GARR TOOL®

High Performance Solid Carbide

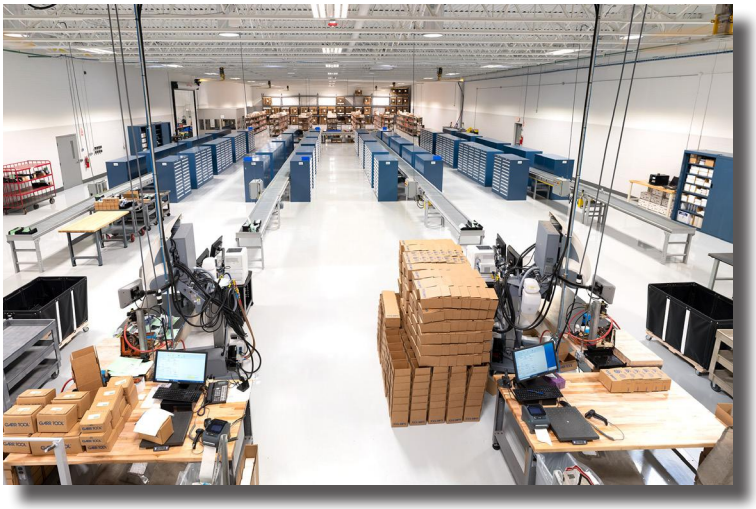
2024

GARR TOOL sets the standard when it comes to high performance tooling. From its beginning in a garage in 1944, GARR TOOL grew quickly due to its quality products and friendly, reliable service. For eighty years in the cutting tool industry, Garr Tool Company has maintained 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 facility of over 200,000 square feet contains clean, efficient production space. An ISO 9001:2015-certified company, GARR TOOL produces thousands of tools per day on our state-of-the-art CNC grinding equipment, run by experienced, conscientious operators. Our select distributors can be found in 35 countries, and end-users worldwide trust and take pride in products that come from GARR TOOL. Our quality tools ensure that individuals in industries such as aerospace, oil and gas, automotive, medical, mold-making, and mining can work efficiently, quickly, and as safely as possible. Garr Tool Company will continue to invest in new technology to meet the future needs of our customers. Adding to our efficiency and service, Oerlikon Balzers Coating USA manages our in-house coating facility.

With a continued focus on maintaining fast, reliable service, we operate an inventory and shipping center in England to better service our customers in the UK and throughout Europe. Quality carbide tooling backed by our ingenuity, integrity, sincerity, work ethic, and personal values is paramount at Garr Tool Company. It's why you can trust GARR TOOL each and every time. We are well-known for having a large inventory in stock, allowing standard catalog items to be shipped 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. To see our selection of tooling, or to learn more about GARR TOOL, we encourage you to visit our website, www.garrtool.com.

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



HTD 12 Series Page 17

New series for High Performance drilling

A3 Series Page 118

Built for High Efficiency Milling
on high RPM machines

V4 Series Page 141

Expanded line of our popular V4 Series

NEW

GARR Technical Advisor

Features ease of use, including an extensive material list and setup versatility

Uses a dynamic function based on spindle interface, toolholding, stability of workpiece and *most importantly*, specific material condition

Adaptability of the GARR Technical Advisor is beneficial when setup factors are sub-optimal

CHECK IT OUT ON OUR WEBSITE

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	30° Helix	BALIQ® ALTINOS Coated (AlTiN-Based)	25
	1580HD	2 Flute	3xD	30° Helix	BALIQ® ALTINOS Coated (AlTiN-Based)	31
	1580H	2 Flute	3xD	30° Helix	BALIQ® ALTINOS Coated (AlTiN-Based)	34
NEW SIZES	1580KD	2 Flute	3xD	30° Helix	Coolant Fed, BALIQ® ALTINOS Coated (AlTiN-Based)	39
	1580KH	2 Flute	3xD	30° Helix	Coolant Fed, BALIQ® ALTINOS Coated (AlTiN-Based)	49
	1250H	2 Flute	5xD	30° Helix	BALIQ® ALTINOS Coated (AlTiN-Based)	25
	1280H	2 Flute	5xD	30° Helix	BALIQ® ALTINOS Coated (AlTiN-Based)	34
NEW SIZES	1280KD	2 Flute	5xD	30° Helix	Coolant Fed, BALIQ® ALTINOS Coated (AlTiN-Based)	39
	1280KH	2 Flute	5xD	30° Helix	Coolant Fed, BALIQ® ALTINOS Coated (AlTiN-Based)	49
NEW SIZES	1880KD	2 Flute	7xD	30° Helix	Coolant Fed, BALIQ® ALTINOS Coated (AlTiN-Based)	39
	1880KH	2 Flute	7xD	30° Helix	Coolant Fed, BALIQ® ALTINOS Coated (AlTiN-Based)	49
	1850H	2 Flute	12xD	30° Helix	BALIQ® ALTINOS Coated (AlTiN-Based)	25
NEW SERIES	HTD 12	2 Flute	12xD	30° Helix	BALIQ® ALTINOS Coated (AlTiN-Based)	17
NEW SIZE	1160	3 Flute	3xD	30° Helix	ALUMASTAR® Coated	20
	1180	3 Flute	5xD	30° Helix	ALUMASTAR® Coated	20

DRILLS - GENERAL PURPOSE

NEW SIZE	1600	2 Flute		25° Helix	N/C Spotting, Bright Finish	56
	1400	2 Flute		10° Helix	Combined Drill/Countersink, Bright Finish	58
	1500	2 Flute	3xD	Straight	Hard Metal, Bright Finish	59
	1500H	2 Flute	3xD	Straight	Hard Metal, Durana Coated	61
	1510	2 Flute	3xD	15° Helix	Slow Spiral, Bright Finish	63
NEW SIZE	1510H	2 Flute	3xD	15° Helix	Slow Spiral, Durana Coated	66
NEW SIZES	1520	2 Flute	3xD	25° Helix	Bright Finish	69
NEW SIZES	1520H	2 Flute	3xD	25° Helix	Durana Coated	75
	1205	2 Flute	5xD	25° Helix	Bright Finish	69
	1205H	2 Flute	5xD	25° Helix	Durana Coated	75
	1200	2 Flute	5xD	25° Helix	Bright Finish	85
	1200H	2 Flute	5xD	25° Helix	Durana Coated	88
	1800H	2 Flute	8xD	35° Helix	Parabolic, Durana Coated	92
	1100	3 Flute	5xD	25° Helix	Bright Finish	90
	1100H	3 Flute	5xD	25° Helix	Durana Coated	81
	1120H	3 Flute	3xD	25° Helix	Durana Coated	81

REAMERS

4100	Standard	Bright Finish	94
4100	Standard Metric	Bright Finish	106

DRILL MILLS

152M	2 Flute	Bright Finish - Included Angle to a Point	108
152MA	2 Flute	TiALN Coated - Included Angle to a Point	109
152DA	2 Flute	TiALN Coated - 120° Drill Point	112
154M	4 Flute	Bright Finish - Included Angle to a Point	110
154MA	4 Flute	TiALN Coated - Included Angle to a Point	111

ROUGHERS

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

END MILLS - HIGH PERFORMANCE - HEM

	142M	2 Flute	Square	ALUMASTAR® Coated	123
	142R	2 Flute	Radius	ALUMASTAR® Coated	124
	142B	2 Flute	Ball	ALUMASTAR® Coated	126
NEW SIZES	A3	3 Flute	S, R, B	Bright Finish	118
	143M	3 Flute	Square	ALUMASTAR® Coated	127
	143R	3 Flute	Radius	ALUMASTAR® Coated	130
NEW SIZES	V4S	4 Flute	Square	AlCrN Coated	141
NEW SIZES	V4R	4 Flute	Radius	AlCrN Coated	141
NEW SIZES	V4B	4 Flute	Ball	AlCrN Coated	141
NEW SIZES	VRX	4 Flute	S, R, B	AlTiN Coated	166
NEW SIZES	V5	5 Flute	S, R	AlCrN Coated	154
	V5C (Chip Splitter)	5 Flute	S, R	AlCrN Coated	160
	VRX-6	6 Flute	S, R	AlTiN Coated	176
NEW SIZES	VX-7	7 Flute	S, R	BALIQ® ALCRONOS Coated (AlCrN-Based)	162
	VX-7C (Chip Splitter)	7 Flute	S, R	BALIQ® ALCRONOS Coated (AlCrN-Based)	165
	TMS	Multi-Flute	Square	AlCrN Coated	134
	TMR	Multi-Flute	Radius	AlCrN Coated	136

END MILLS - HIGH PERFORMANCE

242M/842M	2 Flute	Square	Bright Finish	179
350MX/950MX	2 Flute	Ball	Durana Coated	198
253MA/853MA	3 Flute	Square	AlTiN Coated	180
253M/853M	3 Flute	Square	Bright Finish	182
253MC	3 Flute	Square	TiCN Coated	184
263M	3 Flute	Square	Bright Finish	185
263MC	3 Flute	Square	TiCN Coated	185
263MA/863MA	3 Flute	Square	AlTiN Coated	185
210D	4 Flute	Square	DIAMOND Coated	199
210RD	4 Flute	Radius	DIAMOND Coated	200
310D	4 Flute	Ball	DIAMOND Coated	201
610D	4 Flute	Square	DIAMOND Coated	202
710D	4 Flute	Ball	DIAMOND Coated	203
H-45	4 Flute	Radius	Durana Coated	197
545MA	4/5 Flute	Square	Durana Coated	194
545RA	4/5 Flute	Radius	Durana Coated	195
545BA	4/5 Flute	Ball	Durana Coated	196
255MA/855MA	5 Flute	Square	AlTiN Coated	186
255M/855M	5 Flute	Square	Bright Finish	188
255MC	5 Flute	Square	TiCN Coated	190
255RA/855RA	5 Flute	Radius	AlTiN Coated	191
246M/846M	6 Flute	Square	Bright Finish	193
246MC	6 Flute	Square	TiCN Coated	193
NEW SIZES 246MA/846MA	6 Flute	Square	AlTiN Coated	193

END MILLS - STUB LENGTH - GENERAL PURPOSE

160M/860M	2 Flute	Square	Bright Finish	209
160MA/860MA	2 Flute	Square	TiAlN Coated	211
180M/980M	2 Flute	Ball	Bright Finish	216
180MA/980MA	2 Flute	Ball	TiAlN Coated	217
170M/870M	4 Flute	Square	Bright Finish	209
170MA/870MA	4 Flute	Square	TiAlN Coated	211
170R/870R	4 Flute	Radius	Bright Finish	212
170RA/870RA	4 Flute	Radius	TiAlN Coated	214
190M/990M	4 Flute	Ball	Bright Finish	216
190MA/990MA	4 Flute	Ball	TiAlN Coated	217

END MILLS - STANDARD LENGTH - GENERAL PURPOSE

				PAGE
220M/820M	2 Flute	Square	Bright Finish	218
220MT	2 Flute	Square	TiN Coated	220
220MC	2 Flute	Square	TiCN Coated	221
220MA/820MA	2 Flute	Square	TiAlN Coated	222
220R/820R	2 Flute	Radius	Bright Finish	224
220RA	2 Flute	Radius	TiAlN Coated	227
320M/920M	2 Flute	Ball	Bright Finish	230
320MT	2 Flute	Ball	TiN Coated	232
320MC	2 Flute	Ball	TiCN Coated	233
320MA/920MA	2 Flute	Ball	TiAlN Coated	234
222M	2 Flute	Square	Straight Flute, Bright Finish	236
280M	2 Flute	Square	N/C Tolerance, Bright Finish	260
380M	2 Flute	Ball	N/C Tolerance, Bright Finish	261
223M/823M	3 Flute	Square	Bright Finish	218
223MC	3 Flute	Square	TiCN Coated	221
223MA/823MA	3 Flute	Square	TiAlN Coated	222
223R/823R	3 Flute	Radius	Bright Finish	224
223RA/823RA	3 Flute	Radius	TiAlN Coated	227
323M/923M	3 Flute	Ball	Bright Finish	230
323MC	3 Flute	Ball	TiCN Coated	233
323MA/923MA	3 Flute	Ball	TiAlN Coated	234
273M	3 Flute	Square	Tapered, Bright Finish	237
373M	3 Flute	Ball	Tapered, Bright Finish	237
230M/830M	4 Flute	Square	Bright Finish	218
230MT	4 Flute	Square	TiN Coated	220
230MC	4 Flute	Square	TiCN Coated	221
230MA/830MA	4 Flute	Square	TiAlN Coated	222
230R/830R	4 Flute	Radius	Bright Finish	224
230RA/830RA	4 Flute	Radius	TiAlN Coated	227
330M/930M	4 Flute	Ball	Bright Finish	230
330MT	4 Flute	Ball	TiN Coated	232
330MC	4 Flute	Ball	TiCN Coated	233
330MA/930MA	4 Flute	Ball	TiAlN Coated	234
234M	4 Flute	Square	Straight Flute, Bright Finish	236
334MA	4 Flute	Ball	Straight Flute, TiAlN Coated	236
290M	4 Flute	Square	N/C Tolerance, Bright Finish	260
390M	4 Flute	Ball	N/C Tolerance, Bright Finish	261
435M	4 Flute	Square	Double End, 3/8" Shank, Bright Finish	254
435MA	4 Flute	Square	Double End, 3/8" Shank, TiAlN Coated	254
535M	4 Flute	Ball	Double End, 3/8" Shank, Bright Finish	255
535MA	4 Flute	Ball	Double End, 3/8" Shank, TiAlN Coated	255
430M	4 Flute	Square	Double End, Bright Finish	256
430MA/450MA	4 Flute	Square	Double End, TiAlN Coated	257
530M	4 Flute	Ball	Double End, Bright Finish	258
530MA	4 Flute	Ball	Double End, TiAlN Coated	259

ROTARY FILES

1/4" Diameter	Standard Shape	Steel Shank	262
3/16" Diameter		Solid Carbide	274
1/4" Diameter		1/8" Diameter Steel Shank	275
1/8" Diameter		Solid Carbide	276

END MILLS - EXTRA LENGTH - GENERAL PURPOSE

				PAGE
620M/640M	2 Flute	Square	Bright Finish	238
620MC	2 Flute	Square	TiCN Coated	240
620MA/640MA	2 Flute	Square	TiAlN Coated	241
720M/740M	2 Flute	Ball	Bright Finish	249
720MC	2 Flute	Ball	TiCN Coated	251
720MA/740MA	2 Flute	Ball	TiAlN Coated	252
623M/643M	3 Flute	Square	Bright Finish	238
623MC	3 Flute	Square	TiCN Coated	240
623MA/643MA	3 Flute	Square	TiAlN Coated	241
723M/743M	3 Flute	Ball	Bright Finish	249
723MC	3 Flute	Ball	TiCN Coated	251
723MA/743MA	3 Flute	Ball	TiAlN Coated	252
630M/650M	4 Flute	Square	Bright Finish	238
630MC	4 Flute	Square	TiCN Coated	240
630MA/650MA	4 Flute	Square	TiAlN Coated	241
630R	4 Flute	Radius	Bright Finish	243
630RA	4 Flute	Radius	TiAlN Coated	246
730M/750M	4 Flute	Ball	Bright Finish	249
730MC	4 Flute	Ball	TiCN Coated	251
730MA/750MA	4 Flute	Ball	TiAlN Coated	252

TECHNICAL DATA

Weldon Flat Specs	280
Definitions of Tool Coatings	282
General Purpose Milling Guide - *fractional*	284
General Purpose Milling Guide - *metric*	285
High Performance Milling Guide - *fractional*	286
High Performance Milling Guide - *metric*	287
Aluminum High Performance Milling Guide	288
ARC High Performance Milling Guide	291
VHM High Performance Milling Guide - *fractional*	292
VHM High Performance Milling Guide - *metric*	293
VRX High Performance Milling Guide - *fractional*	294
VRX High Performance Milling Guide - *metric*	295
V4 High Speed Milling Guide - *fractional*	296
V4 High Speed Milling Guide - *metric*	297
V5 High Speed Milling Guide - *fractional*	298
V5 High Speed Milling Guide - *metric*	299
VRX-6 High Performance Milling Guide - *fractional*	300
VRX-6 High Performance Milling Guide - *metric*	301
VX-7 High Performance Milling Guide - *fractional*	302
VX-7 High Performance Milling Guide - *metric*	303
TMS/TMR High Performance Milling Guide - *fractional*	304
TMS/TMR High Performance Milling Guide - *metric*	305
TMS/TMR Chip Thinning Calculations - *fractional*	306
TMS/TMR Chip Thinning Calculations - *metric*	307
High Rc Finisher Milling Guide - *fractional*	308
High Rc Finisher Milling Guide - *metric*	309
Die Mold Cutter Milling Guide - *fractional*	310
Die Mold Cutter Milling Guide - *metric*	311
High Feed Milling Guide	312
Diamond Coated Milling Guide	313
Reaming Guide - *fractional*	314
Reaming Guide - *metric*	315
Drill Mills, Chamfering Milling Guide - *fractional*	316
Drill Mills, Chamfering Milling Guide - *metric*	317
Drill Mills, Through Hole Drilling Guide - *fractional*	318
Drill Mills, Through Hole Drilling Guide - *metric*	319
General Purpose Drilling Guide Bright Finish - *fractional*	320
General Purpose Drilling Guide Bright Finish - *metric*	322
General Purpose Drilling Guide Coated - *fractional*	324
General Purpose Drilling Guide Coated - *metric*	326
Mini Drills High Performance Drilling Guide - *fractional*	328
Mini Drills High Performance Drilling Guide - *metric*	329
HTD 12 High Performance Drilling Guide - *fractional*	330
HTD 12 High Performance Drilling Guide - *metric*	331
High Performance Drilling Guide - *fractional*	332
High Performance Drilling Guide - *metric*	333
3-Flute for Aluminum High Performance Drilling Guide	334
Parameters for Burrs	335

Series / Page Number Search

Series	Page	Series	Page	Series	Page	Series	Page
142B	126	263M	185	650M	238	980M	216
142M	123	263MA	185	650MA	241	980MA	217
142R	124	263MC	185	710D	203	990M	216
143M	127	273M	237	720M	249	990MA	217
143R	130	280M	260	720MA	252	1100	90
152DA	112	290M	260	720MC	251	1100H	81
152M	108	310D	201	723M	249	1120H	81
152MA	109	320M	230	723MA	252	1160	20
154M	110	320MA	234	723MC	251	1180	20
154MA	111	320MC	233	730M	249	1200	85
160M	209	320MT	232	730MA	252	1200H	88
160MA	211	323M	230	730MC	251	1205	69
170M	209	323MA	234	740M	249	1205H	75
170MA	211	323MC	233	740MA	252	1250H	25
170R	212	330M	230	743M	249	1280H	34
170RA	214	330MA	234	743MA	252	1280KD	39
180M	216	330MC	233	750M	249	1280KH	49
180MA	217	330MT	232	750MA	252	1400	58
190M	216	334MA	236	820M	218	1500	59
190MA	217	350MX	198	820MA	222	1500H	61
210D	199	373M	237	820R	224	1510	63
210RD	200	380M	261	823M	218	1510H	66
220M	218	390M	261	823MA	222	1520	69
220MA	222	430M	256	823R	224	1520H	75
220MC	221	430MA	257	823RA	227	1550H	25
220MT	220	435M	254	830M	218	1580H	34
220R	224	435MA	254	830MA	222	1580HD	31
220RA	227	450MA	257	830R	224	1580KD	39
222M	236	530M	258	830RA	227	1580KH	49
223M	218	530MA	259	842M	179	1600	56
223MA	222	535M	255	846M	193	1800H	92
223MC	221	535MA	255	846MA	193	1850H	25
223R	224	545BA	196	853M	182	1880KD	39
223RA	227	545MA	194	853MA	180	1880KH	49
230M	218	545RA	195	855M	188	4100	94
230MA	222	610D	202	855MA	186	A3	118
230MC	221	620M	238	855RA	191	ARC	114
230MT	220	620MA	241	860M	209	BURRS	262
230R	224	620MC	240	860MA	211	HTD 12	17
230RA	227	623M	238	863MA	185	H-45	197
234M	236	623MA	241	870M	209	TMR	136
242M	179	623MC	240	870MA	211	TMS	134
246M	193	630M	238	870R	212	V4B	141
246MA	193	630MA	241	870RA	214	V4R	141
246MC	193	630MC	240	920M	230	V4S	141
253M	182	630R	243	920MA	234	V5	154
253MA	180	630RA	246	923M	230	V5C	160
253MC	184	640M	238	923MA	234	VHM	116
255M	188	640MA	241	930M	230	VRX	166
255MA	186	643M	238	930MA	234	VRX-6	176
255MC	190	643MA	241	950MX	198	VX-7	162
255RA	191					VX-7C	165

EDP / Page Number Search

EDP	Page	EDP	Page	EDP	Page	EDP	Page
00***	25	24**0	224	43**0	249	63***	171
01**0	209	24**7	227	43**2	126	64***	162
01**7	211	24**8	200	43**4	251	64***	266
02**0	209	25**0	260	43**7	252	65***	267
02**7	211	25**1, 25**6	49	44**0	249	66***	268
03**0	216	25**5	39	44**4	251	67***	269
03**7	217	26***	39	44**7	252	68***	270
04**0	216	26**0	260	45**0	218	69***	17
04**7	217	26**0, 26**5	47	45**7	222	69***	271
07***	118	26**1, 26**6	49	46***	114	70***	272
08**0	179	27***	40	46**0	218	70***	20
09**0	179	27***	166	46**7	222	71***	273
10**0	182	27**0	261	46**8	199	72***	274
10**7	180	27**5	39	47**0	230	73***	275
10**8	199	28***	170	47**7	234	74***	276
11**0	218	28***	168	48**0	230	77**0, 77**5	69
11**3	220	28**0	260	48**0, 48**5	197	77**1, 77**6	75
11**4	221	28**5	39	48**7	234	78**1, 78**6	81
11**7	222	29***	45	48**8	201	79**0	224
12**0	218	30***	212	49***	116	79**7	227
12**4	221	30**0	256	49**0	237	80**0	224
12**7	222	30**7	257	50***	141	80**7	227
13**0	218	32**0	258	50***	143	80**8	200
13**3	220	32**7	259	50***	151	81**0	236
13**4	221	34**0	254	50***	154	82**0	236
13**7	222	34**7	254	50***	160	83**0, 83**7	191
13**8	199	36***	224	50**0	237	84**5, 84**7	236
14**0	198	36***	227	51***	154	84**0, 84**7	192
15**0	198	36**0	255	51**0	193	85**0	179
15**8	201	36**7	255	51**4	193	86**0	182
16**0	230	37**0	218	51**7	193	86**4	184
16**3	232	37**7	222	52**0	188	86**7	180
16**4	233	38**0	230	52**4	190	89**0, 89**5	69
16**7	234	38**7	234	52**7	186	89**1, 89**6	75
17**0	230	38**8	202	54**0	238	90**0, 90**5	90
17**4	233	39***	127	54**4	240	90**1, 90**6	81
17**7	234	39***	130	54**7	241	91***	56
18**0	230	39**0	59	55**0	249	92**0	238
18**3	232	39**1	61	55**4	251	92**7	241
18**4	233	39**2	124	55**7	252	93**0	238
18**7	234	40***	132	56**0, 56**5	85	93**7	241
19**0, 19**5	63	40**0	188	56**1, 56**6	88	94**0	238
19**1, 19**6	66	40**2	125	57***	110	94**7	241
20***	31	40**7	186	57***	112	94**8	202
20**0	243	40**8	203	57**0	108	95***	94
20**1, 20**6	34	41**0	238	57**7	109	96***	101
20**7	246	41**1	127	58***	110	97**0	249
21***	33	41**2	123	58***	111	97**7	252
21**0	246	41**3	127	58**0	58	98***	134
21**0	194	41**4	240	59**0, 59**5	59	98***	136
21**2	195	41**7	241	59**1, 59**6	61	98**0	249
21**4	196	42***	126	60***	176	98**7	252
21**1, 21**6	34	42**0	238	60***	262	99**0	249
21**7	247	42**2	123	61***	166	99**7	252
22**0, 22**5	49	42**2	126	61***	263	99**8	203
22**1, 22**6	92	42**3	128	62***	170		
23**0	185	42**4	240	62***	264		
23**4	185	42**7	241	62**7	170		
23**7	185			63***	265		

Recommended for: **ALUMINUM**

Aluminium / Aluminio / Aluminium / Alluminio / 铝

ISO Material Group: N

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1160, 1180		20	ALUMASTAR	3 flute, High performance
1520, 1205		69	BRIGHT	2 flute, General purpose
1520H, 1205H		75	DURANA	2 flute, General purpose
1800H		92	DURANA	2 flute, Parabolic

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
A3		118	BRIGHT	High velocity, 3 flute, High metal removal rate
143M, 143R		127, 130	ALUMASTAR	High velocity, 3 flute, High metal removal rate
142B		126	ALUMASTAR	High velocity, 2 flute, High metal removal rate
142M, 142R		123, 124	ALUMASTAR	High velocity, 2 flute, High metal removal rate
242M, 842M		179	BRIGHT	High performance, 2 flute, For 3000-8000 RPM
ARC		114	BRIGHT	High performance, 3 flute, Staggered helix rougher
253M, 853M		182	BRIGHT	High performance, 3 flute, Profiling and finishing
253MC		184	TiCN	High performance, 3 flute, Profiling and finishing
220M, 820M		218	BRIGHT	2 flute, General purpose, Square end
220MC		221	TiCN	2 flute, General purpose, Square end
320M, 920M		230	BRIGHT	2 flute, General purpose, Ball end
320MC		233	TiCN	2 flute, General purpose, Ball end

Recommended for: **TITANIUM**

Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金

ISO Material Group: S

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1510H		66	DURANA	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		25	ALTINOS	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		31	ALTINOS	2 flute, High performance, Common shank
1580H, 1280H		34	ALTINOS	2 flute, High performance
1580KD, 1280KD, 1880KD		39	ALTINOS	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		49	ALTINOS	2 flute, High performance, Coolant fed
HTD 12		17	ALTINOS	2 flute, High performance, Coolant fed, Double margin, Common shank
1520H, 1205H		75	DURANA	2 flute, General purpose
1160, 1180		20	ALUMASTAR	3 flute, High performance

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V4		141	AlCrN	High performance, 4 flute, Variable helix
V5		154	AlCrN	High performance, 5 flute, Variable helix
VX-7		162	ALCRONOS	High performance, 7 flute, Staggered flute
VRX		166	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		176	AlTiN	High performance, 6 flute, Staggered flute
TMS, TMR		134, 136	AlCrN	High performance, Multiple flute finisher
VHM		116	AlTiN	High performance, 4 flute, Staggered flute rougher
255MA, 855MA		186	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		191	AlTiN	High performance, 5 flute, Corner radius
242M, 842M		179	BRIGHT	High performance, 2 flute, For 3000-8000 RPM
246MA, 846MA		193	AlTiN	High performance, 6 flute, Finisher
253MA, 853MA		180	AlTiN	High performance, 3 flute, Profiling and finishing
223MA, 823MA		222	TiAlN	3 flute, General purpose, Square end
230MA, 830MA		222	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		227	TiAlN	4 flute, General purpose, Corner radius
323MA, 923MA		234	TiAlN	3 flute, General purpose, Ball end
330MA, 930MA		234	TiAlN	4 flute, General purpose, Ball end

Recommended for: STAINLESS STEEL

Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金

ISO Material Group: M

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1510H		66	DURANA	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		25	ALTINOS	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		31	ALTINOS	2 flute, High performance, Common shank
1580H, 1280H		34	ALTINOS	2 flute, High performance
1580KD, 1280KD, 1880KD		39	ALTINOS	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		49	ALTINOS	2 flute, High performance, Coolant fed
HTD 12		17	ALTINOS	2 flute, High performance, Coolant fed, Double margin, Common shank
1520H, 1205H		75	DURANA	2 flute, General purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V4		141	AlCrN	High performance, 4 flute, Variable helix
V5		154	AlCrN	High performance, 5 flute, Variable helix
VX-7		162	ALCRONOS	High performance, 7flute, Staggered flute
VRX		166	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		176	AlTiN	High performance, 6 flute, Staggered flute
253MA, 853MA		180	AlTiN	High performance, 3 flute, Profiling and finishing
255MA, 855MA		186	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		191	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		134, 136	AlCrN	High performance, Multiple flute finisher
253MC		184	TiCN	High performance, 3 flute, Profiling and finishing
246MA, 846MA		193	AlTiN	High performance, 6 flute, Finisher, Square end
223MA, 823MA		222	TiAlN	3 flute, General purpose, Square end
230MA, 830MA		222	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		227	TiAlN	4 flute, General purpose, Corner radius
323MA, 923MA		234	TiAlN	3 flute, General purpose, Ball end
330MA, 930MA		234	TiAlN	4 flute, General purpose, Ball end

Recommended for: INCONEL, HIGH NICKEL ALLOYS

Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金

ISO Material Group: S

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1510H		66	DURANA	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		25	ALTINOS	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		31	ALTINOS	2 flute, High performance, Common shank
1580H, 1280H		34	ALTINOS	2 flute, High performance
1580KD, 1280KD, 1880KD		39	ALTINOS	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		49	ALTINOS	2 flute, High performance, Coolant fed
HTD 12		17	ALTINOS	2 flute, High performance, Coolant fed, Double margin, Common shank
1520H, 1205H		75	DURANA	2 flute, General purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V5		154	AlCrN	High performance, 5 flute, Variable helix
V4		141	AlCrN	High performance, 4 flute, Variable helix
VRX		166	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		176	AlTiN	High performance, 6 flute, Staggered flute
VX-7		162	ALCRONOS	High performance, 7 flute, Staggered flute
VHM		116	AlTiN	High performance, 4 flute, Staggered flute rougher
255MA, 855MA		186	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		191	AlTiN	High performance, 5 flute, Corner radius
246MA, 846MA		193	AlTiN	High performance, 6 flute, Finisher, Square end
TMS, TMR		134, 136	AlCrN	High performance, Multiple flute finisher
230MA, 830MA		222	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		227	TiAlN	4 flute, General purpose, Corner radius
330MA, 930MA		234	TiAlN	4 flute, General purpose, Ball end

Recommended for: BRASS, BRONZE, COPPER, MAGNESIUM

Messing, Bronze / Latón, Bronce / Laiton, Bronze / Ottone, Bronzo / 黄铜, 青铜
Kupfer / Cobre / Cuivre / Rame / 铜 ， Magnesium / Magnesio / Magnésium / Magnesio / 镁

ISO Material Group: N

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1160, 1180		20	ALUMASTAR	3 flute, High performance
1510H		66	DURANA	2 flute, General purpose, Slow spiral
1520, 1205		69	BRIGHT	2 flute, General purpose
1520H, 1205H		75	DURANA	2 flute, General purpose
1500H		61	DURANA	2 flute, Straight flute
1800H		92	DURANA	2 flute, Parabolic

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
143M, 143R		127, 130	ALUMASTAR	High velocity, 3 flute, High metal removal rate
142B		126	ALUMASTAR	High velocity, 2 flute, High metal removal rate
142M, 142R		123, 124	ALUMASTAR	High velocity, 2 flute, High metal removal rate
ARC		114	BRIGHT	High performance, 3 flute, Staggered helix rougher
242M, 842M		179	BRIGHT	High performance, 2 flute, For 3000-8000 RPM
253M, 853M		182	BRIGHT	High performance, 3 flute, Profiling and finishing
253MC		184	TiCN	High performance, 3 flute, Profiling and finishing
220M, 820M		218	BRIGHT	2 flute, General purpose, Square end
220MC		221	TiCN	2 flute, General purpose, Square end
320M, 920M		230	BRIGHT	2 flute, General purpose, Ball end
320MC		233	TiCN	2 flute, General purpose, Ball end

Recommended for: HARDENED TOOL STEELS

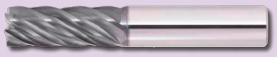
Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢

ISO Material Group: P *(generally over 45 Rc)*

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1500H		61	DURANA	2 flute, Straight flute
1510H		66	DURANA	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		25	ALTINOS	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		31	ALTINOS	2 flute, High performance, Common shank
1580H, 1280H		34	ALTINOS	2 flute, High performance
1580KD, 1280KD, 1880KD		39	ALTINOS	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		49	ALTINOS	2 flute, High performance, Coolant fed
HTD 12		17	ALTINOS	2 flute, High performance, Coolant fed, Double margin, Common shank
1520H, 1205H		75	DURANA	2 flute, General purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
H-45		197	DURANA	High performance, High feed, Corner radius
350MX, 950MX		198	DURANA	High performance, High Rc finisher, Die mold
545MA		194	DURANA	High performance, High Rc finisher, Square end
545RA		195	DURANA	High performance, High Rc finisher, Corner radius
545BA		196	DURANA	High performance, High Rc finisher, Ball end
VRX		166	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		176	AlTiN	High performance, 6 flute, Staggered flute
230MA, 830MA		222	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		227	TiAlN	4 flute, General purpose, Corner radius
330MA, 930MA		234	TiAlN	4 flute, General purpose, Ball end

Recommended for: COMPOSITE MATERIALS

Verbundwerkstoffe / Material compuesto / Materiaux composites / Materiale composito / 复合材料

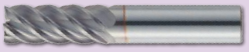
ISO Material Group: O

(Graphite, Plastics, Carbon Fiber)

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1160, 1180		20	ALUMASTAR	3 flute, High performance
154MA		111	TiAlN	4 flute, Center cutting angle
1510H		66	DURANA	2 flute, General purpose, Slow spiral
1520H, 1205H		75	DURANA	2 flute, General purpose
1800H		92	DURANA	2 flute, Parabolic
1500H		61	DURANA	2 flute, Straight flute

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
210D		199	DIAMOND	4 flute, Square end
310D		201	DIAMOND	4 flute, Ball end
210RD		200	DIAMOND	4 flute, Corner radius
143M, 143R		127, 130	ALUMASTAR	High velocity, 3 flute, High metal removal rate
142M, 142R		123, 124	ALUMASTAR	High velocity, 2 flute, High metal removal rate
142B		126	ALUMASTAR	High velocity, 2 flute, High metal removal rate
253M, 853M		182	BRIGHT	High performance, 3 flute, Profiling and finishing
253MC		184	TiCN	High performance, 3 flute, Profiling and finishing
255MC		190	TiCN	High performance, 5 flute, Profiling and finishing
220MC		221	TiCN	2 flute, General purpose, Square end
320MC		233	TiCN	2 flute, General purpose, Ball end
154M, 154MA		110, 111	BRIGHT/TiAlN	4 flute, Drill/Mill, Center cutting to a point
152M, 152MA		108, 109	BRIGHT/TiAlN	2 flute, Drill/Mill, Center cutting to a point

Recommended for: CARBON STEELS, MEDIUM ALLOY STEELS

Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢
Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliages / Acciaio da utensili di media durezza / 中碳合金钢

ISO Material Group: **P** *(generally under 45 Rc)*

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1580HD		31	ALTINOS	2 flute, High performance, Common shank
1550H, 1250H, 1850H		25	ALTINOS	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580H, 1280H		34	ALTINOS	2 flute, High performance
1580KD, 1280KD, 1880KD		39	ALTINOS	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		49	ALTINOS	2 flute, High performance, Coolant fed
HTD 12		17	ALTINOS	2 flute, High performance, Coolant fed, Double margin, Common shank
1510H		66	DURANA	2 flute, General purpose, Slow spiral
1520H, 1205H		75	DURANA	2 flute, General purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V4		141	AlCrN	High performance, 4 flute, Variable helix
V5		154	AlCrN	High performance, 5 flute, Variable helix
VX-7		162	ALCRONOS	High performance, 7 flute, Staggered flute
VRX		166	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		176	AlTiN	High performance, 6 flute, Staggered flute
VHM		116	AlTiN	High performance, 4 flute, Staggered flute rougher
255MA, 855MA		186	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		191	AlTiN	High performance, 5 flute, Corner radius
253MA, 853MA		180	AlTiN	High performance, 3 flute, Profiling and finishing
230MA, 830MA		222	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		227	TiAlN	4 flute, General purpose, Corner radius
330MA, 930MA		234	TiAlN	4 flute, General purpose, Ball end

Recommended for: CAST IRON

Gusseisen / Reparto de Hierro / Cast Fer / Ghisa / 铸铁

ISO Material Group: K

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1120H, 1100H		81	DURANA	3 flute, General purpose
1520H, 1205H		75	DURANA	2 flute, General purpose
1510H		66	DURANA	2 flute, General purpose, Slow spiral
1580H, 1280H		34	ALTINOS	2 flute, High performance
1550H, 1250H, 1850H		25	ALTINOS	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		31	ALTINOS	2 flute, High performance, Common shank
1580KH, 1280KH, 1880KH		49	ALTINOS	2 flute, High performance, Coolant fed
1580KD, 1280KD, 1880KD		39	ALTINOS	2 flute, High performance, Coolant fed, Common shank

END MILLS

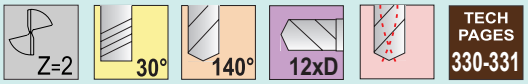
SERIES		PAGE	COATING	DESCRIPTION
VRX		166	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		176	AlTiN	High performance, 6 flute, Staggered flute
V4		141	AlCrN	High performance, 4 flute, Variable helix
V5		154	AlCrN	High performance, 5 flute, Variable helix
VX-7		162	ALCRONOS	High performance, 7 flute, Staggered flute
255MA, 855MA		186	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		191	AlTiN	High performance, 5 flute, Corner radius
143M, 143R		127, 130	ALUMASTAR	High velocity, 3 flute, High metal removal rate
253MA, 853MA		180	AlTiN	High performance, 3 flute, Profiling and finishing
230MC		221	TiCN	4 flute, General purpose, Square end
230MA, 830MA		222	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		227	TiAlN	4 flute, General purpose, Corner radius

TOLERANCES	
d_1	h7
d_2	h6
l_1	+3.00 –3.00mm (+.1181" –.1181")
l_2	+3.00 –3.00mm (+.1181" –.1181")
l_4	+2.00 –0.00mm (+.0787" –.0000")

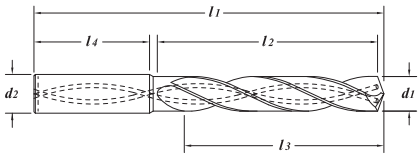
NEW SERIES

Series HTD 12

.1181" - .2188"
(3.000mm - 5.557mm)



BALIQ® ALTINOS Coating (AlTiN-based)
BALIQ® ALTINOS-Beschichtet (AlTiN-based)
Recubrimiento BALIQ® ALTINOS (AlTiN-based)
Revêtement à BALIQ® ALTINOS (AlTiN-based)
Rivestimento BALIQ® ALTINOS (AlTiN-based)
BALIQ® ALTINOS涂层 (AlTiN-based)



High performance solid submicron grain carbide drill with reinforced shank (HA)
h7 drill diameter tolerance
Double margin for true and cleaner holes
Coolant through
Polished flutes
140° Facet point
Pilot drill not required for most applications
Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels < 52Rc

Hochleistungs Bohrer aus Feinkornhartmetall mit verstärktem Schaft (HA)
h7 Bohrerdurchmessertoleranz
Doppelte Kante für echte und saubere Löcher
Kühlmittel durch
Polierte Flöten
140° Facettenpunkt
Für die meisten Anwendungen ist kein Pilotbohrer erforderlich
Empfohlen für Hoch Nickelhaltige und Hochwarmfeste Stähle, Kobaltbasislegierungen, Rostfreier- und Werkzeugstah < 52HRc

Taladro de alto rendimiento de metal submicrónico duro con vástago (HA)
Tolerancia de diámetro de broca h7
Doble filo para agujeros reales y limpios
Refrigerante a través
Flautas pulidas
Punto facetado de 140°
Taladro piloto no requerido para la mayoría de las aplicaciones
Recomendado para aleaciones con alto contenido de níquel, aleaciones de alta temperatura, aleaciones con base de cobalto, aceros inoxidables, y aceros de herramienta < 52Rc

Haute prestation avec drille à grain solide submicron carbure avec tige renforcé (HA)
Tolérance de diamètre de foret h7
Double marge pour des trous vrais et plus propres
Liquide de refroidissement à travers les capacités d'outillage
Flûtes polies
Pointe à facettes 140°
Foret pilote non requis pour la plupart des applications
Recommander pour base nickel, alliages a hautes temperatures, alliages de cobalt, aciers inoxydables et aciers a outils < 52HRC

Punte in sub-micro grana con gambo rinforzato per alte prestazioni (HA)
h7 tolleranza diametro
Doppio margine per fori veri e puliti
Refrigerante attraverso
Flauti lucidati
Punto sfaccettato a 140°
Punta pilota non necessaria per la maggior parte delle applicazioni
Raccomandata per lavorazioni su nickel, superleghe, leghe ad alta percentuale di cobalto, inox e acciai per utensili < 52Hrc

加强柄的超细高效整体硬质合金钻头 (HA)
h7 钻头直径公差
双刃可实现真实、干净的孔
冷却液通过
抛光排屑槽
140° 刻面点
大多数应用不需要导向钻
高镍耐高温合金、钴基合金、不锈钢和工具钢 < 52HRC

EDP#	d_1 Diameter Decimal	d_1 Diameter	d_1 Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Max Drill Depth	l_4 Shank Length
69064	.1181		3.000	6.0	80	40	35	36
69066	.1220		3.100	6.0	80	40	35	36
69068	.1250	1/8"	3.175	6.0	82	42	37	36
69070	.1260		3.200	6.0	82	42	37	36
69072	.1285	#30	3.264	6.0	82	42	37	36
69074	.1299		3.300	6.0	82	42	37	36
69076	.1360	#29	3.454	6.0	85	45	40	36
69078	.1378		3.500	6.0	85	45	40	36
69080	.1417		3.600	6.0	85	45	40	36
69082	.1457		3.700	6.0	90	50	44	36
69084	.1476		3.750	6.0	90	50	44	36
69086	.1496		3.800	6.0	90	50	44	36
69088	.1535		3.900	6.0	90	50	44	36
69090	.1562	5/32"	3.967	6.0	90	50	44	36
69092	.1575		4.000	6.0	95	55	48	36
69094	.1614		4.100	6.0	95	55	48	36
69096	.1654		4.200	6.0	95	55	48	36
69098	.1673		4.250	6.0	95	55	48	36
69100	.1693		4.300	6.0	95	55	48	36
69102	.1719	11/64"	4.366	6.0	95	55	48	36
69104	.1732		4.400	6.0	95	55	48	36
69106	.1772		4.500	6.0	100	60	54	36
69108	.1811		4.600	6.0	100	60	54	36
69110	.1831		4.650	6.0	100	60	54	36
69112	.1850		4.700	6.0	100	60	54	36
69114	.1875	3/16"	4.762	6.0	100	60	54	36
69116	.1890	#12	4.800	6.0	100	60	54	36
69118	.1929		4.900	6.0	100	60	54	36
69120	.1969		5.000	6.0	105	65	58	36
69122	.2010	#7	5.105	6.0	105	65	58	36
69124	.2028		5.150	6.0	105	65	58	36
69126	.2031	13/64"	5.159	6.0	105	65	58	36
69128	.2047		5.200	6.0	110	70	63	36
69130	.2087		5.300	6.0	110	70	63	36
69132	.2165		5.500	6.0	110	70	63	36
69134	.2188	7/32"	5.557	6.0	110	70	63	36

continued →

Series HTD 12 *(continued)*

.2205" - .3937"
(5.600mm - 10.000mm)

EDP#	*d1* Diameter Decimal		*d1* Diameter Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l3* Max Drill Depth	*l4* Shank Length
69136	.2205		5.600	6.0	115	75	67	36
69138	.2244		5.700	6.0	115	75	67	36
69140	.2283		5.800	6.0	115	75	67	36
69142	.2323		5.900	6.0	115	75	67	36
69144	.2344	15/64"	5.954	6.0	120	80	72	36
69146	.2362		6.000	6.0	120	80	72	36
69148	.2370		6.020	8.0	120	80	72	36
69150	.2402		6.100	8.0	120	80	72	36
69152	.2441		6.200	8.0	120	80	72	36
69154	.2480		6.300	8.0	120	80	72	36
69156	.2500	1/4"	6.350	8.0	125	85	77	36
69158	.2520		6.400	8.0	125	85	77	36
69160	.2559		6.500	8.0	125	85	77	36
69162	.2598		6.600	8.0	125	85	77	36
69164	.2638		6.700	8.0	125	85	77	36
69166	.2656	17/64"	6.746	8.0	130	90	81	36
69168	.2677		6.800	8.0	130	90	81	36
69170	.2717		6.900	8.0	130	90	81	36
69172	.2756		7.000	8.0	130	90	81	36
69174	.2795		7.100	8.0	130	90	81	36
69176	.2812	9/32"	7.142	8.0	135	95	87	36
69178	.2835		7.200	8.0	135	95	87	36
69180	.2874		7.300	8.0	135	95	87	36
69182	.2913		7.400	8.0	135	95	87	36
69184	.2953		7.500	8.0	135	95	87	36
69186	.2969	19/64"	7.541	8.0	141	101	92	36
69188	.2992		7.600	8.0	141	101	92	36
69190	.3031		7.700	8.0	141	101	92	36
69192	.3071		7.800	8.0	141	101	92	36
69194	.3125	5/16"	7.937	8.0	141	101	92	36
69196	.3150		8.000	8.0	141	101	92	36
69198	.3189		8.100	10.0	152	108	97	40
69200	.3228		8.200	10.0	152	108	97	40
69202	.3268		8.300	10.0	152	108	97	40
69204	.3287		8.350	10.0	152	108	97	40
69206	.3307		8.400	10.0	152	108	97	40
69208	.3346		8.500	10.0	152	108	97	40
69210	.3386		8.600	10.0	158	114	104	40
69212	.3425		8.700	10.0	158	114	104	40
69214	.3438	11/32"	8.732	10.0	158	114	104	40
69216	.3445		8.750	10.0	158	114	104	40
69218	.3465		8.800	10.0	158	114	104	40
69220	.3504		8.900	10.0	158	114	104	40
69222	.3543		9.000	10.0	158	114	104	40
69224	.3583		9.100	10.0	163	119	108	40
69226	.3602		9.150	10.0	163	119	108	40
69228	.3622		9.200	10.0	163	119	108	40
69230	.3661		9.300	10.0	163	119	108	40
69232	.3701		9.400	10.0	163	119	108	40
69234	.3740		9.500	10.0	163	119	108	40
69236	.3750	3/8"	9.525	10.0	172	128	114	40
69238	.3780		9.600	10.0	172	128	114	40
69240	.3819		9.700	10.0	172	128	114	40
69242	.3858		9.800	10.0	172	128	114	40
69244	.3898		9.900	10.0	172	128	114	40
69246	.3937		10.000	10.0	172	128	114	40

† *Metric equivalents are for reference only*

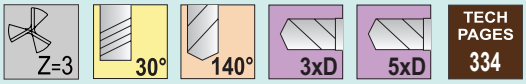
EDP#	d_1 Diameter Decimal		d_1 Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Max Drill Depth	l_4 Shank Length
69248	.3976		10.100	12.0	185	136	124	45
69250	.4016		10.200	12.0	185	136	124	45
69252	.4062	13/32"	10.317	12.0	185	136	124	45
69254	.4134		10.500	12.0	185	136	124	45
69256	.4213		10.700	12.0	185	136	124	45
69258	.4252		10.800	12.0	185	136	124	45
69260	.4331		11.000	12.0	185	136	124	45
69262	.4375	7/16"	11.112	12.0	196	147	135	45
69264	.4409		11.200	12.0	196	147	135	45
69266	.4488		11.400	12.0	196	147	135	45
69268	.4528		11.500	12.0	196	147	135	45
69270	.4688	15/32"	11.907	12.0	202	153	140	45
69272	.4724		12.000	12.0	202	153	140	45

Series 1160, 1180

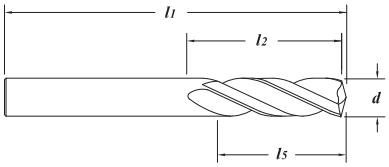
NEW ITEM

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

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



ALUMASTAR Coated
ALUMASTAR-Beschichtet
Recubrimiento de ALUMASTAR
Revêtement ALUMASTAR
Rivestimento ALUMASTAR
ALUMASTAR 涂层



High performance solid submicron grain carbide drill
Designed for drilling aluminum and other soft materials <40Rc
No spot drilling required
Unique point geometry and coating for higher speeds and feeds
High performance drill point
Live tooling recommended on lathe processes

Hochleistungs- Vollhartmetallbohrer aus Feinkornhartmetall
Entwickelt für das Bohren von Aluminium und anderen weichen Werkstoffen <40HRc
Anzentrieren nicht empfohlen
Einzigartige Spitzengeometrie und Beschichtung für höhere Schnittgeschwindigkeiten und Vorschübe
Hochleistungsspitzengeometrie
Empfehlung fuer den Einsatz auf der Drehmaschine

Broca de submicrograno sólido carburo de alto rendimiento
Diseñada para taladrado de aluminio y otros materiales blandos <40HRc
No require pretaladrado
Geometría de punto único y recibrimiento para altas velocidades y alimentaciones
Ángulo de punta de la broca de alto rendimiento
Recomendación para la aplicación en torno

Forets carbure submicrograin a haute performances
Developpes pour le percage des aluminium et autres matieres tendres <40HRc
Pas de point de centre recommande
Geometrie et revetement unique pour de plus grandes vitesses et avances
Foret a haute performance
Outil de filature nécessaires pour une utilisation sur un processus de tournage

Punta in metallo duro ad alte prestazioni
Progettata per foratura di alluminio e altri materiali non ferrosi <40Hrc
Non richiede centrino
Geometria e rivestimento per alta velocità
Punta ad alte prestazioni
Utensili rotanti sono consigliate se usato su un tornio

高效整体硬质合金钻头
适合钻削铝合金和其它软性材质 <40HRc
不需要定位钻
独一无二的刃尖几何形状和涂层适合更高转速和更大进给量
140° 高效钻尖
不建议在车床，或工具必须纺纱

