129.89	123.70
NEW	70801		.4921		12.500	95	53	138.55	132.53	126.50	120.48
		70556	.4921		12.500	135	75	143.84	137.59	131.33	125.08
NEW	70803		.5000	1/2"	12.700	3-3/4"	2-1/16"	139.44	133.38	127.31	121.25
		70561	.5000	1/2"	12.700	5-3/8"	3-1/16"	144.12	137.85	131.59	125.32
NEW	70805		.5010		12.725	3-3/4"	2-1/16"	140.92	134.79	128.67	122.54
NEW		70915	.5010		12.725	5-3/8"	3-1/16"	145.73	139.39	133.06	126.72
NEW	70807		.5118		13.000	107	55	152.84	146.19	139.55	132.91
		70566	.5118		13.000	136	78	158.56	151.67	144.77	137.88

† *Metric equivalents are for reference only*

	3xD (1160) EDP#	5xD (1180) EDP#	Decimal	*d* † Diameter	Metric	*l*1 Overall Length	*l*2 Flute Length	1-11	12-24	25-49	50-100
NEW	70809		.5156	33/64"	13.096	4-1/4"	2-3/16"	156.46	149.66	142.85	136.05
		70571	.5156	33/64"	13.096	5-3/8"	3-1/8"	161.95	154.91	147.87	140.83
NEW	70811		.5312	17/32"	13.492	4-1/4"	2-1/4"	160.06	153.10	146.14	139.18
		70576	.5312	17/32"	13.492	5-11/16"	3-5/16"	165.45	158.26	151.06	143.87
NEW	70813		.5469	35/64"	13.891	4-1/4"	2-1/4"	167.26	159.99	152.72	145.44
		70581	.5469	35/64"	13.891	5-13/16"	3-3/8"	172.18	164.69	157.21	149.72
NEW	70815		.5512		14.000	107	59	170.88	163.45	156.02	148.59
		70586	.5512		14.000	148	86	175.59	167.96	160.32	152.69
NEW	70817		.5625	9/16"	14.287	4-1/2"	2-3/8"	181.76	173.86	165.95	158.05
		70591	.5625	9/16"	14.287	5-15/16"	3-1/2"	187.65	179.49	171.33	163.17
NEW	70819		.5781	37/64"	14.683	4-1/2"	2-1/2"	188.49	180.29	172.10	163.91
		70596	.5781	37/64"	14.683	6"	3-1/2"	194.02	185.58	177.15	168.71
NEW	70821		.5906		15.000	115	64	191.96	183.61	175.27	166.92
		70601	.5906		15.000	152	90	197.40	188.82	180.23	171.65
NEW	70823		.5938	19/32"	15.082	4-1/2"	2-1/2"	192.99	184.60	176.21	167.82
		70606	.5938	19/32"	15.082	6"	3-9/16"	198.34	189.72	181.09	172.47
NEW	70825		.6094	39/64"	15.478	4-1/2"	2-9/16"	193.98	185.55	177.11	168.68
		70611	.6094	39/64"	15.478	6-3/16"	3-11/16"	215.02	205.67	196.32	186.97
NEW	70827		.6250	5/8"	15.875	4-1/2"	2-5/8"	195.97	187.45	178.93	170.41
		70616	.6250	5/8"	15.875	6-5/16"	3-3/4"	216.89	207.46	198.03	188.60
NEW	70829		.6299		16.000	115	66	200.70	191.97	183.25	174.52
		70621	.6299		16.000	160	95	221.43	211.81	202.18	192.55



† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.0000" –.0004" (+.000 –.010mm)
d_2	h6

Series 1550H,1250H,1850H



.0312" - .0354"
(0.792mm - 0.900mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

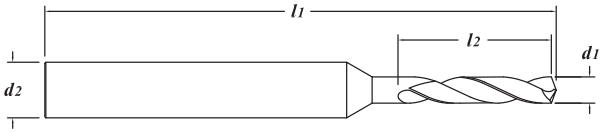
AlTiN-based Coating

High performance solid submicron grain carbide drill on 3mm or 1/8" diameter shank

30° helix for better chip evacuation

Live tooling recommended on lathe processes





3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
00100			.0312	1/32"	0.792	1/8"	2"	5/32"	36.70	35.10	33.51	31.91
	00304		.0312	1/32"	0.792	1/8"	2"	15/64"	38.04	36.39	34.73	33.08
		00510	.0312	1/32"	0.792	1/8"	2"	7/16"	42.07	40.24	38.41	36.58
	00306		.0315		0.800	3.0	50	6.0	37.51	35.88	34.25	32.62
		00512	.0315		0.800	3.0	50	12.0	41.48	39.68	37.87	36.07
	00308		.0319		0.810	3.0	50	6.0	37.51	35.88	34.25	32.62
00106			.0320	#67	0.812	1/8"	2"	11/64"	36.70	35.10	33.51	31.91
	00310		.0320	#67	0.812	1/8"	2"	15/64"	38.04	36.39	34.73	33.08
		00516	.0320	#67	0.812	1/8"	2"	7/16"	42.07	40.24	38.41	36.58
		00518	.0323		0.820	3.0	50	12.0	41.48	39.68	37.87	36.07
00112			.0330	#66	0.838	1/8"	2"	11/64"	36.70	35.10	33.51	31.91
	00316		.0330	#66	0.838	1/8"	2"	15/64"	38.04	36.39	34.73	33.08
		00522	.0330	#66	0.838	1/8"	2"	7/16"	42.07	40.24	38.41	36.58
	00318		.0331		0.840	3.0	50	6.0	37.51	35.88	34.25	32.62
		00524	.0331		0.840	3.0	50	12.0	41.48	39.68	37.87	36.07
00116			.0335		0.850	3.0	50	4.5	36.09	34.52	32.95	31.38
		00526	.0335		0.850	3.0	50	12.0	41.48	39.68	37.87	36.07
	00322		.0339		0.860	3.0	50	6.5	37.51	35.88	34.25	32.62
		00528	.0339		0.860	3.0	50	13.0	41.48	39.68	37.87	36.07
00120			.0343		0.870	3.0	50	4.5	36.09	34.52	32.95	31.38
		00530	.0343		0.870	3.0	50	13.0	41.48	39.68	37.87	36.07
00122			.0346		0.880	3.0	50	4.5	36.09	34.52	32.95	31.38
00124			.0350	#65	0.890	3.0	50	4.5	36.09	34.52	32.95	31.38
	00328		.0350	#65	0.890	3.0	50	6.5	37.51	35.88	34.25	32.62
		00534	.0350	#65	0.890	3.0	50	13.0	41.48	39.68	37.87	36.07
	00330		.0354		0.900	3.0	50	6.5	37.51	35.88	34.25	32.62
		00536	.0354		0.900	3.0	50	13.0	41.48	39.68	37.87	36.07

continued →

Series 1550H,1250H,1850H *(continued)*

.0358" - .0465"
(0.910mm - 1.181mm)

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	00332		.0358		0.910	3.0	50	6.5	37.51	35.88	34.25	32.62
00130			.0360	#64	0.914	1/8"	2"	3/16"	36.70	35.10	33.51	31.91
	00334		.0360	#64	0.914	1/8"	2"	1/4"	38.04	36.39	34.73	33.08
		00540	.0360	#64	0.914	1/8"	2"	1/2"	42.07	40.24	38.41	36.58
00134			.0366		0.930	3.0	50	5.0	36.09	34.52	32.95	31.38
00136			.0370	#63	0.940	3.0	50	5.0	36.09	34.52	32.95	31.38
	00340		.0370	#63	0.940	3.0	50	7.0	37.51	35.88	34.25	32.62
		00546	.0370	#63	0.940	3.0	50	14.0	41.48	39.68	37.87	36.07
00138			.0374		0.950	3.0	50	5.0	36.09	34.52	32.95	31.38
00142			.0380	#62	0.965	1/8"	2"	3/16"	36.70	35.10	33.51	31.91
	00346		.0380	#62	0.965	1/8"	2"	17/64"	38.04	36.39	34.73	33.08
		00552	.0380	#62	0.965	1/8"	2"	9/16"	42.07	40.24	38.41	36.58
		00556	.0386		0.980	3.0	50	14.0	41.48	39.68	37.87	36.07
00148			.0390	#61	0.990	3.0	50	5.0	36.09	34.52	32.95	31.38
	00352		.0390	#61	0.990	3.0	50	7.0	37.51	35.88	34.25	32.62
		00558	.0390	#61	0.990	3.0	50	14.0	41.48	39.68	37.87	36.07
00150			.0394		1.000	3.0	50	5.0	36.09	34.52	32.95	31.38
	00354		.0394		1.000	3.0	50	7.0	37.51	35.88	34.25	32.62
		00560	.0394		1.000	3.0	50	14.0	41.48	39.68	37.87	36.07
00152			.0400	#60	1.016	1/8"	2"	13/64"	36.35	34.77	33.19	31.61
	00356		.0400	#60	1.016	1/8"	2"	9/32"	37.70	36.06	34.42	32.78
		00562	.0400	#60	1.016	1/8"	2"	9/16"	41.68	39.86	38.05	36.24
00154			.0410	#59	1.041	1/8"	2"	13/64"	36.35	34.77	33.19	31.61
	00358		.0410	#59	1.041	1/8"	2"	9/32"	37.70	36.06	34.42	32.78
		00564	.0410	#59	1.041	1/8"	2"	9/16"	41.68	39.86	38.05	36.24
00156			.0413		1.050	3.0	50	5.5	35.74	34.19	32.63	31.08
	00360		.0413		1.050	3.0	50	7.5	37.20	35.59	33.97	32.35
		00566	.0413		1.050	3.0	50	15.0	41.14	39.35	37.56	35.77
00158			.0420	#58	1.066	1/8"	2"	7/32"	36.35	34.77	33.19	31.61
	00362		.0420	#58	1.066	1/8"	2"	5/16"	37.70	36.06	34.42	32.78
00160			.0430	#57	1.092	1/8"	2"	7/32"	36.35	34.77	33.19	31.61
	00364		.0430	#57	1.092	1/8"	2"	5/16"	37.70	36.06	34.42	32.78
		00570	.0430	#57	1.092	1/8"	2"	9/16"	41.68	39.86	38.05	36.24
00162			.0433		1.100	3.0	50	5.5	35.74	34.19	32.63	31.08
	00366		.0433		1.100	3.0	50	8.0	37.20	35.59	33.97	32.35
		00572	.0433		1.100	3.0	50	16.0	41.14	39.35	37.56	35.77
00164			.0453		1.150	3.0	50	6.0	35.74	34.19	32.63	31.08
	00368		.0453		1.150	3.0	50	8.0	37.20	35.59	33.97	32.35
		00574	.0453		1.150	3.0	50	16.0	41.14	39.35	37.56	35.77
00166			.0465	#56	1.181	1/8"	2"	15/64"	36.35	34.77	33.19	31.61
	00370		.0465	#56	1.181	1/8"	2"	11/32"	37.70	36.06	34.42	32.78
		00576	.0465	#56	1.181	1/8"	2"	5/8"	41.68	39.86	38.05	36.24

† *Metric equivalents are for reference only*

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
00168			.0469	3/64"	1.191	1/8"	2"	15/64"	36.35	34.77	33.19	31.61
	00372		.0469	3/64"	1.191	1/8"	2"	11/32"	37.70	36.06	34.42	32.78
		00578	.0469	3/64"	1.191	1/8"	2"	5/8"	41.68	39.86	38.05	36.24
00170			.0472		1.200	3.0	50	6.0	35.74	34.19	32.63	31.08
	00374		.0472		1.200	3.0	50	9.0	37.20	35.59	33.97	32.35
		00580	.0472		1.200	3.0	50	18.0	41.14	39.35	37.56	35.77
00172			.0492		1.250	3.0	50	6.5	35.74	34.19	32.63	31.08
	00376		.0492		1.250	3.0	50	9.0	37.20	35.59	33.97	32.35
		00582	.0492		1.250	3.0	50	18.0	41.14	39.35	37.56	35.77
00174			.0512		1.300	3.0	50	6.5	35.40	33.86	32.32	30.78
	00378		.0512		1.300	3.0	50	9.0	36.81	35.21	33.61	32.01
		00584	.0512		1.300	3.0	50	18.0	40.70	38.93	37.16	35.39
00176			.0520	#55	1.320	1/8"	2"	17/64"	36.00	34.43	32.87	31.30
	00380		.0520	#55	1.320	1/8"	2"	3/8"	37.35	35.73	34.10	32.48
		00586	.0520	#55	1.320	1/8"	2"	3/4"	41.29	39.49	37.70	35.90
00178			.0531		1.350	3.0	50	6.5	35.40	33.86	32.32	30.78
	00382		.0531		1.350	3.0	50	9.5	36.81	35.21	33.61	32.01
		00588	.0531		1.350	3.0	50	19.0	40.70	38.93	37.16	35.39
00180			.0550	#54	1.397	1/8"	2"	9/32"	36.00	34.43	32.87	31.30
	00384		.0550	#54	1.397	1/8"	2"	3/8"	37.35	35.73	34.10	32.48
		00590	.0550	#54	1.397	1/8"	2"	3/4"	41.29	39.49	37.70	35.90
00182			.0551		1.400	3.0	50	7.0	35.40	33.86	32.32	30.78
	00386		.0551		1.400	3.0	50	10.0	36.81	35.21	33.61	32.01
		00592	.0551		1.400	3.0	65	20.0	42.56	40.71	38.86	37.01
00184			.0571		1.450	3.0	50	7.0	35.40	33.86	32.32	30.78
	00388		.0571		1.450	3.0	50	10.5	36.81	35.21	33.61	32.01
		00594	.0571		1.450	3.0	65	21.0	42.56	40.71	38.86	37.01
00186			.0591		1.500	3.0	50	7.5	35.40	33.86	32.32	30.78
	00390		.0591		1.500	3.0	50	10.5	36.81	35.21	33.61	32.01
		00596	.0591		1.500	3.0	65	21.0	42.56	40.71	38.86	37.01
00188			.0595	#53	1.511	1/8"	2"	19/64"	36.00	34.43	32.87	31.30
	00392		.0595	#53	1.511	1/8"	2"	7/16"	37.35	35.73	34.10	32.48
		00598	.0595	#53	1.511	1/8"	2-1/2"	13/16"	43.18	41.31	39.43	37.55
00190			.0610		1.550	3.0	50	7.5	35.03	33.51	31.98	30.46
	00394		.0610		1.550	3.0	50	11.0	36.47	34.88	33.30	31.71
		00600	.0610		1.550	3.0	65	22.0	42.21	40.37	38.54	36.70
00192			.0625	1/16"	1.587	1/8"	2"	5/16"	35.66	34.11	32.56	31.01
	00396		.0625	1/16"	1.587	1/8"	2"	7/16"	37.00	35.39	33.78	32.17
		00602	.0625	1/16"	1.587	1/8"	2-1/2"	13/16"	42.79	40.93	39.07	37.21
00194			.0630		1.600	3.0	50	7.5	35.03	33.51	31.98	30.46
	00398		.0630		1.600	3.0	50	11.0	36.47	34.88	33.30	31.71
		00604	.0630		1.600	3.0	65	22.0	42.21	40.37	38.54	36.70
00196			.0635	#52	1.613	1/8"	2"	5/16"	35.66	34.11	32.56	31.01
	00400		.0635	#52	1.613	1/8"	2"	15/32"	37.00	35.39	33.78	32.17
		00606	.0635	#52	1.613	1/8"	2-1/2"	7/8"	42.79	40.93	39.07	37.21
00198			.0650		1.650	3.0	50	8.5	35.03	33.51	31.98	30.46
	00402		.0650		1.650	3.0	50	11.5	36.47	34.88	33.30	31.71
		00608	.0650		1.650	3.0	65	23.0	42.21	40.37	38.54	36.70
00200			.0669		1.700	3.0	50	8.5	35.03	33.51	31.98	30.46
	00404		.0669		1.700	3.0	50	11.5	36.47	34.88	33.30	31.71
		00610	.0669		1.700	3.0	65	23.0	42.21	40.37	38.54	36.70
00202			.0670	#51	1.702	1/8"	2"	11/32"	35.66	34.11	32.56	31.01
	00406		.0670	#51	1.702	1/8"	2"	15/32"	37.00	35.39	33.78	32.17
		00612	.0670	#51	1.702	1/8"	2-1/2"	7/8"	42.79	40.93	39.07	37.21
00204			.0689		1.750	3.0	50	9.0	35.03	33.51	31.98	30.46
	00408		.0689		1.750	3.0	50	12.0	36.47	34.88	33.30	31.71
		00614	.0689		1.750	3.0	65	24.0	42.21	40.37	38.54	36.70

continued →

Series 1550H,1250H,1850H *(continued)*

.0700" - .0846"
(1.778mm - 2.150mm)



TOLERANCES	
d_1	+.0000" –.0004" (+.000 –.010mm)
d_2	h6

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

AlTiN-based Coating

High performance solid submicron grain carbide drill on 3mm or 1/8" diameter shank



3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
00206			.0700	#50	1.778	1/8"	2"	23/64"	35.31	33.77	32.24	30.70
	00410		.0700	#50	1.778	1/8"	2"	1/2"	36.64	35.05	33.45	31.86
		00616	.0700	#50	1.778	1/8"	2-1/2"	1"	42.37	40.52	38.68	36.84
00208			.0709		1.800	3.0	50	9.0	34.70	33.19	31.68	30.17
	00412		.0709		1.800	3.0	50	13.0	36.12	34.55	32.98	31.41
		00618	.0709		1.800	3.0	65	26.0	41.79	39.97	38.16	36.34
00210			.0728		1.850	3.0	50	9.5	34.70	33.19	31.68	30.17
		00620	.0728		1.850	3.0	65	26.0	41.79	39.97	38.16	36.34
00212			.0730	#49	1.854	1/8"	2"	3/8"	35.31	33.77	32.24	30.70
	00416		.0730	#49	1.854	1/8"	2"	1/2"	36.64	35.05	33.45	31.86
		00622	.0730	#49	1.854	1/8"	2-1/2"	1"	42.37	40.52	38.68	36.84
00214			.0748		1.900	3.0	50	9.5	34.70	33.19	31.68	30.17
	00418		.0748		1.900	3.0	50	13.5	36.12	34.55	32.98	31.41
		00624	.0748		1.900	3.0	65	27.0	41.79	39.97	38.16	36.34
00216			.0760	#48	1.930	1/8"	2"	3/8"	35.31	33.77	32.24	30.70
	00420		.0760	#48	1.930	1/8"	2"	17/32"	36.64	35.05	33.45	31.86
		00626	.0760	#48	1.930	1/8"	2-1/2"	1-1/8"	44.64	42.70	40.76	38.82
00218			.0768		1.950	3.0	50	10.0	34.70	33.19	31.68	30.17
	00422		.0768		1.950	3.0	50	14.0	36.12	34.55	32.98	31.41
		00628	.0768		1.950	3.0	65	28.0	44.03	42.12	40.20	38.29
00220			.0781	5/64"	1.983	1/8"	2"	13/32"	35.31	33.77	32.24	30.70
	00424		.0781	5/64"	1.983	1/8"	2"	9/16"	36.64	35.05	33.45	31.86
		00630	.0781	5/64"	1.983	1/8"	2-1/2"	1-1/8"	44.64	42.70	40.76	38.82
00222			.0785	#47	1.994	1/8"	2"	13/32"	35.31	33.77	32.24	30.70
	00426		.0785	#47	1.994	1/8"	2"	9/16"	36.64	35.05	33.45	31.86
		00632	.0785	#47	1.994	1/8"	2-1/2"	1-1/8"	44.64	42.70	40.76	38.82
00224			.0787		2.000	3.0	50	10.0	34.70	33.19	31.68	30.17
	00428		.0787		2.000	3.0	50	14.0	36.12	34.55	32.98	31.41
		00634	.0787		2.000	3.0	65	28.0	44.03	42.12	40.20	38.29
00226			.0807		2.050	3.0	50	10.5	34.34	32.85	31.35	29.86
	00430		.0807		2.050	3.0	50	14.0	35.77	34.21	32.66	31.10
		00636	.0807		2.050	3.0	65	28.0	43.63	41.73	39.84	37.94
00228			.0810	#46	2.057	1/8"	2"	27/64"	34.95	33.43	31.91	30.39
	00432		.0810	#46	2.057	1/8"	2"	9/16"	36.31	34.73	33.15	31.57
		00638	.0810	#46	2.057	1/8"	2-1/2"	1-1/8"	44.28	42.35	40.43	38.50
00230			.0820	#45	2.083	1/8"	2"	27/64"	34.95	33.43	31.91	30.39
	00434		.0820	#45	2.083	1/8"	2"	9/16"	36.31	34.73	33.15	31.57
		00640	.0820	#45	2.083	1/8"	2-1/2"	1-1/8"	44.28	42.35	40.43	38.50
00232			.0827		2.100	3.0	50	10.5	34.34	32.85	31.35	29.86
	00436		.0827		2.100	3.0	50	14.5	35.77	34.21	32.66	31.10
		00642	.0827		2.100	3.0	65	29.0	43.63	41.73	39.84	37.94
00234			.0846		2.150	3.0	50	11.0	34.34	32.85	31.35	29.86
	00438		.0846		2.150	3.0	50	14.5	35.77	34.21	32.66	31.10
		00644	.0846		2.150	3.0	65	29.0	43.63	41.73	39.84	37.94

† *Metric equivalents are for reference only*

.0860" - .1043"
(2.184mm - 2.650mm)

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
00236			.0860	#44	2.184	1/8"	2"	7/16"	34.95	33.43	31.91	30.39
	00440		.0860	#44	2.184	1/8"	2"	19/32"	36.31	34.73	33.15	31.57
		00646	.0860	#44	2.184	1/8"	2-1/2"	1-3/16"	44.28	42.35	40.43	38.50
00238			.0866		2.200	3.0	50	11.0	34.34	32.85	31.35	29.86
	00442		.0866		2.200	3.0	50	15.5	35.77	34.21	32.66	31.10
		00648	.0866		2.200	3.0	65	31.0	43.63	41.73	39.84	37.94
00240			.0886		2.250	3.0	50	11.5	34.34	32.85	31.35	29.86
00242			.0890	#43	2.260	1/8"	2"	29/64"	34.95	33.43	31.91	30.39
	00446		.0890	#43	2.260	1/8"	2"	5/8"	36.31	34.73	33.15	31.57
		00652	.0890	#43	2.260	1/8"	2-1/2"	1-1/4"	44.28	42.35	40.43	38.50
00244			.0906		2.300	3.0	50	11.5	33.99	32.52	31.04	29.56
	00448		.0906		2.300	3.0	50	16.0	35.42	33.88	32.34	30.80
		00654	.0906		2.300	3.0	65	32.0	43.22	41.34	39.46	37.58
00246			.0925		2.350	3.0	50	12.0	33.99	32.52	31.04	29.56
	00450		.0925		2.350	3.0	50	16.0	35.42	33.88	32.34	30.80
		00656	.0925		2.350	3.0	65	32.0	43.22	41.34	39.46	37.58
00248			.0935	#42	2.375	1/8"	2"	31/64"	34.59	33.09	31.58	30.08
	00452		.0935	#42	2.375	1/8"	2"	21/32"	35.94	34.38	32.81	31.25
		00658	.0935	#42	2.375	1/8"	3"	1-5/16"	43.85	41.94	40.04	38.13
00250			.0938	3/32"	2.382	1/8"	2"	31/64"	34.59	33.09	31.58	30.08
	00454		.0938	3/32"	2.382	1/8"	2"	21/32"	35.94	34.38	32.81	31.25
		00660	.0938	3/32"	2.382	1/8"	3"	1-5/16"	43.85	41.94	40.04	38.13
00252			.0945		2.400	3.0	50	12.0	33.99	32.52	31.04	29.56
	00456		.0945		2.400	3.0	50	17.0	35.42	33.88	32.34	30.80
		00662	.0945		2.400	3.0	75	34.0	43.22	41.34	39.46	37.58
00254			.0960	#41	2.438	1/8"	2"	31/64"	34.59	33.09	31.58	30.08
	00458		.0960	#41	2.438	1/8"	2"	43/64"	35.94	34.38	32.81	31.25
		00664	.0960	#41	2.438	1/8"	3"	1-11/32"	43.85	41.94	40.04	38.13
00256			.0965		2.450	3.0	50	12.5	33.99	32.52	31.04	29.56
		00666	.0965		2.450	3.0	75	34.0	43.22	41.34	39.46	37.58
00258			.0980	#40	2.489	1/8"	2"	1/2"	34.59	33.09	31.58	30.08
	00462		.0980	#40	2.489	1/8"	2"	11/16"	35.94	34.38	32.81	31.25
		00668	.0980	#40	2.489	1/8"	3"	1-3/8"	43.85	41.94	40.04	38.13
00260			.0984		2.500	3.0	50	12.5	33.99	32.52	31.04	29.56
	00464		.0984		2.500	3.0	50	17.5	35.42	33.88	32.34	30.80
		00670	.0984		2.500	3.0	75	35.0	43.22	41.34	39.46	37.58
00262			.0995	#39	2.527	1/8"	2"	1/2"	34.59	33.09	31.58	30.08
	00466		.0995	#39	2.527	1/8"	2"	11/16"	35.94	34.38	32.81	31.25
		00672	.0995	#39	2.527	1/8"	3"	1-3/8"	43.85	41.94	40.04	38.13
00264			.1004		2.550	3.0	50	13.0	33.67	32.21	30.74	29.28
	00468		.1004		2.550	3.0	50	17.5	35.10	33.57	32.05	30.52
		00674	.1004		2.550	3.0	75	35.0	42.85	40.99	39.12	37.26
00266			.1015	#38	2.578	1/8"	2"	17/32"	34.28	32.79	31.30	29.81
	00470		.1015	#38	2.578	1/8"	2"	45/64"	35.63	34.08	32.53	30.98
		00676	.1015	#38	2.578	1/8"	3"	1-13/32"	43.47	41.58	39.69	37.80
00268			.1024		2.600	3.0	50	13.0	33.67	32.21	30.74	29.28
	00472		.1024		2.600	3.0	50	18.0	35.10	33.57	32.05	30.52
		00678	.1024		2.600	3.0	75	36.0	42.85	40.99	39.12	37.26
00270			.1040	#37	2.641	1/8"	2"	17/32"	34.28	32.79	31.30	29.81
	00474		.1040	#37	2.641	1/8"	2"	23/32"	35.63	34.08	32.53	30.98
		00680	.1040	#37	2.641	1/8"	3"	1-7/16"	43.47	41.58	39.69	37.80
00272			.1043		2.650	3.0	50	13.5	33.67	32.21	30.74	29.28
	00476		.1043		2.650	3.0	50	18.5	35.10	33.57	32.05	30.52
		00682	.1043		2.650	3.0	75	37.0	42.85	40.99	39.12	37.26

continued ⟶

Series 1550H,1250H,1850H *(continued)*

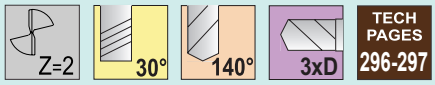
.1063" - .1250"
(2.700mm - 3.175mm)

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
00274			.1063		2.700	3.0	50	13.5	33.67	32.21	30.74	29.28
	00478		.1063		2.700	3.0	50	19.0	35.10	33.57	32.05	30.52
		00684	.1063		2.700	3.0	75	38.0	42.85	40.99	39.12	37.26
00276			.1065	#36	2.705	1/8"	2"	17/32"	34.28	32.79	31.30	29.81
	00480		.1065	#36	2.705	1/8"	2"	3/4"	35.63	34.08	32.53	30.98
		00686	.1065	#36	2.705	1/8"	3"	1-1/2"	43.47	41.58	39.69	37.80
00278			.1083		2.750	3.0	50	14.0	33.67	32.21	30.74	29.28
	00482		.1083		2.750	3.0	50	19.5	35.10	33.57	32.05	30.52
		00688	.1083		2.750	3.0	75	39.0	42.85	40.99	39.12	37.26
00280			.1094	7/64"	2.778	1/8"	2"	9/16"	34.28	32.79	31.30	29.81
	00484		.1094	7/64"	2.778	1/8"	2"	49/64"	35.63	34.08	32.53	30.98
		00690	.1094	7/64"	2.778	1/8"	3"	1-9/16"	43.47	41.58	39.69	37.80
00282			.1100	#35	2.794	1/8"	2"	9/16"	34.28	32.79	31.30	29.81
	00486		.1100	#35	2.794	1/8"	2"	49/64"	35.63	34.08	32.53	30.98
		00692	.1100	#35	2.794	1/8"	3"	1-9/16"	43.47	41.58	39.69	37.80
00284			.1102		2.800	3.0	50	14.0	33.67	32.21	30.74	29.28
	00488		.1102		2.800	3.0	50	19.5	35.10	33.57	32.05	30.52
		00694	.1102		2.800	3.0	75	39.0	42.85	40.99	39.12	37.26
00286			.1110	#34	2.819	1/8"	2"	9/16"	34.28	32.79	31.30	29.81
	00490		.1110	#34	2.819	1/8"	2"	25/32"	35.63	34.08	32.53	30.98
		00696	.1110	#34	2.819	1/8"	3"	1-5/8"	43.47	41.58	39.69	37.80
00288			.1122		2.850	3.0	50	14.5	33.67	32.21	30.74	29.28
		00698	.1122		2.850	3.0	75	40.0	42.85	40.99	39.12	37.26
00290			.1130	#33	2.870	1/8"	2"	19/32"	34.28	32.79	31.30	29.81
	00494		.1130	#33	2.870	1/8"	2"	51/64"	35.63	34.08	32.53	30.98
		00700	.1130	#33	2.870	1/8"	3"	1-5/8"	43.47	41.58	39.69	37.80
00292			.1142		2.900	3.0	50	14.5	33.67	32.21	30.74	29.28
	00496		.1142		2.900	3.0	50	20.0	35.10	33.57	32.05	30.52
		00702	.1142		2.900	3.0	75	40.0	42.85	40.99	39.12	37.26
00294			.1160	#32	2.946	1/8"	2"	19/32"	34.28	32.79	31.30	29.81
	00498		.1160	#32	2.946	1/8"	2"	13/16"	35.63	34.08	32.53	30.98
		00704	.1160	#32	2.946	1/8"	3"	1-5/8"	43.47	41.58	39.69	37.80
00296			.1161		2.950	3.0	50	15.0	33.67	32.21	30.74	29.28
		00706	.1161		2.950	3.0	75	42.0	42.85	40.99	39.12	37.26
00298			.1181		3.000	3.0	50	15.0	31.64	30.26	28.89	27.51
	00502		.1181		3.000	3.0	50	21.0	33.05	31.61	30.18	28.74
		00708	.1181		3.000	3.0	75	42.0	40.42	38.67	36.91	35.15
00300			.1200	#31	3.048	1/8"	2"	5/8"	34.28	32.79	31.30	29.81
	00504		.1200	#31	3.048	1/8"	2"	7/8"	35.63	34.08	32.53	30.98
		00710	.1200	#31	3.048	1/8"	3"	1-3/4"	43.47	41.58	39.69	37.80
00302			.1250	1/8"	3.175	1/8"	2"	5/8"	32.25	30.84	29.44	28.04
	00506		.1250	1/8"	3.175	1/8"	2"	7/8"	33.58	32.12	30.66	29.20
		00712	.1250	1/8"	3.175	1/8"	3"	1-3/4"	41.06	39.27	37.49	35.70

† *Metric equivalents are for reference only*

TOLERANCES

d_1*	3mm - 6mm	+.016 +.004mm (+.00063" +.00015")
	> 6mm - 10mm	+.021 +.006mm (+.00082" +.00023")
	> 10mm - 18mm	+.025 +.007mm (+.00098" +.00027")
	> 18mm - 20mm	+.029 +.008mm (+.00114" +.00031")
d_2	6mm	+.000 –.008mm (+.00000" –.00030")
	8mm - 10mm	+.000 –.009mm (+.00000" –.00035")
	12mm - 18mm	+.000 –.011mm (+.00000" –.00040")
	20mm	+.000 –.013mm (+.00000" –.00050")



Series 1580HD

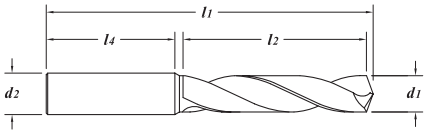
.1181" - .2342"
(3.000mm - 5.950mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

AlTiN-based Coating

High performance solid submicron grain carbide drill with reinforced shank
Up to 50% faster than standard carbide drills
30° helix for better chip evacuation
Honed cutting edge
Can be used as a pilot drill
Live tooling recommended on lathe processes





Note - These drills are made to a plus/plus tolerance on the drill diameter. If you are in need of a minus tolerance drill, please refer to our other high performance drills.

EDP#	d_1 † Diameter Decimal	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
20085	.1181	3.000	6.0	62	20	36	45.41	43.44	41.46	39.49
20095	.1220	3.100	6.0	62	20	36	45.41	43.44	41.46	39.49
20105	.1248	3.170	6.0	62	20	36	45.41	43.44	41.46	39.49
20115	.1260	3.200	6.0	62	20	36	45.41	43.44	41.46	39.49
20125	.1280	3.250	6.0	62	20	36	45.41	43.44	41.46	39.49
20135	.1299	3.300	6.0	62	20	36	45.41	43.44	41.46	39.49
20145	.1339	3.400	6.0	62	20	36	45.41	43.44	41.46	39.49
20155	.1378	3.500	6.0	62	20	36	45.41	43.44	41.46	39.49
20165	.1417	3.600	6.0	62	20	36	45.41	43.44	41.46	39.49
20175	.1457	3.700	6.0	62	20	36	45.41	43.44	41.46	39.49
20185	.1476	3.750	6.0	62	20	36	45.41	43.44	41.46	39.49
20195	.1496	3.800	6.0	66	24	36	45.41	43.44	41.46	39.49
20205	.1535	3.900	6.0	66	24	36	45.41	43.44	41.46	39.49
20215	.1575	4.000	6.0	66	24	36	45.41	43.44	41.46	39.49
20225	.1614	4.100	6.0	66	24	36	45.41	43.44	41.46	39.49
20235	.1654	4.200	6.0	66	24	36	45.41	43.44	41.46	39.49
20245	.1673	4.250	6.0	66	24	36	45.41	43.44	41.46	39.49
20255	.1693	4.300	6.0	66	24	36	45.41	43.44	41.46	39.49
20265	.1732	4.400	6.0	66	24	36	45.41	43.44	41.46	39.49
20275	.1772	4.500	6.0	66	24	36	45.41	43.44	41.46	39.49
20285	.1811	4.600	6.0	66	24	36	45.41	43.44	41.46	39.49
20295	.1831	4.650	6.0	66	24	36	45.41	43.44	41.46	39.49
20305	.1850	4.700	6.0	66	24	36	45.41	43.44	41.46	39.49
20315	.1870	4.750	6.0	66	24	36	45.41	43.44	41.46	39.49
20325	.1890	4.800	6.0	66	28	36	45.41	43.44	41.46	39.49
20335	.1929	4.900	6.0	66	28	36	45.41	43.44	41.46	39.49
20345	.1969	5.000	6.0	66	28	36	45.41	43.44	41.46	39.49
20355	.2008	5.100	6.0	66	28	36	45.41	43.44	41.46	39.49
20365	.2027	5.150	6.0	66	28	36	45.41	43.44	41.46	39.49
20375	.2047	5.200	6.0	66	28	36	45.41	43.44	41.46	39.49
20385	.2087	5.300	6.0	66	28	36	45.41	43.44	41.46	39.49
20395	.2165	5.500	6.0	66	28	36	45.41	43.44	41.46	39.49
20405	.2185	5.550	6.0	66	28	36	45.41	43.44	41.46	39.49
20408	.2205	5.600	6.0	66	28	36	45.41	43.44	41.46	39.49
20412	.2244	5.700	6.0	66	28	36	45.41	43.44	41.46	39.49
20415	.2283	5.800	6.0	66	28	36	45.41	43.44	41.46	39.49
20425	.2323	5.900	6.0	66	28	36	45.41	43.44	41.46	39.49
20435	.2342	5.950	6.0	66	28	36	45.41	43.44	41.46	39.49

continued →

Series 1580HD *(continued)*

.2362" - .4252"
(6.000mm - 10.800mm)

EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
20445	.2362	6.000	6.0	66	28	36	45.41	43.44	41.46	39.49
20448	.2402	6.100	8.0	79	34	36	62.48	59.76	57.05	54.33
20452	.2441	6.200	8.0	79	34	36	62.48	59.76	57.05	54.33
20454	.2480	6.300	8.0	79	34	36	62.48	59.76	57.05	54.33
20455	.2500	6.350	8.0	79	34	36	62.48	59.76	57.05	54.33
20462	.2520	6.400	8.0	79	34	36	62.48	59.76	57.05	54.33
20465	.2559	6.500	8.0	79	34	36	62.48	59.76	57.05	54.33
20468	.2571	6.530	8.0	79	34	36	62.48	59.76	57.05	54.33
20472	.2598	6.600	8.0	79	34	36	62.48	59.76	57.05	54.33
20473	.2638	6.700	8.0	79	34	36	62.48	59.76	57.05	54.33
20475	.2657	6.750	8.0	79	34	36	62.48	59.76	57.05	54.33
20485	.2677	6.800	8.0	79	34	36	62.48	59.76	57.05	54.33
20495	.2717	6.900	8.0	79	34	36	62.48	59.76	57.05	54.33
20505	.2756	7.000	8.0	79	34	36	62.48	59.76	57.05	54.33
20515	.2795	7.100	8.0	79	41	36	62.48	59.76	57.05	54.33
20525	.2815	7.150	8.0	79	41	36	62.48	59.76	57.05	54.33
20535	.2835	7.200	8.0	79	41	36	62.48	59.76	57.05	54.33
20542	.2874	7.300	8.0	79	41	36	62.48	59.76	57.05	54.33
20545	.2913	7.400	8.0	79	41	36	62.48	59.76	57.05	54.33
20555	.2953	7.500	8.0	79	41	36	62.48	59.76	57.05	54.33
20565	.2972	7.550	8.0	79	41	36	62.48	59.76	57.05	54.33
20575	.2992	7.600	8.0	79	41	36	62.48	59.76	57.05	54.33
20585	.3031	7.700	8.0	79	41	36	62.48	59.76	57.05	54.33
20595	.3071	7.800	8.0	79	41	36	62.48	59.76	57.05	54.33
20605	.3130	7.950	8.0	79	41	36	62.48	59.76	57.05	54.33
20615	.3150	8.000	8.0	79	41	36	62.48	59.76	57.05	54.33
20622	.3189	8.100	10.0	89	47	40	86.93	83.15	79.37	75.59
20625	.3228	8.200	10.0	89	47	40	86.93	83.15	79.37	75.59
20635	.3268	8.300	10.0	89	47	40	86.93	83.15	79.37	75.59
20645	.3287	8.350	10.0	89	47	40	86.93	83.15	79.37	75.59
20652	.3307	8.400	10.0	89	47	40	86.93	83.15	79.37	75.59
20655	.3346	8.500	10.0	89	47	40	86.93	83.15	79.37	75.59
20665	.3386	8.600	10.0	89	47	40	86.93	83.15	79.37	75.59
20675	.3425	8.700	10.0	89	47	40	86.93	83.15	79.37	75.59
20685	.3445	8.750	10.0	89	47	40	86.93	83.15	79.37	75.59
20695	.3465	8.800	10.0	89	47	40	86.93	83.15	79.37	75.59
20705	.3504	8.900	10.0	89	47	40	86.93	83.15	79.37	75.59
20715	.3543	9.000	10.0	89	47	40	86.93	83.15	79.37	75.59
20725	.3583	9.100	10.0	89	47	40	86.93	83.15	79.37	75.59
20735	.3602	9.150	10.0	89	47	40	86.93	83.15	79.37	75.59
20745	.3622	9.200	10.0	89	47	40	86.93	83.15	79.37	75.59
20755	.3661	9.300	10.0	89	47	40	86.93	83.15	79.37	75.59
20762	.3701	9.400	10.0	89	47	40	86.93	83.15	79.37	75.59
20765	.3740	9.500	10.0	89	47	40	86.93	83.15	79.37	75.59
20775	.3760	9.550	10.0	89	47	40	86.93	83.15	79.37	75.59
20778	.3780	9.600	10.0	89	47	40	86.93	83.15	79.37	75.59
20782	.3819	9.700	10.0	89	47	40	86.93	83.15	79.37	75.59
20785	.3858	9.800	10.0	89	47	40	86.93	83.15	79.37	75.59
20795	.3898	9.900	10.0	89	47	40	86.93	83.15	79.37	75.59
20805	.3937	10.000	10.0	89	47	40	86.93	83.15	79.37	75.59
20812	.3976	10.100	12.0	102	55	45	113.09	108.17	103.26	98.34
20815	.4016	10.200	12.0	102	55	45	113.09	108.17	103.26	98.34
20825	.4055	10.300	12.0	102	55	45	113.09	108.17	103.26	98.34
20835	.4134	10.500	12.0	102	55	45	113.09	108.17	103.26	98.34
20842	.4173	10.600	12.0	102	55	45	113.09	108.17	103.26	98.34
20845	.4213	10.700	12.0	102	55	45	113.09	108.17	103.26	98.34
20855	.4252	10.800	12.0	102	55	45	113.09	108.17	103.26	98.34

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
20865	.4331	11.000	12.0	102	55	45	113.09	108.17	103.26	98.34
20875	.4370	11.100	12.0	102	55	45	113.09	108.17	103.26	98.34
20885	.4409	11.200	12.0	102	55	45	113.09	108.17	103.26	98.34
20892	.4488	11.400	12.0	102	55	45	113.09	108.17	103.26	98.34
20895	.4528	11.500	12.0	102	55	45	113.09	108.17	103.26	98.34
20905	.4606	11.700	12.0	102	55	45	113.09	108.17	103.26	98.34
20915	.4685	11.900	12.0	102	55	45	113.09	108.17	103.26	98.34
20925	.4724	12.000	12.0	102	55	45	113.09	108.17	103.26	98.34
20935	.4764	12.100	14.0	107	60	45	141.83	135.66	129.50	123.33
20941	.4803	12.200	14.0	107	60	45	141.83	135.66	129.50	123.33
20945	.4842	12.300	14.0	107	60	45	141.83	135.66	129.50	123.33
20955	.4921	12.500	14.0	107	60	45	141.83	135.66	129.50	123.33
20961	.4961	12.600	14.0	107	60	45	141.83	135.66	129.50	123.33
20965	.5000	12.700	14.0	107	60	45	141.83	135.66	129.50	123.33
20975	.5039	12.800	14.0	107	60	45	141.83	135.66	129.50	123.33
20978	.5051	12.830	14.0	107	60	45	141.83	135.66	129.50	123.33
20981	.5079	12.900	14.0	107	60	45	141.83	135.66	129.50	123.33
20982	.5098	12.950	14.0	107	60	45	141.83	135.66	129.50	123.33
20985	.5118	13.000	14.0	107	60	45	141.83	135.66	129.50	123.33
20998	.5236	13.300	14.0	107	60	45	141.83	135.66	129.50	123.33
21005	.5315	13.500	14.0	107	60	45	141.83	135.66	129.50	123.33
21015	.5394	13.700	14.0	107	60	45	141.83	135.66	129.50	123.33
21025	.5433	13.800	14.0	107	60	45	141.83	135.66	129.50	123.33
21035	.5512	14.000	14.0	107	60	45	141.83	135.66	129.50	123.33
21045	.5551	14.100	16.0	115	65	48	168.58	161.25	153.92	146.59
21053	.5591	14.200	16.0	115	65	48	168.58	161.25	153.92	146.59
21055	.5610	14.250	16.0	115	65	48	168.58	161.25	153.92	146.59
21065	.5630	14.300	16.0	115	65	48	168.58	161.25	153.92	146.59
21075	.5709	14.500	16.0	115	65	48	168.58	161.25	153.92	146.59
21085	.5787	14.700	16.0	115	65	48	168.58	161.25	153.92	146.59
21105	.5906	15.000	16.0	115	65	48	168.58	161.25	153.92	146.59
21115	.5945	15.100	16.0	115	65	48	168.58	161.25	153.92	146.59
21125	.6102	15.500	16.0	115	65	48	168.58	161.25	153.92	146.59
21135	.6181	15.700	16.0	115	65	48	168.58	161.25	153.92	146.59
21145	.6220	15.800	16.0	115	65	48	168.58	161.25	153.92	146.59
21155	.6299	16.000	16.0	115	65	48	168.58	161.25	153.92	146.59
21159	.6331	16.080	18.0	123	73	48	223.76	214.03	204.30	194.57
21175	.6496	16.500	18.0	123	73	48	223.76	214.03	204.30	194.57
21185	.6555	16.650	18.0	123	73	48	223.76	214.03	204.30	194.57
21195	.6693	17.000	18.0	123	73	48	223.76	214.03	204.30	194.57
21215	.6870	17.450	18.0	123	73	48	223.76	214.03	204.30	194.57
21225	.6890	17.500	18.0	123	73	48	223.76	214.03	204.30	194.57
21235	.7027	17.850	18.0	123	73	48	223.76	214.03	204.30	194.57
21245	.7087	18.000	18.0	123	73	48	223.76	214.03	204.30	194.57
21255	.7185	18.250	20.0	131	79	50	306.42	293.10	279.77	266.45
21265	.7283	18.500	20.0	131	79	50	306.42	293.10	279.77	266.45
21275	.7342	18.650	20.0	131	79	50	306.42	293.10	279.77	266.45
21295	.7500	19.050	20.0	131	79	50	306.42	293.10	279.77	266.45
21304	.7598	19.300	20.0	131	79	50	306.42	293.10	279.77	266.45
21315	.7677	19.500	20.0	131	79	50	306.42	293.10	279.77	266.45
21325	.7815	19.850	20.0	131	79	50	306.42	293.10	279.77	266.45
21335	.7874	20.000	20.0	131	79	50	306.42	293.10	279.77	266.45





Blank Prep

† *Metric equivalents are for reference only*

TOLERANCES

d	+.0000" –.0005" (+.0000 –.0127mm)	
l1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

Z=2 | 30° | 140° | 3xD | 5xD | TECH PAGES 296-297

Series 1580H, 1280H

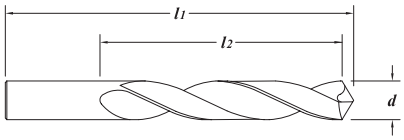
.1181" - .1719"
(3.000mm - 4.366mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

AlTiN-based Coating

High performance - high penetration solid submicron grain carbide drill
Extended tool life and greater surface finish through faster SFM rates
Up to 50% faster than standard carbide drills
30° helix for better chip evacuation
Honed cutting edge
Live tooling recommended on lathe processes





3xD (1580H) EDP#	5xD (1280H) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
20301		.1181		3.000	46	16	31.64	30.26	28.89	27.51
	21301	.1181		3.000	50	19	33.06	31.63	30.19	28.75
20306		.1200	#31	3.048	1-13/16"	5/8"	31.96	30.57	29.18	27.79
	21306	.1200	#31	3.048	2"	3/4"	33.33	31.88	30.43	28.98
20311		.1250	1/8"	3.175	1-15/16"	11/16"	32.25	30.84	29.44	28.04
	21311	.1250	1/8"	3.175	2"	3/4"	33.59	32.13	30.67	29.21
20316		.1285	#30	3.264	1-15/16"	11/16"	32.53	31.12	29.70	28.29
	21316	.1285	#30	3.264	2-1/4"	3/4"	33.89	32.42	30.94	29.47
20321		.1360	#29	3.454	2-1/16"	3/4"	32.84	31.42	29.99	28.56
	21321	.1360	#29	3.454	2-1/4"	7/8"	34.14	32.66	31.17	29.69
20326		.1378		3.500	52	19	33.17	31.72	30.28	28.84
	21326	.1378		3.500	57	22	34.42	32.92	31.43	29.93
20331		.1405	#28	3.569	2-1/16"	3/4"	33.48	32.02	30.57	29.11
	21331	.1405	#28	3.569	2-1/4"	7/8"	34.70	33.19	31.68	30.17
20336		.1406	9/64"	3.571	2-1/16"	3/4"	33.76	32.30	30.83	29.36
	21336	.1406	9/64"	3.571	2-1/4"	7/8"	34.99	33.47	31.95	30.43
20341		.1440	#27	3.658	2-1/16"	3/4"	34.06	32.58	31.10	29.62
	21341	.1440	#27	3.658	2-1/4"	7/8"	35.22	33.69	32.16	30.63
20346		.1470	#26	3.734	2-3/16"	13/16"	34.33	32.84	31.34	29.85
	21346	.1470	#26	3.734	2-1/4"	7/8"	35.51	33.97	32.42	30.88
20351		.1495	#25	3.797	2-3/16"	13/16"	34.68	33.18	31.67	30.16
	21351	.1495	#25	3.797	2-1/4"	15/16"	35.79	34.23	32.68	31.12
20356		.1520	#24	3.861	2-3/16"	13/16"	34.96	33.44	31.92	30.40
	21356	.1520	#24	3.861	2-1/4"	15/16"	36.04	34.47	32.91	31.34
20361		.1540	#23	3.912	2-3/16"	13/16"	35.27	33.74	32.20	30.67
	21361	.1540	#23	3.912	2-1/4"	15/16"	36.35	34.77	33.19	31.61
20366		.1562	5/32"	3.967	2-3/16"	13/16"	35.55	34.00	32.46	30.91
	21366	.1562	5/32"	3.967	2-1/2"	15/16"	36.60	35.01	33.42	31.83
20371		.1570	#22	3.988	2-3/16"	13/16"	35.88	34.32	32.76	31.20
	21371	.1570	#22	3.988	2-1/2"	15/16"	36.87	35.27	33.66	32.06
20376		.1575		4.000	56	21	36.17	34.60	33.02	31.45
	21376	.1575		4.000	65	24	37.15	35.53	33.92	32.30
20381		.1590	#21	4.039	2-3/16"	13/16"	36.48	34.89	33.31	31.72
	21381	.1590	#21	4.039	2-1/2"	15/16"	37.41	35.78	34.16	32.53
20386		.1610	#20	4.089	2-3/16"	13/16"	36.79	35.19	33.59	31.99
	21386	.1610	#20	4.089	2-1/2"	15/16"	37.71	36.07	34.43	32.79
20391		.1660	#19	4.216	2-9/32"	15/16"	37.11	35.50	33.88	32.27
	21391	.1660	#19	4.216	2-1/2"	1"	37.97	36.32	34.67	33.02
20396		.1695	#18	4.305	2-9/32"	15/16"	37.40	35.77	34.15	32.52
	21396	.1695	#18	4.305	2-1/2"	1"	38.23	36.56	34.90	33.24
20401		.1719	11/64"	4.366	2-9/32"	15/16"	37.71	36.07	34.43	32.79
	21401	.1719	11/64"	4.366	2-1/2"	1"	38.50	36.83	35.15	33.48

continued ⟶

Series 1580H, 1280H *(continued)*

.1730" - .2380"
(4.394mm - 6.045mm)

3xD (1580H) EDP#	5xD (1280H) EDP#	Decimal	*d* † Diameter	Metric	*l*1 Overall Length	*l*2 Flute Length	1-11	12-24	25-49	50-100
20406		.1730	#17	4.394	2-9/32"	15/16"	38.02	36.37	34.71	33.06
	21406	.1730	#17	4.394	2-1/2"	1"	38.77	37.08	35.40	33.71
20411		.1770	#16	4.496	2-9/32"	15/16"	38.28	36.62	34.95	33.29
	21411	.1770	#16	4.496	2-1/2"	1"	39.07	37.37	35.67	33.97
20416		.1772		4.500	58	24	38.61	36.93	35.25	33.57
	21416	.1772		4.500	65	25	39.34	37.63	35.92	34.21
20421		.1800	#15	4.572	2-9/32"	15/16"	38.87	37.18	35.49	33.80
	21421	.1800	#15	4.572	2-3/4"	1"	39.58	37.86	36.14	34.42
20426		.1820	#14	4.623	2-9/32"	15/16"	39.23	37.52	35.82	34.11
	21426	.1820	#14	4.623	2-3/4"	1"	39.85	38.12	36.38	34.65
20431		.1850	#13	4.700	2-9/32"	15/16"	39.51	37.80	36.08	34.36
	21431	.1850	#13	4.700	2-3/4"	1-1/4"	40.15	38.40	36.66	34.91
20436		.1875	3/16"	4.763	2-13/32"	1"	39.82	38.09	36.36	34.63
	21436	.1875	3/16"	4.763	2-3/4"	1-1/4"	40.43	38.68	36.92	35.16
20441		.1890	#12	4.801	2-13/32"	1"	40.12	38.38	36.63	34.89
	21441	.1890	#12	4.801	2-3/4"	1-1/4"	40.70	38.93	37.16	35.39
20446		.1910	#11	4.851	2-13/32"	1"	40.49	38.73	36.97	35.21
	21446	.1910	#11	4.851	2-3/4"	1-1/4"	40.95	39.17	37.39	35.61
20451		.1935	#10	4.915	2-13/32"	1"	40.73	38.96	37.19	35.42
	21451	.1935	#10	4.915	2-3/4"	1-1/4"	41.24	39.45	37.65	35.86
20456		.1960	#9	4.978	2-13/32"	1"	41.02	39.24	37.45	35.67
	21456	.1960	#9	4.978	3"	1-5/16"	41.49	39.69	37.88	36.08
20461		.1969		5.000	61	25	41.25	39.46	37.66	35.87
	21461	.1969		5.000	75	33	41.78	39.96	38.15	36.33
20466		.1990	#8	5.055	2-13/32"	1"	41.63	39.82	38.01	36.20
	21466	.1990	#8	5.055	3"	1-5/16"	42.00	40.17	38.35	36.52
20471		.2010	#7	5.105	2-13/32"	1"	41.76	39.94	38.13	36.31
	21471	.2010	#7	5.105	3"	1-5/16"	42.18	40.35	38.51	36.68
20476		.2031	13/64"	5.159	2-13/32"	1"	42.03	40.21	38.38	36.55
	21476	.2031	13/64"	5.159	3"	1-5/16"	42.49	40.65	38.80	36.95
20481		.2040	#6	5.182	2-13/32"	1"	42.32	40.48	38.64	36.80
	21481	.2040	#6	5.182	3"	1-3/8"	42.80	40.94	39.08	37.22
20486		.2055	#5	5.220	2-13/32"	1"	42.63	40.78	38.92	37.07
	21486	.2055	#5	5.220	3"	1-3/8"	43.09	41.22	39.34	37.47
20491		.2090	#4	5.309	2-13/32"	1"	42.88	41.02	39.15	37.29
	21491	.2090	#4	5.309	3"	1-3/8"	43.38	41.49	39.61	37.72
20496		.2130	#3	5.410	2-5/8"	1-3/32"	43.17	41.29	39.42	37.54
	21496	.2130	#3	5.410	3"	1-3/8"	43.68	41.78	39.88	37.98
20501		.2165		5.500	67	28	43.45	41.56	39.67	37.78
	21501	.2165		5.500	75	35	43.94	42.03	40.12	38.21
20506		.2188	7/32"	5.558	2-5/8"	1-3/32"	43.80	41.90	39.99	38.09
	21506	.2188	7/32"	5.558	3"	1-3/8"	44.22	42.30	40.37	38.45
20511		.2210	#2	5.613	2-5/8"	1-3/32"	44.13	42.21	40.29	38.37
	21511	.2210	#2	5.613	3"	1-3/8"	45.17	43.21	41.24	39.28
20516		.2280	#1	5.791	2-5/8"	1-3/32"	44.46	42.53	40.59	38.66
	21516	.2280	#1	5.791	3"	1-3/8"	45.40	43.43	41.45	39.48
20521		.2340	A	5.944	2-5/8"	1-3/32"	44.76	42.81	40.87	38.92
	21521	.2340	A	5.944	3-1/4"	1-1/2"	46.08	44.08	42.07	40.07
20526		.2344	15/64"	5.954	2-5/8"	1-3/32"	45.10	43.14	41.18	39.22
	21526	.2344	15/64"	5.954	3-1/4"	1-1/2"	46.20	44.19	42.18	40.17
20531		.2362		6.000	67	28	45.41	43.44	41.46	39.49
	21531	.2362		6.000	80	38	46.35	44.33	42.32	40.30
20536		.2380	B	6.045	2-3/4"	1-7/32"	45.72	43.74	41.75	39.76
	21536	.2380	B	6.045	3-1/4"	1-5/8"	46.47	44.45	42.43	40.41

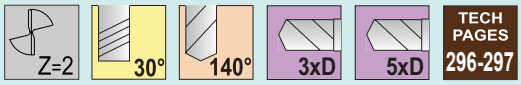
† *Metric equivalents are for reference only*

3xD (1580H) EDP#	5xD (1280H) EDP#	Decimal	*d* † Diameter	Metric	*l*1 Overall Length	*l*2 Flute Length	1-11	12-24	25-49	50-100
20541		.2420	C	6.147	2-3/4"	1-7/32"	46.09	44.09	42.08	40.08
	21541	.2420	C	6.147	3-1/4"	1-5/8"	46.79	44.76	42.72	40.69
20546		.2460	D	6.248	2-3/4"	1-7/32"	46.35	44.33	42.32	40.30
	21546	.2460	D	6.248	3-1/4"	1-5/8"	47.09	45.05	43.00	40.95
20551		.2500	1/4" / E	6.350	2-3/4"	1-7/32"	46.75	44.72	42.68	40.65
	21551	.2500	1/4" / E	6.350	3-1/4"	1-5/8"	47.36	45.30	43.24	41.18
20556		.2559		6.500	70	31	47.50	45.43	43.37	41.30
	21556	.2559		6.500	80	41	48.20	46.10	44.01	41.91
20561		.2570	F	6.528	2-3/4"	1-7/32"	48.24	46.15	44.05	41.95
	21561	.2570	F	6.528	3-1/4"	1-11/16"	49.02	46.89	44.76	42.63
20566		.2610	G	6.629	2-3/4"	1-7/32"	48.98	46.85	44.72	42.59
	21566	.2610	G	6.629	3-1/2"	1-11/16"	49.88	47.71	45.54	43.37
20571		.2656	17/64"	6.746	2-15/16"	1-11/32"	49.71	47.55	45.39	43.23
	21571	.2656	17/64"	6.746	3-1/2"	1-11/16"	50.68	48.48	46.27	44.07
20576		.2660	H	6.756	2-15/16"	1-11/32"	50.45	48.26	46.06	43.87
	21576	.2660	H	6.756	3-1/2"	1-11/16"	51.54	49.30	47.06	44.82
20581		.2720	I	6.909	2-15/16"	1-11/32"	51.20	48.97	46.75	44.52
	21581	.2720	I	6.909	3-1/2"	1-11/16"	52.37	50.09	47.82	45.54
20586		.2756		7.000	75	34	51.95	49.69	47.43	45.17
	21586	.2756		7.000	88	43	53.18	50.86	48.55	46.24
20591		.2770	J	7.036	2-15/16"	1-11/32"	52.67	50.38	48.09	45.80
	21591	.2770	J	7.036	3-1/2"	1-11/16"	54.02	51.67	49.32	46.97
20596		.2810	K	7.137	2-15/16"	1-11/32"	53.42	51.10	48.77	46.45
	21596	.2810	K	7.137	3-1/2"	1-3/4"	54.88	52.49	50.11	47.72
20601		.2812	9/32"	7.142	2-15/16"	1-11/32"	54.17	51.81	49.46	47.10
	21601	.2812	9/32"	7.142	3-1/2"	1-3/4"	55.71	53.28	50.86	48.44
20606		.2900	L	7.366	2-15/16"	1-11/32"	54.90	52.51	50.13	47.74
	21606	.2900	L	7.366	3-1/2"	1-3/4"	56.48	54.02	51.57	49.11
20611		.2950	M	7.493	2-15/16"	1-11/32"	55.97	53.54	51.10	48.67
	21611	.2950	M	7.493	3-3/4"	1-3/4"	57.28	54.79	52.30	49.81
20616		.2953		7.500	75	34	55.97	53.54	51.10	48.67
	21616	.2953		7.500	95	44	57.28	54.79	52.30	49.81
20621		.2969	19/64"	7.541	3-3/32"	1-15/32"	56.47	54.01	51.56	49.10
	21621	.2969	19/64"	7.541	3-3/4"	1-7/8"	57.86	55.34	52.83	50.31
20626		.3020	N	7.671	3-3/32"	1-15/32"	59.00	56.43	53.87	51.30
	21626	.3020	N	7.671	3-3/4"	1-7/8"	60.15	57.53	54.92	52.30
20631		.3125	5/16"	7.938	3-3/32"	1-15/32"	59.20	56.63	54.05	51.48
	21631	.3125	5/16"	7.938	3-3/4"	1-7/8"	60.33	57.71	55.08	52.46
20636		.3150		8.000	79	37	62.48	59.76	57.05	54.33
	21636	.3150		8.000	95	48	63.60	60.83	58.07	55.30
20641		.3160	O	8.026	3-3/32"	1-15/32"	62.48	59.76	57.05	54.33
	21641	.3160	O	8.026	3-3/4"	1-7/8"	63.60	60.83	58.07	55.30
20646		.3230	P	8.204	3-3/32"	1-15/32"	62.93	60.19	57.46	54.72
	21646	.3230	P	8.204	3-3/4"	2-3/32"	63.83	61.05	58.28	55.50
20651		.3281	21/64"	8.334	3-3/32"	1-15/32"	64.09	61.30	58.52	55.73
	21651	.3281	21/64"	8.334	4"	2-3/32"	64.42	61.62	58.82	56.02
20656		.3320	Q	8.433	3-3/32"	1-15/32"	65.24	62.40	59.57	56.73
	21656	.3320	Q	8.433	4"	2-3/32"	65.70	62.84	59.99	57.13
20661		.3346		8.500	79	37	65.52	62.67	59.82	56.97
	21661	.3346		8.500	100	53	66.18	63.31	60.43	57.55
20666		.3390	R	8.611	3-5/16"	1-9/16"	67.29	64.36	61.44	58.51
	21666	.3390	R	8.611	4"	2-3/32"	68.00	65.04	62.09	59.13
20671		.3438	11/32"	8.733	3-5/16"	1-9/16"	68.76	65.77	62.78	59.79
	21671	.3438	11/32"	8.733	4"	2-3/16"	70.38	67.32	64.26	61.20

continued ⟶

Series 1580H, 1280H *(continued)*

.3480" - .4531"
(8.839mm - 11.509mm)



TOLERANCES

d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

AlTiN-based Coating

High performance - high penetration solid submicron grain carbide drill



3xD (1580H) EDP#	5xD (1280H) EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
20676		.3480	S	8.839	3-5/16"	1-9/16"	71.04	67.95	64.86	61.77
	21676	.3480	S	8.839	4"	2-3/16"	73.14	69.96	66.78	63.60
20681		.3543		9.000	84	40	72.84	69.67	66.51	63.34
	21681	.3543		9.000	100	56	73.57	70.37	67.17	63.97
20686		.3580	T	9.093	3-5/16"	1-9/16"	75.69	72.40	69.11	65.82
	21686	.3580	T	9.093	4-1/4"	2-9/32"	76.48	73.15	69.83	66.50
20691		.3594	23/64"	9.129	3-5/16"	1-9/16"	76.16	72.85	69.54	66.23
	21691	.3594	23/64"	9.129	4-1/4"	2-9/32"	76.94	73.59	70.25	66.90
20696		.3680	U	9.347	3-5/16"	1-9/16"	77.75	74.37	70.99	67.61
	21696	.3680	U	9.347	4-1/4"	2-9/32"	81.32	77.78	74.25	70.71
20701		.3740		9.500	84	40	78.40	74.99	71.58	68.17
	21701	.3740		9.500	105	58	82.11	78.54	74.97	71.40
20706		.3750	3/8"	9.525	3-1/2"	1-11/16"	78.87	75.44	72.01	68.58
	21706	.3750	3/8"	9.525	4-1/4"	2-3/8"	82.94	79.33	75.73	72.12
20711		.3770	V	9.576	3-1/2"	1-11/16"	81.89	78.33	74.77	71.21
	21711	.3770	V	9.576	4-1/4"	2-3/8"	84.96	81.27	77.57	73.88
20716		.3860	W	9.804	3-1/2"	1-11/16"	83.33	79.71	76.08	72.46
	21716	.3860	W	9.804	4-1/2"	2-3/8"	86.47	82.71	78.95	75.19
20721		.3906	25/64"	9.921	3-1/2"	1-11/16"	84.38	80.71	77.04	73.37
	21721	.3906	25/64"	9.921	4-1/2"	2-3/8"	87.52	83.71	79.91	76.10
20726		.3937		10.000	89	43	86.93	83.15	79.37	75.59
	21726	.3937		10.000	115	60	90.15	86.23	82.31	78.39
20731		.3970	X	10.084	3-1/2"	1-11/16"	88.11	84.28	80.45	76.62
	21731	.3970	X	10.084	4-1/2"	2-1/2"	91.25	87.29	83.32	79.35
20736		.4040	Y	10.262	3-1/2"	1-11/16"	88.69	84.83	80.98	77.12
	21736	.4040	Y	10.262	4-1/2"	2-9/16"	94.00	89.91	85.83	81.74
20741		.4062	13/32"	10.317	3-1/2"	1-11/16"	91.43	87.45	83.48	79.50
	21741	.4062	13/32"	10.317	4-1/2"	2-9/16"	94.82	90.70	86.57	82.45
20746		.4130	Z	10.490	3-1/2"	1-11/16"	92.28	88.26	84.25	80.24
	21746	.4130	Z	10.490	4-1/2"	2-5/8"	95.68	91.52	87.36	83.20
20751		.4134		10.500	89	43	92.28	88.26	84.25	80.24
	21751	.4134		10.500	115	67	95.68	91.52	87.36	83.20
20756		.4219	27/64"	10.716	3-3/4"	1-13/16"	93.15	89.10	85.05	81.00
	21756	.4219	27/64"	10.716	4-1/2"	2-11/16"	96.54	92.35	88.15	83.95
20761		.4331		11.000	95	46	99.98	95.63	91.29	86.94
	21761	.4331		11.000	115	68	103.59	99.09	94.58	90.08
20766		.4375	7/16"	11.113	3-3/4"	1-13/16"	99.98	95.63	91.29	86.94
	21766	.4375	7/16"	11.113	4-3/4"	2-13/16"	104.01	99.48	94.96	90.44
20771		.4528		11.500	95	46	107.32	102.65	97.99	93.32
	21771	.4528		11.500	120	71	111.14	106.30	101.47	96.64
20776		.4531	29/64"	11.509	3-3/4"	1-13/16"	107.32	102.65	97.99	93.32
	21776	.4531	29/64"	11.509	4-3/4"	2-7/8"	111.14	106.30	101.47	96.64

† *Metric equivalents are for reference only*

3xD (1580H) EDP#	5xD (1280H) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
20781		.4688	15/32"	11.908	4"	1-15/16"	112.76	107.86	102.95	98.05
	21781	.4688	15/32"	11.908	4-3/4"	2-7/8"	116.73	111.65	106.58	101.50
20786		.4724		12.000	102	49	113.09	108.17	103.26	98.34
	21786	.4724		12.000	120	73	117.08	111.99	106.90	101.81
20791		.4844	31/64"	12.304	4"	1-15/16"	113.87	108.92	103.97	99.02
	21791	.4844	31/64"	12.304	5-5/16"	3"	118.38	113.23	108.09	102.94
20796		.4921		12.500	102	49	115.00	110.00	105.00	100.00
	21796	.4921		12.500	135	76	119.80	114.59	109.38	104.17
20801		.5000	1/2"	12.700	4"	1-15/16"	115.74	110.70	105.67	100.64
	21801	.5000	1/2"	12.700	5-3/8"	3-1/16"	120.04	114.82	109.60	104.38
20806		.5118		13.000	107	53	126.86	121.34	115.83	110.31
	21806	.5118		13.000	135	78	130.54	124.86	119.19	113.51
20811		.5156	33/64"	13.096	4-7/32"	2-3/32"	129.86	124.21	118.57	112.92
	21811	.5156	33/64"	13.096	5-3/8"	3-1/8"	133.58	127.78	121.97	116.16
20816		.5312	17/32"	13.492	4-7/32"	2-3/32"	132.85	127.07	121.30	115.52
	21816	.5312	17/32"	13.492	5-11/16"	3-5/16"	136.72	130.78	124.83	118.89
20821		.5315		13.500	110	56	135.85	129.94	124.04	118.13
	21821	.5315		13.500	145	84	139.75	133.67	127.60	121.52
20826		.5469	35/64"	13.891	4-5/16"	2-7/32"	138.83	132.79	126.76	120.72
	21826	.5469	35/64"	13.891	5-13/16"	3-3/8"	142.78	136.58	130.37	124.16
20831		.5512		14.000	110	56	141.83	135.66	129.50	123.33
	21831	.5512		14.000	145	86	145.88	139.54	133.19	126.85
20836		.5625	9/16"	14.288	4-9/16"	2-15/32"	152.67	146.04	139.40	132.76
	21836	.5625	9/16"	14.288	5-15/16"	3-1/2"	156.77	149.95	143.14	136.32
20841		.5709		14.500	116	63	155.54	148.78	142.01	135.25
	21841	.5709		14.500	150	89	159.65	152.71	145.77	138.83
20846		.5781	37/64"	14.684	4-15/16"	2-9/16"	158.32	151.44	144.55	137.67
	21846	.5781	37/64"	14.684	6"	3-1/2"	162.52	155.45	148.39	141.32
20851		.5906		15.000	125	65	161.24	154.23	147.22	140.21
	21851	.5906		15.000	150	90	165.57	158.37	151.17	143.97
20856		.5938	19/32"	15.083	4-15/16"	2-9/16"	162.12	155.07	148.02	140.97
	21856	.5938	19/32"	15.083	6"	3-9/16"	166.42	159.18	151.95	144.71
20861		.6094	39/64"	15.479	5-1/16"	2-13/16"	162.94	155.86	148.77	141.69
	21861	.6094	39/64"	15.479	6-3/16"	3-11/16"	180.35	172.51	164.67	156.83
20866		.6102		15.500	129	71	163.78	156.66	149.54	142.42
	21866	.6102		15.500	160	94	181.18	173.31	165.43	157.55
20871		.6250	5/8"	15.875	5-1/4"	3-1/8"	164.61	157.45	150.30	143.14
	21871	.6250	5/8"	15.875	6-5/16"	3-3/4"	182.03	174.12	166.20	158.29
20876		.6299		16.000	133	79	168.58	161.25	153.92	146.59
	21876	.6299		16.000	160	95	186.12	178.02	169.93	161.84

Series 1580KD, 1280KD

.1181" - .1654"
(3.000mm - 4.200mm)



TECH PAGES 296-297

TOLERANCES

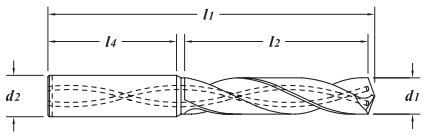
d_1 *	3mm - 6mm	+.016 +.004mm (+.00063" +.00015")
	> 6mm - 10mm	+.021 +.006mm (+.00082" +.00023")
	> 10mm - 18mm	+.025 +.007mm (+.00098" +.00027")
	> 18mm - 20mm	+.029 +.008mm (+.00114" +.00031")
d_2	6mm	+.000 –.008mm (+.00000" –.00030")
	8mm - 10mm	+.000 –.009mm (+.00000" –.00035")
	12mm - 18mm	+.000 –.011mm (+.00000" –.00040")
	20mm	+.000 –.013mm (+.00000" –.00050")

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

AlTiN-based Coating

High performance solid submicron grain carbide drill with reinforced shank
Coolant through capabilities for high pressure coolant systems
Up to 70% faster than standard carbide drills
30° helix for better chip evacuation
Honed cutting edge
Can be used as a pilot drill
Live tooling recommended on lathe processes





** Note - These drills are made to a plus/plus tolerance on the drill diameter. If you are in need of a minus tolerance drill, please refer to our other high performance drills.*

3xD (1580KD) EDP#	5xD (1280KD) EDP#	d_1 † Diameter Decimal	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
27995		.1181	3.000	6.0	62	20	36	58.24	55.70	53.17	50.64
	25065	.1181	3.000	6.0	66	28	36	68.75	65.76	62.77	59.78
28005		.1220	3.100	6.0	62	20	36	58.24	55.70	53.17	50.64
	25075	.1220	3.100	6.0	66	28	36	68.75	65.76	62.77	59.78
28015		.1248	3.170	6.0	62	20	36	58.24	55.70	53.17	50.64
	25085	.1248	3.170	6.0	66	28	36	68.75	65.76	62.77	59.78
28025		.1260	3.200	6.0	62	20	36	58.24	55.70	53.17	50.64
	25095	.1260	3.200	6.0	66	28	36	68.75	65.76	62.77	59.78
28035		.1280	3.250	6.0	62	20	36	58.24	55.70	53.17	50.64
	25105	.1280	3.250	6.0	66	28	36	68.75	65.76	62.77	59.78
28045		.1299	3.300	6.0	62	20	36	58.24	55.70	53.17	50.64
	25115	.1299	3.300	6.0	66	28	36	68.75	65.76	62.77	59.78
28055		.1339	3.400	6.0	62	20	36	58.24	55.70	53.17	50.64
	25125	.1339	3.400	6.0	66	28	36	68.75	65.76	62.77	59.78
28065		.1378	3.500	6.0	62	20	36	58.24	55.70	53.17	50.64
	25135	.1378	3.500	6.0	66	28	36	68.75	65.76	62.77	59.78
28075		.1417	3.600	6.0	62	20	36	58.24	55.70	53.17	50.64
	25145	.1417	3.600	6.0	66	28	36	68.75	65.76	62.77	59.78
28085		.1457	3.700	6.0	62	20	36	58.24	55.70	53.17	50.64
	25155	.1457	3.700	6.0	66	28	36	68.75	65.76	62.77	59.78
28095		.1476	3.750	6.0	62	20	36	58.24	55.70	53.17	50.64
	25165	.1476	3.750	6.0	66	28	36	68.75	65.76	62.77	59.78
28105		.1496	3.800	6.0	66	24	36	58.24	55.70	53.17	50.64
	25175	.1496	3.800	6.0	74	36	36	68.75	65.76	62.77	59.78
28115		.1535	3.900	6.0	66	24	36	58.24	55.70	53.17	50.64
	25185	.1535	3.900	6.0	74	36	36	68.75	65.76	62.77	59.78
28125		.1563	3.970	6.0	66	24	36	58.24	55.70	53.17	50.64
	25195	.1563	3.970	6.0	74	36	36	68.75	65.76	62.77	59.78
28135		.1575	4.000	6.0	66	24	36	58.24	55.70	53.17	50.64
	25205	.1575	4.000	6.0	74	36	36	68.75	65.76	62.77	59.78
28145		.1614	4.100	6.0	66	24	36	58.24	55.70	53.17	50.64
	25215	.1614	4.100	6.0	74	36	36	68.75	65.76	62.77	59.78
28155		.1654	4.200	6.0	66	24	36	58.24	55.70	53.17	50.64
	25225	.1654	4.200	6.0	74	36	36	68.75	65.76	62.77	59.78

† *Metric equivalents are for reference only*

3xD (1580KD) EDP#	5xD (1280KD) EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
28165		.1673	4.250	6.0	66	24	36	58.24	55.70	53.17	50.64
	25235	.1673	4.250	6.0	74	36	36	68.75	65.76	62.77	59.78
28175		.1693	4.300	6.0	66	24	36	58.24	55.70	53.17	50.64
	25245	.1693	4.300	6.0	74	36	36	68.75	65.76	62.77	59.78
28185		.1732	4.400	6.0	66	24	36	58.24	55.70	53.17	50.64
	25255	.1732	4.400	6.0	74	36	36	68.75	65.76	62.77	59.78
28195		.1772	4.500	6.0	66	24	36	58.24	55.70	53.17	50.64
	25265	.1772	4.500	6.0	74	36	36	68.75	65.76	62.77	59.78
28205		.1811	4.600	6.0	66	24	36	58.24	55.70	53.17	50.64
	25275	.1811	4.600	6.0	74	36	36	68.75	65.76	62.77	59.78
	25285	.1831	4.650	6.0	74	36	36	68.75	65.76	62.77	59.78
28225		.1850	4.700	6.0	66	24	36	58.24	55.70	53.17	50.64
	25295	.1850	4.700	6.0	74	36	36	68.75	65.76	62.77	59.78
28235		.1870	4.750	6.0	66	24	36	58.24	55.70	53.17	50.64
	25305	.1870	4.750	6.0	74	36	36	68.75	65.76	62.77	59.78
28245		.1890	4.800	6.0	66	28	36	58.24	55.70	53.17	50.64
	25315	.1890	4.800	6.0	82	44	36	68.75	65.76	62.77	59.78
28255		.1929	4.900	6.0	66	28	36	58.24	55.70	53.17	50.64
	25325	.1929	4.900	6.0	82	44	36	68.75	65.76	62.77	59.78
28265		.1969	5.000	6.0	66	28	36	58.24	55.70	53.17	50.64
	25335	.1969	5.000	6.0	82	44	36	68.75	65.76	62.77	59.78
28275		.2008	5.100	6.0	66	28	36	58.24	55.70	53.17	50.64
	25345	.2008	5.100	6.0	82	44	36	68.75	65.76	62.77	59.78
28285		.2027	5.150	6.0	66	28	36	58.24	55.70	53.17	50.64
	25355	.2027	5.150	6.0	82	44	36	68.75	65.76	62.77	59.78
28295		.2047	5.200	6.0	66	28	36	58.24	55.70	53.17	50.64
	25365	.2047	5.200	6.0	82	44	36	68.75	65.76	62.77	59.78
28305		.2087	5.300	6.0	66	28	36	58.24	55.70	53.17	50.64
	25375	.2087	5.300	6.0	82	44	36	68.75	65.76	62.77	59.78
28315		.2165	5.500	6.0	66	28	36	58.24	55.70	53.17	50.64
	25385	.2165	5.500	6.0	82	44	36	68.75	65.76	62.77	59.78
28325		.2185	5.550	6.0	66	28	36	58.24	55.70	53.17	50.64
	25395	.2185	5.550	6.0	82	44	36	68.75	65.76	62.77	59.78
28335		.2205	5.600	6.0	66	28	36	58.24	55.70	53.17	50.64
	25397	.2205	5.600	6.0	82	44	36	68.75	65.76	62.77	59.78
28345		.2244	5.700	6.0	66	28	36	58.24	55.70	53.17	50.64
	25400	.2244	5.700	6.0	82	44	36	68.75	65.76	62.77	59.78
28355		.2283	5.800	6.0	66	28	36	58.24	55.70	53.17	50.64
	25405	.2283	5.800	6.0	82	44	36	68.75	65.76	62.77	59.78
28365		.2323	5.900	6.0	66	28	36	58.24	55.70	53.17	50.64
	25415	.2323	5.900	6.0	82	44	36	68.75	65.76	62.77	59.78
28375		.2342	5.950	6.0	66	28	36	58.24	55.70	53.17	50.64
	25425	.2342	5.950	6.0	82	44	36	68.75	65.76	62.77	59.78
28385		.2362	6.000	6.0	66	28	36	58.24	55.70	53.17	50.64
	25435	.2362	6.000	6.0	82	44	36	68.75	65.76	62.77	59.78
28395		.2402	6.100	8.0	79	34	36	81.14	77.62	74.09	70.56
	25437	.2402	6.100	8.0	91	53	36	96.67	92.47	88.26	84.06
28405		.2441	6.200	8.0	79	34	36	81.14	77.62	74.09	70.56
	25440	.2441	6.200	8.0	91	53	36	96.67	92.47	88.26	84.06
28415		.2480	6.300	8.0	79	34	36	81.14	77.62	74.09	70.56
	25443	.2480	6.300	8.0	91	53	36	96.67	92.47	88.26	84.06
28425		.2500	6.350	8.0	79	34	36	81.14	77.62	74.09	70.56
	25445	.2500	6.350	8.0	91	53	36	96.67	92.47	88.26	84.06

continued →

Series 1580KD, 1280KD *(continued)*

.2520" - .3346"
(6.400mm - 8.500mm)

3xD (1580KD) EDP#	5xD (1280KD) EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
28435		.2520	6.400	8.0	79	34	36	81.14	77.62	74.09	70.56
	25450	.2520	6.400	8.0	91	53	36	96.67	92.47	88.26	84.06
28445		.2559	6.500	8.0	79	34	36	81.14	77.62	74.09	70.56
	25455	.2559	6.500	8.0	91	53	36	96.67	92.47	88.26	84.06
28446		.2571	6.530	8.0	79	34	36	81.14	77.62	74.09	70.56
	25457	.2571	6.530	8.0	91	53	36	96.67	92.47	88.26	84.06
28455		.2598	6.600	8.0	79	34	36	81.14	77.62	74.09	70.56
	25460	.2598	6.600	8.0	91	53	36	96.67	92.47	88.26	84.06
	25463	.2638	6.700	8.0	91	53	36	96.67	92.47	88.26	84.06
28465		.2657	6.750	8.0	79	34	36	81.14	77.62	74.09	70.56
	25465	.2657	6.750	8.0	91	53	36	96.67	92.47	88.26	84.06
28475		.2677	6.800	8.0	79	34	36	81.14	77.62	74.09	70.56
	25475	.2677	6.800	8.0	91	53	36	96.67	92.47	88.26	84.06
28485		.2717	6.900	8.0	79	34	36	81.14	77.62	74.09	70.56
	25485	.2717	6.900	8.0	91	53	36	96.67	92.47	88.26	84.06
28495		.2756	7.000	8.0	79	34	36	81.14	77.62	74.09	70.56
	25495	.2756	7.000	8.0	91	53	36	96.67	92.47	88.26	84.06
28505		.2795	7.100	8.0	79	41	36	81.14	77.62	74.09	70.56
	25505	.2795	7.100	8.0	91	53	36	96.67	92.47	88.26	84.06
28515		.2815	7.150	8.0	79	41	36	81.14	77.62	74.09	70.56
	25515	.2815	7.150	8.0	91	53	36	96.67	92.47	88.26	84.06
28525		.2835	7.200	8.0	79	41	36	81.14	77.62	74.09	70.56
	25525	.2835	7.200	8.0	91	53	36	96.67	92.47	88.26	84.06
28535		.2874	7.300	8.0	79	41	36	81.14	77.62	74.09	70.56
	25530	.2874	7.300	8.0	91	53	36	96.67	92.47	88.26	84.06
28545		.2913	7.400	8.0	79	41	36	81.14	77.62	74.09	70.56
	25535	.2913	7.400	8.0	91	53	36	96.67	92.47	88.26	84.06
28555		.2953	7.500	8.0	79	41	36	81.14	77.62	74.09	70.56
	25545	.2953	7.500	8.0	91	53	36	96.67	92.47	88.26	84.06
28565		.2972	7.550	8.0	79	41	36	81.14	77.62	74.09	70.56
	25555	.2972	7.550	8.0	91	53	36	96.67	92.47	88.26	84.06
28575		.2992	7.600	8.0	79	41	36	81.14	77.62	74.09	70.56
	25565	.2992	7.600	8.0	91	53	36	96.67	92.47	88.26	84.06
28585		.3031	7.700	8.0	79	41	36	81.14	77.62	74.09	70.56
	25575	.3031	7.700	8.0	91	53	36	96.67	92.47	88.26	84.06
28595		.3071	7.800	8.0	79	41	36	81.14	77.62	74.09	70.56
	25585	.3071	7.800	8.0	91	53	36	96.67	92.47	88.26	84.06
28605		.3130	7.950	8.0	79	41	36	81.14	77.62	74.09	70.56
	25595	.3130	7.950	8.0	91	53	36	96.67	92.47	88.26	84.06
28615		.3150	8.000	8.0	79	41	36	81.14	77.62	74.09	70.56
	25605	.3150	8.000	8.0	91	53	36	96.67	92.47	88.26	84.06
28625		.3189	8.100	10.0	89	47	40	109.34	104.59	99.83	95.08
	25610	.3189	8.100	10.0	103	61	40	124.55	119.13	113.72	108.30
28635		.3228	8.200	10.0	89	47	40	109.34	104.59	99.83	95.08
	25615	.3228	8.200	10.0	103	61	40	124.55	119.13	113.72	108.30
28645		.3268	8.300	10.0	89	47	40	109.34	104.59	99.83	95.08
	25625	.3268	8.300	10.0	103	61	40	124.55	119.13	113.72	108.30
28655		.3287	8.350	10.0	89	47	40	109.34	104.59	99.83	95.08
	25635	.3287	8.350	10.0	103	61	40	124.55	119.13	113.72	108.30
28665		.3307	8.400	10.0	89	47	40	109.34	104.59	99.83	95.08
	25640	.3307	8.400	10.0	103	61	40	124.55	119.13	113.72	108.30
28675		.3346	8.500	10.0	89	47	40	109.34	104.59	99.83	95.08
	25645	.3346	8.500	10.0	103	61	40	124.55	119.13	113.72	108.30

† *Metric equivalents are for reference only*

3xD (1580KD) EDP#	5xD (1280KD) EDP#	d_1 † Diameter Decimal	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
28685		.3386	8.600	10.0	89	47	40	109.34	104.59	99.83	95.08
	25655	.3386	8.600	10.0	103	61	40	124.55	119.13	113.72	108.30
28695		.3425	8.700	10.0	89	47	40	109.34	104.59	99.83	95.08
	25665	.3425	8.700	10.0	103	61	40	124.55	119.13	113.72	108.30
28725		.3445	8.750	10.0	89	47	40	109.34	104.59	99.83	95.08
	25675	.3445	8.750	10.0	103	61	40	124.55	119.13	113.72	108.30
28735		.3465	8.800	10.0	89	47	40	109.34	104.59	99.83	95.08
	25685	.3465	8.800	10.0	103	61	40	124.55	119.13	113.72	108.30
28745		.3504	8.900	10.0	89	47	40	109.34	104.59	99.83	95.08
	25695	.3504	8.900	10.0	103	61	40	124.55	119.13	113.72	108.30
28755		.3543	9.000	10.0	89	47	40	109.34	104.59	99.83	95.08
	25705	.3543	9.000	10.0	103	61	40	124.55	119.13	113.72	108.30
28765		.3583	9.100	10.0	89	47	40	109.34	104.59	99.83	95.08
	25715	.3583	9.100	10.0	103	61	40	124.55	119.13	113.72	108.30
	25725	.3602	9.150	10.0	103	61	40	124.55	119.13	113.72	108.30
28815		.3622	9.200	10.0	89	47	40	109.34	104.59	99.83	95.08
	25735	.3622	9.200	10.0	103	61	40	124.55	119.13	113.72	108.30
28825		.3661	9.300	10.0	89	47	40	109.34	104.59	99.83	95.08
	25745	.3661	9.300	10.0	103	61	40	124.55	119.13	113.72	108.30
28845		.3701	9.400	10.0	89	47	40	109.34	104.59	99.83	95.08
	25750	.3701	9.400	10.0	103	61	40	124.55	119.13	113.72	108.30
28855		.3740	9.500	10.0	89	47	40	109.34	104.59	99.83	95.08
	25755	.3740	9.500	10.0	103	61	40	124.55	119.13	113.72	108.30
28875		.3760	9.550	10.0	89	47	40	109.34	104.59	99.83	95.08
	25765	.3760	9.550	10.0	103	61	40	124.55	119.13	113.72	108.30
28878		.3780	9.600	10.0	89	47	40	109.34	104.59	99.83	95.08
	25767	.3780	9.600	10.0	103	61	40	124.55	119.13	113.72	108.30
28882		.3819	9.700	10.0	89	47	40	109.34	104.59	99.83	95.08
	25770	.3819	9.700	10.0	103	61	40	124.55	119.13	113.72	108.30
28885		.3858	9.800	10.0	89	47	40	109.34	104.59	99.83	95.08
	25775	.3858	9.800	10.0	103	61	40	124.55	119.13	113.72	108.30
28895		.3898	9.900	10.0	89	47	40	109.34	104.59	99.83	95.08
	25785	.3898	9.900	10.0	103	61	40	124.55	119.13	113.72	108.30
28905		.3937	10.000	10.0	89	47	40	109.34	104.59	99.83	95.08
	25795	.3937	10.000	10.0	103	61	40	124.55	119.13	113.72	108.30
28925		.3976	10.100	12.0	102	55	45	141.58	135.42	129.27	123.11
	25800	.3976	10.100	12.0	118	71	45	160.62	153.64	146.65	139.67
28935		.4016	10.200	12.0	102	55	45	141.58	135.42	129.27	123.11
	25805	.4016	10.200	12.0	118	71	45	160.62	153.64	146.65	139.67
28945		.4055	10.300	12.0	102	55	45	141.58	135.42	129.27	123.11
	25815	.4055	10.300	12.0	118	71	45	160.62	153.64	146.65	139.67
28955		.4134	10.500	12.0	102	55	45	141.58	135.42	129.27	123.11
	25825	.4134	10.500	12.0	118	71	45	160.62	153.64	146.65	139.67
28965		.4173	10.600	12.0	102	55	45	141.58	135.42	129.27	123.11
	25830	.4173	10.600	12.0	118	71	45	160.62	153.64	146.65	139.67
28975		.4213	10.700	12.0	102	55	45	141.58	135.42	129.27	123.11
	25835	.4213	10.700	12.0	118	71	45	160.62	153.64	146.65	139.67
28985		.4252	10.800	12.0	102	55	45	141.58	135.42	129.27	123.11
	25845	.4252	10.800	12.0	118	71	45	160.62	153.64	146.65	139.67
28995		.4331	11.000	12.0	102	55	45	141.58	135.42	129.27	123.11
	25855	.4331	11.000	12.0	118	71	45	160.62	153.64	146.65	139.67
29005		.4370	11.100	12.0	102	55	45	141.58	135.42	129.27	123.11
	25865	.4370	11.100	12.0	118	71	45	160.62	153.64	146.65	139.67

continued ⟶

Series 1580KD, 1280KD *(continued)*

.4409" - .5433"
(11.200mm - 13.800mm)



TOLERANCES

d_1 *	3mm - 6mm	+.016 +.004mm (+.00063" +.00015")
	> 6mm - 10mm	+.021 +.006mm (+.00082" +.00023")
	> 10mm - 18mm	+.025 +.007mm (+.00098" +.00027")
	> 18mm - 20mm	+.029 +.008mm (+.00114" +.00031")
d_2	6mm	+.000 –.008mm (+.00000" –.00030")
	8mm - 10mm	+.000 –.009mm (+.00000" –.00035")
	12mm - 18mm	+.000 –.011mm (+.00000" –.00040")
	20mm	+.000 –.013mm (+.00000" –.00050")

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

AlTiN-based Coating

High performance solid submicron grain carbide drill with reinforced shank
Can be used as a pilot drill



3xD (1580KD) EDP#	5xD (1280KD) EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
29015		.4409	11.200	12.0	102	55	45	141.58	135.42	129.27	123.11
	25875	.4409	11.200	12.0	118	71	45	160.62	153.64	146.65	139.67
29025		.4488	11.400	12.0	102	55	45	141.58	135.42	129.27	123.11
	25880	.4488	11.400	12.0	118	71	45	160.62	153.64	146.65	139.67
29035		.4528	11.500	12.0	102	55	45	141.58	135.42	129.27	123.11
	25885	.4528	11.500	12.0	118	71	45	160.62	153.64	146.65	139.67
29045		.4606	11.700	12.0	102	55	45	141.58	135.42	129.27	123.11
	25895	.4606	11.700	12.0	118	71	45	160.62	153.64	146.65	139.67
29055		.4685	11.900	12.0	102	55	45	141.58	135.42	129.27	123.11
29065		.4724	12.000	12.0	102	55	45	141.58	135.42	129.27	123.11
	25915	.4724	12.000	12.0	118	71	45	160.62	153.64	146.65	139.67
29075		.4764	12.100	14.0	107	60	45	197.75	189.16	180.56	171.96
	25925	.4764	12.100	14.0	124	77	45	236.99	226.69	216.38	206.08
29085		.4803	12.200	14.0	107	60	45	197.75	189.16	180.56	171.96
	25930	.4803	12.200	14.0	124	77	45	236.99	226.69	216.38	206.08
29095		.4842	12.300	14.0	107	60	45	197.75	189.16	180.56	171.96
	25935	.4842	12.300	14.0	124	77	45	236.99	226.69	216.38	206.08
29115		.4921	12.500	14.0	107	60	45	197.75	189.16	180.56	171.96
	25945	.4921	12.500	14.0	124	77	45	236.99	226.69	216.38	206.08
29125		.4961	12.600	14.0	107	60	45	197.75	189.16	180.56	171.96
	25950	.4961	12.600	14.0	124	77	45	236.99	226.69	216.38	206.08
29135		.5000	12.700	14.0	107	60	45	197.75	189.16	180.56	171.96
	25955	.5000	12.700	14.0	124	77	45	236.99	226.69	216.38	206.08
29145		.5039	12.800	14.0	107	60	45	197.75	189.16	180.56	171.96
	25960	.5039	12.800	14.0	124	77	45	236.99	226.69	216.38	206.08
29148		.5051	12.830	14.0	107	60	45	197.75	189.16	180.56	171.96
	25961	.5051	12.830	14.0	124	77	45	236.99	226.69	216.38	206.08
29155		.5079	12.900	14.0	107	60	45	197.75	189.16	180.56	171.96
29161		.5098	12.950	14.0	107	60	45	197.75	189.16	180.56	171.96
29165		.5118	13.000	14.0	107	60	45	197.75	189.16	180.56	171.96
	25965	.5118	13.000	14.0	124	77	45	236.99	226.69	216.38	206.08
29175		.5157	13.100	14.0	107	60	45	197.75	189.16	180.56	171.96
	25975	.5157	13.100	14.0	124	77	45	236.99	226.69	216.38	206.08
29181		.5236	13.300	14.0	107	60	45	197.75	189.16	180.56	171.96
29185		.5315	13.500	14.0	107	60	45	197.75	189.16	180.56	171.96
	25985	.5315	13.500	14.0	124	77	45	236.99	226.69	216.38	206.08
29195		.5394	13.700	14.0	107	60	45	197.75	189.16	180.56	171.96
	25995	.5394	13.700	14.0	124	77	45	236.99	226.69	216.38	206.08
29205		.5433	13.800	14.0	107	60	45	197.75	189.16	180.56	171.96
	26005	.5433	13.800	14.0	124	77	45	236.99	226.69	216.38	206.08

† *Metric equivalents are for reference only*

3xD (1580KD) EDP#	5xD (1280KD) EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
29215		.5512	14.000	14.0	107	60	45	197.75	189.16	180.56	171.96
	26015	.5512	14.000	14.0	124	77	45	236.99	226.69	216.38	206.08
29225		.5551	14.100	16.0	115	65	48	241.72	231.21	220.70	210.19
	26025	.5551	14.100	16.0	133	83	48	315.12	301.42	287.72	274.02
29235		.5591	14.200	16.0	115	65	48	241.72	231.21	220.70	210.19
	26027	.5591	14.200	16.0	133	83	48	315.12	301.42	287.72	274.02
29245		.5610	14.250	16.0	115	65	48	241.72	231.21	220.70	210.19
29255		.5630	14.300	16.0	115	65	48	241.72	231.21	220.70	210.19
	26045	.5630	14.300	16.0	133	83	48	315.12	301.42	287.72	274.02
29265		.5709	14.500	16.0	115	65	48	241.72	231.21	220.70	210.19
	26055	.5709	14.500	16.0	133	83	48	315.12	301.42	287.72	274.02
29275		.5787	14.700	16.0	115	65	48	241.72	231.21	220.70	210.19
	26065	.5787	14.700	16.0	133	83	48	315.12	301.42	287.72	274.02
29285		.5827	14.800	16.0	115	65	48	241.72	231.21	220.70	210.19
	26067	.5827	14.800	16.0	133	83	48	315.12	301.42	287.72	274.02
29305		.5906	15.000	16.0	115	65	48	241.72	231.21	220.70	210.19
	26075	.5906	15.000	16.0	133	83	48	315.12	301.42	287.72	274.02
29315		.5945	15.100	16.0	115	65	48	241.72	231.21	220.70	210.19
	26085	.5945	15.100	16.0	133	83	48	315.12	301.42	287.72	274.02
29325		.6102	15.500	16.0	115	65	48	241.72	231.21	220.70	210.19
	26095	.6102	15.500	16.0	133	83	48	315.12	301.42	287.72	274.02
	26105	.6181	15.700	16.0	133	83	48	315.12	301.42	287.72	274.02
29345		.6220	15.800	16.0	115	65	48	241.72	231.21	220.70	210.19
	26107	.6220	15.800	16.0	133	83	48	315.12	301.42	287.72	274.02
	26115	.6299	16.000	16.0	133	83	48	315.12	301.42	287.72	274.02
29363		.6331	16.080	18.0	123	73	48	305.62	292.34	279.05	265.76
	26118	.6331	16.080	18.0	143	93	48	374.64	358.35	342.06	325.77
29365		.6339	16.100	18.0	123	73	48	305.62	292.34	279.05	265.76
	26119	.6339	16.100	18.0	143	93	48	374.64	358.35	342.06	325.77
	26123	.6378	16.200	18.0	143	93	48	374.64	358.35	342.06	325.77
29375		.6398	16.250	18.0	123	73	48	305.62	292.34	279.05	265.76
	26125	.6398	16.250	18.0	143	93	48	374.64	358.35	342.06	325.77
29385		.6496	16.500	18.0	123	73	48	305.62	292.34	279.05	265.76
	26135	.6496	16.500	18.0	143	93	48	374.64	358.35	342.06	325.77
29395		.6555	16.650	18.0	123	73	48	305.62	292.34	279.05	265.76
	26145	.6555	16.650	18.0	143	93	48	374.64	358.35	342.06	325.77
29405		.6693	17.000	18.0	123	73	48	305.62	292.34	279.05	265.76
	26155	.6693	17.000	18.0	143	93	48	374.64	358.35	342.06	325.77
29415		.6713	17.050	18.0	123	73	48	305.62	292.34	279.05	265.76
	26165	.6713	17.050	18.0	143	93	48	374.64	358.35	342.06	325.77
29425		.6870	17.450	18.0	123	73	48	305.62	292.34	279.05	265.76
	26175	.6870	17.450	18.0	143	93	48	374.64	358.35	342.06	325.77
29435		.6890	17.500	18.0	123	73	48	305.62	292.34	279.05	265.76
	26185	.6890	17.500	18.0	143	93	48	374.64	358.35	342.06	325.77
29445		.7027	17.850	18.0	123	73	48	305.62	292.34	279.05	265.76
	26195	.7027	17.850	18.0	143	93	48	374.64	358.35	342.06	325.77
29455		.7087	18.000	18.0	123	73	48	305.62	292.34	279.05	265.76
	26205	.7087	18.000	18.0	143	93	48	374.64	358.35	342.06	325.77
	26215	.7185	18.250	20.0	153	101	50	454.73	434.96	415.19	395.42
	26225	.7283	18.500	20.0	153	101	50	454.73	434.96	415.19	395.42
	26235	.7342	18.650	20.0	153	101	50	454.73	434.96	415.19	395.42

continued ⟶

Series 1580KD, 1280KD *(continued)*

.7480" - .7874"
(19.000mm - 20.000mm)

3xD (1580KD) EDP#	5xD (1280KD) EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
	26245	.7480	19.000	20.0	153	101	50	454.73	434.96	415.19	395.42
29505		.7500	19.050	20.0	131	79	50	403.77	386.21	368.66	351.10
	26255	.7500	19.050	20.0	153	101	50	454.73	434.96	415.19	395.42
29545		.7579	19.250	20.0	131	79	50	403.77	386.21	368.66	351.10
29546		.7590	19.280	20.0	131	79	50	403.77	386.21	368.66	351.10
	26260	.7590	19.280	20.0	153	101	50	454.73	434.96	415.19	395.42
29551		.7598	19.300	20.0	131	79	50	403.77	386.21	368.66	351.10
	26261	.7598	19.300	20.0	153	101	50	454.73	434.96	415.19	395.42
29565		.7677	19.500	20.0	131	79	50	403.77	386.21	368.66	351.10
	26281	.7795	19.800	20.0	153	101	50	454.73	434.96	415.19	395.42
29595		.7815	19.850	20.0	131	79	50	403.77	386.21	368.66	351.10
29605		.7874	20.000	20.0	131	79	50	403.77	386.21	368.66	351.10



† *Metric equivalents are for reference only*

Series 1580KH, 1280KH, 1880KH

TOLERANCES

d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)



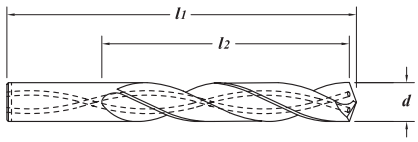
.1181" - .1540"
(3.000mm - 3.912mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

AlTiN-based Coating

High performance - high penetration solid submicron grain carbide drill
Coolant through capabilities for high pressure coolant systems
Extended tool life and greater surface finish through faster SFM rates
Up to 70% faster than standard carbide drills
30° helix for better chip evacuation
Honed cutting edge
Live tooling recommended on lathe processes





3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	d † Diameter Decimal		Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
22010			.1181		3.000	46	16	40.56	38.80	37.03	35.27
	25366		.1181		3.000	50	19	44.86	42.91	40.96	39.01
		26366	.1181		3.000	65	28	50.06	47.88	45.71	43.53
22015			.1200	#31	3.048	1-13/16"	5/8"	40.99	39.20	37.42	35.64
	25371		.1200	#31	3.048	2"	3/4"	45.22	43.25	41.29	39.32
		26371	.1200	#31	3.048	2-1/2"	1-1/8"	50.47	48.28	46.08	43.89
22020			.1250	1/8"	3.175	1-15/16"	11/16"	41.33	39.53	37.74	35.94
	25376		.1250	1/8"	3.175	2"	3/4"	45.59	43.60	41.62	39.64
		26376	.1250	1/8"	3.175	2-1/2"	1-1/8"	50.88	48.66	46.45	44.24
22025			.1285	#30	3.264	1-15/16"	11/16"	41.71	39.90	38.08	36.27
	25381		.1285	#30	3.264	2-1/4"	3/4"	45.99	43.99	41.99	39.99
		26381	.1285	#30	3.264	2-1/2"	1-1/8"	51.34	49.10	46.87	44.64
22030			.1360	#29	3.454	2-1/16"	3/4"	42.10	40.27	38.44	36.61
	25386		.1360	#29	3.454	2-1/4"	7/8"	46.33	44.32	42.30	40.29
		26386	.1360	#29	3.454	3"	1-1/4"	51.70	49.46	47.21	44.96
22035			.1378		3.500	52	19	42.53	40.68	38.83	36.98
	25391		.1378		3.500	57	22	46.69	44.66	42.63	40.60
		26391	.1378		3.500	75	32	52.12	49.85	47.59	45.32
22040			.1405	#28	3.569	2-1/16"	3/4"	42.92	41.05	39.19	37.32
	25396		.1405	#28	3.569	2-1/4"	7/8"	47.07	45.02	42.98	40.93
		26396	.1405	#28	3.569	3"	1-1/4"	52.53	50.25	47.96	45.68
22045			.1406	9/64"	3.571	2-1/16"	3/4"	43.29	41.40	39.52	37.64
	25401		.1406	9/64"	3.571	2-1/4"	7/8"	47.48	45.42	43.35	41.29
		26401	.1406	9/64"	3.571	3"	1-1/4"	52.98	50.68	48.37	46.07
22050			.1440	#27	3.658	2-1/16"	3/4"	43.68	41.78	39.88	37.98
	25406		.1440	#27	3.658	2-1/4"	7/8"	47.79	45.72	43.64	41.56
		26406	.1440	#27	3.658	3"	1-3/8"	53.34	51.02	48.70	46.38
22055			.1470	#26	3.734	2-3/16"	13/16"	44.01	42.10	40.18	38.27
	25411		.1470	#26	3.734	2-1/4"	7/8"	48.20	46.10	44.01	41.91
		26411	.1470	#26	3.734	3"	1-3/8"	53.79	51.45	49.11	46.77
22060			.1495	#25	3.797	2-3/16"	13/16"	44.46	42.53	40.59	38.66
	25416		.1495	#25	3.797	2-1/4"	15/16"	48.56	46.45	44.34	42.23
		26416	.1495	#25	3.797	3"	1-3/8"	54.20	51.84	49.49	47.13
22065			.1520	#24	3.861	2-3/16"	13/16"	44.83	42.88	40.93	38.98
	25421		.1520	#24	3.861	2-1/4"	15/16"	48.91	46.78	44.66	42.53
		26421	.1520	#24	3.861	3"	1-1/2"	54.58	52.21	49.83	47.46
22070			.1540	#23	3.912	2-3/16"	13/16"	45.22	43.25	41.29	39.32
	25426		.1540	#23	3.912	2-1/4"	15/16"	49.31	47.17	45.02	42.88
		26426	.1540	#23	3.912	3"	1-1/2"	55.04	52.65	50.25	47.86

continued →

Series 1580KH, 1280KH, 1880KH *(continued)*

.1562" - .1935"
(3.967mm - 4.915mm)

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	*d* † Diameter Decimal	*d* † Diameter	*d* † Diameter Metric	*l*1 Overall Length	*l*2 Flute Length	1-11	12-24	25-49	50-100
22075			.1562	5/32"	3.967	2-3/16"	13/16"	45.57	43.59	41.61	39.63
	25431		.1562	5/32"	3.967	2-1/2"	15/16"	49.67	47.51	45.35	43.19
		26431	.1562	5/32"	3.967	3"	1-1/2"	55.43	53.02	50.61	48.20
22080			.1570	#22	3.988	2-3/16"	13/16"	45.99	43.99	41.99	39.99
	25436		.1570	#22	3.988	2-1/2"	15/16"	50.01	47.84	45.66	43.49
		26436	.1570	#22	3.988	3"	1-1/2"	55.82	53.39	50.97	48.54
22085			.1575		4.000	56	21	46.36	44.34	42.33	40.31
	25441		.1575		4.000	65	24	50.42	48.22	46.03	43.84
		26441	.1575		4.000	75	38	56.25	53.80	51.36	48.91
22090			.1590	#21	4.039	2-3/16"	13/16"	46.78	44.75	42.71	40.68
	25446		.1590	#21	4.039	2-1/2"	15/16"	50.75	48.54	46.34	44.13
		26446	.1590	#21	4.039	3"	1-1/2"	56.61	54.15	51.69	49.23
22095			.1610	#20	4.089	2-3/16"	13/16"	47.16	45.11	43.06	41.01
	25451		.1610	#20	4.089	2-1/2"	15/16"	51.14	48.92	46.69	44.47
		26451	.1610	#20	4.089	3"	1-1/2"	57.06	54.58	52.10	49.62
22100			.1660	#19	4.216	2-9/32"	15/16"	47.58	45.51	43.44	41.37
	25456		.1660	#19	4.216	2-1/2"	1"	51.53	49.29	47.05	44.81
		26456	.1660	#19	4.216	3"	1-1/2"	57.50	55.00	52.50	50.00
22105			.1695	#18	4.305	2-9/32"	15/16"	47.96	45.87	43.79	41.70
	25461		.1695	#18	4.305	2-1/2"	1"	51.90	49.64	47.39	45.13
		26461	.1695	#18	4.305	3-1/2"	1-3/4"	57.89	55.37	52.86	50.34
22110			.1719	11/64"	4.366	2-9/32"	15/16"	48.35	46.24	44.14	42.04
	25466		.1719	11/64"	4.366	2-1/2"	1"	52.26	49.98	47.71	45.44
		26466	.1719	11/64"	4.366	3-1/2"	1-3/4"	58.29	55.76	53.22	50.69
22115			.1730	#17	4.394	2-9/32"	15/16"	48.74	46.62	44.50	42.38
	25471		.1730	#17	4.394	2-1/2"	1"	52.60	50.31	48.03	45.74
		26471	.1730	#17	4.394	3-1/2"	1-3/4"	58.68	56.13	53.58	51.03
22120			.1770	#16	4.496	2-9/32"	15/16"	49.07	46.94	44.80	42.67
	25476		.1770	#16	4.496	2-1/2"	1"	52.99	50.69	48.38	46.08
		26476	.1770	#16	4.496	3-1/2"	1-3/4"	59.14	56.57	54.00	51.43
22125			.1772		4.500	58	24	49.51	47.36	45.20	43.05
	25481		.1772		4.500	65	25	53.38	51.06	48.74	46.42
		26481	.1772		4.500	88	45	59.57	56.98	54.39	51.80
22130			.1800	#15	4.572	2-9/32"	15/16"	49.82	47.65	45.49	43.32
	25486		.1800	#15	4.572	2-3/4"	1"	53.74	51.40	49.07	46.73
		26486	.1800	#15	4.572	3-1/2"	1-3/4"	59.95	57.34	54.74	52.13
22135			.1820	#14	4.623	2-9/32"	15/16"	50.30	48.11	45.93	43.74
	25491		.1820	#14	4.623	2-3/4"	1"	54.08	51.73	49.38	47.03
		26491	.1820	#14	4.623	3-1/2"	1-3/4"	60.34	57.72	55.09	52.47
22140			.1850	#13	4.699	2-9/32"	15/16"	50.66	48.46	46.25	44.05
	25496		.1850	#13	4.699	2-3/4"	1-1/4"	54.48	52.11	49.74	47.37
		26496	.1850	#13	4.699	3-1/2"	1-3/4"	60.78	58.14	55.49	52.85
22145			.1875	3/16"	4.763	2-13/32"	1"	51.06	48.84	46.62	44.40
	25501		.1875	3/16"	4.763	2-3/4"	1-1/4"	54.87	52.48	50.10	47.71
		26501	.1875	3/16"	4.763	4"	2"	61.24	58.58	55.91	53.25
22150			.1890	#12	4.801	2-13/32"	1"	51.43	49.19	46.96	44.72
	25506		.1890	#12	4.801	2-3/4"	1-1/4"	55.21	52.81	50.41	48.01
		26506	.1890	#12	4.801	4"	2"	61.61	58.93	56.25	53.57
22155			.1910	#11	4.851	2-13/32"	1"	51.90	49.64	47.39	45.13
	25511		.1910	#11	4.851	2-3/4"	1-1/4"	55.57	53.15	50.74	48.32
		26511	.1910	#11	4.851	4"	2"	62.01	59.31	56.62	53.92
22160			.1935	#10	4.915	2-13/32"	1"	52.20	49.93	47.66	45.39
	25516		.1935	#10	4.915	2-3/4"	1-1/4"	55.98	53.55	51.11	48.68
		26516	.1935	#10	4.915	4"	2"	62.45	59.73	57.02	54.30

† *Metric equivalents are for reference only*

.1960" - .2420"
(4.978mm - 6.147mm)

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	Decimal	*d* † Diameter	Metric	*l*1 Overall Length	*l*2 Flute Length	1-11	12-24	25-49	50-100
22165			.1960	#9	4.978	2-13/32"	1"	52.59	50.30	48.02	45.73
	25521		.1960	#9	4.978	3"	1-5/16"	56.30	53.86	51.41	48.96
		26521	.1960	#9	4.978	4"	2"	62.81	60.08	57.35	54.62
22170			.1969		5.000	61	25	52.89	50.59	48.29	45.99
	25526		.1969		5.000	75	33	56.70	54.23	51.77	49.30
		26526	.1969		5.000	100	50	63.25	60.50	57.75	55.00
22175			.1990	#8	5.055	2-13/32"	1"	53.37	51.05	48.73	46.41
	25531		.1990	#8	5.055	3"	1-5/16"	56.98	54.51	52.03	49.55
		26531	.1990	#8	5.055	4"	2"	63.57	60.81	58.04	55.28
22180			.2010	#7	5.105	2-13/32"	1"	53.53	51.21	48.88	46.55
	25536		.2010	#7	5.105	3"	1-5/16"	57.24	54.75	52.26	49.77
		26536	.2010	#7	5.105	4"	2"	63.86	61.08	58.31	55.53
22185			.2031	13/64"	5.159	2-13/32"	1"	53.89	51.55	49.20	46.86
	25541		.2031	13/64"	5.159	3"	1-5/16"	57.65	55.14	52.64	50.13
		26541	.2031	13/64"	5.159	4"	2"	64.33	61.53	58.74	55.94
22190			.2040	#6	5.182	2-13/32"	1"	54.26	51.90	49.54	47.18
	25546		.2040	#6	5.182	3"	1-3/8"	58.09	55.56	53.04	50.51
		26546	.2040	#6	5.182	4"	2"	64.80	61.99	59.17	56.35
22195			.2055	#5	5.220	2-13/32"	1"	54.64	52.26	49.89	47.51
	25551		.2055	#5	5.220	3"	1-3/8"	58.47	55.92	53.38	50.84
		26551	.2055	#5	5.220	4"	2"	65.24	62.40	59.57	56.73
22200			.2090	#4	5.309	2-13/32"	1"	54.99	52.60	50.21	47.82
	25556		.2090	#4	5.309	3"	1-3/8"	58.87	56.31	53.75	51.19
		26556	.2090	#4	5.309	4"	2"	65.68	62.82	59.97	57.11
22205			.2130	#3	5.410	2-5/8"	1-3/32"	55.35	52.94	50.54	48.13
	25561		.2130	#3	5.410	3"	1-3/8"	59.25	56.67	54.10	51.52
		26561	.2130	#3	5.410	4"	2"	66.11	63.24	60.36	57.49
22210			.2165		5.500	67	28	55.71	53.28	50.86	48.44
	25566		.2165		5.500	75	35	59.62	57.02	54.43	51.84
		26566	.2165		5.500	100	50	66.52	63.62	60.73	57.84
22215			.2188	7/32"	5.558	2-5/8"	1-3/32"	56.18	53.74	51.29	48.85
	25571		.2188	7/32"	5.558	3"	1-3/8"	59.74	57.15	54.55	51.95
		26571	.2188	7/32"	5.558	4"	2"	66.91	64.00	61.09	58.18
22220			.2210	#2	5.613	2-5/8"	1-3/32"	56.57	54.11	51.65	49.19
	25576		.2210	#2	5.613	3"	1-3/8"	60.77	58.12	55.48	52.84
		26576	.2210	#2	5.613	4"	2"	67.97	65.01	62.06	59.10
22225			.2280	#1	5.791	2-5/8"	1-3/32"	56.99	54.52	52.04	49.56
	25581		.2280	#1	5.791	3"	1-3/8"	60.98	58.33	55.68	53.03
		26581	.2280	#1	5.791	4-1/8"	2-1/8"	77.87	74.48	71.10	67.71
22230			.2340	A	5.944	2-5/8"	1-3/32"	57.40	54.90	52.41	49.91
	25586		.2340	A	5.944	3-1/4"	1-1/2"	68.44	65.46	62.49	59.51
		26586	.2340	A	5.944	4-1/8"	2-1/8"	82.21	78.64	75.06	71.49
22235			.2344	15/64"	5.954	2-5/8"	1-3/32"	57.82	55.31	52.79	50.28
	25591		.2344	15/64"	5.954	3-1/4"	1-1/2"	68.56	65.58	62.60	59.62
		26591	.2344	15/64"	5.954	4-1/8"	2-1/8"	82.34	78.76	75.18	71.60
22240			.2362		6.000	67	28	58.24	55.70	53.17	50.64
	25596		.2362		6.000	80	38	68.75	65.76	62.77	59.78
		26596	.2362		6.000	105	55	82.52	78.94	75.35	71.76
22245			.2380	B	6.045	2-3/4"	1-7/32"	61.51	58.84	56.16	53.49
	25601		.2380	B	6.045	3-1/4"	1-5/8"	70.92	67.84	64.75	61.67
		26601	.2380	B	6.045	4-1/8"	2-1/8"	85.64	81.92	78.19	74.47
22250			.2420	C	6.147	2-3/4"	1-7/32"	62.02	59.32	56.63	53.93
	25606		.2420	C	6.147	3-1/4"	1-5/8"	71.25	68.16	65.06	61.96
		26606	.2420	C	6.147	4-1/4"	2-1/4"	85.97	82.24	78.50	74.76

continued ⟶

Series 1580KH, 1280KH, 1880KH *(continued)*

.2460" - .3125"
(6.248mm - 7.938mm)

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	*d* † Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
22255			.2460	D	6.248	2-3/4"	1-7/32"	62.36	59.65	56.94	54.23
	25611		.2460	D	6.248	3-1/4"	1-5/8"	71.56	68.45	65.34	62.23
		26611	.2460	D	6.248	4-1/4"	2-1/4"	86.30	82.54	78.79	75.04
22260			.2500	1/4" / E	6.350	2-3/4"	1-7/32"	62.88	60.15	57.41	54.68
	25616		.2500	1/4" / E	6.350	3-1/4"	1-5/8"	71.88	68.75	65.63	62.50
		26616	.2500	1/4" / E	6.350	4-1/4"	2-1/4"	86.61	82.84	79.08	75.31
22265			.2559		6.500	70	31	63.92	61.14	58.36	55.58
	25621		.2559		6.500	80	41	72.76	69.60	66.43	63.27
		26621	.2559		6.500	105	58	87.52	83.71	79.91	76.10
22270			.2570	F	6.528	2-3/4"	1-7/32"	64.89	62.07	59.25	56.43
	25626		.2570	F	6.528	3-1/4"	1-11/16"	74.44	71.20	67.97	64.73
		26626	.2570	F	6.528	4-3/8"	2-3/8"	90.87	86.92	82.97	79.02
22275			.2610	G	6.629	2-3/4"	1-7/32"	65.88	63.02	60.15	57.29
	25631		.2610	G	6.629	3-1/2"	1-11/16"	75.36	72.08	68.81	65.53
		26631	.2610	G	6.629	4-3/8"	2-3/8"	91.82	87.82	83.83	79.84
22280			.2656	17/64"	6.746	2-15/16"	1-11/32"	66.90	63.99	61.08	58.17
	25636		.2656	17/64"	6.746	3-1/2"	1-11/16"	76.23	72.92	69.60	66.29
		26636	.2656	17/64"	6.746	4-3/8"	2-3/8"	92.70	88.67	84.64	80.61
22285			.2660	H	6.756	2-15/16"	1-11/32"	67.88	64.93	61.98	59.03
	25641		.2660	H	6.756	3-1/2"	1-11/16"	77.14	73.79	70.43	67.08
		26641	.2660	H	6.756	4-3/8"	2-3/8"	93.67	89.60	85.52	81.45
22290			.2720	I	6.909	2-15/16"	1-11/32"	68.87	65.88	62.88	59.89
	25646		.2720	I	6.909	3-1/2"	1-11/16"	77.23	73.88	70.52	67.16
		26646	.2720	I	6.909	4-3/8"	2-3/8"	93.76	89.68	85.61	81.53
22295			.2756		7.000	75	34	69.87	66.84	63.80	60.76
	25651		.2756		7.000	88	43	78.11	74.71	71.32	67.92
		26651	.2756		7.000	110	61	94.66	90.54	86.43	82.31
22300			.2770	J	7.036	2-15/16"	1-11/32"	70.84	67.76	64.68	61.60
	25656		.2770	J	7.036	3-1/2"	1-11/16"	82.06	78.50	74.93	71.36
		26656	.2770	J	7.036	4-3/8"	2-3/8"	99.44	95.12	90.79	86.47
22305			.2810	K	7.137	2-15/16"	1-11/32"	71.90	68.77	65.65	62.52
	25661		.2810	K	7.137	3-1/2"	1-3/4"	82.97	79.37	75.76	72.15
		26661	.2810	K	7.137	4-7/16"	2-7/16"	100.38	96.02	91.65	87.29
22310			.2812	9/32"	7.142	2-15/16"	1-11/32"	72.89	69.72	66.55	63.38
	25666		.2812	9/32"	7.142	3-1/2"	1-3/4"	83.87	80.22	76.58	72.93
		26666	.2812	9/32"	7.142	4-7/16"	2-7/16"	101.32	96.91	92.51	88.10
22315			.2900	L	7.366	2-15/16"	1-11/32"	73.86	70.65	67.44	64.23
	25671		.2900	L	7.366	3-1/2"	1-3/4"	84.25	80.59	76.92	73.26
		26671	.2900	L	7.366	4-7/16"	2-7/16"	101.69	97.27	92.85	88.43
22320			.2950	M	7.493	2-15/16"	1-11/32"	75.29	72.02	68.74	65.47
	25676		.2950	M	7.493	3-3/4"	1-3/4"	84.74	81.06	77.37	73.69
		26676	.2950	M	7.493	4-7/16"	2-7/16"	102.20	97.76	93.31	88.87
22325			.2953		7.500	75	34	75.29	72.02	68.74	65.47
	25681		.2953		7.500	95	44	84.74	81.06	77.37	73.69
		26681	.2953		7.500	115	66	102.20	97.76	93.31	88.87
22330			.2969	19/64"	7.541	3-3/32"	1-15/32"	75.93	72.63	69.33	66.03
	25686		.2969	19/64"	7.541	3-3/4"	1-7/8"	90.53	86.59	82.66	78.72
		26686	.2969	19/64"	7.541	4-9/16"	2-9/16"	110.33	105.53	100.74	95.94
22335			.3020	N	7.671	3-3/32"	1-15/32"	79.37	75.92	72.47	69.02
	25691		.3020	N	7.671	3-3/4"	1-7/8"	92.56	88.54	84.51	80.49
		26691	.3020	N	7.671	4-9/16"	2-9/16"	112.47	107.58	102.69	97.80
22340			.3125	5/16"	7.938	3-3/32"	1-15/32"	79.65	76.19	72.72	69.26
	25696		.3125	5/16"	7.938	3-3/4"	1-7/8"	92.77	88.74	84.70	80.67
		26696	.3125	5/16"	7.938	4-11/16"	2-9/16"	112.67	107.77	102.87	97.97

† *Metric equivalents are for reference only*

TOLERANCES

d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)



Series 1580KH, 1280KH, 1880KH *(continued)*

.3150" - .3750"
(8.000mm - 9.525mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

AlTiN-based Coating

High performance - high penetration solid submicron grain carbide drill



3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	Decimal	d † Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
22345			.3150		8.000	79	37	81.14	77.62	74.09	70.56
	25701		.3150		8.000	95	48	96.68	92.48	88.27	84.07
		26701	.3150		8.000	120	69	116.70	111.63	106.55	101.48
22350			.3160	O	8.026	3-3/32"	1-15/32"	81.14	77.62	74.09	70.56
	25706		.3160	O	8.026	3-3/4"	1-7/8"	97.57	93.32	89.08	84.84
		26706	.3160	O	8.026	4-11/16"	2-11/16"	118.67	113.51	108.35	103.19
22355			.3230	P	8.204	3-3/32"	1-15/32"	81.73	78.18	74.62	71.07
	25711		.3230	P	8.204	3-3/4"	2-3/32"	97.82	93.57	89.31	85.06
		26711	.3230	P	8.204	4-11/16"	2-11/16"	118.92	113.75	108.58	103.41
22360			.3281	21/64"	8.334	3-3/32"	1-15/32"	83.26	79.64	76.02	72.40
	25716		.3281	21/64"	8.334	4"	2-3/32"	98.46	94.18	89.90	85.62
		26716	.3281	21/64"	8.334	4-11/16"	2-11/16"	119.59	114.39	109.19	103.99
22365			.3320	Q	8.433	3-3/32"	1-15/32"	84.74	81.06	77.37	73.69
	25721		.3320	Q	8.433	4"	2-3/32"	99.03	94.72	90.42	86.11
		26721	.3320	Q	8.433	4-15/16"	2-15/16"	120.19	114.96	109.74	104.51
22370			.3346		8.500	79	37	85.09	81.39	77.69	73.99
	25726		.3346		8.500	100	53	99.54	95.22	90.89	86.56
		26726	.3346		8.500	125	75	120.70	115.46	110.21	104.96
22375			.3390	R	8.611	3-5/16"	1-9/16"	87.38	83.58	79.78	75.98
	25731		.3390	R	8.611	4"	2-3/32"	102.80	98.33	93.86	89.39
		26731	.3390	R	8.611	4-15/16"	2-15/16"	126.41	120.91	115.42	109.92
22380			.3438	11/32"	8.733	3-5/16"	1-9/16"	89.30	85.42	81.53	77.65
	25736		.3438	11/32"	8.733	4"	2-3/16"	105.34	100.76	96.18	91.60
		26736	.3438	11/32"	8.733	4-15/16"	2-15/16"	129.10	123.49	117.87	112.26
22385			.3480	S	8.839	3-5/16"	1-9/16"	92.25	88.24	84.23	80.22
	25741		.3480	S	8.839	4"	2-3/16"	107.72	103.04	98.35	93.67
		26741	.3480	S	8.839	5"	3"	131.55	125.83	120.11	114.39
22390			.3543		9.000	84	40	94.61	90.50	86.38	82.27
	25746		.3543		9.000	100	56	108.17	103.47	98.76	94.06
		26746	.3543		9.000	125	77	132.04	126.30	120.56	114.82
22395			.3580	T	9.093	3-5/16"	1-9/16"	98.33	94.05	89.78	85.50
	25751		.3580	T	9.093	4-1/4"	2-9/32"	110.22	105.42	100.63	95.84
		26751	.3580	T	9.093	5"	3"	138.79	132.76	126.72	120.69
22400			.3594	23/64"	9.129	3-5/16"	1-9/16"	98.92	94.62	90.32	86.02
	25756		.3594	23/64"	9.129	4-1/4"	2-9/32"	110.63	105.82	101.01	96.20
		26756	.3594	23/64"	9.129	5"	3"	139.29	133.23	127.18	121.12
22405			.3680	U	9.347	3-5/16"	1-9/16"	100.42	96.05	91.69	87.32
	25761		.3680	U	9.347	4-1/4"	2-9/32"	117.27	112.17	107.07	101.97
		26761	.3680	U	9.347	5"	3"	147.36	140.95	134.55	128.14
22410			.3740		9.500	84	40	101.22	96.82	92.42	88.02
	25766		.3740		9.500	105	58	117.84	112.72	107.59	102.47
		26766	.3740		9.500	130	80	148.28	141.83	135.39	128.94
22415			.3750	3/8"	9.525	3-1/2"	1-11/16"	101.84	97.42	92.99	88.56
	25771		.3750	3/8"	9.525	4-1/4"	2-3/8"	120.76	115.51	110.26	105.01
		26771	.3750	3/8"	9.525	5-1/8"	3-1/8"	152.20	145.59	138.97	132.35

continued →

Series 1580KH, 1280KH, 1880KH *(continued)*

.3770" - .4921"
(9.576mm - 12.500mm)

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
22420			.3770	V	9.576	3-1/2"	1-11/16"	105.75	101.16	96.56	91.96
	25776		.3770	V	9.576	4-1/4"	2-3/8"	121.16	115.90	110.63	105.36
		26776	.3770	V	9.576	5-1/8"	3-1/8"	154.59	147.87	141.15	134.43
22425			.3860	W	9.804	3-1/2"	1-11/16"	107.61	102.93	98.25	93.57
	25781		.3860	W	9.804	4-1/2"	2-3/8"	122.49	117.16	111.84	106.51
		26781	.3860	W	9.804	5-1/8"	3-1/8"	155.12	148.38	141.63	134.89
22430			.3906	25/64"	9.921	3-1/2"	1-11/16"	108.95	104.21	99.48	94.74
	25786		.3906	25/64"	9.921	4-1/2"	2-3/8"	123.41	118.04	112.68	107.31
		26786	.3906	25/64"	9.921	5-1/4"	3-1/4"	156.07	149.28	142.50	135.71
22435			.3937		10.000	89	43	109.34	104.59	99.83	95.08
	25791		.3937		10.000	115	60	124.53	119.12	113.70	108.29
		26791	.3937		10.000	135	83	159.14	152.22	145.30	138.38
22440			.3970	X	10.084	3-1/2"	1-11/16"	110.30	105.50	100.71	95.91
	25796		.3970	X	10.084	4-1/2"	2-1/2"	128.77	123.17	117.57	111.97
		26796	.3970	X	10.084	5-1/4"	3-1/4"	162.69	155.62	148.54	141.47
22445			.4040	Y	10.262	3-1/2"	1-11/16"	111.06	106.23	101.40	96.57
	25801		.4040	Y	10.262	4-1/2"	2-9/16"	129.34	123.72	118.09	112.47
		26801	.4040	Y	10.262	5-3/8"	3-3/8"	165.91	158.70	151.48	144.27
22450			.4062	13/32"	10.317	3-1/2"	1-11/16"	114.46	109.48	104.51	99.53
	25806		.4062	13/32"	10.317	4-1/2"	2-9/16"	131.82	126.09	120.36	114.63
		26806	.4062	13/32"	10.317	5-3/8"	3-3/8"	166.85	159.60	152.34	145.09
22455			.4130	Z	10.490	3-1/2"	1-11/16"	115.52	110.50	105.47	100.45
	25811		.4130	Z	10.490	4-1/2"	2-5/8"	133.89	128.07	122.25	116.43
		26811	.4130	Z	10.490	5-3/8"	3-3/8"	169.61	162.24	154.86	147.49
22460			.4134		10.500	89	43	115.52	110.50	105.47	100.45
	25816		.4134		10.500	115	67	133.89	128.07	122.25	116.43
		26816	.4134		10.500	135	86	169.61	162.24	154.86	147.49
22465			.4219	27/64"	10.716	3-3/4"	1-13/16"	116.60	111.53	106.46	101.39
	25821		.4219	27/64"	10.716	4-1/2"	2-11/16"	135.79	129.89	123.98	118.08
		26821	.4219	27/64"	10.716	5-7/16"	3-7/16"	171.73	164.26	156.80	149.33
22470			.4331		11.000	95	46	125.15	119.71	114.27	108.83
	25826		.4331		11.000	115	68	140.68	134.56	128.45	122.33
		26826	.4331		11.000	135	88	178.38	170.62	162.87	155.11
22475			.4375	7/16"	11.113	3-3/4"	1-13/16"	125.15	119.71	114.27	108.83
	25831		.4375	7/16"	11.113	4-3/4"	2-13/16"	143.52	137.28	131.04	124.80
		26831	.4375	7/16"	11.113	5-7/16"	3-7/16"	182.18	174.26	166.34	158.42
22480			.4528		11.500	95	46	134.35	128.51	122.67	116.83
	25836		.4528		11.500	120	71	148.65	142.19	135.72	129.26
		26836	.4528		11.500	140	91	188.66	180.46	172.25	164.05
22485			.4531	29/64"	11.509	3-3/4"	1-13/16"	134.35	128.51	122.67	116.83
	25841		.4531	29/64"	11.509	4-3/4"	2-7/8"	153.73	147.05	140.36	133.68
		26841	.4531	29/64"	11.509	5-9/16"	3-13/16"	194.56	186.10	177.64	169.18
22490			.4688	15/32"	11.908	4"	1-15/16"	141.16	135.03	128.89	122.75
	25846		.4688	15/32"	11.908	4-3/4"	2-7/8"	157.24	150.40	143.57	136.73
		26846	.4688	15/32"	11.908	5-9/16"	3-13/16"	199.42	190.75	182.08	173.41
22495			.4724		12.000	102	49	141.59	135.43	129.28	123.12
	25851		.4724		12.000	120	73	160.62	153.64	146.65	139.67
		26851	.4724		12.000	140	98	204.55	195.66	186.76	177.87
22500			.4844	31/64"	12.304	4"	1-15/16"	150.24	143.70	137.17	130.64
	25856		.4844	31/64"	12.304	5-5/16"	3"	167.58	160.29	153.01	145.72
		26856	.4844	31/64"	12.304	5-9/16"	3-13/16"	209.86	200.74	191.61	182.49
22505			.4921		12.500	102	49	158.36	151.47	144.59	137.70
	25861		.4921		12.500	135	76	179.87	172.05	164.23	156.41
		26861	.4921		12.500	150	102	211.03	201.85	192.68	183.50