3xD (1160) EDP#	5xD (1180) EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
70631		.1562	5/32"	3.967	2-1/16"	9/16"	.497"
	70161	.1562	5/32"	3.967	2-1/2"	1"	.809"
70633		.1570	#22	3.988	2-1/8"	5/8"	.500"
	70163	.1570	#22	3.988	2-1/2"	1"	.814"
70635		.1575		4.000	54	16	13
	70166	.1575		4.000	65	24	21
70637		.1590	#21	4.039	2-1/8"	5/8"	.506"
	70177	.1590	#21	4.039	2-1/2"	1"	.824"
70639		.1610	#20	4.089	2-1/8"	5/8"	.512"
	70179	.1610	#20	4.089	2-1/2"	1"	.834"
70641		.1660	#19	4.216	2-1/8"	5/8"	.528"
	70181	.1660	#19	4.216	2-3/4"	1-1/8"	.860"
70643		.1695	#18	4.305	2-1/8"	5/8"	.539"
	70183	.1695	#18	4.305	2-3/4"	1-1/8"	.878"
70645		.1719	11/64"	4.366	2-1/8"	5/8"	.547"
	70185	.1719	11/64"	4.366	2-3/4"	1-1/8"	.891"
70647		.1730	#17	4.394	2-3/16"	11/16"	.551"
	70187	.1730	#17	4.394	2-3/4"	1-1/8"	.897"
70649		.1770	#16	4.496	2-3/16"	11/16"	.563"
	70189	.1770	#16	4.496	2-3/4"	1-1/8"	.917"
70651		.1772		4.500	55	18	14
	70191	.1772		4.500	65	25	23
70653		.1800	#15	4.572	2-3/16"	11/16"	.573"
	70196	.1800	#15	4.572	2-3/4"	1-1/4"	.933"
70655		.1820	#14	4.623	2-3/16"	11/16"	.579"
	70201	.1820	#14	4.623	2-3/4"	1-1/4"	.943"
70657		.1850	#13	4.700	2-3/16"	11/16"	.589"
	70206	.1850	#13	4.700	2-3/4"	1-1/4"	.959"
70659		.1875	3/16"	4.763	2-3/16"	11/16"	.597"
	70211	.1875	3/16"	4.763	2-3/4"	1-1/4"	.972"
70661		.1890	#12	4.801	2-1/4"	3/4"	.601"
	70216	.1890	#12	4.801	2-3/4"	1-1/4"	.979"
70663		.1910	#11	4.851	2-1/4"	3/4"	.608"
	70221	.1910	#11	4.851	2-3/4"	1-1/4"	.990"

† *Metric equivalents are for reference only*

3xD (1160) EDP#	5xD (1180) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
70665		.1935	#10	4.914	2-1/4"	3/4"	.616"
	70226	.1935	#10	4.914	2-3/4"	1-1/4"	1.003"
70667		.1960	#9	4.978	2-1/4"	3/4"	.624"
	70229	.1960	#9	4.978	3"	1-5/16"	1.016"
70669		.1969		5.000	57	19	16
	70231	.1969		5.000	75	32	26
70671		.1990	#8	5.055	2-1/4"	3/4"	.633"
	70236	.1990	#8	5.055	3"	1-5/16"	1.031"
70673		.2010	#7	5.105	2-1/4"	3/4"	.640"
	70241	.2010	#7	5.105	3"	1-5/16"	1.042"
70675		.2031	13/64"	5.159	2-1/4"	3/4"	.646"
	70246	.2031	13/64"	5.159	3"	1-5/16"	1.053"
70677		.2040	#6	5.182	2-3/8"	7/8"	.649"
	70251	.2040	#6	5.182	3"	1-3/8"	1.057"
70679		.2055	#5	5.220	2-3/8"	7/8"	.654"
	70256	.2055	#5	5.220	3"	1-3/8"	1.065"
70681		.2090	#4	5.309	2-3/8"	7/8"	.665"
	70261	.2090	#4	5.309	3"	1-3/8"	1.083"
70683		.2130	#3	5.410	2-3/8"	7/8"	.678"
	70266	.2130	#3	5.410	3"	1-3/8"	1.104"
70685		.2165		5.500	60	22	18
	70271	.2165		5.500	75	35	29
70687		.2188	7/32"	5.558	2-3/8"	7/8"	.696"
	70276	.2188	7/32"	5.558	3"	1-3/8"	1.134"
70689		.2210	#2	5.613	2-7/16"	15/16"	.703"
	70281	.2210	#2	5.613	3"	1-3/8"	1.145"
70691		.2280	#1	5.791	2-7/16"	15/16"	.726"
	70286	.2280	#1	5.791	3"	1-3/8"	1.182"
70693		.2340	A	5.944	2-7/16"	15/16"	.745"
	70294	.2340	A	5.944	3-1/4"	1-1/2"	1.213"
70695		.2344	15/64"	5.954	2-7/16"	15/16"	.746"
	70296	.2344	15/64"	5.954	3-1/4"	1-1/2"	1.215"
70697		.2362		6.000	64	26	19
	70301	.2362		6.000	82	38	31
70699		.2380	B	6.045	2-1/2"	1"	.757"
	70306	.2380	B	6.045	3-1/4"	1-5/8"	1.233"
70701		.2420	C	6.147	2-1/2"	1"	.770"
	70311	.2420	C	6.147	3-1/4"	1-5/8"	1.254"
70703		.2460	D	6.248	2-1/2"	1"	.783"
	70316	.2460	D	6.248	3-1/4"	1-5/8"	1.275"
70705		.2500	1/4" / E	6.350	2-1/2"	1"	.796"
	70321	.2500	1/4" / E	6.350	3-1/4"	1-5/8"	1.296"
70707		.2510		6.375	2-1/2"	1"	.799"
	70911	.2510		6.375	3-1/4"	1-5/8"	1.300"
70709		.2559		6.500	66	28	21
	70326	.2559		6.500	82	41	34
70711		.2570	F	6.528	2-5/8"	1-1/8"	.818"
	70331	.2570	F	6.528	3-1/4"	1-11/16"	1.332"

continued →

Series 1160, 1180 *(continued)*

.2610" - .3594"
(6.629mm - 9.129mm)

3xD (1160) EDP#	5xD (1180) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
70713		.2610	G	6.629	2-5/8"	1-1/8"	.831"
	70336	.2610	G	6.629	3-1/2"	1-11/16"	1.353"
70715		.2656	17/64"	6.746	2-5/8"	1-1/8"	.845"
	70341	.2656	17/64"	6.746	3-1/2"	1-11/16"	1.376"
70717		.2660	H	6.756	2-11/16"	1-3/16"	.846"
	70346	.2660	H	6.756	3-1/2"	1-11/16"	1.378"
70719		.2720	I	6.909	2-11/16"	1-3/16"	.866"
	70351	.2720	I	6.909	3-1/2"	1-11/16"	1.410"
70721		.2756		7.000	68	30	22
	70356	.2756		7.000	88	43	36
70723		.2770	J	7.036	2-11/16"	1-3/16"	.881"
	70361	.2770	J	7.036	3-1/2"	1-11/16"	1.435"
70725		.2812	9/32"	7.142	2-11/16"	1-3/16"	.895"
	70371	.2812	9/32"	7.142	3-1/2"	1-3/4"	1.457"
70727		.2900	L	7.366	2-3/4"	1-1/4"	.923"
	70376	.2900	L	7.366	3-1/2"	1-3/4"	1.503"
70728		.2950	M	7.493	2-3/4"	1-1/4"	.939"
	70378	.2950	M	7.493	3-3/4"	1-7/8"	1.529"
70729		.2953		7.500	70	32	24
	70381	.2953		7.500	95	44	39
70731		.2969	19/64"	7.541	2-3/4"	1-1/4"	.945"
	70386	.2969	19/64"	7.541	3-3/4"	1-7/8"	1.539"
70733		.3020	N	7.671	2-15/16"	1-7/16"	.961"
	70391	.3020	N	7.671	3-3/4"	1-7/8"	1.565"
70735		.3125	5/16"	7.938	2-15/16"	1-7/16"	.994"
	70396	.3125	5/16"	7.938	3-3/4"	1-7/8"	1.619"
70737		.3150		8.000	76	36	25
	70401	.3150		8.000	95	48	41
70739		.3160	O	8.026	2-15/16"	1-7/16"	1.006"
	70406	.3160	O	8.026	3-3/4"	1-7/8"	1.638"
70741		.3230	P	8.204	2-15/16"	1-7/16"	1.028"
	70411	.3230	P	8.204	3-3/4"	2-3/32"	1.674"
70743		.3281	21/64"	8.334	2-15/16"	1-7/16"	1.044"
	70416	.3281	21/64"	8.334	4"	2-3/32"	1.700"
70745		.3320	Q	8.433	3"	1-7/16"	1.056"
	70421	.3320	Q	8.433	4"	2-3/32"	1.720"
70747		.3346		8.500	76	36	27
	70426	.3346		8.500	100	53	44
70749		.3390	R	8.611	3"	1-7/16"	1.079"
	70431	.3390	R	8.611	4"	2-3/32"	1.757"
70751		.3438	11/32"	8.733	3"	1-7/16"	1.094"
	70436	.3438	11/32"	8.733	4"	2-3/16"	1.782"
70753		.3480	S	8.839	3-1/16"	1-1/2"	1.107"
	70441	.3480	S	8.839	4"	2-3/16"	1.803"
70755		.3543		9.000	78	38	29
	70446	.3543		9.000	100	55	47
70757		.3580	T	9.093	3-1/16"	1-1/2"	1.139"
	70451	.3580	T	9.093	4-1/4"	2-9/32"	1.855"
70759		.3594	23/64"	9.129	3-1/16"	1-1/2"	1.144"
	70456	.3594	23/64"	9.129	4-1/4"	2-9/32"	1.862"

† *Metric equivalents are for reference only*

3xD (1160) EDP#	5xD (1180) EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
70761		.3680	U	9.347	3-1/8"	1-9/16"	1.171"
	70461	.3680	U	9.347	4-1/4"	2-9/32"	1.907"
70763		.3740		9.500	79	39	30
	70466	.3740		9.500	108	58	49
70765		.3750	3/8"	9.525	3-1/8"	1-9/16"	1.193"
	70471	.3750	3/8"	9.525	4-1/4"	2-3/8"	1.943"
70767		.3760		9.550	3-1/8"	1-9/16"	1.196"
	70913	.3760		9.550	4-1/4"	2-3/8"	1.948"
70769		.3770	V	9.576	3-1/4"	1-5/8"	1.200"
	70476	.3770	V	9.576	4-1/4"	2-3/8"	1.954"
70771		.3860	W	9.804	3-1/4"	1-5/8"	1.228"
	70481	.3860	W	9.804	4-1/2"	2-3/8"	2.000"
70773		.3906	25/64"	9.921	3-1/4"	1-5/8"	1.243"
	70486	.3906	25/64"	9.921	4-1/2"	2-3/8"	2.024"
70775		.3937		10.000	84	43	32
	70491	.3937		10.000	114	60	52
70777		.3970	X	10.084	3-5/16"	1-11/16"	1.263"
	70496	.3970	X	10.084	4-1/2"	2-1/2"	2.057"
70779		.4040	Y	10.262	3-5/16"	1-11/16"	1.286"
	70501	.4040	Y	10.262	4-1/2"	2-9/16"	2.094"
70781		.4062	13/32"	10.317	3-5/16"	1-11/16"	1.293"
	70506	.4062	13/32"	10.317	4-1/2"	2-9/16"	2.105"
70783		.4134		10.500	85	43	33
	70511	.4134		10.500	114	67	54
70785		.4219	27/64"	10.716	3-3/8"	1-11/16"	1.343"
	70516	.4219	27/64"	10.716	4-1/2"	2-11/16"	2.186"
70787		.4331		11.000	87	45	35
	70521	.4331		11.000	114	68	57
70789		.4375	7/16"	11.113	3-7/16"	1-3/4"	1.392"
	70526	.4375	7/16"	11.113	4-3/4"	2-13/16"	2.267"
70791		.4528		11.500	90	47	37
	70531	.4528		11.500	120	70	60
70793		.4531	29/64"	11.509	3-9/16"	1-13/16"	1.442"
	70536	.4531	29/64"	11.509	4-3/4"	2-7/8"	2.348"
70795		.4688	15/32"	11.909	3-11/16"	2-1/16"	1.491"
	70541	.4688	15/32"	11.909	4-3/4"	2-7/8"	2.429"
70797		.4724		12.000	93	53	38
	70546	.4724		12.000	120	73	62
70799		.4844	31/64"	12.304	3-11/16"	2-1/16"	1.541"
	70551	.4844	31/64"	12.304	5-5/16"	3"	2.510"
70801		.4921		12.500	95	53	40
	70556	.4921		12.500	135	75	65
70803		.5000	1/2"	12.700	3-3/4"	2-1/16"	1.591"
	70561	.5000	1/2"	12.700	5-3/8"	3-1/16"	2.591"
70805		.5010		12.725	3-3/4"	2-1/16"	1.594"
	70915	.5010		12.725	5-3/8"	3-1/16"	2.596"
70807		.5118		13.000	107	55	41
	70566	.5118		13.000	136	78	67

continued →

Series 1160, 1180 *(continued)*

.5156" - .6299"
(13.096mm - 16.000mm)

	3xD (1160) EDP#	5xD (1180) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
	70809		.5156	33/64"	13.096	4-1/4"	2-3/16"	1.641"
		70571	.5156	33/64"	13.096	5-3/8"	3-1/8"	2.672"
	70811		.5312	17/32"	13.492	4-1/4"	2-1/4"	1.690"
		70576	.5312	17/32"	13.492	5-11/16"	3-5/16"	2.753"
	70813		.5469	35/64"	13.891	4-1/4"	2-1/4"	1.740"
		70581	.5469	35/64"	13.891	5-13/16"	3-3/8"	2.834"
	70815		.5512		14.000	107	59	45
		70586	.5512		14.000	148	86	73
	70817		.5625	9/16"	14.287	4-1/2"	2-3/8"	1.790"
		70591	.5625	9/16"	14.287	5-15/16"	3-1/2"	2.915"
	70819		.5781	37/64"	14.683	4-1/2"	2-1/2"	1.840"
		70596	.5781	37/64"	14.683	6"	3-1/2"	2.996"
	70821		.5906		15.000	115	64	48
		70601	.5906		15.000	152	90	78
NEW	70823		.5938	19/32"	15.082	4-1/2"	2-1/2"	1.890"
		70606	.5938	19/32"	15.082	6"	3-9/16"	3.077"
	70825		.6094	39/64"	15.478	4-1/2"	2-9/16"	1.939"
		70611	.6094	39/64"	15.478	6-3/16"	3-11/16"	3.158"
	70827		.6250	5/8"	15.875	4-1/2"	2-5/8"	1.989"
		70616	.6250	5/8"	15.875	6-5/16"	3-3/4"	3.239"
	70829		.6299		16.000	115	66	51
		70621	.6299		16.000	160	95	83

1180 Series
High Performance Drill in aluminum

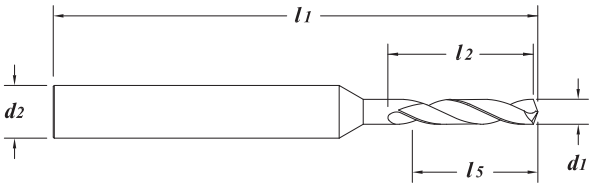
† *Metric equivalents are for reference only*

TOLERANCES	
d_1	+.000 –.010mm (+.0000" –.0004")
d_2	h6
l_1	+3.175 –3.175mm (+.125" –.125")
l_2	+3.175 –3.175mm (+.125" –.125")

Series 1550H,1250H,1850H

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

BALIQ® ALTINOS Coating (AlTiN-based)
BALIQ® ALTINOS-Beschichtet (AlTiN-based)
Recubrimiento BALIQ® ALTINOS (AlTiN-based)
Revêtement à BALIQ® ALTINOS (AlTiN-based)
Rivestimento BALIQ® ALTINOS (AlTiN-based)
BALIQ® ALTINOS涂层 (AlTiN-based)



High performance solid submicron grain carbide drill on 3mm or 1/8" diameter shank
30° helix for better chip evacuation
Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels >40Rc
Live tooling recommended on lathe processes

HochleistungsBohrer aus Feinkornhartmetall mit SchaftDurchmesser 3 mm oder 1/8 Zoll
30° Spirale für bessere Spanabfuhr
Empfohlen für Hoch Nickelhaltige und Hochwarmfeste Stähle, Kobaltbasislegierungen, Rostfreier- und Werkzeugstahl >40HRc
Empfehlung fuer den Einsatz auf der Drehmaschine

De alto rendimiento Broca de metal duro con un diámetro de mango 3mm ó 1/ 8"
Hélice de 30° para una mejor evacuación de viruta
Recomendado para aleaciones con alto contenido de níquel, aleaciones de alta temperatura, aleaciones con base de cobalto, aceros inoxidables, y aceros de herramienta >40HRc
Recomendación para la aplicación en torno

Haute prestation solide submicron foret carbure avec un de queue diameter de 3 mm ou 1/8"
Helice a 30° pour une meilleure evacuation de copeaux
Recommander pour base nickel, alliages a hautes temperatures, alliages de cobalt, aciers inoxydables et aciers a outils >40HRc
Outil de filature nécessaires pour une utilisation sur un processus de tournage

Sub-micro grana Punte in Metallo duro con gambo diametro 3 mm o 1/8"
Elica a 30° per una migliore evacuazione del truciolo
Raccomandata per lavorazioni su nickel, superleghe, leghe ad alta percentuale di cobalto, inox e acciai per utensili >40Hrc
Utensili rotanti sono consigliate se usato su un tornio

带加强的超细高效硬质合金钻头, 柄径3mm或1/8"
30° 螺旋角更便于排屑
高镍耐高温合金、钴基合金、不锈钢和工具钢 >40HRc
不建议在车床，或工具必须纺纱

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	d_1 † Decimal	d_1 † Diameter	d_1 † Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
00100			.0312	1/32"	0.792	1/8"	2"	5/32"	.099"
	00304		.0312	1/32"	0.792	1/8"	2"	15/64"	.162"
		00510	.0312	1/32"	0.792	1/8"	2"	7/16"	.380"
	00306		.0315		0.800	3.0	50	6.0	4
		00512	.0315		0.800	3.0	50	12.0	10
	00308		.0319		0.810	3.0	50	6.0	4
00106			.0320	#67	0.812	1/8"	2"	11/64"	.102"
	00310		.0320	#67	0.812	1/8"	2"	15/64"	.166"
		00516	.0320	#67	0.812	1/8"	2"	7/16"	.390"
		00518	.0323		0.820	3.0	50	12.0	10
00112			.0330	#66	0.838	1/8"	2"	11/64"	.105"
	00316		.0330	#66	0.838	1/8"	2"	15/64"	.171"
		00522	.0330	#66	0.838	1/8"	2"	7/16"	.402"
	00318		.0331		0.840	3.0	50	6.0	4
		00524	.0331		0.840	3.0	50	12.0	10
00116			.0335		0.850	3.0	50	4.5	3
		00526	.0335		0.850	3.0	50	12.0	10
	00322		.0339		0.860	3.0	50	6.5	4
		00528	.0339		0.860	3.0	50	13.0	10
00120			.0343		0.870	3.0	50	4.5	3
		00530	.0343		0.870	3.0	50	13.0	11
00122			.0346		0.880	3.0	50	4.5	3
00124			.0350	#65	0.890	3.0	50	4.5	3
	00328		.0350	#65	0.890	3.0	50	6.5	5
		00534	.0350	#65	0.890	3.0	50	13.0	11
	00330		.0354		0.900	3.0	50	6.5	5
		00536	.0354		0.900	3.0	50	13.0	11

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	l_5 Max Drill Depth
	00332		.0358		0.910	3.0	50	6.5	5
00130			.0360	#64	0.914	1/8"	2"	3/16"	.115"
	00334		.0360	#64	0.914	1/8"	2"	1/4"	.187"
		00540	.0360	#64	0.914	1/8"	2"	1/2"	.439"
00134			.0366		0.930	3.0	50	5.0	3
00136			.0370	#63	0.940	3.0	50	5.0	3
	00340		.0370	#63	0.940	3.0	50	7.0	5
		00546	.0370	#63	0.940	3.0	50	14.0	11
00138			.0374		0.950	3.0	50	5.0	3
00142			.0380	#62	0.965	1/8"	2"	3/16"	.120"
	00346		.0380	#62	0.965	1/8"	2"	17/64"	.197"
		00552	.0380	#62	0.965	1/8"	2"	9/16"	.463"
		00556	.0386		0.980	3.0	50	14.0	12
00148			.0390	#61	0.990	3.0	50	5.0	3
		00558	.0390	#61	0.990	3.0	50	14.0	12
00150			.0394		1.000	3.0	50	5.0	3
	00354		.0394		1.000	3.0	50	7.0	5
		00560	.0394		1.000	3.0	50	14.0	12
00152			.0400	#60	1.016	1/8"	2"	13/64"	.127"
	00356		.0400	#60	1.016	1/8"	2"	9/32"	.207"
		00562	.0400	#60	1.016	1/8"	2"	9/16"	.487"
00154			.0410	#59	1.041	1/8"	2"	13/64"	.131"
	00358		.0410	#59	1.041	1/8"	2"	9/32"	.213"
		00564	.0410	#59	1.041	1/8"	2"	9/16"	.500"
00156			.0413		1.050	3.0	50	5.5	3
	00360		.0413		1.050	3.0	50	7.5	5
		00566	.0413		1.050	3.0	50	15.0	13
00158			.0420	#58	1.066	1/8"	2"	7/32"	.134"
	00362		.0420	#58	1.066	1/8"	2"	5/16"	.218"
00160			.0430	#57	1.092	1/8"	2"	7/32"	.137"
	00364		.0430	#57	1.092	1/8"	2"	5/16"	.223"
		00570	.0430	#57	1.092	1/8"	2"	9/16"	.524"
00162			.0433		1.100	3.0	50	5.5	4
	00366		.0433		1.100	3.0	50	8.0	6
		00572	.0433		1.100	3.0	50	16.0	13
00164			.0453		1.150	3.0	50	6.0	4
	00368		.0453		1.150	3.0	50	8.0	6
		00574	.0453		1.150	3.0	50	16.0	14
00166			.0465	#56	1.181	1/8"	2"	15/64"	.148"
	00370		.0465	#56	1.181	1/8"	2"	11/32"	.241"
		00576	.0465	#56	1.181	1/8"	2"	5/8"	.567"

† *Metric equivalents are for reference only*

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	*d1* † Diameter Decimal	Diameter	Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
00168			.0469	3/64"	1.191	1/8"	2"	15/64"	.149"
	00372		.0469	3/64"	1.191	1/8"	2"	11/32"	.243"
		00578	.0469	3/64"	1.191	1/8"	2"	5/8"	.571"
00170			.0472		1.200	3.0	50	6.0	4
	00374		.0472		1.200	3.0	50	9.0	6
		00580	.0472		1.200	3.0	50	18.0	15
00172			.0492		1.250	3.0	50	6.5	4
	00376		.0492		1.250	3.0	50	9.0	6
		00582	.0492		1.250	3.0	50	18.0	15
00174			.0512		1.300	3.0	50	6.5	4
	00378		.0512		1.300	3.0	50	9.0	7
		00584	.0512		1.300	3.0	50	18.0	16
00176			.0520	#55	1.320	1/8"	2"	17/64"	.166"
	00380		.0520	#55	1.320	1/8"	2"	3/8"	.270"
		00586	.0520	#55	1.320	1/8"	2"	3/4"	.634"
00178			.0531		1.350	3.0	50	6.5	4
	00382		.0531		1.350	3.0	50	9.5	7
		00588	.0531		1.350	3.0	50	19.0	16
00180			.0550	#54	1.397	1/8"	2"	9/32"	.175"
	00384		.0550	#54	1.397	1/8"	2"	3/8"	.285"
		00590	.0550	#54	1.397	1/8"	2"	3/4"	.670"
00182			.0551		1.400	3.0	50	7.0	4
	00386		.0551		1.400	3.0	50	10.0	7
		00592	.0551		1.400	3.0	65	20.0	17
00184			.0571		1.450	3.0	50	7.0	5
	00388		.0571		1.450	3.0	50	10.5	8
		00594	.0571		1.450	3.0	65	21.0	18
00186			.0591		1.500	3.0	50	7.5	5
	00390		.0591		1.500	3.0	50	10.5	8
		00596	.0591		1.500	3.0	65	21.0	18
00188			.0595	#53	1.511	1/8"	2"	19/64"	.189"
	00392		.0595	#53	1.511	1/8"	2"	7/16"	.308"
		00598	.0595	#53	1.511	1/8"	2-1/2"	13/16"	.725"
00190			.0610		1.550	3.0	50	7.5	5
	00394		.0610		1.550	3.0	50	11.0	8
		00600	.0610		1.550	3.0	65	22.0	19
00192			.0625	1/16"	1.587	1/8"	2"	5/16"	.199"
	00396		.0625	1/16"	1.587	1/8"	2"	7/16"	.324"
		00602	.0625	1/16"	1.587	1/8"	2-1/2"	13/16"	.761"
00194			.0630		1.600	3.0	50	7.5	6
	00398		.0630		1.600	3.0	50	11.0	8
		00604	.0630		1.600	3.0	65	22.0	19
00196			.0635	#52	1.613	1/8"	2"	5/16"	.202"
	00400		.0635	#52	1.613	1/8"	2"	15/32"	.329"
		00606	.0635	#52	1.613	1/8"	2-1/2"	7/8"	.774"
00198			.0650		1.650	3.0	50	8.5	5
	00402		.0650		1.650	3.0	50	11.5	9
		00608	.0650		1.650	3.0	65	23.0	20
00200			.0669		1.700	3.0	50	8.5	5
	00404		.0669		1.700	3.0	50	11.5	9
		00610	.0669		1.700	3.0	65	23.0	21
00202			.0670	#51	1.702	1/8"	2"	11/32"	.213"
	00406		.0670	#51	1.702	1/8"	2"	15/32"	.347"
		00612	.0670	#51	1.702	1/8"	2-1/2"	7/8"	.816"
00204			.0689		1.750	3.0	50	9.0	6
	00408		.0689		1.750	3.0	50	12.0	9
		00614	.0689		1.750	3.0	65	24.0	21

continued →

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

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

TOLERANCES	
d_1	+.000 –.010mm (+.0000" –.0004")
d_2	h6
l_1	+3.175 –3.175mm (+.125" –.125")
l_2	+3.175 –3.175mm (+.125" –.125")

BALIQ® ALTINOS Coating (AlTiN-based)
BALIQ® ALTINOS-Beschichtet (AlTiN-based)
Recubrimiento BALIQ® ALTINOS (AlTiN-based)
Revêtement à BALIQ® ALTINOS (AlTiN-based)
Rivestimento BALIQ® ALTINOS (AlTiN-based)
BALIQ® ALTINOS涂层 (AlTiN-based)

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	l_5 Max Drill Depth
00206			.0700	#50	1.778	1/8"	2"	23/64"	.223"
	00410		.0700	#50	1.778	1/8"	2"	1/2"	.363"
		00616	.0700	#50	1.778	1/8"	2-1/2"	1"	.853"
00208			.0709		1.800	3.0	50	9.0	6
	00412		.0709		1.800	3.0	50	13.0	9
		00618	.0709		1.800	3.0	65	26.0	22
00210			.0728		1.850	3.0	50	9.5	6
		00620	.0728		1.850	3.0	65	26.0	23
00212			.0730	#49	1.854	1/8"	2"	3/8"	.232"
	00416		.0730	#49	1.854	1/8"	2"	1/2"	.378"
		00622	.0730	#49	1.854	1/8"	2-1/2"	1"	.889"
00214			.0748		1.900	3.0	50	9.5	6
	00418		.0748		1.900	3.0	50	13.5	10
		00624	.0748		1.900	3.0	65	27.0	23
00216			.0760	#48	1.930	1/8"	2"	3/8"	.242"
	00420		.0760	#48	1.930	1/8"	2"	17/32"	.394"
		00626	.0760	#48	1.930	1/8"	2-1/2"	1-1/8"	.926"
00218			.0768		1.950	3.0	50	10.0	6
	00422		.0768		1.950	3.0	50	14.0	10
		00628	.0768		1.950	3.0	65	28.0	24
00220			.0781	5/64"	1.983	1/8"	2"	13/32"	.249"
	00424		.0781	5/64"	1.983	1/8"	2"	9/16"	.405"
		00630	.0781	5/64"	1.983	1/8"	2-1/2"	1-1/8"	.951"
00222			.0785	#47	1.994	1/8"	2"	13/32"	.250"
	00426		.0785	#47	1.994	1/8"	2"	9/16"	.407"
		00632	.0785	#47	1.994	1/8"	2-1/2"	1-1/8"	.956"
00224			.0787		2.000	3.0	50	10.0	6
	00428		.0787		2.000	3.0	50	14.0	10
		00634	.0787		2.000	3.0	65	28.0	24
00226			.0807		2.050	3.0	50	10.5	7
	00430		.0807		2.050	3.0	50	14.0	11
		00636	.0807		2.050	3.0	65	28.0	25
00228			.0810	#46	2.057	1/8"	2"	27/64"	.258"
	00432		.0810	#46	2.057	1/8"	2"	9/16"	.420"
		00638	.0810	#46	2.057	1/8"	2-1/2"	1-1/8"	.987"
00230			.0820	#45	2.083	1/8"	2"	27/64"	.261"
	00434		.0820	#45	2.083	1/8"	2"	9/16"	.425"
		00640	.0820	#45	2.083	1/8"	2-1/2"	1-1/8"	.999"
00232			.0827		2.100	3.0	50	10.5	7
	00436		.0827		2.100	3.0	50	14.5	11
		00642	.0827		2.100	3.0	65	29.0	26
00234			.0846		2.150	3.0	50	11.0	7
	00438		.0846		2.150	3.0	50	14.5	11
		00644	.0846		2.150	3.0	65	29.0	26

† *Metric equivalents are for reference only*

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
00236			.0860	#44	2.184	1/8"	2"	7/16"	.274"
	00440		.0860	#44	2.184	1/8"	2"	19/32"	.446"
		00646	.0860	#44	2.184	1/8"	2-1/2"	1-3/16"	1.048"
00238			.0866		2.200	3.0	50	11.0	7
	00442		.0866		2.200	3.0	50	15.5	11
		00648	.0866		2.200	3.0	65	31.0	27
00240			.0886		2.250	3.0	50	11.5	7
00242			.0890	#43	2.260	1/8"	2"	29/64"	.283"
	00446		.0890	#43	2.260	1/8"	2"	5/8"	.461"
		00652	.0890	#43	2.260	1/8"	2-1/2"	1-1/4"	1.084"
00244			.0906		2.300	3.0	50	11.5	7
	00448		.0906		2.300	3.0	50	16.0	12
		00654	.0906		2.300	3.0	65	32.0	28
00246			.0925		2.350	3.0	50	12.0	7
	00450		.0925		2.350	3.0	50	16.0	12
		00656	.0925		2.350	3.0	65	32.0	29
00248			.0935	#42	2.375	1/8"	2"	31/64"	.298"
	00452		.0935	#42	2.375	1/8"	2"	21/32"	.485"
		00658	.0935	#42	2.375	1/8"	3"	1-5/16"	1.139"
00250			.0938	3/32"	2.382	1/8"	2"	31/64"	.299"
	00454		.0938	3/32"	2.382	1/8"	2"	21/32"	.486"
		00660	.0938	3/32"	2.382	1/8"	3"	1-5/16"	1.143"
00252			.0945		2.400	3.0	50	12.0	8
	00456		.0945		2.400	3.0	50	17.0	12
		00662	.0945		2.400	3.0	75	34.0	29
00254			.0960	#41	2.438	1/8"	2"	31/64"	.306"
	00458		.0960	#41	2.438	1/8"	2"	43/64"	.498"
		00664	.0960	#41	2.438	1/8"	3"	1-11/32"	1.170"
00256			.0965		2.450	3.0	50	12.5	8
00258			.0980	#40	2.489	1/8"	2"	1/2"	.312"
	00462		.0980	#40	2.489	1/8"	2"	11/16"	.508"
		00668	.0980	#40	2.489	1/8"	3"	1-3/8"	1.194"
00260			.0984		2.500	3.0	50	12.5	8
	00464		.0984		2.500	3.0	50	17.5	13
		00670	.0984		2.500	3.0	75	35.0	30
00262			.0995	#39	2.527	1/8"	2"	1/2"	.317"
	00466		.0995	#39	2.527	1/8"	2"	11/16"	.516"
		00672	.0995	#39	2.527	1/8"	3"	1-3/8"	1.212"
00264			.1004		2.550	3.0	50	13.0	8
	00468		.1004		2.550	3.0	50	17.5	13
		00674	.1004		2.550	3.0	75	35.0	31
00266			.1015	#38	2.578	1/8"	2"	17/32"	.323"
	00470		.1015	#38	2.578	1/8"	2"	45/64"	.526"
		00676	.1015	#38	2.578	1/8"	3"	1-13/32"	1.237"
00268			.1024		2.600	3.0	50	13.0	8
	00472		.1024		2.600	3.0	50	18.0	13
		00678	.1024		2.600	3.0	75	36.0	32
00270			.1040	#37	2.641	1/8"	2"	17/32"	.331"
	00474		.1040	#37	2.641	1/8"	2"	23/32"	.539"
		00680	.1040	#37	2.641	1/8"	3"	1-7/16"	1.267"
00272			.1043		2.650	3.0	50	13.5	8
	00476		.1043		2.650	3.0	50	18.5	14
		00682	.1043		2.650	3.0	75	37.0	32

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	l_5 Max Drill Depth
00274			.1063		2.700	3.0	50	13.5	9
	00478		.1063		2.700	3.0	50	19.0	14
		00684	.1063		2.700	3.0	75	38.0	33
00276			.1065	#36	2.705	1/8"	2"	17/32"	.339"
	00480		.1065	#36	2.705	1/8"	2"	3/4"	.552"
		00686	.1065	#36	2.705	1/8"	3"	1-1/2"	1.297"
00278			.1083		2.750	3.0	50	14.0	9
	00482		.1083		2.750	3.0	50	19.5	14
		00688	.1083		2.750	3.0	75	39.0	34
00280			.1094	7/64"	2.778	1/8"	2"	9/16"	.348"
	00484		.1094	7/64"	2.778	1/8"	2"	49/64"	.567"
		00690	.1094	7/64"	2.778	1/8"	3"	1-9/16"	1.333"
00282			.1100	#35	2.794	1/8"	2"	9/16"	.350"
	00486		.1100	#35	2.794	1/8"	2"	49/64"	.570"
		00692	.1100	#35	2.794	1/8"	3"	1-9/16"	1.340"
00284			.1102		2.800	3.0	50	14.0	9
	00488		.1102		2.800	3.0	50	19.5	15
		00694	.1102		2.800	3.0	75	39.0	34
00286			.1110	#34	2.819	1/8"	2"	9/16"	.353"
	00490		.1110	#34	2.819	1/8"	2"	25/32"	.575"
		00696	.1110	#34	2.819	1/8"	3"	1-5/8"	1.352"
00288			.1122		2.850	3.0	50	14.5	9
		00698	.1122		2.850	3.0	75	40.0	35
00290			.1130	#33	2.870	1/8"	2"	19/32"	.356"
	00494		.1130	#33	2.870	1/8"	2"	51/64"	.586"
		00700	.1130	#33	2.870	1/8"	3"	1-5/8"	1.377"
00292			.1142		2.900	3.0	50	14.5	9
	00496		.1142		2.900	3.0	50	20.0	15
		00702	.1142		2.900	3.0	75	40.0	35
00294			.1160	#32	2.946	1/8"	2"	19/32"	.369"
	00498		.1160	#32	2.946	1/8"	2"	13/16"	.601"
		00704	.1160	#32	2.946	1/8"	3"	1-5/8"	1.413"
00296			.1161		2.950	3.0	50	15.0	9
		00706	.1161		2.950	3.0	75	42.0	36
00298			.1181		3.000	3.0	50	15.0	10
	00502		.1181		3.000	3.0	50	21.0	16
		00708	.1181		3.000	3.0	75	42.0	37
00300			.1200	#31	3.048	1/8"	2"	5/8"	.382"
	00504		.1200	#31	3.048	1/8"	2"	7/8"	.622"
		00710	.1200	#31	3.048	1/8"	3"	1-3/4"	1.462"
00302			.1250	1/8"	3.175	1/8"	2"	5/8"	.398"
	00506		.1250	1/8"	3.175	1/8"	2"	7/8"	.648"
		00712	.1250	1/8"	3.175	1/8"	3"	1-3/4"	1.523"

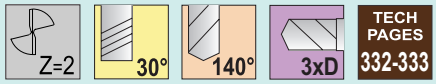
† *Metric equivalents are for reference only*

Series 1580HD

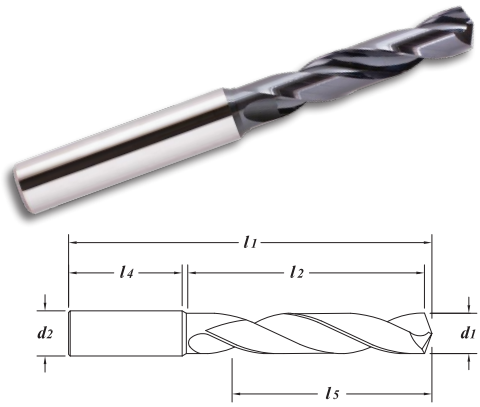
.1181" - .2342"
(3.000mm - 5.950mm)

TOLERANCES

d_1*	3mm - 6mm	+.016mm +.004mm (+.00063" +.00015")
	> 6mm - 10mm	+.021mm +.006mm (+.00082" +.00023")
	> 10mm - 18mm	+.025mm +.007mm (+.00098" +.00027")
	> 18mm - 20mm	+.029mm +.008mm (+.00114" +.00031")
d_2	h6	
l_1	+3.175 –3.175mm (+.125" –.125")	
l_2	+3.175 –3.175mm (+.125" –.125")	
l_4	+1.980 –.000mm (+.078" –.000")	



BALIQ® ALTINOS Coating (AlTiN-based)
BALIQ® ALTINOS-Beschichtet (AlTiN-based)
Recubrimiento BALIQ® ALTINOS (AlTiN-based)
Revêtement à BALIQ® ALTINOS (AlTiN-based)
Rivestimento BALIQ® ALTINOS (AlTiN-based)
BALIQ® ALTINOS涂层 (AlTiN-based)



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
Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels > 40Rc
Live tooling recommended on lathe processes

Hochleistungs Bohrer aus Feinkornhartmetall mit verstärktem Schaft
Bis zu 50% schneller als Standard Hartmetallbohrer
30° Spirale für bessere Spanabfuhr
Gehonte Schneidkante
Kann als Pilotbohrer verwendet werden
Empfohlen für Hoch Nickelhaltige und Hochwarmfeste Stähle, Kobaltbasislegierungen, Rostfreier- und Werkzeugstahl > 40HRc
Empfehlung fuer den Einsatz auf der Drehmaschine

Taladro de alto rendimiento de metal submicrónico duro con vástago
Hasta un 50% más rápidas que las brocas de carburo convencionales
Hélice de 30° para una mejor evacuación de viruta
Labio cortante afilado
Puede ser utilizada como broca piloto
Recomendado para aleaciones con alto contenido de níquel, aleaciones de alta temperatura, aleaciones con base de cobalto, aceros inoxidables, y aceros de herramienta > 40Rc
Recomendación para la aplicación en torno

Haute prestation avec drille à grain solide submicron carbure avec tige renforcé
50% plus rapide que les forets carbure standarts
Helice a 30° pour une meilleure evacuation de copeaux
Preparation de l'arete de coupe
Peut être utilisé comme foret pilote
Recommander pour base nickel, alliages a hautes temperatures, alliages de cobalt, aciers inoxydables et aciers a outils > 40HRC
Outil de filature nécessaires pour une utilisation sur un processus de tournage

Punte in sub-micro grana con gambo rinforzato per alte prestazioni
Fino al 50% più veloce rispetto alle punte in metallo duro standard
Elica a 30° per una migliore evacuazione del truciolo
Tagliente onato
Può essere usata come punta pilota
Raccomandata per lavorazioni su nickel, superleghe, leghe ad alta percentuale di cobalto, inox e acciai per utensili > 40Hrc
Utensili rotanti sono consigliate se usato su un tornio

带加强柄的超细高效整体硬质合金钻头
跟普通的硬质合金钻头相比可提高速度高达50%
30° 螺旋角更便于排屑
切削刃口经过珩磨
可做定心钻使用
高镍耐高温合金、钴基合金、不锈钢和工具钢 > 40HRC
不建议在车床，或工具必须纺纱

** 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_5 Max Drill Depth	l_4 Shank Length
20085	.1181	3.000	6.0	62	20	16	36
20095	.1220	3.100	6.0	62	20	15	36
20105	.1248	3.170	6.0	62	20	15	36
20115	.1260	3.200	6.0	62	20	15	36
20125	.1280	3.250	6.0	62	20	15	36
20135	.1299	3.300	6.0	62	20	15	36
20145	.1339	3.400	6.0	62	20	15	36
20155	.1378	3.500	6.0	62	20	15	36
20165	.1417	3.600	6.0	62	20	15	36
20175	.1457	3.700	6.0	62	20	14	36
20185	.1476	3.750	6.0	62	20	14	36
20195	.1496	3.800	6.0	66	24	18	36
20205	.1535	3.900	6.0	66	24	18	36
20215	.1575	4.000	6.0	66	24	18	36
20225	.1614	4.100	6.0	66	24	18	36
20235	.1654	4.200	6.0	66	24	18	36
20245	.1673	4.250	6.0	66	24	18	36
20255	.1693	4.300	6.0	66	24	18	36
20265	.1732	4.400	6.0	66	24	17	36
20275	.1772	4.500	6.0	66	24	17	36
20285	.1811	4.600	6.0	66	24	17	36
20295	.1831	4.650	6.0	66	24	17	36
20305	.1850	4.700	6.0	66	24	17	36
20315	.1870	4.750	6.0	66	24	17	36
20325	.1890	4.800	6.0	66	28	21	36
20335	.1929	4.900	6.0	66	28	21	36
20345	.1969	5.000	6.0	66	28	21	36
20355	.2008	5.100	6.0	66	28	20	36
20365	.2027	5.150	6.0	66	28	20	36
20375	.2047	5.200	6.0	66	28	20	36
20385	.2087	5.300	6.0	66	28	20	36
20395	.2165	5.500	6.0	66	28	20	36
20405	.2185	5.550	6.0	66	28	20	36
20408	.2205	5.600	6.0	66	28	20	36
20412	.2244	5.700	6.0	66	28	19	36
20415	.2283	5.800	6.0	66	28	19	36
20425	.2323	5.900	6.0	66	28	19	36
20435	.2342	5.950	6.0	66	28	19	36

continued →

Series 1580HD *(continued)*

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

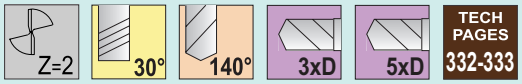
EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth	l_4 Shank Length
20445	.2362	6.000	6.0	66	28	19	36
20448	.2402	6.100	8.0	79	34	25	36
20452	.2441	6.200	8.0	79	34	25	36
20454	.2480	6.300	8.0	79	34	25	36
20455	.2500	6.350	8.0	79	34	24	36
20462	.2520	6.400	8.0	79	34	24	36
20465	.2559	6.500	8.0	79	34	24	36
20468	.2571	6.530	8.0	79	34	24	36
20472	.2598	6.600	8.0	79	34	24	36
20473	.2638	6.700	8.0	79	34	24	36
20475	.2657	6.750	8.0	79	34	24	36
20485	.2677	6.800	8.0	79	34	24	36
20495	.2717	6.900	8.0	79	34	24	36
20505	.2756	7.000	8.0	79	34	24	36
20515	.2795	7.100	8.0	79	41	30	36
20525	.2815	7.150	8.0	79	41	30	36
20535	.2835	7.200	8.0	79	41	30	36
20542	.2874	7.300	8.0	79	41	30	36
20545	.2913	7.400	8.0	79	41	30	36
20555	.2953	7.500	8.0	79	41	30	36
20565	.2972	7.550	8.0	79	41	30	36
20575	.2992	7.600	8.0	79	41	30	36
20585	.3031	7.700	8.0	79	41	29	36
20595	.3071	7.800	8.0	79	41	29	36
20605	.3130	7.950	8.0	79	41	29	36
20615	.3150	8.000	8.0	79	41	29	36
20622	.3189	8.100	10.0	89	47	35	40
20625	.3228	8.200	10.0	89	47	35	40
20635	.3268	8.300	10.0	89	47	35	40
20645	.3287	8.350	10.0	89	47	34	40
20652	.3307	8.400	10.0	89	47	34	40
20655	.3346	8.500	10.0	89	47	34	40
20665	.3386	8.600	10.0	89	47	34	40
20675	.3425	8.700	10.0	89	47	34	40
20685	.3445	8.750	10.0	89	47	34	40
20695	.3465	8.800	10.0	89	47	34	40
20705	.3504	8.900	10.0	89	47	34	40
20715	.3543	9.000	10.0	89	47	34	40
20725	.3583	9.100	10.0	89	47	33	40
20735	.3602	9.150	10.0	89	47	33	40
20745	.3622	9.200	10.0	89	47	33	40
20755	.3661	9.300	10.0	89	47	33	40
20762	.3701	9.400	10.0	89	47	33	40
20765	.3740	9.500	10.0	89	47	33	40
20775	.3760	9.550	10.0	89	47	33	40
20778	.3780	9.600	10.0	89	47	33	40
20782	.3819	9.700	10.0	89	47	32	40
20785	.3858	9.800	10.0	89	47	32	40
20795	.3898	9.900	10.0	89	47	32	40
20805	.3937	10.000	10.0	89	47	32	40
20812	.3976	10.100	12.0	102	55	40	45
20815	.4016	10.200	12.0	102	55	40	45
20825	.4055	10.300	12.0	102	55	40	45
20835	.4134	10.500	12.0	102	55	39	45
20842	.4173	10.600	12.0	102	55	39	45
20845	.4213	10.700	12.0	102	55	39	45
20855	.4252	10.800	12.0	102	55	39	45

† *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_5 Max Drill Depth	l_4 Shank Length
20865	.4331	11.000	12.0	102	55	38	45
20875	.4370	11.100	12.0	102	55	38	45
20885	.4409	11.200	12.0	102	55	38	45
20892	.4488	11.400	12.0	102	55	38	45
20895	.4528	11.500	12.0	102	55	38	45
20905	.4606	11.700	12.0	102	55	37	45
20915	.4685	11.900	12.0	102	55	37	45
20925	.4724	12.000	12.0	102	55	37	45
20935	.4764	12.100	14.0	107	60	42	45
20941	.4803	12.200	14.0	107	60	42	45
20945	.4842	12.300	14.0	107	60	42	45
20955	.4921	12.500	14.0	107	60	41	45
20961	.4961	12.600	14.0	107	60	41	45
20965	.5000	12.700	14.0	107	60	41	45
20975	.5039	12.800	14.0	107	60	41	45
20978	.5051	12.830	14.0	107	60	41	45
20981	.5079	12.900	14.0	107	60	41	45
20982	.5098	12.950	14.0	107	60	41	45
20985	.5118	13.000	14.0	107	60	41	45
20995	.5157	13.100	14.0	107	60	40	45
20998	.5236	13.300	14.0	107	60	40	45
21005	.5315	13.500	14.0	107	60	40	45
21015	.5394	13.700	14.0	107	60	39	45
21025	.5433	13.800	14.0	107	60	39	45
21035	.5512	14.000	14.0	107	60	39	45
21045	.5551	14.100	16.0	115	65	44	48
21053	.5591	14.200	16.0	115	65	44	48
21055	.5610	14.250	16.0	115	65	44	48
21065	.5630	14.300	16.0	115	65	44	48
21075	.5709	14.500	16.0	115	65	43	48
21085	.5787	14.700	16.0	115	65	43	48
21105	.5906	15.000	16.0	115	65	43	48
21115	.5945	15.100	16.0	115	65	42	48
21125	.6102	15.500	16.0	115	65	42	48
21135	.6181	15.700	16.0	115	65	41	48
21145	.6220	15.800	16.0	115	65	41	48
21155	.6299	16.000	16.0	115	65	41	48
21159	.6331	16.080	18.0	123	73	49	48
21175	.6496	16.500	18.0	123	73	48	48
21185	.6555	16.650	18.0	123	73	48	48
21195	.6693	17.000	18.0	123	73	48	48
21215	.6870	17.450	18.0	123	73	47	48
21225	.6890	17.500	18.0	123	73	47	48
21235	.7027	17.850	18.0	123	73	46	48
21245	.7087	18.000	18.0	123	73	46	48
21255	.7185	18.250	20.0	131	79	52	50
21265	.7283	18.500	20.0	131	79	51	50
21275	.7342	18.650	20.0	131	79	51	50
21295	.7500	19.050	20.0	131	79	50	50
21304	.7598	19.300	20.0	131	79	50	50
21315	.7677	19.500	20.0	131	79	50	50
21325	.7815	19.850	20.0	131	79	49	50
21335	.7874	20.000	20.0	131	79	49	50

Series 1580H, 1280H

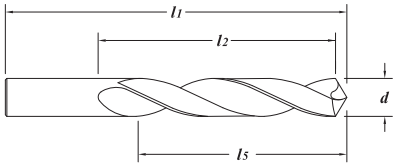
.1181" - .1719"
(3.000mm - 4.366mm)



TOLERANCES

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

BALIQ® ALTINOS Coating (AlTiN-based)
BALIQ® ALTINOS-Beschichtet (AlTiN-based)
Recubrimiento BALIQ® ALTINOS (AlTiN-based)
Revêtement à BALIQ® ALTINOS (AlTiN-based)
Rivestimento BALIQ® ALTINOS (AlTiN-based)
BALIQ® ALTINOS涂层 (AlTiN-based)



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
Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels >40Rc
Live tooling recommended on lathe processes

Hochleistungs- Vollhartmetallbohrer aus Feinkornhartmetall
Hohe Leistung – Hohe Vorschubgeschwindigkeiten
Bis zu 50% schneller als Standard Hartmetallbohrer
30° Spirale für bessere Spanabfuhr
Gehonte Schneidkante
Empfohlen für Hoch Nickelhaltige und Hochwarmfeste Stähle, Kobaltbasislegierungen, Rostfreier- und Werkzeugstahl >40HRc
Empfehlung fuer den Einsatz auf der Drehmaschine

Broca de submicrograno sólido carburo de alto rendimiento
Mayor duración de la herramienta y mejores acabados superficiales gracias al mayor índice SFM
Hasta un 50% más rápidas que las brocas de carburo convencionales
Hélice de 30° para una mejor evacuación de viruta
Labio cortante afilado
Recomendado para aleaciones con alto contenido de níquel, aleaciones de alta temperatura, aleaciones con base de cobalto, aceros inoxidables, y aceros de herramienta >40Rc
Recomendación para la aplicación en torno

Forets carbure submicrograin a haute performance – haut pouvoir de coupe
Amelioration de la duree de vie et de l'etat de surface en finition aussi avec des avances plus elevees
50% plus rapide que les forets carbure standarts
Helice a 30° pour une meilleure evacuation de copeaux
Preparation de l'arete de coupe
Recommander pour base nickel, alliages a hautes temperatures, alliages de cobalt, aciers inoxydables et aciers a outils >40HRC
Outil de filature nécessaires pour une utilisation sur un processus de tournage

Alte prestazioni – Alta penetrazioni Super sub-micrograno metallo duro
Vita utensile più lunga e ottima finitura della superficie con maggiori avanzamenti
Fino al 50% più veloce rispetto alle punte in metallo duro standard
Elica a 30° per una migliore evacuazione del truciolo
Tagliente onato
Raccomandata per lavorazioni su nickel, superleghe, leghe ad alta percentuale di cobalto, inox e acciai per utensili >40Hrc
Utensili rotanti sono consigliate se usato su un tornio

高效率—高进给 高效整体硬质合金钻头
通过加快切削速度延长刀具使用寿命、提高表面光洁度
跟普通的硬质合金钻头相比可提高速度高达50%
30° 螺旋角更便于排屑
切削刃口经过珩磨
高镍耐高温合金、钴基合金、不锈钢和工具钢 >40HRC
不建议在车床，或工具必须纺纱

3xD (1580H) EDP#	5xD (1280H) EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
20301		.1181		3.000	46	16	10
	21301	.1181		3.000	50	19	16
20306		.1200	#31	3.048	1-13/16"	5/8"	.382"
	21306	.1200	#31	3.048	2"	3/4"	.622"
20311		.1250	1/8"	3.175	1-15/16"	11/16"	.398"
	21311	.1250	1/8"	3.175	2"	3/4"	.648"
20316		.1285	#30	3.264	1-15/16"	11/16"	.409"
	21316	.1285	#30	3.264	2-1/4"	3/4"	.666"
20321		.1360	#29	3.454	2-1/16"	3/4"	.433"
	21321	.1360	#29	3.454	2-1/4"	7/8"	.705"
20326		.1378		3.500	52	19	11
	21326	.1378		3.500	57	22	18
20331		.1405	#28	3.569	2-1/16"	3/4"	.447"
	21331	.1405	#28	3.569	2-1/4"	7/8"	.728"
20336		.1406	9/64"	3.571	2-1/16"	3/4"	.447"
	21336	.1406	9/64"	3.571	2-1/4"	7/8"	.729"
20341		.1440	#27	3.658	2-1/16"	3/4"	.458"
	21341	.1440	#27	3.658	2-1/4"	7/8"	.746"
20346		.1470	#26	3.734	2-3/16"	13/16"	.468"
	21346	.1470	#26	3.734	2-1/4"	7/8"	.762"
20351		.1495	#25	3.797	2-3/16"	13/16"	.476"
	21351	.1495	#25	3.797	2-1/4"	15/16"	.775"
20356		.1520	#24	3.861	2-3/16"	13/16"	.484"
	21356	.1520	#24	3.861	2-1/4"	15/16"	.788"
20361		.1540	#23	3.912	2-3/16"	13/16"	.490"
	21361	.1540	#23	3.912	2-1/4"	15/16"	.798"
20366		.1562	5/32"	3.967	2-3/16"	13/16"	.497"
	21366	.1562	5/32"	3.967	2-1/2"	15/16"	.809"
20371		.1570	#22	3.988	2-3/16"	13/16"	.500"
	21371	.1570	#22	3.988	2-1/2"	15/16"	.814"
20376		.1575		4.000	56	21	13
	21376	.1575		4.000	65	24	21
20381		.1590	#21	4.039	2-3/16"	13/16"	.506"
	21381	.1590	#21	4.039	2-1/2"	15/16"	.824"
20386		.1610	#20	4.089	2-3/16"	13/16"	.512"
	21386	.1610	#20	4.089	2-1/2"	15/16"	.834"
20391		.1660	#19	4.216	2-9/32"	15/16"	.528"
	21391	.1660	#19	4.216	2-1/2"	1"	.860"
20396		.1695	#18	4.305	2-9/32"	15/16"	.539"
	21396	.1695	#18	4.305	2-1/2"	1"	.878"
20401		.1719	11/64"	4.366	2-9/32"	15/16"	.547"
	21401	.1719	11/64"	4.366	2-1/2"	1"	.891"

† *Metric equivalents are for reference only*

3xD (1580H) EDP#	5xD (1280H) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
20406		.1730	#17	4.394	2-9/32"	15/16"	.551"
	21406	.1730	#17	4.394	2-1/2"	1"	.897"
20411		.1770	#16	4.496	2-9/32"	15/16"	.563"
	21411	.1770	#16	4.496	2-1/2"	1"	.917"
20416		.1772		4.500	58	24	14
	21416	.1772		4.500	65	25	23
20421		.1800	#15	4.572	2-9/32"	15/16"	.573"
	21421	.1800	#15	4.572	2-3/4"	1"	.933"
20426		.1820	#14	4.623	2-9/32"	15/16"	.579"
	21426	.1820	#14	4.623	2-3/4"	1"	.943"
20431		.1850	#13	4.700	2-9/32"	15/16"	.589"
	21431	.1850	#13	4.700	2-3/4"	1-1/4"	.959"
20436		.1875	3/16"	4.763	2-13/32"	1"	.597"
	21436	.1875	3/16"	4.763	2-3/4"	1-1/4"	.972"
20441		.1890	#12	4.801	2-13/32"	1"	.601"
	21441	.1890	#12	4.801	2-3/4"	1-1/4"	.979"
20446		.1910	#11	4.851	2-13/32"	1"	.608"
	21446	.1910	#11	4.851	2-3/4"	1-1/4"	.990"
20451		.1935	#10	4.915	2-13/32"	1"	.616"
	21451	.1935	#10	4.915	2-3/4"	1-1/4"	1.003"
20456		.1960	#9	4.978	2-13/32"	1"	.624"
	21456	.1960	#9	4.978	3"	1-5/16"	1.016"
20461		.1969		5.000	61	25	16
	21461	.1969		5.000	75	33	26
20466		.1990	#8	5.055	2-13/32"	1"	.633"
	21466	.1990	#8	5.055	3"	1-5/16"	1.031"
20471		.2010	#7	5.105	2-13/32"	1"	.640"
	21471	.2010	#7	5.105	3"	1-5/16"	1.042"
20476		.2031	13/64"	5.159	2-13/32"	1"	.646"
	21476	.2031	13/64"	5.159	3"	1-5/16"	1.053"
20481		.2040	#6	5.182	2-13/32"	1"	.649"
	21481	.2040	#6	5.182	3"	1-3/8"	1.057"
20486		.2055	#5	5.220	2-13/32"	1"	.654"
	21486	.2055	#5	5.220	3"	1-3/8"	1.065"
20491		.2090	#4	5.309	2-13/32"	1"	.665"
	21491	.2090	#4	5.309	3"	1-3/8"	1.083"
20496		.2130	#3	5.410	2-5/8"	1-3/32"	.678"
	21496	.2130	#3	5.410	3"	1-3/8"	1.104"
20501		.2165		5.500	67	28	18
	21501	.2165		5.500	75	35	29
20506		.2188	7/32"	5.558	2-5/8"	1-3/32"	.696"
	21506	.2188	7/32"	5.558	3"	1-3/8"	1.134"
20511		.2210	#2	5.613	2-5/8"	1-3/32"	.703"
	21511	.2210	#2	5.613	3"	1-3/8"	1.145"
20516		.2280	#1	5.791	2-5/8"	1-3/32"	.726"
	21516	.2280	#1	5.791	3"	1-3/8"	1.182"
20521		.2340	A	5.944	2-5/8"	1-3/32"	.745"
	21521	.2340	A	5.944	3-1/4"	1-1/2"	1.213"
20526		.2344	15/64"	5.954	2-5/8"	1-3/32"	.746"
	21526	.2344	15/64"	5.954	3-1/4"	1-1/2"	1.215"
20531		.2362		6.000	67	28	19
	21531	.2362		6.000	80	38	31
20536		.2380	B	6.045	2-3/4"	1-7/32"	.757"
	21536	.2380	B	6.045	3-1/4"	1-5/8"	1.233"

continued →

Series 1580H, 1280H *(continued)*

.2420" - .3438"
(6.147mm - 8.733mm)

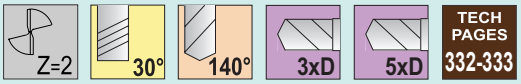
3xD (1580H) EDP#	5xD (1280H) EDP#	*d* † Diameter Decimal		*d* † Diameter Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
20541		.2420	C	6.147	2-3/4"	1-7/32"	.770"
	21541	.2420	C	6.147	3-1/4"	1-5/8"	1.254"
20546		.2460	D	6.248	2-3/4"	1-7/32"	.783"
	21546	.2460	D	6.248	3-1/4"	1-5/8"	1.275"
20551		.2500	1/4" / E	6.350	2-3/4"	1-7/32"	.796"
	21551	.2500	1/4" / E	6.350	3-1/4"	1-5/8"	1.296"
20556		.2559		6.500	70	31	21
	21556	.2559		6.500	80	41	34
20561		.2570	F	6.528	2-3/4"	1-7/32"	.818"
	21561	.2570	F	6.528	3-1/4"	1-11/16"	1.332"
20566		.2610	G	6.629	2-3/4"	1-7/32"	.831"
	21566	.2610	G	6.629	3-1/2"	1-11/16"	1.353"
20571		.2656	17/64"	6.746	2-15/16"	1-11/32"	.845"
	21571	.2656	17/64"	6.746	3-1/2"	1-11/16"	1.376"
20576		.2660	H	6.756	2-15/16"	1-11/32"	.846"
	21576	.2660	H	6.756	3-1/2"	1-11/16"	1.378"
20581		.2720	I	6.909	2-15/16"	1-11/32"	.866"
	21581	.2720	I	6.909	3-1/2"	1-11/16"	1.410"
20586		.2756		7.000	75	34	22
	21586	.2756		7.000	88	43	36
20591		.2770	J	7.036	2-15/16"	1-11/32"	.881"
	21591	.2770	J	7.036	3-1/2"	1-11/16"	1.435"
20596		.2810	K	7.137	2-15/16"	1-11/32"	.894"
	21596	.2810	K	7.137	3-1/2"	1-3/4"	1.456"
20601		.2812	9/32"	7.142	2-15/16"	1-11/32"	.895"
	21601	.2812	9/32"	7.142	3-1/2"	1-3/4"	1.457"
20606		.2900	L	7.366	2-15/16"	1-11/32"	.923"
	21606	.2900	L	7.366	3-1/2"	1-3/4"	1.503"
20611		.2950	M	7.493	2-15/16"	1-11/32"	.939"
	21611	.2950	M	7.493	3-3/4"	1-3/4"	1.529"
20616		.2953		7.500	75	34	24
	21616	.2953		7.500	95	44	39
20621		.2969	19/64"	7.541	3-3/32"	1-15/32"	.945"
	21621	.2969	19/64"	7.541	3-3/4"	1-7/8"	1.539"
20626		.3020	N	7.671	3-3/32"	1-15/32"	.961"
	21626	.3020	N	7.671	3-3/4"	1-7/8"	1.565"
20631		.3125	5/16"	7.938	3-3/32"	1-15/32"	.994"
	21631	.3125	5/16"	7.938	3-3/4"	1-7/8"	1.619"
20636		.3150		8.000	79	37	25
	21636	.3150		8.000	95	48	41
20641		.3160	O	8.026	3-3/32"	1-15/32"	1.006"
	21641	.3160	O	8.026	3-3/4"	1-7/8"	1.638"
20646		.3230	P	8.204	3-3/32"	1-15/32"	1.028"
	21646	.3230	P	8.204	3-3/4"	2-3/32"	1.674"
20651		.3281	21/64"	8.334	3-3/32"	1-15/32"	1.044"
	21651	.3281	21/64"	8.334	4"	2-3/32"	1.700"
20656		.3320	Q	8.433	3-3/32"	1-15/32"	1.056"
	21656	.3320	Q	8.433	4"	2-3/32"	1.720"
20661		.3346		8.500	79	37	27
	21661	.3346		8.500	100	53	44
20666		.3390	R	8.611	3-5/16"	1-9/16"	1.079"
	21666	.3390	R	8.611	4"	2-3/32"	1.757"
20671		.3438	11/32"	8.733	3-5/16"	1-9/16"	1.094"
	21671	.3438	11/32"	8.733	4"	2-3/16"	1.782"

† *Metric equivalents are for reference only*

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

Series 1580H, 1280H *(continued)*

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



BALIQ® ALTINOS Coating (AlTiN-based)
BALIQ® ALTINOS-Beschichtet (AlTiN-based)
Recubrimiento BALIQ® ALTINOS (AlTiN-based)
Revêtement à BALIQ® ALTINOS (AlTiN-based)
Rivestimento BALIQ® ALTINOS (AlTiN-based)
BALIQ® ALTINOS涂层 (AlTiN-based)

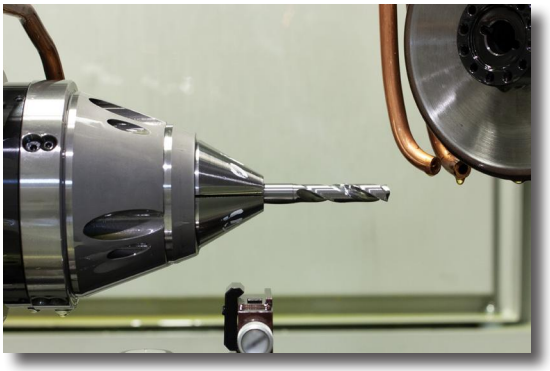
3xD (1580H) EDP#	5xD (1280H) EDP#	*d* † Diameter Decimal		Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
20676		.3480	S	8.839	3-5/16"	1-9/16"	1.107"
	21676	.3480	S	8.839	4"	2-3/16"	1.803"
20681		.3543		9.000	84	40	29
	21681	.3543		9.000	100	56	47
20686		.3580	T	9.093	3-5/16"	1-9/16"	1.139"
	21686	.3580	T	9.093	4-1/4"	2-9/32"	1.855"
20691		.3594	23/64"	9.129	3-5/16"	1-9/16"	1.144"
	21691	.3594	23/64"	9.129	4-1/4"	2-9/32"	1.862"
20696		.3680	U	9.347	3-5/16"	1-9/16"	1.171"
	21696	.3680	U	9.347	4-1/4"	2-9/32"	1.907"
20701		.3740		9.500	84	40	30
	21701	.3740		9.500	105	58	49
20706		.3750	3/8"	9.525	3-1/2"	1-11/16"	1.193"
	21706	.3750	3/8"	9.525	4-1/4"	2-3/8"	1.943"
20711		.3770	V	9.576	3-1/2"	1-11/16"	1.200"
	21711	.3770	V	9.576	4-1/4"	2-3/8"	1.954"
20716		.3860	W	9.804	3-1/2"	1-11/16"	1.228"
	21716	.3860	W	9.804	4-1/2"	2-3/8"	2.000"
20721		.3906	25/64"	9.921	3-1/2"	1-11/16"	1.243"
	21721	.3906	25/64"	9.921	4-1/2"	2-3/8"	2.024"
20726		.3937		10.000	89	43	32
	21726	.3937		10.000	115	60	52
20731		.3970	X	10.084	3-1/2"	1-11/16"	1.263"
	21731	.3970	X	10.084	4-1/2"	2-1/2"	2.057"
20736		.4040	Y	10.262	3-1/2"	1-11/16"	1.286"
	21736	.4040	Y	10.262	4-1/2"	2-9/16"	2.094"
20741		.4062	13/32"	10.317	3-1/2"	1-11/16"	1.293"
	21741	.4062	13/32"	10.317	4-1/2"	2-9/16"	2.105"
20746		.4130	Z	10.490	3-1/2"	1-11/16"	1.314"
	21746	.4130	Z	10.490	4-1/2"	2-5/8"	2.140"
20751		.4134		10.500	89	43	33
	21751	.4134		10.500	115	67	54
20756		.4219	27/64"	10.716	3-3/4"	1-13/16"	1.343"
	21756	.4219	27/64"	10.716	4-1/2"	2-11/16"	2.186"
20761		.4331		11.000	95	46	35
	21761	.4331		11.000	115	68	57
20766		.4375	7/16"	11.113	3-3/4"	1-13/16"	1.392"
	21766	.4375	7/16"	11.113	4-3/4"	2-13/16"	2.267"
20771		.4528		11.500	95	46	37
	21771	.4528		11.500	120	71	60
20776		.4531	29/64"	11.509	3-3/4"	1-13/16"	1.442"
	21776	.4531	29/64"	11.509	4-3/4"	2-7/8"	2.348"

continued →

Series 1580H, 1280H *(continued)*

.4688" - .6299"
(11.908mm - 16.000mm)

3xD (1580H) EDP#	5xD (1280H) EDP#	*d* † Diameter Decimal		*d* † Diameter Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
20781		.4688	15/32"	11.908	4"	1-15/16"	1.492"
	21781	.4688	15/32"	11.908	4-3/4"	2-7/8"	2.429"
20786		.4724		12.000	102	49	38
	21786	.4724		12.000	120	73	62
20791		.4844	31/64"	12.304	4"	1-15/16"	1.541"
	21791	.4844	31/64"	12.304	5-5/16"	3"	2.510"
20796		.4921		12.500	102	49	40
	21796	.4921		12.500	135	76	65
20801		.5000	1/2"	12.700	4"	1-15/16"	1.591"
	21801	.5000	1/2"	12.700	5-3/8"	3-1/16"	2.591"
20806		.5118		13.000	107	53	41
	21806	.5118		13.000	135	78	67
20811		.5156	33/64"	13.096	4-7/32"	2-3/32"	1.641"
	21811	.5156	33/64"	13.096	5-3/8"	3-1/8"	2.672"
20816		.5312	17/32"	13.492	4-7/32"	2-3/32"	1.690"
	21816	.5312	17/32"	13.492	5-11/16"	3-5/16"	2.753"
20821		.5315		13.500	110	56	43
	21821	.5315		13.500	145	84	70
20826		.5469	35/64"	13.891	4-5/16"	2-7/32"	1.740"
	21826	.5469	35/64"	13.891	5-13/16"	3-3/8"	2.834"
20831		.5512		14.000	110	56	45
	21831	.5512		14.000	145	86	73
20836		.5625	9/16"	14.288	4-9/16"	2-15/32"	1.790"
	21836	.5625	9/16"	14.288	5-15/16"	3-1/2"	2.915"
20841		.5709		14.500	116	63	46
	21841	.5709		14.500	150	89	75
20846		.5781	37/64"	14.684	4-15/16"	2-9/16"	1.840"
	21846	.5781	37/64"	14.684	6"	3-1/2"	2.996"
20851		.5906		15.000	125	65	48
	21851	.5906		15.000	150	90	78
20856		.5938	19/32"	15.083	4-15/16"	2-9/16"	1.890"
	21856	.5938	19/32"	15.083	6"	3-9/16"	3.077"
20861		.6094	39/64"	15.479	5-1/16"	2-13/16"	1.939"
	21861	.6094	39/64"	15.479	6-3/16"	3-11/16"	3.158"
20866		.6102		15.500	129	71	49
	21866	.6102		15.500	160	94	80
20871		.6250	5/8"	15.875	5-1/4"	3-1/8"	1.989"
	21871	.6250	5/8"	15.875	6-5/16"	3-3/4"	3.239"
20876		.6299		16.000	133	79	51
	21876	.6299		16.000	160	95	83



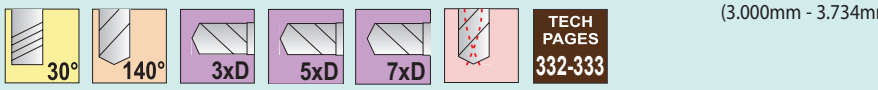
† *Metric equivalents are for reference only*

TOLERANCES		
d_1 *	3mm - 6mm	+.016mm +.004mm (+.00063" +.00015")
	> 6mm - 10mm	+.021mm +.006mm (+.00082" +.00023")
	> 10mm - 18mm	+.025mm +.007mm (+.00098" +.00027")
	> 18mm - 20mm	+.029mm +.008mm (+.00114" +.00031")
d_2	h6	
l_1	+3.175 –3.175mm (+.125" –.125")	
l_2	+3.175 –3.175mm (+.125" –.125")	
l_4	+1.980 –.000mm (+.078" –.000")	

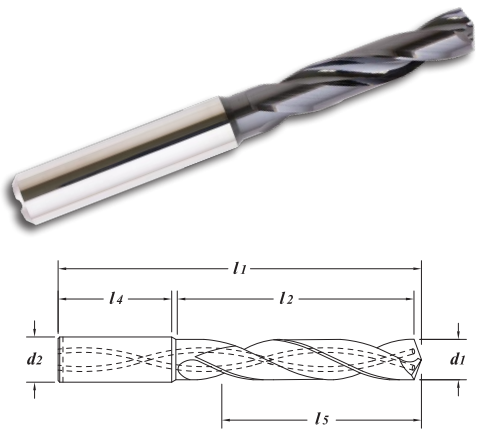
NEW ITEMS

Series 1580KD, 1280KD, 1880KD

.1181" - .1470"
(3.000mm - 3.734mm)



BALIQ® ALTINOS Coating (AlTiN-based)
BALIQ® ALTINOS-Beschichtet (AlTiN-based)
Recubrimiento BALIQ® ALTINOS (AlTiN-based)
Revêtement à BALIQ® ALTINOS (AlTiN-based)
Rivestimento BALIQ® ALTINOS (AlTiN-based)
BALIQ® ALTINOS涂层 (AlTiN-based)



* *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.*

High performance solid submicron grain carbide drill with reinforced shank
Coolant through 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
Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels > 40Rc
Live tooling recommended on lathe processes

Hochleistungs Bohrer aus Feinkornhartmetall mit verstärktem Schaft
Mit Innenkühlung für Systeme mit hohen Kühlmitteldruck
Bis zu 70% schneller als Standard Hartmetallbohrer
30° Spirale für bessere Spanabfuhr
Gehonte Schneidkante
Kann als Pilotbohrer verwendet werden
Empfohlen für Hoch Nickelhaltige und Hochwarmfeste Stähle, Kobaltbasislegierungen, Rostfreier- und Werkzeugstah > 40HRc
Empfehlung fuer den Einsatz auf der Drehmaschine

Taladro de alto rendimiento de metal submicrónico duro con vástago
Refrigeración interior para sistemas con refrigeración de alta presión
Hasta un 70% más rápidas que las brocas de carburo convencionales
Hélice de 30° para una mejor evacuación de viruta
Labio cortante afilado
Puede ser utilizada como broca piloto
Recomendado para aleaciones con alto contenido de níquel, aleaciones de alta temperatura, aleaciones con base de cobalto, aceros inoxidables, y aceros de herramienta > 40Rc
Recomendación para la aplicación en torno

Haute prestation avec drille à grain solide submicron carbure avec tige renforcé
Lubrification central pour système de lubrification haute pression
70% plus rapide que les forets carbure standarts
Helice a 30° pour une meilleure evacuation de copeaux
Preparation de l'arete de coupe
Peut être utilisé comme foret pilote
Recommander pour base nickel, alliages a hautes temperatures, alliages de cobalt, aciers inoxydables et aciers a outils > 40HRC
Outil de filature nécessaires pour une utilisation sur un processus de tournage

Punte in sub-micro grana con gambo rinforzato per alte prestazioni
Lubrificazione interna per sistemi ad alta pressione
Fino al 70% più veloce rispetto alle punte in metallo duro standard
Elica a 30° per una migliore evacuazione del truciolo
Tagliente onato
Può essere usata come punta pilota
Raccomandata per lavorazioni su nickel, superleghe, leghe ad alta percentuale di cobalto, inox e acciai per utensili > 40Hrc
Utensili rotanti sono consigliate se usato su un tornio

带加强柄的超细高效整体硬质合金钻头
内冷孔用于高压内冷系统
跟普通的硬质合金钻头相比可提高速度高达70%
30° 螺旋角更便于排屑
切削刃口经过珩磨
可做定心钻使用
高镍耐高温合金、钴基合金、不锈钢和工具钢 > 40HRC
不建议在车床，或工具必须纺纱

3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	d_1 Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth	l_4 Shank Length
27995			.1181		3.000	6.0	62	20	16	36
	25065		.1181		3.000	6.0	66	28	24	36
		26942	.1181		3.000	6.0	70	30	26	36
28005			.1220		3.100	6.0	62	20	15	36
	25075		.1220		3.100	6.0	66	28	23	36
28015			.1248		3.170	6.0	62	20	15	36
	25085		.1248		3.170	6.0	66	28	23	36
		26946	.1248		3.170	6.0	70	30	25	36
28018			.1250	1/8"	3.175	6.0	62	20	15	36
	25088		.1250	1/8"	3.175	6.0	66	28	23	36
		26948	.1250	1/8"	3.175	6.0	70	30	25	36
28025			.1260		3.200	6.0	62	20	15	36
	25095		.1260		3.200	6.0	66	28	23	36
		26950	.1260		3.200	6.0	70	30	25	36
28035			.1280		3.250	6.0	62	20	15	36
	25105		.1280		3.250	6.0	66	28	23	36
		26952	.1280		3.250	6.0	70	30	25	36
28038			.1285	#30	3.264	6.0	62	20	15	36
	25108		.1285	#30	3.264	6.0	66	28	23	36
		26954	.1285	#30	3.264	6.0	70	30	25	36
28045			.1299		3.300	6.0	62	20	15	36
	25115		.1299		3.300	6.0	66	28	23	36
		26956	.1299		3.300	6.0	70	30	25	36
28055			.1339		3.400	6.0	62	20	15	36
	25125		.1339		3.400	6.0	66	28	23	36
28058			.1360	#29	3.454	6.0	62	20	15	36
	25128		.1360	#29	3.454	6.0	66	28	23	36
		26960	.1360	#29	3.454	6.0	70	30	25	36
28065			.1378		3.500	6.0	62	20	15	36
	25135		.1378		3.500	6.0	66	28	23	36
		26962	.1378		3.500	6.0	75	37	32	36
28075			.1417		3.600	6.0	62	20	15	36
	25145		.1417		3.600	6.0	66	28	23	36
28085			.1457		3.700	6.0	62	20	14	36
	25155		.1457		3.700	6.0	66	28	22	36
28088			.1470	#26	3.734	6.0	62	20	14	36
	25158		.1470	#26	3.734	6.0	66	28	22	36
		26968	.1470	#26	3.734	6.0	75	37	31	36

continued →

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

.1476" - .1811"
(3.750mm - 4.600mm)

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	*d1* Diameter Decimal		Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth	*l4* Shank Length
	28095			.1476		3.750	6.0	62	20	14	36
		25165		.1476		3.750	6.0	66	28	22	36
NEW			26972	.1476		3.750	6.0	75	37	31	36
	28098			.1495	#25	3.797	6.0	62	20	14	36
		25172		.1495	#25	3.797	6.0	66	28	22	36
NEW			26978	.1495	#25	3.797	6.0	75	37	31	36
	28105			.1496		3.800	6.0	66	24	18	36
		25175		.1496		3.800	6.0	74	36	30	36
	28115			.1535		3.900	6.0	66	24	18	36
		25185		.1535		3.900	6.0	74	36	30	36
			26982	.1535		3.900	6.0	75	37	31	36
	28118			.1562	5/32"	3.967	6.0	66	24	18	36
		25192		.1562	5/32"	3.967	6.0	74	36	30	36
			26984	.1562	5/32"	3.967	6.0	75	37	31	36
	28125			.1563		3.970	6.0	66	24	18	36
		25195		.1563		3.970	6.0	74	36	30	36
	28135			.1575		4.000	6.0	66	24	18	36
		25205		.1575		4.000	6.0	74	36	30	36
			26986	.1575		4.000	6.0	75	37	31	36
	28138			.1590	#21	4.038	6.0	66	24	18	36
		25208		.1590	#21	4.038	6.0	74	36	30	36
			26988	.1590	#21	4.038	6.0	75	37	31	36
	28140			.1610	#20	4.089	6.0	66	24	18	36
		25212		.1610	#20	4.089	6.0	74	36	30	36
			26990	.1610	#20	4.089	6.0	75	37	31	36
	28145			.1614		4.100	6.0	66	24	18	36
		25215		.1614		4.100	6.0	74	36	30	36
			26992	.1614		4.100	6.0	75	37	31	36
	28155			.1654		4.200	6.0	66	24	18	36
		25225		.1654		4.200	6.0	74	36	30	36
			26994	.1654		4.200	6.0	75	37	31	36
	28158			.1660	#19	4.216	6.0	66	24	18	36
		25228		.1660	#19	4.216	6.0	74	36	30	36
			26996	.1660	#19	4.216	6.0	85	45	39	36
	28165			.1673		4.250	6.0	66	24	18	36
		25235		.1673		4.250	6.0	74	36	30	36
NEW			26998	.1673		4.250	6.0	85	45	39	36
	28175			.1693		4.300	6.0	66	24	18	36
		25245		.1693		4.300	6.0	74	36	30	36
	28178			.1719	11/64"	4.366	6.0	66	24	17	36
		25248		.1719	11/64"	4.366	6.0	74	36	29	36
			27002	.1719	11/64"	4.366	6.0	85	45	38	36
	28185			.1732		4.400	6.0	66	24	17	36
		25255		.1732		4.400	6.0	74	36	29	36
			27004	.1732		4.400	6.0	85	45	38	36
	28188			.1770	#16	4.496	6.0	66	24	17	36
		25262		.1770	#16	4.496	6.0	74	36	29	36
			27006	.1770	#16	4.496	6.0	85	45	38	36
	28195			.1772		4.500	6.0	66	24	17	36
		25265		.1772		4.500	6.0	74	36	29	36
			27008	.1772		4.500	6.0	85	45	38	36
	28205			.1811		4.600	6.0	66	24	17	36
		25275		.1811		4.600	6.0	74	36	29	36
			27011	.1811		4.600	6.0	85	45	38	36
	28208			.1820	#14	4.622	6.0	66	24	17	36
		25280		.1820	#14	4.622	6.0	74	36	29	36
NEW			27012	.1820	#14	4.622	6.0	90	50	43	36

† *Metric equivalents are for reference only*

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	*d1* Diameter Decimal		Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth	*l4* Shank Length
		25285		.1831		4.650	6.0	74	36	29	36
			27014	.1831		4.650	6.0	90	50	43	36
	28225			.1850		4.700	6.0	66	24	17	36
		25295		.1850		4.700	6.0	74	36	29	36
	28235			.1870		4.750	6.0	66	24	17	36
		25305		.1870		4.750	6.0	74	36	29	36
NEW			27016	.1870		4.750	6.0	90	50	43	36
	28238			.1875	3/16"	4.762	6.0	66	28	21	36
		25310		.1875	3/16"	4.762	6.0	74	36	29	36
			27018	.1875	3/16"	4.762	6.0	90	50	43	36
	28245			.1890	#12	4.800	6.0	66	28	21	36
		25315		.1890	#12	4.800	6.0	82	44	37	36
			27021	.1890	#12	4.800	6.0	90	50	43	36
	28255			.1929		4.900	6.0	66	28	21	36
		25325		.1929		4.900	6.0	82	44	37	36
			27022	.1929		4.900	6.0	90	50	43	36
	28258			.1960	#9	4.978	6.0	66	28	21	36
		25330		.1960	#9	4.978	6.0	82	44	37	36
NEW			27024	.1960	#9	4.978	6.0	90	50	43	36
	28265			.1969		5.000	6.0	66	28	21	36
		25335		.1969		5.000	6.0	82	44	37	36
			27026	.1969		5.000	6.0	90	50	43	36
	28275			.2008		5.100	6.0	66	28	20	36
		25345		.2008		5.100	6.0	82	44	36	36
	28278			.2010	#7	5.105	6.0	66	28	20	36
		25348		.2010	#7	5.105	6.0	82	44	36	36
			27031	.2010	#7	5.105	6.0	97	57	49	36
	28285			.2027		5.150	6.0	66	28	20	36
		25355		.2027		5.150	6.0	82	44	36	36
	28295			.2047		5.200	6.0	66	28	20	36
		25365		.2047		5.200	6.0	82	44	36	36
	28305			.2087		5.300	6.0	66	28	20	36
		25375		.2087		5.300	6.0	82	44	36	36
	28308			.2130	#3	5.410	6.0	66	28	20	36
		25380		.2130	#3	5.410	6.0	82	44	36	36
			27036	.2130	#3	5.410	6.0	97	57	49	36
	28315			.2165		5.500	6.0	66	28	20	36
		25385		.2165		5.500	6.0	82	44	36	36
			27038	.2165		5.500	6.0	97	57	49	36
	28325			.2185		5.550	6.0	66	28	20	36
		25395		.2185		5.550	6.0	82	44	36	36
	28328			.2188	7/32"	5.557	6.0	66	28	20	36
		25398		.2188	7/32"	5.557	6.0	82	44	36	36
			27041	.2188	7/32"	5.557	6.0	97	57	49	36
	28335			.2205		5.600	6.0	66	28	20	36
		25397		.2205		5.600	6.0	82	44	36	36
NEW			27042	.2205		5.600	6.0	97	57	49	36
	28345			.2244		5.700	6.0	66	28	19	36
		25400		.2244		5.700	6.0	82	44	35	36
			27044	.2244		5.700	6.0	97	57	48	36
	28348			.2280	#1	5.791	6.0	66	28	19	36
		25403		.2280	#1	5.791	6.0	82	44	35	36
			27046	.2280	#1	5.791	6.0	97	57	48	36
	28355			.2283		5.800	6.0	66	28	19	36
		25405		.2283		5.800	6.0	82	44	35	36
			27048	.2283		5.800	6.0	97	57	48	36

continued →

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

.2323" - .2812"
(5.900mm - 7.142mm)

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	d_1 Diameter Decimal	d_1 Diameter	d_1 Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth	l_4 Shank Length
	28365			.2323		5.900	6.0	66	28	19	36
		25415		.2323		5.900	6.0	82	44	35	36
NEW			27051	.2323		5.900	6.0	97	57	48	36
	28375			.2342		5.950	6.0	66	28	19	36
		25425		.2342		5.950	6.0	82	44	35	36
NEW			27052	.2342		5.950	6.0	97	57	48	36
	28385			.2362		6.000	6.0	66	28	19	36
		25435		.2362		6.000	6.0	82	44	35	36
			27054	.2362		6.000	6.0	97	57	48	36
	28395			.2402		6.100	8.0	79	34	25	36
		25437		.2402		6.100	8.0	91	53	44	36
	28405			.2441		6.200	8.0	79	34	25	36
		25440		.2441		6.200	8.0	91	53	44	36
	28415			.2480		6.300	8.0	79	34	25	36
		25443		.2480		6.300	8.0	91	53	44	36
	28425			.2500	1/4"	6.350	8.0	79	34	24	36
		25445		.2500	1/4"	6.350	8.0	91	53	43	36
			27056	.2500	1/4"	6.350	8.0	106	66	56	36
	28435			.2520		6.400	8.0	79	34	24	36
		25450		.2520		6.400	8.0	91	53	43	36
			27058	.2520		6.400	8.0	106	66	56	36
	28445			.2559		6.500	8.0	79	34	24	36
		25455		.2559		6.500	8.0	91	53	43	36
			27061	.2559		6.500	8.0	106	66	56	36
	28446			.2571		6.530	8.0	79	34	24	36
		25457		.2571		6.530	8.0	91	53	43	36
			27062	.2571		6.530	8.0	106	66	56	36
	28455			.2598		6.600	8.0	79	34	24	36
		25460		.2598		6.600	8.0	91	53	43	36
			27064	.2598		6.600	8.0	106	66	56	36
		25463		.2638		6.700	8.0	91	53	43	36
			27066	.2638		6.700	8.0	106	66	56	36
	28463			.2656	17/64"	6.746	8.0	79	34	24	36
		25464		.2656	17/64"	6.746	8.0	91	53	43	36
			27068	.2656	17/64"	6.746	8.0	106	66	56	36
	28465			.2657		6.750	8.0	79	34	24	36
		25465		.2657		6.750	8.0	91	53	43	36
	28475			.2677		6.800	8.0	79	34	24	36
		25475		.2677		6.800	8.0	91	53	43	36
			27071	.2677		6.800	8.0	106	66	56	36
	28485			.2717		6.900	8.0	79	34	24	36
		25485		.2717		6.900	8.0	91	53	43	36
			27072	.2717		6.900	8.0	116	76	66	36
	28495			.2756		7.000	8.0	79	34	24	36
		25495		.2756		7.000	8.0	91	53	43	36
			27074	.2756		7.000	8.0	116	76	66	36
NEW	28498			.2770	J	7.035	8.0	79	41	30	36
		25498		.2770	J	7.035	8.0	91	53	42	36
NEW			27076	.2770	J	7.035	8.0	116	76	65	36
	28505			.2795		7.100	8.0	79	41	30	36
		25505		.2795		7.100	8.0	91	53	42	36
	28508			.2812	9/32"	7.142	8.0	79	41	30	36
		25512		.2812	9/32"	7.142	8.0	91	53	42	36
			27079	.2812	9/32"	7.142	8.0	116	76	65	36

† *Metric equivalents are for reference only*

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	*d1* Diameter Decimal		*d1* Diameter Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth	*l4* Shank Length
	28515			.2815		7.150	8.0	79	41	30	36
		25515		.2815		7.150	8.0	91	53	42	36
NEW			27082	.2815		7.150	8.0	116	76	65	36
	28525			.2835		7.200	8.0	79	41	30	36
		25525		.2835		7.200	8.0	91	53	42	36
	28535			.2874		7.300	8.0	79	41	30	36
		25530		.2874		7.300	8.0	91	53	42	36
	28545			.2913		7.400	8.0	79	41	30	36
		25535		.2913		7.400	8.0	91	53	42	36
	28555			.2953		7.500	8.0	79	41	30	36
		25545		.2953		7.500	8.0	91	53	42	36
			27086	.2953		7.500	8.0	116	76	65	36
	28565			.2972		7.550	8.0	79	41	30	36
		25555		.2972		7.550	8.0	91	53	42	36
			27088	.2972		7.550	8.0	116	76	65	36
	28575			.2992		7.600	8.0	79	41	30	36
		25565		.2992		7.600	8.0	91	53	42	36
	28578			.3020	N	7.670	8.0	79	41	29	36
		25570		.3020	N	7.670	8.0	91	53	41	36
NEW			27092	.3020	N	7.670	8.0	116	76	64	36
	28585			.3031		7.700	8.0	79	41	29	36
		25575		.3031		7.700	8.0	91	53	41	36
	28595			.3071		7.800	8.0	79	41	29	36
		25585		.3071		7.800	8.0	91	53	41	36
			27096	.3071		7.800	8.0	116	76	64	36
	28602			.3125	5/16"	7.937	8.0	79	41	29	36
		25593		.3125	5/16"	7.937	8.0	91	53	41	36
			27101	.3125	5/16"	7.937	8.0	116	76	64	36
	28605			.3130		7.950	8.0	79	41	29	36
		25595		.3130		7.950	8.0	91	53	41	36
			27102	.3130		7.950	8.0	116	76	64	36
	28615			.3150		8.000	8.0	79	41	29	36
		25605		.3150		8.000	8.0	91	53	41	36
			27104	.3150		8.000	8.0	116	76	64	36
	28625			.3189		8.100	10.0	89	47	35	40
		25610		.3189		8.100	10.0	103	61	49	40
	28635			.3228		8.200	10.0	89	47	35	40
		25615		.3228		8.200	10.0	103	61	49	40
	28638			.3230	P	8.204	10.0	89	47	35	40
NEW		25618		.3230	P	8.204	10.0	103	61	49	40
NEW			27108	.3230	P	8.204	10.0	131	87	75	40
	28645			.3268		8.300	10.0	89	47	35	40
		25625		.3268		8.300	10.0	103	61	49	40
	28648			.3281	21/64"	8.333	10.0	89	47	35	40
		25628		.3281	21/64"	8.333	10.0	103	61	49	40
			27112	.3281	21/64"	8.333	10.0	131	87	75	40
	28655			.3287		8.350	10.0	89	47	34	40
		25635		.3287		8.350	10.0	103	61	48	40
			27114	.3287		8.350	10.0	131	87	74	40
	28665			.3307		8.400	10.0	89	47	34	40
		25640		.3307		8.400	10.0	103	61	48	40
	28675			.3346		8.500	10.0	89	47	34	40
		25645		.3346		8.500	10.0	103	61	48	40
			27118	.3346		8.500	10.0	131	87	74	40
	28685			.3386		8.600	10.0	89	47	34	40
		25655		.3386		8.600	10.0	103	61	48	40
			27121	.3386		8.600	10.0	131	87	74	40

continued →

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

.3390" - .3906"
(8.610mm - 9.920mm)

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	Decimal	d_1 Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth	l_4 Shank Length
	28688			.3390	R	8.610	10.0	89	47	34	40
		25658		.3390	R	8.610	10.0	103	61	48	40
			27122	.3390	R	8.610	10.0	131	87	74	40
	28695			.3425		8.700	10.0	89	47	34	40
		25665		.3425		8.700	10.0	103	61	48	40
			27124	.3425		8.700	10.0	131	87	74	40
	28698			.3438	11/32"	8.732	10.0	89	47	34	40
		25670		.3438	11/32"	8.732	10.0	103	61	48	40
			27126	.3438	11/32"	8.732	10.0	131	87	74	40
	28725			.3445		8.750	10.0	89	47	34	40
		25675		.3445		8.750	10.0	103	61	48	40
			27128	.3445		8.750	10.0	131	87	74	40
	28735			.3465		8.800	10.0	89	47	34	40
		25685		.3465		8.800	10.0	103	61	48	40
			27130	.3465		8.800	10.0	131	87	74	40
	28745			.3504		8.900	10.0	89	47	34	40
		25695		.3504		8.900	10.0	103	61	48	40
	28755			.3543		9.000	10.0	89	47	34	40
		25705		.3543		9.000	10.0	103	61	48	40
			27134	.3543		9.000	10.0	131	87	74	40
	28765			.3583		9.100	10.0	89	47	33	40
		25715		.3583		9.100	10.0	103	61	47	40
	28768			.3594	23/64"	9.128	10.0	89	47	33	40
		25720		.3594	23/64"	9.128	10.0	103	61	47	40
			27138	.3594	23/64"	9.128	10.0	139	95	84	40
		25725		.3602		9.150	10.0	103	61	47	40
NEW			27140	.3602		9.150	10.0	139	95	81	40
	28815			.3622		9.200	10.0	89	47	33	40
		25735		.3622		9.200	10.0	103	61	47	40
	28825			.3661		9.300	10.0	89	47	33	40
		25745		.3661		9.300	10.0	103	61	47	40
	28845			.3701		9.400	10.0	89	47	33	40
		25750		.3701		9.400	10.0	103	61	47	40
	28855			.3740		9.500	10.0	89	47	33	40
		25755		.3740		9.500	10.0	103	61	47	40
NEW			27146	.3740		9.500	10.0	139	95	81	40
	28858			.3750	3/8"	9.525	10.0	89	47	33	40
		25760		.3750	3/8"	9.525	10.0	103	61	47	40
			27148	.3750	3/8"	9.525	10.0	139	95	81	40
	28875			.3760		9.550	10.0	89	47	33	40
		25765		.3760		9.550	10.0	103	61	47	40
NEW			27150	.3760		9.550	10.0	139	95	81	40
	28878			.3780		9.600	10.0	89	47	33	40
		25767		.3780		9.600	10.0	103	61	47	40
			27152	.3780		9.600	10.0	139	95	81	40
	28882			.3819		9.700	10.0	89	47	32	40
		25770		.3819		9.700	10.0	103	61	46	40
	28885			.3858		9.800	10.0	89	47	32	40
		25775		.3858		9.800	10.0	103	61	46	40
	28895			.3898		9.900	10.0	89	47	32	40
		25785		.3898		9.900	10.0	103	61	46	40
			27160	.3898		9.900	10.0	139	95	80	40
	28898			.3906	25/64"	9.920	10.0	89	47	32	40
		25787		.3906	25/64"	9.920	10.0	103	61	46	40
			27162	.3906	25/64"	9.920	10.0	139	95	80	40

† *Metric equivalents are for reference only*

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	*d1* Diameter Decimal	*d1* Diameter	*d1* Diameter Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth	*l4* Shank Length
	28905			.3937		10.000	10.0	89	47	32	40
		25795		.3937		10.000	10.0	103	61	46	40
			27164	.3937		10.000	10.0	139	95	80	40
	28925			.3976		10.100	12.0	102	55	40	45
		25800		.3976		10.100	12.0	118	71	56	45
	28935			.4016		10.200	12.0	102	55	40	45
		25805		.4016		10.200	12.0	118	71	56	45
	28945			.4055		10.300	12.0	102	55	40	45
		25815		.4055		10.300	12.0	118	71	56	45
NEW			27170	.4055		10.300	12.0	155	106	91	45
	28948			.4062	13/32"	10.317	12.0	102	55	40	45
		25817		.4062	13/32"	10.317	12.0	118	71	56	45
			27172	.4062	13/32"	10.317	12.0	155	106	91	45
	28953			.4130	Z	10.490	12.0	102	55	39	45
		25823		.4130	Z	10.490	12.0	118	71	55	45
			27178	.4130	Z	10.490	12.0	155	106	90	45
	28955			.4134		10.500	12.0	102	55	39	45
		25825		.4134		10.500	12.0	118	71	55	45
			27180	.4134		10.500	12.0	155	106	90	45
	28965			.4173		10.600	12.0	102	55	39	45
		25830		.4173		10.600	12.0	118	71	55	45
NEW			27182	.4173		10.600	12.0	155	106	90	45
	28975			.4213		10.700	12.0	102	55	39	45
		25835		.4213		10.700	12.0	118	71	55	45
NEW			27184	.4213		10.700	12.0	155	106	90	45
	28978			.4219	27/64"	10.716	12.0	102	55	39	45
		25838		.4219	27/64"	10.716	12.0	118	71	55	45
			27186	.4219	27/64"	10.716	12.0	155	106	90	45
	28985			.4252		10.800	12.0	102	55	39	45
		25845		.4252		10.800	12.0	118	71	55	45
	28995			.4331		11.000	12.0	102	55	39	45
		25855		.4331		11.000	12.0	118	71	55	45
			27190	.4331		11.000	12.0	163	114	98	45
	29005			.4370		11.100	12.0	102	55	38	45
		25865		.4370		11.100	12.0	118	71	54	45
	29008			.4375	7/16"	11.112	12.0	102	55	38	45
		25868		.4375	7/16"	11.112	12.0	118	71	54	45
			27194	.4375	7/16"	11.112	12.0	163	114	97	45
	29015			.4409		11.200	12.0	102	55	38	45
		25875		.4409		11.200	12.0	118	71	54	45
	29025			.4488		11.400	12.0	102	55	38	45
		25880		.4488		11.400	12.0	118	71	54	45
	29035			.4528		11.500	12.0	102	55	38	45
		25885		.4528		11.500	12.0	118	71	54	45
NEW	29038			.4531	29/64"	11.508	12.0	102	55	38	45
		25888		.4531	29/64"	11.508	12.0	118	71	54	45
			27200	.4531	29/64"	11.508	12.0	163	114	97	45
	29045			.4606		11.700	12.0	102	55	37	45
		25895		.4606		11.700	12.0	118	71	53	45
	29055			.4685		11.900	12.0	102	55	37	45
	29058			.4688	15/32"	11.907	12.0	102	55	37	45
		25910		.4688	15/32"	11.907	12.0	118	71	53	45
			27208	.4688	15/32"	11.907	12.0	163	114	96	45

continued →

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

.4724" - .5610"
(12.000mm - 14.250mm)

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	Decimal	*d1* Diameter	Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth	*l4* Shank Length
	29065			.4724		12.000	12.0	102	55	37	45
		25915		.4724		12.000	12.0	118	71	53	45
NEW			27210	.4724		12.000	12.0	163	114	96	45
	29075			.4764		12.100	14.0	107	60	42	45
		25925		.4764		12.100	14.0	124	77	59	45
	29085			.4803		12.200	14.0	107	60	42	45
		25930		.4803		12.200	14.0	124	77	59	45
	29095			.4842		12.300	14.0	107	60	42	45
		25935		.4842		12.300	14.0	124	77	59	45
	29098			.4844	31/64"	12.303	14.0	107	60	42	45
		25937		.4844	31/64"	12.303	14.0	124	77	59	45
			27214	.4844	31/64"	12.303	14.0	182	133	115	45
	29115			.4921		12.500	14.0	107	60	41	45
		25945		.4921		12.500	14.0	124	77	58	45
			27218	.4921		12.500	14.0	182	133	114	45
	29125			.4961		12.600	14.0	107	60	41	45
		25950		.4961		12.600	14.0	124	77	58	45
	29135			.5000	1/2"	12.700	14.0	107	60	41	45
		25955		.5000	1/2"	12.700	14.0	124	77	58	45
			27220	.5000	1/2"	12.700	14.0	182	133	114	45
	29145			.5039		12.800	14.0	107	60	41	45
		25960		.5039		12.800	14.0	124	77	58	45
	29148			.5051		12.830	14.0	107	60	41	45
		25961		.5051		12.830	14.0	124	77	58	45
NEW			27224	.5051		12.830	14.0	182	133	114	45
	29155			.5079		12.900	14.0	107	60	41	45
NEW			27226	.5079		12.900	14.0	182	133	114	45
	29161			.5098		12.950	14.0	107	60	41	45
NEW			27228	.5098		12.950	14.0	182	133	114	45
	29165			.5118		13.000	14.0	107	60	41	45
		25965		.5118		13.000	14.0	124	77	58	45
			27230	.5118		13.000	14.0	182	133	114	45
	29175			.5157		13.100	14.0	107	60	40	45
		25975		.5157		13.100	14.0	124	77	57	45
	29181			.5236		13.300	14.0	107	60	40	45
	29184			.5312	17/32"	13.492	14.0	107	60	40	45
		25983		.5312	17/32"	13.492	14.0	124	77	57	45
			27238	.5312	17/32"	13.492	14.0	182	133	113	45
	29185			.5315		13.500	14.0	107	60	40	45
		25985		.5315		13.500	14.0	124	77	57	45
NEW			27240	.5315		13.500	14.0	182	133	113	45
	29195			.5394		13.700	14.0	107	60	39	45
		25995		.5394		13.700	14.0	124	77	56	45
	29205			.5433		13.800	14.0	107	60	39	45
		26005		.5433		13.800	14.0	124	77	56	45
	29215			.5512		14.000	14.0	107	60	39	45
		26015		.5512		14.000	14.0	124	77	56	45
			27250	.5512		14.000	14.0	182	133	112	45
	29225			.5551		14.100	16.0	115	65	44	48
		26025		.5551		14.100	16.0	133	83	62	48
	29235			.5591		14.200	16.0	115	65	44	48
		26027		.5591		14.200	16.0	133	83	62	48
	29245			.5610		14.250	16.0	115	65	44	48