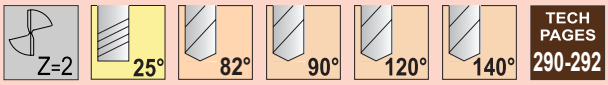
† *Metric equivalents are for reference only*

.5000" - .6299"
(12.700mm - 16.000mm)

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	Decimal	*d* † Diameter	Metric	*l*1 Overall Length	*l*2 Flute Length	1-11	12-24	25-49	50-100
22510			.5000	1/2"	12.700	4"	1-15/16"	159.36	152.43	145.50	138.57
	25866		.5000	1/2"	12.700	5-3/8"	3-1/16"	181.57	173.68	165.78	157.89
		26866	.5000	1/2"	12.700	6"	4"	211.78	202.58	193.37	184.16
22515			.5118		13.000	107	53	176.88	169.19	161.50	153.81
	25871		.5118		13.000	135	78	205.92	196.97	188.01	179.06
		26871	.5118		13.000	150	102	221.72	212.08	202.44	192.80
22520			.5156	33/64"	13.096	4-7/32"	2-3/32"	181.07	173.20	165.32	157.45
	25876		.5156	33/64"	13.096	5-3/8"	3-1/8"	214.62	205.29	195.96	186.63
		26876	.5156	33/64"	13.096	6"	4"	231.05	221.00	210.96	200.91
22525			.5312	17/32"	13.492	4-7/32"	2-3/32"	185.22	177.17	169.11	161.06
	25881		.5312	17/32"	13.492	5-11/16"	3-5/16"	218.09	208.60	199.12	189.64
		26881	.5312	17/32"	13.492	6-1/8"	4-1/8"	234.80	224.59	214.38	204.17
22530			.5315		13.500	110	56	189.41	181.17	172.94	164.70
	25886		.5315		13.500	145	84	221.46	211.83	202.20	192.57
		26886	.5315		13.500	155	105	238.43	228.06	217.70	207.33
22535			.5469	35/64"	13.891	4-5/16"	2-7/32"	193.55	185.13	176.72	168.30
	25891		.5469	35/64"	13.891	5-13/16"	3-3/8"	233.59	223.43	213.28	203.12
		26891	.5469	35/64"	13.891	6-1/8"	4-1/8"	245.88	235.19	224.50	213.81
22540			.5512		14.000	110	56	197.74	189.15	180.55	171.95
	25896		.5512		14.000	145	86	237.02	226.71	216.41	206.10
		26896	.5512		14.000	155	105	249.50	238.66	227.81	216.96
22545			.5625	9/16"	14.288	4-9/16"	2-15/32"	218.93	209.41	199.89	190.37
	25901		.5625	9/16"	14.288	5-15/16"	3-1/2"	255.35	244.24	233.14	222.04
		26901	.5625	9/16"	14.288	6-1/4"	4-3/8"	269.38	257.66	245.95	234.24
22550			.5709		14.500	116	63	223.05	213.36	203.66	193.96
	25906		.5709		14.500	150	89	257.37	246.18	234.99	223.80
		26906	.5709		14.500	160	109	271.52	259.71	247.91	236.10
22555			.5781	37/64"	14.684	4-15/16"	2-9/16"	227.03	217.16	207.29	197.42
	25911		.5781	37/64"	14.684	6"	3-1/2"	258.07	246.85	235.63	224.41
		26911	.5781	37/64"	14.684	6-1/4"	4-3/8"	272.24	260.40	248.57	236.73
22560			.5906		15.000	125	65	231.21	221.16	211.10	201.05
	25916		.5906		15.000	150	90	261.43	250.06	238.70	227.33
		26916	.5906		15.000	160	112	275.78	263.79	251.80	239.81
22565			.5938	19/32"	15.083	4-15/16"	2-9/16"	232.47	222.37	212.26	202.15
	25921		.5938	19/32"	15.083	6"	3-9/16"	268.24	256.58	244.91	233.25
		26921	.5938	19/32"	15.083	6-3/8"	4-3/8"	282.95	270.64	258.34	246.04
22570			.6094	39/64"	15.479	5-1/16"	2-13/16"	233.62	223.47	213.31	203.15
	25926		.6094	39/64"	15.479	6-3/16"	3-11/16"	301.88	288.75	275.63	262.50
		26926	.6094	39/64"	15.479	6-7/16"	4-7/16"	318.40	304.56	290.71	276.87
22575			.6102		15.500	129	71	234.84	224.63	214.42	204.21
	25931		.6102		15.500	160	94	302.70	289.54	276.38	263.22
		26931	.6102		15.500	165	113	319.30	305.42	291.53	277.65
22580			.6250	5/8"	15.875	5-1/4"	3-1/8"	236.00	225.74	215.48	205.22
	25936		.6250	5/8"	15.875	6-5/16"	3-3/4"	311.05	297.53	284.00	270.48
		26936	.6250	5/8"	15.875	6-9/16"	4-9/16"	328.14	313.87	299.61	285.34
22585			.6299		16.000	133	79	241.72	231.21	220.70	210.19
	25941		.6299		16.000	160	95	315.13	301.43	287.73	274.03
		26941	.6299		16.000	165	117	332.44	317.99	303.53	289.08

Series 1600

TOLERANCES	
d	+.0000" –.0005" (+.0000 –.0127mm)
l_1	+.125" –.125" (+3.175 –3.175mm)

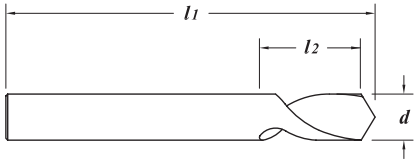


TECH PAGES 290-292

N/C Spotting

Solid submicron grain carbide drill
For spotting to stabilize long drills
Can be used for chamfering
Rough, angled or spherical surfaces
No O.D. clearance
For locating on true position
Live tooling recommended on lathe processes

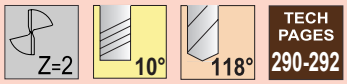




82° EDP#	90° EDP#	120° EDP#	140° EDP#	Decimal	*d* † Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
91650	91500	91572	91240	.0787		2.000	50	10	9.90	9.47	9.04	8.61
91652	91505	91575	91245	.0938	3/32"	2.383	2"	3/8"	11.21	10.73	10.24	9.75
-	91510	91580	91250	.1181		3.000	50	10	13.21	12.64	12.06	11.49
91656	91000	91100	91260	.1250	1/8"	3.175	2"	3/8"	13.21	12.64	12.06	11.49
91658	91520	91590	91270	.1575		4.000	50	12	17.28	16.53	15.78	15.03
91660	91010	91110	91280	.1875	3/16"	4.763	3"	3/4"	17.28	16.53	15.78	15.03
-	91530	91600	91290	.1969		5.000	65	15	18.16	17.37	16.58	15.79
91664	91540	91610	91300	.2362		6.000	65	20	20.52	19.62	18.73	17.84
91666	91020	91120	91310	.2500	1/4"	6.350	3"	3/4"	20.52	19.62	18.73	17.84
91668	91025	91125	91315	.3125	5/16"	7.938	3"	1"	24.82	23.74	22.66	21.58
91670	91550	91620	91320	.3150		8.000	75	25	24.82	23.74	22.66	21.58
91672	91030	91130	91330	.3750	3/8"	9.525	3"	1"	26.91	25.74	24.57	23.40
-	91560	91630	91340	.3937		10.000	88	25	37.13	35.52	33.90	32.29
91676	91565	91635	91345	.4375	7/16"	11.113	4"	1"	41.46	39.66	37.85	36.05
-	91570	91640	91350	.4724		12.000	100	30	44.63	42.69	40.75	38.81
91680	91040	91140	91360	.5000	1/2"	12.700	4"	1"	46.41	44.40	42.38	40.36
-	91050	91170	91370	.5512		14.000	100	30	79.98	76.51	73.03	69.55
91684	91060	91180	-	.5625	9/16"	14.287	4"	1"	87.22	83.42	79.63	75.84
91686	91070	91190	91390	.6250	5/8"	15.875	5"	1"	107.01	102.36	97.70	93.05
91688	91080	91200	91400	.6299		16.000	125	30	109.87	105.09	100.32	95.54
91690	91090	91210	-	.7087		18.000	125	30	150.72	144.17	137.61	131.06
91692	91150	91220	91420	.7500	3/4"	19.050	5"	1"	154.81	148.08	141.35	134.62
-	91160	91230	91430	.7874		20.000	125	30	167.61	160.33	153.04	145.75

† *Metric equivalents are for reference only*

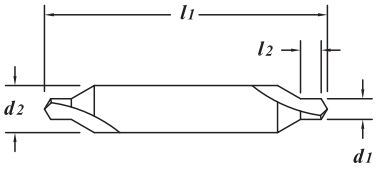
TOLERANCES	
d_1	+.003" –.000" (+.0762 –.0000mm)
d_2	h6
l_1	+.125" –.125" (+3.175 –3.175mm)
l_2	+.008" –.008" (+.203 –.203mm)



Combined Drill and Countersink

Solid submicron grain carbide drill
For center drilling applications
60° ±0°30' included countersink angle
Live tooling recommended on lathe processes
Drill length (l_2) is equal to drill diameter (d_1)
Not able to be altered





EDP #	Number	d_1 † Decimal Diameter	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Drill Length	1-11	12-24	25-49	50-100
58030	1	.0469	3/64"	1.191	1/8"	1-1/2"	.0469	14.82	14.18	13.53	12.89
58040	2	.0781	5/64"	1.984	3/16"	2"	.0781	23.35	22.33	21.32	20.30
58050	3	.1094	7/64"	2.779	1/4"	2"	.1094	26.59	25.43	24.28	23.12
58060	4	.1250	1/8"	3.175	5/16"	2-1/8"	.1250	37.21	35.60	33.98	32.36
58070	5	.1875	3/16"	4.763	7/16"	2-3/4"	.1875	53.15	50.84	48.53	46.22
58080	6	.2188	7/32"	5.558	1/2"	3"	.2188	70.76	67.68	64.61	61.53



Tool prep, Coating inspection

Series 1500

.0625" - .1660"
(1.588mm - 4.216mm)

Z=2 | 0° | 135° | 3xD | TECH PAGES 290-292

TOLERANCES

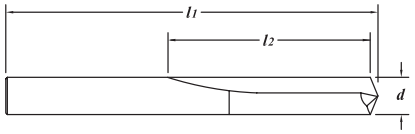
d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

Recommended for high nickel, cobalt-based, and powdered metals

Hard Metal

Solid submicron grain carbide drill
Straight flute design provides excellent rigidity
Materials 40 Rc and higher
Live tooling recommended on lathe processes
Hardlube Coating - page 56





EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
59165	.0625	1/16"	1.588	1-3/4"	5/8"	10.20	9.76	9.31	8.87
59180	.0700	#50	1.778	1-3/4"	3/4"	10.20	9.76	9.31	8.87
59185	.0730	#49	1.854	1-3/4"	3/4"	10.20	9.76	9.31	8.87
59190	.0760	#48	1.930	1-3/4"	3/4"	10.20	9.76	9.31	8.87
59195	.0781	5/64"	1.984	1-3/4"	3/4"	10.20	9.76	9.31	8.87
59200	.0785	#47	1.994	1-3/4"	7/8"	10.20	9.76	9.31	8.87
39000	.0787		2.000	50	22	10.20	9.76	9.31	8.87
59210	.0810	#46	2.057	2"	7/8"	10.20	9.76	9.31	8.87
59215	.0820	#45	2.083	2"	7/8"	10.20	9.76	9.31	8.87
59220	.0860	#44	2.184	2"	7/8"	10.20	9.76	9.31	8.87
59225	.0890	#43	2.261	2"	7/8"	10.20	9.76	9.31	8.87
59230	.0935	#42	2.375	2"	7/8"	10.20	9.76	9.31	8.87
59235	.0938	3/32"	2.383	2"	7/8"	10.20	9.76	9.31	8.87
59240	.0960	#41	2.438	2"	7/8"	11.63	11.12	10.62	10.11
59245	.0980	#40	2.489	2"	7/8"	11.63	11.12	10.62	10.11
39050	.0984		2.500	50	22	11.63	11.12	10.62	10.11
59255	.0995	#39	2.527	2"	7/8"	11.63	11.12	10.62	10.11
59260	.1015	#38	2.578	2"	7/8"	11.63	11.12	10.62	10.11
59265	.1040	#37	2.642	2"	7/8"	11.63	11.12	10.62	10.11
59270	.1065	#36	2.705	2"	7/8"	11.63	11.12	10.62	10.11
59275	.1094	7/64"	2.779	2"	1"	11.63	11.12	10.62	10.11
59280	.1100	#35	2.794	2"	1"	12.09	11.56	11.04	10.51
59285	.1110	#34	2.819	2"	1"	12.09	11.56	11.04	10.51
59290	.1130	#33	2.870	2"	1"	12.09	11.56	11.04	10.51
59295	.1160	#32	2.946	2"	1"	12.09	11.56	11.04	10.51
39100	.1181		3.000	50	25	12.09	11.56	11.04	10.51
59305	.1200	#31	3.048	2"	1"	12.09	11.56	11.04	10.51
59310	.1250	1/8"	3.175	2"	1"	11.14	10.66	10.17	9.69
59315	.1285	#30	3.264	2"	1"	13.14	12.57	12.00	11.43
59320	.1360	#29	3.454	2"	1"	13.14	12.57	12.00	11.43
39150	.1378		3.500	50	25	13.14	12.57	12.00	11.43
59330	.1405	#28	3.569	2"	1"	13.14	12.57	12.00	11.43
59335	.1406	9/64"	3.571	2"	1"	13.14	12.57	12.00	11.43
59340	.1440	#27	3.658	2"	1"	13.50	12.91	12.33	11.74
59345	.1470	#26	3.734	2"	1"	14.19	13.57	12.96	12.34
59350	.1495	#25	3.797	2"	1"	14.19	13.57	12.96	12.34
59355	.1520	#24	3.861	2"	1"	14.19	13.57	12.96	12.34
59360	.1540	#23	3.912	2"	1"	14.19	13.57	12.96	12.34
59365	.1562	5/32"	3.967	2-1/2"	1-1/8"	14.19	13.57	12.96	12.34
59370	.1570	#22	3.988	2-1/2"	1-1/8"	15.38	14.71	14.04	13.37
39200	.1575		4.000	63	28	15.38	14.71	14.04	13.37
59380	.1590	#21	4.039	2-1/2"	1-1/8"	15.73	15.05	14.36	13.68
59385	.1610	#20	4.089	2-1/2"	1-1/8"	15.73	15.05	14.36	13.68
59390	.1660	#19	4.216	2-1/2"	1-1/8"	16.32	15.61	14.90	14.19

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
59395	.1695	#18	4.305	2-1/2"	1-3/16"	16.32	15.61	14.90	14.19
59400	.1719	11/64"	4.366	2-1/2"	1-3/16"	16.32	15.61	14.90	14.19
59405	.1730	#17	4.394	2-1/2"	1-3/16"	16.68	15.95	15.23	14.50
59410	.1770	#16	4.496	2-1/2"	1-3/16"	16.68	15.95	15.23	14.50
39250	.1772		4.500	63	28	16.68	15.95	15.23	14.50
59420	.1800	#15	4.572	2-1/2"	1-3/16"	16.68	15.95	15.23	14.50
59425	.1820	#14	4.623	2-1/2"	1-3/16"	17.61	16.84	16.08	15.31
59430	.1850	#13	4.700	2-1/2"	1-3/16"	17.61	16.84	16.08	15.31
59435	.1875	3/16"	4.763	2-1/2"	1-3/16"	16.92	16.18	15.45	14.71
59440	.1890	#12	4.801	2-1/2"	1-3/16"	17.48	16.72	15.96	15.20
59445	.1910	#11	4.851	2-1/2"	1-3/16"	17.48	16.72	15.96	15.20
59450	.1935	#10	4.915	2-1/2"	1-1/4"	18.53	17.72	16.92	16.11
59455	.1960	#9	4.978	2-1/2"	1-1/4"	18.53	17.72	16.92	16.11
39300	.1969		5.000	63	32	18.53	17.72	16.92	16.11
59465	.1990	#8	5.055	2-1/2"	1-1/4"	19.14	18.30	17.47	16.64
59470	.2010	#7	5.105	2-1/2"	1-1/4"	19.14	18.30	17.47	16.64
59475	.2031	13/64"	5.159	2-1/2"	1-1/4"	19.14	18.30	17.47	16.64
59480	.2040	#6	5.182	2-1/2"	1-1/4"	20.19	19.32	18.44	17.56
59485	.2055	#5	5.220	2-1/2"	1-1/4"	20.19	19.32	18.44	17.56
59490	.2090	#4	5.309	2-1/2"	1-1/4"	20.19	19.32	18.44	17.56
59495	.2130	#3	5.410	2-1/2"	1-1/4"	20.19	19.32	18.44	17.56
39350	.2165		5.500	63	32	20.19	19.32	18.44	17.56
59505	.2188	7/32"	5.558	2-1/2"	1-1/2"	20.19	19.32	18.44	17.56
59510	.2210	#2	5.613	2-1/2"	1-1/2"	21.60	20.66	19.72	18.78
59515	.2280	#1	5.791	2-1/2"	1-1/2"	21.60	20.66	19.72	18.78
59525	.2344	15/64"	5.954	2-1/2"	1-1/2"	24.07	23.02	21.98	20.93
39400	.2362		6.000	63	38	24.07	23.02	21.98	20.93
59550	.2500	1/4"	6.350	2-1/2"	1-1/2"	22.67	21.68	20.70	19.71
39450	.2559		6.500	63	38	27.47	26.28	25.08	23.89
59570	.2656	17/64"	6.746	2-1/2"	1-1/2"	27.47	26.28	25.08	23.89
39500	.2756		7.000	63	38	28.16	26.94	25.71	24.49
59600	.2812	9/32"	7.142	2-1/2"	1-1/2"	28.16	26.94	25.71	24.49
39520	.2953		7.500	63	41	29.59	28.30	27.02	25.73
59620	.2969	19/64"	7.541	2-1/2"	1-5/8"	29.59	28.30	27.02	25.73
59630	.3125	5/16"	7.938	2-1/2"	1-5/8"	29.59	28.30	27.02	25.73
39540	.3150		8.000	63	41	31.12	29.77	28.41	27.06
59650	.3281	21/64"	8.334	3"	1-5/8"	32.04	30.65	29.25	27.86
39560	.3346		8.500	76	41	35.79	34.23	32.68	31.12
59670	.3438	11/32"	8.733	3"	1-5/8"	35.79	34.23	32.68	31.12
39580	.3543		9.000	76	41	38.86	37.17	35.48	33.79
59690	.3594	23/64"	9.129	3"	1-3/4"	38.86	37.17	35.48	33.79
59705	.3750	3/8"	9.525	3"	1-3/4"	42.37	40.52	38.68	36.84
59720	.3906	25/64"	9.921	3"	1-3/4"	47.87	45.79	43.71	41.63
39620	.3937		10.000	76	44	47.87	45.79	43.71	41.63
59740	.4062	13/32"	10.317	3"	1-3/4"	53.51	51.18	48.86	46.53
39640	.4134		10.500	76	44	55.99	53.56	51.12	48.69
59755	.4219	27/64"	10.716	3"	1-3/4"	58.91	56.35	53.79	51.23
39660	.4331		11.000	76	44	59.97	57.37	54.76	52.15
59765	.4375	7/16"	11.113	3"	1-3/4"	59.97	57.37	54.76	52.15
59775	.4531	29/64"	11.509	3"	1-3/4"	62.88	60.15	57.41	54.68
59780	.4688	15/32"	11.908	3"	1-3/4"	62.88	60.15	57.41	54.68
39700	.4724		12.000	76	44	62.88	60.15	57.41	54.68
59790	.4844	31/64"	12.304	3"	1-3/4"	62.88	60.15	57.41	54.68
39720	.4921		12.500	76	44	64.31	61.51	58.72	55.92
59800	.5000	1/2"	12.700	3"	1-3/4"	64.31	61.51	58.72	55.92

Series 1500H

.0625" - .1660"
(1.588mm - 4.216mm)

Z=2 | 0° | 135° | 3xD | TECH PAGES 290-292

TOLERANCES

d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

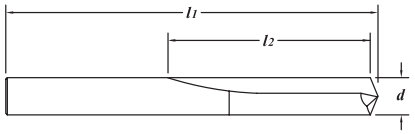
Recommended for high nickel, cobalt-based, and powdered metals

Hard Metal

Hardlube Coating

Solid submicron grain carbide drill
Straight flute design provides excellent rigidity
Materials 40 Rc and higher
Excellent heat resistance and lubricity
Live tooling recommended on lathe processes
Uncoated - page 54





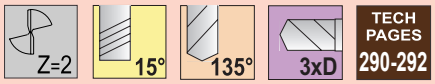
EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
59166	.0625	1/16"	1.588	1-3/4"	5/8"	12.25	11.72	11.18	10.65
59181	.0700	#50	1.778	1-3/4"	3/4"	12.25	11.72	11.18	10.65
59186	.0730	#49	1.854	1-3/4"	3/4"	12.25	11.72	11.18	10.65
59191	.0760	#48	1.930	1-3/4"	3/4"	12.25	11.72	11.18	10.65
59196	.0781	5/64"	1.984	1-3/4"	3/4"	12.25	11.72	11.18	10.65
59201	.0785	#47	1.994	1-3/4"	7/8"	12.25	11.72	11.18	10.65
39001	.0787		2.000	50	22	12.25	11.72	11.18	10.65
59211	.0810	#46	2.057	2"	7/8"	12.25	11.72	11.18	10.65
59216	.0820	#45	2.083	2"	7/8"	12.25	11.72	11.18	10.65
59221	.0860	#44	2.184	2"	7/8"	12.25	11.72	11.18	10.65
59226	.0890	#43	2.261	2"	7/8"	12.25	11.72	11.18	10.65
59231	.0935	#42	2.375	2"	7/8"	12.25	11.72	11.18	10.65
59236	.0938	3/32"	2.383	2"	7/8"	12.25	11.72	11.18	10.65
59241	.0960	#41	2.438	2"	7/8"	13.63	13.04	12.44	11.85
59246	.0980	#40	2.489	2"	7/8"	13.63	13.04	12.44	11.85
39051	.0984		2.500	50	22	13.63	13.04	12.44	11.85
59256	.0995	#39	2.527	2"	7/8"	13.63	13.04	12.44	11.85
59261	.1015	#38	2.578	2"	7/8"	13.63	13.04	12.44	11.85
59266	.1040	#37	2.642	2"	7/8"	13.63	13.04	12.44	11.85
59271	.1065	#36	2.705	2"	7/8"	13.63	13.04	12.44	11.85
59276	.1094	7/64"	2.779	2"	1"	13.63	13.04	12.44	11.85
59281	.1100	#35	2.794	2"	1"	14.13	13.52	12.90	12.29
59286	.1110	#34	2.819	2"	1"	14.13	13.52	12.90	12.29
59291	.1130	#33	2.870	2"	1"	14.13	13.52	12.90	12.29
59296	.1160	#32	2.946	2"	1"	14.13	13.52	12.90	12.29
39101	.1181		3.000	50	25	14.13	13.52	12.90	12.29
59306	.1200	#31	3.048	2"	1"	14.13	13.52	12.90	12.29
59311	.1250	1/8"	3.175	2"	1"	13.17	12.60	12.02	11.45
59316	.1285	#30	3.264	2"	1"	15.17	14.51	13.85	13.19
59321	.1360	#29	3.454	2"	1"	15.17	14.51	13.85	13.19
39151	.1378		3.500	50	25	15.17	14.51	13.85	13.19
59331	.1405	#28	3.569	2"	1"	15.17	14.51	13.85	13.19
59336	.1406	9/64"	3.571	2"	1"	15.17	14.51	13.85	13.19
59341	.1440	#27	3.658	2"	1"	15.51	14.84	14.16	13.49
59346	.1470	#26	3.734	2"	1"	16.23	15.52	14.82	14.11
59351	.1495	#25	3.797	2"	1"	16.23	15.52	14.82	14.11
59356	.1520	#24	3.861	2"	1"	16.23	15.52	14.82	14.11
59361	.1540	#23	3.912	2"	1"	16.23	15.52	14.82	14.11
59366	.1562	5/32"	3.967	2-1/2"	1-1/8"	16.23	15.52	14.82	14.11
59371	.1570	#22	3.988	2-1/2"	1-1/8"	17.39	16.63	15.88	15.12
39201	.1575		4.000	63	28	17.39	16.63	15.88	15.12
59381	.1590	#21	4.039	2-1/2"	1-1/8"	17.76	16.98	16.21	15.44
59386	.1610	#20	4.089	2-1/2"	1-1/8"	17.76	16.98	16.21	15.44
59391	.1660	#19	4.216	2-1/2"	1-1/8"	18.34	17.55	16.75	15.95

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
59396	.1695	#18	4.305	2-1/2"	1-3/16"	18.34	17.55	16.75	15.95
59401	.1719	11/64"	4.366	2-1/2"	1-3/16"	18.34	17.55	16.75	15.95
59406	.1730	#17	4.394	2-1/2"	1-3/16"	18.70	17.89	17.07	16.26
59411	.1770	#16	4.496	2-1/2"	1-3/16"	18.70	17.89	17.07	16.26
39251	.1772		4.500	63	28	18.70	17.89	17.07	16.26
59421	.1800	#15	4.572	2-1/2"	1-3/16"	18.70	17.89	17.07	16.26
59426	.1820	#14	4.623	2-1/2"	1-3/16"	19.61	18.76	17.90	17.05
59431	.1850	#13	4.700	2-1/2"	1-3/16"	19.61	18.76	17.90	17.05
59436	.1875	3/16"	4.763	2-1/2"	1-3/16"	18.92	18.10	17.27	16.45
59441	.1890	#12	4.801	2-1/2"	1-3/16"	20.94	20.03	19.12	18.21
59446	.1910	#11	4.851	2-1/2"	1-3/16"	20.94	20.03	19.12	18.21
59451	.1935	#10	4.915	2-1/2"	1-1/4"	22.00	21.04	20.09	19.13
59456	.1960	#9	4.978	2-1/2"	1-1/4"	22.00	21.04	20.09	19.13
39301	.1969		5.000	63	32	22.00	21.04	20.09	19.13
59466	.1990	#8	5.055	2-1/2"	1-1/4"	22.60	21.62	20.63	19.65
59471	.2010	#7	5.105	2-1/2"	1-1/4"	22.60	21.62	20.63	19.65
59476	.2031	13/64"	5.159	2-1/2"	1-1/4"	22.60	21.62	20.63	19.65
59481	.2040	#6	5.182	2-1/2"	1-1/4"	23.67	22.64	21.61	20.58
59486	.2055	#5	5.220	2-1/2"	1-1/4"	23.67	22.64	21.61	20.58
59491	.2090	#4	5.309	2-1/2"	1-1/4"	23.67	22.64	21.61	20.58
59496	.2130	#3	5.410	2-1/2"	1-1/4"	23.67	22.64	21.61	20.58
39351	.2165		5.500	63	32	23.67	22.64	21.61	20.58
59506	.2188	7/32"	5.558	2-1/2"	1-1/2"	23.67	22.64	21.61	20.58
59511	.2210	#2	5.613	2-1/2"	1-1/2"	25.08	23.99	22.90	21.81
59516	.2280	#1	5.791	2-1/2"	1-1/2"	25.08	23.99	22.90	21.81
59526	.2344	15/64"	5.954	2-1/2"	1-1/2"	27.52	26.32	25.13	23.93
39401	.2362		6.000	63	38	27.52	26.32	25.13	23.93
59551	.2500	1/4"	6.350	2-1/2"	1-1/2"	26.12	24.98	23.85	22.71
39451	.2559		6.500	63	38	33.64	32.18	30.71	29.25
59571	.2656	17/64"	6.746	2-1/2"	1-1/2"	33.64	32.18	30.71	29.25
39501	.2756		7.000	63	38	34.33	32.84	31.34	29.85
59601	.2812	9/32"	7.142	2-1/2"	1-1/2"	34.33	32.84	31.34	29.85
39521	.2953		7.500	63	41	35.75	34.20	32.64	31.09
59621	.2969	19/64"	7.541	2-1/2"	1-5/8"	35.75	34.20	32.64	31.09
59631	.3125	5/16"	7.938	2-1/2"	1-5/8"	35.75	34.20	32.64	31.09
39541	.3150		8.000	63	41	37.29	35.67	34.05	32.43
59651	.3281	21/64"	8.334	3"	1-5/8"	38.20	36.54	34.88	33.22
39561	.3346		8.500	76	41	41.96	40.14	38.31	36.49
59671	.3438	11/32"	8.733	3"	1-5/8"	41.96	40.14	38.31	36.49
39581	.3543		9.000	76	41	45.41	43.44	41.46	39.49
59691	.3594	23/64"	9.129	3"	1-3/4"	45.41	43.44	41.46	39.49
39601	.3740		9.500	76	41	48.96	46.83	44.70	42.57
59706	.3750	3/8"	9.525	3"	1-3/4"	48.96	46.83	44.70	42.57
59721	.3906	25/64"	9.921	3"	1-3/4"	54.99	52.60	50.21	47.82
39621	.3937		10.000	76	44	54.99	52.60	50.21	47.82
59741	.4062	13/32"	10.317	3"	1-3/4"	60.63	57.99	55.36	52.72
59756	.4219	27/64"	10.716	3"	1-3/4"	66.07	63.20	60.32	57.45
39661	.4331		11.000	76	44	67.10	64.19	61.27	58.35
59766	.4375	7/16"	11.113	3"	1-3/4"	67.10	64.19	61.27	58.35
39681	.4528		11.500	76	44	68.84	65.85	62.85	59.86
59776	.4531	29/64"	11.509	3"	1-3/4"	70.01	66.97	63.92	60.88
59781	.4688	15/32"	11.908	3"	1-3/4"	70.01	66.97	63.92	60.88
39701	.4724		12.000	76	44	70.01	66.97	63.92	60.88
59791	.4844	31/64"	12.304	3"	1-3/4"	70.01	66.97	63.92	60.88
39721	.4921		12.500	76	44	71.42	68.31	65.21	62.10
59801	.5000	1/2"	12.700	3"	1-3/4"	71.42	68.31	65.21	62.10

Series 1510

.0625" - .1575"
(1.588mm - 4.000mm)



TOLERANCES

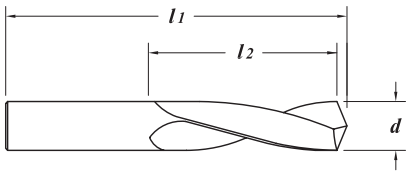
d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

Recommended for titanium, inconel, hastalloy, waspalloy, and stainless steel

Slow Helix

Solid submicron grain carbide drill
Heavy web for extra rigidity and added strength
Thinned point
Live tooling recommended on lathe processes
Hardlube Coating - page 61





EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
19070	.0625	1/16"	1.588	1-3/4"	5/8"	7.51	7.18	6.86	6.53
19075	.0635	#52	1.613	1-3/4"	11/16"	7.62	7.29	6.96	6.63
19080	.0670	#51	1.702	1-3/4"	11/16"	7.74	7.40	7.07	6.73
19085	.0700	#50	1.778	1-3/4"	11/16"	7.94	7.59	7.25	6.90
19090	.0730	#49	1.854	1-3/4"	11/16"	8.12	7.77	7.41	7.06
19095	.0760	#48	1.930	1-3/4"	11/16"	8.40	8.03	7.67	7.30
19100	.0781	5/64"	1.984	1-3/4"	11/16"	8.71	8.33	7.95	7.57
19105	.0785	#47	1.994	1-3/4"	3/4"	8.99	8.60	8.21	7.82
19115	.0787		2.000	45	19	9.14	8.75	8.35	7.95
19120	.0810	#46	2.057	1-3/4"	3/4"	9.28	8.88	8.47	8.07
19125	.0820	#45	2.083	1-3/4"	3/4"	9.56	9.14	8.73	8.31
19130	.0860	#44	2.184	1-3/4"	3/4"	9.88	9.45	9.02	8.59
19135	.0890	#43	2.261	1-3/4"	3/4"	10.17	9.72	9.28	8.84
19140	.0935	#42	2.375	1-3/4"	3/4"	10.30	9.86	9.41	8.96
19145	.0938	3/32"	2.383	1-3/4"	3/4"	10.55	10.09	9.63	9.17
19150	.0960	#41	2.438	1-13/16"	13/16"	10.63	10.16	9.70	9.24
19155	.0980	#40	2.489	1-13/16"	13/16"	10.78	10.31	9.84	9.37
19160	.0984		2.500	46	21	10.84	10.37	9.90	9.43
19165	.0995	#39	2.527	1-13/16"	13/16"	10.89	10.42	9.94	9.47
19170	.1015	#38	2.578	1-13/16"	13/16"	10.99	10.52	10.04	9.56
19175	.1040	#37	2.642	1-13/16"	13/16"	11.09	10.60	10.12	9.64
19180	.1065	#36	2.705	1-13/16"	13/16"	11.17	10.68	10.20	9.71
19185	.1094	7/64"	2.779	1-13/16"	13/16"	11.21	10.73	10.24	9.75
19190	.1100	#35	2.794	1-7/8"	7/8"	11.29	10.80	10.31	9.82
19195	.1110	#34	2.819	1-7/8"	7/8"	11.42	10.92	10.43	9.93
19200	.1130	#33	2.870	1-7/8"	7/8"	11.51	11.01	10.51	10.01
19205	.1160	#32	2.946	1-7/8"	7/8"	11.59	11.09	10.58	10.08
19210	.1181		3.000	48	22	11.70	11.19	10.68	10.17
19215	.1200	#31	3.048	1-7/8"	7/8"	11.82	11.31	10.79	10.28
19220	.1250	1/8"	3.175	1-7/8"	7/8"	11.94	11.42	10.90	10.38
19225	.1285	#30	3.264	1-15/16"	15/16"	12.26	11.73	11.19	10.66
19230	.1360	#29	3.454	1-15/16"	15/16"	12.58	12.03	11.49	10.94
19235	.1378		3.500	49	24	12.98	12.42	11.85	11.29
19240	.1405	#28	3.569	1-15/16"	15/16"	13.14	12.57	12.00	11.43
19245	.1406	9/64"	3.571	1-15/16"	15/16"	13.29	12.72	12.14	11.56
19250	.1440	#27	3.658	2-1/16"	1"	14.47	13.84	13.21	12.58
19255	.1470	#26	3.734	2-1/16"	1"	14.62	13.98	13.35	12.71
19260	.1495	#25	3.797	2-1/16"	1"	14.80	14.16	13.51	12.87
19265	.1520	#24	3.861	2-1/16"	1"	14.82	14.18	13.53	12.89
19270	.1540	#23	3.912	2-1/16"	1"	14.93	14.28	13.63	12.98
19275	.1562	5/32"	3.967	2-1/16"	1"	15.02	14.37	13.71	13.06
19280	.1570	#22	3.988	2-1/8"	1-1/16"	15.95	15.26	14.56	13.87
19285	.1575		4.000	54	27	16.17	15.47	14.76	14.06

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
19290	.1590	#21	4.039	2-1/8"	1-1/16"	16.36	15.65	14.94	14.23
19295	.1610	#20	4.089	2-1/8"	1-1/16"	16.49	15.77	15.06	14.34
19300	.1660	#19	4.216	2-1/8"	1-1/16"	17.16	16.41	15.67	14.92
19305	.1695	#18	4.305	2-1/8"	1-1/16"	17.37	16.61	15.86	15.10
19310	.1719	11/64"	4.366	2-1/8"	1-1/16"	17.70	16.93	16.16	15.39
19315	.1730	#17	4.394	2-3/16"	1-1/8"	17.96	17.18	16.40	15.62
19320	.1770	#16	4.496	2-3/16"	1-1/8"	18.16	17.37	16.58	15.79
19325	.1772		4.500	56	29	18.26	17.47	16.67	15.88
19330	.1800	#15	4.572	2-3/16"	1-1/8"	18.34	17.55	16.75	15.95
19335	.1820	#14	4.623	2-3/16"	1-1/8"	18.76	17.94	17.13	16.31
19340	.1850	#13	4.700	2-3/16"	1-1/8"	18.89	18.07	17.25	16.43
19345	.1875	3/16"	4.763	2-3/16"	1-1/8"	18.98	18.15	17.33	16.50
19350	.1890	#12	4.801	2-1/4"	1-3/16"	19.60	18.74	17.89	17.04
19355	.1910	#11	4.851	2-1/4"	1-3/16"	19.83	18.96	18.10	17.24
19360	.1935	#10	4.915	2-1/4"	1-3/16"	20.73	19.83	18.93	18.03
19365	.1960	#9	4.978	2-1/4"	1-3/16"	21.28	20.35	19.43	18.50
19370	.1969		5.000	57	30	21.39	20.46	19.53	18.60
19375	.1990	#8	5.055	2-1/4"	1-3/16"	21.55	20.61	19.68	18.74
19380	.2010	#7	5.105	2-1/4"	1-3/16"	22.18	21.22	20.25	19.29
19385	.2031	13/64"	5.159	2-1/4"	1-3/16"	22.34	21.37	20.40	19.43
19390	.2040	#6	5.182	2-3/8"	1-1/4"	22.79	21.80	20.81	19.82
19395	.2055	#5	5.220	2-3/8"	1-1/4"	23.25	22.24	21.23	20.22
19400	.2090	#4	5.309	2-3/8"	1-1/4"	23.69	22.66	21.63	20.60
19405	.2130	#3	5.410	2-3/8"	1-1/4"	24.10	23.06	22.01	20.96
19410	.2165		5.500	60	32	24.28	23.22	22.17	21.11
19415	.2188	7/32"	5.558	2-3/8"	1-1/4"	24.46	23.40	22.33	21.27
19420	.2210	#2	5.613	2-7/16"	1-5/16"	25.04	23.95	22.86	21.77
19425	.2280	#1	5.791	2-7/16"	1-5/16"	25.21	24.11	23.02	21.92
19430	.2340	A	5.944	2-7/16"	1-5/16"	25.27	24.17	23.07	21.97
19435	.2344	15/64"	5.954	2-7/16"	1-5/16"	25.31	24.21	23.11	22.01
19440	.2362		6.000	64	35	25.38	24.28	23.17	22.07
19445	.2380	B	6.045	2-1/2"	1-3/8"	25.50	24.39	23.28	22.17
19450	.2420	C	6.147	2-1/2"	1-3/8"	25.67	24.55	23.44	22.32
19455	.2460	D	6.248	2-1/2"	1-3/8"	25.89	24.76	23.64	22.51
19460	.2500	1/4" / E	6.350	2-1/2"	1-3/8"	26.04	24.90	23.77	22.64
19465	.2559		6.500	67	37	26.67	25.51	24.35	23.19
19470	.2570	F	6.528	2-5/8"	1-7/16"	27.23	26.05	24.86	23.68
19475	.2610	G	6.629	2-5/8"	1-7/16"	27.78	26.58	25.37	24.16
19480	.2656	17/64"	6.746	2-5/8"	1-7/16"	28.35	27.12	25.88	24.65
19485	.2660	H	6.756	2-11/16"	1-1/2"	29.16	27.90	26.63	25.36
19490	.2720	I	6.909	2-11/16"	1-1/2"	29.50	28.22	26.93	25.65
19495	.2756		7.000	68	38	29.74	28.45	27.15	25.86
19500	.2770	J	7.036	2-11/16"	1-1/2"	30.00	28.70	27.39	26.09
19505	.2810	K	7.137	2-11/16"	1-1/2"	30.27	28.95	27.64	26.32
19510	.2812	9/32"	7.142	2-11/16"	1-1/2"	30.43	29.11	27.78	26.46
19515	.2900	L	7.366	2-3/4"	1-9/16"	31.56	30.18	28.81	27.44
19520	.2950	M	7.493	2-3/4"	1-9/16"	33.78	32.31	30.84	29.37
19525	.2953		7.500	70	40	33.78	32.31	30.84	29.37
19530	.2969	19/64"	7.541	2-3/4"	1-9/16"	33.96	32.48	31.01	29.53
19535	.3020	N	7.671	2-15/16"	1-5/8"	35.77	34.21	32.66	31.10
19540	.3125	5/16"	7.938	2-15/16"	1-5/8"	35.90	34.34	32.78	31.22
19545	.3150		8.000	75	43	38.53	36.85	35.18	33.50
19550	.3160	O	8.026	2-15/16"	1-11/16"	38.53	36.85	35.18	33.50
19555	.3230	P	8.204	2-15/16"	1-11/16"	38.86	37.17	35.48	33.79
19560	.3281	21/64"	8.334	2-15/16"	1-11/16"	39.09	37.39	35.69	33.99
19565	.3320	Q	8.433	3"	1-11/16"	40.00	38.26	36.52	34.78
19570	.3346		8.500	76	43	40.38	38.62	36.87	35.11

continued →

Series 1510 *(continued)*

.3390" - .6299"
(8.611mm - 16.000mm)

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
19575	.3390	R	8.611	3"	1-11/16"	41.63	39.82	38.01	36.20
19580	.3438	11/32"	8.733	3"	1-11/16"	43.32	41.44	39.55	37.67
19585	.3480	S	8.839	3-1/16"	1-3/4"	43.92	42.01	40.10	38.19
19590	.3543		9.000	78	44	44.18	42.26	40.34	38.42
19595	.3580	T	9.093	3-1/16"	1-3/4"	44.36	42.43	40.50	38.57
19600	.3594	23/64"	9.129	3-1/16"	1-3/4"	44.65	42.71	40.77	38.83
19605	.3680	U	9.347	3-1/8"	1-13/16"	48.91	46.78	44.66	42.53
19615	.3750	3/8"	9.525	3-1/8"	1-13/16"	49.75	47.59	45.42	43.26
19620	.3770	V	9.576	3-1/4"	1-7/8"	50.72	48.51	46.31	44.10
19625	.3860	W	9.804	3-1/4"	1-7/8"	51.77	49.52	47.27	45.02
19630	.3906	25/64"	9.921	3-1/4"	1-7/8"	52.57	50.28	48.00	45.71
19635	.3937		10.000	84	49	54.44	52.07	49.71	47.34
19640	.3970	X	10.084	3-5/16"	1-15/16"	56.03	53.59	51.16	48.72
19645	.4040	Y	10.262	3-5/16"	1-15/16"	56.48	54.02	51.57	49.11
19650	.4062	13/32"	10.317	3-5/16"	1-15/16"	58.52	55.98	53.43	50.89
19655	.4130	Z	10.490	3-3/8"	2"	59.16	56.58	54.01	51.44
19660	.4134		10.500	86	51	59.16	56.58	54.01	51.44
19665	.4219	27/64"	10.716	3-3/8"	2"	59.81	57.21	54.61	52.01
19670	.4331		11.000	87	52	64.96	62.14	59.31	56.49
19675	.4375	7/16"	11.113	3-7/16"	2-1/16"	64.96	62.14	59.31	56.49
19685	.4531	29/64"	11.509	3-9/16"	2-1/8"	70.45	67.39	64.32	61.26
19690	.4688	15/32"	11.908	3-5/8"	2-1/8"	74.52	71.28	68.04	64.80
19695	.4724		12.000	94	56	74.78	71.53	68.28	65.03
19700	.4844	31/64"	12.304	3-11/16"	2-3/16"	75.37	72.09	68.82	65.54
19705	.4921		12.500	95	56	76.21	72.90	69.58	66.27
19710	.5000	1/2"	12.700	3-3/4"	2-1/4"	76.76	73.43	70.09	66.75
19720	.5156	33/64"	13.096	4-1/4"	2-3/8"	103.16	98.67	94.19	89.70
19725	.5312	17/32"	13.492	4-1/4"	2-3/8"	105.83	101.23	96.63	92.03
19730	.5315		13.500	107	60	108.56	103.84	99.12	94.40
19735	.5469	35/64"	13.891	4-1/4"	2-3/8"	111.24	106.40	101.57	96.73
19740	.5512		14.000	107	60	113.95	109.00	104.04	99.09
19745	.5625	9/16"	14.287	4-1/2"	2-1/2"	124.26	118.86	113.45	108.05
19755	.5781	37/64"	14.683	4-1/2"	2-1/2"	129.44	123.82	118.19	112.56
19760	.5906		15.000	115	65	132.08	126.34	120.59	114.85
19765	.5938	19/32"	15.082	4-1/2"	2-1/2"	132.84	127.06	121.29	115.51
19770	.6094	39/64"	15.478	4-1/2"	2-1/2"	133.57	127.77	121.96	116.15
19780	.6250	5/8"	15.875	4-1/2"	2-1/2"	135.08	129.21	123.33	117.46
19785	.6299		16.000	115	65	138.68	132.65	126.62	120.59

† *Metric equivalents are for reference only*

TOLERANCES

d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

Z=2 | 15° | 135° | 3xD | TECH PAGES 290-292

Series 1510H

.0625" - .1575"
(1.588mm - 4.000mm)

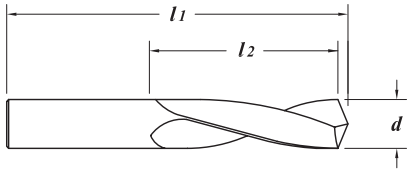
Recommended for titanium, inconel, hastalloy, waspalloy, and stainless steel

Slow Helix

Hardlube Coating

Solid submicron grain carbide drill
Excellent heat resistance and lubricity
Heavy web for extra rigidity and added strength
Thinned point
Live tooling recommended on lathe processes
Uncoated - page 58





EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
19071	.0625	1/16"	1.588	1-3/4"	5/8"	9.51	9.10	8.68	8.27
19076	.0635	#52	1.613	1-3/4"	11/16"	9.64	9.22	8.80	8.38
19081	.0670	#51	1.702	1-3/4"	11/16"	9.74	9.32	8.89	8.47
19086	.0700	#50	1.778	1-3/4"	11/16"	9.94	9.50	9.07	8.64
19091	.0730	#49	1.854	1-3/4"	11/16"	10.14	9.70	9.26	8.82
19096	.0760	#48	1.930	1-3/4"	11/16"	10.40	9.94	9.49	9.04
19101	.0781	5/64"	1.984	1-3/4"	11/16"	10.72	10.25	9.79	9.32
19106	.0785	#47	1.994	1-3/4"	3/4"	11.01	10.53	10.05	9.57
19116	.0787		2.000	45	19	11.14	10.66	10.17	9.69
19121	.0810	#46	2.057	1-3/4"	3/4"	11.29	10.80	10.31	9.82
19126	.0820	#45	2.083	1-3/4"	3/4"	11.58	11.08	10.57	10.07
19131	.0860	#44	2.184	1-3/4"	3/4"	11.88	11.36	10.85	10.33
19136	.0890	#43	2.261	1-3/4"	3/4"	12.18	11.65	11.12	10.59
19141	.0935	#42	2.375	1-3/4"	3/4"	12.31	11.77	11.24	10.70
19146	.0938	3/32"	2.383	1-3/4"	3/4"	12.56	12.01	11.47	10.92
19151	.0960	#41	2.438	1-13/16"	13/16"	12.64	12.09	11.54	10.99
19156	.0980	#40	2.489	1-13/16"	13/16"	12.79	12.23	11.68	11.12
19161	.0984		2.500	46	21	12.86	12.30	11.74	11.18
19166	.0995	#39	2.527	1-13/16"	13/16"	12.93	12.36	11.80	11.24
19171	.1015	#38	2.578	1-13/16"	13/16"	13.00	12.43	11.87	11.30
19176	.1040	#37	2.642	1-13/16"	13/16"	13.08	12.51	11.94	11.37
19181	.1065	#36	2.705	1-13/16"	13/16"	13.17	12.60	12.02	11.45
19186	.1094	7/64"	2.779	1-13/16"	13/16"	13.25	12.67	12.10	11.52
19191	.1100	#35	2.794	1-7/8"	7/8"	13.31	12.73	12.15	11.57
19196	.1110	#34	2.819	1-7/8"	7/8"	13.43	12.85	12.26	11.68
19201	.1130	#33	2.870	1-7/8"	7/8"	13.51	12.93	12.34	11.75
19206	.1160	#32	2.946	1-7/8"	7/8"	13.60	13.01	12.42	11.83
19211	.1181		3.000	48	22	13.72	13.12	12.53	11.93
19216	.1200	#31	3.048	1-7/8"	7/8"	13.81	13.21	12.61	12.01
19221	.1250	1/8"	3.175	1-7/8"	7/8"	13.96	13.35	12.75	12.14
19226	.1285	#30	3.264	1-15/16"	15/16"	14.27	13.65	13.03	12.41
19231	.1360	#29	3.454	1-15/16"	15/16"	14.58	13.95	13.31	12.68
19236	.1378		3.500	49	24	15.00	14.34	13.69	13.04
19241	.1405	#28	3.569	1-15/16"	15/16"	15.17	14.51	13.85	13.19
19246	.1406	9/64"	3.571	1-15/16"	15/16"	15.28	14.62	13.95	13.29
19251	.1440	#27	3.658	2-1/16"	1"	16.48	15.76	15.05	14.33
19256	.1470	#26	3.734	2-1/16"	1"	16.63	15.91	15.18	14.46
19261	.1495	#25	3.797	2-1/16"	1"	16.82	16.09	15.36	14.63
19266	.1520	#24	3.861	2-1/16"	1"	16.85	16.12	15.38	14.65
19271	.1540	#23	3.912	2-1/16"	1"	16.94	16.20	15.47	14.73
19276	.1562	5/32"	3.967	2-1/16"	1"	17.03	16.29	15.55	14.81
19281	.1570	#22	3.988	2-1/8"	1-1/16"	17.96	17.18	16.40	15.62
19286	.1575		4.000	54	27	18.16	17.37	16.58	15.79

continued →

Series 1510H *(continued)*

.1590" - .3346"
(4.039mm - 8.500mm)

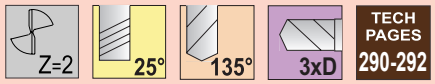
EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
19291	.1590	#21	4.039	2-1/8"	1-1/16"	18.37	17.57	16.77	15.97
19296	.1610	#20	4.089	2-1/8"	1-1/16"	18.50	17.70	16.89	16.09
19301	.1660	#19	4.216	2-1/8"	1-1/16"	19.16	18.33	17.49	16.66
19306	.1695	#18	4.305	2-1/8"	1-1/16"	19.37	18.52	17.68	16.84
19311	.1719	11/64"	4.366	2-1/8"	1-1/16"	19.72	18.87	18.01	17.15
19316	.1730	#17	4.394	2-3/16"	1-1/8"	19.98	19.11	18.24	17.37
19321	.1770	#16	4.496	2-3/16"	1-1/8"	20.18	19.31	18.43	17.55
19326	.1772		4.500	56	29	20.26	19.38	18.50	17.62
19331	.1800	#15	4.572	2-3/16"	1-1/8"	20.34	19.46	18.57	17.69
19336	.1820	#14	4.623	2-3/16"	1-1/8"	20.77	19.87	18.96	18.06
19341	.1850	#13	4.700	2-3/16"	1-1/8"	20.92	20.01	19.10	18.19
19346	.1875	3/16"	4.763	2-3/16"	1-1/8"	20.98	20.06	19.15	18.24
19351	.1890	#12	4.801	2-1/4"	1-3/16"	23.07	22.07	21.06	20.06
19356	.1910	#11	4.851	2-1/4"	1-3/16"	23.31	22.30	21.28	20.27
19361	.1935	#10	4.915	2-1/4"	1-3/16"	24.22	23.17	22.11	21.06
19366	.1960	#9	4.978	2-1/4"	1-3/16"	24.76	23.68	22.61	21.53
19371	.1969		5.000	57	30	24.87	23.79	22.71	21.63
19376	.1990	#8	5.055	2-1/4"	1-3/16"	25.01	23.93	22.84	21.75
19381	.2010	#7	5.105	2-1/4"	1-3/16"	25.66	24.54	23.43	22.31
19386	.2031	13/64"	5.159	2-1/4"	1-3/16"	25.81	24.68	23.56	22.44
19391	.2040	#6	5.182	2-3/8"	1-1/4"	26.28	25.14	23.99	22.85
19396	.2055	#5	5.220	2-3/8"	1-1/4"	26.75	25.59	24.42	23.26
19401	.2090	#4	5.309	2-3/8"	1-1/4"	27.14	25.96	24.78	23.60
19406	.2130	#3	5.410	2-3/8"	1-1/4"	27.57	26.37	25.17	23.97
19411	.2165		5.500	60	32	27.76	26.55	25.35	24.14
19416	.2188	7/32"	5.558	2-3/8"	1-1/4"	27.93	26.72	25.50	24.29
19421	.2210	#2	5.613	2-7/16"	1-5/16"	28.52	27.28	26.04	24.80
19426	.2280	#1	5.791	2-7/16"	1-5/16"	28.68	27.43	26.19	24.94
19431	.2340	A	5.944	2-7/16"	1-5/16"	28.75	27.50	26.25	25.00
19436	.2344	15/64"	5.954	2-7/16"	1-5/16"	28.78	27.53	26.28	25.03
19441	.2362		6.000	64	35	28.88	27.62	26.37	25.11
19446	.2380	B	6.045	2-1/2"	1-3/8"	28.97	27.71	26.45	25.19
19451	.2420	C	6.147	2-1/2"	1-3/8"	29.15	27.89	26.62	25.35
19456	.2460	D	6.248	2-1/2"	1-3/8"	29.35	28.07	26.80	25.52
19461	.2500	1/4" / E	6.350	2-1/2"	1-3/8"	29.52	28.24	26.95	25.67
19466	.2559		6.500	67	37	32.84	31.42	29.99	28.56
19471	.2570	F	6.528	2-5/8"	1-7/16"	33.41	31.96	30.50	29.05
19476	.2610	G	6.629	2-5/8"	1-7/16"	33.96	32.48	31.01	29.53
19481	.2656	17/64"	6.746	2-5/8"	1-7/16"	34.52	33.02	31.52	30.02
19486	.2660	H	6.756	2-11/16"	1-1/2"	35.33	33.79	32.26	30.72
19491	.2720	I	6.909	2-11/16"	1-1/2"	35.66	34.11	32.56	31.01
19496	.2756		7.000	68	38	35.90	34.34	32.78	31.22
19501	.2770	J	7.036	2-11/16"	1-1/2"	36.18	34.61	33.03	31.46
19506	.2810	K	7.137	2-11/16"	1-1/2"	36.44	34.86	33.27	31.69
19511	.2812	9/32"	7.142	2-11/16"	1-1/2"	36.57	34.98	33.39	31.80
19516	.2900	L	7.366	2-3/4"	1-9/16"	37.71	36.07	34.43	32.79
19521	.2950	M	7.493	2-3/4"	1-9/16"	39.93	38.19	36.46	34.72
19526	.2953		7.500	70	40	39.93	38.19	36.46	34.72
19531	.2969	19/64"	7.541	2-3/4"	1-9/16"	40.10	38.36	36.61	34.87
19536	.3020	N	7.671	2-15/16"	1-5/8"	41.94	40.12	38.29	36.47
19541	.3125	5/16"	7.938	2-15/16"	1-5/8"	42.08	40.25	38.42	36.59
19546	.3150		8.000	75	43	44.69	42.75	40.80	38.86
19551	.3160	O	8.026	2-15/16"	1-11/16"	44.69	42.75	40.80	38.86
19556	.3230	P	8.204	2-15/16"	1-11/16"	45.01	43.05	41.10	39.14
19561	.3281	21/64"	8.334	2-15/16"	1-11/16"	45.25	43.29	41.32	39.35
19566	.3320	Q	8.433	3"	1-11/16"	46.16	44.15	42.15	40.14
19571	.3346		8.500	76	43	46.54	44.52	42.49	40.47

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
19576	.3390	R	8.611	3"	1-11/16"	47.79	45.72	43.64	41.56
19581	.3438	11/32"	8.733	3"	1-11/16"	49.50	47.34	45.19	43.04
19586	.3480	S	8.839	3-1/16"	1-3/4"	52.27	50.00	47.72	45.45
19591	.3543		9.000	78	44	52.57	50.28	48.00	45.71
19596	.3580	T	9.093	3-1/16"	1-3/4"	52.69	50.40	48.11	45.82
19601	.3594	23/64"	9.129	3-1/16"	1-3/4"	53.03	50.72	48.42	46.11
19606	.3680	U	9.347	3-1/8"	1-13/16"	57.27	54.78	52.29	49.80
19611	.3740		9.500	79	46	57.73	55.22	52.71	50.20
19616	.3750	3/8"	9.525	3-1/8"	1-13/16"	58.12	55.59	53.07	50.54
19621	.3770	V	9.576	3-1/4"	1-7/8"	60.29	57.67	55.05	52.43
19626	.3860	W	9.804	3-1/4"	1-7/8"	61.35	58.69	56.02	53.35
19631	.3906	25/64"	9.921	3-1/4"	1-7/8"	62.11	59.41	56.71	54.01
19636	.3937		10.000	84	49	64.00	61.22	58.43	55.65
19641	.3970	X	10.084	3-5/16"	1-15/16"	65.62	62.77	59.91	57.06
19646	.4040	Y	10.262	3-5/16"	1-15/16"	66.07	63.20	60.32	57.45
19651	.4062	13/32"	10.317	3-5/16"	1-15/16"	68.08	65.12	62.16	59.20
19656	.4130	Z	10.490	3-3/8"	2"	68.72	65.74	62.75	59.76
19661	.4134		10.500	86	51	68.72	65.74	62.75	59.76
19666	.4219	27/64"	10.716	3-3/8"	2"	69.37	66.35	63.34	60.32
19671	.4331		11.000	87	52	74.52	71.28	68.04	64.80
19676	.4375	7/16"	11.113	3-7/16"	2-1/16"	74.52	71.28	68.04	64.80
19681	.4528		11.500	91	54	80.02	76.54	73.06	69.58
19686	.4531	29/64"	11.509	3-9/16"	2-1/8"	80.02	76.54	73.06	69.58
19691	.4688	15/32"	11.908	3-5/8"	2-1/8"	84.08	80.42	76.77	73.11
19696	.4724		12.000	94	56	84.35	80.69	77.02	73.35
19701	.4844	31/64"	12.304	3-11/16"	2-3/16"	84.93	81.24	77.54	73.85
19706	.4921		12.500	95	56	85.79	82.06	78.33	74.60
19711	.5000	1/2"	12.700	3-3/4"	2-1/4"	86.34	82.59	78.83	75.08
19716	.5118		13.000	107	60	114.33	109.36	104.39	99.42
19721	.5156	33/64"	13.096	4-1/4"	2-3/8"	117.02	111.94	106.85	101.76
19726	.5312	17/32"	13.492	4-1/4"	2-3/8"	119.72	114.51	109.31	104.10
19731	.5315		13.500	107	60	122.41	117.08	111.76	106.44
19736	.5469	35/64"	13.891	4-1/4"	2-3/8"	125.09	119.65	114.21	108.77
19741	.5512		14.000	107	60	127.81	122.25	116.70	111.14
19746	.5625	9/16"	14.287	4-1/2"	2-1/2"	138.13	132.12	126.12	120.11
19751	.5709		14.500	115	65	140.71	134.60	128.48	122.36
19756	.5781	37/64"	14.683	4-1/2"	2-1/2"	143.30	137.07	130.84	124.61
19761	.5906		15.000	115	65	145.92	139.58	133.23	126.89
19766	.5938	19/32"	15.082	4-1/2"	2-1/2"	146.69	140.32	133.94	127.56
19771	.6094	39/64"	15.478	4-1/2"	2-1/2"	147.44	141.03	134.62	128.21
19776	.6102		15.500	115	65	148.20	141.76	135.31	128.87
19781	.6250	5/8"	15.875	4-1/2"	2-1/2"	148.96	142.48	136.01	129.53
19786	.6299		16.000	115	65	152.56	145.93	139.29	132.66

Series 1520

.0625" - .1575"
(1.588mm - 4.000mm)



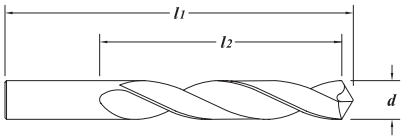
TOLERANCES

d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

General purpose for all material groups

- Solid submicron grain carbide drill
- No spotting required in most applications
- 4-facet self-centering point
- Live tooling recommended on lathe processes
- Hardlube Coating - page 67





EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
77165	.0625	1/16"	1.588	1-3/4"	5/8"	7.13	6.82	6.51	6.20
77170	.0635	#52	1.613	1-3/4"	11/16"	7.23	6.92	6.60	6.29
77175	.0670	#51	1.702	1-3/4"	11/16"	7.34	7.02	6.70	6.38
77180	.0700	#50	1.778	1-3/4"	11/16"	7.52	7.19	6.87	6.54
77185	.0730	#49	1.854	1-3/4"	11/16"	7.72	7.38	7.05	6.71
77190	.0760	#48	1.930	1-3/4"	11/16"	7.97	7.62	7.28	6.93
77195	.0781	5/64"	1.984	1-3/4"	11/16"	8.27	7.91	7.55	7.19
77200	.0785	#47	1.994	1-3/4"	3/4"	8.54	8.17	7.80	7.43
77205	.0787		2.000	45	19	8.68	8.31	7.93	7.55
77210	.0810	#46	2.057	1-3/4"	3/4"	8.82	8.44	8.05	7.67
77215	.0820	#45	2.083	1-3/4"	3/4"	9.09	8.69	8.30	7.90
77220	.0860	#44	2.184	1-3/4"	3/4"	9.38	8.98	8.57	8.16
77225	.0890	#43	2.261	1-3/4"	3/4"	9.65	9.23	8.81	8.39
77230	.0935	#42	2.375	1-3/4"	3/4"	9.79	9.36	8.94	8.51
77235	.0938	3/32"	2.383	1-3/4"	3/4"	10.01	9.57	9.14	8.70
77240	.0960	#41	2.438	1-13/16"	13/16"	10.10	9.66	9.22	8.78
77245	.0980	#40	2.489	1-13/16"	13/16"	10.25	9.80	9.36	8.91
77250	.0984		2.500	46	21	10.30	9.86	9.41	8.96
77255	.0995	#39	2.527	1-13/16"	13/16"	10.35	9.90	9.45	9.00
77260	.1015	#38	2.578	1-13/16"	13/16"	10.44	9.99	9.53	9.08
77265	.1040	#37	2.642	1-13/16"	13/16"	10.52	10.07	9.61	9.15
77270	.1065	#36	2.705	1-13/16"	13/16"	10.59	10.13	9.67	9.21
77275	.1094	7/64"	2.779	1-13/16"	13/16"	10.66	10.20	9.73	9.27
77280	.1100	#35	2.794	1-7/8"	7/8"	10.73	10.26	9.80	9.33
77285	.1110	#34	2.819	1-7/8"	7/8"	10.86	10.38	9.91	9.44
77290	.1130	#33	2.870	1-7/8"	7/8"	10.93	10.45	9.98	9.50
77295	.1160	#32	2.946	1-7/8"	7/8"	11.01	10.53	10.05	9.57
77300	.1181		3.000	48	22	11.13	10.65	10.16	9.68
77305	.1200	#31	3.048	1-7/8"	7/8"	11.20	10.71	10.23	9.74
77310	.1250	1/8"	3.175	1-7/8"	7/8"	11.33	10.84	10.34	9.85
77315	.1285	#30	3.264	1-15/16"	15/16"	11.64	11.13	10.63	10.12
77320	.1360	#29	3.454	1-15/16"	15/16"	11.94	11.42	10.90	10.38
77325	.1378		3.500	49	24	12.33	11.79	11.26	10.72
77330	.1405	#28	3.569	1-15/16"	15/16"	12.50	11.96	11.41	10.87
77335	.1406	9/64"	3.571	1-15/16"	15/16"	12.62	12.07	11.52	10.97
77340	.1440	#27	3.658	2-1/16"	1"	13.73	13.13	12.54	11.94
77345	.1470	#26	3.734	2-1/16"	1"	13.87	13.27	12.66	12.06
77350	.1495	#25	3.797	2-1/16"	1"	14.05	13.44	12.83	12.22
77355	.1520	#24	3.861	2-1/16"	1"	14.08	13.46	12.85	12.24
77360	.1540	#23	3.912	2-1/16"	1"	14.18	13.56	12.95	12.33
77365	.1562	5/32"	3.967	2-1/16"	1"	14.27	13.65	13.03	12.41
77370	.1570	#22	3.988	2-1/8"	1-1/16"	15.17	14.51	13.85	13.19
77375	.1575		4.000	54	27	15.36	14.70	14.03	13.36

† *Metric equivalents are for reference only*

EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
77380	.1590	#21	4.039	2-1/8"	1-1/16"	15.54	14.86	14.19	13.51
77385	.1610	#20	4.089	2-1/8"	1-1/16"	15.65	14.97	14.29	13.61
77390	.1660	#19	4.216	2-1/8"	1-1/16"	16.28	15.58	14.87	14.16
77395	.1695	#18	4.305	2-1/8"	1-1/16"	16.49	15.77	15.06	14.34
77400	.1719	11/64"	4.366	2-1/8"	1-1/16"	16.84	16.10	15.37	14.64
77405	.1730	#17	4.394	2-3/16"	1-1/8"	17.07	16.32	15.58	14.84
77410	.1770	#16	4.496	2-3/16"	1-1/8"	17.25	16.50	15.75	15.00
77415	.1772		4.500	56	29	17.34	16.59	15.83	15.08
77420	.1800	#15	4.572	2-3/16"	1-1/8"	17.41	16.65	15.90	15.14
77425	.1820	#14	4.623	2-3/16"	1-1/8"	17.81	17.04	16.26	15.49
77430	.1850	#13	4.700	2-3/16"	1-1/8"	17.95	17.17	16.39	15.61
77435	.1875	3/16"	4.763	2-3/16"	1-1/8"	18.03	17.25	16.46	15.68
77440	.1890	#12	4.801	2-1/4"	1-3/16"	18.62	17.81	17.00	16.19
77445	.1910	#11	4.851	2-1/4"	1-3/16"	18.83	18.01	17.19	16.37
77450	.1935	#10	4.915	2-1/4"	1-3/16"	19.72	18.87	18.01	17.15
77455	.1960	#9	4.978	2-1/4"	1-3/16"	20.22	19.34	18.46	17.58
77460	.1969		5.000	57	30	20.33	19.45	18.56	17.68
77465	.1990	#8	5.055	2-1/4"	1-3/16"	20.47	19.58	18.69	17.80
77470	.2010	#7	5.105	2-1/4"	1-3/16"	21.07	20.15	19.24	18.32
77475	.2031	13/64"	5.159	2-1/4"	1-3/16"	21.23	20.31	19.38	18.46
77480	.2040	#6	5.182	2-3/8"	1-1/4"	21.67	20.72	19.78	18.84
77485	.2055	#5	5.220	2-3/8"	1-1/4"	22.11	21.15	20.19	19.23
77490	.2090	#4	5.309	2-3/8"	1-1/4"	22.49	21.52	20.54	19.56
77495	.2130	#3	5.410	2-3/8"	1-1/4"	22.89	21.89	20.90	19.90
77500	.2165		5.500	60	32	23.07	22.07	21.06	20.06
77505	.2188	7/32"	5.558	2-3/8"	1-1/4"	23.23	22.22	21.21	20.20
77510	.2210	#2	5.613	2-7/16"	1-5/16"	23.81	22.77	21.74	20.70
77515	.2280	#1	5.791	2-7/16"	1-5/16"	23.94	22.90	21.86	20.82
77520	.2340	A	5.944	2-7/16"	1-5/16"	23.99	22.95	21.90	20.86
77525	.2344	15/64"	5.954	2-7/16"	1-5/16"	24.06	23.01	21.97	20.92
77530	.2362		6.000	64	35	24.14	23.09	22.04	20.99
77535	.2380	B	6.045	2-1/2"	1-3/8"	24.22	23.17	22.11	21.06
77540	.2420	C	6.147	2-1/2"	1-3/8"	24.40	23.34	22.28	21.22
77545	.2460	D	6.248	2-1/2"	1-3/8"	24.59	23.52	22.45	21.38
77550	.2500	1/4" / E	6.350	2-1/2"	1-3/8"	24.76	23.68	22.61	21.53
77555	.2559		6.500	67	37	25.35	24.24	23.14	22.04
77560	.2570	F	6.528	2-5/8"	1-7/16"	25.89	24.76	23.64	22.51
77565	.2610	G	6.629	2-5/8"	1-7/16"	26.38	25.23	24.09	22.94
77570	.2656	17/64"	6.746	2-5/8"	1-7/16"	26.94	25.77	24.60	23.43
77575	.2660	H	6.756	2-11/16"	1-1/2"	27.70	26.50	25.29	24.09
77580	.2720	I	6.909	2-11/16"	1-1/2"	28.03	26.81	25.59	24.37
77585	.2756		7.000	68	38	28.24	27.02	25.79	24.56
77590	.2770	J	7.036	2-11/16"	1-1/2"	28.52	27.28	26.04	24.80
77595	.2810	K	7.137	2-11/16"	1-1/2"	28.77	27.52	26.27	25.02
77600	.2812	9/32"	7.142	2-11/16"	1-1/2"	28.91	27.65	26.40	25.14
77605	.2900	L	7.366	2-3/4"	1-9/16"	29.98	28.68	27.37	26.07
77610	.2950	M	7.493	2-3/4"	1-9/16"	32.09	30.69	29.30	27.90
77615	.2953		7.500	70	40	32.09	30.69	29.30	27.90
77620	.2969	19/64"	7.541	2-3/4"	1-9/16"	32.25	30.84	29.44	28.04
77625	.3020	N	7.671	2-15/16"	1-5/8"	33.98	32.51	31.03	29.55
77630	.3125	5/16"	7.938	2-15/16"	1-5/8"	34.10	32.62	31.13	29.65
77635	.3150		8.000	75	43	36.57	34.98	33.39	31.80
77640	.3160	O	8.026	2-15/16"	1-11/16"	36.57	34.98	33.39	31.80
77645	.3230	P	8.204	2-15/16"	1-11/16"	36.90	35.30	33.69	32.09
77650	.3281	21/64"	8.334	2-15/16"	1-11/16"	37.13	35.52	33.90	32.29
77655	.3320	Q	8.433	3"	1-11/16"	37.98	36.33	34.68	33.03
77660	.3346		8.500	76	43	38.34	36.67	35.01	33.34

continued →

Series 1520 *(continued)*

.3390" - .5000"
(8.611mm - 12.700mm)

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
77665	.3390	R	8.611	3"	1-11/16"	39.56	37.84	36.12	34.40
77670	.3438	11/32"	8.733	3"	1-11/16"	41.18	39.39	37.60	35.81
77675	.3480	S	8.839	3-1/16"	1-3/4"	41.73	39.92	38.10	36.29
77680	.3543		9.000	78	44	41.98	40.15	38.33	36.50
77685	.3580	T	9.093	3-1/16"	1-3/4"	42.15	40.32	38.48	36.65
77690	.3594	23/64"	9.129	3-1/16"	1-3/4"	42.44	40.59	38.75	36.90
77695	.3680	U	9.347	3-1/8"	1-13/16"	46.47	44.45	42.43	40.41
77700	.3740		9.500	79	46	46.91	44.87	42.83	40.79
77705	.3750	3/8"	9.525	3-1/8"	1-13/16"	47.28	45.22	43.17	41.11
77710	.3770	V	9.576	3-1/4"	1-7/8"	48.16	46.07	43.97	41.88
77715	.3860	W	9.804	3-1/4"	1-7/8"	49.19	47.05	44.91	42.77
77720	.3906	25/64"	9.921	3-1/4"	1-7/8"	49.92	47.75	45.58	43.41
77725	.3937		10.000	84	49	51.72	49.47	47.22	44.97
77730	.3970	X	10.084	3-5/16"	1-15/16"	53.22	50.91	48.59	46.28
77740	.4062	13/32"	10.317	3-5/16"	1-15/16"	55.60	53.19	50.77	48.35
77745	.4130	Z	10.490	3-3/8"	2"	56.21	53.77	51.32	48.88
77750	.4134		10.500	86	51	56.21	53.77	51.32	48.88
77755	.4219	27/64"	10.716	3-3/8"	2"	56.81	54.34	51.87	49.40
77760	.4331		11.000	87	52	61.69	59.00	56.32	53.64
77765	.4375	7/16"	11.113	3-7/16"	2-1/16"	61.69	59.00	56.32	53.64
77770	.4528		11.500	91	54	66.93	64.02	61.11	58.20
77775	.4531	29/64"	11.509	3-9/16"	2-1/8"	66.93	64.02	61.11	58.20
77780	.4688	15/32"	11.908	3-5/8"	2-1/8"	70.79	67.72	64.64	61.56
77785	.4724		12.000	94	56	71.06	67.97	64.88	61.79
77790	.4844	31/64"	12.304	3-11/16"	2-3/16"	71.59	68.48	65.36	62.25
77795	.4921		12.500	95	56	72.42	69.27	66.12	62.97
77800	.5000	1/2"	12.700	3-3/4"	2-1/4"	72.93	69.76	66.59	63.42



Drill and Reamer Manufacturing

† *Metric equivalents are for reference only*

TOLERANCES

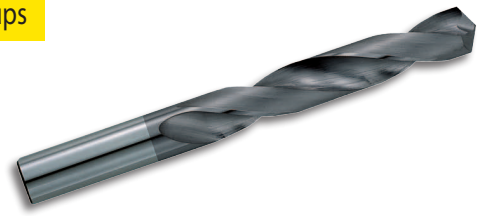
d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

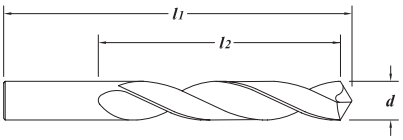
Z=2 | 25° | 135° | 3xD | TECH PAGES 290-292

Series 1520H

.0625" - .1575"
(1.588mm - 4.000mm)

General purpose for all material groups





Hardlube Coating

Solid submicron grain carbide drill
Excellent heat resistance and lubricity
No spotting required in most applications
4-facet self-centering point
Live tooling recommended on lathe processes
Uncoated - page 64

EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
77166	.0625	1/16"	1.588	1-3/4"	5/8"	9.14	8.75	8.35	7.95
77171	.0635	#52	1.613	1-3/4"	11/16"	9.26	8.86	8.45	8.05
77176	.0670	#51	1.702	1-3/4"	11/16"	9.37	8.97	8.56	8.15
77181	.0700	#50	1.778	1-3/4"	11/16"	9.52	9.11	8.69	8.28
77186	.0730	#49	1.854	1-3/4"	11/16"	9.73	9.31	8.88	8.46
77191	.0760	#48	1.930	1-3/4"	11/16"	9.98	9.55	9.11	8.68
77196	.0781	5/64"	1.984	1-3/4"	11/16"	10.28	9.83	9.39	8.94
77201	.0785	#47	1.994	1-3/4"	3/4"	10.56	10.10	9.64	9.18
77206	.0787		2.000	45	19	10.71	10.24	9.78	9.31
77211	.0810	#46	2.057	1-3/4"	3/4"	10.83	10.36	9.89	9.42
77216	.0820	#45	2.083	1-3/4"	3/4"	11.10	10.62	10.13	9.65
77221	.0860	#44	2.184	1-3/4"	3/4"	11.40	10.90	10.41	9.91
77226	.0890	#43	2.261	1-3/4"	3/4"	11.65	11.14	10.64	10.13
77231	.0935	#42	2.375	1-3/4"	3/4"	11.81	11.30	10.78	10.27
77236	.0938	3/32"	2.383	1-3/4"	3/4"	12.03	11.51	10.98	10.46
77241	.0960	#41	2.438	1-13/16"	13/16"	12.11	11.58	11.06	10.53
77246	.0980	#40	2.489	1-13/16"	13/16"	12.26	11.73	11.19	10.66
77251	.0984		2.500	46	21	12.31	11.77	11.24	10.70
77256	.0995	#39	2.527	1-13/16"	13/16"	12.36	11.83	11.29	10.75
77261	.1015	#38	2.578	1-13/16"	13/16"	12.48	11.94	11.39	10.85
77266	.1040	#37	2.642	1-13/16"	13/16"	12.52	11.98	11.43	10.89
77271	.1065	#36	2.705	1-13/16"	13/16"	12.60	12.06	11.51	10.96
77276	.1094	7/64"	2.779	1-13/16"	13/16"	12.66	12.11	11.56	11.01
77281	.1100	#35	2.794	1-7/8"	7/8"	12.74	12.19	11.63	11.08
77286	.1110	#34	2.819	1-7/8"	7/8"	12.87	12.31	11.75	11.19
77291	.1130	#33	2.870	1-7/8"	7/8"	12.95	12.39	11.82	11.26
77296	.1160	#32	2.946	1-7/8"	7/8"	13.03	12.46	11.90	11.33
77301	.1181		3.000	48	22	13.13	12.56	11.99	11.42
77306	.1200	#31	3.048	1-7/8"	7/8"	13.23	12.65	12.08	11.50
77311	.1250	1/8"	3.175	1-7/8"	7/8"	13.35	12.77	12.19	11.61
77316	.1285	#30	3.264	1-15/16"	15/16"	13.65	13.06	12.46	11.87
77321	.1360	#29	3.454	1-15/16"	15/16"	13.96	13.35	12.75	12.14
77326	.1378		3.500	49	24	14.35	13.73	13.10	12.48
77331	.1405	#28	3.569	1-15/16"	15/16"	14.50	13.87	13.24	12.61
77336	.1406	9/64"	3.571	1-15/16"	15/16"	14.64	14.00	13.37	12.73
77341	.1440	#27	3.658	2-1/16"	1"	15.74	15.06	14.37	13.69
77346	.1470	#26	3.734	2-1/16"	1"	15.90	15.21	14.52	13.83
77351	.1495	#25	3.797	2-1/16"	1"	16.04	15.35	14.65	13.95
77356	.1520	#24	3.861	2-1/16"	1"	16.10	15.40	14.70	14.00
77361	.1540	#23	3.912	2-1/16"	1"	16.19	15.49	14.78	14.08
77366	.1562	5/32"	3.967	2-1/16"	1"	16.27	15.57	14.86	14.15
77371	.1570	#22	3.988	2-1/8"	1-1/16"	17.18	16.43	15.69	14.94
77376	.1575		4.000	54	27	17.37	16.61	15.86	15.10

Series 1520H *(continued)*

.1590" - .3346"
(4.039mm - 8.500mm)

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
77381	.1590	#21	4.039	2-1/8"	1-1/16"	17.57	16.81	16.04	15.28
77386	.1610	#20	4.089	2-1/8"	1-1/16"	17.68	16.91	16.14	15.37
77391	.1660	#19	4.216	2-1/8"	1-1/16"	18.31	17.51	16.72	15.92
77396	.1695	#18	4.305	2-1/8"	1-1/16"	18.50	17.70	16.89	16.09
77401	.1719	11/64"	4.366	2-1/8"	1-1/16"	18.83	18.01	17.19	16.37
77406	.1730	#17	4.394	2-3/16"	1-1/8"	19.08	18.25	17.42	16.59
77411	.1770	#16	4.496	2-3/16"	1-1/8"	19.26	18.43	17.59	16.75
77416	.1772		4.500	56	29	19.35	18.51	17.67	16.83
77421	.1800	#15	4.572	2-3/16"	1-1/8"	19.45	18.60	17.76	16.91
77426	.1820	#14	4.623	2-3/16"	1-1/8"	19.83	18.96	18.10	17.24
77431	.1850	#13	4.700	2-3/16"	1-1/8"	19.96	19.10	18.23	17.36
77436	.1875	3/16"	4.763	2-3/16"	1-1/8"	20.02	19.15	18.28	17.41
77441	.1890	#12	4.801	2-1/4"	1-3/16"	22.10	21.14	20.18	19.22
77446	.1910	#11	4.851	2-1/4"	1-3/16"	22.30	21.33	20.36	19.39
77451	.1935	#10	4.915	2-1/4"	1-3/16"	23.17	22.17	21.16	20.15
77456	.1960	#9	4.978	2-1/4"	1-3/16"	23.69	22.66	21.63	20.60
77461	.1969		5.000	57	30	23.81	22.77	21.74	20.70
77466	.1990	#8	5.055	2-1/4"	1-3/16"	23.92	22.88	21.84	20.80
77471	.2010	#7	5.105	2-1/4"	1-3/16"	24.55	23.49	22.42	21.35
77476	.2031	13/64"	5.159	2-1/4"	1-3/16"	24.69	23.62	22.54	21.47
77481	.2040	#6	5.182	2-3/8"	1-1/4"	25.14	24.05	22.95	21.86
77486	.2055	#5	5.220	2-3/8"	1-1/4"	25.58	24.46	23.35	22.24
77491	.2090	#4	5.309	2-3/8"	1-1/4"	25.99	24.86	23.73	22.60
77496	.2130	#3	5.410	2-3/8"	1-1/4"	26.36	25.21	24.07	22.92
77501	.2165		5.500	60	32	26.55	25.40	24.24	23.09
77506	.2188	7/32"	5.558	2-3/8"	1-1/4"	26.70	25.54	24.38	23.22
77511	.2210	#2	5.613	2-7/16"	1-5/16"	27.28	26.09	24.91	23.72
77516	.2280	#1	5.791	2-7/16"	1-5/16"	27.43	26.24	25.04	23.85
77521	.2340	A	5.944	2-7/16"	1-5/16"	27.47	26.28	25.08	23.89
77526	.2344	15/64"	5.954	2-7/16"	1-5/16"	27.52	26.32	25.13	23.93
77531	.2362		6.000	64	35	27.59	26.39	25.19	23.99
77536	.2380	B	6.045	2-1/2"	1-3/8"	27.69	26.49	25.28	24.08
77541	.2420	C	6.147	2-1/2"	1-3/8"	27.86	26.65	25.44	24.23
77546	.2460	D	6.248	2-1/2"	1-3/8"	28.05	26.83	25.61	24.39
77551	.2500	1/4" / E	6.350	2-1/2"	1-3/8"	28.22	26.99	25.77	24.54
77556	.2559		6.500	67	37	31.50	30.13	28.76	27.39
77561	.2570	F	6.528	2-5/8"	1-7/16"	32.04	30.65	29.25	27.86
77566	.2610	G	6.629	2-5/8"	1-7/16"	32.56	31.14	29.73	28.31
77571	.2656	17/64"	6.746	2-5/8"	1-7/16"	33.11	31.67	30.23	28.79
77576	.2660	H	6.756	2-11/16"	1-1/2"	33.87	32.40	30.92	29.45
77581	.2720	I	6.909	2-11/16"	1-1/2"	34.19	32.70	31.22	29.73
77586	.2756		7.000	68	38	34.42	32.92	31.43	29.93
77591	.2770	J	7.036	2-11/16"	1-1/2"	34.68	33.18	31.67	30.16
77596	.2810	K	7.137	2-11/16"	1-1/2"	34.93	33.41	31.89	30.37
77601	.2812	9/32"	7.142	2-11/16"	1-1/2"	35.08	33.55	32.03	30.50
77606	.2900	L	7.366	2-3/4"	1-9/16"	36.13	34.56	32.99	31.42
77611	.2950	M	7.493	2-3/4"	1-9/16"	38.23	36.56	34.90	33.24
77616	.2953		7.500	70	40	38.23	36.56	34.90	33.24
77621	.2969	19/64"	7.541	2-3/4"	1-9/16"	38.41	36.74	35.07	33.40
77626	.3020	N	7.671	2-15/16"	1-5/8"	40.15	38.40	36.66	34.91
77631	.3125	5/16"	7.938	2-15/16"	1-5/8"	40.28	38.53	36.78	35.03
77636	.3150		8.000	75	43	42.75	40.89	39.03	37.17
77641	.3160	O	8.026	2-15/16"	1-11/16"	42.75	40.89	39.03	37.17
77646	.3230	P	8.204	2-15/16"	1-11/16"	43.06	41.18	39.31	37.44
77651	.3281	21/64"	8.334	2-15/16"	1-11/16"	43.30	41.42	39.53	37.65
77656	.3320	Q	8.433	3"	1-11/16"	44.16	42.24	40.32	38.40
77661	.3346		8.500	76	43	44.51	42.57	40.64	38.70

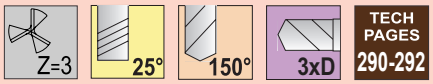
† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
77666	.3390	R	8.611	3"	1-11/16"	45.72	43.74	41.75	39.76
77671	.3438	11/32"	8.733	3"	1-11/16"	47.33	45.28	43.22	41.16
77676	.3480	S	8.839	3-1/16"	1-3/4"	50.07	47.89	45.72	43.54
77681	.3543		9.000	78	44	50.32	48.14	45.95	43.76
77686	.3580	T	9.093	3-1/16"	1-3/4"	50.49	48.29	46.10	43.90
77691	.3594	23/64"	9.129	3-1/16"	1-3/4"	50.80	48.59	46.38	44.17
77696	.3680	U	9.347	3-1/8"	1-13/16"	54.82	52.44	50.05	47.67
77701	.3740		9.500	79	46	55.26	52.86	50.45	48.05
77706	.3750	3/8"	9.525	3-1/8"	1-13/16"	55.61	53.20	50.78	48.36
77711	.3770	V	9.576	3-1/4"	1-7/8"	57.75	55.24	52.73	50.22
77716	.3860	W	9.804	3-1/4"	1-7/8"	58.77	56.21	53.66	51.10
77721	.3906	25/64"	9.921	3-1/4"	1-7/8"	59.49	56.90	54.32	51.73
77726	.3937		10.000	84	49	61.30	58.63	55.97	53.30
77731	.3970	X	10.084	3-5/16"	1-15/16"	62.79	60.06	57.33	54.60
77736	.4040	Y	10.262	3-5/16"	1-15/16"	63.23	60.48	57.73	54.98
77741	.4062	13/32"	10.317	3-5/16"	1-15/16"	65.18	62.35	59.51	56.68
77746	.4130	Z	10.490	3-3/8"	2"	65.76	62.90	60.04	57.18
77751	.4134		10.500	86	51	65.76	62.90	60.04	57.18
77756	.4219	27/64"	10.716	3-3/8"	2"	66.39	63.50	60.62	57.73
77761	.4331		11.000	87	52	71.27	68.17	65.07	61.97
77766	.4375	7/16"	11.113	3-7/16"	2-1/16"	71.27	68.17	65.07	61.97
77771	.4528		11.500	91	54	76.50	73.17	69.85	66.52
77776	.4531	29/64"	11.509	3-9/16"	2-1/8"	76.50	73.17	69.85	66.52
77781	.4688	15/32"	11.908	3-5/8"	2-1/8"	80.37	76.88	73.38	69.89
77786	.4724		12.000	94	56	80.62	77.11	73.61	70.10
77791	.4844	31/64"	12.304	3-11/16"	2-3/16"	81.17	77.64	74.11	70.58
77796	.4921		12.500	95	56	81.96	78.40	74.83	71.27
77801	.5000	1/2"	12.700	3-3/4"	2-1/4"	82.49	78.90	75.32	71.73



Series 1120H

.1094" - .2090"
(2.779mm - 5.309mm)



TOLERANCES

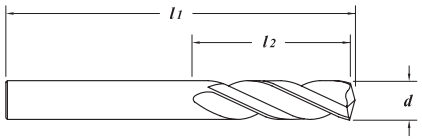
d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

Recommended for cast iron, tungsten, and materials with high silicon content



Hardlube Coating

Solid submicron grain carbide drill
Self-centering drill point
Near reamer finishes
Can be used as a core drill
Excellent heat resistance and lubricity
Stub length reduces deflection and vibration
Tighter tolerance holes
Improved roundness and straightness
Live tooling recommended on lathe processes



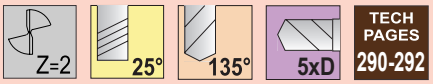
EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
78276	.1094	7/64"	2.779	1-13/16"	13/16"	14.79	14.15	13.50	12.86
78281	.1100	#35	2.794	1-7/8"	7/8"	14.92	14.27	13.62	12.97
78286	.1110	#34	2.819	1-7/8"	7/8"	15.08	14.42	13.77	13.11
78291	.1130	#33	2.870	1-7/8"	7/8"	15.30	14.63	13.97	13.30
78296	.1160	#32	2.946	1-7/8"	7/8"	15.49	14.82	14.14	13.47
78301	.1181		3.000	48	22	15.62	14.94	14.26	13.58
78306	.1200	#31	3.048	1-7/8"	7/8"	15.72	15.04	14.35	13.67
78311	.1250	1/8"	3.175	1-7/8"	7/8"	15.90	15.21	14.52	13.83
78316	.1285	#30	3.264	1-15/16"	15/16"	16.25	15.54	14.84	14.13
78321	.1360	#29	3.454	1-15/16"	15/16"	16.63	15.91	15.18	14.46
78326	.1378		3.500	49	24	17.11	16.37	15.62	14.88
78331	.1405	#28	3.569	1-15/16"	15/16"	17.30	16.54	15.79	15.04
78336	.1406	9/64"	3.571	1-15/16"	15/16"	17.47	16.71	15.95	15.19
78341	.1440	#27	3.658	2-1/16"	1"	18.69	17.88	17.06	16.25
78346	.1470	#26	3.734	2-1/16"	1"	18.89	18.07	17.25	16.43
78351	.1495	#25	3.797	2-1/16"	1"	19.07	18.24	17.41	16.58
78356	.1520	#24	3.861	2-1/16"	1"	19.10	18.27	17.44	16.61
78361	.1540	#23	3.912	2-1/16"	1"	19.25	18.41	17.58	16.74
78366	.1562	5/32"	3.967	2-1/16"	1"	19.34	18.50	17.66	16.82
78371	.1570	#22	3.988	2-1/8"	1-1/16"	20.45	19.56	18.67	17.78
78376	.1575		4.000	54	27	20.45	19.56	18.67	17.78
78381	.1590	#21	4.039	2-1/8"	1-1/16"	20.85	19.94	19.04	18.13
78386	.1610	#20	4.089	2-1/8"	1-1/16"	20.85	19.94	19.04	18.13
78391	.1660	#19	4.216	2-1/8"	1-1/16"	21.01	20.10	19.18	18.27
78396	.1695	#18	4.305	2-1/8"	1-1/16"	21.14	20.22	19.30	18.38
78401	.1719	11/64"	4.366	2-1/8"	1-1/16"	21.26	20.34	19.41	18.49
78406	.1730	#17	4.394	2-3/16"	1-1/8"	22.14	21.18	20.21	19.25
78411	.1770	#16	4.496	2-3/16"	1-1/8"	22.37	21.40	20.42	19.45
78416	.1772		4.500	56	29	22.46	21.48	20.51	19.53
78421	.1800	#15	4.572	2-3/16"	1-1/8"	22.55	21.57	20.59	19.61
78426	.1820	#14	4.623	2-3/16"	1-1/8"	23.02	22.02	21.02	20.02
78431	.1850	#13	4.700	2-3/16"	1-1/8"	23.14	22.13	21.13	20.12
78436	.1875	3/16"	4.763	2-3/16"	1-1/8"	23.14	22.13	21.13	20.12
78441	.1890	#12	4.801	2-1/4"	1-3/16"	24.78	23.71	22.63	21.55
78446	.1910	#11	4.851	2-1/4"	1-3/16"	25.00	23.91	22.83	21.74
78451	.1935	#10	4.915	2-1/4"	1-3/16"	26.01	24.88	23.75	22.62
78456	.1960	#9	4.978	2-1/4"	1-3/16"	26.57	25.41	24.26	23.10
78461	.1969		5.000	57	30	26.70	25.54	24.38	23.22
78466	.1990	#8	5.055	2-1/4"	1-3/16"	26.86	25.70	24.53	23.36
78471	.2010	#7	5.105	2-1/4"	1-3/16"	27.57	26.37	25.17	23.97
78476	.2031	13/64"	5.159	2-1/4"	1-3/16"	28.49	27.25	26.01	24.77
78486	.2055	#5	5.220	2-3/8"	1-1/4"	28.76	27.51	26.26	25.01
78491	.2090	#4	5.309	2-3/8"	1-1/4"	29.19	27.92	26.65	25.38

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
78496	.2130	#3	5.410	2-3/8"	1-1/4"	29.64	28.35	27.06	25.77
78501	.2165		5.500	60	32	29.83	28.53	27.24	25.94
78506	.2188	7/32"	5.558	2-3/8"	1-1/4"	30.03	28.72	27.42	26.11
78511	.2210	#2	5.613	2-7/16"	1-5/16"	30.69	29.36	28.02	26.69
78516	.2280	#1	5.791	2-7/16"	1-5/16"	30.82	29.48	28.14	26.80
78521	.2340	A	5.944	2-7/16"	1-5/16"	30.98	29.63	28.29	26.94
78526	.2344	15/64"	5.954	2-7/16"	1-5/16"	31.11	29.76	28.40	27.05
78531	.2362		6.000	64	35	31.19	29.83	28.48	27.12
78536	.2380	B	6.045	2-1/2"	1-3/8"	31.30	29.94	28.58	27.22
78541	.2420	C	6.147	2-1/2"	1-3/8"	31.50	30.13	28.76	27.39
78546	.2460	D	6.248	2-1/2"	1-3/8"	31.68	30.31	28.93	27.55
78551	.2500	1/4" / E	6.350	2-1/2"	1-3/8"	31.88	30.49	29.11	27.72
78556	.2559		6.500	67	37	35.29	33.76	32.22	30.69
78561	.2570	F	6.528	2-5/8"	1-7/16"	35.89	34.33	32.77	31.21
78566	.2610	G	6.629	2-5/8"	1-7/16"	36.35	34.77	33.19	31.61
78571	.2656	17/64"	6.746	2-5/8"	1-7/16"	36.94	35.33	33.73	32.12
78576	.2660	H	6.756	2-11/16"	1-1/2"	37.85	36.20	34.56	32.91
78581	.2720	I	6.909	2-11/16"	1-1/2"	38.21	36.55	34.89	33.23
78586	.2756		7.000	68	38	38.43	36.76	35.09	33.42
78591	.2770	J	7.036	2-11/16"	1-1/2"	38.72	37.04	35.35	33.67
78596	.2810	K	7.137	2-11/16"	1-1/2"	39.04	37.35	35.65	33.95
78601	.2812	9/32"	7.142	2-11/16"	1-1/2"	40.18	38.43	36.69	34.94
78606	.2900	L	7.366	2-3/4"	1-9/16"	41.46	39.66	37.85	36.05
78611	.2950	M	7.493	2-3/4"	1-9/16"	42.48	40.63	38.79	36.94
78616	.2953		7.500	70	40	42.48	40.63	38.79	36.94
78621	.2969	19/64"	7.541	2-3/4"	1-9/16"	42.48	40.63	38.79	36.94
78626	.3020	N	7.671	2-15/16"	1-5/8"	43.92	42.01	40.10	38.19
78631	.3125	5/16"	7.938	2-15/16"	1-5/8"	44.08	42.16	40.25	38.33
78636	.3150		8.000	75	43	46.83	44.79	42.76	40.72
78641	.3160	O	8.026	2-15/16"	1-11/16"	46.83	44.79	42.76	40.72
78646	.3230	P	8.204	2-15/16"	1-11/16"	46.83	44.79	42.76	40.72
78651	.3281	21/64"	8.334	2-15/16"	1-11/16"	48.60	46.49	44.37	42.26
78656	.3320	Q	8.433	3"	1-11/16"	49.59	47.43	45.28	43.12
78661	.3346		8.500	76	43	49.99	47.82	45.64	43.47
78666	.3390	R	8.611	3"	1-11/16"	51.35	49.12	46.88	44.65
78671	.3438	11/32"	8.733	3"	1-11/16"	53.21	50.90	48.58	46.27
78676	.3480	S	8.839	3-1/16"	1-3/4"	60.23	57.61	54.99	52.37
78681	.3543		9.000	78	44	60.56	57.93	55.29	52.66
78686	.3580	T	9.093	3-1/16"	1-3/4"	60.71	58.07	55.43	52.79
78691	.3594	23/64"	9.129	3-1/16"	1-3/4"	61.12	58.47	55.81	53.15
78696	.3680	U	9.347	3-1/8"	1-13/16"	64.63	61.82	59.01	56.20
78701	.3740		9.500	79	46	65.57	62.72	59.87	57.02
78706	.3750	3/8"	9.525	3-1/8"	1-13/16"	65.57	62.72	59.87	57.02
78711	.3770	V	9.576	3-1/4"	1-7/8"	66.22	63.34	60.46	57.58
78716	.3860	W	9.804	3-1/4"	1-7/8"	69.93	66.89	63.85	60.81
78721	.3906	25/64"	9.921	3-1/4"	1-7/8"	70.79	67.72	64.64	61.56
78726	.3937		10.000	84	49	73.00	69.83	66.65	63.48
78736	.4040	Y	10.262	3-5/16"	1-15/16"	75.41	72.13	68.85	65.57
78741	.4062	13/32"	10.317	3-5/16"	1-15/16"	77.79	74.40	71.02	67.64
78746	.4130	Z	10.490	3-3/8"	2"	78.49	75.08	71.66	68.25
78751	.4134		10.500	86	51	78.49	75.08	71.66	68.25
78756	.4219	27/64"	10.716	3-3/8"	2"	79.29	75.85	72.40	68.95
78761	.4331		11.000	87	52	84.49	80.82	77.14	73.47
78766	.4375	7/16"	11.113	3-7/16"	2-1/16"	84.49	80.82	77.14	73.47
78776	.4531	29/64"	11.509	3-9/16"	2-1/8"	90.85	86.90	82.95	79.00
78781	.4688	15/32"	11.908	3-5/8"	2-1/8"	95.57	91.41	87.26	83.10
78786	.4724		12.000	94	56	95.83	91.66	87.50	83.33
78791	.4844	31/64"	12.304	3-11/16"	2-3/16"	96.12	91.94	87.76	83.58
78796	.4921		12.500	95	56	97.60	93.36	89.11	84.87
78801	.5000	1/2"	12.700	3-3/4"	2-1/4"	98.11	93.84	89.58	85.31

Series 1205

.0625" - .1575"
(1.588mm - 4.000mm)



TECH PAGES 290-292

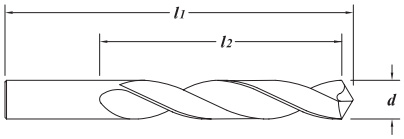
TOLERANCES

d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

General purpose for all material groups



- Solid submicron grain carbide drill
- No spotting required in most applications
- 4-facet self-centering point
- Adaptability when converting from high-speed steel
- Live tooling recommended on lathe processes
- Hardlube Coating - page 75



EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
89165	.0625	1/16"	1.588	1-3/4"	3/4"	7.13	6.82	6.51	6.20
89170	.0635	#52	1.613	1-3/4"	3/4"	7.23	6.92	6.60	6.29
89175	.0670	#51	1.702	1-3/4"	3/4"	7.34	7.02	6.70	6.38
89180	.0700	#50	1.778	1-3/4"	7/8"	7.52	7.19	6.87	6.54
89185	.0730	#49	1.854	1-3/4"	7/8"	7.72	7.38	7.05	6.71
89190	.0760	#48	1.930	1-3/4"	7/8"	7.97	7.62	7.28	6.93
89195	.0781	5/64"	1.984	1-3/4"	7/8"	8.27	7.91	7.55	7.19
89200	.0785	#47	1.994	1-3/4"	7/8"	8.54	8.17	7.80	7.43
89205	.0787		2.000	44	22	8.68	8.31	7.93	7.55
89210	.0810	#46	2.057	1-3/4"	7/8"	8.82	8.44	8.05	7.67
89215	.0820	#45	2.083	1-3/4"	7/8"	9.09	8.69	8.30	7.90
89220	.0860	#44	2.184	2"	1"	9.38	8.98	8.57	8.16
89225	.0890	#43	2.261	2"	1"	9.65	9.23	8.81	8.39
89230	.0935	#42	2.375	2"	1"	9.79	9.36	8.94	8.51
89235	.0938	3/32"	2.383	2"	1"	10.01	9.57	9.14	8.70
89240	.0960	#41	2.438	2"	1"	10.10	9.66	9.22	8.78
89245	.0980	#40	2.489	2"	1"	10.25	9.80	9.36	8.91
89250	.0984		2.500	57	32	10.30	9.86	9.41	8.96
89255	.0995	#39	2.527	2-1/4"	1-1/4"	10.35	9.90	9.45	9.00
89260	.1015	#38	2.578	2-1/4"	1-1/4"	10.48	10.02	9.57	9.11
89265	.1040	#37	2.642	2-1/4"	1-1/4"	10.61	10.15	9.69	9.23
89270	.1065	#36	2.705	2-1/4"	1-1/4"	10.75	10.29	9.82	9.35
89275	.1094	7/64"	2.779	2-1/4"	1-1/4"	10.93	10.45	9.98	9.50
89280	.1100	#35	2.794	2-1/4"	1-1/4"	11.05	10.57	10.09	9.61
89285	.1110	#34	2.819	2-1/4"	1-1/4"	11.18	10.69	10.21	9.72
89290	.1130	#33	2.870	2-1/4"	1-1/4"	11.39	10.89	10.40	9.90
89295	.1160	#32	2.946	2-1/4"	1-1/4"	11.51	11.01	10.51	10.01
89300	.1181		3.000	57	32	11.63	11.12	10.62	10.11
89305	.1200	#31	3.048	2-1/4"	1-1/4"	11.70	11.19	10.68	10.17
89310	.1250	1/8"	3.175	2-1/4"	1-1/4"	11.85	11.33	10.82	10.30
89315	.1285	#30	3.264	2-1/4"	1-1/4"	12.14	11.62	11.09	10.56
89320	.1360	#29	3.454	2-1/2"	1-3/8"	12.52	11.98	11.43	10.89
89325	.1378		3.500	63	35	12.94	12.38	11.81	11.25
89330	.1405	#28	3.569	2-1/2"	1-3/8"	13.06	12.50	11.93	11.36
89335	.1406	9/64"	3.571	2-1/2"	1-3/8"	13.21	12.64	12.06	11.49
89340	.1440	#27	3.658	2-1/2"	1-3/8"	13.73	13.13	12.54	11.94
89345	.1470	#26	3.734	2-1/2"	1-3/8"	13.87	13.27	12.66	12.06
89350	.1495	#25	3.797	2-1/2"	1-3/8"	14.05	13.44	12.83	12.22
89355	.1520	#24	3.861	2-1/2"	1-3/8"	14.08	13.46	12.85	12.24
89360	.1540	#23	3.912	2-1/2"	1-3/8"	14.18	13.56	12.95	12.33
89365	.1562	5/32"	3.967	2-1/2"	1-3/8"	14.27	13.65	13.03	12.41
89370	.1570	#22	3.988	2-1/2"	1-3/8"	15.17	14.51	13.85	13.19
89375	.1575		4.000	63	35	15.36	14.70	14.03	13.36

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
89380	.1590	#21	4.039	2-1/2"	1-3/8"	15.54	14.86	14.19	13.51
89385	.1610	#20	4.089	2-1/2"	1-3/8"	15.65	14.97	14.29	13.61
89390	.1660	#19	4.216	2-3/4"	1-5/8"	16.28	15.58	14.87	14.16
89395	.1695	#18	4.305	2-3/4"	1-5/8"	16.49	15.77	15.06	14.34
89400	.1719	11/64"	4.366	2-3/4"	1-5/8"	16.84	16.10	15.37	14.64
89405	.1730	#17	4.394	2-3/4"	1-5/8"	17.07	16.32	15.58	14.84
89410	.1770	#16	4.496	2-3/4"	1-5/8"	17.25	16.50	15.75	15.00
89415	.1772		4.500	70	41	17.34	16.59	15.83	15.08
89420	.1800	#15	4.572	2-3/4"	1-5/8"	17.41	16.65	15.90	15.14
89425	.1820	#14	4.623	2-3/4"	1-5/8"	17.81	17.04	16.26	15.49
89430	.1850	#13	4.700	2-3/4"	1-5/8"	17.95	17.17	16.39	15.61
89435	.1875	3/16"	4.763	2-3/4"	1-5/8"	18.03	17.25	16.46	15.68
89440	.1890	#12	4.801	2-3/4"	1-5/8"	18.62	17.81	17.00	16.19
89445	.1910	#11	4.851	2-3/4"	1-5/8"	18.83	18.01	17.19	16.37
89450	.1935	#10	4.915	2-3/4"	1-5/8"	19.72	18.87	18.01	17.15
89455	.1960	#9	4.978	3"	1-3/4"	20.22	19.34	18.46	17.58
89460	.1969		5.000	76	44	20.33	19.45	18.56	17.68
89465	.1990	#8	5.055	3"	1-3/4"	20.47	19.58	18.69	17.80
89470	.2010	#7	5.105	3"	1-3/4"	21.07	20.15	19.24	18.32
89475	.2031	13/64"	5.159	3"	1-3/4"	21.23	20.31	19.38	18.46
89480	.2040	#6	5.182	3"	1-3/4"	21.67	20.72	19.78	18.84
89485	.2055	#5	5.220	3"	1-3/4"	22.11	21.15	20.19	19.23
89490	.2090	#4	5.309	3"	1-3/4"	22.49	21.52	20.54	19.56
89495	.2130	#3	5.410	3"	1-3/4"	22.89	21.89	20.90	19.90
89500	.2165		5.500	76	44	23.07	22.07	21.06	20.06
89505	.2188	7/32"	5.558	3"	1-3/4"	23.23	22.22	21.21	20.20
89510	.2210	#2	5.613	3"	1-3/4"	23.81	22.77	21.74	20.70
89515	.2280	#1	5.791	3"	1-3/4"	23.94	22.90	21.86	20.82
89520	.2340	A	5.944	3-1/4"	2"	24.22	23.17	22.11	21.06
89525	.2344	15/64"	5.954	3-1/4"	2"	24.29	23.23	22.18	21.12
89530	.2362		6.000	82	50	24.38	23.32	22.26	21.20
89535	.2380	B	6.045	3-1/4"	2"	24.46	23.40	22.33	21.27
89540	.2420	C	6.147	3-1/4"	2"	24.64	23.57	22.50	21.43
89545	.2460	D	6.248	3-1/4"	2"	24.83	23.75	22.67	21.59
89550	.2500	1/4" / E	6.350	3-1/4"	2"	25.00	23.91	22.83	21.74
89555	.2559		6.500	82	50	25.61	24.50	23.38	22.27
89560	.2570	F	6.528	3-1/4"	2"	26.13	24.99	23.86	22.72
89565	.2610	G	6.629	3-1/2"	2-1/8"	26.67	25.51	24.35	23.19
89570	.2656	17/64"	6.746	3-1/2"	2-1/8"	27.21	26.03	24.84	23.66
89575	.2660	H	6.756	3-1/2"	2-1/8"	27.99	26.77	25.56	24.34
89580	.2720	I	6.909	3-1/2"	2-1/8"	28.30	27.07	25.84	24.61
89585	.2756		7.000	88	54	28.53	27.29	26.05	24.81
89590	.2770	J	7.036	3-1/2"	2-1/8"	28.78	27.53	26.28	25.03
89595	.2810	K	7.137	3-1/2"	2-1/8"	29.04	27.78	26.51	25.25
89600	.2812	9/32"	7.142	3-1/2"	2-1/8"	29.22	27.95	26.68	25.41
89605	.2900	L	7.366	3-1/2"	2-1/8"	30.27	28.95	27.64	26.32
89610	.2950	M	7.493	3-3/4"	2-3/8"	32.40	30.99	29.58	28.17
89615	.2953		7.500	95	60	32.40	30.99	29.58	28.17
89620	.2969	19/64"	7.541	3-3/4"	2-3/8"	32.40	30.99	29.58	28.17
89625	.3020	N	7.671	3-3/4"	2-3/8"	34.33	32.84	31.34	29.85
89630	.3125	5/16"	7.938	3-3/4"	2-3/8"	34.45	32.96	31.46	29.96
89635	.3150		8.000	95	60	36.96	35.35	33.75	32.14
89640	.3160	O	8.026	3-3/4"	2-3/8"	36.96	35.35	33.75	32.14
89645	.3230	P	8.204	3-3/4"	2-3/8"	36.96	35.35	33.75	32.14
89650	.3281	21/64"	8.334	4"	2-1/2"	37.51	35.88	34.25	32.62
89655	.3320	Q	8.433	4"	2-1/2"	38.39	36.72	35.05	33.38
89660	.3346		8.500	101	63	38.72	37.04	35.35	33.67

continued →

Series 1205 *(continued)*

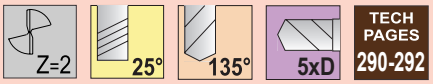
.3390" - .6299"
(8.611mm - 16.000mm)

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
89665	.3390	R	8.611	4"	2-1/2"	39.97	38.24	36.50	34.76
89670	.3438	11/32"	8.733	4"	2-1/2"	41.58	39.78	37.97	36.16
89675	.3480	S	8.839	4"	2-1/2"	41.73	39.92	38.10	36.29
89680	.3543		9.000	101	63	41.98	40.15	38.33	36.50
89685	.3580	T	9.093	4-1/4"	2-3/4"	42.35	40.51	38.67	36.83
89690	.3594	23/64"	9.129	4-1/4"	2-3/4"	42.65	40.80	38.94	37.09
89695	.3680	U	9.347	4-1/4"	2-3/4"	48.40	46.30	44.19	42.09
89700	.3740		9.500	107	70	48.85	46.73	44.60	42.48
89705	.3750	3/8"	9.525	4-1/4"	2-3/4"	49.24	47.10	44.96	42.82
89710	.3770	V	9.576	4-1/4"	2-3/4"	50.17	47.99	45.81	43.63
89715	.3860	W	9.804	4-1/2"	2-7/8"	51.24	49.02	46.79	44.56
89720	.3906	25/64"	9.921	4-1/2"	2-7/8"	52.00	49.74	47.48	45.22
89725	.3937		10.000	114	73	53.88	51.54	49.19	46.85
89730	.3970	X	10.084	4-1/2"	2-7/8"	55.46	53.05	50.64	48.23
89735	.4040	Y	10.262	4-1/2"	2-7/8"	55.91	53.48	51.05	48.62
89740	.4062	13/32"	10.317	4-1/2"	2-7/8"	57.93	55.41	52.89	50.37
89745	.4130	Z	10.490	4-1/2"	2-7/8"	58.54	55.99	53.45	50.90
89750	.4134		10.500	114	73	58.54	55.99	53.45	50.90
89755	.4219	27/64"	10.716	4-1/2"	2-7/8"	59.19	56.62	54.04	51.47
89760	.4331		11.000	114	73	64.27	61.48	58.68	55.89
89765	.4375	7/16"	11.113	4-1/2"	2-7/8"	64.27	61.48	58.68	55.89
89770	.4528		11.500	120	76	69.72	66.69	63.66	60.63
89775	.4531	29/64"	11.509	4-3/4"	3"	69.72	66.69	63.66	60.63
89780	.4688	15/32"	11.908	4-3/4"	3"	73.75	70.54	67.34	64.13
89785	.4724		12.000	120	76	73.99	70.77	67.56	64.34
89790	.4844	31/64"	12.304	4-3/4"	3"	73.99	70.77	67.56	64.34
89795	.4921		12.500	120	76	75.97	72.67	69.36	66.06
89800	.5000	1/2"	12.700	4-3/4"	3"	75.97	72.67	69.36	66.06
89805	.5118		13.000	127	83	95.44	91.29	87.14	82.99
89810	.5156	33/64"	13.096	5"	3-1/4"	98.00	93.74	89.48	85.22
89815	.5312	17/32"	13.492	5"	3-1/4"	100.56	96.18	91.81	87.44
89820	.5315		13.500	127	83	103.12	98.64	94.15	89.67
89825	.5469	35/64"	13.891	5"	3-1/4"	105.69	101.09	96.50	91.90
89830	.5512		14.000	127	83	108.25	103.54	98.84	94.13
89835	.5625	9/16"	14.287	5"	3-1/4"	118.05	112.92	107.78	102.65
89840	.5709		14.500	127	83	120.51	115.27	110.03	104.79
89845	.5781	37/64"	14.683	5-1/4"	3-1/2"	122.97	117.62	112.28	106.93
89850	.5906		15.000	133	89	125.48	120.02	114.57	109.11
89855	.5938	19/32"	15.082	5-1/4"	3-1/2"	126.20	120.71	115.23	109.74
89860	.6094	39/64"	15.478	5-1/4"	3-1/2"	126.89	121.37	115.86	110.34
89865	.6102		15.500	133	89	127.62	122.07	116.52	110.97
89870	.6250	5/8"	15.875	5-1/4"	3-1/2"	128.32	122.74	117.16	111.58
89875	.6299		16.000	133	89	131.76	126.03	120.30	114.57

† *Metric equivalents are for reference only*

TOLERANCES

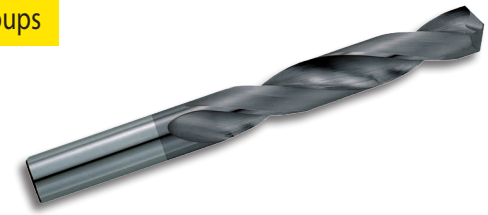
d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

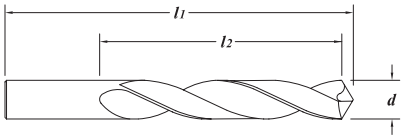


Series 1205H

.0625" - .1575"
(1.588mm - 4.000mm)

General purpose for all material groups





Hardlube Coating

Solid submicron grain carbide drill
Excellent heat resistance and lubricity
No spotting required in most applications
4-facet self-centering point
Adaptability when converting from high-speed steel
Live tooling recommended on lathe processes
Uncoated - page 72

EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
89166	.0625	1/16"	1.588	1-3/4"	3/4"	9.14	8.75	8.35	7.95
89171	.0635	#52	1.613	1-3/4"	3/4"	9.26	8.86	8.45	8.05
89176	.0670	#51	1.702	1-3/4"	3/4"	9.37	8.97	8.56	8.15
89181	.0700	#50	1.778	1-3/4"	7/8"	9.52	9.11	8.69	8.28
89186	.0730	#49	1.854	1-3/4"	7/8"	9.74	9.32	8.89	8.47
89191	.0760	#48	1.930	1-3/4"	7/8"	9.98	9.55	9.11	8.68
89196	.0781	5/64"	1.984	1-3/4"	7/8"	10.30	9.86	9.41	8.96
89201	.0785	#47	1.994	1-3/4"	7/8"	10.58	10.12	9.66	9.20
89206	.0787		2.000	44	22	10.71	10.24	9.78	9.31
89211	.0810	#46	2.057	1-3/4"	7/8"	10.84	10.37	9.90	9.43
89216	.0820	#45	2.083	1-3/4"	7/8"	11.11	10.63	10.14	9.66
89221	.0860	#44	2.184	2"	1"	11.41	10.91	10.42	9.92
89226	.0890	#43	2.261	2"	1"	11.66	11.15	10.65	10.14
89231	.0935	#42	2.375	2"	1"	11.81	11.30	10.78	10.27
89236	.0938	3/32"	2.383	2"	1"	12.03	11.51	10.98	10.46
89241	.0960	#41	2.438	2"	1"	12.13	11.61	11.08	10.55
89246	.0980	#40	2.489	2"	1"	12.28	11.75	11.21	10.68
89251	.0984		2.500	57	32	12.31	11.77	11.24	10.70
89256	.0995	#39	2.527	2-1/4"	1-1/4"	12.36	11.83	11.29	10.75
89261	.1015	#38	2.578	2-1/4"	1-1/4"	12.51	11.97	11.42	10.88
89266	.1040	#37	2.642	2-1/4"	1-1/4"	12.62	12.07	11.52	10.97
89271	.1065	#36	2.705	2-1/4"	1-1/4"	12.77	12.21	11.66	11.10
89276	.1094	7/64"	2.779	2-1/4"	1-1/4"	12.96	12.40	11.83	11.27
89281	.1100	#35	2.794	2-1/4"	1-1/4"	13.06	12.50	11.93	11.36
89286	.1110	#34	2.819	2-1/4"	1-1/4"	13.20	12.63	12.05	11.48
89291	.1130	#33	2.870	2-1/4"	1-1/4"	13.41	12.83	12.24	11.66
89296	.1160	#32	2.946	2-1/4"	1-1/4"	13.51	12.93	12.34	11.75
89301	.1181		3.000	57	32	13.63	13.04	12.44	11.85
89306	.1200	#31	3.048	2-1/4"	1-1/4"	13.73	13.13	12.54	11.94
89311	.1250	1/8"	3.175	2-1/4"	1-1/4"	13.85	13.24	12.64	12.04
89316	.1285	#30	3.264	2-1/4"	1-1/4"	14.17	13.55	12.94	12.32
89321	.1360	#29	3.454	2-1/2"	1-3/8"	14.54	13.90	13.27	12.64
89326	.1378		3.500	63	35	14.94	14.29	13.64	12.99
89331	.1405	#28	3.569	2-1/2"	1-3/8"	15.10	14.44	13.79	13.13
89336	.1406	9/64"	3.571	2-1/2"	1-3/8"	15.24	14.58	13.91	13.25
89341	.1440	#27	3.658	2-1/2"	1-3/8"	15.76	15.07	14.39	13.70
89346	.1470	#26	3.734	2-1/2"	1-3/8"	15.90	15.21	14.52	13.83
89351	.1495	#25	3.797	2-1/2"	1-3/8"	16.04	15.35	14.65	13.95
89356	.1520	#24	3.861	2-1/2"	1-3/8"	16.12	15.42	14.72	14.02
89361	.1540	#23	3.912	2-1/2"	1-3/8"	16.20	15.50	14.79	14.09
89366	.1562	5/32"	3.967	2-1/2"	1-3/8"	16.27	15.57	14.86	14.15
89371	.1570	#22	3.988	2-1/2"	1-3/8"	17.18	16.43	15.69	14.94
89376	.1575		4.000	63	35	17.38	16.62	15.87	15.11

continued →

Series 1205H *(continued)*

.1590" - .3346"
(4.039mm - 8.500mm)

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
89381	.1590	#21	4.039	2-1/2"	1-3/8"	17.57	16.81	16.04	15.28
89386	.1610	#20	4.089	2-1/2"	1-3/8"	17.68	16.91	16.14	15.37
89391	.1660	#19	4.216	2-3/4"	1-5/8"	18.32	17.52	16.73	15.93
89396	.1695	#18	4.305	2-3/4"	1-5/8"	18.50	17.70	16.89	16.09
89401	.1719	11/64"	4.366	2-3/4"	1-5/8"	18.83	18.01	17.19	16.37
89406	.1730	#17	4.394	2-3/4"	1-5/8"	19.10	18.27	17.44	16.61
89411	.1770	#16	4.496	2-3/4"	1-5/8"	19.26	18.43	17.59	16.75
89416	.1772		4.500	70	41	19.37	18.52	17.68	16.84
89421	.1800	#15	4.572	2-3/4"	1-5/8"	19.45	18.60	17.76	16.91
89426	.1820	#14	4.623	2-3/4"	1-5/8"	19.83	18.96	18.10	17.24
89431	.1850	#13	4.700	2-3/4"	1-5/8"	19.98	19.11	18.24	17.37
89436	.1875	3/16"	4.763	2-3/4"	1-5/8"	20.06	19.18	18.31	17.44
89441	.1890	#12	4.801	2-3/4"	1-5/8"	22.10	21.14	20.18	19.22
89446	.1910	#11	4.851	2-3/4"	1-5/8"	22.30	21.33	20.36	19.39
89451	.1935	#10	4.915	2-3/4"	1-5/8"	23.17	22.17	21.16	20.15
89456	.1960	#9	4.978	3"	1-3/4"	23.69	22.66	21.63	20.60
89461	.1969		5.000	76	44	23.81	22.77	21.74	20.70
89466	.1990	#8	5.055	3"	1-3/4"	23.91	22.87	21.83	20.79
89471	.2010	#7	5.105	3"	1-3/4"	24.54	23.47	22.41	21.34
89476	.2031	13/64"	5.159	3"	1-3/4"	24.69	23.62	22.54	21.47
89481	.2040	#6	5.182	3"	1-3/4"	25.14	24.05	22.95	21.86
89486	.2055	#5	5.220	3"	1-3/4"	25.58	24.46	23.35	22.24
89491	.2090	#4	5.309	3"	1-3/4"	25.99	24.86	23.73	22.60
89496	.2130	#3	5.410	3"	1-3/4"	26.36	25.21	24.07	22.92
89501	.2165		5.500	76	44	26.53	25.38	24.22	23.07
89506	.2188	7/32"	5.558	3"	1-3/4"	26.69	25.53	24.37	23.21
89511	.2210	#2	5.613	3"	1-3/4"	27.24	26.06	24.87	23.69
89516	.2280	#1	5.791	3"	1-3/4"	27.42	26.22	25.03	23.84
89521	.2340	A	5.944	3-1/4"	2"	27.80	26.59	25.38	24.17
89526	.2344	15/64"	5.954	3-1/4"	2"	27.88	26.66	25.45	24.24
89531	.2362		6.000	82	50	27.97	26.75	25.54	24.32
89536	.2380	B	6.045	3-1/4"	2"	28.05	26.83	25.61	24.39
89541	.2420	C	6.147	3-1/4"	2"	28.23	27.01	25.78	24.55
89546	.2460	D	6.248	3-1/4"	2"	28.43	27.19	25.96	24.72
89551	.2500	1/4" / E	6.350	3-1/4"	2"	28.58	27.34	26.09	24.85
89556	.2559		6.500	82	50	32.18	30.78	29.38	27.98
89561	.2570	F	6.528	3-1/4"	2"	32.74	31.32	29.89	28.47
89566	.2610	G	6.629	3-1/2"	2-1/8"	33.24	31.79	30.35	28.90
89571	.2656	17/64"	6.746	3-1/2"	2-1/8"	33.79	32.32	30.85	29.38
89576	.2660	H	6.756	3-1/2"	2-1/8"	34.56	33.06	31.55	30.05
89581	.2720	I	6.909	3-1/2"	2-1/8"	34.88	33.36	31.85	30.33
89586	.2756		7.000	88	54	35.10	33.57	32.05	30.52
89591	.2770	J	7.036	3-1/2"	2-1/8"	35.35	33.81	32.28	30.74
89596	.2810	K	7.137	3-1/2"	2-1/8"	35.63	34.08	32.53	30.98
89601	.2812	9/32"	7.142	3-1/2"	2-1/8"	35.77	34.21	32.66	31.10
89606	.2900	L	7.366	3-1/2"	2-1/8"	36.86	35.26	33.65	32.05
89611	.2950	M	7.493	3-3/4"	2-3/8"	38.96	37.27	35.57	33.88
89616	.2953		7.500	95	60	38.96	37.27	35.57	33.88
89621	.2969	19/64"	7.541	3-3/4"	2-3/8"	38.96	37.27	35.57	33.88
89626	.3020	N	7.671	3-3/4"	2-3/8"	40.89	39.12	37.34	35.56
89631	.3125	5/16"	7.938	3-3/4"	2-3/8"	41.04	39.26	37.47	35.69
89636	.3150		8.000	95	60	43.53	41.64	39.74	37.85
89641	.3160	O	8.026	3-3/4"	2-3/8"	43.53	41.64	39.74	37.85
89646	.3230	P	8.204	3-3/4"	2-3/8"	43.53	41.64	39.74	37.85
89651	.3281	21/64"	8.334	4"	2-1/2"	44.08	42.16	40.25	38.33
89656	.3320	Q	8.433	4"	2-1/2"	44.97	43.01	41.06	39.10
89661	.3346		8.500	101	63	45.29	43.32	41.35	39.38

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
89666	.3390	R	8.611	4"	2-1/2"	46.53	44.51	42.48	40.46
89671	.3438	11/32"	8.733	4"	2-1/2"	48.15	46.06	43.96	41.87
89676	.3480	S	8.839	4"	2-1/2"	50.06	47.88	45.71	43.53
89681	.3543		9.000	101	63	50.34	48.15	45.96	43.77
89686	.3580	T	9.093	4-1/4"	2-3/4"	52.34	50.06	47.79	45.51
89691	.3594	23/64"	9.129	4-1/4"	2-3/4"	52.66	50.37	48.08	45.79
89696	.3680	U	9.347	4-1/4"	2-3/4"	58.42	55.88	53.34	50.80
89701	.3740		9.500	107	70	58.85	56.29	53.73	51.17
89706	.3750	3/8"	9.525	4-1/4"	2-3/4"	59.24	56.66	54.09	51.51
89711	.3770	V	9.576	4-1/4"	2-3/4"	60.69	58.05	55.41	52.77
89716	.3860	W	9.804	4-1/2"	2-7/8"	61.77	59.08	56.40	53.71
89721	.3906	25/64"	9.921	4-1/2"	2-7/8"	62.51	59.80	57.08	54.36
89726	.3937		10.000	114	73	64.40	61.60	58.80	56.00
89731	.3970	X	10.084	4-1/2"	2-7/8"	65.96	63.10	60.23	57.36
89736	.4040	Y	10.262	4-1/2"	2-7/8"	66.41	63.53	60.64	57.75
89741	.4062	13/32"	10.317	4-1/2"	2-7/8"	68.44	65.46	62.49	59.51
89746	.4130	Z	10.490	4-1/2"	2-7/8"	69.07	66.07	63.06	60.06
89751	.4134		10.500	114	73	69.07	66.07	63.06	60.06
89756	.4219	27/64"	10.716	4-1/2"	2-7/8"	69.71	66.68	63.65	60.62
89761	.4331		11.000	114	73	74.78	71.53	68.28	65.03
89766	.4375	7/16"	11.113	4-1/2"	2-7/8"	74.78	71.53	68.28	65.03
89771	.4528		11.500	120	76	80.24	76.75	73.26	69.77
89776	.4531	29/64"	11.509	4-3/4"	3"	80.24	76.75	73.26	69.77
89781	.4688	15/32"	11.908	4-3/4"	3"	84.26	80.60	76.93	73.27
89786	.4724		12.000	120	76	84.51	80.84	77.16	73.49
89791	.4844	31/64"	12.304	4-3/4"	3"	84.51	80.84	77.16	73.49
89796	.4921		12.500	120	76	86.48	82.72	78.96	75.20
89801	.5000	1/2"	12.700	4-3/4"	3"	86.48	82.72	78.96	75.20
89806	.5118		13.000	127	83	108.84	104.10	99.37	94.64
89811	.5156	33/64"	13.096	5"	3-1/4"	111.39	106.55	101.70	96.86
89816	.5312	17/32"	13.492	5"	3-1/4"	113.95	109.00	104.04	99.09
89821	.5315		13.500	127	83	116.51	111.44	106.38	101.31
89826	.5469	35/64"	13.891	5"	3-1/4"	119.06	113.88	108.71	103.53
89831	.5512		14.000	127	83	121.65	116.36	111.07	105.78
89836	.5625	9/16"	14.287	5"	3-1/4"	131.43	125.72	120.00	114.29
89841	.5709		14.500	127	83	133.88	128.06	122.24	116.42
89846	.5781	37/64"	14.683	5-1/4"	3-1/2"	136.37	130.44	124.51	118.58
89851	.5906		15.000	133	89	138.85	132.81	126.78	120.74
89856	.5938	19/32"	15.082	5-1/4"	3-1/2"	139.60	133.53	127.46	121.39
89861	.6094	39/64"	15.478	5-1/4"	3-1/2"	140.29	134.19	128.09	121.99
89866	.6102		15.500	133	89	141.01	134.88	128.75	122.62
89871	.6250	5/8"	15.875	5-1/4"	3-1/2"	141.73	135.56	129.40	123.24
89876	.6299		16.000	133	89	145.14	138.83	132.52	126.21

Series 1200

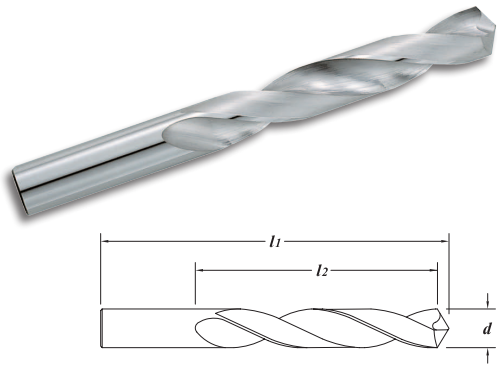
.0625" - .1575"
(1.588mm - 4.000mm)

Z=2 | 25° | 118° | 5xD | TECH PAGES 290-292

TOLERANCES

d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

Solid submicron grain carbide drill
General purpose jobber style
Cam point (≤1/8" diameter - 4-facet point)
Live tooling recommended on lathe processes
Hardlube Coating - page 81



EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
56165	.0625	1/16"	1.588	1-3/4"	3/4"	7.13	6.82	6.51	6.20
56170	.0635	#52	1.613	1-3/4"	3/4"	7.23	6.92	6.60	6.29
56175	.0670	#51	1.702	1-3/4"	3/4"	7.34	7.02	6.70	6.38
56180	.0700	#50	1.778	1-3/4"	7/8"	7.52	7.19	6.87	6.54
56185	.0730	#49	1.854	1-3/4"	7/8"	7.72	7.38	7.05	6.71
56190	.0760	#48	1.930	1-3/4"	7/8"	7.97	7.62	7.28	6.93
56195	.0781	5/64"	1.984	1-3/4"	7/8"	8.27	7.91	7.55	7.19
56200	.0785	#47	1.994	1-3/4"	7/8"	8.54	8.17	7.80	7.43
56205	.0787		2.000	44	22	8.68	8.31	7.93	7.55
56210	.0810	#46	2.057	1-3/4"	7/8"	8.82	8.44	8.05	7.67
56215	.0820	#45	2.083	1-3/4"	7/8"	9.09	8.69	8.30	7.90
56220	.0860	#44	2.184	2"	1"	9.38	8.98	8.57	8.16
56225	.0890	#43	2.261	2"	1"	9.65	9.23	8.81	8.39
56230	.0935	#42	2.375	2"	1"	9.79	9.36	8.94	8.51
56235	.0938	3/32"	2.383	2"	1"	10.01	9.57	9.14	8.70
56240	.0960	#41	2.438	2"	1"	10.10	9.66	9.22	8.78
56245	.0980	#40	2.489	2"	1"	10.25	9.80	9.36	8.91
56250	.0984		2.500	57	32	10.30	9.86	9.41	8.96
56255	.0995	#39	2.527	2-1/4"	1-1/4"	10.35	9.90	9.45	9.00
56260	.1015	#38	2.578	2-1/4"	1-1/4"	10.48	10.02	9.57	9.11
56265	.1040	#37	2.642	2-1/4"	1-1/4"	10.61	10.15	9.69	9.23
56270	.1065	#36	2.705	2-1/4"	1-1/4"	10.75	10.29	9.82	9.35
56275	.1094	7/64"	2.779	2-1/4"	1-1/4"	10.93	10.45	9.98	9.50
56280	.1100	#35	2.794	2-1/4"	1-1/4"	11.05	10.57	10.09	9.61
56285	.1110	#34	2.819	2-1/4"	1-1/4"	11.18	10.69	10.21	9.72
56290	.1130	#33	2.870	2-1/4"	1-1/4"	11.39	10.89	10.40	9.90
56295	.1160	#32	2.946	2-1/4"	1-1/4"	11.51	11.01	10.51	10.01
56300	.1181		3.000	57	32	11.63	11.12	10.62	10.11
56305	.1200	#31	3.048	2-1/4"	1-1/4"	11.70	11.19	10.68	10.17
56310	.1250	1/8"	3.175	2-1/4"	1-1/4"	11.85	11.33	10.82	10.30
56315	.1285	#30	3.264	2-1/4"	1-1/4"	12.14	11.62	11.09	10.56
56320	.1360	#29	3.454	2-1/2"	1-3/8"	12.52	11.98	11.43	10.89
56325	.1378		3.500	63	35	12.94	12.38	11.81	11.25
56330	.1405	#28	3.569	2-1/2"	1-3/8"	13.06	12.50	11.93	11.36
56335	.1406	9/64"	3.571	2-1/2"	1-3/8"	13.21	12.64	12.06	11.49
56340	.1440	#27	3.658	2-1/2"	1-3/8"	13.73	13.13	12.54	11.94
56345	.1470	#26	3.734	2-1/2"	1-3/8"	13.87	13.27	12.66	12.06
56350	.1495	#25	3.797	2-1/2"	1-3/8"	14.05	13.44	12.83	12.22
56355	.1520	#24	3.861	2-1/2"	1-3/8"	14.08	13.46	12.85	12.24
56360	.1540	#23	3.912	2-1/2"	1-3/8"	14.18	13.56	12.95	12.33
56365	.1562	5/32"	3.967	2-1/2"	1-3/8"	14.27	13.65	13.03	12.41
56370	.1570	#22	3.988	2-1/2"	1-3/8"	15.17	14.51	13.85	13.19
56375	.1575		4.000	63	35	15.36	14.70	14.03	13.36

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
56380	.1590	#21	4.039	2-1/2"	1-3/8"	15.54	14.86	14.19	13.51
56385	.1610	#20	4.089	2-1/2"	1-3/8"	15.65	14.97	14.29	13.61
56390	.1660	#19	4.216	2-3/4"	1-5/8"	16.28	15.58	14.87	14.16
56395	.1695	#18	4.305	2-3/4"	1-5/8"	16.49	15.77	15.06	14.34
56400	.1719	11/64"	4.366	2-3/4"	1-5/8"	16.84	16.10	15.37	14.64
56405	.1730	#17	4.394	2-3/4"	1-5/8"	17.07	16.32	15.58	14.84
56410	.1770	#16	4.496	2-3/4"	1-5/8"	17.25	16.50	15.75	15.00
56415	.1772		4.500	70	41	17.34	16.59	15.83	15.08
56420	.1800	#15	4.572	2-3/4"	1-5/8"	17.41	16.65	15.90	15.14
56425	.1820	#14	4.623	2-3/4"	1-5/8"	17.81	17.04	16.26	15.49
56430	.1850	#13	4.700	2-3/4"	1-5/8"	17.95	17.17	16.39	15.61
56435	.1875	3/16"	4.763	2-3/4"	1-5/8"	18.03	17.25	16.46	15.68
56440	.1890	#12	4.801	2-3/4"	1-5/8"	18.62	17.81	17.00	16.19
56445	.1910	#11	4.851	2-3/4"	1-5/8"	18.83	18.01	17.19	16.37
56450	.1935	#10	4.915	2-3/4"	1-5/8"	19.72	18.87	18.01	17.15
56455	.1960	#9	4.978	3"	1-3/4"	20.22	19.34	18.46	17.58
56460	.1969		5.000	76	44	20.33	19.45	18.56	17.68
56465	.1990	#8	5.055	3"	1-3/4"	20.47	19.58	18.69	17.80
56470	.2010	#7	5.105	3"	1-3/4"	21.07	20.15	19.24	18.32
56475	.2031	13/64"	5.159	3"	1-3/4"	21.23	20.31	19.38	18.46
56480	.2040	#6	5.182	3"	1-3/4"	21.67	20.72	19.78	18.84
56485	.2055	#5	5.220	3"	1-3/4"	22.11	21.15	20.19	19.23
56490	.2090	#4	5.309	3"	1-3/4"	22.49	21.52	20.54	19.56
56495	.2130	#3	5.410	3"	1-3/4"	22.89	21.89	20.90	19.90
56500	.2165		5.500	76	44	23.07	22.07	21.06	20.06
56505	.2188	7/32"	5.558	3"	1-3/4"	23.23	22.22	21.21	20.20
56510	.2210	#2	5.613	3"	1-3/4"	23.81	22.77	21.74	20.70
56515	.2280	#1	5.791	3"	1-3/4"	23.94	22.90	21.86	20.82
56520	.2340	A	5.944	3-1/4"	2"	24.22	23.17	22.11	21.06
56525	.2344	15/64"	5.954	3-1/4"	2"	24.29	23.23	22.18	21.12
56530	.2362		6.000	82	50	24.38	23.32	22.26	21.20
56535	.2380	B	6.045	3-1/4"	2"	24.46	23.40	22.33	21.27
56540	.2420	C	6.147	3-1/4"	2"	24.64	23.57	22.50	21.43
56545	.2460	D	6.248	3-1/4"	2"	24.83	23.75	22.67	21.59
56550	.2500	1/4" / E	6.350	3-1/4"	2"	25.00	23.91	22.83	21.74
56555	.2559		6.500	82	50	25.61	24.50	23.38	22.27
56560	.2570	F	6.528	3-1/4"	2"	26.13	24.99	23.86	22.72
56565	.2610	G	6.629	3-1/2"	2-1/8"	26.67	25.51	24.35	23.19
56570	.2656	17/64"	6.746	3-1/2"	2-1/8"	27.21	26.03	24.84	23.66
56575	.2660	H	6.756	3-1/2"	2-1/8"	27.99	26.77	25.56	24.34
56580	.2720	I	6.909	3-1/2"	2-1/8"	28.30	27.07	25.84	24.61
56585	.2756		7.000	88	54	28.53	27.29	26.05	24.81
56590	.2770	J	7.036	3-1/2"	2-1/8"	28.78	27.53	26.28	25.03
56595	.2810	K	7.137	3-1/2"	2-1/8"	29.04	27.78	26.51	25.25
56600	.2812	9/32"	7.142	3-1/2"	2-1/8"	29.22	27.95	26.68	25.41
56605	.2900	L	7.366	3-1/2"	2-1/8"	30.27	28.95	27.64	26.32
56610	.2950	M	7.493	3-3/4"	2-3/8"	32.40	30.99	29.58	28.17
56615	.2953		7.500	95	60	32.40	30.99	29.58	28.17
56620	.2969	19/64"	7.541	3-3/4"	2-3/8"	32.40	30.99	29.58	28.17
56625	.3020	N	7.671	3-3/4"	2-3/8"	34.33	32.84	31.34	29.85
56630	.3125	5/16"	7.938	3-3/4"	2-3/8"	34.45	32.96	31.46	29.96
56635	.3150		8.000	95	60	36.96	35.35	33.75	32.14
56640	.3160	O	8.026	3-3/4"	2-3/8"	36.96	35.35	33.75	32.14
56645	.3230	P	8.204	3-3/4"	2-3/8"	36.96	35.35	33.75	32.14
56650	.3281	21/64"	8.334	4"	2-1/2"	37.51	35.88	34.25	32.62
56655	.3320	Q	8.433	4"	2-1/2"	38.39	36.72	35.05	33.38
56660	.3346		8.500	101	63	38.72	37.04	35.35	33.67

continued ⟶

Series 1200 *(continued)*

.3390" - .5000"
(8.611mm - 12.700mm)

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
56665	.3390	R	8.611	4"	2-1/2"	39.97	38.24	36.50	34.76
56670	.3438	11/32"	8.733	4"	2-1/2"	41.58	39.78	37.97	36.16
56675	.3480	S	8.839	4"	2-1/2"	41.73	39.92	38.10	36.29
56680	.3543		9.000	101	63	41.98	40.15	38.33	36.50
56685	.3580	T	9.093	4-1/4"	2-3/4"	42.35	40.51	38.67	36.83
56690	.3594	23/64"	9.129	4-1/4"	2-3/4"	42.65	40.80	38.94	37.09
56695	.3680	U	9.347	4-1/4"	2-3/4"	48.40	46.30	44.19	42.09
56700	.3740		9.500	107	70	48.85	46.73	44.60	42.48
56705	.3750	3/8"	9.525	4-1/4"	2-3/4"	49.24	47.10	44.96	42.82
56710	.3770	V	9.576	4-1/4"	2-3/4"	50.17	47.99	45.81	43.63
56715	.3860	W	9.804	4-1/2"	2-7/8"	51.24	49.02	46.79	44.56
56720	.3906	25/64"	9.921	4-1/2"	2-7/8"	52.00	49.74	47.48	45.22
56725	.3937		10.000	114	73	53.88	51.54	49.19	46.85
56730	.3970	X	10.084	4-1/2"	2-7/8"	55.46	53.05	50.64	48.23
56735	.4040	Y	10.262	4-1/2"	2-7/8"	55.91	53.48	51.05	48.62
56740	.4062	13/32"	10.317	4-1/2"	2-7/8"	57.93	55.41	52.89	50.37
56745	.4130	Z	10.490	4-1/2"	2-7/8"	58.54	55.99	53.45	50.90
56750	.4134		10.500	114	73	58.54	55.99	53.45	50.90
56755	.4219	27/64"	10.716	4-1/2"	2-7/8"	59.19	56.62	54.04	51.47
56760	.4331		11.000	114	73	64.27	61.48	58.68	55.89
56765	.4375	7/16"	11.113	4-1/2"	2-7/8"	64.27	61.48	58.68	55.89
56770	.4528		11.500	120	76	69.72	66.69	63.66	60.63
56775	.4531	29/64"	11.509	4-3/4"	3"	69.72	66.69	63.66	60.63
56780	.4688	15/32"	11.908	4-3/4"	3"	73.75	70.54	67.34	64.13
56785	.4724		12.000	120	76	73.99	70.77	67.56	64.34
56790	.4844	31/64"	12.304	4-3/4"	3"	73.99	70.77	67.56	64.34
56795	.4921		12.500	120	76	75.97	72.67	69.36	66.06
56800	.5000	1/2"	12.700	4-3/4"	3"	75.97	72.67	69.36	66.06



Drill Manufacturing

† *Metric equivalents are for reference only*

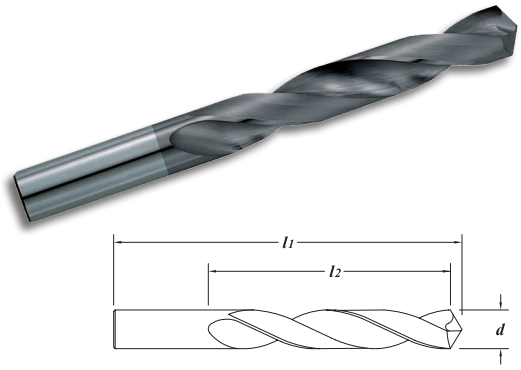
TOLERANCES

d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

Z=2 | 25° | 118° | 5xD | TECH PAGES 290-292

Series 1200H

.0625" - .1575"
(1.588mm - 4.000mm)



Hardlube Coating

Solid submicron grain carbide drill
General purpose jobber style
Excellent heat resistance and lubricity
Cam point (≤1/8" diameter is with 4-facet point)
Live tooling recommended on lathe processes
Uncoated - page 78

EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
56166	.0625	1/16"	1.588	1-3/4"	3/4"	9.14	8.75	8.35	7.95
56171	.0635	#52	1.613	1-3/4"	3/4"	9.26	8.86	8.45	8.05
56181	.0700	#50	1.778	1-3/4"	7/8"	9.52	9.11	8.69	8.28
56186	.0730	#49	1.854	1-3/4"	7/8"	9.74	9.32	8.89	8.47
56191	.0760	#48	1.930	1-3/4"	7/8"	9.98	9.55	9.11	8.68
56196	.0781	5/64"	1.984	1-3/4"	7/8"	10.30	9.86	9.41	8.96
56206	.0787		2.000	44	22	10.71	10.24	9.78	9.31
56216	.0820	#45	2.083	1-3/4"	7/8"	11.11	10.63	10.14	9.66
56221	.0860	#44	2.184	2"	1"	11.41	10.91	10.42	9.92
56226	.0890	#43	2.261	2"	1"	11.66	11.15	10.65	10.14
56231	.0935	#42	2.375	2"	1"	11.81	11.30	10.78	10.27
56236	.0938	3/32"	2.383	2"	1"	12.03	11.51	10.98	10.46
56241	.0960	#41	2.438	2"	1"	12.13	11.61	11.08	10.55
56246	.0980	#40	2.489	2"	1"	12.28	11.75	11.21	10.68
56251	.0984		2.500	57	32	12.31	11.77	11.24	10.70
56256	.0995	#39	2.527	2-1/4"	1-1/4"	12.36	11.83	11.29	10.75
56261	.1015	#38	2.578	2-1/4"	1-1/4"	12.51	11.97	11.42	10.88
56266	.1040	#37	2.642	2-1/4"	1-1/4"	12.62	12.07	11.52	10.97
56271	.1065	#36	2.705	2-1/4"	1-1/4"	12.77	12.21	11.66	11.10
56276	.1094	7/64"	2.779	2-1/4"	1-1/4"	12.96	12.40	11.83	11.27
56281	.1100	#35	2.794	2-1/4"	1-1/4"	13.06	12.50	11.93	11.36
56286	.1110	#34	2.819	2-1/4"	1-1/4"	13.20	12.63	12.05	11.48
56291	.1130	#33	2.870	2-1/4"	1-1/4"	13.41	12.83	12.24	11.66
56296	.1160	#32	2.946	2-1/4"	1-1/4"	13.51	12.93	12.34	11.75
56301	.1181		3.000	57	32	13.63	13.04	12.44	11.85
56306	.1200	#31	3.048	2-1/4"	1-1/4"	13.73	13.13	12.54	11.94
56311	.1250	1/8"	3.175	2-1/4"	1-1/4"	13.85	13.24	12.64	12.04
56316	.1285	#30	3.264	2-1/4"	1-1/4"	14.17	13.55	12.94	12.32
56321	.1360	#29	3.454	2-1/2"	1-3/8"	14.54	13.90	13.27	12.64
56331	.1405	#28	3.569	2-1/2"	1-3/8"	15.10	14.44	13.79	13.13
56336	.1406	9/64"	3.571	2-1/2"	1-3/8"	15.24	14.58	13.91	13.25
56341	.1440	#27	3.658	2-1/2"	1-3/8"	15.76	15.07	14.39	13.70
56346	.1470	#26	3.734	2-1/2"	1-3/8"	15.90	15.21	14.52	13.83
56351	.1495	#25	3.797	2-1/2"	1-3/8"	16.04	15.35	14.65	13.95
56356	.1520	#24	3.861	2-1/2"	1-3/8"	16.12	15.42	14.72	14.02
56361	.1540	#23	3.912	2-1/2"	1-3/8"	16.20	15.50	14.79	14.09
56366	.1562	5/32"	3.967	2-1/2"	1-3/8"	16.27	15.57	14.86	14.15
56371	.1570	#22	3.988	2-1/2"	1-3/8"	17.18	16.43	15.69	14.94

continued →

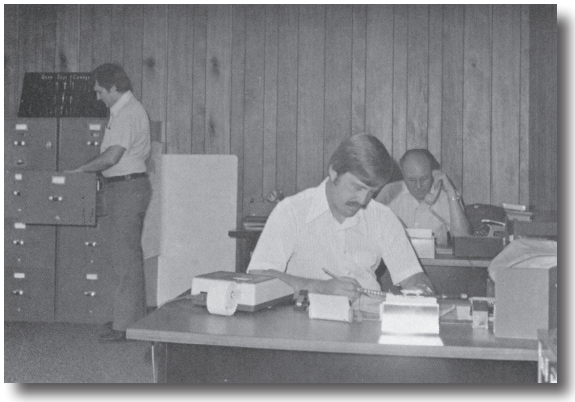
Series 1200H *(continued)*

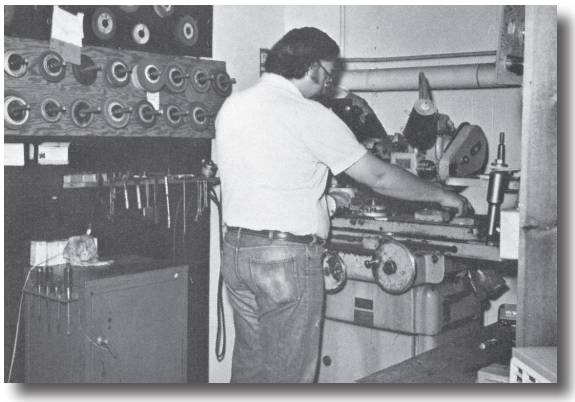
.1590" - .5000"
(4.039mm - 12.700mm)

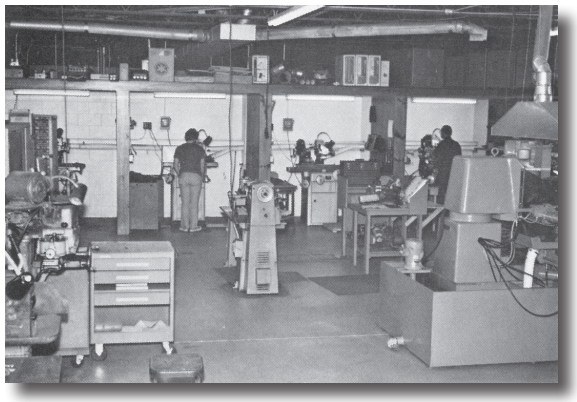
EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
56381	.1590	#21	4.039	2-1/2"	1-3/8"	17.57	16.81	16.04	15.28
56386	.1610	#20	4.089	2-1/2"	1-3/8"	17.68	16.91	16.14	15.37
56391	.1660	#19	4.216	2-3/4"	1-5/8"	18.32	17.52	16.73	15.93
56396	.1695	#18	4.305	2-3/4"	1-5/8"	18.50	17.70	16.89	16.09
56401	.1719	11/64"	4.366	2-3/4"	1-5/8"	18.83	18.01	17.19	16.37
56411	.1770	#16	4.496	2-3/4"	1-5/8"	19.26	18.43	17.59	16.75
56421	.1800	#15	4.572	2-3/4"	1-5/8"	19.45	18.60	17.76	16.91
56426	.1820	#14	4.623	2-3/4"	1-5/8"	19.83	18.96	18.10	17.24
56436	.1875	3/16"	4.763	2-3/4"	1-5/8"	20.06	19.18	18.31	17.44
56441	.1890	#12	4.801	2-3/4"	1-5/8"	22.10	21.14	20.18	19.22
56446	.1910	#11	4.851	2-3/4"	1-5/8"	22.30	21.33	20.36	19.39
56451	.1935	#10	4.915	2-3/4"	1-5/8"	23.17	22.17	21.16	20.15
56471	.2010	#7	5.105	3"	1-3/4"	24.54	23.47	22.41	21.34
56481	.2040	#6	5.182	3"	1-3/4"	25.14	24.05	22.95	21.86
56486	.2055	#5	5.220	3"	1-3/4"	25.58	24.46	23.35	22.24
56491	.2090	#4	5.309	3"	1-3/4"	25.99	24.86	23.73	22.60
56496	.2130	#3	5.410	3"	1-3/4"	26.36	25.21	24.07	22.92
56506	.2188	7/32"	5.558	3"	1-3/4"	26.69	25.53	24.37	23.21
56516	.2280	#1	5.791	3"	1-3/4"	27.42	26.22	25.03	23.84
56526	.2344	15/64"	5.954	3-1/4"	2"	27.88	26.66	25.45	24.24
56541	.2420	C	6.147	3-1/4"	2"	28.23	27.01	25.78	24.55
56551	.2500	1/4" / E	6.350	3-1/4"	2"	28.58	27.34	26.09	24.85
56561	.2570	F	6.528	3-1/4"	2"	32.74	31.32	29.89	28.47
56566	.2610	G	6.629	3-1/2"	2-1/8"	33.24	31.79	30.35	28.90
56571	.2656	17/64"	6.746	3-1/2"	2-1/8"	33.79	32.32	30.85	29.38
56601	.2812	9/32"	7.142	3-1/2"	2-1/8"	35.77	34.21	32.66	31.10
56606	.2900	L	7.366	3-1/2"	2-1/8"	36.86	35.26	33.65	32.05
56626	.3020	N	7.671	3-3/4"	2-3/8"	40.89	39.12	37.34	35.56
56631	.3125	5/16"	7.938	3-3/4"	2-3/8"	41.04	39.26	37.47	35.69
56646	.3230	P	8.204	3-3/4"	2-3/8"	43.53	41.64	39.74	37.85
56651	.3281	21/64"	8.334	4"	2-1/2"	44.08	42.16	40.25	38.33
56671	.3438	11/32"	8.733	4"	2-1/2"	48.15	46.06	43.96	41.87
56696	.3680	U	9.347	4-1/4"	2-3/4"	58.42	55.88	53.34	50.80
56706	.3750	3/8"	9.525	4-1/4"	2-3/4"	59.24	56.66	54.09	51.51
56731	.3970	X	10.084	4-1/2"	2-7/8"	65.96	63.10	60.23	57.36
56741	.4062	13/32"	10.317	4-1/2"	2-7/8"	68.44	65.46	62.49	59.51
56756	.4219	27/64"	10.716	4-1/2"	2-7/8"	69.71	66.68	63.65	60.62
56766	.4375	7/16"	11.113	4-1/2"	2-7/8"	74.78	71.53	68.28	65.03
56801	.5000	1/2"	12.700	4-3/4"	3"	86.48	82.72	78.96	75.20

† *Metric equivalents are for reference only*

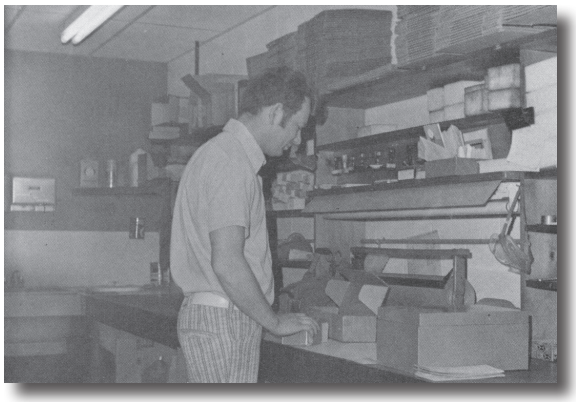


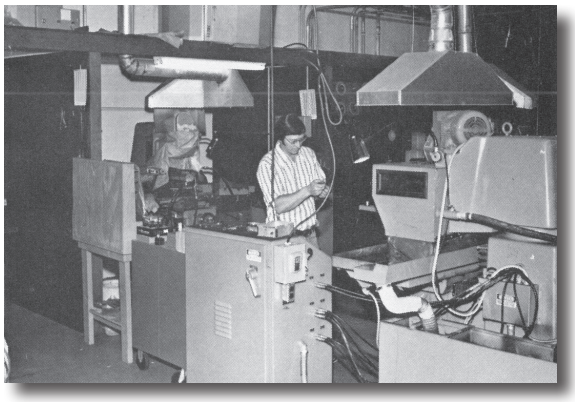












Series 1100

.1094" - .2040"
(2.779mm - 5.182mm)

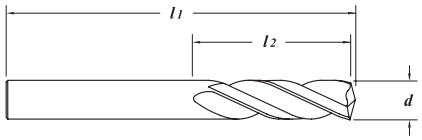
Z=3 | 25° | 150° | 5xD | TECH PAGES 290-292

TOLERANCES

d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

Recommended for cast iron, tungsten, and materials with high silicon content





- Solid submicron grain carbide drill
- Self-centering drill point
- Near reamer finishes
- Can be used as a core drill
- Tighter tolerance holes
- Improved roundness and straightness
- Live tooling recommended on lathe processes
- Hardlube Coating - page 86

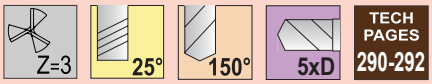
EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
90275	.1094	7/64"	2.779	2-1/4"	1-1/4"	13.27	12.69	12.12	11.54
90280	.1100	#35	2.794	2-1/4"	1-1/4"	13.41	12.83	12.24	11.66
90285	.1110	#34	2.819	2-1/4"	1-1/4"	13.58	12.99	12.40	11.81
90290	.1130	#33	2.870	2-1/4"	1-1/4"	13.80	13.20	12.60	12.00
90295	.1160	#32	2.946	2-1/4"	1-1/4"	13.98	13.38	12.77	12.16
90300	.1181		3.000	57	32	14.09	13.48	12.86	12.25
90305	.1200	#31	3.048	2-1/4"	1-1/4"	14.19	13.57	12.96	12.34
90310	.1250	1/8"	3.175	2-1/4"	1-1/4"	14.39	13.76	13.14	12.51
90315	.1285	#30	3.264	2-1/4"	1-1/4"	14.73	14.09	13.45	12.81
90320	.1360	#29	3.454	2-1/2"	1-3/8"	15.19	14.53	13.87	13.21
90325	.1378		3.500	63	35	15.67	14.99	14.31	13.63
90330	.1405	#28	3.569	2-1/2"	1-3/8"	15.86	15.17	14.48	13.79
90335	.1406	9/64"	3.571	2-1/2"	1-3/8"	16.03	15.33	14.64	13.94
90340	.1440	#27	3.658	2-1/2"	1-3/8"	16.68	15.95	15.23	14.50
90345	.1470	#26	3.734	2-1/2"	1-3/8"	16.91	16.17	15.44	14.70
90350	.1495	#25	3.797	2-1/2"	1-3/8"	17.05	16.31	15.57	14.83
90355	.1520	#24	3.861	2-1/2"	1-3/8"	17.09	16.35	15.60	14.86
90365	.1562	5/32"	3.967	2-1/2"	1-3/8"	17.32	16.57	15.81	15.06
90375	.1575		4.000	63	35	18.41	17.61	16.81	16.01
90380	.1590	#21	4.039	2-1/2"	1-3/8"	18.85	18.03	17.21	16.39
90385	.1610	#20	4.089	2-1/2"	1-3/8"	18.85	18.03	17.21	16.39
90390	.1660	#19	4.216	2-3/4"	1-5/8"	19.01	18.18	17.36	16.53
90395	.1695	#18	4.305	2-3/4"	1-5/8"	19.12	18.29	17.46	16.63
90400	.1719	11/64"	4.366	2-3/4"	1-5/8"	19.25	18.41	17.58	16.74
90420	.1800	#15	4.572	2-3/4"	1-5/8"	20.55	19.66	18.76	17.87
90425	.1820	#14	4.623	2-3/4"	1-5/8"	21.01	20.10	19.18	18.27
90435	.1875	3/16"	4.763	2-3/4"	1-5/8"	21.14	20.22	19.30	18.38
90440	.1890	#12	4.801	2-3/4"	1-5/8"	21.29	20.36	19.44	18.51
90455	.1960	#9	4.978	3"	1-3/4"	23.09	22.09	21.08	20.08
90460	.1969		5.000	76	44	23.23	22.22	21.21	20.20
90470	.2010	#7	5.105	3"	1-3/4"	24.10	23.06	22.01	20.96
90475	.2031	13/64"	5.159	3"	1-3/4"	25.01	23.93	22.84	21.75
90480	.2040	#6	5.182	3"	1-3/4"	25.16	24.07	22.97	21.88

† *Metric equivalents are for reference only*

EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
90485	.2055	#5	5.220	3"	1-3/4"	25.28	24.18	23.08	21.98
90500	.2165		5.500	76	44	26.36	25.21	24.07	22.92
90505	.2188	7/32"	5.558	3"	1-3/4"	26.58	25.42	24.27	23.11
90510	.2210	#2	5.613	3"	1-3/4"	27.22	26.04	24.85	23.67
90515	.2280	#1	5.791	3"	1-3/4"	27.36	26.17	24.98	23.79
90525	.2344	15/64"	5.954	3-1/4"	2"	27.77	26.57	25.36	24.15
90530	.2362		6.000	82	50	27.85	26.64	25.43	24.22
90550	.2500	1/4" / E	6.350	3-1/4"	2"	28.57	27.32	26.08	24.84
90555	.2559		6.500	82	50	29.27	28.00	26.72	25.45
90560	.2570	F	6.528	3-1/4"	2"	29.89	28.59	27.29	25.99
90565	.2610	G	6.629	3-1/2"	2-1/8"	31.44	30.07	28.71	27.34
90570	.2656	17/64"	6.746	3-1/2"	2-1/8"	32.06	30.67	29.27	27.88
90575	.2660	H	6.756	3-1/2"	2-1/8"	32.98	31.55	30.11	28.68
90580	.2720	I	6.909	3-1/2"	2-1/8"	33.38	31.93	30.48	29.03
90585	.2756		7.000	88	54	33.63	32.16	30.70	29.24
90600	.2812	9/32"	7.142	3-1/2"	2-1/8"	35.45	33.91	32.37	30.83
90605	.2900	L	7.366	3-1/2"	2-1/8"	36.77	35.17	33.57	31.97
90620	.2969	19/64"	7.541	3-3/4"	2-3/8"	39.04	37.35	35.65	33.95
90625	.3020	N	7.671	3-3/4"	2-3/8"	39.33	37.62	35.91	34.20
90630	.3125	5/16"	7.938	3-3/4"	2-3/8"	39.38	37.66	35.95	34.24
90635	.3150		8.000	95	60	42.25	40.41	38.58	36.74
90640	.3160	O	8.026	3-3/4"	2-3/8"	42.25	40.41	38.58	36.74
90650	.3281	21/64"	8.334	4"	2-1/2"	44.19	42.27	40.35	38.43
90655	.3320	Q	8.433	4"	2-1/2"	45.24	43.27	41.31	39.34
90660	.3346		8.500	101	63	45.64	43.66	41.67	39.69
90665	.3390	R	8.611	4"	2-1/2"	47.06	45.01	42.97	40.92
90670	.3438	11/32"	8.733	4"	2-1/2"	49.02	46.89	44.76	42.63
90680	.3543		9.000	101	63	50.99	48.77	46.56	44.34
90690	.3594	23/64"	9.129	4-1/4"	2-3/4"	51.83	49.58	47.32	45.07
90705	.3750	3/8"	9.525	4-1/4"	2-3/4"	56.28	53.83	51.39	48.94
90725	.3937		10.000	114	73	65.42	62.58	59.73	56.89
90745	.4130	Z	10.490	4-1/2"	2-7/8"	71.07	67.98	64.89	61.80
90755	.4219	27/64"	10.716	4-1/2"	2-7/8"	71.88	68.75	65.63	62.50
90760	.4331		11.000	114	73	78.04	74.65	71.25	67.86
90765	.4375	7/16"	11.113	4-1/2"	2-7/8"	78.04	74.65	71.25	67.86
90775	.4531	29/64"	11.509	4-3/4"	3"	84.69	81.00	77.32	73.64
90780	.4688	15/32"	11.908	4-3/4"	3"	89.59	85.69	81.80	77.90
90790	.4844	31/64"	12.304	4-3/4"	3"	89.86	85.95	82.05	78.14
90800	.5000	1/2"	12.700	4-3/4"	3"	92.23	88.22	84.21	80.20

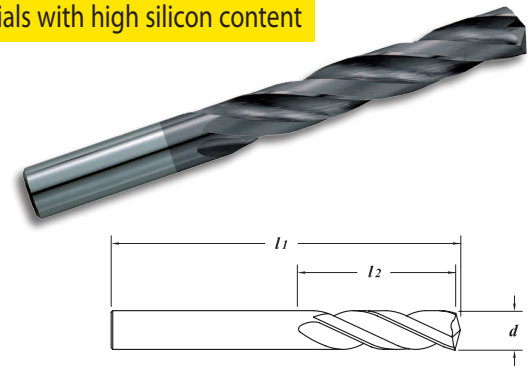
Series 1100H

.1094" - .2165"
(2.779mm - 5.500mm)



TOLERANCES		
d	+.0000" –.0005" (+.0000 –.0127mm)	
l_1	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	> 1/8"	+.125" –.125" (+3.175 –3.175mm)
l_2	≤ 1/8"	+.125" –.062" (+3.175 –1.588mm)
	>1/8"	+.125" –.125" (+3.175 –3.175mm)

Recommended for cast iron, tungsten, and materials with high silicon content



Hardlube Coating

Solid submicron grain carbide drill
Self-centering drill point
Near reamer finishes
Can be used as a core drill
Excellent heat resistance and lubricity
Tighter tolerance holes
Improved roundness and straightness
Live tooling recommended on lathe processes
Uncoated - page 84

EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
90276	.1094	7/64"	2.779	2-1/4"	1-1/4"	15.27	14.61	13.94	13.28
90281	.1100	#35	2.794	2-1/4"	1-1/4"	15.43	14.76	14.09	13.42
90291	.1130	#33	2.870	2-1/4"	1-1/4"	15.84	15.15	14.46	13.77
90296	.1160	#32	2.946	2-1/4"	1-1/4"	15.99	15.29	14.60	13.90
90301	.1181		3.000	57	32	16.12	15.42	14.72	14.02
90306	.1200	#31	3.048	2-1/4"	1-1/4"	16.23	15.52	14.82	14.11
90311	.1250	1/8"	3.175	2-1/4"	1-1/4"	16.39	15.68	14.96	14.25
90316	.1285	#30	3.264	2-1/4"	1-1/4"	16.74	16.02	15.29	14.56
90321	.1360	#29	3.454	2-1/2"	1-3/8"	17.23	16.48	15.73	14.98
90326	.1378		3.500	63	35	17.70	16.93	16.16	15.39
90331	.1405	#28	3.569	2-1/2"	1-3/8"	17.89	17.12	16.34	15.56
90336	.1406	9/64"	3.571	2-1/2"	1-3/8"	18.06	17.27	16.49	15.70
90341	.1440	#27	3.658	2-1/2"	1-3/8"	18.70	17.89	17.07	16.26
90346	.1470	#26	3.734	2-1/2"	1-3/8"	18.91	18.08	17.26	16.44
90351	.1495	#25	3.797	2-1/2"	1-3/8"	19.08	18.25	17.42	16.59
90356	.1520	#24	3.861	2-1/2"	1-3/8"	19.10	18.27	17.44	16.61
90361	.1540	#23	3.912	2-1/2"	1-3/8"	19.26	18.43	17.59	16.75
90366	.1562	5/32"	3.967	2-1/2"	1-3/8"	19.34	18.50	17.66	16.82
90371	.1570	#22	3.988	2-1/2"	1-3/8"	20.45	19.56	18.67	17.78
90376	.1575		4.000	63	35	20.45	19.56	18.67	17.78
90381	.1590	#21	4.039	2-1/2"	1-3/8"	20.90	19.99	19.08	18.17
90386	.1610	#20	4.089	2-1/2"	1-3/8"	20.90	19.99	19.08	18.17
90391	.1660	#19	4.216	2-3/4"	1-5/8"	21.02	20.11	19.19	18.28
90396	.1695	#18	4.305	2-3/4"	1-5/8"	21.15	20.23	19.31	18.39
90401	.1719	11/64"	4.366	2-3/4"	1-5/8"	21.26	20.34	19.41	18.49
90406	.1730	#17	4.394	2-3/4"	1-5/8"	22.14	21.18	20.21	19.25
90411	.1770	#16	4.496	2-3/4"	1-5/8"	22.38	21.41	20.43	19.46
90416	.1772		4.500	70	41	22.47	21.49	20.52	19.54
90421	.1800	#15	4.572	2-3/4"	1-5/8"	22.59	21.60	20.62	19.64
90426	.1820	#14	4.623	2-3/4"	1-5/8"	23.03	22.03	21.03	20.03
90431	.1850	#13	4.700	2-3/4"	1-5/8"	23.14	22.13	21.13	20.12
90436	.1875	3/16"	4.763	2-3/4"	1-5/8"	23.14	22.13	21.13	20.12
90441	.1890	#12	4.801	2-3/4"	1-5/8"	24.76	23.68	22.61	21.53
90446	.1910	#11	4.851	2-3/4"	1-5/8"	24.98	23.89	22.81	21.72
90451	.1935	#10	4.915	2-3/4"	1-5/8"	26.01	24.88	23.75	22.62
90456	.1960	#9	4.978	3"	1-3/4"	26.57	25.41	24.26	23.10
90461	.1969		5.000	76	44	26.69	25.53	24.37	23.21
90466	.1990	#8	5.055	3"	1-3/4"	26.85	25.69	24.52	23.35
90471	.2010	#7	5.105	3"	1-3/4"	27.57	26.37	25.17	23.97
90476	.2031	13/64"	5.159	3"	1-3/4"	28.47	27.24	26.00	24.76
90481	.2040	#6	5.182	3"	1-3/4"	28.64	27.39	26.15	24.90
90486	.2055	#5	5.220	3"	1-3/4"	28.75	27.50	26.25	25.00
90491	.2090	#4	5.309	3"	1-3/4"	29.19	27.92	26.65	25.38
90496	.2130	#3	5.410	3"	1-3/4"	29.64	28.35	27.06	25.77
90501	.2165		5.500	76	44	29.83	28.53	27.24	25.94

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
90506	.2188	7/32"	5.558	3"	1-3/4"	30.03	28.72	27.42	26.11
90511	.2210	#2	5.613	3"	1-3/4"	30.67	29.34	28.00	26.67
90516	.2280	#1	5.791	3"	1-3/4"	30.82	29.48	28.14	26.80
90521	.2340	A	5.944	3-1/4"	2"	31.25	29.89	28.53	27.17
90526	.2344	15/64"	5.954	3-1/4"	2"	31.35	29.99	28.62	27.26
90531	.2362		6.000	82	50	31.44	30.07	28.71	27.34
90536	.2380	B	6.045	3-1/4"	2"	31.56	30.18	28.81	27.44
90541	.2420	C	6.147	3-1/4"	2"	31.74	30.36	28.98	27.60
90546	.2460	D	6.248	3-1/4"	2"	31.96	30.57	29.18	27.79
90551	.2500	1/4" / E	6.350	3-1/4"	2"	32.14	30.75	29.35	27.95
90556	.2559		6.500	82	50	35.85	34.29	32.73	31.17
90561	.2570	F	6.528	3-1/4"	2"	36.44	34.86	33.27	31.69
90566	.2610	G	6.629	3-1/2"	2-1/8"	38.01	36.36	34.70	33.05
90571	.2656	17/64"	6.746	3-1/2"	2-1/8"	38.63	36.95	35.27	33.59
90576	.2660	H	6.756	3-1/2"	2-1/8"	39.55	37.83	36.11	34.39
90581	.2720	I	6.909	3-1/2"	2-1/8"	39.97	38.24	36.50	34.76
90586	.2756		7.000	88	54	40.19	38.45	36.70	34.95
90591	.2770	J	7.036	3-1/2"	2-1/8"	40.51	38.75	36.99	35.23
90596	.2810	K	7.137	3-1/2"	2-1/8"	40.81	39.04	37.26	35.49
90601	.2812	9/32"	7.142	3-1/2"	2-1/8"	42.03	40.21	38.38	36.55
90606	.2900	L	7.366	3-1/2"	2-1/8"	43.36	41.47	39.59	37.70
90611	.2950	M	7.493	3-3/4"	2-3/8"	45.61	43.63	41.64	39.66
90616	.2953		7.500	95	60	45.61	43.63	41.64	39.66
90621	.2969	19/64"	7.541	3-3/4"	2-3/8"	45.61	43.63	41.64	39.66
90626	.3020	N	7.671	3-3/4"	2-3/8"	45.91	43.91	41.92	39.92
90631	.3125	5/16"	7.938	3-3/4"	2-3/8"	45.94	43.95	41.95	39.95
90636	.3150		8.000	95	60	48.82	46.70	44.57	42.45
90641	.3160	O	8.026	3-3/4"	2-3/8"	48.82	46.70	44.57	42.45
90646	.3230	P	8.204	3-3/4"	2-3/8"	48.82	46.70	44.57	42.45
90651	.3281	21/64"	8.334	4"	2-1/2"	50.78	48.58	46.37	44.16
90656	.3320	Q	8.433	4"	2-1/2"	51.83	49.58	47.32	45.07
90661	.3346		8.500	101	63	52.22	49.95	47.68	45.41
90666	.3390	R	8.611	4"	2-1/2"	53.66	51.33	48.99	46.66
90671	.3438	11/32"	8.733	4"	2-1/2"	55.58	53.16	50.75	48.33
90676	.3480	S	8.839	4"	2-1/2"	59.00	56.43	53.87	51.30
90681	.3543		9.000	101	63	59.34	56.76	54.18	51.60
90691	.3594	23/64"	9.129	4-1/4"	2-3/4"	61.80	59.11	56.43	53.74
90696	.3680	U	9.347	4-1/4"	2-3/4"	65.33	62.49	59.65	56.81
90701	.3740		9.500	107	70	66.27	63.39	60.51	57.63
90706	.3750	3/8"	9.525	4-1/4"	2-3/4"	66.27	63.39	60.51	57.63
90711	.3770	V	9.576	4-1/4"	2-3/4"	68.95	65.96	62.96	59.96
90716	.3860	W	9.804	4-1/2"	2-7/8"	72.73	69.56	66.40	63.24
90721	.3906	25/64"	9.921	4-1/2"	2-7/8"	73.63	70.43	67.23	64.03
90726	.3937		10.000	114	73	75.91	72.61	69.31	66.01
90736	.4040	Y	10.262	4-1/2"	2-7/8"	78.40	74.99	71.58	68.17
90741	.4062	13/32"	10.317	4-1/2"	2-7/8"	80.86	77.34	73.83	70.31
90746	.4130	Z	10.490	4-1/2"	2-7/8"	81.57	78.02	74.48	70.93
90751	.4134		10.500	114	73	81.57	78.02	74.48	70.93
90756	.4219	27/64"	10.716	4-1/2"	2-7/8"	82.39	78.80	75.22	71.64
90761	.4331		11.000	114	73	88.54	84.69	80.84	76.99
90766	.4375	7/16"	11.113	4-1/2"	2-7/8"	88.54	84.69	80.84	76.99
90771	.4528		11.500	120	76	95.19	91.05	86.91	82.77
90776	.4531	29/64"	11.509	4-3/4"	3"	95.19	91.05	86.91	82.77
90781	.4688	15/32"	11.908	4-3/4"	3"	100.08	95.73	91.38	87.03
90786	.4724		12.000	120	76	100.36	96.00	91.63	87.27
90791	.4844	31/64"	12.304	4-3/4"	3"	100.36	96.00	91.63	87.27
90796	.4921		12.500	120	76	102.76	98.30	93.83	89.36
90801	.5000	1/2"	12.700	4-3/4"	3"	102.76	98.30	93.83	89.36

Series 1800H

.1875" - .3125"
(4.763mm - 7.938mm)

Z=2 | 35° | 135° | 8xD | TECH PAGES 290-292

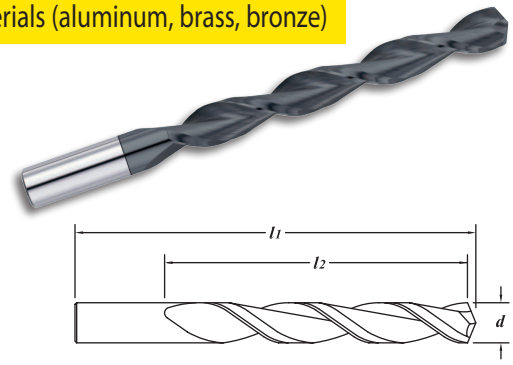
TOLERANCES	
d	+.0000" –.0005" (+.0000 –.0127mm)
l_1	+.125" –.125" (+3.175 –3.175mm)
l_2	+.125" –.125" (+3.175 –3.175mm)

Recommended for deep holes in soft, non-ferrous materials (aluminum, brass, bronze)

Parabolic

Hardlube Coating

Solid submicron grain carbide drill
Wide open flutes and high helix remove chips quickly
4-facet point
Live tooling recommended on lathe processes



EDP#	*d* † Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
22436	.1875	3/16"	4.763	3-13/16"	2-5/16"	24.87	23.79	22.71	21.63
22441	.1890	#12	4.801	3-13/16"	2-5/16"	25.44	24.33	23.23	22.12
22456	.1960	#9	4.978	3-15/16"	2-7/16"	27.20	26.02	24.83	23.65
22461	.1969		5.000	100	62	27.77	26.57	25.36	24.15
22466	.1990	#8	5.055	3-15/16"	2-7/16"	28.24	27.02	25.79	24.56
22471	.2010	#7	5.105	3-15/16"	2-7/16"	28.75	27.50	26.25	25.00
22476	.2031	13/64"	5.159	3-15/16"	2-7/16"	29.22	27.95	26.68	25.41
22486	.2055	#5	5.220	4"	2-1/2"	30.19	28.88	27.56	26.25
22496	.2130	#3	5.410	4"	2-1/2"	31.13	29.78	28.42	27.07
22501	.2165		5.500	102	64	31.64	30.26	28.89	27.51
22506	.2188	7/32"	5.558	4"	2-1/2"	32.11	30.71	29.32	27.92
22511	.2210	#2	5.613	4"	2-1/2"	32.58	31.16	29.75	28.33
22516	.2280	#1	5.791	4-1/8"	2-5/8"	33.07	31.64	30.20	28.76
22531	.2362		6.000	105	67	34.58	33.08	31.57	30.07
22541	.2420	C	6.147	4-1/4"	2-3/4"	34.96	33.44	31.92	30.40
22546	.2460	D	6.248	4-1/4"	2-3/4"	35.11	33.58	32.06	30.53
22551	.2500	1/4" / E	6.350	4-1/4"	2-3/4"	35.29	33.76	32.22	30.69
22556	.2559		6.500	108	70	36.47	34.88	33.30	31.71
22561	.2570	F	6.528	4-3/8"	2-7/8"	38.01	36.36	34.70	33.05
22566	.2610	G	6.629	4-3/8"	2-7/8"	39.04	37.35	35.65	33.95
22571	.2656	17/64"	6.746	4-3/8"	2-7/8"	40.17	38.42	36.68	34.93
22576	.2660	H	6.756	4-3/8"	2-7/8"	41.49	39.69	37.88	36.08
22581	.2720	I	6.909	4-3/8"	2-7/8"	42.73	40.88	39.02	37.16
22586	.2756		7.000	111	73	44.02	42.11	40.19	38.28
22596	.2810	K	7.137	4-7/16"	2-15/16"	45.94	43.95	41.95	39.95
22606	.2900	L	7.366	4-7/16"	2-15/16"	47.98	45.89	43.81	41.72
22631	.3125	5/16"	7.938	4-11/16"	3-3/16"	50.16	47.98	45.80	43.62

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	1-11	12-24	25-49	50-100
22636	.3150		8.000	119	81	53.04	50.73	48.43	46.12
22646	.3230	P	8.204	4-11/16"	3-3/16"	55.46	53.05	50.64	48.23
22656	.3320	Q	8.433	4-15/16"	3-7/16"	57.93	55.41	52.89	50.37
22661	.3346		8.500	125	87	59.13	56.56	53.99	51.42
22666	.3390	R	8.611	4-15/16"	3-7/16"	61.00	58.34	55.69	53.04
22696	.3680	U	9.347	5"	3-1/2"	67.37	64.44	61.51	58.58
22706	.3750	3/8"	9.525	5-1/8"	3-5/8"	67.93	64.98	62.02	59.07
22721	.3906	25/64"	9.921	5-1/4"	3-3/4"	74.70	71.46	68.21	64.96
22726	.3937		10.000	133	95	76.94	73.59	70.25	66.90
22751	.4134		10.500	137	98	90.25	86.33	82.40	78.48
22761	.4331		11.000	138	100	97.28	93.05	88.82	84.59
22766	.4375	7/16"	11.113	5-7/16"	3-15/16"	97.28	93.05	88.82	84.59
22776	.4531	29/64"	11.509	5-9/16"	4-5/16"	98.66	94.37	90.08	85.79
22801	.5000	1/2"	12.700	6"	4-1/2"	103.76	99.25	94.74	90.23
22811	.5156	33/64"	13.096	6"	4-1/2"	131.16	125.46	119.75	114.05
22831	.5512		14.000	156	117	153.78	147.09	140.41	133.72



Series 4100

.0590" - .0820"
(1.499mm - 2.083mm)



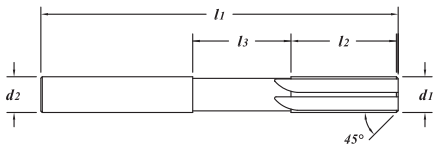
TECH PAGES 282-283

TOLERANCES

d_1	.0590" – .2509" (1.498 – 6.372mm)	+.0002" –.0000" (+.0050 –.0000mm)
	.2510" – .5020" (6.375 – 12.750mm)	+.0003" –.0000" (+.0075 –.0000mm)
d_2	.0590" – .2509" (1.498 – 6.372mm)	+.0002" –.0000" (+.0050 –.0000mm)
	.2510" – .5020" (6.375 – 12.750mm)	+.0003" –.0000" (+.0075 –.0000mm)

Solid Carbide Submicron Grain
Straight - RHC Flutes
Standard 45° Lead Chamfer
Neck diameter is .010" ±.002" less than (d_1) fluted diameter





EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes	1-11	12-24	25-49	50-100
95066	.0590		1.499	.0590"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95069	.0591		1.500	.0591"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95072	.0595	#53	1.511	.0595"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95075	.0600		1.524	.0600"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95078	.0605		1.537	.0605"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95081	.0610		1.549	.0610"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95084	.0615		1.562	.0615"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95087	.0620		1.575	.0620"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95090	.0625	1/16"	1.588	.0625"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95093	.0630		1.600	.0630"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95096	.0635	#52	1.613	.0635"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95099	.0640		1.626	.0640"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95102	.0645		1.638	.0645"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95105	.0650		1.651	.0650"	1-1/2"	3/8"	.250"	4	14.24	13.62	13.00	12.38
95108	.0660		1.676	.0660"	1-3/4"	1/2"	.250"	4	14.24	13.62	13.00	12.38
95111	.0670	#51	1.702	.0670"	1-3/4"	1/2"	.250"	4	14.24	13.62	13.00	12.38
95114	.0680		1.727	.0680"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95117	.0690		1.753	.0690"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95120	.0700	#50	1.778	.0700"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95123	.0710		1.803	.0710"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95126	.0720		1.829	.0720"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95129	.0730	#49	1.854	.0730"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95132	.0740		1.880	.0740"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95135	.0750		1.905	.0750"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95138	.0760	#48	1.930	.0760"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95141	.0770		1.956	.0770"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95144	.0780		1.981	.0780"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95147	.0781	5/64"	1.984	.0781"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95150	.0785	#47	1.994	.0785"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95153	.0787		2.000	.0787"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95156	.0790		2.007	.0790"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95159	.0800		2.032	.0800"	1-3/4"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95162	.0810	#46	2.057	.0810"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95165	.0820	#45	2.083	.0820"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38

† *Metric equivalents are for reference only*

EDP#	*d1* † Diameter Decimal		Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l3* Neck Length	Number Flutes	1-11	12-24	25-49	50-100
95168	.0830		2.108	.0830"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95171	.0840		2.134	.0840"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95174	.0850		2.159	.0850"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95177	.0860	#44	2.184	.0860"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95180	.0870		2.210	.0870"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95183	.0880		2.235	.0880"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95186	.0890	#43	2.261	.0890"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95189	.0900		2.286	.0900"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95192	.0910		2.311	.0910"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95195	.0915		2.324	.0915"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95198	.0920		2.337	.0920"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95201	.0925		2.350	.0925"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95204	.0930		2.362	.0930"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95207	.0935	#42	2.375	.0935"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95210	.0938	3/32"	2.383	.0938"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95213	.0940		2.388	.0940"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95216	.0945		2.400	.0945"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95219	.0950		2.413	.0950"	2"	1/2"	.375"	4	14.24	13.62	13.00	12.38
95222	.0960	#41	2.438	.0960"	2-1/4"	5/8"	.375"	4	16.01	15.31	14.62	13.92
95225	.0970		2.464	.0970"	2-1/4"	5/8"	.375"	4	16.01	15.31	14.62	13.92
95228	.0980	#40	2.489	.0980"	2-1/4"	5/8"	.375"	4	16.01	15.31	14.62	13.92
95231	.0984		2.500	.0984"	2-1/4"	5/8"	.375"	4	16.01	15.31	14.62	13.92
95234	.0990		2.515	.0990"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95237	.0995	#39	2.527	.0995"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95240	.1000		2.540	.1000"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95243	.1010		2.565	.1010"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95246	.1015	#38	2.578	.1015"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95249	.1020		2.591	.1020"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95252	.1030		2.616	.1030"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95255	.1040	#37	2.642	.1040"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95258	.1050		2.667	.1050"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95261	.1060		2.692	.1060"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95264	.1065	#36	2.705	.1065"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95267	.1070		2.718	.1070"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95270	.1080		2.743	.1080"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95273	.1090		2.769	.1090"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95276	.1094	7/64"	2.779	.1094"	2-1/4"	5/8"	.500"	4	16.01	15.31	14.62	13.92
95279	.1100	#35	2.794	.1100"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95282	.1110	#34	2.819	.1110"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95285	.1120		2.845	.1120"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95288	.1130	#33	2.870	.1130"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95291	.1140		2.896	.1140"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95294	.1150		2.921	.1150"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95297	.1160	#32	2.946	.1160"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95300	.1170		2.972	.1170"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95303	.1180		2.997	.1180"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95306	.1181		3.000	.1181"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95309	.1190		3.023	.1190"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03

continued ⟶

Series 4100 *(continued)*

.1200" - .1550"
(3.048mm - 3.937mm)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes	1-11	12-24	25-49	50-100
95312	.1200	#31	3.048	.1200"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95315	.1210		3.073	.1210"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95318	.1220		3.099	.1220"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95321	.1230		3.124	.1230"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95324	.1235		3.137	.1235"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95327	.1240		3.150	.1240"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95330	.1245		3.162	.1245"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95333	.1248		3.170	.1248"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95336	.1250	1/8"	3.175	.1250"	2-1/4"	5/8"	.500"	4	16.13	15.43	14.73	14.03
95339	.1255		3.188	.1255"	2-1/4"	5/8"	.500"	4	16.79	16.06	15.33	14.60
95342	.1260		3.200	.1260"	2-1/4"	5/8"	.500"	4	16.79	16.06	15.33	14.60
95345	.1265		3.213	.1265"	2-1/4"	5/8"	.500"	4	16.79	16.06	15.33	14.60
95348	.1270		3.226	.1270"	2-1/4"	5/8"	.500"	4	16.79	16.06	15.33	14.60
95351	.1275		3.239	.1275"	2-1/4"	5/8"	.500"	4	16.79	16.06	15.33	14.60
95354	.1280		3.251	.1280"	2-1/4"	5/8"	.500"	4	16.79	16.06	15.33	14.60
95357	.1285	#30	3.264	.1285"	2-1/4"	5/8"	.500"	4	16.79	16.06	15.33	14.60
95360	.1290		3.277	.1290"	2-1/4"	5/8"	.500"	4	16.79	16.06	15.33	14.60
95363	.1300		3.302	.1300"	2-1/4"	5/8"	.500"	4	16.79	16.06	15.33	14.60
95366	.1310		3.327	.1310"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95369	.1320		3.353	.1320"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95372	.1330		3.378	.1330"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95375	.1340		3.404	.1340"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95378	.1350		3.429	.1350"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95381	.1360	#29	3.454	.1360"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95384	.1370		3.480	.1370"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95387	.1378		3.500	.1378"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95390	.1380		3.505	.1380"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95393	.1390		3.531	.1390"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95396	.1400		3.556	.1400"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95399	.1405	#28	3.569	.1405"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95402	.1406	9/64"	3.571	.1406"	2-1/2"	3/4"	.500"	4	18.63	17.82	17.01	16.20
95405	.1410		3.581	.1410"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95408	.1420		3.607	.1420"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95411	.1430		3.632	.1430"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95414	.1440	#27	3.658	.1440"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95417	.1450		3.683	.1450"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95420	.1460		3.708	.1460"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95423	.1470	#26	3.734	.1470"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95426	.1480		3.759	.1480"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95429	.1490		3.785	.1490"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95432	.1495	#25	3.797	.1495"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95435	.1500		3.810	.1500"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95438	.1510		3.835	.1510"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95441	.1520	#24	3.861	.1520"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95444	.1530		3.886	.1530"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95447	.1540	#23	3.912	.1540"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95450	.1545		3.924	.1545"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95453	.1550		3.937	.1550"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes	1-11	12-24	25-49	50-100
95456	.1555		3.950	.1555"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95459	.1560		3.962	.1560"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95462	.1562	5/32"	3.967	.1562"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95465	.1565		3.975	.1565"	2-1/2"	3/4"	.500"	4	20.17	19.29	18.42	17.54
95468	.1570	#22	3.988	.1570"	2-1/2"	3/4"	.500"	4	22.43	21.45	20.48	19.50
95471	.1575		4.000	.1575"	2-1/2"	3/4"	.500"	4	22.43	21.45	20.48	19.50
95474	.1580		4.013	.1580"	2-1/2"	3/4"	.500"	4	22.43	21.45	20.48	19.50
95477	.1590	#21	4.039	.1590"	2-1/2"	3/4"	.500"	4	22.43	21.45	20.48	19.50
95480	.1600		4.064	.1600"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95483	.1610	#20	4.089	.1610"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95486	.1620		4.115	.1620"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95489	.1630		4.140	.1630"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95492	.1640		4.166	.1640"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95495	.1650		4.191	.1650"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95498	.1660	#19	4.216	.1660"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95501	.1670		4.242	.1670"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95504	.1680		4.267	.1680"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95507	.1690		4.293	.1690"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95510	.1695	#18	4.305	.1695"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95513	.1700		4.318	.1700"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95516	.1710		4.343	.1710"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95519	.1719	11/64"	4.366	.1719"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95522	.1720		4.369	.1720"	2-3/4"	7/8"	.625"	4	22.43	21.45	20.48	19.50
95525	.1730	#17	4.394	.1730"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95528	.1740		4.420	.1740"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95531	.1750		4.445	.1750"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95534	.1760		4.470	.1760"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95537	.1770	#16	4.496	.1770"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95540	.1772		4.500	.1772"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95543	.1780		4.521	.1780"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95546	.1790		4.547	.1790"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95549	.1800	#15	4.572	.1800"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95552	.1810		4.597	.1810"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95555	.1820	#14	4.623	.1820"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95558	.1830		4.648	.1830"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95561	.1840		4.674	.1840"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95564	.1850	#13	4.699	.1850"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95567	.1855		4.712	.1855"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95570	.1860		4.724	.1860"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95573	.1865		4.737	.1865"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95576	.1870		4.750	.1870"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95577	.1873		4.757	.1873"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95579	.1875	3/16"	4.763	.1875"	2-3/4"	7/8"	.625"	4	23.33	22.32	21.30	20.29
95582	.1880		4.775	.1880"	2-3/4"	7/8"	.625"	4	23.83	22.79	21.76	20.72
95585	.1885		4.788	.1885"	2-3/4"	7/8"	.625"	4	23.83	22.79	21.76	20.72
95588	.1890	#12	4.801	.1890"	2-3/4"	7/8"	.625"	4	23.83	22.79	21.76	20.72
95591	.1900		4.826	.1900"	2-3/4"	7/8"	.625"	4	23.83	22.79	21.76	20.72
95594	.1910	#11	4.851	.1910"	2-3/4"	7/8"	.625"	4	23.83	22.79	21.76	20.72

continued →

Series 4100 *(continued)*

.1920" - .2250"
(4.877mm - 5.715mm)

Z=4 | Z=6 | 0° | 45° | TECH PAGES 282-283

TOLERANCES

d_1	.0590" – .2509" (1.498 – 6.372mm)	+.0002" –.0000" (+.0050 –.0000mm)
	.2510" – .5020" (6.375 – 12.750mm)	+.0003" –.0000" (+.0075 –.0000mm)
d_2	.0590" – .2509" (1.498 – 6.372mm)	+.0002" –.0000" (+.0050 –.0000mm)
	.2510" – .5020" (6.375 – 12.750mm)	+.0003" –.0000" (+.0075 –.0000mm)



Solid Carbide Submicron Grain
Neck diameter is .010" ±.002" less than (d_1) fluted diameter

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes	1-11	12-24	25-49	50-100
95597	.1920		4.877	.1920"	2-3/4"	7/8"	.625"	4	23.83	22.79	21.76	20.72
95600	.1930		4.902	.1930"	2-3/4"	7/8"	.625"	4	23.83	22.79	21.76	20.72
95603	.1935	#10	4.915	.1935"	2-3/4"	7/8"	.625"	4	23.83	22.79	21.76	20.72
95606	.1940		4.928	.1940"	2-3/4"	7/8"	.625"	4	23.83	22.79	21.76	20.72
95609	.1950		4.953	.1950"	2-3/4"	7/8"	.625"	4	23.83	22.79	21.76	20.72
95612	.1960	#9	4.978	.1960"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95615	.1969		5.000	.1969"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95618	.1970		5.004	.1970"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95621	.1980		5.029	.1980"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95624	.1990	#8	5.055	.1990"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95627	.2000		5.080	.2000"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95630	.2010	#7	5.105	.2010"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95633	.2020		5.131	.2020"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95636	.2030		5.156	.2030"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95639	.2031	13/64"	5.159	.2031"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95642	.2040	#6	5.182	.2040"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95645	.2050		5.207	.2050"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95648	.2055	#5	5.220	.2055"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95651	.2060		5.232	.2060"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95654	.2070		5.258	.2070"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95657	.2080		5.283	.2080"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95660	.2090	#4	5.309	.2090"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95663	.2100		5.334	.2100"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95666	.2110		5.359	.2110"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95669	.2120		5.385	.2120"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95672	.2130	#3	5.410	.2130"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95675	.2140		5.436	.2140"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95678	.2150		5.461	.2150"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95681	.2160		5.486	.2160"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95684	.2165		5.500	.2165"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95687	.2170		5.512	.2170"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95690	.2180		5.537	.2180"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95693	.2188	7/32"	5.558	.2188"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95696	.2190		5.563	.2190"	3"	1"	.625"	4	26.94	25.77	24.60	23.43
95699	.2200		5.588	.2200"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95702	.2210	#2	5.613	.2210"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95705	.2220		5.639	.2220"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95708	.2230		5.664	.2230"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95711	.2240		5.690	.2240"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95714	.2250		5.715	.2250"	3"	1"	.625"	4	31.44	30.07	28.71	27.34

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes	1-11	12-24	25-49	50-100
95717	.2260		5.740	.2260"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95720	.2270		5.766	.2270"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95723	.2280	#1	5.791	.2280"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95726	.2290		5.817	.2290"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95729	.2300		5.842	.2300"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95732	.2310		5.867	.2310"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95735	.2320		5.893	.2320"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95738	.2330		5.918	.2330"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95741	.2340	A	5.944	.2340"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95744	.2344	15/64"	5.954	.2344"	3"	1"	.625"	4	31.44	30.07	28.71	27.34
95747	.2350		5.969	.2350"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95750	.2360		5.994	.2360"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95753	.2362		6.000	.2362"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95756	.2370		6.020	.2370"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95759	.2380	B	6.045	.2380"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95762	.2390		6.071	.2390"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95765	.2400		6.096	.2400"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95768	.2410		6.121	.2410"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95771	.2420	C	6.147	.2420"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95774	.2430		6.172	.2430"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95777	.2440		6.198	.2440"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95780	.2450		6.223	.2450"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95783	.2460	D	6.248	.2460"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95786	.2470		6.274	.2470"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95789	.2480		6.299	.2480"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95792	.2485		6.312	.2485"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95795	.2490		6.325	.2490"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95798	.2495		6.337	.2495"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95799	.2498		6.345	.2498"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95801	.2500	1/4" / E	6.350	.2500"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95802	.2502		6.355	.2502"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95804	.2505		6.363	.2505"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95807	.2510		6.375	.2510"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95810	.2515		6.388	.2515"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95813	.2520		6.401	.2520"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95816	.2530		6.426	.2530"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95819	.2540		6.452	.2540"	3"	1"	.625"	4	32.61	31.20	29.78	28.36
95822	.2550		6.477	.2550"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95825	.2559		6.500	.2559"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95828	.2560		6.502	.2560"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95831	.2570	F	6.528	.2570"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95834	.2580		6.553	.2580"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95837	.2590		6.579	.2590"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95840	.2600		6.604	.2600"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95843	.2610	G	6.629	.2610"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95846	.2620		6.655	.2620"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95849	.2630		6.680	.2630"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95852	.2640		6.706	.2640"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69

continued →

Series 4100 *(continued)*

.2650" - .3070"
(6.731mm - 7.798mm)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes	1-11	12-24	25-49	50-100
95855	.2650		6.731	.2650"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95858	.2656	17/64"	6.746	.2656"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95861	.2660	H	6.756	.2660"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95864	.2670		6.782	.2670"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95867	.2680		6.807	.2680"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95870	.2690		6.833	.2690"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95873	.2700		6.858	.2700"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95876	.2710		6.883	.2710"	3-1/4"	1-1/8"	.625"	6	37.59	35.96	34.32	32.69
95879	.2720	I	6.909	.2720"	3-1/4"	1-1/8"	.750"	6	37.96	36.31	34.66	33.01
95882	.2730		6.934	.2730"	3-1/4"	1-1/8"	.750"	6	37.96	36.31	34.66	33.01
95885	.2740		6.960	.2740"	3-1/4"	1-1/8"	.750"	6	37.96	36.31	34.66	33.01
95888	.2750		6.985	.2750"	3-1/4"	1-1/8"	.750"	6	37.96	36.31	34.66	33.01
95891	.2756		7.000	.2756"	3-1/4"	1-1/8"	.750"	6	37.96	36.31	34.66	33.01
95894	.2760		7.010	.2760"	3-1/4"	1-1/8"	.750"	6	37.96	36.31	34.66	33.01
95897	.2770	J	7.036	.2770"	3-1/4"	1-1/8"	.750"	6	37.96	36.31	34.66	33.01
95900	.2780		7.061	.2780"	3-1/4"	1-1/8"	.750"	6	37.96	36.31	34.66	33.01
95903	.2790		7.087	.2790"	3-1/4"	1-1/8"	.750"	6	37.96	36.31	34.66	33.01
95906	.2800		7.112	.2800"	3-1/4"	1-1/8"	.750"	6	37.96	36.31	34.66	33.01
95909	.2810	K	7.137	.2810"	3-1/4"	1-1/8"	.750"	6	37.96	36.31	34.66	33.01
95912	.2812	9/32"	7.142	.2812"	3-1/4"	1-1/8"	.750"	6	37.96	36.31	34.66	33.01
95915	.2820		7.163	.2820"	3-1/4"	1-1/8"	.750"	6	41.09	39.30	37.52	35.73
95918	.2830		7.188	.2830"	3-1/4"	1-1/8"	.750"	6	41.09	39.30	37.52	35.73
95921	.2840		7.214	.2840"	3-1/4"	1-1/8"	.750"	6	41.09	39.30	37.52	35.73
95924	.2850		7.239	.2850"	3-1/4"	1-1/8"	.750"	6	41.09	39.30	37.52	35.73
95927	.2860		7.264	.2860"	3-1/4"	1-1/8"	.750"	6	41.09	39.30	37.52	35.73
95930	.2870		7.290	.2870"	3-1/4"	1-1/8"	.750"	6	41.09	39.30	37.52	35.73
95933	.2880		7.315	.2880"	3-1/4"	1-1/8"	.750"	6	41.09	39.30	37.52	35.73
95936	.2890		7.341	.2890"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95939	.2900	L	7.366	.2900"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95942	.2910		7.391	.2910"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95945	.2920		7.417	.2920"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95948	.2930		7.442	.2930"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95951	.2940		7.468	.2940"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95954	.2950	M	7.493	.2950"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95957	.2953		7.500	.2953"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95960	.2960		7.518	.2960"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95963	.2969	19/64"	7.541	.2969"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95966	.2970		7.544	.2970"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95969	.2980		7.569	.2980"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95972	.2990		7.595	.2990"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95975	.3000		7.620	.3000"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95978	.3010		7.645	.3010"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95981	.3020	N	7.671	.3020"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95984	.3030		7.696	.3030"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95987	.3040		7.722	.3040"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95990	.3050		7.747	.3050"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95993	.3060		7.772	.3060"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
95996	.3070		7.798	.3070"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00

† *Metric equivalents are for reference only*

EDP#	*d1* † Diameter Decimal	Diameter	Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l3* Neck Length	Number Flutes	1-11	12-24	25-49	50-100
95999	.3080		7.823	.3080"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96002	.3090		7.849	.3090"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96005	.3100		7.874	.3100"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96006	.3105		7.887	.3105"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96008	.3110		7.899	.3110"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96011	.3115		7.912	.3115"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96014	.3120		7.925	.3120"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96015	.3123		7.932	.3123"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96017	.3125	5/16"	7.938	.3125"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96021	.3130		7.950	.3130"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96023	.3135		7.963	.3135"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96026	.3140		7.976	.3140"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96029	.3150		8.000	.3150"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96032	.3160	O	8.026	.3160"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96035	.3170		8.052	.3170"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96038	.3180		8.077	.3180"	3-1/4"	1-1/8"	.750"	6	41.40	39.60	37.80	36.00
96041	.3190		8.103	.3190"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96044	.3200		8.128	.3200"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96047	.3210		8.153	.3210"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96050	.3220		8.179	.3220"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96053	.3230	P	8.204	.3230"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96056	.3240		8.230	.3240"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96059	.3250		8.255	.3250"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96062	.3260		8.280	.3260"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96065	.3270		8.306	.3270"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96068	.3280		8.331	.3280"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96071	.3281	21/64"	8.334	.3281"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96074	.3290		8.357	.3290"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96077	.3300		8.382	.3300"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96079	.3310		8.407	.3310"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96083	.3320	Q	8.433	.3320"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96086	.3330		8.458	.3330"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96089	.3340		8.484	.3340"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96092	.3346		8.500	.3346"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96095	.3350		8.509	.3350"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96098	.3360		8.534	.3360"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96101	.3370		8.560	.3370"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96104	.3380		8.585	.3380"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96107	.3390	R	8.611	.3390"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96110	.3400		8.636	.3400"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96113	.3410		8.661	.3410"	3-1/2"	1-1/4"	.750"	6	51.01	48.80	46.58	44.36
96116	.3420		8.687	.3420"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96119	.3430		8.712	.3430"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96122	.3438	11/32"	8.733	.3438"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96125	.3440		8.738	.3440"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96128	.3450		8.763	.3450"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96131	.3460		8.788	.3460"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96134	.3470		8.814	.3470"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96

continued ⟶

Series 4100 *(continued)*

.3480" - .3810"
(8.839mm - 9.677mm)

Z=4 | Z=6 | 0° | 45° | TECH PAGES 282-283

TOLERANCES		
d_1	.0590" – .2509" (1.498 – 6.372mm)	+.0002" –.0000" (+.0050 –.0000mm)
	.2510" – .5020" (6.375 – 12.750mm)	+.0003" –.0000" (+.0075 –.0000mm)
d_2	.0590" – .2509" (1.498 – 6.372mm)	+.0002" –.0000" (+.0050 –.0000mm)
	.2510" – .5020" (6.375 – 12.750mm)	+.0003" –.0000" (+.0075 –.0000mm)



Solid Carbide Submicron Grain
Neck diameter is .010" ±.002" less than (d_1) fluted diameter

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes	1-11	12-24	25-49	50-100
96137	.3480	S	8.839	.3480"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96141	.3490		8.865	.3490"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96143	.3500		8.890	.3500"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96146	.3510		8.915	.3510"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96149	.3520		8.941	.3520"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96152	.3530		8.966	.3530"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96155	.3540		8.992	.3540"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96158	.3543		9.000	.3543"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96161	.3550		9.017	.3550"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96164	.3560		9.042	.3560"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96167	.3570		9.068	.3570"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96170	.3580	T	9.093	.3580"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96173	.3590		9.119	.3590"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96176	.3594	23/64"	9.129	.3594"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96179	.3600		9.144	.3600"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96182	.3610		9.169	.3610"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96185	.3620		9.195	.3620"	3-1/2"	1-1/4"	.750"	6	54.00	51.66	49.31	46.96
96191	.3640		9.246	.3640"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96194	.3650		9.271	.3650"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96197	.3660		9.296	.3660"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96199	.3670		9.322	.3670"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96203	.3680	U	9.347	.3680"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96206	.3690		9.373	.3690"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96209	.3700		9.398	.3700"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96212	.3710		9.423	.3710"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96215	.3720		9.449	.3720"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96218	.3730		9.474	.3730"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96221	.3740		9.500	.3740"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96224	.3745		9.512	.3745"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96225	.3748		9.520	.3748"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96227	.3750	3/8"	9.525	.3750"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96230	.3755		9.538	.3755"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96233	.3760		9.550	.3760"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96236	.3765		9.563	.3765"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96239	.3770	V	9.576	.3770"	3-1/2"	1-1/4"	.750"	6	55.64	53.22	50.80	48.38
96242	.3780		9.601	.3780"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96245	.3790		9.627	.3790"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96248	.3800		9.652	.3800"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96251	.3810		9.677	.3810"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes	1-11	12-24	25-49	50-100
96254	.3820		9.703	.3820"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96257	.3830		9.728	.3830"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96260	.3840		9.754	.3840"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96263	.3850		9.779	.3850"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96266	.3860	W	9.804	.3860"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96269	.3870		9.830	.3870"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96272	.3880		9.855	.3880"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96275	.3890		9.881	.3890"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96278	.3900		9.906	.3900"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96281	.3906	25/64"	9.921	.3906"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96284	.3910		9.931	.3910"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96287	.3920		9.957	.3920"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96290	.3930		9.982	.3930"	3-1/2"	1-1/4"	.750"	6	65.25	62.41	59.58	56.74
96293	.3937		10.000	.3937"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96296	.3940		10.008	.3940"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96299	.3950		10.033	.3950"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96302	.3960		10.058	.3960"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96305	.3970	X	10.084	.3970"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96308	.3980		10.109	.3980"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96311	.3990		10.135	.3990"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96314	.4000		10.160	.4000"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96317	.4010		10.185	.4010"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96319	.4020		10.211	.4020"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96323	.4030		10.236	.4030"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96326	.4040	Y	10.262	.4040"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96329	.4050		10.287	.4050"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96332	.4060		10.312	.4060"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96335	.4062	13/32"	10.317	.4062"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96338	.4070		10.338	.4070"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96341	.4080		10.363	.4080"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96344	.4090		10.389	.4090"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96347	.4100		10.414	.4100"	3-1/2"	1-1/4"	.750"	6	67.56	64.63	61.69	58.75
96350	.4110		10.439	.4110"	3-1/2"	1-1/4"	.750"	6	69.93	66.89	63.85	60.81
96353	.4120		10.465	.4120"	3-1/2"	1-1/4"	.750"	6	69.93	66.89	63.85	60.81
96356	.4130	Z	10.490	.4130"	3-1/2"	1-1/4"	.750"	6	69.93	66.89	63.85	60.81
96359	.4134		10.500	.4134"	3-1/2"	1-1/4"	.750"	6	69.93	66.89	63.85	60.81
96362	.4140		10.516	.4140"	3-1/2"	1-1/4"	.750"	6	69.93	66.89	63.85	60.81
96365	.4150		10.541	.4150"	3-1/2"	1-1/4"	.750"	6	69.93	66.89	63.85	60.81
96366	.4160		10.566	.4160"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96367	.4170		10.592	.4170"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96369	.4190		10.643	.4190"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96374	.4210		10.693	.4210"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96377	.4219	27/64"	10.716	.4219"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96380	.4220		10.719	.4220"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96383	.4230		10.744	.4230"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96386	.4240		10.770	.4240"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81

continued →

Series 4100 *(continued)*

.4250" - .4724"
(10.795mm - 12.000mm)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes	1-11	12-24	25-49	50-100
96389	.4250		10.795	.4250"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96392	.4260		10.820	.4260"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96395	.4270		10.846	.4270"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96398	.4280		10.871	.4280"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96404	.4300		10.922	.4300"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96407	.4310		10.947	.4310"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96410	.4320		10.973	.4320"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96413	.4330		10.998	.4330"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96416	.4331		11.000	.4331"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96419	.4340		11.024	.4340"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96422	.4350		11.049	.4350"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96425	.4360		11.074	.4360"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96428	.4365		11.087	.4365"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96431	.4370		11.100	.4370"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96432	.4373		11.107	.4373"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96434	.4375	7/16"	11.113	.4375"	4"	1-3/8"	.750"	6	69.93	66.89	63.85	60.81
96437	.4380		11.125	.4380"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96440	.4385		11.138	.4385"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96443	.4390		11.151	.4390"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96446	.4400		11.176	.4400"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96449	.4410		11.201	.4410"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96455	.4430		11.252	.4430"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96458	.4440		11.278	.4440"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96461	.4450		11.303	.4450"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96467	.4470		11.354	.4470"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96470	.4480		11.379	.4480"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96473	.4490		11.405	.4490"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96476	.4500		11.430	.4500"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96479	.4510		11.455	.4510"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96485	.4528		11.500	.4528"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96488	.4530		11.506	.4530"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96491	.4531	29/64"	11.509	.4531"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96494	.4540		11.532	.4540"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96497	.4550		11.557	.4550"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96500	.4560		11.582	.4560"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96503	.4570		11.608	.4570"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96506	.4580		11.633	.4580"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96512	.4600		11.684	.4600"	4"	1-3/8"	.750"	6	74.96	71.70	68.44	65.18
96515	.4610		11.709	.4610"	4"	1-3/8"	.750"	6	77.21	73.85	70.50	67.14
96527	.4650		11.811	.4650"	4"	1-3/8"	.750"	6	77.21	73.85	70.50	67.14
96530	.4660		11.836	.4660"	4"	1-3/8"	.750"	6	77.21	73.85	70.50	67.14
96533	.4670		11.862	.4670"	4"	1-3/8"	.750"	6	77.21	73.85	70.50	67.14
96539	.4688	15/32"	11.908	.4688"	4"	1-3/8"	.750"	6	77.21	73.85	70.50	67.14
96542	.4690		11.913	.4690"	4"	1-3/8"	.750"	6	77.21	73.85	70.50	67.14
96545	.4700		11.938	.4700"	4"	1-1/2"	.750"	6	77.21	73.85	70.50	67.14
96548	.4710		11.963	.4710"	4"	1-1/2"	.750"	6	77.21	73.85	70.50	67.14
96551	.4720		11.989	.4720"	4"	1-1/2"	.750"	6	77.21	73.85	70.50	67.14
96554	.4724		12.000	.4724"	4"	1-1/2"	.750"	6	77.21	73.85	70.50	67.14

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes	1-11	12-24	25-49	50-100
96557	.4730		12.014	.4730"	4"	1-1/2"	.750"	6	77.21	73.85	70.50	67.14
96561	.4740		12.040	.4740"	4"	1-1/2"	.750"	6	77.21	73.85	70.50	67.14
96563	.4750		12.065	.4750"	4"	1-1/2"	.750"	6	77.21	73.85	70.50	67.14
96566	.4760		12.090	.4760"	4"	1-1/2"	.750"	6	77.21	73.85	70.50	67.14
96569	.4770		12.116	.4770"	4"	1-1/2"	.750"	6	77.21	73.85	70.50	67.14
96572	.4780		12.141	.4780"	4"	1-1/2"	.750"	6	77.21	73.85	70.50	67.14
96578	.4800		12.192	.4800"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96581	.4810		12.217	.4810"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96584	.4820		12.243	.4820"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96590	.4840		12.294	.4840"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96593	.4844	31/64"	12.304	.4844"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96596	.4850		12.319	.4850"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96602	.4870		12.370	.4870"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96608	.4890		12.421	.4890"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96617	.4920		12.497	.4920"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96620	.4921		12.500	.4921"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96623	.4930		12.522	.4930"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96629	.4950		12.573	.4950"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96632	.4960		12.598	.4960"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96635	.4970		12.624	.4970"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96638	.4980		12.649	.4980"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96641	.4990		12.675	.4990"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96644	.4995		12.687	.4995"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96645	.4998		12.695	.4998"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96647	.5000	1/2"	12.700	.5000"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96650	.5005		12.713	.5005"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96653	.5010		12.725	.5010"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61
96656	.5020		12.751	.5020"	4"	1-1/2"	.750"	6	78.90	75.47	72.04	68.61

Series 4100 (Metric)

1.990mm - 10.040mm
(.07835" - .39528")

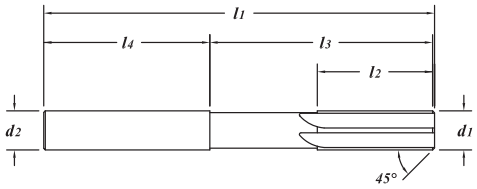
Z=4 | Z=6 | 0° | 45° | TECH PAGES 283

TOLERANCES

d_1	1.500 – 6.372mm	+.005mm –.000
	6.375 – 12.750mm	+.0075mm –.0000
d_2	1.500 – 6.372mm	+.005mm –.000
	6.375 – 12.750mm	+.0075mm –.0000

Solid Carbide Submicron Grain
Straight - RHC Flutes
Standard 45° Lead Chamfer
Neck diameter is 0.25mm ±0.05 less than (d_1) fluted diameter





EDP#	d_1 Decimal	d_1 Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	l_4 Shank Length	Number Flutes	1-11	12-24	25-49	50-100
96659	.07835	1.990	1.990	50	12	32	18	4	14.69	14.05	13.41	12.77
96662	.07874	2.000	2.000	50	12	32	18	4	14.69	14.05	13.41	12.77
96665	.07913	2.010	2.010	50	12	32	18	4	14.69	14.05	13.41	12.77
96668	.07953	2.020	2.020	50	12	32	18	4	14.69	14.05	13.41	12.77
96671	.11772	2.990	2.990	65	16	36	29	4	18.03	17.25	16.46	15.68
96674	.11811	3.000	3.000	65	16	36	29	4	18.03	17.25	16.46	15.68
96677	.11850	3.010	3.010	65	16	36	29	4	18.03	17.25	16.46	15.68
96680	.11890	3.020	3.020	65	16	36	29	4	18.03	17.25	16.46	15.68
96683	.15709	3.990	3.990	75	20	45	30	4	24.37	23.31	22.25	21.19
96686	.15748	4.000	4.000	75	20	45	30	4	24.37	23.31	22.25	21.19
96689	.15787	4.010	4.010	75	20	45	30	4	24.37	23.31	22.25	21.19
96692	.15827	4.020	4.020	75	20	45	30	4	24.37	23.31	22.25	21.19
96695	.15866	4.030	4.030	75	20	45	30	4	24.37	23.31	22.25	21.19
96698	.19646	4.990	4.990	100	25	60	40	4	31.20	29.84	28.49	27.13
96701	.19685	5.000	5.000	100	25	60	40	4	31.20	29.84	28.49	27.13
96704	.19724	5.010	5.010	100	25	60	40	4	31.20	29.84	28.49	27.13
96707	.19764	5.020	5.020	100	25	60	40	4	31.20	29.84	28.49	27.13
96710	.19803	5.030	5.030	100	25	60	40	4	31.20	29.84	28.49	27.13
96713	.23583	5.990	5.990	100	25	60	40	4	37.89	36.25	34.60	32.95
96716	.23622	6.000	6.000	100	25	60	40	4	37.89	36.25	34.60	32.95
96719	.23661	6.010	6.010	100	25	60	40	4	37.89	36.25	34.60	32.95
96722	.23701	6.020	6.020	100	25	60	40	4	37.89	36.25	34.60	32.95
96725	.27559	7.000	7.000	100	25	60	40	6	43.72	41.82	39.92	38.02
96728	.31457	7.990	7.990	120	32	75	45	6	52.58	50.29	48.01	45.72
96731	.31496	8.000	8.000	120	32	75	45	6	52.58	50.29	48.01	45.72
96734	.31535	8.010	8.010	120	32	75	45	6	52.58	50.29	48.01	45.72
96737	.31575	8.020	8.020	120	32	75	45	6	52.58	50.29	48.01	45.72
96740	.31614	8.030	8.030	120	32	75	45	6	52.58	50.29	48.01	45.72
96743	.35433	9.000	9.000	120	32	75	45	6	66.19	63.32	60.44	57.56
96746	.39291	9.980	9.980	130	32	75	55	6	77.73	74.35	70.97	67.59
96749	.39331	9.990	9.990	130	32	75	55	6	77.73	74.35	70.97	67.59
96752	.39370	10.000	10.000	130	32	75	55	6	81.79	78.23	74.68	71.12
96755	.39409	10.010	10.010	130	32	75	55	6	81.79	78.23	74.68	71.12
96758	.39449	10.020	10.020	130	32	75	55	6	81.79	78.23	74.68	71.12
96761	.39488	10.030	10.030	130	32	75	55	6	81.79	78.23	74.68	71.12
96764	.39528	10.040	10.040	130	32	75	55	6	81.79	78.23	74.68	71.12

EDP#	*d1* Decimal	*d1* Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l3* Reach Length	*l4* Shank Length	Number Flutes	1-11	12-24	25-49	50-100
96767	.47165	11.980	11.980	150	40	100	50	6	93.63	89.56	85.49	81.42
96770	.47205	11.990	11.990	150	40	100	50	6	93.63	89.56	85.49	81.42
96773	.47244	12.000	12.000	150	40	100	50	6	93.63	89.56	85.49	81.42
96776	.47283	12.010	12.010	150	40	100	50	6	93.63	89.56	85.49	81.42
96779	.47323	12.020	12.020	150	40	100	50	6	93.63	89.56	85.49	81.42
96782	.47362	12.030	12.030	150	40	100	50	6	93.63	89.56	85.49	81.42



Reamer Manufacturing



LHS / RHC

STR / RHC

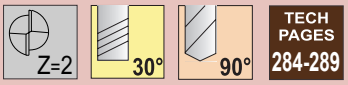
RHS / RHC

Special Reamers - Solid Carbide - 2 Week Delivery

Solid Carbide Submicron Grain
All reamers furnished with a standard 45° Lead Chamfer
All reamers furnished with a standard neck for reach
Neck diameter is .010" ±.002" less than fluted diameter

Diameter Decimal	Diameter Metric	Overall Length	Flute Length	No. of Flutes
.0590" - .0650"	1.499 - 1.651	1-1/2"	3/8"	4
.0660" - .0800"	1.676 - 2.032	1-3/4"	1/2"	4
.0810" - .0950"	2.057 - 2.413	2"	1/2"	4
.0960" - .1300"	2.438 - 3.302	2-1/4"	5/8"	4
.1310" - .1590"	3.327 - 4.039	2-1/2"	3/4"	4
.1600" - .1950"	4.064 - 4.953	2-3/4"	7/8"	4
.1960" - .2540"	4.978 - 6.452	3"	1"	4
.2550" - .3180"	6.477 - 8.077	3-1/4"	1-1/8"	6
.3190" - .4150"	8.103 - 10.541	3-1/2"	1-1/4"	6
.4160" - .4690"	10.566 - 11.913	4"	1-3/8"	6
.4700" - .5020"	11.938 - 12.751	4"	1-1/2"	6
.5030" - .5700"	12.776 - 14.478	4"	1-5/8"	6
.5710" - .7500"	14.503 - 19.050	4"	1-3/4"	6

Series 152M

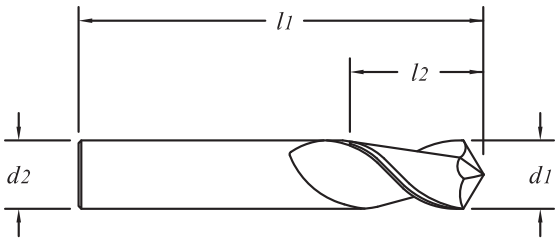


TOLERANCES	
d_1	+.000" –.002" (+.000 /–.050mm)
d_2	h6

Drill/End Mill

Solid submicron grain carbide
Included angle to a point - center cutting
Tools do not have drill point geometry
Extremely versatile
Point tolerance ±0°30'





MATERIAL HARDNESS (Rc)
70
35
0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
57200	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	11.18	10.69	10.21	9.72
57210	.1875	3/16"	4.763	3/16"	2"	5/8"	14.73	14.09	13.45	12.81
57220	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	18.30	17.50	16.71	15.91
57230	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	23.99	22.95	21.90	20.86
57240	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	29.36	28.08	26.81	25.53
57250	.4375	7/16"	11.113	7/16"	2-3/4"	1"	36.13	34.56	32.99	31.42
57260	.5000	1/2"	12.700	1/2"	3"	1"	54.65	52.27	49.90	47.52
57270	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	88.39	84.55	80.70	76.86
57280	.7500	3/4"	19.050	3/4"	4"	1-1/2"	130.08	124.42	118.77	113.11

† *Metric equivalents are for reference only*

TOLERANCES

d_1	+.000" –.002" (+.000 /–.050mm)
d_2	h6

Z=2 | 30° | 90° | TECH PAGES 284-289

Drill/End Mill

TiALN Coating

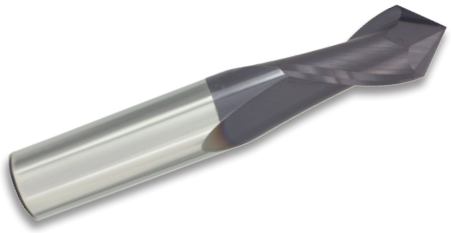
Solid submicron grain carbide

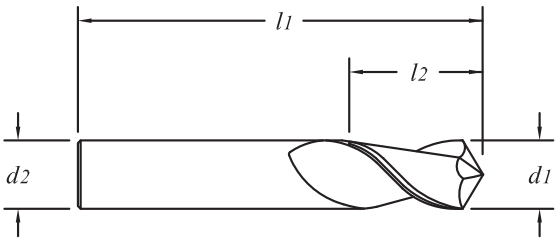
Included angle to a point - center cutting

Tools do not have drill point geometry

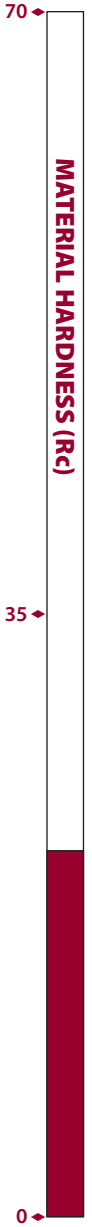
Extremely versatile

Point tolerance ±0°30'





EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
57207	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	13.77	13.17	12.57	11.97
57217	.1875	3/16"	4.763	3/16"	2"	5/8"	17.32	16.57	15.81	15.06
57227	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	23.62	22.59	21.57	20.54
57237	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	32.02	30.62	29.23	27.84
57247	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	37.39	35.76	34.14	32.51
57257	.4375	7/16"	11.113	7/16"	2-3/4"	1"	45.21	43.24	41.28	39.31
57267	.5000	1/2"	12.700	1/2"	3"	1"	63.77	61.00	58.22	55.45
57277	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	101.52	97.11	92.69	88.28
57287	.7500	3/4"	19.050	3/4"	4"	1-1/2"	145.59	139.26	132.93	126.60



Series 154M

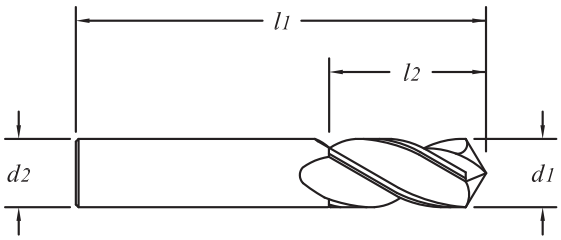
TOLERANCES	
d_1	+.000" –.002" (+.000 /–.050mm)
d_2	h6

Z=4 | 30° | 60° | 82° | 90° | 100° | TECH PAGES 284-289

Drill/End Mill

Solid submicron grain carbide
Included angle to a point - center cutting
Tools do not have drill point geometry
Extremely versatile
Point tolerance ±0°30'





MATERIAL HARDNESS (Rc)
70
35
0

60° EDP#	82° EDP#	90° EDP#	100° EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
-	57344	58198	-	.1181		3.000	3.0	38	12	11.75	11.24	10.73	10.22
-	57346	58200	57386	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	11.18	10.69	10.21	9.72
-	-	58202	57388	.1575		4.000	4.0	50	14	15.47	14.80	14.12	13.45
-	57350	58210	57390	.1875	3/16"	4.763	3/16"	2"	5/8"	14.73	14.09	13.45	12.81
-	57352	58212	57392	.1969		5.000	5.0	65	16	18.76	17.94	17.13	16.31
57314	57354	58214	57394	.2362		6.000	6.0	65	19	19.23	18.39	17.56	16.72
57316	57356	58220	57396	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	18.30	17.50	16.71	15.91
57318	57358	58230	57398	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	23.99	22.95	21.90	20.86
57320	-	58232	57400	.3150		8.000	8.0	65	22	25.24	24.15	23.05	21.95
57322	57362	58240	57402	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	29.36	28.08	26.81	25.53
57324	57364	58242	57404	.3937		10.000	10.0	70	25	36.04	34.47	32.91	31.34
57326	57366	58250	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"	36.13	34.56	32.99	31.42
57328	-	58252	57408	.4724		12.000	12.0	75	25	57.40	54.90	52.41	49.91
57330	57370	58260	57410	.5000	1/2"	12.700	1/2"	3"	1"	54.65	52.27	49.90	47.52
57332	57372	58270	57412	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	88.39	84.55	80.70	76.86
57334	-	58272	57414	.6299		16.000	16.0	88	32	92.78	88.75	84.71	80.68
57336	57376	58280	57416	.7500	3/4"	19.050	3/4"	4"	1-1/2"	130.08	124.42	118.77	113.11
-	57378	58282	-	.7874		20.000	20.0	100	38	183.11	175.15	167.19	159.23

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 /–.050mm)
d_2	h6

Z=4 | 30° | 60° | 82° | 90° | 100° | TECH PAGES 284-289

Drill/End Mill

TiALN Coating

Solid submicron grain carbide

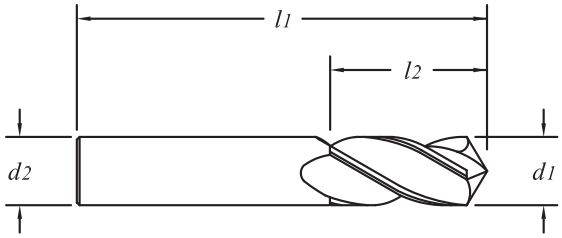
Included angle to a point - center cutting

Tools do not have drill point geometry

Extremely versatile

Point tolerance ±0°30'





60° EDP#	82° EDP#	90° EDP#	100° EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
-	-	58205	-	.1181		3.000	3.0	38	12	14.33	13.71	13.08	12.46
-	58346	58207	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	13.77	13.17	12.57	11.97
-	58348	58209	58388	.1575		4.000	4.0	50	14	18.06	17.27	16.49	15.70
-	58350	58217	58390	.1875	3/16"	4.763	3/16"	2"	5/8"	17.32	16.57	15.81	15.06
-	-	58219	-	.1969		5.000	5.0	65	16	24.09	23.05	22.00	20.95
58314	58354	58221	58394	.2362		6.000	6.0	65	19	24.56	23.50	22.43	21.36
58316	58356	58227	58396	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	23.62	22.59	21.57	20.54
58318	58358	58237	58398	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	32.02	30.62	29.23	27.84
58320	-	58239	58400	.3150		8.000	8.0	65	22	33.21	31.77	30.32	28.88
58322	58362	58247	58402	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	37.39	35.76	34.14	32.51
58324	58364	58249	58404	.3937		10.000	10.0	70	25	45.14	43.18	41.21	39.25
58326	58366	58257	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"	45.21	43.24	41.28	39.31
58328	-	58259	58408	.4724		12.000	12.0	75	25	66.47	63.58	60.69	57.80
58330	58370	58267	58410	.5000	1/2"	12.700	1/2"	3"	1"	63.77	61.00	58.22	55.45
58332	58372	58277	58412	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	101.52	97.11	92.69	88.28
-	58374	58279	-	.6299		16.000	16.0	88	32	105.94	101.33	96.73	92.12
58336	58376	58287	58416	.7500	3/4"	19.050	3/4"	4"	1-1/2"	145.59	139.26	132.93	126.60
-	58378	58289	-	.7874		20.000	20.0	100	38	206.05	197.09	188.13	179.17

MATERIAL HARDNESS (Rc)

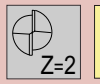
70

35

0

Series 152DA

TOLERANCES	
d_1	+.000" –.002" (+.000 /–.050mm)
d_2	h6







TECH PAGES 284-289

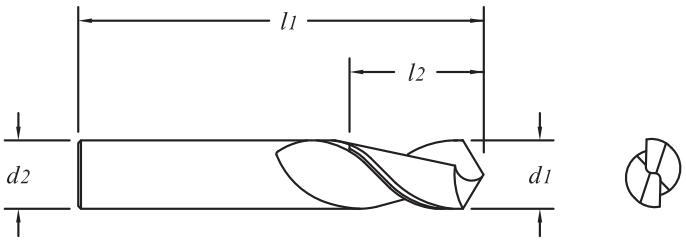
Recommended for drilling and milling in mild steels and non-ferrous materials

Drill/End Mill

TiALN Coating

Solid submicron grain carbide
Four-facet drill point geometry
Extremely versatile
Point tolerance ±1°





MATERIAL HARDNESS (Rc)
70
35
0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
57421	.1181		3.000	3.0	38	12	14.33	13.71	13.08	12.46
57423	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	13.77	13.17	12.57	11.97
57425	.1575		4.000	4.0	50	14	18.06	17.27	16.49	15.70
57427	.1875	3/16"	4.762	3/16"	2"	5/8"	17.32	16.57	15.81	15.06
57429	.1969		5.000	5.0	65	16	24.09	23.05	22.00	20.95
57431	.2362		6.000	6.0	65	19	24.56	23.50	22.43	21.36
57433	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	23.62	22.59	21.57	20.54
57435	.3125	5/16"	7.937	5/16"	2-1/2"	7/8"	32.02	30.62	29.23	27.84
57437	.3150		8.000	8.0	65	22	33.21	31.77	30.32	28.88
57439	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	37.39	35.76	34.14	32.51
57441	.3937		10.000	10.0	70	25	45.14	43.18	41.21	39.25
57443	.4375	7/16"	11.112	7/16"	2-3/4"	1"	45.21	43.24	41.28	39.31
57445	.4724		12.000	12.0	75	25	66.47	63.58	60.69	57.80
57447	.5000	1/2"	12.700	1/2"	3"	1"	63.77	61.00	58.22	55.45
57449	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	101.52	97.11	92.69	88.28
57451	.6299		16.000	16.0	88	32	105.94	101.33	96.73	92.12
57453	.7500	3/4"	19.050	3/4"	4"	1-1/2"	145.59	139.26	132.93	126.60
57455	.7874		20.000	20.0	100	38	206.05	197.09	188.13	179.17

† *Metric equivalents are for reference only*


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HARD CARBON COATING

An addition to the Garr Tool lineup of quality coating options

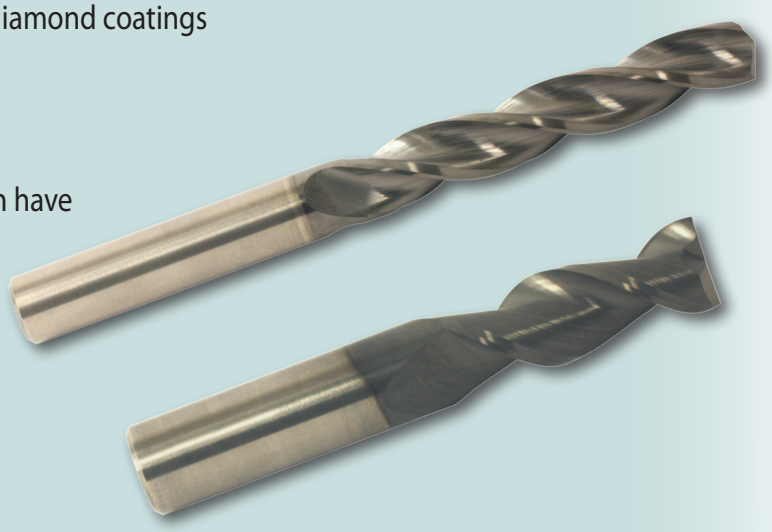


Recommended applications:

Aluminum and aluminum alloys with up to 12% silicon
Non-ferrous metals such as copper, bronze, and platinum
Composites such as GRP, CFK, CFRP, and PEEK
Applications involving combined abrasion and adhesion

Advantages of using Hard Carbon:

Excellent wear resistance due to high hardness
Sharp cutting edges in comparison with diamond coatings
Very good adhesion
Thin, smooth, high density
Can be used on end mills and drills
Most standard products in our catalog can have Hard Carbon added in 2 weeks



**** Sample Pricing:***

<u>50-100 pc. pricing column</u>

<13157> 230MA 1/4" TiAlN Coated - $17.46 each
<13150> 230M 1/4" Hard Carbon Coated - $24.24 each
<10158> 210D 1/4" Diamond Coated - $103.39 each

* Pricing listed as of 2/1/2019, and is meant for comparison only.
For specific and current pricing, please contact our sales office to request a quote.

Solid micrograin carbide tested for drilling of carbon fiber and glass-filled composites

These specials are built to order uncoated in two weeks

Having a quality dust collection system helps prolong tool life and quality of parts

'Clamping' of part to table can cause stress fractures in material



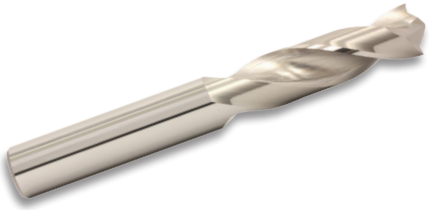
SERIES 780 - 8-FACET POINT

Double angle drill point geometry reduces cutting forces to eliminate exit burrs

Works well in carbon fiber especially when the honeycomb core is either titanium or aluminum

Works in glass-filled epoxy, harder plastics, softer steels, CFRP (Carbon Fiber Reinforced Plastic), and aluminum

Can be coated with a variety of coatings depending on your application



SERIES 790 - MODIFIED BRAD POINT

Designed for drilling CFRP

Excellent entry and exit hole quality

Designed to prevent delamination

Good for drilling panels and paper honeycomb core

Coatings of choice for this drill are Polycrystalline Diamond, Amorphous Diamond / Hard Carbon (DLC, TAC), or TiAlN-based for extra tool life



SERIES 805 - CARBON FIBER

Designed for drilling CFRP and plastics

Good in both multidirectional fibers and unidirectional fibers

90° center cutting point for better entry and exit hole with little to no delamination

Parabolic flute shape for less tool pressure on the material, and also for better chip flow in soft plastics

Add Hard Carbon coating for longer tool life than uncoated tools, and shorter lead times than Diamond coating

ROUTERS

Solid micrograin carbide tested for milling of carbon fiber and glass-filled composites

These specials are built to order uncoated in two weeks

There are many challenges to machining composite materials. Keeping the material from delaminating is key. Our tools have higher rake angles and combinations of left hand and/or right hand spirals to help eliminate 'fraying' of the laminate.

Please specify what type of end cut your job requires (*i.e. - no end cut, burr type, end mill type, or drill point*)

Having a quality dust collection system helps prolong tool life and quality of parts

'Clamping' of part to table can cause stress fractures in material

Please specify what coating, if any, your job requires:

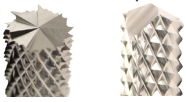
- Polycrystalline Diamond
- Amorphous Diamond / Hard Carbon
- AlCrN Coated



SERIES 700 - FIBERGLASS ROUTER

For cutting glass-filled epoxies

End cut examples



Burr Type | Drill Point



SERIES 701 - KEVLAR ROUTER

Gives a clean edge when trimming Aramid Fibers (Kevlar)

End cut examples

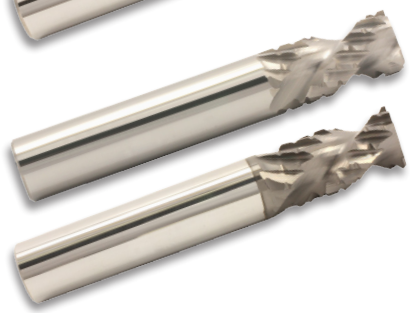


Burr Type | Drill Point



SERIES 702 - CARBON FIBER ROUTER

For trim milling of single-layer panels



SERIES 703 - CARBON FIBER ROUTER

For rough cutting of stacked panels with or without honeycomb cores

Solid micrograin carbide tested for milling of carbon fiber and glass-filled composites

These specials are built to order uncoated in two weeks

There are many challenges to machining composite materials. Keeping the material from delaminating is key. Our tools have higher rake angles and combinations of left hand and/or right hand spirals to help eliminate 'fraying' of the laminate.

Please specify what type of end cut your job requires (*i.e. - no end cut, burr type, end mill type, or drill point*)

Having a quality dust collection system helps prolong tool life and quality of parts

'Clamping' of part to table can cause stress fractures in material

Please specify what coating, if any, your job requires:

- Polycrystalline Diamond
- Amorphous Diamond / Hard Carbon
- AlCrN Coated



SERIES 704 - COMPRESSION ROUTER - 4 FLUTE

For profile milling of carbon fiber





SERIES 705 - COMPRESSION ROUTER - 2 FLUTE

For slotting of carbon fiber





SERIES 706 - SINGLE FLUTE ROUTER

For aluminum and soft plastics



Series ARC

.1575" - .3750"
(4.000mm - 9.525mm)

Z=3 | VAR | 45° | TECH PAGES 266

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
d_3	+.000" –.005" (+.000 –.127mm)

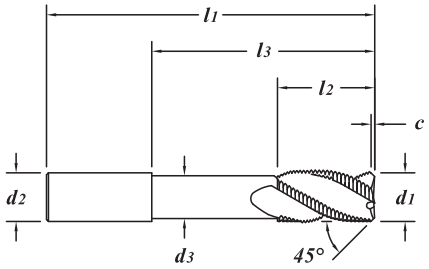
Recommended for aluminum and non-ferrous materials

Aluminum Knuckle Rougher / Ripper

Bright finish - Uncoated

Solid submicron grain carbide end mill - center cutting
Wave knuckle design to break up chips
Each flute has individual helix angle to break up harmonics
Reduces tool pressure requiring less machine power
Designed for roughing Aluminum Alloys
Ideal for use in extruded Aluminum



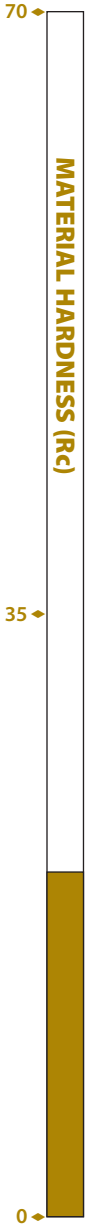


MATERIAL HARDNESS (Rc)
70
35
0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	c Chamfer Length	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
46219	.1575		4.000	6.0	50	8	0.30	-	-	32.86	31.43	30.00	28.57
46222	.1575		4.000	6.0	50	12	0.30	-	-	32.86	31.43	30.00	28.57
46225	.1575		4.000	6.0	65	10	0.30	30	3.2	37.61	35.97	34.34	32.70
46228	.1575		4.000	6.0	75	15	0.30	40	3.2	49.50	47.34	45.19	43.04
46231	.1875	3/16"	4.763	3/16"	2"	5/16"	.015"	-	-	27.88	26.66	25.45	24.24
46234	.1875	3/16"	4.763	3/16"	2"	9/16"	.015"	-	-	27.88	26.66	25.45	24.24
46237	.1875	3/16"	4.763	3/16"	3"	1"	.015"	-	-	39.01	37.31	35.62	33.92
46240	.1875	3/16"	4.763	3/16"	3"	1/2"	.015"	1-1/2"	.160"	42.45	40.60	38.76	36.91
46243	.2362		6.000	6.0	50	12	0.50	-	-	32.60	31.19	29.77	28.35
46246	.2362		6.000	6.0	65	19	0.50	-	-	35.31	33.77	32.24	30.70
46249	.2362		6.000	6.0	100	20	0.50	60	5.2	50.07	47.89	45.72	43.54
46252	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	-	31.17	29.81	28.46	27.10
46255	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-	34.88	33.36	31.85	30.33
46258	.2500	1/4"	6.350	1/4"	4"	1-1/2"	.020"	-	-	45.02	43.07	41.11	39.15
46261	.2500	1/4"	6.350	1/4"	4"	1"	.020"	2"	.220"	48.47	46.37	44.26	42.15
46264	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-	-	37.19	35.57	33.96	32.34
46267	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	-	38.61	36.93	35.25	33.57
46270	.3125	5/16"	7.938	5/16"	4"	1-1/2"	.020"	-	-	55.30	52.90	50.49	48.09
46273	.3125	5/16"	7.938	5/16"	4"	1"	.020"	2"	.285"	58.74	56.19	53.63	51.08
46276	.3150		8.000	8.0	50	12	0.50	-	-	38.09	36.43	34.78	33.12
46279	.3150		8.000	8.0	65	22	0.50	-	-	39.57	37.85	36.13	34.41
46282	.3150		8.000	8.0	100	40	0.50	-	-	57.25	54.76	52.27	49.78
46285	.3150		8.000	8.0	100	20	0.50	60	7.2	60.69	58.05	55.41	52.77
46288	.3150		8.000	8.0	150	40	0.50	100	7.2	80.55	77.04	73.54	70.04
46291	.3750	3/8"	9.525	3/8"	2"	1/2"	.025"	-	-	43.40	41.51	39.63	37.74
46294	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.025"	-	-	48.22	46.12	44.03	41.93
46297	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.025"	-	-	56.35	53.90	51.45	49.00
46300	.3750	3/8"	9.525	3/8"	4"	1-5/8"	.025"	-	-	60.58	57.95	55.31	52.68
46303	.3750	3/8"	9.525	3/8"	4"	1"	.025"	2"	.345"	64.02	61.24	58.45	55.67
46306	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.025"	4"	.345"	82.21	78.64	75.06	71.49

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	c Chamfer Length	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
46309	.3937		10.000	10.0	50	16	0.50	-	-	53.66	51.33	48.99	46.66
46312	.3937		10.000	10.0	70	22	0.50	-	-	56.58	54.12	51.66	49.20
46315	.3937		10.000	10.0	100	40	0.50	-	-	70.48	67.42	64.35	61.29
46318	.3937		10.000	10.0	100	20	0.50	60	9.2	73.92	70.71	67.49	64.28
46321	.3937		10.000	10.0	150	40	0.50	100	9.2	92.71	88.68	84.65	80.62
46324	.4724		12.000	12.0	65	19	0.80	-	-	61.69	59.00	56.32	53.64
46327	.4724		12.000	12.0	75	32	0.80	-	-	69.75	66.72	63.68	60.65
46330	.4724		12.000	12.0	100	50	0.80	-	-	81.77	78.21	74.66	71.10
46333	.4724		12.000	12.0	100	25	0.80	60	11.2	85.20	81.50	77.79	74.09
46336	.4724		12.000	12.0	150	40	0.80	100	11.2	115.40	110.39	105.37	100.35
46339	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-	58.72	56.17	53.61	51.06
46342	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	66.55	63.66	60.76	57.87
46345	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-	77.81	74.43	71.04	67.66
46348	.5000	1/2"	12.700	1/2"	4"	1"	.030"	2"	.470"	81.25	77.72	74.18	70.65
46351	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"	4"	.470"	113.63	108.69	103.75	98.81
46354	.6250	5/8"	15.875	5/8"	3"	3/4"	.035"	-	-	104.17	99.64	95.11	90.58
46357	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.035"	-	-	107.23	102.56	97.90	93.24
46360	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.035"	-	-	113.59	108.65	103.71	98.77
46363	.6250	5/8"	15.875	5/8"	4"	1"	.035"	2"	.595"	117.04	111.95	106.86	101.77
46366	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	3"	.595"	164.39	157.25	150.10	142.95
46369	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	4"	.595"	164.39	157.25	150.10	142.95
46372	.6299		16.000	16.0	75	19	1.00	-	-	109.63	104.86	100.10	95.33
46375	.6299		16.000	16.0	88	32	1.00	-	-	112.46	107.57	102.68	97.79
46378	.6299		16.000	16.0	100	50	1.00	-	-	120.39	115.16	109.92	104.69
46381	.6299		16.000	16.0	100	20	1.00	50	15.2	123.83	118.45	113.06	107.68
46384	.6299		16.000	16.0	150	40	1.00	100	15.2	166.15	158.93	151.70	144.48
46387	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.040"	-	-	156.81	150.00	143.18	136.36
46390	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.040"	-	-	219.75	210.20	200.64	191.09
46393	.7500	3/4"	19.050	3/4"	4"	7/8"	.040"	2"	.720"	160.26	153.30	146.33	139.36
46396	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	3"	.720"	264.58	253.08	241.57	230.07
46399	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	4"	.720"	264.58	253.08	241.57	230.07
46402	.7874		20.000	20.0	100	22	1.00	-	-	221.26	211.64	202.02	192.40
46405	.7874		20.000	20.0	100	40	1.00	-	-	221.26	211.64	202.02	192.40
46408	.7874		20.000	20.0	100	30	1.00	50	19.2	224.70	214.93	205.16	195.39
46411	.7874		20.000	20.0	150	40	1.00	100	19.2	274.45	262.52	250.58	238.65
46414	1.000	1"	25.400	1"	4"	1-1/2"	.040"	-	-	266.27	254.69	243.12	231.54
46417	1.000	1"	25.400	1"	5"	2"	.040"	-	-	329.49	315.16	300.84	286.51
46420	1.000	1"	25.400	1"	6"	2"	.040"	3-1/2"	.970"	442.73	423.48	404.23	384.98
46423	1.000	1"	25.400	1"	7"	2"	.040"	4-1/2"	.970"	582.21	556.90	531.58	506.27



Series VHM

.1575" - .3543"
(4.000mm - 9.000mm)

Z=4 | 30° | 45° | TECH PAGES 267

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
d_3	+.000" –.005" (+.000 –.127mm)

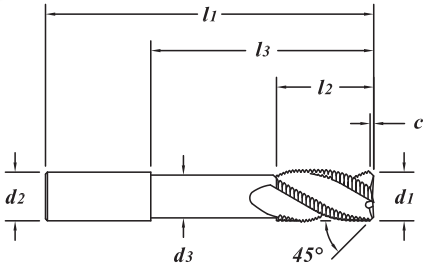
Recommended for stainless steel, inconel, pH materials, cold rolled steel, titanium, cast iron and tool steels under 40Rc

Staggered Flute Knuckle Rougher / Ripper

AlTiN Coating

Solid submicron grain carbide end mill - center cutting
State-of-the-art rougher using VRX technology
Reduces tool pressure for more aggressive machining
Recommended for pocket milling
Variable flute geometry



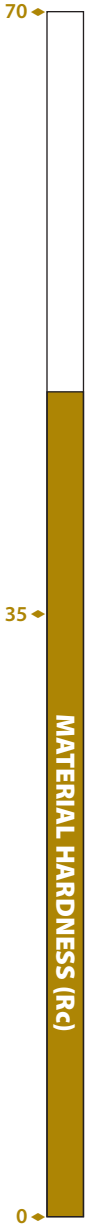


MATERIAL HARDNESS (Rc)
70
35
0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	c Chamfer Length	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
49450	.1575		4.000	6.0	50	8	0.30	-	-	36.36	34.78	33.20	31.62
49455	.1575		4.000	6.0	50	12	0.30	-	-	36.36	34.78	33.20	31.62
49460	.1575		4.000	6.0	65	10	0.30	30	3.4	42.27	40.44	38.60	36.76
49465	.1575		4.000	6.0	75	15	0.30	40	3.4	54.18	51.82	49.47	47.11
49470	.1875	3/16"	4.763	3/16"	2"	5/16"	.015"	-	-	30.31	29.00	27.68	26.36
49475	.1875	3/16"	4.763	3/16"	2"	9/16"	.015"	-	-	30.31	29.00	27.68	26.36
49480	.1875	3/16"	4.763	3/16"	3"	1"	.015"	-	-	42.50	40.66	38.81	36.96
49485	.1875	3/16"	4.763	3/16"	3"	1/2"	.015"	1-1/2"	.165"	45.94	43.95	41.95	39.95
49490	.2362		6.000	6.0	50	12	0.50	-	-	36.11	34.54	32.97	31.40
49500	.2362		6.000	6.0	65	19	0.50	-	-	39.99	38.25	36.51	34.77
49505	.2362		6.000	6.0	100	15	0.50	40	5.4	55.51	53.10	50.68	48.27
49510	.2362		6.000	6.0	100	20	0.50	60	5.4	55.51	53.10	50.68	48.27
49520	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	-	34.68	33.18	31.67	30.16
49540	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-	39.56	37.84	36.12	34.40
49543	.2500	1/4"	6.350	1/4"	4"	1-1/2"	.020"	-	-	50.46	48.27	46.07	43.88
49547	.2500	1/4"	6.350	1/4"	4"	1"	.020"	2"	.225"	53.90	51.56	49.21	46.87
49550	.2756		7.000	8.0	50	12	0.50	-	-	49.12	46.98	44.85	42.71
49555	.2756		7.000	8.0	65	22	0.50	-	-	53.11	50.80	48.49	46.18
49570	.2812	9/32"	7.142	5/16"	2"	7/16"	.020"	-	-	48.24	46.15	44.05	41.95
49575	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.020"	-	-	51.96	49.70	47.44	45.18
49580	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-	-	42.15	40.32	38.48	36.65
49600	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	-	45.43	43.45	41.48	39.50
49603	.3125	5/16"	7.938	5/16"	4"	1-1/2"	.020"	-	-	64.04	61.26	58.47	55.69
49605	.3125	5/16"	7.938	5/16"	4"	1"	.020"	2"	.285"	67.48	64.55	61.61	58.68
49610	.3150		8.000	8.0	50	12	0.50	-	-	43.03	41.16	39.29	37.42
49620	.3150		8.000	8.0	65	22	0.50	-	-	46.38	44.36	42.35	40.33
49622	.3150		8.000	8.0	100	40	0.50	-	-	65.99	63.12	60.25	57.38
49623	.3150		8.000	8.0	100	20	0.50	60	7.4	69.44	66.42	63.40	60.38
49624	.3150		8.000	8.0	150	40	0.50	100	7.4	92.39	88.37	84.36	80.34
49625	.3438	11/32"	8.733	3/8"	2"	1/2"	.025"	-	-	54.72	52.34	49.96	47.58
49630	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	.025"	-	-	62.25	59.54	56.84	54.13
49635	.3543		9.000	10.0	50	14	0.50	-	-	67.10	64.19	61.27	58.35
49637	.3543		9.000	10.0	65	22	0.50	-	-	72.93	69.76	66.59	63.42

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	c Chamfer Length	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
49640	.3750	3/8"	9.525	3/8"	2"	1/2"	.025"	-	-	48.35	46.24	44.14	42.04
49660	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.025"	-	-	55.03	52.64	50.24	47.85
49662	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.025"	-	-	63.17	60.42	57.68	54.93
49664	.3750	3/8"	9.525	3/8"	4"	1-5/8"	.025"	-	-	69.33	66.32	63.30	60.29
49667	.3750	3/8"	9.525	3/8"	4"	1"	.025"	2"	.355"	72.77	69.61	66.44	63.28
49670	.3937		10.000	10.0	50	16	0.50	-	-	59.31	56.73	54.15	51.57
49680	.3937		10.000	10.0	70	22	0.50	-	-	64.43	61.63	58.83	56.03
49682	.3937		10.000	10.0	100	40	0.50	-	-	80.60	77.10	73.59	70.09
49684	.3937		10.000	10.0	100	20	0.50	40	9.4	84.04	80.39	76.73	73.08
49686	.3937		10.000	10.0	100	30	0.50	60	9.4	84.04	80.39	76.73	73.08
49690	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.025"	-	-	64.75	61.93	59.12	56.30
49700	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.025"	-	-	64.75	61.93	59.12	56.30
49710	.4724		12.000	12.0	65	19	0.80	-	-	69.53	66.51	63.48	60.46
49720	.4724		12.000	12.0	75	32	0.80	-	-	77.58	74.21	70.83	67.46
49725	.4724		12.000	12.0	100	50	0.80	-	-	91.90	87.90	83.91	79.91
49730	.4724		12.000	12.0	100	25	0.80	60	11.4	95.34	91.19	87.05	82.90
49735	.4724		12.000	12.0	150	40	0.80	100	11.4	129.61	123.97	118.34	112.70
* 49740	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-	66.57	63.68	60.78	57.89
* 49760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	74.39	71.16	67.92	64.69
* 49761	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-	87.94	84.12	80.29	76.47
* 49762	.5000	1/2"	12.700	1/2"	4"	1"	.030"	2"	.480"	91.38	87.41	83.43	79.46
* 49764	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"	4"	.480"	127.81	122.25	116.70	111.14
* 49765	.5512		14.000	14.0	75	19	0.80	-	-	110.06	105.27	100.49	95.70
* 49770	.5512		14.000	14.0	88	32	0.80	-	-	113.11	108.20	103.28	98.36
* 49780	.6250	5/8"	15.875	5/8"	3"	3/4"	.035"	-	-	115.47	110.45	105.43	100.41
* 49800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.035"	-	-	118.53	113.38	108.22	103.07
* 49820	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.035"	-	-	124.89	119.46	114.03	108.60
* 49824	.6250	5/8"	15.875	5/8"	4"	1"	.035"	2"	.605"	128.33	122.75	117.17	111.59
* 49826	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	3"	.605"	181.07	173.20	165.32	157.45
* 49828	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	4"	.605"	181.07	173.20	165.32	157.45
* 49830	.6299		16.000	16.0	75	19	1.00	-	-	120.57	115.32	110.08	104.84
* 49840	.6299		16.000	16.0	88	32	1.00	-	-	123.74	118.36	112.98	107.60
* 49842	.6299		16.000	16.0	100	50	1.00	-	-	131.68	125.95	120.23	114.50
* 49843	.6299		16.000	16.0	100	20	1.00	50	15.4	135.13	129.25	123.38	117.50
* 49844	.6299		16.000	16.0	150	40	1.00	100	15.4	182.83	174.88	166.93	158.98
* 49850	.7087		18.000	18.0	100	38	1.00	-	-	177.89	170.16	162.42	154.69
* 49860	.7500	3/4"	19.050	3/4"	3"	7/8"	.040"	-	-	166.74	159.49	152.24	144.99
* 49880	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.040"	-	-	170.19	162.79	155.39	147.99
* 49882	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.040"	-	-	236.08	225.82	215.55	205.29
* 49886	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	3"	.730"	283.85	271.51	259.17	246.83
* 49887	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	4"	.730"	283.85	271.51	259.17	246.83
* 49890	.7874		20.000	20.0	75	22	1.00	-	-	235.69	225.45	215.20	204.95
* 49900	.7874		20.000	20.0	100	38	1.00	-	-	240.84	230.37	219.90	209.43
* 49902	.7874		20.000	20.0	100	30	1.00	50	19.4	244.29	233.67	223.05	212.43
* 49904	.7874		20.000	20.0	150	40	1.00	100	19.4	299.54	286.52	273.49	260.47
* 49915	.9843		25.000	25.0	100	25	1.00	-	-	276.22	264.21	252.20	240.19
* 49920	.9843		25.000	25.0	100	38	1.00	-	-	276.22	264.21	252.20	240.19
* 49925	1.000	1"	25.400	1"	4"	1"	.040"	-	-	285.86	273.43	261.00	248.57
* 49930	1.000	1"	25.400	1"	4"	1-1/2"	.040"	-	-	285.86	273.43	261.00	248.57
* 49940	1.000	1"	25.400	1"	5"	2"	.040"	-	-	351.96	336.66	321.35	306.05



* - Tools with weldon flats

Series 142M

TOLERANCES	
d_1	+.000" –.001" (+.000 –.025mm)
d_2	h6

Z=2 | 41° | TECH PAGES 262

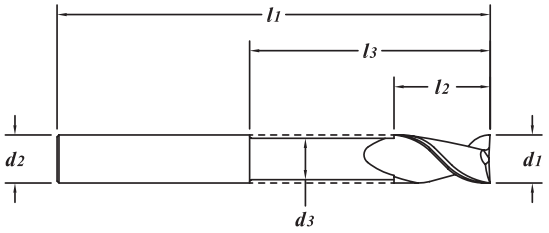
Recommended for aluminum

HSAL End Mill - Square End

ALUMASTAR Coating

Solid submicron grain carbide end mill - center cutting
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)
For high speed machining of aluminum
High velocity - high metal removal rate (for spindles 10,000 RPM and above)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours



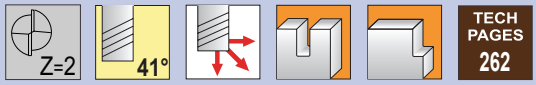


MATERIAL HARDNESS (Rc) 70 35 0

EDP#	d_1 † Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
41222	.1575		4.000	6.0	50	12	-	-	25.93	24.81	23.68	22.55
41232	.1575		4.000	6.0	65	6	20	3.7	32.46	31.05	29.64	28.23
41282	.1875	3/16"	4.763	3/16"	2"	9/16"	-	-	19.55	18.70	17.85	17.00
41342	.1969		5.000	6.0	65	16	-	-	26.76	25.60	24.43	23.27
41352	.1969		5.000	6.0	75	8	20	4.7	45.51	43.53	41.55	39.57
41402	.2362		6.000	6.0	65	19	-	-	25.91	24.78	23.66	22.53
41412	.2362		6.000	6.0	75	10	25	5.7	44.05	42.13	40.22	38.30
41462	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	24.61	23.54	22.47	21.40
41542	.2756		7.000	8.0	65	19	-	-	39.73	38.01	36.28	34.55
41602	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	-	-	34.19	32.70	31.22	29.73
41662	.3150		8.000	8.0	65	19	-	-	36.00	34.43	32.87	31.30
41672	.3150		8.000	8.0	75	12	25	7.4	54.31	51.95	49.59	47.23
41722	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-	40.16	38.41	36.67	34.92
41802	.3937		10.000	10.0	70	24	-	-	60.43	57.81	55.18	52.55
41812	.3937		10.000	10.0	75	12	30	9.4	66.92	64.01	61.10	58.19
41822	.3937		10.000	10.0	100	12	35	9.4	80.57	77.07	73.56	70.06
41882	.4724		12.000	12.0	75	32	-	-	67.60	64.66	61.72	58.78
41892	.4724		12.000	12.0	75	16	30	11.4	72.76	69.60	66.43	63.27
41902	.4724		12.000	12.0	100	16	35	11.4	99.27	94.95	90.64	86.32
41912	.4724		12.000	12.0	100	16	40	11.4	99.27	94.95	90.64	86.32
41942	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	64.23	61.44	58.64	55.85
42022	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	128.01	122.44	116.88	111.31
42072	.6299		16.000	16.0	75	16	30	15.4	126.79	121.28	115.76	110.25
42082	.6299		16.000	16.0	100	40	-	-	134.72	128.87	123.01	117.15
42092	.6299		16.000	16.0	100	20	40	15.4	139.87	133.79	127.71	121.63
42102	.6299		16.000	16.0	125	20	60	15.4	178.74	170.97	163.20	155.43
42142	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-	163.78	156.66	149.54	142.42
42212	.7874		20.000	20.0	100	32	-	-	219.89	210.33	200.77	191.21
42222	.7874		20.000	20.0	100	20	40	19	225.04	215.26	205.47	195.69
42232	.7874		20.000	20.0	125	20	60	19	260.60	249.27	237.94	226.61
42302	1.000	1"	25.400	1"	4"	1-5/8"	-	-	246.16	235.46	224.75	214.05