† *Metric equivalents are for reference only*

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	Decimal	*d1* Diameter	Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth	*l4* Shank Length
	29250			.5625	9/16"	14.287	16.0	115	65	44	48
		26042		.5625	9/16"	14.287	16.0	133	83	62	48
			27254	.5625	9/16"	14.287	16.0	204	152	131	48
	29255			.5630		14.300	16.0	115	65	44	48
		26045		.5630		14.300	16.0	133	83	62	48
	29265			.5709		14.500	16.0	115	65	43	48
		26055		.5709		14.500	16.0	133	83	61	48
NEW			27258	.5709		14.500	16.0	204	152	130	48
	29275			.5787		14.700	16.0	115	65	43	48
		26065		.5787		14.700	16.0	133	83	61	48
	29285			.5827		14.800	16.0	115	65	43	48
		26067		.5827		14.800	16.0	133	83	61	48
	29305			.5906		15.000	16.0	115	65	43	48
		26075		.5906		15.000	16.0	133	83	61	48
			27264	.5906		15.000	16.0	204	152	130	48
NEW	29308			.5938	19/32"	15.082	16.0	115	65	42	48
		26083		.5938	19/32"	15.082	16.0	133	83	60	48
			27266	.5938	19/32"	15.082	16.0	204	152	129	48
	29315			.5945		15.100	16.0	115	65	42	48
		26085		.5945		15.100	16.0	133	83	60	48
NEW			27268	.5945		15.100	16.0	204	152	129	48
	29325			.6102		15.500	16.0	115	65	42	48
		26095		.6102		15.500	16.0	133	83	60	48
		26105		.6181		15.700	16.0	133	83	59	48
	29345			.6220		15.800	16.0	115	65	41	48
		26107		.6220		15.800	16.0	133	83	59	48
NEW			27276	.6220		15.800	16.0	204	152	128	48
	29348			.6250	5/8"	15.875	16.0	115	65	41	48
		26108		.6250	5/8"	15.875	16.0	133	83	59	48
NEW			27278	.6250	5/8"	15.875	16.0	204	152	128	48
		26115		.6299		16.000	16.0	133	83	59	48
NEW			27282	.6299		16.000	16.0	204	152	128	48
	29363			.6331		16.080	18.0	123	73	49	48
		26118		.6331		16.080	18.0	143	93	69	48
	29365			.6339		16.100	18.0	123	73	49	48
		26119		.6339		16.100	18.0	143	93	69	48
		26123		.6378		16.200	18.0	143	93	69	48
	29375			.6398		16.250	18.0	123	73	49	48
		26125		.6398		16.250	18.0	143	93	69	48
	29385			.6496		16.500	18.0	123	73	48	48
		26135		.6496		16.500	18.0	143	93	68	48
	29395			.6555		16.650	18.0	123	73	48	48
		26145		.6555		16.650	18.0	143	93	68	48
	29405			.6693		17.000	18.0	123	73	48	48
		26155		.6693		17.000	18.0	143	93	68	48
	29415			.6713		17.050	18.0	123	73	47	48
		26165		.6713		17.050	18.0	143	93	67	48
	29425			.6870		17.450	18.0	123	73	47	48
		26175		.6870		17.450	18.0	143	93	67	48
	29435			.6890		17.500	18.0	123	73	47	48
		26185		.6890		17.500	18.0	143	93	67	48
	29445			.7027		17.850	18.0	123	73	46	48
		26195		.7027		17.850	18.0	143	93	66	48
	29455			.7087		18.000	18.0	123	73	46	48
		26205		.7087		18.000	18.0	143	93	66	48
		26215		.7185		18.250	20.0	153	101	74	50
		26225		.7283		18.500	20.0	153	101	73	50

continued →

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

.7342" - .7874"
(18.650mm - 20.000mm)

3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	d_1 Diameter Decimal		d_1 Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth	l_4 Shank Length
	26235		.7342		18.650	20.0	153	101	73	50
	26245		.7480		19.000	20.0	153	101	73	50
29505			.7500	3/4"	19.050	20.0	131	79	50	50
	26255		.7500	3/4"	19.050	20.0	153	101	72	50
29545			.7579		19.250	20.0	131	79	50	50
29546			.7590		19.280	20.0	131	79	50	50
	26260		.7590		19.280	20.0	153	101	72	50
29551			.7598		19.300	20.0	131	79	50	50
	26261		.7598		19.300	20.0	153	101	72	50
29565			.7677		19.500	20.0	131	79	50	50
	26281		.7795		19.800	20.0	153	101	71	50
29595			.7815		19.850	20.0	131	79	49	50
29605			.7874		20.000	20.0	131	79	49	50

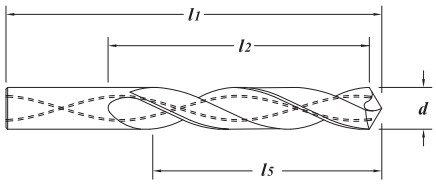
† *Metric equivalents are for reference only*

Series 1580KH, 1280KH, 1880KH

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

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

BALIQ® ALTINOS Coating (AlTiN-based)
BALIQ® ALTINOS-Beschichtet (AlTiN-based)
Recubrimiento BALIQ® ALTINOS (AlTiN-based)
Revêtement à BALIQ® ALTINOS (AlTiN-based)
Rivestimento BALIQ® ALTINOS (AlTiN-based)
BALIQ® ALTINOS涂层 (AlTiN-based)



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
Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels > 40Rc
Live tooling recommended on lathe processes

Hohe Leistung – Hohe Vorschubgeschwindigkeiten- Vollhartmetallbohrer aus Feinkornhartmetall
Kühlkanäle für Hochdruck Kühlmittelsysteme
Bis zu 70% schneller als Standard Hartmetallbohrer
30° Spirale für bessere Spanabfuhr
Gehonte Schneidkante
Empfohlen für Hoch Nickelhaltige und Hochwarmfeste Stähle, Kobaltbasislegierungen, Rostfreier- und Werkzeugstahl > 40HRc
Empfehlung fuer den Einsatz auf der Drehmaschine

Broca de submicrograno sólido carburo de alto rendimiento
Orificios de paso refrigerante concebidos para sistemas de refrigeración de alta presión
Hasta un 70% más rápidas que las brocas de carburo convencionales
Hélice de 30° para una mejor evacuación de viruta
Labio cortante afilado
Recomendado para aleaciones con alto contenido de níquel, aleaciones de alta temperatura, aleaciones con base de cobalto, aceros inoxidables, y aceros de herramienta > 40Rc
Recomendación para la aplicación en torno

Forets carbure submicrograin a haute performance – haut pouvoir de coupe
Canaux de refroidissement pour forte pression de systèmes de liquide de refroidissement
70% plus rapide que les forets carbure standarts
Helice a 30° pour une meilleure evacuation de copeaux
Preparation de l'arete de coupe
Recommander pour base nickel, alliages a hautes temperatures, alliages de cobalt, aciers inoxydables et aciers a outils > 40HRC
Outil de filature nécessaires pour une utilisation sur un processus de tournage

Alte prestazioni – Alta penetrazioni Super sub-micrograno metallo duro
Lubrificazione interna per sistemi ad alta pressione
Fino al 70% più veloce rispetto alle punte in metallo duro standard
Elica a 30° per una migliore evacuazione del truciolo
Tagliente onato
Raccomandata per lavorazioni su nickel, superleghe, leghe ad alta percentuale di cobalto, inox e acciai per utensili > 40Hrc
Utensili rotanti sono consigliate se usato su un tornio

高效率—高进给 高效整体硬质合金钻头
通过加快切削速度延长刀具使用寿命、提高表面光洁度
跟普通的硬质合金钻头相比可提高速度高达70%
30° 螺旋角更便于排屑
切削刃口经过珩磨
高镍耐高温合金、钴基合金、不锈钢和工具钢 >40HRC
不建议在车床，或工具必须纺纱

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	d † Diameter Decimal	Diameter	Diameter Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
22010			.1181		3.000	46	16	10
	25366		.1181		3.000	50	19	16
		26366	.1181		3.000	65	28	22
22015			.1200	#31	3.048	1-13/16"	5/8"	.382"
	25371		.1200	#31	3.048	2"	3/4"	.622"
		26371	.1200	#31	3.048	2-1/2"	1-1/8"	.862"
22020			.1250	1/8"	3.175	1-15/16"	11/16"	.398"
	25376		.1250	1/8"	3.175	2"	3/4"	.648"
		26376	.1250	1/8"	3.175	2-1/2"	1-1/8"	.898"
22025			.1285	#30	3.264	1-15/16"	11/16"	.409"
	25381		.1285	#30	3.264	2-1/4"	3/4"	.666"
		26381	.1285	#30	3.264	2-1/2"	1-1/8"	.923"
22030			.1360	#29	3.454	2-1/16"	3/4"	.433"
	25386		.1360	#29	3.454	2-1/4"	7/8"	.705"
		26386	.1360	#29	3.454	3"	1-1/4"	.977"
22035			.1378		3.500	52	19	11
	25391		.1378		3.500	57	22	18
		26391	.1378		3.500	75	32	25
22040			.1405	#28	3.569	2-1/16"	3/4"	.447"
	25396		.1405	#28	3.569	2-1/4"	7/8"	.728"
		26396	.1405	#28	3.569	3"	1-1/4"	1.009"
22045			.1406	9/64"	3.571	2-1/16"	3/4"	.447"
	25401		.1406	9/64"	3.571	2-1/4"	7/8"	.729"
		26401	.1406	9/64"	3.571	3"	1-1/4"	1.010"
22050			.1440	#27	3.658	2-1/16"	3/4"	.458"
	25406		.1440	#27	3.658	2-1/4"	7/8"	.746"
		26406	.1440	#27	3.658	3"	1-3/8"	1.034"
22055			.1470	#26	3.734	2-3/16"	13/16"	.468"
	25411		.1470	#26	3.734	2-1/4"	7/8"	.762"
		26411	.1470	#26	3.734	3"	1-3/8"	1.056"
22060			.1495	#25	3.797	2-3/16"	13/16"	.476"
	25416		.1495	#25	3.797	2-1/4"	15/16"	.775"
		26416	.1495	#25	3.797	3"	1-3/8"	1.074"
22065			.1520	#24	3.861	2-3/16"	13/16"	.484"
	25421		.1520	#24	3.861	2-1/4"	15/16"	.788"
		26421	.1520	#24	3.861	3"	1-1/2"	1.092"
22070			.1540	#23	3.912	2-3/16"	13/16"	.490"
	25426		.1540	#23	3.912	2-1/4"	15/16"	.798"
		26426	.1540	#23	3.912	3"	1-1/2"	1.106"

continued →

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

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

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
22075			.1562	5/32"	3.967	2-3/16"	13/16"	.497"
	25431		.1562	5/32"	3.967	2-1/2"	15/16"	.809"
		26431	.1562	5/32"	3.967	3"	1-1/2"	1.122"
22080			.1570	#22	3.988	2-3/16"	13/16"	.500"
	25436		.1570	#22	3.988	2-1/2"	15/16"	.814"
		26436	.1570	#22	3.988	3"	1-1/2"	1.128"
22085			.1575		4.000	56	21	13
	25441		.1575		4.000	65	24	21
		26441	.1575		4.000	75	38	29
22090			.1590	#21	4.039	2-3/16"	13/16"	.506"
	25446		.1590	#21	4.039	2-1/2"	15/16"	.824"
		26446	.1590	#21	4.039	3"	1-1/2"	1.142"
22095			.1610	#20	4.089	2-3/16"	13/16"	.512"
	25451		.1610	#20	4.089	2-1/2"	15/16"	.834"
		26451	.1610	#20	4.089	3"	1-1/2"	1.156"
22100			.1660	#19	4.216	2-9/32"	15/16"	.528"
	25456		.1660	#19	4.216	2-1/2"	1"	.860"
		26456	.1660	#19	4.216	3"	1-1/2"	1.192"
22105			.1695	#18	4.305	2-9/32"	15/16"	.539"
	25461		.1695	#18	4.305	2-1/2"	1"	.878"
		26461	.1695	#18	4.305	3-1/2"	1-3/4"	1.217"
22110			.1719	11/64"	4.366	2-9/32"	15/16"	.547"
	25466		.1719	11/64"	4.366	2-1/2"	1"	.891"
		26466	.1719	11/64"	4.366	3-1/2"	1-3/4"	1.235"
22115			.1730	#17	4.394	2-9/32"	15/16"	.551"
	25471		.1730	#17	4.394	2-1/2"	1"	.897"
		26471	.1730	#17	4.394	3-1/2"	1-3/4"	1.243"
22120			.1770	#16	4.496	2-9/32"	15/16"	.563"
	25476		.1770	#16	4.496	2-1/2"	1"	.917"
		26476	.1770	#16	4.496	3-1/2"	1-3/4"	1.271"
22125			.1772		4.500	58	24	14
	25481		.1772		4.500	65	25	23
		26481	.1772		4.500	88	45	32
22130			.1800	#15	4.572	2-9/32"	15/16"	.573"
	25486		.1800	#15	4.572	2-3/4"	1"	.933"
		26486	.1800	#15	4.572	3-1/2"	1-3/4"	1.293"
22135			.1820	#14	4.623	2-9/32"	15/16"	.579"
	25491		.1820	#14	4.623	2-3/4"	1"	.913"
		26491	.1820	#14	4.623	3-1/2"	1-3/4"	1.307"
22140			.1850	#13	4.699	2-9/32"	15/16"	.589"
	25496		.1850	#13	4.699	2-3/4"	1-1/4"	.959"
		26496	.1850	#13	4.699	3-1/2"	1-3/4"	1.329"
22145			.1875	3/16"	4.763	2-13/32"	1"	.597"
	25501		.1875	3/16"	4.763	2-3/4"	1-1/4"	.972"
		26501	.1875	3/16"	4.763	4"	2"	1.347"
22150			.1890	#12	4.801	2-13/32"	1"	.601"
	25506		.1890	#12	4.801	2-3/4"	1-1/4"	.979"
		26506	.1890	#12	4.801	4"	2"	1.357"
22155			.1910	#11	4.851	2-13/32"	1"	.608"
	25511		.1910	#11	4.851	2-3/4"	1-1/4"	.990"
		26511	.1910	#11	4.851	4"	2"	1.372"
22160			.1935	#10	4.915	2-13/32"	1"	.616"
	25516		.1935	#10	4.915	2-3/4"	1-1/4"	1.003"
		26516	.1935	#10	4.915	4"	2"	1.390"

† *Metric equivalents are for reference only*

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
22165			.1960	#9	4.978	2-13/32"	1"	.624"
	25521		.1960	#9	4.978	3"	1-5/16"	1.016"
		26521	.1960	#9	4.978	4"	2"	1.408"
22170			.1969		5.000	61	25	16
	25526		.1969		5.000	75	33	26
		26526	.1969		5.000	100	50	36
22175			.1990	#8	5.055	2-13/32"	1"	.633"
	25531		.1990	#8	5.055	3"	1-5/16"	1.031"
		26531	.1990	#8	5.055	4"	2"	1.429"
22180			.2010	#7	5.105	2-13/32"	1"	.640"
	25536		.2010	#7	5.105	3"	1-5/16"	1.042"
		26536	.2010	#7	5.105	4"	2"	1.444"
22185			.2031	13/64"	5.159	2-13/32"	1"	.646"
	25541		.2031	13/64"	5.159	3"	1-5/16"	1.053"
		26541	.2031	13/64"	5.159	4"	2"	1.459"
22190			.2040	#6	5.182	2-13/32"	1"	.649"
	25546		.2040	#6	5.182	3"	1-3/8"	1.057"
		26546	.2040	#6	5.182	4"	2"	1.465"
22195			.2055	#5	5.220	2-13/32"	1"	.654"
	25551		.2055	#5	5.220	3"	1-3/8"	1.065"
		26551	.2055	#5	5.220	4"	2"	1.476"
22200			.2090	#4	5.309	2-13/32"	1"	.665"
	25556		.2090	#4	5.309	3"	1-3/8"	1.083"
		26556	.2090	#4	5.309	4"	2"	1.501"
22205			.2130	#3	5.410	2-5/8"	1-3/32"	.678"
	25561		.2130	#3	5.410	3"	1-3/8"	1.104"
		26561	.2130	#3	5.410	4"	2"	1.530"
22210			.2165		5.500	67	28	18
	25566		.2165		5.500	75	35	29
		26566	.2165		5.500	100	50	40
22215			.2188	7/32"	5.558	2-5/8"	1-3/32"	.696"
	25571		.2188	7/32"	5.558	3"	1-3/8"	1.134"
		26571	.2188	7/32"	5.558	4"	2"	1.571"
22220			.2210	#2	5.613	2-5/8"	1-3/32"	.703"
	25576		.2210	#2	5.613	3"	1-3/8"	1.145"
		26576	.2210	#2	5.613	4"	2"	1.587"
22225			.2280	#1	5.791	2-5/8"	1-3/32"	.726"
	25581		.2280	#1	5.791	3"	1-3/8"	1.182"
		26581	.2280	#1	5.791	4-1/8"	2-1/8"	1.638"
22230			.2340	A	5.944	2-5/8"	1-3/32"	.745"
	25586		.2340	A	5.944	3-1/4"	1-1/2"	1.213"
		26586	.2340	A	5.944	4-1/8"	2-1/8"	1.681"
22235			.2344	15/64"	5.954	2-5/8"	1-3/32"	.746"
	25591		.2344	15/64"	5.954	3-1/4"	1-1/2"	1.215"
		26591	.2344	15/64"	5.954	4-1/8"	2-1/8"	1.684"
22240			.2362		6.000	67	28	19
	25596		.2362		6.000	80	38	31
		26596	.2362		6.000	105	55	43
22245			.2380	B	6.045	2-3/4"	1-7/32"	.757"
	25601		.2380	B	6.045	3-1/4"	1-5/8"	1.233"
		26601	.2380	B	6.045	4-1/8"	2-1/8"	1.709"
22250			.2420	C	6.147	2-3/4"	1-7/32"	.770"
	25606		.2420	C	6.147	3-1/4"	1-5/8"	1.254"
		26606	.2420	C	6.147	4-1/4"	2-1/4"	1.738"

continued →

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

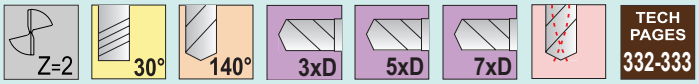
.2460" - .3125"
(6.248mm - 7.938mm)

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	*d* † Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
22255			.2460	D	6.248	2-3/4"	1-7/32"	.783"
	25611		.2460	D	6.248	3-1/4"	1-5/8"	1.275"
		26611	.2460	D	6.248	4-1/4"	2-1/4"	1.767"
22260			.2500	1/4" / E	6.350	2-3/4"	1-7/32"	.796"
	25616		.2500	1/4" / E	6.350	3-1/4"	1-5/8"	1.296"
		26616	.2500	1/4" / E	6.350	4-1/4"	2-1/4"	1.796"
22265			.2559		6.500	70	31	21
	25621		.2559		6.500	80	41	34
		26621	.2559		6.500	105	58	47
22270			.2570	F	6.528	2-3/4"	1-7/32"	.818"
	25626		.2570	F	6.528	3-1/4"	1-11/16"	1.332"
		26626	.2570	F	6.528	4-3/8"	2-3/8"	1.846"
22275			.2610	G	6.629	2-3/4"	1-7/32"	.831"
	25631		.2610	G	6.629	3-1/2"	1-11/16"	1.353"
		26631	.2610	G	6.629	4-3/8"	2-3/8"	1.875"
22280			.2656	17/64"	6.746	2-15/16"	1-11/32"	.845"
	25636		.2656	17/64"	6.746	3-1/2"	1-11/16"	1.376"
		26636	.2656	17/64"	6.746	4-3/8"	2-3/8"	1.908"
22285			.2660	H	6.756	2-15/16"	1-11/32"	.846"
	25641		.2660	H	6.756	3-1/2"	1-11/16"	1.378"
		26641	.2660	H	6.756	4-3/8"	2-3/8"	1.910"
22290			.2720	I	6.909	2-15/16"	1-11/32"	.866"
	25646		.2720	I	6.909	3-1/2"	1-11/16"	1.410"
		26646	.2720	I	6.909	4-3/8"	2-3/8"	1.954"
22295			.2756		7.000	75	34	22
	25651		.2756		7.000	88	43	36
		26651	.2756		7.000	110	61	50
22300			.2770	J	7.036	2-15/16"	1-11/32"	.881"
	25656		.2770	J	7.036	3-1/2"	1-11/16"	1.435"
		26656	.2770	J	7.036	4-3/8"	2-3/8"	1.989"
22305			.2810	K	7.137	2-15/16"	1-11/32"	.894"
	25661		.2810	K	7.137	3-1/2"	1-3/4"	1.456"
		26661	.2810	K	7.137	4-7/16"	2-7/16"	2.018"
22310			.2812	9/32"	7.142	2-15/16"	1-11/32"	.895"
	25666		.2812	9/32"	7.142	3-1/2"	1-3/4"	1.457"
		26666	.2812	9/32"	7.142	4-7/16"	2-7/16"	2.020"
22315			.2900	L	7.366	2-15/16"	1-11/32"	.923"
	25671		.2900	L	7.366	3-1/2"	1-3/4"	1.503"
		26671	.2900	L	7.366	4-7/16"	2-7/16"	2.083"
22320			.2950	M	7.493	2-15/16"	1-11/32"	.939"
	25676		.2950	M	7.493	3-3/4"	1-3/4"	1.529"
		26676	.2950	M	7.493	4-7/16"	2-7/16"	2.119"
22325			.2953		7.500	75	34	24
	25681		.2953		7.500	95	44	39
		26681	.2953		7.500	115	66	54
22330			.2969	19/64"	7.541	3-3/32"	1-15/32"	.945"
	25686		.2969	19/64"	7.541	3-3/4"	1-7/8"	1.539"
		26686	.2969	19/64"	7.541	4-9/16"	2-9/16"	2.132"
22335			.3020	N	7.671	3-3/32"	1-15/32"	.961"
	25691		.3020	N	7.671	3-3/4"	1-7/8"	1.565"
		26691	.3020	N	7.671	4-9/16"	2-9/16"	2.169"
22340			.3125	5/16"	7.938	3-3/32"	1-15/32"	.994"
	25696		.3125	5/16"	7.938	3-3/4"	1-7/8"	1.619"
		26696	.3125	5/16"	7.938	4-11/16"	2-9/16"	2.244"

† *Metric equivalents are for reference only*

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

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



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

BALIQ® ALTINOS Coating (AlTiN-based)
BALIQ® ALTINOS-Beschichtet (AlTiN-based)
Recubrimiento BALIQ® ALTINOS (AlTiN-based)
Revêtement à BALIQ® ALTINOS (AlTiN-based)
Rivestimento BALIQ® ALTINOS (AlTiN-based)
BALIQ® ALTINOS涂层 (AlTiN-based)

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	d † Diameter Decimal		d † Diameter Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
22345			.3150		8.000	79	37	25
	25701		.3150		8.000	95	48	41
		26701	.3150		8.000	120	69	57
22350			.3160	O	8.026	3-3/32"	1-15/32"	1.006"
	25706		.3160	O	8.026	3-3/4"	1-7/8"	1.638"
		26706	.3160	O	8.026	4-11/16"	2-11/16"	2.270"
22355			.3230	P	8.204	3-3/32"	1-15/32"	1.028"
	25711		.3230	P	8.204	3-3/4"	2-3/32"	1.674"
		26711	.3230	P	8.204	4-11/16"	2-11/16"	2.320"
22360			.3281	21/64"	8.334	3-3/32"	1-15/32"	1.044"
	25716		.3281	21/64"	8.334	4"	2-3/32"	1.700"
		26716	.3281	21/64"	8.334	4-11/16"	2-11/16"	2.356"
22365			.3320	Q	8.433	3-3/32"	1-15/32"	1.056"
	25721		.3320	Q	8.433	4"	2-3/32"	1.720"
		26721	.3320	Q	8.433	4-15/16"	2-15/16"	2.384"
22370			.3346		8.500	79	37	27
	25726		.3346		8.500	100	53	44
		26726	.3346		8.500	125	75	61
22375			.3390	R	8.611	3-5/16"	1-9/16"	1.079"
	25731		.3390	R	8.611	4"	2-3/32"	1.757"
		26731	.3390	R	8.611	4-15/16"	2-15/16"	2.435"
22380			.3438	11/32"	8.733	3-5/16"	1-9/16"	1.094"
	25736		.3438	11/32"	8.733	4"	2-3/16"	1.782"
		26736	.3438	11/32"	8.733	4-15/16"	2-15/16"	2.470"
22385			.3480	S	8.839	3-5/16"	1-9/16"	1.107"
	25741		.3480	S	8.839	4"	2-3/16"	1.803"
		26741	.3480	S	8.839	5"	3"	2.499"
22390			.3543		9.000	84	40	29
	25746		.3543		9.000	100	56	47
		26746	.3543		9.000	125	77	65
22395			.3580	T	9.093	3-5/16"	1-9/16"	1.139"
	25751		.3580	T	9.093	4-1/4"	2-9/32"	1.855"
		26751	.3580	T	9.093	5"	3"	2.571"
22400			.3594	23/64"	9.129	3-5/16"	1-9/16"	1.144"
	25756		.3594	23/64"	9.129	4-1/4"	2-9/32"	1.862"
		26756	.3594	23/64"	9.129	5"	3"	2.581"
22405			.3680	U	9.347	3-5/16"	1-9/16"	1.171"
	25761		.3680	U	9.347	4-1/4"	2-9/32"	1.907"
		26761	.3680	U	9.347	5"	3"	2.643"
22410			.3740		9.500	84	40	30
	25766		.3740		9.500	105	58	49
		26766	.3740		9.500	130	80	68
22415			.3750	3/8"	9.525	3-1/2"	1-11/16"	1.193"
	25771		.3750	3/8"	9.525	4-1/4"	2-3/8"	1.943"
		26771	.3750	3/8"	9.525	5-1/8"	3-1/8"	2.693"

continued →

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

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

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
22420			.3770	V	9.576	3-1/2"	1-11/16"	1.200"
	25776		.3770	V	9.576	4-1/4"	2-3/8"	1.954"
		26776	.3770	V	9.576	5-1/8"	3-1/8"	2.708"
22425			.3860	W	9.804	3-1/2"	1-11/16"	1.228"
	25781		.3860	W	9.804	4-1/2"	2-3/8"	2.000"
		26781	.3860	W	9.804	5-1/8"	3-1/8"	2.772"
22430			.3906	25/64"	9.921	3-1/2"	1-11/16"	1.243"
	25786		.3906	25/64"	9.921	4-1/2"	2-3/8"	2.024"
		26786	.3906	25/64"	9.921	5-1/4"	3-1/4"	2.805"
22435			.3937		10.000	89	43	32
	25791		.3937		10.000	115	60	52
		26791	.3937		10.000	135	83	72
22440			.3970	X	10.084	3-1/2"	1-11/16"	1.263"
	25796		.3970	X	10.084	4-1/2"	2-1/2"	2.057"
		26796	.3970	X	10.084	5-1/4"	3-1/4"	2.851"
22445			.4040	Y	10.262	3-1/2"	1-11/16"	1.286"
	25801		.4040	Y	10.262	4-1/2"	2-9/16"	2.094"
		26801	.4040	Y	10.262	5-3/8"	3-3/8"	2.902"
22450			.4062	13/32"	10.317	3-1/2"	1-11/16"	1.293"
	25806		.4062	13/32"	10.317	4-1/2"	2-9/16"	2.105"
		26806	.4062	13/32"	10.317	5-3/8"	3-3/8"	2.917"
22455			.4130	Z	10.490	3-1/2"	1-11/16"	1.314"
	25811		.4130	Z	10.490	4-1/2"	2-5/8"	2.140"
		26811	.4130	Z	10.490	5-3/8"	3-3/8"	2.966"
22460			.4134		10.500	89	43	33
	25816		.4134		10.500	115	67	54
		26816	.4134		10.500	135	86	75
22465			.4219	27/64"	10.716	3-3/4"	1-13/16"	1.343"
	25821		.4219	27/64"	10.716	4-1/2"	2-11/16"	2.186"
		26821	.4219	27/64"	10.716	5-7/16"	3-7/16"	3.030"
22470			.4331		11.000	95	46	35
	25826		.4331		11.000	115	68	57
		26826	.4331		11.000	135	88	79
22475			.4375	7/16"	11.113	3-3/4"	1-13/16"	1.392"
	25831		.4375	7/16"	11.113	4-3/4"	2-13/16"	2.267"
		26831	.4375	7/16"	11.113	5-7/16"	3-7/16"	3.142"
22480			.4528		11.500	95	46	37
	25836		.4528		11.500	120	71	60
		26836	.4528		11.500	140	91	83
22485			.4531	29/64"	11.509	3-3/4"	1-13/16"	1.442"
	25841		.4531	29/64"	11.509	4-3/4"	2-7/8"	2.348"
		26841	.4531	29/64"	11.509	5-9/16"	3-13/16"	3.254"
22490			.4688	15/32"	11.908	4"	1-15/16"	1.492"
	25846		.4688	15/32"	11.908	4-3/4"	2-7/8"	2.429"
		26846	.4688	15/32"	11.908	5-9/16"	3-13/16"	3.367"
22495			.4724		12.000	102	49	38
	25851		.4724		12.000	120	73	62
		26851	.4724		12.000	140	98	86
22500			.4844	31/64"	12.304	4"	1-15/16"	1.541"
	25856		.4844	31/64"	12.304	5-5/16"	3"	2.510"
		26856	.4844	31/64"	12.304	5-9/16"	3-13/16"	3.479"
22505			.4921		12.500	102	49	40
	25861		.4921		12.500	135	76	65
		26861	.4921		12.500	150	102	90

† *Metric equivalents are for reference only*

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
22510			.5000	1/2"	12.700	4"	1-15/16"	1.591"
	25866		.5000	1/2"	12.700	5-3/8"	3-1/16"	2.591"
		26866	.5000	1/2"	12.700	6"	4"	3.591"
22515			.5118		13.000	107	53	41
	25871		.5118		13.000	135	78	67
		26871	.5118		13.000	150	102	93
22520			.5156	33/64"	13.096	4-7/32"	2-3/32"	1.641"
	25876		.5156	33/64"	13.096	5-3/8"	3-1/8"	2.672"
		26876	.5156	33/64"	13.096	6"	4"	3.703"
22525			.5312	17/32"	13.492	4-7/32"	2-3/32"	1.690"
	25881		.5312	17/32"	13.492	5-11/16"	3-5/16"	2.753"
		26881	.5312	17/32"	13.492	6-1/8"	4-1/8"	3.815"
22530			.5315		13.500	110	56	43
	25886		.5315		13.500	145	84	70
		26886	.5315		13.500	155	105	97
22535			.5469	35/64"	13.891	4-5/16"	2-7/32"	1.740"
	25891		.5469	35/64"	13.891	5-13/16"	3-3/8"	2.834"
		26891	.5469	35/64"	13.891	6-1/8"	4-1/8"	3.928"
22540			.5512		14.000	110	56	45
	25896		.5512		14.000	145	86	73
		26896	.5512		14.000	155	105	101
22545			.5625	9/16"	14.288	4-9/16"	2-15/32"	1.790"
	25901		.5625	9/16"	14.288	5-15/16"	3-1/2"	2.915"
		26901	.5625	9/16"	14.288	6-1/4"	4-3/8"	4.040"
22550			.5709		14.500	116	63	46
	25906		.5709		14.500	150	89	75
		26906	.5709		14.500	160	109	104
22555			.5781	37/64"	14.684	4-15/16"	2-9/16"	1.840"
	25911		.5781	37/64"	14.684	6"	3-1/2"	2.996"
		26911	.5781	37/64"	14.684	6-1/4"	4-3/8"	4.152"
22560			.5906		15.000	125	65	48
	25916		.5906		15.000	150	90	78
		26916	.5906		15.000	160	112	108
22565			.5938	19/32"	15.083	4-15/16"	2-9/16"	1.890"
	25921		.5938	19/32"	15.083	6"	3-9/16"	3.077"
		26921	.5938	19/32"	15.083	6-3/8"	4-3/8"	4.265"
22570			.6094	39/64"	15.479	5-1/16"	2-13/16"	1.939"
	25926		.6094	39/64"	15.479	6-3/16"	3-11/16"	3.158"
		26926	.6094	39/64"	15.479	6-7/16"	4-7/16"	4.377"
22575			.6102		15.500	129	71	49
	25931		.6102		15.500	160	94	80
		26931	.6102		15.500	165	113	111
22580			.6250	5/8"	15.875	5-1/4"	3-1/8"	1.989"
	25936		.6250	5/8"	15.875	6-5/16"	3-3/4"	3.239"
		26936	.6250	5/8"	15.875	6-9/16"	4-9/16"	4.489"
22585			.6299		16.000	133	79	51
	25941		.6299		16.000	160	95	83
		26941	.6299		16.000	165	117	115

Series 1600

NEW ITEM

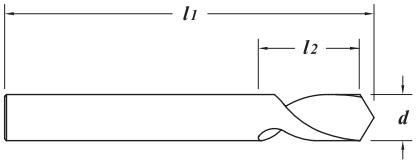
.0787" - .3750"
(2.000mm - 9.525mm)

Z=2 | 25° | 82° | 90° | 120° | 142°

TECH PAGES 320-323

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

N/C Spotting
NC-Anbohrer
Marcado N/C
Forets a Pointer, N/C Pointage
Punta da Centro per Controlli Numerici
数控定位



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

Vollhartmetallbohrer aus Feinkornhartmetall
Vorzentrieren zum stabilisieren von langen Bohrern
Kann zum Erstellen einer Fase verwendet werden
Grobe, Winklige oder Kugelförmige Oberflächen
Aufbohrer
Für höhere Positioniergenauigkeit
Empfehlung fuer den Einsatz auf der Drehmaschine

Broca de submicrograno sólido carburo
Pretaladrado para estabilizar brocas largas
Se puede utilizar para crear un chaflán
Superficies rugosas, angulosas o esféricas
Sin holgura de D.E.
Para situarla en posición real
Recomendación para la aplicación en torno

Forets carbure submicrograin
Pour repérer pour stabiliser forets longs
Peut être utilisé pour créer un chanfrein
Rugueux, surfaces angulaires ou sphériques
Pas de dia dédouanement
Pour localiser la position réelle
Outil de filature nécessaires pour une utilisation sur un processus de tournage

Punte in sub-micro grana
Centrino per stabilizzare punti lunghe
Può essere usato per creare uno smusso
Adatto su pareti inclinate o sferiche
Posizionamento preciso
Utensili rotanti sono consigliate se usato su un tornio

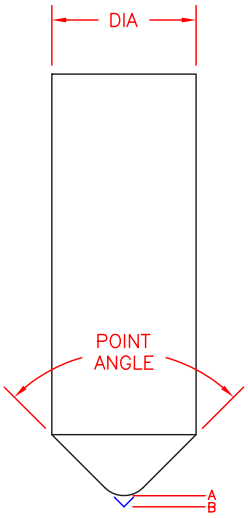
整体硬质合金钻头
定位稳定长钻头
可用于创建倒角
粗加工面、斜面或者球面
没有外径间隙
供准确位置上定位用
不建议在车床，或工具必须纺纱

82° EDP#	90° EDP#	120° EDP#	142° EDP#	d † Diameter Decimal	d † Diameter	d † Diameter Metric	l_1 Overall Length	l_2 Flute Length
91650	91500	91572	91240	.0787		2.000	50	10
91652	91505	91575	91245	.0938	3/32"	2.383	2"	3/8"
-	91507	-	-	.1181		3.000	38	6
-	91510	91580	91250	.1181		3.000	50	10
-	91512	-	-	.1181		3.000	75	10
-	91514	-	-	.1250	1/8"	3.175	1-1/2"	1/4"
91656	91000	91100	91260	.1250	1/8"	3.175	2"	3/8"
-	91002	-	-	.1250	1/8"	3.175	3"	3/8"
91658	91520	91590	91270	.1575		4.000	50	12
-	91522	-	-	.1875	3/16"	4.763	2"	3/8"
-	91524	-	-	.1875	3/16"	4.763	2-1/2"	1/2"
91660	91010	91110	91280	.1875	3/16"	4.763	3"	3/4"
-	91012	-	-	.1875	3/16"	4.763	4"	3/4"
-	91014	-	-	.1969		5.000	50	10
-	91530	91600	91290	.1969		5.000	65	15
-	91532	-	-	.1969		5.000	75	15
-	91534	-	-	.2362		6.000	50	12
91664	91540	91610	91300	.2362		6.000	65	20
-	91542	-	-	.2362		6.000	75	20
-	91544	-	-	.2362		6.000	100	20
-	91546	-	-	.2500	1/4"	6.350	2"	1/2"
-	91547	-	-	.2500	1/4"	6.350	2-1/2"	5/8"
91666	91020	91120	91310	.2500	1/4"	6.350	3"	3/4"
-	91021	-	-	.2500	1/4"	6.350	4"	3/4"
-	91022	-	-	.2500	1/4"	6.350	6"	3/4"
-	91023	-	-	.3125	5/16"	7.938	2"	1/2"
-	91024	-	-	.3125	5/16"	7.938	2-1/2"	5/8"
91668	91025	91125	91315	.3125	5/16"	7.938	3"	1"
-	91026	-	-	.3125	5/16"	7.938	4"	1"
-	91548	-	-	.3150		8.000	50	12
-	91549	-	-	.3150		8.000	65	16
91670	91550	91620	91320	.3150		8.000	75	25
-	91551	-	-	.3150		8.000	100	25
-	91028	-	-	.3750	3/8"	9.525	2"	1/2"
-	91029	-	-	.3750	3/8"	9.525	2-1/2"	5/8"
91672	91030	91130	91330	.3750	3/8"	9.525	3"	1"
-	91031	-	-	.3750	3/8"	9.525	4"	1"
-	91032	-	-	.3750	3/8"	9.525	6"	1"

† *Metric equivalents are for reference only*

	82° EDP#	90° EDP#	120° EDP#	142° EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length
	-	91558	-	-	.3937		10.000	65	16
	-	91559	-	-	.3937		10.000	70	20
	-	91560	91630	91340	.3937		10.000	88	25
	-	91561	-	-	.3937		10.000	100	25
	-	91564	-	-	.4375	7/16"	11.113	2-3/4"	3/4"
	91676	91565	91635	91345	.4375	7/16"	11.113	4"	1"
	-	91568	-	-	.4724		12.000	65	16
	-	91569	-	-	.4724		12.000	75	20
	-	91570	91640	91350	.4724		12.000	100	30
	-	91038	-	-	.5000	1/2"	12.700	2-1/2"	5/8"
	-	91039	-	-	.5000	1/2"	12.700	3"	3/4"
	91680	91040	91140	91360	.5000	1/2"	12.700	4"	1"
	-	91041	-	-	.5000	1/2"	12.700	6"	1"
	-	91050	91170	91370	.5512		14.000	100	30
	91684	91060	91180	-	.5625	9/16"	14.287	4"	1"
	-	91067	-	-	.6250	5/8"	15.875	3"	3/4"
	-	91068	-	-	.6250	5/8"	15.875	3-1/2"	1"
	-	91069	-	-	.6250	5/8"	15.875	4"	1"
	91686	91070	91190	91390	.6250	5/8"	15.875	5"	1"
	-	91077	-	-	.6299		16.000	75	20
	-	91078	-	-	.6299		16.000	88	25
NEW	-	91079	-	-	.6299		16.000	100	25
	91688	91080	91200	91400	.6299		16.000	125	30
	91690	91090	91210	-	.7087		18.000	125	30
	-	91148	-	-	.7500	3/4"	19.050	3"	3/4"
	-	91149	-	-	.7500	3/4"	19.050	4"	1"
	91692	91150	91220	91420	.7500	3/4"	19.050	5"	1"
	-	91159	-	-	.7874		20.000	100	25
	-	91160	91230	91430	.7874		20.000	125	30
	-	91161	-	-	.7874		20.000	150	30

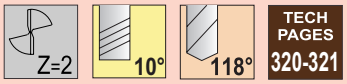
DIAMETER		DRILL POINT ANGLE			
		82°	90°	120°	142°
2mm	.0787	.003	.002	.001	.001
3/32"	.0938	.003	.003	.002	.001
3mm	.1181	.004	.004	.002	.001
1/8"	.1250	.004	.004	.002	.001
4mm	.1575	.005	.005	.003	.002
3/16"	.1875	.006	.006	.003	.002
5mm	.1969	.007	.006	.003	.002
6mm	.2362	.008	.007	.004	.003
1/4"	.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



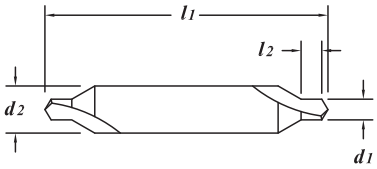
Garr Tool series 1600 spotting drills are not only useful for starting holes, but also for leaving the desired chamfer when programmed to the correct depth. Because spotting drills do not come to a true point, but have a small "flat" as shown in the figure to the left, the length deviation from the chart 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.

Series 1400

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



Combined Drill and Countersink
Kobiniertes Bohren - und Ansenken
Broca y Avellanadora Combinadas
Percage et Chanfreinage
Centrino a Doppia Punta
组合式钻孔和锪孔钻头



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

Vollhartmetallbohrer aus Feinkornhartmetall
Zentrierbohrer Anwendungen
60° ±0°30' inclusive Ansenkwinkel
Empfehlung fuer den Einsatz auf der Drehmaschine
Bohrerlänge (l_2) ist gleich wie Bohrdurchmesser (d_1)
Kann nicht modifiziert werden

Broca de submicrograno sólido carburo
Aplicaciones de perforación central
Ángulo de avellanado entre caras de 60° ±0°30'
Recomendación para la aplicación en torno
Drill length (l_2) is equal to drill diameter (d_1)
No es possible modificar

Forets carbure submicrograin
Pour applications pour percage au centre
Inclus angle de chanfreinage a 60° ±0°30'
Outil de filature nécessaires pour une utilisation sur un processus de tournage
La longueur de coupe (l_2) est égale au diamètre (d_1)
Outil non modifiable

Punte in sub-micro grana
Centrinatura
60° ±0°30' di svasatura
Utensili rotanti sono consigliate se usato su un tornio
Lunghezza punta (l_2) uguale a diametro punta (d_1)
Non può essere modificata

整体硬质合金钻头
钻中心孔用途
60° ±0°30' 锪孔夹角
不建议在车床，或工具必须纺纱
钻头长度 (l_2) 等于钻头直径 (d_1)
无法改制

EDP #	Number	d_1 † Diameter Decimal	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Drill Length
58030	1	.0469	1.191	1/8"	1-1/2"	.0469
58040	2	.0781	1.984	3/16"	2"	.0781
58050	3	.1094	2.779	1/4"	2"	.1094
58060	4	.1250	3.175	5/16"	2-1/8"	.1250
58070	5	.1875	4.763	7/16"	2-3/4"	.1875
58080	6	.2188	5.558	1/2"	3"	.2188

† *Metric equivalents are for reference only*

Series 1500

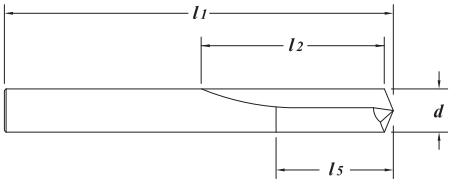
.0625" - .1660"
(1.588mm - 4.216mm)

TOLERANCES

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

Z=2 | 0° | 135° | 3xD | TECH PAGES 320-323

Hard Metal
Hartmetall
Metal Duroe
Métal Dur
Metallo Duro
硬金属



Solid submicron grain carbide drill
Straight flute design provides excellent rigidity
Materials 40 Rc and higher
Excellent heat resistance and lubricity
Recommended for high nickel, cobalt based and powdered metals
Live tooling recommended on lathe processes
Durana Coating - Page 61

Vollhartmetallbohrer aus Feinkornhartmetall
Gerades Spannutendesign für exzellente Stabilität
Werkstoffe mit 40HRc und höher
Exzellente Hitzebeständigkeit und Schmiereigenschaften
Empfohlen für Hoch Nickelhaltige und Kobaltbasislegierungen, Pulvermetall
Empfehlung fuer den Einsatz auf der Drehmaschine
Durana Beschichtung - Seite 61

Broca de submicrograno sólido carburo
El diseño de ranuras rectas proporciona excelente rigidez
Materiales 40Rc y superiores
Excelente resistencia térmica y lubricación
Recomendado para alto contenido en níquel, aleaciones con base de cobalto y metal pulverizado
Recomendación para la aplicación en torno
Recubrimiento de Durana - Página 61

Forets carbure submicrograin
Le design de la goujure apporte une excellente rigidite
Materiaux de 40 HRC et plus
Excellente resistance a la haute temperature et glissement
Recommander pour alliages a hautes teneur en nickel, base cobalt et metal fritte
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Revêtement Durana - Page 61

Punte in sub-micro grana
Tagliente dritto che consente un'ottima rigidità
Materiali a 40 Hrc e superiori
Eccellente resistenza al calore e autolubrificante
Raccomandata per lavorazioni su leghe di nickel, cobalto e sinterizzati
Utensili rotanti sono consigliate se usato su un tornio
Rivestimento in Durana - Pagina 61

整体硬质合金钻头
直排屑槽结构保证了极好的刚性
推荐加工洛氏硬度40或40以上的材质
耐热性和润滑性特好
推荐加工高镍合金、钴基合金和粉末冶金
不建议在车床，或工具必须纺纱
涂层 Durana - 61页

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
59165	.0625	1/16"	1.588	1-3/4"	5/8"	.200"
59180	.0700	#50	1.778	1-3/4"	3/4"	.224"
59185	.0730	#49	1.854	1-3/4"	3/4"	.234"
59190	.0760	#48	1.930	1-3/4"	3/4"	.244"
59195	.0781	5/64"	1.984	1-3/4"	3/4"	.250"
59200	.0785	#47	1.994	1-3/4"	7/8"	.252"
39000	.0787		2.000	50	22	6
59210	.0810	#46	2.057	2"	7/8"	.260"
59215	.0820	#45	2.083	2"	7/8"	.263"
59220	.0860	#44	2.184	2"	7/8"	.276"
59225	.0890	#43	2.261	2"	7/8"	.285"
59230	.0935	#42	2.375	2"	7/8"	.300"
59235	.0938	3/32"	2.383	2"	7/8"	.301"
59240	.0960	#41	2.438	2"	7/8"	.308"
59245	.0980	#40	2.489	2"	7/8"	.314"
39050	.0984		2.500	50	22	8
59255	.0995	#39	2.527	2"	7/8"	.319"
59260	.1015	#38	2.578	2"	7/8"	.326"
59265	.1040	#37	2.642	2"	7/8"	.334"
59270	.1065	#36	2.705	2"	7/8"	.342"
59275	.1094	7/64"	2.779	2"	1"	.351"
59280	.1100	#35	2.794	2"	1"	.353"
59285	.1110	#34	2.819	2"	1"	.356"
59290	.1130	#33	2.870	2"	1"	.362"
59295	.1160	#32	2.946	2"	1"	.372"
39100	.1181		3.000	50	25	10
59305	.1200	#31	3.048	2"	1"	.385"
59310	.1250	1/8"	3.175	2"	1"	.401"
59315	.1285	#30	3.264	2"	1"	.412"
59320	.1360	#29	3.454	2"	1"	.436"
39150	.1378		3.500	50	25	11
59330	.1405	#28	3.569	2"	1"	.451"
59335	.1406	9/64"	3.571	2"	1"	.451"
59340	.1440	#27	3.658	2"	1"	.462"
59345	.1470	#26	3.734	2"	1"	.471"
59350	.1495	#25	3.797	2"	1"	.479"
59355	.1520	#24	3.861	2"	1"	.487"
59360	.1540	#23	3.912	2"	1"	.494"
59365	.1562	5/32"	3.967	2-1/2"	1-1/8"	.501"
59370	.1570	#22	3.988	2-1/2"	1-1/8"	.504"
39200	.1575		4.000	63	28	13
59380	.1590	#21	4.039	2-1/2"	1-1/8"	.510"
59385	.1610	#20	4.089	2-1/2"	1-1/8"	.516"
59390	.1660	#19	4.216	2-1/2"	1-1/8"	.532"

continued →

Series 1500 *(continued)*

.1695" - .5000"
(4.305mm - 12.700mm)

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
59395	.1695	#18	4.305	2-1/2"	1-3/16"	.544"
59400	.1719	11/64"	4.366	2-1/2"	1-3/16"	.551"
59405	.1730	#17	4.394	2-1/2"	1-3/16"	.555"
59410	.1770	#16	4.496	2-1/2"	1-3/16"	.568"
39250	.1772		4.500	63	28	14
59420	.1800	#15	4.572	2-1/2"	1-3/16"	.577"
59425	.1820	#14	4.623	2-1/2"	1-3/16"	.584"
59430	.1850	#13	4.700	2-1/2"	1-3/16"	.593"
59435	.1875	3/16"	4.763	2-1/2"	1-3/16"	.601"
59440	.1890	#12	4.801	2-1/2"	1-3/16"	.606"
59445	.1910	#11	4.851	2-1/2"	1-3/16"	.613"
59450	.1935	#10	4.915	2-1/2"	1-1/4"	.621"
59455	.1960	#9	4.978	2-1/2"	1-1/4"	.629"
39300	.1969		5.000	63	32	16
59465	.1990	#8	5.055	2-1/2"	1-1/4"	.638"
59470	.2010	#7	5.105	2-1/2"	1-1/4"	.645"
59475	.2031	13/64"	5.159	2-1/2"	1-1/4"	.651"
59480	.2040	#6	5.182	2-1/2"	1-1/4"	.654"
59485	.2055	#5	5.220	2-1/2"	1-1/4"	.659"
59490	.2090	#4	5.309	2-1/2"	1-1/4"	.670"
59495	.2130	#3	5.410	2-1/2"	1-1/4"	.683"
39350	.2165		5.500	63	32	18
59505	.2188	7/32"	5.558	2-1/2"	1-1/2"	.702"
59510	.2210	#2	5.613	2-1/2"	1-1/2"	.709"
59515	.2280	#1	5.791	2-1/2"	1-1/2"	.731"
59525	.2344	15/64"	5.954	2-1/2"	1-1/2"	.752"
39400	.2362		6.000	63	38	19
59550	.2500	1/4"	6.350	2-1/2"	1-1/2"	.802"
59570	.2656	17/64"	6.746	2-1/2"	1-1/2"	.852"
39500	.2756		7.000	63	38	22
59600	.2812	9/32"	7.142	2-1/2"	1-1/2"	.902"
39520	.2953		7.500	63	41	24
59620	.2969	19/64"	7.541	2-1/2"	1-5/8"	.952"
59630	.3125	5/16"	7.938	2-1/2"	1-5/8"	1.002"
39540	.3150		8.000	63	41	26
59650	.3281	21/64"	8.334	3"	1-5/8"	1.052"
39560	.3346		8.500	76	41	27
59670	.3438	11/32"	8.733	3"	1-5/8"	1.103"
39580	.3543		9.000	76	41	29
59690	.3594	23/64"	9.129	3"	1-3/4"	1.153"
59705	.3750	3/8"	9.525	3"	1-3/4"	1.203"
59720	.3906	25/64"	9.921	3"	1-3/4"	1.253"
39620	.3937		10.000	76	44	32
59740	.4062	13/32"	10.317	3"	1-3/4"	1.303"
39640	.4134		10.500	76	44	34
59755	.4219	27/64"	10.716	3"	1-3/4"	1.353"
39660	.4331		11.000	76	44	35
59765	.4375	7/16"	11.113	3"	1-3/4"	1.403"
59775	.4531	29/64"	11.509	3"	1-3/4"	1.453"
59780	.4688	15/32"	11.908	3"	1-3/4"	1.503"
39700	.4724		12.000	76	44	38
59790	.4844	31/64"	12.304	3"	1-3/4"	1.554"
39720	.4921		12.500	76	44	40
59800	.5000	1/2"	12.700	3"	1-3/4"	1.604"

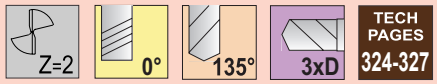
† *Metric equivalents are for reference only*

TOLERANCES

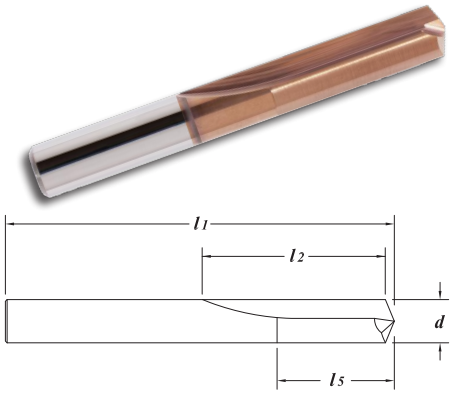
d	+.0000 –.0127mm (+.0000" –.0005")	
l1	≤ 1/8"	+3.175 –1.588mm (+.125" –.062")
	> 1/8"	+3.175 –3.175mm (+.125" –.125")
l2	≤ 1/8"	+3.175 –1.588mm (+.125" –.062")
	>1/8"	+3.175 –3.175mm (+.125" –.125")

Series 1500H

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



Hard Metal - BALINIT® Durana Coated
Hartmetall - BALINIT® Durana-Beschichtet
Metal Duro - Recubrimiento de BALINIT® Durana
Métal Dur - Revêtement BALINIT® Durana
Metallo Duro - Rivestimento in BALINIT® Durana
硬金属 - BALINIT® Durana 涂层



Solid submicron grain carbide drill
Straight flute design provides excellent rigidity
Materials 40 Rc and higher
Excellent heat resistance and lubricity
Recommended for high nickel, cobalt based and powdered metals
Live tooling recommended on lathe processes
Bright Finish - Page 59

Vollhartmetallbohrer aus Feinkornhartmetall
Gerades Spannutendesign für exzellente Stabilität
Werkstoffe mit 40HRc und höher
Exzellente Hitzebeständigkeit und Schmiereigenschaften
Empfohlen für Hoch Nickelhaltige und Kobaltbasislegierungen, Pulvermetall
Empfehlung fuer den Einsatz auf der Drehmaschine
Unbeschichtet - Seite 59

Broca de submicrograno sólido carburo
El diseño de ranuras rectas proporciona excelente rigidez
Materiales 40Rc y superiores
Excelente resistencia térmica y lubricación
Recomendado para alto contenido en níquel, aleaciones con base de cobalto y metal pulverizado
Recomendación para la aplicación en torno
Sin recubrimiento - Página 59

Forets carbure submicrograin
Le design de la goujure apporte une excellente rigidite
Materiaux de 40HRC et plus
Excellente resistance a la haute temperature et glissement
Recommander pour alliages a hautes teneur en nickel, base cobalt et metal fritte
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Non revêtu - Page 59

Punte in sub-micro grana
Tagliente dritto che consente un'ottima rigidità
Materiali a 40Hrc e superiori
Eccellente resistenza al calore e autolubrificante
Raccomandata per lavorazioni su leghe di nickel, cobalto e sinterizzati
Utensili rotanti sono consigliate se usato su un tornio
Non rivestito - Pagina 59

整体硬质合金钻头
直排屑槽结构保证了极好的刚性
推荐加工洛氏硬度40或40以上的材质
耐热性和润滑性特好
推荐加工高镍合金、钴基合金和粉末冶金
不建议在车床，或工具必须纺纱
无涂层 - 59页

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
59166	.0625	1/16"	1.588	1-3/4"	5/8"	.200"
59181	.0700	#50	1.778	1-3/4"	3/4"	.224"
59186	.0730	#49	1.854	1-3/4"	3/4"	.234"
59191	.0760	#48	1.930	1-3/4"	3/4"	.244"
59196	.0781	5/64"	1.984	1-3/4"	3/4"	.250"
59201	.0785	#47	1.994	1-3/4"	7/8"	.252"
39001	.0787		2.000	50	22	6
59211	.0810	#46	2.057	2"	7/8"	.260"
59216	.0820	#45	2.083	2"	7/8"	.263"
59221	.0860	#44	2.184	2"	7/8"	.276"
59226	.0890	#43	2.261	2"	7/8"	.285"
59231	.0935	#42	2.375	2"	7/8"	.300"
59236	.0938	3/32"	2.383	2"	7/8"	.301"
59241	.0960	#41	2.438	2"	7/8"	.308"
59246	.0980	#40	2.489	2"	7/8"	.314"
39051	.0984		2.500	50	22	8
59256	.0995	#39	2.527	2"	7/8"	.319"
59261	.1015	#38	2.578	2"	7/8"	.326"
59266	.1040	#37	2.642	2"	7/8"	.334"
59271	.1065	#36	2.705	2"	7/8"	.342"
59276	.1094	7/64"	2.779	2"	1"	.351"
59281	.1100	#35	2.794	2"	1"	.353"
59286	.1110	#34	2.819	2"	1"	.356"
59291	.1130	#33	2.870	2"	1"	.362"
59296	.1160	#32	2.946	2"	1"	.372"
39101	.1181		3.000	50	25	10
59306	.1200	#31	3.048	2"	1"	.385"
59311	.1250	1/8"	3.175	2"	1"	.401"
59316	.1285	#30	3.264	2"	1"	.412"
59321	.1360	#29	3.454	2"	1"	.436"
39151	.1378		3.500	50	25	11
59331	.1405	#28	3.569	2"	1"	.451"
59336	.1406	9/64"	3.571	2"	1"	.451"
59341	.1440	#27	3.658	2"	1"	.462"
59346	.1470	#26	3.734	2"	1"	.471"
59351	.1495	#25	3.797	2"	1"	.479"
59356	.1520	#24	3.861	2"	1"	.487"
59361	.1540	#23	3.912	2"	1"	.494"
59366	.1562	5/32"	3.967	2-1/2"	1-1/8"	.501"
59371	.1570	#22	3.988	2-1/2"	1-1/8"	.504"
39201	.1575		4.000	63	28	13
59381	.1590	#21	4.039	2-1/2"	1-1/8"	.510"
59386	.1610	#20	4.089	2-1/2"	1-1/8"	.516"
59391	.1660	#19	4.216	2-1/2"	1-1/8"	.532"

continued →

Series 1500H *(continued)*

.1695" - .5000"
(4.305mm - 12.700mm)

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
59396	.1695	#18	4.305	2-1/2"	1-3/16"	.544"
59401	.1719	11/64"	4.366	2-1/2"	1-3/16"	.551"
59406	.1730	#17	4.394	2-1/2"	1-3/16"	.555"
59411	.1770	#16	4.496	2-1/2"	1-3/16"	.568"
39251	.1772		4.500	63	28	14
59421	.1800	#15	4.572	2-1/2"	1-3/16"	.577"
59426	.1820	#14	4.623	2-1/2"	1-3/16"	.584"
59431	.1850	#13	4.700	2-1/2"	1-3/16"	.593"
59436	.1875	3/16"	4.763	2-1/2"	1-3/16"	.601"
59441	.1890	#12	4.801	2-1/2"	1-3/16"	.606"
59446	.1910	#11	4.851	2-1/2"	1-3/16"	.613"
59451	.1935	#10	4.915	2-1/2"	1-1/4"	.621"
59456	.1960	#9	4.978	2-1/2"	1-1/4"	.629"
39301	.1969		5.000	63	32	16
59466	.1990	#8	5.055	2-1/2"	1-1/4"	.638"
59471	.2010	#7	5.105	2-1/2"	1-1/4"	.645"
59476	.2031	13/64"	5.159	2-1/2"	1-1/4"	.651"
59481	.2040	#6	5.182	2-1/2"	1-1/4"	.654"
59486	.2055	#5	5.220	2-1/2"	1-1/4"	.659"
59491	.2090	#4	5.309	2-1/2"	1-1/4"	.670"
59496	.2130	#3	5.410	2-1/2"	1-1/4"	.683"
39351	.2165		5.500	63	32	18
59506	.2188	7/32"	5.558	2-1/2"	1-1/2"	.702"
59511	.2210	#2	5.613	2-1/2"	1-1/2"	.709"
59516	.2280	#1	5.791	2-1/2"	1-1/2"	.731"
59526	.2344	15/64"	5.954	2-1/2"	1-1/2"	.752"
39401	.2362		6.000	63	38	19
59551	.2500	1/4"	6.350	2-1/2"	1-1/2"	.802"
39451	.2559		6.500	63	38	21
59571	.2656	17/64"	6.746	2-1/2"	1-1/2"	.852"
39501	.2756		7.000	63	38	22
59601	.2812	9/32"	7.142	2-1/2"	1-1/2"	.902"
39521	.2953		7.500	63	41	24
59621	.2969	19/64"	7.541	2-1/2"	1-5/8"	.952"
59631	.3125	5/16"	7.938	2-1/2"	1-5/8"	1.002"
39541	.3150		8.000	63	41	26
59651	.3281	21/64"	8.334	3"	1-5/8"	1.052"
39561	.3346		8.500	76	41	27
59671	.3438	11/32"	8.733	3"	1-5/8"	1.103"
39581	.3543		9.000	76	41	29
59691	.3594	23/64"	9.129	3"	1-3/4"	1.153"
39601	.3740		9.500	76	41	30
59706	.3750	3/8"	9.525	3"	1-3/4"	1.203"
59721	.3906	25/64"	9.921	3"	1-3/4"	1.253"
39621	.3937		10.000	76	44	32
59741	.4062	13/32"	10.317	3"	1-3/4"	1.303"
59756	.4219	27/64"	10.716	3"	1-3/4"	1.353"
39661	.4331		11.000	76	44	35
59766	.4375	7/16"	11.113	3"	1-3/4"	1.403"
39681	.4528		11.500	76	44	37
59776	.4531	29/64"	11.509	3"	1-3/4"	1.453"
59781	.4688	15/32"	11.908	3"	1-3/4"	1.503"
39701	.4724		12.000	76	44	38
59791	.4844	31/64"	12.304	3"	1-3/4"	1.554"
39721	.4921		12.500	76	44	40
59801	.5000	1/2"	12.700	3"	1-3/4"	1.604"

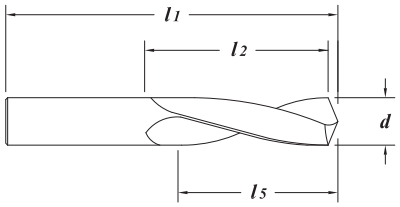
† *Metric equivalents are for reference only*

Series 1510

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

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

Slow Helix
Reduzierte Helix
Hélice Lenta
Hélice Réduite
Lento a Spirale
缓螺旋



Solid submicron grain carbide drill
Heavy web for extra rigidity and added strength
Thinned point
Recommended to run in titanium, inconel, hastelloy, waspaloy, and stainless steel
Live tooling recommended on lathe processes
Durana Coating - page 66

Vollhartmetallbohrer aus Feinkornhartmetall
Starke Schneidkante für hohe Stabilität
Ausspitzung
Empfohlen für Titan, Inconel, Hastelloy, Waspaloy, und Rostfreie Stähle
Empfehlung fuer den Einsatz auf der Drehmaschine
Durana-Beschichtet - Seite 66

Broca de submicrograno sólido carburo
Cuerpo resistente para mayor rigidez y resistencia
Punta rebajada
Recomendado para titanio, inconel, hastelloy, waspaloy y acero inoxidable
Recomendación para la aplicación en torno
Recubrimiento de Durana - Página 66

Forets carbure submicrograin
Corps lourd pour plus de rigidite
Ame amincie
Recommander pour titane, inconel, hastelloy, waspaloy et acier inoxydable
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Revêtement Durana - Page 66

Punte in sub-micro grana
Gambo robusto per una massimia rigidità
Centro scaricato
Raccomandata per lavorazioni su titanio, inconel, hastelloy, waspaloy e acciaio inox
Utensili rotanti sono consigliate se usato su un tornio
Rivestimento in Durana - Pagina 66

整体硬质合金钻头
大的中心刃产生超强刚性和强度
经过修磨的刀尖
推荐加工钛合金、铬镍铁耐热耐蚀合金、耐盐酸镍基合金、耐高热镍基合金和不锈钢合金
不建议在车床，或工具必须纺纱
Durana 涂层 - 66页

EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
19070	.0625	1/16"	1.588	1-3/4"	5/8"	.200"
19075	.0635	#52	1.613	1-3/4"	11/16"	.204"
19080	.0670	#51	1.702	1-3/4"	11/16"	.215"
19085	.0700	#50	1.778	1-3/4"	11/16"	.224"
19090	.0730	#49	1.854	1-3/4"	11/16"	.234"
19095	.0760	#48	1.930	1-3/4"	11/16"	.244"
19100	.0781	5/64"	1.984	1-3/4"	11/16"	.250"
19105	.0785	#47	1.994	1-3/4"	3/4"	.252"
19115	.0787		2.000	45	19	6
19120	.0810	#46	2.057	1-3/4"	3/4"	.260"
19125	.0820	#45	2.083	1-3/4"	3/4"	.263"
19130	.0860	#44	2.184	1-3/4"	3/4"	.276"
19135	.0890	#43	2.261	1-3/4"	3/4"	.285"
19140	.0935	#42	2.375	1-3/4"	3/4"	.300"
19145	.0938	3/32"	2.383	1-3/4"	3/4"	.301"
19150	.0960	#41	2.438	1-13/16"	13/16"	.308"
19155	.0980	#40	2.489	1-13/16"	13/16"	.314"
19160	.0984		2.500	46	21	8
19165	.0995	#39	2.527	1-13/16"	13/16"	.319"
19170	.1015	#38	2.578	1-13/16"	13/16"	.326"
19175	.1040	#37	2.642	1-13/16"	13/16"	.334"
19180	.1065	#36	2.705	1-13/16"	13/16"	.342"
19185	.1094	7/64"	2.779	1-13/16"	13/16"	.351"
19190	.1100	#35	2.794	1-7/8"	7/8"	.353"
19195	.1110	#34	2.819	1-7/8"	7/8"	.356"
19200	.1130	#33	2.870	1-7/8"	7/8"	.362"
19205	.1160	#32	2.946	1-7/8"	7/8"	.372"
19210	.1181		3.000	48	22	10
19215	.1200	#31	3.048	1-7/8"	7/8"	.385"
19220	.1250	1/8"	3.175	1-7/8"	7/8"	.401"
19225	.1285	#30	3.264	1-15/16"	15/16"	.412"
19230	.1360	#29	3.454	1-15/16"	15/16"	.436"
19235	.1378		3.500	49	24	11
19240	.1405	#28	3.569	1-15/16"	15/16"	.451"
19245	.1406	9/64"	3.571	1-15/16"	15/16"	.451"
19250	.1440	#27	3.658	2-1/16"	1"	.462"
19255	.1470	#26	3.734	2-1/16"	1"	.471"
19260	.1495	#25	3.797	2-1/16"	1"	.479"
19265	.1520	#24	3.861	2-1/16"	1"	.487"
19270	.1540	#23	3.912	2-1/16"	1"	.494"
19275	.1562	5/32"	3.967	2-1/16"	1"	.501"
19280	.1570	#22	3.988	2-1/8"	1-1/16"	.504"
19285	.1575		4.000	54	27	13

continued →

Series 1510 *(continued)*

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

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
19290	.1590	#21	4.039	2-1/8"	1-1/16"	.510"
19295	.1610	#20	4.089	2-1/8"	1-1/16"	.516"
19300	.1660	#19	4.216	2-1/8"	1-1/16"	.532"
19305	.1695	#18	4.305	2-1/8"	1-1/16"	.544"
19310	.1719	11/64"	4.366	2-1/8"	1-1/16"	.551"
19315	.1730	#17	4.394	2-3/16"	1-1/8"	.555"
19320	.1770	#16	4.496	2-3/16"	1-1/8"	.568"
19325	.1772		4.500	56	29	14
19330	.1800	#15	4.572	2-3/16"	1-1/8"	.577"
19335	.1820	#14	4.623	2-3/16"	1-1/8"	.584"
19340	.1850	#13	4.700	2-3/16"	1-1/8"	.593"
19345	.1875	3/16"	4.763	2-3/16"	1-1/8"	.601"
19350	.1890	#12	4.801	2-1/4"	1-3/16"	.606"
19355	.1910	#11	4.851	2-1/4"	1-3/16"	.613"
19360	.1935	#10	4.915	2-1/4"	1-3/16"	.621"
19365	.1960	#9	4.978	2-1/4"	1-3/16"	.629"
19370	.1969		5.000	57	30	16
19375	.1990	#8	5.055	2-1/4"	1-3/16"	.638"
19380	.2010	#7	5.105	2-1/4"	1-3/16"	.645"
19385	.2031	13/64"	5.159	2-1/4"	1-3/16"	.651"
19390	.2040	#6	5.182	2-3/8"	1-1/4"	.654"
19395	.2055	#5	5.220	2-3/8"	1-1/4"	.659"
19400	.2090	#4	5.309	2-3/8"	1-1/4"	.670"
19405	.2130	#3	5.410	2-3/8"	1-1/4"	.683"
19410	.2165		5.500	60	32	18
19415	.2188	7/32"	5.558	2-3/8"	1-1/4"	.702"
19420	.2210	#2	5.613	2-7/16"	1-5/16"	.709"
19425	.2280	#1	5.791	2-7/16"	1-5/16"	.731"
19430	.2340	A	5.944	2-7/16"	1-5/16"	.750"
19435	.2344	15/64"	5.954	2-7/16"	1-5/16"	.752"
19440	.2362		6.000	64	35	19
19445	.2380	B	6.045	2-1/2"	1-3/8"	.763"
19450	.2420	C	6.147	2-1/2"	1-3/8"	.776"
19455	.2460	D	6.248	2-1/2"	1-3/8"	.789"
19460	.2500	1/4" / E	6.350	2-1/2"	1-3/8"	.802"
19465	.2559		6.500	67	37	21
19470	.2570	F	6.528	2-5/8"	1-7/16"	.824"
19475	.2610	G	6.629	2-5/8"	1-7/16"	.837"
19480	.2656	17/64"	6.746	2-5/8"	1-7/16"	.852"
19485	.2660	H	6.756	2-11/16"	1-1/2"	.853"
19490	.2720	I	6.909	2-11/16"	1-1/2"	.872"
19495	.2756		7.000	68	38	22
19500	.2770	J	7.036	2-11/16"	1-1/2"	.888"
19505	.2810	K	7.137	2-11/16"	1-1/2"	.901"
19510	.2812	9/32"	7.142	2-11/16"	1-1/2"	.902"
19515	.2900	L	7.366	2-3/4"	1-9/16"	.930"
19520	.2950	M	7.493	2-3/4"	1-9/16"	.946"
19525	.2953		7.500	70	40	24
19530	.2969	19/64"	7.541	2-3/4"	1-9/16"	.952"
19535	.3020	N	7.671	2-15/16"	1-5/8"	.969"
19540	.3125	5/16"	7.938	2-15/16"	1-5/8"	1.002"
19545	.3150		8.000	75	43	26
19550	.3160	O	8.026	2-15/16"	1-11/16"	1.013"
19555	.3230	P	8.204	2-15/16"	1-11/16"	1.036"
19560	.3281	21/64"	8.334	2-15/16"	1-11/16"	1.052"
19565	.3320	Q	8.433	3"	1-11/16"	1.065"
19570	.3346		8.500	76	43	27

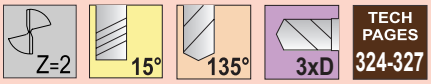
† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
19575	.3390	R	8.611	3"	1-11/16"	1.087"
19580	.3438	11/32"	8.733	3"	1-11/16"	1.103"
19585	.3480	S	8.839	3-1/16"	1-3/4"	1.116"
19590	.3543		9.000	78	44	29
19595	.3580	T	9.093	3-1/16"	1-3/4"	1.148"
19600	.3594	23/64"	9.129	3-1/16"	1-3/4"	1.153"
19605	.3680	U	9.347	3-1/8"	1-13/16"	1.180"
19615	.3750	3/8"	9.525	3-1/8"	1-13/16"	1.203"
19620	.3770	V	9.576	3-1/4"	1-7/8"	1.209"
19625	.3860	W	9.804	3-1/4"	1-7/8"	1.238"
19630	.3906	25/64"	9.921	3-1/4"	1-7/8"	1.253"
19635	.3937		10.000	84	49	32
19640	.3970	X	10.084	3-5/16"	1-15/16"	1.273"
19645	.4040	Y	10.262	3-5/16"	1-15/16"	1.296"
19650	.4062	13/32"	10.317	3-5/16"	1-15/16"	1.303"
19655	.4130	Z	10.490	3-3/8"	2"	1.325"
19660	.4134		10.500	86	51	34
19665	.4219	27/64"	10.716	3-3/8"	2"	1.353"
19670	.4331		11.000	87	52	35
19675	.4375	7/16"	11.113	3-7/16"	2-1/16"	1.403"
19685	.4531	29/64"	11.509	3-9/16"	2-1/8"	1.453"
19690	.4688	15/32"	11.908	3-5/8"	2-1/8"	1.503"
19695	.4724		12.000	94	56	38
19700	.4844	31/64"	12.304	3-11/16"	2-3/16"	1.554"
19705	.4921		12.500	95	56	40
19710	.5000	1/2"	12.700	3-3/4"	2-1/4"	1.604"
19720	.5156	33/64"	13.096	4-1/4"	2-3/8"	1.654"
19725	.5312	17/32"	13.492	4-1/4"	2-3/8"	1.704"
19730	.5315		13.500	107	60	43
19735	.5469	35/64"	13.891	4-1/4"	2-3/8"	1.754"
19740	.5512		14.000	107	60	45
19745	.5625	9/16"	14.287	4-1/2"	2-1/2"	1.804"
19755	.5781	37/64"	14.683	4-1/2"	2-1/2"	1.854"
19760	.5906		15.000	115	65	48
19765	.5938	19/32"	15.082	4-1/2"	2-1/2"	1.904"
19770	.6094	39/64"	15.478	4-1/2"	2-1/2"	1.954"
19780	.6250	5/8"	15.875	4-1/2"	2-1/2"	2.004"
19785	.6299		16.000	115	65	51

Series 1510H

NEW ITEM

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

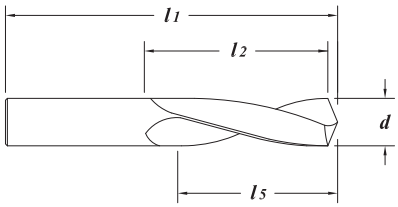


TECH PAGES 324-327

TOLERANCES

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

Slow Helix - BALINIT® Durana Coated
Reduzierte Helix - BALINIT® Durana-Beschichtet
Hélice Lenta - Recubrimiento de BALINIT® Durana
Hélice Réduite - Revêtement BALINIT® Durana
Elica Dolce - Rivestimento in BALINIT® Durana
缓螺旋 - BALINIT® Durana 涂层



Solid submicron grain carbide drill
Excellent heat resistance and lubricity
Heavy web for extra rigidity and added strength
Thinned point
Recommended to run in titanium, inconel, hastelloy, waspaloy, and stainless steel
Live tooling recommended on lathe processes
Bright Finish - page 63

Vollhartmetallbohrer aus Feinkornhartmetall
Exzellente Hitzebeständigkeit und Schmiereigenschaften
Starke Schneidkante für hohe Stabilität
Ausspitzung
Empfohlen für Titan, Inconel, Hastelloy, Waspaloy, und Rostfreie Stähle
Empfehlung fuer den Einsatz auf der Drehmaschine
Unbeschichtet - Seite 63

Broca de submicrograno sólido carburo
Excelente resistencia térmica y lubricación
Cuerpo resistente para mayor rigidez y resistencia
Punta rebajada
Recomendado para titanio, inconel, hastelloy, waspaloy y acero inoxidable
Recomendación para la aplicación en torno
Sin recubrimiento - Página 63

Forets carbure submicrograin
Excellente resistance a la haute temperature et glissement
Corps lourd pour plus de rigidite
Ame amincie
Recommander pour titane, inconel, hastelloy, waspaloy et acier inoxydable
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Sans revêtement - Page 63

Punte in sub-micro grana
Eccellente resistenza al calore e autolubrificante
Gambo robusto per una massimia rigidità
Centro scaricato
Raccomandata per lavorazioni su titanio, inconel, hastelloy, waspaloy e acciaio inox
Utensili rotanti sono consigliate se usato su un tornio
Non Rivestito - Pagina 63

整体硬质合金钻头
耐热性和润滑性特好
大的中心刃产生超强刚性和强度
经过修磨的刀尖
推荐加工钛合金、铬镍铁耐热耐蚀合金、耐盐酸镍基合金、耐高热镍基合金和不锈钢合金
不建议在车床，或工具必须纺纱
未涂层 - 63页

	EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
	19071	.0625	1/16"	1.588	1-3/4"	5/8"	.200"
	19076	.0635	#52	1.613	1-3/4"	11/16"	.204"
	19081	.0670	#51	1.702	1-3/4"	11/16"	.215"
	19086	.0700	#50	1.778	1-3/4"	11/16"	.224"
	19091	.0730	#49	1.854	1-3/4"	11/16"	.234"
	19096	.0760	#48	1.930	1-3/4"	11/16"	.244"
	19101	.0781	5/64"	1.984	1-3/4"	11/16"	.250"
	19106	.0785	#47	1.994	1-3/4"	3/4"	.252"
	19116	.0787		2.000	45	19	6
	19121	.0810	#46	2.057	1-3/4"	3/4"	.260'
	19126	.0820	#45	2.083	1-3/4"	3/4"	.263"
NEW	19128	.0827		2.100	45	19	7
	19131	.0860	#44	2.184	1-3/4"	3/4"	.276"
	19136	.0890	#43	2.261	1-3/4"	3/4"	.285"
	19138	.0906		2.300	45	19	7
	19141	.0935	#42	2.375	1-3/4"	3/4"	.300"
	19146	.0938	3/32"	2.383	1-3/4"	3/4"	.301"
	19148	.0945		2.400	46	21	8
	19151	.0960	#41	2.438	1-13/16"	13/16"	.308"
	19156	.0980	#40	2.489	1-13/16"	13/16"	.314"
	19161	.0984		2.500	46	21	8
	19166	.0995	#39	2.527	1-13/16"	13/16"	.319"
	19171	.1015	#38	2.578	1-13/16"	13/16"	.326"
	19176	.1040	#37	2.642	1-13/16"	13/16"	.334"
	19181	.1065	#36	2.705	1-13/16"	13/16"	.342"
	19186	.1094	7/64"	2.779	1-13/16"	13/16"	.351"
	19191	.1100	#35	2.794	1-7/8"	7/8"	.353"
	19196	.1110	#34	2.819	1-7/8"	7/8"	.356"
	19201	.1130	#33	2.870	1-7/8"	7/8"	.362"
	19206	.1160	#32	2.946	1-7/8"	7/8"	.372"
	19211	.1181		3.000	48	22	10
	19216	.1200	#31	3.048	1-7/8"	7/8"	.385"
	19218	.1220		3.100	48	22	10
	19221	.1250	1/8"	3.175	1-7/8"	7/8"	.401"
	19226	.1285	#30	3.264	1-15/16"	15/16"	.412"
	19231	.1360	#29	3.454	1-15/16"	15/16"	.436"
	19236	.1378		3.500	49	24	11
	19241	.1405	#28	3.569	1-15/16"	15/16"	.451"
	19246	.1406	9/64"	3.571	1-15/16"	15/16"	.451"
	19251	.1440	#27	3.658	2-1/16"	1"	.462"
	19256	.1470	#26	3.734	2-1/16"	1"	.471"
	19261	.1495	#25	3.797	2-1/16"	1"	.479"
	19266	.1520	#24	3.861	2-1/16"	1"	.487"
	19271	.1540	#23	3.912	2-1/16"	1"	.494"
	19276	.1562	5/32"	3.967	2-1/16"	1"	.501"
	19281	.1570	#22	3.988	2-1/8"	1-1/16"	.504"
	19286	.1575		4.000	54	27	13

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
19291	.1590	#21	4.039	2-1/8"	1-1/16"	.510"
19296	.1610	#20	4.089	2-1/8"	1-1/16"	.516"
19301	.1660	#19	4.216	2-1/8"	1-1/16"	.532"
19306	.1695	#18	4.305	2-1/8"	1-1/16"	.544"
19311	.1719	11/64"	4.366	2-1/8"	1-1/16"	.551"
19316	.1730	#17	4.394	2-3/16"	1-1/8"	.555"
19321	.1770	#16	4.496	2-3/16"	1-1/8"	.568"
19326	.1772		4.500	56	29	14
19331	.1800	#15	4.572	2-3/16"	1-1/8"	.577"
19336	.1820	#14	4.623	2-3/16"	1-1/8"	.584"
19341	.1850	#13	4.700	2-3/16"	1-1/8"	.593"
19346	.1875	3/16"	4.763	2-3/16"	1-1/8"	.601"
19351	.1890	#12	4.801	2-1/4"	1-3/16"	.606"
19356	.1910	#11	4.851	2-1/4"	1-3/16"	.613"
19361	.1935	#10	4.915	2-1/4"	1-3/16"	.621"
19366	.1960	#9	4.978	2-1/4"	1-3/16"	.629"
19371	.1969		5.000	57	30	16
19376	.1990	#8	5.055	2-1/4"	1-3/16"	.638"
19381	.2010	#7	5.105	2-1/4"	1-3/16"	.645"
19386	.2031	13/64"	5.159	2-1/4"	1-3/16"	.651"
19391	.2040	#6	5.182	2-3/8"	1-1/4"	.654"
19396	.2055	#5	5.220	2-3/8"	1-1/4"	.659"
19401	.2090	#4	5.309	2-3/8"	1-1/4"	.670"
19406	.2130	#3	5.410	2-3/8"	1-1/4"	.683"
19411	.2165		5.500	60	32	18
19416	.2188	7/32"	5.558	2-3/8"	1-1/4"	.702"
19421	.2210	#2	5.613	2-7/16"	1-5/16"	.709"
19426	.2280	#1	5.791	2-7/16"	1-5/16"	.731"
19431	.2340	A	5.944	2-7/16"	1-5/16"	.750"
19436	.2344	15/64"	5.954	2-7/16"	1-5/16"	.752"
19441	.2362		6.000	64	35	19
19446	.2380	B	6.045	2-1/2"	1-3/8"	.763"
19451	.2420	C	6.147	2-1/2"	1-3/8"	.776"
19456	.2460	D	6.248	2-1/2"	1-3/8"	.789"
19461	.2500	1/4" / E	6.350	2-1/2"	1-3/8"	.802"
19466	.2559		6.500	67	37	21
19471	.2570	F	6.528	2-5/8"	1-7/16"	.824"
19476	.2610	G	6.629	2-5/8"	1-7/16"	.837"
19481	.2656	17/64"	6.746	2-5/8"	1-7/16"	.852"
19486	.2660	H	6.756	2-11/16"	1-1/2"	.853"
19491	.2720	I	6.909	2-11/16"	1-1/2"	.872"
19496	.2756		7.000	68	38	22
19501	.2770	J	7.036	2-11/16"	1-1/2"	.888"
19506	.2810	K	7.137	2-11/16"	1-1/2"	.901"
19511	.2812	9/32"	7.142	2-11/16"	1-1/2"	.902"
19516	.2900	L	7.366	2-3/4"	1-9/16"	.930"
19521	.2950	M	7.493	2-3/4"	1-9/16"	.946"
19526	.2953		7.500	70	40	24
19531	.2969	19/64"	7.541	2-3/4"	1-9/16"	.952"
19536	.3020	N	7.671	2-15/16"	1-5/8"	.989"
19541	.3125	5/16"	7.938	2-15/16"	1-5/8"	1.002"
19546	.3150		8.000	75	43	26
19551	.3160	O	8.026	2-15/16"	1-11/16"	1.013"
19556	.3230	P	8.204	2-15/16"	1-11/16"	1.036"
19561	.3281	21/64"	8.334	2-15/16"	1-11/16"	1.052"
19566	.3320	Q	8.433	3"	1-11/16"	1.065"
19571	.3346		8.500	76	43	27

continued →

Series 1510H *(continued)*

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

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
19576	.3390	R	8.611	3"	1-11/16"	1.087"
19581	.3438	11/32"	8.733	3"	1-11/16"	1.103"
19586	.3480	S	8.839	3-1/16"	1-3/4"	1.116"
19591	.3543		9.000	78	44	29
19596	.3580	T	9.093	3-1/16"	1-3/4"	1.148"
19601	.3594	23/64"	9.129	3-1/16"	1-3/4"	1.153"
19606	.3680	U	9.347	3-1/8"	1-13/16"	1.180"
19611	.3740		9.500	79	46	30
19616	.3750	3/8"	9.525	3-1/8"	1-13/16"	1.203"
19621	.3770	V	9.576	3-1/4"	1-7/8"	1.209"
19626	.3860	W	9.804	3-1/4"	1-7/8"	1.238"
19631	.3906	25/64"	9.921	3-1/4"	1-7/8"	1.253"
19636	.3937		10.000	84	49	32
19641	.3970	X	10.084	3-5/16"	1-15/16"	1.273"
19646	.4040	Y	10.262	3-5/16"	1-15/16"	1.296"
19651	.4062	13/32"	10.317	3-5/16"	1-15/16"	1.303"
19656	.4130	Z	10.490	3-3/8"	2"	1.325"
19661	.4134		10.500	86	51	34
19666	.4219	27/64"	10.716	3-3/8"	2"	1.353"
19671	.4331		11.000	87	52	35
19676	.4375	7/16"	11.113	3-7/16"	2-1/16"	1.403"
19681	.4528		11.500	91	54	37
19686	.4531	29/64"	11.509	3-9/16"	2-1/8"	1.453"
19691	.4688	15/32"	11.908	3-5/8"	2-1/8"	1.503"
19696	.4724		12.000	94	56	38
19701	.4844	31/64"	12.304	3-11/16"	2-3/16"	1.554"
19706	.4921		12.500	95	56	40
19711	.5000	1/2"	12.700	3-3/4"	2-1/4"	1.604"
19716	.5118		13.000	107	60	42
19721	.5156	33/64"	13.096	4-1/4"	2-3/8"	1.654"
19726	.5312	17/32"	13.492	4-1/4"	2-3/8"	1.704"
19731	.5315		13.500	107	60	43
19736	.5469	35/64"	13.891	4-1/4"	2-3/8"	1.754"
19741	.5512		14.000	107	60	45
19746	.5625	9/16"	14.287	4-1/2"	2-1/2"	1.804"
19751	.5709		14.500	115	65	47
19756	.5781	37/64"	14.683	4-1/2"	2-1/2"	1.854"
19761	.5906		15.000	115	65	48
19766	.5938	19/32"	15.082	4-1/2"	2-1/2"	1.904"
19771	.6094	39/64"	15.478	4-1/2"	2-1/2"	1.954"
19776	.6102		15.500	115	65	50
19781	.6250	5/8"	15.875	4-1/2"	2-1/2"	2.004"
19786	.6299		16.000	115	65	51

† *Metric equivalents are for reference only*

TOLERANCES

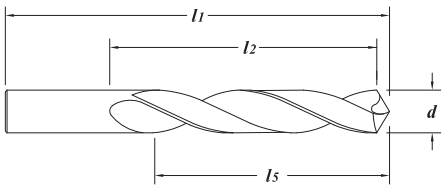
d	+.0000 –.0127mm (+.0000" –.0005")	
l_1	≤ 1/8"	+3.175 –1.588mm (+.125" –.062")
	> 1/8"	+3.175 –3.175mm (+.125" –.125")
l_2	≤ 1/8"	+3.175 –1.588mm (+.125" –.062")
	>1/8"	+3.175 –3.175mm (+.125" –.125")

NEW ITEMS

Series 1520, 1205

.0625" - .1015"
(1.588mm - 2.578mm)

Z=2 | 25° | 135° | 3xD | 5xD | TECH PAGES 320-323



Solid submicron grain carbide drill
No spotting required in most applications
4-facet self-centering point
General purpose for all material groups
Live tooling recommended on lathe processes
Durana Coating - page 75

Vollhartmetallbohrer aus Feinkornhartmetall
Vorzentrieren bei den meisten Anwendungen nicht notwendig
4-Fasen-Anschliff Selbstzentrierend Punkt
Allzweck für alle Materialgruppen
Empfehlung fuer den Einsatz auf der Drehmaschine
Durana-Beschichtet - Seite 75

Broca de submicrograno sólido carburo
No se requiere pretaladrado para la mayoría de las aplicaciones
Punta de 4 caras autocentrada
De uso general para todos los grupos de materiales
Recomendación para la aplicación en torno
Recubrimiento de Durana - Página 75

Forets carbure submicrograin
Pas de point de centre requis pour la plupart des applications
Pointe auto centrante avec 4 faces de depouille
Usage général pour tous les groupes de matériaux
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Revêtement Durana - Page 75

Punte in sub-micro grana
Pre-centraggio non richiesto nella maggior parte delle applicazioni
Punto 4 facce autocentrante
Scopo generale per tutte le materie
Utensili rotanti sono consigliate se usato su un tornio
Rivestimento in Durana - Pagina 75

整体硬质合金钻头
自定心刀尖
在多数用途中不需要定心
4-小平面刀尖
通用使用的所有材料组
不建议在车床，或工具必须纺纱
Durana 涂层 - 75页

3xD (1520) EDP#	5xD (1205) EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
77165		.0625	1/16"	1.588	1-3/4"	5/8"	.200"
	89165	.0625	1/16"	1.588	1-3/4"	3/4"	.325"
77170		.0635	#52	1.613	1-3/4"	11/16"	.204"
	89170	.0635	#52	1.613	1-3/4"	3/4"	.331"
77175		.0670	#51	1.702	1-3/4"	11/16"	.215"
	89175	.0670	#51	1.702	1-3/4"	3/4"	.349"
77180		.0700	#50	1.778	1-3/4"	11/16"	.224"
	89180	.0700	#50	1.778	1-3/4"	7/8"	.364"
77185		.0730	#49	1.854	1-3/4"	11/16"	.234"
	89185	.0730	#49	1.854	1-3/4"	7/8"	.380"
77190		.0760	#48	1.930	1-3/4"	11/16"	.244"
	89190	.0760	#48	1.930	1-3/4"	7/8"	.396"
77195		.0781	5/64"	1.984	1-3/4"	11/16"	.250"
	89195	.0781	5/64"	1.984	1-3/4"	7/8"	.407"
77200		.0785	#47	1.994	1-3/4"	3/4"	.252"
	89200	.0785	#47	1.994	1-3/4"	7/8"	.409"
77205		.0787		2.000	44	19	6
	89205	.0787		2.000	44	22	10
77210		.0810	#46	2.057	1-3/4"	3/4"	.260"
	89210	.0810	#46	2.057	1-3/4"	7/8"	.422"
77215		.0820	#45	2.083	1-3/4"	3/4"	.263"
	89215	.0820	#45	2.083	1-3/4"	7/8"	.427"
77220		.0860	#44	2.184	1-3/4"	3/4"	.276"
	89220	.0860	#44	2.184	2"	1"	.448"
77225		.0890	#43	2.261	1-3/4"	3/4"	.285"
	89225	.0890	#43	2.261	2"	1"	.463"
77230		.0935	#42	2.375	1-3/4"	3/4"	.300"
	89230	.0935	#42	2.375	2"	1"	.487"
77235		.0938	3/32"	2.383	1-3/4"	3/4"	.301"
	89235	.0938	3/32"	2.383	2"	1"	.488"
77240		.0960	#41	2.438	1-13/16"	13/16"	.308"
	89240	.0960	#41	2.438	2"	1"	.500"
77245		.0980	#40	2.489	1-13/16"	13/16"	.314"
	89245	.0980	#40	2.489	2"	1"	.510"
77250		.0984		2.500	46	21	8
	89250	.0984		2.500	57	32	13
77255		.0995	#39	2.527	1-13/16"	13/16"	.319"
	89255	.0995	#39	2.527	2-1/4"	1-1/4"	.518"
77260		.1015	#38	2.578	1-13/16"	13/16"	.326"
	89260	.1015	#38	2.578	2-1/4"	1-1/4"	.529"

continued →

Series 1520, 1205 *(continued)*

.1040" - .1719"
(2.642mm - 4.366mm)

3xD (1520) EDP#	5xD (1205) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
77265		.1040	#37	2.642	1-13/16"	13/16"	.334"
	89265	.1040	#37	2.642	2-1/4"	1-1/4"	.542"
77270		.1065	#36	2.705	1-13/16"	13/16"	.342"
	89270	.1065	#36	2.705	2-1/4"	1-1/4"	.555"
77275		.1094	7/64"	2.779	1-13/16"	13/16"	.351"
	89275	.1094	7/64"	2.779	2-1/4"	1-1/4"	.570"
77280		.1100	#35	2.794	1-7/8"	7/8"	.353"
	89280	.1100	#35	2.794	2-1/4"	1-1/4"	.573"
77285		.1110	#34	2.819	1-7/8"	7/8"	.356"
	89285	.1110	#34	2.819	2-1/4"	1-1/4"	.578"
77290		.1130	#33	2.870	1-7/8"	7/8"	.362"
	89290	.1130	#33	2.870	2-1/4"	1-1/4"	.588"
77295		.1160	#32	2.946	1-7/8"	7/8"	.372"
	89295	.1160	#32	2.946	2-1/4"	1-1/4"	.604"
77300		.1181		3.000	48	22	10
	89300	.1181		3.000	57	32	16
77305		.1200	#31	3.048	1-7/8"	7/8"	.385"
	89305	.1200	#31	3.048	2-1/4"	1-1/4"	.625"
77310		.1250	1/8"	3.175	1-7/8"	7/8"	.401"
	89310	.1250	1/8"	3.175	2-1/4"	1-1/4"	.651"
77315		.1285	#30	3.264	1-15/16"	15/16"	.412"
	89315	.1285	#30	3.264	2-1/4"	1-1/4"	.669"
77320		.1360	#29	3.454	1-15/16"	15/16"	.436"
	89320	.1360	#29	3.454	2-1/2"	1-3/8"	.708"
77325		.1378		3.500	49	24	11
	89325	.1378		3.500	63	35	18
77330		.1405	#28	3.569	1-15/16"	15/16"	.451"
	89330	.1405	#28	3.569	2-1/2"	1-3/8"	.732"
77335		.1406	9/64"	3.571	1-15/16"	15/16"	.451"
	89335	.1406	9/64"	3.571	2-1/2"	1-3/8"	.732"
77340		.1440	#27	3.658	2-1/16"	1"	.462"
	89340	.1440	#27	3.658	2-1/2"	1-3/8"	.750"
77345		.1470	#26	3.734	2-1/16"	1"	.471"
	89345	.1470	#26	3.734	2-1/2"	1-3/8"	.765"
77350		.1495	#25	3.797	2-1/16"	1"	.479"
	89350	.1495	#25	3.797	2-1/2"	1-3/8"	.778"
77355		.1520	#24	3.861	2-1/16"	1"	.487"
	89355	.1520	#24	3.861	2-1/2"	1-3/8"	.791"
77360		.1540	#23	3.912	2-1/16"	1"	.494"
	89360	.1540	#23	3.912	2-1/2"	1-3/8"	.802"
77365		.1562	5/32"	3.967	2-1/16"	1"	.501"
	89365	.1562	5/32"	3.967	2-1/2"	1-3/8"	.813"
77370		.1570	#22	3.988	2-1/8"	1-1/16"	.504"
	89370	.1570	#22	3.988	2-1/2"	1-3/8"	.818"
77375		.1575		4.000	54	27	13
	89375	.1575		4.000	63	35	21
77380		.1590	#21	4.039	2-1/8"	1-1/16"	.510"
	89380	.1590	#21	4.039	2-1/2"	1-3/8"	.828"
77385		.1610	#20	4.089	2-1/8"	1-1/16"	.516"
	89385	.1610	#20	4.089	2-1/2"	1-3/8"	.838"
77390		.1660	#19	4.216	2-1/8"	1-1/16"	.532"
	89390	.1660	#19	4.216	2-3/4"	1-5/8"	.864"
77395		.1695	#18	4.305	2-1/8"	1-1/16"	.544"
	89395	.1695	#18	4.305	2-3/4"	1-5/8"	.883"
77400		.1719	11/64"	4.366	2-1/8"	1-1/16"	.551"
	89400	.1719	11/64"	4.366	2-3/4"	1-5/8"	.895"

† *Metric equivalents are for reference only*

3xD (1520) EDP#	5xD (1205) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
77405		.1730	#17	4.394	2-3/16"	1-1/8"	.555"
	89405	.1730	#17	4.394	2-3/4"	1-5/8"	.901"
77410		.1770	#16	4.496	2-3/16"	1-1/8"	.568"
	89410	.1770	#16	4.496	2-3/4"	1-5/8"	.922"
77415		.1772		4.500	56	29	14
	89415	.1772		4.500	70	41	23
77420		.1800	#15	4.572	2-3/16"	1-1/8"	.577"
	89420	.1800	#15	4.572	2-3/4"	1-5/8"	.937"
77425		.1820	#14	4.623	2-3/16"	1-1/8"	.584"
	89425	.1820	#14	4.623	2-3/4"	1-5/8"	.948"
77430		.1850	#13	4.700	2-3/16"	1-1/8"	.593"
	89430	.1850	#13	4.700	2-3/4"	1-5/8"	.963"
77435		.1875	3/16"	4.763	2-3/16"	1-1/8"	.601"
	89435	.1875	3/16"	4.763	2-3/4"	1-5/8"	.976"
77440		.1890	#12	4.801	2-1/4"	1-3/16"	.606"
	89440	.1890	#12	4.801	2-3/4"	1-5/8"	.984"
77445		.1910	#11	4.851	2-1/4"	1-3/16"	.613"
	89445	.1910	#11	4.851	2-3/4"	1-5/8"	.995"
77450		.1935	#10	4.915	2-1/4"	1-3/16"	.621"
	89450	.1935	#10	4.915	2-3/4"	1-5/8"	1.008"
77455		.1960	#9	4.978	2-1/4"	1-3/16"	.629"
	89455	.1960	#9	4.978	3"	1-3/4"	1.021"
77460		.1969		5.000	57	30	16
	89460	.1969		5.000	76	44	26
77465		.1990	#8	5.055	2-1/4"	1-3/16"	.638"
	89465	.1990	#8	5.055	3"	1-3/4"	1.036"
77470		.2010	#7	5.105	2-1/4"	1-3/16"	.645"
	89470	.2010	#7	5.105	3"	1-3/4"	1.047"
77475		.2031	13/64"	5.159	2-1/4"	1-3/16"	.651"
	89475	.2031	13/64"	5.159	3"	1-3/4"	1.058"
77480		.2040	#6	5.182	2-3/8"	1-1/4"	.654"
	89480	.2040	#6	5.182	3"	1-3/4"	1.062"
77485		.2055	#5	5.220	2-3/8"	1-1/4"	.659"
	89485	.2055	#5	5.220	3"	1-3/4"	1.070"
77490		.2090	#4	5.309	2-3/8"	1-1/4"	.670"
	89490	.2090	#4	5.309	3"	1-3/4"	1.088"
77495		.2130	#3	5.410	2-3/8"	1-1/4"	.683"
	89495	.2130	#3	5.410	3"	1-3/4"	1.109"
77500		.2165		5.500	60	32	18
	89500	.2165		5.500	76	44	29
77505		.2188	7/32"	5.558	2-3/8"	1-1/4"	.702"
	89505	.2188	7/32"	5.558	3"	1-3/4"	1.139"
77510		.2210	#2	5.613	2-7/16"	1-5/16"	.709"
	89510	.2210	#2	5.613	3"	1-3/4"	1.151"
77515		.2280	#1	5.791	2-7/16"	1-5/16"	.731"
	89515	.2280	#1	5.791	3"	1-3/4"	1.187"
77520		.2340	A	5.944	2-7/16"	1-5/16"	.750"
	89520	.2340	A	5.944	3-1/4"	2"	1.218"
77525		.2344	15/64"	5.954	2-7/16"	1-5/16"	.752"
	89525	.2344	15/64"	5.954	3-1/4"	2"	1.221"
77530		.2362		6.000	64	35	19
	89530	.2362		6.000	82	50	31
77535		.2380	B	6.045	2-1/2"	1-3/8"	.763"
	89535	.2380	B	6.045	3-1/4"	2"	1.239"
77540		.2420	C	6.147	2-1/2"	1-3/8"	.776"
	89540	.2420	C	6.147	3-1/4"	2"	1.260"

continued →

Series 1520, 1205 *(continued)*

.2460" - .3543"
(6.248mm - 9.000mm)