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.001" (+.000 –.025mm)
d_2	h6
r	+.0005" –.0005" (+.0127 –.0127mm)



TECH PAGES 262

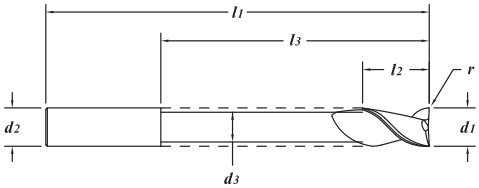
Recommended for aluminum

HSAL End Mill - Corner Radius

ALUMASTAR Coating

Solid submicron grain carbide end mill - center cutting
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)
For high speed machining of aluminum
High velocity - high metal removal rate (for spindles 10,000 RPM and above)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours





EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
39222	.1575		4.000	6.0	50	12	0.30	-	-	30.35	29.03	27.71	26.39
39232	.1575		4.000	6.0	65	6	0.50	20	3.7	37.11	35.50	33.88	32.27
39242	.1575		4.000	6.0	65	6	1.00	20	3.7	37.11	35.50	33.88	32.27
39282	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-	-	22.51	21.53	20.55	19.57
39342	.1969		5.000	6.0	65	16	0.30	-	-	31.31	29.95	28.59	27.23
39352	.1969		5.000	6.0	75	8	0.50	20	4.7	51.16	48.94	46.71	44.49
39362	.1969		5.000	6.0	75	8	1.00	20	4.7	51.16	48.94	46.71	44.49
39402	.2362		6.000	6.0	65	19	0.30	-	-	30.31	29.00	27.68	26.36
39412	.2362		6.000	6.0	75	10	0.50	25	5.7	49.52	47.37	45.21	43.06
39422	.2362		6.000	6.0	75	10	1.00	25	5.7	49.52	47.37	45.21	43.06
39432	.2362		6.000	6.0	75	10	1.50	25	5.7	49.52	47.37	45.21	43.06
39442	.2362		6.000	6.0	75	10	2.00	25	5.7	49.52	47.37	45.21	43.06
39462	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-	28.80	27.54	26.29	25.04
39602	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.015"	-	-	38.11	36.45	34.80	33.14
39662	.3150		8.000	8.0	65	19	0.50	-	-	40.10	38.36	36.61	34.87
39672	.3150		8.000	8.0	75	12	0.50	25	7.4	61.10	58.44	55.79	53.13
39682	.3150		8.000	8.0	75	12	1.00	25	7.4	61.10	58.44	55.79	53.13
39692	.3150		8.000	8.0	75	12	2.00	25	7.4	61.10	58.44	55.79	53.13
39702	.3150		8.000	8.0	75	12	3.00	25	7.4	61.10	58.44	55.79	53.13
39722	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	-	44.41	42.48	40.55	38.62
39802	.3937		10.000	10.0	70	24	0.50	-	-	68.11	65.15	62.19	59.23
39812	.3937		10.000	10.0	100	12	1.00	35	9.4	91.56	87.58	83.60	79.62
39822	.3937		10.000	10.0	100	12	1.50	35	9.4	91.56	87.58	83.60	79.62
39832	.3937		10.000	10.0	100	12	2.00	35	9.4	91.56	87.58	83.60	79.62
39842	.3937		10.000	10.0	100	12	3.00	35	9.4	91.56	87.58	83.60	79.62
39882	.4724		12.000	12.0	75	32	0.50	-	-	84.25	80.59	76.92	73.26
39892	.4724		12.000	12.0	100	16	0.50	40	11.4	108.28	103.58	98.87	94.16
39902	.4724		12.000	12.0	100	16	1.00	40	11.4	108.28	103.58	98.87	94.16
39912	.4724		12.000	12.0	100	16	1.50	40	11.4	108.28	103.58	98.87	94.16
39922	.4724		12.000	12.0	100	16	2.00	40	11.4	108.28	103.58	98.87	94.16
39932	.4724		12.000	12.0	100	16	3.00	40	11.4	108.28	103.58	98.87	94.16

continued →

Series 142R *(continued)*

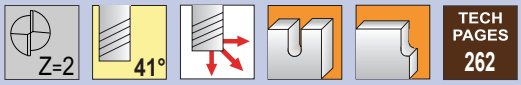
.5000" - .7874"
(12.700mm - 20.000mm)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
39942	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	80.04	76.56	73.08	69.60
40022	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-	138.45	132.43	126.41	120.39
40082	.6299		16.000	16.0	100	40	1.00	-	-	145.75	139.41	133.08	126.74
40092	.6299		16.000	16.0	125	20	1.00	60	15.4	198.05	189.44	180.83	172.22
40102	.6299		16.000	16.0	125	20	2.00	60	15.4	198.05	189.44	180.83	172.22
40142	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-	179.69	171.88	164.06	156.25
40182	.7874		20.000	20.0	100	40	1.00	-	-	252.23	241.26	230.30	219.33
40192	.7874		20.000	20.0	150	20	1.00	65	19.0	345.40	330.39	315.37	300.35
40202	.7874		20.000	20.0	150	20	2.00	65	19.0	345.40	330.39	315.37	300.35
40212	.7874		20.000	20.0	150	20	3.00	65	19.0	345.40	330.39	315.37	300.35

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.001" (+.000 –.025mm)
d_2	h6
ball radius	+.0000" –.0005" (+.0000 –.0127mm)



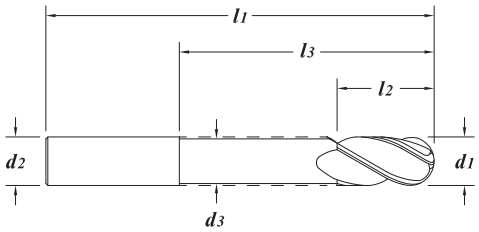
Recommended for aluminum

HSAL End Mill - Ball End

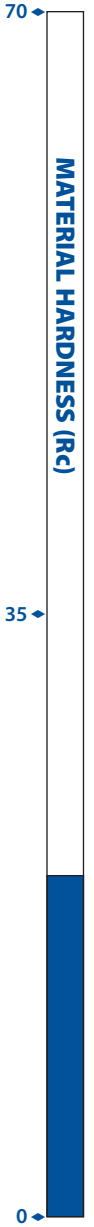
ALUMASTAR Coating



Solid submicron grain carbide end mill - center cutting
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)
For high speed machining of aluminum
High velocity - high metal removal rate (for spindles 10,000 RPM and above)
Need to use properly balanced holders
Holds perpendicularity
Honed edge on radius for improved finish
Flats can be added within 48 hours



	EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
	42522	.1575		4.000	6.0	50	12	-	-	30.35	29.03	27.71	26.39
	42582	.1875	3/16"	4.763	3/16"	2"	9/16"	-	-	22.51	21.53	20.55	19.57
	42642	.1969		5.000	6.0	65	16	-	-	31.31	29.95	28.59	27.23
	42702	.2362		6.000	6.0	65	19	-	-	30.31	29.00	27.68	26.36
	42762	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	28.80	27.54	26.29	25.04
NEW	42764	.2500	1/4"	6.350	1/4"	4"	3/8"	1-1/8"	.235"	49.89	47.72	45.55	43.38
	42842	.2756		7.000	8.0	65	19	-	-	44.08	42.16	40.25	38.33
	42902	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	-	-	38.11	36.45	34.80	33.14
	42962	.3150		8.000	8.0	65	19	-	-	40.10	38.36	36.61	34.87
	43022	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-	44.41	42.48	40.55	38.62
NEW	43023	.3750	3/8"	9.525	3/8"	4"	1/2"	1-1/8"	.355"	75.84	72.54	69.24	65.95
	43102	.3937		10.000	10.0	70	24	-	-	68.11	65.15	62.19	59.23
	43182	.4724		12.000	12.0	75	32	-	-	84.25	80.59	76.92	73.26
	43242	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	80.04	76.56	73.08	69.60
NEW	43243	.5000	1/2"	12.700	1/2"	4"	5/8"	2-1/4"	.475"	102.87	98.40	93.92	89.45
	43322	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	138.45	132.43	126.41	120.39
	43382	.6299		16.000	16.0	100	40	-	-	145.75	139.41	133.08	126.74
	43442	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-	179.69	171.88	164.06	156.25
NEW	43444	.7500	3/4"	19.050	3/4"	5"	1"	3-1/16"	.715"	246.49	235.77	225.06	214.34
	43482	.7874		20.000	20.0	100	32	-	-	252.23	241.26	230.30	219.33
	43542	.9843		25.000	25.0	100	38	-	-	291.86	279.17	266.48	253.79
	43602	1.000	1"	25.400	1"	4"	1-5/8"	-	-	306.44	293.12	279.79	266.47



Series 143M

NEW ITEMS

.1181" - .3750"
(3.000mm - 9.525mm)

Z=3 | 38° | TECH PAGES 262

TOLERANCES	
d_1	+.000" –.001" (+.000 –.025mm)
d_2	h6

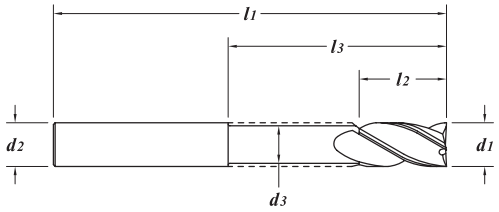
Recommended for aluminum



HSAL End Mill - Square End

ALUMASTAR Coating

Solid submicron grain carbide end mill - center cutting
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)
For high speed machining of aluminum
High velocity - high metal removal rate (for 5,000-20,000 RPM spindles)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours



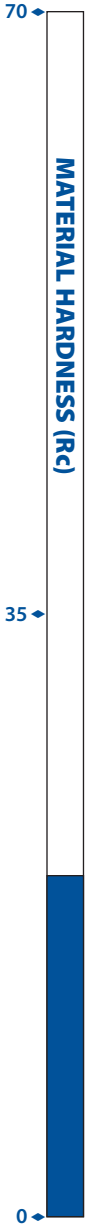
MATERIAL HARDNESS (Rc)
70
35
0

	EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
	41173	.1181		3.000	3.0	38	6	-	-	19.50	18.66	17.81	16.96
	41183	.1181		3.000	3.0	38	12	-	-	19.50	18.66	17.81	16.96
	41193	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	-	-	19.00	18.17	17.35	16.52
	41203	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	-	-	19.00	18.17	17.35	16.52
	41213	.1575		4.000	6.0	50	8	-	-	25.93	24.81	23.68	22.55
	41223	.1575		4.000	6.0	50	12	-	-	25.93	24.81	23.68	22.55
	41243	.1575		4.000	6.0	65	6	20	3.7	32.46	31.05	29.64	28.23
	41273	.1875	3/16"	4.763	3/16"	2"	5/16"	-	-	19.55	18.70	17.85	17.00
	41283	.1875	3/16"	4.763	3/16"	2"	9/16"	-	-	19.55	18.70	17.85	17.00
	41303	.1875	3/16"	4.763	3/16"	3"	7/32"	3/4"	.170"	36.70	35.10	33.51	31.91
	41313	.1875	3/16"	4.763	3/16"	3"	1"	-	-	31.54	30.17	28.80	27.43
	41343	.1969		5.000	6.0	65	16	-	-	26.76	25.60	24.43	23.27
	41363	.1969		5.000	6.0	75	8	20	4.7	45.51	43.53	41.55	39.57
	41403	.2362		6.000	6.0	65	19	-	-	25.91	24.78	23.66	22.53
	41423	.2362		6.000	6.0	75	10	25	5.7	44.05	42.13	40.22	38.30
NEW	39735	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-	23.36	22.34	21.33	20.31
NEW	39737	.2500	1/4"	6.350	1/4"	2"	1/2"	-	-	23.36	22.34	21.33	20.31
	41453	.2500	1/4"	6.350	1/4"	2-1/2"	3/8"	-	-	24.61	23.54	22.47	21.40
	41463	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	24.61	23.54	22.47	21.40
	41473	.2500	1/4"	6.350	1/4"	3"	1"	-	-	37.32	35.70	34.07	32.45
	41493	.2500	1/4"	6.350	1/4"	4"	3/8"	1-1/8"	.235"	44.49	42.56	40.62	38.69
	41503	.2500	1/4"	6.350	1/4"	4"	3/8"	2-1/8"	.235"	49.66	47.50	45.34	43.18
	41513	.2500	1/4"	6.350	1/4"	4"	1-5/8"	-	-	39.34	37.63	35.92	34.21
	41543	.2756		7.000	8.0	65	19	-	-	39.73	38.01	36.28	34.55
	41563	.2756		7.000	8.0	75	12	25	6.4	59.69	57.09	54.50	51.90
	41593	.3125	5/16"	7.938	5/16"	2-1/2"	7/16"	-	-	34.19	32.70	31.22	29.73
	41603	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	-	-	34.19	32.70	31.22	29.73
	41623	.3125	5/16"	7.938	5/16"	4"	7/16"	1-1/8"	.297"	58.39	55.85	53.31	50.77
NEW	39739	.3150		8.000	8.0	50	12	-	-	32.32	30.91	29.51	28.10
	41663	.3150		8.000	8.0	65	19	-	-	36.00	34.43	32.87	31.30
	41683	.3150		8.000	8.0	75	12	25	7.4	54.31	51.95	49.59	47.23
	41693	.3150		8.000	8.0	100	12	55	7.4	66.60	63.70	60.81	57.91
NEW	39741	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	35.97	34.41	32.84	31.28
	41713	.3750	3/8"	9.525	3/8"	2-1/2"	1/2"	-	-	40.16	38.41	36.67	34.92
NEW	39743	.3750	3/8"	9.525	3/8"	2-1/2"	3/4"	-	-	40.16	38.41	36.67	34.92
	41723	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-	40.16	38.41	36.67	34.92
	41733	.3750	3/8"	9.525	3/8"	3"	1"	-	-	51.77	49.52	47.27	45.02
	41763	.3750	3/8"	9.525	3/8"	4"	1/2"	2-1/8"	.355"	67.87	64.92	61.97	59.02
	41773	.3750	3/8"	9.525	3/8"	4"	1-5/8"	-	-	57.56	55.06	52.55	50.05
	42363	.3750	3/8"	9.525	3/8"	4"	2"	-	-	57.56	55.06	52.55	50.05
	41783	.3750	3/8"	9.525	3/8"	6"	1/2"	4"	.355"	102.83	98.36	93.89	89.42

GARR TOOL®

† Metric equivalents are for reference only

	EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
NEW	39745	.3937		10.000	10.0	50	14	-	-	55.53	53.12	50.70	48.29
	41803	.3937		10.000	10.0	70	24	-	-	60.43	57.81	55.18	52.55
	41843	.3937		10.000	10.0	100	12	35	9.4	80.57	77.07	73.56	70.06
	41853	.3937		10.000	10.0	100	12	55	9.4	85.72	81.99	78.27	74.54
	41863	.3937		10.000	10.0	150	12	110	9.4	120.12	114.90	109.67	104.45
NEW	39747	.4724		12.000	12.0	65	16	-	-	63.40	60.64	57.89	55.13
NEW	39749	.4724		12.000	12.0	75	26	-	-	67.60	64.66	61.72	58.78
	41883	.4724		12.000	12.0	75	32	-	-	67.60	64.66	61.72	58.78
	41893	.4724		12.000	12.0	100	50	-	-	88.39	84.55	80.70	76.86
	41903	.4724		12.000	12.0	100	16	40	11.4	99.27	94.95	90.64	86.32
	41913	.4724		12.000	12.0	100	16	55	11.4	99.27	94.95	90.64	86.32
	41923	.4724		12.000	12.0	150	16	110	11.4	151.74	145.15	138.55	131.95
NEW	39751	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	60.16	57.54	54.93	52.31
NEW	39753	.5000	1/2"	12.700	1/2"	2-1/2"	3/4"	-	-	60.16	57.54	54.93	52.31
	41933	.5000	1/2"	12.700	1/2"	3"	5/8"	-	-	64.23	61.44	58.64	55.85
NEW	39755	.5000	1/2"	12.700	1/2"	3"	1"	-	-	64.23	61.44	58.64	55.85
	41943	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	64.23	61.44	58.64	55.85
	41963	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	83.97	80.32	76.67	73.02
	41973	.5000	1/2"	12.700	1/2"	4"	2"	-	-	83.97	80.32	76.67	73.02
	41983	.5000	1/2"	12.700	1/2"	4"	5/8"	2-1/8"	.475"	94.29	90.19	86.09	81.99
	41993	.5000	1/2"	12.700	1/2"	6"	5/8"	4-1/8"	.475"	144.16	137.90	131.63	125.36
	42003	.5000	1/2"	12.700	1/2"	6"	3-1/8"	-	-	123.53	118.16	112.79	107.42
NEW	39757	.6250	5/8"	15.875	5/8"	3"	3/4"	-	-	119.00	113.83	108.65	103.48
	42013	.6250	5/8"	15.875	5/8"	3-1/2"	3/4"	-	-	122.43	117.11	111.78	106.46
NEW	39759	.6250	5/8"	15.875	5/8"	3-1/2"	1"	-	-	122.43	117.11	111.78	106.46
	42016	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	122.43	117.11	111.78	106.46
	42021	.6250	5/8"	15.875	5/8"	4"	1-1/2"	-	-	128.01	122.44	116.88	111.31
	42023	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	128.01	122.44	116.88	111.31
	42373	.6250	5/8"	15.875	5/8"	4"	2-1/8"	-	-	128.01	122.44	116.88	111.31
	42033	.6250	5/8"	15.875	5/8"	6"	3/4"	2-3/8"	.590"	178.66	170.90	163.13	155.36
	42043	.6250	5/8"	15.875	5/8"	6"	3/4"	4-3/8"	.590"	188.98	180.76	172.55	164.33
	42053	.6250	5/8"	15.875	5/8"	6"	3-1/4"	-	-	168.34	161.02	153.70	146.38
	42083	.6299		16.000	16.0	100	40	-	-	134.72	128.87	123.01	117.15
	42103	.6299		16.000	16.0	100	20	40	15.4	139.87	133.79	127.71	121.63
	42113	.6299		16.000	16.0	125	20	60	15.4	178.74	170.97	163.20	155.43
	42123	.6299		16.000	16.0	150	20	110	15.4	198.94	190.29	181.64	172.99
	42133	.7500	3/4"	19.050	3/4"	4"	1"	-	-	163.78	156.66	149.54	142.42
	42136	.7500	3/4"	19.050	3/4"	4"	1-1/4"	-	-	163.78	156.66	149.54	142.42
	42141	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	163.78	156.66	149.54	142.42
	42143	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-	163.78	156.66	149.54	142.42
	42153	.7500	3/4"	19.050	3/4"	5"	2-1/4"	-	-	216.27	206.87	197.46	188.06
	42163	.7500	3/4"	19.050	3/4"	6"	1"	2-1/2"	.715"	235.27	225.04	214.81	204.58
	42173	.7500	3/4"	19.050	3/4"	6"	1"	4-3/8"	.715"	242.55	232.00	221.46	210.91
	42193	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	228.05	218.13	208.22	198.30
	42203	.7874		20.000	20.0	100	25	-	-	219.89	210.33	200.77	191.21
	42213	.7874		20.000	20.0	100	32	-	-	219.89	210.33	200.77	191.21
	42223	.7874		20.000	20.0	100	20	40	19.0	225.04	215.26	205.47	195.69
	42226	.7874		20.000	20.0	125	20	60	19.0	260.60	249.27	237.94	226.61
	42233	.7874		20.000	20.0	150	20	85	19.0	301.98	288.85	275.72	262.59
	42236	.7874		20.000	20.0	150	20	110	19.0	307.15	293.80	280.44	267.09
	42243	.9843		25.000	25.0	100	38	-	-	253.72	242.69	231.66	220.63
	42283	.9843		25.000	25.0	100	25	50	24.0	258.87	247.61	236.36	225.10
	42286	.9843		25.000	25.0	125	25	65	24.0	323.56	309.50	295.43	281.36
	42291	.9843		25.000	25.0	150	25	90	24.0	405.88	388.23	370.59	352.94
	42293	1.000	1"	25.400	1"	4"	1"	-	-	246.16	235.46	224.75	214.05
	42303	1.000	1"	25.400	1"	4"	1-5/8"	-	-	246.16	235.46	224.75	214.05
	42313	1.000	1"	25.400	1"	5"	2"	-	-	303.86	290.65	277.44	264.23
	42343	1.000	1"	25.400	1"	6"	1-1/4"	3-3/8"	.960"	393.70	376.59	359.47	342.35
	42353	1.000	1"	25.400	1"	6"	3-1/4"	-	-	378.25	361.80	345.36	328.91



Series 143R

NEW ITEMS

.1181" - .2362"
(3.000mm - 6.000mm)

Z=3 | 38° | TECH PAGES 262

TOLERANCES	
d_1	+.000" –.001" (+.000 –.025mm)
d_2	h6
r	+.0005" –.0005" (+.0127 –.0127mm)

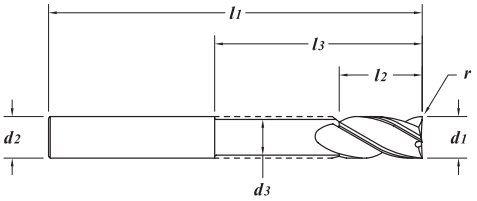
Recommended for aluminum

HSAL End Mill - Corner Radius

ALUMASTAR Coating

Solid submicron grain carbide end mill - center cutting
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)
For high speed machining of aluminum
High velocity - high metal removal rate (for 5,000-20,000 RPM spindles)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours



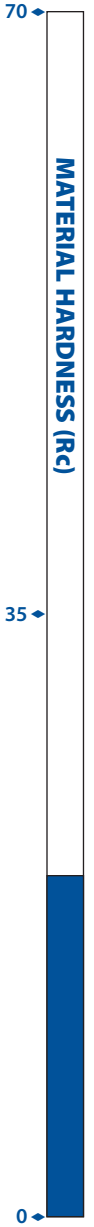


MATERIAL HARDNESS (Rc)
70
35
0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
39113	.1181		3.000	3.0	38	6	0.20	-	-	22.48	21.51	20.53	19.55
39123	.1181		3.000	3.0	38	6	0.50	-	-	22.48	21.51	20.53	19.55
39133	.1181		3.000	3.0	38	12	0.20	-	-	22.48	21.51	20.53	19.55
39143	.1181		3.000	3.0	38	12	0.50	-	-	22.48	21.51	20.53	19.55
39153	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"	-	-	21.82	20.87	19.92	18.97
39163	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.020"	-	-	21.82	20.87	19.92	18.97
39173	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	-	-	21.82	20.87	19.92	18.97
39183	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	-	-	21.82	20.87	19.92	18.97
39193	.1575		4.000	6.0	50	8	0.20	-	-	30.35	29.03	27.71	26.39
39203	.1575		4.000	6.0	50	8	0.50	-	-	30.35	29.03	27.71	26.39
39213	.1575		4.000	6.0	50	12	0.20	-	-	30.35	29.03	27.71	26.39
39223	.1575		4.000	6.0	50	12	0.30	-	-	30.35	29.03	27.71	26.39
39225	.1575		4.000	6.0	50	12	0.50	-	-	30.35	29.03	27.71	26.39
39243	.1575		4.000	6.0	65	6	0.30	20	3.7	37.11	35.50	33.88	32.27
39253	.1575		4.000	6.0	65	6	0.50	20	3.7	37.11	35.50	33.88	32.27
39263	.1575		4.000	6.0	65	6	1.00	20	3.7	37.11	35.50	33.88	32.27
39265	.1875	3/16"	4.763	3/16"	2"	5/16"	.010"	-	-	22.51	21.53	20.55	19.57
39275	.1875	3/16"	4.763	3/16"	2"	5/16"	.020"	-	-	22.51	21.53	20.55	19.57
39280	.1875	3/16"	4.763	3/16"	2"	5/16"	.030"	-	-	22.51	21.53	20.55	19.57
39283	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-	-	22.51	21.53	20.55	19.57
39285	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	-	-	22.51	21.53	20.55	19.57
39293	.1875	3/16"	4.763	3/16"	2"	9/16"	.030"	-	-	22.51	21.53	20.55	19.57
39303	.1875	3/16"	4.763	3/16"	3"	7/32"	.010"	3/4"	.170"	41.20	39.41	37.62	35.83
39313	.1875	3/16"	4.763	3/16"	3"	7/32"	.030"	3/4"	.170"	41.20	39.41	37.62	35.83
39343	.1969		5.000	6.0	65	16	0.30	-	-	31.31	29.95	28.59	27.23
39363	.1969		5.000	6.0	75	8	0.30	20	4.7	51.16	48.94	46.71	44.49
39373	.1969		5.000	6.0	75	8	0.50	20	4.7	51.16	48.94	46.71	44.49
39383	.1969		5.000	6.0	75	8	1.00	20	4.7	51.16	48.94	46.71	44.49
39403	.2362		6.000	6.0	65	19	0.30	-	-	30.31	29.00	27.68	26.36
39423	.2362		6.000	6.0	75	10	0.30	25	5.7	49.52	47.37	45.21	43.06
39433	.2362		6.000	6.0	75	10	0.50	25	5.7	49.52	47.37	45.21	43.06
39436	.2362		6.000	6.0	75	10	1.00	25	5.7	49.52	47.37	45.21	43.06
39439	.2362		6.000	6.0	75	10	1.50	25	5.7	49.52	47.37	45.21	43.06
39443	.2362		6.000	6.0	75	10	2.00	25	5.7	49.52	47.37	45.21	43.06

† *Metric equivalents are for reference only*

	EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
NEW	39314	.2500	1/4"	6.350	1/4"	2"	1/2"	.010"	-	-	27.32	26.13	24.94	23.76
NEW	39316	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"	-	-	27.32	26.13	24.94	23.76
NEW	39318	.2500	1/4"	6.350	1/4"	2"	1/2"	.020"	-	-	27.32	26.13	24.94	23.76
	39453	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-	28.80	27.54	26.29	25.04
	39463	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-	28.80	27.54	26.29	25.04
NEW	39320	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-	28.80	27.54	26.29	25.04
	39473	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-	28.80	27.54	26.29	25.04
	39493	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	1-1/8"	.235"	49.89	47.72	45.55	43.38
	40403	.2500	1/4"	6.350	1/4"	4"	3/8"	.030"	1-1/8"	.235"	49.89	47.72	45.55	43.38
	39503	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	2-1/8"	.235"	55.03	52.64	50.24	47.85
	39543	.2756		7.000	8.0	65	19	0.30	-	-	44.08	42.16	40.25	38.33
	39563	.2756		7.000	8.0	75	12	0.30	25	6.4	67.15	64.23	61.31	58.39
NEW	39322	.3125	5/16"	7.938	5/16"	2"	1/2"	.010"	-	-	34.87	33.35	31.84	30.32
NEW	39324	.3125	5/16"	7.938	5/16"	2"	1/2"	.020"	-	-	34.87	33.35	31.84	30.32
	39593	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.010"	-	-	38.11	36.45	34.80	33.14
	39603	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.015"	-	-	38.11	36.45	34.80	33.14
NEW	39326	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.020"	-	-	38.11	36.45	34.80	33.14
	39613	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.030"	-	-	38.11	36.45	34.80	33.14
	39623	.3125	5/16"	7.938	5/16"	4"	7/16"	.015"	1-1/8"	.297"	65.58	62.73	59.88	57.03
	39633	.3125	5/16"	7.938	5/16"	4"	7/16"	.030"	1-1/8"	.297"	65.58	62.73	59.88	57.03
NEW	39328	.3150		8.000	8.0	50	12	0.50	-	-	36.49	34.90	33.32	31.73
	39663	.3150		8.000	8.0	65	19	0.50	-	-	40.10	38.36	36.61	34.87
	39683	.3150		8.000	8.0	75	12	0.50	25	7.4	61.10	58.44	55.79	53.13
	39688	.3150		8.000	8.0	75	12	1.00	25	7.4	61.10	58.44	55.79	53.13
	39693	.3150		8.000	8.0	75	12	2.00	25	7.4	61.10	58.44	55.79	53.13
	39698	.3150		8.000	8.0	75	12	3.00	25	7.4	61.10	58.44	55.79	53.13
NEW	39330	.3750	3/8"	9.525	3/8"	2"	1/2"	.010"	-	-	41.03	39.25	37.46	35.68
NEW	39332	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-	41.03	39.25	37.46	35.68
	39703	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	-	-	44.41	42.48	40.55	38.62
	39713	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	-	-	44.41	42.48	40.55	38.62
NEW	39334	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	-	-	44.41	42.48	40.55	38.62
	39723	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	-	44.41	42.48	40.55	38.62
	39733	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	-	-	44.41	42.48	40.55	38.62
	39763	.3750	3/8"	9.525	3/8"	4"	1/2"	.030"	2-1/8"	.355"	75.84	72.55	69.25	65.95
	39773	.3750	3/8"	9.525	3/8"	4"	1/2"	.060"	2-1/8"	.355"	75.84	72.55	69.25	65.95
	39783	.3750	3/8"	9.525	3/8"	6"	1/2"	.030"	4"	.355"	110.75	105.93	101.12	96.30
NEW	39336	.3937		10.000	10.0	50	14	0.50	-	-	61.70	59.02	56.33	53.65
	39803	.3937		10.000	10.0	70	24	0.50	-	-	68.11	65.15	62.19	59.23
	39843	.3937		10.000	10.0	100	12	0.50	35	9.4	91.56	87.58	83.60	79.62
	39848	.3937		10.000	10.0	100	12	1.00	35	9.4	91.56	87.58	83.60	79.62
	39853	.3937		10.000	10.0	100	12	1.50	35	9.4	91.56	87.58	83.60	79.62
	39863	.3937		10.000	10.0	100	12	2.00	35	9.4	91.56	87.58	83.60	79.62
	39873	.3937		10.000	10.0	100	12	3.00	35	9.4	91.56	87.58	83.60	79.62
NEW	39344	.4724		12.000	12.0	65	16	0.50	-	-	73.92	70.71	67.49	64.28
	39883	.4724		12.000	12.0	75	32	0.50	-	-	84.25	80.59	76.92	73.26
NEW	39346	.4724		12.000	12.0	75	32	0.75	-	-	84.25	80.59	76.92	73.26
NEW	39348	.4724		12.000	12.0	75	32	1.00	-	-	84.25	80.59	76.92	73.26
	39903	.4724		12.000	12.0	100	16	0.50	40	11.4	108.28	103.58	98.87	94.16
	39907	.4724		12.000	12.0	100	16	1.00	40	11.4	108.28	103.58	98.87	94.16
	39911	.4724		12.000	12.0	100	16	1.50	40	11.4	108.28	103.58	98.87	94.16
	39915	.4724		12.000	12.0	100	16	2.00	40	11.4	108.28	103.58	98.87	94.16
	39919	.4724		12.000	12.0	100	16	3.00	40	11.4	108.28	103.58	98.87	94.16



continued →

Series 143R *(continued)*

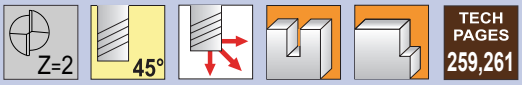
.5000" - 1.000"
(12.700mm - 25.400mm)

MATERIAL HARDNESS (Rc)
70
35
0

	EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
NEW	39353	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-	70.23	67.18	64.12	61.07
NEW	39355	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-	70.23	67.18	64.12	61.07
	39923	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-	80.04	76.56	73.08	69.60
	39933	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-	80.04	76.56	73.08	69.60
NEW	39356	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-	80.04	76.56	73.08	69.60
	39943	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	80.04	76.56	73.08	69.60
	39953	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-	80.04	76.56	73.08	69.60
	39963	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-	80.04	76.56	73.08	69.60
NEW	39972	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.015"	-	-	92.55	88.53	84.50	80.48
	39973	.5000	1/2"	12.700	1/2"	4"	2"	.010"	-	-	92.55	88.53	84.50	80.48
	40413	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-	92.55	88.53	84.50	80.48
	40423	.5000	1/2"	12.700	1/2"	4"	2"	.060"	-	-	92.55	88.53	84.50	80.48
	40433	.5000	1/2"	12.700	1/2"	4"	5/8"	.010"	2-1/8"	.475"	102.87	98.40	93.92	89.45
	39983	.5000	1/2"	12.700	1/2"	4"	5/8"	.030"	2-1/8"	.475"	102.87	98.40	93.92	89.45
	40443	.5000	1/2"	12.700	1/2"	4"	5/8"	.060"	2-1/8"	.475"	102.87	98.40	93.92	89.45
	40453	.5000	1/2"	12.700	1/2"	4"	5/8"	.120"	2-1/8"	.475"	102.87	98.40	93.92	89.45
	39993	.5000	1/2"	12.700	1/2"	6"	5/8"	.030"	4-1/8"	.475"	154.38	147.66	140.95	134.24
	39366	.6250	5/8"	15.875	5/8"	3"	3/4"	.010"	-	-	129.15	123.53	117.92	112.30
	39368	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"	-	-	129.15	123.53	117.92	112.30
NEW	39369	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-	132.87	127.09	121.32	115.54
NEW	39370	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-	132.87	127.09	121.32	115.54
	40463	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.015"	-	-	138.45	132.43	126.41	120.39
NEW	39372	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.020"	-	-	138.45	132.43	126.41	120.39
	40023	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-	138.45	132.43	126.41	120.39
	40473	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.060"	-	-	138.45	132.43	126.41	120.39
	40483	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.120"	-	-	138.45	132.43	126.41	120.39
	40033	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	2-3/8"	.590"	197.96	189.35	180.75	172.14
	40043	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-3/8"	.590"	208.30	199.24	190.19	181.13
	40083	.6299		16.000	16.0	100	40	1.00	-	-	145.75	139.41	133.08	126.74
	40103	.6299		16.000	16.0	100	20	1.00	40	15.4	150.90	144.34	137.78	131.22
	40113	.6299		16.000	16.0	125	20	2.00	60	15.4	198.05	189.44	180.83	172.22
	40118	.6299		16.000	16.0	125	20	3.00	60	15.4	198.05	189.44	180.83	172.22
	40123	.6299		16.000	16.0	125	20	4.00	60	15.4	198.05	189.44	180.83	172.22
NEW	39374	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.020"	-	-	179.69	171.88	164.06	156.25
	40133	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.015"	-	-	179.69	171.88	164.06	156.25
NEW	39376	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.020"	-	-	179.69	171.88	164.06	156.25
	40143	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-	179.69	171.88	164.06	156.25
	40153	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.060"	-	-	179.69	171.88	164.06	156.25
	40493	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.120"	-	-	179.69	171.88	164.06	156.25
	40503	.7500	3/4"	19.050	3/4"	6"	1"	.015"	2-1/2"	.715"	267.79	256.15	244.50	232.86
	40163	.7500	3/4"	19.050	3/4"	6"	1"	.030"	2-1/2"	.715"	267.79	256.15	244.50	232.86
	40513	.7500	3/4"	19.050	3/4"	6"	1"	.060"	2-1/2"	.715"	267.79	256.15	244.50	232.86
	40523	.7500	3/4"	19.050	3/4"	6"	1"	.120"	2-1/2"	.715"	267.79	256.15	244.50	232.86
NEW	40171	.7500	3/4"	19.050	3/4"	6"	1"	.015"	4"	.715"	275.06	263.10	251.14	239.18
	40173	.7500	3/4"	19.050	3/4"	6"	1"	.030"	4-3/8"	.715"	275.06	263.10	251.14	239.18
	40183	.7874		20.000	20.0	100	32	1.00	-	-	252.23	241.26	230.30	219.33
	40223	.7874		20.000	20.0	100	20	1.00	40	19.0	257.38	246.19	235.00	223.81
	40225	.7874		20.000	20.0	150	20	1.00	65	19.0	345.40	330.39	315.37	300.35
	40226	.7874		20.000	20.0	150	20	2.00	65	19.0	345.40	330.39	315.37	300.35
	40229	.7874		20.000	20.0	150	20	3.00	65	19.0	345.40	330.39	315.37	300.35
	40231	.7874		20.000	20.0	150	20	4.00	65	19.0	345.40	330.39	315.37	300.35
	40243	.9843		25.000	25.0	100	38	1.00	-	-	291.86	279.17	266.48	253.79
	40293	1.000	1"	25.400	1"	4"	1-5/8"	.030"	-	-	306.44	293.12	279.79	266.47
	40303	1.000	1"	25.400	1"	4"	1-5/8"	.060"	-	-	306.44	293.12	279.79	266.47
	40313	1.000	1"	25.400	1"	4"	1-5/8"	.120"	-	-	306.44	293.12	279.79	266.47
	40343	1.000	1"	25.400	1"	6"	1-1/4"	.030"	3-3/8"	.960"	449.09	429.56	410.04	390.51
	40353	1.000	1"	25.400	1"	6"	1-1/4"	.060"	3-3/8"	.960"	449.09	429.56	410.04	390.51
	40363	1.000	1"	25.400	1"	6"	1-1/4"	.120"	3-3/8"	.960"	449.09	429.56	410.04	390.51
NEW	40366	1.000	1"	25.400	1"	6"	1-1/4"	.030"	4"	.960"	449.09	429.56	410.04	390.51

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.001" (+.000 –.025mm)
d_2	h6

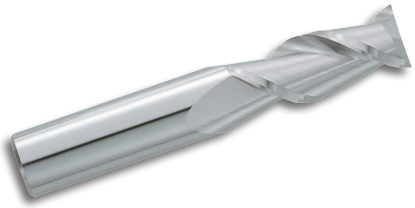


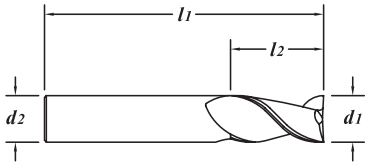
TECH PAGES 259,261

Recommended for aluminum and titanium

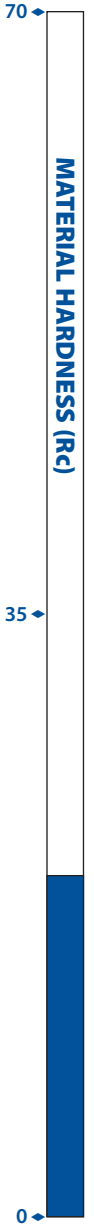
Square End

Solid submicron grain carbide end mill - center cutting
High performance machining
Rigid work holding, machine stability and part integrity are critical!
Excellent choice for slotting
Polished cylindrical O.D. margin reduces chatter
Sharp corners (Can be modified with a corner radius)
Designed for spindles between 3,000-8,000 RPM, 1% diameter for chip load



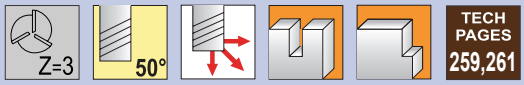


EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
08910	.1181		3.000	3.0	38	8	11.63	11.12	10.62	10.11
08920	.1181		3.000	3.0	50	12	14.01	13.40	12.79	12.18
85160	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	10.91	10.44	9.96	9.49
85170	.1250	1/8"	3.175	1/8"	2"	1/2"	13.14	12.57	12.00	11.43
08950	.1575		4.000	6.0	50	8	18.89	18.07	17.25	16.43
08960	.1575		4.000	6.0	50	12	18.89	18.07	17.25	16.43
85180	.1875	3/16"	4.763	3/16"	2"	5/16"	13.63	13.04	12.44	11.85
85190	.1875	3/16"	4.763	3/16"	2"	9/16"	13.63	13.04	12.44	11.85
08990	.1969		5.000	6.0	50	10	17.79	17.02	16.24	15.47
09000	.1969		5.000	6.0	65	15	19.78	18.92	18.06	17.20
09010	.2362		6.000	6.0	50	12	15.15	14.49	13.83	13.17
09020	.2362		6.000	6.0	65	25	16.27	15.57	14.86	14.15
09030	.2362		6.000	6.0	100	50	29.50	28.22	26.93	25.65
85200	.2500	1/4"	6.350	1/4"	2"	1/2"	14.35	13.73	13.10	12.48
85220	.2500	1/4"	6.350	1/4"	2-1/2"	1"	15.51	14.84	14.16	13.49
85240	.2500	1/4"	6.350	1/4"	4"	2"	28.03	26.81	25.59	24.37
85300	.3125	5/16"	7.938	5/16"	3"	1-1/8"	32.75	31.33	29.90	28.48
09240	.3150		8.000	8.0	65	20	22.85	21.86	20.86	19.87
09040	.3150		8.000	8.0	75	30	34.51	33.01	31.51	30.01
09050	.3150		8.000	8.0	100	50	38.49	36.82	35.14	33.47
85400	.3750	3/8"	9.525	3/8"	2"	5/8"	24.25	23.20	22.14	21.09
85420	.3750	3/8"	9.525	3/8"	2-1/2"	1"	27.09	25.92	24.74	23.56
85440	.3750	3/8"	9.525	3/8"	4"	2"	40.48	38.72	36.96	35.20
09060	.3937		10.000	10.0	50	16	28.22	26.99	25.77	24.54
09070	.3937		10.000	10.0	70	25	32.98	31.55	30.11	28.68
09080	.3937		10.000	10.0	100	50	51.59	49.35	47.10	44.86
09090	.4724		12.000	12.0	65	20	42.15	40.32	38.48	36.65
09100	.4724		12.000	12.0	75	32	45.57	43.59	41.61	39.63
09110	.4724		12.000	12.0	100	50	62.79	60.06	57.33	54.60
85500	.5000	1/2"	12.700	1/2"	2-1/2"	3/4"	39.81	38.08	36.35	34.62
85520	.5000	1/2"	12.700	1/2"	3"	1-1/4"	43.40	41.51	39.63	37.74
85540	.5000	1/2"	12.700	1/2"	4"	2"	59.24	56.66	54.09	51.51
85600	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"	83.70	80.06	76.42	72.78
85620	.6250	5/8"	15.875	5/8"	6"	3"	122.10	116.79	111.48	106.17
09120	.6299		16.000	16.0	88	40	87.87	84.05	80.23	76.41
09130	.6299		16.000	16.0	150	75	122.10	116.79	111.48	106.17
09140	.7087		18.000	18.0	100	45	128.87	123.27	117.66	112.06
85700	.7500	3/4"	19.050	3/4"	4"	1-3/4"	122.72	117.38	112.05	106.71
85720	.7500	3/4"	19.050	3/4"	6"	3"	194.50	186.04	177.59	169.13
09350	.7874		20.000	20.0	100	38	163.83	156.71	149.58	142.46
09150	.7874		20.000	20.0	150	75	204.90	195.99	187.08	178.17
09160	.9843		25.000	25.0	100	45	190.33	182.05	173.78	165.50
09170	.9843		25.000	25.0	150	75	315.74	302.02	288.29	274.56
85800	1.000	1"	25.400	1"	4"	1-3/4"	183.56	175.58	167.60	159.62
85820	1.000	1"	25.400	1"	6"	3"	330.68	316.31	301.93	287.55



Series 253MA, 853MA

.1181" - .5512"
(3.000mm - 14.000mm)



TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

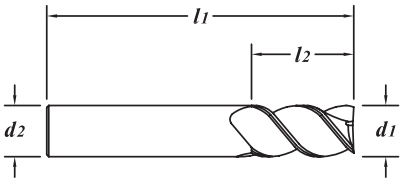
Recommended for stainless steel



Square End

AlTiN Coating

Solid submicron grain carbide end mill - center cutting
High performance machining
Rigid work holding, machine stability and part integrity are critical!
Dry or semi-dry machining
Slots stainless steel at an axial depth of 25% of diameter
Sharp corners (Can be modified with a corner radius)
Uncoated - page 130
TiCN Coated - page 132



MATERIAL HARDNESS (Rc)
70
35
0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
10347	.1181		3.000	3.0	38	8	14.24	13.62	13.00	12.38
10357	.1181		3.000	3.0	50	12	17.16	16.41	15.67	14.92
86137	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	13.52	12.94	12.35	11.76
86147	.1250	1/8"	3.175	1/8"	2"	1/2"	16.31	15.60	14.89	14.18
10387	.1575		4.000	6.0	50	8	23.01	22.01	21.01	20.01
10397	.1575		4.000	6.0	50	12	23.01	22.01	21.01	20.01
86157	.1875	3/16"	4.763	3/16"	2"	5/16"	15.46	14.78	14.11	13.44
86167	.1875	3/16"	4.763	3/16"	2"	9/16"	15.46	14.78	14.11	13.44
86187	.1875	3/16"	4.763	3/16"	3"	1"	26.96	25.78	24.61	23.44
10407	.1969		5.000	5.0	50	8	18.32	17.52	16.73	15.93
10417	.1969		5.000	5.0	50	14	18.32	17.52	16.73	15.93
10507	.1969		5.000	6.0	50	8	22.54	21.56	20.58	19.60
10517	.1969		5.000	6.0	65	16	24.61	23.54	22.47	21.40
10017	.2362		6.000	6.0	50	12	19.16	18.33	17.49	16.66
10027	.2362		6.000	6.0	65	19	21.60	20.66	19.72	18.78
10037	.2362		6.000	6.0	75	32	33.29	31.85	30.40	28.95
86207	.2500	1/4"	6.350	1/4"	2"	1/2"	18.39	17.59	16.79	15.99
86227	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	20.85	19.94	19.04	18.13
86247	.2500	1/4"	6.350	1/4"	3"	1-1/4"	31.88	30.49	29.11	27.72
86267	.3125	5/16"	7.938	5/16"	2"	7/16"	25.42	24.31	23.21	22.10
86277	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	29.74	28.45	27.15	25.86
86287	.3125	5/16"	7.938	5/16"	4"	1-1/4"	46.71	44.68	42.65	40.62
10427	.3150		8.000	8.0	50	11	26.46	25.31	24.16	23.01
10047	.3150		8.000	8.0	65	20	30.82	29.48	28.14	26.80
10057	.3150		8.000	8.0	75	32	42.48	40.63	38.79	36.94
86307	.3750	3/8"	9.525	3/8"	2"	1/2"	30.03	28.72	27.42	26.11
86327	.3750	3/8"	9.525	3/8"	2-1/2"	1"	35.09	33.56	32.04	30.51
86347	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	50.63	48.43	46.23	44.03
10067	.3937		10.000	10.0	50	12	34.75	33.24	31.73	30.22
10077	.3937		10.000	10.0	75	25	49.08	46.95	44.81	42.68
10087	.3937		10.000	10.0	88	38	62.15	59.44	56.74	54.04
86367	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"	42.18	40.35	38.51	36.68
86377	.4375	7/16"	11.113	7/16"	2-3/4"	1"	42.18	40.35	38.51	36.68
86387	.4375	7/16"	11.113	7/16"	4"	2"	67.45	64.52	61.58	58.65
10097	.4724		12.000	12.0	65	16	51.22	48.99	46.77	44.54
10107	.4724		12.000	12.0	75	26	54.65	52.27	49.90	47.52
10117	.4724		12.000	12.0	100	50	74.59	71.35	68.10	64.86
86407	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	49.12	46.98	44.85	42.71
86427	.5000	1/2"	12.700	1/2"	3"	1"	52.47	50.19	47.91	45.63
86447	.5000	1/2"	12.700	1/2"	4"	2"	71.01	67.93	64.84	61.75
10437	.5512		14.000	14.0	65	16	76.49	73.16	69.84	66.51
10447	.5512		14.000	14.0	75	25	81.89	78.33	74.77	71.21
10457	.5512		14.000	14.0	100	50	99.39	95.07	90.75	86.43

† *Metric equivalents are for reference only*

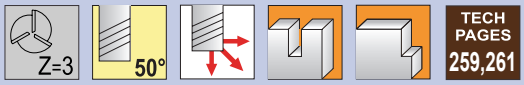
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
86467	.5625	9/16"	14.288	9/16"	3"	7/8"	82.12	78.55	74.98	71.41
86477	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	87.26	83.47	79.67	75.88
86507	.6250	5/8"	15.875	5/8"	3"	7/8"	87.08	83.29	79.51	75.72
86527	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	96.83	92.62	88.41	84.20
86547	.6250	5/8"	15.875	5/8"	6"	2-1/2"	141.61	135.45	129.30	123.14
10137	.6299		16.000	16.0	88	32	101.02	96.62	92.23	87.84
10147	.6299		16.000	16.0	150	65	141.61	135.45	129.30	123.14
10167	.7087		18.000	18.0	100	38	144.35	138.07	131.80	125.52
86607	.7500	3/4"	19.050	3/4"	3-1/2"	1"	138.22	132.21	126.20	120.19
86627	.7500	3/4"	19.050	3/4"	4"	1-1/2"	138.22	132.21	126.20	120.19
86647	.7500	3/4"	19.050	3/4"	6"	3"	217.11	207.67	198.23	188.79
10187	.7874		20.000	20.0	100	38	186.74	178.62	170.50	162.38
10197	.7874		20.000	20.0	150	75	234.24	224.06	213.87	203.69
86697	1.000	1"	25.400	1"	4"	1-1/8"	206.49	197.52	188.54	179.56
86727	1.000	1"	25.400	1"	4"	2"	206.49	197.52	188.54	179.56
86747	1.000	1"	25.400	1"	6"	3-1/4"	360.04	344.39	328.73	313.08



1180 Series
High Performance Drill in aluminum
(reference pg. 17)

Series 253M, 853M

.1181" - .5512"
(3.000mm - 14.000mm)



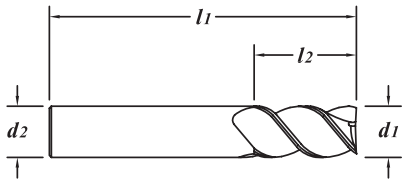
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

Recommended for aluminum and stainless steel



Square End

Solid submicron grain carbide end mill - center cutting
High performance machining
Rigid work holding, machine stability and part integrity are critical!
Slots aluminum at an axial depth of 25% of diameter
Sharp corners (Can be modified with a corner radius)
AlTiN Coating - page 128
TiCN Coated - page 132



MATERIAL HARDNESS (Rc)
70
35
0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
10340	.1181		3.000	3.0	38	8	11.63	11.12	10.62	10.11
10350	.1181		3.000	3.0	50	12	14.01	13.40	12.79	12.18
86130	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	10.91	10.44	9.96	9.49
86140	.1250	1/8"	3.175	1/8"	2"	1/2"	13.14	12.57	12.00	11.43
10380	.1575		4.000	6.0	50	8	18.89	18.07	17.25	16.43
10390	.1575		4.000	6.0	50	12	18.89	18.07	17.25	16.43
86150	.1875	3/16"	4.763	3/16"	2"	5/16"	12.86	12.30	11.74	11.18
86160	.1875	3/16"	4.763	3/16"	2"	9/16"	12.86	12.30	11.74	11.18
86180	.1875	3/16"	4.763	3/16"	3"	1"	22.92	21.92	20.93	19.93
10400	.1969		5.000	5.0	50	8	14.28	13.66	13.04	12.42
10410	.1969		5.000	5.0	50	14	14.28	13.66	13.04	12.42
10010	.2362		6.000	6.0	50	12	15.15	14.49	13.83	13.17
10020	.2362		6.000	6.0	65	19	16.27	15.57	14.86	14.15
10030	.2362		6.000	6.0	75	32	27.95	26.73	25.52	24.30
86200	.2500	1/4"	6.350	1/4"	2"	1/2"	14.35	13.73	13.10	12.48
86220	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	15.51	14.84	14.16	13.49
86240	.2500	1/4"	6.350	1/4"	3"	1-1/4"	26.57	25.41	24.26	23.10
86260	.3125	5/16"	7.938	5/16"	2"	7/16"	19.63	18.78	17.92	17.07
86270	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	21.76	20.81	19.87	18.92
86280	.3125	5/16"	7.938	5/16"	4"	1-1/4"	36.55	34.96	33.37	31.78
10420	.3150		8.000	8.0	50	11	20.70	19.80	18.90	18.00
10040	.3150		8.000	8.0	65	20	22.85	21.86	20.86	19.87
10050	.3150		8.000	8.0	75	32	34.51	33.01	31.51	30.01
86300	.3750	3/8"	9.525	3/8"	2"	1/2"	24.25	23.20	22.14	21.09
86320	.3750	3/8"	9.525	3/8"	2-1/2"	1"	27.09	25.92	24.74	23.56
86340	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	40.48	38.72	36.96	35.20
10060	.3937		10.000	10.0	50	12	28.22	26.99	25.77	24.54
10070	.3937		10.000	10.0	75	25	40.01	38.27	36.53	34.79
10080	.3937		10.000	10.0	88	38	50.39	48.20	46.01	43.82
86360	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"	33.07	31.64	30.20	28.76
86370	.4375	7/16"	11.113	7/16"	2-3/4"	1"	33.07	31.64	30.20	28.76
86380	.4375	7/16"	11.113	7/16"	4"	2"	55.69	53.27	50.85	48.43
10090	.4724		12.000	12.0	65	16	42.15	40.32	38.48	36.65
10100	.4724		12.000	12.0	75	26	45.57	43.59	41.61	39.63
10110	.4724		12.000	12.0	100	50	62.79	60.06	57.33	54.60
86400	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	40.03	38.29	36.55	34.81
86420	.5000	1/2"	12.700	1/2"	3"	1"	43.40	41.51	39.63	37.74
86440	.5000	1/2"	12.700	1/2"	4"	2"	59.24	56.66	54.09	51.51
10430	.5512		14.000	14.0	65	16	65.94	63.07	60.21	57.34
10440	.5512		14.000	14.0	75	25	71.33	68.23	65.13	62.03
10450	.5512		14.000	14.0	100	50	86.25	82.50	78.75	75.00

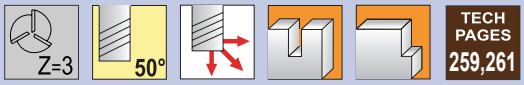
† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
86460	.5625	9/16"	14.288	9/16"	3"	7/8"	71.59	68.48	65.36	62.25
86470	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	74.12	70.90	67.67	64.45
86480	.5625	9/16"	14.288	9/16"	6"	2-1/2"	112.46	107.57	102.68	97.79
86500	.6250	5/8"	15.875	5/8"	3"	7/8"	76.54	73.22	69.89	66.56
86520	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	83.70	80.06	76.42	72.78
86540	.6250	5/8"	15.875	5/8"	6"	2-1/2"	122.10	116.79	111.48	106.17
10120	.6299		16.000	16.0	75	20	80.56	77.06	73.55	70.05
10130	.6299		16.000	16.0	88	32	87.87	84.05	80.23	76.41
10140	.6299		16.000	16.0	150	65	122.10	116.79	111.48	106.17
10160	.7087		18.000	18.0	100	38	128.85	123.24	117.64	112.04
10170	.7087		18.000	18.0	150	75	183.56	175.58	167.60	159.62
86600	.7500	3/4"	19.050	3/4"	3-1/2"	1"	122.72	117.38	112.05	106.71
86620	.7500	3/4"	19.050	3/4"	4"	1-1/2"	122.72	117.38	112.05	106.71
86640	.7500	3/4"	19.050	3/4"	6"	3"	194.50	186.04	177.59	169.13
10460	.7874		20.000	20.0	75	22	149.28	142.79	136.30	129.81
10180	.7874		20.000	20.0	100	38	163.83	156.71	149.58	142.46
10190	.7874		20.000	20.0	150	75	204.90	195.99	187.08	178.17
10480	.9843		25.000	25.0	100	50	190.33	182.05	173.78	165.50
10490	.9843		25.000	25.0	150	82	315.74	302.02	288.29	274.56
86690	1.000	1"	25.400	1"	4"	1-1/8"	183.56	175.58	167.60	159.62
86720	1.000	1"	25.400	1"	4"	2"	183.56	175.58	167.60	159.62
86740	1.000	1"	25.400	1"	6"	3-1/4"	330.68	316.31	301.93	287.55



Series 253MC

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



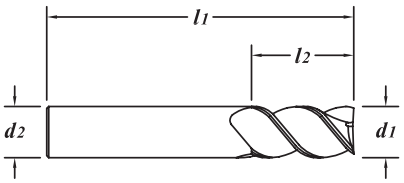
Recommended for aluminum and 303 stainless steel



Square End

TiCN Coated

Solid submicron grain carbide end mill - center cutting
High performance machining
Rigid work holding, machine stability and part integrity are critical!
Improved abrasion resistance and lubricity
Slots aluminum and stainless steel at an axial depth of 25% of diameter
Sharp corners (Can be modified with a corner radius)
AlTiN Coating - page 128
Uncoated - page 130



70
35
0
MATERIAL HARDNESS (Rc)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
86154	.1875	3/16"	4.763	3/16"	2"	5/16"	15.15	14.49	13.83	13.17
86164	.1875	3/16"	4.763	3/16"	2"	9/16"	15.15	14.49	13.83	13.17
86184	.1875	3/16"	4.763	3/16"	3"	1"	26.12	24.98	23.85	22.71
86204	.2500	1/4"	6.350	1/4"	2"	1/2"	17.57	16.81	16.04	15.28
86224	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	20.15	19.27	18.40	17.52
86244	.2500	1/4"	6.350	1/4"	3"	1-1/4"	31.18	29.82	28.47	27.11
86264	.3125	5/16"	7.938	5/16"	2"	7/16"	24.64	23.57	22.50	21.43
86274	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	27.95	26.73	25.52	24.30
86284	.3125	5/16"	7.938	5/16"	4"	1-1/4"	44.25	42.33	40.40	38.48
86304	.3750	3/8"	9.525	3/8"	2"	1/2"	29.27	28.00	26.72	25.45
86324	.3750	3/8"	9.525	3/8"	2-1/2"	1"	32.11	30.71	29.32	27.92
86344	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	48.15	46.06	43.96	41.87
86364	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"	40.51	38.75	36.99	35.23
86374	.4375	7/16"	11.113	7/16"	2-3/4"	1"	40.51	38.75	36.99	35.23
86384	.4375	7/16"	11.113	7/16"	4"	2"	64.96	62.14	59.31	56.49
86404	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	47.46	45.40	43.33	41.27
86424	.5000	1/2"	12.700	1/2"	3"	1"	50.82	48.61	46.40	44.19
86444	.5000	1/2"	12.700	1/2"	4"	2"	68.53	65.55	62.57	59.59
86464	.5625	9/16	14.288	9/16"	3"	7/8"	81.57	78.02	74.48	70.93
86474	.5625	9/16	14.288	9/16"	3-1/2"	1-1/4"	85.70	81.97	78.25	74.52
86484	.5625	9/16	14.288	9/16"	6"	2-1/2"	128.67	123.08	117.48	111.89
86504	.6250	5/8"	15.875	5/8"	3"	7/8"	86.51	82.75	78.99	75.23
86524	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	95.25	91.11	86.97	82.83
86544	.6250	5/8"	15.875	5/8"	6"	2-1/2"	138.32	132.31	126.29	120.28
86604	.7500	3/4"	19.050	3/4"	3-1/2"	1"	135.96	130.05	124.14	118.23
86624	.7500	3/4"	19.050	3/4"	4"	1-1/2"	135.96	130.05	124.14	118.23
86644	.7500	3/4"	19.050	3/4"	6"	3"	213.03	203.76	194.50	185.24
86694	1.000	1"	25.400	1"	4"	1-1/8"	203.48	194.63	185.79	176.94
86724	1.000	1"	25.400	1"	4"	2"	203.48	194.63	185.79	176.94
86744	1.000	1"	25.400	1"	6"	3-1/4"	356.88	341.36	325.85	310.33

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

Series 263M, 263MC, 263MA, 863MA

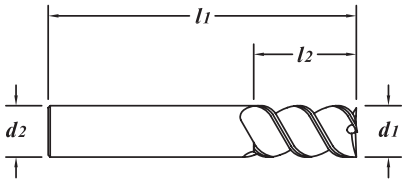
Z=3 | 60° | TECH PAGES 259,261

Recommended for steels, stainless steel, high-temperature alloys



Square End

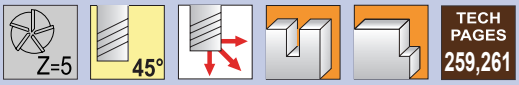
Solid submicron grain carbide end mill - center cutting
High performance profiling
Rigid work holding, machine stability and part integrity are critical!
Modified end gash - will not cut square corner
Can be modified with a corner radius



(263M) UNCOATED EDP#	(263MC) TiCN EDP#	(263MA/863MA) AlTiN EDP#	Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
23010	-	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	15.51	14.84	14.16	13.49
23020	-	-	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	21.76	20.81	19.87	18.92
23030	-	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	27.09	25.92	24.74	23.56
23040	-	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"	33.07	31.64	30.20	28.76
23050	-	-	.5000	1/2"	12.700	1/2"	3"	1"	43.40	41.51	39.63	37.74
23060	-	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	83.70	80.06	76.42	72.78
23070	-	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	122.72	117.38	112.05	106.71
23080	-	-	1.000	1"	25.400	1"	4"	1-1/2"	183.56	175.58	167.60	159.62
-	23014	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	20.15	19.27	18.40	17.52
-	23024	-	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	27.95	26.73	25.52	24.30
-	23034	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	33.29	31.85	30.40	28.95
-	23044	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"	40.51	38.75	36.99	35.23
-	23054	-	.5000	1/2"	12.700	1/2"	3"	1"	50.82	48.61	46.40	44.19
-	23064	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	95.25	91.11	86.97	82.83
-	23074	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	135.96	130.05	124.14	118.23
-	23084	-	1.000	1"	25.400	1"	4"	1-1/2"	203.48	194.63	185.79	176.94
-	-	23517	.2362		6.000	6.0	65	13	21.60	20.66	19.72	18.78
-	-	23017	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	20.85	19.94	19.04	18.13
-	-	23027	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	29.74	28.45	27.15	25.86
-	-	23527	.3150		8.000	8.0	65	19	30.82	29.48	28.14	26.80
-	-	23037	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	35.09	33.56	32.04	30.51
-	-	23537	.3937		10.000	10.0	70	22	42.08	40.25	38.42	36.59
-	-	23047	.4375	7/16"	11.113	7/16"	2-3/4"	1"	42.18	40.35	38.51	36.68
-	-	23547	.4724		12.000	12.0	75	26	54.65	52.27	49.90	47.52
-	-	23057	.5000	1/2"	12.700	1/2"	3"	1"	52.47	50.19	47.91	45.63
-	-	23067	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	96.83	92.62	88.41	84.20
-	-	23557	.6299		16.000	16.0	88	32	101.02	96.62	92.23	87.84
-	-	23077	.7500	3/4"	19.050	3/4"	4"	1-1/2"	138.22	132.21	126.20	120.19
-	-	23087	1.000	1"	25.400	1"	4"	1-1/2"	206.49	197.52	188.54	179.56

Series 255MA, 855MA

.1181" - .4724"
(3.000mm - 12.000mm)



TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

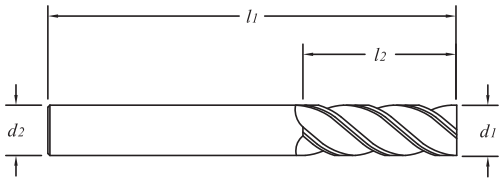
Recommended for steels, stainless steel, and exotics

Square End

AlTiN Coating

Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Dry or semi-dry machining
Improved finishes in titanium
Heavy core, Sharp corners
Uncoated - page 136
TiCN Coated - page 138





MATERIAL HARDNESS (Rc)
70
35
0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
40047	.1181		3.000	3.0	38	8	14.24	13.62	13.00	12.38
40057	.1181		3.000	3.0	50	12	17.16	16.41	15.67	14.92
52087	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	13.52	12.94	12.35	11.76
52097	.1250	1/8"	3.175	1/8"	2"	1/2"	16.31	15.60	14.89	14.18
40087	.1575		4.000	6.0	50	8	23.01	22.01	21.01	20.01
40097	.1575		4.000	6.0	50	12	23.01	22.01	21.01	20.01
52107	.1875	3/16"	4.763	3/16"	2"	5/16"	15.46	14.78	14.11	13.44
52127	.1875	3/16"	4.763	3/16"	2"	9/16"	15.46	14.78	14.11	13.44
40107	.1969		5.000	5.0	50	8	18.32	17.52	16.73	15.93
40127	.1969		5.000	5.0	50	14	18.32	17.52	16.73	15.93
40117	.1969		5.000	6.0	50	8	22.54	21.56	20.58	19.60
40137	.1969		5.000	6.0	65	16	24.61	23.54	22.47	21.40
40207	.2362		6.000	6.0	50	10	19.16	18.33	17.49	16.66
40227	.2362		6.000	6.0	65	20	21.60	20.66	19.72	18.78
40247	.2362		6.000	6.0	100	32	35.75	34.20	32.64	31.09
52207	.2500	1/4"	6.350	1/4"	2"	3/8"	18.39	17.59	16.79	15.99
52227	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	20.85	19.94	19.04	18.13
52247	.2500	1/4"	6.350	1/4"	4"	1-1/4"	34.28	32.79	31.30	29.81
52307	.3125	5/16"	7.938	5/16"	2"	7/16"	25.42	24.31	23.21	22.10
52327	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	29.74	28.45	27.15	25.86
52347	.3125	5/16"	7.938	5/16"	4"	1-1/4"	46.71	44.68	42.65	40.62
40307	.3150		8.000	8.0	50	11	26.46	25.31	24.16	23.01
40327	.3150		8.000	8.0	65	21	30.82	29.48	28.14	26.80
40347	.3150		8.000	8.0	100	32	48.63	46.52	44.40	42.29
40367	.3543		9.000	10.0	65	22	47.59	45.52	43.45	41.38
52407	.3750	3/8"	9.525	3/8"	2"	1/2"	30.03	28.72	27.42	26.11
52427	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	35.09	33.56	32.04	30.51
52447	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	50.63	48.43	46.23	44.03
40407	.3937		10.000	10.0	50	12	34.75	33.24	31.73	30.22
40427	.3937		10.000	10.0	70	22	42.08	40.25	38.42	36.59
40447	.3937		10.000	10.0	88	38	62.15	59.44	56.74	54.04
52507	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"	42.18	40.35	38.51	36.68
52527	.4375	7/16"	11.113	7/16"	2-3/4"	1"	42.18	40.35	38.51	36.68
52547	.4375	7/16"	11.113	7/16"	4"	2"	67.45	64.52	61.58	58.65
40507	.4724		12.000	12.0	65	16	51.22	48.99	46.77	44.54
40527	.4724		12.000	12.0	75	32	54.65	52.27	49.90	47.52
40547	.4724		12.000	12.0	100	50	74.59	71.35	68.10	64.86

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
52607	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	49.12	46.98	44.85	42.71
52627	.5000	1/2"	12.700	1/2"	3"	1-1/4"	52.47	50.19	47.91	45.63
52647	.5000	1/2"	12.700	1/2"	4"	2"	71.01	67.93	64.84	61.75
52707	.6250	5/8"	15.875	5/8"	3"	3/4"	87.08	83.29	79.51	75.72
52727	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"	96.83	92.62	88.41	84.20
52747	.6250	5/8"	15.875	5/8"	6"	2-1/2"	141.61	135.45	129.30	123.14
40607	.6299		16.000	16.0	75	20	91.08	87.12	83.16	79.20
40627	.6299		16.000	16.0	88	41	101.02	96.62	92.23	87.84
40647	.6299		16.000	16.0	150	63	141.61	135.45	129.30	123.14
52807	.7500	3/4"	19.050	3/4"	3"	7/8"	122.68	117.35	112.01	106.68
52827	.7500	3/4"	19.050	3/4"	4"	1-5/8"	138.22	132.21	126.20	120.19
52837	.7500	3/4"	19.050	3/4"	5"	2"	185.52	177.45	169.39	161.32
52847	.7500	3/4"	19.050	3/4"	6"	3-1/4"	217.11	207.67	198.23	188.79
40727	.7874		20.000	20.0	100	41	186.74	178.62	170.50	162.38
40747	.7874		20.000	20.0	150	82	234.24	224.06	213.87	203.69
40787	.9843		25.000	25.0	100	28	213.26	203.98	194.71	185.44
40827	.9843		25.000	25.0	100	50	213.26	203.98	194.71	185.44
40847	.9843		25.000	25.0	150	82	345.09	330.09	315.08	300.08
52897	1.000	1"	25.400	1"	4"	1-1/8"	206.49	197.52	188.54	179.56
52927	1.000	1"	25.400	1"	4"	2"	206.49	197.52	188.54	179.56
52947	1.000	1"	25.400	1"	6"	3-1/4"	360.04	344.39	328.73	313.08



End Mill Manufacturing

Series 255M, 855M

.1181" - .5000"
(3.000mm - 12.700mm)

Z=5 | 45° | TECH PAGES 259,261

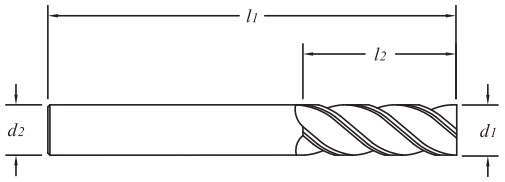
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

Recommended for steels, stainless steel, and exotics

Square End

Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Improved finishes in titanium
Heavy core
Sharp corners
AlTiN Coating - page 134
TiCN Coated - page 138





MATERIAL HARDNESS (Rc)
70
35
0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
40040	.1181		3.000	3.0	38	8	11.63	11.12	10.62	10.11
40050	.1181		3.000	3.0	50	12	14.01	13.40	12.79	12.18
52080	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	10.91	10.44	9.96	9.49
52090	.1250	1/8"	3.175	1/8"	2"	1/2"	13.14	12.57	12.00	11.43
40080	.1575		4.000	6.0	50	8	18.89	18.07	17.25	16.43
40090	.1575		4.000	6.0	50	12	18.89	18.07	17.25	16.43
52100	.1875	3/16"	4.763	3/16"	2"	5/16"	12.86	12.30	11.74	11.18
52120	.1875	3/16"	4.763	3/16"	2"	9/16"	12.86	12.30	11.74	11.18
40100	.1969		5.000	5.0	50	8	14.28	13.66	13.04	12.42
40120	.1969		5.000	5.0	50	14	14.28	13.66	13.04	12.42
40200	.2362		6.000	6.0	50	10	15.15	14.49	13.83	13.17
40220	.2362		6.000	6.0	65	20	16.27	15.57	14.86	14.15
40240	.2362		6.000	6.0	100	32	29.50	28.22	26.93	25.65
52200	.2500	1/4"	6.350	1/4"	2"	3/8"	14.35	13.73	13.10	12.48
52220	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	15.51	14.84	14.16	13.49
52240	.2500	1/4"	6.350	1/4"	4"	1-1/4"	28.03	26.81	25.59	24.37
52300	.3125	5/16"	7.938	5/16"	2"	7/16"	19.63	18.78	17.92	17.07
52320	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	21.76	20.81	19.87	18.92
52340	.3125	5/16"	7.938	5/16"	4"	1-1/4"	36.55	34.96	33.37	31.78
40320	.3150		8.000	8.0	65	21	22.85	21.86	20.86	19.87
40340	.3150		8.000	8.0	100	32	38.49	36.82	35.14	33.47
52400	.3750	3/8"	9.525	3/8"	2"	1/2"	24.25	23.20	22.14	21.09
52420	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	27.09	25.92	24.74	23.56
52440	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	40.48	38.72	36.96	35.20
40420	.3937		10.000	10.0	70	22	32.98	31.55	30.11	28.68
40440	.3937		10.000	10.0	88	38	50.39	48.20	46.01	43.82
52500	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"	33.07	31.64	30.20	28.76
52520	.4375	7/16"	11.113	7/16"	2-3/4"	1"	33.07	31.64	30.20	28.76
52540	.4375	7/16"	11.113	7/16"	4"	2"	55.69	53.27	50.85	48.43
40520	.4724		12.000	12.0	75	32	45.57	43.59	41.61	39.63
40540	.4724		12.000	12.0	100	50	62.79	60.06	57.33	54.60
52600	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	40.03	38.29	36.55	34.81
52620	.5000	1/2"	12.700	1/2"	3"	1-1/4"	43.40	41.51	39.63	37.74
52640	.5000	1/2"	12.700	1/2"	4"	2"	59.24	56.66	54.09	51.51

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
52700	.6250	5/8"	15.875	5/8"	3"	3/4"	76.54	73.22	69.89	66.56
52720	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"	83.70	80.06	76.42	72.78
52740	.6250	5/8"	15.875	5/8"	6"	2-1/2"	122.10	116.79	111.48	106.17
40600	.6299		16.000	16.0	75	20	80.56	77.06	73.55	70.05
40620	.6299		16.000	16.0	88	41	87.87	84.05	80.23	76.41
40640	.6299		16.000	16.0	150	63	122.10	116.79	111.48	106.17
52800	.7500	3/4"	19.050	3/4"	3"	7/8"	110.07	105.28	100.50	95.71
52820	.7500	3/4"	19.050	3/4"	4"	1-5/8"	122.72	117.38	112.05	106.71
52830	.7500	3/4"	19.050	3/4"	5"	2"	166.12	158.90	151.67	144.45
52840	.7500	3/4"	19.050	3/4"	6"	3-1/4"	194.50	186.04	177.59	169.13
40700	.7874		20.000	20.0	75	22	149.28	142.79	136.30	129.81
40720	.7874		20.000	20.0	100	41	163.83	156.71	149.58	142.46
40740	.7874		20.000	20.0	150	82	204.90	195.99	187.08	178.17
40780	.9843		25.000	25.0	100	28	190.33	182.05	173.78	165.50
40820	.9843		25.000	25.0	100	50	190.33	182.05	173.78	165.50
40840	.9843		25.000	25.0	150	82	315.74	302.02	288.29	274.56
52890	1.000	1"	25.400	1"	4"	1-1/8"	183.56	175.58	167.60	159.62
52920	1.000	1"	25.400	1"	4"	2"	183.56	175.58	167.60	159.62
52940	1.000	1"	25.400	1"	6"	3-1/4"	330.68	316.31	301.93	287.55



Series 255MC

.1875" - 1.000"
(4.763mm - 25.400mm)

Z=5 | 45° | TECH PAGES 259,261

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

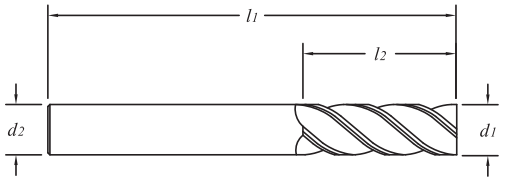
Recommended for steels, stainless steel, and exotics

Square End

TiCN Coated

Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Improved abrasion resistance and lubricity
Improved finishes in titanium
Heavy core
Sharp corners
AlTiN Coating - page 134
Uncoated - page 136



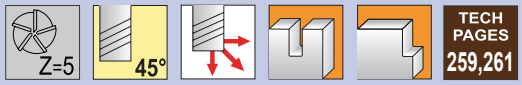


MATERIAL HARDNESS (Rc) 70 35 0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
52104	.1875	3/16"	4.763	3/16"	2"	5/16"	15.15	14.49	13.83	13.17
52124	.1875	3/16"	4.763	3/16"	2"	9/16"	15.15	14.49	13.83	13.17
52204	.2500	1/4"	6.350	1/4"	2"	3/8"	17.57	16.81	16.04	15.28
52224	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	20.15	19.27	18.40	17.52
52244	.2500	1/4"	6.350	1/4"	4"	1-1/4"	33.03	31.59	30.16	28.72
52304	.3125	5/16"	7.938	5/16"	2"	7/16"	24.64	23.57	22.50	21.43
52324	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	27.95	26.73	25.52	24.30
52344	.3125	5/16"	7.938	5/16"	4"	1-1/4"	44.25	42.33	40.40	38.48
52404	.3750	3/8"	9.525	3/8"	2"	1/2"	29.27	28.00	26.72	25.45
52424	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	33.29	31.85	30.40	28.95
52444	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	48.15	46.06	43.96	41.87
52504	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"	40.51	38.75	36.99	35.23
52524	.4375	7/16"	11.113	7/16"	2-3/4"	1"	40.51	38.75	36.99	35.23
52544	.4375	7/16"	11.113	7/16"	4"	2"	64.96	62.14	59.31	56.49
52604	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	47.46	45.40	43.33	41.27
52624	.5000	1/2"	12.700	1/2"	3"	1-1/4"	50.82	48.61	46.40	44.19
52644	.5000	1/2"	12.700	1/2"	4"	2"	68.53	65.55	62.57	59.59
52704	.6250	5/8"	15.875	5/8"	3"	3/4"	86.51	82.75	78.99	75.23
52724	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"	95.25	91.11	86.97	82.83
52744	.6250	5/8"	15.875	5/8"	6"	2-1/2"	138.32	132.31	126.29	120.28
52804	.7500	3/4"	19.050	3/4"	3"	7/8"	122.35	117.03	111.71	106.39
52824	.7500	3/4"	19.050	3/4"	4"	1-5/8"	135.96	130.05	124.14	118.23
52844	.7500	3/4"	19.050	3/4"	6"	3-1/4"	213.03	203.76	194.50	185.24
52894	1.000	1"	25.400	1"	4"	1-1/8"	203.48	194.63	185.79	176.94
52924	1.000	1"	25.400	1"	4"	2"	203.48	194.63	185.79	176.94
52944	1.000	1"	25.400	1"	6"	3-1/4"	356.88	341.36	325.85	310.33

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)



TECH PAGES 259,261

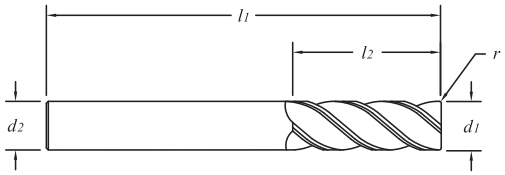
Recommended for steels, stainless steel, and exotics

Corner Radius

AlTiN Coating

Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Dry or semi-dry machining
Improved finishes in titanium
Heavy core





EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
83527	.1181		3.000	3.0	38	8	0.20	15.55	14.87	14.20	13.52
83537	.1181		3.000	3.0	38	8	0.50	15.55	14.87	14.20	13.52
83547	.1181		3.000	3.0	50	12	0.20	18.63	17.82	17.01	16.20
83550	.1181		3.000	3.0	50	12	0.30	18.63	17.82	17.01	16.20
83557	.1181		3.000	3.0	50	12	0.50	18.63	17.82	17.01	16.20
83567	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"	14.78	14.14	13.49	12.85
83577	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.020"	14.78	14.14	13.49	12.85
83587	.1250	1/8"	3.175	1/8"	2"	1/2"	.010"	18.16	17.37	16.58	15.79
83597	.1250	1/8"	3.175	1/8"	2"	1/2"	.020"	18.16	17.37	16.58	15.79
83600	.1250	1/8"	3.175	1/8"	2"	1/2"	.030"	18.16	17.37	16.58	15.79
83607	.1575		4.000	6.0	50	8	0.30	25.07	23.98	22.89	21.80
83617	.1575		4.000	6.0	50	8	0.50	25.07	23.98	22.89	21.80
83627	.1575		4.000	6.0	50	12	0.30	25.07	23.98	22.89	21.80
83637	.1575		4.000	6.0	50	12	0.50	25.07	23.98	22.89	21.80
83647	.1875	3/16"	4.763	3/16"	2"	5/16"	.010"	18.57	17.77	16.96	16.15
83657	.1875	3/16"	4.763	3/16"	2"	5/16"	.020"	18.57	17.77	16.96	16.15
83667	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	18.57	17.77	16.96	16.15
83677	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	18.57	17.77	16.96	16.15
83680	.1875	3/16"	4.763	3/16"	2"	9/16"	.030"	18.57	17.77	16.96	16.15
83707	.1969		5.000	6.0	65	15	0.30	27.34	26.15	24.96	23.77
83717	.1969		5.000	6.0	65	15	0.50	27.34	26.15	24.96	23.77
83767	.2362		6.000	6.0	50	12	0.30	23.59	22.56	21.54	20.51
83777	.2362		6.000	6.0	50	12	0.50	23.59	22.56	21.54	20.51
83780	.2362		6.000	6.0	65	19	0.20	26.48	25.33	24.18	23.03
83787	.2362		6.000	6.0	65	19	0.30	26.48	25.33	24.18	23.03
83797	.2362		6.000	6.0	65	19	0.50	26.48	25.33	24.18	23.03
83807	.2362		6.000	6.0	65	19	1.00	26.48	25.33	24.18	23.03
83827	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"	22.70	21.71	20.73	19.74
83837	.2500	1/4"	6.350	1/4"	2"	3/8"	.030"	22.70	21.71	20.73	19.74
83845	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	25.52	24.41	23.30	22.19
83847	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	25.52	24.41	23.30	22.19
83857	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	25.52	24.41	23.30	22.19
83877	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	25.52	24.41	23.30	22.19
83927	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	30.99	29.65	28.30	26.95
83937	.3125	5/16"	7.938	5/16"	2"	7/16"	.030"	30.99	29.65	28.30	26.95
83940	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.010"	34.55	33.04	31.54	30.04
83947	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	34.55	33.04	31.54	30.04
83957	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	34.55	33.04	31.54	30.04
83977	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.060"	34.55	33.04	31.54	30.04



continued →

Series 255RA, 855RA *(continued)*

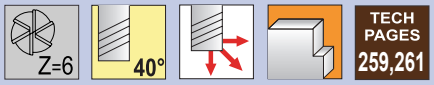
.3150" - 1.000"
(8.000mm - 25.400mm)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
83987	.3150		8.000	8.0	50	12	0.50	32.13	30.73	29.34	27.94
83997	.3150		8.000	8.0	50	12	1.00	32.13	30.73	29.34	27.94
84000	.3150		8.000	8.0	65	22	0.30	35.83	34.28	32.72	31.16
84007	.3150		8.000	8.0	65	22	0.50	35.83	34.28	32.72	31.16
84017	.3150		8.000	8.0	65	22	1.00	35.83	34.28	32.72	31.16
84027	.3150		8.000	8.0	65	22	1.50	35.83	34.28	32.72	31.16
84087	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	36.54	34.95	33.36	31.77
84097	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"	36.54	34.95	33.36	31.77
84100	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	40.18	38.43	36.69	34.94
84107	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	40.18	38.43	36.69	34.94
84117	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	40.18	38.43	36.69	34.94
84137	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	40.18	38.43	36.69	34.94
84167	.3937		10.000	10.0	70	22	0.50	48.58	46.46	44.35	42.24
84177	.3937		10.000	10.0	70	22	1.00	48.58	46.46	44.35	42.24
84257	.4724		12.000	12.0	75	32	0.30	71.04	67.95	64.86	61.77
84267	.4724		12.000	12.0	75	32	0.50	71.04	67.95	64.86	61.77
84277	.4724		12.000	12.0	75	32	1.00	71.04	67.95	64.86	61.77
84287	.4724		12.000	12.0	75	32	1.50	71.04	67.95	64.86	61.77
84307	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	68.16	65.20	62.23	59.27
84317	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	68.16	65.20	62.23	59.27
84327	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	68.16	65.20	62.23	59.27
84337	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	68.16	65.20	62.23	59.27
84357	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	68.16	65.20	62.23	59.27
84367	.5000	1/2"	12.700	1/2"	4"	2"	.030"	80.74	77.23	73.72	70.21
84377	.5000	1/2"	12.700	1/2"	4"	2"	.060"	80.74	77.23	73.72	70.21
84397	.5000	1/2"	12.700	1/2"	4"	2"	.120"	80.74	77.23	73.72	70.21
84467	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	108.40	103.69	98.97	94.26
84487	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	108.40	103.69	98.97	94.26
84497	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	108.40	103.69	98.97	94.26
84507	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	108.40	103.69	98.97	94.26
84567	.6299		16.000	16.0	88	32	1.00	113.03	108.12	103.20	98.29
84577	.6299		16.000	16.0	88	32	2.00	113.03	108.12	103.20	98.29
84587	.6299		16.000	16.0	150	65	1.00	168.80	161.46	154.12	146.78
84597	.6299		16.000	16.0	150	65	2.00	168.80	161.46	154.12	146.78
84667	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	155.12	148.38	141.63	134.89
84687	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	155.12	148.38	141.63	134.89
84697	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	155.12	148.38	141.63	134.89
84700	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	155.12	148.38	141.63	134.89
84707	.7500	3/4"	19.050	3/4"	5"	2"	.030"	214.79	205.45	196.11	186.77
84717	.7500	3/4"	19.050	3/4"	5"	2"	.060"	214.79	205.45	196.11	186.77
84747	.7500	3/4"	19.050	3/4"	5"	2"	.120"	214.79	205.45	196.11	186.77
84757	.7500	3/4"	19.050	3/4"	5"	2"	.190"	214.79	205.45	196.11	186.77
84767	.7874		20.000	20.0	100	38	1.00	219.52	209.98	200.43	190.89
84777	.7874		20.000	20.0	100	38	3.00	219.52	209.98	200.43	190.89
84887	.9843		25.000	25.0	100	38	1.00	251.22	240.30	229.37	218.45
84897	.9843		25.000	25.0	100	38	3.00	251.22	240.30	229.37	218.45
84957	1.000	1"	25.400	1"	4"	1-1/2"	.015"	264.26	252.77	241.28	229.79
84967	1.000	1"	25.400	1"	4"	1-1/2"	.030"	264.26	252.77	241.28	229.79
84970	1.000	1"	25.400	1"	4"	1-1/2"	.060"	264.26	252.77	241.28	229.79
84977	1.000	1"	25.400	1"	4"	1-1/2"	.120"	264.26	252.77	241.28	229.79
84987	1.000	1"	25.400	1"	5"	2"	.030"	324.98	310.85	296.72	282.59
84990	1.000	1"	25.400	1"	5"	2"	.060"	324.98	310.85	296.72	282.59
84997	1.000	1"	25.400	1"	5"	2"	.120"	324.98	310.85	296.72	282.59
85007	1.000	1"	25.400	1"	5"	2"	.190"	324.98	310.85	296.72	282.59

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

Series 246M, 246MC, 246MA, 846M, 846MA

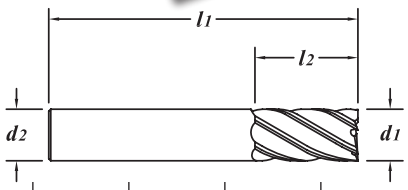


Recommended for steels

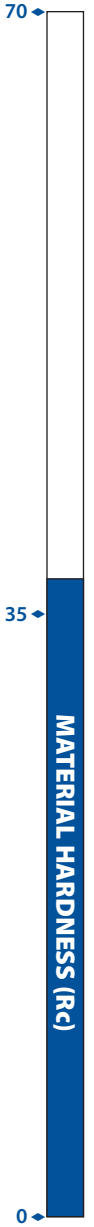


Square End

Solid submicron grain carbide end mill - center cutting
High performance finishing in a variety of steels
Rigid work holding, machine stability and part integrity are critical!
Excellent durability



(246M/846M) UNCOATED EDP#	(246MC) TiCN EDP#	(246MA/846MA) AlTiN EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
51110	-	-	.1875	3/16"	4.763	3/16"	2"	5/8"	12.86	12.30	11.74	11.18
51510	-	-	.1969		5.000	5.0	50	16	14.28	13.66	13.04	12.42
51520	-	-	.2362		6.000	6.0	65	20	16.27	15.57	14.86	14.15
51150	-	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	15.51	14.84	14.16	13.49
51190	-	-	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	21.76	20.81	19.87	18.92
51530	-	-	.3150		8.000	8.0	65	22	22.85	21.86	20.86	19.87
51230	-	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	27.09	25.92	24.74	23.56
51540	-	-	.3937		10.000	10.0	70	25	32.98	31.55	30.11	28.68
51270	-	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"	33.07	31.64	30.20	28.76
51310	-	-	.5000	1/2"	12.700	1/2"	3"	1"	43.40	41.51	39.63	37.74
51330	-	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	83.70	80.06	76.42	72.78
51560	-	-	.6299		16.000	16.0	88	32	87.87	84.05	80.23	76.41
51350	-	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	122.72	117.38	112.05	106.71
51370	-	-	1.000	1"	25.400	1"	4"	1-1/2"	183.56	175.58	167.60	159.62
51400	-	-	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"	535.91	512.61	489.31	466.01
51430	-	-	1.250	1-1/4"	31.750	1-1/4"	6"	3"	701.52	671.02	640.52	610.02
-	51114	-	.1875	3/16"	4.763	3/16"	2"	5/8"	15.15	14.49	13.83	13.17
-	51154	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	20.15	19.27	18.40	17.52
-	51194	-	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	27.95	26.73	25.52	24.30
-	51234	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	33.29	31.85	30.40	28.95
-	51274	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"	40.51	38.75	36.99	35.23
-	51314	-	.5000	1/2"	12.700	1/2"	3"	1"	50.82	48.61	46.40	44.19
-	51334	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	95.25	91.11	86.97	82.83
-	51354	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	135.96	130.05	124.14	118.23
-	51374	-	1.000	1"	25.400	1"	4"	1-1/2"	203.44	194.59	185.75	176.90
-	51404	-	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"	568.03	543.33	518.64	493.94
-	51434	-	1.250	1-1/4"	31.750	1-1/4"	6"	3"	737.85	705.77	673.69	641.61
-	-	51117	.1875	3/16"	4.763	3/16"	2"	5/8"	15.46	14.78	14.11	13.44
-	-	51517	.1969		5.000	5.0	50	16	18.32	17.52	16.73	15.93
-	-	51597	.1969		5.000	6.0	65	16	24.61	23.54	22.47	21.40
-	-	51527	.2362		6.000	6.0	65	20	21.60	20.66	19.72	18.78
-	-	51157	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	20.85	19.94	19.04	18.13
-	-	51197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	29.74	28.45	27.15	25.86
-	-	51537	.3150		8.000	8.0	65	22	30.82	29.48	28.14	26.80
-	-	51237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	35.09	33.56	32.04	30.51
-	-	51547	.3937		10.000	10.0	70	25	42.08	40.25	38.42	36.59
-	-	51277	.4375	7/16"	11.113	7/16"	2-3/4"	1"	42.18	40.35	38.51	36.68
-	-	51557	.4724		12.000	12.0	75	26	54.65	52.27	49.90	47.52
-	-	51317	.5000	1/2"	12.700	1/2"	3"	1"	52.47	50.19	47.91	45.63
-	-	51337	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	96.83	92.62	88.41	84.20
-	-	51567	.6299		16.000	16.0	88	32	101.02	96.62	92.23	87.84
-	-	51357	.7500	3/4"	19.050	3/4"	4"	1-1/2"	138.22	132.21	126.20	120.19
-	-	51577	.7874		20.000	20.0	100	38	186.74	178.62	170.50	162.38
-	-	51587	.9843		25.000	25.0	100	38	213.26	203.98	194.71	185.44
-	-	51377	1.000	1"	25.400	1"	4"	1-1/2"	206.49	197.52	188.54	179.56
-	-	51407	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"	573.51	548.57	523.64	498.70
-	-	51437	1.250	1-1/4"	31.750	1-1/4"	6"	3"	739.12	706.98	674.85	642.71



Series TMS

.2362" - .5000"
(6.000mm - 12.700mm)

TECH PAGES 268-269

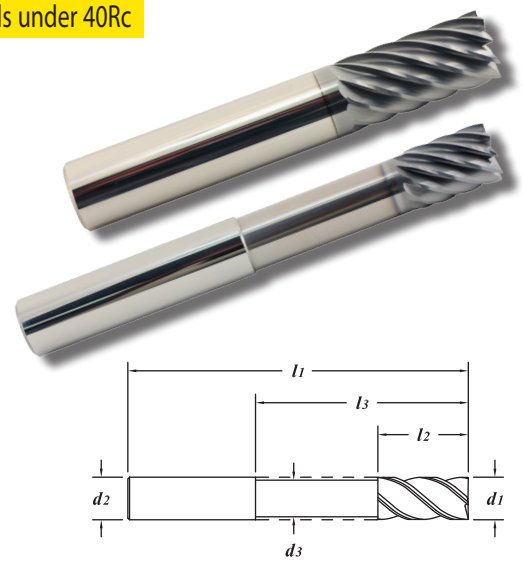
TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6

Recommended for titanium and steels under 40Rc

Multi-Flute End Mill - Square End

AlCrN Coating

Solid submicron grain carbide end mill - non-center cutting
Engineered for Titanium
Multiple flutes for increased feed rates
Odd number of flutes to naturally break up harmonics
Effective for Trochoidal milling
Up to 8% Radial (ap) engagement
Can be used to finish most steels under 40Rc, as well as aluminum
Conventional grind for better finish cutting and less push off when finishing
Regrindable



MATERIAL HARDNESS (Rc)
70
35
0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter	Number Flutes	1-11	12-24	25-49	50-100
98390	.2362		6.000	6.0	50	12	-	-	7	24.68	23.61	22.53	21.46
98392	.2362		6.000	6.0	65	19	-	-	7	27.82	26.61	25.40	24.19
98394	.2362		6.000	6.0	100	38	-	-	7	46.36	44.34	42.33	40.31
98396	.2362		6.000	6.0	100	10	60	5.4	7	49.80	47.63	45.47	43.30
98398	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-	7	23.68	22.65	21.62	20.59
98400	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	7	26.85	25.69	24.52	23.35
98402	.2500	1/4"	6.350	1/4"	4"	1-1/2"	-	-	7	44.47	42.54	40.60	38.67
98404	.3125	5/16"	7.938	5/16"	2"	7/16"	-	-	7	35.16	33.63	32.10	30.57
98406	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	-	-	7	38.31	36.64	34.98	33.31
98408	.3125	5/16"	7.938	5/16"	4"	1-1/2"	-	-	7	60.69	58.05	55.41	52.77
98410	.3150		8.000	8.0	50	12	-	-	7	35.63	34.08	32.53	30.98
98412	.3150		8.000	8.0	65	22	-	-	7	39.69	37.96	36.24	34.51
98414	.3150		8.000	8.0	100	38	-	-	7	63.18	60.43	57.69	54.94
98416	.3150		8.000	8.0	100	12	60	7.4	7	66.62	63.72	60.83	57.93
98418	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	7	42.30	40.46	38.62	36.78
98420	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-	7	45.20	43.23	41.27	39.30
98422	.3750	3/8"	9.525	3/8"	3"	1-1/4"	-	-	7	58.19	55.66	53.13	50.60
98424	.3750	3/8"	9.525	3/8"	4"	2"	-	-	7	65.22	62.38	59.55	56.71
98426	.3937		10.000	10.0	50	16	-	-	7	49.27	47.12	44.98	42.84
98428	.3937		10.000	10.0	70	22	-	-	7	54.20	51.84	49.49	47.13
98430	.3937		10.000	10.0	100	38	-	-	7	82.17	78.60	75.02	71.45
98432	.3937		10.000	10.0	100	50	-	-	7	82.17	78.60	75.02	71.45
98434	.3937		10.000	10.0	100	16	60	9.4	7	85.62	81.90	78.17	74.45
98436	.4724		12.000	12.0	75	26	-	-	9	70.40	67.34	64.28	61.22
98438	.4724		12.000	12.0	75	32	-	-	9	70.40	67.34	64.28	61.22
98440	.4724		12.000	12.0	100	42	-	-	9	96.61	92.41	88.21	84.01
98442	.4724		12.000	12.0	100	52	-	-	9	96.61	92.41	88.21	84.01
98444	.4724		12.000	12.0	150	19	105	11.4	9	136.19	130.27	124.35	118.43
98446	.5000	1/2"	12.700	1/2"	3"	1"	-	-	9	67.60	64.66	61.72	58.78
98448	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	9	67.60	64.66	61.72	58.78
98450	.5000	1/2"	12.700	1/2"	4"	5/8"	2-1/8"	.470"	9	94.91	90.78	86.66	82.53
98452	.5000	1/2"	12.700	1/2"	4"	1-1/2"	-	-	9	91.47	87.49	83.52	79.54
98454	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	9	91.47	87.49	83.52	79.54

† *Metric equivalents are for reference only*

EDP#	*d1* † Diameter Decimal	Diameter	Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l3* Reach Length	*d3* Neck Diameter	Number Flutes	1-11	12-24	25-49	50-100
98456	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	9	139.20	133.14	127.09	121.04
98458	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	9	148.66	142.20	135.73	129.27
98460	.6250	5/8"	15.875	5/8"	6"	3-1/4"	-	-	9	204.55	195.66	186.76	177.87
98462	.6250	5/8"	15.875	5/8"	6"	3/4"	4-1/8"	.590"	9	207.99	198.95	189.90	180.86
98464	.6299		16.000	16.0	88	32	-	-	9	145.21	138.90	132.58	126.27
98466	.6299		16.000	16.0	100	42	-	-	9	155.01	148.27	141.53	134.79
98468	.6299		16.000	16.0	150	60	-	-	9	213.29	204.02	194.74	185.47
98470	.6299		16.000	16.0	150	80	-	-	9	213.29	204.02	194.74	185.47
98472	.6299		16.000	16.0	150	22	102	15.4	9	216.73	207.31	197.88	188.46
98474	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	11	206.64	197.66	188.67	179.69
98476	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-	11	206.64	197.66	188.67	179.69
98478	.7500	3/4"	19.050	3/4"	5"	2-1/8"	-	-	11	277.38	265.32	253.26	241.20
98480	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	11	324.58	310.46	296.35	282.24
98484	.7874		20.000	20.0	100	26	-	-	11	268.44	256.77	245.10	233.43
98486	.7874		20.000	20.0	100	38	-	-	11	268.44	256.77	245.10	233.43
98488	.7874		20.000	20.0	150	60	-	-	11	338.10	323.40	308.70	294.00
98490	.7874		20.000	20.0	150	80	-	-	11	338.10	323.40	308.70	294.00
98494	1.000	1"	25.400	1"	4"	1-1/2"	-	-	13	284.96	272.57	260.18	247.79
98496	1.000	1"	25.400	1"	5"	2-1/4"	-	-	13	381.42	364.84	348.25	331.67
98498	1.000	1"	25.400	1"	6"	3-1/4"	-	-	13	496.87	475.27	453.66	432.06
98500	1.000	1"	25.400	1"	7"	4-1/4"	-	-	13	668.14	639.09	610.04	580.99



Series TMR

.4724"
(12.000mm)






TECH PAGES 268-269

TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025mm –.025mm)

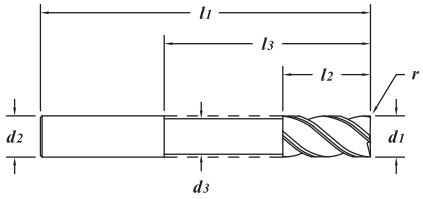
Recommended for titanium and steels under 40Rc

Multi-Flute End Mill - Corner Radius

AlCrN Coating

Solid submicron grain carbide end mill - non-center cutting
Engineered for Titanium
Multiple flutes for increased feed rates
Odd number of flutes to naturally break up harmonics
Effective for Trochoidal milling
Up to 8% Radial (ap) engagement
Can be used to finish most steels under 40Rc, as well as aluminum
Conventional grind for better finish cutting and less push off when finishing
Regrindable





EDP#	d_1 † Diameter Decimal	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	Number Flutes	1-11	12-24	25-49	50-100
98502	.4724	12.000	12.0	75	26	0.30	-	-	7	85.62	81.90	78.17	74.45
98504	.4724	12.000	12.0	75	26	0.50	-	-	7	85.62	81.90	78.17	74.45
98508	.4724	12.000	12.0	75	26	1.00	-	-	7	85.62	81.90	78.17	74.45
98516	.4724	12.000	12.0	75	26	4.00	-	-	7	85.62	81.90	78.17	74.45
98518	.4724	12.000	12.0	75	32	0.50	-	-	7	85.62	81.90	78.17	74.45
98522	.4724	12.000	12.0	75	32	1.00	-	-	7	85.62	81.90	78.17	74.45
98524	.4724	12.000	12.0	75	32	1.50	-	-	7	85.62	81.90	78.17	74.45
98528	.4724	12.000	12.0	75	32	3.00	-	-	7	85.62	81.90	78.17	74.45
98532	.4724	12.000	12.0	100	42	0.50	-	-	7	101.42	97.01	92.60	88.19
98538	.4724	12.000	12.0	100	42	1.50	-	-	7	101.42	97.01	92.60	88.19
98544	.4724	12.000	12.0	100	42	4.00	-	-	7	101.42	97.01	92.60	88.19
98546	.4724	12.000	12.0	100	52	0.50	-	-	7	101.42	97.01	92.60	88.19
98550	.4724	12.000	12.0	100	52	1.00	-	-	7	101.42	97.01	92.60	88.19
98552	.4724	12.000	12.0	100	52	1.50	-	-	7	101.42	97.01	92.60	88.19
98556	.4724	12.000	12.0	100	52	3.00	-	-	7	101.42	97.01	92.60	88.19
98560	.4724	12.000	12.0	150	19	0.50	105	11.4	7	140.71	134.60	128.48	122.36
98564	.4724	12.000	12.0	150	19	1.00	105	11.4	7	140.71	134.60	128.48	122.36
98570	.4724	12.000	12.0	150	19	3.00	105	11.4	7	140.71	134.60	128.48	122.36

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

EDP#	*d1* † Diameter Decimal	Diameter	Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*r* Corner Radius	*l3* Reach Length	*d3* Neck Diameter	Number Flutes	1-11	12-24	25-49	50-100
98574	.5000	1/2"	12.700	1/2"	3"	1"	.010"	-	-	7	82.13	78.56	74.99	71.42
98576	.5000	1/2"	12.700	1/2"	3"	1"	.020"	-	-	7	82.13	78.56	74.99	71.42
98578	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-	7	82.13	78.56	74.99	71.42
98580	.5000	1/2"	12.700	1/2"	3"	1"	.060"	-	-	7	82.13	78.56	74.99	71.42
98582	.5000	1/2"	12.700	1/2"	3"	1"	.090"	-	-	7	82.13	78.56	74.99	71.42
98584	.5000	1/2"	12.700	1/2"	3"	1"	.120"	-	-	7	82.13	78.56	74.99	71.42
98586	.5000	1/2"	12.700	1/2"	3"	1"	.125"	-	-	7	82.13	78.56	74.99	71.42
98588	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-	7	82.13	78.56	74.99	71.42
98590	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-	7	82.13	78.56	74.99	71.42
98592	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	7	82.13	78.56	74.99	71.42
98594	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-	7	82.13	78.56	74.99	71.42
98598	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-	7	82.13	78.56	74.99	71.42
98600	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-	7	82.13	78.56	74.99	71.42
98602	.5000	1/2"	12.700	1/2"	4"	5/8"	.010"	2-1/8"	.470"	7	100.50	96.13	91.76	87.39
98604	.5000	1/2"	12.700	1/2"	4"	5/8"	.020"	2-1/8"	.470"	7	100.50	96.13	91.76	87.39
98606	.5000	1/2"	12.700	1/2"	4"	5/8"	.030"	2-1/8"	.470"	7	100.50	96.13	91.76	87.39
98608	.5000	1/2"	12.700	1/2"	4"	5/8"	.060"	2-1/8"	.470"	7	100.50	96.13	91.76	87.39
98610	.5000	1/2"	12.700	1/2"	4"	5/8"	.120"	2-1/8"	.470"	7	100.50	96.13	91.76	87.39
98612	.5000	1/2"	12.700	1/2"	4"	5/8"	.125"	2-1/8"	.470"	7	100.50	96.13	91.76	87.39
98614	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.010"	-	-	7	97.06	92.84	88.62	84.40
98616	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.020"	-	-	7	97.06	92.84	88.62	84.40
98618	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-	7	97.06	92.84	88.62	84.40
98620	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.060"	-	-	7	97.06	92.84	88.62	84.40
98622	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.010"	-	-	7	97.06	92.84	88.62	84.40
98626	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-	7	97.06	92.84	88.62	84.40
98628	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.060"	-	-	7	97.06	92.84	88.62	84.40
98630	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.120"	-	-	7	97.06	92.84	88.62	84.40
98632	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.125"	-	-	7	97.06	92.84	88.62	84.40
98634	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	-	-	7	145.94	139.59	133.25	126.90
98636	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-	7	145.94	139.59	133.25	126.90
98638	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-	7	145.94	139.59	133.25	126.90
98640	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-	7	145.94	139.59	133.25	126.90
98642	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-	7	145.94	139.59	133.25	126.90
98644	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.125"	-	-	7	145.94	139.59	133.25	126.90
98646	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.010"	-	-	7	158.63	151.73	144.84	137.94
98648	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.020"	-	-	7	158.63	151.73	144.84	137.94
98652	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.060"	-	-	7	158.63	151.73	144.84	137.94
98654	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.120"	-	-	7	158.63	151.73	144.84	137.94
98658	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.010"	-	-	7	218.37	208.88	199.38	189.89
98660	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.020"	-	-	7	218.37	208.88	199.38	189.89
98662	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.030"	-	-	7	218.37	208.88	199.38	189.89
98666	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.120"	-	-	7	218.37	208.88	199.38	189.89
98670	.6250	5/8"	15.875	5/8"	6"	3/4"	.010"	4-1/8"	.590"	7	221.84	212.19	202.55	192.90
98672	.6250	5/8"	15.875	5/8"	6"	3/4"	.020"	4-1/8"	.590"	7	221.84	212.19	202.55	192.90
98674	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-1/8"	.590"	7	221.84	212.19	202.55	192.90
98678	.6250	5/8"	15.875	5/8"	6"	3/4"	.120"	4-1/8"	.590"	7	221.84	212.19	202.55	192.90

continued →

Series TMR *(continued)*

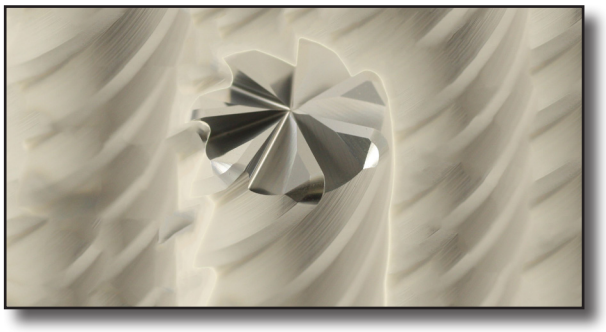
.6299" - .7874"
(16.000mm - 20.000mm)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	Number Flutes	1-11	12-24	25-49	50-100
98680	.6299		16.000	16.0	88	32	0.50	-	-	7	152.28	145.66	139.04	132.42
98690	.6299		16.000	16.0	88	32	3.00	-	-	7	152.28	145.66	139.04	132.42
98696	.6299		16.000	16.0	100	42	0.50	-	-	7	161.94	154.90	147.86	140.82
98700	.6299		16.000	16.0	100	42	1.00	-	-	7	161.94	154.90	147.86	140.82
98704	.6299		16.000	16.0	100	42	2.00	-	-	7	161.94	154.90	147.86	140.82
98706	.6299		16.000	16.0	100	42	3.00	-	-	7	161.94	154.90	147.86	140.82
98708	.6299		16.000	16.0	100	42	4.00	-	-	7	161.94	154.90	147.86	140.82
98710	.6299		16.000	16.0	100	42	5.00	-	-	7	161.94	154.90	147.86	140.82
98712	.6299		16.000	16.0	150	60	0.50	-	-	7	227.10	217.23	207.35	197.48
98716	.6299		16.000	16.0	150	60	1.00	-	-	7	227.10	217.23	207.35	197.48
98720	.6299		16.000	16.0	150	60	2.00	-	-	7	227.10	217.23	207.35	197.48
98722	.6299		16.000	16.0	150	60	3.00	-	-	7	227.10	217.23	207.35	197.48
98724	.6299		16.000	16.0	150	60	4.00	-	-	7	227.10	217.23	207.35	197.48
98726	.6299		16.000	16.0	150	60	5.00	-	-	7	227.10	217.23	207.35	197.48
98732	.6299		16.000	16.0	150	80	1.00	-	-	7	227.10	217.23	207.35	197.48
98738	.6299		16.000	16.0	150	80	3.00	-	-	7	227.10	217.23	207.35	197.48
98744	.6299		16.000	16.0	150	22	0.50	102	15.4	7	230.55	220.53	210.50	200.48
98752	.6299		16.000	16.0	150	22	2.00	102	15.4	7	230.55	220.53	210.50	200.48
98754	.6299		16.000	16.0	150	22	3.00	102	15.4	7	230.55	220.53	210.50	200.48
98760	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.010"	-	-	9	217.66	208.20	198.73	189.27
98764	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-	9	217.66	208.20	198.73	189.27
98766	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-	9	217.66	208.20	198.73	189.27
98770	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.190"	-	-	9	217.66	208.20	198.73	189.27
98772	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.250"	-	-	9	217.66	208.20	198.73	189.27
98774	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.010"	-	-	9	217.66	208.20	198.73	189.27
98778	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-	9	217.66	208.20	198.73	189.27
98784	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.190"	-	-	9	217.66	208.20	198.73	189.27
98788	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.010"	-	-	9	301.91	288.78	275.66	262.53
98790	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.020"	-	-	9	301.91	288.78	275.66	262.53
98794	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.060"	-	-	9	301.91	288.78	275.66	262.53
98796	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.120"	-	-	9	301.91	288.78	275.66	262.53
98800	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.250"	-	-	9	301.91	288.78	275.66	262.53
98802	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.010"	-	-	9	358.62	343.02	327.43	311.84
98804	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.020"	-	-	9	358.62	343.02	327.43	311.84
98806	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-	9	358.62	343.02	327.43	311.84
98808	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.060"	-	-	9	358.62	343.02	327.43	311.84
98814	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.250"	-	-	9	358.62	343.02	327.43	311.84
98816	.7500	3/4"	19.050	3/4"	6"	1"	.010"	4-1/8"	.720"	9	362.07	346.32	330.58	314.84
98820	.7500	3/4"	19.050	3/4"	6"	1"	.030"	4-1/8"	.720"	9	362.07	346.32	330.58	314.84
98822	.7500	3/4"	19.050	3/4"	6"	1"	.060"	4-1/8"	.720"	9	362.07	346.32	330.58	314.84
98830	.7874		20.000	20.0	100	26	0.50	-	-	9	296.22	283.34	270.46	257.58
98834	.7874		20.000	20.0	100	26	1.00	-	-	9	296.22	283.34	270.46	257.58
98864	.7874		20.000	20.0	100	38	6.00	-	-	9	296.22	283.34	270.46	257.58
98866	.7874		20.000	20.0	150	60	0.50	-	-	9	364.12	348.29	332.46	316.63
98876	.7874		20.000	20.0	150	60	3.00	-	-	9	364.12	348.29	332.46	316.63
98882	.7874		20.000	20.0	150	60	6.00	-	-	9	364.12	348.29	332.46	316.63
98884	.7874		20.000	20.0	150	80	0.50	-	-	9	364.12	348.29	332.46	316.63

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	Number Flutes	1-11	12-24	25-49	50-100
98920	1.000	25.400	1"	4"	1-1/2"	.015"	-	-	11	343.00	328.09	313.17	298.26
98924	1.000	25.400	1"	4"	1-1/2"	.060"	-	-	11	343.00	328.09	313.17	298.26
98928	1.000	25.400	1"	4"	1-1/2"	.120"	-	-	11	343.00	328.09	313.17	298.26
98934	1.000	25.400	1"	5"	2-1/4"	.015"	-	-	11	422.04	403.69	385.34	366.99
98936	1.000	25.400	1"	5"	2-1/4"	.030"	-	-	11	422.04	403.69	385.34	366.99
98942	1.000	25.400	1"	5"	2-1/4"	.120"	-	-	11	422.04	403.69	385.34	366.99
98944	1.000	25.400	1"	5"	2-1/4"	.190"	-	-	11	422.04	403.69	385.34	366.99
98946	1.000	25.400	1"	5"	2-1/4"	.250"	-	-	11	422.04	403.69	385.34	366.99
98948	1.000	25.400	1"	6"	3-1/4"	.030"	-	-	11	550.44	526.50	502.57	478.64
98950	1.000	25.400	1"	6"	3-1/4"	.060"	-	-	11	550.44	526.50	502.57	478.64
98954	1.000	25.400	1"	6"	3-1/4"	.190"	-	-	11	550.44	526.50	502.57	478.64
98958	1.000	25.400	1"	7"	4-1/4"	.030"	-	-	11	721.67	690.29	658.92	627.54
98966	1.000	25.400	1"	7"	4-1/4"	.250"	-	-	11	721.67	690.29	658.92	627.54



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† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6

NEW ITEMS

Z=4 | VAR | TECH PAGES 272-273

Recommended for titanium, inconel, and steels

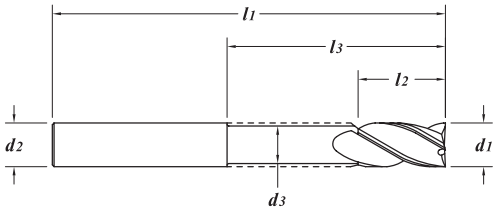


Variable Helix End Mill - Square End

AlCrN Coating

Solid submicron grain carbide end mill - center cutting
Helix geometry varies over length of flutes
Variable flute design helps with chip evacuation in slots and pockets
Variable rake aids in chip formation
PCT (Polish Carbide Treatment) enhances tool life by 20%
Minimizes burr on part
Can be modified with a flat within 48 hours
V4 Corner Radius - page 150
V4 Ball End - page 153

The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders



	EDP# (plain)	EDP# (weldon)	d1 † Diameter Decimal	d1 † Diameter	d1 † Diameter Metric	d2 Shank Diameter	l1 Overall Length	l2 Flute Length	l3 Reach Length	d3 Neck Diameter	1-11	12-24	25-49	50-100
	50236	-	.2362		6.000	6.0	65	12	-	-	23.77	22.74	21.70	20.67
	50237	-	.2362		6.000	6.0	65	19	-	-	23.77	22.74	21.70	20.67
	50540	-	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-	20.33	19.45	18.56	17.68
	50238	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	22.94	21.95	20.95	19.95
NEW	50600	-	.2500	1/4"	6.350	1/4"	4"	3/8"	1-1/8"	.235"	46.85	44.81	42.78	40.74
	50541	-	.3125	5/16"	7.937	5/16"	2"	7/16"	-	-	28.08	26.86	25.64	24.42
	50239	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	-	-	32.71	31.28	29.86	28.44
NEW	50602	-	.3150		8.000	8.0	50	12	-	-	29.11	27.84	26.58	25.31
	50240	-	.3150		8.000	8.0	65	22	-	-	33.89	32.42	30.94	29.47
	50542	-	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	33.13	31.69	30.25	28.81
	50241	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	-	-	38.61	36.93	35.25	33.57
NEW	50604	-	.3750	3/8"	9.525	3/8"	4"	1/2"	1-1/8"	.355"	67.56	64.62	61.68	58.75
NEW	50606	-	.3937		10.000	10.0	50	14	-	-	42.55	40.70	38.85	37.00
	50242	-	.3937		10.000	10.0	70	22	-	-	46.28	44.26	42.25	40.24
NEW	50608	-	.3937		10.000	10.0	70	26	-	-	46.28	44.26	42.25	40.24
	50450	50449	.4724		12.000	12.0	75	26	-	-	60.13	57.52	54.90	52.29
	50243	50283	.4724		12.000	12.0	75	32	-	-	60.13	57.52	54.90	52.29
	50564	-	.4724		12.000	12.0	100	42	-	-	80.36	76.87	73.37	69.88
	50543	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	54.17	51.81	49.46	47.10
	50452	50453	.5000	1/2"	12.700	1/2"	3"	1"	-	-	57.73	55.22	52.71	50.20
	50244	50284	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	57.73	55.22	52.71	50.20
	50578	50579	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	78.11	74.71	71.32	67.92
	50245	50285	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	78.11	74.71	71.32	67.92
NEW	50610	-	.5000	1/2"	12.700	1/2"	4"	5/8"	2-1/4"	.475"	89.79	85.89	81.98	78.08
	50235	-	.5000	1/2"	12.700	1/2"	6"	5/8"	4-1/8"	.475"	124.19	118.79	113.39	107.99
	50545	50546	.6250	5/8"	15.875	5/8"	3"	3/4"	-	-	100.73	96.35	91.97	87.59
	50246	50286	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	106.51	101.88	97.25	92.62
NEW	50612	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	113.75	108.80	103.86	98.91
	50547	-	.6299		16.000	16.0	75	19	-	-	105.32	100.74	96.16	91.58
	50247	50287	.6299		16.000	16.0	88	32	-	-	111.12	106.29	101.46	96.63
	50549	50550	.7500	3/4"	19.050	3/4"	4"	1"	-	-	152.04	145.43	138.82	132.21
	50248	50288	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	152.04	145.43	138.82	132.21
	50551	50552	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	152.04	145.43	138.82	132.21
	50553	50554	.7500	3/4"	19.050	3/4"	5"	2-1/8"	-	-	204.07	195.20	186.32	177.45
	50555	-	.7874		20.000	20.0	100	25	-	-	205.42	196.49	187.56	178.63
	50249	50289	.7874		20.000	20.0	100	38	-	-	205.42	196.49	187.56	178.63
	50250	50290	1.000	1"	25.400	1"	4"	1-1/2"	-	-	227.15	217.27	207.40	197.52

Series V4R

NEW ITEMS

.2362" - .3150"
(6.000mm - 8.000mm)

Z=4 | VAR | TECH PAGES 272-273

TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

Recommended for titanium, inconel, and steels

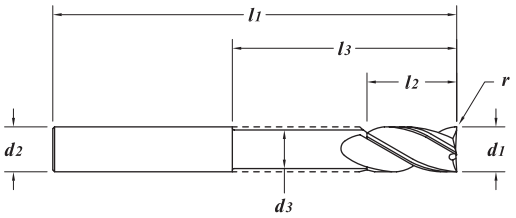


Variable Helix End Mill - Corner Radius

AlCrN Coating

Solid submicron grain carbide end mill - center cutting
Helix geometry varies over length of flutes
Variable flute design helps with chip evacuation in slots and pockets
Variable rake aids in chip formation
PCT (Polish Carbide Treatment) enhances tool life by 20%
Minimizes burr on part
Can be modified with a flat within 48 hours
V4 Square End - page 149
V4 Ball End - page 153

The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders

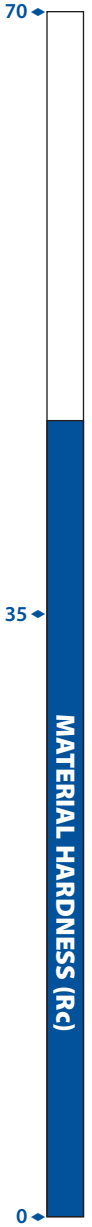


MATERIAL HARDNESS (Rc)
70
35
0

	EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
	50199	-	.2362		6.000	6.0	65	12	0.30	-	-	27.03	25.85	24.68	23.50
	50200	-	.2362		6.000	6.0	65	12	0.50	-	-	27.03	25.85	24.68	23.50
	50201	-	.2362		6.000	6.0	65	12	0.75	-	-	27.03	25.85	24.68	23.50
	50202	-	.2362		6.000	6.0	65	12	1.00	-	-	27.03	25.85	24.68	23.50
	50203	-	.2362		6.000	6.0	65	12	1.50	-	-	27.03	25.85	24.68	23.50
	50204	-	.2362		6.000	6.0	65	19	0.30	-	-	27.03	25.85	24.68	23.50
	50205	-	.2362		6.000	6.0	65	19	0.50	-	-	27.03	25.85	24.68	23.50
	50206	-	.2362		6.000	6.0	65	19	1.00	-	-	27.03	25.85	24.68	23.50
	50490	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"	-	-	23.46	22.44	21.42	20.40
NEW	50614	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.010"	-	-	23.46	22.44	21.42	20.40
NEW	50616	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"	-	-	23.46	22.44	21.42	20.40
NEW	50618	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.020"	-	-	23.46	22.44	21.42	20.40
	50207	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-	25.99	24.86	23.73	22.60
	50208	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-	25.99	24.86	23.73	22.60
NEW	50620	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-	25.99	24.86	23.73	22.60
	50209	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-	25.99	24.86	23.73	22.60
	50210	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	-	-	25.99	24.86	23.73	22.60
	50211	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	1-1/4"	.230"	50.36	48.17	45.98	43.79
NEW	50622	-	.3125	5/16"	7.937	5/16"	2"	7/16"	.010"	-	-	32.04	30.65	29.25	27.86
NEW	50624	-	.3125	5/16"	7.937	5/16"	2"	7/16"	.015"	-	-	32.04	30.65	29.25	27.86
	50492	-	.3125	5/16"	7.937	5/16"	2"	7/16"	.020"	-	-	32.04	30.65	29.25	27.86
NEW	50626	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.010"	-	-	35.20	33.67	32.14	30.61
NEW	50628	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.015"	-	-	35.20	33.67	32.14	30.61
	50212	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.020"	-	-	35.20	33.67	32.14	30.61
	50213	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.030"	-	-	35.20	33.67	32.14	30.61
NEW	50630	-	.3150		8.000	8.0	50	12	0.50	-	-	33.22	31.78	30.33	28.89
	50214	-	.3150		8.000	8.0	65	22	0.50	-	-	36.52	34.94	33.35	31.76
	50356	-	.3150		8.000	8.0	65	22	0.75	-	-	36.52	34.94	33.35	31.76
	50215	-	.3150		8.000	8.0	65	22	1.00	-	-	36.52	34.94	33.35	31.76
	50357	-	.3150		8.000	8.0	65	22	1.50	-	-	36.52	34.94	33.35	31.76
	50358	-	.3150		8.000	8.0	65	22	2.00	-	-	36.52	34.94	33.35	31.76

† *Metric equivalents are for reference only*

	EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
NEW	50632	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.010"	-	-	37.82	36.18	34.53	32.89
	50494	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-	37.82	36.18	34.53	32.89
NEW	50634	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"	-	-	37.82	36.18	34.53	32.89
	50216	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.010"	-	-	41.11	39.33	37.54	35.75
	50217	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.020"	-	-	41.11	39.33	37.54	35.75
	50218	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.030"	-	-	41.11	39.33	37.54	35.75
	50219	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.060"	-	-	41.11	39.33	37.54	35.75
NEW	50636	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.090"	-	-	41.11	39.33	37.54	35.75
	50220	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.020"	1-7/8"	.350"	72.67	69.51	66.35	63.19
NEW	50638	-	.3937		10.000	10.0	50	14	0.50	-	-	45.66	43.67	41.69	39.70
	50221	-	.3937		10.000	10.0	70	22	0.50	-	-	49.65	47.49	45.33	43.17
	50359	-	.3937		10.000	10.0	70	22	0.75	-	-	49.65	47.49	45.33	43.17
	50360	-	.3937		10.000	10.0	70	22	1.00	-	-	49.65	47.49	45.33	43.17
	50361	-	.3937		10.000	10.0	70	22	1.50	-	-	49.65	47.49	45.33	43.17
	50362	-	.3937		10.000	10.0	70	22	2.00	-	-	49.65	47.49	45.33	43.17
	50363	50369	.4724		12.000	12.0	75	26	0.30	-	-	73.13	69.95	66.77	63.59
	50364	50370	.4724		12.000	12.0	75	26	0.50	-	-	73.13	69.95	66.77	63.59
	50365	50366	.4724		12.000	12.0	75	26	0.75	-	-	73.13	69.95	66.77	63.59
	50367	50371	.4724		12.000	12.0	75	26	1.00	-	-	73.13	69.95	66.77	63.59
	50372	50373	.4724		12.000	12.0	75	26	1.50	-	-	73.13	69.95	66.77	63.59
	50374	50375	.4724		12.000	12.0	75	26	2.00	-	-	73.13	69.95	66.77	63.59
	50222	50270	.4724		12.000	12.0	75	32	0.50	-	-	73.13	69.95	66.77	63.59
	50223	50271	.4724		12.000	12.0	75	32	1.00	-	-	73.13	69.95	66.77	63.59
	50566	-	.4724		12.000	12.0	100	42	0.30	-	-	85.10	81.40	77.70	74.00
	50568	-	.4724		12.000	12.0	100	42	0.50	-	-	85.10	81.40	77.70	74.00
	50570	-	.4724		12.000	12.0	100	42	1.00	-	-	85.10	81.40	77.70	74.00
	50572	-	.4724		12.000	12.0	100	42	2.00	-	-	85.10	81.40	77.70	74.00
	50574	-	.4724		12.000	12.0	100	42	3.00	-	-	85.10	81.40	77.70	74.00
NEW	50640	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-	62.84	60.10	57.37	54.64
	50496	50497	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-	62.84	60.10	57.37	54.64
NEW	50642	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-	62.84	60.10	57.37	54.64
NEW	50644	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.125"	-	-	62.84	60.10	57.37	54.64
	50379	50380	.5000	1/2"	12.700	1/2"	3"	1"	.010"	-	-	70.14	67.09	64.04	60.99
	50381	50382	.5000	1/2"	12.700	1/2"	3"	1"	.020"	-	-	70.14	67.09	64.04	60.99
	50383	50384	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-	70.14	67.09	64.04	60.99
	50385	50386	.5000	1/2"	12.700	1/2"	3"	1"	.060"	-	-	70.14	67.09	64.04	60.99
	50224	50272	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-	70.14	67.09	64.04	60.99
	50225	50273	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-	70.14	67.09	64.04	60.99
	50226	50274	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	70.14	67.09	64.04	60.99
	50227	50275	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-	70.14	67.09	64.04	60.99
	50228	50276	.5000	1/2"	12.700	1/2"	4"	5/8"	.020"	2-1/4"	.470"	94.63	90.52	86.40	82.29
	50580	50581	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.010"	-	-	82.90	79.30	75.69	72.09
	50582	50583	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.020"	-	-	82.90	79.30	75.69	72.09
	50584	50585	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.030"	-	-	82.90	79.30	75.69	72.09
	50586	50587	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.040"	-	-	82.90	79.30	75.69	72.09
	50588	50589	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.060"	-	-	82.90	79.30	75.69	72.09
	50590	50591	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.120"	-	-	82.90	79.30	75.69	72.09
	50594	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.020"	4-1/8"	.470"	128.98	123.38	117.77	112.16
	50596	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.030"	4-1/8"	.470"	128.98	123.38	117.77	112.16



continued ⟶

Series V4R *(continued)*

.6250" - 1.000"
(15.875mm - 25.400mm)

EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
50498	50499	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"	-	-	108.65	103.93	99.20	94.48
50500	50501	.6250	5/8"	15.875	5/8"	3"	3/4"	.030"	-	-	108.65	103.93	99.20	94.48
50502	50503	.6250	5/8"	15.875	5/8"	3"	3/4"	.060"	-	-	108.65	103.93	99.20	94.48
50229	50277	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-	111.67	106.81	101.96	97.10
50534	50535	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-	111.67	106.81	101.96	97.10
50536	50537	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.040"	-	-	111.67	106.81	101.96	97.10
50538	50539	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-	111.67	106.81	101.96	97.10
50230	50278	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-	111.67	106.81	101.96	97.10
50504	-	.6299		16.000	16.0	75	19	0.50	-	-	113.42	108.49	103.56	98.63
50506	-	.6299		16.000	16.0	75	19	1.00	-	-	113.42	108.49	103.56	98.63
50508	-	.6299		16.000	16.0	75	19	3.00	-	-	113.42	108.49	103.56	98.63
50231	50279	.6299		16.000	16.0	88	32	0.50	-	-	116.54	111.47	106.41	101.34
50409	50410	.6299		16.000	16.0	88	32	0.75	-	-	116.54	111.47	106.41	101.34
50411	50412	.6299		16.000	16.0	88	32	1.00	-	-	116.54	111.47	106.41	101.34
50413	50414	.6299		16.000	16.0	88	32	1.50	-	-	116.54	111.47	106.41	101.34
50415	50416	.6299		16.000	16.0	88	32	2.00	-	-	116.54	111.47	106.41	101.34
50417	50418	.6299		16.000	16.0	88	32	3.00	-	-	116.54	111.47	106.41	101.34
50510	50511	.7500	3/4"	19.050	3/4"	4"	1"	.020"	-	-	160.14	153.18	146.21	139.25
50512	50513	.7500	3/4"	19.050	3/4"	4"	1"	.030"	-	-	160.14	153.18	146.21	139.25
50514	50515	.7500	3/4"	19.050	3/4"	4"	1"	.060"	-	-	160.14	153.18	146.21	139.25
50516	50517	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.020"	-	-	160.14	153.18	146.21	139.25
50232	50280	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-	160.14	153.18	146.21	139.25
50518	50519	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-	160.14	153.18	146.21	139.25
50520	50521	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-	160.14	153.18	146.21	139.25
50522	50523	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.020"	-	-	160.14	153.18	146.21	139.25
50524	50525	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-	160.14	153.18	146.21	139.25
50526	50527	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.060"	-	-	160.14	153.18	146.21	139.25
50528	-	.7874		20.000	20.0	100	38	1.00	-	-	226.65	216.80	206.94	197.09
50530	-	.7874		20.000	20.0	100	38	2.00	-	-	226.65	216.80	206.94	197.09
50532	-	.7874		20.000	20.0	100	38	3.00	-	-	226.65	216.80	206.94	197.09
50233	50281	1.000	1"	25.400	1"	4"	1-1/2"	.030"	-	-	273.40	261.51	249.63	237.74
50234	50282	1.000	1"	25.400	1"	5"	2-1/8"	.030"	-	-	336.40	321.77	307.15	292.52

MATERIAL HARDNESS (Rc)
70
35
0



V4-S series in 1018 material

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

Z=4 | VAR

TECH PAGES 272-273

Recommended for titanium, inconel, and steels

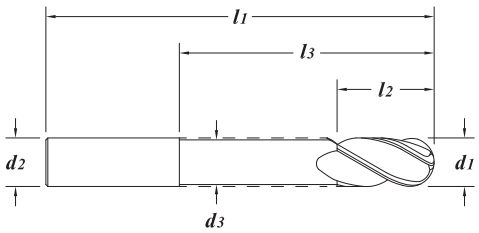


Variable Helix End Mill - Ball End

AlCrN Coating

Solid submicron grain carbide end mill - center cutting
Helix geometry varies over length of flutes
Variable flute design helps with chip evacuation in slots and pockets
Variable rake aids in chip formation
PCT (Polish Carbide Treatment) enhances tool life by 20%
Minimizes burr on part
Can be modified with a flat within 48 hours
V4 Square End - page 149
V4 Corner Radius - page 150

The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders



	EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
	50252	-	.2362		6.000	6.0	65	12	-	-	27.03	25.85	24.68	23.50
	50253	-	.2362		6.000	6.0	65	19	-	-	27.03	25.85	24.68	23.50
	50560	-	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-	23.46	22.44	21.42	20.40
	50254	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	25.99	24.86	23.73	22.60
NEW	50474	-	.2500	1/4"	6.350	1/4"	4"	3/8"	1-1/8"	.237"	50.36	48.17	45.98	43.79
	50561	-	.3125	5/16"	7.937	5/16"	2"	7/16"	-	-	32.04	30.65	29.25	27.86
	50255	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	-	-	35.20	33.67	32.14	30.61
	50256	-	.3150		8.000	8.0	65	22	-	-	36.52	34.94	33.35	31.76
	50562	-	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	37.82	36.18	34.53	32.89
	50257	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	-	-	41.11	39.33	37.54	35.75
NEW	50476	-	.3750	3/8"	9.525	3/8"	4"	1/2"	1-1/8"	.356"	72.67	69.51	66.35	63.19
	50258	-	.3937		10.000	10.0	70	22	-	-	49.65	47.49	45.33	43.17
	50470	-	.4724		12.000	12.0	75	26	-	-	73.13	69.95	66.77	63.59
	50259	50291	.4724		12.000	12.0	75	32	-	-	73.13	69.95	66.77	63.59
	50576	-	.4724		12.000	12.0	100	42	-	-	85.10	81.40	77.70	74.00
	50563	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	62.84	60.10	57.37	54.64
	50472	50473	.5000	1/2"	12.700	1/2"	3"	1"	-	-	70.14	67.09	64.04	60.99
	50260	50292	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	70.14	67.09	64.04	60.99
	50592	50593	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	82.90	79.30	75.69	72.09
	50261	50293	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	82.90	79.30	75.69	72.09
NEW	50478	-	.5000	1/2"	12.700	1/2"	4"	5/8"	2-1/4"	.475"	94.63	90.52	86.40	82.29
	50598	-	.5000	1/2"	12.700	1/2"	6"	5/8"	4-1/8"	.470"	128.98	123.38	117.77	112.16
	50262	50294	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	111.67	106.81	101.96	97.10
	50263	50295	.6299		16.000	16.0	88	32	-	-	116.54	111.47	106.41	101.34
	50264	50296	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	160.14	153.18	146.21	139.25
	50265	50297	.7874		20.000	20.0	100	38	-	-	226.65	216.80	206.94	197.09
	50266	50298	1.000	1"	25.400	1"	4"	1-1/2"	-	-	273.40	261.51	249.63	237.74

Series V5

NEW ITEMS

.2362" - .3125"
(6.000mm - 7.938mm)

Z=5 | VAR | TECH PAGES 274-275

TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

Recommended for titanium, inconel, and stainless steel



Variable Helix End Mill

AlCrN Coating

Solid submicron grain carbide end mill - center cutting

Effective for trochoidal milling

Staggered flutes to control harmonics

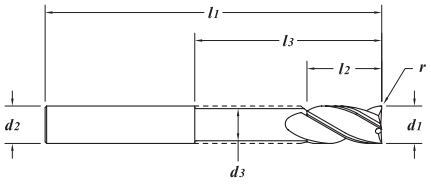
Variable flute design helps with chip evacuation in slots and pockets

PCT (Polish Carbide Treatment) enhances tool life

12mm and larger tools offered with weldon flat

.375" and larger diameters can be modified within 48 hours

The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders



MATERIAL HARDNESS (Rc)
70
35
0

EDP# (plain)	EDP# (weldon)	d1 † Diameter Decimal	Diameter	Metric	d2 Shank Diameter	l1 Overall Length	l2 Flute Length	r Corner Radius	l3 Reach Length	d3 Neck Diameter	1-11	12-24	25-49	50-100
50000	-	.2362		6.000	6.0	50	13	-	-	-	22.03	21.08	20.12	19.16
50001	-	.2362		6.000	6.0	50	13	0.5	-	-	25.48	24.38	23.27	22.16
50002	-	.2362		6.000	6.0	65	19	-	-	-	24.84	23.76	22.68	21.60
50003	-	.2362		6.000	6.0	65	19	0.5	-	-	28.24	27.02	25.79	24.56
50004	-	.2362		6.000	6.0	65	13	-	20	5.4	33.13	31.69	30.25	28.81
50005	-	.2362		6.000	6.0	65	13	0.5	20	5.4	36.54	34.95	33.36	31.77
50006	-	.2362		6.000	6.0	65	13	1.0	20	5.4	36.54	34.95	33.36	31.77
50007	-	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-	-	21.15	20.23	19.31	18.39
51000	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.010"	-	-	24.53	23.46	22.40	21.33
50008	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"	-	-	24.53	23.46	22.40	21.33
51001	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	-	24.53	23.46	22.40	21.33
50009	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.030"	-	-	24.53	23.46	22.40	21.33
51002	-	.2500	1/4"	6.350	1/4"	2"	1/2"	-	-	-	21.15	20.23	19.31	18.39
51003	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.010"	-	-	24.53	23.46	22.40	21.33
51004	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"	-	-	24.53	23.46	22.40	21.33
50011	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	-	23.98	22.94	21.89	20.85
51005	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-	27.15	25.97	24.79	23.61
50012	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-	27.15	25.97	24.79	23.61
50013	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-	27.15	25.97	24.79	23.61
50014	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-	27.15	25.97	24.79	23.61
50015	-	.2500	1/4"	6.350	1/4"	3"	1"	-	-	-	36.63	35.04	33.44	31.85
51006	-	.2500	1/4"	6.350	1/4"	3"	1"	.010"	-	-	40.25	38.50	36.75	35.00
51007	-	.2500	1/4"	6.350	1/4"	3"	1"	.015"	-	-	40.25	38.50	36.75	35.00
50016	-	.2500	1/4"	6.350	1/4"	3"	1"	.030"	-	-	40.25	38.50	36.75	35.00
50017	-	.2500	1/4"	6.350	1/4"	4"	1/2"	.015"	1-1/4"	.235"	52.64	50.35	48.06	45.77
51008	-	.2500	1/4"	6.350	1/4"	4"	1/2"	.015"	2-1/8"	.235"	52.64	50.35	48.06	45.77
50023	-	.2756		7.000	8.0	65	22	0.2	-	-	43.71	41.81	39.91	38.01
50018	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	-	-	-	34.20	32.71	31.23	29.74
50019	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.015"	-	-	36.81	35.21	33.61	32.01
50021	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	-	36.81	35.21	33.61	32.01
50022	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	-	-	36.81	35.21	33.61	32.01

GARR TOOL®

† *Metric equivalents are for reference only*

EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
50024	-	.3150		8.000	8.0	65	22	0.2	-	-	38.19	36.53	34.87	33.21
50025	-	.3150		8.000	8.0	65	22	0.5	-	-	38.19	36.53	34.87	33.21
50026	-	.3150		8.000	8.0	75	19	-	26	7.2	59.31	56.73	54.15	51.57
50027	-	.3150		8.000	8.0	75	19	0.5	26	7.2	64.17	61.38	58.59	55.80
50028	-	.3150		8.000	8.0	75	19	1.0	26	7.2	64.17	61.38	58.59	55.80
50029	-	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	-	34.53	33.03	31.53	30.03
50031	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.015"	-	-	39.54	37.82	36.10	34.38
50032	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-	39.54	37.82	36.10	34.38
50033	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"	-	-	39.54	37.82	36.10	34.38
50034	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	-	-	-	40.35	38.60	36.84	35.09
50035	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.015"	-	-	42.99	41.12	39.25	37.38
50036	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.020"	-	-	42.99	41.12	39.25	37.38
50037	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.030"	-	-	42.99	41.12	39.25	37.38
50038	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.060"	-	-	42.99	41.12	39.25	37.38
51009	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.015"	-	-	56.57	54.11	51.65	49.19
51010	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.015"	-	-	63.68	60.91	58.14	55.37
50039	-	.3750	3/8"	9.525	3/8"	4"	2"	-	-	-	58.22	55.69	53.16	50.63
50041	-	.3750	3/8"	9.525	3/8"	4"	2"	.030"	-	-	63.68	60.91	58.14	55.37
51011	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.015"	1-1/8"	.355"	75.98	72.68	69.37	66.07
50042	-	.3750	3/8"	9.525	3/8"	4"	7/8"	.015"	1-7/8"	.355"	75.98	72.68	69.37	66.07
51012	-	.3750	3/8"	9.525	3/8"	6"	1/2"	.015"	2-1/8"	.355"	100.45	96.09	91.72	87.35
51013	-	.3750	3/8"	9.525	3/8"	6"	1/2"	.015"	3-1/8"	.355"	100.45	96.09	91.72	87.35
51014	-	.3750	3/8"	9.525	3/8"	6"	1/2"	.015"	4-1/8"	.355"	100.45	96.09	91.72	87.35
50043	-	.3937		10.000	10.0	70	22	-	-	-	48.39	46.29	44.18	42.08
51015	-	.3937		10.000	10.0	70	22	0.30	-	-	51.91	49.65	47.40	45.14
50044	-	.3937		10.000	10.0	70	22	0.50	-	-	51.91	49.65	47.40	45.14
51016	-	.3937		10.000	10.0	70	22	0.75	-	-	51.91	49.65	47.40	45.14
51017	-	.3937		10.000	10.0	70	22	1.00	-	-	51.91	49.65	47.40	45.14
50045	-	.3937		10.000	10.0	75	22	-	32	9.0	67.08	64.16	61.25	58.33
50046	-	.3937		10.000	10.0	75	22	0.50	32	9.0	72.36	69.21	66.07	62.92
51018	-	.3937		10.000	10.0	75	22	0.75	32	9.0	72.36	69.21	66.07	62.92
50047	-	.3937		10.000	10.0	75	22	1.00	32	9.0	72.36	69.21	66.07	62.92
51019	-	.4724		12.000	12.0	65	19	-	-	-	58.90	56.34	53.78	51.22
51020	-	.4724		12.000	12.0	65	19	0.50	-	-	68.52	65.54	62.56	59.58
50484	50485	.4724		12.000	12.0	75	26	-	-	-	62.85	60.12	57.38	54.65
51021	-	.4724		12.000	12.0	75	26	0.30	-	-	76.45	73.13	69.80	66.48
50486	50487	.4724		12.000	12.0	75	26	0.50	-	-	76.45	73.13	69.80	66.48
51022	-	.4724		12.000	12.0	75	26	0.75	-	-	76.45	73.13	69.80	66.48
51023	-	.4724		12.000	12.0	75	26	1.00	-	-	76.45	73.13	69.80	66.48
NEW 50112	-	.4724		12.000	12.0	75	26	2.00	-	-	76.45	73.13	69.80	66.48
50048	50299	.4724		12.000	12.0	75	32	-	-	-	62.85	60.12	57.38	54.65
51024	-	.4724		12.000	12.0	75	32	0.30	-	-	76.45	73.13	69.80	66.48
50049	50300	.4724		12.000	12.0	75	32	0.50	-	-	76.45	73.13	69.80	66.48
51025	-	.4724		12.000	12.0	75	32	0.75	-	-	76.45	73.13	69.80	66.48
51026	-	.4724		12.000	12.0	75	32	1.00	-	-	76.45	73.13	69.80	66.48
51027	-	.4724		12.000	12.0	100	38	-	-	-	84.01	80.36	76.70	73.05
51028	-	.4724		12.000	12.0	100	38	0.50	-	-	88.96	85.10	81.23	77.36
50423	-	.4724		12.000	12.0	100	42	-	-	-	84.01	80.36	76.70	73.05
50425	-	.4724		12.000	12.0	100	42	0.30	-	-	88.96	85.10	81.23	77.36
50427	-	.4724		12.000	12.0	100	42	0.50	-	-	88.96	85.10	81.23	77.36
50429	-	.4724		12.000	12.0	100	42	1.00	-	-	88.96	85.10	81.23	77.36
50431	-	.4724		12.000	12.0	100	42	2.00	-	-	88.96	85.10	81.23	77.36
51029	-	.4724		12.000	12.0	100	52	-	-	-	84.01	80.36	76.70	73.05
51030	-	.4724		12.000	12.0	100	52	0.50	-	-	88.96	85.10	81.23	77.36
50051	50301	.4724		12.000	12.0	100	26	-	38	10.8	96.26	92.07	87.89	83.70
50052	50302	.4724		12.000	12.0	100	26	0.50	38	10.8	101.21	96.81	92.41	88.01
50053	50303	.4724		12.000	12.0	100	26	1.00	38	10.8	101.21	96.81	92.41	88.01

continued →

Series V5 *(continued)*

.5000"
(12.700mm)

EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
50054	50304	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-	56.49	54.03	51.58	49.12
50106	50305	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-	65.70	62.84	59.99	57.13
50055	50306	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-	65.70	62.84	59.99	57.13
50107	50307	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-	65.70	62.84	59.99	57.13
50056	50308	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-	60.35	57.73	55.10	52.48
50108	50309	.5000	1/2"	12.700	1/2"	3"	1"	.010"	-	-	73.34	70.15	66.96	63.77
50057	50310	.5000	1/2"	12.700	1/2"	3"	1"	.020"	-	-	73.34	70.15	66.96	63.77
50109	50311	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-	73.34	70.15	66.96	63.77
50058	50312	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-	60.35	57.73	55.10	52.48
50111	50313	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-	73.34	70.15	66.96	63.77
50059	50314	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-	73.34	70.15	66.96	63.77
50061	50315	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-	73.34	70.15	66.96	63.77
50062	50316	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	73.34	70.15	66.96	63.77
50063	50317	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.045"	-	-	73.34	70.15	66.96	63.77
50064	50318	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-	73.34	70.15	66.96	63.77
50065	50319	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.090"	-	-	73.34	70.15	66.96	63.77
50433	50435	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.010"	-	-	86.66	82.90	79.13	75.36
51031	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.015"	-	-	86.66	82.90	79.13	75.36
51032	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-	86.66	82.90	79.13	75.36
50436	50437	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-	81.66	78.11	74.56	71.01
50438	50439	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.010"	-	-	86.66	82.90	79.13	75.36
50440	50441	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.020"	-	-	86.66	82.90	79.13	75.36
50442	50443	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.030"	-	-	86.66	82.90	79.13	75.36
50444	50445	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.040"	-	-	86.66	82.90	79.13	75.36
50446	50447	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.060"	-	-	86.66	82.90	79.13	75.36
50067	50321	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	-	81.66	78.11	74.56	71.01
51033	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.015"	-	-	86.66	82.90	79.13	75.36
50068	50322	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-	86.66	82.90	79.13	75.36
51034	-	.5000	1/2"	12.700	1/2"	6"	1"	.030"	-	-	122.57	117.24	111.91	106.58
51035	-	.5000	1/2"	12.700	1/2"	6"	3-1/8"	-	-	-	117.10	112.01	106.92	101.83
51036	-	.5000	1/2"	12.700	1/2"	6"	3-1/8"	.030"	-	-	122.57	117.24	111.91	106.58
51037	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	1-1/2"	.475"	98.93	94.63	90.33	86.03
51038	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	2-1/4"	.475"	98.93	94.63	90.33	86.03
50066	50320	.5000	1/2"	12.700	1/2"	4"	1-1/4"	.030"	2-1/4"	.475"	98.93	94.63	90.33	86.03
51039	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.015"	3-3/8"	.475"	134.86	129.00	123.13	117.27
51040	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.015"	4-1/8"	.475"	134.86	129.00	123.13	117.27

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
50069	50323	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-	111.35	106.51	101.67	96.83
51041	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-	116.75	111.67	106.60	101.52
50071	50324	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-	116.75	111.67	106.60	101.52
50072	50325	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-	116.75	111.67	106.60	101.52
50401	50402	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-	116.75	111.67	106.60	101.52
51042	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-	118.92	113.75	108.58	103.41
51043	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-	126.91	121.40	115.88	110.36
51044	-	.6250	5/8"	15.875	5/8"	4"	2-1/8"	-	-	-	118.92	113.75	108.58	103.41
51045	-	.6250	5/8"	15.875	5/8"	4"	2-1/8"	.030"	-	-	126.91	121.40	115.88	110.36
51046	-	.6250	5/8"	15.875	5/8"	6"	2-1/2"	.030"	-	-	174.70	167.10	159.51	151.91
50403	50404	.6250	5/8"	15.875	5/8"	6"	3-1/8"	.030"	-	-	174.70	167.10	159.51	151.91
51047	-	.6250	5/8"	15.875	5/8"	6"	3-1/8"	.060"	-	-	174.70	167.10	159.51	151.91
51048	-	.6250	5/8"	15.875	5/8"	6"	3-1/2"	.030"	-	-	174.70	167.10	159.51	151.91
51049	-	.6250	5/8"	15.875	5/8"	4"	3/4"	.030"	1-5/8"	.590"	137.59	131.60	125.62	119.64
50073	50326	.6250	5/8"	15.875	5/8"	4"	1-1/4"	.030"	2-1/4"	.590"	137.59	131.60	125.62	119.64
51050	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	2-3/8"	.590"	186.98	178.85	170.72	162.59
51051	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	3-3/8"	.590"	186.98	178.85	170.72	162.59
51052	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-1/8"	.590"	186.98	178.85	170.72	162.59
51053	-	.6299		16.000	16.0	75	19	-	-	-	113.07	108.15	103.24	98.32
51054	-	.6299		16.000	16.0	75	19	0.50	-	-	118.58	113.42	108.27	103.11
50074	50327	.6299		16.000	16.0	88	32	-	-	-	116.17	111.12	106.07	101.02
50075	50328	.6299		16.000	16.0	88	32	0.50	-	-	121.82	116.52	111.23	105.93
50420	-	.6299		16.000	16.0	88	32	1.00	-	-	121.82	116.52	111.23	105.93
51055	-	.6299		16.000	16.0	88	32	2.00	-	-	121.82	116.52	111.23	105.93
50422	-	.6299		16.000	16.0	88	32	3.00	-	-	121.82	116.52	111.23	105.93
50424	-	.6299		16.000	16.0	88	32	4.00	-	-	121.82	116.52	111.23	105.93
50430	-	.6299		16.000	16.0	100	40	0.50	-	-	129.54	123.90	118.27	112.64
50432	-	.6299		16.000	16.0	100	40	1.00	-	-	129.54	123.90	118.27	112.64
50434	-	.6299		16.000	16.0	100	40	3.00	-	-	129.54	123.90	118.27	112.64
50076	50329	.6299		16.000	16.0	100	32	-	50	14.4	134.25	128.41	122.58	116.74
50077	-	.6299		16.000	16.0	100	32	0.50	50	14.4	140.23	134.13	128.04	121.94
50426	-	.6299		16.000	16.0	100	32	1.00	50	14.4	140.23	134.13	128.04	121.94
51056	-	.6299		16.000	16.0	100	32	2.00	50	14.4	140.23	134.13	128.04	121.94
50428	-	.6299		16.000	16.0	100	32	3.00	50	14.4	140.23	134.13	128.04	121.94
50078	-	.7087		18.000	18.0	100	32	0.75	-	-	174.89	167.29	159.68	152.08

continued →

Series V5 *(continued)*

.7500"
(19.050mm)

EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
50079	50332	.7500	3/4"	19.050	3/4"	3"	7/8"	-	-	-	155.39	148.63	141.88	135.12
51103	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.015"	-	-	163.88	156.75	149.63	142.50
50081	50333	.7500	3/4"	19.050	3/4"	3"	7/8"	.030"	-	-	163.86	156.74	149.61	142.49
51057	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.060"	-	-	163.88	156.75	149.63	142.50
51105	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.120"	-	-	163.88	156.75	149.63	142.50
51107	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.015"	-	-	167.43	160.15	152.87	145.59
51058	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.030"	-	-	167.43	160.15	152.87	145.59
51109	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.060"	-	-	167.43	160.15	152.87	145.59
50082	50334	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-	158.95	152.04	145.13	138.22
51111	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-	167.43	160.15	152.87	145.59
50083	50335	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-	167.43	160.15	152.87	145.59
50084	50336	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-	167.43	160.15	152.87	145.59
51059	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.078"	-	-	167.43	160.15	152.87	145.59
50085	50337	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-	167.43	160.15	152.87	145.59
51113	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.190"	-	-	167.43	160.15	152.87	145.59
51060	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-	-	158.95	152.04	145.13	138.22
51115	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.015"	-	-	167.43	160.15	152.87	145.59
51061	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-	167.43	160.15	152.87	145.59
51119	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.060"	-	-	167.43	160.15	152.87	145.59
51062	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-	158.95	152.04	145.13	138.22
51121	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.015"	-	-	167.43	160.15	152.87	145.59
51063	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-	167.43	160.15	152.87	145.59
51123	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.060"	-	-	167.43	160.15	152.87	145.59
50086	50338	.7500	3/4"	19.050	3/4"	5"	2-1/8"	-	-	-	213.35	204.07	194.80	185.52
51125	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.015"	-	-	232.24	222.15	212.05	201.95
50087	50339	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.030"	-	-	232.24	222.15	212.05	201.95
51064	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.060"	-	-	232.24	222.15	212.05	201.95
51065	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.120"	-	-	232.24	222.15	212.05	201.95
51127	-	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.015"	-	-	232.24	222.15	212.05	201.95
51066	-	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.030"	-	-	232.24	222.15	212.05	201.95
51129	-	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.060"	-	-	232.24	222.15	212.05	201.95
51131	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.015"	-	-	232.24	222.15	212.05	201.95
51067	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.030"	-	-	232.24	222.15	212.05	201.95
51133	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.060"	-	-	232.24	222.15	212.05	201.95
51135	-	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.015"	-	-	232.24	222.15	212.05	201.95
51068	-	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.030"	-	-	232.24	222.15	212.05	201.95
51137	-	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.060"	-	-	232.24	222.15	212.05	201.95
50089	50341	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-	249.68	238.82	227.97	217.11
51139	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.015"	-	-	275.86	263.87	251.87	239.88
50091	50342	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-	275.86	263.87	251.87	239.88
51141	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.060"	-	-	275.86	263.87	251.87	239.88
51143	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.015"	-	-	347.92	332.79	317.67	302.54
51145	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.030"	-	-	347.92	332.79	317.67	302.54
51147	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.060"	-	-	347.92	332.79	317.67	302.54
51069	-	.7500	3/4"	19.050	3/4"	4"	1"	.030"	2"	.705"	179.72	171.91	164.09	156.28
51070	-	.7500	3/4"	19.050	3/4"	5"	1"	.030"	2-1/2"	.705"	244.55	233.92	223.28	212.65
50088	50340	.7500	3/4"	19.050	3/4"	5-1/2"	1-1/2"	.030"	3-1/4"	.705"	288.21	275.68	263.15	250.62
51071	-	.7500	3/4"	19.050	3/4"	6"	1"	.030"	4-1/8"	.705"	288.21	275.68	263.15	250.62

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
50092	50343	.7874		20.000	20.0	100	38	-	-	-	214.75	205.41	196.08	186.74
51072	-	.7874		20.000	20.0	100	38	0.50	-	-	236.96	226.66	216.35	206.05
50093	50344	.7874		20.000	20.0	100	38	0.75	-	-	236.96	226.66	216.35	206.05
51073	-	.7874		20.000	20.0	100	38	1.00	-	-	236.96	226.66	216.35	206.05
51074	-	.7874		20.000	20.0	100	38	1.50	-	-	236.96	226.66	216.35	206.05
51075	-	.7874		20.000	20.0	100	38	2.00	-	-	236.96	226.66	216.35	206.05
51076	-	.7874		20.000	20.0	100	38	3.00	-	-	236.96	226.66	216.35	206.05
51077	-	.9843		25.000	25.0	100	38	-	-	-	245.26	234.60	223.93	213.27
51078	-	.9843		25.000	25.0	100	38	0.50	-	-	271.58	259.78	247.97	236.16
51079	-	.9843		25.000	25.0	100	38	0.75	-	-	271.58	259.78	247.97	236.16
51080	-	.9843		25.000	25.0	100	38	1.50	-	-	271.58	259.78	247.97	236.16
51081	-	.9843		25.000	25.0	100	38	3.00	-	-	271.58	259.78	247.97	236.16
50094	-	1.000	1"	25.400	1"	4"	1-1/4"	-	-	-	237.46	227.14	216.81	206.49
50095	-	1.000	1"	25.400	1"	4"	1-1/4"	.030"	-	-	285.84	273.42	260.99	248.56
51082	-	1.000	1"	25.400	1"	4"	1-1/4"	.120"	-	-	285.84	273.42	260.99	248.56
-	50348	1.000	1"	25.400	1"	4"	1-1/2"	-	-	-	237.46	227.14	216.81	206.49
-	50349	1.000	1"	25.400	1"	4"	1-1/2"	.030"	-	-	285.84	273.42	260.99	248.56
-	50350	1.000	1"	25.400	1"	4"	1-1/2"	.060"	-	-	285.84	273.42	260.99	248.56
51083	-	1.000	1"	25.400	1"	4"	1-1/2"	.120"	-	-	285.84	273.42	260.99	248.56
50097	-	1.000	1"	25.400	1"	4"	1-3/4"	-	-	-	237.46	227.14	216.81	206.49
50098	-	1.000	1"	25.400	1"	4"	1-3/4"	.030"	-	-	285.84	273.42	260.99	248.56
50099	-	1.000	1"	25.400	1"	4"	1-3/4"	.060"	-	-	285.84	273.42	260.99	248.56
51084	-	1.000	1"	25.400	1"	4"	1-3/4"	.120"	-	-	285.84	273.42	260.99	248.56
51085	-	1.000	1"	25.400	1"	4-1/2"	2"	.030"	-	-	318.76	304.90	291.04	277.18
51086	-	1.000	1"	25.400	1"	4-1/2"	2"	.060"	-	-	318.76	304.90	291.04	277.18
51087	-	1.000	1"	25.400	1"	4-1/2"	2"	.120"	-	-	318.76	304.90	291.04	277.18
51088	-	1.000	1"	25.400	1"	4-1/2"	2"	.250"	-	-	318.76	304.90	291.04	277.18
51089	-	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-	-	351.68	336.39	321.10	305.81
51090	-	1.000	1"	25.400	1"	5"	2-5/8"	.030"	-	-	351.68	336.39	321.10	305.81
50104	50354	1.000	1"	25.400	1"	6"	3-1/4"	-	-	-	414.07	396.07	378.06	360.06
50105	-	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	-	458.68	438.74	418.79	398.85
51091	-	1.000	1"	25.400	1"	6"	3-3/8"	.060"	-	-	458.68	438.74	418.79	398.85
51092	-	1.000	1"	25.400	1"	7"	4-1/4"	.030"	-	-	559.73	535.39	511.06	486.72
51093	-	1.000	1"	25.400	1"	7"	4-1/4"	.060"	-	-	559.73	535.39	511.06	486.72
51094	-	1.000	1"	25.400	1"	5"	1-1/4"	.030"	2-5/8"	.940"	364.00	348.17	332.35	316.52
50101	-	1.000	1"	25.400	1"	5-1/2"	1-3/4"	.030"	3-1/4"	.940"	466.37	446.09	425.82	405.54
50102	50352	1.000	1"	25.400	1"	5-1/2"	1-3/4"	.060"	3-1/4"	.940"	466.37	446.09	425.82	405.54
51095	-	1.000	1"	25.400	1"	6"	1-1/4"	.030"	3-3/8"	.940"	470.98	450.51	430.03	409.55
51096	-	1.000	1"	25.400	1"	7"	1-1/4"	.030"	4-1/4"	.940"	572.26	547.38	522.50	497.62

Series V5 - Chip Splitter

NEW ITEMS

.4724" - .6299"
(12.000mm - 16.000mm)

Z=5 | VAR | TECH PAGES 274-275

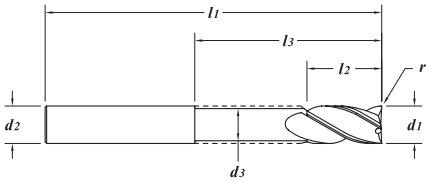
TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

Variable Helix End Mill

AlCrN Coating

Solid submicron grain carbide end mill - center cutting
Chip splitter to help break long chips
Effective for trochoidal milling
Staggered flutes to control harmonics
Variable flute design helps with chip evacuation in slots and pockets
PCT (Polish Carbide Treatment) enhances tool life





70
35
0
MATERIAL HARDNESS (Rc)

	EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
NEW	50801	-	.4724		12.000	12.0	100	42	0.30	-	-	95.00	90.87	86.74	82.61
	50800	-	.4724		12.000	12.0	100	42	1.00	-	-	95.00	90.87	86.74	82.61
NEW	50803	-	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-	66.39	63.50	60.62	57.73
NEW	50807	-	.5000	1/2"	12.700	1/2"	3"	1"	.015"	-	-	79.37	75.92	72.47	69.02
NEW	50809	-	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-	79.37	75.92	72.47	69.02
	50810	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-	79.37	75.92	72.47	69.02
	50815	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	79.37	75.92	72.47	69.02
NEW	50811	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-	79.37	75.92	72.47	69.02
NEW	50813	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-	79.37	75.92	72.47	69.02
	50820	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.090"	-	-	79.37	75.92	72.47	69.02
	50825	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.010"	-	-	92.70	88.67	84.64	80.61
NEW	50817	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-	92.70	88.67	84.64	80.61
	50830	-	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-	87.70	83.89	80.07	76.26
NEW	50819	-	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.030"	-	-	92.70	88.67	84.64	80.61
	50835	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	-	87.70	83.89	80.07	76.26
NEW	50821	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	1-1/2"	.475"	104.97	100.41	95.84	91.28
NEW	50823	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-	123.99	118.60	113.21	107.82
	50840	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-	123.99	118.60	113.21	107.82
NEW	50827	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-	126.17	120.68	115.20	109.71
NEW	50829	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-	134.16	128.33	122.49	116.66
	50845	-	.6250	5/8"	15.875	5/8"	4"	2-1/8"	.030"	-	-	134.16	128.33	122.49	116.66
NEW	50831	-	.6250	5/8"	15.875	5/8"	6"	2-1/2"	.030"	-	-	181.94	174.03	166.12	158.21
NEW	50833	-	.6299		16.000	16.0	100	40	0.50	-	-	136.78	130.83	124.89	118.94
NEW	50837	-	.6299		16.000	16.0	100	40	1.00	-	-	136.78	130.83	124.89	118.94

GARR TOOL®

† *Metric equivalents are for reference only*

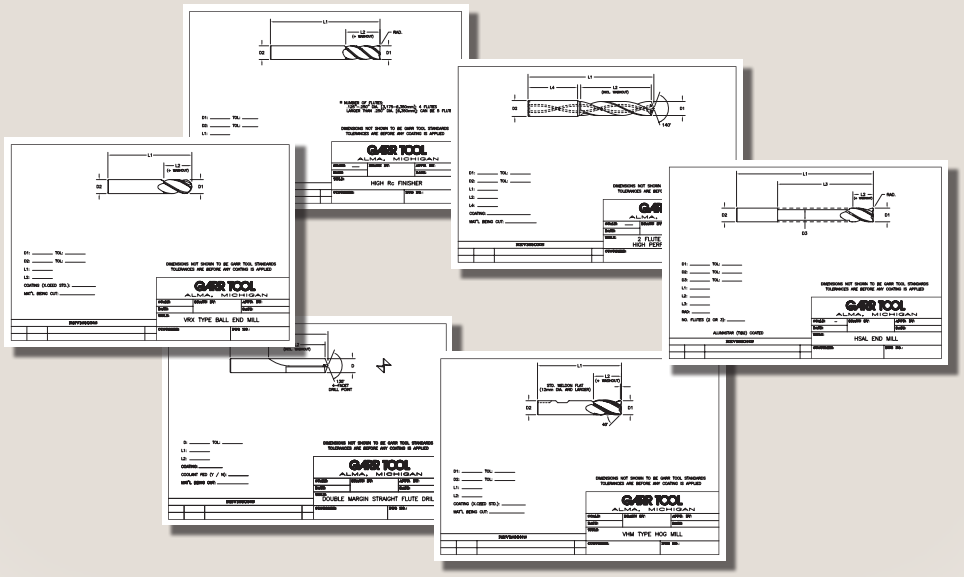
Series V5 - Chip Splitter *(continued)*

.7500" - 1.0000"
(19.050mm - 25.400mm)

	EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
NEW	50839	-	.7500	3/4"	19.050	3/4"	3"	7/8"	-	-	-	162.94	155.86	148.77	141.69
NEW	50841	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.030"	-	-	171.42	163.97	156.51	149.06
NEW	50843	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-	174.98	167.38	159.77	152.16
NEW	50847	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-	174.98	167.38	159.77	152.16
	50850	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-	174.98	167.38	159.77	152.16
NEW	50849	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-	166.51	159.27	152.03	144.79
NEW	50851	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-	174.98	167.38	159.77	152.16
	50855	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.030"	-	-	239.79	229.36	218.94	208.51
NEW	50853	-	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.030"	-	-	239.79	229.36	218.94	208.51
NEW	50857	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.030"	-	-	239.79	229.36	218.94	208.51
NEW	50859	-	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.015"	-	-	239.79	229.36	218.94	208.51
NEW	50861	-	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.030"	-	-	239.79	229.36	218.94	208.51
NEW	50863	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-	257.23	246.05	234.86	223.68
	50860	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-	283.42	271.10	258.77	246.45
NEW	50867	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.015"	-	-	355.48	340.02	324.57	309.11
NEW	50869	-	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-	-	359.24	343.62	328.00	312.38
NEW	50871	-	1.000	1"	25.400	1"	5"	2-5/8"	.030"	-	-	359.24	343.62	328.00	312.38
NEW	50873	-	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	-	466.23	445.96	425.69	405.42





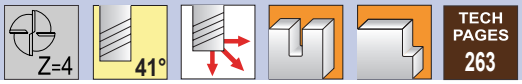


Access an assortment of 'fill-in-the-blank' prints from our website to aid in the quoting of custom tooling.

www.garrtool.com

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)



Recommended for inconel, pH materials, titanium and tool steels >40Rc



Square End, Corner Radius, Ball End

AlTiN Coating

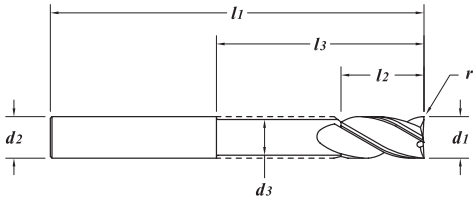
Solid submicron grain carbide end mill - center cutting

The standard in high performance milling

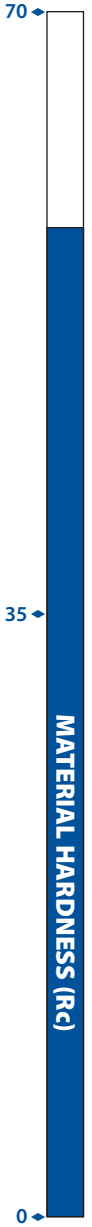
Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

Staggered flute geometry

The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders



EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
61084	-	.0591		1.500	3.0	38	3.0	-	-	-	14.50	13.87	13.24	12.61
61086	-	.0591		1.500	3.0	38	3.0	0.20	-	-	16.45	15.73	15.02	14.30
61088	-	.0591		1.500	3.0	38	3.0	BALL	-	-	16.45	15.73	15.02	14.30
61090	-	.0591		1.500	3.0	38	6.0	-	-	-	14.50	13.87	13.24	12.61
61092	-	.0591		1.500	3.0	38	6.0	0.20	-	-	16.45	15.73	15.02	14.30
61094	-	.0591		1.500	3.0	38	6.0	BALL	-	-	16.45	15.73	15.02	14.30
61096	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	-	-	-	13.66	13.07	12.47	11.88
61098	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	.010"	-	-	15.49	14.82	14.14	13.47
61100	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	BALL	-	-	15.49	14.82	14.14	13.47
61102	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	-	-	-	13.66	13.07	12.47	11.88
61104	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.010"	-	-	15.49	14.82	14.14	13.47
61106	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	BALL	-	-	15.49	14.82	14.14	13.47
61108	-	.0787		2.000	3.0	38	4.0	-	-	-	13.66	13.07	12.47	11.88
61110	-	.0787		2.000	3.0	38	4.0	0.20	-	-	15.49	14.82	14.14	13.47
61112	-	.0787		2.000	3.0	38	4.0	BALL	-	-	15.49	14.82	14.14	13.47
61114	-	.0787		2.000	3.0	38	8.0	-	-	-	13.66	13.07	12.47	11.88
61116	-	.0787		2.000	3.0	38	8.0	0.20	-	-	15.49	14.82	14.14	13.47
61118	-	.0787		2.000	3.0	38	8.0	BALL	-	-	15.49	14.82	14.14	13.47
61120	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	-	-	-	13.05	12.49	11.92	11.35
61122	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	.010"	-	-	14.93	14.28	13.63	12.98
61124	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	BALL	-	-	14.93	14.28	13.63	12.98
61126	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	-	-	-	13.05	12.49	11.92	11.35
61128	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.010"	-	-	14.93	14.28	13.63	12.98
61130	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	BALL	-	-	14.93	14.28	13.63	12.98
61877	-	.1181		3.000	3.0	38	8	-	-	-	12.26	11.73	11.19	10.66
27420	-	.1181		3.000	3.0	50	8	0.20	-	-	13.79	13.19	12.59	11.99
61132	-	.1181		3.000	3.0	50	8	0.30	-	-	13.79	13.19	12.59	11.99
27425	-	.1181		3.000	3.0	50	8	0.50	-	-	13.79	13.19	12.59	11.99
61134	-	.1181		3.000	3.0	50	8	BALL	-	-	13.79	13.19	12.59	11.99
61887	-	.1181		3.000	3.0	38	12	-	-	-	12.26	11.73	11.19	10.66
27430	-	.1181		3.000	3.0	50	12	0.20	-	-	13.79	13.19	12.59	11.99
61136	-	.1181		3.000	3.0	50	12	0.30	-	-	13.79	13.19	12.59	11.99
27435	-	.1181		3.000	3.0	50	12	0.50	-	-	13.79	13.19	12.59	11.99
61138	-	.1181		3.000	3.0	50	12	BALL	-	-	13.79	13.19	12.59	11.99



continued →

Series VRX *(continued)*

.1250" - .1969"
(3.175mm - 5.000mm)

EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
61917	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	-	-	-	12.26	11.73	11.19	10.66
27440	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"	-	-	13.79	13.19	12.59	11.99
61140	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.015"	-	-	13.79	13.19	12.59	11.99
61073		.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.030"	-	-	13.79	13.19	12.59	11.99
61142	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	BALL	-	-	13.79	13.19	12.59	11.99
61144	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	-	-	-	12.26	11.73	11.19	10.66
61146	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	.010"	-	-	13.79	13.19	12.59	11.99
61148	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	.015"	-	-	13.79	13.19	12.59	11.99
61074		.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	.030"	-	-	13.79	13.19	12.59	11.99
61149	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	BALL	-	-	13.79	13.19	12.59	11.99
61927	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	-	-	-	12.26	11.73	11.19	10.66
27450	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	-	-	13.79	13.19	12.59	11.99
61150	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"	-	-	13.79	13.19	12.59	11.99
27455	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	-	-	13.79	13.19	12.59	11.99
61075		.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.030"	-	-	13.79	13.19	12.59	11.99
61152	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	BALL	-	-	13.79	13.19	12.59	11.99
61154	-	.1562	5/32"	3.967	3/16"	2"	5/16"	-	-	-	16.16	15.46	14.75	14.05
27460	-	.1562	5/32"	3.967	3/16"	2"	5/16"	.010"	-	-	19.01	18.18	17.36	16.53
61156	-	.1562	5/32"	3.967	3/16"	2"	5/16"	.015"	-	-	19.01	18.18	17.36	16.53
61076		.1562	5/32"	3.967	3/16"	2"	5/16"	.030"	-	-	19.01	18.18	17.36	16.53
61077		.1562	5/32"	3.967	3/16"	2"	5/16"	BALL	-	-	19.01	18.18	17.36	16.53
61158	-	.1562	5/32"	3.967	3/16"	2"	1/2"	-	-	-	16.16	15.46	14.75	14.05
27470	-	.1562	5/32"	3.967	3/16"	2"	1/2"	.010"	-	-	19.01	18.18	17.36	16.53
61160	-	.1562	5/32"	3.967	3/16"	2"	1/2"	.015"	-	-	19.01	18.18	17.36	16.53
61078		.1562	5/32"	3.967	3/16"	2"	1/2"	.030"	-	-	19.01	18.18	17.36	16.53
61079		.1562	5/32"	3.967	3/16"	2"	1/2"	BALL	-	-	19.01	18.18	17.36	16.53
61162	-	.1575		4.000	6.0	50	8	-	-	-	23.01	22.01	21.01	20.01
27480	-	.1575		4.000	6.0	50	8	0.30	-	-	23.37	22.35	21.34	20.32
61164	-	.1575		4.000	6.0	50	8	0.50	-	-	23.37	22.35	21.34	20.32
28470	-	.1575		4.000	6.0	50	8	BALL	-	-	23.37	22.35	21.34	20.32
61977	-	.1575		4.000	6.0	50	12	-	-	-	23.01	22.01	21.01	20.01
27490	-	.1575		4.000	6.0	50	12	0.30	-	-	23.37	22.35	21.34	20.32
27495	-	.1575		4.000	6.0	50	12	0.50	-	-	23.37	22.35	21.34	20.32
28480	-	.1575		4.000	6.0	50	12	BALL	-	-	23.37	22.35	21.34	20.32
61166	-	.1575		4.000	6.0	65	19	-	-	-	25.52	24.41	23.30	22.19
61168	-	.1575		4.000	6.0	65	19	0.30	-	-	25.90	24.77	23.65	22.52
62007	-	.1875	3/16"	4.763	3/16"	2"	5/16"	-	-	-	15.46	14.78	14.11	13.44
27500	-	.1875	3/16"	4.763	3/16"	2"	5/16"	.010"	-	-	17.32	16.57	15.81	15.06
61170	-	.1875	3/16"	4.763	3/16"	2"	5/16"	.015"	-	-	17.32	16.57	15.81	15.06
61172	-	.1875	3/16"	4.763	3/16"	2"	5/16"	.020"	-	-	17.32	16.57	15.81	15.06
28490	-	.1875	3/16"	4.763	3/16"	2"	5/16"	BALL	-	-	17.32	16.57	15.81	15.06
61174	-	.1875	3/16"	4.763	3/16"	2"	7/16"	-	-	-	15.46	14.78	14.11	13.44
61176	-	.1875	3/16"	4.763	3/16"	2"	7/16"	.010"	-	-	17.32	16.57	15.81	15.06
61178	-	.1875	3/16"	4.763	3/16"	2"	7/16"	.015"	-	-	17.32	16.57	15.81	15.06
62017	-	.1875	3/16"	4.763	3/16"	2"	9/16"	-	-	-	15.46	14.78	14.11	13.44
27520	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-	-	17.32	16.57	15.81	15.06
61180	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.015"	-	-	17.32	16.57	15.81	15.06
27521	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	-	-	17.32	16.57	15.81	15.06
61182	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.030"	-	-	17.32	16.57	15.81	15.06
28500	-	.1875	3/16"	4.763	3/16"	2"	9/16"	BALL	-	-	17.32	16.57	15.81	15.06
61184	-	.1875	3/16"	4.763	3/16"	3"	1"	.010"	-	-	29.64	28.35	27.06	25.77
61186	-	.1875	3/16"	4.763	3/16"	3"	1-1/4"	.010"	-	-	29.64	28.35	27.06	25.77
63100	-	.1875	3/16"	4.763	3/16"	4"	5/16"	.010"	-	-	32.26	30.86	29.45	28.05
61188	-	.1969		5.000	6.0	50	10	-	-	-	22.54	21.56	20.58	19.60
27522	-	.1969		5.000	6.0	50	10	0.30	-	-	22.90	21.90	20.91	19.91
61190	-	.1969		5.000	6.0	50	10	0.50	-	-	22.90	21.90	20.91	19.91
28510	-	.1969		5.000	6.0	50	10	BALL	-	-	22.90	21.90	20.91	19.91

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

EDP# (plain)	EDP# (weldon)	*d1* † Diameter Decimal	Diameter	Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*r* Corner Radius	*l3* Reach Length	*d3* Neck Diameter	1-11	12-24	25-49	50-100
62057	-	.1969		5.000	6.0	65	15	-	-	-	24.61	23.54	22.47	21.40
27524	-	.1969		5.000	6.0	65	15	0.30	-	-	25.37	24.27	23.16	22.06
27526	-	.1969		5.000	6.0	65	15	0.50	-	-	25.37	24.27	23.16	22.06
27528	-	.1969		5.000	6.0	65	15	1.00	-	-	25.37	24.27	23.16	22.06
28520	-	.1969		5.000	6.0	65	15	BALL	-	-	25.37	24.27	23.16	22.06
63110	-	.1969		5.000	6.0	100	10	0.30	-	-	48.61	46.50	44.38	42.27
61192	-	.1969		5.000	6.0	100	10	0.30	55	4.70	56.93	54.45	51.98	49.50
61194	-	.2188	7/32"	5.558	1/4"	2"	3/8"	-	-	-	19.00	18.17	17.35	16.52
61196	-	.2188	7/32"	5.558	1/4"	2"	3/8"	.010"	-	-	22.02	21.07	20.11	19.15
27525	-	.2188	7/32"	5.558	1/4"	2"	3/8"	.015"	-	-	22.02	21.07	20.11	19.15
61198	-	.2188	7/32"	5.558	1/4"	2"	3/8"	BALL	-	-	22.02	21.07	20.11	19.15
61200	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	-	-	-	21.56	20.63	19.69	18.75
61202	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.010"	-	-	24.43	23.36	22.30	21.24
27530	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.015"	-	-	24.43	23.36	22.30	21.24
61204	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.020"	-	-	24.43	23.36	22.30	21.24
61206	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	BALL	-	-	24.43	23.36	22.30	21.24
61208	-	.2188	7/32"	5.558	1/4"	3"	1-1/4"	.015"	-	-	36.20	34.63	33.05	31.48
63120	-	.2188	7/32"	5.558	1/4"	4"	3/8"	.015"	-	-	46.94	44.90	42.86	40.82
61210	-	.2188	7/32"	5.558	1/4"	4"	3/8"	.015"	2-1/4"	.205"	55.26	52.86	50.45	48.05
62077	-	.2362		6.000	6.0	50	12	-	-	-	19.16	18.33	17.49	16.66
27535	-	.2362		6.000	6.0	50	12	0.30	-	-	22.16	21.20	20.23	19.27
61212	-	.2362		6.000	6.0	50	12	0.50	-	-	22.16	21.20	20.23	19.27
61214	-	.2362		6.000	6.0	50	12	0.75	-	-	22.16	21.20	20.23	19.27
28530	-	.2362		6.000	6.0	50	12	BALL	-	-	22.16	21.20	20.23	19.27
62087	-	.2362		6.000	6.0	65	19	-	-	-	21.60	20.66	19.72	18.78
61216	-	.2362		6.000	6.0	65	19	0.20	-	-	24.56	23.50	22.43	21.36
27540	-	.2362		6.000	6.0	65	19	0.30	-	-	24.56	23.50	22.43	21.36
27545	-	.2362		6.000	6.0	65	19	0.50	-	-	24.56	23.50	22.43	21.36
61218	-	.2362		6.000	6.0	65	19	0.75	-	-	24.56	23.50	22.43	21.36
27547	-	.2362		6.000	6.0	65	19	1.00	-	-	24.56	23.50	22.43	21.36
27548	-	.2362		6.000	6.0	65	19	1.50	-	-	24.56	23.50	22.43	21.36
28540	-	.2362		6.000	6.0	65	19	BALL	-	-	24.56	23.50	22.43	21.36
61220	-	.2362		6.000	6.0	75	26	0.30	-	-	36.54	34.95	33.36	31.77
61222	-	.2362		6.000	6.0	75	26	0.50	-	-	36.54	34.95	33.36	31.77
61224	-	.2362		6.000	6.0	75	38	0.30	-	-	36.54	34.95	33.36	31.77
61226	-	.2362		6.000	6.0	75	38	0.50	-	-	36.54	34.95	33.36	31.77
63130	-	.2362		6.000	6.0	100	12	0.30	32	5.70	47.39	45.33	43.27	41.21
62137	-	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-	-	18.39	17.59	16.79	15.99
61228	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.010"	-	-	21.32	20.39	19.47	18.54
27560	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"	-	-	21.32	20.39	19.47	18.54
61230	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	-	21.32	20.39	19.47	18.54
28570	-	.2500	1/4"	6.350	1/4"	2"	3/8"	BALL	-	-	21.32	20.39	19.47	18.54
61232	-	.2500	1/4"	6.350	1/4"	2"	1/2"	-	-	-	18.39	17.59	16.79	15.99
61234	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"	-	-	21.32	20.39	19.47	18.54
62147	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	-	20.85	19.94	19.04	18.13
27570	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-	23.62	22.59	21.57	20.54
27580	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-	23.62	22.59	21.57	20.54
61236	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-	23.62	22.59	21.57	20.54
27581	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-	23.62	22.59	21.57	20.54
61238	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.040"	-	-	23.62	22.59	21.57	20.54
27583	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	-	-	23.62	22.59	21.57	20.54
28580	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	BALL	-	-	23.62	22.59	21.57	20.54

continued →

Series VRX *(continued)*

.2500" - .3438"
(6.350mm - 8.733mm)

EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
61240	-	.2500	1/4"	6.350	1/4"	3"	1"	.015"	-	-	34.99	33.47	31.95	30.43
61242	-	.2500	1/4"	6.350	1/4"	3"	1-1/2"	.015"	-	-	34.99	33.47	31.95	30.43
61244	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	3/4"	.240"	45.77	43.78	41.79	39.80
63140	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	1-1/4"	.240"	45.77	43.78	41.79	39.80
61246	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	2-1/8"	.240"	45.77	43.78	41.79	39.80
27585	-	.2756		7.000	8.0	50	12	0.30	-	-	34.58	33.08	31.57	30.07
27590	-	.2756		7.000	8.0	65	22	0.30	-	-	38.01	36.36	34.70	33.05
61248	-	.2812	9/32"	7.142	5/16"	2"	7/16"	-	-	-	29.08	27.82	26.55	25.29
27595	-	.2812	9/32"	7.142	5/16"	2"	7/16"	.015"	-	-	33.33	31.88	30.43	28.98
61250	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	-	-	-	34.04	32.56	31.08	29.60
61252	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.010"	-	-	36.64	35.05	33.45	31.86
27597	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.015"	-	-	36.64	35.05	33.45	31.86
61254	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.020"	-	-	36.64	35.05	33.45	31.86
63150	-	.2812	9/32"	7.142	5/16"	4"	7/16"	.015"	-	-	63.30	60.54	57.79	55.04
62207	-	.3125	5/16"	7.938	5/16"	2"	7/16"	-	-	-	25.42	24.31	23.21	22.10
61256	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.010"	-	-	29.13	27.86	26.60	25.33
61258	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.015"	-	-	29.13	27.86	26.60	25.33
27600	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-	-	29.13	27.86	26.60	25.33
61260	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.030"	-	-	29.13	27.86	26.60	25.33
28610	-	.3125	5/16"	7.938	5/16"	2"	7/16"	BALL	-	-	29.13	27.86	26.60	25.33
62217	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	-	-	-	29.74	28.45	27.15	25.86
27610	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.010"	-	-	32.02	30.62	29.23	27.84
61262	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.015"	-	-	32.02	30.62	29.23	27.84
27620	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	-	32.02	30.62	29.23	27.84
27622	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	-	-	32.02	30.62	29.23	27.84
61264	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.040"	-	-	32.02	30.62	29.23	27.84
27624	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.060"	-	-	32.02	30.62	29.23	27.84
28620	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	BALL	-	-	32.02	30.62	29.23	27.84
61266	-	.3125	5/16"	7.938	5/16"	3"	1-1/4"	.015"	-	-	44.63	42.69	40.75	38.81
63160	-	.3125	5/16"	7.938	5/16"	4"	7/16"	.020"	1-7/8"	.300"	61.72	59.04	56.35	53.67
62257	-	.3150		8.000	8.0	50	12	-	-	-	26.46	25.31	24.16	23.01
61268	-	.3150		8.000	8.0	50	12	0.30	-	-	30.20	28.89	27.57	26.26
27630	-	.3150		8.000	8.0	50	12	0.50	-	-	30.20	28.89	27.57	26.26
61270	-	.3150		8.000	8.0	50	12	0.75	-	-	30.20	28.89	27.57	26.26
28630	-	.3150		8.000	8.0	50	12	BALL	-	-	30.20	28.89	27.57	26.26
62267	-	.3150		8.000	8.0	65	22	-	-	-	30.82	29.48	28.14	26.80
27635	-	.3150		8.000	8.0	65	22	0.30	-	-	33.21	31.77	30.32	28.88
27640	-	.3150		8.000	8.0	65	22	0.50	-	-	33.21	31.77	30.32	28.88
61272	-	.3150		8.000	8.0	65	22	0.75	-	-	33.21	31.77	30.32	28.88
27642	-	.3150		8.000	8.0	65	22	1.00	-	-	33.21	31.77	30.32	28.88
27643	-	.3150		8.000	8.0	65	22	1.50	-	-	33.21	31.77	30.32	28.88
61274	-	.3150		8.000	8.0	65	22	2.00	-	-	33.21	31.77	30.32	28.88
28640	-	.3150		8.000	8.0	65	22	BALL	-	-	33.21	31.77	30.32	28.88
61276	-	.3150		8.000	8.0	75	38	0.50	-	-	46.53	44.51	42.48	40.46
61278	-	.3150		8.000	8.0	100	50	0.50	-	-	53.15	50.84	48.53	46.22
63170	-	.3150		8.000	8.0	100	12	0.50	47	7.60	63.85	61.07	58.30	55.52
61280	-	.3438	11/32"	8.733	3/8"	2"	1/2"	-	-	-	33.98	32.51	31.03	29.55
27645	-	.3438	11/32"	8.733	3/8"	2"	1/2"	.020"	-	-	38.89	37.20	35.51	33.82
61282	-	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	-	-	-	39.70	37.97	36.25	34.52
27650	-	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	.020"	-	-	42.29	40.45	38.61	36.77
61284	-	.3438	11/32"	8.733	3/8"	3"	1-1/4"	.015"	-	-	55.65	53.23	50.81	48.39

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

Series VRX *(continued)*

.3438" - .3937"
(8.733mm - 10.000mm)

Z=4 | 41° | TECH PAGES 263

Recommended for inconel, pH materials, titanium and tool steels >40Rc



AlTiN Coating

Solid submicron grain carbide end mill - center cutting

The standard in high performance milling

Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

Staggered flute geometry

EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
63180	-	.3438	11/32"	8.733	3/8"	4"	1/2"	.020"	-	-	67.77	64.82	61.88	58.93
27655	-	.3543		9.000	10.0	50	14	0.50	-	-	46.95	44.91	42.87	40.83
62287	-	.3543		9.000	10.0	65	22	-	-	-	47.59	45.52	43.45	41.38
27657	-	.3543		9.000	10.0	65	22	0.50	-	-	51.04	48.82	46.60	44.38
62317	-	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	-	30.03	28.72	27.42	26.11
27658	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.010"	-	-	34.37	32.88	31.38	29.89
61286	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.015"	-	-	34.37	32.88	31.38	29.89
27660	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-	34.37	32.88	31.38	29.89
27662	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"	-	-	34.37	32.88	31.38	29.89
61288	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.060"	-	-	34.37	32.88	31.38	29.89
28670	-	.3750	3/8"	9.525	3/8"	2"	1/2"	BALL	-	-	34.37	32.88	31.38	29.89
62327	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-	-	35.09	33.56	32.04	30.51
27670	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	-	-	37.39	35.76	34.14	32.51
61290	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	-	-	37.39	35.76	34.14	32.51
27680	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	-	-	37.39	35.76	34.14	32.51
27682	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	-	37.39	35.76	34.14	32.51
61292	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.040"	-	-	37.39	35.76	34.14	32.51
61294	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.050"	-	-	37.39	35.76	34.14	32.51
27684	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	-	-	37.39	35.76	34.14	32.51
61296	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.094"	-	-	37.39	35.76	34.14	32.51
28680	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	BALL	-	-	37.39	35.76	34.14	32.51
61298	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.015"	-	-	49.20	47.06	44.92	42.78
61300	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.015"	-	-	55.36	52.95	50.55	48.14
61302	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	BALL	-	-	55.36	52.95	50.55	48.14
61304	-	.3750	3/8"	9.525	3/8"	4"	2"	.015"	-	-	55.36	52.95	50.55	48.14
61306	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.015"	1-1/8"	.360"	66.07	63.20	60.32	57.45
63190	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.020"	1-7/8"	.360"	66.07	63.20	60.32	57.45
61308	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.015"	2-1/8"	.360"	66.07	63.20	60.32	57.45
61310	-	.3750	3/8"	9.525	3/8"	6"	1/2"	.015"	3-1/8"	.360"	87.35	83.56	79.76	75.96
61312	-	.3937		10.000	10.0	50	16	-	-	-	38.69	37.00	35.32	33.64
27690	-	.3937		10.000	10.0	50	16	0.50	-	-	41.50	39.70	37.89	36.09
61314	-	.3937		10.000	10.0	50	16	1.00	-	-	41.50	39.70	37.89	36.09
28690	-	.3937		10.000	10.0	50	16	BALL	-	-	41.50	39.70	37.89	36.09
62397	-	.3937		10.000	10.0	70	22	-	-	-	42.08	40.25	38.42	36.59
27698	-	.3937		10.000	10.0	70	22	0.30	-	-	45.14	43.18	41.21	39.25
27700	-	.3937		10.000	10.0	70	22	0.50	-	-	45.14	43.18	41.21	39.25
61316	-	.3937		10.000	10.0	70	22	0.75	-	-	45.14	43.18	41.21	39.25
27702	-	.3937		10.000	10.0	70	22	1.00	-	-	45.14	43.18	41.21	39.25
28700	-	.3937		10.000	10.0	70	22	BALL	-	-	45.14	43.18	41.21	39.25
61318	-	.3937		10.000	10.0	70	32	0.50	-	-	45.14	43.18	41.21	39.25
61320	-	.3937		10.000	10.0	100	38	0.50	-	-	70.09	67.05	64.00	60.95
61322	-	.3937		10.000	10.0	100	50	0.50	-	-	70.09	67.05	64.00	60.95
63200	-	.3937		10.000	10.0	100	14	0.50	47	9.50	80.80	77.29	73.77	70.26

MATERIAL HARDNESS (Rc): 70 ◆ 35 ◆ 0

continued →

Series VRX *(continued)*

.4375" - .5000"
(11.113mm - 12.700mm)

EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
27705	-	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.020"	-	-	45.21	43.24	41.28	39.31
28705	-	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	BALL	-	-	45.21	43.24	41.28	39.31
62437	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	-	-	-	42.18	40.35	38.51	36.68
27708	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	.010"	-	-	45.21	43.24	41.28	39.31
27710	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	.020"	-	-	45.21	43.24	41.28	39.31
28710	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	BALL	-	-	45.21	43.24	41.28	39.31
63210	-	.4375	7/16"	11.113	7/16"	6"	1"	.020"	-	-	97.45	93.21	88.98	84.74
62475	-	.4724		12.000	12.0	65	19	-	-	-	51.22	48.99	46.77	44.54
27712	-	.4724		12.000	12.0	65	19	0.30	-	-	59.58	56.99	54.40	51.81
27715	-	.4724		12.000	12.0	65	19	0.50	-	-	59.58	56.99	54.40	51.81
28715	-	.4724		12.000	12.0	65	19	BALL	-	-	59.58	56.99	54.40	51.81
61324	-	.4724		12.000	12.0	75	26	-	-	-	54.65	52.27	49.90	47.52
61326	-	.4724		12.000	12.0	75	26	0.50	-	-	66.47	63.58	60.69	57.80
62485	-	.4724		12.000	12.0	75	32	-	-	-	54.65	52.27	49.90	47.52
27718	-	.4724		12.000	12.0	75	32	0.30	-	-	66.47	63.58	60.69	57.80
27720	-	.4724		12.000	12.0	75	32	0.50	-	-	66.47	63.58	60.69	57.80
61328	-	.4724		12.000	12.0	75	32	0.75	-	-	66.47	63.58	60.69	57.80
27722	-	.4724		12.000	12.0	75	32	1.00	-	-	66.47	63.58	60.69	57.80
27730	-	.4724		12.000	12.0	75	32	1.50	-	-	66.47	63.58	60.69	57.80
27735	-	.4724		12.000	12.0	75	32	2.00	-	-	66.47	63.58	60.69	57.80
61330	-	.4724		12.000	12.0	75	32	3.00	-	-	66.47	63.58	60.69	57.80
28720	-	.4724		12.000	12.0	75	32	BALL	-	-	66.47	63.58	60.69	57.80
61332	-	.4724		12.000	12.0	100	38	-	-	-	74.53	71.29	68.05	64.81
61334	-	.4724		12.000	12.0	100	38	0.50	-	-	78.74	75.32	71.89	68.47
61336	-	.4724		12.000	12.0	100	42	-	-	-	74.53	71.29	68.05	64.81
61338	-	.4724		12.000	12.0	100	42	0.50	-	-	78.74	75.32	71.89	68.47
61340	-	.4724		12.000	12.0	100	52	-	-	-	74.53	71.29	68.05	64.81
61342	-	.4724		12.000	12.0	100	52	0.50	-	-	78.74	75.32	71.89	68.47
63220	-	.4724		12.000	12.0	150	19	0.50	57	11.50	117.27	112.17	107.07	101.97
62525	62527	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-	49.12	46.98	44.85	42.71
27739	27738	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-	57.13	54.65	52.16	49.68
61344	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"	-	-	57.13	54.65	52.16	49.68
27741	27740	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-	57.13	54.65	52.16	49.68
27743	27742	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-	57.13	54.65	52.16	49.68
61346	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"	-	-	57.13	54.65	52.16	49.68
28751	28750	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	BALL	-	-	57.13	54.65	52.16	49.68
61348	-	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-	52.47	50.19	47.91	45.63
61350	-	.5000	1/2"	12.700	1/2"	3"	1"	.015"	-	-	63.77	61.00	58.22	55.45
61352	-	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-	63.77	61.00	58.22	55.45
61354	-	.5000	1/2"	12.700	1/2"	3"	1"	.060"	-	-	63.77	61.00	58.22	55.45
61356	-	.5000	1/2"	12.700	1/2"	3"	1"	.125"	-	-	63.77	61.00	58.22	55.45
61358	-	.5000	1/2"	12.700	1/2"	3"	1"	BALL	-	-	63.77	61.00	58.22	55.45
62535	62537	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-	52.47	50.19	47.91	45.63
27751	27750	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-	63.77	61.00	58.22	55.45
61360	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-	63.77	61.00	58.22	55.45
27761	27760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-	63.77	61.00	58.22	55.45
27763	27762	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	63.77	61.00	58.22	55.45
61362	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.040"	-	-	63.77	61.00	58.22	55.45
61364	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.050"	-	-	63.77	61.00	58.22	55.45
27767	27764	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-	63.77	61.00	58.22	55.45
61366	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.078"	-	-	63.77	61.00	58.22	55.45
63398	63399	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.090"	-	-	63.77	61.00	58.22	55.45

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

	EDP# (plain)	EDP# (weldon)	*d1* † Diameter Decimal	*d1* † Diameter	Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*r* Corner Radius	*l3* Reach Length	*d3* Neck Diameter	1-11	12-24	25-49	50-100
	61368	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.094"	-	-	63.77	61.00	58.22	55.45
	61370	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.100"	-	-	63.77	61.00	58.22	55.45
	27769	27768	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-	63.77	61.00	58.22	55.45
	61372	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-	63.77	61.00	58.22	55.45
	28761	28760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	BALL	-	-	63.77	61.00	58.22	55.45
	28771	28770	.5000	1/2"	12.700	1/2"	4"	5/8"	BALL	-	-	75.36	72.08	68.81	65.53
	61374	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	-	-	-	71.01	67.93	64.84	61.75
	63401	63400	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.010"	-	-	75.36	72.08	68.81	65.53
	61376	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.015"	-	-	75.36	72.08	68.81	65.53
	63411	63410	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-	75.36	72.08	68.81	65.53
	63421	63420	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.060"	-	-	75.36	72.08	68.81	65.53
NEW	63424	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.125"	-	-	75.36	72.08	68.81	65.53
	61378	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	BALL	-	-	75.36	72.08	68.81	65.53
	61380	-	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.015"	-	-	75.36	72.08	68.81	65.53
	61382	-	.5000	1/2"	12.700	1/2"	4"	1-3/4"	.015"	-	-	75.36	72.08	68.81	65.53
	62565	62567	.5000	1/2"	12.700	1/2"	4"	2"	-	-	-	71.01	67.93	64.84	61.75
	63431	63430	.5000	1/2"	12.700	1/2"	4"	2"	.010"	-	-	75.36	72.08	68.81	65.53
	61384	-	.5000	1/2"	12.700	1/2"	4"	2"	.015"	-	-	75.36	72.08	68.81	65.53
	63441	63440	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-	75.36	72.08	68.81	65.53
	63451	63450	.5000	1/2"	12.700	1/2"	4"	2"	.060"	-	-	75.36	72.08	68.81	65.53
	61386	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.015"	-	-	75.36	72.08	68.81	65.53
	63241	63240	.5000	1/2"	12.700	1/2"	6"	2"	.020"	-	-	106.57	101.94	97.30	92.67
	61388	-	.5000	1/2"	12.700	1/2"	6"	2-1/2"	.015"	-	-	106.57	101.94	97.30	92.67
	61390	-	.5000	1/2"	12.700	1/2"	6"	2-1/2"	.030"	-	-	106.57	101.94	97.30	92.67
	61392	-	.5000	1/2"	12.700	1/2"	6"	3-1/4"	.030"	-	-	106.57	101.94	97.30	92.67
	61394	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	1-1/2"	.480"	86.02	82.28	78.54	74.80
	61396	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	2-1/4"	.480"	86.02	82.28	78.54	74.80
	63231	63230	.5000	1/2"	12.700	1/2"	4"	5/8"	.020"	2-1/4"	.480"	86.02	82.28	78.54	74.80
	61398	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.015"	3-3/8"	.480"	117.23	112.13	107.04	101.94
	61400	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.015"	4-1/8"	.480"	117.23	112.13	107.04	101.94
	27766	27765	.5512		14.000	14.0	75	19	0.50	-	-	94.09	90.00	85.91	81.82
	28781	28780	.5512		14.000	14.0	75	19	BALL	-	-	94.09	90.00	85.91	81.82
	27771	27770	.5512		14.000	14.0	88	32	0.50	-	-	96.70	92.50	88.29	84.09
	28786	28785	.5512		14.000	14.0	88	32	BALL	-	-	96.70	92.50	88.29	84.09
	63261	63260	.5512		14.000	14.0	150	50	0.50	-	-	145.16	138.85	132.54	126.23
	63251	-	.5512		14.000	14.0	150	19	0.50	57	13.50	155.86	149.08	142.31	135.53
	62625	62627	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	-	-	-	87.26	83.47	79.67	75.88
	61402	-	.6250	5/8"	15.875	5/8"	3"	3/4"	-	-	-	94.08	89.99	85.90	81.81
	63461	63460	.6250	5/8"	15.875	5/8"	3"	3/4"	.010"	-	-	98.77	94.48	90.18	85.89
	61404	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.015"	-	-	98.77	94.48	90.18	85.89
	27781	27780	.6250	5/8"	15.875	5/8"	3"	3/4"	.025"	-	-	98.77	94.48	90.18	85.89
	61406	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.060"	-	-	98.77	94.48	90.18	85.89
	28796	28795	.6250	5/8"	15.875	5/8"	3"	3/4"	BALL	-	-	98.77	94.48	90.18	85.89
	62655	62657	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-	96.83	92.62	88.41	84.20
	27791	27790	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	-	-	101.52	97.11	92.69	88.28
	61408	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-	101.52	97.11	92.69	88.28
	61410	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-	101.52	97.11	92.69	88.28
	27801	27800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.025"	-	-	101.52	97.11	92.69	88.28
	61412	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-	101.52	97.11	92.69	88.28
	61414	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.040"	-	-	101.52	97.11	92.69	88.28
	27803	27802	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-	101.52	97.11	92.69	88.28
	61416	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.078"	-	-	101.52	97.11	92.69	88.28
	61418	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.094"	-	-	101.52	97.11	92.69	88.28
	27805	27804	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-	101.52	97.11	92.69	88.28
	61420	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.125"	-	-	101.52	97.11	92.69	88.28
	28801	28800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	BALL	-	-	101.52	97.11	92.69	88.28

continued →

Series VRX *(continued)*

.6250" - .7500"
(15.875mm - 19.050mm)

MATERIAL HARDNESS (Rc)
70
35
0

	EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
	61422	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	-	-	-	103.41	98.91	94.42	89.92
	63501	63500	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.010"	-	-	110.35	105.56	100.76	95.96
	61424	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.015"	-	-	110.35	105.56	100.76	95.96
	63511	63510	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.030"	-	-	110.35	105.56	100.76	95.96
	63521	63520	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.060"	-	-	110.35	105.56	100.76	95.96
	61426	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-	103.41	98.91	94.42	89.92
	61428	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.015"	-	-	110.35	105.56	100.76	95.96
	61430	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-	110.35	105.56	100.76	95.96
	61432	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.060"	-	-	110.35	105.56	100.76	95.96
	62675	62677	.6250	5/8"	15.875	5/8"	4"	1-3/4"	-	-	-	103.41	98.91	94.42	89.92
	63531	63530	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.010"	-	-	110.35	105.56	100.76	95.96
	63541	63540	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.030"	-	-	110.35	105.56	100.76	95.96
	63551	63550	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.060"	-	-	110.35	105.56	100.76	95.96
	63281	63280	.6250	5/8"	15.875	5/8"	6"	2"	.025"	-	-	151.92	145.31	138.71	132.10
NEW	63283	-	.6250	5/8"	15.875	5/8"	6"	2"	.090"	-	-	151.92	145.31	138.71	132.10
NEW	63285	-	.6250	5/8"	15.875	5/8"	6"	2"	.125"	-	-	151.92	145.31	138.71	132.10
	28806	28805	.6250	5/8"	15.875	5/8"	6"	2"	BALL	-	-	151.92	145.31	138.71	132.10
	61434	-	.6250	5/8"	15.875	5/8"	6"	2-1/2"	.030"	-	-	151.92	145.31	138.71	132.10
	61436	-	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.030"	-	-	151.92	145.31	138.71	132.10
	61438	-	.6250	5/8"	15.875	5/8"	4"	3/4"	.030"	1-5/8"	.600"	121.03	115.76	110.50	105.24
	61440	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	2-3/8"	.600"	162.59	155.52	148.45	141.38
	63271	63270	.6250	5/8"	15.875	5/8"	6"	3/4"	.025"	3-1/4"	.600"	162.59	155.52	148.45	141.38
	61442	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-1/8"	.600"	162.59	155.52	148.45	141.38
	61444	-	.6299		16.000	16.0	75	19	-	-	-	98.33	94.05	89.78	85.50
	27809	-	.6299		16.000	16.0	75	19	0.30	-	-	103.11	98.63	94.14	89.66
	27811	27810	.6299		16.000	16.0	75	19	0.50	-	-	103.11	98.63	94.14	89.66
	61446	-	.6299		16.000	16.0	75	19	1.00	-	-	103.11	98.63	94.14	89.66
	28811	28810	.6299		16.000	16.0	75	19	BALL	-	-	103.11	98.63	94.14	89.66
	62715	62717	.6299		16.000	16.0	88	32	-	-	-	101.02	96.62	92.23	87.84
	27819	27818	.6299		16.000	16.0	88	32	0.30	-	-	105.94	101.33	96.73	92.12
	27821	27820	.6299		16.000	16.0	88	32	0.50	-	-	105.94	101.33	96.73	92.12
	61448	-	.6299		16.000	16.0	88	32	0.75	-	-	105.94	101.33	96.73	92.12
	27823	27822	.6299		16.000	16.0	88	32	1.00	-	-	105.94	101.33	96.73	92.12
	61450	-	.6299		16.000	16.0	88	32	1.50	-	-	105.94	101.33	96.73	92.12
	27825	27824	.6299		16.000	16.0	88	32	2.00	-	-	105.94	101.33	96.73	92.12
	61452	-	.6299		16.000	16.0	88	32	3.00	-	-	105.94	101.33	96.73	92.12
	28821	28820	.6299		16.000	16.0	88	32	BALL	-	-	105.94	101.33	96.73	92.12
	63581	63580	.6299		16.000	16.0	100	38	0.30	-	-	112.64	107.75	102.85	97.95
	61454	-	.6299		16.000	16.0	100	38	0.50	-	-	112.64	107.75	102.85	97.95
	61456	-	.6299		16.000	16.0	100	42	0.50	-	-	112.64	107.75	102.85	97.95
	63291	63290	.6299		16.000	16.0	150	19	0.50	82	15.25	162.59	155.52	148.45	141.38
	27831	-	.7087		18.000	18.0	75	22	0.80	-	-	148.74	142.27	135.81	129.34
	28831	-	.7087		18.000	18.0	75	22	BALL	-	-	148.74	142.27	135.81	129.34
	27836	27835	.7087		18.000	18.0	100	38	0.80	-	-	152.09	145.48	138.86	132.25
	28836	28835	.7087		18.000	18.0	100	38	BALL	-	-	152.09	145.48	138.86	132.25
	63301	-	.7087		18.000	18.0	150	25	0.80	82	17.25	237.00	226.70	216.39	206.09
	61458	-	.7500	3/4"	19.050	3/4"	3"	7/8"	-	-	-	135.26	129.38	123.50	117.62
	27841	27840	.7500	3/4"	19.050	3/4"	3"	7/8"	.030"	-	-	142.49	136.29	130.10	123.90
	61460	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.060"	-	-	142.49	136.29	130.10	123.90
	28841	28840	.7500	3/4"	19.050	3/4"	3"	7/8"	BALL	-	-	142.49	136.29	130.10	123.90
	61462	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	-	-	-	138.22	132.21	126.20	120.19
	61464	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.030"	-	-	145.59	139.26	132.93	126.60
	62775	62777	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-	138.22	132.21	126.20	120.19
	27851	27850	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-	145.59	139.26	132.93	126.60
	27861	27860	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-	145.59	139.26	132.93	126.60
	27865	27864	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-	145.59	139.26	132.93	126.60
	27867	27866	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-	145.59	139.26	132.93	126.60
	28861	28860	.7500	3/4"	19.050	3/4"	4"	1-1/2"	BALL	-	-	145.59	139.26	132.93	126.60

† *Metric equivalents are for reference only*

	EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
	61466	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-	-	138.22	132.21	126.20	120.19
	61468	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.015"	-	-	145.59	139.26	132.93	126.60
	61470	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-	145.59	139.26	132.93	126.60
	61472	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.060"	-	-	145.59	139.26	132.93	126.60
	61474	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	BALL	-	-	145.59	139.26	132.93	126.60
	62785	62787	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-	138.22	132.21	126.20	120.19
	63601	63600	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.015"	-	-	145.59	139.26	132.93	126.60
	27869	27868	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-	145.59	139.26	132.93	126.60
	63611	63610	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.060"	-	-	145.59	139.26	132.93	126.60
	61476	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.094"	-	-	145.59	139.26	132.93	126.60
	63621	63620	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.120"	-	-	145.59	139.26	132.93	126.60
	61478	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.190"	-	-	145.59	139.26	132.93	126.60
	61480	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	BALL	-	-	145.59	139.26	132.93	126.60
	62795	62797	.7500	3/4"	19.050	3/4"	5"	2"	-	-	-	185.52	177.45	169.39	161.32
	63631	63630	.7500	3/4"	19.050	3/4"	5"	2"	.015"	-	-	201.94	193.16	184.38	175.60
	63311	63310	.7500	3/4"	19.050	3/4"	5"	2"	.030"	-	-	201.94	193.16	184.38	175.60
	63641	63640	.7500	3/4"	19.050	3/4"	5"	2"	.060"	-	-	201.94	193.16	184.38	175.60
	61482	-	.7500	3/4"	19.050	3/4"	5"	2"	.094"	-	-	201.94	193.16	184.38	175.60
	61484	-	.7500	3/4"	19.050	3/4"	5"	2"	.125"	-	-	201.94	193.16	184.38	175.60
	28866	28865	.7500	3/4"	19.050	3/4"	5"	2"	BALL	-	-	201.94	193.16	184.38	175.60
	61486	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	-	-	-	185.52	177.45	169.39	161.32
	61488	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.030"	-	-	201.94	193.16	184.38	175.60
	62805	62807	.7500	3/4"	19.050	3/4"	6"	3"	-	-	-	217.11	207.67	198.23	188.79
	63651	63650	.7500	3/4"	19.050	3/4"	6"	3"	.015"	-	-	239.88	229.45	219.02	208.59
	63661	63660	.7500	3/4"	19.050	3/4"	6"	3"	.030"	-	-	239.88	229.45	219.02	208.59
	63671	63670	.7500	3/4"	19.050	3/4"	6"	3"	.060"	-	-	239.88	229.45	219.02	208.59
	61490	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-	217.11	207.67	198.23	188.79
	61492	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-	239.88	229.45	219.02	208.59
	61494	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	-	-	-	272.68	260.82	248.97	237.11
	61496	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.030"	-	-	302.54	289.39	276.23	263.08
	63321	63320	.7500	3/4"	19.050	3/4"	6"	1"	.030"	3-1/4"	.730"	250.63	239.73	228.84	217.94
NEW	63323	-	.7500	3/4"	19.050	3/4"	6"	1"	.060"	3-1/4"	.730"	250.63	239.73	228.84	217.94
NEW	63325	-	.7500	3/4"	19.050	3/4"	6"	1"	.090"	3-1/4"	.730"	250.63	239.73	228.84	217.94
NEW	63327	-	.7500	3/4"	19.050	3/4"	6"	1"	.125"	3-1/4"	.730"	250.63	239.73	228.84	217.94
NEW	63329	-	.7500	3/4"	19.050	3/4"	6"	1"	.190"	3-1/4"	.730"	250.63	239.73	228.84	217.94
	61498	-	.7874		20.000	20.0	75	22	-	-	-	182.62	174.68	166.74	158.80
	61500	-	.7874		20.000	20.0	75	22	0.50	-	-	201.50	192.74	183.98	175.22
	27871	27870	.7874		20.000	20.0	75	22	1.00	-	-	201.50	192.74	183.98	175.22
	28871	28870	.7874		20.000	20.0	75	22	BALL	-	-	201.50	192.74	183.98	175.22
	62825	62827	.7874		20.000	20.0	100	38	-	-	-	186.74	178.62	170.50	162.38
	27879	27878	.7874		20.000	20.0	100	38	0.50	-	-	206.05	197.09	188.13	179.17
	61502	-	.7874		20.000	20.0	100	38	0.75	-	-	206.05	197.09	188.13	179.17
	27881	27880	.7874		20.000	20.0	100	38	1.00	-	-	206.05	197.09	188.13	179.17
	27891	27890	.7874		20.000	20.0	100	38	1.50	-	-	206.05	197.09	188.13	179.17
	61504	-	.7874		20.000	20.0	100	38	3.00	-	-	206.05	197.09	188.13	179.17
	28881	28880	.7874		20.000	20.0	100	38	BALL	-	-	206.05	197.09	188.13	179.17
	61506	-	.7874		20.000	20.0	100	42	0.50	-	-	206.05	197.09	188.13	179.17
	61508	-	.7874		20.000	20.0	125	52	0.50	-	-	228.42	218.49	208.56	198.63
	63331	63330	.7874		20.000	20.0	150	25	1.00	82	19.30	263.96	252.48	241.01	229.53
	27911	-	.8661		22.000	22.0	100	38	1.00	-	-	226.34	216.50	206.66	196.82

continued ⟶

Series VRX *(continued)*

.9843" - 1.000"
(25.000mm - 25.400mm)

EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
61510	-	.9843		25.000	25.0	100	26	-	-	-	213.26	203.98	194.71	185.44
61512	-	.9843		25.000	25.0	100	26	0.50	-	-	236.15	225.89	215.62	205.35
62855	62857	.9843		25.000	25.0	100	38	-	-	-	213.26	203.98	194.71	185.44
61514	-	.9843		25.000	25.0	100	38	0.50	-	-	236.15	225.89	215.62	205.35
27941	27940	.9843		25.000	25.0	100	38	1.00	-	-	236.15	225.89	215.62	205.35
27951	-	.9843		25.000	25.0	100	38	1.50	-	-	236.15	225.89	215.62	205.35
61516	-	.9843		25.000	25.0	100	38	3.00	-	-	236.15	225.89	215.62	205.35
28901	28900	.9843		25.000	25.0	100	38	BALL	-	-	236.15	225.89	215.62	205.35
61518	-	.9843		25.000	25.0	100	42	-	-	-	213.26	203.98	194.71	185.44
61520	-	.9843		25.000	25.0	100	42	0.50	-	-	236.15	225.89	215.62	205.35
61522	-	.9843		25.000	25.0	125	50	0.50	-	-	294.83	282.01	269.19	256.37
63351	63350	.9843		25.000	25.0	125	50	1.00	-	-	294.83	282.01	269.19	256.37
63361	63360	.9843		25.000	25.0	150	32	1.00	82	24.40	395.36	378.17	360.98	343.79
61524	-	1.000	1"	25.400	1"	4"	1"	-	-	-	206.49	197.52	188.54	179.56
27959	27958	1.000	1"	25.400	1"	4"	1"	.015"	-	-	248.55	237.74	226.94	216.13
27961	27960	1.000	1"	25.400	1"	4"	1"	.035"	-	-	248.55	237.74	226.94	216.13
-	27962	1.000	1"	25.400	1"	4"	1"	.060"	-	-	248.55	237.74	226.94	216.13
28911	28910	1.000	1"	25.400	1"	4"	1"	BALL	-	-	248.55	237.74	226.94	216.13
62885	62887	1.000	1"	25.400	1"	4"	1-1/2"	-	-	-	206.49	197.52	188.54	179.56
27967	27966	1.000	1"	25.400	1"	4"	1-1/2"	.015"	-	-	248.55	237.74	226.94	216.13
61526	-	1.000	1"	25.400	1"	4"	1-1/2"	.025"	-	-	248.55	237.74	226.94	216.13
27971	27970	1.000	1"	25.400	1"	4"	1-1/2"	.035"	-	-	248.55	237.74	226.94	216.13
27981	27980	1.000	1"	25.400	1"	4"	1-1/2"	.060"	-	-	248.55	237.74	226.94	216.13
27991	-	1.000	1"	25.400	1"	4"	1-1/2"	.090"	-	-	248.55	237.74	226.94	216.13
61528	-	1.000	1"	25.400	1"	4"	1-1/2"	.125"	-	-	248.55	237.74	226.94	216.13
61530	-	1.000	1"	25.400	1"	4"	1-1/2"	.190"	-	-	248.55	237.74	226.94	216.13
61532	-	1.000	1"	25.400	1"	4"	1-1/2"	.250"	-	-	248.55	237.74	226.94	216.13
28916	28915	1.000	1"	25.400	1"	4"	1-1/2"	BALL	-	-	248.55	237.74	226.94	216.13
61534	-	1.000	1"	25.400	1"	4"	1-5/8"	.030"	-	-	248.55	237.74	226.94	216.13
62895	62897	1.000	1"	25.400	1"	4"	1-3/4"	-	-	-	206.49	197.52	188.54	179.56
28001	28000	1.000	1"	25.400	1"	4"	1-3/4"	.015"	-	-	248.55	237.74	226.94	216.13
61536	-	1.000	1"	25.400	1"	4"	1-3/4"	.030"	-	-	248.55	237.74	226.94	216.13
28011	28012	1.000	1"	25.400	1"	4"	1-3/4"	.060"	-	-	248.55	237.74	226.94	216.13
28021	-	1.000	1"	25.400	1"	4"	1-3/4"	.090"	-	-	248.55	237.74	226.94	216.13
61538	-	1.000	1"	25.400	1"	4"	1-3/4"	.125"	-	-	248.55	237.74	226.94	216.13
61540	-	1.000	1"	25.400	1"	4"	1-3/4"	.190"	-	-	248.55	237.74	226.94	216.13
61542	-	1.000	1"	25.400	1"	4"	1-3/4"	.250"	-	-	248.55	237.74	226.94	216.13
62905	62907	1.000	1"	25.400	1"	5"	2"	-	-	-	276.41	264.40	252.38	240.36
63369	63368	1.000	1"	25.400	1"	5"	2"	.015"	-	-	305.81	292.51	279.22	265.92
63371	63370	1.000	1"	25.400	1"	5"	2"	.035"	-	-	305.81	292.51	279.22	265.92
63373	63372	1.000	1"	25.400	1"	5"	2"	.060"	-	-	305.81	292.51	279.22	265.92
63375	63374	1.000	1"	25.400	1"	5"	2"	.090"	-	-	305.81	292.51	279.22	265.92
61544	-	1.000	1"	25.400	1"	5"	2"	.125"	-	-	305.81	292.51	279.22	265.92
61546	-	1.000	1"	25.400	1"	5"	2"	.250"	-	-	305.81	292.51	279.22	265.92
28931	28930	1.000	1"	25.400	1"	5"	2"	BALL	-	-	305.81	292.51	279.22	265.92
61548	-	1.000	1"	25.400	1"	5"	2-1/2"	-	-	-	276.41	264.40	252.38	240.36
61550	-	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-	-	305.81	292.51	279.22	265.92
62915	62917	1.000	1"	25.400	1"	6"	3"	-	-	-	360.04	344.39	328.73	313.08
61552	-	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	-	398.85	381.51	364.17	346.83
61554	-	1.000	1"	25.400	1"	7"	4-1/4"	.030"	-	-	486.71	465.55	444.39	423.23
61556	-	1.000	1"	25.400	1"	7"	4-1/4"	.060"	-	-	486.71	465.55	444.39	423.23
61558	-	1.000	1"	25.400	1"	6"	1-1/4"	.030"	2-5/8"	.980"	413.10	395.14	377.18	359.22
63381	63380	1.000	1"	25.400	1"	6"	1-1/4"	.035"	3-1/4"	.980"	413.10	395.14	377.18	359.22
61560	-	1.000	1"	25.400	1"	6"	1-1/4"	.060"	3-1/4"	.980"	413.10	395.14	377.18	359.22
61562	-	1.000	1"	25.400	1"	7"	1-1/4"	.030"	4-1/4"	.980"	500.96	479.18	457.40	435.62

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

NEW ITEMS

Series VRX-6

.2362" - .4724"
(6.000mm - 12.000mm)

TECH PAGES 264

Recommended for inconel, pH materials, titanium and tool steels >40Rc



Square End, Corner Radius

AlTiN Coating

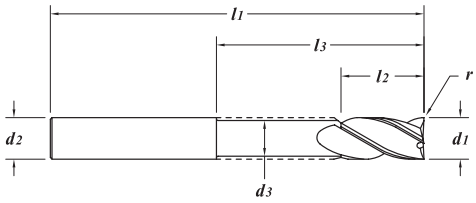
Solid submicron grain carbide end mill - center cutting

6 flutes for better finish and longer tool life

Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

Staggered flute geometry

Recommended for Trochoidal / Dynamic milling



	EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
NEW	60101	.2362		6.000	6.0	65	20	-	-	-	21.60	20.66	19.72	18.78
NEW	60103	.2362		6.000	6.0	65	20	0.50	-	-	26.48	25.33	24.18	23.03
	60100	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	-	20.85	19.94	19.04	18.13
	60102	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-	25.52	24.41	23.30	22.19
	60104	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-	25.52	24.41	23.30	22.19
NEW	60105	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-	25.52	24.41	23.30	22.19
	60106	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-	25.52	24.41	23.30	22.19
	60162	.3150		8.000	8.0	65	22	-	-	-	30.82	29.48	28.14	26.80
NEW	60107	.3150		8.000	8.0	65	22	0.50	-	-	35.83	34.27	32.71	31.16
NEW	60109	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	-	30.03	28.72	27.42	26.11
NEW	60111	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-	36.54	34.95	33.36	31.77
	60108	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-	-	35.09	33.56	32.04	30.51
	60110	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	-	-	40.18	38.43	36.69	34.94
NEW	60113	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	-	-	40.18	38.43	36.69	34.94
	60112	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	-	40.18	38.43	36.69	34.94
	60114	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	-	-	40.18	38.43	36.69	34.94
NEW	60184	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"	-	-	52.88	50.58	48.28	45.98
	60164	.3937		10.000	10.0	70	22	-	-	-	42.08	40.25	38.42	36.59
NEW	60115	.3937		10.000	10.0	70	22	0.50	-	-	48.58	46.47	44.36	42.24
NEW	60117	.3937		10.000	10.0	70	22	1.00	-	-	48.58	46.47	44.36	42.24
NEW	60119	.4724		12.000	12.0	65	20	-	-	-	51.22	48.99	46.77	44.54
NEW	60121	.4724		12.000	12.0	65	20	0.50	-	-	63.68	60.91	58.14	55.37
NEW	60123	.4724		12.000	12.0	75	26	-	-	-	54.65	52.27	49.90	47.52
NEW	60125	.4724		12.000	12.0	75	26	0.75	-	-	71.04	67.95	64.86	61.77
	60166	.4724		12.000	12.0	75	32	-	-	-	54.65	52.27	49.90	47.52
NEW	60127	.4724		12.000	12.0	75	32	0.50	-	-	71.04	67.95	64.86	61.77
NEW	60129	.4724		12.000	12.0	75	32	1.00	-	-	71.04	67.95	64.86	61.77

continued →

Series VRX-6 *(continued)*

.5000" - 1.000"
(12.700mm - 25.400mm)

	EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
NEW	60131	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-	49.12	46.98	44.85	42.71
NEW	60157	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"	-	-	61.07	58.41	55.76	53.10
NEW	60133	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-	61.07	58.41	55.76	53.10
NEW	60159	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-	61.07	58.41	55.76	53.10
NEW	60186	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.125"	-	-	61.07	58.41	55.76	53.10
NEW	60135	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-	52.47	50.19	47.91	45.63
	60116	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-	52.47	50.19	47.91	45.63
	60118	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-	68.16	65.20	62.23	59.27
	60120	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-	68.16	65.20	62.23	59.27
	60122	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-	68.16	65.20	62.23	59.27
	60124	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	68.16	65.20	62.23	59.27
	60126	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-	68.16	65.20	62.23	59.27
	60128	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-	68.16	65.20	62.23	59.27
NEW	60137	.5000	1/2"	12.700	1/2"	4"	1-1/2"	-	-	-	71.01	67.93	64.84	61.75
NEW	60139	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-	80.74	77.23	73.72	70.21
	60130	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	-	71.01	67.93	64.84	61.75
	60132	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.010"	-	-	80.74	77.23	73.72	70.21
	60134	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.020"	-	-	80.74	77.23	73.72	70.21
	60136	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-	80.74	77.23	73.72	70.21
NEW	60141	.6250	5/8"	15.875	5/8"	3"	3/4"	-	-	-	94.08	89.99	85.90	81.81
NEW	60143	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"	-	-	105.46	100.87	96.29	91.70
	60138	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-	96.83	92.62	88.41	84.20
	60140	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-	108.40	103.69	98.97	94.26
NEW	60145	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-	108.40	103.69	98.97	94.26
	60142	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-	108.40	103.69	98.97	94.26
	60144	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-	108.40	103.69	98.97	94.26
	60146	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.125"	-	-	108.40	103.69	98.97	94.26
	60148	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-	103.41	98.91	94.42	89.92
	60150	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-	115.76	110.73	105.69	100.66
	60168	.6299		16.000	16.0	88	32	-	-	-	101.02	96.62	92.23	87.84
NEW	60170	.6299		16.000	16.0	88	32	0.50	-	-	113.03	108.12	103.20	98.29
NEW	60174	.6299		16.000	16.0	100	40	-	-	-	107.41	102.74	98.07	93.40
NEW	60176	.6299		16.000	16.0	100	40	0.50	-	-	120.19	114.96	109.74	104.51
NEW	60180	.6299		16.000	16.0	100	32	-	50	14.50	117.59	112.48	107.36	102.25
NEW	60182	.6299		16.000	16.0	100	32	0.50	50	14.50	130.36	124.69	119.02	113.36
	60152	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-	138.22	132.21	126.20	120.19
	60154	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-	155.12	148.38	141.63	134.89
NEW	60147	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.020"	-	-	155.12	148.38	141.63	134.89
	60156	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-	155.12	148.38	141.63	134.89
	60158	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-	155.12	148.38	141.63	134.89
	60160	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.125"	-	-	155.12	148.38	141.63	134.89
NEW	60149	.7500	3/4"	19.050	3/4"	6"	3"	-	-	-	217.11	207.67	198.23	188.79
NEW	60151	.7500	3/4"	19.050	3/4"	6"	3"	.030"	-	-	252.52	241.54	230.56	219.58
NEW	60153	1.000	1"	25.400	1"	6"	3"	.030"	-	-	419.84	401.59	383.33	365.08
NEW	60155	1.000	1"	25.400	1"	7"	1-1/4"	-	4-1/8"	.980"	453.36	433.65	413.94	394.23

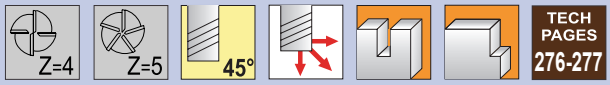
MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

HIGH ROCKWELL END MILLS

Series 545MA



Recommended for inconel, tool steels, hardened die mold >40Rc



Square End

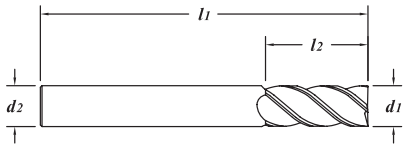
AlTiN Coating

Solid submicron grain carbide end mill - center cutting

High performance tool for use in high Rockwell and difficult to machine materials

Corner Radius - page 176

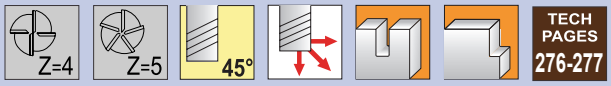
Ball End - page 177



EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	Number of Flutes	1-11	12-24	25-49	50-100
21200	.1181		3.000	3.0	38	12	4	15.03	14.38	13.72	13.07
21230	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	4	14.28	13.66	13.04	12.42
21260	.1575		4.000	6.0	50	12	4	24.29	23.23	22.18	21.12
21290	.1875	3/16"	4.763	3/16"	2"	9/16"	4	17.95	17.17	16.39	15.61
21320	.1969		5.000	6.0	65	15	4	26.60	25.44	24.29	23.13
21350	.2362		6.000	6.0	65	19	4	25.79	24.67	23.55	22.43
21380	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	4	24.86	23.78	22.70	21.62
21410	.2756		7.000	8.0	65	22	5	38.95	37.26	35.56	33.87
21440	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	5	33.75	32.29	30.82	29.35
21470	.3150		8.000	8.0	65	22	5	35.48	33.94	32.39	30.85
21500	.3543		9.000	10.0	65	22	5	52.12	49.85	47.59	45.32
21530	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	5	39.12	37.42	35.72	34.02
21560	.3937		10.000	10.0	70	22	5	47.22	45.17	43.11	41.06
21620	.4724		12.000	12.0	75	32	5	69.23	66.22	63.21	60.20
21660	.5000	1/2"	12.700	1/2"	3"	1-1/4"	5	65.83	62.96	60.10	57.24
21710	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	5	104.51	99.97	95.42	90.88
21740	.6299		16.000	16.0	88	32	5	109.92	105.14	100.36	95.58
21800	.7500	3/4"	19.050	3/4"	4"	1-1/2"	5	149.70	143.19	136.68	130.17
21830	.7874		20.000	20.0	100	38	5	211.62	202.42	193.22	184.02
21890	.9843		25.000	25.0	100	38	5	264.59	253.09	241.58	230.08
21920	1.000	1"	25.400	1"	4"	1-1/2"	5	255.82	244.70	233.57	222.45

Series 545RA

HIGH ROCKWELL END MILLS



TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

Recommended for inconel, tool steels, hardened die mold >40Rc

Corner Radius

AlTiN Coating

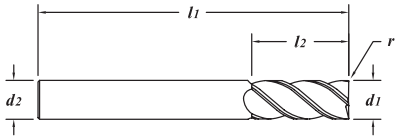
Solid submicron grain carbide end mill - center cutting

High performance tool for use in high Rockwell and difficult to machine materials

Square End - page 175

Ball End - page 177





EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	Number of Flutes	1-11	12-24	25-49	50-100
21202	.1181		3.000	3.0	38	12	0.20	4	16.41	15.70	14.98	14.27
21212	.1181		3.000	3.0	38	12	0.50	4	16.41	15.70	14.98	14.27
21232	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	4	15.59	14.92	14.24	13.56
21242	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	4	15.59	14.92	14.24	13.56
21262	.1575		4.000	6.0	50	12	0.30	4	26.46	25.31	24.16	23.01
21292	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	4	19.60	18.74	17.89	17.04
21302	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	4	19.60	18.74	17.89	17.04
21322	.1969		5.000	6.0	65	15	0.30	4	28.87	27.61	26.36	25.10
21342	.2362		6.000	6.0	65	19	0.20	4	27.96	26.74	25.53	24.31
21352	.2362		6.000	6.0	65	19	0.50	4	27.96	26.74	25.53	24.31
21372	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	4	26.93	25.76	24.59	23.42
21382	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	4	26.93	25.76	24.59	23.42
21392	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	4	26.93	25.76	24.59	23.42
21412	.2756		7.000	8.0	65	22	0.50	5	42.24	40.40	38.57	36.73
21432	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.010"	5	36.47	34.88	33.30	31.71
21442	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.015"	5	36.47	34.88	33.30	31.71
21452	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	5	36.47	34.88	33.30	31.71
21462	.3150		8.000	8.0	65	22	0.20	5	38.39	36.72	35.05	33.38
21472	.3150		8.000	8.0	65	22	0.50	5	38.39	36.72	35.05	33.38
21502	.3543		9.000	10.0	65	22	0.50	5	56.73	54.26	51.80	49.33
21522	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	5	42.44	40.59	38.75	36.90
21532	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	5	42.44	40.59	38.75	36.90
21542	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	5	42.44	40.59	38.75	36.90
21552	.3937		10.000	10.0	70	22	0.20	5	51.27	49.04	46.81	44.58
21562	.3937		10.000	10.0	70	22	0.50	5	51.27	49.04	46.81	44.58
21612	.4724		12.000	12.0	75	32	0.50	5	75.74	72.45	69.15	65.86
21622	.4724		12.000	12.0	75	32	1.00	5	75.74	72.45	69.15	65.86
21642	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	5	71.94	68.82	65.69	62.56
21652	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	5	71.94	68.82	65.69	62.56
21662	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	5	71.94	68.82	65.69	62.56
21672	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	5	71.94	68.82	65.69	62.56
21692	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	5	114.43	109.45	104.48	99.50
21702	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	5	114.43	109.45	104.48	99.50
21712	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	5	114.43	109.45	104.48	99.50
21722	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	5	114.43	109.45	104.48	99.50
21732	.6299		16.000	16.0	88	32	0.50	5	120.45	115.21	109.98	104.74
21742	.6299		16.000	16.0	88	32	1.00	5	120.45	115.21	109.98	104.74
21772	.7087		18.000	18.0	100	38	0.50	5	171.90	164.43	156.95	149.48
21802	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	5	164.50	157.34	150.19	143.04
21812	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	5	164.50	157.34	150.19	143.04
21822	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	5	164.50	157.34	150.19	143.04
21832	.7874		20.000	20.0	100	38	0.50	5	232.55	222.44	212.33	202.22
21922	1.000	1"	25.400	1"	4"	1-1/2"	.015"	5	281.13	268.91	256.68	244.46
21932	1.000	1"	25.400	1"	4"	1-1/2"	.030"	5	281.13	268.91	256.68	244.46
21942	1.000	1"	25.400	1"	4"	1-1/2"	.060"	5	281.13	268.91	256.68	244.46

MATERIAL HARDNESS (Rc)

70

35

0

GARR TOOL®

† Metric equivalents are for reference only

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

HIGH ROCKWELL END MILLS

Series 545BA

Z=4 | Z=5 | 45° | TECH PAGES 276-277

Recommended for inconel, tool steels, hardened die mold >40Rc



Ball End

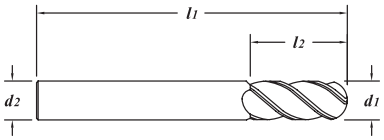
AlTiN Coating

Solid submicron grain carbide end mill - center cutting

High performance tool for use in high Rockwell and difficult to machine materials

Square End - page 175

Corner Radius - page 176



EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	Number of Flutes	1-11	12-24	25-49	50-100
21204	.1181		3.000	3.0	38	12	4	16.41	15.70	14.98	14.27
21234	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	4	15.59	14.92	14.24	13.56
21264	.1575		4.000	6.0	50	12	4	26.46	25.31	24.16	23.01
21294	.1875	3/16"	4.763	3/16"	2"	9/16"	4	19.60	18.74	17.89	17.04
21324	.1969		5.000	6.0	65	15	4	28.87	27.61	26.36	25.10
21354	.2362		6.000	6.0	65	19	4	27.96	26.74	25.53	24.31
21384	.2500	1/4"	6.353	1/4"	2-1/2"	3/4"	4	26.93	25.76	24.59	23.42
21414	.2756		7.000	8.0	65	22	5	42.24	40.40	38.57	36.73
21444	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	5	36.47	34.88	33.30	31.71
21474	.3150		8.000	8.0	65	22	5	38.39	36.72	35.05	33.38
21504	.3543		9.000	10.0	65	22	5	56.73	54.26	51.80	49.33
21534	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	5	42.44	40.59	38.75	36.90
21564	.3937		10.000	10.0	70	22	5	51.27	49.04	46.81	44.58
21624	.4724		12.000	12.0	75	32	5	75.74	72.45	69.15	65.86
21664	.5000	1/2"	12.700	1/2"	3"	1-1/4"	5	71.94	68.82	65.69	62.56
21714	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	5	114.43	109.45	104.48	99.50
21744	.6299		16.000	16.0	88	32	5	120.45	115.21	109.98	104.74
21774	.7087		18.000	18.0	100	38	5	171.90	164.43	156.95	149.48
21804	.7500	3/4"	19.050	3/4"	4"	1-1/2"	5	164.50	157.34	150.19	143.04
21924	1.000	1"	25.400	1"	4"	1-1/2"	5	281.13	268.91	256.68	244.46

Series H-45

HIGH FEED END MILLS

Z=4 | 45° | TECH PAGES 280

TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

Recommended for die mold applications

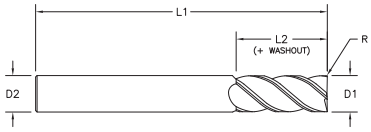
Corner Radius

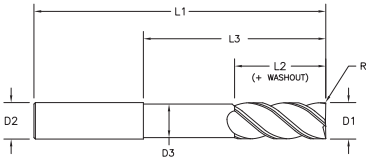
AlTiN Coating

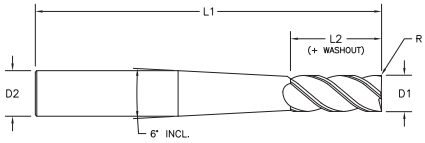
Solid submicron grain carbide end mill - center cutting
For light axial / radial depths of cut
Rigid work holding, machine stability and part integrity are critical!
Recommended for high Rockwell materials
Modified reach lengths available within 48 hours



* - tool has 3° blend angle to shank
* - tool has reduced diameter shank







MATERIAL HARDNESS (Rc): 70 – 35 – 0

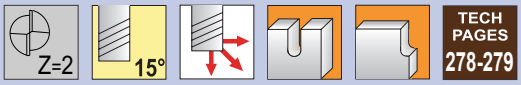
	EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
	48300	.1181		3.000	6.0	65	3	0.75	15.0	2.80	37.15	35.53	33.92	32.30
	48305	.1250	1/8"	3.175	1/8"	3"	1/8"	.015"	-	-	28.06	26.84	25.62	24.40
	48310	.1250	1/8"	3.175	1/8"	3"	1/8"	.030"	-	-	28.06	26.84	25.62	24.40
	48315	.1250	1/8"	3.175	3/16"	2-1/2"	1/8"	.010"	3/4"	.115"	32.97	31.54	30.10	28.67
	48320	.1250	1/8"	3.175	3/16"	2-1/2"	1/8"	.015"	3/4"	.115"	32.97	31.54	30.10	28.67
	48325	.1250	1/8"	3.175	3/16"	2-1/2"	1/8"	.020"	3/4"	.115"	32.97	31.54	30.10	28.67
*	48330	.1250	1/8"	3.175	3/16"	3"	1/8"	.030"	*	-	30.08	28.78	27.47	26.16
	48335	.1575		4.000	6.0	65	4	1.00	20.0	3.70	35.66	34.11	32.56	31.01
	48340	.1875	3/16"	4.763	3/16"	3"	3/16"	.015"	-	-	32.36	30.95	29.55	28.14
	48345	.1875	3/16"	4.763	3/16"	3"	3/16"	.030"	-	-	32.36	30.95	29.55	28.14
	48350	.1875	3/16"	4.763	3/16"	3"	3/16"	.060"	-	-	32.36	30.95	29.55	28.14
	48355	.1875	3/16"	4.763	1/4"	2-1/2"	3/16"	.020"	7/8"	.175"	34.64	33.13	31.63	30.12
	48360	.1875	3/16"	4.763	1/4"	2-1/2"	3/16"	.030"	7/8"	.175"	34.64	33.13	31.63	30.12
	48365	.1875	3/16"	4.763	1/4"	2-1/2"	3/16"	.060"	7/8"	.175"	34.64	33.13	31.63	30.12
	48370	.1875	3/16"	4.763	1/4"	4"	3/16"	.020"	1-1/2"	.175"	50.07	47.89	45.72	43.54
	48375	.1875	3/16"	4.763	1/4"	4"	3/16"	.030"	1-1/2"	.175"	50.07	47.89	45.72	43.54
*	48380	.1875	3/16"	4.763	1/4"	4"	3/16"	.030"	*	-	50.07	47.89	45.72	43.54
*	48385	.1969		5.000	6.0	100	5	1.20	* 10.0	5.00	51.90	49.64	47.39	45.13
	48390	.2362		6.000	6.0	100	6	1.50	30.0	5.70	49.23	47.09	44.95	42.81
	48395	.2500	1/4"	6.350	1/4"	3"	1/4"	.015"	-	-	37.40	35.77	34.15	32.52
	48400	.2500	1/4"	6.350	1/4"	3"	1/4"	.030"	-	-	37.40	35.77	34.15	32.52
	48405	.2500	1/4"	6.350	1/4"	3"	1/4"	.060"	-	-	37.40	35.77	34.15	32.52
*	48410	.2756		7.000	6.0	100	7	1.50	*	-	77.89	74.50	71.12	67.73
	48415	.3125	5/16"	7.938	5/16"	2-1/2"	5/16"	.020"	-	-	34.55	33.04	31.54	30.04
	48420	.3125	5/16"	7.938	5/16"	3"	5/16"	.078"	1-5/8"	.300"	55.13	52.73	50.34	47.94
	48425	.3125	5/16"	7.938	5/16"	3"	5/16"	.094"	1-5/8"	.300"	55.13	52.73	50.34	47.94
	48430	.3150		8.000	8.0	75	8	2.00	-	-	49.63	47.48	45.32	43.16
	48435	.3150		8.000	8.0	100	8	2.00	40.0	7.70	64.38	61.58	58.78	55.98
	48440	.3750	3/8"	9.525	3/8"	3"	3/8"	.015"	-	-	52.44	50.16	47.88	45.60
	48445	.3750	3/8"	9.525	3/8"	3"	3/8"	.030"	-	-	52.44	50.16	47.88	45.60
	48450	.3750	3/8"	9.525	3/8"	3"	3/8"	.060"	-	-	52.44	50.16	47.88	45.60
	48455	.3750	3/8"	9.525	3/8"	3"	3/8"	.094"	2.00"	.365"	59.93	57.32	54.72	52.11
	48460	.3750	3/8"	9.525	3/8"	4"	3/8"	.030"	2-1/2"	.365"	66.70	63.80	60.90	58.00
	48465	.3750	3/8"	9.525	3/8"	4"	3/8"	.094"	2-1/2"	.365"	66.70	63.80	60.90	58.00
	48470	.3937		10.000	10.0	100	10	2.00	50.0	9.70	82.35	78.77	75.19	71.61
	48475	.4724		12.000	12.0	100	12	3.00	60.0	11.70	91.46	87.48	83.51	79.53
	48480	.5000	1/2"	12.700	1/2"	3"	1/2"	.015"	-	-	68.16	65.20	62.23	59.27
	48485	.5000	1/2"	12.700	1/2"	3"	1/2"	.030"	-	-	68.16	65.20	62.23	59.27
	48490	.5000	1/2"	12.700	1/2"	3"	1/2"	.060"	-	-	68.16	65.20	62.23	59.27
	48495	.5000	1/2"	12.700	1/2"	3"	1/2"	.125"	-	-	68.16	65.20	62.23	59.27
	48500	.5000	1/2"	12.700	1/2"	4"	1/2"	.125"	-	-	80.74	77.23	73.72	70.21

† *Metric equivalents are for reference only*

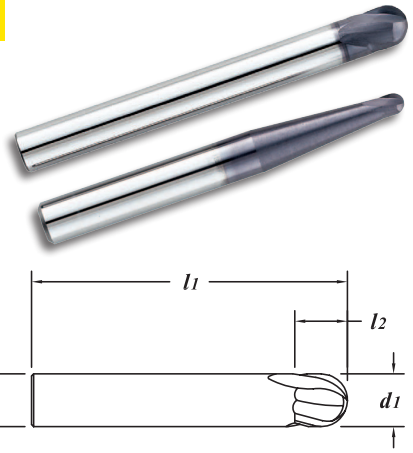
TOLERANCES	
d_1	+.000" –.001" (+.000 –.025mm)
d_2	h6
ball radius	+.0000" –.0005" (+.0000 –.0127mm)

DIE MOLD CUTTERS

Series 350MX, 950MX



Recommended for die mold applications



Die Mold Cutter - Ball End

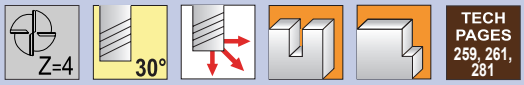
AlTiN Coating

Solid submicron grain carbide end mill - center cutting
High performance machining in the die mold industry
Rigid work holding, machine stability and part integrity are critical!
≤5mm (.1969") diameter have 5° taper to shank
Recommended for high Rockwell materials
Can be modified with a neck in 48 hours

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
14210	.0312	1/32"	0.792	1/4"	3"	1/32"	58.04	55.52	52.99	50.47
15210	.0394		1.000	6.0	75	1	58.04	55.52	52.99	50.47
15220	.0591		1.500	6.0	75	1.5	58.04	55.52	52.99	50.47
14220	.0625	1/16"	1.588	1/4"	3"	1/16"	58.04	55.52	52.99	50.47
15230	.0787		2.000	6.0	75	2	58.04	55.52	52.99	50.47
14230	.0938	3/32"	2.383	1/4"	3"	3/32"	58.04	55.52	52.99	50.47
15240	.1181		3.000	6.0	75	3	56.72	54.25	51.79	49.32
14240	.1250	1/8"	3.175	1/4"	3"	1/8"	56.72	54.25	51.79	49.32
15250	.1575		4.000	6.0	75	4	55.89	53.46	51.03	48.60
14250	.1875	3/16"	4.763	1/4"	3"	3/16"	55.89	53.46	51.03	48.60
15260	.1969		5.000	6.0	75	5	55.89	53.46	51.03	48.60
15270	.2362		6.000	6.0	75	6	54.73	52.35	49.97	47.59
14260	.2500	1/4"	6.350	1/4"	3"	1/4"	54.73	52.35	49.97	47.59
14270	.3125	5/16"	7.938	5/16"	4"	5/16"	67.02	64.11	61.19	58.28
15280	.3150		8.000	8.0	100	8	67.02	64.11	61.19	58.28
14280	.3750	3/8"	9.525	3/8"	4"	3/8"	74.15	70.93	67.70	64.48
15290	.3937		10.000	10.0	100	10	80.22	76.74	73.25	69.76
15300	.4724		12.000	12.0	100	12	97.16	92.94	88.71	84.49
14290	.5000	1/2"	12.700	1/2"	4"	1/2"	108.20	103.50	98.79	94.09

Series 210D

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



Recommended for graphite, fiber-reinforced plastics, carbon fiber

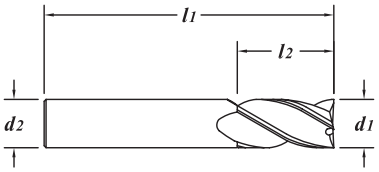
Square End

Diamond Coating

Solid grade C-2 carbide end mill - center cutting

Crystalline diamond coating





EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
10018	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"	70.44	67.38	64.31	61.25
46018	.0394		1.000	3.0	38	4	74.14	70.92	67.69	64.47
10028	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"	70.44	67.38	64.31	61.25
46028	.0591		1.500	3.0	38	6	74.14	70.92	67.69	64.47
10038	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	68.20	65.23	62.27	59.30
46038	.0787		2.000	3.0	38	8	71.79	68.67	65.55	62.43
10058	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	66.99	64.08	61.16	58.25
46058	.1181		3.000	3.0	38	12	66.63	63.73	60.84	57.94
10078	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	63.28	60.53	57.78	55.03
46078	.1575		4.000	4.0	50	14	106.48	101.85	97.22	92.59
10118	.1875	3/16"	4.763	3/16"	2"	5/8"	101.15	96.76	92.36	87.96
46098	.1969		5.000	5.0	50	16	122.73	117.39	112.06	106.72
46108	.2362		6.000	6.0	65	20	125.17	119.72	114.28	108.84
10158	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	118.90	113.73	108.56	103.39
10198	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	142.26	136.07	129.89	123.70
46128	.3150		8.000	8.0	65	20	167.92	160.62	153.32	146.02
10238	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	159.41	152.48	145.55	138.62
46148	.3937		10.000	10.0	70	25	185.98	177.89	169.81	161.72
46168	.4724		12.000	12.0	75	25	203.88	195.02	186.15	177.29
10318	.5000	1/2"	12.700	1/2"	3"	1"	193.68	185.26	176.84	168.42
13338	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	279.92	267.75	255.58	243.41
46188	.6299		16.000	16.0	88	32	340.84	326.02	311.20	296.38
13358	.7500	3/4"	19.050	3/4"	4"	1-1/2"	529.61	506.58	483.56	460.53
13378	1.000	1"	25.400	1"	4"	1-1/2"	832.07	795.89	759.72	723.54

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)



Recommended for graphite, fiber-reinforced plastics, carbon fiber



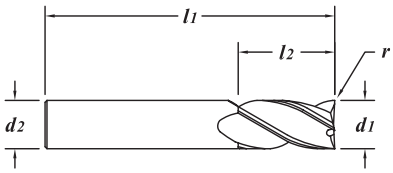
Corner Radius

Diamond Coating

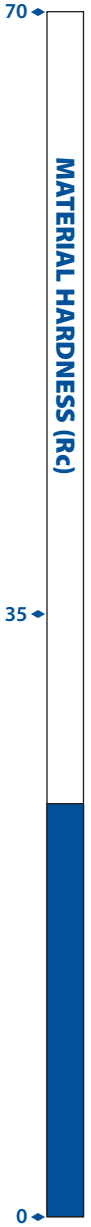
Solid grade C-2 carbide end mill - center cutting

Crystalline diamond coating

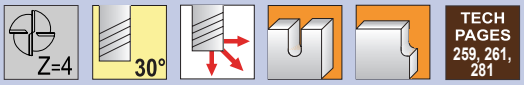
For stronger corners and part radius



EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
24118	.1181		3.000	3.0	38	12	0.50	92.31	88.30	84.28	80.27
80018	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"	87.69	83.88	80.06	76.25
80028	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	87.69	83.88	80.06	76.25
24148	.1575		4.000	4.0	50	14	0.30	133.39	127.59	121.79	115.99
24158	.1575		4.000	4.0	50	14	0.50	133.39	127.59	121.79	115.99
80058	.1875	3/16"	4.763	3/16"	2"	5/8"	.015"	126.73	121.22	115.71	110.20
80068	.1875	3/16"	4.763	3/16"	2"	5/8"	.020"	126.73	121.22	115.71	110.20
24178	.2362		6.000	6.0	65	20	0.50	142.34	136.15	129.96	123.77
24208	.2362		6.000	6.0	65	20	1.50	142.34	136.15	129.96	123.77
80108	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	135.23	129.35	123.47	117.59
80118	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	135.23	129.35	123.47	117.59
80128	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	135.23	129.35	123.47	117.59
24248	.3150		8.000	8.0	65	20	1.00	178.50	170.74	162.98	155.22
80248	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	170.07	162.68	155.28	147.89
80258	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	170.07	162.68	155.28	147.89
24318	.3937		10.000	10.0	70	25	1.00	198.27	189.65	181.03	172.41
24378	.4724		12.000	12.0	75	25	0.50	218.03	208.55	199.07	189.59
24398	.4724		12.000	12.0	75	25	1.00	218.03	208.55	199.07	189.59
80328	.5000	1/2"	12.700	1/2"	3"	1"	.030"	207.13	198.12	189.12	180.11
80348	.5000	1/2"	12.700	1/2"	3"	1"	.060"	207.13	198.12	189.12	180.11



Series 310D



TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

Recommended for graphite, fiber-reinforced plastics, carbon fiber

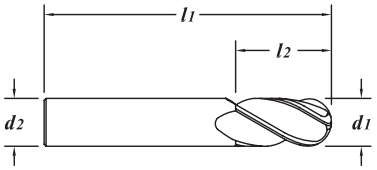
Ball End

Diamond Coating

Solid grade C-2 carbide end mill - center cutting

Crystalline diamond coating





MATERIAL HARDNESS (Rc)

70

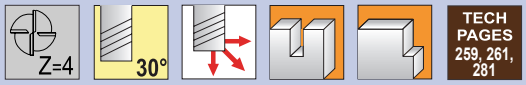
35

0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
15018	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"	95.23	91.09	86.95	82.81
48018	.0394		1.000	3.0	38	4	100.25	95.89	91.53	87.17
15028	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"	95.23	91.09	86.95	82.81
48028	.0591		1.500	3.0	38	6	100.25	95.89	91.53	87.17
15038	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	93.00	88.96	84.91	80.87
48038	.0787		2.000	3.0	38	8	97.88	93.62	89.37	85.11
15058	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	91.38	87.41	83.43	79.46
48058	.1181		3.000	3.0	38	12	92.31	88.30	84.28	80.27
15078	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	87.69	83.88	80.06	76.25
48078	.1575		4.000	4.0	50	14	133.39	127.59	121.79	115.99
15118	.1875	3/16"	4.763	3/16"	2"	5/8"	126.73	121.22	115.71	110.20
48098	.1969		5.000	5.0	50	16	139.38	133.32	127.26	121.20
48108	.2362		6.000	6.0	65	20	142.34	136.15	129.96	123.77
15158	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	135.23	129.35	123.47	117.59
15198	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	152.31	145.68	139.06	132.44
48128	.3150		8.000	8.0	65	20	178.50	170.74	162.98	155.22
15238	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	170.07	162.68	155.28	147.89
48168	.4724		12.000	12.0	75	25	218.03	208.55	199.07	189.59
15318	.5000	1/2"	12.700	1/2"	3"	1"	207.13	198.12	189.12	180.11
18358	.7500	3/4"	19.050	3/4"	4"	1-1/2"	543.11	519.50	495.88	472.27
48208	.7874		20.000	20.0	100	38	690.68	660.65	630.62	600.59

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



Recommended for graphite, fiber-reinforced plastics, carbon fiber

Extra Length - Square End

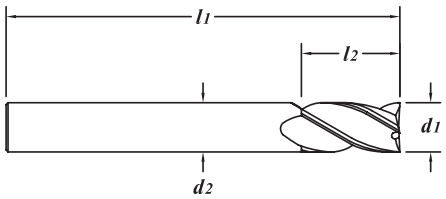
Diamond Coating

Solid grade C-2 carbide end mill - center cutting

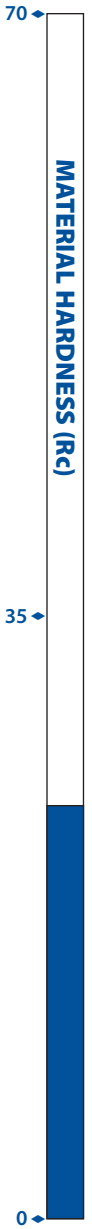
Crystalline diamond coating

Can be modified with a neck in 48 hours

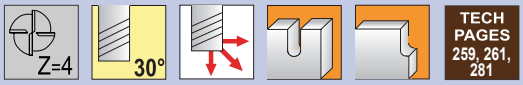




EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
94028	.1181		3.000	3.0	75	20	102.10	97.66	93.22	88.78
38038	.1250	1/8"	3.175	1/8"	3"	1"	97.00	92.79	88.57	84.35
94068	.1575		4.000	4.0	75	25	136.61	130.67	124.73	118.79
38048	.1875	3/16"	4.763	3/16"	4"	1"	129.77	124.12	118.48	112.84
38058	.2500	1/4"	6.350	1/4"	3"	1"	139.04	132.99	126.95	120.90
38068	.2500	1/4"	6.350	1/4"	4"	1"	144.39	138.12	131.84	125.56
38078	.2500	1/4"	6.350	1/4"	6"	1-1/2"	165.26	158.07	150.89	143.70
38098	.3125	5/16"	7.938	5/16"	4"	1"	169.28	161.92	154.56	147.20
94168	.3150		8.000	8.0	100	25	202.48	193.68	184.87	176.07
38128	.3750	3/8"	9.525	3/8"	4"	1"	188.51	180.31	172.12	163.92
38138	.3750	3/8"	9.525	3/8"	6"	1-1/2"	208.33	199.28	190.22	181.16
94208	.3937		10.000	10.0	100	25	226.06	216.23	206.40	196.57
94248	.4724		12.000	12.0	100	25	249.62	238.77	227.91	217.06
38168	.5000	1/2"	12.700	1/2"	4"	1"	237.15	226.84	216.53	206.22
38178	.5000	1/2"	12.700	1/2"	4"	2"	237.15	226.84	216.53	206.22



Series 710D



TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

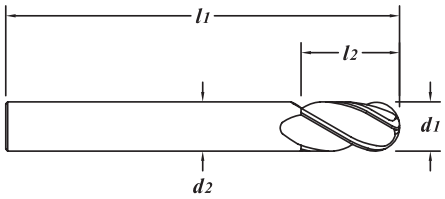
Recommended for graphite, fiber-reinforced plastics, carbon fiber

Extra Length - Ball End

Diamond Coating

Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating
Can be modified with a neck in 48 hours





EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
99028	.1181		3.000	3.0	75	20	124.69	119.27	113.85	108.43
40038	.1250	1/8"	3.175	1/8"	3"	1"	118.47	113.32	108.17	103.02
99068	.1575		4.000	4.0	75	25	155.15	148.40	141.66	134.91
40048	.1875	3/16"	4.763	3/16"	4"	1"	147.38	140.98	134.57	128.16
99108	.2362		6.000	6.0	100	25	170.52	163.11	155.69	148.28
99128	.2362		6.000	6.0	150	38	189.34	181.10	172.87	164.64
40058	.2500	1/4"	6.350	1/4"	3"	1"	156.65	149.84	143.03	136.22
40068	.2500	1/4"	6.350	1/4"	4"	1"	162.01	154.97	147.92	140.88
40078	.2500	1/4"	6.350	1/4"	6"	1-1/2"	179.87	172.05	164.23	156.41
40098	.3125	5/16"	7.938	5/16"	4"	1"	186.90	178.77	170.65	162.52
99168	.3150		8.000	8.0	100	25	217.83	208.36	198.89	189.42
40128	.3750	3/8"	9.525	3/8"	4"	1"	206.14	197.18	188.21	179.25
40138	.3750	3/8"	9.525	3/8"	6"	1-1/2"	218.10	208.62	199.13	189.65
99208	.3937		10.000	10.0	100	25	241.42	230.92	220.43	209.93
40168	.5000	1/2"	12.700	1/2"	4"	1"	251.77	240.82	229.88	218.93
40178	.5000	1/2"	12.700	1/2"	4"	2"	251.77	240.82	229.88	218.93

† *Metric equivalents are for reference only*

TOLERANCES

d_1	≤ .030"	+.000" –.001" (+.000 –.025mm)
	≥ 1/32"	+.000" –.002" (+.000 –.050mm)
d_2	h6	









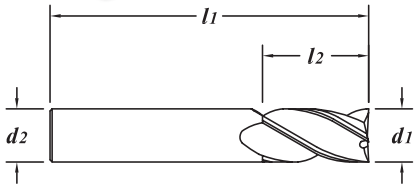

TECH PAGES 258,260

.0050" - .0787"
(0.127mm - 2.000mm)

Stub Length - Square End

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
TiALN Coated - page 187
Standard Length - page 194
Extended length - page 220





(160M/860M) 2 Flute EDP#	(170M/870M) 4 Flute EDP#	Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
01200	-	.0050	.0050"	0.127	1/8"	1-1/2"	.008"	22.34	21.37	20.40	19.43
01210	-	.0060	.0060"	0.152	1/8"	1-1/2"	.009"	22.34	21.37	20.40	19.43
01220	-	.0070	.0070"	0.178	1/8"	1-1/2"	.011"	21.02	20.11	19.19	18.28
01250	-	.0100	.0100"	0.254	1/8"	1-1/2"	.015"	19.84	18.98	18.11	17.25
01270	-	.0120	.0120"	0.305	1/8"	1-1/2"	.018"	18.37	17.57	16.77	15.97
01280	-	.0130	.0130"	0.330	1/8"	1-1/2"	.020"	18.27	17.48	16.68	15.89
01290	-	.0140	.0140"	0.356	1/8"	1-1/2"	.021"	18.27	17.48	16.68	15.89
01300	-	.0150	.0150"	0.381	1/8"	1-1/2"	.023"	18.27	17.48	16.68	15.89
01310	-	.0160	.0160"	0.406	1/8"	1-1/2"	.024"	18.03	17.25	16.46	15.68
01320	-	.0170	.0170"	0.432	1/8"	1-1/2"	.026"	18.03	17.25	16.46	15.68
01330	-	.0180	.0180"	0.457	1/8"	1-1/2"	.027"	17.69	16.92	16.15	15.38
01340	-	.0190	.0190"	0.483	1/8"	1-1/2"	.029"	17.69	16.92	16.15	15.38
01350	-	.0200	.0200"	0.508	1/8"	1-1/2"	.030"	17.69	16.92	16.15	15.38
01360	-	.0210	.0210"	0.533	1/8"	1-1/2"	.032"	17.69	16.92	16.15	15.38
01370	-	.0220	.0220"	0.559	1/8"	1-1/2"	.033"	17.48	16.72	15.96	15.20
01380	-	.0230	.0230"	0.584	1/8"	1-1/2"	.035"	17.48	16.72	15.96	15.20
01390	-	.0240	.0240"	0.610	1/8"	1-1/2"	.036"	17.48	16.72	15.96	15.20
01400	-	.0250	.0250"	0.635	1/8"	1-1/2"	.038"	16.49	15.77	15.06	14.34
01410	-	.0260	.0260"	0.660	1/8"	1-1/2"	.039"	16.49	15.77	15.06	14.34
01420	-	.0270	.0270"	0.686	1/8"	1-1/2"	.041"	14.79	14.15	13.50	12.86
01430	-	.0280	.0280"	0.711	1/8"	1-1/2"	.042"	14.79	14.15	13.50	12.86
01440	-	.0290	.0290"	0.737	1/8"	1-1/2"	.044"	14.79	14.15	13.50	12.86
01450	-	.0300	.0300"	0.762	1/8"	1-1/2"	.045"	14.79	14.15	13.50	12.86
01010	02010	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"	10.76	10.30	9.83	9.36
01510	02510	.0394		1.000	3.0	38	2	11.30	10.81	10.32	9.83
01020	02020	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"	10.76	10.30	9.83	9.36
01520	02520	.0591		1.500	3.0	38	3	11.30	10.81	10.32	9.83
01030	02030	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	8.53	8.16	7.79	7.42
01530	02530	.0787		2.000	3.0	38	4	8.98	8.59	8.20	7.81

continued ⟶

Series 160M, 170M, 860M, 870M *(continued)*

.0938" - 1.000"
(2.383mm - 25.400mm)