3xD (1520) EDP#	5xD (1205) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
77545		.2460	D	6.248	2-1/2"	1-3/8"	.789"
	89545	.2460	D	6.248	3-1/4"	2"	1.281"
77550		.2500	1/4" / E	6.350	2-1/2"	1-3/8"	.802"
	89550	.2500	1/4" / E	6.350	3-1/4"	2"	1.302"
77555		.2559		6.500	67	37	21
	89555	.2559		6.500	82	50	34
77560		.2570	F	6.528	2-5/8"	1-7/16"	.824"
	89560	.2570	F	6.528	3-1/4"	2"	1.338"
77565		.2610	G	6.629	2-5/8"	1-7/16"	.837"
	89565	.2610	G	6.629	3-1/2"	2-1/8"	1.359"
77570		.2656	17/64"	6.746	2-5/8"	1-7/16"	.852"
	89570	.2656	17/64"	6.746	3-1/2"	2-1/8"	1.383"
77575		.2660	H	6.756	2-11/16"	1-1/2"	.853"
	89575	.2660	H	6.756	3-1/2"	2-1/8"	1.385"
77580		.2720	I	6.909	2-11/16"	1-1/2"	.872"
	89580	.2720	I	6.909	3-1/2"	2-1/8"	1.416"
77585		.2756		7.000	68	38	22
	89585	.2756		7.000	88	54	36
77590		.2770	J	7.036	2-11/16"	1-1/2"	.888"
	89590	.2770	J	7.036	3-1/2"	2-1/8"	1.442"
77595		.2810	K	7.137	2-11/16"	1-1/2"	.901"
	89595	.2810	K	7.137	3-1/2"	2-1/8"	1.463"
77600		.2812	9/32"	7.142	2-11/16"	1-1/2"	.902"
	89600	.2812	9/32"	7.142	3-1/2"	2-1/8"	1.464"
77605		.2900	L	7.366	2-3/4"	1-9/16"	.930"
	89605	.2900	L	7.366	3-1/2"	2-1/8"	1.510"
77610		.2950	M	7.493	2-3/4"	1-9/16"	.946"
	89610	.2950	M	7.493	3-3/4"	2-3/8"	1.536"
77615		.2953		7.500	70	40	24
	89615	.2953		7.500	95	60	39
77620		.2969	19/64"	7.541	2-3/4"	1-9/16"	.952"
	89620	.2969	19/64"	7.541	3-3/4"	2-3/8"	1.546"
77625		.3020	N	7.671	2-15/16"	1-5/8"	.969"
	89625	.3020	N	7.671	3-3/4"	2-3/8"	1.573"
77630		.3125	5/16"	7.938	2-15/16"	1-5/8"	1.002"
	89630	.3125	5/16"	7.938	3-3/4"	2-3/8"	1.627"
77635		.3150		8.000	75	43	26
	89635	.3150		8.000	95	60	42
77640		.3160	O	8.026	2-15/16"	1-11/16"	1.013"
	89640	.3160	O	8.026	3-3/4"	2-3/8"	1.645"
77645		.3230	P	8.204	2-15/16"	1-11/16"	1.036"
	89645	.3230	P	8.204	3-3/4"	2-3/8"	1.682"
77650		.3281	21/64"	8.334	2-15/16"	1-11/16"	1.052"
	89650	.3281	21/64"	8.334	4"	2-1/2"	1.708"
77655		.3320	Q	8.433	3"	1-11/16"	1.065"
	89655	.3320	Q	8.433	4"	2-1/2"	1.729"
77660		.3346		8.500	76	43	27
	89660	.3346		8.500	101	63	44
77665		.3390	R	8.611	3"	1-11/16"	1.087"
	89665	.3390	R	8.611	4"	2-1/2"	1.765"
77670		.3438	11/32"	8.733	3"	1-11/16"	1.103"
	89670	.3438	11/32"	8.733	4"	2-1/2"	1.790"
77675		.3480	S	8.839	3-1/16"	1-3/4"	1.116"
	89675	.3480	S	8.839	4"	2-1/2"	1.812"
77680		.3543		9.000	78	44	29
	89680	.3543		9.000	101	63	47

† *Metric equivalents are for reference only*

3xD (1520) EDP#	5xD (1205) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
77685		.3580	T	9.093	3-1/16"	1-3/4"	1.148"
	89685	.3580	T	9.093	4-1/4"	2-3/4"	1.864"
77690		.3594	23/64"	9.129	3-1/16"	1-3/4"	1.153"
	89690	.3594	23/64"	9.129	4-1/4"	2-3/4"	1.871"
77695		.3680	U	9.347	3-1/8"	1-13/16"	1.180"
	89695	.3680	U	9.347	4-1/4"	2-3/4"	1.916"
77700		.3740		9.500	79	46	30
	89700	.3740		9.500	107	70	49
77705		.3750	3/8"	9.525	3-1/8"	1-13/16"	1.203"
	89705	.3750	3/8"	9.525	4-1/4"	2-3/4"	1.953"
77710		.3770	V	9.576	3-1/4"	1-7/8"	1.209"
	89710	.3770	V	9.576	4-1/4"	2-3/4"	1.963"
77715		.3860	W	9.804	3-1/4"	1-7/8"	1.238"
	89715	.3860	W	9.804	4-1/2"	2-7/8"	2.010"
77720		.3906	25/64"	9.921	3-1/4"	1-7/8"	1.253"
	89720	.3906	25/64"	9.921	4-1/2"	2-7/8"	2.034"
77725		.3937		10.000	84	49	32
	89725	.3937		10.000	114	73	52
77730		.3970	X	10.084	3-5/16"	1-15/16"	1.273"
	89730	.3970	X	10.084	4-1/2"	2-7/8"	2.067"
	89735	.4040	Y	10.262	4-1/2"	2-7/8"	2.104"
77740		.4062	13/32"	10.317	3-5/16"	1-15/16"	1.303"
	89740	.4062	13/32"	10.317	4-1/2"	2-7/8"	2.115"
77745		.4130	Z	10.490	3-3/8"	2"	1.325"
	89745	.4130	Z	10.490	4-1/2"	2-7/8"	2.151"
77750		.4134		10.500	86	51	34
	89750	.4134		10.500	114	73	55
77755		.4219	27/64"	10.716	3-3/8"	2"	1.353"
	89755	.4219	27/64"	10.716	4-1/2"	2-7/8"	2.197"
77760		.4331		11.000	87	52	35
	89760	.4331		11.000	114	73	57
77765		.4375	7/16"	11.113	3-7/16"	2-1/16"	1.403"
	89765	.4375	7/16"	11.113	4-1/2"	2-7/8"	2.278"
77770		.4528		11.500	91	54	37
	89770	.4528		11.500	120	76	60
77775		.4531	29/64"	11.509	3-9/16"	2-1/8"	1.453"
	89775	.4531	29/64"	11.509	4-3/4"	3"	2.359"
77780		.4688	15/32"	11.908	3-5/8"	2-1/8"	1.503"
	89780	.4688	15/32"	11.908	4-3/4"	3"	2.441"
77785		.4724		12.000	94	56	38
	89785	.4724		12.000	120	76	62
77790		.4844	31/64"	12.304	3-11/16"	2-3/16"	1.554"
	89790	.4844	31/64"	12.304	4-3/4"	3"	2.522"
77795		.4921		12.500	95	56	40
	89795	.4921		12.500	120	76	65
77800		.5000	1/2"	12.700	3-3/4"	2-1/4"	1.604"
	89800	.5000	1/2"	12.700	4-3/4"	3"	2.604"
77805		.5118		13.000	107	60	42
	89805	.5118		13.000	127	83	68
77810		.5156	33/64"	13.096	4-1/4"	2-3/8"	1.654"
	89810	.5156	33/64"	13.096	5"	3-1/4"	2.685"
77815		.5312	17/32"	13.492	4-1/4"	2-3/8"	1.704"
	89815	.5312	17/32"	13.492	5"	3-1/4"	2.766"
77820		.5315		13.500	107	60	43
	89820	.5315		13.500	127	83	70

continued →

Series 1520, 1205 *(continued)*

.5469" - .6299"
(13.891mm - 16.000mm)

	3xD (1520) EDP#	5xD (1205) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
	77825		.5469	35/64"	13.891	4-1/4"	2-3/8"	1.754"
		89825	.5469	35/64"	13.891	5"	3-1/4"	2.848"
	77830		.5512		14.000	107	60	45
		89830	.5512		14.000	127	83	73
	77835		.5625	9/16"	14.287	4-1/2"	2-1/2"	1.804"
		89835	.5625	9/16"	14.287	5"	3-1/4"	2.929"
NEW	77840		.5709		14.500	115	65	47
		89840	.5709		14.500	127	83	76
	77845		.5781	37/64"	14.683	4-1/2"	2-1/2"	1.854"
		89845	.5781	37/64"	14.683	5-1/4"	3-1/2"	3.010"
	77850		.5906		15.000	115	65	48
		89850	.5906		15.000	133	89	78
	77855		.5938	19/32"	15.082	4-1/2"	2-1/2"	1.904"
		89855	.5938	19/32"	15.082	5-1/4"	3-1/2"	3.092"
NEW	77860		.6094	39/64"	15.478	4-1/2"	2-1/2"	1.954"
		89860	.6094	39/64"	15.478	5-1/4"	3-1/2"	3.173"
	77865		.6102		15.500	115	65	50
		89865	.6102		15.500	133	89	81
	77870		.6250	5/8"	15.875	4-1/2"	2-1/2"	2.004"
		89870	.6250	5/8"	15.875	5-1/4"	3-1/2"	3.254"
NEW	77875		.6299		16.000	115	65	51
		89875	.6299		16.000	133	89	83

† *Metric equivalents are for reference only*

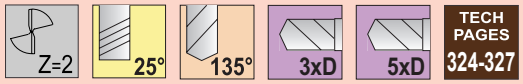
TOLERANCES

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

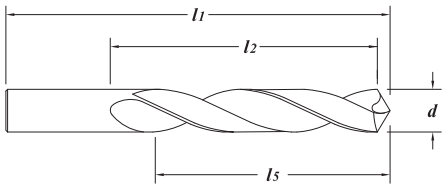
NEW ITEMS

Series 1520H, 1205H

.0625" - .1015"
(1.588mm - 2.578mm)



BALINIT® Durana Coated
BALINIT® Durana-Beschichtet
Recubrimiento de BALINIT® Durana
Revêtement BALINIT® Durana
Rivestimento in BALINIT® Durana
BALINIT® Durana 涂层



Solid submicron grain carbide drill
Excellent heat resistance and lubricity
No spotting required in most applications
4-facet self-centering point
General purpose for all material groups
Live tooling recommended on lathe processes
Bright Finish - page 69

Vollhartmetallbohrer aus Feinkornhartmetall
Exzellente Hitzebeständigkeit und Schmiereigenschaften
Vorzentrieren bei den meisten Anwendungen nicht notwendig
4-Fasen-Anschliff Selbstzentrierend Punkt
Allzweck für alle Materialgruppen
Empfehlung fuer den Einsatz auf der Drehmaschine
Unbeschichtet - Seite 69

Broca de submicrograno sólido carburo
Excelente resistencia térmica y lubricación
No se requiere pretaladrado para la mayoría de las aplicaciones
Punta de 4 caras autocentrada
De uso general para todos los grupos de materiales
Recomendación para la aplicación en torno
Sin recubrimiento - Página 69

Forets carbure submicrograin
Excellente resistance a la haute temperature et glissement
Pas de point de centre requis pour la plupart des applications
Pointe auto centrante avec 4 faces de depouille
Usage général pour tous les groupes de matériaux
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Sans revêtement - Page 69

Punte in sub-micro grana
Eccellente resistenza al calore e autolubrificante
Pre-centraggio non richiesto nella maggior parte delle applicazioni
Punto 4 facce autocentrante
Scopo generale per tutte le materie
Utensili rotanti sono consigliate se usato su un tornio
Non Rivestito - Pagina 69

整体硬质合金钻头
耐热性和润滑性特好
自定心刀尖
在多数用途中不需要定心
通用使用的所有材料组
不建议在车床，或工具必须纺纱
未涂层 - 69页

3xD (1520H) EDP#	5xD (1205H) EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
77166		.0625	1/16"	1.588	1-3/4"	5/8"	.200"
	89166	.0625	1/16"	1.588	1-3/4"	3/4"	.325"
77171		.0635	#52	1.613	1-3/4"	11/16"	.204"
	89171	.0635	#52	1.613	1-3/4"	3/4"	.331"
77176		.0670	#51	1.702	1-3/4"	11/16"	.215"
	89176	.0670	#51	1.702	1-3/4"	3/4"	.349"
77181		.0700	#50	1.778	1-3/4"	11/16"	.224"
	89181	.0700	#50	1.778	1-3/4"	7/8"	.364"
77186		.0730	#49	1.854	1-3/4"	11/16"	.234"
	89186	.0730	#49	1.854	1-3/4"	7/8"	.380"
77191		.0760	#48	1.930	1-3/4"	11/16"	.244"
	89191	.0760	#48	1.930	1-3/4"	7/8"	.396"
77196		.0781	5/64"	1.984	1-3/4"	11/16"	.250"
	89196	.0781	5/64"	1.984	1-3/4"	7/8"	.407"
77201		.0785	#47	1.994	1-3/4"	3/4"	.252"
	89201	.0785	#47	1.994	1-3/4"	7/8"	.409"
77206		.0787		2.000	44	19	6
	89206	.0787		2.000	44	22	10
77211		.0810	#46	2.057	1-3/4"	3/4"	.260"
	89211	.0810	#46	2.057	1-3/4"	7/8"	.422"
77216		.0820	#45	2.083	1-3/4"	3/4"	.263"
	89216	.0820	#45	2.083	1-3/4"	7/8"	.427"
77221		.0860	#44	2.184	1-3/4"	3/4"	.276"
	89221	.0860	#44	2.184	2"	1"	.448"
77226		.0890	#43	2.261	1-3/4"	3/4"	.285"
	89226	.0890	#43	2.261	2"	1"	.463"
77231		.0935	#42	2.375	1-3/4"	3/4"	.300"
	89231	.0935	#42	2.375	2"	1"	.487"
77236		.0938	3/32"	2.383	1-3/4"	3/4"	.301"
	89236	.0938	3/32"	2.383	2"	1"	.488"
77241		.0960	#41	2.438	1-13/16"	13/16"	.308"
	89241	.0960	#41	2.438	2"	1"	.500"
77246		.0980	#40	2.489	1-13/16"	13/16"	.314"
	89246	.0980	#40	2.489	2"	1"	.510"
77251		.0984		2.500	46	21	8
	89251	.0984		2.500	57	32	13
77256		.0995	#39	2.527	1-13/16"	13/16"	.319"
	89256	.0995	#39	2.527	2-1/4"	1-1/4"	.518"
77261		.1015	#38	2.578	1-13/16"	13/16"	.326"
	89261	.1015	#38	2.578	2-1/4"	1-1/4"	.529"

Series 1520H, 1205H *(continued)*

.1040" - .1719"
(2.642mm - 4.366mm)

3xD (1520H) EDP#	5xD (1205H) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
77266		.1040	#37	2.642	1-13/16"	13/16"	.334"
	89266	.1040	#37	2.642	2-1/4"	1-1/4"	.542"
77271		.1065	#36	2.705	1-13/16"	13/16"	.342"
	89271	.1065	#36	2.705	2-1/4"	1-1/4"	.555"
77276		.1094	7/64"	2.779	1-13/16"	13/16"	.351"
	89276	.1094	7/64"	2.779	2-1/4"	1-1/4"	.570"
77281		.1100	#35	2.794	1-7/8"	7/8"	.353"
	89281	.1100	#35	2.794	2-1/4"	1-1/4"	.573"
77286		.1110	#34	2.819	1-7/8"	7/8"	.356"
	89286	.1110	#34	2.819	2-1/4"	1-1/4"	.578"
77291		.1130	#33	2.870	1-7/8"	7/8"	.362"
	89291	.1130	#33	2.870	2-1/4"	1-1/4"	.588"
77296		.1160	#32	2.946	1-7/8"	7/8"	.372"
	89296	.1160	#32	2.946	2-1/4"	1-1/4"	.604"
77301		.1181		3.000	48	22	10
	89301	.1181		3.000	57	32	16
77306		.1200	#31	3.048	1-7/8"	7/8"	.385"
	89306	.1200	#31	3.048	2-1/4"	1-1/4"	.625"
77311		.1250	1/8"	3.175	1-7/8"	7/8"	.401"
	89311	.1250	1/8"	3.175	2-1/4"	1-1/4"	.651"
77316		.1285	#30	3.264	1-15/16"	15/16"	.412"
	89316	.1285	#30	3.264	2-1/4"	1-1/4"	.669"
77321		.1360	#29	3.454	1-15/16"	15/16"	.436"
	89321	.1360	#29	3.454	2-1/2"	1-3/8"	.708"
77326		.1378		3.500	49	24	11
	89326	.1378		3.500	63	35	18
77331		.1405	#28	3.569	1-15/16"	15/16"	.451"
	89331	.1405	#28	3.569	2-1/2"	1-3/8"	.732"
77336		.1406	9/64"	3.571	1-15/16"	15/16"	.451"
	89336	.1406	9/64"	3.571	2-1/2"	1-3/8"	.732"
77341		.1440	#27	3.658	2-1/16"	1"	.462"
	89341	.1440	#27	3.658	2-1/2"	1-3/8"	.750"
77346		.1470	#26	3.734	2-1/16"	1"	.471"
	89346	.1470	#26	3.734	2-1/2"	1-3/8"	.765"
77351		.1495	#25	3.797	2-1/16"	1"	.479"
	89351	.1495	#25	3.797	2-1/2"	1-3/8"	.778"
77356		.1520	#24	3.861	2-1/16"	1"	.487"
	89356	.1520	#24	3.861	2-1/2"	1-3/8"	.791"
77361		.1540	#23	3.912	2-1/16"	1"	.494"
	89361	.1540	#23	3.912	2-1/2"	1-3/8"	.802"
77366		.1562	5/32"	3.967	2-1/16"	1"	.501"
	89366	.1562	5/32"	3.967	2-1/2"	1-3/8"	.813"
77371		.1570	#22	3.988	2-1/8"	1-1/16"	.504"
	89371	.1570	#22	3.988	2-1/2"	1-3/8"	.818"
77376		.1575		4.000	54	27	13
	89376	.1575		4.000	63	35	21
77381		.1590	#21	4.039	2-1/8"	1-1/16"	.510"
	89381	.1590	#21	4.039	2-1/2"	1-3/8"	.828"
77386		.1610	#20	4.089	2-1/8"	1-1/16"	.516"
	89386	.1610	#20	4.089	2-1/2"	1-3/8"	.838"
77391		.1660	#19	4.216	2-1/8"	1-1/16"	.532"
	89391	.1660	#19	4.216	2-3/4"	1-5/8"	.864"
77396		.1695	#18	4.305	2-1/8"	1-1/16"	.544"
	89396	.1695	#18	4.305	2-3/4"	1-5/8"	.883"
77401		.1719	11/64"	4.366	2-1/8"	1-1/16"	.551"
	89401	.1719	11/64"	4.366	2-3/4"	1-5/8"	.895"

† *Metric equivalents are for reference only*

3xD (1520H) EDP#	5xD (1205H) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
77406		.1730	#17	4.394	2-3/16"	1-1/8"	.555"
	89406	.1730	#17	4.394	2-3/4"	1-5/8"	.901"
77411		.1770	#16	4.496	2-3/16"	1-1/8"	.568"
	89411	.1770	#16	4.496	2-3/4"	1-5/8"	.922"
77416		.1772		4.500	56	29	14
	89416	.1772		4.500	70	41	23
77421		.1800	#15	4.572	2-3/16"	1-1/8"	.577"
	89421	.1800	#15	4.572	2-3/4"	1-5/8"	.937"
77426		.1820	#14	4.623	2-3/16"	1-1/8"	.584"
	89426	.1820	#14	4.623	2-3/4"	1-5/8"	.948"
77431		.1850	#13	4.700	2-3/16"	1-1/8"	.593"
	89431	.1850	#13	4.700	2-3/4"	1-5/8"	.963"
77436		.1875	3/16"	4.763	2-3/16"	1-1/8"	.601"
	89436	.1875	3/16"	4.763	2-3/4"	1-5/8"	.976"
77441		.1890	#12	4.801	2-1/4"	1-3/16"	.606"
	89441	.1890	#12	4.801	2-3/4"	1-5/8"	.984"
77446		.1910	#11	4.851	2-1/4"	1-3/16"	.613"
	89446	.1910	#11	4.851	2-3/4"	1-5/8"	.995"
77451		.1935	#10	4.915	2-1/4"	1-3/16"	.621"
	89451	.1935	#10	4.915	2-3/4"	1-5/8"	1.008"
77456		.1960	#9	4.978	2-1/4"	1-3/16"	.629"
	89456	.1960	#9	4.978	3"	1-3/4"	1.021"
77461		.1969		5.000	57	30	16
	89461	.1969		5.000	76	44	26
77466		.1990	#8	5.055	2-1/4"	1-3/16"	.638"
	89466	.1990	#8	5.055	3"	1-3/4"	1.036"
77471		.2010	#7	5.105	2-1/4"	1-3/16"	.645"
	89471	.2010	#7	5.105	3"	1-3/4"	1.047"
77476		.2031	13/64"	5.159	2-1/4"	1-3/16"	.651"
	89476	.2031	13/64"	5.159	3"	1-3/4"	1.058"
77481		.2040	#6	5.182	2-3/8"	1-1/4"	.654"
	89481	.2040	#6	5.182	3"	1-3/4"	1.062"
77486		.2055	#5	5.220	2-3/8"	1-1/4"	.659"
	89486	.2055	#5	5.220	3"	1-3/4"	1.070"
77491		.2090	#4	5.309	2-3/8"	1-1/4"	.670"
	89491	.2090	#4	5.309	3"	1-3/4"	1.088"
77496		.2130	#3	5.410	2-3/8"	1-1/4"	.683"
	89496	.2130	#3	5.410	3"	1-3/4"	1.109"
77501		.2165		5.500	60	32	18
	89501	.2165		5.500	76	44	29
77506		.2188	7/32"	5.558	2-3/8"	1-1/4"	.702"
	89506	.2188	7/32"	5.558	3"	1-3/4"	1.139"
77511		.2210	#2	5.613	2-7/16"	1-5/16"	.709"
	89511	.2210	#2	5.613	3"	1-3/4"	1.151"
77516		.2280	#1	5.791	2-7/16"	1-5/16"	.731"
	89516	.2280	#1	5.791	3"	1-3/4"	1.187"
77521		.2340	A	5.944	2-7/16"	1-5/16"	.750"
	89521	.2340	A	5.944	3-1/4"	2"	1.218"
77526		.2344	15/64"	5.954	2-7/16"	1-5/16"	.752"
	89526	.2344	15/64"	5.954	3-1/4"	2"	1.221"
77531		.2362		6.000	64	35	19
	89531	.2362		6.000	82	50	31
77536		.2380	B	6.045	2-1/2"	1-3/8"	.763"
	89536	.2380	B	6.045	3-1/4"	2"	1.239"
77541		.2420	C	6.147	2-1/2"	1-3/8"	.776"
	89541	.2420	C	6.147	3-1/4"	2"	1.260"

continued →

Series 1520H, 1205H *(continued)*

.2460" - .3543"
(6.248mm - 9.000mm)

3xD (1520H) EDP#	5xD (1205H) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
77546		.2460	D	6.248	2-1/2"	1-3/8"	.789"
	89546	.2460	D	6.248	3-1/4"	2"	1.281"
77551		.2500	1/4" / E	6.350	2-1/2"	1-3/8"	.802"
	89551	.2500	1/4" / E	6.350	3-1/4"	2"	1.302"
77556		.2559		6.500	67	37	21
	89556	.2559		6.500	82	50	34
77561		.2570	F	6.528	2-5/8"	1-7/16"	.824"
	89561	.2570	F	6.528	3-1/4"	2"	1.338"
77566		.2610	G	6.629	2-5/8"	1-7/16"	.837"
	89566	.2610	G	6.629	3-1/2"	2-1/8"	1.359"
77571		.2656	17/64"	6.746	2-5/8"	1-7/16"	.852"
	89571	.2656	17/64"	6.746	3-1/2"	2-1/8"	1.383"
77576		.2660	H	6.756	2-11/16"	1-1/2"	.853"
	89576	.2660	H	6.756	3-1/2"	2-1/8"	1.385"
77581		.2720	I	6.909	2-11/16"	1-1/2"	.872"
	89581	.2720	I	6.909	3-1/2"	2-1/8"	1.416"
77586		.2756		7.000	68	38	22
	89586	.2756		7.000	88	54	36
77591		.2770	J	7.036	2-11/16"	1-1/2"	.888"
	89591	.2770	J	7.036	3-1/2"	2-1/8"	1.442"
77596		.2810	K	7.137	2-11/16"	1-1/2"	.901"
	89596	.2810	K	7.137	3-1/2"	2-1/8"	1.463"
77601		.2812	9/32"	7.142	2-11/16"	1-1/2"	.902"
	89601	.2812	9/32"	7.142	3-1/2"	2-1/8"	1.464"
77606		.2900	L	7.366	2-3/4"	1-9/16"	.930"
	89606	.2900	L	7.366	3-1/2"	2-1/8"	1.510"
77611		.2950	M	7.493	2-3/4"	1-9/16"	.946"
	89611	.2950	M	7.493	3-3/4"	2-3/8"	1.536"
77616		.2953		7.500	70	40	24
	89616	.2953		7.500	95	60	39
77621		.2969	19/64"	7.541	2-3/4"	1-9/16"	.952"
	89621	.2969	19/64"	7.541	3-3/4"	2-3/8"	1.546"
77626		.3020	N	7.671	2-15/16"	1-5/8"	.969"
	89626	.3020	N	7.671	3-3/4"	2-3/8"	1.573"
77631		.3125	5/16"	7.938	2-15/16"	1-5/8"	1.002"
	89631	.3125	5/16"	7.938	3-3/4"	2-3/8"	1.627"
77636		.3150		8.000	75	43	26
	89636	.3150		8.000	95	60	42
77641		.3160	O	8.026	2-15/16"	1-11/16"	1.013"
	89641	.3160	O	8.026	3-3/4"	2-3/8"	1.645"
77646		.3230	P	8.204	2-15/16"	1-11/16"	1.036"
	89646	.3230	P	8.204	3-3/4"	2-3/8"	1.682"
77651		.3281	21/64"	8.334	2-15/16"	1-11/16"	1.052"
	89651	.3281	21/64"	8.334	4"	2-1/2"	1.708"
77656		.3320	Q	8.433	3"	1-11/16"	1.065"
	89656	.3320	Q	8.433	4"	2-1/2"	1.729"
77661		.3346		8.500	76	43	27
	89661	.3346		8.500	101	63	44
77666		.3390	R	8.611	3"	1-11/16"	1.087"
	89666	.3390	R	8.611	4"	2-1/2"	1.765"
77671		.3438	11/32"	8.733	3"	1-11/16"	1.103"
	89671	.3438	11/32"	8.733	4"	2-1/2"	1.790"
77676		.3480	S	8.839	3-1/16"	1-3/4"	1.116"
	89676	.3480	S	8.839	4"	2-1/2"	1.812"
77681		.3543		9.000	78	44	29
	89681	.3543		9.000	101	63	47

† *Metric equivalents are for reference only*

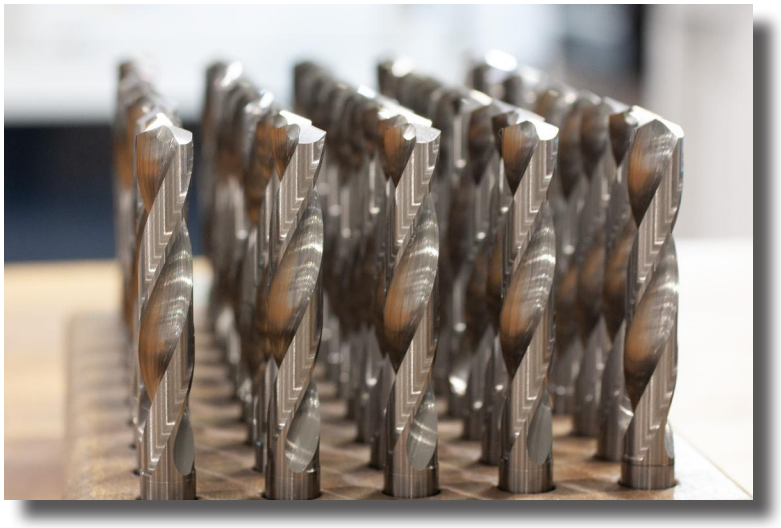
	3xD (1520H) EDP#	5xD (1205H) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
	77686		.3580	T	9.093	3-1/16"	1-3/4"	1.148"
		89686	.3580	T	9.093	4-1/4"	2-3/4"	1.864"
	77691		.3594	23/64"	9.129	3-1/16"	1-3/4"	1.153"
		89691	.3594	23/64"	9.129	4-1/4"	2-3/4"	1.871"
	77696		.3680	U	9.347	3-1/8"	1-13/16"	1.180"
		89696	.3680	U	9.347	4-1/4"	2-3/4"	1.916"
	77701		.3740		9.500	79	46	30
		89701	.3740		9.500	107	70	49
	77706		.3750	3/8"	9.525	3-1/8"	1-13/16"	1.203"
		89706	.3750	3/8"	9.525	4-1/4"	2-3/4"	1.953"
	77711		.3770	V	9.576	3-1/4"	1-7/8"	1.209"
		89711	.3770	V	9.576	4-1/4"	2-3/4"	1.963"
	77716		.3860	W	9.804	3-1/4"	1-7/8"	1.238"
		89716	.3860	W	9.804	4-1/2"	2-7/8"	2.010"
	77721		.3906	25/64"	9.921	3-1/4"	1-7/8"	1.253"
		89721	.3906	25/64"	9.921	4-1/2"	2-7/8"	2.034"
	77726		.3937		10.000	84	49	32
		89726	.3937		10.000	114	73	52
	77731		.3970	X	10.084	3-5/16"	1-15/16"	1.273"
		89731	.3970	X	10.084	4-1/2"	2-7/8"	2.067"
	77736		.4040	Y	10.262	3-5/16"	1-15/16"	1.296"
		89736	.4040	Y	10.262	4-1/2"	2-7/8"	2.104"
	77741		.4062	13/32"	10.317	3-5/16"	1-15/16"	1.303"
		89741	.4062	13/32"	10.317	4-1/2"	2-7/8"	2.115"
	77746		.4130	Z	10.490	3-3/8"	2"	1.325"
		89746	.4130	Z	10.490	4-1/2"	2-7/8"	2.151"
	77751		.4134		10.500	86	51	34
		89751	.4134		10.500	114	73	55
	77756		.4219	27/64"	10.716	3-3/8"	2"	1.353"
		89756	.4219	27/64"	10.716	4-1/2"	2-7/8"	2.197"
	77761		.4331		11.000	87	52	35
		89761	.4331		11.000	114	73	57
	77766		.4375	7/16"	11.113	3-7/16"	2-1/16"	1.403"
		89766	.4375	7/16"	11.113	4-1/2"	2-7/8"	2.278"
	77771		.4528		11.500	91	54	37
		89771	.4528		11.500	120	76	60
	77776		.4531	29/64"	11.509	3-9/16"	2-1/8"	1.453"
		89776	.4531	29/64"	11.509	4-3/4"	3"	2.359"
	77781		.4688	15/32"	11.908	3-5/8"	2-1/8"	1.503"
		89781	.4688	15/32"	11.908	4-3/4"	3"	2.441"
	77786		.4724		12.000	94	56	38
		89786	.4724		12.000	120	76	62
	77791		.4844	31/64"	12.304	3-11/16"	2-3/16"	1.554"
		89791	.4844	31/64"	12.304	4-3/4"	3"	2.522"
	77796		.4921		12.500	95	56	40
		89796	.4921		12.500	120	76	65
	77801		.5000	1/2"	12.700	3-3/4"	2-1/4"	1.604"
		89801	.5000	1/2"	12.700	4-3/4"	3"	2.604"
	77806		.5118		13.000	107	60	42
		89806	.5118		13.000	127	83	68
	77811		.5156	33/64"	13.096	4-1/4"	2-3/8"	1.654"
		89811	.5156	33/64"	13.096	5"	3-1/4"	2.685"
	77816		.5312	17/32"	13.492	4-1/4"	2-3/8"	1.704"
		89816	.5312	17/32"	13.492	5"	3-1/4"	2.766"
NEW	77821		.5315		13.500	107	60	43
		89821	.5315		13.500	127	83	70

continued →

Series 1520H, 1205H *(continued)*

.5469" - .6299"
(13.891mm - 16.000mm)

	3xD (1520H) EDP#	5xD (1205H) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
	77826		.5469	35/64"	13.891	4-1/4"	2-3/8"	1.754"
		89826	.5469	35/64"	13.891	5"	3-1/4"	2.848"
	77831		.5512		14.000	107	60	45
		89831	.5512		14.000	127	83	73
	77836		.5625	9/16"	14.287	4-1/2"	2-1/2"	1.804"
		89836	.5625	9/16"	14.287	5"	3-1/4"	2.929"
	77841		.5709		14.500	115	65	47
		89841	.5709		14.500	127	83	76
	77846		.5781	37/64"	14.683	4-1/2"	2-1/2"	1.854"
		89846	.5781	37/64"	14.683	5-1/4"	3-1/2"	3.010"
	77851		.5906		15.000	115	65	48
		89851	.5906		15.000	133	89	78
	77856		.5938	19/32"	15.082	4-1/2"	2-1/2"	1.904"
		89856	.5938	19/32"	15.082	5-1/4"	3-1/2"	3.092"
NEW	77861		.6094	39/64"	15.478	4-1/2"	2-1/2"	1.954"
		89861	.6094	39/64"	15.478	5-1/4"	3-1/2"	3.173"
	77866		.6102		15.500	115	65	50
		89866	.6102		15.500	133	89	81
	77871		.6250	5/8"	15.875	4-1/2"	2-1/2"	2.004"
		89871	.6250	5/8"	15.875	5-1/4"	3-1/2"	3.254"
NEW	77876		.6299		16.000	115	65	51
		89876	.6299		16.000	133	89	83



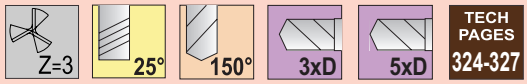
† *Metric equivalents are for reference only*

Series 1120H, 1100H

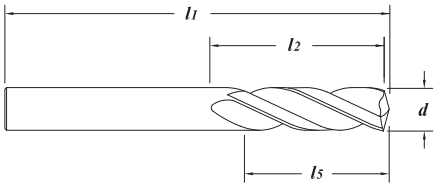
.1094" - .1575"
(2.779mm - 4.000mm)

TOLERANCES

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



BALINIT® Durana Coated
BALINIT® Durana-Beschichtet
Recubrimiento de BALINIT® Durana
Revêtement BALINIT® Durana
Rivestimento in BALINIT® Durana
BALINIT® Durana 涂层



Solid submicron grain carbide drill
Self-centering 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
Recommended for cast aluminum, cast iron and materials with high silicon content
Live tooling recommended on lathe processes
Series 1100 Bright Finish - page 90

Vollhartmetallbohrer aus Feinkornhartmetall
Anschliff Selbstzentrierend Punkt
Nahe an geriebenen Oberflächen
Kann als Aufbohrer verwendet werden
Exzellente Hitzebeständigkeit und Schmiereigenschaften
Kurze Ausführung Reduziert Abdrängung und Vibrationen
Bessere Bohrungstoleranzen
Verbesserter Rundlauf und Genauigkeit
Empfohlen für Aluminiumguss, Grauguss und Werkstoffe mit hohem Silizium Gehalt
Empfehlung fuer den Einsatz auf der Drehmaschine
Serie 1100 Unbeschichtet - Seite 90

Broca de submicrograno sólido carburo
Punta autocentrada caras
Acabado similar al escariado
Puede ser utilizada para taladrado directo
Excelente resistencia térmica y lubricación
Longitud corta reduce desviaciones y vibraciones
Orificios de alta tolerancia y precisión
Mejor acabado redondeado y recto
Recomendado para aluminio fundido, hierro fundido y materiales con alto contenido de silicio
Recomendación para la aplicación en torno
Serie 1100 Sin recubrimiento - Página 90

Forets carbure submicrograin
Pointe auto centrante
Près de finitions alésoir
Peut être utilisé comme foret-aléseur
Excellente resistance a la haute temperature et glissement
Longueur Stub réduit flexion et de vibration
Le resserrement des trous de tolérance
Amélioration rondeur et de rectitude
Recommander pour fonte d'aluminium, fonte grise et matieres a haute teneur en silicium
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Série 1100 Sans revêtement - Page 90

Punte in sub-micro grana
Punto autocentrante
Ottimo grado di finitura
Può essere usata come punta da centro
Eccellente resistenza al calore e autolubrificante
Serie corta riduce la flessione e la vibrazione
Alta tolleranza dei fori
Migliore rotondità e linearità
Raccomandata per lavorazioni su alluminio, ghisa e materiali ad alto contenuto di silicio
Utensili rotanti sono consigliate se usato su un tornio
Serie 1100 Non Rivestito - Pagina 90

整体硬质合金钻头
自定心刀尖
接近铰孔光洁度
可做套料钻使用
耐热性和润滑性特好
短型长度减少挠曲、减少振动
紧公差孔
提高正圆度和直线度
推荐加工铸铝、铸铁和硅含量高的材质
不建议在车床，或工具必须纺纱
1100系列 未涂层 - 90页

3xD (1120H) EDP#	5xD (1100H) EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
78276		.1094	7/64"	2.779	1-13/16"	13/16"	.343"
	90276	.1094	7/64"	2.779	2-1/4"	1-1/4"	.562"
78281		.1100	#35	2.794	1-7/8"	7/8"	.345"
	90281	.1100	#35	2.794	2-1/4"	1-1/4"	.565"
78286		.1110	#34	2.819	1-7/8"	7/8"	.348"
78291		.1130	#33	2.870	1-7/8"	7/8"	.354"
	90291	.1130	#33	2.870	2-1/4"	1-1/4"	.580"
78296		.1160	#32	2.946	1-7/8"	7/8"	.364"
	90296	.1160	#32	2.946	2-1/4"	1-1/4"	.596"
78301		.1181		3.000	48	22	9
	90301	.1181		3.000	57	32	15
78306		.1200	#31	3.048	1-7/8"	7/8"	.376"
	90306	.1200	#31	3.048	2-1/4"	1-1/4"	.616"
78311		.1250	1/8"	3.175	1-7/8"	7/8"	.392"
	90311	.1250	1/8"	3.175	2-1/4"	1-1/4"	.642"
78316		.1285	#30	3.264	1-15/16"	15/16"	.403"
	90316	.1285	#30	3.264	2-1/4"	1-1/4"	.660"
78321		.1360	#29	3.454	1-15/16"	15/16"	.426"
	90321	.1360	#29	3.454	2-1/2"	1-3/8"	.698"
78326		.1378		3.500	49	24	11
	90326	.1378		3.500	63	35	18
78331		.1405	#28	3.569	1-15/16"	15/16"	.440"
	90331	.1405	#28	3.569	2-1/2"	1-3/8"	.721"
78336		.1406	9/64"	3.571	1-15/16"	15/16"	.441"
	90336	.1406	9/64"	3.571	2-1/2"	1-3/8"	.722"
78341		.1440	#27	3.658	2-1/16"	1"	.451"
	90341	.1440	#27	3.658	2-1/2"	1-3/8"	.739"
78346		.1470	#26	3.734	2-1/16"	1"	.461"
	90346	.1470	#26	3.734	2-1/2"	1-3/8"	.755"
78351		.1495	#25	3.797	2-1/16"	1"	.469"
	90351	.1495	#25	3.797	2-1/2"	1-3/8"	.768"
78356		.1520	#24	3.861	2-1/16"	1"	.476"
	90356	.1520	#24	3.861	2-1/2"	1-3/8"	.780"
78361		.1540	#23	3.912	2-1/16"	1"	.483"
	90361	.1540	#23	3.912	2-1/2"	1-3/8"	.791"
78366		.1562	5/32"	3.967	2-1/16"	1"	.490"
	90366	.1562	5/32"	3.967	2-1/2"	1-3/8"	.802"
78371		.1570	#22	3.988	2-1/8"	1-1/16"	.492"
	90371	.1570	#22	3.988	2-1/2"	1-3/8"	.806"
78376		.1575		4.000	54	27	13
	90376	.1575		4.000	63	35	21

continued →

Series 1120H, 1100H *(continued)*

.1590" - .2362"
(4.039mm - 6.000mm)

3xD (1120H) EDP#	5xD (1100H) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
78381		.1590	#21	4.039	2-1/8"	1-1/16"	.498"
	90381	.1590	#21	4.039	2-1/2"	1-3/8"	.816"
78386		.1610	#20	4.089	2-1/8"	1-1/16"	.505"
	90386	.1610	#20	4.089	2-1/2"	1-3/8"	.827"
78391		.1660	#19	4.216	2-1/8"	1-1/16"	.520"
	90391	.1660	#19	4.216	2-3/4"	1-5/8"	.852"
78396		.1695	#18	4.305	2-1/8"	1-1/16"	.531"
	90396	.1695	#18	4.305	2-3/4"	1-5/8"	.870"
78401		.1719	11/64"	4.366	2-1/8"	1-1/16"	.539"
	90401	.1719	11/64"	4.366	2-3/4"	1-5/8"	.883"
78406		.1730	#17	4.394	2-3/16"	1-1/8"	.542"
	90406	.1730	#17	4.394	2-3/4"	1-5/8"	.888"
78411		.1770	#16	4.496	2-3/16"	1-1/8"	.555"
	90411	.1770	#16	4.496	2-3/4"	1-5/8"	.909"
78416		.1772		4.500	56	29	14
	90416	.1772		4.500	70	41	23
78421		.1800	#15	4.572	2-3/16"	1-1/8"	.564"
	90421	.1800	#15	4.572	2-3/4"	1-5/8"	.924"
78426		.1820	#14	4.623	2-3/16"	1-1/8"	.570"
	90426	.1820	#14	4.623	2-3/4"	1-5/8"	.934'
78431		.1850	#13	4.700	2-3/16"	1-1/8"	.580"
	90431	.1850	#13	4.700	2-3/4"	1-5/8"	.950'
78436		.1875	3/16"	4.763	2-3/16"	1-1/8"	.588"
	90436	.1875	3/16"	4.763	2-3/4"	1-5/8"	.963"
78441		.1890	#12	4.801	2-1/4"	1-3/16"	.592"
	90441	.1890	#12	4.801	2-3/4"	1-5/8"	.970"
78446		.1910	#11	4.851	2-1/4"	1-3/16"	.599"
	90446	.1910	#11	4.851	2-3/4"	1-5/8"	.981"
78451		.1935	#10	4.915	2-1/4"	1-3/16"	.606"
	90451	.1935	#10	4.915	2-3/4"	1-5/8"	.993"
78456		.1960	#9	4.978	2-1/4"	1-3/16"	.614"
	90456	.1960	#9	4.978	3"	1-3/4"	1.006"
78461		.1969		5.000	57	30	16
	90461	.1969		5.000	76	44	26
78466		.1990	#8	5.055	2-1/4"	1-3/16"	.624"
	90466	.1990	#8	5.055	3"	1-3/4"	1.022"
78471		.2010	#7	5.105	2-1/4"	1-3/16"	.630"
	90471	.2010	#7	5.105	3"	1-3/4"	1.032"
78476		.2031	13/64"	5.159	2-1/4"	1-3/16"	.637"
	90476	.2031	13/64"	5.159	3"	1-3/4"	1.043"
	90481	.2040	#6	5.182	3"	1-3/4"	1.047"
78486		.2055	#5	5.220	2-3/8"	1-1/4"	.644"
	90486	.2055	#5	5.220	3"	1-3/4"	1.055"
78491		.2090	#4	5.309	2-3/8"	1-1/4"	.655"
	90491	.2090	#4	5.309	3"	1-3/4"	1.073"
78496		.2130	#3	5.410	2-3/8"	1-1/4"	.668"
	90496	.2130	#3	5.410	3"	1-3/4"	1.094"
78501		.2165		5.500	60	32	17
	90501	.2165		5.500	76	44	28
78506		.2188	7/32"	5.558	2-3/8"	1-1/4"	.686"
	90506	.2188	7/32"	5.558	3"	1-3/4"	1.123"
78511		.2210	#2	5.613	2-7/16"	1-5/16"	.693"
	90511	.2210	#2	5.613	3"	1-3/4"	1.135"
78516		.2280	#1	5.791	2-7/16"	1-5/16"	.715"
	90516	.2280	#1	5.791	3"	1-3/4"	1.171"
78521		.2340	A	5.944	2-7/16"	1-5/16"	.733"
	90521	.2340	A	5.944	3-1/4"	2"	1.201"
78526		.2344	15/64"	5.954	2-7/16"	1-5/16"	.735"
	90526	.2344	15/64"	5.954	3-1/4"	2"	1.203"
78531		.2362		6.000	64	35	19
	90531	.2362		6.000	82	50	31

† *Metric equivalents are for reference only*

3xD (1120H) EDP#	5xD (1100H) EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
78536		.2380	B	6.045	2-1/2"	1-3/8"	.746"
	90536	.2380	B	6.045	3-1/4"	2"	1.222"
78541		.2420	C	6.147	2-1/2"	1-3/8"	.758"
	90541	.2420	C	6.147	3-1/4"	2"	1.242"
78546		.2460	D	6.248	2-1/2"	1-3/8"	.771"
	90546	.2460	D	6.248	3-1/4"	2"	1.263"
78551		.2500	1/4" / E	6.350	2-1/2"	1-3/8"	.783"
	90551	.2500	1/4" / E	6.350	3-1/4"	2"	1.283"
78556		.2559		6.500	67	37	21
	90556	.2559		6.500	82	50	33
78561		.2570	F	6.528	2-5/8"	1-7/16"	.805"
	90561	.2570	F	6.528	3-1/4"	2"	1.319"
78566		.2610	G	6.629	2-5/8"	1-7/16"	.818"
	90566	.2610	G	6.629	3-1/2"	2-1/8"	1.340"
78571		.2656	17/64"	6.746	2-5/8"	1-7/16"	.832"
	90571	.2656	17/64"	6.746	3-1/2"	2-1/8"	1.364"
78576		.2660	H	6.756	2-11/16"	1-1/2"	.834"
	90576	.2660	H	6.756	3-1/2"	2-1/8"	1.366"
78581		.2720	I	6.909	2-11/16"	1-1/2"	.852"
	90581	.2720	I	6.909	3-1/2"	2-1/8"	1.396"
78586		.2756		7.000	68	38	22
	90586	.2756		7.000	88	54	36
78591		.2770	J	7.036	2-11/16"	1-1/2"	.868"
	90591	.2770	J	7.036	3-1/2"	2-1/8"	1.422"
78596		.2810	K	7.137	2-11/16"	1-1/2"	.881"
	90596	.2810	K	7.137	3-1/2"	2-1/8"	1.443"
78601		.2812	9/32"	7.142	2-11/16"	1-1/2"	.881"
	90601	.2812	9/32"	7.142	3-1/2"	2-1/8"	1.444"
78606		.2900	L	7.366	2-3/4"	1-9/16"	.909"
	90606	.2900	L	7.366	3-1/2"	2-1/8"	1.489"
78611		.2950	M	7.493	2-3/4"	1-9/16"	.925"
	90611	.2950	M	7.493	3-3/4"	2-3/8"	1.515"
78616		.2953		7.500	70	40	23
	90616	.2953		7.500	95	60	39
78621		.2969	19/64"	7.541	2-3/4"	1-9/16"	.930"
	90621	.2969	19/64"	7.541	3-3/4"	2-3/8"	1.524"
78626		.3020	N	7.671	2-15/16"	1-5/8"	.946"
	90626	.3020	N	7.671	3-3/4"	2-3/8"	1.550"
78631		.3125	5/16"	7.938	2-15/16"	1-5/8"	.979"
	90631	.3125	5/16"	7.938	3-3/4"	2-3/8"	1.604"
78636		.3150		8.000	75	43	25
	90636	.3150		8.000	95	60	41
78641		.3160	O	8.026	2-15/16"	1-11/16"	.990"
	90641	.3160	O	8.026	3-3/4"	2-3/8"	1.622"
78646		.3230	P	8.204	2-15/16"	1-11/16"	1.012"
	90646	.3230	P	8.204	3-3/4"	2-3/8"	1.658"
78651		.3281	21/64"	8.334	2-15/16"	1-11/16"	1.028"
	90651	.3281	21/64"	8.334	4"	2-1/2"	1.684"
78656		.3320	Q	8.433	3"	1-11/16"	1.040"
	90656	.3320	Q	8.433	4"	2-1/2"	1.704"
78661		.3346		8.500	76	43	27
	90661	.3346		8.500	101	63	44
78666		.3390	R	8.611	3"	1-11/16"	1.062"
	90666	.3390	R	8.611	4"	2-1/2"	1.740"
78671		.3438	11/32"	8.733	3"	1-11/16"	1.077"
	90671	.3438	11/32"	8.733	4"	2-1/2"	1.765"
78676		.3480	S	8.839	3-1/16"	1-3/4"	1.091"
	90676	.3480	S	8.839	4"	2-1/2"	1.787"
78681		.3543		9.000	78	44	28
	90681	.3543		9.000	101	63	46

continued →

Series 1120H, 1100H *(continued)*

.3580" - .5000"
(9.093mm - 12.700mm)

3xD (1120H) EDP#	5xD (1100H) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
78686		.3580	T	9.093	3-1/16"	1-3/4"	1.122"
78691		.3594	23/64"	9.129	3-1/16"	1-3/4"	1.126"
	90691	.3594	23/64"	9.129	4-1/4"	2-3/4"	1.845"
78696		.3680	U	9.347	3-1/8"	1-13/16"	1.153"
	90696	.3680	U	9.347	4-1/4"	2-3/4"	1.889"
78701		.3740		9.500	79	46	30
	90701	.3740		9.500	107	70	49
78706		.3750	3/8"	9.525	3-1/8"	1-13/16"	1.175"
	90706	.3750	3/8"	9.525	4-1/4"	2-3/4"	1.925"
78711		.3770	V	9.576	3-1/4"	1-7/8"	1.182"
	90711	.3770	V	9.576	4-1/4"	2-3/4"	1.936"
78716		.3860	W	9.804	3-1/4"	1-7/8"	1.210"
	90716	.3860	W	9.804	4-1/2"	2-7/8"	1.982"
78721		.3906	25/64"	9.921	3-1/4"	1-7/8"	1.224"
	90721	.3906	25/64"	9.921	4-1/2"	2-7/8"	2.005"
78726		.3937		10.000	84	49	31
	90726	.3937		10.000	114	73	51
78736		.4040	Y	10.262	3-5/16"	1-15/16"	1.266"
	90736	.4040	Y	10.262	4-1/2"	2-7/8"	2.074"
78741		.4062	13/32"	10.317	3-5/16"	1-15/16"	1.273"
	90741	.4062	13/32"	10.317	4-1/2"	2-7/8"	2.085"
78746		.4130	Z	10.490	3-3/8"	2"	1.294"
	90746	.4130	Z	10.490	4-1/2"	2-7/8"	2.120"
78751		.4134		10.500	86	51	33
	90751	.4134		10.500	114	73	54
78756		.4219	27/64"	10.716	3-3/8"	2"	1.322"
	90756	.4219	27/64"	10.716	4-1/2"	2-7/8"	2.166"
78761		.4331		11.000	87	52	34
	90761	.4331		11.000	114	73	56
78766		.4375	7/16"	11.113	3-7/16"	2-1/16"	1.371"
	90766	.4375	7/16"	11.113	4-1/2"	2-7/8"	2.246"
	90771	.4528		11.500	120	76	59
78776		.4531	29/64"	11.509	3-9/16"	2-1/8"	1.420"
	90776	.4531	29/64"	11.509	4-3/4"	3"	2.326"
78781		.4688	15/32"	11.908	3-5/8"	2-1/8"	1.469"
	90781	.4688	15/32"	11.908	4-3/4"	3"	2.407"
78786		.4724		12.000	94	56	38
	90786	.4724		12.000	120	76	62
78791		.4844	31/64"	12.304	3-11/16"	2-3/16"	1.518"
	90791	.4844	31/64"	12.304	4-3/4"	3"	2.487"
78796		.4921		12.500	95	56	39
	90796	.4921		12.500	120	76	64
78801		.5000	1/2"	12.700	3-3/4"	2-1/4"	1.567"
	90801	.5000	1/2"	12.700	4-3/4"	3"	2.567"

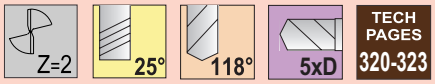
† *Metric equivalents are for reference only*

Series 1200

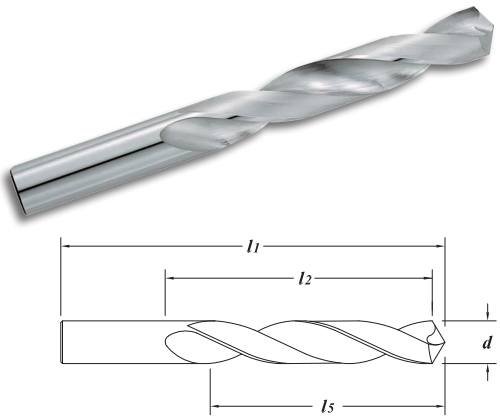
.0625" - .1575"
(1.588mm - 4.000mm)

TOLERANCES

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



TECH PAGES 320-323



Solid submicron grain carbide drill
General purpose jobber style
Cam point (≤1/8" diameter - 4-facet point)
Live tooling recommended on lathe processes
Durana Coated - page 88

Vollhartmetallbohrer aus Feinkornhartmetall
Universeller Bohrer
Durchmesser 3 mm (1/8") und kleiner – 118° Spitzenwinkel und 4-Fasen-Anschliff
Empfehlung fuer den Einsatz auf der Drehmaschine
Durana-Beschichtet - Seite 88

Broca de submicrograno sólido carburo
Broca para uso general
Para diámetros de 1/8" e inferiores – punta de 4 caras de 118°
Recomendación para la aplicación en torno
Recubrimiento de Durana - Página 88

Forets carbure submicrograin
Forets pour application generale
D1/8 et plus petit - 118° avec 4 faces de depouille
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Revêtement Durana - Page 88

Punte in sub-micro grana
Punta per impieghi generali
Affilatura a 118° punto
Utensili rotanti sono consigliate se usato su un tornio
Rivestimento in Durana - Pagina 88

整体硬质合金钻头
通用型机用钻头
(1/8英寸直径和 1/8英寸以下直径 - 118° 4-小平面刀尖)
不建议在车床，或工具必须纺纱
Durana 涂层 - 88页

EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
56165	.0625	1/16"	1.588	1-3/4"	3/4"	.331"
56170	.0635	#52	1.613	1-3/4"	3/4"	.337"
56175	.0670	#51	1.702	1-3/4"	3/4"	.355"
56180	.0700	#50	1.778	1-3/4"	7/8"	.371"
56185	.0730	#49	1.854	1-3/4"	7/8"	.387"
56190	.0760	#48	1.930	1-3/4"	7/8"	.403"
56195	.0781	5/64"	1.984	1-3/4"	7/8"	.414"
56200	.0785	#47	1.994	1-3/4"	7/8"	.416"
56205	.0787		2.000	44	22	11
56210	.0810	#46	2.057	1-3/4"	7/8"	.429"
56215	.0820	#45	2.083	1-3/4"	7/8"	.435"
56220	.0860	#44	2.184	2"	1"	.456"
56225	.0890	#43	2.261	2"	1"	.472"
56230	.0935	#42	2.375	2"	1"	.496"
56235	.0938	3/32"	2.383	2"	1"	.497"
56240	.0960	#41	2.438	2"	1"	.509"
56245	.0980	#40	2.489	2"	1"	.519"
56250	.0984		2.500	57	32	13
56255	.0995	#39	2.527	2-1/4"	1-1/4"	.527"
56260	.1015	#38	2.578	2-1/4"	1-1/4"	.538"
56265	.1040	#37	2.642	2-1/4"	1-1/4"	.551"
56270	.1065	#36	2.705	2-1/4"	1-1/4"	.564"
56275	.1094	7/64"	2.779	2-1/4"	1-1/4"	.580"
56280	.1100	#35	2.794	2-1/4"	1-1/4"	.583"
56285	.1110	#34	2.819	2-1/4"	1-1/4"	.588"
56290	.1130	#33	2.870	2-1/4"	1-1/4"	.599"
56295	.1160	#32	2.946	2-1/4"	1-1/4"	.615"
56300	.1181		3.000	57	32	16
56305	.1200	#31	3.048	2-1/4"	1-1/4"	.636"
56310	.1250	1/8"	3.175	2-1/4"	1-1/4"	.663"
56315	.1285	#30	3.264	2-1/4"	1-1/4"	.681"
56320	.1360	#29	3.454	2-1/2"	1-3/8"	.721"
56325	.1378		3.500	63	35	19
56330	.1405	#28	3.569	2-1/2"	1-3/8"	.745"
56335	.1406	9/64"	3.571	2-1/2"	1-3/8"	.745"
56340	.1440	#27	3.658	2-1/2"	1-3/8"	.763"
56345	.1470	#26	3.734	2-1/2"	1-3/8"	.779"
56350	.1495	#25	3.797	2-1/2"	1-3/8"	.792"
56355	.1520	#24	3.861	2-1/2"	1-3/8"	.806"
56360	.1540	#23	3.912	2-1/2"	1-3/8"	.816"
56365	.1562	5/32"	3.967	2-1/2"	1-3/8"	.828"
56370	.1570	#22	3.988	2-1/2"	1-3/8"	.832"
56375	.1575		4.000	63	35	21

continued →

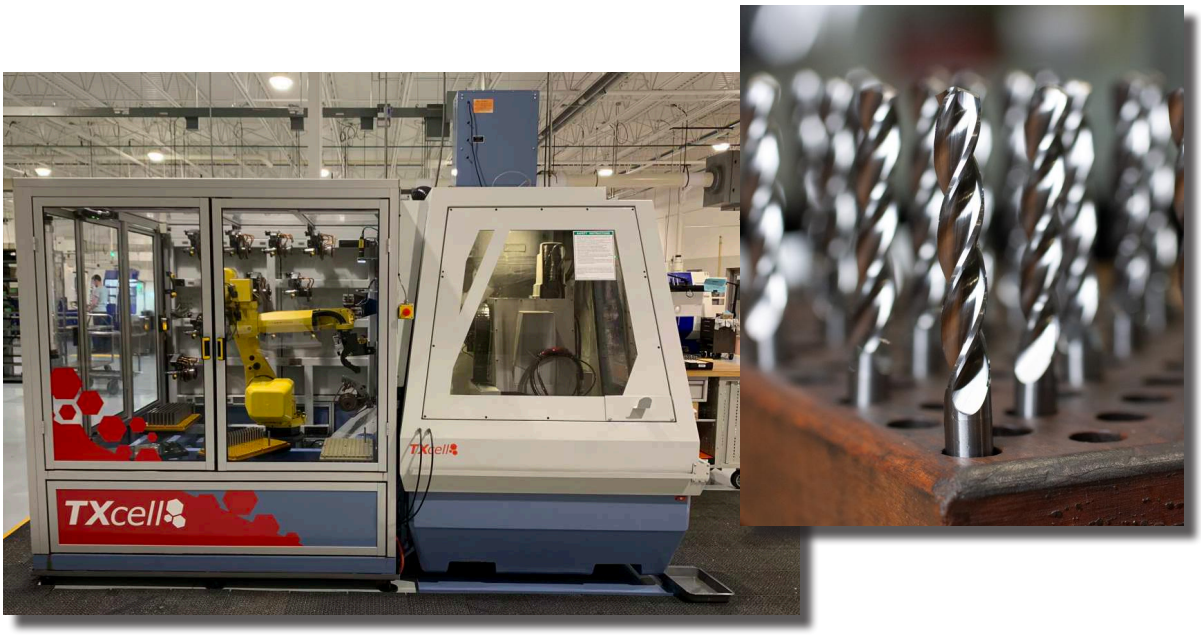
Series 1200 *(continued)*

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

EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
56380	.1590	#21	4.039	2-1/2"	1-3/8"	.843"
56385	.1610	#20	4.089	2-1/2"	1-3/8"	.853"
56390	.1660	#19	4.216	2-3/4"	1-5/8"	.880"
56395	.1695	#18	4.305	2-3/4"	1-5/8"	.898"
56400	.1719	11/64"	4.366	2-3/4"	1-5/8"	.911"
56405	.1730	#17	4.394	2-3/4"	1-5/8"	.917"
56410	.1770	#16	4.496	2-3/4"	1-5/8"	.938"
56415	.1772		4.500	70	41	24
56420	.1800	#15	4.572	2-3/4"	1-5/8"	.954"
56425	.1820	#14	4.623	2-3/4"	1-5/8"	.965"
56430	.1850	#13	4.700	2-3/4"	1-5/8"	.981"
56435	.1875	3/16"	4.763	2-3/4"	1-5/8"	.994"
56440	.1890	#12	4.801	2-3/4"	1-5/8"	1.002"
56445	.1910	#11	4.851	2-3/4"	1-5/8"	1.012"
56450	.1935	#10	4.915	2-3/4"	1-5/8"	1.026"
56455	.1960	#9	4.978	3"	1-3/4"	1.039"
56460	.1969		5.000	76	44	26
56465	.1990	#8	5.055	3"	1-3/4"	1.055"
56470	.2010	#7	5.105	3"	1-3/4"	1.065"
56475	.2031	13/64"	5.159	3"	1-3/4"	1.077"
56480	.2040	#6	5.182	3"	1-3/4"	1.081"
56485	.2055	#5	5.220	3"	1-3/4"	1.089"
56490	.2090	#4	5.309	3"	1-3/4"	1.108"
56495	.2130	#3	5.410	3"	1-3/4"	1.129"
56500	.2165		5.500	76	44	29
56505	.2188	7/32"	5.558	3"	1-3/4"	1.160"
56510	.2210	#2	5.613	3"	1-3/4"	1.171"
56515	.2280	#1	5.791	3"	1-3/4"	1.208"
56520	.2340	A	5.944	3-1/4"	2"	1.240"
56525	.2344	15/64"	5.954	3-1/4"	2"	1.242"
56530	.2362		6.000	82	50	32
56535	.2380	B	6.045	3-1/4"	2"	1.262"
56540	.2420	C	6.147	3-1/4"	2"	1.283"
56545	.2460	D	6.248	3-1/4"	2"	1.304"
56550	.2500	1/4" / E	6.350	3-1/4"	2"	1.325"
56555	.2559		6.500	82	50	34
56560	.2570	F	6.528	3-1/4"	2"	1.362"
56565	.2610	G	6.629	3-1/2"	2-1/8"	1.383"
56570	.2656	17/64"	6.746	3-1/2"	2-1/8"	1.408"
56575	.2660	H	6.756	3-1/2"	2-1/8"	1.410"
56580	.2720	I	6.909	3-1/2"	2-1/8"	1.442"
56585	.2756		7.000	88	54	37
56590	.2770	J	7.036	3-1/2"	2-1/8"	1.468"
56595	.2810	K	7.137	3-1/2"	2-1/8"	1.489"
56600	.2812	9/32"	7.142	3-1/2"	2-1/8"	1.490"
56605	.2900	L	7.366	3-1/2"	2-1/8"	1.537"
56610	.2950	M	7.493	3-3/4"	2-3/8"	1.564"
56615	.2953		7.500	95	60	40
56620	.2969	19/64"	7.541	3-3/4"	2-3/8"	1.574"
56625	.3020	N	7.671	3-3/4"	2-3/8"	1.601"
56630	.3125	5/16"	7.938	3-3/4"	2-3/8"	1.656"
56635	.3150		8.000	95	60	42
56640	.3160	O	8.026	3-3/4"	2-3/8"	1.675"
56645	.3230	P	8.204	3-3/4"	2-3/8"	1.712"
56650	.3281	21/64"	8.334	4"	2-1/2"	1.739"
56655	.3320	Q	8.433	4"	2-1/2"	1.760"
56660	.3346		8.500	101	63	45

† *Metric equivalents are for reference only*

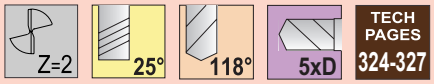
EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
56665	.3390	R	8.611	4"	2-1/2"	1.797"
56670	.3438	11/32"	8.733	4"	2-1/2"	1.822"
56675	.3480	S	8.839	4"	2-1/2"	1.845"
56680	.3543		9.000	101	63	48
56685	.3580	T	9.093	4-1/4"	2-3/4"	1.898"
56690	.3594	23/64"	9.129	4-1/4"	2-3/4"	1.905"
56695	.3680	U	9.347	4-1/4"	2-3/4"	1.951"
56700	.3740		9.500	107	70	50
56705	.3750	3/8"	9.525	4-1/4"	2-3/4"	1.988"
56710	.3770	V	9.576	4-1/4"	2-3/4"	1.998"
56715	.3860	W	9.804	4-1/2"	2-7/8"	2.046"
56720	.3906	25/64"	9.921	4-1/2"	2-7/8"	2.070"
56725	.3937		10.000	114	73	53
56730	.3970	X	10.084	4-1/2"	2-7/8"	2.104"
56735	.4040	Y	10.262	4-1/2"	2-7/8"	2.141"
56740	.4062	13/32"	10.317	4-1/2"	2-7/8"	2.153"
56745	.4130	Z	10.490	4-1/2"	2-7/8"	2.189"
56750	.4134		10.500	114	73	56
56755	.4219	27/64"	10.716	4-1/2"	2-7/8"	2.236"
56760	.4331		11.000	114	73	58
56765	.4375	7/16"	11.113	4-1/2"	2-7/8"	2.319"
56770	.4528		11.500	120	76	61
56775	.4531	29/64"	11.509	4-3/4"	3"	2.402"
56780	.4688	15/32"	11.908	4-3/4"	3"	2.485"
56785	.4724		12.000	120	76	64
56790	.4844	31/64"	12.304	4-3/4"	3"	2.568"
56795	.4921		12.500	120	76	2.608"
56800	.5000	1/2"	12.700	4-3/4"	3"	2.650"



Drill Manufacturing

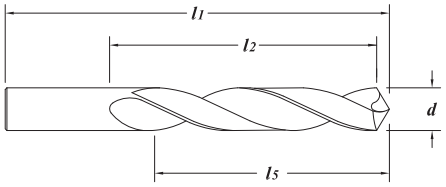
Series 1200H

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



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

BALINIT® Durana Coated
BALINIT® Durana-Beschichtet
Recubrimiento de BALINIT® Durana
Revêtement BALINIT® Durana
Rivestimento in BALINIT® Durana
BALINIT® Durana 涂层



Solid submicron grain carbide drill
General purpose jobber style
Excellent heat resistance and lubricity
Cam point (≤1/8" diameter - 4-facet point)
Live tooling recommended on lathe processes
Bright Finish - page 85

Vollhartmetallbohrer aus Feinkornhartmetall
Universeller Bohrer
Exzellente Hitzebeständigkeit und Schmiereigenschaften
Durchmesser 3 mm (1/8") und kleiner – 118° Spitzenwinkel und 4-Fasen-Anschliff
Empfehlung fuer den Einsatz auf der Drehmaschine
Unbeschichtet - Seite 85

Broca de submicrograno sólido carburo
Broca para uso general
Excelente resistencia térmica y lubricación
Para diámetros de 1/8" e inferiores – punta de 4 caras de 118°
Recomendación para la aplicación en torno
Sin recubrimiento - Página 85

Forets carbure submicrograin
Forets pour application generale
Excellente resistance a la haute temperature et glissement
D1/8 et plus petit - 118° avec 4 faces de depouille
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Sans revêtement - Page 85

Punte in sub-micro grana
Punta per impieghi generali
Eccellente resistenza al calore e autolubrificante
Affilatura a 118° punto
Utensili rotanti sono consigliate se usato su un tornio
Non Rivestito - Pagina 85

整体硬质合金钻头
通用型机用钻头
耐热性和润滑性特好
(1/8英寸直径和 1/8英寸以下直径 - 118° 4-小平面刃尖)
不建议在车床，或工具必须纺纱
未涂层 - 85页

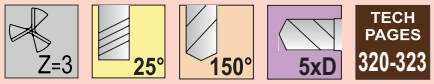
EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
56166	.0625	1/16"	1.588	1-3/4"	3/4"	.331"
56171	.0635	#52	1.613	1-3/4"	3/4"	.337"
56181	.0700	#50	1.778	1-3/4"	7/8"	.371"
56186	.0730	#49	1.854	1-3/4"	7/8"	.387"
56191	.0760	#48	1.930	1-3/4"	7/8"	.403"
56196	.0781	5/64"	1.984	1-3/4"	7/8"	.414"
56206	.0787		2.000	44	22	11
56216	.0820	#45	2.083	1-3/4"	7/8"	.435"
56221	.0860	#44	2.184	2"	1"	.456"
56226	.0890	#43	2.261	2"	1"	.472"
56231	.0935	#42	2.375	2"	1"	.496"
56236	.0938	3/32"	2.383	2"	1"	.497"
56241	.0960	#41	2.438	2"	1"	.509"
56246	.0980	#40	2.489	2"	1"	.519"
56251	.0984		2.500	57	32	13
56256	.0995	#39	2.527	2-1/4"	1-1/4"	.527"
56261	.1015	#38	2.578	2-1/4"	1-1/4"	.538"
56266	.1040	#37	2.642	2-1/4"	1-1/4"	.551"
56271	.1065	#36	2.705	2-1/4"	1-1/4"	.564"
56276	.1094	7/64"	2.779	2-1/4"	1-1/4"	.580"
56281	.1100	#35	2.794	2-1/4"	1-1/4"	.583"
56286	.1110	#34	2.819	2-1/4"	1-1/4"	.588"
56291	.1130	#33	2.870	2-1/4"	1-1/4"	.599"
56296	.1160	#32	2.946	2-1/4"	1-1/4"	.615"
56301	.1181		3.000	57	32	16
56306	.1200	#31	3.048	2-1/4"	1-1/4"	.636"
56311	.1250	1/8"	3.175	2-1/4"	1-1/4"	.663"
56316	.1285	#30	3.264	2-1/4"	1-1/4"	.681"
56321	.1360	#29	3.454	2-1/2"	1-3/8"	.721"
56331	.1405	#28	3.569	2-1/2"	1-3/8"	.745"
56336	.1406	9/64"	3.571	2-1/2"	1-3/8"	.745"
56341	.1440	#27	3.658	2-1/2"	1-3/8"	.763"
56346	.1470	#26	3.734	2-1/2"	1-3/8"	.779"
56351	.1495	#25	3.797	2-1/2"	1-3/8"	.792"
56356	.1520	#24	3.861	2-1/2"	1-3/8"	.806"
56361	.1540	#23	3.912	2-1/2"	1-3/8"	.816"
56366	.1562	5/32"	3.967	2-1/2"	1-3/8"	.828"
56371	.1570	#22	3.988	2-1/2"	1-3/8"	.832"

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
56381	.1590	#21	4.039	2-1/2"	1-3/8"	.843"
56386	.1610	#20	4.089	2-1/2"	1-3/8"	.853"
56391	.1660	#19	4.216	2-3/4"	1-5/8"	.880"
56396	.1695	#18	4.305	2-3/4"	1-5/8"	.898"
56401	.1719	11/64"	4.366	2-3/4"	1-5/8"	.911"
56411	.1770	#16	4.496	2-3/4"	1-5/8"	.938"
56421	.1800	#15	4.572	2-3/4"	1-5/8"	.954"
56426	.1820	#14	4.623	2-3/4"	1-5/8"	.965"
56436	.1875	3/16"	4.763	2-3/4"	1-5/8"	.994"
56441	.1890	#12	4.801	2-3/4"	1-5/8"	1.002"
56446	.1910	#11	4.851	2-3/4"	1-5/8"	1.012"
56451	.1935	#10	4.915	2-3/4"	1-5/8"	1.026"
56471	.2010	#7	5.105	3"	1-3/4"	1.065"
56481	.2040	#6	5.182	3"	1-3/4"	1.081"
56486	.2055	#5	5.220	3"	1-3/4"	1.089"
56491	.2090	#4	5.309	3"	1-3/4"	1.108"
56496	.2130	#3	5.410	3"	1-3/4"	1.129"
56506	.2188	7/32"	5.558	3"	1-3/4"	1.160"
56516	.2280	#1	5.791	3"	1-3/4"	1.208"
56526	.2344	15/64"	5.954	3-1/4"	2"	1.242"
56541	.2420	C	6.147	3-1/4"	2"	1.283"
56551	.2500	1/4" / E	6.350	3-1/4"	2"	1.325"
56561	.2570	F	6.528	3-1/4"	2"	1.362"
56566	.2610	G	6.629	3-1/2"	2-1/8"	1.383"
56571	.2656	17/64"	6.746	3-1/2"	2-1/8"	1.408"
56601	.2812	9/32"	7.142	3-1/2"	2-1/8"	1.490"
56606	.2900	L	7.366	3-1/2"	2-1/8"	1.537"
56626	.3020	N	7.671	3-3/4"	2-3/8"	1.601"
56631	.3125	5/16"	7.938	3-3/4"	2-3/8"	1.656"
56646	.3230	P	8.204	3-3/4"	2-3/8"	1.712"
56651	.3281	21/64"	8.334	4"	2-1/2"	1.739"
56671	.3438	11/32"	8.733	4"	2-1/2"	1.822"
56696	.3680	U	9.347	4-1/4"	2-3/4"	1.951"
56706	.3750	3/8"	9.525	4-1/4"	2-3/4"	1.988"
56731	.3970	X	10.084	4-1/2"	2-7/8"	2.104"
56741	.4062	13/32"	10.317	4-1/2"	2-7/8"	2.153"
56756	.4219	27/64"	10.716	4-1/2"	2-7/8"	2.236"
56766	.4375	7/16"	11.113	4-1/2"	2-7/8"	2.319"
56801	.5000	1/2"	12.700	4-3/4"	3"	2.650"

Series 1100

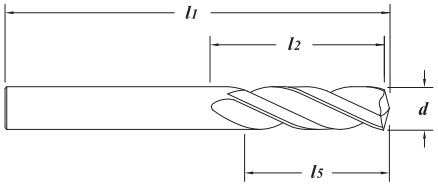
.1094" - .2040"
(2.779mm - 5.182mm)



TECH PAGES 320-323

TOLERANCES

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



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
Recommended for cast aluminum, cast iron and materials with high silicon content
Live tooling recommended on lathe processes
Durana Coated - page 81

Vollhartmetallbohrer aus Feinkornhartmetall
Selbstzentrierend Punkt
Nahe an geriebenen Oberflächen
Kann als Aufbohrer verwendet werden
Bessere Bohrungstoleranzen
Verbesserter Rundlauf und Genauigkeit
Empfohlen für Aluminiumguss, Grauguss und Werkstoffe mit hohem Silizium Gehalt
Empfehlung fuer den Einsatz auf der Drehmaschine
Durana-Beschichtet - Seite 81

Broca de submicrograno sólido carburo
Uno mismo punto de centrado
Acabado similar al escariado
Puede ser utilizada para taladrado directo
Orificios de alta tolerancia y precisión
Mejor acabado redondeado y recto
Recomendado para aluminio fundido, hierro fundido y materiales con alto contenido de silicio
Recomendación para la aplicación en torno
Recubrimiento de Durana - Página 81

Forets carbure submicrograin
Pointe auto centrante
Près de finitions alésoir
Peut être utilisé comme foret-aléseur
Le resserrement des trous de tolérance
Amélioration rondeur et de rectitude
Recommander pour fonte d'aluminium, fonte grise et matieres a haute teneur en silicium
Outil de filature nécessaires pour une utilisation sur un processus de tournage
Revêtement Durana - Page 81

Punte in sub-micro grana
Punto auto centrante
Ottimo grado di finitura
Può essere usata come punta da centro
Alta tolleranza dei fori
Migliore rotondità e linearità
Raccomandata per lavorazioni su alluminio, ghisa e materiali ad alto contenuto di silicio
Utensili rotanti sono consigliate se usato su un tornio
Rivestimento in Durana - Pagina 81

整体硬质合金钻头
自定心刀尖
接近铰孔光洁度
可做套料钻使用
紧公差孔
提高正圆度和直线度
推荐加工铸铝、铸铁和硅含量高的材质
不建议在车床，或工具必须纺纱
Durana 涂层 - 81页

EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
90275	.1094	7/64"	2.779	2-1/4"	1-1/4"	.562"
90280	.1100	#35	2.794	2-1/4"	1-1/4"	.565"
90285	.1110	#34	2.819	2-1/4"	1-1/4"	.570"
90290	.1130	#33	2.870	2-1/4"	1-1/4"	.580"
90295	.1160	#32	2.946	2-1/4"	1-1/4"	.596"
90300	.1181		3.000	57	32	15
90305	.1200	#31	3.048	2-1/4"	1-1/4"	.616"
90310	.1250	1/8"	3.175	2-1/4"	1-1/4"	.642"
90315	.1285	#30	3.264	2-1/4"	1-1/4"	.660"
90320	.1360	#29	3.454	2-1/2"	1-3/8"	.698"
90325	.1378		3.500	63	35	18
90330	.1405	#28	3.569	2-1/2"	1-3/8"	.721"
90335	.1406	9/64"	3.571	2-1/2"	1-3/8"	.722"
90340	.1440	#27	3.658	2-1/2"	1-3/8"	.739"
90345	.1470	#26	3.734	2-1/2"	1-3/8"	.755"
90350	.1495	#25	3.797	2-1/2"	1-3/8"	.768"
90355	.1520	#24	3.861	2-1/2"	1-3/8"	.780"
90365	.1562	5/32"	3.967	2-1/2"	1-3/8"	.802"
90375	.1575		4.000	63	35	21
90380	.1590	#21	4.039	2-1/2"	1-3/8"	.816"
90385	.1610	#20	4.089	2-1/2"	1-3/8"	.827"
90390	.1660	#19	4.216	2-3/4"	1-5/8"	.852"
90395	.1695	#18	4.305	2-3/4"	1-5/8"	.870"
90400	.1719	11/64"	4.366	2-3/4"	1-5/8"	.883"
90420	.1800	#15	4.572	2-3/4"	1-5/8"	.924"
90425	.1820	#14	4.623	2-3/4"	1-5/8"	.934"
90435	.1875	3/16"	4.763	2-3/4"	1-5/8"	.963"
90440	.1890	#12	4.801	2-3/4"	1-5/8"	.970"
90455	.1960	#9	4.978	3"	1-3/4"	1.006"
90460	.1969		5.000	76	44	26
90470	.2010	#7	5.105	3"	1-3/4"	1.032"
90475	.2031	13/64"	5.159	3"	1-3/4"	1.043"
90480	.2040	#6	5.182	3"	1-3/4"	1.047"

† *Metric equivalents are for reference only*

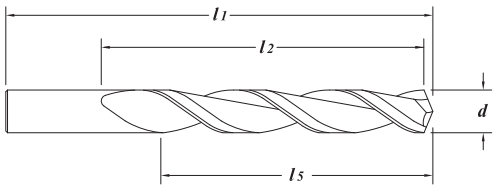
EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
90485	.2055	#5	5.220	3"	1-3/4"	1.055"
90500	.2165		5.500	76	44	28
90505	.2188	7/32"	5.558	3"	1-3/4"	1.123"
90510	.2210	#2	5.613	3"	1-3/4"	1.135"
90515	.2280	#1	5.791	3"	1-3/4"	1.171"
90525	.2344	15/64"	5.954	3-1/4"	2"	1.203"
90530	.2362		6.000	82	50	31
90550	.2500	1/4" / E	6.350	3-1/4"	2"	1.283"
90555	.2559		6.500	82	50	33
90560	.2570	F	6.528	3-1/4"	2"	1.319"
90565	.2610	G	6.629	3-1/2"	2-1/8"	1.340"
90570	.2656	17/64"	6.746	3-1/2"	2-1/8"	1.364"
90575	.2660	H	6.756	3-1/2"	2-1/8"	1.366"
90580	.2720	I	6.909	3-1/2"	2-1/8"	1.396"
90585	.2756		7.000	88	54	36
90600	.2812	9/32"	7.142	3-1/2"	2-1/8"	1.444"
90605	.2900	L	7.366	3-1/2"	2-1/8"	1.489"
90620	.2969	19/64"	7.541	3-3/4"	2-3/8"	1.524"
90625	.3020	N	7.671	3-3/4"	2-3/8"	1.550"
90630	.3125	5/16"	7.938	3-3/4"	2-3/8"	1.604"
90635	.3150		8.000	95	60	41
90640	.3160	O	8.026	3-3/4"	2-3/8"	1.622"
90650	.3281	21/64"	8.334	4"	2-1/2"	1.684"
90655	.3320	Q	8.433	4"	2-1/2"	1.704"
90660	.3346		8.500	101	63	44
90665	.3390	R	8.611	4"	2-1/2"	1.740"
90670	.3438	11/32"	8.733	4"	2-1/2"	1.765"
90680	.3543		9.000	101	63	46
90690	.3594	23/64"	9.129	4-1/4"	2-3/4"	1.845"
90705	.3750	3/8"	9.525	4-1/4"	2-3/4"	1.925"
90725	.3937		10.000	114	73	51
90745	.4130	Z	10.490	4-1/2"	2-7/8"	2.120"
90755	.4219	27/64"	10.716	4-1/2"	2-7/8"	2.166"
90760	.4331		11.000	114	73	56
90765	.4375	7/16"	11.113	4-1/2"	2-7/8"	2.246"
90775	.4531	29/64"	11.509	4-3/4"	3"	2.326"
90780	.4688	15/32"	11.908	4-3/4"	3"	2.407"
90790	.4844	31/64"	12.304	4-3/4"	3"	2.487"
90800	.5000	1/2"	12.700	4-3/4"	3"	2.567"

Series 1800H

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

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

Parabolic - BALINIT® Durana Coated
Parabolische - BALINIT® Durana-Beschichtet
Parabólica - Recubrimiento de BALINIT® Durana
Parabolique - Revêtement BALINIT® Durana
Elicoidale - Rivestimento in BALINIT® Durana
抛物线排屑槽 - BALINIT® Durana 涂层



Solid submicron grain carbide drill
Wide open flutes and high helix remove chips quickly
4-facet point
Recommended for deep holes in soft, non-ferrous materials (aluminum, brass and bronze)
Live tooling recommended on lathe processes

Vollhartmetallbohrer aus Feinkornhartmetall
Grosse Spannuten und grösserer Spiralwinkel für schnelle Spanentfernung
4-Fasen-Anschliff Punkt
Empfohlen für Tiefe Bohrungen in Weiche Nichteisenmetalle (Aluminium, Messing und Bronze)
Empfehlung fuer den Einsatz auf der Drehmaschine

Broca de submicrograno sólido carburo
Ranuras anchas y abiertas y la hélice más alta evacúan las virutas con la máxima rapidez
Punta de 4 caras
Recomendado para orificios profundos en material no ferroso blando (aluminio, latón, bronce)
Recomendación para la aplicación en torno

Forets carbure submicrograin
Goujures tres larges egle d'helice eleve pour une evacuation plus rapide des copeaux
Pointe avec 4 faces de depouille
Recommander pour trous profonds dans matieres tenders non ferreuses
Outil de filature nécessaires pour une utilisation sur un processus de tournage

Punte in sub-micro grana
Elica accentuata per una più veloce evacuazione del truciolo
Punto 4 facce
Fori profondi su materiali non ferrosi (alluminio, ottone, bronzo)
Utensili rotanti sono consigliate se usato su un tornio

整体硬质合金钻头
开放式宽容屑槽和大螺旋角能快速清除切屑
4-小平面刀尖
推荐加工在软质有色金属（铝、黄铜和青铜）内钻深孔
不建议在车床，或工具必须纺纱

EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length	l_5 Max Drill Depth
22436	.1875	3/16"	4.763	3-13/16"	2-5/16"	1.539"
22441	.1890	#12	4.801	3-13/16"	2-5/16"	1.551"
22456	.1960	#9	4.978	3-15/16"	2-7/16"	1.609"
22461	.1969		5.000	100	62	41
22466	.1990	#8	5.055	3-15/16"	2-7/16"	1.633"
22471	.2010	#7	5.105	3-15/16"	2-7/16"	1.650"
22476	.2031	13/64"	5.159	3-15/16"	2-7/16"	1.667"
22486	.2055	#5	5.220	4"	2-1/2"	1.687"
22496	.2130	#3	5.410	4"	2-1/2"	1.748"
22501	.2165		5.500	102	64	45
22506	.2188	7/32"	5.558	4"	2-1/2"	1.796"
22511	.2210	#2	5.613	4"	2-1/2"	1.814"
22516	.2280	#1	5.791	4-1/8"	2-5/8"	1.871"
22531	.2362		6.000	105	67	49
22541	.2420	C	6.147	4-1/4"	2-3/4"	1.986"
22546	.2460	D	6.248	4-1/4"	2-3/4"	2.019"
22551	.2500	1/4" / E	6.350	4-1/4"	2-3/4"	2.052"
22556	.2559		6.500	108	70	53
22561	.2570	F	6.528	4-3/8"	2-7/8"	2.109"
22566	.2610	G	6.629	4-3/8"	2-7/8"	2.142"
22571	.2656	17/64"	6.746	4-3/8"	2-7/8"	2.180"
22576	.2660	H	6.756	4-3/8"	2-7/8"	2.183"
22581	.2720	I	6.909	4-3/8"	2-7/8"	2.232"
22586	.2756		7.000	111	73	57
22596	.2810	K	7.137	4-7/16"	2-15/16"	2.306"
22606	.2900	L	7.366	4-7/16"	2-15/16"	2.380"
22631	.3125	5/16"	7.938	4-11/16"	3-3/16"	2.565"

† *Metric equivalents are for reference only*

EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length	*l5* Max Drill Depth
22636	.3150		8.000	119	81	66
22646	.3230	P	8.204	4-11/16"	3-3/16"	2.651"
22656	.3320	Q	8.433	4-15/16"	3-7/16"	2.725"
22661	.3346		8.500	125	87	70
22666	.3390	R	8.611	4-15/16"	3-7/16"	2.782"
22696	.3680	U	9.347	5"	3-1/2"	3.020"
22706	.3750	3/8"	9.525	5-1/8"	3-5/8"	3.078"
22721	.3906	25/64"	9.921	5-1/4"	3-3/4"	3.206"
22726	.3937		10.000	133	95	82
22751	.4134		10.500	137	98	86
22761	.4331		11.000	138	100	90
22766	.4375	7/16"	11.113	5-7/16"	3-15/16"	3.591"
22776	.4531	29/64"	11.509	5-9/16"	4-5/16"	3.719"
22801	.5000	1/2"	12.700	6"	4-1/2"	4.104"
22811	.5156	33/64"	13.096	6"	4-1/2"	4.232"
22831	.5512		14.000	156	117	115

Series 4100

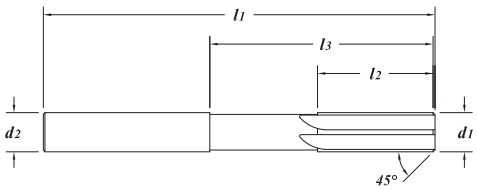
.0590" - .0820"
(1.499mm - 2.083mm)

TECH PAGES 314-315

TOLERANCES

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

Standard Reamers
Standard Reibahlen
Escariadores Estándar
Alesoirs Standarts
Alesatori Standard
标准铰刀



Solid Carbide Submicron Grain
Straight - RHC Flutes
Standard 45° Lead Chamfer
Neck diameter is 0,250 ±0,050mm (.010" ±.002") less than fluted diameter (d_1)

Vollhartmetall aus Feinkornhartmetall
Gerade RHC-Spannuten
Standard 45° Führungsfase
Hals-Durchmesser ist 0,250 ±0,050 mm (0,010 Zoll ±0,002 Zoll) kleiner als der Nenn-Durchmesser (d_1)

Carburo sólido de grano submicrónico
Rectos – ranuras RHC
Chaflán de guía estándar de 45°
Diámetro de cuello de 0,250 ±0,050mm (.010" ±.002") menor que diámetro de corte (d_1)

Carbure plein submicrograin
droites goujures - RHC
Une norme chanfrein à 45°
Diamètre de la nuque est 0,250 ± 0,050 mm (.010 "±.002") plus petit que le diamètre de coupe (d_1)

Super sub-micrograno metallo duro
Taglienti dritti
Inclinazione standard a 45°
Diametro del collo di 0,250 ± 0,050 mm (.010 "±.002") inferiore rispetto al diametro di taglio (d_1)

超细晶粒整体硬质合金
直线型—洛氏硬度C级出屑槽
标准45° 导程倒角
颈部直径为 0,250 ± 0,050 mm (.010 "±.002"), 小于刃部直径 (d_1)

EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	Number Flutes
95066	.0590		1.499	.0590"	1-1/2"	3/8"	5/8"	4
95069	.0591		1.500	.0591"	1-1/2"	3/8"	5/8"	4
95072	.0595	#53	1.511	.0595"	1-1/2"	3/8"	5/8"	4
95075	.0600		1.524	.0600"	1-1/2"	3/8"	5/8"	4
95078	.0605		1.537	.0605"	1-1/2"	3/8"	5/8"	4
95081	.0610		1.549	.0610"	1-1/2"	3/8"	5/8"	4
95084	.0615		1.562	.0615"	1-1/2"	3/8"	5/8"	4
95087	.0620		1.575	.0620"	1-1/2"	3/8"	5/8"	4
95090	.0625	1/16"	1.588	.0625"	1-1/2"	3/8"	5/8"	4
95093	.0630		1.600	.0630"	1-1/2"	3/8"	5/8"	4
95096	.0635	#52	1.613	.0635"	1-1/2"	3/8"	5/8"	4
95099	.0640		1.626	.0640"	1-1/2"	3/8"	5/8"	4
95102	.0645		1.638	.0645"	1-1/2"	3/8"	5/8"	4
95105	.0650		1.651	.0650"	1-1/2"	3/8"	5/8"	4
95108	.0660		1.676	.0660"	1-3/4"	1/2"	3/4"	4
95111	.0670	#51	1.702	.0670"	1-3/4"	1/2"	3/4"	4
95114	.0680		1.727	.0680"	1-3/4"	1/2"	7/8"	4
95117	.0690		1.753	.0690"	1-3/4"	1/2"	7/8"	4
95120	.0700	#50	1.778	.0700"	1-3/4"	1/2"	7/8"	4
95123	.0710		1.803	.0710"	1-3/4"	1/2"	7/8"	4
95126	.0720		1.829	.0720"	1-3/4"	1/2"	7/8"	4
95129	.0730	#49	1.854	.0730"	1-3/4"	1/2"	7/8"	4
95132	.0740		1.880	.0740"	1-3/4"	1/2"	7/8"	4
95135	.0750		1.905	.0750"	1-3/4"	1/2"	7/8"	4
95138	.0760	#48	1.930	.0760"	1-3/4"	1/2"	7/8"	4
95141	.0770		1.956	.0770"	1-3/4"	1/2"	7/8"	4
95144	.0780		1.981	.0780"	1-3/4"	1/2"	7/8"	4
95147	.0781	5/64"	1.984	.0781"	1-3/4"	1/2"	7/8"	4
95150	.0785	#47	1.994	.0785"	1-3/4"	1/2"	7/8"	4
95153	.0787		2.000	.0787"	1-3/4"	1/2"	7/8"	4
95156	.0790		2.007	.0790"	1-3/4"	1/2"	7/8"	4
95159	.0800		2.032	.0800"	1-3/4"	1/2"	7/8"	4
95162	.0810	#46	2.057	.0810"	2"	1/2"	7/8"	4
95165	.0820	#45	2.083	.0820"	2"	1/2"	7/8"	4

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

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

† *Metric equivalents are for reference only*

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

continued →

Series 4100 *(continued)*

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

TECH PAGES 314-315

TOLERANCES

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

Standard Reamers
Standard Reibahlen
Escariadores Estándar
Alesoirs Standarts
Alesatori Standard
标准铰刀

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

† *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	Number Flutes
95717	.2260		5.740	.2260"	3"	1"	1-5/8"	4
95720	.2270		5.766	.2270"	3"	1"	1-5/8"	4
95723	.2280	#1	5.791	.2280"	3"	1"	1-5/8"	4
95726	.2290		5.817	.2290"	3"	1"	1-5/8"	4
95729	.2300		5.842	.2300"	3"	1"	1-5/8"	4
95732	.2310		5.867	.2310"	3"	1"	1-5/8"	4
95735	.2320		5.893	.2320"	3"	1"	1-5/8"	4
95738	.2330		5.918	.2330"	3"	1"	1-5/8"	4
95741	.2340	A	5.944	.2340"	3"	1"	1-5/8"	4
95744	.2344	15/64"	5.954	.2344"	3"	1"	1-5/8"	4
95747	.2350		5.969	.2350"	3"	1"	1-5/8"	4
95750	.2360		5.994	.2360"	3"	1"	1-5/8"	4
95753	.2362		6.000	.2362"	3"	1"	1-5/8"	4
95756	.2370		6.020	.2370"	3"	1"	1-5/8"	4
95759	.2380	B	6.045	.2380"	3"	1"	1-5/8"	4
95762	.2390		6.071	.2390"	3"	1"	1-5/8"	4
95765	.2400		6.096	.2400"	3"	1"	1-5/8"	4
95768	.2410		6.121	.2410"	3"	1"	1-5/8"	4
95771	.2420	C	6.147	.2420"	3"	1"	1-5/8"	4
95774	.2430		6.172	.2430"	3"	1"	1-5/8"	4
95777	.2440		6.198	.2440"	3"	1"	1-5/8"	4
95780	.2450		6.223	.2450"	3"	1"	1-5/8"	4
95783	.2460	D	6.248	.2460"	3"	1"	1-5/8"	4
95786	.2470		6.274	.2470"	3"	1"	1-5/8"	4
95789	.2480		6.299	.2480"	3"	1"	1-5/8"	4
95792	.2485		6.312	.2485"	3"	1"	1-5/8"	4
95795	.2490		6.325	.2490"	3"	1"	1-5/8"	4
95798	.2495		6.337	.2495"	3"	1"	1-5/8"	4
95799	.2498		6.345	.2498"	3"	1"	1-5/8"	4
95801	.2500	1/4" / E	6.350	.2500"	3"	1"	1-5/8"	4
95802	.2502		6.355	.2502"	3"	1"	1-5/8"	4
95804	.2505		6.363	.2505"	3"	1"	1-5/8"	4
95807	.2510		6.375	.2510"	3"	1"	1-5/8"	4
95810	.2515		6.388	.2515"	3"	1"	1-5/8"	4
95813	.2520		6.401	.2520"	3"	1"	1-5/8"	4
95816	.2530		6.426	.2530"	3"	1"	1-5/8"	4
95819	.2540		6.452	.2540"	3"	1"	1-5/8"	4
95822	.2550		6.477	.2550"	3-1/4"	1-1/8"	1-3/4"	6
95825	.2559		6.500	.2559"	3-1/4"	1-1/8"	1-3/4"	6
95828	.2560		6.502	.2560"	3-1/4"	1-1/8"	1-3/4"	6
95831	.2570	F	6.528	.2570"	3-1/4"	1-1/8"	1-3/4"	6
95834	.2580		6.553	.2580"	3-1/4"	1-1/8"	1-3/4"	6
95837	.2590		6.579	.2590"	3-1/4"	1-1/8"	1-3/4"	6
95840	.2600		6.604	.2600"	3-1/4"	1-1/8"	1-3/4"	6
95843	.2610	G	6.629	.2610"	3-1/4"	1-1/8"	1-3/4"	6
95846	.2620		6.655	.2620"	3-1/4"	1-1/8"	1-3/4"	6
95849	.2630		6.680	.2630"	3-1/4"	1-1/8"	1-3/4"	6
95852	.2640		6.706	.2640"	3-1/4"	1-1/8"	1-3/4"	6

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 Reach Length	Number Flutes
95855	.2650		6.731	.2650"	3-1/4"	1-1/8"	1-3/4"	6
95858	.2656	17/64"	6.746	.2656"	3-1/4"	1-1/8"	1-3/4"	6
95861	.2660	H	6.756	.2660"	3-1/4"	1-1/8"	1-3/4"	6
95864	.2670		6.782	.2670"	3-1/4"	1-1/8"	1-3/4"	6
95867	.2680		6.807	.2680"	3-1/4"	1-1/8"	1-3/4"	6
95870	.2690		6.833	.2690"	3-1/4"	1-1/8"	1-3/4"	6
95873	.2700		6.858	.2700"	3-1/4"	1-1/8"	1-3/4"	6
95876	.2710		6.883	.2710"	3-1/4"	1-1/8"	1-3/4"	6
95879	.2720	I	6.909	.2720"	3-1/4"	1-1/8"	1-7/8"	6
95882	.2730		6.934	.2730"	3-1/4"	1-1/8"	1-7/8"	6
95885	.2740		6.960	.2740"	3-1/4"	1-1/8"	1-7/8"	6
95888	.2750		6.985	.2750"	3-1/4"	1-1/8"	1-7/8"	6
95891	.2756		7.000	.2756"	3-1/4"	1-1/8"	1-7/8"	6
95894	.2760		7.010	.2760"	3-1/4"	1-1/8"	1-7/8"	6
95897	.2770	J	7.036	.2770"	3-1/4"	1-1/8"	1-7/8"	6
95900	.2780		7.061	.2780"	3-1/4"	1-1/8"	1-7/8"	6
95903	.2790		7.087	.2790"	3-1/4"	1-1/8"	1-7/8"	6
95906	.2800		7.112	.2800"	3-1/4"	1-1/8"	1-7/8"	6
95909	.2810	K	7.137	.2810"	3-1/4"	1-1/8"	1-7/8"	6
95912	.2812	9/32"	7.142	.2812"	3-1/4"	1-1/8"	1-7/8"	6
95915	.2820		7.163	.2820"	3-1/4"	1-1/8"	1-7/8"	6
95918	.2830		7.188	.2830"	3-1/4"	1-1/8"	1-7/8"	6
95921	.2840		7.214	.2840"	3-1/4"	1-1/8"	1-7/8"	6
95924	.2850		7.239	.2850"	3-1/4"	1-1/8"	1-7/8"	6
95927	.2860		7.264	.2860"	3-1/4"	1-1/8"	1-7/8"	6
95930	.2870		7.290	.2870"	3-1/4"	1-1/8"	1-7/8"	6
95933	.2880		7.315	.2880"	3-1/4"	1-1/8"	1-7/8"	6
95936	.2890		7.341	.2890"	3-1/4"	1-1/8"	1-7/8"	6
95939	.2900	L	7.366	.2900"	3-1/4"	1-1/8"	1-7/8"	6
95942	.2910		7.391	.2910"	3-1/4"	1-1/8"	1-7/8"	6
95945	.2920		7.417	.2920"	3-1/4"	1-1/8"	1-7/8"	6
95948	.2930		7.442	.2930"	3-1/4"	1-1/8"	1-7/8"	6
95951	.2940		7.468	.2940"	3-1/4"	1-1/8"	1-7/8"	6
95954	.2950	M	7.493	.2950"	3-1/4"	1-1/8"	1-7/8"	6
95957	.2953		7.500	.2953"	3-1/4"	1-1/8"	1-7/8"	6
95960	.2960		7.518	.2960"	3-1/4"	1-1/8"	1-7/8"	6
95963	.2969	19/64"	7.541	.2969"	3-1/4"	1-1/8"	1-7/8"	6
95966	.2970		7.544	.2970"	3-1/4"	1-1/8"	1-7/8"	6
95969	.2980		7.569	.2980"	3-1/4"	1-1/8"	1-7/8"	6
95972	.2990		7.595	.2990"	3-1/4"	1-1/8"	1-7/8"	6
95975	.3000		7.620	.3000"	3-1/4"	1-1/8"	1-7/8"	6
95978	.3010		7.645	.3010"	3-1/4"	1-1/8"	1-7/8"	6
95981	.3020	N	7.671	.3020"	3-1/4"	1-1/8"	1-7/8"	6
95984	.3030		7.696	.3030"	3-1/4"	1-1/8"	1-7/8"	6
95987	.3040		7.722	.3040"	3-1/4"	1-1/8"	1-7/8"	6
95990	.3050		7.747	.3050"	3-1/4"	1-1/8"	1-7/8"	6
95993	.3060		7.772	.3060"	3-1/4"	1-1/8"	1-7/8"	6
95996	.3070		7.798	.3070"	3-1/4"	1-1/8"	1-7/8"	6