(160M/860M) 2 Flute EDP#	(170M/870M) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
01040	02040	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	8.07	7.72	7.37	7.02
01540	02540	.0984		2.500	3.0	38	5	8.50	8.13	7.76	7.39
01550	02550	.1181		3.000	3.0	38	6	8.29	7.93	7.57	7.21
01050	02050	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	7.87	7.52	7.18	6.84
01560	02560	.1378		3.500	4.0	50	7	11.60	11.10	10.59	10.09
01060	02060	.1562	5/32"	3.967	3/16"	2"	5/16"	11.04	10.56	10.08	9.60
01570	02570	.1575		4.000	4.0	50	8	10.97	10.49	10.02	9.54
01580	02580	.1772		4.500	5.0	50	9.5	14.56	13.93	13.29	12.66
01070	02070	.1875	3/16"	4.763	3/16"	2"	3/8"	10.44	9.99	9.53	9.08
01590	02590	.1969		5.000	5.0	50	10	13.58	12.99	12.40	11.81
01080	02080	.2188	7/32"	5.558	1/4"	2"	7/16"	13.85	13.24	12.64	12.04
01600	02600	.2362		6.000	6.0	50	12	14.39	13.76	13.14	12.51
01090	02090	.2500	1/4"	6.350	1/4"	2"	1/2"	13.65	13.06	12.46	11.87
01610	02610	.2756		7.000	7.0	50	12	18.70	17.89	17.07	16.26
01100	02100	.3125	5/16"	7.938	5/16"	2"	1/2"	18.68	17.86	17.05	16.24
01620	02620	.3150		8.000	8.0	50	12	19.63	18.78	17.92	17.07
01630	02630	.3543		9.000	9.0	50	14	24.25	23.20	22.14	21.09
01110	02110	.3750	3/8"	9.525	3/8"	2"	5/8"	23.07	22.07	21.06	20.06
01640	02640	.3937		10.000	10.0	50	16	26.81	25.64	24.48	23.31
01650	02650	.4331		11.000	11.0	65	19	31.33	29.96	28.60	27.24
01120	02120	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	28.52	27.28	26.04	24.80
01660	02660	.4724		12.000	12.0	65	19	40.03	38.29	36.55	34.81
01130	02130	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	38.04	36.39	34.73	33.08
01140	02140	.6250	5/8"	15.875	5/8"	3"	3/4"	72.70	69.54	66.38	63.22
01670	02670	.6299		16.000	16.0	75	19	76.52	73.19	69.87	66.54
01150	02150	.7500	3/4"	19.050	3/4"	3"	1"	104.57	100.02	95.48	90.93
-	02680	.7874		20.000	20.0	75	25	141.82	135.65	129.49	123.32
-	02160	1.000	1"	25.400	1"	3"	1"	179.94	172.12	164.29	156.47

MATERIAL HARDNESS (Rc)
70
35
0

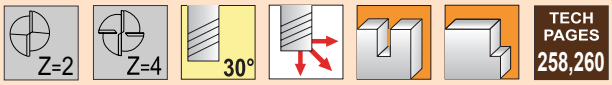


End Mill Manufacturing

GARR TOOL®

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



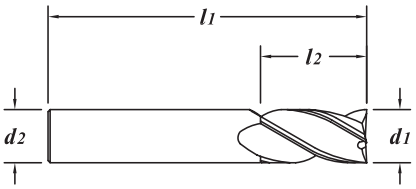
TECH PAGES 258,260



Stub Length - Square End

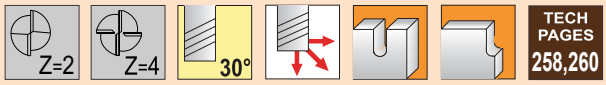
TiALN Coating

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Dry or semi-dry machining
Extremely versatile
Uncoated - page 185
Standard Length - page 198
Extended length - page 223



(160MA/860MA) 2 Flute EDP#	(170MA/870MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
01017	02017	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"	13.35	12.77	12.19	11.61
01517	02517	.0394		1.000	3.0	38	2	13.92	13.31	12.71	12.10
01027	02027	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"	13.35	12.77	12.19	11.61
01527	02527	.0591		1.500	3.0	38	3	13.92	13.31	12.71	12.10
01037	02037	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	11.13	10.65	10.16	9.68
01537	02537	.0787		2.000	3.0	38	4	11.58	11.08	10.57	10.07
01047	02047	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	10.67	10.21	9.74	9.28
01547	02547	.0984		2.500	3.0	38	5	11.09	10.60	10.12	9.64
01557	02557	.1181		3.000	3.0	38	6	10.87	10.40	9.92	9.45
01057	02057	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	10.44	9.99	9.53	9.08
01567	02567	.1378		3.500	4.0	50	7	14.19	13.57	12.96	12.34
01067	02067	.1562	5/32"	3.967	3/16"	2"	5/16"	13.62	13.02	12.43	11.84
01577	02577	.1575		4.000	4.0	50	8	13.58	12.99	12.40	11.81
01587	02587	.1772		4.500	5.0	50	9.5	18.61	17.80	16.99	16.18
01077	02077	.1875	3/16"	4.763	3/16"	2"	3/8"	13.04	12.47	11.91	11.34
01597	02597	.1969		5.000	5.0	50	10	17.61	16.84	16.08	15.31
01087	02087	.2188	7/32"	5.558	1/4"	2"	7/16"	17.89	17.12	16.34	15.56
01607	02607	.2362		6.000	6.0	50	12	18.41	17.61	16.81	16.01
01097	02097	.2500	1/4"	6.350	1/4"	2"	1/2"	17.69	16.92	16.15	15.38
01617	02617	.2756		7.000	7.0	50	12	24.46	23.40	22.33	21.27
01107	02107	.3125	5/16"	7.938	5/16"	2"	1/2"	24.44	23.38	22.31	21.25
01627	02627	.3150		8.000	8.0	50	12	25.42	24.31	23.21	22.10
01637	02637	.3543		9.000	9.0	50	14	30.02	28.71	27.41	26.10
01117	02117	.3750	3/8"	9.525	3/8"	2"	5/8"	28.82	27.57	26.31	25.06
01647	02647	.3937		10.000	10.0	50	16	33.34	31.89	30.44	28.99
01657	02657	.4331		11.000	11.0	65	19	40.41	38.65	36.90	35.14
01127	02127	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	37.61	35.97	34.34	32.70
01667	02667	.4724		12.000	12.0	65	19	49.12	46.98	44.85	42.71
01137	02137	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	47.13	45.08	43.03	40.98
01147	02147	.6250	5/8"	15.875	5/8"	3"	3/4"	83.25	79.63	76.01	72.39
01677	02677	.6299		16.000	16.0	75	19	87.03	83.25	79.46	75.68
01157	02157	.7500	3/4"	19.050	3/4"	3"	1"	117.19	112.09	107.00	101.90
-	02687	.7874		20.000	20.0	75	25	161.70	154.67	147.64	140.61
-	02167	1.000	1"	25.400	1"	3"	1"	199.82	191.14	182.45	173.76

Series 180M, 190M, 980M, 990M



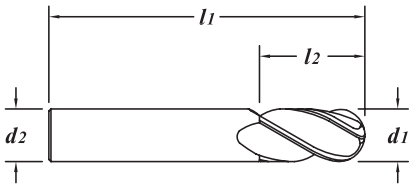
TECH PAGES 258,260

TOLERANCES		
d_1	≤ .030"	+.000" –.001" (+.000 –.025mm)
	≥ 1/32"	+.000" –.002" (+.000 –.050mm)
d_2	h6	
ball radius	+.000" –.001" (+.000 –.025mm)	

Stub Length - Ball End

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
TiALN Coating - page 189
Standard Length - page 205
Extended length - page 231



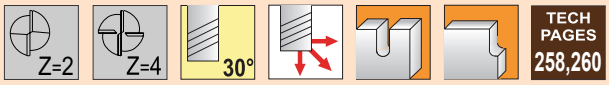


MATERIAL HARDNESS (Rc) 70 35 0

(180M/980M) 2 Flute EDP#	(190M/990M) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
03250	-	.0100	.0100"	0.254	1/8"	1-1/2"	.015"	22.79	21.80	20.81	19.82
03300	-	.0150	.0150"	0.381	1/8"	1-1/2"	.023"	22.70	21.71	20.73	19.74
03350	-	.0200	.0200"	0.508	1/8"	1-1/2"	.030"	22.10	21.14	20.18	19.22
03400	-	.0250	.0250"	0.635	1/8"	1-1/2"	.038"	21.36	20.43	19.50	18.57
03450	-	.0300	.0300"	0.762	1/8"	1-1/2"	.045"	18.40	17.60	16.80	16.00
03010	04010	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"	13.65	13.06	12.46	11.87
03510	04510	.0394		1.000	3.0	38	2	14.33	13.71	13.08	12.46
03020	04020	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"	13.65	13.06	12.46	11.87
03520	-	.0591		1.500	3.0	38	3	14.33	13.71	13.08	12.46
03030	04030	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	10.06	9.63	9.19	8.75
03530	04530	.0787		2.000	3.0	38	4	10.58	10.12	9.66	9.20
03040	04040	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	9.50	9.09	8.67	8.26
03540	04540	.0984		2.500	3.0	38	5	9.98	9.55	9.11	8.68
03550	04550	.1181		3.000	3.0	38	6	9.73	9.31	8.88	8.46
03050	04050	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	9.26	8.86	8.45	8.05
03560	04560	.1378		3.500	4.0	50	7	13.63	13.04	12.44	11.85
03060	04060	.1562	5/32"	3.967	3/16"	2"	5/16"	12.96	12.40	11.83	11.27
03570	04570	.1575		4.000	4.0	50	8	12.95	12.39	11.82	11.26
03580	04580	.1772		4.500	5.0	50	9.5	17.11	16.37	15.62	14.88
03070	04070	.1875	3/16"	4.763	3/16"	2"	3/8"	12.29	11.76	11.22	10.69
03590	04590	.1969		5.000	5.0	50	10	16.12	15.42	14.72	14.02
03080	04080	.2188	7/32"	5.558	1/4"	2"	7/16"	16.31	15.60	14.89	14.18
03600	04600	.2362		6.000	6.0	50	12	16.93	16.19	15.46	14.72
03090	04090	.2500	1/4"	6.350	1/4"	2"	1/2"	16.04	15.35	14.65	13.95
03610	04610	.2756		7.000	7.0	50	12	22.15	21.19	20.22	19.26
03100	04100	.3125	5/16"	7.938	5/16"	2"	1/2"	21.95	21.00	20.04	19.09
03620	04620	.3150		8.000	8.0	50	12	23.12	22.11	21.11	20.10
03630	04630	.3543		9.000	9.0	50	14	28.54	27.30	26.06	24.82
03110	04110	.3750	3/8"	9.525	3/8"	2"	5/8"	27.12	25.94	24.76	23.58
03640	04640	.3937		10.000	10.0	50	16	31.54	30.17	28.80	27.43
03120	04120	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	33.55	32.09	30.63	29.17
03660	04660	.4724		12.000	12.0	65	19	47.06	45.01	42.97	40.92
03130	04130	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	44.72	42.78	40.83	38.89
03150	04150	.7500	3/4"	19.050	3/4"	3"	1"	123.05	117.70	112.35	107.00

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)



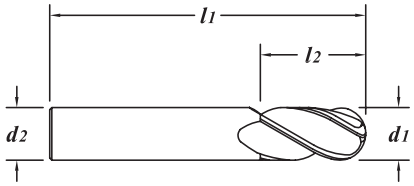
TECH PAGES 258,260

Stub Length - Ball End

TiALN Coating

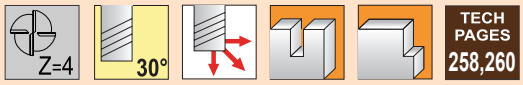
Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Dry or semi-dry machining
Extremely versatile
Uncoated - page 188
Standard Length - page 209
Extended length - page 234





(180MA/980MA) 2 Flute EDP#	(190MA/990MA) 4 Flute EDP#	Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
03017	04017	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"	16.25	15.54	14.84	14.13
03517	04517	.0394		1.000	3.0	38	2	16.93	16.19	15.46	14.72
03027	04027	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"	16.25	15.54	14.84	14.13
03527	04527	.0591		1.500	3.0	38	3	16.93	16.19	15.46	14.72
03037	04037	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	12.64	12.09	11.54	10.99
03537	04537	.0787		2.000	3.0	38	4	13.17	12.60	12.02	11.45
03047	04047	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	12.09	11.56	11.04	10.51
03547	04547	.0984		2.500	3.0	38	5	12.58	12.03	11.49	10.94
03557	04557	.1181		3.000	3.0	38	6	12.32	11.78	11.25	10.71
03057	04057	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	11.85	11.33	10.82	10.30
03567	04567	.1378		3.500	4.0	50	7	16.23	15.52	14.82	14.11
03067	04067	.1562	5/32"	3.967	3/16"	2"	5/16"	15.54	14.86	14.19	13.51
03577	04577	.1575		4.000	4.0	50	8	15.53	14.85	14.18	13.50
03587	04587	.1772		4.500	5.0	50	9.5	21.15	20.23	19.31	18.39
03077	04077	.1875	3/16"	4.763	3/16"	2"	3/8"	14.88	14.23	13.59	12.94
03597	04597	.1969		5.000	5.0	50	10	20.15	19.27	18.40	17.52
03087	04087	.2188	7/32"	5.558	1/4"	2"	7/16"	20.34	19.46	18.57	17.69
03607	04607	.2362		6.000	6.0	50	12	20.95	20.04	19.13	18.22
03097	04097	.2500	1/4"	6.350	1/4"	2"	1/2"	20.10	19.23	18.35	17.48
03617	04617	.2756		7.000	7.0	50	12	27.92	26.71	25.49	24.28
03107	04107	.3125	5/16"	7.938	5/16"	2"	1/2"	27.72	26.51	25.31	24.10
03627	04627	.3150		8.000	8.0	50	12	28.88	27.62	26.37	25.11
03637	04637	.3543		9.000	9.0	50	14	34.32	32.82	31.33	29.84
03117	04117	.3750	3/8"	9.525	3/8"	2"	5/8"	32.88	31.45	30.02	28.59
03647	04647	.3937		10.000	10.0	50	16	38.08	36.42	34.77	33.11
03657	04657	.4331		11.000	11.0	65	19	45.37	43.40	41.42	39.45
03127	04127	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	42.64	40.79	38.93	37.08
03667	04667	.4724		12.000	12.0	65	19	56.17	53.72	51.28	48.84
03137	04137	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	53.81	51.47	49.13	46.79
-	04147	.6250	5/8"	15.875	5/8"	3"	3/4"	96.09	91.92	87.74	83.56
-	04157	.7500	3/4"	19.050	3/4"	3"	1"	135.68	129.78	123.88	117.98
-	04687	.7874		20.000	20.0	75	25	186.71	178.60	170.48	162.36

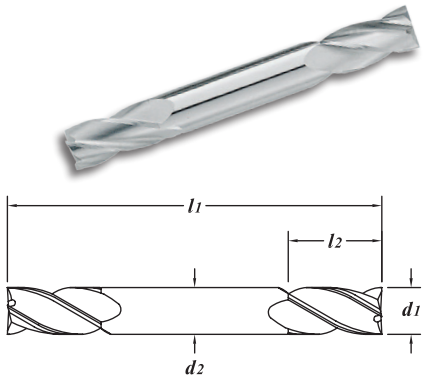
Series 175M, 875M



TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

Stub Length - Double End

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
TiALN Coating - page 191
Standard Length - page 216



70
35
0

MATERIAL HARDNESS (Rc)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
06020	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"	19.34	18.50	17.66	16.82
06030	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	19.34	18.50	17.66	16.82
06040	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	19.34	18.50	17.66	16.82
06540	.0984		2.500	3.0	38	5	20.36	19.47	18.59	17.70
06050	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	11.98	11.46	10.94	10.42
06560	.1378		3.500	4.0	50	7	22.43	21.45	20.48	19.50
06060	.1562	5/32"	3.967	3/16"	2"	5/16"	21.29	20.36	19.44	18.51
06570	.1575		4.000	4.0	50	8	18.30	17.50	16.71	15.91
06070	.1875	3/16"	4.763	3/16"	2"	3/8"	17.38	16.62	15.87	15.11
06080	.2188	7/32"	5.558	1/4"	2-1/2"	1/2"	24.83	23.75	22.67	21.59
06600	.2362		6.000	6.0	65	12	23.81	22.77	21.74	20.70
06090	.2500	1/4"	6.350	1/4"	2-1/2"	1/2"	22.61	21.63	20.64	19.66
06100	.3125	5/16"	7.938	5/16"	2-1/2"	1/2"	28.14	26.92	25.69	24.47
06110	.3750	3/8"	9.525	3/8"	2-1/2"	1/2"	29.92	28.62	27.32	26.02
06130	.5000	1/2"	12.700	1/2"	3"	5/8"	50.85	48.64	46.43	44.22

† *Metric equivalents are for reference only*

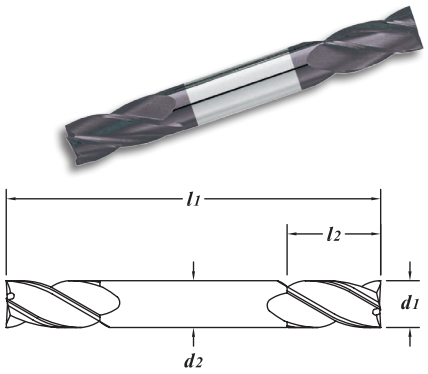
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

Z=4 | 30° | TECH PAGES 258,260

Stub Length - Double End

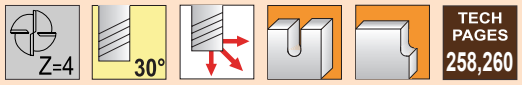
TiALN Coating

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Dry or semi-dry machining
Extremely versatile
Uncoated - page 190
Standard Length - page 217



EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
06017	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"	23.22	22.21	21.20	20.19
06517	.0394		1.000	3.0	38	2	24.24	23.19	22.13	21.08
06027	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"	23.22	22.21	21.20	20.19
06527	.0591		1.500	3.0	38	3	24.24	23.19	22.13	21.08
06037	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	23.22	22.21	21.20	20.19
06537	.0787		2.000	3.0	38	4	24.24	23.19	22.13	21.08
06047	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	23.22	22.21	21.20	20.19
06547	.0984		2.500	3.0	38	5	24.24	23.19	22.13	21.08
06557	.1181		3.000	3.0	38	6	16.50	15.79	15.07	14.35
06057	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	15.87	15.18	14.49	13.80
06567	.1378		3.500	4.0	50	7	26.31	25.17	24.02	22.88
06067	.1562	5/32"	3.967	3/16"	2"	5/16"	25.17	24.08	22.98	21.89
06577	.1575		4.000	4.0	50	8	22.16	21.20	20.23	19.27
06077	.1875	3/16"	4.763	3/16"	2"	3/8"	21.26	20.34	19.41	18.49
06087	.2188	7/32"	5.558	1/4"	2-1/2"	1/2"	32.84	31.42	29.99	28.56
06607	.2362		6.000	6.0	65	12	31.81	30.43	29.04	27.66
06097	.2500	1/4"	6.350	1/4"	2-1/2"	1/2"	30.61	29.28	27.95	26.62
06107	.3125	5/16"	7.938	5/16"	2-1/2"	1/2"	40.11	38.37	36.62	34.88
06627	.3150		8.000	8.0	65	12	41.60	39.79	37.98	36.17
06117	.3750	3/8"	9.525	3/8"	2-1/2"	1/2"	41.93	40.11	38.28	36.46
06137	.5000	1/2"	12.700	1/2"	3"	5/8"	64.49	61.69	58.88	56.08

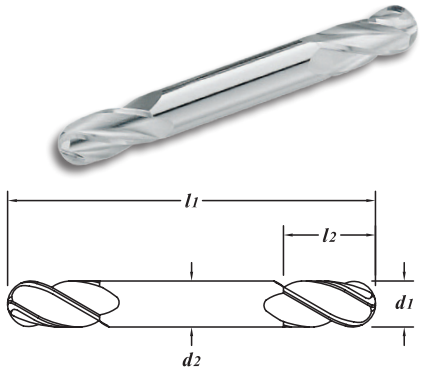
Series 195M, 995M



TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

Stub Length - Ball End - Double End

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
TiALN Coating - page 193
Standard Length - page 218



70
35
0

MATERIAL HARDNESS (Rc)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
08010	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"	22.71	21.73	20.74	19.75
08510	.0394		1.000	3.0	38	2	23.91	22.87	21.83	20.79
08020	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"	22.71	21.73	20.74	19.75
08520	.0591		1.500	3.0	38	3	23.91	22.87	21.83	20.79
08030	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	22.71	21.73	20.74	19.75
08040	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	22.71	21.73	20.74	19.75
08050	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	14.09	13.48	12.86	12.25
08060	.1562	5/32"	3.967	3/16"	2"	5/16"	25.02	23.94	22.85	21.76
08070	.1875	3/16"	4.763	3/16"	2"	3/8"	20.46	19.57	18.68	17.79
08090	.2500	1/4"	6.350	1/4"	2-1/2"	1/2"	26.60	25.44	24.29	23.13

† *Metric equivalents are for reference only*

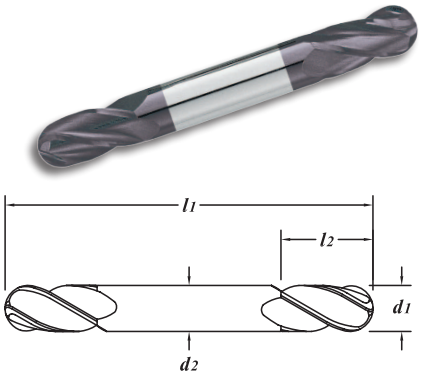
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

Z=4 | 30° | TECH PAGES 258,260

Stub Length - Ball End - Double End

TiALN Coating

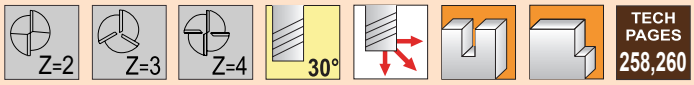
Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Dry or semi-dry machining
Extremely versatile
Uncoated - page 192
Standard Length - page 219



EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
08017	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"	26.60	25.44	24.29	23.13
08517	.0394		1.000	3.0	38	2	27.80	26.59	25.38	24.17
08027	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"	26.60	25.44	24.29	23.13
08037	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	26.60	25.44	24.29	23.13
08537	.0787		2.000	3.0	38	4	27.80	26.59	25.38	24.17
08047	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	26.60	25.44	24.29	23.13
08557	.1181		3.000	3.0	38	6	18.73	17.92	17.10	16.29
08057	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	17.97	17.19	16.41	15.63
08067	.1562	5/32"	3.967	3/16"	2"	5/16"	28.91	27.65	26.40	25.14
08577	.1575		4.000	4.0	50	8	25.42	24.31	23.21	22.10
08077	.1875	3/16"	4.763	3/16"	2"	3/8"	24.33	23.28	22.22	21.16
08597	.1969		5.000	5.0	65	10	35.29	33.76	32.22	30.69
08607	.2362		6.000	6.0	65	12	36.01	34.44	32.88	31.31
08097	.2500	1/4"	6.350	1/4"	2-1/2"	1/2"	34.62	33.11	31.61	30.10
08107	.3125	5/16"	7.938	5/16"	2-1/2"	1/2"	45.09	43.13	41.17	39.21
08117	.3750	3/8"	9.525	3/8"	2-1/2"	1/2"	47.20	45.14	43.09	41.04
08647	.3937		10.000	10.0	75	14	64.89	62.07	59.25	56.43
08137	.5000	1/2"	12.700	1/2"	3"	5/8"	73.49	70.29	67.10	63.90

Series 220M, 223M, 230M, 820M, 823M, 830M

.0050" - .0984"
(0.127mm - 2.500mm)

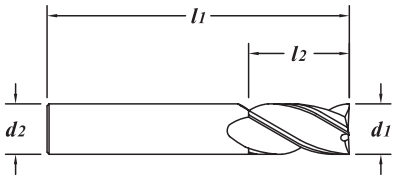


TOLERANCES		
d_1	≤ .030"	+.000" –.001" (+.000 –.025mm)
	≥ 1/32"	+.000" –.002" (+.000 –.050mm)
d_2	h6	

Standard Length - Square End

Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiN Coating - page 196
TiCN Coating - page 197
TiALN Coating - page 198
Stub Length - page 185
Extended length - page 220





MATERIAL HARDNESS (Rc)
70
35
0

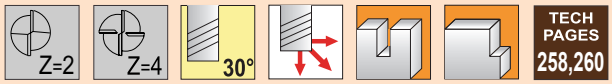
(220M/820M) 2 Flute EDP#	(223M/823M) 3 Flute EDP#	(230M/830M) 4 Flute EDP#	Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
11500	-	-	.0050	.0050"	0.127	1/8"	1-1/2"	.015"	22.34	21.37	20.40	19.43
11510	-	-	.0060	.0060"	0.152	1/8"	1-1/2"	.018"	22.34	21.37	20.40	19.43
11520	-	-	.0070	.0070"	0.178	1/8"	1-1/2"	.021"	21.02	20.11	19.19	18.28
11530	-	-	.0080	.0080"	0.203	1/8"	1-1/2"	.024"	21.02	20.11	19.19	18.28
11540	-	-	.0090	.0090"	0.229	1/8"	1-1/2"	.027"	19.84	18.98	18.11	17.25
11550	-	13550	.0100	.0100"	0.254	1/8"	1-1/2"	.030"	19.84	18.98	18.11	17.25
11560	-	-	.0110	.0110"	0.279	1/8"	1-1/2"	.033"	18.37	17.57	16.77	15.97
11570	-	-	.0120	.0120"	0.305	1/8"	1-1/2"	.036"	18.37	17.57	16.77	15.97
11580	-	-	.0130	.0130"	0.330	1/8"	1-1/2"	.039"	18.27	17.48	16.68	15.89
11590	-	-	.0140	.0140"	0.356	1/8"	1-1/2"	.042"	18.27	17.48	16.68	15.89
11600	-	13600	.0150	.0150"	0.381	1/8"	1-1/2"	.045"	18.27	17.48	16.68	15.89
11610	-	-	.0160	.0160"	0.406	1/8"	1-1/2"	.048"	18.03	17.25	16.46	15.68
11620	-	-	.0170	.0170"	0.432	1/8"	1-1/2"	.051"	18.03	17.25	16.46	15.68
11630	-	-	.0180	.0180"	0.457	1/8"	1-1/2"	.054"	17.69	16.92	16.15	15.38
11640	-	-	.0190	.0190"	0.483	1/8"	1-1/2"	.057"	17.69	16.92	16.15	15.38
11650	-	13650	.0200	.0200"	0.508	1/8"	1-1/2"	.060"	17.69	16.92	16.15	15.38
11660	-	-	.0210	.0210"	0.533	1/8"	1-1/2"	.063"	17.69	16.92	16.15	15.38
11670	-	-	.0220	.0220"	0.559	1/8"	1-1/2"	.066"	17.48	16.72	15.96	15.20
11680	-	-	.0230	.0230"	0.584	1/8"	1-1/2"	.069"	17.48	16.72	15.96	15.20
11690	-	-	.0240	.0240"	0.610	1/8"	1-1/2"	.072"	17.48	16.72	15.96	15.20
11700	-	13700	.0250	.0250"	0.635	1/8"	1-1/2"	.075"	16.49	15.77	15.06	14.34
11710	-	-	.0260	.0260"	0.660	1/8"	1-1/2"	.078"	16.49	15.77	15.06	14.34
11720	-	-	.0270	.0270"	0.686	1/8"	1-1/2"	.081"	14.79	14.15	13.50	12.86
11730	-	-	.0280	.0280"	0.711	1/8"	1-1/2"	.084"	14.79	14.15	13.50	12.86
11740	-	-	.0290	.0290"	0.737	1/8"	1-1/2"	.087"	14.79	14.15	13.50	12.86
11750	-	13750	.0300	.0300"	0.762	1/8"	1-1/2"	.090"	14.79	14.15	13.50	12.86
11010	12010	13010	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"	10.76	10.30	9.83	9.36
45010	37010	46010	.0394		1.000	3.0	38	4	11.30	10.81	10.32	9.83
11020	12020	13020	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"	10.76	10.30	9.83	9.36
45020	37020	46020	.0591		1.500	3.0	38	6	11.30	10.81	10.32	9.83
11030	12030	13030	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	9.98	9.55	9.11	8.68
11040	12040	13040	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"	9.98	9.55	9.11	8.68
45030	37030	46030	.0787		2.000	3.0	38	8	10.48	10.02	9.57	9.11
11050	12050	13050	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	9.44	9.03	8.62	8.21
45040	37040	46040	.0984		2.500	3.0	38	12	9.91	9.48	9.05	8.62

† *Metric equivalents are for reference only*

(220M/820M) 2 Flute EDP#	(223M/823M) 3 Flute EDP#	(230M/830M) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
11060	12060	13060	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"	9.44	9.03	8.62	8.21
45050	37050	46050	.1181		3.000	3.0	38	12	9.15	8.76	8.36	7.96
11070	12070	13070	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	8.72	8.34	7.96	7.58
45060	37060	46060	.1378		3.500	4.0	50	12	13.55	12.96	12.37	11.78
11080	12080	13080	.1406	9/64"	3.571	3/16"	2"	9/16"	12.88	12.32	11.76	11.20
11090	12090	13090	.1562	5/32"	3.967	3/16"	2"	9/16"	12.88	12.32	11.76	11.20
45070	37070	46070	.1575		4.000	4.0	50	14	12.85	12.29	11.73	11.17
11100	12100	13100	.1719	11/64"	4.366	3/16"	2"	9/16"	12.88	12.32	11.76	11.20
45080	37080	46080	.1772		4.500	5.0	50	14	15.72	15.04	14.35	13.67
11110	12110	13110	.1875	3/16"	4.763	3/16"	2"	5/8"	12.22	11.69	11.16	10.63
45090	37090	46090	.1969		5.000	5.0	65	16	15.00	14.34	13.69	13.04
11120	12120	13120	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"	16.19	15.49	14.78	14.08
11130	12130	13130	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"	16.19	15.49	14.78	14.08
11140	12140	13140	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"	16.19	15.49	14.78	14.08
45100	37100	46100	.2362		6.000	6.0	65	19	15.47	14.80	14.12	13.45
11150	12150	13150	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	14.73	14.09	13.45	12.81
11160	12160	13160	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"	25.84	24.72	23.59	22.47
45110	37110	46110	.2756		7.000	7.0	65	22	21.25	20.33	19.40	18.48
11170	12170	13170	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"	25.84	24.72	23.59	22.47
11180	12180	13180	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"	25.84	24.72	23.59	22.47
11190	12190	13190	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	20.67	19.77	18.87	17.97
45120	37120	46120	.3150		8.000	8.0	65	22	21.70	20.76	19.81	18.87
11200	12200	13200	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"	30.61	29.28	27.95	26.62
11210	12210	13210	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	30.61	29.28	27.95	26.62
45130	37130	46130	.3543		9.000	9.0	65	22	27.03	25.85	24.68	23.50
11220	12220	13220	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"	30.61	29.28	27.95	26.62
11230	12230	13230	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	25.75	24.63	23.51	22.39
11240	12240	13240	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"	36.60	35.01	33.42	31.83
45140	37140	46140	.3937		10.000	10.0	70	25	31.33	29.96	28.60	27.24
11250	12250	13250	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"	36.60	35.01	33.42	31.83
11260	12260	13260	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"	36.60	35.01	33.42	31.83
45150	37150	46150	.4331		11.000	11.0	75	25	32.98	31.55	30.11	28.68
11270	12270	13270	.4375	7/16"	11.113	7/16"	2-3/4"	1"	31.41	30.04	28.68	27.31
11280	12280	13280	.4531	29/64"	11.509	1/2"	3"	1"	49.30	47.16	45.01	42.87
11290	-	13290	.4688	15/32"	11.908	1/2"	3"	1"	49.30	47.16	45.01	42.87
45160	37160	46160	.4724		12.000	12.0	75	25	43.30	41.42	39.53	37.65
11300	12300	13300	.4844	31/64"	12.304	1/2"	3"	1"	49.30	47.16	45.01	42.87
11310	12310	13310	.5000	1/2"	12.700	1/2"	3"	1"	41.23	39.44	37.64	35.85
45170	37170	46170	.5512		14.000	14.0	88	32	73.93	70.72	67.50	64.29
11320	12320	13320	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	70.43	67.36	64.30	61.24
11330	12330	13330	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	79.50	76.04	72.59	69.13
45180	37180	46180	.6299		16.000	16.0	88	38	83.49	79.86	76.23	72.60
11340	12340	13340	.6875	11/16"	17.463	3/4"	4"	1-1/2"	132.40	126.64	120.89	115.13
45190	37190	46190	.7087		18.000	18.0	100	38	122.41	117.08	111.76	106.44
11350	12350	13350	.7500	3/4"	19.050	3/4"	4"	1-1/2"	116.56	111.50	106.43	101.36
45200	37200	46200	.7874		20.000	20.0	100	38	155.63	148.86	142.10	135.33
45210	37210	46210	.8661		22.000	22.0	100	38	172.94	165.42	157.90	150.38
11360	12360	13360	.8750	7/8"	22.225	7/8"	4"	1-1/2"	167.75	160.46	153.16	145.87
45220	37220	46220	.9843		25.000	25.0	100	38	180.81	172.95	165.09	157.23
11370	12370	13370	1.000	1"	25.400	1"	4"	1-1/2"	174.39	166.80	159.22	151.64
-	-	13390	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"	509.13	486.99	464.86	442.72

Series 220MT, 230MT

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



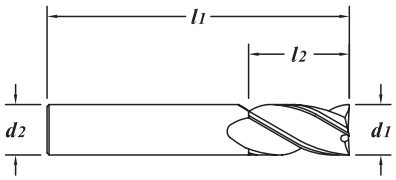
TECH PAGES 258,260

Standard Length - Square End

TiN Coating

Solid submicron grain carbide end mill - center cutting
Improved lubricity
Extremely versatile
Uncoated - page 194
TiCN Coating - page 197
TiALN Coating - page 198





(220MT) 2 Flute EDP#	(230MT) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
11073	13073	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	10.25	9.80	9.36	8.91
11113	13113	.1875	3/16"	4.763	3/16"	2"	5/8"	13.73	13.13	12.54	11.94
11153	13153	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	17.81	17.04	16.26	15.49
11193	13193	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	24.81	23.73	22.65	21.57
11233	13233	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	29.89	28.59	27.29	25.99
11273	13273	.4375	7/16"	11.113	7/16"	2-3/4"	1"	36.42	34.84	33.25	31.67
11313	13313	.5000	1/2"	12.700	1/2"	3"	1"	46.25	44.24	42.23	40.22
11333	13333	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	87.22	83.42	79.63	75.84
11353	13353	.7500	3/4"	19.050	3/4"	4"	1-1/2"	125.40	119.94	114.49	109.04
-	13373	1.000	1"	25.400	1"	4"	1-1/2"	189.81	181.56	173.30	165.05

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

Z=2 Z=3 Z=4 30°

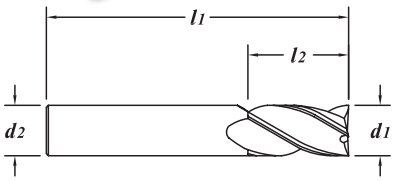
TECH PAGES 258,260

Standard Length - Square End

TiCN Coating

Solid submicron grain carbide end mill - center cutting
Improved abrasion resistance and lubricity
Extremely versatile
Uncoated - page 194
TiN Coating - page 196
TiALN Coating - page 198
Extended length - page 222





(220MC) 2 Flute EDP#	(223MC) 3 Flute EDP#	(230MC) 4 Flute EDP#	Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
11014	12014	13014	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"	13.05	12.49	11.92	11.35
11024	12024	13024	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"	13.05	12.49	11.92	11.35
11034	12034	13034	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	12.28	11.75	11.21	10.68
11044	12044	13044	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"	12.28	11.75	11.21	10.68
11054	12054	13054	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	11.73	11.22	10.71	10.20
11064	12064	13064	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"	11.73	11.22	10.71	10.20
11074	12074	13074	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	11.01	10.53	10.05	9.57
11084	12084	13084	.1406	9/64"	3.571	3/16"	2"	9/16"	15.17	14.51	13.85	13.19
11094	12094	13094	.1562	5/32"	3.967	3/16"	2"	9/16"	15.17	14.51	13.85	13.19
11104	12104	13104	.1719	11/64"	4.366	3/16"	2"	9/16"	15.17	14.51	13.85	13.19
11114	12114	13114	.1875	3/16"	4.763	3/16"	2"	5/8"	14.50	13.87	13.24	12.61
11124	12124	13124	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"	20.83	19.92	19.02	18.11
11134	12134	13134	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"	20.83	19.92	19.02	18.11
11144	12144	13144	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"	20.83	19.92	19.02	18.11
11154	12154	13154	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	19.37	18.52	17.68	16.84
11164	12164	13164	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"	32.04	30.65	29.25	27.86
11174	12174	13174	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"	32.04	30.65	29.25	27.86
11184	12184	13184	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"	32.04	30.65	29.25	27.86
11194	12194	13194	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	26.85	25.69	24.52	23.35
11204	12204	13204	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"	36.80	35.20	33.60	32.00
11214	12214	13214	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	36.80	35.20	33.60	32.00
11224	12224	13224	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"	36.80	35.20	33.60	32.00
11234	12234	13234	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	31.92	30.54	29.15	27.76
11244	12244	13244	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"	44.03	42.12	40.20	38.29
11254	12254	13254	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"	44.03	42.12	40.20	38.29
11264	-	13264	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"	44.03	42.12	40.20	38.29
11274	12274	13274	.4375	7/16"	11.113	7/16"	2-3/4"	1"	38.86	37.17	35.48	33.79
11284	-	13284	.4531	29/64"	11.509	1/2"	3"	1"	56.73	54.26	51.80	49.33
11294	12294	13294	.4688	15/32"	11.908	1/2"	3"	1"	56.73	54.26	51.80	49.33
-	12304	13304	.4844	31/64"	12.304	1/2"	3"	1"	56.73	54.26	51.80	49.33
11314	12314	13314	.5000	1/2"	12.700	1/2"	3"	1"	48.68	46.56	44.45	42.33
11324	12324	13324	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	82.01	78.44	74.88	71.31
11334	12334	13334	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	91.08	87.12	83.16	79.20
11344	-	13344	.6875	11/16"	17.463	3/4"	4"	1-1/2"	145.62	139.29	132.96	126.63
11354	12354	13354	.7500	3/4"	19.050	3/4"	4"	1-1/2"	129.81	124.17	118.52	112.88
11364	-	13364	.8750	7/8"	22.225	7/8"	4"	1-1/2"	187.63	179.48	171.32	163.16
11374	12374	13374	1.000	1"	25.400	1"	4"	1-1/2"	194.27	185.82	177.38	168.93
-	-	13394	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"	541.27	517.74	494.20	470.67

Series 220MA, 223MA, 230MA, 820MA, 823MA, 830MA

.0312" - .3594"
(0.792mm - 9.129mm)

Z=2 Z=3 Z=4 30°

TECH PAGES 258,260

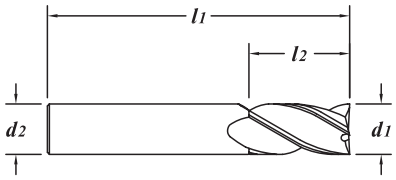
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

Standard Length - Square End

TiALN Coating

Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Uncoated - page 194
TiN Coating - page 196
TiCN Coating - page 197
Stub Length - page 187
Extended Length - page 223





MATERIAL HARDNESS (Rc) 70 35 0

(220MA/820MA) 2 Flute EDP#	(223MA/823MA) 3 Flute EDP#	(230MA/830MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
11017	12017	13017	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"	13.35	12.77	12.19	11.61
45017	37017	46017	.0394		1.000	3.0	38	4	13.89	13.29	12.68	12.08
11027	12027	13027	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"	13.35	12.77	12.19	11.61
45027	37027	46027	.0591		1.500	3.0	38	6	13.89	13.29	12.68	12.08
11037	12037	13037	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	12.58	12.03	11.49	10.94
11047	12047	13047	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"	12.58	12.03	11.49	10.94
45037	37037	46037	.0787		2.000	3.0	38	8	13.06	12.50	11.93	11.36
11057	12057	13057	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	12.03	11.51	10.98	10.46
45047	37047	46047	.0984		2.500	3.0	38	12	12.51	11.97	11.42	10.88
11067	12067	13067	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"	12.03	11.51	10.98	10.46
45057	37057	46057	.1181		3.000	3.0	38	12	11.75	11.24	10.73	10.22
11077	12077	13077	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	11.30	10.81	10.32	9.83
45067	37067	46067	.1378		3.500	4.0	50	12	16.13	15.43	14.73	14.03
11087	12087	13087	.1406	9/64"	3.571	3/16"	2"	9/16"	15.47	14.80	14.12	13.45
11097	12097	13097	.1562	5/32"	3.967	3/16"	2"	9/16"	15.47	14.80	14.12	13.45
45077	37077	46077	.1575		4.000	4.0	50	14	15.43	14.76	14.09	13.42
11107	12107	13107	.1719	11/64"	4.366	3/16"	2"	9/16"	15.47	14.80	14.12	13.45
45087	37087	46087	.1772		4.500	5.0	50	14	19.76	18.90	18.04	17.18
11117	12117	13117	.1875	3/16"	4.763	3/16"	2"	5/8"	14.80	14.16	13.51	12.87
45097	37097	46097	.1969		5.000	5.0	65	16	20.33	19.45	18.56	17.68
11127	12127	13127	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"	21.55	20.61	19.68	18.74
11137	12137	13137	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"	21.55	20.61	19.68	18.74
11147	12147	13147	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"	21.55	20.61	19.68	18.74
45107	37107	46107	.2362		6.000	6.0	65	19	20.82	19.91	19.01	18.10
11157	12157	13157	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	20.08	19.21	18.33	17.46
11167	12167	13167	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"	33.84	32.37	30.90	29.43
45117	37117	46117	.2756		7.000	7.0	65	22	29.23	27.96	26.69	25.42
11177	12177	13177	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"	33.84	32.37	30.90	29.43
11187	12187	13187	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"	33.84	32.37	30.90	29.43
11197	12197	13197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	28.67	27.42	26.18	24.93
45127	37127	46127	.3150		8.000	8.0	65	22	29.70	28.41	27.12	25.83
11207	12207	13207	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"	38.61	36.93	35.25	33.57
11217	12217	13217	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	38.61	36.93	35.25	33.57
45137	37137	46137	.3543		9.000	9.0	65	22	35.02	33.50	31.97	30.45
11227	12227	13227	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"	38.61	36.93	35.25	33.57

† *Metric equivalents are for reference only*

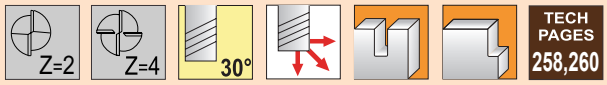
(220MA/820MA) 2 Flute EDP#	(223MA/823MA) 3 Flute EDP#	(230MA/830MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
11237	12237	13237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	33.73	32.26	30.80	29.33
11247	12247	13247	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"	45.70	43.71	41.73	39.74
45147	37147	46147	.3937		10.000	10.0	70	25	40.41	38.65	36.90	35.14
11257	12257	13257	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"	45.70	43.71	41.73	39.74
11267	12267	13267	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"	45.70	43.71	41.73	39.74
45157	37157	46157	.4331		11.000	11.0	75	25	42.08	40.25	38.42	36.59
11277	12277	13277	.4375	7/16"	11.113	7/16"	2-3/4"	1"	40.51	38.75	36.99	35.23
11287	12287	13287	.4531	29/64"	11.509	1/2"	3"	1"	58.40	55.86	53.32	50.78
11297	12297	13297	.4688	15/32"	11.908	1/2"	3"	1"	58.40	55.86	53.32	50.78
45167	37167	46167	.4724		12.000	12.0	75	25	52.38	50.11	47.83	45.55
11307	12307	13307	.4844	31/64"	12.304	1/2"	3"	1"	58.40	55.86	53.32	50.78
11317	12317	13317	.5000	1/2"	12.700	1/2"	3"	1"	50.32	48.14	45.95	43.76
45177	37177	46177	.5512		14.000	14.0	88	32	87.08	83.29	79.51	75.72
11327	12327	13327	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	83.56	79.93	76.29	72.66
11337	12337	13337	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	92.67	88.64	84.61	80.58
45187	37187	46187	.6299		16.000	16.0	88	38	96.65	92.44	88.24	84.04
11347	12347	13347	.6875	11/16"	17.463	3/4"	4"	1-1/2"	147.92	141.49	135.06	128.63
45197	37197	46197	.7087		18.000	18.0	100	38	137.92	131.92	125.93	119.93
11357	12357	13357	.7500	3/4"	19.050	3/4"	4"	1-1/2"	132.09	126.35	120.60	114.86
45207	37207	46207	.7874		20.000	20.0	100	38	178.56	170.80	163.03	155.27
45217	37217	46217	.8661		22.000	22.0	100	38	195.86	187.34	178.83	170.31
11367	12367	13367	.8750	7/8"	22.225	7/8"	4"	1-1/2"	190.67	182.38	174.09	165.80
45227	37227	46227	.9843		25.000	25.0	100	38	203.73	194.88	186.02	177.16
11377	12377	13377	1.000	1"	25.400	1"	4"	1-1/2"	197.29	188.72	180.14	171.56
-	-	13397	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"	542.34	518.76	495.18	471.60



End Mill Manufacturing

Series 220R, 230R

.0625" - .5000"
(1.588mm - 12.700mm)

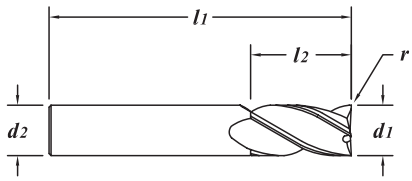


TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

Standard Length - Corner Radius

Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Extremely versatile
TiALN Coating - page 202
Extended Length - page 225





(220R) 2 Flute EDP#	(230R) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
79580	80580	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.010"	12.88	12.32	11.76	11.20
79590	80590	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.015"	12.88	12.32	11.76	11.20
79600	80600	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.010"	12.32	11.78	11.25	10.71
79610	80610	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.015"	12.32	11.78	11.25	10.71
79620	80620	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.020"	12.32	11.78	11.25	10.71
79000	80000	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	11.18	10.69	10.21	9.72
79010	80010	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"	11.18	10.69	10.21	9.72
79020	80020	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	11.18	10.69	10.21	9.72
79030	80030	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.030"	11.18	10.69	10.21	9.72
79040	80040	.1875	3/16"	4.763	3/16"	2"	5/8"	.010"	14.73	14.09	13.45	12.81
79050	80050	.1875	3/16"	4.763	3/16"	2"	5/8"	.015"	14.73	14.09	13.45	12.81
79060	80060	.1875	3/16"	4.763	3/16"	2"	5/8"	.020"	14.73	14.09	13.45	12.81
79070	80070	.1875	3/16"	4.763	3/16"	2"	5/8"	.030"	14.73	14.09	13.45	12.81
-	80090	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	18.30	17.50	16.71	15.91
79100	80100	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	18.30	17.50	16.71	15.91
79110	80110	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	18.30	17.50	16.71	15.91
79120	80120	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	18.30	17.50	16.71	15.91
79130	80130	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.045"	18.30	17.50	16.71	15.91
79140	80140	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	18.30	17.50	16.71	15.91
79160	80160	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.015"	23.99	22.95	21.90	20.86
79170	80170	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.020"	23.99	22.95	21.90	20.86
79180	80180	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.030"	23.99	22.95	21.90	20.86
79190	80190	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.045"	23.99	22.95	21.90	20.86
79200	80200	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.060"	23.99	22.95	21.90	20.86
-	80220	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	29.36	28.08	26.81	25.53
79230	80230	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	29.36	28.08	26.81	25.53
79240	80240	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	29.36	28.08	26.81	25.53
79250	80250	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	29.36	28.08	26.81	25.53
79260	80260	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.045"	29.36	28.08	26.81	25.53
79270	80270	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	29.36	28.08	26.81	25.53
-	80290	.5000	1/2"	12.700	1/2"	3"	1"	.010"	54.65	52.27	49.90	47.52
79300	80300	.5000	1/2"	12.700	1/2"	3"	1"	.015"	54.65	52.27	49.90	47.52
79310	80310	.5000	1/2"	12.700	1/2"	3"	1"	.020"	54.65	52.27	49.90	47.52
79320	80320	.5000	1/2"	12.700	1/2"	3"	1"	.030"	54.65	52.27	49.90	47.52
79330	80330	.5000	1/2"	12.700	1/2"	3"	1"	.045"	54.65	52.27	49.90	47.52
79340	80340	.5000	1/2"	12.700	1/2"	3"	1"	.060"	54.65	52.27	49.90	47.52
79350	80350	.5000	1/2"	12.700	1/2"	3"	1"	.090"	54.65	52.27	49.90	47.52
79360	80360	.5000	1/2"	12.700	1/2"	3"	1"	.125"	54.65	52.27	49.90	47.52

† *Metric equivalents are for reference only*

(220R) 2 Flute EDP#	(230R) 4 Flute EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
79370	80370	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	88.39	84.55	80.70	76.86
79380	80380	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	88.39	84.55	80.70	76.86
79390	80390	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	88.39	84.55	80.70	76.86
79400	80400	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.045"	88.39	84.55	80.70	76.86
79410	80410	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	88.39	84.55	80.70	76.86
79420	80420	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.090"	88.39	84.55	80.70	76.86
79440	80440	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	130.08	124.42	118.77	113.11
79450	80450	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.020"	130.08	124.42	118.77	113.11
79460	80460	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	130.08	124.42	118.77	113.11
79470	80470	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.045"	130.08	124.42	118.77	113.11
79480	80480	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	130.08	124.42	118.77	113.11
79490	80490	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.090"	130.08	124.42	118.77	113.11
79500	80500	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.125"	130.08	124.42	118.77	113.11
79630	80630	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.250"	130.08	124.42	118.77	113.11
79510	80510	1.000	1"	25.400	1"	4"	1-1/2"	.015"	225.62	215.81	206.00	196.19
79520	80520	1.000	1"	25.400	1"	4"	1-1/2"	.020"	225.62	215.81	206.00	196.19
79530	80530	1.000	1"	25.400	1"	4"	1-1/2"	.030"	225.62	215.81	206.00	196.19
79540	80540	1.000	1"	25.400	1"	4"	1-1/2"	.045"	225.62	215.81	206.00	196.19
79550	80550	1.000	1"	25.400	1"	4"	1-1/2"	.060"	225.62	215.81	206.00	196.19
79560	80560	1.000	1"	25.400	1"	4"	1-1/2"	.090"	225.62	215.81	206.00	196.19
79570	80570	1.000	1"	25.400	1"	4"	1-1/2"	.125"	225.62	215.81	206.00	196.19
79640	80640	1.000	1"	25.400	1"	4"	1-1/2"	.250"	225.62	215.81	206.00	196.19

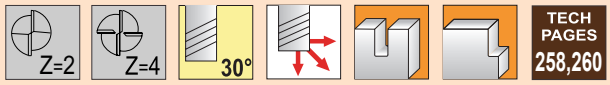




Tool Reconditioning Prep Area

Series 220RA, 230RA, 830RA

.0625" - .3125"
(1.588mm - 7.938mm)



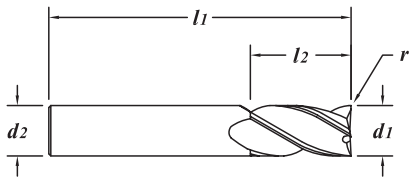
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

Standard Length - Corner Radius

TiALN Coating

Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
For stronger corners and part radius
Extremely versatile
Uncoated - page 200
Extended Length - page 228

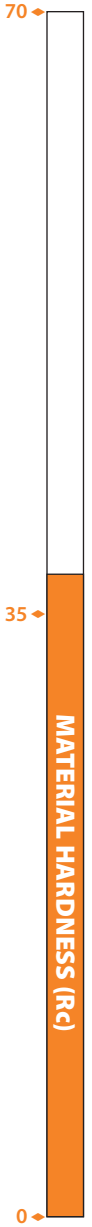




(220RA) 2 Flute EDP#	(230RA/830RA) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
79587	80587	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.010"	15.47	14.80	14.12	13.45
79597	80597	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.015"	15.47	14.80	14.12	13.45
79607	80607	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.010"	14.90	14.26	13.61	12.96
79617	80617	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.015"	14.90	14.26	13.61	12.96
79627	80627	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.020"	14.90	14.26	13.61	12.96
-	24077	.1181		3.000	3.0	38	12	0.20	13.79	13.19	12.59	11.99
-	24087	.1181		3.000	3.0	38	12	0.50	13.79	13.19	12.59	11.99
79007	80007	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	13.77	13.17	12.57	11.97
79017	80017	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"	13.77	13.17	12.57	11.97
79027	80027	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	13.77	13.17	12.57	11.97
79037	80037	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.030"	13.77	13.17	12.57	11.97
-	24097	.1575		4.000	4.0	50	14	0.30	18.06	17.27	16.49	15.70
-	24107	.1575		4.000	4.0	50	14	0.50	18.06	17.27	16.49	15.70
79047	80047	.1875	3/16"	4.763	3/16"	2"	5/8"	.010"	17.32	16.57	15.81	15.06
79057	80057	.1875	3/16"	4.763	3/16"	2"	5/8"	.015"	17.32	16.57	15.81	15.06
79067	80067	.1875	3/16"	4.763	3/16"	2"	5/8"	.020"	17.32	16.57	15.81	15.06
79077	80077	.1875	3/16"	4.763	3/16"	2"	5/8"	.030"	17.32	16.57	15.81	15.06
-	24117	.1969		5.000	5.0	50	16	0.30	24.09	23.05	22.00	20.95
-	24127	.1969		5.000	5.0	65	16	0.50	24.09	23.05	22.00	20.95
-	24177	.2362		6.000	6.0	65	19	0.50	24.56	23.50	22.43	21.36
-	24187	.2362		6.000	6.0	65	19	0.80	24.56	23.50	22.43	21.36
-	24197	.2362		6.000	6.0	65	19	1.00	24.56	23.50	22.43	21.36
-	24207	.2362		6.000	6.0	65	19	1.50	24.56	23.50	22.43	21.36
-	24217	.2362		6.000	6.0	65	19	2.00	24.56	23.50	22.43	21.36
-	80097	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	23.62	22.59	21.57	20.54
79107	80107	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	23.62	22.59	21.57	20.54
79117	80117	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	23.62	22.59	21.57	20.54
79127	80127	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	23.62	22.59	21.57	20.54
79137	80137	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.045"	23.62	22.59	21.57	20.54
79147	80147	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	23.62	22.59	21.57	20.54
79167	80167	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.015"	32.02	30.62	29.23	27.84
79177	80177	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.020"	32.02	30.62	29.23	27.84
79187	80187	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.030"	32.02	30.62	29.23	27.84
79197	80197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.045"	32.02	30.62	29.23	27.84
79207	80207	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.060"	32.02	30.62	29.23	27.84

† *Metric equivalents are for reference only*

(220RA) 2 Flute EDP#	(230RA/830RA) 4 Flute EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
-	24227	.3150		8.000	8.0	65	22	0.50	33.21	31.77	30.32	28.88
-	24237	.3150		8.000	8.0	65	22	0.80	33.21	31.77	30.32	28.88
-	24247	.3150		8.000	8.0	65	22	1.00	33.21	31.77	30.32	28.88
-	24257	.3150		8.000	8.0	65	22	1.50	33.21	31.77	30.32	28.88
-	24267	.3150		8.000	8.0	65	22	2.00	33.21	31.77	30.32	28.88
-	24277	.3150		8.000	8.0	65	22	2.50	33.21	31.77	30.32	28.88
-	24287	.3150		8.000	8.0	65	22	3.00	33.21	31.77	30.32	28.88
-	80227	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	37.39	35.76	34.14	32.51
79237	80237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	37.39	35.76	34.14	32.51
79247	80247	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	37.39	35.76	34.14	32.51
79257	80257	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	37.39	35.76	34.14	32.51
79267	80267	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.045"	37.39	35.76	34.14	32.51
79277	80277	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	37.39	35.76	34.14	32.51
-	24297	.3937		10.000	10.0	70	25	0.50	45.14	43.18	41.21	39.25
-	24307	.3937		10.000	10.0	70	25	0.80	45.14	43.18	41.21	39.25
-	24317	.3937		10.000	10.0	70	25	1.00	45.14	43.18	41.21	39.25
-	24327	.3937		10.000	10.0	70	25	1.50	45.14	43.18	41.21	39.25
-	24337	.3937		10.000	10.0	70	25	2.00	45.14	43.18	41.21	39.25
-	24347	.3937		10.000	10.0	70	25	2.50	45.14	43.18	41.21	39.25
-	24357	.3937		10.000	10.0	70	25	3.00	45.14	43.18	41.21	39.25
-	24367	.3937		10.000	10.0	70	25	3.20	45.14	43.18	41.21	39.25
-	80279	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.010"	45.21	43.24	41.28	39.31
-	80281	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.015"	45.21	43.24	41.28	39.31
-	80283	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.020"	45.21	43.24	41.28	39.31
-	80285	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.030"	45.21	43.24	41.28	39.31
-	80287	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.045"	45.21	43.24	41.28	39.31
-	80289	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.060"	45.21	43.24	41.28	39.31
-	80291	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.090"	45.21	43.24	41.28	39.31
-	80293	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.125"	45.21	43.24	41.28	39.31
-	24377	.4724		12.000	12.0	75	25	0.50	66.47	63.58	60.69	57.80
-	24387	.4724		12.000	12.0	75	25	0.80	66.47	63.58	60.69	57.80
-	24397	.4724		12.000	12.0	75	25	1.00	66.47	63.58	60.69	57.80
-	24407	.4724		12.000	12.0	75	25	1.50	66.47	63.58	60.69	57.80
-	24417	.4724		12.000	12.0	75	25	2.00	66.47	63.58	60.69	57.80
-	24427	.4724		12.000	12.0	75	25	2.50	66.47	63.58	60.69	57.80
-	24437	.4724		12.000	12.0	75	25	3.00	66.47	63.58	60.69	57.80
-	24447	.4724		12.000	12.0	75	25	3.20	66.47	63.58	60.69	57.80
-	80297	.5000	1/2"	12.700	1/2"	3"	1"	.010"	63.77	61.00	58.22	55.45
79307	80307	.5000	1/2"	12.700	1/2"	3"	1"	.015"	63.77	61.00	58.22	55.45
79317	80317	.5000	1/2"	12.700	1/2"	3"	1"	.020"	63.77	61.00	58.22	55.45
79327	80327	.5000	1/2"	12.700	1/2"	3"	1"	.030"	63.77	61.00	58.22	55.45
79337	80337	.5000	1/2"	12.700	1/2"	3"	1"	.045"	63.77	61.00	58.22	55.45
79347	80347	.5000	1/2"	12.700	1/2"	3"	1"	.060"	63.77	61.00	58.22	55.45
79357	80357	.5000	1/2"	12.700	1/2"	3"	1"	.090"	63.77	61.00	58.22	55.45
79367	80367	.5000	1/2"	12.700	1/2"	3"	1"	.125"	63.77	61.00	58.22	55.45
79377	80377	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	101.52	97.11	92.69	88.28
-	80387	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	101.52	97.11	92.69	88.28
79397	80397	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	101.52	97.11	92.69	88.28
79407	80407	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.045"	101.52	97.11	92.69	88.28
79417	80417	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	101.52	97.11	92.69	88.28
79427	80427	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.090"	101.52	97.11	92.69	88.28
-	24457	.6299		16.000	16.0	88	38	0.50	105.94	101.33	96.73	92.12
-	24467	.6299		16.000	16.0	88	38	1.00	105.94	101.33	96.73	92.12
-	24477	.6299		16.000	16.0	88	38	2.00	105.94	101.33	96.73	92.12
-	24487	.6299		16.000	16.0	88	38	2.50	105.94	101.33	96.73	92.12
-	24497	.6299		16.000	16.0	88	38	3.00	105.94	101.33	96.73	92.12
-	24507	.6299		16.000	16.0	88	38	4.00	105.94	101.33	96.73	92.12
-	24517	.6299		16.000	16.0	88	38	5.00	105.94	101.33	96.73	92.12



continued →

Series 220RA, 230RA, 830RA *(continued)*

.7500" - 1.000"
(19.050mm - 25.400mm)

(220RA) 2 Flute EDP#	(230RA/830RA) 4 Flute EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
79447	80447	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	145.59	139.26	132.93	126.60
79457	80457	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.020"	145.59	139.26	132.93	126.60
79467	80467	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	145.59	139.26	132.93	126.60
79477	80477	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.045"	145.59	139.26	132.93	126.60
79487	80487	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	145.59	139.26	132.93	126.60
79497	80497	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.090"	145.59	139.26	132.93	126.60
79507	80507	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.125"	145.59	139.26	132.93	126.60
79637	80637	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.250"	145.59	139.26	132.93	126.60
-	24527	.7874		20.000	20.0	100	38	0.50	206.05	197.09	188.13	179.17
-	24537	.7874		20.000	20.0	100	38	1.00	206.05	197.09	188.13	179.17
-	24547	.7874		20.000	20.0	100	38	2.00	206.05	197.09	188.13	179.17
-	24557	.7874		20.000	20.0	100	38	3.00	206.05	197.09	188.13	179.17
-	24567	.7874		20.000	20.0	100	38	5.00	206.05	197.09	188.13	179.17
-	80517	1.000	1"	25.400	1"	4"	1-1/2"	.015"	248.55	237.74	226.94	216.13
-	80527	1.000	1"	25.400	1"	4"	1-1/2"	.020"	248.55	237.74	226.94	216.13
79537	80537	1.000	1"	25.400	1"	4"	1-1/2"	.030"	248.55	237.74	226.94	216.13
-	80547	1.000	1"	25.400	1"	4"	1-1/2"	.045"	248.55	237.74	226.94	216.13
79557	80557	1.000	1"	25.400	1"	4"	1-1/2"	.060"	248.55	237.74	226.94	216.13
-	80567	1.000	1"	25.400	1"	4"	1-1/2"	.090"	248.55	237.74	226.94	216.13
79577	80577	1.000	1"	25.400	1"	4"	1-1/2"	.125"	248.55	237.74	226.94	216.13
79647	80647	1.000	1"	25.400	1"	4"	1-1/2"	.250"	248.55	237.74	226.94	216.13



End Mill Manufacturing

† *Metric equivalents are for reference only*

TOLERANCES

d_1	≤ .030"	+.000" –.001" (+.000 –.025mm)
	≥ 1/32"	+.000" –.002" (+.000 –.050mm)
d_2	h6	
ball radius	+.000" –.001" (+.000 –.025mm)	

Series 320M, 323M, 330M, 920M, 923M, 930M

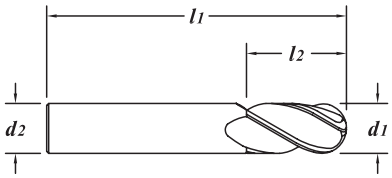
Z=2 Z=3 Z=4 30° TECH PAGES 258,260

.0100" - .2656"
(0.254mm - 6.746mm)

Standard Length - Ball End

Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiN Coating - page 207
TiCN Coating - page 208
TiALN Coating - page 209
Stub Length - page 188
Extended length - page 231





(320M/920M) 2 Flute EDP#	(323M/923M) 3 Flute EDP#	(330M/930M) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
16550	-	-	.0100	.0100"	0.254	1/8"	1-1/2"	.030"	22.79	21.80	20.81	19.82
16600	-	-	.0150	.0150"	0.381	1/8"	1-1/2"	.045"	22.70	21.71	20.73	19.74
16650	-	-	.0200	.0200"	0.508	1/8"	1-1/2"	.060"	22.10	21.14	20.18	19.22
16700	-	-	.0250	.0250"	0.635	1/8"	1-1/2"	.075"	21.36	20.43	19.50	18.57
16750	-	-	.0300	.0300"	0.762	1/8"	1-1/2"	.090"	18.40	17.60	16.80	16.00
16010	17010	18010	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"	13.65	13.06	12.46	11.87
47010	38010	48010	.0394		1.000	3.0	38	4	14.33	13.71	13.08	12.46
16020	17020	18020	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"	13.65	13.06	12.46	11.87
47020	38020	48020	.0591		1.500	3.0	38	6	14.33	13.71	13.08	12.46
16030	17030	18030	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	12.88	12.32	11.76	11.20
16040	17040	18040	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"	12.88	12.32	11.76	11.20
47030	38030	48030	.0787		2.000	3.0	38	8	13.51	12.93	12.34	11.75
16050	17050	18050	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	12.32	11.78	11.25	10.71
47040	38040	48040	.0984		2.500	3.0	38	12	12.95	12.39	11.82	11.26
16060	17060	18060	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"	12.32	11.78	11.25	10.71
47050	38050	48050	.1181		3.000	3.0	38	12	11.75	11.24	10.73	10.22
16070	17070	18070	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	11.18	10.69	10.21	9.72
47060	38060	48060	.1378		3.500	4.0	50	12	17.25	16.50	15.75	15.00
16080	17080	18080	.1406	9/64"	3.571	3/16"	2"	9/16"	16.40	15.69	14.97	14.26
16090	17090	18090	.1562	5/32"	3.967	3/16"	2"	9/16"	16.40	15.69	14.97	14.26
47070	38070	48070	.1575		4.000	4.0	50	14	15.47	14.80	14.12	13.45
16100	17100	18100	.1719	11/64"	4.366	3/16"	2"	9/16"	16.40	15.69	14.97	14.26
47080	38080	48080	.1772		4.500	5.0	50	14	19.47	18.62	17.78	16.93
16110	17110	18110	.1875	3/16"	4.763	3/16"	2"	5/8"	14.73	14.09	13.45	12.81
47090	38090	48090	.1969		5.000	5.0	65	16	18.76	17.94	17.13	16.31
16120	17120	18120	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"	19.08	18.25	17.42	16.59
16130	17130	18130	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"	19.08	18.25	17.42	16.59
16140	17140	18140	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"	19.08	18.25	17.42	16.59
47100	38100	48100	.2362		6.000	6.0	65	19	19.23	18.39	17.56	16.72
16150	17150	18150	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	18.30	17.50	16.71	15.91
16160	17160	18160	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"	28.64	27.39	26.15	24.90

continued →

Series 320M, 323M, 330M, 920M, 923M, 930M *(continued)*

.2756" - 1.000"
(7.00mm - 25.40mm)

(320M/920M) 2 Flute EDP#	(323M/923M) 3 Flute EDP#	(330M/930M) 4 Flute EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
47110	38110	48110	.2756		7.000	7.0	65	22	24.68	23.61	22.53	21.46
16170	17170	18170	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"	28.64	27.39	26.15	24.90
16180	-	18180	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"	28.64	27.39	26.15	24.90
16190	17190	18190	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	23.99	22.95	21.90	20.86
47120	38120	48120	.3150		8.000	8.0	65	22	25.24	24.15	23.05	21.95
16200	17200	18200	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"	34.28	32.79	31.30	29.81
16210	17210	18210	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	34.28	32.79	31.30	29.81
47130	38130	48130	.3543		9.000	9.0	65	22	30.84	29.50	28.16	26.82
16220	-	18220	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"	34.28	32.79	31.30	29.81
16230	17230	18230	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	29.36	28.08	26.81	25.53
16240	17240	18240	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"	42.18	40.35	38.51	36.68
47140	38140	48140	.3937		10.000	10.0	70	25	36.04	34.47	32.91	31.34
16250	17250	18250	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"	42.18	40.35	38.51	36.68
16260	17260	18260	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"	42.18	40.35	38.51	36.68
47150	38150	48150	.4331		11.000	11.0	75	25	37.94	36.29	34.64	32.99
16270	17270	18270	.4375	7/16"	11.113	7/16"	2-3/4"	1"	36.13	34.56	32.99	31.42
16280	17280	18280	.4531	29/64"	11.509	1/2"	3"	1"	60.42	57.79	55.17	52.54
16290	17290	18290	.4688	15/32"	11.908	1/2"	3"	1"	60.42	57.79	55.17	52.54
47160	38160	48160	.4724		12.000	12.0	75	25	57.40	54.90	52.41	49.91
16300	17300	18300	.4844	31/64"	12.304	1/2"	3"	1"	60.42	57.79	55.17	52.54
16310	17310	18310	.5000	1/2"	12.700	1/2"	3"	1"	54.65	52.27	49.90	47.52
47170	38170	48170	.5512		14.000	14.0	88	32	83.56	79.93	76.29	72.66
16320	17320	18320	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	79.59	76.13	72.67	69.21
16330	17330	18330	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	88.39	84.55	80.70	76.86
47180	38180	48180	.6299		16.000	16.0	88	38	92.78	88.75	84.71	80.68
16340	17340	18340	.6875	11/16"	17.463	3/4"	4"	1-1/2"	147.13	140.73	134.34	127.94
47190	38190	48190	.7087		18.000	18.0	100	38	136.55	130.61	124.68	118.74
16350	17350	18350	.7500	3/4"	19.050	3/4"	4"	1-1/2"	130.08	124.42	118.77	113.11
47200	38200	48200	.7874		20.000	20.0	100	38	183.11	175.15	167.19	159.23
47210	38210	48210	.8661		22.000	22.0	100	38	203.41	194.57	185.72	176.88
16360	17360	18360	.8750	7/8"	22.225	7/8"	4"	1-1/2"	208.38	199.32	190.26	181.20
47220	-	-	.9843		25.000	25.0	100	38	213.23	203.96	194.69	185.42
16370	17370	18370	1.000	1"	25.400	1"	4"	1-1/2"	225.62	215.81	206.00	196.19

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

TOLERANCES

d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

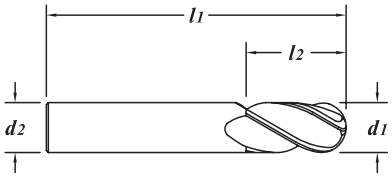
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Standard Length - Ball End

TiN Coating

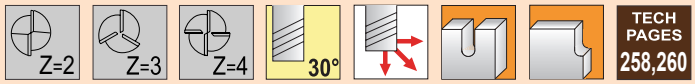
Solid submicron grain carbide end mill - center cutting
Improved lubricity
Extremely versatile
Uncoated - page 205
TiCN Coating - page 208
TiALN Coating - page 209





(320MT) 2 Flute EDP#	(330MT) 4 Flute EDP#	d_1 † Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
16073	18073	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	12.70	12.14	11.59	11.04
16113	18113	.1875	3/16"	4.763	3/16"	2"	5/8"	16.26	15.55	14.85	14.14
16153	18153	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	21.38	20.45	19.52	18.59
16193	18193	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	28.14	26.92	25.69	24.47
16233	18233	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	33.51	32.05	30.60	29.14
16273	18273	.4375	7/16"	11.113	7/16"	2-3/4"	1"	41.14	39.35	37.56	35.77
16313	18313	.5000	1/2"	12.700	1/2"	3"	1"	59.67	57.08	54.48	51.89
16333	18333	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	96.09	91.92	87.74	83.56
16353	18353	.7500	3/4"	19.050	3/4"	4"	1-1/2"	138.89	132.85	126.81	120.77
16373	18373	1.000	1"	25.400	1"	4"	1-1/2"	241.05	230.57	220.09	209.61

Series 320MC, 323MC, 330MC

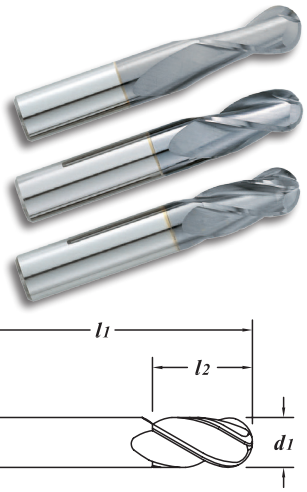


TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

Standard Length - Ball End

TiCN Coating

Solid submicron grain carbide end mill - center cutting
Improved abrasion resistance and lubricity
Extremely versatile
Uncoated - page 205
TiN Coating - page 207
TiALN Coating - page 209
Extended length - page 233

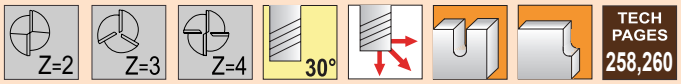


(320MC) 2 Flute EDP#	(323MC) 3 Flute EDP#	(330MC) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
16014	17014	18014	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"	15.93	15.24	14.54	13.85
16024	17024	18024	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"	15.93	15.24	14.54	13.85
16034	17034	18034	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	15.17	14.51	13.85	13.19
16044	17044	18044	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"	15.17	14.51	13.85	13.19
16054	17054	18054	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	14.59	13.96	13.32	12.69
16064	17064	18064	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"	14.59	13.96	13.32	12.69
16074	17074	18074	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	13.46	12.87	12.29	11.70
16084	17084	18084	.1406	9/64"	3.571	3/16"	2"	9/16"	18.70	17.89	17.07	16.26
16094	17094	18094	.1562	5/32"	3.967	3/16"	2"	9/16"	18.70	17.89	17.07	16.26
16104	-	18104	.1719	11/64"	4.366	3/16"	2"	9/16"	18.70	17.89	17.07	16.26
16114	17114	18114	.1875	3/16"	4.763	3/16"	2"	5/8"	17.01	16.27	15.53	14.79
16124	17124	18124	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"	23.70	22.67	21.64	20.61
16134	17134	18134	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"	23.70	22.67	21.64	20.61
16144	17144	18144	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"	23.70	22.67	21.64	20.61
16154	17154	18154	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	22.92	21.92	20.93	19.93
-	17164	18164	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"	34.82	33.31	31.79	30.28
16174	17174	18174	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"	34.82	33.31	31.79	30.28
-	-	18184	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"	34.82	33.31	31.79	30.28
16194	17194	18194	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	30.21	28.90	27.58	26.27
16204	-	-	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"	40.48	38.72	36.96	35.20
-	17214	18214	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	40.48	38.72	36.96	35.20
16224	-	18224	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"	40.48	38.72	36.96	35.20
16234	17234	18234	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	35.55	34.00	32.46	30.91
16244	-	18244	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"	49.59	47.43	45.28	43.12
16254	17254	18254	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"	49.59	47.43	45.28	43.12
-	-	18264	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"	49.59	47.43	45.28	43.12
16274	17274	18274	.4375	7/16"	11.113	7/16"	2-3/4"	1"	43.56	41.67	39.77	37.88
-	-	18284	.4531	29/64"	11.509	1/2"	3"	1"	67.86	64.91	61.96	59.01
-	17294	18294	.4688	15/32"	11.908	1/2"	3"	1"	67.86	64.91	61.96	59.01
16304	17304	18304	.4844	31/64"	12.304	1/2"	3"	1"	67.86	64.91	61.96	59.01
16314	17314	18314	.5000	1/2"	12.700	1/2"	3"	1"	62.10	59.40	56.70	54.00
16324	17324	18324	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	91.15	87.19	83.22	79.26
16334	17334	18334	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	99.97	95.62	91.28	86.93
-	17344	-	.6875	11/16"	17.463	3/4"	4"	1-1/2"	160.36	153.38	146.41	139.44
16354	17354	18354	.7500	3/4"	19.050	3/4"	4"	1-1/2"	143.30	137.07	130.84	124.61
16364	17364	18364	.8750	7/8"	22.225	7/8"	4"	1-1/2"	228.26	218.34	208.41	198.49
16374	17374	18374	1.000	1"	25.400	1"	4"	1-1/2"	245.51	234.84	224.16	213.49

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

Series 320MA, 323MA, 330MA, 920MA, 923MA, 930MA



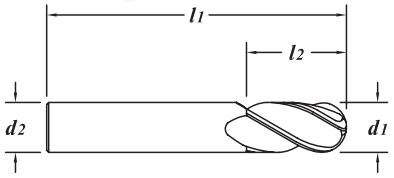
.0312" - .3150"
(0.792mm - 8.000mm)



Standard Length - Ball End

TiALN Coating

Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Uncoated - page 205
TiN Coating - page 207
TiCN Coating - page 208
Stub Length - page 189
Extended length - page 234



(320MA/920MA) 2 Flute EDP#	(323MA/923MA) 3 Flute EDP#	(330MA/930MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
16017	17017	18017	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"	16.23	15.52	14.82	14.11
47017	38017	48017	.0394		1.000	3.0	38	4	16.92	16.18	15.45	14.71
16027	17027	18027	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"	16.23	15.52	14.82	14.11
47027	38027	48027	.0591		1.500	3.0	38	6	16.92	16.18	15.45	14.71
16037	17037	18037	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	15.47	14.80	14.12	13.45
16047	17047	18047	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"	15.47	14.80	14.12	13.45
47037	38037	48037	.0787		2.000	3.0	38	8	16.11	15.41	14.71	14.01
16057	17057	18057	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	14.90	14.26	13.61	12.96
47047	38047	48047	.0984		2.500	3.0	38	12	15.53	14.85	14.18	13.50
16067	17067	18067	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"	14.90	14.26	13.61	12.96
47057	38057	48057	.1181		3.000	3.0	38	12	14.33	13.71	13.08	12.46
16077	17077	18077	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	13.77	13.17	12.57	11.97
47067	38067	48067	.1378		3.500	4.0	50	12	19.83	18.96	18.10	17.24
16087	17087	18087	.1406	9/64"	3.571	3/16"	2"	9/16"	19.01	18.18	17.36	16.53
16097	17097	18097	.1562	5/32"	3.967	3/16"	2"	9/16"	19.01	18.18	17.36	16.53
47077	38077	48077	.1575		4.000	4.0	50	14	18.06	17.27	16.49	15.70
16107	17107	18107	.1719	11/64"	4.366	3/16"	2"	9/16"	19.01	18.18	17.36	16.53
47087	38087	48087	.1772		4.500	5.0	50	14	23.51	22.48	21.46	20.44
16117	17117	18117	.1875	3/16"	4.763	3/16"	2"	5/8"	17.32	16.57	15.81	15.06
47097	38097	48097	.1969		5.000	5.0	65	16	24.09	23.05	22.00	20.95
16127	17127	18127	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"	24.43	23.36	22.30	21.24
16137	17137	18137	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"	24.43	23.36	22.30	21.24
16147	17147	18147	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"	24.43	23.36	22.30	21.24
47107	38107	48107	.2362		6.000	6.0	65	19	24.56	23.50	22.43	21.36
16157	17157	18157	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	23.62	22.59	21.57	20.54
16167	17167	18167	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"	36.64	35.05	33.45	31.86
47117	38117	48117	.2756		7.000	7.0	65	22	32.65	31.23	29.81	28.39
16177	17177	18177	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"	36.64	35.05	33.45	31.86
16187	17187	18187	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"	36.64	35.05	33.45	31.86
16197	17197	18197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	32.02	30.62	29.23	27.84
47127	38127	48127	.3150		8.000	8.0	65	22	33.21	31.77	30.32	28.88

continued →

Series 320MA, 323MA, 330MA, 920MA, 923MA, 930MA *(continued)*

.3281" - 1.000"
(8.334mm - 25.400mm)

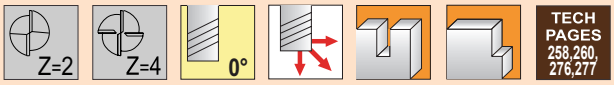
(320MA/920MA) 2 Flute EDP#	(323MA/923MA) 3 Flute EDP#	(330MA/930MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
16207	17207	18207	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"	42.29	40.45	38.61	36.77
16217	17217	18217	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	42.29	40.45	38.61	36.77
47137	38137	48137	.3543		9.000	9.0	65	22	38.82	37.14	35.45	33.76
16227	17227	18227	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"	42.29	40.45	38.61	36.77
16237	17237	18237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	37.39	35.76	34.14	32.51
16247	17247	18247	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"	51.26	49.03	46.80	44.57
47147	38147	48147	.3937		10.000	10.0	70	25	45.14	43.18	41.21	39.25
16257	17257	18257	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"	51.26	49.03	46.80	44.57
16267	-	18267	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"	51.26	49.03	46.80	44.57
47157	38157	48157	.4331		11.000	11.0	75	25	47.02	44.98	42.93	40.89
16277	17277	18277	.4375	7/16"	11.113	7/16"	2-3/4"	1"	45.21	43.24	41.28	39.31
16287	17287	18287	.4531	29/64"	11.509	1/2"	3"	1"	69.53	66.51	63.48	60.46
16297	17297	18297	.4688	15/32"	11.908	1/2"	3"	1"	69.53	66.51	63.48	60.46
47167	38167	48167	.4724		12.000	12.0	75	25	66.47	63.58	60.69	57.80
16307	17307	18307	.4844	31/64"	12.304	1/2"	3"	1"	69.53	66.51	63.48	60.46
16317	17317	18317	.5000	1/2"	12.700	1/2"	3"	1"	63.77	61.00	58.22	55.45
47177	38177	48177	.5512		14.000	14.0	88	32	96.70	92.50	88.29	84.09
16327	17327	18327	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	92.72	88.69	84.66	80.63
16337	17337	18337	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	101.52	97.11	92.69	88.28
47187	38187	48187	.6299		16.000	16.0	88	38	105.94	101.33	96.73	92.12
16347	17347	18347	.6875	11/16"	17.463	3/4"	4"	1-1/2"	162.63	155.56	148.49	141.42
47197	38197	48197	.7087		18.000	18.0	100	38	152.09	145.48	138.86	132.25
16357	17357	18357	.7500	3/4"	19.050	3/4"	4"	1-1/2"	145.59	139.26	132.93	126.60
47207	38207	48207	.7874		20.000	20.0	100	38	206.05	197.09	188.13	179.17
47217	38217	48217	.8661		22.000	22.0	100	38	226.34	216.50	206.66	196.82
-	17367	18367	.8750	7/8"	22.225	7/8"	4"	1-1/2"	231.31	221.25	211.20	201.14
47227	38227	48227	.9843		25.000	25.0	100	38	236.15	225.89	215.62	205.35
16377	17377	18377	1.000	1"	25.400	1"	4"	1-1/2"	248.55	237.74	226.94	216.13

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

NEW ITEMS

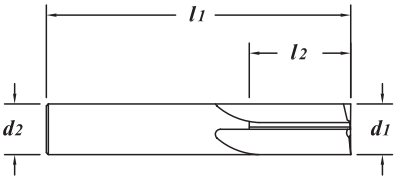
Series 222M, 234M, 334MA



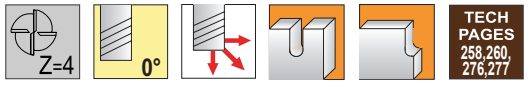
Standard Length - Straight Flute - Square End

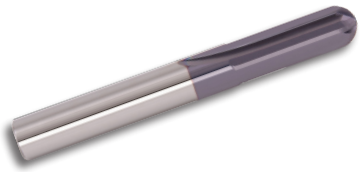
Solid submicron grain carbide end mill - center cutting
For cutting high Rc materials
Helps to hold perpendicularity





(222M) 2 Flute EDP#	(234M) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
81070	82070	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	9.68	9.26	8.84	8.42
81110	82110	.1875	3/16"	4.763	3/16"	2"	5/8"	13.58	12.99	12.40	11.81
81150	82150	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	16.38	15.66	14.95	14.24
81190	82190	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	22.95	21.96	20.96	19.96
81230	82230	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	28.60	27.36	26.11	24.87
81270	82270	.4375	7/16"	11.113	7/16"	2-3/4"	1"	34.90	33.39	31.87	30.35
81310	82310	.5000	1/2"	12.700	1/2"	3"	1"	45.77	43.78	41.79	39.80
81330	82330	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	88.34	84.50	80.66	76.82

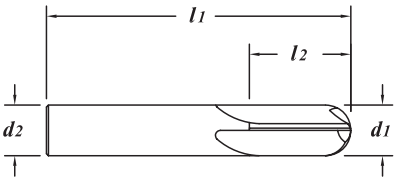




Standard Length - Straight Flute - Ball End

TiALN Coating

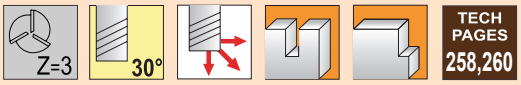
Solid submicron grain carbide end mill - center cutting
For cutting high Rc materials
Helps to hold perpendicularity



	(334MA) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
NEW	84077	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	14.32	13.70	13.07	12.45
NEW	84115	.1875	3/16"	4.763	3/16"	2"	5/8"	18.29	17.49	16.70	15.90
NEW	84157	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	24.22	23.17	22.11	21.06
NEW	84237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	38.47	36.80	35.12	33.45

Series 273M, 373M

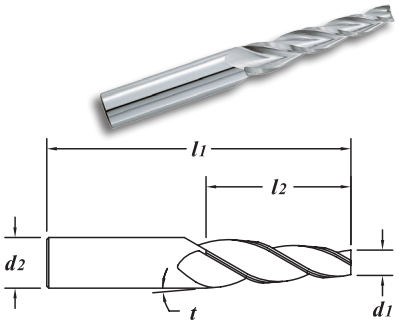
TOLERANCES	
d_1	+.003" –.000" (+.075 –.000mm)
d_2	h6



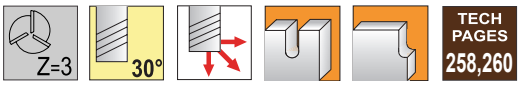
TECH PAGES 258,260

Standard Length - Tapered - Square End

Solid submicron grain carbide end mill - center cutting
Excellent for holding draft angles in mold and die applications



273M EDP#	d_2 Shank Diameter	t Taper Per Side	d_1 † Tip Diameter Decimal	Tip Diameter	Tip Diameter Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
49010	1/4"	1°	.1250	1/8"	3.175	3"	1-1/2"	31.74	30.36	28.98	27.60
49020	1/4"	1° 30′	.1250	1/8"	3.175	3"	1-1/2"	31.74	30.36	28.98	27.60
49030	1/4"	2°	.1250	1/8"	3.175	3"	1"	31.74	30.36	28.98	27.60
49040	1/4"	3°	.1250	1/8"	3.175	3"	1-1/4"	31.74	30.36	28.98	27.60
49050	1/4"	5°	.1250	1/8"	3.175	3"	3/4"	31.74	30.36	28.98	27.60
49060	1/4"	7°	.1250	1/8"	3.175	3"	1/2"	31.74	30.36	28.98	27.60
49070	3/8"	1°	.1875	3/16"	4.763	3-1/2"	1-3/4"	47.67	45.60	43.52	41.45
49080	3/8"	1° 30′	.1875	3/16"	4.763	3-1/2"	1-3/4"	47.67	45.60	43.52	41.45
49090	3/8"	2°	.1875	3/16"	4.763	3-1/2"	1-3/4"	47.67	45.60	43.52	41.45
49100	3/8"	3°	.1562	5/32"	3.967	3-1/2"	1-3/4"	47.67	45.60	43.52	41.45
49110	3/8"	5°	.1250	1/8"	3.175	3-1/2"	1-1/2"	47.67	45.60	43.52	41.45
49120	3/8"	7°	.1562	5/32"	3.967	3-1/2"	1"	47.67	45.60	43.52	41.45
49130	1/2"	3°	.2500	1/4"	6.350	4"	2"	65.67	62.81	59.96	57.10
49140	1/2"	5°	.2500	1/4"	6.350	4"	1-1/2"	65.67	62.81	59.96	57.10
49150	1/2"	7°	.1875	3/16"	4.763	4"	1-5/16"	65.67	62.81	59.96	57.10

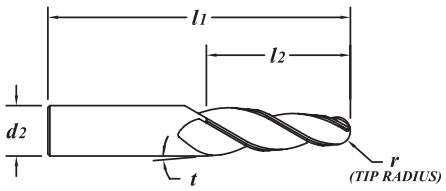


TECH PAGES 258,260



Standard Length - Tapered - Ball End

Solid submicron grain carbide end mill - center cutting
Excellent for holding draft angles in mold and die applications
Radius tolerance +.003" –.000" (+.075mm –.000mm)



373M EDP#	d_2 Shank Diameter	t Taper Per Side	r † Tip Radius Decimal	Tip Radius	Tip Radius Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
50010	1/4"	1°	.0620	.062"	1.575	3"	1-1/2"	35.21	33.68	32.15	30.62
50020	1/4"	1° 30′	.0620	.062"	1.575	3"	1-1/2"	35.21	33.68	32.15	30.62
50030	1/4"	2°	.0620	.062"	1.575	3"	1"	35.21	33.68	32.15	30.62
50040	1/4"	3°	.0620	.062"	1.575	3"	1-1/4"	35.21	33.68	32.15	30.62
50050	1/4"	5°	.0620	.062"	1.575	3"	3/4"	35.21	33.68	32.15	30.62
50060	1/4"	7°	.0620	.062"	1.575	3"	1/2"	35.21	33.68	32.15	30.62
50070	3/8"	1°	.0930	.093"	2.362	3-1/2"	1-3/4"	52.93	50.63	48.33	46.03
50080	3/8"	1° 30′	.0930	.093"	2.362	3-1/2"	1-3/4"	52.93	50.63	48.33	46.03
50090	3/8"	2°	.0930	.093"	2.362	3-1/2"	1-3/4"	52.93	50.63	48.33	46.03
50100	3/8"	3°	.0780	.078"	1.981	3-1/2"	1-3/4"	52.93	50.63	48.33	46.03
50110	3/8"	5°	.0620	.062"	1.575	3-1/2"	1-1/2"	52.93	50.63	48.33	46.03
50120	3/8"	7°	.0780	.078"	1.981	3-1/2"	1"	52.93	50.63	48.33	46.03
50130	1/2"	3°	.1250	.125"	3.175	4"	2"	75.47	72.19	68.91	65.63
50140	1/2"	5°	.1250	.125"	3.175	4"	1-1/2"	75.47	72.19	68.91	65.63
50150	1/2"	7°	.0930	.093"	2.362	4"	1-5/16"	75.47	72.19	68.91	65.63

† *Metric equivalents are for reference only*

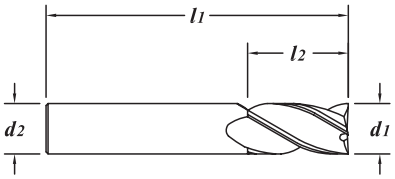
TOLERANCES	
d_1	+.001" –.000" (+.025 –.000mm)
d_2	h6

Z=2 Z=4 30° TECH PAGES 258,260

Standard Length - N/C Tolerance - Square End



Solid submicron grain carbide end mill - center cutting
Excellent for keyways
Tight tolerance for precision machining
For use when matching tools are necessary



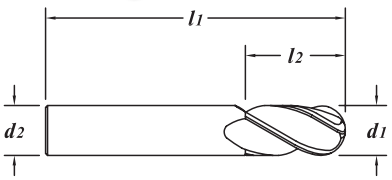
(280M) 2 Flute EDP#	(290M) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
25010	26010	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	14.18	13.56	12.95	12.33
25020	26020	.0938	3/32"	2.383	1/8"	1-1/2"	5/16"	13.43	12.85	12.26	11.68
25030	26030	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	13.04	12.47	11.91	11.34
25040	26040	.1875	3/16"	4.763	3/16"	2"	9/16"	17.34	16.59	15.83	15.08
25050	26050	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	19.94	19.07	18.21	17.34
* 25070	* 26070	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	36.64	35.05	33.45	31.86
* 25090	* 26090	.5000	1/2"	12.700	1/2"	3"	1"	58.68	56.13	53.58	51.03
-	* 26100	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	104.47	99.92	95.38	90.84

Z=2 Z=4 30° TECH PAGES 258,260



Standard Length - N/C Tolerance - Ball End

Solid submicron grain carbide end mill - center cutting
Excellent for keyways
Tight tolerance for precision machining
For use when matching tools are necessary
Ball radius tolerance +.0005" –.0000" (+.0127mm –.0000mm)

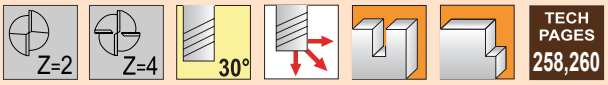


(380M) 2 Flute EDP#	(390M) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
27010	28010	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	16.32	15.61	14.90	14.19
27030	28030	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	15.00	14.34	13.69	13.04
-	28040	.1875	3/16"	4.763	3/16"	2"	9/16"	19.94	19.07	18.21	17.34
27050	28050	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	22.95	21.96	20.96	19.96
-	28060	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	32.81	31.38	29.96	28.53
* 27070	* 28070	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	42.15	40.32	38.48	36.65
-	* 28090	.5000	1/2"	12.700	1/2"	3"	1"	67.51	64.57	61.64	58.70
-	* 28100	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	120.18	114.95	109.73	104.50

* - Tools with weldon flats

Series 425M, 435M, 425MA, 435MA

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

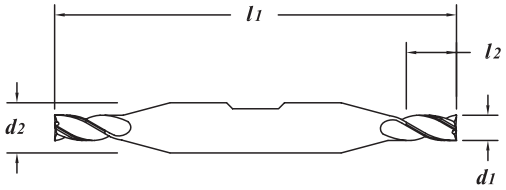


TECH PAGES 258,260

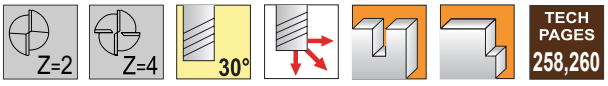
Standard Length - Double End - 3/8" Shank

Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel





(425M) 2 Flute EDP#	(435M) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
33010	34010	.1250	1/8"	3.175	3/8"	3"	3/8"	37.94	36.29	34.64	32.99
33020	34020	.1562	5/32"	3.967	3/8"	3"	7/16"	37.94	36.29	34.64	32.99
33030	34030	.1875	3/16"	4.763	3/8"	3"	1/2"	37.94	36.29	34.64	32.99
33040	-	.2188	7/32"	5.558	3/8"	3"	9/16"	37.94	36.29	34.64	32.99
33050	34050	.2500	1/4"	6.350	3/8"	3"	5/8"	37.94	36.29	34.64	32.99
33060	34060	.2812	9/32"	7.142	3/8"	4"	11/16"	43.60	41.70	39.81	37.91
33070	34070	.3125	5/16"	7.938	3/8"	4"	3/4"	43.60	41.70	39.81	37.91
33090	34090	.3750	3/8"	9.525	3/8"	4"	3/4"	43.60	41.70	39.81	37.91



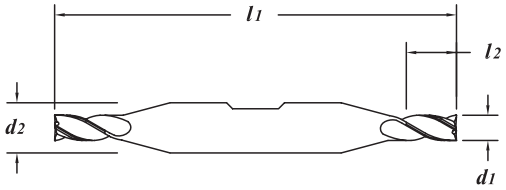
TECH PAGES 258,260

Standard Length - Double End - 3/8" Shank

TiALN Coated

Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel
Dry or semi-dry machining



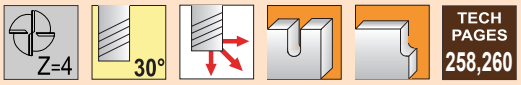


(425MA) 2 Flute EDP#	(435MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
-	34017	.1250	1/8"	3.175	3/8"	3"	3/8"	49.93	47.76	45.59	43.42
-	34027	.1562	5/32"	3.967	3/8"	3"	7/16"	49.93	47.76	45.59	43.42
-	34037	.1875	3/16"	4.763	3/8"	3"	1/2"	49.93	47.76	45.59	43.42
-	34047	.2188	7/32"	5.558	3/8"	3"	9/16"	49.93	47.76	45.59	43.42
33057	34057	.2500	1/4"	6.350	3/8"	3"	5/8"	49.93	47.76	45.59	43.42
-	34067	.2812	9/32"	7.142	3/8"	4"	11/16"	58.81	56.25	53.70	51.14
-	34077	.3125	5/16"	7.938	3/8"	4"	3/4"	58.81	56.25	53.70	51.14
-	34097	.3750	3/8"	9.525	3/8"	4"	3/4"	58.81	56.25	53.70	51.14

† *Metric equivalents are for reference only*

TOLERANCES

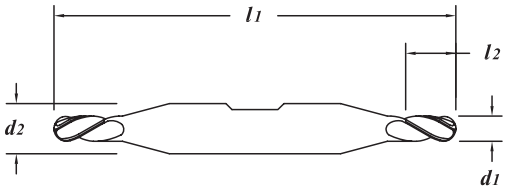
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)



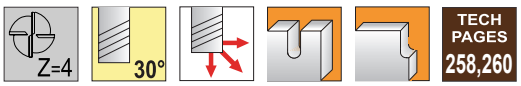


Standard Length - Double End - 3/8" Shank - Ball End

Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel



EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
36010	.1250	1/8"	3.175	3/8"	3"	3/8"	44.63	42.69	40.75	38.81
36030	.1875	3/16"	4.763	3/8"	3"	1/2"	44.63	42.69	40.75	38.81
36050	.2500	1/4"	6.350	3/8"	3"	5/8"	44.63	42.69	40.75	38.81

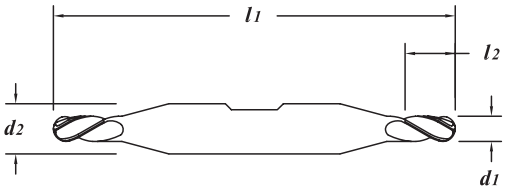




Standard Length - Double End - 3/8" Shank - Ball End

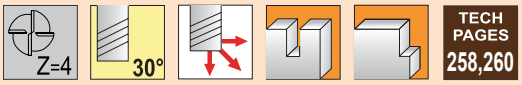
TiALN Coated

Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel
Dry or semi-dry machining



EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
36017	.1250	1/8"	3.175	3/8"	3"	3/8"	56.61	54.15	51.69	49.23
36027	.1562	5/32"	3.967	3/8"	3"	7/16"	56.61	54.15	51.69	49.23
36037	.1875	3/16"	4.763	3/8"	3"	1/2"	56.61	54.15	51.69	49.23
36057	.2500	1/4"	6.350	3/8"	3"	5/8"	56.61	54.15	51.69	49.23
36077	.3125	5/16"	7.938	3/8"	4"	3/4"	66.49	63.60	60.71	57.82

Series 430M

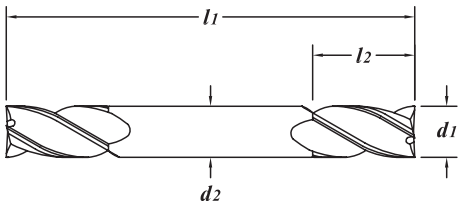


TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

Standard Length - Double End

Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiALN Coating - page 217
Stub Length - page 190





70
35
0

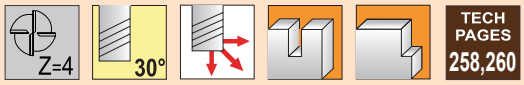
MATERIAL HARDNESS (Rc)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
30030	.0625	1/16"	1.588	1/8"	2"	3/16"	22.97	21.97	20.97	19.97
30040	.0938	3/32"	2.383	1/8"	2"	1/4"	22.97	21.97	20.97	19.97
30050	.1250	1/8"	3.175	1/8"	2"	3/8"	16.59	15.87	15.15	14.43
30060	.1562	5/32"	3.967	3/16"	2-1/2"	7/16"	23.71	22.68	21.65	20.62
30070	.1875	3/16"	4.763	3/16"	2-1/2"	1/2"	19.84	18.98	18.11	17.25
30090	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"	24.06	23.01	21.97	20.92
30100	.3125	5/16"	7.938	5/16"	3-1/2"	3/4"	31.41	30.04	28.68	27.31
30110	.3750	3/8"	9.525	3/8"	3-1/2"	3/4"	40.56	38.80	37.03	35.27
30130	.5000	1/2"	12.700	1/2"	4"	1"	64.77	61.95	59.14	56.32

† *Metric equivalents are for reference only*

TOLERANCES

d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



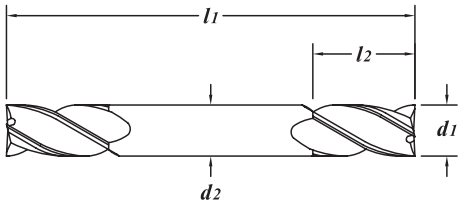
TECH PAGES 258,260

Standard Length - Double End

TiALN Coating

Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Uncoated - page 216
Stub Length - page 191





(430MA/450MA) EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
30017	.0312	1/32"	0.792	1/8"	2"	3/32"	26.85	25.69	24.52	23.35
30517	.0394		1.000	3.0	50	4	28.07	26.85	25.63	24.41
30027	.0469	3/64"	1.191	1/8"	2"	1/8"	26.85	25.69	24.52	23.35
30037	.0625	1/16"	1.588	1/8"	2"	3/16"	26.85	25.69	24.52	23.35
30537	.0787		2.000	3.0	50	6	28.07	26.85	25.63	24.41
30047	.0938	3/32"	2.383	1/8"	2"	1/4"	26.85	25.69	24.52	23.35
30057	.1250	1/8"	3.175	1/8"	2"	3/8"	20.48	19.59	18.70	17.81
30567	.1378		3.500	4.0	65	9.5	31.00	29.66	28.31	26.96
30067	.1562	5/32"	3.967	3/16"	2-1/2"	7/16"	29.75	28.46	27.16	25.87
30077	.1875	3/16"	4.763	3/16"	2-1/2"	1/2"	25.90	24.77	23.65	22.52
30597	.1969		5.000	5.0	65	12	32.22	30.82	29.42	28.02
30087	.2188	7/32"	5.558	1/4"	2-1/2"	9/16"	34.42	32.92	31.43	29.93
30607	.2362		6.000	6.0	65	16	33.32	31.87	30.42	28.97
30097	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"	32.09	30.69	29.30	27.90
30107	.3125	5/16"	7.938	5/16"	3-1/2"	3/4"	46.63	44.61	42.58	40.55
30117	.3750	3/8"	9.525	3/8"	3-1/2"	3/4"	55.81	53.38	50.96	48.53
30647	.3937		10.000	10.0	88	19	74.41	71.17	67.94	64.70
30127	.4375	7/16"	11.113	7/16"	4"	7/8"	75.29	72.02	68.74	65.47
30137	.5000	1/2"	12.700	1/2"	4"	1"	82.41	78.83	75.24	71.66

Series 530M

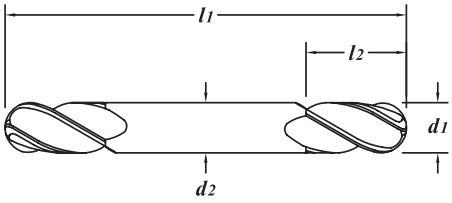
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

Z=4 | 30° | TECH PAGES 258,260

Standard Length - Double End - Ball End

Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiALN Coating - page 219
Stub Length - page 192



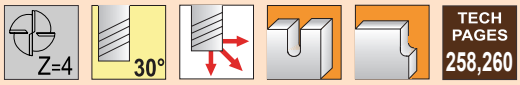


70
35
0
MATERIAL HARDNESS (Rc)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
32050	.1250	1/8"	3.175	1/8"	2"	3/8"	19.07	18.24	17.41	16.58
32070	.1875	3/16"	4.763	3/16"	2-1/2"	1/2"	23.36	22.34	21.33	20.31
32090	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"	27.72	26.51	25.31	24.10
32110	.3750	3/8"	9.525	3/8"	3-1/2"	3/4"	46.68	44.65	42.62	40.59
32130	.5000	1/2"	12.700	1/2"	4"	1"	74.49	71.25	68.01	64.77

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

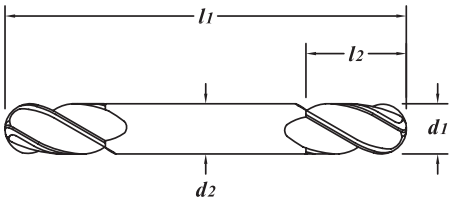


Standard Length - Double End - Ball End

TiALN Coating

Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Uncoated - page 218
Stub Length - page 193

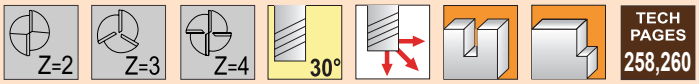




EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
32017	.0312	1/32"	0.792	1/8"	2"	3/32"	30.31	29.00	27.68	26.36
32027	.0469	3/64"	1.191	1/8"	2"	1/8"	30.31	29.00	27.68	26.36
32037	.0625	1/16"	1.588	1/8"	2"	3/16"	30.31	29.00	27.68	26.36
32047	.0938	3/32"	2.383	1/8"	2"	1/4"	30.31	29.00	27.68	26.36
32057	.1250	1/8"	3.175	1/8"	2"	3/8"	22.95	21.96	20.96	19.96
32067	.1562	5/32"	3.967	3/16"	2-1/2"	7/16"	33.32	31.87	30.42	28.97
32077	.1875	3/16"	4.763	3/16"	2-1/2"	1/2"	29.41	28.13	26.85	25.57
32097	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"	35.73	34.18	32.62	31.07
32107	.3125	5/16"	7.938	5/16"	3-1/2"	3/4"	51.36	49.13	46.89	44.66
32117	.3750	3/8"	9.525	3/8"	3-1/2"	3/4"	61.90	59.21	56.52	53.83
32137	.5000	1/2"	12.700	1/2"	4"	1"	92.14	88.13	84.13	80.12

Series 620M, 623M, 630M, 640M, 643M, 650M

.1181" - .3150"
(3.000mm - 8.000mm)

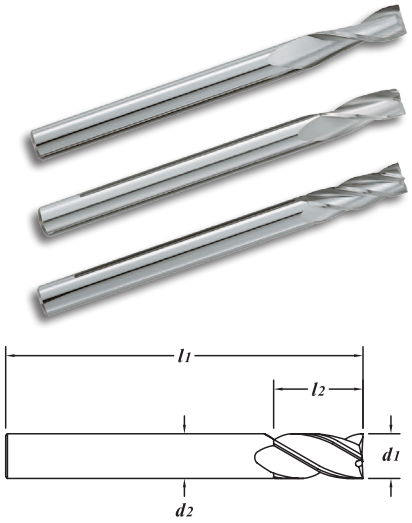


TECH PAGES 258,260

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

Extra Length

Solid submicron grain carbide end mill - center cutting
Extended reach
Can be modified with a neck within 48 hours
Extremely versatile
TiCN Coating - page 222
TiALN Coating - page 223
Stub Length - page 185
Standard length - page 194



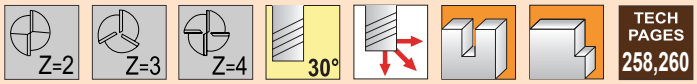
(620M/640M) 2 Flute EDP#	(623M/643M) 3 Flute EDP#	(630M/650M) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
92010	93010	94010	.1181		3.000	3.0	50	16	12.22	11.69	11.16	10.63
92020	93020	94020	.1181		3.000	3.0	75	20	20.77	19.87	18.96	18.06
92030	93030	94030	.1181		3.000	3.0	75	25	20.77	19.87	18.96	18.06
41010	54510	42010	.1250	1/8"	3.175	1/8"	2"	5/8"	12.79	12.23	11.68	11.12
41020	54520	42020	.1250	1/8"	3.175	1/8"	3"	3/4"	19.73	18.88	18.02	17.16
41030	54530	42030	.1250	1/8"	3.175	1/8"	3"	1"	19.73	18.88	18.02	17.16
92040	93040	94040	.1575		4.000	4.0	50	16	12.85	12.29	11.73	11.17
92050	93050	94050	.1575		4.000	4.0	75	20	21.25	20.33	19.40	18.48
92060	93060	94060	.1575		4.000	4.0	75	25	21.25	20.33	19.40	18.48
41040	54540	42040	.1875	3/16"	4.763	3/16"	3"	1"	21.77	20.82	19.88	18.93
41050	54550	42050	.1875	3/16"	4.763	3/16"	3"	1-1/8"	21.77	20.82	19.88	18.93
41060	54560	42060	.1875	3/16"	4.763	3/16"	4"	1"	24.05	23.00	21.96	20.91
92070	93070	94070	.1969		5.000	5.0	50	16	15.10	14.44	13.79	13.13
92080	93080	94080	.1969		5.000	5.0	75	20	22.92	21.92	20.93	19.93
92090	93090	94090	.1969		5.000	5.0	75	25	22.92	21.92	20.93	19.93
92100	93100	94100	.2362		6.000	6.0	75	25	26.57	25.41	24.26	23.10
92110	93110	94110	.2362		6.000	6.0	100	25	28.03	26.81	25.59	24.37
92120	93120	94120	.2362		6.000	6.0	100	32	28.03	26.81	25.59	24.37
92130	93130	94130	.2362		6.000	6.0	150	38	37.92	36.27	34.62	32.97
41070	54570	42070	.2500	1/4"	6.350	1/4"	3"	1"	25.21	24.11	23.02	21.92
41080	54580	42080	.2500	1/4"	6.350	1/4"	4"	1"	26.62	25.47	24.31	23.15
41090	54590	42090	.2500	1/4"	6.350	1/4"	4"	1-1/2"	26.62	25.47	24.31	23.15
41100	54600	42100	.2500	1/4"	6.350	1/4"	6"	1-1/2"	36.01	34.44	32.88	31.31
41110	54610	42110	.3125	5/16"	7.938	5/16"	3"	1"	31.12	29.77	28.41	27.06
41120	54620	42120	.3125	5/16"	7.938	5/16"	4"	1"	34.74	33.23	31.72	30.21
41130	54630	42130	.3125	5/16"	7.938	5/16"	4"	1-5/8"	34.74	33.23	31.72	30.21
41140	54640	42140	.3125	5/16"	7.938	5/16"	6"	1-1/2"	51.52	49.28	47.04	44.80
92140	93140	94140	.3150		8.000	8.0	75	25	32.78	31.35	29.93	28.50
92150	93150	94150	.3150		8.000	8.0	100	25	36.55	34.96	33.37	31.78
92160	93160	94160	.3150		8.000	8.0	100	41	36.55	34.96	33.37	31.78
92170	93170	94170	.3150		8.000	8.0	150	50	52.83	50.53	48.24	45.94

† *Metric equivalents are for reference only*

(620M/640M) 2 Flute EDP#	(623M/643M) 3 Flute EDP#	(630M/650M) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
41150	54650	42150	.3750	3/8"	9.525	3/8"	3"	1"	35.01	33.48	31.96	30.44
41160	54660	42160	.3750	3/8"	9.525	3/8"	4"	1"	38.43	36.76	35.09	33.42
41170	54670	42170	.3750	3/8"	9.525	3/8"	4"	2"	38.43	36.76	35.09	33.42
41180	54680	42180	.3750	3/8"	9.525	3/8"	6"	1-1/2"	56.02	53.58	51.15	48.71
41190	54690	42190	.3750	3/8"	9.525	3/8"	6"	3"	56.02	53.58	51.15	48.71
92180	93180	94180	.3937		10.000	10.0	75	25	38.01	36.36	34.70	33.05
92190	93190	94190	.3937		10.000	10.0	100	25	49.00	46.87	44.74	42.61
92200	93200	94200	.3937		10.000	10.0	100	50	49.00	46.87	44.74	42.61
92210	93210	94210	.3937		10.000	10.0	150	38	64.46	61.66	58.85	56.05
92220	93220	94220	.3937		10.000	10.0	150	75	64.46	61.66	58.85	56.05
41200	54700	42200	.4375	7/16"	11.113	7/16"	4"	1"	52.91	50.61	48.31	46.01
41210	54710	42210	.4375	7/16"	11.113	7/16"	4"	2"	52.91	50.61	48.31	46.01
41220	54720	42220	.4375	7/16"	11.113	7/16"	6"	1-1/2"	70.33	67.28	64.22	61.16
41230	54730	42230	.4375	7/16"	11.113	7/16"	6"	3"	70.33	67.28	64.22	61.16
92230	93230	94230	.4724		12.000	12.0	100	25	59.67	57.08	54.48	51.89
92240	93240	94240	.4724		12.000	12.0	100	50	59.67	57.08	54.48	51.89
92250	93250	94250	.4724		12.000	12.0	150	50	81.37	77.84	74.30	70.76
92260	93260	94260	.4724		12.000	12.0	150	75	81.37	77.84	74.30	70.76
41240	54740	42240	.5000	1/2"	12.700	1/2"	4"	1"	56.28	53.83	51.39	48.94
41250	54750	42250	.5000	1/2"	12.700	1/2"	4"	2"	56.28	53.83	51.39	48.94
41260	54760	42260	.5000	1/2"	12.700	1/2"	6"	1-1/2"	81.37	77.84	74.30	70.76
41270	54770	42270	.5000	1/2"	12.700	1/2"	6"	3"	81.37	77.84	74.30	70.76
92270	93270	94270	.5512		14.000	14.0	100	25	81.93	78.36	74.80	71.24
92280	93280	94280	.5512		14.000	14.0	100	50	81.93	78.36	74.80	71.24
92290	93290	94290	.5512		14.000	14.0	150	50	106.81	102.17	97.52	92.88
92300	93300	94300	.5512		14.000	14.0	150	75	106.81	102.17	97.52	92.88
41280	54780	42280	.5625	9/16"	14.288	9/16"	6"	2"	106.82	102.18	97.53	92.89
41290	54790	42290	.5625	9/16"	14.288	9/16"	6"	3"	106.82	102.18	97.53	92.89
41300	54800	42300	.6250	5/8"	15.875	5/8"	6"	2"	115.99	110.95	105.90	100.86
41310	54810	42310	.6250	5/8"	15.875	5/8"	6"	3"	115.99	110.95	105.90	100.86
92310	93310	94310	.6299		16.000	16.0	150	50	115.99	110.95	105.90	100.86
92320	93320	94320	.6299		16.000	16.0	150	75	115.99	110.95	105.90	100.86
92330	93330	94330	.7087		18.000	18.0	150	50	174.39	166.80	159.22	151.64
92340	93340	94340	.7087		18.000	18.0	150	75	174.39	166.80	159.22	151.64
41320	54820	42320	.7500	3/4"	19.050	3/4"	6"	2"	184.77	176.74	168.70	160.67
41330	54830	42330	.7500	3/4"	19.050	3/4"	6"	3"	184.77	176.74	168.70	160.67
92350	93350	94350	.7874		20.000	20.0	150	50	194.65	186.19	177.72	169.26
92360	93360	94360	.7874		20.000	20.0	150	75	194.65	186.19	177.72	169.26
92370	93370	94370	.9843		25.000	25.0	150	50	299.94	286.90	273.86	260.82
-	93380	94380	.9843		25.000	25.0	150	75	299.94	286.90	273.86	260.82
41340	54840	42340	1.000	1"	25.400	1"	6"	2"	314.12	300.47	286.81	273.15
41350	54850	42350	1.000	1"	25.400	1"	6"	3"	314.12	300.47	286.81	273.15
-	-	42360	1.000	1"	25.400	1"	6"	4"	330.65	316.27	301.90	287.52
-	-	42390	1.250	1-1/4"	31.750	1-1/4"	6"	3"	666.45	637.47	608.50	579.52

Series 620MC, 623MC, 630MC

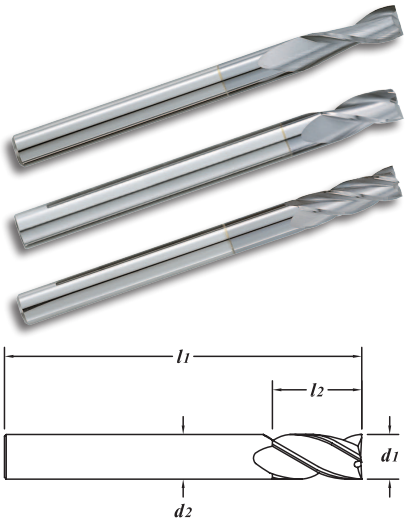
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



Extra Length

TiCN Coating

Solid submicron grain carbide end mill - center cutting
Extended reach
Improved abrasion resistance and lubricity
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 220
TiALN Coating - page 223
Standard length - page 197



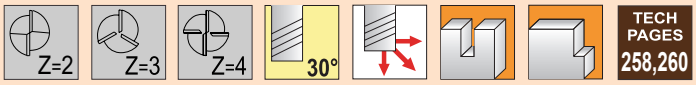
MATERIAL HARDNESS (Rc)
70
35
0

(620MC) 2 Flute EDP#	(623MC) 3 Flute EDP#	(630MC) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
41014	54514	42014	.1250	1/8"	3.175	1/8"	2"	5/8"	15.07	14.41	13.76	13.10
41024	54524	42024	.1250	1/8"	3.175	1/8"	3"	3/4"	22.51	21.53	20.55	19.57
41034	54534	42034	.1250	1/8"	3.175	1/8"	3"	1"	22.51	21.53	20.55	19.57
41044	54544	42044	.1875	3/16"	4.763	3/16"	3"	1"	24.98	23.89	22.81	21.72
41054	54554	42054	.1875	3/16"	4.763	3/16"	3"	1-1/8"	24.98	23.89	22.81	21.72
41064	54564	42064	.1875	3/16"	4.763	3/16"	4"	1"	27.75	26.54	25.34	24.13
41074	54574	42074	.2500	1/4"	6.350	1/4"	3"	1"	29.87	28.57	27.27	25.97
41084	54584	42084	.2500	1/4"	6.350	1/4"	4"	1"	31.64	30.26	28.89	27.51
41094	54594	42094	.2500	1/4"	6.350	1/4"	4"	1-1/2"	31.64	30.26	28.89	27.51
41104	54604	42104	.2500	1/4"	6.350	1/4"	6"	1-1/2"	44.69	42.75	40.80	38.86
41114	54614	42114	.3125	5/16"	7.938	5/16"	3"	1"	37.32	35.70	34.07	32.45
41124	54624	42124	.3125	5/16"	7.938	5/16"	4"	1"	42.41	40.57	38.72	36.88
41134	54634	42134	.3125	5/16"	7.938	5/16"	4"	1-5/8"	42.41	40.57	38.72	36.88
41144	54644	42144	.3125	5/16"	7.938	5/16"	6"	1-1/2"	61.89	59.20	56.51	53.82
41154	54654	42154	.3750	3/8"	9.525	3/8"	3"	1"	41.20	39.41	37.62	35.83
41164	54664	42164	.3750	3/8"	9.525	3/8"	4"	1"	46.16	44.15	42.15	40.14
41174	54674	42174	.3750	3/8"	9.525	3/8"	4"	2"	46.16	44.15	42.15	40.14
41184	54684	42184	.3750	3/8"	9.525	3/8"	6"	1-1/2"	66.41	63.53	60.64	57.75
41194	54694	42194	.3750	3/8"	9.523	3/8"	6"	3"	66.41	63.53	60.64	57.75
41204	54704	42204	.4375	7/16"	11.113	7/16"	4"	1"	62.19	59.49	56.78	54.08
41214	54714	42214	.4375	7/16"	11.113	7/16"	4"	2"	62.19	59.49	56.78	54.08
41224	54724	42224	.4375	7/16"	11.113	7/16"	6"	1-1/2"	83.49	79.86	76.23	72.60
-	54734	42234	.4375	7/16"	11.113	7/16"	6"	3"	83.49	79.86	76.23	72.60
41244	54744	42244	.5000	1/2"	12.700	1/2"	4"	1"	65.55	62.70	59.85	57.00
41254	54754	42254	.5000	1/2"	12.700	1/2"	4"	2"	65.55	62.70	59.85	57.00
41264	54764	42264	.5000	1/2"	12.700	1/2"	6"	1-1/2"	94.52	90.41	86.30	82.19
41274	54774	42274	.5000	1/2"	12.700	1/2"	6"	3"	94.52	90.41	86.30	82.19
41284	54784	42284	.5625	9/16"	14.288	9/16"	6"	2"	123.05	117.70	112.35	107.00
41294	-	42294	.5625	9/16"	14.288	9/16"	6"	3"	123.05	117.70	112.35	107.00
41304	54804	42304	.6250	5/8"	15.875	5/8"	6"	2"	132.20	126.46	120.71	114.96
41314	54814	42314	.6250	5/8"	15.875	5/8"	6"	3"	132.20	126.46	120.71	114.96
41324	54824	42324	.7500	3/4"	19.050	3/4"	6"	2"	203.30	194.46	185.62	176.78
41334	54834	42334	.7500	3/4"	19.050	3/4"	6"	3"	203.30	194.46	185.62	176.78
41344	54844	42344	1.000	1"	25.400	1"	6"	2"	340.35	325.56	310.76	295.96
41354	54854	42354	1.000	1"	25.400	1"	6"	3"	340.35	325.56	310.76	295.96
-	-	42364	1.000	1"	25.400	1"	6"	4"	356.87	341.35	325.84	310.32
-	-	42394	1.250	1-1/4"	31.750	1-1/4"	6"	3"	702.79	672.23	641.68	611.12

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6

Series 620MA, 623MA, 630MA, 640MA, 643MA, 650MA



TECH PAGES 258,260

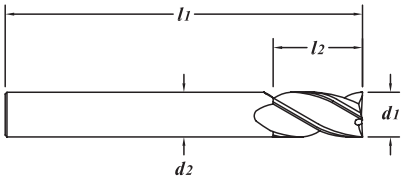
.1181" - .3150"
(3.000mm - 8.000mm)

Extra Length

TiALN Coating

Solid submicron grain carbide end mill - center cutting
Extended reach
Dry or semi-dry machining
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 220
TiCN Coating - page 222
Stub Length - page 187
Standard length - page 198





(620MA/640MA) 2 Flute EDP#	(623MA/643MA) 3 Flute EDP#	(630MA/650MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
92017	93017	94017	.1181		3.000	3.0	50	16	14.27	13.65	13.03	12.41
92027	93027	94027	.1181		3.000	3.0	75	20	23.36	22.34	21.33	20.31
92037	93037	94037	.1181		3.000	3.0	75	25	23.36	22.34	21.33	20.31
41017	54517	42017	.1250	1/8"	3.175	1/8"	2"	5/8"	15.39	14.72	14.05	13.38
41027	54527	42027	.1250	1/8"	3.175	1/8"	3"	3/4"	22.90	21.90	20.91	19.91
41037	54537	42037	.1250	1/8"	3.175	1/8"	3"	1"	22.90	21.90	20.91	19.91
92047	93047	94047	.1575		4.000	4.0	50	16	15.43	14.76	14.09	13.42
92057	93057	94057	.1575		4.000	4.0	75	20	25.27	24.17	23.07	21.97
92067	93067	94067	.1575		4.000	4.0	75	25	25.27	24.17	23.07	21.97
41047	54547	42047	.1875	3/16"	4.763	3/16"	3"	1"	25.81	24.68	23.56	22.44
41057	54557	42057	.1875	3/16"	4.763	3/16"	3"	1-1/8"	25.81	24.68	23.56	22.44
41067	54567	42067	.1875	3/16"	4.763	3/16"	4"	1"	28.75	27.50	26.25	25.00
92077	93077	94077	.1969		5.000	5.0	50	16	19.12	18.29	17.46	16.63
92087	93087	94087	.1969		5.000	5.0	75	20	28.24	27.02	25.79	24.56
92097	93097	94097	.1969		5.000	5.0	75	25	28.24	27.02	25.79	24.56
92107	93107	94107	.2362		6.000	6.0	75	25	31.88	30.49	29.11	27.72
92117	93117	94117	.2362		6.000	6.0	100	25	34.28	32.79	31.30	29.81
92127	93127	94127	.2362		6.000	6.0	100	32	34.28	32.79	31.30	29.81
92137	93137	94137	.2362		6.000	6.0	150	38	46.74	44.70	42.67	40.64
41077	54577	42077	.2500	1/4"	6.350	1/4"	3"	1"	30.57	29.24	27.91	26.58
41087	54587	42087	.2500	1/4"	6.350	1/4"	4"	1"	32.88	31.45	30.02	28.59
41097	54597	42097	.2500	1/4"	6.350	1/4"	4"	1-1/2"	32.88	31.45	30.02	28.59
41107	54607	42107	.2500	1/4"	6.350	1/4"	6"	1-1/2"	44.84	42.89	40.94	38.99
41117	54617	42117	.3125	5/16"	7.938	5/16"	3"	1"	39.12	37.42	35.72	34.02
41127	54627	42127	.3125	5/16"	7.938	5/16"	4"	1"	44.88	42.93	40.98	39.03
41137	54637	42137	.3125	5/16"	7.938	5/16"	4"	1-5/8"	44.88	42.93	40.98	39.03
41147	54647	42147	.3125	5/16"	7.938	5/16"	6"	1-1/2"	65.42	62.58	59.73	56.89
92147	93147	94147	.3150		8.000	8.0	75	25	40.74	38.97	37.20	35.43
92157	93157	94157	.3150		8.000	8.0	100	25	46.71	44.68	42.65	40.62
92167	93167	94167	.3150		8.000	8.0	100	41	46.71	44.68	42.65	40.62
92177	93177	94177	.3150		8.000	8.0	150	50	66.75	63.84	60.94	58.04

continued →

Series 620MA, 623MA, 630MA, 640MA, 643MA, 650MA *(continued)*

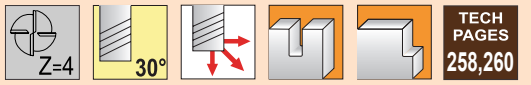
.3750" - 1.250"
(9.525mm - 31.750mm)

(620MA/640MA) 2 Flute EDP#	(623MA/643MA) 3 Flute EDP#	(630MA/650MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
41157	54657	42157	.3750	3/8"	9.525	3/8"	3"	1"	43.02	41.15	39.28	37.41
41167	54667	42167	.3750	3/8"	9.525	3/8"	4"	1"	48.61	46.50	44.38	42.27
41177	54677	42177	.3750	3/8"	9.525	3/8"	4"	2"	48.61	46.50	44.38	42.27
41187	54687	42187	.3750	3/8"	9.525	3/8"	6"	1-1/2"	69.93	66.89	63.85	60.81
41197	54697	42197	.3750	3/8"	9.525	3/8"	6"	3"	69.93	66.89	63.85	60.81
92187	93187	94187	.3937		10.000	10.0	75	25	47.09	45.05	43.00	40.95
92197	93197	94197	.3937		10.000	10.0	100	25	60.77	58.12	55.48	52.84
92207	93207	94207	.3937		10.000	10.0	100	50	60.77	58.12	55.48	52.84
92217	93217	94217	.3937		10.000	10.0	150	38	80.99	77.47	73.95	70.43
92227	93227	94227	.3937		10.000	10.0	150	75	80.99	77.47	73.95	70.43
41207	54707	42207	.4375	7/16"	11.113	7/16"	4"	1"	64.68	61.86	59.05	56.24
41217	54717	42217	.4375	7/16"	11.113	7/16"	4"	2"	64.68	61.86	59.05	56.24
41227	54727	42227	.4375	7/16"	11.113	7/16"	6"	1-1/2"	86.89	83.12	79.34	75.56
41237	54737	42237	.4375	7/16"	11.113	7/16"	6"	3"	86.89	83.12	79.34	75.56
92237	93237	94237	.4724		12.000	12.0	100	25	71.44	68.33	65.23	62.12
92247	93247	94247	.4724		12.000	12.0	100	50	71.44	68.33	65.23	62.12
92257	93257	94257	.4724		12.000	12.0	150	50	97.91	93.65	89.40	85.14
92267	93267	94267	.4724		12.000	12.0	150	75	97.91	93.65	89.40	85.14
41247	54747	42247	.5000	1/2"	12.700	1/2"	4"	1"	68.05	65.09	62.13	59.17
41257	54757	42257	.5000	1/2"	12.700	1/2"	4"	2"	68.05	65.09	62.13	59.17
41267	54767	42267	.5000	1/2"	12.700	1/2"	6"	1-1/2"	97.91	93.65	89.40	85.14
41277	54777	42277	.5000	1/2"	12.700	1/2"	6"	3"	97.91	93.65	89.40	85.14
92277	93277	94277	.5512		14.000	14.0	100	25	95.07	90.94	86.80	82.67
92287	93287	94287	.5512		14.000	14.0	100	50	95.07	90.94	86.80	82.67
-	93297	94297	.5512		14.000	14.0	150	50	126.34	120.85	115.35	109.86
92307	93307	94307	.5512		14.000	14.0	150	75	126.34	120.85	115.35	109.86
41287	54787	42287	.5625	9/16"	14.288	9/16"	6"	2"	126.34	120.85	115.35	109.86
-	54797	42297	.5625	9/16"	14.288	9/16"	6"	3"	126.34	120.85	115.35	109.86
41307	54807	42307	.6250	5/8"	15.875	5/8"	6"	2"	135.52	129.62	123.73	117.84
41317	54817	42317	.6250	5/8"	15.875	5/8"	6"	3"	135.52	129.62	123.73	117.84
92317	93317	94317	.6299		16.000	16.0	150	50	135.52	129.62	123.73	117.84
92327	93327	94327	.6299		16.000	16.0	150	75	135.52	129.62	123.73	117.84
-	-	94337	.7087		18.000	18.0	150	50	197.00	188.43	179.87	171.30
-	93347	94347	.7087		18.000	18.0	150	75	197.00	188.43	179.87	171.30
41327	54827	42327	.7500	3/4"	19.050	3/4"	6"	2"	207.38	198.36	189.35	180.33
41337	54837	42337	.7500	3/4"	19.050	3/4"	6"	3"	207.38	198.36	189.35	180.33
92357	93357	94357	.7874		20.000	20.0	150	50	224.01	214.27	204.53	194.79
92367	93367	94367	.7874		20.000	20.0	150	75	224.01	214.27	204.53	194.79
-	93377	94377	.9843		25.000	25.0	150	50	329.29	314.97	300.66	286.34
92387	93387	94387	.9843		25.000	25.0	150	75	329.29	314.97	300.66	286.34
41347	54847	42347	1.000	1"	25.400	1"	6"	2"	343.46	328.53	313.59	298.66
41357	54857	42357	1.000	1"	25.400	1"	6"	3"	343.46	328.53	313.59	298.66
-	-	42367	1.000	1"	25.400	1"	6"	4"	360.00	344.34	328.69	313.04
-	-	42397	1.250	1-1/4"	31.750	1-1/4"	6"	3"	704.05	673.44	642.83	612.22

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

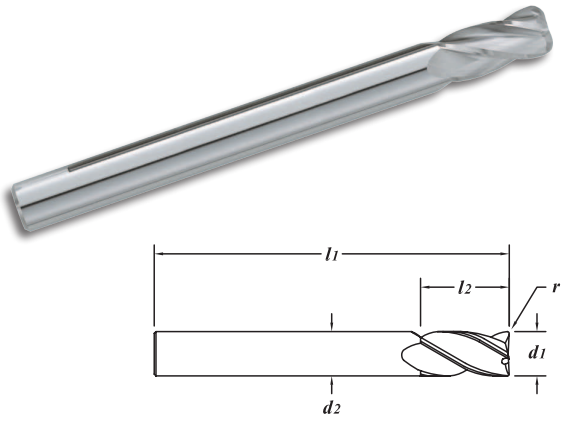


Series 630R

.1250" - .3125"
(3.175mm - 7.938mm)

Extra Length - Corner Radius

Solid submicron grain carbide end mill - center cutting
Extended reach
For stronger corners and part radius
Can be modified with a neck within 48 hours
Extremely versatile
TiALN Coating - page 228
Standard length - page 200



EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
20100	.1250	1/8"	3.175	1/8"	3"	1"	.010"	23.22	22.21	21.20	20.19
20110	.1250	1/8"	3.175	1/8"	3"	1"	.015"	23.22	22.21	21.20	20.19
20120	.1250	1/8"	3.175	1/8"	3"	1"	.020"	23.22	22.21	21.20	20.19
20130	.1250	1/8"	3.175	1/8"	3"	1"	.030"	23.22	22.21	21.20	20.19
20140	.1250	1/8"	3.175	1/8"	3"	1"	.045"	23.22	22.21	21.20	20.19
20150	.1875	3/16"	4.763	3/16"	3"	1"	.010"	25.61	24.50	23.38	22.27
20160	.1875	3/16"	4.763	3/16"	3"	1"	.015"	25.61	24.50	23.38	22.27
20170	.1875	3/16"	4.763	3/16"	3"	1"	.020"	25.61	24.50	23.38	22.27
20180	.1875	3/16"	4.763	3/16"	3"	1"	.030"	25.61	24.50	23.38	22.27
20190	.1875	3/16"	4.763	3/16"	3"	1"	.045"	25.61	24.50	23.38	22.27
20200	.1875	3/16"	4.763	3/16"	3"	1"	.060"	25.61	24.50	23.38	22.27
20210	.1875	3/16"	4.763	3/16"	4"	1"	.010"	27.57	26.37	25.17	23.97
20220	.1875	3/16"	4.763	3/16"	4"	1"	.015"	27.57	26.37	25.17	23.97
20230	.1875	3/16"	4.763	3/16"	4"	1"	.020"	27.57	26.37	25.17	23.97
20240	.1875	3/16"	4.763	3/16"	4"	1"	.030"	27.57	26.37	25.17	23.97
20250	.1875	3/16"	4.763	3/16"	4"	1"	.045"	27.57	26.37	25.17	23.97
20260	.1875	3/16"	4.763	3/16"	4"	1"	.060"	27.57	26.37	25.17	23.97
20270	.2500	1/4"	6.350	1/4"	3"	1"	.010"	29.65	28.36	27.07	25.78
20280	.2500	1/4"	6.350	1/4"	3"	1"	.020"	29.65	28.36	27.07	25.78
20290	.2500	1/4"	6.350	1/4"	3"	1"	.030"	29.65	28.36	27.07	25.78
20300	.2500	1/4"	6.350	1/4"	3"	1"	.045"	29.65	28.36	27.07	25.78
20310	.2500	1/4"	6.350	1/4"	3"	1"	.060"	29.65	28.36	27.07	25.78
20320	.2500	1/4"	6.350	1/4"	4"	1"	.010"	31.19	29.83	28.48	27.12
20330	.2500	1/4"	6.350	1/4"	4"	1"	.020"	31.19	29.83	28.48	27.12
20340	.2500	1/4"	6.350	1/4"	4"	1"	.030"	31.19	29.83	28.48	27.12
20350	.2500	1/4"	6.350	1/4"	4"	1"	.045"	31.19	29.83	28.48	27.12
20360	.2500	1/4"	6.350	1/4"	4"	1"	.060"	31.19	29.83	28.48	27.12
20370	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.010"	40.55	38.79	37.02	35.26
20380	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.020"	40.55	38.79	37.02	35.26
20390	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.030"	40.55	38.79	37.02	35.26
20400	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.045"	40.55	38.79	37.02	35.26
20410	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.060"	40.55	38.79	37.02	35.26
20420	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.010"	40.86	39.08	37.31	35.53
20430	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.020"	40.86	39.08	37.31	35.53
20440	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.030"	40.86	39.08	37.31	35.53
20450	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.045"	40.86	39.08	37.31	35.53
20460	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.060"	40.86	39.08	37.31	35.53
20470	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.090"	40.86	39.08	37.31	35.53
20480	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.125"	40.86	39.08	37.31	35.53



continued →

Series 630R *(continued)*

.3750" - .6250"
(9.525mm - 15.875mm)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
20490	.3750	3/8"	9.525	3/8"	4"	1"	.010"	45.21	43.24	41.28	39.31
20500	.3750	3/8"	9.525	3/8"	4"	1"	.020"	45.21	43.24	41.28	39.31
20510	.3750	3/8"	9.525	3/8"	4"	1"	.030"	45.21	43.24	41.28	39.31
20520	.3750	3/8"	9.525	3/8"	4"	1"	.045"	45.21	43.24	41.28	39.31
20530	.3750	3/8"	9.525	3/8"	4"	1"	.060"	45.21	43.24	41.28	39.31
20540	.3750	3/8"	9.525	3/8"	4"	1"	.090"	45.21	43.24	41.28	39.31
20550	.3750	3/8"	9.525	3/8"	4"	1"	.125"	45.21	43.24	41.28	39.31
20560	.3750	3/8"	9.525	3/8"	4"	2"	.010"	45.21	43.24	41.28	39.31
20570	.3750	3/8"	9.525	3/8"	4"	2"	.020"	45.21	43.24	41.28	39.31
20580	.3750	3/8"	9.525	3/8"	4"	2"	.030"	45.21	43.24	41.28	39.31
20590	.3750	3/8"	9.525	3/8"	4"	2"	.045"	45.21	43.24	41.28	39.31
20600	.3750	3/8"	9.525	3/8"	4"	2"	.060"	45.21	43.24	41.28	39.31
20610	.3750	3/8"	9.525	3/8"	4"	2"	.090"	45.21	43.24	41.28	39.31
20620	.3750	3/8"	9.525	3/8"	4"	2"	.125"	45.21	43.24	41.28	39.31
20630	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.010"	62.09	59.39	56.69	53.99
20640	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.020"	62.09	59.39	56.69	53.99
20650	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.030"	62.09	59.39	56.69	53.99
20660	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.045"	62.09	59.39	56.69	53.99
20670	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.060"	62.09	59.39	56.69	53.99
20680	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.090"	62.09	59.39	56.69	53.99
20690	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.125"	62.09	59.39	56.69	53.99
20700	.5000	1/2"	12.700	1/2"	4"	1"	.015"	63.57	60.81	58.04	55.28
20710	.5000	1/2"	12.700	1/2"	4"	1"	.020"	63.57	60.81	58.04	55.28
20720	.5000	1/2"	12.700	1/2"	4"	1"	.030"	63.57	60.81	58.04	55.28
20730	.5000	1/2"	12.700	1/2"	4"	1"	.045"	63.57	60.81	58.04	55.28
20740	.5000	1/2"	12.700	1/2"	4"	1"	.060"	63.57	60.81	58.04	55.28
20750	.5000	1/2"	12.700	1/2"	4"	1"	.090"	63.57	60.81	58.04	55.28
20760	.5000	1/2"	12.700	1/2"	4"	1"	.125"	63.57	60.81	58.04	55.28
20770	.5000	1/2"	12.700	1/2"	4"	2"	.015"	63.57	60.81	58.04	55.28
20780	.5000	1/2"	12.700	1/2"	4"	2"	.020"	63.57	60.81	58.04	55.28
20790	.5000	1/2"	12.700	1/2"	4"	2"	.030"	63.57	60.81	58.04	55.28
20800	.5000	1/2"	12.700	1/2"	4"	2"	.045"	63.57	60.81	58.04	55.28
20810	.5000	1/2"	12.700	1/2"	4"	2"	.060"	63.57	60.81	58.04	55.28
20820	.5000	1/2"	12.700	1/2"	4"	2"	.090"	63.57	60.81	58.04	55.28
20830	.5000	1/2"	12.700	1/2"	4"	2"	.125"	63.57	60.81	58.04	55.28
20840	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.015"	90.05	86.13	82.22	78.30
20850	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.020"	90.05	86.13	82.22	78.30
20860	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"	90.05	86.13	82.22	78.30
20870	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.045"	90.05	86.13	82.22	78.30
20880	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.060"	90.05	86.13	82.22	78.30
20890	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.090"	90.05	86.13	82.22	78.30
20900	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.125"	90.05	86.13	82.22	78.30
20910	.6250	5/8"	15.875	5/8"	6"	2"	.010"	132.40	126.64	120.89	115.13
20920	.6250	5/8"	15.875	5/8"	6"	2"	.015"	132.40	126.64	120.89	115.13
20930	.6250	5/8"	15.875	5/8"	6"	2"	.020"	132.40	126.64	120.89	115.13
20940	.6250	5/8"	15.875	5/8"	6"	2"	.030"	132.40	126.64	120.89	115.13
20950	.6250	5/8"	15.875	5/8"	6"	2"	.045"	132.40	126.64	120.89	115.13
20960	.6250	5/8"	15.875	5/8"	6"	2"	.060"	132.40	126.64	120.89	115.13
20970	.6250	5/8"	15.875	5/8"	6"	2"	.090"	132.40	126.64	120.89	115.13
20980	.6250	5/8"	15.875	5/8"	6"	2"	.125"	132.40	126.64	120.89	115.13

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

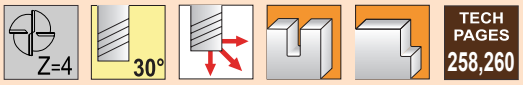
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
20990	.7500	3/4"	19.050	3/4"	6"	3"	.015"	217.28	207.83	198.39	188.94
21000	.7500	3/4"	19.050	3/4"	6"	3"	.020"	217.28	207.83	198.39	188.94
21010	.7500	3/4"	19.050	3/4"	6"	3"	.030"	217.28	207.83	198.39	188.94
21020	.7500	3/4"	19.050	3/4"	6"	3"	.045"	217.28	207.83	198.39	188.94
21030	.7500	3/4"	19.050	3/4"	6"	3"	.060"	217.28	207.83	198.39	188.94
21040	.7500	3/4"	19.050	3/4"	6"	3"	.090"	217.28	207.83	198.39	188.94
21050	.7500	3/4"	19.050	3/4"	6"	3"	.125"	217.28	207.83	198.39	188.94
21140	.7500	3/4"	19.050	3/4"	6"	3"	.250"	217.28	207.83	198.39	188.94
21060	1.000	1"	25.400	1"	6"	3"	.015"	369.48	353.42	337.35	321.29
21070	1.000	1"	25.400	1"	6"	3"	.020"	369.48	353.42	337.35	321.29
21080	1.000	1"	25.400	1"	6"	3"	.030"	369.48	353.42	337.35	321.29
21090	1.000	1"	25.400	1"	6"	3"	.045"	369.48	353.42	337.35	321.29
21100	1.000	1"	25.400	1"	6"	3"	.060"	369.48	353.42	337.35	321.29
21110	1.000	1"	25.400	1"	6"	3"	.090"	369.48	353.42	337.35	321.29
21120	1.000	1"	25.400	1"	6"	3"	.125"	369.48	353.42	337.35	321.29
21130	1.000	1"	25.400	1"	6"	3"	.250"	369.48	353.42	337.35	321.29



End Mill Reconditioning

Series 630RA

.1250" - .3125"
(3.175mm - 7.938mm)



TOLERANCES

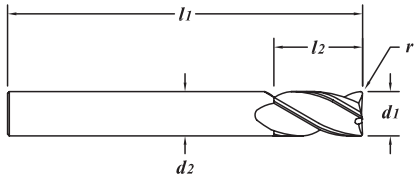
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

Extra Length - Corner Radius

TiALN Coating

Solid submicron grain carbide end mill - center cutting
Extended reach
For stronger corners and part radius
Dry or semi-dry machining
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 225
Standard length - page 202





MATERIAL HARDNESS (Rc)
70
35
0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
20107	.1250	1/8"	3.175	1/8"	3"	1"	.010"	26.38	25.23	24.09	22.94
20117	.1250	1/8"	3.175	1/8"	3"	1"	.015"	26.38	25.23	24.09	22.94
20127	.1250	1/8"	3.175	1/8"	3"	1"	.020"	26.38	25.23	24.09	22.94
20137	.1250	1/8"	3.175	1/8"	3"	1"	.030"	26.38	25.23	24.09	22.94
20147	.1250	1/8"	3.175	1/8"	3"	1"	.045"	26.38	25.23	24.09	22.94
20157	.1875	3/16"	4.763	3/16"	3"	1"	.010"	29.64	28.35	27.06	25.77
20167	.1875	3/16"	4.763	3/16"	3"	1"	.015"	29.64	28.35	27.06	25.77
20177	.1875	3/16"	4.763	3/16"	3"	1"	.020"	29.64	28.35	27.06	25.77
20187	.1875	3/16"	4.763	3/16"	3"	1"	.030"	29.64	28.35	27.06	25.77
20197	.1875	3/16"	4.763	3/16"	3"	1"	.045"	29.64	28.35	27.06	25.77
20207	.1875	3/16"	4.763	3/16"	3"	1"	.060"	29.64	28.35	27.06	25.77
20217	.1875	3/16"	4.763	3/16"	4"	1"	.010"	32.26	30.86	29.45	28.05
20227	.1875	3/16"	4.763	3/16"	4"	1"	.015"	32.26	30.86	29.45	28.05
20237	.1875	3/16"	4.763	3/16"	4"	1"	.020"	32.26	30.86	29.45	28.05
20247	.1875	3/16"	4.763	3/16"	4"	1"	.030"	32.26	30.86	29.45	28.05
20257	.1875	3/16"	4.763	3/16"	4"	1"	.045"	32.26	30.86	29.45	28.05
20267	.1875	3/16"	4.763	3/16"	4"	1"	.060"	32.26	30.86	29.45	28.05
20277	.2500	1/4"	6.350	1/4"	3"	1"	.010"	34.99	33.47	31.95	30.43
20287	.2500	1/4"	6.350	1/4"	3"	1"	.020"	34.99	33.47	31.95	30.43
20297	.2500	1/4"	6.350	1/4"	3"	1"	.030"	34.99	33.47	31.95	30.43
20307	.2500	1/4"	6.350	1/4"	3"	1"	.045"	34.99	33.47	31.95	30.43
20317	.2500	1/4"	6.350	1/4"	3"	1"	.060"	34.99	33.47	31.95	30.43
20327	.2500	1/4"	6.350	1/4"	4"	1"	.010"	37.47	35.84	34.21	32.58
20337	.2500	1/4"	6.350	1/4"	4"	1"	.020"	37.47	35.84	34.21	32.58
20347	.2500	1/4"	6.350	1/4"	4"	1"	.030"	37.47	35.84	34.21	32.58
20357	.2500	1/4"	6.350	1/4"	4"	1"	.045"	37.47	35.84	34.21	32.58
20367	.2500	1/4"	6.350	1/4"	4"	1"	.060"	37.47	35.84	34.21	32.58
20377	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.010"	49.37	47.22	45.08	42.93
20387	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.020"	49.37	47.22	45.08	42.93
20397	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.030"	49.37	47.22	45.08	42.93
20407	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.045"	49.37	47.22	45.08	42.93
20417	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.060"	49.37	47.22	45.08	42.93
20427	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.010"	51.03	48.81	46.59	44.37
20437	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.020"	51.03	48.81	46.59	44.37
20447	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.030"	51.03	48.81	46.59	44.37
20457	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.045"	51.03	48.81	46.59	44.37
20467	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.060"	51.03	48.81	46.59	44.37
20477	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.090"	51.03	48.81	46.59	44.37
20487	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.125"	51.03	48.81	46.59	44.37

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
20497	.3750	3/8"	9.525	3/8"	4"	1"	.010"	55.36	52.95	50.55	48.14
20507	.3750	3/8"	9.525	3/8"	4"	1"	.020"	55.36	52.95	50.55	48.14
20517	.3750	3/8"	9.525	3/8"	4"	1"	.030"	55.36	52.95	50.55	48.14
20527	.3750	3/8"	9.525	3/8"	4"	1"	.045"	55.36	52.95	50.55	48.14
20537	.3750	3/8"	9.525	3/8"	4"	1"	.060"	55.36	52.95	50.55	48.14
20547	.3750	3/8"	9.525	3/8"	4"	1"	.090"	55.36	52.95	50.55	48.14
20557	.3750	3/8"	9.525	3/8"	4"	1"	.125"	55.36	52.95	50.55	48.14
20567	.3750	3/8"	9.525	3/8"	4"	2"	.010"	55.36	52.95	50.55	48.14
20577	.3750	3/8"	9.525	3/8"	4"	2"	.020"	55.36	52.95	50.55	48.14
20587	.3750	3/8"	9.525	3/8"	4"	2"	.030"	55.36	52.95	50.55	48.14
20597	.3750	3/8"	9.525	3/8"	4"	2"	.045"	55.36	52.95	50.55	48.14
20607	.3750	3/8"	9.525	3/8"	4"	2"	.060"	55.36	52.95	50.55	48.14
20617	.3750	3/8"	9.525	3/8"	4"	2"	.090"	55.36	52.95	50.55	48.14
20627	.3750	3/8"	9.525	3/8"	4"	2"	.125"	55.36	52.95	50.55	48.14
20637	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.010"	76.65	73.32	69.98	66.65
20647	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.020"	76.65	73.32	69.98	66.65
20657	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.030"	76.65	73.32	69.98	66.65
20667	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.045"	76.65	73.32	69.98	66.65
20677	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.060"	76.65	73.32	69.98	66.65
20687	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.090"	76.65	73.32	69.98	66.65
20697	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.125"	76.65	73.32	69.98	66.65
21157	.4375	7/16"	11.113	7/16"	4"	1"	.010"	74.04	70.82	67.60	64.38
21167	.4375	7/16"	11.113	7/16"	4"	1"	.015"	74.04	70.82	67.60	64.38
21177	.4375	7/16"	11.113	7/16"	4"	1"	.020"	74.04	70.82	67.60	64.38
21187	.4375	7/16"	11.113	7/16"	4"	1"	.030"	74.04	70.82	67.60	64.38
21227	.4375	7/16"	11.113	7/16"	4"	1"	.125"	74.04	70.82	67.60	64.38
20707	.5000	1/2"	12.700	1/2"	4"	1"	.015"	75.36	72.08	68.81	65.53
20717	.5000	1/2"	12.700	1/2"	4"	1"	.020"	75.36	72.08	68.81	65.53
20727	.5000	1/2"	12.700	1/2"	4"	1"	.030"	75.36	72.08	68.81	65.53
20737	.5000	1/2"	12.700	1/2"	4"	1"	.045"	75.36	72.08	68.81	65.53
20747	.5000	1/2"	12.700	1/2"	4"	1"	.060"	75.36	72.08	68.81	65.53
20757	.5000	1/2"	12.700	1/2"	4"	1"	.090"	75.36	72.08	68.81	65.53
20767	.5000	1/2"	12.700	1/2"	4"	1"	.125"	75.36	72.08	68.81	65.53
20777	.5000	1/2"	12.700	1/2"	4"	2"	.015"	75.36	72.08	68.81	65.53
20787	.5000	1/2"	12.700	1/2"	4"	2"	.020"	75.36	72.08	68.81	65.53
20797	.5000	1/2"	12.700	1/2"	4"	2"	.030"	75.36	72.08	68.81	65.53
20807	.5000	1/2"	12.700	1/2"	4"	2"	.045"	75.36	72.08	68.81	65.53
20817	.5000	1/2"	12.700	1/2"	4"	2"	.060"	75.36	72.08	68.81	65.53
20827	.5000	1/2"	12.700	1/2"	4"	2"	.090"	75.36	72.08	68.81	65.53
20837	.5000	1/2"	12.700	1/2"	4"	2"	.125"	75.36	72.08	68.81	65.53
20847	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.015"	106.57	101.94	97.30	92.67
20857	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.020"	106.57	101.94	97.30	92.67
20867	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"	106.57	101.94	97.30	92.67
20877	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.045"	106.57	101.94	97.30	92.67
20887	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.060"	106.57	101.94	97.30	92.67
20897	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.090"	106.57	101.94	97.30	92.67
20907	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.125"	106.57	101.94	97.30	92.67
20917	.6250	5/8"	15.875	5/8"	6"	2"	.010"	151.92	145.31	138.71	132.10
20927	.6250	5/8"	15.875	5/8"	6"	2"	.015"	151.92	145.31	138.71	132.10
20937	.6250	5/8"	15.875	5/8"	6"	2"	.020"	151.92	145.31	138.71	132.10
20947	.6250	5/8"	15.875	5/8"	6"	2"	.030"	151.92	145.31	138.71	132.10
20957	.6250	5/8"	15.875	5/8"	6"	2"	.045"	151.92	145.31	138.71	132.10
20967	.6250	5/8"	15.875	5/8"	6"	2"	.060"	151.92	145.31	138.71	132.10
20977	.6250	5/8"	15.875	5/8"	6"	2"	.090"	151.92	145.31	138.71	132.10
20987	.6250	5/8"	15.875	5/8"	6"	2"	.125"	151.92	145.31	138.71	132.10

continued →

Series 630RA *(continued)*

.7500" - 1.000"
(19.050mm - 25.400mm)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
20997	.7500	3/4"	19.050	3/4"	6"	3"	.015"	239.88	229.45	219.02	208.59
21007	.7500	3/4"	19.050	3/4"	6"	3"	.020"	239.88	229.45	219.02	208.59
21017	.7500	3/4"	19.050	3/4"	6"	3"	.030"	239.88	229.45	219.02	208.59
21027	.7500	3/4"	19.050	3/4"	6"	3"	.045"	239.88	229.45	219.02	208.59
21037	.7500	3/4"	19.050	3/4"	6"	3"	.060"	239.88	229.45	219.02	208.59
21047	.7500	3/4"	19.050	3/4"	6"	3"	.090"	239.88	229.45	219.02	208.59
21057	.7500	3/4"	19.050	3/4"	6"	3"	.125"	239.88	229.45	219.02	208.59
21147	.7500	3/4"	19.050	3/4"	6"	3"	.250"	239.88	229.45	219.02	208.59
21067	1.000	1"	25.400	1"	6"	3"	.015"	398.85	381.51	364.17	346.83
21077	1.000	1"	25.400	1"	6"	3"	.020"	398.85	381.51	364.17	346.83
21087	1.000	1"	25.400	1"	6"	3"	.030"	398.85	381.51	364.17	346.83
21097	1.000	1"	25.400	1"	6"	3"	.045"	398.85	381.51	364.17	346.83
21107	1.000	1"	25.400	1"	6"	3"	.060"	398.85	381.51	364.17	346.83
21117	1.000	1"	25.400	1"	6"	3"	.090"	398.85	381.51	364.17	346.83
21127	1.000	1"	25.400	1"	6"	3"	.125"	398.85	381.51	364.17	346.83
21137	1.000	1"	25.400	1"	6"	3"	.250"	398.85	381.51	364.17	346.83



MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

Series 720M, 723M, 730M, 740M, 743M, 750M

Z=2 Z=3 Z=4 30°

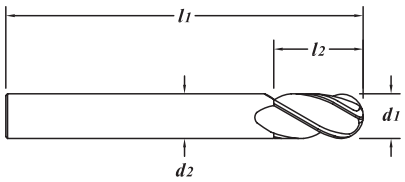
TECH PAGES 258,260

.1181" - .3150"
(3.000mm - 8.000mm)

Extra Length - Ball End

Solid submicron grain carbide end mill - center cutting
Extended reach
Can be modified with a neck within 48 hours
Extremely versatile
TiCN Coating - page 233
TiALN Coating - page 234
Stub Length - page 188
Standard length - page 205





(720M/740M) 2 Flute EDP#	(723M/743M) 3 Flute EDP#	(730M/750M) 4 Flute EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
97010	98010	99010	.1181		3.000	3.0	50	16	14.84	14.19	13.55	12.90
97020	98020	99020	.1181		3.000	3.0	75	20	24.44	23.38	22.31	21.25
97030	98030	99030	.1181		3.000	3.0	75	25	24.44	23.38	22.31	21.25
43010	55510	44010	.1250	1/8"	3.175	1/8"	2"	5/8"	15.05	14.40	13.74	13.09
43020	55520	44020	.1250	1/8"	3.175	1/8"	3"	3/4"	23.22	22.21	21.20	20.19
43030	55530	44030	.1250	1/8"	3.175	1/8"	3"	1"	23.22	22.21	21.20	20.19
97040	98040	99040	.1575		4.000	4.0	50	16	15.47	14.80	14.12	13.45
97050	98050	99050	.1575		4.000	4.0	75	20	24.96	23.87	22.79	21.70
97060	98060	99060	.1575		4.000	4.0	75	25	24.96	23.87	22.79	21.70
43040	55540	44040	.1875	3/16"	4.763	3/16"	3"	1"	25.61	24.50	23.38	22.27
43050	55550	44050	.1875	3/16"	4.763	3/16"	3"	1-1/8"	25.61	24.50	23.38	22.27
43060	55560	44060	.1875	3/16"	4.763	3/16"	4"	1"	27.57	26.37	25.17	23.97
97070	98070	99070	.1969		5.000	5.0	50	16	17.89	17.12	16.34	15.56
97080	98080	99080	.1969		5.000	5.0	75	20	26.96	25.78	24.61	23.44
97090	98090	99090	.1969		5.000	5.0	75	25	26.96	25.78	24.61	23.44
97100	98100	99100	.2362		6.000	6.0	75	25	31.20	29.84	28.49	27.13
97110	98110	99110	.2362		6.000	6.0	100	25	32.84	31.42	29.99	28.56
97120	98120	99120	.2362		6.000	6.0	100	32	32.84	31.42	29.99	28.56
97130	98130	99130	.2362		6.000	6.0	150	38	42.69	40.83	38.98	37.12
43070	55570	44070	.2500	1/4"	6.350	1/4"	3"	1"	29.65	28.36	27.07	25.78
43080	55580	44080	.2500	1/4"	6.350	1/4"	4"	1"	31.19	29.83	28.48	27.12
43090	55590	44090	.2500	1/4"	6.350	1/4"	4"	1-1/2"	31.19	29.83	28.48	27.12
43100	55600	44100	.2500	1/4"	6.350	1/4"	6"	1-1/2"	40.55	38.79	37.02	35.26
43110	55610	44110	.3125	5/16"	7.938	5/16"	3"	1"	36.63	35.04	33.44	31.85
43120	55620	44120	.3125	5/16"	7.938	5/16"	4"	1"	40.86	39.08	37.31	35.53
43130	55630	44130	.3125	5/16"	7.938	5/16"	4"	1-5/8"	40.86	39.08	37.31	35.53
43140	55640	44140	.3125	5/16"	7.938	5/16"	6"	1-1/2"	60.63	57.99	55.36	52.72
97140	98140	99140	.3150		8.000	8.0	75	25	38.55	36.87	35.20	33.52
97150	98150	99150	.3150		8.000	8.0	100	25	43.02	41.15	39.28	37.41
97160	98160	99160	.3150		8.000	8.0	100	41	43.02	41.15	39.28	37.41
97170	98170	99170	.3150		8.000	8.0	150	50	62.22	59.51	56.81	54.10

continued →

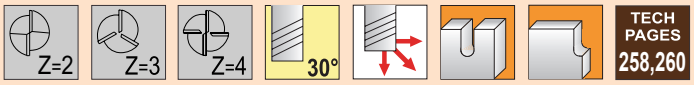
Series 720M, 723M, 730M, 740M, 743M, 750M *(continued)*

.3750" - 1.000"
(9.525mm - 25.400mm)

(720M/740M) 2 Flute EDP#	(723M/743M) 3 Flute EDP#	(730M/750M) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
43150	55650	44150	.3750	3/8"	9.525	3/8"	3"	1"	41.20	39.41	37.62	35.83
43160	55660	44160	.3750	3/8"	9.525	3/8"	4"	1"	45.21	43.24	41.28	39.31
43170	55670	44170	.3750	3/8"	9.525	3/8"	4"	2"	45.21	43.24	41.28	39.31
43180	55680	44180	.3750	3/8"	9.525	3/8"	6"	1-1/2"	62.76	60.03	57.30	54.57
43190	55690	44190	.3750	3/8"	9.525	3/8"	6"	3"	62.76	60.03	57.30	54.57
97180	98180	99180	.3937		10.000	10.0	75	25	44.52	42.58	40.65	38.71
97190	98190	99190	.3937		10.000	10.0	100	25	58.35	55.81	53.28	50.74
97200	98200	99200	.3937		10.000	10.0	100	50	58.35	55.81	53.28	50.74
97210	98210	99210	.3937		10.000	10.0	150	38	75.06	71.80	68.53	65.27
97220	98220	99220	.3937		10.000	10.0	150	75	75.06	71.80	68.53	65.27
43200	55700	44200	.4375	7/16"	11.113	7/16"	4"	1"	62.24	59.53	56.83	54.12
43210	55710	44210	.4375	7/16"	11.113	7/16"	4"	2"	62.24	59.53	56.83	54.12
43220	-	44220	.4375	7/16"	11.113	7/16"	6"	1-1/2"	80.90	77.39	73.87	70.35
43230	-	44230	.4375	7/16"	11.113	7/16"	6"	3"	80.90	77.39	73.87	70.35
97230	98230	99230	.4724		12.000	12.0	100	25	66.99	64.08	61.16	58.25
97240	98240	99240	.4724		12.000	12.0	100	50	66.99	64.08	61.16	58.25
97250	98250	99250	.4724		12.000	12.0	150	50	90.02	86.11	82.19	78.28
97260	98260	99260	.4724		12.000	12.0	150	75	90.02	86.11	82.19	78.28
43240	55740	44240	.5000	1/2"	12.700	1/2"	4"	1"	63.57	60.81	58.04	55.28
43250	55750	44250	.5000	1/2"	12.700	1/2"	4"	2"	63.57	60.81	58.04	55.28
43260	55760	44260	.5000	1/2"	12.700	1/2"	6"	1-1/2"	90.05	86.13	82.22	78.30
43270	55770	44270	.5000	1/2"	12.700	1/2"	6"	3"	90.05	86.13	82.22	78.30
97270	98270	-	.5512		14.000	14.0	100	25	92.56	88.54	84.51	80.49
97280	98280	-	.5512		14.000	14.0	100	50	92.56	88.54	84.51	80.49
97290	98290	99290	.5512		14.000	14.0	150	50	125.65	120.19	114.72	109.26
97300	98300	-	.5512		14.000	14.0	150	75	125.65	120.19	114.72	109.26
43280	55780	44280	.5625	9/16"	14.288	9/16"	6"	2"	125.64	120.18	114.71	109.25
-	55790	44290	.5625	9/16"	14.288	9/16"	6"	3"	125.64	120.18	114.71	109.25
43300	55800	44300	.6250	5/8"	15.875	5/8"	6"	2"	132.40	126.64	120.89	115.13
43310	55810	44310	.6250	5/8"	15.875	5/8"	6"	3"	132.40	126.64	120.89	115.13
97310	98310	99310	.6299		16.000	16.0	150	50	132.39	126.63	120.88	115.12
97320	98320	99320	.6299		16.000	16.0	150	75	132.39	126.63	120.88	115.12
97340	98340	99340	.7087		18.000	18.0	150	75	203.65	194.80	185.94	177.09
43320	55820	44320	.7500	3/4"	19.050	3/4"	6"	2"	217.28	207.83	198.39	188.94
43330	55830	44330	.7500	3/4"	19.050	3/4"	6"	3"	217.28	207.83	198.39	188.94
97350	98350	99350	.7874		20.000	20.0	150	50	223.92	214.18	204.45	194.71
97360	98360	99360	.7874		20.000	20.0	150	75	223.92	214.18	204.45	194.71
-	98370	99370	.9843		25.000	25.0	150	50	355.30	339.86	324.41	308.96
97380	98380	-	.9843		25.000	25.0	150	75	355.30	339.86	324.41	308.96
43340	55840	44340	1.000	1"	25.400	1"	6"	2"	369.48	353.42	337.35	321.29
43350	55850	44350	1.000	1"	25.400	1"	6"	3"	369.48	353.42	337.35	321.29

† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)



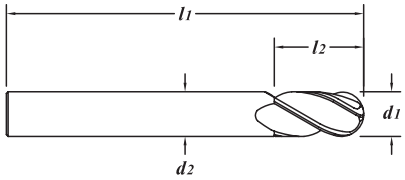
TECH PAGES 258,260

Extra Length - Ball End

TiCN Coating

Solid submicron grain carbide end mill - center cutting
Extended reach
Improved abrasion resistance and lubricity
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 231
TiALN Coating - page 234
Standard length - page 208

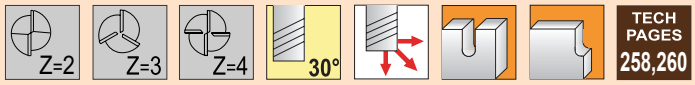




(720MC) 2 Flute EDP#	(723MC) 3 Flute EDP#	(730MC) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
43014	55514	44014	.1250	1/8"	3.175	1/8"	2"	5/8"	17.32	16.57	15.81	15.06
43024	55524	44024	.1250	1/8"	3.175	1/8"	3"	3/4"	26.01	24.88	23.75	22.62
43034	55534	44034	.1250	1/8"	3.175	1/8"	3"	1"	26.01	24.88	23.75	22.62
43044	55544	44044	.1875	3/16"	4.763	3/16"	3"	1"	28.80	27.54	26.29	25.04
43054	55554	44054	.1875	3/16"	4.763	3/16"	3"	1-1/8"	28.80	27.54	26.29	25.04
43064	55564	44064	.1875	3/16"	4.763	3/16"	4"	1"	31.28	29.92	28.56	27.20
43074	55574	44074	.2500	1/4"	6.350	1/4"	3"	1"	34.28	32.79	31.30	29.81
43084	55584	44084	.2500	1/4"	6.350	1/4"	4"	1"	36.20	34.63	33.05	31.48
43094	55594	44094	.2500	1/4"	6.350	1/4"	4"	1-1/2"	36.20	34.63	33.05	31.48
43104	55604	44104	.2500	1/4"	6.350	1/4"	6"	1-1/2"	49.20	47.06	44.92	42.78
43114	55614	44114	.3125	5/16"	7.938	5/16"	3"	1"	42.84	40.98	39.11	37.25
43124	55624	44124	.3125	5/16"	7.938	5/16"	4"	1"	48.58	46.46	44.35	42.24
43134	-	44134	.3125	5/16"	7.938	5/16"	4"	1-5/8"	48.58	46.46	44.35	42.24
43144	55644	44144	.3125	5/16"	7.938	5/16"	6"	1-1/2"	71.01	67.93	64.84	61.75
43154	55654	44154	.3750	3/8"	9.525	3/8"	3"	1"	47.39	45.33	43.27	41.21
43164	55664	44164	.3750	3/8"	9.525	3/8"	4"	1"	52.92	50.62	48.32	46.02
43174	55674	44174	.3750	3/8"	9.525	3/8"	4"	2"	52.92	50.62	48.32	46.02
43184	55684	44184	.3750	3/8"	9.525	3/8"	6"	1-1/2"	73.15	69.97	66.79	63.61
-	55694	44194	.3750	3/8"	9.525	3/8"	6"	3"	73.15	69.97	66.79	63.61
-	55704	44204	.4375	7/16"	11.113	7/16"	4"	1"	71.53	68.42	65.31	62.20
-	55714	44214	.4375	7/16"	11.113	7/16"	4"	2"	71.53	68.42	65.31	62.20
43224	55724	44224	.4375	7/16"	11.113	7/16"	6"	1-1/2"	94.04	89.95	85.86	81.77
-	-	44234	.4375	7/16"	11.113	7/16"	6"	3"	94.04	89.95	85.86	81.77
43244	55744	44244	.5000	1/2"	12.700	1/2"	4"	1"	72.86	69.70	66.53	63.36
43254	55754	44254	.5000	1/2"	12.700	1/2"	4"	2"	72.86	69.70	66.53	63.36
43264	55764	44264	.5000	1/2"	12.700	1/2"	6"	1-1/2"	103.19	98.70	94.22	89.73
43274	55774	44274	.5000	1/2"	12.700	1/2"	6"	3"	103.19	98.70	94.22	89.73
-	55784	44284	.5625	9/16"	14.288	9/16"	6"	2"	141.89	135.72	129.55	123.38
-	-	44294	.5625	9/16"	14.288	9/16"	6"	3"	141.89	135.72	129.55	123.38
43304	55804	44304	.6250	5/8"	15.875	5/8"	6"	2"	148.61	142.15	135.69	129.23
-	-	44314	.6250	5/8"	15.875	5/8"	6"	3"	148.61	142.15	135.69	129.23
43324	55824	44324	.7500	3/4"	19.050	3/4"	6"	2"	235.81	225.56	215.30	205.05
43334	55834	44334	.7500	3/4"	19.050	3/4"	6"	3"	235.81	225.56	215.30	205.05
-	55844	44344	1.000	1"	25.400	1"	6"	2"	395.73	378.52	361.32	344.11
43354	55854	44354	1.000	1"	25.400	1"	6"	3"	395.73	378.52	361.32	344.11

Series 720MA, 723MA, 730MA, 740MA, 743MA, 750MA

.1181" - .3150"
(3.000mm - 8.000mm)



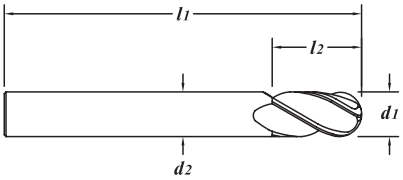
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

Extra Length - Ball End

TiALN Coating

Solid submicron grain carbide end mill - center cutting
Extended reach
Dry or semi-dry machining
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 231
TiCN Coating - page 233
Stub Length - page 189
Standard length - page 209





(720MA/740MA) 2 Flute EDP#	(723MA/743MA) 3 Flute EDP#	(730MA/750MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
97017	98017	99017	.1181		3.000	3.0	50	16	16.91	16.17	15.44	14.70
97027	98027	99027	.1181		3.000	3.0	75	20	27.03	25.85	24.68	23.50
97037	98037	99037	.1181		3.000	3.0	75	25	27.03	25.85	24.68	23.50
43017	55517	44017	.1250	1/8"	3.175	1/8"	2"	5/8"	17.62	16.85	16.09	15.32
43027	55527	44027	.1250	1/8"	3.175	1/8"	3"	3/4"	26.38	25.23	24.09	22.94
43037	55537	44037	.1250	1/8"	3.175	1/8"	3"	1"	26.38	25.23	24.09	22.94
97047	98047	99047	.1575		4.000	4.0	50	16	18.06	17.27	16.49	15.70
97057	98057	99057	.1575		4.000	4.0	75	20	28.99	27.73	26.47	25.21
97067	98067	99067	.1575		4.000	4.0	75	25	28.99	27.73	26.47	25.21
43047	55547	44047	.1875	3/16"	4.763	3/16"	3"	1"	29.64	28.35	27.06	25.77
43057	55557	44057	.1875	3/16"	4.763	3/16"	3"	1-1/8"	29.64	28.35	27.06	25.77
43067	55567	44067	.1875	3/16"	4.763	3/16"	4"	1"	32.26	30.86	29.45	28.05
97077	98077	99077	.1969		5.000	5.0	50	16	21.93	20.98	20.02	19.07
97087	98087	99087	.1969		5.000	5.0	75	20	32.29	30.89	29.48	28.08
97097	98097	99097	.1969		5.000	5.0	75	25	32.29	30.89	29.48	28.08
97107	98107	99107	.2362		6.000	6.0	75	25	36.54	34.95	33.36	31.77
97117	98117	99117	.2362		6.000	6.0	100	25	39.09	37.39	35.69	33.99
97127	98127	99127	.2362		6.000	6.0	100	32	39.09	37.39	35.69	33.99
97137	98137	99137	.2362		6.000	6.0	150	38	51.50	49.26	47.02	44.78
43077	55577	44077	.2500	1/4"	6.350	1/4"	3"	1"	34.99	33.47	31.95	30.43
43087	55587	44087	.2500	1/4"	6.350	1/4"	4"	1"	37.47	35.84	34.21	32.58
43097	55597	44097	.2500	1/4"	6.350	1/4"	4"	1-1/2"	37.47	35.84	34.21	32.58
43107	55607	44107	.2500	1/4"	6.350	1/4"	6"	1-1/2"	49.37	47.22	45.08	42.93
43117	-	44117	.3125	5/16"	7.938	5/16"	3"	1"	44.63	42.69	40.75	38.81
43127	55627	44127	.3125	5/16"	7.938	5/16"	4"	1"	51.03	48.81	46.59	44.37
43137	55637	44137	.3125	5/16"	7.938	5/16"	4"	1-5/8"	51.03	48.81	46.59	44.37
43147	55647	44147	.3125	5/16"	7.938	5/16"	6"	1-1/2"	74.52	71.28	68.04	64.80
97147	98147	99147	.3150		8.000	8.0	75	25	46.53	44.51	42.48	40.46
97157	98157	99157	.3150		8.000	8.0	100	25	53.15	50.84	48.53	46.22
97167	98167	99167	.3150		8.000	8.0	100	41	53.15	50.84	48.53	46.22
97177	98177	99177	.3150		8.000	8.0	150	50	76.11	72.80	69.49	66.18

† Metric equivalents are for reference only

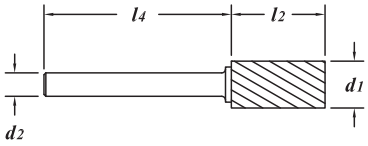
(720MA/740MA) 2 Flute EDP#	(723MA/743MA) 3 Flute EDP#	(730MA/750MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
43157	55657	44157	.3750	3/8"	9.525	3/8"	3"	1"	49.20	47.06	44.92	42.78
43167	55667	44167	.3750	3/8"	9.525	3/8"	4"	1"	55.36	52.95	50.55	48.14
43177	55677	44177	.3750	3/8"	9.525	3/8"	4"	2"	55.36	52.95	50.55	48.14
43187	55687	44187	.3750	3/8"	9.525	3/8"	6"	1-1/2"	76.65	73.32	69.98	66.65
43197	55697	44197	.3750	3/8"	9.525	3/8"	6"	3"	76.65	73.32	69.98	66.65
97187	98187	99187	.3937		10.000	10.0	75	25	53.62	51.29	48.96	46.63
97197	98197	99197	.3937		10.000	10.0	100	25	70.09	67.05	64.00	60.95
97207	98207	99207	.3937		10.000	10.0	100	50	70.09	67.05	64.00	60.95
97217	98217	99217	.3937		10.000	10.0	150	38	91.57	87.59	83.61	79.63
97227	98227	99227	.3937		10.000	10.0	150	75	91.57	87.59	83.61	79.63
43207	-	44207	.4375	7/16"	11.113	7/16"	4"	1"	74.04	70.82	67.60	64.38
-	55717	44217	.4375	7/16"	11.113	7/16"	4"	2"	74.04	70.82	67.60	64.38
43227	-	44227	.4375	7/16"	11.113	7/16"	6"	1-1/2"	97.45	93.21	88.98	84.74
43237	55737	44237	.4375	7/16"	11.113	7/16"	6"	3"	97.45	93.21	88.98	84.74
97237	-	99237	.4724		12.000	12.0	100	25	78.74	75.32	71.89	68.47
97247	98247	99247	.4724		12.000	12.0	100	50	78.74	75.32	71.89	68.47
97257	98257	99257	.4724		12.000	12.0	150	50	106.57	101.94	97.30	92.67
97267	98267	99267	.4724		12.000	12.0	150	75	106.57	101.94	97.30	92.67
43247	55747	44247	.5000	1/2"	12.700	1/2"	4"	1"	75.36	72.08	68.81	65.53
43257	55757	44257	.5000	1/2"	12.700	1/2"	4"	2"	75.36	72.08	68.81	65.53
43267	55767	44267	.5000	1/2"	12.700	1/2"	6"	1-1/2"	106.57	101.94	97.30	92.67
43277	55777	44277	.5000	1/2"	12.700	1/2"	6"	3"	106.57	101.94	97.30	92.67
97277	-	99277	.5512		14.000	14.0	100	25	105.73	101.13	96.54	91.94
-	-	99287	.5512		14.000	14.0	100	50	105.73	101.13	96.54	91.94
97297	-	99297	.5512		14.000	14.0	150	50	145.16	138.85	132.54	126.23
-	-	99307	.5512		14.000	14.0	150	75	145.16	138.85	132.54	126.23
43287	-	44287	.5625	9/16"	14.288	9/16"	6"	2"	145.16	138.85	132.54	126.23
43297	-	44297	.5625	9/16"	14.288	9/16"	6"	3"	145.16	138.85	132.54	126.23
43307	55807	44307	.6250	5/8"	15.875	5/8"	6"	2"	151.92	145.31	138.71	132.10
43317	55817	44317	.6250	5/8"	15.875	5/8"	6"	3"	151.92	145.31	138.71	132.10
97317	98317	99317	.6299		16.000	16.0	150	50	151.92	145.31	138.71	132.10
97327	98327	99327	.6299		16.000	16.0	150	75	151.92	145.31	138.71	132.10
-	98337	99337	.7087		18.000	18.0	150	50	226.27	216.44	206.60	196.76
-	-	99347	.7087		18.000	18.0	150	75	226.27	216.44	206.60	196.76
43327	55827	44327	.7500	3/4"	19.050	3/4"	6"	2"	239.88	229.45	219.02	208.59
43337	55837	44337	.7500	3/4"	19.050	3/4"	6"	3"	239.88	229.45	219.02	208.59
97357	98357	99357	.7874		20.000	20.0	150	50	253.30	242.29	231.27	220.26
97367	98367	99367	.7874		20.000	20.0	150	75	253.30	242.29	231.27	220.26
-	-	99377	.9843		25.000	25.0	150	50	384.65	367.93	351.20	334.48
-	-	99387	.9843		25.000	25.0	150	75	384.65	367.93	351.20	334.48
-	55847	44347	1.000	1"	25.400	1"	6"	2"	398.85	381.51	364.17	346.83
43357	55857	44357	1.000	1"	25.400	1"	6"	3"	398.85	381.51	364.17	346.83

SA (1/4" Steel Shank)

Carbide Rotary Files - Cylindrical Shape

Submicron Grain Carbide
A - Aluminum Cut
D - Double Cut
* - Solid Carbide





EDP#	TOOL #	d1 † Diameter Decimal	d1 † Diameter	d1 † Diameter Metric	d2 Shank Diameter	l2 Flute Length	l4 Shank Length	1-11	12-24	25-49	50-100
60010	* SA-14	.1875	3/16"	4.763	1/4"	5/8"	1-3/8"	9.56	9.14	8.73	8.31
60012	* SA-14D	.1875	3/16"	4.763	1/4"	5/8"	1-3/8"	9.56	9.14	8.73	8.31
60020	* SA-1	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"	8.50	8.13	7.76	7.39
60021	* SA-1A	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"	10.67	10.21	9.74	9.28
60022	* SA-1D	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"	8.50	8.13	7.76	7.39
60030	SA-2	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"	11.88	11.36	10.85	10.33
60032	SA-2D	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"	11.88	11.36	10.85	10.33
60040	SA-3	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"	12.80	12.24	11.69	11.13
60041	SA-3A	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"	17.23	16.48	15.73	14.98
60042	SA-3D	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"	12.80	12.24	11.69	11.13
60050	SA-4	.4375	7/16"	11.113	1/4"	1"	1-3/4"	17.68	16.91	16.14	15.37
60052	SA-4D	.4375	7/16"	11.113	1/4"	1"	1-3/4"	17.68	16.91	16.14	15.37
60060	SA-5	.5000	1/2"	12.700	1/4"	1"	1-3/4"	18.86	18.04	17.22	16.40
60061	SA-5A	.5000	1/2"	12.700	1/4"	1"	1-3/4"	24.44	23.38	22.31	21.25
60062	SA-5D	.5000	1/2"	12.700	1/4"	1"	1-3/4"	18.86	18.04	17.22	16.40
60070	SA-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"	22.85	21.86	20.86	19.87
60071	SA-6A	.6250	5/8"	15.875	1/4"	1"	1-3/4"	38.30	36.63	34.97	33.30
60072	SA-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"	22.85	21.86	20.86	19.87
60080	SA-7	.7500	3/4"	19.050	1/4"	1"	1-3/4"	36.17	34.60	33.02	31.45
60081	SA-7A	.7500	3/4"	19.050	1/4"	1"	1-3/4"	43.39	41.50	39.62	37.73
60082	SA-7D	.7500	3/4"	19.050	1/4"	1"	1-3/4"	36.17	34.60	33.02	31.45
60090	SA-9	1.000	1"	25.400	1/4"	1"	1-3/4"	49.34	47.19	45.05	42.90
60091	SA-9A	1.000	1"	25.400	1/4"	1"	1-3/4"	59.17	56.60	54.02	51.45
60092	SA-9D	1.000	1"	25.400	1/4"	1"	1-3/4"	49.34	47.19	45.05	42.90

Basic Rotary File Cut Styles Available



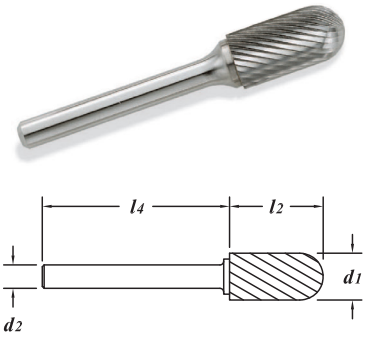
Standard Cut | Chipbreaker Cut | Double Cut (D) | Diamond Cut (add 20%) | Aluminum Cut (A) | End Cut (add 10%)

Double Cut and Aluminum Cut rotary files are in stock where indicated by (D) and (A) in the catalog tables.

† *Metric equivalents are for reference only*

Carbide Rotary Files - Cylindrical-Radius Shape

Submicron Grain Carbide
A - Aluminum Cut
D - Double Cut
* - Solid Carbide



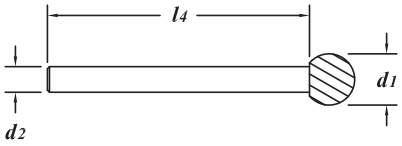
EDP#	TOOL #	d1 † Diameter Decimal	Diameter	Metric	d2 Shank Diameter	l2 Flute Length	l4 Shank Length	1-11	12-24	25-49	50-100
61010	* SC-14	.1875	3/16"	4.763	1/4"	5/8"	1-3/8"	10.81	10.34	9.87	9.40
61012	* SC-14D	.1875	3/16"	4.763	1/4"	5/8"	1-3/8"	10.81	10.34	9.87	9.40
61020	* SC-1	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"	10.18	9.74	9.29	8.85
61021	* SC-1A	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"	13.43	12.85	12.26	11.68
61022	* SC-1D	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"	10.18	9.74	9.29	8.85
61030	SC-2	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"	11.88	11.36	10.85	10.33
61032	SC-2D	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"	11.88	11.36	10.85	10.33
61040	SC-3	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"	13.87	13.27	12.66	12.06
61041	SC-3A	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"	24.04	22.99	21.95	20.90
61042	SC-3D	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"	13.87	13.27	12.66	12.06
61050	SC-4	.4375	7/16"	11.113	1/4"	1"	1-3/4"	20.06	19.18	18.31	17.44
61052	SC-4D	.4375	7/16"	11.113	1/4"	1"	1-3/4"	20.06	19.18	18.31	17.44
61060	SC-5	.5000	1/2"	12.700	1/4"	1"	1-3/4"	20.79	19.89	18.98	18.08
61061	SC-5A	.5000	1/2"	12.700	1/4"	1"	1-3/4"	31.60	30.23	28.85	27.48
61062	SC-5D	.5000	1/2"	12.700	1/4"	1"	1-3/4"	20.79	19.89	18.98	18.08
61070	SC-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"	27.76	26.55	25.35	24.14
61071	SC-6A	.6250	5/8"	15.875	1/4"	1"	1-3/4"	43.29	41.40	39.52	37.64
61072	SC-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"	27.76	26.55	25.35	24.14
61080	SC-7	.7500	3/4"	19.050	1/4"	1"	1-3/4"	40.86	39.08	37.31	35.53
61081	SC-7A	.7500	3/4"	19.050	1/4"	1"	1-3/4"	60.10	57.49	54.87	52.26
61082	SC-7D	.7500	3/4"	19.050	1/4"	1"	1-3/4"	40.86	39.08	37.31	35.53

SD (1/4" Steel Shank)

Carbide Rotary Files - Ball Shape

Submicron Grain Carbide
A - Aluminum Cut
D - Double Cut
* - Solid Carbide





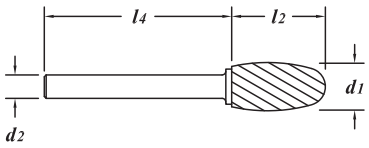
EDP#	TOOL #	d1 † Diameter Decimal	Diameter	Metric	d2 Shank Diameter	l2 Flute Length	l4 Shank Length	1-11	12-24	25-49	50-100
62010	* SD-14	.1875	3/16"	4.763	1/4"	-	2"	10.81	10.34	9.87	9.40
62012	* SD-14D	.1875	3/16"	4.763	1/4"	-	2"	10.81	10.34	9.87	9.40
62020	* SD-1	.2500	1/4"	6.350	1/4"	-	2"	10.81	10.34	9.87	9.40
62021	* SD-1A	.2500	1/4"	6.350	1/4"	-	2"	17.14	16.39	15.65	14.90
62022	* SD-1D	.2500	1/4"	6.350	1/4"	-	2"	10.81	10.34	9.87	9.40
62030	SD-2	.3125	5/16"	7.938	1/4"	-	1-3/4"	10.18	9.74	9.29	8.85
62032	SD-2D	.3125	5/16"	7.938	1/4"	-	1-3/4"	10.18	9.74	9.29	8.85
62040	SD-3	.3750	3/8"	9.525	1/4"	-	1-3/4"	11.04	10.56	10.08	9.60
62041	SD-3A	.3750	3/8"	9.525	1/4"	-	1-3/4"	17.86	17.08	16.31	15.53
62042	SD-3D	.3750	3/8"	9.525	1/4"	-	1-3/4"	11.04	10.56	10.08	9.60
62050	SD-4	.4375	7/16"	11.113	1/4"	-	1-3/4"	16.03	15.33	14.64	13.94
62052	SD-4D	.4375	7/16"	11.113	1/4"	-	1-3/4"	16.03	15.33	14.64	13.94
62060	SD-5	.5000	1/2"	12.700	1/4"	-	1-3/4"	16.55	15.83	15.11	14.39
62061	SD-5A	.5000	1/2"	12.700	1/4"	-	1-3/4"	22.13	21.16	20.20	19.24
62062	SD-5D	.5000	1/2"	12.700	1/4"	-	1-3/4"	16.55	15.83	15.11	14.39
62070	SD-6	.6250	5/8"	15.875	1/4"	-	1-3/4"	18.50	17.70	16.89	16.09
62071	SD-6A	.6250	5/8"	15.875	1/4"	-	1-3/4"	38.30	36.63	34.97	33.30
62072	SD-6D	.6250	5/8"	15.875	1/4"	-	1-3/4"	18.50	17.70	16.89	16.09
62080	SD-7	.7500	3/4"	19.050	1/4"	-	1-3/4"	26.35	25.20	24.06	22.91
62082	SD-7D	.7500	3/4"	19.050	1/4"	-	1-3/4"	26.35	25.20	24.06	22.91
62090	SD-9	1.000	1"	25.400	1/4"	-	1-3/4"	48.86	46.74	44.61	42.49
62092	SD-9D	1.000	1"	25.400	1/4"	-	1-3/4"	48.86	46.74	44.61	42.49

† *Metric equivalents are for reference only*

Carbide Rotary Files - Egg Shape

Submicron Grain Carbide
A - Aluminum Cut
D - Double Cut
* - Solid Carbide



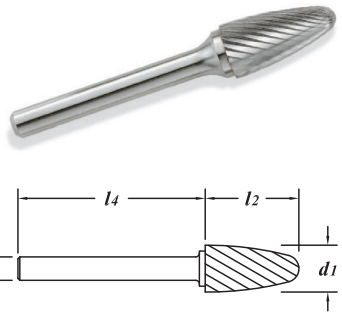


EDP#	TOOL #	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
63010	* SE-1	.2500	1/4"	6.350	1/4"	3/8"	2"	11.11	10.63	10.14	9.66
63012	* SE-1D	.2500	1/4"	6.350	1/4"	3/8"	2"	11.11	10.63	10.14	9.66
63020	SE-3	.3750	3/8"	9.525	1/4"	5/8"	1-3/4"	15.43	14.76	14.09	13.42
63021	SE-3A	.3750	3/8"	9.525	1/4"	5/8"	1-3/4"	22.37	21.40	20.42	19.45
63022	SE-3D	.3750	3/8"	9.525	1/4"	5/8"	1-3/4"	15.43	14.76	14.09	13.42
63030	SE-5	.5000	1/2"	12.700	1/4"	7/8"	1-3/4"	19.75	18.89	18.03	17.17
63031	SE-5A	.5000	1/2"	12.700	1/4"	7/8"	1-3/4"	32.11	30.71	29.32	27.92
63032	SE-5D	.5000	1/2"	12.700	1/4"	7/8"	1-3/4"	19.75	18.89	18.03	17.17
63040	SE-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"	29.00	27.74	26.48	25.22
63041	SE-6A	.6250	5/8"	15.875	1/4"	1"	1-3/4"	47.64	45.57	43.50	41.43
63042	SE-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"	29.00	27.74	26.48	25.22
63050	SE-7	.7500	3/4"	19.050	1/4"	1"	1-3/4"	39.97	38.24	36.50	34.76
63052	SE-7D	.7500	3/4"	19.050	1/4"	1"	1-3/4"	39.97	38.24	36.50	34.76

SF (1/4" Steel Shank)

Carbide Rotary Files - Tree-Radius Shape

Submicron Grain Carbide
A - Aluminum Cut
D - Double Cut
* - Solid Carbide



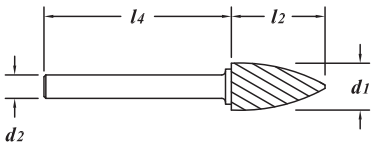
EDP#	TOOL #	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
64010	* SF-1	.2500	1/4"	6.350	1/4"	5/8"	2"	11.11	10.63	10.14	9.66
64011	* SF-1A	.2500	1/4"	6.350	1/4"	5/8"	2"	17.14	16.39	15.65	14.90
64012	* SF-1D	.2500	1/4"	6.350	1/4"	5/8"	2"	11.11	10.63	10.14	9.66
64020	SF-3	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"	13.39	12.80	12.22	11.64
64021	SF-3A	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"	21.60	20.66	19.72	18.78
64022	SF-3D	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"	13.39	12.80	12.22	11.64
64030	SF-5	.5000	1/2"	12.700	1/4"	1"	1-3/4"	20.06	19.18	18.31	17.44
64031	SF-5A	.5000	1/2"	12.700	1/4"	1"	1-3/4"	30.57	29.24	27.91	26.58
64032	SF-5D	.5000	1/2"	12.700	1/4"	1"	1-3/4"	20.06	19.18	18.31	17.44
64040	SF-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"	27.76	26.55	25.35	24.14
64041	SF-6A	.6250	5/8"	15.875	1/4"	1"	1-3/4"	42.49	40.65	38.80	36.95
64042	SF-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"	27.76	26.55	25.35	24.14
64050	SF-14	.7500	3/4"	19.050	1/4"	1-1/4"	1-3/4"	42.77	40.91	39.05	37.19
64052	SF-14D	.7500	3/4"	19.050	1/4"	1-1/4"	1-3/4"	42.77	40.91	39.05	37.19

† *Metric equivalents are for reference only*

Carbide Rotary Files - Tree-Pointed Shape

Submicron Grain Carbide
D - Double Cut
* - Solid Carbide





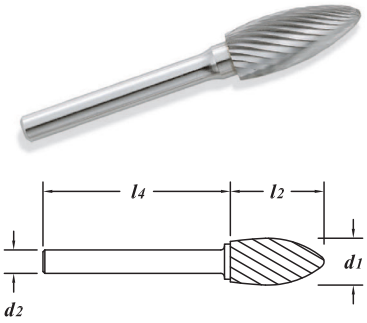
EDP#	TOOL #	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
65010	* SG-1	.2500	1/4"	6.350	1/4"	5/8"	2"	11.11	10.63	10.14	9.66
65012	* SG-1D	.2500	1/4"	6.350	1/4"	5/8"	2"	11.11	10.63	10.14	9.66
65020	SG-3	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"	14.28	13.66	13.04	12.42
65022	SG-3D	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"	14.28	13.66	13.04	12.42
65030	SG-13	.5000	1/2"	12.700	1/4"	3/4"	1-3/4"	19.12	18.29	17.46	16.63
65032	SG-13D	.5000	1/2"	12.700	1/4"	3/4"	1-3/4"	19.12	18.29	17.46	16.63
65040	SG-5	.5000	1/2"	12.700	1/4"	1"	1-3/4"	19.78	18.92	18.06	17.20
65042	SG-5D	.5000	1/2"	12.700	1/4"	1"	1-3/4"	19.78	18.92	18.06	17.20
65050	SG-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"	27.76	26.55	25.35	24.14
65052	SG-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"	27.76	26.55	25.35	24.14
65060	SG-7	.7500	3/4"	19.050	1/4"	1"	1-3/4"	36.72	35.12	33.53	31.93
65062	SG-7D	.7500	3/4"	19.050	1/4"	1"	1-3/4"	36.72	35.12	33.53	31.93

SH (1/4" Steel Shank)

Carbide Rotary Files - Flame Shape

Submicron Grain Carbide

D - Double Cut



EDP#	TOOL #	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
66010	SH-2	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"	13.58	12.99	12.40	11.81
66012	SH-2D	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"	13.58	12.99	12.40	11.81
66020	SH-5	.5000	1/2"	12.700	1/4"	1-1/4"	1-3/4"	27.76	26.55	25.35	24.14
66022	SH-5D	.5000	1/2"	12.700	1/4"	1-1/4"	1-3/4"	27.76	26.55	25.35	24.14
66030	SH-6	.6250	5/8"	15.875	1/4"	1-7/16"	1-3/4"	36.40	34.82	33.23	31.65
66032	SH-6D	.6250	5/8"	15.875	1/4"	1-7/16"	1-3/4"	36.40	34.82	33.23	31.65
66040	SH-7	.7500	3/4"	19.050	1/4"	1-5/8"	1-3/4"	44.72	42.78	40.83	38.89
66042	SH-7D	.7500	3/4"	19.050	1/4"	1-5/8"	1-3/4"	44.72	42.78	40.83	38.89

† *Metric equivalents are for reference only*

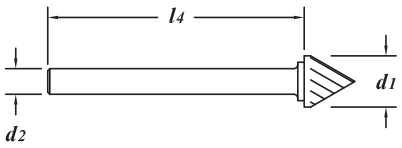
Carbide Rotary Files - Taper Shape *(60° Included Angle)*

Submicron Grain Carbide

D - Double Cut

** - Solid Carbide/Double End



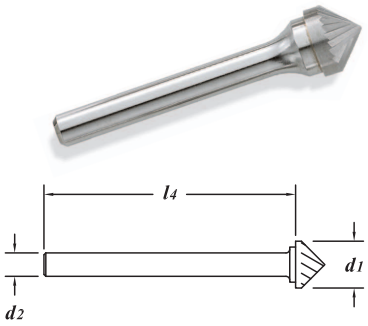


EDP#	TOOL #	d1 † Diameter Decimal	d1 † Diameter	d1 † Diameter Metric	d2 Shank Diameter	l4 Shank Length	1-11	12-24	25-49	50-100
67010	**SJ-1	.2500	1/4"	6.350	1/4"	1-11/16"	13.97	13.37	12.76	12.15
67012	**SJ-1D	.2500	1/4"	6.350	1/4"	1-11/16"	13.97	13.37	12.76	12.15
67020	SJ-3	.3750	3/8"	9.525	1/4"	1-3/4"	11.73	11.22	10.71	10.20
67022	SJ-3D	.3750	3/8"	9.525	1/4"	1-3/4"	11.73	11.22	10.71	10.20
67030	SJ-5	.5000	1/2"	12.700	1/4"	1-3/4"	14.47	13.84	13.21	12.58
67032	SJ-5D	.5000	1/2"	12.700	1/4"	1-3/4"	14.47	13.84	13.21	12.58
67040	SJ-6	.6250	5/8"	15.875	1/4"	1-3/4"	19.27	18.44	17.60	16.76
67042	SJ-6D	.6250	5/8"	15.875	1/4"	1-3/4"	19.27	18.44	17.60	16.76
67050	SJ-7	.7500	3/4"	19.050	1/4"	1-3/4"	25.29	24.19	23.09	21.99
67052	SJ-7D	.7500	3/4"	19.050	1/4"	1-3/4"	25.29	24.19	23.09	21.99
67070	SJ-9	1.000	1"	25.400	1/4"	1-3/4"	40.56	38.80	37.03	35.27
67072	SJ-9D	1.000	1"	25.400	1/4"	1-3/4"	40.56	38.80	37.03	35.27

SK (1/4" Steel Shank)

Carbide Rotary Files - Taper Shape *(90° Included Angle)*

Submicron Grain Carbide
D - Double Cut
** - Solid Carbide/Double End

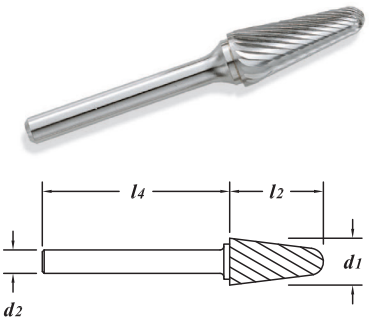


EDP#	TOOL #	*d1* † Diameter Decimal	Diameter	Metric	*d2* Shank Diameter	*l4* Shank Length	1-11	12-24	25-49	50-100
68010	**SK-1	.2500	1/4"	6.350	1/4"	1-11/16"	13.97	13.37	12.76	12.15
68012	**SK-1D	.2500	1/4"	6.350	1/4"	1-11/16"	13.97	13.37	12.76	12.15
68020	SK-3	.3750	3/8"	9.525	1/4"	1-3/4"	11.73	11.22	10.71	10.20
68022	SK-3D	.3750	3/8"	9.525	1/4"	1-3/4"	11.73	11.22	10.71	10.20
68030	SK-5	.5000	1/2"	12.700	1/4"	1-3/4"	14.47	13.84	13.21	12.58
68032	SK-5D	.5000	1/2"	12.700	1/4"	1-3/4"	14.47	13.84	13.21	12.58
68040	SK-6	.6250	5/8"	15.875	1/4"	1-3/4"	19.27	18.44	17.60	16.76
68042	SK-6D	.6250	5/8"	15.875	1/4"	1-3/4"	19.27	18.44	17.60	16.76
68050	SK-7	.7500	3/4"	19.050	1/4"	1-3/4"	25.29	24.19	23.09	21.99
68052	SK-7D	.7500	3/4"	19.050	1/4"	1-3/4"	25.29	24.19	23.09	21.99
68070	SK-9	1.000	1"	25.400	1/4"	1-3/4"	40.56	38.80	37.03	35.27
68072	SK-9D	1.000	1"	25.400	1/4"	1-3/4"	40.56	38.80	37.03	35.27

† *Metric equivalents are for reference only*

Carbide Rotary Files - Cone-Radius Shape *(14° Included Angle)*

Submicron Grain Carbide
A - Aluminum Cut
D - Double Cut
* - Solid Carbide

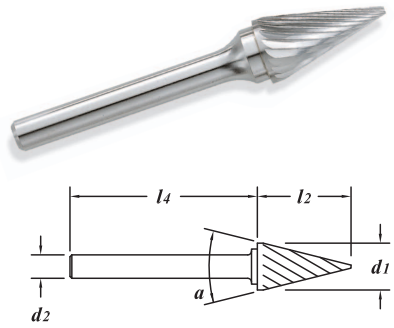


EDP#	TOOL #	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
69010	* SL-1	.2500	1/4"	6.350	1/4"	5/8"	2"	11.11	10.63	10.14	9.66
69012	* SL-1D	.2500	1/4"	6.350	1/4"	5/8"	2"	11.11	10.63	10.14	9.66
69020	SL-2	.3125	5/16"	7.938	1/4"	7/8"	1-3/4"	13.27	12.69	12.12	11.54
69022	SL-2D	.3125	5/16"	7.938	1/4"	7/8"	1-3/4"	13.27	12.69	12.12	11.54
69030	SL-3	.3750	3/8"	9.525	1/4"	1-1/16"	1-3/4"	15.73	15.05	14.36	13.68
69031	SL-3A	.3750	3/8"	9.525	1/4"	1-1/16"	1-3/4"	26.22	25.08	23.94	22.80
69032	SL-3D	.3750	3/8"	9.525	1/4"	1-1/16"	1-3/4"	15.73	15.05	14.36	13.68
69040	SL-4	.5000	1/2"	12.700	1/4"	1-1/8"	1-3/4"	19.12	18.29	17.46	16.63
69041	SL-4A	.5000	1/2"	12.700	1/4"	1-1/8"	1-3/4"	32.49	31.08	29.66	28.25
69042	SL-4D	.5000	1/2"	12.700	1/4"	1-1/8"	1-3/4"	19.12	18.29	17.46	16.63
69050	SL-5	.6250	5/8"	15.875	1/4"	1-3/16"	1-3/4"	37.64	36.00	34.37	32.73
69051	SL-5A	.6250	5/8"	15.875	1/4"	1-3/16"	1-3/4"	51.26	49.03	46.80	44.57
69052	SL-5D	.6250	5/8"	15.875	1/4"	1-3/16"	1-3/4"	37.64	36.00	34.37	32.73
69060	SL-7	.7500	3/4"	19.050	1/4"	1-1/2"	1-3/4"	49.68	47.52	45.36	43.20
69062	SL-7D	.7500	3/4"	19.050	1/4"	1-1/2"	1-3/4"	49.68	47.52	45.36	43.20

SM (1/4" Steel Shank)

Carbide Rotary Files - Cone Flat Shape *(no radius)*

Submicron Grain Carbide
D - Double Cut
* - Solid Carbide



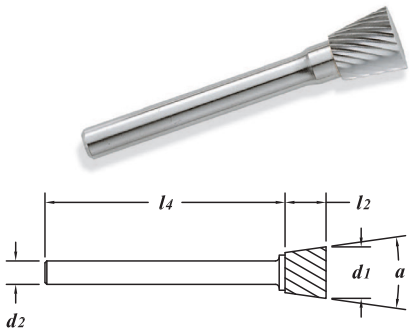
EDP#	TOOL #	*d1* † Diameter Decimal	Diameter	Metric	*d2* Shank Diameter	*a* Included Angle	*l2* Flute Length	*l4* Shank Length	1-11	12-24	25-49	50-100
70010	* SM-1	.2500	1/4"	6.350	1/4"	22°	1/2"	2"	11.11	10.63	10.14	9.66
70012	* SM-1D	.2500	1/4"	6.350	1/4"	22°	1/2"	2"	11.11	10.63	10.14	9.66
70020	SM-4	.3750	3/8"	9.525	1/4"	28°	5/8"	1-3/4"	15.73	15.05	14.36	13.68
70022	SM-4D	.3750	3/8"	9.525	1/4"	28°	5/8"	1-3/4"	15.73	15.05	14.36	13.68
70030	SM-5	.5000	1/2"	12.700	1/4"	28°	7/8"	1-3/4"	19.75	18.89	18.03	17.17
70032	SM-5D	.5000	1/2"	12.700	1/4"	28°	7/8"	1-3/4"	19.75	18.89	18.03	17.17
70040	SM-6	.6250	5/8"	15.875	1/4"	31°	1"	1-3/4"	26.23	25.09	23.95	22.81
70042	SM-6D	.6250	5/8"	15.875	1/4"	31°	1"	1-3/4"	26.23	25.09	23.95	22.81



† *Metric equivalents are for reference only*

Carbide Rotary Files - Inverted Cone Shape

Submicron Grain Carbide
D - Double Cut
* - Solid Carbide



EDP#	TOOL #	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	a Included Angle	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
71010	* SN-1	.2500	1/4"	6.350	1/4"	10°	5/16"	2"	11.11	10.63	10.14	9.66
71012	* SN-1D	.2500	1/4"	6.350	1/4"	10°	5/16"	2"	11.11	10.63	10.14	9.66
71020	SN-2	.3750	3/8"	9.525	1/4"	13°	3/8"	1-3/4"	13.87	13.27	12.66	12.06
71022	SN-2D	.3750	3/8"	9.525	1/4"	13°	3/8"	1-3/4"	13.87	13.27	12.66	12.06
71030	SN-3	.5000	1/2"	12.700	1/4"	16°	1/2"	1-3/4"	19.12	18.29	17.46	16.63
71032	SN-3D	.5000	1/2"	12.700	1/4"	16°	1/2"	1-3/4"	19.12	18.29	17.46	16.63



3/16" Diameter (3/16" Shank)

Solid Carbide Rotary Files

Submicron Grain Carbide

D - Double Cut



EDP#	TOOL #	d_1 † Diameter Decimal	Diameter	Metric	l_1 Overall Length	a Included Angle	l_2 Flute Length	1-11	12-24	25-49	50-100
72010	SA-81	.1875	3/16"	4.763	2"	-	5/8"	12.16	11.63	11.10	10.57
72012	SA-81D	.1875	3/16"	4.763	2"	-	5/8"	12.16	11.63	11.10	10.57
72020	SC-81	.1875	3/16"	4.763	2"	-	5/8"	12.16	11.63	11.10	10.57
72030	SD-81	.1875	3/16"	4.763	2"	-	-	12.16	11.63	11.10	10.57
72032	SD-81D	.1875	3/16"	4.763	2"	-	-	12.16	11.63	11.10	10.57
72040	SE-81	.1875	3/16"	4.763	2"	-	9/32"	12.16	11.63	11.10	10.57
72042	SE-81D	.1875	3/16"	4.763	2"	-	9/32"	12.16	11.63	11.10	10.57
72050	SF-81	.1875	3/16"	4.763	2"	-	1/2"	12.16	11.63	11.10	10.57
72052	SF-81D	.1875	3/16"	4.763	2"	-	1/2"	12.16	11.63	11.10	10.57
72060	SG-81	.1875	3/16"	4.763	2"	-	1/2"	12.16	11.63	11.10	10.57
72062	SG-81D	.1875	3/16"	4.763	2"	-	1/2"	12.16	11.63	11.10	10.57
72070	SJ-81	.1875	3/16"	4.763	2"	60°	-	12.16	11.63	11.10	10.57
72072	SJ-81D	.1875	3/16"	4.763	2"	60°	-	12.16	11.63	11.10	10.57
72080	SK-81	.1875	3/16"	4.763	2"	90°	-	12.16	11.63	11.10	10.57
72082	SK-81D	.1875	3/16"	4.763	2"	90°	-	12.16	11.63	11.10	10.57
72090	SL-81	.1875	3/16"	4.763	2"	14°	1/2"	12.16	11.63	11.10	10.57
72092	SL-81D	.1875	3/16"	4.763	2"	14°	1/2"	12.16	11.63	11.10	10.57
72100	SM-81	.1875	3/16"	4.763	2"	12°	5/8"	12.16	11.63	11.10	10.57
72110	SN-81	.1875	3/16"	4.763	2"	10°	1/4"	12.16	11.63	11.10	10.57
72112	SN-81D	.1875	3/16"	4.763	2"	10°	1/4"	12.16	11.63	11.10	10.57

† *Metric equivalents are for reference only*

Carbide Rotary Files

Submicron Grain Carbide

D - Double Cut≤



SA-51

SB-51

SC-51

SD-51

SE-51

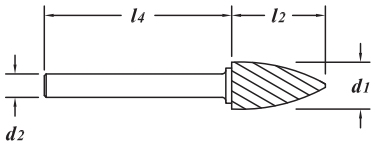


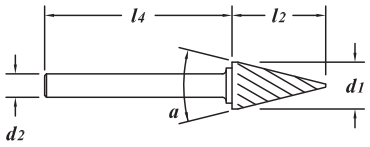
SF-51

SG-51

SM-51

SN-51





EDP#	TOOL #	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	a Included Angle	l_2 Flute Length	l_4 Shank Length	1-11	12-24	25-49	50-100
73010	SA-51	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"	11.60	11.10	10.59	10.09
73012	SA-51D	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"	11.60	11.10	10.59	10.09
73020	SB-51	.2500	1/4"	6.350	1/8"	-	3/16"	1-1/2"	11.60	11.10	10.59	10.09
73022	SB-51D	.2500	1/4"	6.350	1/8"	-	3/16"	1-1/2"	11.60	11.10	10.59	10.09
73030	SC-51	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"	11.60	11.10	10.59	10.09
73032	SC-51D	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"	11.60	11.10	10.59	10.09
73040	SD-51	.2500	1/4"	6.350	1/8"	-	-	1-1/2"	11.60	11.10	10.59	10.09
73042	SD-51D	.2500	1/4"	6.350	1/8"	-	-	1-1/2"	11.60	11.10	10.59	10.09
73050	SE-51	.2500	1/4"	6.350	1/8"	-	3/8"	1-1/2"	11.60	11.10	10.59	10.09
73052	SE-51D	.2500	1/4"	6.350	1/8"	-	3/8"	1-1/2"	11.60	11.10	10.59	10.09
73060	SF-51	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"	11.60	11.10	10.59	10.09
73062	SF-51D	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"	11.60	11.10	10.59	10.09
73070	SG-51	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"	11.60	11.10	10.59	10.09
73072	SG-51D	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"	11.60	11.10	10.59	10.09
73080	SM-51	.2500	1/4"	6.350	1/8"	22°	1/2"	1-1/2"	11.60	11.10	10.59	10.09
73082	SM-51D	.2500	1/4"	6.350	1/8"	22°	1/2"	1-1/2"	11.60	11.10	10.59	10.09
73090	SN-51	.2500	1/4"	6.350	1/8"	10°	1/4"	1-1/2"	11.60	11.10	10.59	10.09
73092	SN-51D	.2500	1/4"	6.350	1/8"	10°	1/4"	1-1/2"	11.60	11.10	10.59	10.09

CAD drawings representative for dimension placement

1/8" Diameter (1/8" Shank)

Solid Carbide Rotary Files

Submicron Grain Carbide

D - Double Cut



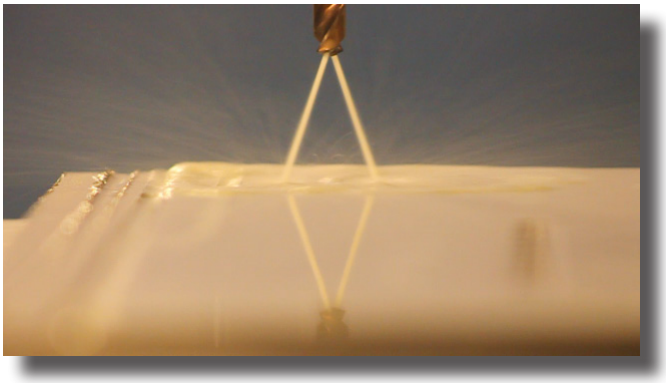
SA-41
SA-42
SA-43
SC-41
SC-42
SD-41
SD-42
SE-41
SF-42

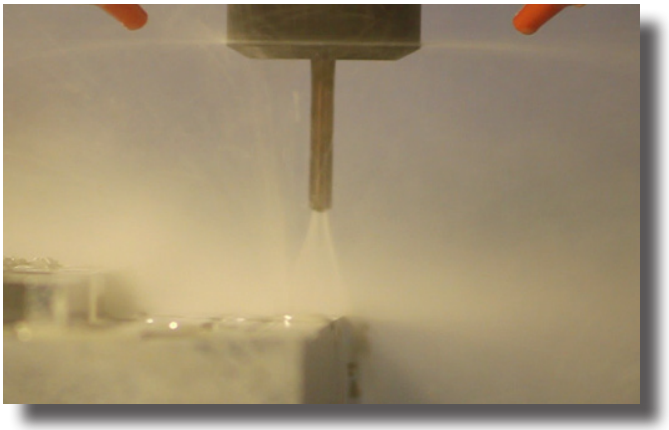


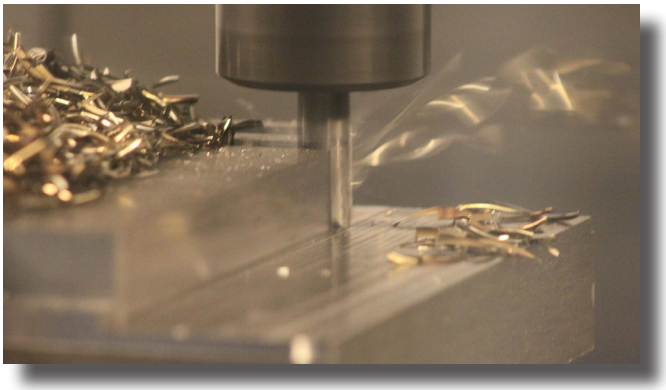
SG-43
SH-41
SJ-42
SK-42
SL-41
SL-42
SM-41
SM-43
SN-42

EDP#	TOOL #	d_1 † Diameter Decimal	Diameter	Metric	l_1 Overall Length	a Included Angle	l_2 Flute Length	1-11	12-24	25-49	50-100
74010	SA-41	.0625	1/16"	1.588	1-1/2"	-	1/4"	6.87	6.57	6.27	5.97
74012	SA-41D	.0625	1/16"	1.588	1-1/2"	-	1/4"	6.87	6.57	6.27	5.97
74020	SA-42	.0938	3/32"	2.383	1-1/2"	-	7/16"	6.87	6.57	6.27	5.97
74022	SA-42D	.0938	3/32"	2.383	1-1/2"	-	7/16"	6.87	6.57	6.27	5.97
74030	SA-43	.1250	1/8"	3.175	1-1/2"	-	9/16"	6.87	6.57	6.27	5.97
74032	SA-43D	.1250	1/8"	3.175	1-1/2"	-	9/16"	6.87	6.57	6.27	5.97
74040	SC-41	.0938	3/32"	2.383	1-1/2"	-	7/16"	6.87	6.57	6.27	5.97
74042	SC-41D	.0938	3/32"	2.383	1-1/2"	-	7/16"	6.87	6.57	6.27	5.97
74050	SC-42	.1250	1/8"	3.175	1-1/2"	-	9/16"	6.87	6.57	6.27	5.97
74052	SC-42D	.1250	1/8"	3.175	1-1/2"	-	9/16"	6.87	6.57	6.27	5.97
74060	SD-41	.0938	3/32"	2.383	1-1/2"	-	-	6.87	6.57	6.27	5.97
74062	SD-41D	.0938	3/32"	2.383	1-1/2"	-	-	6.87	6.57	6.27	5.97
74070	SD-42	.1250	1/8"	3.175	1-1/2"	-	-	6.87	6.57	6.27	5.97
74072	SD-42D	.1250	1/8"	3.175	1-1/2"	-	-	6.87	6.57	6.27	5.97
74080	SE-41	.1250	1/8"	3.175	1-1/2"	-	7/32"	6.87	6.57	6.27	5.97
74082	SE-41D	.1250	1/8"	3.175	1-1/2"	-	7/32"	6.87	6.57	6.27	5.97
74090	SF-42	.1250	1/8"	3.175	1-1/2"	-	1/2"	6.87	6.57	6.27	5.97
74092	SF-42D	.1250	1/8"	3.175	1-1/2"	-	1/2"	6.87	6.57	6.27	5.97
74100	SG-43	.1250	1/8"	3.175	1-1/2"	-	3/8"	6.87	6.57	6.27	5.97
74102	SG-43D	.1250	1/8"	3.175	1-1/2"	-	3/8"	6.87	6.57	6.27	5.97
74110	SH-41	.1250	1/8"	3.175	1-1/2"	-	1/4"	6.87	6.57	6.27	5.97
74112	SH-41D	.1250	1/8"	3.175	1-1/2"	-	1/4"	6.87	6.57	6.27	5.97
74120	SJ-42	.1250	1/8"	3.175	1-1/2"	60°	-	6.87	6.57	6.27	5.97
74122	SJ-42D	.1250	1/8"	3.175	1-1/2"	60°	-	6.87	6.57	6.27	5.97
74130	SK-42	.1250	1/8"	3.175	1-1/2"	90°	-	6.87	6.57	6.27	5.97
74132	SK-42D	.1250	1/8"	3.175	1-1/2"	90°	-	6.87	6.57	6.27	5.97
74140	SL-41	.1250	1/8"	3.175	1-1/2"	8°	3/8"	6.87	6.57	6.27	5.97
74142	SL-41D	.1250	1/8"	3.175	1-1/2"	8°	3/8"	6.87	6.57	6.27	5.97
74150	SL-42	.1250	1/8"	3.175	1-1/2"	8°	1/2"	6.87	6.57	6.27	5.97
74152	SL-42D	.1250	1/8"	3.175	1-1/2"	8°	1/2"	6.87	6.57	6.27	5.97
74160	SM-41	.1250	1/8"	3.175	1-1/2"	12°	3/8"	6.87	6.57	6.27	5.97
74162	SM-41D	.1250	1/8"	3.175	1-1/2"	12°	3/8"	6.87	6.57	6.27	5.97
74170	SM-43	.1250	1/8"	3.175	1-1/2"	7°	5/8"	6.87	6.57	6.27	5.97
74172	SM-43D	.1250	1/8"	3.175	1-1/2"	7°	5/8"	6.87	6.57	6.27	5.97
74180	SN-42	.1250	1/8"	3.175	1-1/2"	10°	3/16"	6.87	6.57	6.27	5.97
74182	SN-42D	.1250	1/8"	3.175	1-1/2"	10°	3/16"	6.87	6.57	6.27	5.97

† *Metric equivalents are for reference only*







Troubleshooting Guide - Drills	252
Troubleshooting Guide - End Mills	253
Troubleshooting Guide - Reamers	254
Formulas	255
Tool Coating Types	256
SFM/RPM Conversion Charts	257
General Milling Guide - *fractional*	258
High Performance Milling Guide - *fractional*	259
General Milling Guide - *metric*	260
High Performance Milling Guide - *metric*	261
Alumastar Coated Milling Guide	262
VRX Milling Guide	263
VRX-6 Milling Guide	264
ARC Milling Guide	266
VHM Milling Guide	267
TMS/TMR Milling Guide - *fractional*	268
TMS/TMR Milling Guide - *metric*	269
TMS/TMR Chip Thinning Calculations - *fractional*	270
TMS/TMR Chip Thinning Calculations - *metric*	271
V4 High Speed Milling Guide - *fractional*	272
V4 High Speed Milling Guide - *metric*	273
V5 High Speed Milling Guide - *fractional*	274
V5 High Speed Milling Guide - *metric*	275
High Rc Finisher Milling Guide - *fractional*	276
High Rc Finisher Milling Guide - *metric*	277
Die Mold Cutter Milling Guide - *fractional*	278
Die Mold Cutter Milling Guide - *metric*	279
High Feed Milling Guide	280
Diamond Coated Milling Guide	281
Reaming Guide - *fractional*	282
Reaming Guide - *metric*	283
Drill Mills, Chamfering - *fractional*	284
Drill Mills, Chamfering - *metric*	285
Drill Mills, Through Hole - *fractional*	286
Drill Mills, Through Hole - *metric*	287
Drill Mills, Solids - *fractional*	288
Drill Mills, Solids - *metric*	289
General Drilling Guide - *fractional*	290
General Drilling Guide - *metric*	292
High Performance Mini Drills Guide - *fractional*	294
High Performance Mini Drills Guide - *metric*	295
High Performance Drilling Guide - *fractional*	296
High Performance Drilling Guide - *metric*	297
3-Flute for Aluminum Drilling Guide	298
Length Deviation Chart for Spotting Drills	299
Material Hardness Conversion Chart	300
Decimal Equivalent Chart	301

Troubleshooting for Drills

PROBLEM	SUGGESTIONS
Chipping on point	Reduce feed rate
	Check part rigidity
	Constant feed rate
	Verify speeds and feeds
	Minimum drill overhang
	Reduce number of peck cycles
Chipping on O.D.	Reduce feed rate
	Confirm concentricity of drill in holder
	Check coolant flow and location
	Check part rigidity
Breakage	Reduce feed rate
	Check your program - is 'R' clearing the part
	Check coolant flow and location
	Check part rigiditiy
Heavy wear on corners	Increase feed rate
	Check coolant flow and location
	Confirm concentricity of drill in holder
	Check part rigidity
Long, stringy chips	Increase feed rate
	Increase hone relief
	Constant feed rate
	Increase number of peck cycles
Excessive noise	Check drill
	Check part rigidity
	Check for proper speeds and feeds
Tool life	Lower speeds and feeds
	Check coolant flow and location
	Confirm concentricity of drill in holder
	Confirm coolant concentration
Hole too small	Increase feed rate
	Confirm coolant concentration
	Confirm drill diameter
Hole too large	Reduce feed rate
	Slow feed rate to start hole
	Increase RPMs
	Spot hole
Chip welding	Increase RPMs by 20%
	Confirm coolant concentration
	Check coolant flow and location
Chip packing	Add a peck cycle to clear chips
	Increase RPMs
	Reduce feed rate
	Check coolant flow and location

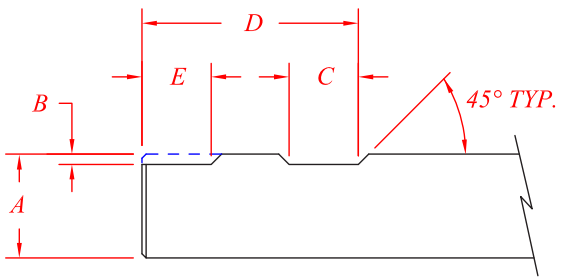
PROBLEM	SUGGESTIONS
Chipping	Check part rigidity
	Verify speeds and feeds
	Confirm concentricity of end mill in holder
	Decrease ramp angle or slow down approach
	Check coolant flow and location
Breakage	Decrease feed rate
	Decrease axial depth
	Use shorter tool or stub holder
	Resharpen earlier
Chattering	Too light of a cut
	Leave more stock for finish pass
	Decrease axial depth
	Adjust speeds and feeds
Part finish	Confirm concentricity of end mill in holder
	Decrease feed rate
	Use different style of end mill
	Check coolant flow and location
	Check part rigidity
Burr	Change end mill sooner / too much wear
	Verify speeds and feeds
	Increase spindle speed
	Decrease feed rate
	Use different style of end mill
Excessive noise	Check part rigidity
	Verify speeds and feeds
	Too light of a cut
	Confirm concentricity of end mill in holder
Tool life	Work material harder than expected
	Verify speeds and feeds
	Recutting chips
	Too light of a cut
	Use different style of end mill
Wear	Speed too fast
	Too light of a feed
	Confirm concentricity of end mill in holder
	Verify speeds and feeds
Chip welding	Verify speeds and feeds
	Check coolant flow and location
	Use different style of end mill
Chip packing	Check coolant flow and location
	Decrease axial depth
	Adjust speeds and feeds
	Use different style of end mill
Wall not straight	Decrease feed rate
	Decrease axial depth
	Use shorter tool or stub holder
	Use different style of end mill

Troubleshooting for Reamers

PROBLEM	SUGGESTIONS
Hole diameter too large	Check part rigidity
	Verify speeds and feeds
	Confirm concentricity of reamer in holder
	Confirm diameter of reamer
	Check coolant flow and location
Hole diameter too small	Leave more stock before reaming
	Reamer worn
	Check coolant flow and concentration
	Resharpen earlier
Hole not straight	Hole was not drilled properly
	Leave more stock before reaming
	Confirm concentricity of reamer in holder
	Check part rigidity
Part finish	Reamer worn
	Verify speeds and feeds
	Confirm concentricity of reamer in holder
	Check coolant flow and location
	Check part rigidity
Tool life	Work material harder than expected
	Verify speeds and feeds
	Not evacuating chips properly
	Too light of a cut
Wear	Speed too fast
	Too light of a feed
	Confirm concentricity of reamer in holder
	Check coolant flow, location, and concentration
Not evacuating	Verify speeds and feeds
	Check coolant flow, location, and concentration
	Reamer worn

STANDARD WELDON SHANK DIMENSIONS

Diameter (A)		B	C	D	E
3/8"	.3750"	.050" - .065"	.280" - .282"	.921"	-
7/16"	.4375"	.050" - .065"	.312" - .314"	.991"	-
1/2"	.5000"	.060" - .075"	.330" - .332"	1.055"	-
9/16"	.5625"	.065" - .080"	.400" - .402"	1.154"	-
5/8"	.6250"	.065" - .080"	.400" - .402"	1.154"	-
3/4"	.7500"	.075" - .090"	.455" - .457"	1.242"	-
7/8"	.8750"	.065" - .080"	.455" - .457"	1.242"	.500"
1"	1.0000"	.075" - .090"	.515" - .517"	1.398"	.500"
1-1/4"	1.2500"	.094" - .109"	.515" - .517"	1.398"	.500"



$$SFM = \frac{\pi \times Diameter \times RPM}{12}$$

$$CPT = \frac{IPM}{RPM \times Number\ of\ Teeth}$$

$$RPM = \frac{SFM \times 3.82}{Diameter}$$

$$IPM = RPM \times Number\ of\ Teeth \times CPT$$

Chip Thinning Calculation:

$$\frac{.50\left(\frac{Diameter}{Radial\ Stepover}\right)}{\sqrt{\left(\frac{Diameter}{Radial\ Stepover}\right)-1}} \times CPT_{\text{(Actual)}} = CPT_{\text{(Programmed)}}$$

Example below:

$$\frac{.50\left(\frac{0.50}{.015}\right)}{\sqrt{\left(\frac{0.50}{.015}\right)-1}} = \frac{16.667}{5.6} = 2.93 \times .0015 = .0045$$

(Chip Thinning reference charts on pages 270-271)

For additional help:
Check out our web site, the MC-20 machinist calculator or, if you have a smartphone, search for the feedrate calculator from the App Store.

h6 TOLERANCE FOR SHRINK FIT HOLDERS
(as taken from the Machinery's Handbook)

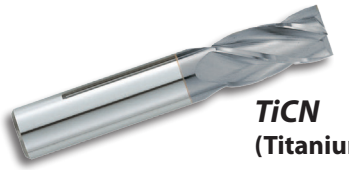
SHANK DIAMETER		TOLERANCE
Decimal	Nominal	
≤ .1181"	≤ 3mm	-.00000" / -.00024"
> .1181" - .2362"	> 3mm - 6mm	-.00000" / -.00032"
> .2362" - .3937"	> 6mm - 10mm	-.00000" / -.00035"
> .3937" - .7087"	> 10mm - 18mm	-.00000" / -.00043"
> .7087" - 1.1811"	> 18mm - 30mm	-.00000" / -.00050"
> 1.1811"	> 30mm	-.00000" / -.00050"

Tool Coatings for Standard Products



TiN
(Titanium Nitride)

General purpose coating - low heat resistance. Good lubricity.



TiCN
(Titanium Carbonitride)

Good abrasion resistance. Recommended for aluminum, brass and bronze applications. Low heat resistance - good lubricity.



TiAlN
(Titanium Aluminum Nitride)

Multi-layer coating with good thermal stability for increased speeds and feeds. For semi-dry to dry cutting of most steels, high-nickel alloys, stainless steel and cast iron. Excellent heat resistance, good lubricity. For materials that are 40Rc and under.



AlTiN
(Aluminum Titanium)

A single-layer coating whose hardness, oxidation resistance and thermal stability were optimized for material hardness above 38Rc and high-speed machining of materials that are difficult to work (titanium alloys, Inconel).



ALUMASTAR®
(Titanium Diboride - TiB_2)

A thin film coating with a low affinity for aluminum, ideal for machining aluminum alloys. The resistance to adhesion of aluminum allows higher speeds or feeds. Coating thickness is intentionally kept lower in order to maintain a sharp edge.



CRYSTALLINE DIAMOND
(CVD)

Improved productivity in composites. Excellent choice for cutting graphite and fiberglass. Can be added to a special for milling or drilling applications.



AlCrN
(Aluminum Chromium)

Aluminum Chromium-based coatings have excellent wear resistance, thermal shock stability, and hot hardness. Well suited for Titanium, Inconel, and carbon fiber.



HARDLUBE

Multi-layer coating with thermal stability and lubricating properties needed for the drilling of steels, high-nickel alloys, stainless steel, cast iron, aluminum, brass, and bronze. Excellent heat resistance, great lubricity.



AlTiN-based

Greater abrasion resistance, extra shear strength, lower adhesion tendency, maximum toughness and a very smooth surface achieve a quantum leap in drilling performance. This coating is particularly advantageous for carbide drills. With its unique nanostructure, AlTiN plus AlCrN, it boosts productivitiy in various materials.

Fractional

	DIAMETER														
	.0625"	.0938"	.1250"	.1562"	.1875"	.2188"	.2500"	.3125"	.3750"	.4375"	.5000"	.6250"	.7500"	.8750"	1.000"
	1/16"	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1"
SFM	**RPM**														
50	3050	2040	1530	1220	1020	875	765	610	510	440	380	310	250	220	190
75	4580	3060	2290	1830	1530	1310	1150	920	760	570	570	460	380	330	285
100	6100	4080	3050	2450	2040	1750	1530	1220	1020	760	760	610	510	440	385
125	7630	5100	3820	3050	2550	2180	1920	1530	1270	950	950	770	630	550	475
150	9150	6120	4570	3670	3060	2620	2290	1830	1530	1140	1140	920	760	660	575
175	10,680	7140	5350	4270	3570	3060	2680	2140	1780	1330	1330	1080	880	770	665
200	12,200	8150	6100	4900	4070	3500	3100	2450	2000	1500	1500	1200	1000	875	750
300	18,500	12,200	9200	7300	6100	5250	4600	3700	3100	2300	2300	1800	1500	1300	1100
400	24,500	16,300	12,200	9800	8150	7000	6100	4900	4100	3050	3050	2450	2050	1750	1525
500	30,500	20,400	15,300	12,200	10,200	8700	7600	6100	5100	3800	3800	3100	2500	2200	1900
750	45,800	36,700	22,900	18,300	15,300	13,100	11,500	9200	7600	5700	5700	4600	3800	3770	2850
1000	-	40,800	30,600	24,500	20,400	17,500	15,300	12,200	10,200	7650	7650	6100	5100	4400	3800
1500	-	-	40,800	36,700	30,600	26,200	22,900	18,300	15,300	11,300	11,300	9200	7600	6500	5700
2000	-	-	-	49,000	40,800	35,000	30,600	24,400	20,400	15,300	15,300	12,200	10,200	8700	7600
3000	-	-	-	-	-	52,500	45,900	36,600	30,600	22,900	22,900	18,300	15,300	13,100	11,400
4000	-	-	-	-	-	-	-	48,800	40,800	30,600	30,600	24,400	20,400	17,500	15,200
5000	-	-	-	-	-	-	-	-	51,000	38,200	38,200	30,600	25,500	21,800	19,000

Metric

	DIAMETER														
	.0394"	.0787"	.1181"	.1575"	.1969"	.2362"	.3150"	.3937"	.4724"	.5512"	.6299"	.7087"	.7874"	.8661"	.9843"
	1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	25.0
M/Min.	**RPM**														
15	4800	2400	1600	1200	960	800	600	480	400	340	300	265	240	220	190
22	7000	3500	2300	1750	1400	1170	875	700	585	500	440	390	350	320	280
30	10,000	4800	3200	2400	1900	1590	1200	955	800	685	600	530	480	440	380
38	12,100	6000	4000	3025	2420	2020	1515	1210	1000	870	760	670	600	550	485
45	14,300	7200	4800	3600	2870	2390	1790	1430	1200	1020	900	800	710	650	575
53	16,880	8440	5630	4220	3375	2815	2110	1690	1400	1200	1055	940	845	770	675
60	19,110	9550	6370	4780	3825	3185	2390	1910	1590	1365	1200	1060	955	870	765
90	28,770	14,350	9550	7165	5735	4780	3585	2870	2390	2050	1790	1590	1430	1300	1150
120	38,220	19,100	12,750	9550	7645	6370	4780	3820	3185	2730	2490	2120	1910	1740	1530
150	47,770	23,885	15,925	11,950	9550	7965	5970	4780	3980	3410	2990	2650	2390	2170	1900
230	-	36,625	24,400	18,315	14,650	12,210	9150	7325	6100	5230	4580	4070	3660	3330	2930
300	-	47,770	31,850	23,885	19,110	15,925	11,950	9550	7960	6825	5970	5300	4780	4340	3820
450	-	-	47,770	35,830	28,660	23,885	17,915	14,330	11,950	10,240	8960	7960	7170	6510	5730
600	-	-	-	47,770	38,220	31,850	23,885	19,100	15,920	13,650	12,000	10,600	9550	8685	7600
900	-	-	-	-	-	47,770	35,830	28,660	23,885	20,475	17,900	15,900	14,330	13,030	11,500
1200	-	-	-	-	-	-	47,770	38,210	31,850	27,300	23,885	21,230	19,100	17,370	15,300
1500	-	-	-	-	-	-	-	47,770	39,810	34,210	29,860	26,540	23,885	21,710	19,100

General Solid Carbide Milling Guide

Fractional

Type	Rc Hardness	MILLING SFM (Vc)					CHIPLOAD PER FLUTE (Fz)				
		2 flute stub / std.	2 flute extra length	3 & 4 flute stub / std.	3 & 4 flute extra length	Diamond Coated	1/32" - 1/8"	1/8" - 1/4"	1/4" - 1/2"	1/2" - 1"	1" - 1-1/4"
COBALT BASE ALLOYS											
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35	-	-	175 - 225	150 - 200	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	125 - 175	100 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
NICKEL BASE ALLOYS											
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	-	-	125 - 175	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	70 - 115	70 - 100	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
IRON BASE ALLOYS											
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	-	-	175 - 225	150 - 200	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	125 - 175	100 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
MONEL											
Monel - 65% Nickel		175 - 300	125 - 175	175 - 300	125 - 175	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"	.0040" - .0060"
TITANIUM ALLOYS											
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		200 - 300	125 - 250	200 - 300	125 - 250	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"	.0040" - .0060"
5553 / Beta Titanium		-	-	125 - 225	100 - 200	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
STAINLESS STEELS											
13/8, 15/5, 17-4, pH Types	< 35	-	-	150 - 250	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	125 - 175	80 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
Inox, 200 Series, 300 Series	< 35	-	-	200 - 250	125 - 175	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	150 - 200	100 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
304L, 316L, Nitronic 50, Inox	< 35	-	-	90 - 125	80 - 120	-	.0005" - .0008"	.0008" - .0015"	.0010" - .0020"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	75 - 110	60 - 90	-	.0003" - .0005"	.0005" - .0010"	.0010" - .0015"	.0010" - .0030"	.0020" - .0040"
400 Series	< 35	-	-	150 - 250	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	125 - 175	80 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
HIGH STRENGTH TOOL STEELS											
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30	-	-	150 - 225	125 - 175	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	30 - 38	-	-	90 - 125	80 - 120	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 38	-	-	60 - 90	50 - 80	-	.0002" - .0004"	.0003" - .0007"	.0008" - .0015"	.0010" - .0025"	.0015" - .0035"
MEDIUM ALLOY TOOL STEELS											
200, 250, 300, 8620	< 35	-	-	175 - 250	150 - 200	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"	.0040" - .0060"
	> 35	-	-	100 - 175	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
CARBON STEELS											
A36, 12L14, 1000's, 1100's, 1300's	< 35	-	-	175 - 250	150 - 200	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"	.0040" - .0060"
	> 35	-	-	100 - 175	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
CAST MATERIAL											
Steel		225 - 325	175 - 250	250 - 350	175 - 250	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
Ductile Iron		200 - 300	125 - 200	200 - 300	125 - 200	-	.0005" - .0015"	.0010" - .0030"	.0015" - .0040"	.0020" - .0060"	.0030" - .0080"
Gray Iron		225 - 325	175 - 250	250 - 350	175 - 250	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
Aluminum		250 - 350	250 - 350	250 - 350	250 - 350	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
ALUMINUM											
Aircraft Grade (6061, 7075)	Standard Speed	300 - 500	300 - 500	300 - 500	300 - 500	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0150"
	High Speed	*(SEE HIGH SPEED ALUMINUM CHART - PAGE 262)*									
MAGNESIUM											
		300 - 500	300 - 500	300 - 500	300 - 500	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
COPPER											
Copper Alloys		300 - 400	250 - 350	300 - 450	250 - 350	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0035"	.0020" - .0080"	.0040" - .0100"
BRASS, BRONZE											
Brass, Aluminum/Bronze, Low Silicon Bronze		300 - 400	200 - 300	275 - 375	200 - 300	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0035"	.0020" - .0080"	.0040" - .0100"
COMPOSITE MATERIAL											
Glass Epoxy, Fiberglass, Plastics		200 - 400	200 - 400	200 - 400	200 - 400	200 - 500	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
Graphite, G10		*(SEE GRAPHITE CHART - PAGE 281)*				300 - 1000	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"

When plunging into a solid, drop feed by approximately 50%.
20% of diameter for basic engagement parameters.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

High Performance Solid Carbide Milling Guide
Fractional

Type	Rc Hardness	MILLING SFM (Vc)				CHIPLOAD PER FLUTE (Fz)		
		Aluminum Series		All Other High Performance Series		1/8" - 1/4"	1/4" - 1/2"	1/2" - 1"
		Uncoated	Coated	Uncoated	AlTiN Coating			
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35	-	-	200 - 275	275 - 400	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 35	-	-	125 - 175	175 - 250	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	-	-	150 - 200	200 - 300	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 35	-	-	90 - 125	125 - 200	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
IRON BASE ALLOYS								
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	-	-	200 - 300	250 - 350	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 35	-	-	150 - 200	200 - 250	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
MONEL								
Monel - 65% Nickel		-	-	200 - 300	275 - 400	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"
TITANIUM ALLOYS								
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		125 - 300	250 - 400	150 - 300	250 - 400	.0005" - .0012"	.0010" - .0025"	.0015" - .0040"
5553 / Beta Titanium		-	-	100 - 200	150 - 250	.0004" - .0010"	.0008" - .0020"	.0010" - .0030"
STAINLESS STEELS								
13/8, 15/5, 17-4, pH Types	< 35	-	-	200 - 300	250 - 350	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 35	-	-	150 - 200	200 - 250	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
Inox, 200 Series, 300 Series	< 35	-	-	250 - 350	300 - 400	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 35	-	-	175 - 275	225 - 300	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
304L, 316L, Nitronic 50, Inox	< 35	-	-	125 - 200	250 - 300	.0008" - .0015"	.0010" - .0020"	.0020" - .0040"
	> 35	-	-	90 - 125	200 - 250	.0005" - .0010"	.0010" - .0015"	.0010" - .0030"
400 Series	< 35	-	-	200 - 300	250 - 350	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 35	-	-	150 - 200	200 - 250	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30	-	-	225 - 300	250 - 350	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	30 - 38	-	-	125 - 200	150 - 250	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
	> 38	*(SEE HIGH ROCKWELL CHART - PAGES 276-277)*						
MEDIUM ALLOY TOOL STEELS								
200, 250, 300, 8620	< 35	-	-	250 - 350	250 - 400	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"
	> 35	-	-	150 - 200	150 - 300	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
CARBON STEELS								
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	-	-	250 - 350	300 - 500	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"
	> 35	-	-	150 - 200	250 - 400	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
CAST MATERIAL								
Steel		-	-	175 - 250	250 - 350	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"
Ductile Iron		-	-	200 - 300	250 - 400	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"
Gray Iron		-	-	175 - 250	200 - 400	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"
Aluminum		300 - 400	350 - 500	300 - 400	-	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"
ALUMINUM								
Aircraft Grade (6061, 7075)	Standard Speed	300 - 400	300 - 600	200 - 400	300 - 500	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"
	High Speed	*(SEE HIGH SPEED ALUMINUM CHART - PAGE 262)*						
MAGNESIUM								
		200 - 300	200 - 500	200 - 300	300 - 500	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"
COPPER								
Copper Alloys		200 - 300	300 - 500	200 - 300	300 - 500	.0010" - .0025"	.0015" - .0035"	.0020" - .0080"
BRASS, BRONZE								
Brass, Aluminum/Bronze, Low Silicon Bronze		200 - 300	300 - 500	200 - 300	200 - 400	.0010" - .0025"	.0015" - .0035"	.0020" - .0080"

Beryllium added to any material adds hardness and some nickel content. If tool displays chatter, increase feed (IPM) up to 30% and reduce speed (RPM) by 10%.
More detailed information is available on succeeding pages regarding the following materials: Aluminum, High Rockwell Steels, Graphite, and VRX end mills

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

General Solid Carbide Milling Guide

Metric

Type	Rc Hardness	MILLING M/Min. (Vc)					CHIPLOAD PER FLUTE (Fz)				
		2 flute stub / std.	2 flute extra length	3 & 4 flute stub / std.	3 & 4 flute extra length	DIAMOND COATED	1.0 - 3.0	3.0 - 6.0	6.0 - 12.0	12.0 - 25.0	25.0 - 32.0
COBALT BASE ALLOYS											
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35	-	-	50 - 70	45 - 60	-	.010 - .025	.020 - .050	.025 - .075	.050 - .100	.075 - .125
	> 35	-	-	35 - 50	30 - 45	-	.005 - .015	.010 - .035	.025 - .050	.025 - .075	.050 - .100
NICKEL BASE ALLOYS											
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	-	-	35 - 50	30 - 45	-	.010 - .025	.020 - .050	.025 - .075	.050 - .100	.075 - .125
	> 35	-	-	20 - 35	15 - 25	-	.005 - .015	.010 - .035	.025 - .050	.025 - .075	.050 - .100
IRON BASE ALLOYS											
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	-	-	50 - 70	45 - 60	-	.010 - .025	.020 - .050	.025 - .075	.050 - .100	.075 - .125
	> 35	-	-	35 - 50	30 - 45	-	.005 - .015	.010 - .035	.025 - .050	.025 - .075	.050 - .100
MONEL											
Monel - 65% Nickel		50 - 90	35 - 50	50 - 90	35 - 50	-	.015 - .035	.025 - .065	.035 - .100	.075 - .125	.100 - .150
TITANIUM ALLOYS											
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		60 - 90	35 - 75	60 - 90	35 - 75	-	.015 - .035	.025 - .065	.035 - .100	.075 - .125	.100 - .150
5553 / Beta Titanium		-	-	35 - 65	30 - 60	-	.010 - .025	.020 - .050	.025 - .075	.050 - .100	.075 - .125
STAINLESS STEELS											
13/8, 15/5, 17-4, pH Types	< 35	-	-	45 - 75	30 - 45	-	.010 - .025	.020 - .050	.025 - .075	.050 - .100	.075 - .125
	> 35	-	-	35 - 50	25 - 45	-	.005 - .015	.010 - .035	.025 - .050	.025 - .075	.050 - .100
Inox, 200 Series, 300 Series	< 35	-	-	60 - 80	40 - 55	-	.010 - .025	.020 - .050	.025 - .075	.050 - .100	.075 - .125
	> 35	-	-	45 - 60	30 - 45	-	.005 - .015	.010 - .035	.025 - .050	.025 - .075	.050 - .100
304L, 316L, Nitronic 50, Inox	< 35	-	-	25 - 40	25 - 35	-	.010 - .020	.020 - .035	.025 - .050	.035 - .075	.050 - .100
	> 35	-	-	20 - 35	15 - 25	-	.005 - .015	.010 - .025	.025 - .035	.025 - .050	.035 - .075
400 Series	< 35	-	-	45 - 75	30 - 45	-	.010 - .025	.020 - .050	.025 - .075	.050 - .100	.075 - .125
	> 35	-	-	35 - 50	25 - 40	-	.005 - .015	.010 - .035	.025 - .050	.025 - .075	.050 - .100
HIGH STRENGTH TOOL STEELS											
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30	-	-	45 - 60	35 - 50	-	.010 - .025	.020 - .050	.025 - .075	.050 - .100	.075 - .125
	30 - 38	-	-	30 - 45	25 - 35	-	.005 - .015	.010 - .035	.025 - .050	.025 - .075	.050 - .100
	> 38	-	-	15 - 30	10 - 25	-	.003 - .008	.005 - .020	.015 - .040	.020 - .065	.035 - .090
MEDIUM ALLOY TOOL STEELS											
200, 250, 300, 8620	< 35	-	-	55 - 75	45 - 60	-	.015 - .035	.025 - .065	.035 - .100	.075 - .125	.100 - .150
	> 35	-	-	35 - 55	30 - 45	-	.010 - .025	.020 - .050	.025 - .075	.050 - .100	.075 - .125
CARBON STEELS											
A36, 12L14, 1000's, 1100's, 1300's	< 35	-	-	55 - 75	45 - 60	-	.015 - .035	.025 - .065	.035 - .100	.075 - .125	.100 - .150
	> 35	-	-	35 - 55	30 - 45	-	.010 - .025	.020 - .050	.025 - .075	.050 - .100	.075 - .125
CAST MATERIAL											
Steel		70 - 100	50 - 75	75 - 105	50 - 75	-	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .250
Ductile Iron		60 - 90	35 - 60	60 - 90	35 - 60	-	.015 - .035	.025 - .075	.035 - .100	.050 - .150	.075 - .200
Gray Iron		70 - 100	50 - 75	75 - 105	50 - 75	-	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .250
Aluminum		75 - 105	75 - 105	75 - 105	75 - 105	-	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .250
ALUMINUM											
Aircraft Grade (6061, 7075)	Standard Speed	90 - 150	90 - 150	90 - 150	90 - 150	-	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .300
	High Speed	*(SEE HIGH SPEED ALUMINUM CHART - PAGE 262)*									
MAGNESIUM											
		90 - 150	90 - 150	90 - 150	90 - 150	-	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .250
COPPER											
Copper Alloys		120 - 150	75 - 105	90 - 135	75 - 105	-	.020 - .040	.025 - .065	.040 - .090	.050 - .200	.075 - .250
BRASS, BRONZE											
Brass, Aluminum/Bronze, Low Silicon Bronze		90 - 120	60 - 90	75 - 115	60 - 90	-	.020 - .040	.025 - .065	.040 - .090	.050 - .200	.075 - .250
COMPOSITE MATERIAL											
Glass Epoxy, Fiberglass, Plastics		60 - 120	60 - 120	60 - 120	60 - 120	60 - 150	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .250
Graphite, G10		*(SEE GRAPHITE CHART - PAGE 281)*				90 - 300	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .250

When plunging into a solid, drop feed by approximately 50%.
20% of diameter for basic engagement parameters.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

High Performance Solid Carbide Milling Guide
Metric

Type	Rc Hardness	MILLING M/Min. (Vc)				CHIPLOAD PER FLUTE (Fz)		
		Aluminum Series		All Other High Performance Series		3.0 - 6.0	6.0 - 12.0	12.0 - 25.0
		Uncoated	Coated	Uncoated	AlTiN Coating			
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-4. L-605	< 35	-	-	60 - 80	80 - 120	.020 - .050	.025 - .075	.050 - .100
	> 35	-	-	40 - 50	50 - 75	.010 - .035	.025 - .050	.025 - .075
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	-	-	45 - 60	60 - 90	.020 - .050	.025 - .075	.050 - .100
	> 35	-	-	25 - 40	40 - 60	.010 - .035	.025 - .050	.025 - .075
IRON BASE ALLOYS								
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	-	-	60 - 90	75 - 105	.020 - .050	.025 - .075	.050 - .100
	> 35	-	-	45 - 60	60 - 75	.010 - .035	.025 - .050	.025 - .075
MONEL								
Monel - 65% Nickel		-	-	60 - 90	80 - 120	.025 - .065	.035 - .100	.075 - .125
TITANIUM ALLOYS								
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		40 - 90	75 - 120	45 - 90	75 - 120	.010 - .025	.025 - .065	.035 - .100
5553 / Beta Titanium		-	-	30 - 60	45 - 75	.008 - .020	.020 - .050	.025 - .075
STAINLESS STEELS								
13/8, 15/5, 17-4, pH Types	< 35	-	-	60 - 105	75 - 90	.020 - .050	.025 - .075	.050 - .100
	> 35	-	-	45 - 75	60 - 75	.010 - .035	.025 - .050	.025 - .075
Inox, 200 Series, 300 Series	< 35	-	-	75 - 105	90 - 120	.020 - .050	.025 - .075	.050 - .100
	> 35	-	-	50 - 80	65 - 90	.010 - .035	.025 - .050	.025 - .075
304L, 316L, Nitronic 50, Inox	< 35	-	-	40 - 60	75 - 90	.020 - .035	.025 - .050	.035 - .075
	> 35	-	-	25 - 40	60 - 75	.010 - .025	.025 - .035	.025 - .050
400 Series	< 35	-	-	60 - 105	75 - 90	.020 - .050	.025 - .075	.050 - .100
	> 35	-	-	45 - 75	60 - 75	.010 - .035	.025 - .050	.025 - .075
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30	-	-	65 - 90	75 - 105	.020 - .050	.025 - .075	.050 - .100
	30 - 38	-	-	40 - 60	45 - 75	.010 - .035	.025 - .050	.025 - .075
	> 38	*(SEE HIGH ROCKWELL CHART - PAGES 276-277)*						
MEDIUM ALLOY TOOL STEELS								
200, 250, 300, 8620	< 35	-	-	75 - 105	75 - 120	.025 - .065	.035 - .100	.075 - .125
	> 35	-	-	45 - 60	45 - 90	.020 - .050	.025 - .075	.050 - .100
CARBON STEELS								
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	-	-	75 - 105	90 - 150	.025 - .065	.035 - .100	.075 - .125
	> 35	-	-	45 - 60	75 - 120	.020 - .050	.025 - .075	.050 - .100
CAST MATERIAL								
Steel		-	-	50 - 75	75 - 120	.035 - .100	.050 - .150	.075 - .250
Ductile Iron		-	-	60 - 90	90 - 125	.035 - .100	.050 - .150	.075 - .250
Gray Iron		-	-	50 - 75	75 - 125	.035 - .100	.050 - .150	.075 - .250
Aluminum		90 - 120	90 - 150	90 - 120	-	.035 - .100	.050 - .150	.075 - .250
ALUMINUM								
Aircraft Grade (6061, 7075)	Standard Speed	90 - 120	90 - 180	60 - 120	90 - 150	.035 - .100	.050 - .150	.075 - .250
	High Speed	*(SEE HIGH SPEED ALUMINUM CHART - PAGE 262)*						
MAGNESIUM								
		60 - 90	60 - 150	60 - 90	90 - 150	.035 - .100	.050 - .150	.075 - .250
COPPER								
Copper Alloys		60 - 90	90 - 150	60 - 90	90 - 150	.025 - .065	.040 - .090	.050 - .200
BRASS, BRONZE								
Brass, Aluminum/Bronze, Low Silicon Bronze		60 - 90	90 - 150	60 - 90	60 - 120	.025 - .065	.040 - .090	.050 - .200

Beryllium added to any material adds hardness and some nickel content. If tool displays chatter, increase feed (M/Min.) up to 30% and reduce speed (RPM) by 10%.
More detailed information is available on succeeding pages regarding the following materials: Aluminum, High Rockwell Steels, Graphite, and VRX end mills

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Application Guide for Alumastar Coated End Mills in Aircraft Grade Aluminum

Fractional

	SLOTTING		SIDE MILLING
	Axial = .5xD	Axial = 1xD	Axial ≤ 1xD Radial ≤ .5xD
	SFM = 1500 - 2000	SFM = 750 - 1500	SFM = 1500 - 2000
Diameter	CPT = 1.5% - 3% of diameter	CPT = 1% - 2% of diameter	CPT = 2% - 3% of diameter
1/8"	.0019" - .0038"	.0013" - .0025"	.0025" - .0038"
3/16"	.0028" - .0056"	.0018" - .0037"	.0037" - .0056"
1/4"	.0037" - .0074"	.0025" - .0050"	.0050" - .0075"
5/16"	.0052" - .0104"	.0031" - .0062"	.0062" - .0094"
3/8"	.0055" - .0110"	.0037" - .0074"	.0075" - .0112"
1/2"	.0075" - .0150"	.0050" - .0100"	.0100" - .0150"
5/8"	.0093" - .0186"	.0062" - .0125"	.0125" - .0187"
3/4"	.0112" - .0224"	.0075" - .0150"	.0150" - .0225"
1"	.0150" - .0300"	.0100" - .0200"	.0200" - .0300"

Metric

	SLOTTING		SIDE MILLING
	Axial = .5xD	Axial = 1xD	Axial ≤ 1xD Radial ≤ 0.5xD
	M/Min. = 450 - 760	M/Min. = 225 - 450	M/Min. = 450 - 760
Diameter	CPT = 1.5% - 3% of diameter	CPT = 1% - 2% of diameter	CPT = 2% - 3% of diameter
3.0	.045 - .090	.030 - .060	.060 - .090
4.0	.060 - .120	.040 - .080	.080 - .120
6.0	.090 - .180	.060 - .120	.120 - .180
8.0	.120 - .240	.080 - .160	.160 - .240
10.0	.150 - .300	.100 - .200	.200 - .300
12.0	.180 - .360	.120 - .240	.240 - .360
16.0	.240 - .480	.160 - .320	.320 - .480
20.0	.300 - .600	.200 - .400	.400 - .600
25.0	.375 - .750	.250 - .500	.500 - .750

CPT = Chipload per flute (Fz)

For CAT 40 machines using tools over 5/8" diameter, speeds and feeds may need to be reduced by as much as 50%

END MILL NOTES:

- Climb milling recommended for best finish
- Figures shown are based on 6061 / 7075
- CAT 50 Taper holders are recommended for 3/4" and 1" diameter end mills
- In controlled slotting tests, 4000 SFM, 1% diameter Chipload Per Flute, and 50% of Dia. axial depth were obtained
- In cases for tools with slower SFM (M/Min.), reference Series 242M/842M, page 127

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Fractional

Material	Rc	SFM (Vc)	CHIPLOAD PER FLUTE Recommendations (Fz)										*Profiling	Slotting
			1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	Radial	Axial
Stainless Steel: 303		290-375	.0003"-.0005"	.0004"-.0008"	.0008"-.0010"	.0010"-.0015"	.0013"-.0020"	.0015"-.0020"	.0020"-.0030"	.0025"-.0035"	.0030"-.0040"	.0035"-.0045"	1 x D	1 x D
Stainless Steel: 304, 316, 400 Series, Kovar, Invar		250-300	.0003"-.0005"	.0003"-.0006"	.0006"-.0010"	.0008"-.0015"	.0010"-.0020"	.0012"-.0020"	.0015"-.0020"	.0020"-.0025"	.0025"-.0030"	.0025"-.0035"	1 x D	1 x D
Stainless Steel: 304L, 316L, 8620, 17/4, 15/5, 13/8, PH Mat'l	<35 >35	250-300 200-250	.0003"-.0005" .0003"-.0005"	.0003"-.0006" .0003"-.0006"	.0006"-.0008" .0006"-.0008"	.0007"-.0010" .0007"-.0010"	.0010"-.0015" .0008"-.0010"	.0015"-.0020" .0010"-.0015"	.0015"-.0025" .0010"-.0020"	.0020"-.0030" .0015"-.0025"	.0025"-.0035" .0020"-.0030"	.0030"-.0040" .0020"-.0030"	1 x D 0.5 x D	1 x D 0.5 x D
High Temperature Alloys: Inconel 625/718, A286	<35 >35	125-175 80-100	.0003"-.0005" .0002"-.0004"	.0004"-.0008" .0003"-.0006"	.0008"-.0010" .0007"-.0010"	.0010"-.0015" .0008"-.0010"	.0012"-.0020" .0010"-.0015"	.0020"-.0025" .0010"-.0015"	.0025"-.0030" .0010"-.0015"	.0030"-.0035" .0012"-.0020"	.0030"-.0035" .0015"-.0025"	.0030"-.0040" .0015"-.0025"	0.5 x D 0.2 x D	0.3 x D 0.2 x D
Titanium: 6AL4V, CP		150-200	.0003"-.0005"	.0004"-.0008"	.0008"-.0010"	.0010"-.0015"	.0010"-.0020"	.0015"-.0020"	.0020"-.0030"	.0025"-.0030"	.0030"-.0035"	.0030"-.0040"	1 x D	1 x D
Carbon Steels: 1000 Series	<35 >35	400-600 275-425	.0003"-.0005" .0002"-.0004"	.0004"-.0008" .0003"-.0006"	.0008"-.0010" .0006"-.0008"	.0010"-.0015" .0008"-.0012"	.0010"-.0020" .0010"-.0015"	.0015"-.0020" .0010"-.0020"	.0020"-.0030" .0015"-.0025"	.0025"-.0035" .0020"-.0025"	.0030"-.0040" .0020"-.0030"	.0035"-.0045" .0025"-.0035"	0.3 x D 0.3 x D	0.5 x D 0.5 x D
High Strength Tool Steel: 4130, 4140, A2, D2, P20, H13	<30	250-400	.0003"-.0005"	.0003"-.0006"	.0006"-.0010"	.0008"-.0015"	.0010"-.0020"	.0012"-.0020"	.0015"-.0022"	.0020"-.0025"	.0025"-.0030"	.0025"-.0035"	0.5 x D	0.5 x D
	30-38	250-400	.0003"-.0005"	.0003"-.0006"	.0006"-.0008"	.0007"-.0010"	.0008"-.0010"	.0010"-.0015"	.0010"-.0020"	.0015"-.0025"	.0020"-.0030"	.0020"-.0030"	0.3 x D	0.5 x D
	>38	*(SEE HIGH ROCKWELL CHART - PAGE 276)*												
Gray Cast Iron		400-500	.0003"-.0005"	.0005"-.0010"	.0010"-.0020"	.0010"-.0020"	.0015"-.0020"	.0015"-.0025"	.0020"-.0035"	.0025"-.0035"	.0030"-.0040"	.0040"-.0050"	1 x D	1 x D

Metric

Material	Rc	M/Min. (Vc)	CHIPLOAD PER FLUTE - Metric Recommendations (Fz)										*Profiling	Slotting
			1.5	3.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0	25.0	Radial	Axial
Stainless Steel: 303		90-115	.008-.012	.010-.020	.020-.025	.025-.038	.033-.050	.038-.050	.050-.076	.063-.089	.076-.102	.089-.114	1 x D	1 x D
Stainless Steel: 304, 316, 400 Series, Kovar, Invar		75-90	.005-.010	.008-.015	.015-.025	.020-.038	.025-.050	.030-.050	.038-.050	.050-.063	.063-.076	.063-.089	1 x D	1 x D
Stainless Steel: 304L, 316L, 17/4, 15/5, 13/8, PH Materials	<35 >35	75-85 60-75	.005-.010 .005-.010	.008-.015 .008-.015	.015-.020 .015-.020	.018-.025 .018-.025	.025-.038 .020-.025	.038-.050 .025-.038	.038-.063 .025-.050	.050-.076 .038-.063	.063-.089 .050-.076	.076-.102 .050-.076	1 x D 0.5 x D	1 x D 0.5 x D
High Temperature Alloys: Inconel 625/718, A286	<35 >35	40-55 25-30	.008-.012 .005-.010	.010-.020 .008-.015	.020-.025 .018-.025	.025-.038 .020-.025	.030-.050 .025-.038	.050-.063 .025-.038	.063-.076 .025-.038	.076-.089 .030-.050	.076-.089 .038-.063	.076-.102 .038-.063	0.5 x D 0.2 x D	0.3 x D 0.2 x D
Titanium: 6AL4V, CP		45-60	.008-.012	.010-.020	.020-.025	.025-.038	.025-.050	.038-.050	.050-.076	.063-.076	.076-.089	.076-.102	1 x D	1 x D
Carbon Steels: 1000 Series	<35 >35	125-185 85-130	.008-.012 .006-.010	.010-.020 .008-.015	.020-.025 .015-.020	.025-.038 .020-.030	.025-.050 .025-.038	.038-.050 .025-.050	.050-.076 .038-.063	.063-.089 .050-.063	.076-.102 .050-.076	.089-.114 .063-.089	0.3 x D 0.3 x D	0.5 x D 0.5 x D
High Strength Tool Steel: 4130, 4140, A2, D2, P20, H13	<30	75-125	.005-.010	.008-.015	.015-.025	.020-.038	.025-.050	.030-.050	.038-.056	.050-.063	.063-.076	.063-.089	0.5 x D	0.5 x D
	30-38	75-125	.004-.008	.006-.015	.015-.020	.018-.025	.020-.025	.025-.038	.025-.050	.038-.063	.050-.076	.050-.076	0.3 x D	0.5 x D
	>38	*(SEE HIGH ROCKWELL CHART - PAGE 277)*												
Gray Cast Iron		125-150	.010-.015	.013-.025	.025-.050	.025-.050	.038-.050	.038-.063	.050-.089	.063-.089	.076-.102	.102-.127	1 x D	1 x D

*** For profiling, axial = 1xD**

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

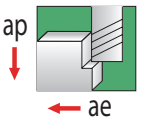
GARR TOOL Milling Guide for VRX-6 Series End Mills

Fractional

	Material Group S	Material Group M	Material Group S	Material Group P	Material Group K
	Nickel or Cobalt-based	Stainless	Titanium Alloys	Carbon Steels	Grey Cast Iron
	Inconel, Cobalt Chrome, Ductile Iron	Invar, 400, 316, pH Series	6Al4V	1000 Series	
	SFM = 150 - 225	SFM = 250 - 400	SFM = 250 - 450	SFM = 400 - 600	SFM = 400 - 500
DIA	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)
1/4"	.0006" - .0012"	.0010" - .0015"	.0010" - .0015"	.0015" - .0020"	.0015" - .0020"
3/8"	.0008" - .0016"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0020" - .0030"
1/2"	.0012" - .0023"	.0020" - .0030"	.0020" - .0030"	.0025" - .0035"	.0025" - .0035"
5/8"	.0015" - .0025"	.0025" - .0035"	.0025" - .0035"	.0030" - .0040"	.0030" - .0040"
3/4"	.0018" - .0025"	.0030" - .0040"	.0030" - .0040"	.0035" - .0045"	.0035" - .0045"
1"	.0020" - .0030"	.0035" - .0050"	.0035" - .0050"	.0040" - .0055"	.0040" - .0055"

Profile/Trochoidal Milling

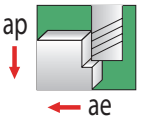
Axial (ap)	up to 2xD
Radial (ae)	15% of Dia.



	Nickel or Cobalt-based	Stainless	Titanium Alloys	Carbon Steels	Grey Cast Iron
	Inconel, Cobalt Chrome, Ductile Iron	Invar, 400, 316, pH Series	6Al4V	1000 Series	
	SFM = 200 - 250	SFM = 300 - 500	SFM = 300 - 600	SFM = 450 - 650	SFM = 450 - 550
DIA	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)
1/4"	.0010" - .0015"	.0015" - .0020"	.0015" - .0020"	.0020" - .0025"	.0020" - .0025"
3/8"	.0012" - .0020"	.0020" - .0030"	.0020" - .0030"	.0025" - .0035"	.0025" - .0035"
1/2"	.0015" - .0025"	.0025" - .0035"	.0025" - .0035"	.0030" - .0040"	.0030" - .0040"
5/8"	.0018" - .0028"	.0030" - .0040"	.0030" - .0040"	.0035" - .0045"	.0035" - .0045"
3/4"	.0020" - .0030"	.0035" - .0045"	.0035" - .0045"	.0040" - .0050"	.0040" - .0050"
1"	.0025" - .0035"	.0040" - .0055"	.0040" - .0055"	.0050" - .0065"	.0050" - .0065"

Profile/Trochoidal Milling

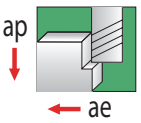
Axial (ap)	up to 3xD
Radial (ae)	10% of Dia.



	Nickel or Cobalt-based	Stainless	Titanium Alloys	Carbon Steels	Grey Cast Iron
	Inconel, Cobalt Chrome, Ductile Iron	Invar, 400, 316, pH Series	6Al4V	1000 Series	
	SFM = 225 - 300	SFM = 400 - 600	SFM = 400 - 700	SFM = 500 - 700	SFM = 450 - 600
DIA	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)
1/4"	.0015" - .0025"	.0020" - .0030"	.0020" - .0030"	.0025" - .0035"	.0025" - .0035"
3/8"	.0017" - .0030"	.0025" - .0040"	.0025" - .0040"	.0030" - .0045"	.0030" - .0045"
1/2"	.0020" - .0035"	.0030" - .0045"	.0030" - .0045"	.0035" - .0050"	.0035" - .0050"
5/8"	.0025" - .0040"	.0035" - .0050"	.0035" - .0050"	.0040" - .0055"	.0040" - .0055"
3/4"	.0030" - .0045"	.0040" - .0055"	.0040" - .0055"	.0045" - .0060"	.0045" - .0060"
1"	.0035" - .0050"	.0050" - .0070"	.0050" - .0070"	.0055" - .0070"	.0055" - .0070"

Profile/Trochoidal Milling

Axial (ap)	up to 4xD
Radial (ae)	5% of Dia.



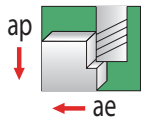
NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Metric

	Material Group S	Material Group M	Material Group S	Material Group P	Material Group K
	Nickel or Cobalt-based	Stainless	Titanium Alloys	Carbon Steels	Grey Cast Iron
	Inconel, Cobalt Chrome, Ductile Iron	Invar, 400, 316, pH Series	6Al4V	1000 Series	
	SMM = 45 - 70	SMM = 75 - 120	SMM = 75 - 140	SMM = 120 - 180	SMM = 120 - 150
DIA	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)
6.0	.015 - .030	.025 - .035	.025 - .035	.035 - .050	.035 - .050
8.0	.020 - .040	.030 - .050	.030 - .050	.040 - .060	.040 - .060
10.0	.025 - .055	.035 - .065	.035 - .065	.050 - .075	.050 - .075
12.0	.030 - .060	.050 - .075	.050 - .075	.060 - .090	.060 - .090
16.0	.035 - .065	.065 - .090	.065 - .090	.075 - .100	.075 - .100
20.0	.045 - .065	.075 - .100	.075 - .100	.090 - .115	.090 - .115
25.0	.050 - .075	.085 - .125	.090 - .125	.100 - .140	.100 - .140

Profile/Trochoidal Milling

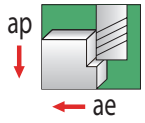
Axial (ap)	up to 2xD
Radial (ae)	11%-16% x D



	Nickel or Cobalt-based	Stainless	Titanium Alloys	Carbon Steels	Grey Cast Iron
	Inconel, Cobalt Chrome, Ductile Iron	Invar, 400, 316, pH Series	6Al4V	1000 Series	
	SMM = 60 - 75	SMM = 90 - 150	SMM = 90 - 180	SMM = 140 - 200	SMM = 140 - 160
DIA	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)
6.0	.025 - .035	.035 - .050	.035 - .050	.050 - .065	.050 - .065
8.0	.025 - .045	.040 - .060	.040 - .060	.060 - .080	.060 - .080
10.0	.030 - .050	.050 - .075	.050 - .075	.065 - .090	.065 - .090
12.0	.035 - .060	.060 - .085	.060 - .090	.075 - .100	.075 - .100
16.0	.040 - .065	.075 - .100	.075 - .100	.090 - .115	.090 - .115
20.0	.050 - .075	.085 - .110	.085 - .115	.100 - .125	.100 - .125
25.0	.060 - .085	.100 - .140	.100 - .140	.125 - .165	.125 - .165

Profile/Trochoidal Milling

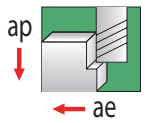
Axial (ap)	up to 3xD
Radial (ae)	6%-10% x D



	Nickel or Cobalt-based	Stainless	Titanium Alloys	Carbon Steels	Grey Cast Iron
	Inconel, Cobalt Chrome, Ductile Iron	Invar, 400, 316, pH Series	6Al4V	1000 Series	
	SMM = 70 - 90	SMM = 120 - 180	SMM = 120 - 210	SMM = 150 - 210	SMM = 140 - 180
DIA	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)
6.0	.035 - .060	.050 - .075	.050 - .075	.065 - .085	.065 - .085
8.0	.035 - .065	.055 - .085	.055 - .085	.070 - .095	.070 - .095
10.0	.040 - .070	.065 - .100	.065 - .100	.075 - .110	.075 - .110
12.0	.050 - .085	.075 - .110	.075 - .110	.090 - .125	.090 - .125
16.0	.060 - .100	.090 - .120	.090 - .120	.100 - .135	.100 - .135
20.0	.075 - .110	.100 - .130	.100 - .130	.115 - .150	.115 - .150
25.0	.090 - .125	.120 - .170	.120 - .170	.140 - .185	.140 - .185

Profile/Trochoidal Milling

Axial (ap)	up to 4xD
Radial (ae)	3%-5% x D



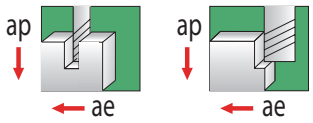
NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Application Guide for ARC Series 3-Flute Roughers

Fractional

	Aluminum	Non-Ferrous (Copper, Brass, Bronze)	Titanium Alloys	Carbon Steels
	SFM = 700 - 1000	SFM = 300 - 500	SFM = 150 - 250	SFM = 200 - 300
Diameter	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)
3/16"	.0010" - .0020"	.0008" - .0013"	.0005" - .0008"	.0008" - .0010"
1/4"	.0015" - .0025"	.0012" - .0018"	.0007" - .0010"	.0010" - .0015"
5/16"	.0020" - .0030"	.0015" - .0023"	.0008" - .0013"	.0012" - .0020"
3/8"	.0025" - .0035"	.0018" - .0028"	.0012" - .0018"	.0013" - .0022"
1/2"	.0030" - .0040"	.0020" - .0035"	.0015" - .0023"	.0015" - .0025"
5/8"	.0040" - .0050"	.0025" - .0045"	.0018" - .0028"	.0018" - .0030"
3/4"	.0050" - .0060"	.0030" - .0050"	.0020" - .0035"	.0022" - .0035"
1"	.0060" - .0070"	.0040" - .0060"	.0025" - .0045"	.0025" - .0040"

	SLOTTING	PROFILING
Axial (ap)	1xD	2xD
Radial (ae)	1xD	0.5xD



Metric

	Aluminum	Non-Ferrous (Copper, Brass, Bronze)	Titanium Alloys	Carbon Steels
	SMM = 200 - 350	SMM = 80 - 150	SMM = 40 - 80	SMM = 70 - 90
Diameter	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)
4.0	.025 - .050	.020 - .035	.010 - .020	.020 - .025
6.0	.040 - .065	.025 - .050	.015 - .025	.025 - .040
8.0	.050 - .075	.035 - .055	.020 - .035	.025 - .050
10.0	.060 - .090	.045 - .075	.025 - .050	.025 - .060
12.0	.075 - .100	.050 - .090	.035 - .055	.035 - .060
16.0	.100 - .125	.060 - .115	.045 - .075	.050 - .075
20.0	.125 - .150	.075 - .125	.050 - .090	.050 - .090
25.0	.150 - .180	.100 - .150	.060 - .115	.060 - .100

ARC SERIES TOOLS ARE NOT DESIGNED FOR OVER 28Rc MATERIALS

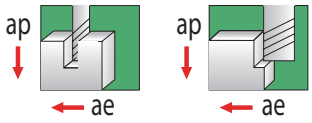
CPT (Fz) = Chipload per flute

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Fractional

Material	SFM (Vc)	CHIPLOAD PER FLUTE (CPT) - Recommendations (Fz)							
		3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
Stainless Steel: 303	290-375	.0008" - .0010"	.0010" - .0015"	.0013" - .0020"	.0015" - .0020"	.0020" - .0030"	.0025" - .0035"	.0030" - .0040"	.0035" - .0045"
Stainless Steel: 304, 316, 400 Series, Kovar, Invar	250-300	.0006" - .0010"	.0008" - .0015"	.0010" - .0020"	.0012" - .0020"	.0015" - .0020"	.0020" - .0025"	.0025" - .0030"	.0025" - .0035"
Stainless Steel: 304L, 316L, 8620, 17/4, 15/5, 13/8, PH Mat'l	200-250	.0006" - .0008"	.0007" - .0010"	.0008" - .0010"	.0010" - .0015"	.0010" - .0020"	.0015" - .0025"	.0020" - .0030"	.0020" - .0030"
High Temperature Alloys: Inconel 625/718, A286	100-175	.0007" - .0010"	.0008" - .0010"	.0010" - .0015"	.0010" - .0015"	.0010" - .0015"	.0012" - .0020"	.0015" - .0025"	.0015" - .0025"
Titanium: 6AL4V, CP	150-200	.0008" - .0010"	.0010" - .0015"	.0010" - .0020"	.0015" - .0020"	.0020" - .0030"	.0025" - .0030"	.0030" - .0035"	.0030" - .0040"
Carbon Steels: 1000 Series	275-425	.0006" - .0008"	.0008" - .0012"	.0010" - .0015"	.0010" - .0020"	.0015" - .0025"	.0020" - .0025"	.0020" - .0030"	.0025" - .0035"
High Strength Tool Steel: 4130, 4140, A2, D2, P20, H13	250-400	.0006" - .0008"	.0007" - .0010"	.0008" - .0010"	.0010" - .0015"	.0010" - .0020"	.0015" - .0025"	.0020" - .0030"	.0020" - .0030"
Gray Cast Iron	400-500	.0010" - .0020"	.0010" - .0020"	.0015" - .0020"	.0015" - .0025"	.0020" - .0035"	.0025" - .0035"	.0030" - .0040"	.0040" - .0050"

	SLOTTING	PROFILING
Axial (ap)	0.5xD	2xD
Radial (ae)	1xD	0.2xD



Metric

Material	M/Min. (Vc)	CHIPLOAD PER FLUTE (CPT) - Metric Recommendations (Fz)								
		4.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0	25.0
Stainless Steel: 303	90-115	.010 - .020	.020 - .025	.025 - .038	.033 - .050	.038 - .050	.050 - .076	.063 - .089	.076 - .102	.089 - .114
Stainless Steel: 304, 316, 400 Series, Kovar, Invar	75-90	.008 - .015	.015 - .025	.020 - .038	.025 - .050	.030 - .050	.038 - .050	.050 - .063	.063 - .076	.063 - .089
Stainless Steel: 304L, 316L, 17/4, 15/5, 13/8, PH Materials	60-75	.008 - .015	.015 - .020	.018 - .025	.020 - .025	.025 - .038	.025 - .050	.038 - .063	.050 - .076	.050 - .076
High Temperature Alloys: Inconel 625/718, A286	30-55	.008 - .015	.018 - .025	.020 - .025	.025 - .038	025 - .038	.025 - .038	.030 - .050	.038 - .063	.038 - .063
Titanium: 6AL4V, CP	45-60	.010 - .020	.020 - .025	.025 - .038	.025 - .050	.038 - .050	.050 - .076	.063 - .076	.076 - .089	.076 - .102
Carbon Steels: 1000 Series	85-130	.008 - .015	.015 - .020	.020 - .030	.025 - .038	.025 - .050	.038 - .063	.050 - .063	.050 - .076	.063 - .089
High Strength Tool Steel: 4130, 4140, A2, D2, P20, H13	75-125	.006 - .015	.015 - .020	.018 - .025	.020 - .025	.025 - .038	.025 - .050	.038 - .063	.050 - .076	.050 - .076
Gray Cast Iron	125-150	.013 - .025	.025 - .050	.025 - .050	.038 - .050	.038 - .063	.050 - .089	.063 - .089	.076 - .102	.102 - .127

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

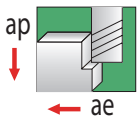
GARR TOOL Speeds and Feeds for TMS and TMR End Mills

Fractional

(CHIP THINNING CALCULATION ALREADY APPLIED)

Material Type	SFM (Vc)	CHIPLOAD PER FLUTE (Fz) at 2% RADIAL ENGAGEMENT (USING PROGRAMMED CALCULATION - PG. 270)						
		1/4" (.2500)	5/16" (.3125)	3/8" (.3750)	1/2" (.5000)	5/8" (.6250)	3/4" (.7500)	1.0" (1.000)
TITANIUM ALLOYS								
6Al - 4V	250 - 400	.0020" - .0042"	.0030" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
5553	150 - 250	.0015" - .0028"	.0018" - .0035"	.0025" - .0043"	.0030" - .0055"	.0035" - .0065"	.0042" - .0080"	.0052" - .0095"
STAINLESS STEELS								
Free Machining (303)	300 - 400	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
Austenitic (304 / 304L)	225 - 350	.0017" - .0035"	.0025" - .0043"	.0030" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"
Martensitic (17-4 / 416)	200 - 250	.0015" - .0028"	.0018" - .0035"	.0025" - .0043"	.0030" - .0055"	.0035" - .0065"	.0042" - .0080"	.0052" - .0095"
TOOL STEELS UNDER 40Rc								
8620	250 - 400	.0017" - .0035"	.0025" - .0043"	.0030" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"
4140, D2 & S7	250 - 350	.0015" - .0028"	.0018" - .0035"	.0025" - .0043"	.0030" - .0055"	.0035" - .0065"	.0042" - .0080"	.0052" - .0095"
CARBON STEELS								
1000 Series, A36 & 12L14	300 - 500	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
CAST MATERIALS								
Steel & Iron	250 - 350	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
Aluminum	300 - 400	.0017" - .0035"	.0025" - .0043"	.0030" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"
ALUMINUM								
6061 - T6	300 - 500	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
COPPER & BRASS ALLOYS								
Short Chip	250 - 350	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
Long Chip	175 - 300	.0017" - .0035"	.0025" - .0043"	.0030" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"

SFM / RPM Conversion



ap = full flute length
ae = 2%

	DIAMETER (d)						
	.2500"	.3125"	.3750"	.5000"	.6250"	.7500"	1.000"
	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
SFM (Vc)	RPM (n)						
100	1528	1222	1019	764	611	509	382
125	1910	1528	1273	955	764	637	478
150	2292	1834	1528	1146	917	764	573
175	2674	2139	1783	1337	1070	891	669
200	3056	2445	2037	1528	1222	1019	764
250	3820	3056	2547	1910	1528	1273	955
300	4584	3667	3056	2292	1834	1528	1146
350	5348	4278	3565	2674	2139	1783	1337
400	6112	4890	4075	3056	2445	2037	1528
450	6876	5501	4584	3438	2750	2292	1719
500	7640	6112	5093	3820	3056	2547	1910
550	8404	6723	5603	4202	3362	2801	2101
600	9168	7334	6112	4584	3667	3056	2292

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

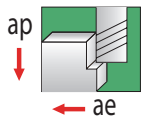
GARR TOOL Speeds and Feeds for TMS and TMR End Mills

Metric

(CHIP THINNING CALCULATION ALREADY APPLIED)

Material Type	SMM (Vc)	CHIPLOAD PER FLUTE (Fz) at 2% RADIAL ENGAGEMENT (USING PROGRAMMED CALCULATION - PG. 271)					
		6.0 (.2362)	8.0 (.3150)	10.0 (.3937)	12.0 (.4724)	16.0 (.6299)	20.0 (.7874)
TITANIUM ALLOYS							
6Al-4V	75 - 120	.050 - .105	.075 - .130	.090 - .165	.105 - .200	.130 - .240	.165 - .365
5553	45 - 75	.035 - .070	.045 - .090	.065 - .105	.075 - .140	.090 - .165	.105 - .200
STAINLESS STEELS							
Free Machining (303)	90 - 120	.050 - .105	.075 - .130	.090 - .165	.105 - .200	.130 - .240	.165 - .365
Austenitic (304 / 304L)	70 - 100	.040 - .090	.065 - .110	.075 - .130	.090 - .165	.110 - .200	.130 - .240
Martensitic (17-4 / 416)	60 - 75	.035 - .070	.045 - .090	.065 - .105	.075 - .140	.090 - .165	.105 - .200
TOOL STEELS UNDER 40Rc							
8620	80 - 120	.040 - .090	.065 - .110	.075 - .130	.090 - .165	.110 - .200	.130 - .240
4140, D2 & S7	75 - 110	.035 - .070	.045 - .090	.065 - .105	.075 - .140	.090 - .165	.105 - .200
CARBON STEELS							
1000 Series, A36 & 12L14	90 - 150	.050 - .105	.075 - .130	.090 - .165	.105 - .200	.130 - .240	.165 - .365
CAST MATERIALS							
Steel & Iron	75 - 110	.050 - .105	.075 - .130	.090 - .165	.105 - .200	.130 - .240	.165 - .365
Aluminum	90 - 120	.040 - .090	.065 - .110	.075 - .130	.090 - .165	.110 - .200	.130 - .240
ALUMINUM							
6061-T6	90 - 150	.050 - .105	.075 - .130	.090 - .165	.105 - .200	.130 - .240	.165 - .365
COPPER & BRASS ALLOYS							
Short Chip	75 - 110	.050 - .105	.075 - .130	.090 - .165	.105 - .200	.130 - .240	.165 - .365
Long Chip	60 - 90	.040 - .090	.065 - .110	.075 - .130	.090 - .165	.110 - .200	.130 - .240

SMM / RPM Conversion



ap = full flute length
ae = 2%

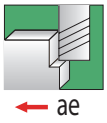
	DIAMETER (d)					
	.2362"	.3150"	.3937"	.4724"	.6299"	.7874"
	6.0	8.0	10.0	12.0	16.0	20.0
SMM (Vc)	RPM (n)					
30	1592	1194	955	796	597	477
35	1857	1393	1114	928	696	557
40	2122	1592	1273	1061	796	637
45	2387	1790	1432	1194	895	716
50	2653	1989	1592	1326	995	796
55	2918	2188	1751	1459	1094	875
60	3183	2387	1910	1592	1194	955
65	3448	2586	2069	1724	1293	1035
70	3714	2785	2228	1857	1393	1114
75	3979	2984	2387	1989	1492	1194
80	4244	3183	2546	2122	1592	1273
85	4509	3382	2706	2255	1691	1353
90	4775	3581	2865	2387	1790	1432
95	5040	3780	3024	2520	1890	1512
100	5305	3979	3183	2653	1989	1592
120	6366	4775	3820	3183	2387	1910
150	7958	5968	4775	3979	2984	2387
175	9284	6963	5570	4642	3482	2785
200	10610	7958	6366	5305	3979	3183

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Chip Thinning Calculations for TMS / TMR End Mills

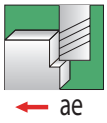
Fractional

ae = 3%



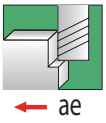
3% Radial Engagement (.03 x d)	
Actual (CPT)	Programmed (CPT)
.0002″	.0005″
.0003″	.0010″
.0005″	.0015″
.0007″	.0020″
.0009″	.0025″
.0010″	.0030″
.0012″	.0035″
.0014″	.0040″
.0015″	.0045″
.0017″	.0050″
.0019″	.0055″
.0020″	.0060″
.0022″	.0065″
.0024″	.0070″
.0026″	.0075″
.0027″	.0080″
.0029″	.0085″
.0031″	.0090″
.0032″	.0095″
.0034″	.0100″
.0036″	.0105″
.0037″	.0110″
.0039″	.0115″
.0041″	.0120″
.0043″	.0125″
.0044″	.0130″
.0046″	.0135″
.0048″	.0140″
.0049″	.0145″
.0051″	.0150″
.0053″	.0155″
.0054″	.0160″
.0056″	.0165″
.0058″	.0170″
.0060″	.0175″
.0061″	.0180″
.0063″	.0185″
.0065″	.0190″
.0066″	.0195″
.0068″	.0200″

ae = 2%



2% Radial Engagement (.02 x d)	
Actual (CPT)	Programmed (CPT)
.0001″	.0005″
.0003″	.0010″
.0004″	.0015″
.0006″	.0020″
.0007″	.0025″
.0008″	.0030″
.0010″	.0035″
.0011″	.0040″
.0013″	.0045″
.0014″	.0050″
.0015″	.0055″
.0017″	.0060″
.0018″	.0065″
.0020″	.0070″
.0021″	.0075″
.0022″	.0080″
.0024″	.0085″
.0025″	.0090″
.0027″	.0095″
.0028″	.0100″
.0029″	.0105″
.0031″	.0110″
.0032″	.0115″
.0034″	.0120″
.0035″	.0125″
.0036″	.0130″
.0038″	.0135″
.0039″	.0140″
.0041″	.0145″
.0042″	.0150″
.0043″	.0155″
.0045″	.0160″
.0046″	.0165″
.0048″	.0170″
.0049″	.0175″
.0050″	.0180″
.0052″	.0185″
.0053″	.0190″
.0055″	.0195″
.0056″	.0200″

ae = 1%



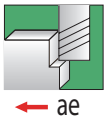
1% Radial Engagement (.01 x d)	
Actual (CPT)	Programmed (CPT)
.0001″	.0005″
.0002″	.0010″
.0003″	.0015″
.0004″	.0020″
.0005″	.0025″
.0006″	.0030″
.0007″	.0035″
.0008″	.0040″
.0009″	.0045″
.0010″	.0050″
.0011″	.0055″
.0012″	.0060″
.0013″	.0065″
.0014″	.0070″
.0015″	.0075″
.0016″	.0080″
.0017″	.0085″
.0018″	.0090″
.0019″	.0095″
.0020″	.0100″
.0021″	.0105″
.0022″	.0110″
.0023″	.0115″
.0024″	.0120″
.0025″	.0125″
.0026″	.0130″
.0027″	.0135″
.0028″	.0140″
.0029″	.0145″
.0030″	.0150″
.0031″	.0155″
.0032″	.0160″
.0033″	.0165″
.0034″	.0170″
.0035″	.0175″
.0036″	.0180″
.0037″	.0185″
.0038″	.0190″
.0039″	.0195″
.0040″	.0200″

CPT = CHIPLOAD PER TOOTH (Fz)

Chip Thinning Calculations for TMS / TMR End Mills

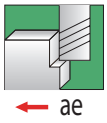
Metric

ae = 3%



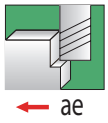
3% Radial Engagement (.03 x d)	
Actual (CPT)	Programmed (CPT)
.0043	.0127
.0086	.0254
.0130	.0381
.0173	.0508
.0216	.0635
.0259	.0762
.0302	.0889
.0345	.1016
.0389	.1143
.0432	.1270
.0475	.1397
.0518	.1524
.0561	.1651
.0605	.1778
.0648	.1905
.0691	.2032
.0734	.2159
.0777	.2286
.0820	.2413
.0864	.2540
.0907	.2667
.0950	.2794
.0993	.2921
.1036	.3048
.1080	.3175
.1123	.3302
.1166	.3429
.1209	.3556
.1252	.3683
.1295	.3810
.1339	.3937
.1382	.4064
.1425	.4191
.1468	.4318
.1511	.4445
.1554	.4572
.1598	.4699
.1641	.4826
.1684	.4953
.1727	.5080

ae = 2%



2% Radial Engagement (.02 x d)	
Actual (CPT)	Programmed (CPT)
.0036	.0127
.0071	.0254
.0107	.0381
.0142	.0508
.0178	.0635
.0213	.0762
.0249	.0889
.0284	.1016
.0320	.1143
.0356	.1270
.0391	.1397
.0427	.1524
.0462	.1651
.0498	.1778
.0533	.1905
.0569	.2032
.0605	.2159
.0640	.2286
.0676	.2413
.0711	.2540
.0747	.2667
.0782	.2794
.0818	.2921
.0853	.3048
.0889	.3175
.0925	.3302
.0960	.3429
.0996	.3556
.1031	.3683
.1067	.3810
.1102	.3937
.1138	.4064
.1173	.4191
.1209	.4318
.1245	.4445
.1280	.4572
.1316	.4699
.1351	.4826
.1387	.4953
.1422	.5080

ae = 1%



1% Radial Engagement (.01 x d)	
Actual (CPT)	Programmed (CPT)
.0025	.0127
.0051	.0254
.0076	.0381
.0102	.0508
.0127	.0635
.0152	.0762
.0178	.0889
.0203	.1016
.0229	.1143
.0254	.1270
.0279	.1397
.0305	.1524
.0330	.1651
.0356	.1778
.0381	.1905
.0406	.2032
.0432	.2159
.0457	.2286
.0483	.2413
.0508	.2540
.0533	.2667
.0559	.2794
.0584	.2921
.0610	.3048
.0635	.3175
.0660	.3302
.0686	.3429
.0711	.3556
.0737	.3683
.0762	.3810
.0787	.3937
.0813	.4064
.0838	.4191
.0864	.4318
.0889	.4445
.0914	.4572
.0940	.4699
.0965	.4826
.0991	.4953
.1016	.5080

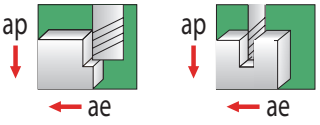
CPT = CHIPLOAD PER TOOTH (Fz)

GARR TOOL Milling Guide for V4 End Mills in Titanium, Inconel, and Stainless

Fractional

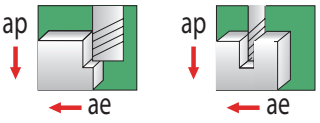
	Titanium Alloys	Nickel or Cobalt-based Material	Stainless (400 Series, pH Series)	Carbon Steel
	SFM = 100 - 200	SFM = 50 - 100	SFM = 100 - 225	SFM = 250 - 400
DIAMETER	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)
.1575" - .2755"	.0004" - .0008"	.0003" - .0006"	.0005" - .0010"	.0008" - .0020"
.2756" - .3124"	.0005" - .0010"	.0004" - .0008"	.0007" - .0012"	.0010" - .0020"
.3125" - .3749"	.0007" - .0012"	.0005" - .0010"	.0008" - .0015"	.0015" - .0025"
.3750" - .4999"	.0008" - .0015"	.0007" - .0012"	.0010" - .0018"	.0020" - .0030"
.5000" - .6249"	.0010" - .0018"	.0008" - .0015"	.0012" - .0020"	.0020" - .0025"
.6250" - .7499"	.0012" - .0020"	.0010" - .0018"	.0015" - .0022"	.0025" - .0030"
.7500" - .8749"	.0015" - .0022"	.0012" - .0020"	.0018" - .0025"	.0030" - .0035"
.8750" - 1.000"	.0018" - .0025"	.0015" - .0022"	.0022" - .0030"	.0035" - .0040"

	Profiling Side Cutting	Slotting Pocket Milling
Axial (ap)	1xD	100% of Dia.
Radial (ae)	100% of Dia.	1xD



	Titanium Alloys	Nickel or Cobalt-based Material	Stainless (400 Series, pH Series)	Carbon Steel
	SFM = 150 - 250	SFM = 60 - 125	SFM = 150 - 300	SFM = 300 - 500
DIAMETER	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)
.1575" - .2755"	.0008" - .0011"	.0004" - .0008"	.0008" - .0012"	.0010" - .0025"
.2756" - .3124"	.0010" - .0015"	.0005" - .0010"	.0010" - .0018"	.0015" - .0030"
.3125" - .3749"	.0012" - .0018"	.0007" - .0012"	.0012" - .0020"	.0020" - .0035"
.3750" - .4999"	.0012" - .0021"	.0008" - .0015"	.0015" - .0022"	.0025" - .0040"
.5000" - .6249"	.0015" - .0025"	.0010" - .0018"	.0018" - .0030"	.0030" - .0035"
.6250" - .7499"	.0018" - .0030"	.0012" - .0020"	.0020" - .0033"	.0035" - .0040"
.7500" - .8749"	.0020" - .0032"	.0015" - .0022"	.0023" - .0037"	.0040" - .0045"
.8750" - 1.000"	.0025" - .0035"	.0018" - .0025"	.0027" - .0040"	.0045" - .0050"

	Profiling Side Cutting	Slotting Pocket Milling
Axial (ap)	1xD	50% of Dia.
Radial (ae)	50% of Dia.	1xD

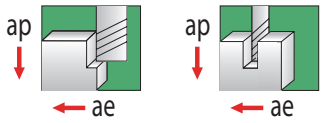


NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Metric

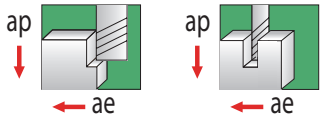
	Titanium Alloys	Nickel or Cobalt-based Material	Stainless (400 Series, pH Series)	Carbon Steel
	SMM = 30 - 60	SMM = 15 - 30	SMM = 30 - 70	SMM = 75 - 120
DIAMETER	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)
4.0 - 7.0	.010 - .020	.005 - .008	.010 - .025	.020 - .050
7.0 - 8.0	.012 - .025	.010 - .020	.015 - .030	.025 - .055
8.0 - 10.0	.015 - .030	.012 - .025	.020 - .040	.030 - .065
10.0 - 13.0	.020 - .040	.015 - .030	.025 - .045	.050 - .080
13.0 - 16.0	.025 - .045	.020 - .040	.030 - .050	.055 - .085
16.0 - 19.0	.030 - .050	.025 - .045	.035 - .055	.060 - .090
19.0 - 22.0	.035 - .055	.030 - .050	.045 - .065	.065 - .095
22.0 - 25.0	.045 - .065	.035 - .055	.055 - .075	.070 - .100

	Profiling Side Cutting	Slotting Pocket Milling
Axial (ap)	1xD	100% of Dia.
Radial (ae)	100% of Dia.	1xD



	Titanium Alloys	Nickel or Cobalt-based Material	Stainless (400 Series, pH Series)	Carbon Steel
	SMM = 45 - 75	SMM = 20 - 40	SMM = 45 - 90	SMM = 90 - 150
DIAMETER	CPT (Fz)	CPT (Fz)	CPT (Fz)	CPT (Fz)
4.0 - 7.0	.020 - .030	.010 - .020	.020 - .030	.025 - .065
7.0 - 8.0	.025 - .040	.013 - .025	.025 - .045	.035 - .080
8.0 - 10.0	.030 - .045	.018 - .030	.030 - .050	.045 - .090
10.0 - 13.0	.030 - .050	.020 - .040	.035 - .055	.055 - .100
13.0 - 16.0	.035 - .060	.025 - .045	.045 - .075	.075 - .095
16.0 - 19.0	.045 - .075	.030 - .050	.050 - .080	.085 - .105
19.0 - 22.0	.050 - .080	.035 - .055	.055 - .095	.095 - .115
22.0 - 25.0	.060 - .090	.045 - .065	.065 - .105	.105 - .125

	Profiling Side Cutting	Slotting Pocket Milling
Axial (ap)	1xD	50% of Dia.
Radial (ae)	50% of Dia.	1xD



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

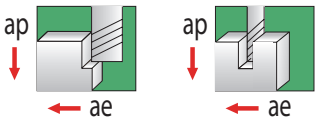
GARR TOOL Milling Guide for V5 End Mills in Titanium, Inconel, and Stainless

(CHIP THINNING CALCULATION ALREADY APPLIED)

Fractional

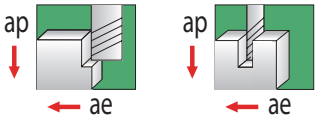
	Titanium Alloys	Nickel or Cobalt-based Material	Stainless (400 Series, pH Series)
	SFM = 150 - 250	SFM = 60 - 125	SFM = 150 - 300
DIAMETER	CPT (Fz)	CPT (Fz)	CPT (Fz)
.2362" - .2755"	.0008" - .0011"	.0004" - .0008"	.0008" - .0012"
.2756" - .3124"	.0010" - .0015"	.0005" - .0010"	.0010" - .0018"
.3125" - .3749"	.0012" - .0018"	.0007" - .0012"	.0012" - .0020"
.3750" - .4999"	.0012" - .0021"	.0008" - .0015"	.0015" - .0022"
.5000" - .6249"	.0015" - .0025"	.0010" - .0018"	.0018" - .0030"
.6250" - .7499"	.0018" - .0030"	.0012" - .0020"	.0020" - .0033"
.7500" - .8749"	.0020" - .0032"	.0015" - .0022"	.0025" - .0037"
.8750" - 1.000"	.0025" - .0035"	.0018" - .0025"	.0030" - .0042"

	Profiling Side Cutting	Slotting Pocket Milling
Axial (ap)	1xD	50% of Dia.
Radial (ae)	50% of Dia.	1xD



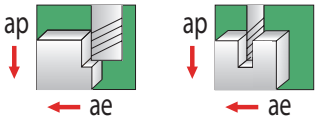
	Titanium Alloys	Nickel or Cobalt-based Material	Stainless (400 Series, pH Series)
	SFM = 300 - 500	SFM = 100 - 200	SFM = 250 - 400
DIAMETER	CPT (Fz)	CPT (Fz)	CPT (Fz)
.2362" - .2755"	.0011" - .0015"	.0007" - .0011"	.0011" - .0015"
.2756" - .3124"	.0013" - .0021"	.0008" - .0013"	.0015" - .0021"
.3125" - .3749"	.0015" - .0023"	.0010" - .0015"	.0018" - .0025"
.3750" - .4999"	.0018" - .0025"	.0011" - .0018"	.0021" - .0028"
.5000" - .6249"	.0021" - .0033"	.0013" - .0021"	.0023" - .0033"
.6250" - .7499"	.0023" - .0036"	.0015" - .0023"	.0028" - .0038"
.7500" - .8749"	.0028" - .0040"	.0018" - .0025"	.0033" - .0043"
.8750" - 1.000"	.0033" - .0045"	.0021" - .0028"	.0038" - .0048"

	Profiling Side Cutting	Slotting Pocket Milling
Axial (ap)	1xD	20% of Dia.
Radial (ae)	20% of Dia.	1xD



	Titanium Alloys	Nickel or Cobalt-based Material	Stainless (400 Series, pH Series)
	SFM = 400 - 700	SFM = 150 - 250	SFM = 300 - 500
DIAMETER	CPT (Fz)	CPT (Fz)	CPT (Fz)
.2362" - .2755"	.0018" - .0022"	.0015" - .0020"	.0020" - .0025"
.2756" - .3124"	.0022" - .0028"	.0017" - .0022"	.0022" - .0030"
.3125" - .3749"	.0025" - .0032"	.0018" - .0025"	.0025" - .0035"
.3750" - .4999"	.0028" - .0035"	.0020" - .0028"	.0028" - .0040"
.5000" - .6249"	.0030" - .0040"	.0022" - .0030"	.0030" - .0045"
.6250" - .7499"	.0035" - .0045"	.0025" - .0032"	.0032" - .0050"
.7500" - .8749"	.0040" - .0050"	.0028" - .0035"	.0035" - .0055"
.8750" - 1.000"	.0045" - .0055"	.0032" - .0040"	.0040" - .0060"

	Profiling Side Cutting	Slotting Pocket Milling
Axial (ap)	1xD	5% of Dia.
Radial (ae)	5% of Dia.	1xD



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

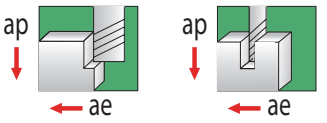
GARR TOOL Milling Guide for V5 End Mills in Titanium, Inconel, and Stainless

(CHIP THINNING CALCULATION ALREADY APPLIED)

Metric

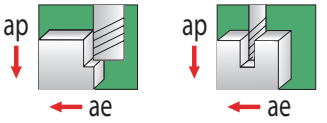
	Titanium Alloys	Nickel or Cobalt-based Material	Stainless (400 Series, pH Series)
	SMM = 45 - 75	SMM = 20 - 40	SMM = 45 - 90
DIAMETER	CPT (Fz)	CPT (Fz)	CPT (Fz)
6.0 - 8.0	.020 - .030	.010 - .020	.020 - .030
8.0 - 10.0	.025 - .040	.013 - .025	.025 - .045
10.0 - 12.0	.030 - .045	.018 - .030	.030 - .050
12.0 - 14.0	.030 - .050	.020 - .040	.035 - .055
14.0 - 16.0	.035 - .060	.025 - .045	.045 - .075
16.0 - 18.0	.045 - .075	.030 - .050	.050 - .080
18.0 - 20.0	.050 - .080	.035 - .055	.055 - .095
22.0 - 25.0	.060 - .090	.045 - .065	.065 - .105

	Profiling Side Cutting	Slotting Pocket Milling
Axial (ap)	1xD	50% of Dia.
Radial (ae)	50% of Dia.	1xD



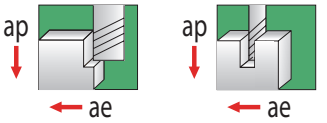
	Titanium Alloys	Nickel or Cobalt-based Material	Stainless (400 Series, pH Series)
	SMM = 90 - 150	SMM = 30 - 60	SMM = 75 - 120
DIAMETER	CPT (Fz)	CPT (Fz)	CPT (Fz)
6.0 - 8.0	.027 - .037	.017 - .027	.027 - .037
8.0 - 10.0	.032 - .052	.020 - .032	.037 - .052
10.0 - 12.0	.042 - .062	.027 - .042	.052 - .067
12.0 - 14.0	.052 - .067	.032 - .047	.057 - .077
14.0 - 16.0	.057 - .082	.037 - .052	.062 - .082
16.0 - 18.0	.062 - .087	.042 - .062	.072 - .092
18.0 - 20.0	.067 - .092	.047 - .072	.077 - .097
22.0 - 25.0	.072 - .097	.052 - .082	.087 - .107

	Profiling Side Cutting	Slotting Pocket Milling
Axial (ap)	1xD	20% of Dia.
Radial (ae)	20% of Dia.	1xD



	Titanium Alloys	Nickel or Cobalt-based Material	Stainless (400 Series, pH Series)
	SMM = 120 - 210	SMM = 45 - 75	SMM = 90 - 150
DIAMETER	CPT (Fz)	CPT (Fz)	CPT (Fz)
6.0 - 8.0	.045 - .065	.035 - .045	.050 - .070
8.0 - 10.0	.065 - .080	.038 - .050	.065 - .085
10.0 - 12.0	.075 - .085	.045 - .065	.075 - .095
12.0 - 14.0	.080 - .090	.050 - .070	.080 - .100
14.0 - 16.0	.085 - .100	.055 - .075	.090 - .110
16.0 - 18.0	.095 - .115	.060 - .085	.105 - .125
18.0 - 20.0	.110 - .125	.065 - .095	.115 - .135
22.0 - 25.0	.115 - .135	.070 - .105	.120 - .145

	Profiling Side Cutting	Slotting Pocket Milling
Axial (ap)	1xD	5% of Dia.
Radial (ae)	5% of Dia.	1xD



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for High Rc Finishers in Hardened Steel

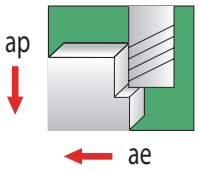
Fractional

(Reference series: 545MA, 545BA, 545RA, VRX)

	38 - 45 HRc		45 - 50 HRc		50 - 55 HRc		55 - 60 HRc		60 - 65 HRc		65 - 70 HRc	
	SFM = 450		SFM = 250		SFM = 175		SFM = 125		SFM = 75		SFM = 60	
DIAMETER	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)
1/8"	13750	.0009"	7650	.0008"	5350	.0006"	3820	.0005"	2300	.0004"	1850	.0003"
3/16"	9200	.0012"	5100	.0010"	3570	.0008"	2550	.0007"	1530	.0006"	1225	.0004"
1/4"	6900	.0015"	3850	.0012"	2675	.0010"	1910	.0008"	1150	.0007"	925	.0006"
3/8"	4600	.0018"	2550	.0015"	1800	.0012"	1275	.0010"	765	.0009"	615	.0008"
1/2"	3450	.0022"	1950	.0018"	1350	.0014"	955	.0012"	575	.0012"	460	.0010"
5/8"	2750	.0027"	1550	.0022"	1100	.0020"	765	.0018"	460	.0015"	370	.0013"
3/4"	2300	.0030"	1275	.0027"	900	.0025"	640	.0022"	390	.0017"	310	.0017"
1"	1720	.0033"	960	.0030"	675	.0027"	480	.0025"	290	.0023"	230	.0019"

	Profiling / Side Cutting
Axial (ap)	1xD
Radial (ae)	5% of Dia.

	Slotting / Pocket Milling
Axial (ap)	5% of Dia.
Radial (ae)	1xD



High Speed Machining

	38 - 45 HRc		45 - 50 HRc		50 - 55 HRc		55 - 60 HRc		60 - 65 HRc		65 - 70 HRc	
	SFM = 1200		SFM = 1000		SFM = 800		SFM = 600		SFM = 450		SFM = 375	
DIAMETER	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)
1/8"	36670	.0006"	30600	.0005"	24500	.0004"	18340	.0004"	13750	.0003"	11460	.0002"
3/16"	24450	.0009"	20400	.0008"	16300	.0006"	12230	.0005"	9200	.0004"	7650	.0003"
1/4"	18340	.0012"	15300	.0010"	12230	.0008"	9200	.0007"	6900	.0005"	5750	.0004"
3/8"	12225	.0015"	10200	.0012"	8150	.0010"	6100	.0008"	4600	.0007"	3850	.0006"
1/2"	9170	.0018"	7650	.0015"	6100	.0012"	4600	.0010"	3450	.0009"	2870	.0008"
5/8"	7335	.0022"	6100	.0018"	4900	.0014"	3700	.0012"	2750	.0011"	2300	.0010"
3/4"	6115	.0027"	5100	.0022"	4100	.0020"	3100	.0018"	2300	.0014"	1900	.0013"
1"	4585	.0030"	3820	.0027"	3100	.0025"	2300	.0022"	1720	.0019"	1450	.0017"

	Profiling / Side Cutting
Axial (ap)	1xD
Radial (ae)	2% of Dia.

	Slotting / Pocket Milling
Axial (ap)	2% of Dia.
Radial (ae)	1xD

D = Tool Diameter

Example: 2% of Dia., when D = 1/2" (.02 x .500") = .010" per pass

Preferable method is to run tools with air blast to keep chips away from the cutting edge.
If air is not available, either coolant spray or dry machining is acceptable.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for High Rc Finishers in Hardened Steel

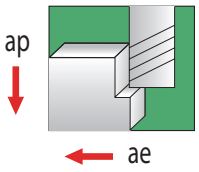
Metric

(Reference series: 545MA, 545BA, 545RA, VRX)

	38 - 45 HRc		45 - 50 HRc		50 - 55 HRc		55 - 60 HRc		60 - 65 HRc		65 - 70 HRc	
	M/Min. = 135		M/Min. = 75		M/Min. = 50		M/Min. = 40		M/Min. = 25		M/Min. = 20	
DIAMETER	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)
3.0	14500	.025	8100	.020	5650	.015	4050	.010	2400	.008	1950	.007
4.0	10900	.030	6100	.025	4200	.020	3000	.015	1800	.010	1450	.008
6.0	7300	.035	4050	.030	2800	.025	2000	.020	1200	.015	970	.010
8.0	5450	.040	3000	.035	2100	.030	1500	.025	900	.020	725	.015
12.0	3650	.055	2000	.045	1400	.035	1000	.030	600	.025	480	.020
16.0	2700	.065	1500	.055	1050	.050	750	.045	450	.030	360	.025
18.0	2400	.075	1350	.065	950	.060	675	.055	400	.045	320	.030
20.0	2150	.078	1200	.070	850	.065	600	.058	360	.050	290	.040
25.0	1750	.080	1000	.075	700	.070	500	.060	300	.055	250	.045

	Profiling / Side Cutting
Axial (ap)	1xD
Radial (ae)	5% of Dia.

	Slotting / Pocket Milling
Axial (ap)	5% of Dia.
Radial (ae)	1xD



High Speed Machining

	38 - 45 HRc		45 - 50 HRc		50 - 55 HRc		55 - 60 HRc		60 - 65 HRc		65 - 70 HRc	
	M/Min. = 365		M/Min. = 305		M/Min. = 240		M/Min. = 180		M/Min. = 135		M/Min. = 115	
DIAMETER	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)
3.0	38800	.020	32300	.015	25800	.008	19400	.008	14500	.007	12100	.005
4.0	29100	.025	24200	.020	19400	.015	14500	.010	10900	.008	9100	.007
6.0	19400	.030	16100	.025	12900	.020	9700	.015	7300	.010	6050	.008
8.0	14500	.035	12100	.030	9700	.025	7250	.020	5450	.015	4500	.010
12.0	9700	.045	8075	.035	6450	.030	4850	.025	3650	.020	3000	.015
16.0	7250	.055	6050	.045	4850	.035	3600	.030	2700	.025	2300	.020
18.0	6450	.065	5400	.055	4300	.050	3200	.045	2400	.030	2000	.025
20.0	5800	.070	4850	.060	3850	.055	2900	.050	2150	.040	1800	.028
25.0	4650	.075	3870	.065	3100	.060	2300	.055	1750	.045	1450	.030

	Profiling / Side Cutting
Axial (ap)	1xD
Radial (ae)	2% of Dia.

	Slotting / Pocket Milling
Axial (ap)	2% of Dia.
Radial (ae)	1xD

D = Tool Diameter

Example: 2% of Dia., when D = 12mm (.02 x 12mm) = .24mm per pass

Preferable method is to run tools with air blast to keep chips away from the cutting edge.
If air is not available, either coolant spray or dry machining is acceptable.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Speed and Feed Recommendations for Cutting Die Molds

Fractional

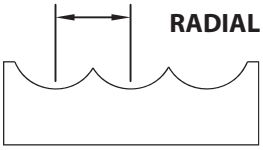
Roughing

(Reference series: 350MX)

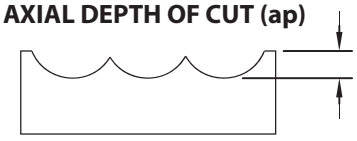
	RPM		CHIPLOAD PER FLUTE (Fz)	
DIAMETER	40 - 50 HRc	50 - 60 HRc	40 - 50 HRc	50 - 60 HRc
1/32"	20,000 - 40,000	20,000 - 40,000	.0005" - .0007"	.0004" - .0005"
1/16"	20,000 - 40,000	20,000 - 40,000	.0010" - .0015"	.0008" - .0010"
3/32"	20,000 - 32,000	20,000 - 30,000	.0015" - .0020"	.0010" - .0015"
1/8"	18,000 - 24,000	15,000 - 20,000	.0020" - .0025"	.0015" - .0020"
3/16"	12,000 - 16,000	10,000 - 14,000	.0030" - .0040"	.0020" - .0030"
1/4"	9,000 - 12,000	7,500 - 10,000	.0040" - .0050"	.0025" - .0040"
5/16"	7,000 - 10,000	6,000 - 8,500	.0050" - .0065"	.0035" - .0050"
3/8"	6,000 - 8,000	5,000 - 7,000	.0060" - .0075"	.0045" - .0060"
1/2"	4,500 - 6,000	4,000 - 5,500	.0080" - .0100"	.0055" - .0080"
5/8"	3,500 - 5,000	3,000 - 4,500	.0090" - .0110"	.0065" - .0090"
3/4"	3,000 - 4,000	2,500 - 3,500	.0100" - .0120"	.0075" - .0100"
1"	2,300 - 3,000	2,000 - 2,500	.0110" - .0130"	.0085" - .0110"

Semi-Finishing and Finishing

	RPM		CHIPLOAD PER FLUTE (Fz)	
DIAMETER	40 - 50 HRc	50 - 60 HRc	40 - 50 HRc	50 - 60 HRc
1/32"	20,000 - 40,000	20,000 - 40,000	.0004" - .0005"	.0003" - .0004"
1/16"	20,000 - 40,000	20,000 - 40,000	.0008" - .0010"	.0005" - .0008"
3/32"	20,000 - 40,000	20,000 - 40,000	.0010" - .0015"	.0008" - .0012"
1/8"	20,000 - 40,000	20,000 - 36,000	.0015" - .0020"	.0010" - .0015"
3/16"	20,000 - 32,000	20,000 - 25,000	.0020" - .0030"	.0015" - .0020"
1/4"	18,000 - 25,000	15,000 - 18,000	.0025" - .0040"	.0020" - .0030"
5/16"	14,000 - 19,000	12,000 - 14,000	.0035" - .0050"	.0025" - .0040"
3/8"	12,000 - 16,000	10,000 - 12,000	.0045" - .0060"	.0030" - .0045"
1/2"	9,000 - 12,000	7,500 - 9,000	.0055" - .0080"	.0040" - .0060"
5/8"	6,500 - 9,000	5,000 - 7,000	.0065" - .0090"	.0050" - .0070"
3/4"	5,500 - 7,500	4,000 - 6,000	.0075" - .0100"	.0060" - .0080"
1"	4,000 - 6,000	3,500 - 5,500	.0085" - .0110"	.0070" - .0090"



RADIAL STEP OVER (ae)



AXIAL DEPTH OF CUT (ap)

Roughing	
Axial (ap)	15% - 25% of Dia.
Radial (ae)	20% - 30% of Dia.

Semi-Finishing	
Axial (ap)	5% - 8% of Dia.
Radial (ae)	2% - 5% of Dia.

Finishing	
Axial (ap)	1% - 3% of Dia.
Radial (ae)	.5% - 1% of Dia.

High pressure air is recommended for clearing chips away from the cut.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Speed and Feed Recommendations for Cutting Die Molds
Metric

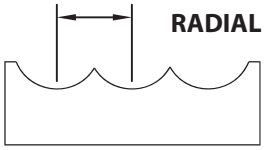
Roughing

(Reference series: 950MX)

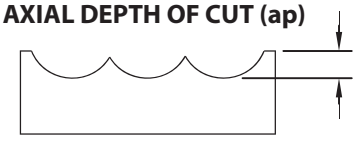
	RPM		CHIPLOAD PER FLUTE (Fz)	
DIAMETER	40 - 50 HRc	50 - 60 HRc	40 - 50 HRc	50 - 60 HRc
1.0	20,000 - 40,000	20,000 - 40,000	.013 - .018	.010 - .013
1.5	20,000 - 40,000	20,000 - 40,000	.025 - .038	.020 - .025
2.0	20,000 - 32,000	20,000 - 30,000	.038 - .050	.025 - .038
3.0	18,000 - 24,000	15,000 - 20,000	.050 - .065	.038 - .050
4.0	12,000 - 16,000	10,000 - 14,000	.075 - .100	.050 - .075
6.0	9,000 - 12,000	7,500 - 10,000	.100 - .125	.065 - .100
8.0	7,000 - 10,000	6,000 - 8,500	.125 - .165	.088 - .125
10.0	6,000 - 8,000	5,000 - 7,000	.150 - .190	.110 - .150
12.0	4,500 - 6,000	4,000 - 5,500	.200 - .250	.140 - .200
16.0	3,500 - 5,000	3,000 - 4,500	.225 - .275	.165 - .225
20.0	3,000 - 4,000	2,500 - 3,500	.250 - .300	.190 - .250
25.0	2,300 - 3,000	2,000 - 2,500	.275 - .325	.215 - .275

Semi-Finishing and Finishing

	RPM		CHIPLOAD PER FLUTE (Fz)	
DIAMETER	40 - 50 HRc	50 - 60 HRc	40 - 50 HRc	50 - 60 HRc
1.0	20,000 - 40,000	20,000 - 40,000	.010 - .013	.008 - .010
1.5	20,000 - 40,000	20,000 - 40,000	.020 - .025	.013 - .020
2.0	20,000 - 40,000	20,000 - 40,000	.025 - .038	.020 - .030
3.0	20,000 - 40,000	20,000 - 36,000	.038 - .050	.025 - .038
4.0	20,000 - 32,000	20,000 - 25,000	.050 - .075	.038 - .050
6.0	18,000 - 25,000	15,000 - 18,000	.065 - .100	.050 - .075
8.0	14,000 - 19,000	12,000 - 14,000	.088 - .125	.065 - .100
10.0	12,000 - 16,000	10,000 - 12,000	.110 - .150	.075 - .110
12.0	9,000 - 12,000	7,500 - 9,000	.140 - .200	.100 - .150
16.0	6,500 - 9,000	5,000 - 7,000	.165 - .225	.125 - .175
20.0	5,500 - 7,500	4,000 - 6,000	.190 - .250	.150 - .200
25.0	4,000 - 6,000	3,500 - 5,500	.215 - .275	.175 - .225



RADIAL STEP OVER (ae)



AXIAL DEPTH OF CUT (ap)

Roughing	
Axial (ap)	15% - 25% of Dia.
Radial (ae)	20% - 30% of Dia.

Semi-Finishing	
Axial (ap)	5% - 8% of Dia.
Radial (ae)	2% - 5% of Dia.

Finishing	
Axial (ap)	1% - 3% of Dia.
Radial (ae)	.5% - 1% of Dia.

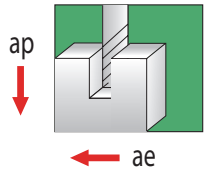
High pressure air is recommended for clearing chips away from the cut.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

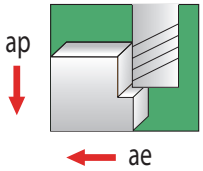
Speed and Feed Recommendations for H-45 High Feed End Mills

	UP TO 40 HRC			40 to 45 HRC			45 TO 55 HRC			55 TO 60 HRC		
DIAMETER	SPEED RPM	FEED IN/MIN	FEED MM/MIN	SPEED RPM	FEED IN/MIN	FEED MM/MIN	SPEED RPM	FEED IN/MIN	FEED MM/MIN	SPEED RPM	FEED IN/MIN	FEED MM/MIN
3.0	16000	120	3100	13000	80	2032	11300	70	1778	9700	35	889
1/8"	15200	120	3100	12000	80	2000	10700	70	1800	9200	35	900
4.0	12100	145	3700	9700	100	2540	8500	85	2159	7300	40	1016
3/16"	10200	160	4100	8200	110	2800	7100	90	2300	6100	45	1200
5.0	9700	155	4000	7700	105	2667	6800	90	2286	5800	45	1143
6.0	8100	180	4600	6500	120	3048	5700	100	2540	4900	50	1270
1/4"	7650	180	4600	6100	120	3100	5400	100	2600	4600	50	1300
5/16"	6100	195	4950	4900	130	3300	4300	110	2800	3700	55	1400
8.0	6050	195	4950	4850	130	3302	4300	110	2794	3650	55	1397
3/8"	5100	200	5200	4100	135	3400	3600	115	3000	3100	60	1550
10.0	4850	200	5100	3900	135	3429	3400	115	2921	2900	60	1524
12.0	4050	250	6400	3200	160	4064	2800	135	3429	2400	65	1651
1/2"	3800	240	6100	3100	160	4100	2700	135	3500	2300	65	1700

	Slotting Pocket Milling
Axial (ap)	0.3 x Radius
Radial (ae)	1 x D



	Profiling Side Cutting
Axial (ap)	1 x D
Radial (ae)	0.3 x Radius



D = Tool Diameter

Example: Axial = 0.3 x radius, when D = 1/2" with .060" corner radius (.3 x .060") = .018" per pass

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Speed and Feed Recommendations for Diamond Coated End Mills in Graphite

Fractional

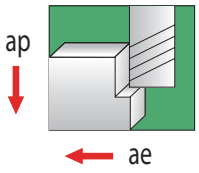
DIAMETER	RPM	CHIPLOAD PER FLUTE (Fz)
1/32" - 1/16"	15,000 - 35,000	.0005" - .0010"
1/16" - 1/8"	8,000 - 31,000	.0008" - .0015"
1/8" - 3/16"	8,000 - 31,000	.0010" - .0020"
3/16" - 1/4"	8,000 - 25,000	.0010" - .0020"
1/4" - 5/16"	6,000 - 23,000	.0020" - .0040"
5/16" - 3/8"	6,000 - 20,000	.0020" - .0040"
3/8" - 1/2"	6,000 - 20,000	.0030" - .0050"
1/2" - 5/8"	4,500 - 15,000	.0050" - .0060"
5/8" - 3/4"	4,500 - 12,000	.0060" - .0070"
3/4" - 1"	4,500 - 12,000	.0070" - .0080"

Metric

DIAMETER	RPM	CHIPLOAD PER FLUTE (Fz)
1.0 - 3.0	15,000 - 35,000	.015 - .030
3.0 - 6.0	8,000 - 31,000	.030 - .050
6.0 - 10.0	6,000 - 31,000	.050 - .100
10.0 - 12.0	6,000 - 25,000	.080 - .130
16.0 - 20.0	4,500 - 15,000	.130 - .150
20.0 - 25.0	4,500 - 12,000	.150 - .200

Generally, tools will run at maximum RPM in relation to the corresponding parameters below:

	SLOTTING	PROFILING
Axial (ap)	5% of Dia.	1xD
Radial (ae)	1xD	10% of Dia.



These recommendations are suggested for use primarily in graphite cutting applications. Rigid work holding, machine stability and part integrity are critical!

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Reaming Guide

Fractional

Type	Rc Hardness	Recommended SFM	Chipload Per Flute (Fz)			
		Series 4100	.0590" - .1250" (1.499 - 3.175mm)	.1251" - .2500" (3.178 - 6.350mm)	.2501" - .3750" (6.353 - 9.525mm)	.3751" - .5020" (9.528 - 12.750mm)
COBALT BASE ALLOYS						
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35 > 35	80-120 60-80	.0003"-.0008"	.0005"-.0010"	.0008"-.0012"	.0010"-.0015"
NICKEL BASE ALLOYS						
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35 > 35	100-125 80-110	.0003"-.0008"	.0005"-.0010"	.0008"-.0012"	.0010"-.0015"
IRON BASE ALLOYS						
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35 > 35	150-175 120-150	.0004"-.0009"	.0006"-.0012"	.0009"-.0013"	.0010"-.0017"
MONEL						
Monel - 65% Nickel		75-110	.0003"-.0008"	.0005"-.0010"	.0008"-.0012"	.0010"-.0015"
TITANIUM ALLOYS						
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		120-150	.0004"-.0009"	.0006"-.0012"	.0009"-.0013"	.0010"-.0017"
STAINLESS STEELS						
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35 > 35	100-125 80-110	.0004"-.0009"	.0006"-.0012"	.0009"-.0013"	.0010"-.0017"
(Austentic) Inox, 200 Series, 300 Series	< 35 > 35	100-125 80-110	.0004"-.0009"	.0006"-.0012"	.0009"-.0013"	.0010"-.0017"
(Austentic) 304L, 316L, Nitronic 50, Inox	< 35 > 35	80-100 60-80	.0003"-.0008"	.0005"-.0010"	.0008"-.0012"	.0010"-.0015"
(Martensitic) 400 Series	< 35 > 35	100-125 80-110	.0004"-.0009"	.0006"-.0012"	.0009"-.0013"	.0010"-.0017"
HIGH STRENGTH TOOL STEELS						
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35 > 35	100-125 80-110	.0003"-.0008"	.0005"-.0010"	.0008"-.0012"	.0010"-.0015"
MEDIUM ALLOY TOOL STEELS						
200, 250, 300, 8620	< 35 > 35	100-125 80-110	.0004"-.0009"	.0006"-.0012"	.0009"-.0013"	.0010"-.0017"
CARBON STEELS						
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35 > 35	100-125 80-110	.0004"-.0009"	.0006"-.0012"	.0009"-.0013"	.0010"-.0017"
CAST MATERIAL						
Steel		125-150	.0003"-.0008"	.0005"-.0010"	.0008"-.0012"	.0010"-.0015"
Ductile Iron		150-225	.0005"-.0010"	.0007"-.0012"	.0010"-.0015"	.0010"-.0018"
Gray Iron		125-200	.0005"-.0010"	.0007"-.0012"	.0010"-.0015"	.0010"-.0018"
Aluminum		150-225	.0005"-.0010"	.0007"-.0012"	.0010"-.0015"	.0010"-.0018"
ALUMINUM						
Aircraft Grade (6061, 7075)		225	.0005"-.0010"	.0007"-.0012"	.0010"-.0015"	.0010"-.0018"
MAGNESIUM						
		225	.0005"-.0010"	.0007"-.0012"	.0010"-.0015"	.0010"-.0018"
COPPER						
Copper Alloys		225	.0005"-.0010"	.0007"-.0012"	.0010"-.0015"	.0010"-.0018"
BRASS, BRONZE						
Brass, Aluminum/Bronze, Low Silicon Bronze		125-200	.0005"-.0010"	.0007"-.0012"	.0010"-.0015"	.0010"-.0018"
COMPOSITE MATERIAL						
Glass Epoxy, Fiberglass, Plastics, Graphite, G10		150	.0003"-.0008"	.0005"-.0010"	.0008"-.0012"	.0010"-.0015"

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Type	Rc Hardness	Recommended SMM	Chipload Per Flute (Fz)			
		Series 4100	1.50 - 3.00mm	3.01 - 6.00mm	6.01 - 9.00mm	9.01 - 13.00mm
COBALT BASE ALLOYS						
Powdered Metal, Stellite, Hs - 21, Haynes 25/188, X - 40, L - 605	< 35 > 35	25 - 40 15 - 25	.008 - .020	.013 - .025	.020 - .030	.025 - .040
NICKEL BASE ALLOYS						
Invar, Kovar, Inconel - 625/718, Waspalloy, Rene, Hastalloy, A286	< 35 > 35	30 - 40 25 - 35	.008 - .020	.013 - .025	.020 - .030	.025 - .040
IRON BASE ALLOYS						
Incoloy 800 - 802, Multimet N - 155, Timkin 16 - 25 - 6, Carpenter 22 - b3	< 35 > 35	45 - 50 35 - 45	.010 - .023	.015 - .030	.023 - .035	.025 - .045
MONEL						
Monel - 65% Nickel		20 - 35	.008 - .020	.013 - .025	.020 - .030	.025 - .040
TITANIUM ALLOYS						
Commercially Pure, 6Al - 4V, Astm 1/2/3, 6Al - 25N - 4Zr - 2Mo - Si		40 - 45	.010 - .023	.015 - .030	.023 - .035	.025 - .045
STAINLESS STEELS						
(Precipitation) 13/8, 15/5, 17 - 4, pH Types	< 35 > 35	30 - 40 25 - 35	.010 - .023	.015 - .030	.023 - .035	.025 - .045
(Austentic) Inox, 200 Series, 300 Series	< 35 > 35	30 - 40 25 - 35	.010 - .023	.015 - .030	.023 - .035	.025 - .045
(Austentic) 304L, 316L, Nitronic 50, Inox	< 35 > 35	25 - 30 15 - 25	.008 - .020	.013 - .025	.020 - .030	.025 - .040
(Martensitic) 400 Series	< 35 > 35	30 - 35 25 - 30	.010 - .023	.015 - .030	.023 - .035	.025 - .045
HIGH STRENGTH TOOL STEELS						
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35 > 35	30 - 40 25 - 35	.008 - .020	.013 - .025	.020 - .030	.025 - .040
MEDIUM ALLOY TOOL STEELS						
200, 250, 300, 8620	< 35 > 35	30 - 40 25 - 35	.010 - .023	.015 - .030	.023 - .035	.025 - .045
CARBON STEELS						
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35 > 35	30 - 40 25 - 35	.010 - .023	.015 - .030	.023 - .035	.025 - .045
CAST MATERIAL						
Steel		40 - 45	.008 - .020	.013 - .025	.020 - .030	.025 - .040
Ductile Iron		45 - 70	.013 - .025	.018 - .025	.025 - .040	.025 - .050
Gray Iron		35 - 70	.013 - .025	.018 - .025	.025 - .040	.025 - .050
Aluminum		40 - 70	.013 - .025	.018 - .025	.025 - .040	.025 - .050
ALUMINUM						
Aircraft Grade (6061, 7075)		70	.013 - .025	.018 - .025	.025 - .040	.025 - .050
MAGNESIUM						
		70	.013 - .025	.018 - .025	.025 - .040	.025 - .050
COPPER						
Copper Alloys		70	.013 - .025	.018 - .025	.025 - .040	.025 - .050
BRASS, BRONZE						
Brass, Aluminum/Bronze, Low Silicon Bronze		40 - 60	.013 - .025	.018 - .025	.025 - .040	.025 - .050
COMPOSITE MATERIAL						
Glass Epoxy, Fiberglass, Plastics, Graphite, G10		40 - 45	.008 - .020	.010 - .025	.020 - .030	.025 - .040

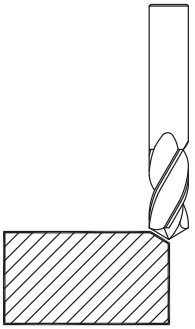
NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Speeds and Feeds for Drill Mills

Fractional

* Chamfering *

Type	Rc Hardness	SFM (Vc)		CHIPLOAD PER FLUTE (Fz)				
		154M, 154MA 152M, 152MA	1600 152D, 152DA	3/32" - 1/8"	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 3/4"
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35 > 35	175 - 225 125 - 175	150 - 200 100 - 150	.0003" - .0008" .0002" - .0004"	.0005" - .0010" .0003" - .0005"	.0008" - .0020" .0005" - .0015"	.0010" - .0030" .0010" - .0020"	.0020" - .0040" .0010" - .0030"
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35 > 35	125 - 175 70 - 115	100 - 150 70 - 100	.0003" - .0008" .0002" - .0004"	.0005" - .0010" .0003" - .0005"	.0008" - .0020" .0005" - .0015"	.0010" - .0030" .0010" - .0020"	.0020" - .0040" .0010" - .0030"
TITANIUM ALLOYS								
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		200 - 300	125 - 250	.0005" - .0010"	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"
5553 / Beta Titanium		175 - 225	150 - 200	.0003" - .0008"	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
STAINLESS STEELS								
13/8, 15/5, 17-4, pH Types	< 35 > 35	150 - 250 125 - 175	100 - 150 80 - 150	.0003" - .0008" .0002" - .0004"	.0005" - .0010" .0003" - .0005"	.0008" - .0020" .0005" - .0015"	.0010" - .0030" .0010" - .0020"	.0020" - .0040" .0010" - .0030"
Inox, 200 Series, 300 Series	< 35 > 35	200 - 250 150 - 200	125 - 175 100 - 150	.0003" - .0008" .0002" - .0004"	.0005" - .0010" .0003" - .0005"	.0008" - .0020" .0005" - .0015"	.0010" - .0030" .0010" - .0020"	.0020" - .0040" .0010" - .0030"
304L, 316L, Nitronic 50, Inox	< 35 > 35	90 - 125 75 - 110	80 - 120 60 - 90	.0003" - .0006" .0002" - .0004"	.0005" - .0008" .0003" - .0005"	.0008" - .0015" .0005" - .0010"	.0010" - .0020" .0010" - .0015"	.0020" - .0040" .0010" - .0030"
400 Series	< 35 > 35	150 - 250 125 - 175	100 - 150 80 - 150	.0003" - .0008" .0002" - .0004"	.0005" - .0010" .0003" - .0005"	.0008" - .0020" .0005" - .0015"	.0010" - .0030" .0010" - .0020"	.0020" - .0040" .0010" - .0030"
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30	150 - 225	125 - 175	.0003" - .0008"	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	30 - 38	90 - 125	80 - 120	.0002" - .0004"	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
	> 38	60 - 90	40 - 70	.0002" - .0003"	.0002" - .0004"	.0003" - .0006"	.0005" - .0010"	.0006" - .0020"
TOOL STEELS								
200, 250, 300, 8620, A36, 12L14, 1018, 1020	< 35 > 35	175 - 250 100 - 175	150 - 200 100 - 150	.0005" - .0010" .0003" - .0008"	.0007" - .0015" .0005" - .0010"	.0010" - .0025" .0008" - .0020"	.0015" - .0040" .0010" - .0030"	.0030" - .0050" .0020" - .0040"
CAST MATERIAL								
Steel, Iron		250 - 350	175 - 250	.0007" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"
Aluminum		250 - 350	250 - 350	.0007" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"
ALUMINUM								
Aircraft Grade (6061, 7075)		350 - 500	300 - 400	.0007" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"
COPPER								
Copper Alloys		250 - 350	150 - 300	.0005" - .0010"	.0007" - .0015"	.0010" - .0025"	.0015" - .0035"	.0020" - .0050"
BRASS, BRONZE								
Brass, Aluminum/Bronze, Low Silicon Bronze		250 - 350	150 - 300	.0005" - .0010"	.0007" - .0015"	.0010" - .0025"	.0015" - .0035"	.0020" - .0050"
COMPOSITE MATERIAL								
Glass Epoxy, Fiberglass, Plastics		250 - 450	200 - 400	.0007" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"
Graphite, G10, Carbon Fiber		300 - 500	250 - 450	.0007" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"



Chamfering a corner

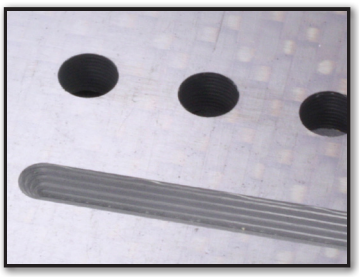
DRILL MILL USES:

Chamfering - for all metals, use general milling speeds and feeds. Depending on depth, use diameter at top of part to determine chipload. For example, if using 1/4" diameter, 90° point and depth is 1/8", calculate the chipload based on 1/8" diameter.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

* Chamfering *

Type	Rc Hardness	SFM (Vc)		CHIPLOAD PER FLUTE (Fz)				
		154M, 154MA 152M, 152MA	1600 152D, 152DA	2.0 - 3.0	3.0 - 6.0	6.0 - 10.0	10.0 - 14.0	14.0 - 20.0
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-4. L-605	< 35 > 35	50 - 70 35 - 50	45 - 60 30 - 45	.008 - .020 .003 - .010	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35 > 35	35 - 50 20 - 35	30 - 45 15 - 25	.006 - .020 .003 - .010	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075
TITANIUM ALLOYS								
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		60 - 90	35 - 75	.008 - .025	.015 - .035	.025 - .065	.035 - .100	.075 - .125
5553 / Beta Titanium		50 - 65	45 - 60	.006 - .020	.010 - .025	.020 - .050	.025 - .075	.050 - .100
STAINLESS STEELS								
13/8, 15/5, 17-4, pH Types	< 35 > 35	45 - 75 35 - 50	30 - 45 25 - 45	.006 - .020 .003 - .010	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075
Inox, 200 Series, 300 Series	< 35 > 35	60 - 80 45 - 60	40 - 55 30 - 45	.008 - .020 .003 - .010	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075
304L, 316L, Nitronic 50, Inox	< 35 > 35	25 - 40 20 - 35	25 - 35 15 - 25	.006 - .015 .003 - .010	.010 - .020 .005 - .015	.020 - .035 .010 - .025	.025 - .050 .025 - .035	.035 - .075 .025 - .050
400 Series	< 35 > 35	45 - 70 35 - 50	30 - 45 25 - 40	.006 - .020 .003 - .010	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30	45 - 60	35 - 50	.006 - .020	.010 - .025	.020 - .050	.025 - .075	.050 - .100
	30 - 38	30 - 45	25 - 35	.003 - .010	.005 - .015	.010 - .035	.025 - .050	.025 - .075
	> 38	15 - 30	10 - 25	.002 - .006	.003 - .008	.005 - .020	.015 - .040	.020 - .065
TOOL STEELS								
200, 250, 300, 8620, A36, 12L14, 1018, 1020	< 35 > 35	55 - 75 35 - 55	45 - 60 30 - 45	.008 - .025 .006 - .020	.015 - .035 .010 - .025	.025 - .065 .020 - .050	.035 - .100 .025 - .075	.075 - .125 .050 - .100
CAST MATERIAL								
Steel, Iron		75 - 105	50 - 75	.010 - .035	.025 - .050	.035 - .100	.050 - .150	.075 - .250
Aluminum		75 - 105	75 - 105	.010 - .035	.025 - .050	.035 - .100	.050 - .150	.075 - .250
ALUMINUM								
Aircraft Grade (6061, 7075)		90 - 150	90 - 150	.010 - .035	.025 - .050	.035 - .100	.050 - .150	.075 - .250
COPPER								
Copper Alloys		75 - 115	60 - 90	.008 - .025	.020 - .040	.025 - .065	.040 - .090	.050 - .200
BRASS, BRONZE								
Brass, Aluminum/Bronze, Low Silicon Bronze		75 - 115	60 - 90	.008 - .025	.020 - .040	.025 - .065	.040 - .090	.050 - .200
COMPOSITE MATERIAL								
Glass Epoxy, Fiberglass, Plastics		60 - 120	60 - 120	.010 - .035	.025 - .050	.035 - .100	.050 - .150	.075 - .250
Graphite, G10, Carbon Fiber		90 - 150	75 - 135	.010 - .035	.025 - .050	.035 - .100	.050 - .150	.075 - .250



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Speeds and Feeds for Drill Mills

Fractional

* Through Hole *

Type	Rc Hardness	SFM (Vc)		CHIPLOAD PER FLUTE (Fz)			
		152M, 152MA 154M, 154MA	152D, 152DA	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 3/4"
TITANIUM ALLOYS							
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		-	125 - 250	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"
STAINLESS STEELS							
13/8, 15/5, 17-4, pH Types	< 35 > 35	- -	100 - 150 80 - 150	.0005" - .0010" .0003" - .0005"	.0008" - .0020" .0005" - .0015"	.0010" - .0030" .0010" - .0020"	.0020" - .0040" .0010" - .0030"
HIGH STRENGTH TOOL STEELS							
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30 30 - 38	-	125 - 175 80 - 120	.0005" - .0010" .0003" - .0005"	.0008" - .0020" .0005" - .0015"	.0010" - .0030" .0010" - .0020"	.0020" - .0040" .0010" - .0030"
MEDIUM ALLOY TOOL STEELS							
200, 250, 300, 8620	< 35 > 35	- -	150 - 200 100 - 150	.0007" - .0015" .0005" - .0010"	.0010" - .0025" .0008" - .0020"	.0015" - .0040" .0010" - .0030"	.0030" - .0050" .0020" - .0040"
CARBON STEELS							
A36, 12L14, 1000's, 1100's, 1300's	< 35 > 35	175 - 250 -	150 - 200 100 - 150	.0007" - .0015" .0005" - .0010"	.0010" - .0025" .0008" - .0020"	.0015" - .0040" .0010" - .0030"	.0030" - .0050" .0020" - .0040"
CAST MATERIAL							
Steel		-	175 - 250	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"
Ductile Iron		-	175 - 250	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"
Gray Iron		-	175 - 250	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"
Aluminum		250 - 350	250 - 350	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"
ALUMINUM							
Aircraft Grade (6061, 7075)		350 - 500	300 - 400	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"
MAGNESIUM							
		250 - 400	250 - 350	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"
COPPER							
Copper Alloys		250 - 350	150 - 300	.0007" - .0015"	.0010" - .0025"	.0015" - .0035"	.0020" - .0050"
BRASS, BRONZE							
Brass, Aluminum/Bronze, Low Silicon Bronze		250 - 350	150 - 300	.0007" - .0015"	.0010" - .0025"	.0015" - .0035"	.0020" - .0050"
COMPOSITE MATERIAL							
Glass Epoxy, Fiberglass, Plastics		250 - 450	200 - 400	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"
Graphite, G10, Carbon Fiber		300 - 500	250 - 450	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0030" - .0060"



NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Speeds and Feeds for Drill Mills

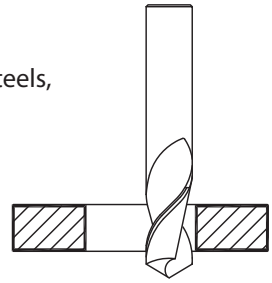
Metric

* Through Hole *

Type	Rc Hardness	SFM (Vc)		CHIPLOAD PER FLUTE (Fz)			
		152M, 152MA 154M, 154MA	152D, 152DA	3.0 - 6.0	6.0 - 10.0	10.0 - 14.0	14.0 - 20.0
TITANIUM ALLOYS							
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		-	35 - 75	.015 - .035	.025 - .065	.035 - .100	.075 - .125
STAINLESS STEELS							
13/8, 15/5, 17-4, pH Types	< 35 > 35	- -	30 - 45 25 - 45	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075
HIGH STRENGTH TOOL STEELS							
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30 30 - 38	- -	35 - 50 25 - 35	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075
MEDIUM ALLOY TOOL STEELS							
200, 250, 300, 8620	< 35 > 35	- -	45 - 60 30 - 45	.015 - .035 .010 - .025	.025 - .065 .020 - .050	.035 - .100 .025 - .075	.075 - .125 .050 - .100
CARBON STEELS							
A36, 12L14, 1000's, 1100's, 1300's	< 35 > 35	55 - 75 -	45 - 60 30 - 45	.015 - .035 .010 - .025	.025 - .065 .020 - .050	.035 - .100 .025 - .075	.075 - .125 .050 - .100
CAST MATERIAL							
Steel		-	50 - 75	.025 - .050	.035 - .075	.050 - .100	.075 - .150
Ductile Iron		-	60 - 90	.025 - .050	.035 - .075	.050 - .100	.075 - .150
Gray Iron		-	50 - 75	.025 - .050	.035 - .075	.050 - .100	.075 - .150
Aluminum		75 - 105	75 - 105	.025 - .050	.035 - .075	.050 - .100	.075 - .150
ALUMINUM							
Aircraft Grade (6061, 7075)		90 - 150	90 - 150	.025 - .050	.035 - .075	.050 - .100	.075 - .150
MAGNESIUM							
		90 - 135	75 - 105	.020 - .040	.025 - .065	.040 - .090	.050 - .125
COPPER							
Copper Alloys		75 - 115	60 - 90	.020 - .040	.025 - .065	.040 - .090	.050 - .125
BRASS, BRONZE							
Brass, Aluminum/Bronze, Low Silicon Bronze		75 - 115	60 - 90	.020 - .040	.025 - .065	.040 - .090	.050 - .125
COMPOSITE MATERIAL							
Glass Epoxy, Fiberglass, Plastics		60 - 120	60 - 120	.025 - .050	.035 - .075	.050 - .100	.075 - .150
Graphite, G10, Carbon Fiber		90 - 150	75 - 135	.025 - .050	.035 - .075	.050 - .100	.075 - .150

DRILL MILL USES:

Through Hole - mostly for composites, plastics, softer steels, copper, aluminum and similar metals.



Drilling through, then side milling

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

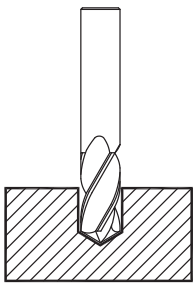
Speeds and Feeds for Drill Mills

Fractional

* Solids *

Type	Rc Hardness	SFM (Vc)	CHIPLOAD PER FLUTE (Fz)			
		152M, 152MA 154M, 154MA	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 3/4"
STAINLESS STEELS						
13/8, 15/5, 17-4, pH Types	< 35	125 - 175	.0003" - .0008"	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"
400 Series	< 35	125 - 175	.0003" - .0008"	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"
HIGH STRENGTH TOOL STEELS						
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30 30 - 38	125 - 200 90 - 125	.0003" - .0008" .0002" - .0004"	.0005" - .0010" .0003" - .0005"	.0008" - .0020" .0005" - .0015"	.0010" - .0030" .0010" - .0020"
MEDIUM ALLOY TOOL STEELS						
200, 250, 300	< 35	150 - 225	.0005" - .0010"	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"
CARBON STEELS						
A36, 1000's, 1100's, 1300's	< 35	150 - 250	.0005" - .0010"	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"
CAST MATERIAL						
Steel		150 - 250	.0007" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"
Aluminum		200 - 350	.0007" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"
ALUMINUM						
Aircraft Grade (6061, 7075)		250 - 400	.0007" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"
MAGNESIUM						
		250 - 400	.0007" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"
COPPER						
Copper Alloys		250 - 350	.0005" - .0010"	.0007" - .0015"	.0010" - .0025"	.0015" - .0035"
BRASS, BRONZE						
Brass, Aluminum/Bronze, Low Silicon Bronze		250 - 350	.0005" - .0010"	.0007" - .0015"	.0010" - .0025"	.0015" - .0035"
COMPOSITE MATERIAL						
Glass Epoxy, Fiberglass, Plastics		250 - 450	.0007" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"
Graphite, G10, Carbon Fiber		300 - 500	.0007" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"





Slotting

DRILL MILL USES:

Solids - primarily for use in composites and plastics.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

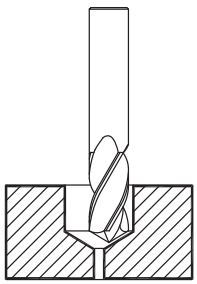
Speeds and Feeds for Drill Mills

Metric

* Solids *

Type	Rc Hardness	SFM (Vc)	CHIPLOAD PER FLUTE (Fz)			
		152M, 152MA 154M, 154MA	3.0 - 6.0	6.0 - 10.0	10.0 - 14.0	14.0 - 20.0
STAINLESS STEELS						
13/8, 15/5, 17-4, pH Types	< 35	45 - 75	.006 - .020	.010 - .025	.020 - .050	.025 - .075
400 Series	< 35	45 - 75	.006 - .020	.010 - .025	.020 - .050	.025 - .075
HIGH STRENGTH TOOL STEELS						
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30 30 - 38	45 - 60 30 - 45	.006 - .020 .003 - .010	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050
MEDIUM ALLOY TOOL STEELS						
200, 250, 300	< 35	55 - 75	.008 - .025	.015 - .035	.025 - .065	.035 - .100
CARBON STEELS						
A36, 1000's, 1100's, 1300's	< 35	55 - 75	.008 - .025	.015 - .035	.025 - .065	.035 - .100
CAST MATERIAL						
Steel		75 - 105	.010 - .035	.025 - .050	.035 - .075	.050 - .100
Aluminum		75 - 105	.010 - .035	.020 - .050	.035 - .075	.050 - .100
ALUMINUM						
Aircraft Grade (6061, 7075)		90 - 150	.010 - .035	.025 - .050	.035 - .075	.050 - .100
MAGNESIUM						
		90 - 135	.008 - .025	.020 - .040	.025 - .065	.040 - .090
COPPER						
Copper Alloys		75 - 115	.008 - .025	.020 - .040	.025 - .065	.040 - .090
BRASS, BRONZE						
Brass, Aluminum/Bronze, Low Silicon Bronze		75 - 115	.008 - .025	.020 - .040	.025 - .065	.040 - .090
COMPOSITE MATERIAL						
Glass Epoxy, Fiberglass, Plastics		60 - 120	.010 - .035	.025 - .050	.035 - .075	.050 - .100
Graphite, G10, Carbon Fiber		90 - 150	.010 - .035	.025 - .050	.035 - .075	.050 - .100





Milling pre-drilled through hole to size

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Drilling Guide

Fractional

Type	Rc Hardness	RECOMMENDED SFM BY SERIES			
		1100, 1120	1200, 1205, 1520, 1600, 1400	1500, 1510, 1300	1800H
COBALT BASE ALLOYS					
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35 > 35	80 - 120 –	100 - 150 80 - 110	100 - 150 80 - 110	- -
NICKEL BASE ALLOYS					
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35 > 35	100 - 125 –	100 - 150 90 - 125	125 - 175 90 - 125	- -
IRON BASE ALLOYS					
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35 > 35	100 - 125 –	100 - 150 90 - 125	125 - 175 90 - 150	- -
MONEL					
Monel - 65% Nickel		-	100 - 150	100 - 150	-
TITANIUM ALLOYS					
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		125 - 175	150 - 200	150 - 200	-
STAINLESS STEELS					
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35 > 35	- -	125 - 175 80 - 125	150 - 200 100 - 150	- -
(Austentic) Inox, 200 Series, 300 Series	< 35 > 35	- -	100 - 175 100 - 125	150 - 200 125 - 150	- -
(Austentic) 304L, 316L, Nitronic 50, Inox	< 35 > 35	- -	80 - 100 60 - 90	90 - 125 80 - 100	- -
(Martensitic) 400 Series	< 35 > 35	- -	100 - 150 80 - 125	125 - 175 100 - 140	- -
HIGH STRENGTH TOOL STEELS					
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35 35 - 50	- -	100 - 175 80 - 130	125 - 175 80 - 130	- -
Thompson Shaft, Armor Plate (Class 1)	> 50	-	-	70 - 90	- -
MEDIUM ALLOY TOOL STEELS					
200, 250, 300, 8620	< 35 > 35	- -	125 - 175 100 - 150	125 - 175 100 - 150	- -
CARBON STEELS					
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35 > 35	- -	125 - 175 100 - 125	150 - 200 100 - 175	- -
CAST MATERIAL					
Steel		150 - 200	125 - 175	–	–
Ductile Iron		200 - 400	125 - 200	150 - 250	–
Gray Iron		175 - 300	100 - 200	150 - 250	–
Aluminum		200 - 400	150 - 250	–	250 - 400
ALUMINUM					
Aircraft Grade (6061, 7075)		-	250 - 350	-	250 - 400
MAGNESIUM					
		-	200 - 300	-	200 - 400
COPPER					
Copper Alloys		-	150 - 250	-	-
BRASS, BRONZE					
Brass, Aluminum/Bronze, Low Silicon Bronze		- -	150 - 300 125 - 200	- -	200 - 400 200 - 400
COMPOSITE MATERIAL					
Glass Epoxy, Fiberglass, Plastics, Graphite, G10		200	150 - 300	150 - 300	-

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Type	Rc Hardness	CHIPLOAD PER FLUTE (Fz)				
		1/16" - 1/8"	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 5/8"
COBALT BASE ALLOYS						
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35	.0004" - .0010"	.0008" - .0020"	.0015" - .0025"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0005" - .0010"	.0010" - .0015"	.0010" - .0020"	.0015" - .0030"
NICKEL BASE ALLOYS						
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	.0005" - .0015"	.0010" - .0015"	.0015" - .0025"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
IRON BASE ALLOYS						
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	.0010" - .0015"	.0010" - .0020"	.0015" - .0035"	.0020" - .0050"	.0030" - .0060"
	> 35	.0008" - .0015"	.0010" - .0020"	.0015" - .0025"	.0020" - .0040"	.0025" - .0050"
MONEL						
Monel - 65% Nickel		.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
TITANIUM ALLOYS						
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		.0008" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0025" - .0050"
STAINLESS STEELS						
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35	.0005" - .0015"	.0010" - .0020"	.0015" - .0035"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
(Austentic) Inox, 200 Series, 300 Series	< 35	.0005" - .0015"	.0010" - .0020"	.0015" - .0035"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
(Austentic) 304L, 316L, Nitronic 50, Inox	< 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
	> 35	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0010" - .0020"	.0015" - .0030"
(Martensitic) 400 Series	< 35	.0005" - .0015"	.0010" - .0020"	.0015" - .0035"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
HIGH STRENGTH TOOL STEELS						
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35	.0005" - .0015"	.0010" - .0020"	.0015" - .0025"	.0015" - .0030"	.0020" - .0040"
	35 - 50	.0004" - .0010"	.0008" - .0020"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"
Thompson Shaft, Armor Plate (Class 1)	> 50	.0003" - .0006"	.0005" - .0010"	.0008" - .0015"	.0010" - .0020"	.0015" - .0030"
MEDIUM ALLOY TOOL STEELS						
200, 250, 300, 8620	< 35	.0010" - .0015"	.0015" - .0025"	.0020" - .0030"	.0020" - .0040"	.0025" - .0050"
	> 35	.0005" - .0010"	.0010" - .0020"	.0010" - .0025"	.0015" - .0030"	.0020" - .0040"
CARBON STEELS						
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	.0010" - .0015"	.0015" - .0025"	.0020" - .0030"	.0020" - .0040"	.0025" - .0050"
	> 35	.0005" - .0010"	.0010" - .0020"	.0010" - .0025"	.0015" - .0035"	.0020" - .0040"
CAST MATERIAL						
Steel		.0008" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0025" - .0050"
Ductile Iron		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
Gray Iron		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
Aluminum		.0010" - .0020"	.0015" - .0040"	.0020" - .0050"	.0030" - .0060"	.0035" - .0070"
ALUMINUM						
Aircraft Grade (6061, 7075)		.0010" - .0020"	.0015" - .0040"	.0020" - .0050"	.0030" - .0060"	.0035" - .0070"
MAGNESIUM						
		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
COPPER						
Copper Alloys		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
BRASS, BRONZE						
Brass, Aluminum/Bronze, Low Silicon Bronze		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
		.0008" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0025" - .0050"
COMPOSITE MATERIAL						
Glass Epoxy, Fiberglass, Plastics, Graphite, G10		.0006" - .0015"	.0008" - .0020"	.0010" - .0025"	.0015" - .0030"	.0020" - .0040"

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Drilling Guide

Metric

Type	Rc Hardness	RECOMMENDED M/Min. BY SERIES			
		1100, 1120	1200, 1205, 1520, 1600, 1400	1500, 1510, 1300	1800H
COBALT BASE ALLOYS					
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35 > 35	25 - 40 -	30 - 45 25 - 35	30 - 45 25 - 35	- -
NICKEL BASE ALLOYS					
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35 > 35	30 - 40 -	30 - 45 25 - 40	40 - 50 25 - 40	- -
IRON BASE ALLOYS					
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35 > 35	30 - 40 -	40 - 50 30 - 40	40 - 50 30 - 45	- -
MONEL					
Monel - 65% Nickel		-	30 - 45	30 - 45	-
TITANIUM ALLOYS					
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		-	45 - 60	45 - 60	-
STAINLESS STEELS					
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35 > 35	-	40 - 50 25 - 40	45 - 60 30 - 45	- -
(Austentic) Inox, 200 Series, 300 Series	< 35 > 35	-	30 - 50 30 - 40	45 - 60 40 - 45	- -
(Austentic) 304L, 316L, Nitronic 50, Inox	< 35 > 35	-	25 - 30 20 - 30	30 - 40 25 - 30	- -
(Martensitic) 400 Series	< 35 > 35	-	30 - 45 25 - 40	40 - 55 30 - 45	- -
HIGH STRENGTH TOOL STEELS					
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35 35 - 50	- -	30 - 55 25 - 40	40 - 55 25 - 40	- -
Thompson Shaft, Armor Plate (Class 1)	> 50	-	-	20 - 30	- -
MEDIUM ALLOY TOOL STEELS					
200, 250, 300, 8620	< 35 > 35	-	40 - 55 30 - 45	40 - 55 30 - 45	- -
CARBON STEELS					
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35 > 35	-	40 - 55 30 - 40	45 - 60 30 - 55	- -
CAST MATERIAL					
Steel		45 - 60	40 - 55	-	-
Ductile Iron		60 - 120	40 - 60	45 - 75	-
Gray Iron		50 - 90	30 - 60	45 - 75	-
Aluminum		60 - 120	45 - 70	-	70 - 120
ALUMINUM					
Aircraft Grade (6061, 7075)		-	75 - 100	-	70 - 120
MAGNESIUM					
		-	60 - 90	-	60 - 120
COPPER					
Copper Alloys		-	45 - 70	-	-
BRASS, BRONZE					
Brass, Aluminum/Bronze, Low Silicon Bronze		- -	45 - 90 40 - 60	- -	60 - 120 60 - 120
COMPOSITE MATERIAL					
Glass Epoxy, Fiberglass, Plastics, Graphite, G10		60	45 - 90	45 - 90	-

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Type	Rc Hardness	CHIPLOAD PER FLUTE (Fz)				
		2.0 - 3.0	3.0 - 6.0	6.0 - 10.0	10.0 - 13.0	13.0 - 16.0
COBALT BASE ALLOYS						
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-4. L-605	< 35	.010 - .025	.020 - .050	.040 - .065	.050 - .100	.065 - .125
	> 35	.010 - .025	.013 - .025	.025 - .040	.025 - .050	.040 - .075
NICKEL BASE ALLOYS						
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	.013 - .040	.025 - .040	.040 - .065	.050 - .100	.065 - .125
	> 35	.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
IRON BASE ALLOYS						
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	.025 - .040	.025 - .050	.040 - .090	.050 - .100	.075 - .150
	> 35	.020 - .040	.025 - .050	.040 - .065	.040 - .075	.065 - .125
MONEL						
Monel - 65% Nickel		.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
TITANIUM ALLOYS						
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		.020 - .040	.025 - .050	.040 - .075	.050 - .100	.065 - .125
STAINLESS STEELS						
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35	.013 - .040	.025 - .050	.040 - .090	.050 - .100	.065 - .125
	> 35	.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
(Austentic) Inox, 200 Series, 300 Series	< 35	.013 - .040	.025 - .050	.040 - .090	.050 - .100	.065 - .125
	> 35	.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
(Austentic) 304L, 316L, Nitronic 50, Inox	< 35	.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
	> 35	.008 - .020	.013 - .025	.025 - .040	.025 - .050	.040 - .075
(Martensitic) 400 Series	< 35	.013 - .040	.025 - .050	.040 - .090	.050 - .100	.065 - .125
	> 35	.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
HIGH STRENGTH TOOL STEELS						
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35	.013 - .040	.025 - .050	.040 - .065	.050 - .100	.075 - .125
	35 - 50	.010 - .025	.020 - .050	.025 - .050	.030 - .075	.040 - .100
Thompson Shaft, Armor Plate (Class 1)	> 50	.008 - .020	.010 - .030	.015 - .040	.020 - .060	.030 - .080
MEDIUM ALLOY TOOL STEELS						
200, 250, 300, 8620	< 35	.025 - .040	.040 - .065	.050 - .075	.050 - .100	.065 - .125
	> 35	.013 - .040	.025 - .050	.025 - .065	.040 - .075	.050 - .100
CARBON STEELS						
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	.025 - .040	.040 - .065	.050 - .075	.050 - .100	.065 - .125
	> 35	.013 - .040	.025 - .050	.025 - .065	.040 - .090	.050 - .100
CAST MATERIAL						
Steel		.020 - .040	.025 - .050	.040 - .075	.050 - .100	.065 - .125
Ductile Iron		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
Gray Iron		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
Aluminum		.025 - .050	.025 - .100	.050 - .125	.075 - .150	.090 - .180
ALUMINUM						
Aircraft Grade (6061, 7075)		.025 - .050	.025 - .100	.050 - .125	.075 - .150	.090 - .180
MAGNESIUM						
		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
COPPER						
Copper Alloys		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
BRASS, BRONZE						
Brass, Aluminum/Bronze, Low Silicon Bronze		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
		.020 - .040	.025 - .050	.040 - .075	.050 - .100	.065 - .125
COMPOSITE MATERIAL						
Glass Epoxy, Fiberglass, Plastics, Graphite, G10		.015 - .040	.020 - .050	.025 - .065	.040 - .075	.050 - .100

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GARR TOOL High Performance Drilling Guide for Mini Drills

Fractional

Type	Rc Hardness	Recommended SFM	CHIPLOAD PER FLUTE (Fz)		
		Series 1250H 1550H 1850H	1/32" - 0.99mm (.0312" - .0390")	1.00mm - 2.00mm (.0394" - .0787")	2.01mm - 1/8" (.0791" - .1250")
COBALT BASE ALLOYS					
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35 > 35	100 - 150 80 - 110	.0002" - .0004" .0002" - .0004"	.0004" - .0008" .0003" - .0006"	.0006" - .0012" .0005" - .0010"
NICKEL BASE ALLOYS					
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35 > 35	125 - 150 100 - 125	.0003" - .0005" .0002" - .0004"	.0004" - .0008" .0003" - .0006"	.0006" - .0012" .0005" - .0010"
IRON BASE ALLOYS					
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35 > 35	125 - 175 80 - 100	.0004" - .0008" .0003" - .0006"	.0006" - .0012" .0004" - .0008"	.0008" - .0015" .0006" - .0012"
MONEL					
Monel - 65% Nickel		75 - 125	.0002" - .0004"	.0003" - .0006"	.0005" - .0010"
TITANIUM ALLOYS					
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		150 - 200	.0003" - .0006"	.0004" - .0008"	.0006" - .0012"
STAINLESS STEELS					
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35 > 35	125 - 175 80 - 125	.0003" - .0005" .0002" - .0004"	.0004" - .0008" .0003" - .0006"	.0006" - .0012" .0005" - .0010"
(Austentic) Inox, 200 Series, 300 Series	< 35 > 35	100 - 175 80 - 125	.0003" - .0005" .0002" - .0004"	.0004" - .0008" .0003" - .0006"	.0006" - .0012" .0005" - .0010"
(Austentic) 304L, 316L, Nitronic 50, Inox	< 35 > 35	80 - 100 60 - 90	.0003" - .0005" .0002" - .0004"	.0004" - .0008" .0003" - .0006"	.0006" - .0012" .0005" - .0010"
(Martensitic) 400 Series	< 35 > 35	100 - 150 80 - 125	.0003" - .0005" .0002" - .0004"	.0004" - .0008" .0003" - .0006"	.0006" - .0012" .0005" - .0010"
HIGH STRENGTH TOOL STEELS					
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35 35-48 > 48	100 - 175 80 - 130 60 - 80	.0003" - .0006" .0002" - .0005" .0002" - .0004"	.0004" - .0008" .0003" - .0008" .0003" - .0006"	.0006" - .0012" .0006" - .0012" .0005" - .0010"
MEDIUM ALLOY TOOL STEELS					
200, 250, 300, 8620	< 35 > 35	125 - 175 80 - 125	.0004" - .0008" .0003" - .0005"	.0006" - .0012" .0004" - .0008"	.0008" - .0015" .0006" - .0012"
CARBON STEELS					
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35 > 35	125 - 175 80 - 125	.0004" - .0008" .0003" - .0005"	.0006" - .0012" .0004" - .0008"	.0008" - .0015" .0006" - .0012"
CAST MATERIAL					
Steel		100 - 175	.0003" - .0006"	.0004" - .0008"	.0006" - .0012"
Ductile Iron		100 - 200	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
Gray Iron		80 - 175	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
Aluminum		100 - 250	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
ALUMINUM					
2014, 2024, 6061-(T1-T6), 7075, Extruded		125 - 300	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
MAGNESIUM					
		125 - 250	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
COPPER					
Copper Alloys		125 - 250	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
BRASS					
Short Chips Long Chips		125 - 250 100 - 200	.0004" - .0008" .0003" - .0005"	.0006" - .0012" .0004" - .0008"	.0008" - .0015" .0006" - .0012"
BRONZE					
Short Chips Long Chips		100 - 250 80 - 175	.0004" - .0008" .0003" - .0006"	.0006" - .0012" .0004" - .0008"	.0008" - .0015" .0006" - .0012"

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GARR TOOL High Performance Drilling Guide for Mini Drills

Metric

Type	Rc Hardness	Recommended M/Min. Series 1250H 1550H 1850H	CHIPLOAD PER FLUTE (Fz) 1/32" - 0.99mm (.0312" - .0390")	1.00mm - 2.00mm (.0394" - .0787")	2.01mm - 1/8" (.0791" - .1250")
COBALT BASE ALLOYS					
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35 > 35	30 - 45 25 - 35	.005 - .010 .005 - .010	.010 - .020 .008 - .015	.015 - .030 .013 - .025
NICKEL BASE ALLOYS					
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35 > 35	40 - 45 30 - 40	.008 - .013 .005 - .010	.010 - .020 .008 - .015	.015 - .030 .013 - .025
IRON BASE ALLOYS					
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35 > 35	40 - 50 25 - 30	.010 - .020 .008 - .015	.015 - .030 .010 - .020	.020 - .038 .015 - .030
MONEL					
Monel - 65% Nickel		20 - 40	.005 - .010	.008 - .015	.013 - .025
TITANIUM ALLOYS					
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		45 - 60	.008 - .015	.010 - .020	.015 - .030
STAINLESS STEELS					
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35 > 35	40 - 50 25 - 40	.008 - .013 .005 - .010	.010 - .020 .008 - .015	.015 - .030 .013 - .025
(Austentic) Inox, 200 Series, 300 Series	< 35 > 35	30 - 50 25 - 40	.008 - .013 .005 - .010	.010 - .020 .008 - .015	.015 - .030 .013 - .025
(Austentic) 304L, 316L, Nitronic 50, Inox	< 35 > 35	25 - 30 20 - 25	.008 - .013 .005 - .010	.010 - .020 .008 - .015	.015 - .030 .013 - .025
(Martensitic) 400 Series	< 35 > 35	30 - 45 25 - 40	.008 - .013 .005 - .010	.010 - .020 .008 - .015	.015 - .030 .013 - .025
HIGH STRENGTH TOOL STEELS					
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35 35-48 > 48	30 - 50 25 - 40 20 - 25	.008 - .015 .005 - .013 .005 - .010	.010 - .020 .008 - .020 .008 - .015	.015 - .030 .015 - .030 .013 - .025
MEDIUM ALLOY TOOL STEELS					
200, 250, 300, 8620	< 35 > 35	40 - 50 25 - 40	.010 - .020 .008 - .013	.015 - .030 .010 - .020	.020 - .038 .015 - .030
CARBON STEELS					
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35 > 35	40 - 50 25 - 40	.010 - .020 .008 - .013	.015 - .030 .010 - .020	.020 - .038 .015 - .030
CAST MATERIAL					
Steel		30 - 50	.008 - .015	.010 - .020	.015 - .030
Ductile Iron		30 - 60	.010 - .020	.015 - .030	.020 - .038
Gray Iron		25 - 50	.010 - .020	.015 - .030	.020 - .038
Aluminum		30 - 75	.010 - .020	.015 - .030	.020 - .038
ALUMINUM					
2014, 2024, 6061-(T1-T6), 7075, Extruded		40 - 90	.010 - .020	.015 - .030	.020 - .038
MAGNESIUM					
		40 - 75	.010 - .020	.015 - .030	.020 - .038
COPPER					
Copper Alloys		40 - 75	.010 - .020	.015 - .030	.020 - .038
BRASS					
Short Chips Long Chips		40 - 75 30 - 60	.010 - .020 .008 - .013	.015 - .030 .010 - .020	.020 - .038 .015 - .030
BRONZE					
Short Chips Long Chips		30 - 75 25 - 50	.010 - .020 .008 - .015	.015 - .030 .010 - .020	.020 - .038 .015 - .030

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Drilling Guide

Fractional

Type	Rc Hardness	Recommended SFM		CHIPLOAD PER FLUTE (Fz)				
		NON-COOLANT	*COOLANT FED*					
		1580H 1280H 1580HD	1580KH 1280KH 1880KH 1580KD 1280KD	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 5/8"	5/8" - 3/4"
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes	< 35	185	225	.0010" - .0020"	.0020" - .0030"	.0025" - .0035"	.0030" - .0040"	.0035" - .0055"
25/188, X-40, L-605	> 35	125	180	.0005" - .0015"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0030" - .0045"
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy,	< 35	125	200	.0010" - .0020"	.0020" - .0030"	.0025" - .0035"	.0030" - .0040"	.0035" - .0055"
Rene, Hastalloy, A286	> 35	90	160	.0005" - .0015"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0030" - .0045"
IRON BASE ALLOYS								
Incoloy 800-802, Multimet N-155,	< 35	175	250	.0015" - .0025"	.0025" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0055"
Timkin 16-25-6, Carpenter 22-b3	> 35	125	200	.0005" - .0015"	.0015" - .0025"	.0025" - .0030"	.0030" - .0035"	.0030" - .0045"
MONEL								
Monel - 65% Nickel		150	225	.0010" - .0020"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0055"
TITANIUM ALLOYS								
Commercially Pure, 6Al-4V,		225	300	.0010" - .0020"	.0020" - .0030"	.0025" - .0035"	.0030" - .0040"	.0035" - .0055"
Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si								
STAINLESS STEELS								
(Precipitation)	< 35	225	300	.0015" - .0025"	.0025" - .0030"	.0030" - .0035"	.0035" - .0045"	.0040" - .0055"
13/8, 15/5, 17-4, pH Types	> 35	175	240	.0005" - .0015"	.0015" - .0025"	.0025" - .0030"	.0030" - .0035"	.0035" - .0045"
(Austentic)	< 35	225	300	.0015" - .0025"	.0025" - .0030"	.0030" - .0035"	.0035" - .0045"	.0040" - .0055"
Inox, 200 Series, 300 Series	> 35	175	225	.0010" - .0015"	.0015" - .0020"	.0020" - .0025"	.0025" - .0035"	.0035" - .0045"
(Austentic)	< 35	125	175	.0010" - .0015"	.0015" - .0020"	.0020" - .0030"	.0030" - .0040"	.0025" - .0040"
304L, 316L, Nitronic 50, Inox	> 35	80	100	.0003" - .0010"	.0010" - .0015"	.0015" - .0025"	.0025" - .0035"	.0020" - .0040"
(Martensitic)	< 35	225	300	.0015" - .0025"	.0025" - .0030"	.0030" - .0035"	.0035" - .0045"	.0040" - .0055"
400 Series	> 35	175	240	.0005" - .0015"	.0015" - .0025"	.0025" - .0030"	.0030" - .0035"	.0035" - .0045"
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2,	< 35	200	300	.0015" - .0025"	.0025" - .0030"	.0030" - .0035"	.0035" - .0045"	.0045" - .0055"
P20, H11, H13, S2, O1	> 35	175	240	.0005" - .0015"	.0015" - .0025"	.0025" - .0030"	.0030" - .0035"	.0035" - .0045"
MEDIUM ALLOY TOOL STEELS								
200, 250, 300, 8620	< 35	200	300	.0015" - .0025"	.0025" - .0030"	.0030" - .0035"	.0035" - .0045"	.0045" - .0065"
	> 35	175	240	.0005" - .0015"	.0015" - .0025"	.0025" - .0030"	.0030" - .0035"	.0035" - .0045"
CARBON STEELS								
Platinum, A36, 12L14,	< 35	200	300	.0015" - .0025"	.0025" - .0030"	.0030" - .0035"	.0035" - .0045"	.0045" - .0065"
1000's, 1100's, 1300's	> 35	175	240	.0005" - .0015"	.0015" - .0025"	.0025" - .0030"	.0030" - .0035"	.0035" - .0045"
CAST MATERIAL								
Steel		200	300	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	.0045" - .0055"	.0065" - .0075"
Ductile Iron		250	350	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	.0045" - .0055"	.0065" - .0075"
Gray Iron		250	400	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	.0045" - .0055"	.0065" - .0075"
ALUMINUM								
2014, 2024, 6061-(T1-T6), 7075		300 - 400	300 - 500	.0035" - .0045"	.0045" - .0055"	.0065" - .0075"	.0085" - .0095"	.0085" - .0095"
Die Cast, Extruded		250 - 300	300 - 400	.0025" - .0035"	.0035" - .0045"	.0055" - .0065"	.0075" - .0085"	.0075" - .0085"
MAGNESIUM								
		300	400	.0035" - .0045"	.0045" - .0055"	.0065" - .0075"	.0085" - .0095"	.0085" - .0095"
COPPER								
Copper Alloys		300	400	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	.0045" - .0055"	.0065" - .0075"
BRASS								
Short Chips		300	400	.0035" - .0045"	.0045" - .0055"	.0065" - .0075"	.0085" - .0095"	.0085" - .0095"
Long Chips		200	300	.0025" - .0035"	.0035" - .0045"	.0055" - .0065"	.0075" - .0085"	.0075" - .0085"
BRONZE								
Short Chips		200	300	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	.0055" - .0065"	.0075" - .0085"
Long Chips		150	250	.0015" - .0025"	.0025" - .0035"	.0025" - .0035"	.0045" - .0055"	.0065" - .0075"

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL High Performance Drilling Guide

Metric

Type	Rc Hardness	Recommended M/Min.		CHIPLOAD PER FLUTE (Fz)				
		NON-COOLANT	*COOLANT FED*					
		1580H 1280H 1580HD	1580KH 1280KH 1880KH 1580KD 1280KD	3.0 - 6.0	6.0 - 10.0	10.0 - 13.0	13.0 - 16.0	16.0 - 20.0
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes	< 35	60	70	.035 - .060	.060 - .085	.075 - .100	.085 - .110	.095 - .130
25/188, X-40, L-605	> 35	40	55	.025 - .050	.050 - .075	.060 - .085	.075 - .100	.095 - .110
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy,	< 35	40	60	.035 - .060	.060 - .085	.075 - .100	.085 - .125	.085 - .110
Rene, Hastalloy, A286	> 35	20	45	.025 - .050	.050 - .075	.060 - .085	.075 - .100	.085 - .100
IRON BASE ALLOYS								
Incoloy 800-802, Multimet N-155,	< 35	50	75	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.110 - .140
Timkin 16-25-6, Carpenter 22-b3	> 35	40	60	.025 - .050	.050 - .075	.075 - .085	.085 - .100	.095 - .110
MONEL								
Monel - 65% Nickel		45	70	.035 - .060	.050 - .075	.060 - .085	.075 - .100	.085 - .120
TITANIUM ALLOYS								
Commercially Pure, 6Al-4V,		70	90	.035 - .060	.060 - .085	.075 - .100	.085 - .110	.095 - .130
Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si								
STAINLESS STEELS								
(Precipitation)	< 35	70	90	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.100 - .140
13/8, 15/5, 17-4, pH Types	> 35	50	70	.025 - .050	.050 - .075	.075 - .085	.085 - .100	.085 - .110
(Austentic)	< 35	70	90	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.100 - .140
Inox, 200 Series, 300 Series	> 35	50	70	.035 - .050	.050 - .060	.060 - .075	.075 - .100	.075 - .110
(Austentic)	< 35	40	55	.035 - .050	.050 - .060	.060 - .085	.085 - .110	.075 - .110
304L, 316L, Nitronic 50, Inox	> 35	20	30	.025 - .035	.035 - .050	.050 - .075	.075 - .100	.075 - .110
(Martensitic)	< 35	70	90	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.100 - .130
400 Series	> 35	50	70	.025 - .050	.050 - .075	.075 - .085	.085 - .100	.085 - .110
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2,	< 35	60	90	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.100 - .130
P20, H11, H13, S2, O1	> 35	50	70	.025 - .050	.050 - .075	.075 - .085	.085 - .100	.085 - .100
MEDIUM ALLOY TOOL STEELS								
200, 250, 300, 8620	< 35	60	90	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.100 - .140
	> 35	50	70	.025 - .050	.050 - .075	.075 - .085	.085 - .100	.085 - .110
CARBON STEELS								
Platinum, A36, 12L14,	< 35	60	90	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.100 - .140
1000's, 1100's, 1300's	> 35	50	70	.025 - .050	.050 - .075	.075 - .085	.085 - .100	.085 - .120
CAST MATERIAL								
Steel		60	90	.060 - .090	.100 - .125	.100 - .125	.125 - .150	.175 - .200
Ductile Iron		75	100	.060 - .090	.100 - .125	.100 - .125	.125 - .150	.175 - .200
Gray Iron		75	120	.060 - .090	.100 - .125	.100 - .125	.125 - .150	.175 - .200
ALUMINUM								
2014, 2024, 6061-(T1-T6), 7075		90 - 120	90 - 150	.090 - .120	.125 - .150	.175 - .200	.225 - .250	.225 - .250
Die Cast, Extruded		75 - 90	90 - 120	.060 - .100	.100 - .120	.150 - .175	.200 - .225	.200 - .225
MAGNESIUM								
		90	120	.080 - .120	.125 - .150	.175 - .200	.225 - .250	.225 - .250
COPPER								
Copper Alloys		90	120	.060 - .100	.100 - .125	.100 - .125	.125 - .150	.175 - .200
BRASS								
Short Chips		90	120	.080 - .120	.125 - .150	.175 - .200	.225 - .250	.225 - .250
Long Chips		60	90	.060 - .090	.100 - .125	.150 - .175	.200 - .225	.200 - .225
BRONZE								
Short Chips		60	90	.060 - .100	.100 - .125	.100 - .125	.150 - .175	.200 - .225
Long Chips		45	70	.040 - .060	.060 - .085	.075 - .100	.125 - .150	.175 - .200

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Application Guide for Aluminum Series 3-Flute Drills

Fractional

CHIPLOAD PER FLUTE (Fz)								
Material	Type	SFM	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"
Aluminum Alloy	6061	450 - 650	.0020" - .0040"	.0025" - .0050"	.0035" - .0060"	.0045" - .0070"	.0055" - .0080"	.0065" - .0100"
Cast Aluminum	380	300 - 500	.0015" - .0030"	.0020" - .0040"	.0030" - .0050"	.0030" - .0060"	.0035" - .0070"	.0040" - .0080"
Magnesium		250 - 500	.0015" - .0030"	.0020" - .0040"	.0030" - .0050"	.0030" - .0060"	.0035" - .0070"	.0040" - .0080"
Copper & Brass		250 - 400	.0010" - .0025"	.0020" - .0030"	.0020" - .0030"	.0020" - .0040"	.0030" - .0050"	.0030" - .0060"
Titanium	6Al-4V	100 - 300	.0010" - .0020"	.0020" - .0030"	.0020" - .0030"	.0020" - .0040"	.0030" - .0050"	.0030" - .0060"

Metric

CHIPLOAD PER FLUTE (Fz)								
Material	Type	M/Min.	4.0	6.0	8.0	10.0	12.0	16.0
Aluminum Alloy	6061	140 - 200	.050 - .100	.065 - .125	.090 - .150	.115 - .175	.150 - .200	.165 - .250
Cast Aluminum	380	90 - 150	.038 - .075	.050 - .100	.075 - .125	.075 - .150	.090 - .175	.100 - .200
Magnesium		75 - 150	.038 - .075	.050 - .100	.075 - .125	.075 - .150	.090 - .175	.100 - .200
Copper & Brass		75 - 120	.025 - .060	.050 - .075	.050 - .075	.050 - .100	.075 - .125	.075 - .150
Titanium	6Al-4V	30 - 90	.025 - .050	.050 - .075	.050 - .075	.050 - .100	.075 - .125	.075 - .150

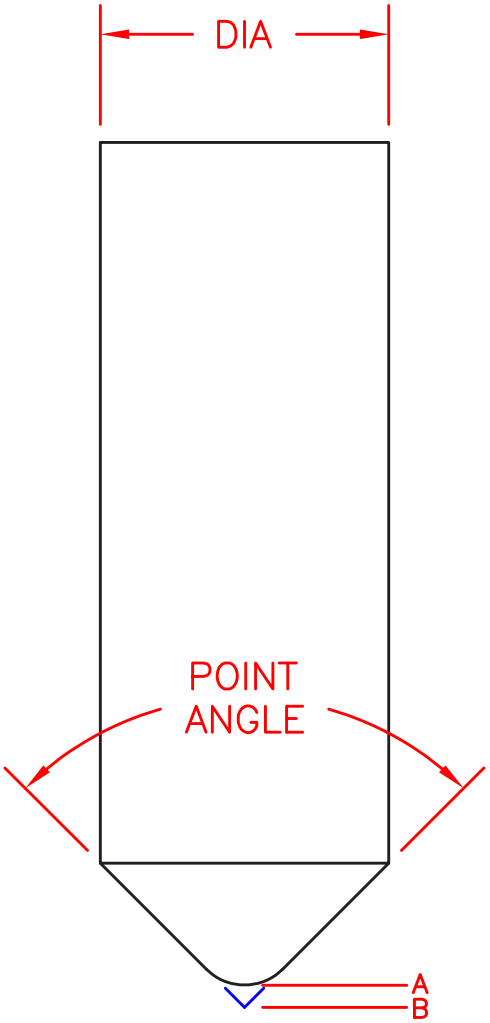


NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

Length Deviation Chart for Spotting Drills

DIAMETER		DRILL POINT ANGLE			
		82°	90°	120°	140°
2mm	.0787	.003	.002	.001	.001
3/32"	.0938	.003	.003	.002	.001
3mm	.1181	.004	.004	.002	.001
1/8"	.1250	.004	.004	.002	.001
4mm	.1575	.005	.005	.003	.002
3/16"	.1875	.006	.006	.003	.002
5mm	.1969	.007	.006	.003	.002
6mm	.2362	.008	.007	.004	.003
1/4"	.2500	.009	.008	.004	.003
5/16"	.3125	.011	.009	.005	.003
8mm	.3150	.011	.009	.005	.003
3/8"	.3750	.013	.011	.006	.004
10mm	.3937	.014	.012	.007	.004
7/16"	.4375	.015	.013	.008	.005
12mm	.4724	.016	.014	.008	.005
1/2"	.5000	.017	.015	.009	.005
14mm	.5512	.019	.017	.010	.006
9/16"	.5625	.019	.017	.010	.006
5/8"	.6250	.022	.019	.011	.007
16mm	.6299	.022	.019	.011	.007
18mm	.7087	.024	.021	.012	.008
3/4"	.7500	.026	.023	.013	.008
20mm	.7874	.027	.024	.014	.009

Garr Tool series 1600 spotting drills are not only useful for starting holes, but also for leaving the desired chamfer when programmed to the correct depth. Because spotting drills do not come to a true point, but have a small "flat" as shown in the figure to the right, the length deviation from the chart above must be taken into account to leave the correct chamfer length. This chart gives the distance from the theoretical drill point 'B' to the actual drill point 'A'. These values can be used to compensate for the "flat" on our spotting drills in your calculations.



Hardness Conversion Chart

ROCKWELL HARDNESS (HRb)	ROCKWELL HARDNESS (HRc)	BRINELL HARDNESS (HB)	VICKERS HARDNESS (HV)	TENSILE STRENGTH (N/mm^2)	PSI ($1000\ lb/in^2$)
67	-	116	122	401	58
70	-	121	127	432	63
73	-	126	132	448	65
75	-	131	137	455	66
77	-	137	143	463	67
80	-	143	150	479	69
82	-	149	156	494	72
84	-	156	163	525	76
86	-	163	171	540	78
89	-	170	178	556	81
91	-	179	188	602	88
93	-	187	196	632	92
96	-	197	212	664	97
97	-	207	218	695	101
98	-	212	222	710	103
-	20	217	228	741	107
-	21	223	234	756	110
-	22	229	241	772	112
-	23	235	247	787	114
-	24	241	255	818	118
-	25	248	261	849	123
-	27	255	269	865	125
-	28	262	275	895	130
-	29	269	284	911	132
-	30	277	292	942	136
-	31	285	300	973	141
-	32	293	308	988	143
-	33	302	318	1019	147
-	34	311	327	1050	152
-	35	321	337	1096	159
-	37	331	349	1127	163
-	38	341	359	1158	168
-	39	352	370	1189	172
-	40	363	381	1235	179
-	41	375	395	1266	183
-	42	388	408	1312	190
-	44	401	422	1359	197
-	45	415	437	1420	206
-	46	429	452	1467	212
-	48	444	470	1513	219
-	50	461	497	1559	226
-	51	477	517	1621	235
-	52	495	532	1668	241
-	54	543	572	1729	250
-	56	514	609	1807	262
-	57	555	630	1884	273
-	59	578	670	1961	284
-	60	601	698	2039	295
-	61	-	720	-	-
-	62	-	746	-	-
-	63	-	772	-	-
-	64	-	800	-	-
-	65	-	832	-	-
-	66	-	865	-	-
-	67	-	900	-	-
-	68	-	940	-	-

Conversions from each scale are approximate

Decimal Equivalent Chart

Diameter	Decimal Equiv.
#80	.0135
0.35mm	.0138
#79	.0145
1/64"	.0156
0.40mm	.0158
#78	.0160
0.45mm	.0177
#77	.0180
0.50mm	.0197
#76	.0200
#75	.0210
0.55mm	.0217
#74	.0225
0.60mm	.0236
#73	.0240
#72	.0250
0.65mm	.0256
#71	.0260
0.70mm	.0276
#70	.0280
#69	.0292
0.75mm	.0295
#68	.0310
1/32"	.0312
0.80mm	.0315
#67	.0320
#66	.0330
0.85mm	.0335
#65	.0350
0.90mm	.0354
#64	.0360
#63	.0370
0.95mm	.0374
#62	.0380
#61	.0390
1.00mm	.0394
#60	.0400
#59	.0410
1.05mm	.0413
#58	.0420
#57	.0430
1.10mm	.0433
1.15mm	.0453
#56	.0465
3/64"	.0469
1.20mm	.0472
1.25mm	.0492
1.30mm	.0512
#55	.0520
1.35mm	.0531
#54	.0550
1.40mm	.0551
1.45mm	.0571
1.50mm	.0591
#53	.0595
1.55mm	.0610
1/16"	.0625
1.60mm	.0630
#52	.0635
1.65mm	.0650
1.70mm	.0669
#51	.0670
1.75mm	.0689
#50	.0700
1.80mm	.0709
1.85mm	.0728

Diameter	Decimal Equiv.
#49	.0730
1.90mm	.0748
#48	.0760
1.95mm	.0768
5/64"	.0781
#47	.0785
2.00mm	.0787
2.05mm	.0807
#46	.0810
#45	.0820
2.10mm	.0827
2.15mm	.0846
#44	.0860
2.20mm	.0866
2.25mm	.0886
#43	.0890
2.30mm	.0906
2.35mm	.0925
#42	.0935
3/32"	.0938
2.40mm	.0945
#41	.0960
2.45mm	.0965
#40	.0980
2.50mm	.0984
#39	.0995
#38	.1015
2.60mm	.1024
#37	.1040
2.70mm	.1063
#36	.1065
2.75mm	.1083
7/64"	.1094
#35	.1100
2.80mm	.1102
#34	.1110
#33	.1130
2.90mm	.1142
#32	.1160
3.00mm	.1181
#31	.1200
3.10mm	.1220
1/8"	.1250
3.20mm	.1260
3.25mm	.1280
#30	.1285
3.30mm	.1299
3.40mm	.1339
#29	.1360
3.50mm	.1378
#28	.1405
9/64"	.1406
3.60mm	.1417
#27	.1440
3.70mm	.1457
#26	.1470
3.75mm	.1476
#25	.1495
3.80mm	.1496
#24	.1520
3.90mm	.1535
#23	.1540
5/32"	.1562
#22	.1570
4.00mm	.1575
#21	.1590
#20	.1610

Diameter	Decimal Equiv.
4.10mm	.1614
4.20mm	.1654
#19	.1660
4.25mm	.1673
4.30mm	.1693
#18	.1695
11/64"	.1719
#17	.1730
4.40mm	.1732
#16	.1770
4.50mm	.1772
#15	.1800
4.60mm	.1811
#14	.1820
#13	.1850
4.70mm	.1850
4.75mm	.1870
3/16"	.1875
4.80mm	.1890
#12	.1890
#11	.1910
4.90mm	.1929
#10	.1935
#9	.1960
5.00mm	.1969
#8	.1990
5.10mm	.2008
#7	.2010
13/64"	.2031
#6	.2040
5.20mm	.2047
#5	.2055
5.25mm	.2067
5.30mm	.2087
#4	.2090
5.40mm	.2126
#3	.2130
5.50mm	.2165
7/32"	.2188
5.60mm	.2205
#2	.2210
5.70mm	.2244
5.75mm	.2264
#1	.2280
5.80mm	.2283
5.90mm	.2323
A	.2340
15/64"	.2344
6.00mm	.2362
B	.2380
6.10mm	.2402
C	.2420
6.20mm	.2441
D	.2460
6.25mm	.2461
6.30mm	.2480
1/4"	.2500
E	.2500
6.40mm	.2520
6.50mm	.2559
F	.2570
6.60mm	.2598
G	.2610
6.70mm	.2638
17/64"	.2656
6.75mm	.2657
H	.2660

Diameter	Decimal Equiv.
6.80mm	.2677
6.90mm	.2717
I	.2720
7.00mm	.2756
J	.2770
7.10mm	.2795
K	.2810
9/32"	.2812
7.20mm	.2835
7.25mm	.2854
7.30mm	.2874
L	.2900
7.40mm	.2913
M	.2950
7.50mm	.2953
19/64"	.2969
7.60mm	.2992
N	.3020
7.70mm	.3031
7.75mm	.3051
7.80mm	.3071
7.90mm	.3110
5/16"	.3125
8.00mm	.3150
O	.3160
8.10mm	.3189
8.20mm	.3228
P	.3230
8.25mm	.3248
8.30mm	.3268
21/64"	.3281
8.40mm	.3307
Q	.3320
8.50mm	.3346
8.60mm	.3386
R	.3390
8.70mm	.3425
11/32"	.3438
8.75mm	.3445
8.80mm	.3465
S	.3480
8.90mm	.3504
9.00mm	.3543
T	.3580
9.10mm	.3583
23/64"	.3594
9.20mm	.3622
9.25mm	.3642
9.30mm	.3661
U	.3680
9.40mm	.3701
9.50mm	.3740
3/8"	.3750
V	.3770
9.60mm	.3780
9.70mm	.3819
9.75mm	.3839
9.80mm	.3858
W	.3860
9.90mm	.3898
25/64"	.3906
10.00mm	.3937
X	.3970
Y	.4040
13/32"	.4062
Z	.4130
10.50mm	.4134

Diameter	Decimal Equiv.
27/64"	.4219
11.00mm	.4331
7/16"	.4375
11.50mm	.4528
29/64"	.4531
15/32"	.4688
12.00mm	.4724
31/64"	.4844
12.50mm	.4921
1/2"	.5000
13.00mm	.5118
33/64"	.5156
17/32"	.5312
13.50mm	.5315
35/64"	.5469
14.00mm	.5512
9/16"	.5625
14.50mm	.5709
37/64"	.5781
15.00mm	.5906
19/32"	.5938
39/64"	.6094
15.50mm	.6102
5/8"	.6250
16.00mm	.6299
41/64"	.6406
16.50mm	.6496
21/32"	.6562
17.00mm	.6693
43/64"	.6719
11/16"	.6875
17.50mm	.6890
45/64"	.7031
18.00mm	.7087
23/32"	.7188
18.50mm	.7283
47/64"	.7344
19.00mm	.7480
3/4"	.7500
49/64"	.7656
19.50mm	.7677
25/32"	.7812
20.00mm	.7874
51/64"	.7969
20.50mm	.8071
13/16"	.8125
21.00mm	.8268
53/64"	.8281
27/32"	.8438
21.50mm	.8465
55/64"	.8594
22.00mm	.8661
7/8"	.8750
22.50mm	.8858
57/64"	.8906
23.00mm	.9055
29/32"	.9062
59/64"	.9219
23.50mm	.9252
15/16"	.9375
24.00mm	.9449
61/64"	.9531
24.50mm	.9646
31/32"	.9688
25.00mm	.9843
63/64"	.9844
1"	1.0000

Standards
Every GARR carbide cutting tool is manufactured from premium submicron grain carbide, unless otherwise noted.

Each of our styles of end mills is center cutting, unless otherwise noted.

Altered Standards - 48 Hour Delivery
Many special tooling needs can be satisfied by adding a flat, a corner radius, or by making a minor diameter change to one of our standard tools. Garr Tool Company will ship altered standards within 48 hours. Contact us for pricing.

GARR TOOL cannot be responsible for tools altered by other parties.

Solid Carbide Specials - 2 Week Delivery
Blueprint and non-blueprint specials will be quoted within 24 hours. Uncoated tooling made from stock material will be manufactured to your specifications within two weeks.

Solid carbide cutting tools which are 1" or less in diameter and up to 12" in length can be produced from premium submicron grain carbide in the time it takes most manufacturers to quote and order material.

Garr Tool Company can take care of your special round tooling needs. We deliver!

Reconditioning Service
With our state-of-the-art reconditioning department, you can expect quality reground tools at competitive prices. Let us be your 'local' source for regrinding.

Check Us Out
Our web site, *www.garrtool.com*, enhances the level of customer service you have come to expect from us. Increase the speed and accuracy of special pricing requests by e-mailing prints for quote to *sales@garrtool.com*.

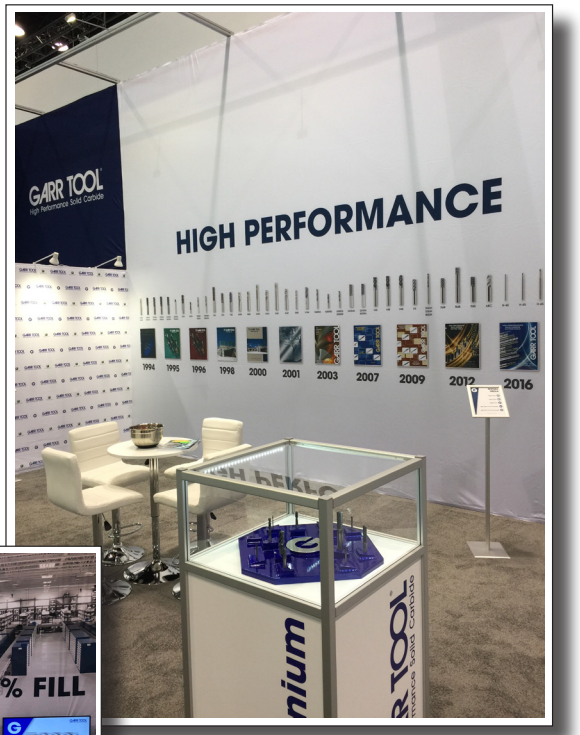
A collection of 'fill-in-the-blank' prints is available for download from our website to aid in quoting of specials.

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GARR TOOL®

7800 N Alger Road
Alma, Michigan 48801
800-248-9003
989-463-6171
Fax 989-463-3609

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