† *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	Number Flutes
95999	.3080		7.823	.3080"	3-1/4"	1-1/8"	1-7/8"	6
96002	.3090		7.849	.3090"	3-1/4"	1-1/8"	1-7/8"	6
96005	.3100		7.874	.3100"	3-1/4"	1-1/8"	1-7/8"	6
96006	.3105		7.887	.3105"	3-1/4"	1-1/8"	1-7/8"	6
96008	.3110		7.899	.3110"	3-1/4"	1-1/8"	1-7/8"	6
96011	.3115		7.912	.3115"	3-1/4"	1-1/8"	1-7/8"	6
96014	.3120		7.925	.3120"	3-1/4"	1-1/8"	1-7/8"	6
96015	.3123		7.932	.3123"	3-1/4"	1-1/8"	1-7/8"	6
96017	.3125	5/16"	7.938	.3125"	3-1/4"	1-1/8"	1-7/8"	6
96021	.3130		7.950	.3130"	3-1/4"	1-1/8"	1-7/8"	6
96023	.3135		7.963	.3135"	3-1/4"	1-1/8"	1-7/8"	6
96026	.3140		7.976	.3140"	3-1/4"	1-1/8"	1-7/8"	6
96029	.3150		8.000	.3150"	3-1/4"	1-1/8"	1-7/8"	6
96032	.3160	O	8.026	.3160"	3-1/4"	1-1/8"	1-7/8"	6
96035	.3170		8.052	.3170"	3-1/4"	1-1/8"	1-7/8"	6
96038	.3180		8.077	.3180"	3-1/4"	1-1/8"	1-7/8"	6
96041	.3190		8.103	.3190"	3-1/2"	1-1/4"	2"	6
96044	.3200		8.128	.3200"	3-1/2"	1-1/4"	2"	6
96047	.3210		8.153	.3210"	3-1/2"	1-1/4"	2"	6
96050	.3220		8.179	.3220"	3-1/2"	1-1/4"	2"	6
96053	.3230	P	8.204	.3230"	3-1/2"	1-1/4"	2"	6
96056	.3240		8.230	.3240"	3-1/2"	1-1/4"	2"	6
96059	.3250		8.255	.3250"	3-1/2"	1-1/4"	2"	6
96062	.3260		8.280	.3260"	3-1/2"	1-1/4"	2"	6
96065	.3270		8.306	.3270"	3-1/2"	1-1/4"	2"	6
96068	.3280		8.331	.3280"	3-1/2"	1-1/4"	2"	6
96071	.3281	21/64"	8.334	.3281"	3-1/2"	1-1/4"	2"	6
96074	.3290		8.357	.3290"	3-1/2"	1-1/4"	2"	6
96077	.3300		8.382	.3300"	3-1/2"	1-1/4"	2"	6
96079	.3310		8.407	.3310"	3-1/2"	1-1/4"	2"	6
96083	.3320	Q	8.433	.3320"	3-1/2"	1-1/4"	2"	6
96086	.3330		8.458	.3330"	3-1/2"	1-1/4"	2"	6
96089	.3340		8.484	.3340"	3-1/2"	1-1/4"	2"	6
96092	.3346		8.500	.3346"	3-1/2"	1-1/4"	2"	6
96095	.3350		8.509	.3350"	3-1/2"	1-1/4"	2"	6
96098	.3360		8.534	.3360"	3-1/2"	1-1/4"	2"	6
96101	.3370		8.560	.3370"	3-1/2"	1-1/4"	2"	6
96104	.3380		8.585	.3380"	3-1/2"	1-1/4"	2"	6
96107	.3390	R	8.611	.3390"	3-1/2"	1-1/4"	2"	6
96110	.3400		8.636	.3400"	3-1/2"	1-1/4"	2"	6
96113	.3410		8.661	.3410"	3-1/2"	1-1/4"	2"	6
96116	.3420		8.687	.3420"	3-1/2"	1-1/4"	2"	6
96119	.3430		8.712	.3430"	3-1/2"	1-1/4"	2"	6
96122	.3438	11/32"	8.733	.3438"	3-1/2"	1-1/4"	2"	6
96125	.3440		8.738	.3440"	3-1/2"	1-1/4"	2"	6
96128	.3450		8.763	.3450"	3-1/2"	1-1/4"	2"	6
96131	.3460		8.788	.3460"	3-1/2"	1-1/4"	2"	6
96134	.3470		8.814	.3470"	3-1/2"	1-1/4"	2"	6

continued →

Series 4100 *(continued)*

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

TECH PAGES 314-315

TOLERANCES

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

Standard Reamers
Standard Reibahlen
Escariadores Estándar
Alesoirs Standarts
Alesatori Standard
标准铰刀

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

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

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

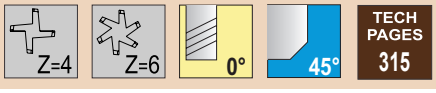
† *Metric equivalents are for reference only*

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

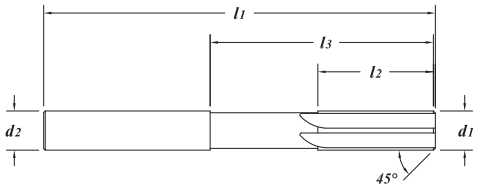
Series 4100 (Metric)

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

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



Metric Reamers
metrisch Reibahlen
Escariadores métrico
Alesoirs métrique
Alesatori metrico
公制铰刀



Solid Carbide Submicron Grain
Straight - RHC Flutes
Standard 45° Lead Chamfer
Neck diameter is 0,250 ±0,050mm (.010" ±.002") less than fluted diameter (d_1)

Vollhartmetall aus Feinkornhartmetall
Gerade RHC-Spannuten
Standard 45° Führungsfase
Hals-Durchmesser ist 0,250 ±0,050 mm (0,010 Zoll ±0,002 Zoll) kleiner als der Nenn-Durchmesser (d_1)

Carburo sólido de grano submicrónico
Rectos – ranuras RHC
Chaflán de guía estándar de 45°
Diámetro de cuello de 0,250 ±0,050mm (.010" ±.002") menor que diámetro de corte (d_1)

Carbure plein submicrograin
droites goujures - RHC
Une norme chanfrein à 45°
Diamètre de la nuque est 0,250 ± 0,050 mm (.010 "±.002") plus petit que le diamètre de coupe (d_1)

Super sub-micrograno metallo duro
Taglienti dritti
Inclinazione standard a 45°
Diametro del collo di 0,250 ± 0,050 mm (.010 "±.002") inferiore rispetto al diametro di taglio (d_1)

超细晶粒整体硬质合金
直线型—洛氏硬度C级出屑槽
标准45° 导程倒角
颈部直径为 0,250 ± 0,050 mm (.010 "±.002"), 小于刃部直径 (d_1)

EDP#	d_1 Decimal	d_1 Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	Number Flutes
96659	.07835	1.990	1.990	50	12	32	4
96662	.07874	2.000	2.000	50	12	32	4
96665	.07913	2.010	2.010	50	12	32	4
96668	.07953	2.020	2.020	50	12	32	4
96671	.11772	2.990	2.990	65	16	36	4
96674	.11811	3.000	3.000	65	16	36	4
96677	.11850	3.010	3.010	65	16	36	4
96680	.11890	3.020	3.020	65	16	36	4
96683	.15709	3.990	3.990	75	20	45	4
96686	.15748	4.000	4.000	75	20	45	4
96689	.15787	4.010	4.010	75	20	45	4
96692	.15827	4.020	4.020	75	20	45	4
96695	.15866	4.030	4.030	75	20	45	4
96698	.19646	4.990	4.990	100	25	60	4
96701	.19685	5.000	5.000	100	25	60	4
96704	.19724	5.010	5.010	100	25	60	4
96707	.19764	5.020	5.020	100	25	60	4
96710	.19803	5.030	5.030	100	25	60	4
96713	.23583	5.990	5.990	100	25	60	4
96716	.23622	6.000	6.000	100	25	60	4
96719	.23661	6.010	6.010	100	25	60	4
96722	.23701	6.020	6.020	100	25	60	4
96725	.27559	7.000	7.000	100	25	60	6
96728	.31457	7.990	7.990	120	32	75	6
96731	.31496	8.000	8.000	120	32	75	6
96734	.31535	8.010	8.010	120	32	75	6
96737	.31575	8.020	8.020	120	32	75	6
96740	.31614	8.030	8.030	120	32	75	6
96743	.35433	9.000	9.000	120	32	75	6
96746	.39291	9.980	9.980	130	32	75	6
96749	.39331	9.990	9.990	130	32	75	6
96752	.39370	10.000	10.000	130	32	75	6
96755	.39409	10.010	10.010	130	32	75	6
96758	.39449	10.020	10.020	130	32	75	6
96761	.39488	10.030	10.030	130	32	75	6
96764	.39528	10.040	10.040	130	32	75	6

EDP#	d_1		d_2	l_1	l_2	l_3	
	Decimal	Metric	Shank Diameter	Overall Length	Flute Length	Reach Length	Number Flutes
96767	.47165	11.980	11.980	150	40	100	6
96770	.47205	11.990	11.990	150	40	100	6
96773	.47244	12.000	12.000	150	40	100	6
96776	.47283	12.010	12.010	150	40	100	6
96779	.47323	12.020	12.020	150	40	100	6
96782	.47362	12.030	12.030	150	40	100	6

LHS / RHC

STR / RHC

RHS / RHC

Special Reamers - Solid Carbide - 2 Week Delivery

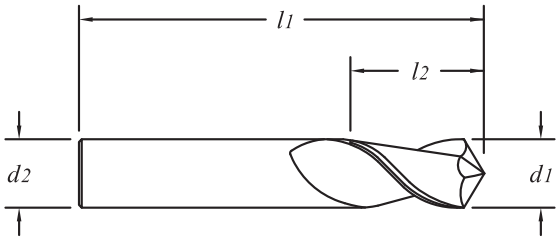
Solid Carbide Submicron Grain
All reamers furnished with a standard 45° Lead Chamfer
All reamers furnished with a standard neck for reach
Neck diameter is .010" ±.002" less than fluted diameter

Diameter		Overall Length	Flute Length	No. of Flutes
Decimal	Metric			
.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 –.050mm (+.000" –.002")
d_2	h6

Z=2 | 30° | 90° | TECH PAGES 316-317



MATERIAL HARDNESS (Rc)

70

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

Hochleistungs- VollhartmetallBohrer und fräser aus Feinkornhartmetall
Inklusive Winkel zum Zentrum - Zentrumsschnitt
Werkzeuge haben keine Ausspitzung
Extrem Vielseitig
Punkt-Toleranz: ±0°30'

Fresa/Broca de submicrograno sólido carburo
Ángulo de la punta - corte centrado
Herramientas sin punta para taladrado
Extremadamente versátil
Tolerancia del punta: ±0°30'

35

Forets/Fraises carbure submicrograin
L'angle se prolonge vers à un point - coupe au centre
Outils n'ont pas la géométrie pointe du foret
Utilisations variables
Point tolerance: ±0°30'

Punte / Fresa de sub-micro grano metallo duro
Incluso l'angolo al punto - taglio al centro
Gli utensili non hanno la geometria drill point
Estremamente varsatile
Tolleranza punto: ±0°30'

整体硬质合金立铣刀/钻头
夹角逐渐变细并形成尖端 – 中心切削
刀具没有钻尖部份
功能极多
钻点允差: ±0°30'

0

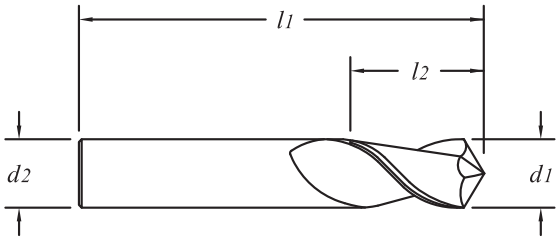
EDP#	d_1 † Diameter Decimal	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
57200	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
57210	.1875	3/16"	4.763	3/16"	2"	5/8"
57220	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
57230	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
57240	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
57250	.4375	7/16"	11.113	7/16"	2-3/4"	1"
57260	.5000	1/2"	12.700	1/2"	3"	1"
57270	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
57280	.7500	3/4"	19.050	3/4"	4"	1-1/2"

† *Metric equivalents are for reference only*

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

Z=2 | 30° | 90° | TECH PAGES 316-317

TiAlN Coated
TiAlN-Beschichtet
Recubrimiento de TiAlN
Revêtement TiAlN
Rivestimento in TiAlN
TiAlN 涂层



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

Hochleistungs- VollhartmetallBohrer und fräser aus Feinkornhartmetall
Inklusive Winkel zum Zentrum - Zentrumsschnitt
Werkzeuge haben keine Ausspitzung
Extrem Vielseitig
Punkt-Toleranz: ±0°30'

Fresa/Broca de submicrograno sólido carburo
Ángulo de la punta - corte centrado
Herramientas sin punta para taladrado
Extremadamente versátil
Tolerancia del punta: ±0°30'

Forets/Fraises carbure submicrograin
L'angle se prolonge vers à un point - coupe au centre
Outils n'ont pas la géométrie pointe du foret
Utilisations variables
Point tolerance: ±0°30'

Punte / Fresa de sub-micro grano metallo duro
Incluso l'angolo al punto - taglio al centro
Gli utensili non hanno la geometria drill point
Estremamente varsatile
Tolleranza punto: ±0°30'

整体硬质合金立铣刀/钻头
夹角逐渐变细并形成尖端 – 中心切削
刀具没有钻尖部份
功能极多
钻点允差: ±0°30'

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
57207	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
57217	.1875	3/16"	4.763	3/16"	2"	5/8"
57227	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
57237	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
57247	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
57257	.4375	7/16"	11.113	7/16"	2-3/4"	1"
57267	.5000	1/2"	12.700	1/2"	3"	1"
57277	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
57287	.7500	3/4"	19.050	3/4"	4"	1-1/2"

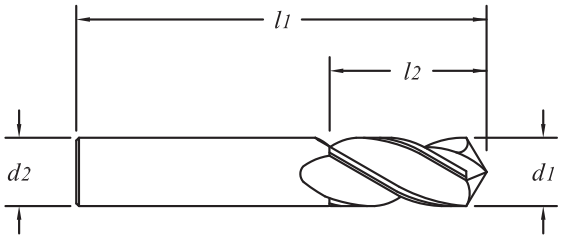
Series 154M

TOLERANCES

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

Z=4 | 30° | 60° | 82° | 90° | 100°

TECH PAGES 316-317



MATERIAL HARDNESS (Rc)

70

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

Hochleistungs- VollhartmetallBohrer und fräser aus Feinkornhartmetall
Inklusive Winkel zum Zentrum - Zentrumsschnitt
Werkzeuge haben keine Ausspitzung
Extrem Vielseitig
Punkt-Toleranz: ±0°30'

Fresa/Broca de submicrograno sólido carburo
Ángulo de la punta - corte centrado
Herramientas sin punta para taladrado
Extremadamente versátil
Tolerancia del punta: ±0°30'

35

Forets/Fraises carbure submicrograin
L'angle se prolonge vers à un point - coupe au centre
Outils n'ont pas la géométrie pointe du foret
Utilisations variables
Point tolerance: ±0°30'

Punte / Fresa de sub-micro grano metallo duro
Incluso l'angolo al punto - taglio al centro
Gli utensili non hanno la geometria drill point
Estremamente versatile
Tolleranza punto: ±0°30'

整体硬质合金立铣刀/钻头
夹角逐渐变细并形成尖端 – 中心切削
刀具没有钻尖部份
功能极多
钻点允差: ±0°30'

0

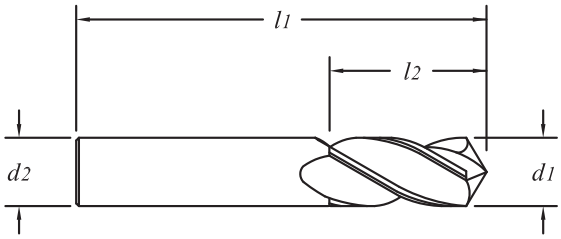
60° EDP#	82° EDP#	90° EDP#	100° EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
-	-	58198	-	.1181		3.000	3.0	38	12
-	57346	58200	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
-	-	58202	-	.1575		4.000	4.0	50	14
-	57350	58210	57390	.1875	3/16"	4.763	3/16"	2"	5/8"
-	57352	58212	57392	.1969		5.000	5.0	65	16
57314	57354	58214	-	.2362		6.000	6.0	65	19
57316	57356	58220	57396	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
57318	57358	58230	57398	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
57320	-	58232	57400	.3150		8.000	8.0	65	22
57322	57362	58240	57402	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
57324	-	58242	57404	.3937		10.000	10.0	70	25
-	-	58252	57408	.4724		12.000	12.0	75	25
57330	57370	58260	57410	.5000	1/2"	12.700	1/2"	3"	1"
57332	57372	58270	57412	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
-	-	58272	57414	.6299		16.000	16.0	88	32
57336	57376	58280	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"

† *Metric equivalents are for reference only*

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

Z=4 | 30° | 60° | 82° | 90° | 100° | TECH PAGES 316-317

TiAlN Coated
TiAlN-Beschichtet
Recubrimiento de TiAlN
Revêtement TiAlN
Rivestimento in TiAlN
TiAlN 涂层



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

Hochleistungs- VollhartmetallBohrer und fräser aus Feinkornhartmetall
Inklusive Winkel zum Zentrum - Zentrumsschnitt
Werkzeuge haben keine Ausspitzung
Extrem Vielseitig
Punkt-Toleranz: ±0°30'

Fresa/Broca de submicrograno sólido carburo
Ángulo de la punta - corte centrado
Herramientas sin punta para taladrado
Extremadamente versátil
Tolerancia del punta: ±0°30'

Forets/Fraises carbure submicrograin
L'angle se prolonge vers à un point - coupe au centre
Outils n'ont pas la géométrie pointe du foret
Utilisations variables
Point tolerance: ±0°30'

Punte / Fresa de sub-micro grano metallo duro
Incluso l'angolo al punto - taglio al centro
Gli utensili non hanno la geometria drill point
Estremamente varsatile
Tolleranza punto: ±0°30'

整体硬质合金立铣刀/钻头
夹角逐渐变细并形成尖端 – 中心切削
刀具没有钻尖部份
功能极多
钻点允差: ±0°30'

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
-	-	58205	-	.1181		3.000	3.0	38	12
-	58346	58207	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
-	58348	58209	58388	.1575		4.000	4.0	50	14
-	58350	58217	58390	.1875	3/16"	4.763	3/16"	2"	5/8"
-	-	58219	-	.1969		5.000	5.0	65	16
58314	58354	58221	58394	.2362		6.000	6.0	65	19
58316	58356	58227	58396	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
58318	58358	58237	58398	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
58320	-	58239	58400	.3150		8.000	8.0	65	22
58322	58362	58247	58402	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
58324	58364	58249	58404	.3937		10.000	10.0	70	25
58326	58366	58257	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"
58328	-	58259	58408	.4724		12.000	12.0	75	25
58330	58370	58267	58410	.5000	1/2"	12.700	1/2"	3"	1"
58332	58372	58277	58412	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
-	58374	58279	-	.6299		16.000	16.0	88	32
58336	58376	58287	58416	.7500	3/4"	19.050	3/4"	4"	1-1/2"
-	58378	58289	-	.7874		20.000	20.0	100	38

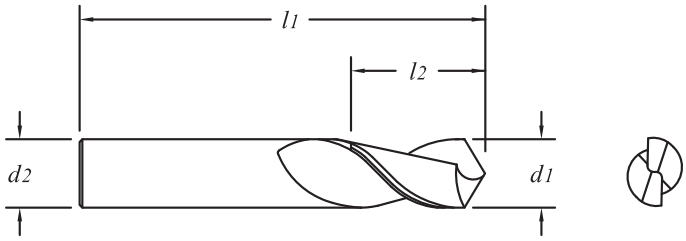
MATERIAL HARDNESS (Rc)
70
35
0

Series 152DA

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

Z=2 | 30° | 120° | TECH PAGES 318-319

TiAlN Coated
TiAlN-Beschichtet
Recubrimiento de TiAlN
Revêtement TiAlN
Rivestimento in TiAlN
TiAlN 涂层



MATERIAL HARDNESS (Rc)

70

Solid submicron grain carbide drill/end mill
Recommended for drilling and milling of mild steels and non-ferrous materials
4-facet drill point geometry (NOT to a true point - Reference page 57)
Extremely versatile
Drill point tolerance: ±1°

Hochleistungs- VollhartmetallBohrer und fräser aus Feinkornhartmetall
Empfohlen für das Bohren und Fräsen von weichen Stählen und Nicht-Eisen-Werkstoffen
4-Fasen-Anschliff Punkt (NICHT als eingeschlossener Winkel zu einem Punkt erstellt – Referenzseite 57)
Extrem Vielseitig
Punkt-Toleranz: ±1°

Fresa/Broca de submicrograno sólido carburo
Recomendado para el taladrado y fresado de aceros dulces y materiales no férricos
Punta de 4 caras (NO hecho a un punto verdadero - Página de referencia 57)
Extremadamente versátil
Tolerancia del punta: ±1°

35

Forets/Fraises carbure submicrograin
Recommandé pour perçage et le fraisage des aciers doux et des matériaux de non-ferreux
Géométrie de pointe du foret a 4 facettes (PAS fait valoir un point vrai - Référence page 57)
Utilisations variables
Point tolerance: ±1°

Punte / Fresa de sub-micro grano metallo duro
Raccomandata per foratura e fresatura di acciai morbidi e materiali non ferrosi
Punto 4 facce (NON è un punto vero - Pagina di riferimento 57)
Estremamente varsatile
Tolleranza punto: ±1°

整体硬质合金立铣刀/钻头
推荐用于钻和铣削软钢和非铁材料
4-小平面刀尖 （钻尖不是整点-参考第57页）
功能极多
钻点允差: ±1°

0

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
57421	.1181		3.000	3.0	38	12
57423	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
57425	.1575		4.000	4.0	50	14
57427	.1875	3/16"	4.762	3/16"	2"	5/8"
57429	.1969		5.000	5.0	65	16
57431	.2362		6.000	6.0	65	19
57433	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
57435	.3125	5/16"	7.937	5/16"	2-1/2"	7/8"
57437	.3150		8.000	8.0	65	22
57439	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
57441	.3937		10.000	10.0	70	25
57443	.4375	7/16"	11.112	7/16"	2-3/4"	1"
57445	.4724		12.000	12.0	75	25
57447	.5000	1/2"	12.700	1/2"	3"	1"
57449	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
57451	.6299		16.000	16.0	88	32
57453	.7500	3/4"	19.050	3/4"	4"	1-1/2"
57455	.7874		20.000	20.0	100	38

† *Metric equivalents are for reference only*

Since 1927
Star
NTG 6RL

630XW
ROLLOMATIC

TXcell

MX7LINEAR

Series ARC

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

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

TECH PAGES 291

Aluminum Rough Cut Mill - Bright Finish

Aluminium Schruppfräser - Bright Fertig (Ohne Beschichtung)

Fresa de Desbaste Para Aluminio - Acabado Brillante (Sin Recubrimiento)

Fraise Ravageuse Pour l´Usinage de l´Aluminium - Finition Brillante (Sans Revêtement)

Fresa per Sgrossatura su Alluminio - Eccellente Finitura (Non Rivestito)

粗加工铝合金铣刀 - 高亮光洁度(未涂层)

MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
Standard 45° Lead Chamfer
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 and non-ferrous materials

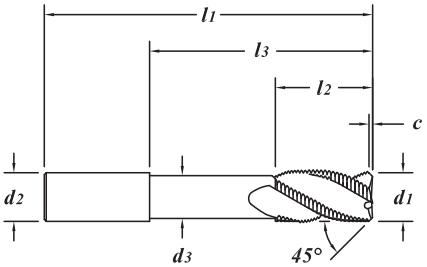
Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Standard 45° Führungsfase
Schruppprofil entwickelt, um die Spänne zu brechen
Jede Spannnute hat einen Spiralwinkel, um die Vibrationen zu vermeiden
Reduziert den Druck auf das Werkzeug und erfordert weniger Maschinenleistung
Entwickelt für das Schruppen von Aluminium Legierungen und Nicht-Eisen Materialien

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Chaflán de guía estándar de 45°
Diseño ondulado para rotura de viruta
Cada labio tiene ángulo de hélice individual para rotura de armónicos
Reduce la presión de la herramienta necesitando menos potencia de máquina
Diseñada para desbaste de aleaciones de aluminio y materiales no férricos

Fraises carbure submicrograin - coupe au centre
Une norme chanfrein à 45°
Profile en vagues pour casser le copeau
Chaque dent a un angle d´hélice particulier pour éviter les vibrations
Réduit le stress sur l'outil et nécessite moins de puissance de la machine
Adapté pour l´ébauche des alliages d´aluminium et des matières non-ferreuses

Fresa sub-micrograno metallo duro - taglio al centro
Inclinazione standard a 45°
Geometria ondulata per rompere il truciolo
Ogni elica ha uno specifico angolo per rompere le vibrazioni armoniche
Riduce la pressione e richiede meno potenza alla macchina
Geometria per sgrossatura su leghe di alluminio e materiali non ferrosi

高效超细晶粒整体硬质合金立铣刀 - 中心切削
标准45° 导程倒角
波刃设计利于断屑
每刃有独立螺旋角破坏共振利于排屑
降低刀具切削阻力，减小机床功耗
专为铝合金及有色金属粗加工设计



EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	c Chamfer Length	l_3 Reach Length	d_3 Neck Diameter
46219	.1575		4.000	6.0	50	8	0.30	-	-
46222	.1575		4.000	6.0	50	12	0.30	-	-
46225	.1575		4.000	6.0	65	10	0.30	30	3.2
46228	.1575		4.000	6.0	75	15	0.30	40	3.2
46231	.1875	3/16"	4.763	3/16"	2"	5/16"	.015"	-	-
46234	.1875	3/16"	4.763	3/16"	2"	9/16"	.015"	-	-
46237	.1875	3/16"	4.763	3/16"	3"	1"	.015"	-	-
46240	.1875	3/16"	4.763	3/16"	3"	1/2"	.015"	1-1/2"	.160"
46243	.2362		6.000	6.0	50	12	0.50	-	-
46246	.2362		6.000	6.0	65	19	0.50	-	-
46249	.2362		6.000	6.0	100	20	0.50	60	5.2
46252	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	-
46255	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-
46258	.2500	1/4"	6.350	1/4"	4"	1-1/2"	.020"	-	-
46261	.2500	1/4"	6.350	1/4"	4"	1"	.020"	2"	.220"
46264	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-	-
46267	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	-
46270	.3125	5/16"	7.938	5/16"	4"	1-1/2"	.020"	-	-
46273	.3125	5/16"	7.938	5/16"	4"	1"	.020"	2"	.285"
46276	.3150		8.000	8.0	50	12	0.50	-	-
46279	.3150		8.000	8.0	65	22	0.50	-	-
46282	.3150		8.000	8.0	100	40	0.50	-	-
46285	.3150		8.000	8.0	100	20	0.50	60	7.2
46288	.3150		8.000	8.0	150	40	0.50	100	7.2
46291	.3750	3/8"	9.525	3/8"	2"	1/2"	.025"	-	-
46294	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.025"	-	-
46297	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.025"	-	-
46300	.3750	3/8"	9.525	3/8"	4"	1-5/8"	.025"	-	-
46303	.3750	3/8"	9.525	3/8"	4"	1"	.025"	2"	.345"
46306	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.025"	4"	.345"

GARR TOOL®

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	c Chamfer Length	l_3 Reach Length	d_3 Neck Diameter
46309	.3937		10.000	10.0	50	16	0.50	-	-
46312	.3937		10.000	10.0	70	22	0.50	-	-
46315	.3937		10.000	10.0	100	40	0.50	-	-
46318	.3937		10.000	10.0	100	20	0.50	60	9.2
46321	.3937		10.000	10.0	150	40	0.50	100	9.2
46324	.4724		12.000	12.0	65	19	0.80	-	-
46327	.4724		12.000	12.0	75	32	0.80	-	-
46330	.4724		12.000	12.0	100	50	0.80	-	-
46333	.4724		12.000	12.0	100	25	0.80	60	11.2
46336	.4724		12.000	12.0	150	40	0.80	100	11.2
46339	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-
46342	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
46345	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-
46348	.5000	1/2"	12.700	1/2"	4"	1"	.030"	2"	.470"
46351	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"	4"	.470"
46354	.6250	5/8"	15.875	5/8"	3"	3/4"	.035"	-	-
46357	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.035"	-	-
46360	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.035"	-	-
46363	.6250	5/8"	15.875	5/8"	4"	1"	.035"	2"	.595"
46366	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	3"	.595"
46369	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	4"	.595"
46372	.6299		16.000	16.0	75	19	1.00	-	-
46375	.6299		16.000	16.0	88	32	1.00	-	-
46378	.6299		16.000	16.0	100	50	1.00	-	-
46381	.6299		16.000	16.0	100	20	1.00	50	15.2
46384	.6299		16.000	16.0	150	40	1.00	100	15.2
46387	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.040"	-	-
46390	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.040"	-	-
46393	.7500	3/4"	19.050	3/4"	4"	7/8"	.040"	2"	.720"
46396	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	3"	.720"
46399	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	4"	.720"
46402	.7874		20.000	20.0	100	22	1.00	-	-
46405	.7874		20.000	20.0	100	40	1.00	-	-
46408	.7874		20.000	20.0	100	30	1.00	50	19.2
46411	.7874		20.000	20.0	150	40	1.00	100	19.2
46414	1.000	1"	25.400	1"	4"	1-1/2"	.040"	-	-
46417	1.000	1"	25.400	1"	5"	2"	.040"	-	-
46420	1.000	1"	25.400	1"	6"	2"	.040"	3-1/2"	.970"
46423	1.000	1"	25.400	1"	7"	2"	.040"	4-1/2"	.970"

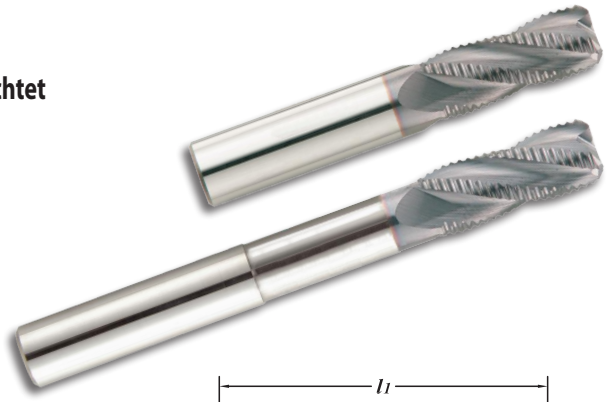
Series VHM

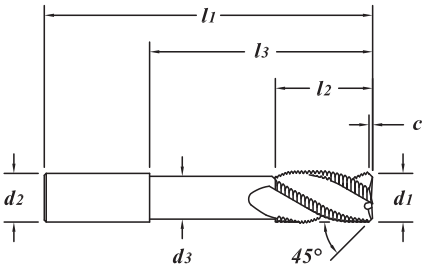
.1575" - .3543"
(4.000mm - 9.000mm)

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

TECH PAGES 292-293

Staggered Flute Hog Mill - AlTiN Coated
Schruppfräser mit Speziellen Spannut-Design - AlTiN-Beschichtet
Fresa de Labio Escalonado - Recubrimiento de AlTiN
Fraise Ébauche à Denture Variable - Revêtement AlTiN
Fresa Rompitruciolo - Rivestimento in AlTiN
错齿波纹铣刀 - AlTiN 涂层





MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
State-of-the-art rougher using VRX technology
Reduces tool pressure for more aggresive machining
Recommended for stainless steel, inconel, pH materials, cold rolled steel, titanium, cast iron and tool steels <40Rc
Variable flute geometry

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Herkömmliche Vollhartmetallschrupper
Reduziert Schnittdruck für eine aggressivere Bearbeitung
Empfohlen für Rostfreien Stahl, Inconel, Pulvermetalle, Kaltformstähle, Titan, Grauguss und Werkzeugstähle <40HRc
Variable Spannut-Geometrie

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Desbaste de la mejor calidad con la tecnología VRX
Reduce la presión en la herramienta para los mecanizados más agresivos
Recomendado para acero inoxidable, inconel, materiales pH, acero laminado en frío, hierro de fundición y aceros herramienta <40Rc
Geometria variable de ranura de viruta

Fraises carbure submicrograin - coupe au centre
La maitrise de l'art pour le fraisage d'ebauche avec technologie des VRX
Reduction de la pression outil pour un fraisage plus agressif
Recommandee pour les aciers inoxydables, inconel, inoxs pH, aciers a outils, aciers forges, titane, fonts et aciers a outils <40HRC
Géometrie variable de la helix

Fresa sub-micrograno metallo duro - taglio al centro
Metallo duro per sgrossatura con tecnologia VRX
Riduce lo sforzo di taglio per lavorazioni aggressive
Raccomandata per lavorazioni su inox, inconel, acciai pressati a freddo, titanio, ghisa e acciai per utensili <40Hrc
Geometria ad elica variabile

超细晶粒整体硬质合金立铣刀 - 中心切削
最先进的整体硬质合金粗切刀具/用途 VRX 技术
减少刀具压力，用于更高速度，更大进给的加工
推荐加工不锈钢、铬镍铁耐热耐蚀合金、含磷材质、冷轧钢、钛钢、铸铁和工具钢
不等分刃设计

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
49450	.1575		4.000	6.0	50	8	0.30	-	-
49455	.1575		4.000	6.0	50	12	0.30	-	-
49460	.1575		4.000	6.0	65	10	0.30	30	3.4
49465	.1575		4.000	6.0	75	15	0.30	40	3.4
49470	.1875	3/16"	4.763	3/16"	2"	5/16"	.015"	-	-
49475	.1875	3/16"	4.763	3/16"	2"	9/16"	.015"	-	-
49480	.1875	3/16"	4.763	3/16"	3"	1"	.015"	-	-
49485	.1875	3/16"	4.763	3/16"	3"	1/2"	.015"	1-1/2"	.165"
49490	.2362		6.000	6.0	50	12	0.50	-	-
49500	.2362		6.000	6.0	65	19	0.50	-	-
49505	.2362		6.000	6.0	100	15	0.50	40	5.4
49510	.2362		6.000	6.0	100	20	0.50	60	5.4
49520	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	-
49540	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-
49543	.2500	1/4"	6.350	1/4"	4"	1-1/2"	.020"	-	-
49547	.2500	1/4"	6.350	1/4"	4"	1"	.020"	2"	.225"
49550	.2756		7.000	8.0	50	12	0.50	-	-
49555	.2756		7.000	8.0	65	22	0.50	-	-
49570	.2812	9/32"	7.142	5/16"	2"	7/16"	.020"	-	-
49575	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.020"	-	-
49580	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-	-
49600	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	-
49603	.3125	5/16"	7.938	5/16"	4"	1-1/2"	.020"	-	-
49605	.3125	5/16"	7.938	5/16"	4"	1"	.020"	2"	.285"
49610	.3150		8.000	8.0	50	12	0.50	-	-
49620	.3150		8.000	8.0	65	22	0.50	-	-
49622	.3150		8.000	8.0	100	40	0.50	-	-
49623	.3150		8.000	8.0	100	20	0.50	60	7.4
49624	.3150		8.000	8.0	150	40	0.50	100	7.4
49625	.3438	11/32"	8.733	3/8"	2"	1/2"	.025"	-	-
49630	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	.025"	-	-
49635	.3543		9.000	10.0	50	14	0.50	-	-
49637	.3543		9.000	10.0	65	22	0.50	-	-

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † 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
49640	.3750	3/8"	9.525	3/8"	2"	1/2"	.025"	-	-
49660	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.025"	-	-
49662	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.025"	-	-
49664	.3750	3/8"	9.525	3/8"	4"	1-5/8"	.025"	-	-
49667	.3750	3/8"	9.525	3/8"	4"	1"	.025"	2"	.355"
49670	.3937		10.000	10.0	50	16	0.50	-	-
49680	.3937		10.000	10.0	70	22	0.50	-	-
49682	.3937		10.000	10.0	100	40	0.50	-	-
49684	.3937		10.000	10.0	100	20	0.50	40	9.4
49686	.3937		10.000	10.0	100	30	0.50	60	9.4
49690	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.025"	-	-
49700	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.025"	-	-
49710	.4724		12.000	12.0	65	19	0.80	-	-
49720	.4724		12.000	12.0	75	32	0.80	-	-
49725	.4724		12.000	12.0	100	50	0.80	-	-
49730	.4724		12.000	12.0	100	25	0.80	60	11.4
49735	.4724		12.000	12.0	150	40	0.80	100	11.4
* 49740	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-
* 49760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
* 49761	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-
* 49762	.5000	1/2"	12.700	1/2"	4"	1"	.030"	2"	.480"
* 49764	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"	4"	.480"
* 49765	.5512		14.000	14.0	75	19	0.80	-	-
* 49770	.5512		14.000	14.0	88	32	0.80	-	-
* 49780	.6250	5/8"	15.875	5/8"	3"	3/4"	.035"	-	-
* 49800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.035"	-	-
* 49820	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.035"	-	-
* 49824	.6250	5/8"	15.875	5/8"	4"	1"	.035"	2"	.605"
* 49826	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	3"	.605"
* 49828	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	4"	.605"
* 49830	.6299		16.000	16.0	75	19	1.00	-	-
* 49840	.6299		16.000	16.0	88	32	1.00	-	-
* 49842	.6299		16.000	16.0	100	50	1.00	-	-
* 49843	.6299		16.000	16.0	100	20	1.00	50	15.4
* 49844	.6299		16.000	16.0	150	40	1.00	100	15.4
* 49850	.7087		18.000	18.0	100	38	1.00	-	-
* 49860	.7500	3/4"	19.050	3/4"	3"	7/8"	.040"	-	-
* 49880	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.040"	-	-
* 49882	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.040"	-	-
* 49886	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	3"	.730"
* 49887	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	4"	.730"
* 49890	.7874		20.000	20.0	75	22	1.00	-	-
* 49900	.7874		20.000	20.0	100	38	1.00	-	-
* 49902	.7874		20.000	20.0	100	30	1.00	50	19.4
* 49904	.7874		20.000	20.0	150	40	1.00	100	19.4
* 49915	.9843		25.000	25.0	100	25	1.00	-	-
* 49920	.9843		25.000	25.0	100	38	1.00	-	-
* 49925	1.000	1"	25.400	1"	4"	1"	.040"	-	-
* 49930	1.000	1"	25.400	1"	4"	1-1/2"	.040"	-	-
* 49940	1.000	1"	25.400	1"	5"	2"	.040"	-	-

* - Tools with weldon flats

Series A3

NEW ITEMS

.1575" - .2500"
(4.000mm - 6.350mm)

HIGH EFFICIENCY MILLING

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

Z=3 | VAR

TECH PAGES 288-290

Variable Helix End Mill

Fräser mit Einer Variablen Spiralgeometrie

Fresa de Hélice Variable

Fraise Avec un Angle Hélice Variable

Fresa ad Elica Variabile

不等螺旋铣刀

MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
Engineered for High Velocity Machining of Aluminium
Proprietary geometry with polished flutes breaks up harmonics
Improved end geometry provides superior floor finishes and increased plunge rates
Capable of running up to 40,000 RPM - reduces vibration and balance issues
Chip splitters and neck on shank can be added within 48 hours
Bright Finish

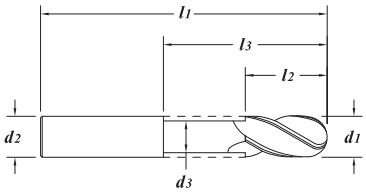
Hochleistungs - Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Entwickelt für die Hochgeschwindigkeitsbearbeitung von Aluminium
Proprietäre Geometrie mit polierten Flöten bricht Harmonische auf
Die verbesserte End geometrie bietet hervorragende Bodenbeläge und erhöhte Eintauchraten
Kann bis zu 40.000 U / min laufen - reduziert Vibrations- und Gleichgewichtsprobleme
Chip spalter und Hals am Schaft können innerhalb von 48 Stunden hinzugefügt werden
Bright Fertig (Ohne Beschichtung)

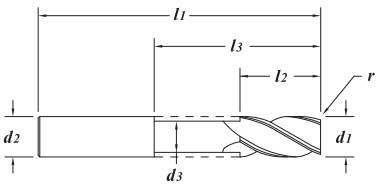
Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Diseñado para el mecanizado de aluminio de alta velocidad
La geometría patentada con flautas pulidas rompe los armónicos
La geometría del extremo mejorada proporciona acabados de piso superiores y mayores tasas de inmersión
Capaz de funcionar hasta 40.000 RPM, reduce los problemas de vibración y equilibrio
Los divisores de viruta y el cuello en el vástago se pueden agregar en 48 horas
Acabado Brillante (Sin Recubrimiento)

Fraises carbure submicrograin - coupe au centre
Conçu pour l'usinage à haute vitesse de l'aluminium
La géométrie propriétaire avec des flûtes polies brise les harmoniques
La géométrie améliorée des extrémités offre des finitions de plancher supérieures et des taux de plongée accrus
Capable de fonctionner jusqu'à 40000 tr / min - réduit les problèmes de vibration et d'équilibre
Les séparateurs de copeaux et le col sur la tige peuvent être ajoutés dans les 48 heures
Finition Brillante (Sans Revêtement)

Fresa sub-micrograno metallo duro - taglio al centro
Progettato per la lavorazione ad alta velocità dell'alluminio
La geometria proprietaria con flauti levigati rompe le armoniche
La geometria delle estremità migliorata offre finiture del pavimento superiori e maggiori velocità di immersione
In grado di funzionare fino a 40.000 giri / min - riduce i problemi di vibrazioni e bilanciamento
I separatori di trucioli e il collo sul gambo possono essere aggiunti entro 48 ore
Eccellente Finitura (Non Rivestito)

超细晶粒整体硬质合金立铣刀 - 中心切削
专为铝的高速加工而设计
专有的几何形状和抛光的凹槽可以消除谐波
改进的端部几何形状可提供出色的地板光洁度和增加的切入率
能够运行高达40,000RPM-减少振动和平衡问题
切屑分离器和刀柄上的颈部可在48小时内添加
高亮光洁度(未涂层)





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
07000	.1575		4.000	6.0	50	12	-	16	3.80
07001	.1575		4.000	6.0	50	12	0.20	16	3.80
07002	.1575		4.000	6.0	50	12	0.50	16	3.80
07003	.1575		4.000	6.0	50	12	1.00	16	3.80
07004	.1875	3/16"	4.763	3/16"	2"	1/2"	-	5/8"	.179"
07005	.1875	3/16"	4.763	3/16"	2"	1/2"	.015"	5/8"	.179"
07006	.1875	3/16"	4.763	3/16"	2"	1/2"	.030"	5/8"	.179"
07007	.1875	3/16"	4.763	3/16"	2"	1/2"	.060"	5/8"	.179"
07008	.1875	3/16"	4.763	3/16"	2"	1/2"	BALL	5/8"	.179"
07009	.1969		5.000	6.0	65	16	-	26	4.70
07010	.1969		5.000	6.0	65	16	0.20	26	4.70
07011	.1969		5.000	6.0	65	16	0.50	26	4.70
07012	.1969		5.000	6.0	65	16	1.00	26	4.70
07013	.2362		6.000	6.0	65	19	-	26	5.70
07014	.2362		6.000	6.0	65	19	0.20	26	5.70
07015	.2362		6.000	6.0	65	19	0.50	26	5.70
07016	.2362		6.000	6.0	65	19	1.00	26	5.70
07017	.2362		6.000	6.0	65	19	1.50	26	5.70
07018	.2362		6.000	6.0	65	19	2.00	26	5.70
07019	.2362		6.000	6.0	65	19	BALL	26	5.70
NEW 07228	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-	-
NEW 07229	.2500	1/4"	6.350	1/4"	2"	1/2"	-	-	-
07020	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	-
07021	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-
07022	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-
07023	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	-	-
07024	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.090"	-	-
07025	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	BALL	-	-
07026	.2500	1/4"	6.350	1/4"	3"	1"	-	-	-
07027	.2500	1/4"	6.350	1/4"	3"	1"	.030"	-	-
07028	.2500	1/4"	6.350	1/4"	3"	1"	.060"	-	-
07029	.2500	1/4"	6.350	1/4"	3"	3/8"	-	1-1/8"	.235"
07030	.2500	1/4"	6.350	1/4"	3"	3/8"	.015"	1-1/8"	.235".
07031	.2500	1/4"	6.350	1/4"	3"	3/8"	.030"	1-1/8"	.235"
07032	.2500	1/4"	6.350	1/4"	3"	3/8"	.060"	1-1/8"	.235"

GARR TOOL®

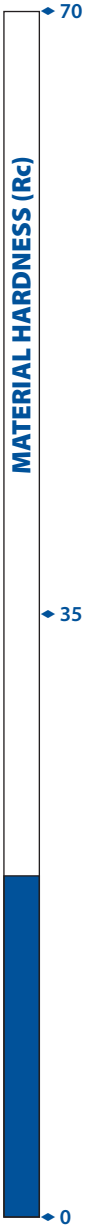
† Metric equivalents are for reference only

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
07033	.3150		8.000	8.0	65	19	-	26	7.40
07034	.3150		8.000	8.0	65	19	0.20	26	7.40
07035	.3150		8.000	8.0	65	19	0.50	26	7.40
07036	.3150		8.000	8.0	65	19	1.00	26	7.40
07037	.3150		8.000	8.0	65	19	1.50	26	7.40
07038	.3150		8.000	8.0	65	19	2.00	26	7.40
07039	.3150		8.000	8.0	65	19	3.00	26	7.40
07040	.3150		8.000	8.0	65	19	BALL	26	7.40
07041	.3750	3/8"	9.525	3/8"	2-1/2"	1"	-	-	-
07042	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.010"	-	-
07043	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.015"	-	-
07044	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.020"	-	-
07045	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.030"	-	-
07046	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.060"	-	-
07047	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.090"	-	-
07048	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.120"	-	-
07049	.3750	3/8"	9.525	3/8"	2-1/2"	1"	BALL	-	-
07050	.3750	3/8"	9.525	3/8"	3"	1-1/4"	-	-	-
07051	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.015"	-	-
07052	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"	-	-
07053	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.060"	-	-
07054	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.120"	-	-
07055	.3750	3/8"	9.525	3/8"	3"	1/2"	-	1-1/8"	.355"
07056	.3750	3/8"	9.525	3/8"	3"	1/2"	.015"	1-1/8"	.355"
07057	.3750	3/8"	9.525	3/8"	3"	1/2"	.030"	1-1/8"	.355"
07058	.3750	3/8"	9.525	3/8"	3"	1/2"	.060"	1-1/8"	.355"
07059	.3750	3/8"	9.525	3/8"	3"	1/2"	.090"	1-1/8"	.355"
07060	.3750	3/8"	9.525	3/8"	3"	1/2"	.120"	1-1/8"	.355"
07061	.3750	3/8"	9.525	3/8"	4"	1/2"	-	2-1/8"	.355"
07062	.3750	3/8"	9.525	3/8"	4"	1/2"	.015"	2-1/8"	.355"
07063	.3750	3/8"	9.525	3/8"	4"	1/2"	.020"	2-1/8"	.355"
07064	.3750	3/8"	9.525	3/8"	4"	1/2"	.030"	2-1/8"	.355"
07065	.3750	3/8"	9.525	3/8"	4"	1/2"	.060"	2-1/8"	.355"
07066	.3750	3/8"	9.525	3/8"	4"	1/2"	.090"	2-1/8"	.355"
07067	.3750	3/8"	9.525	3/8"	4"	1/2"	.120"	2-1/8"	.355"
07068	.3937		10.000	10.0	70	22	-	30	9.40
07069	.3937		10.000	10.0	70	22	0.20	30	9.40
07070	.3937		10.000	10.0	70	22	0.50	30	9.40
07071	.3937		10.000	10.0	70	22	1.00	30	9.40
07072	.3937		10.000	10.0	70	22	1.50	30	9.40
07073	.3937		10.000	10.0	70	22	2.00	30	9.40
07074	.3937		10.000	10.0	70	22	3.00	30	9.40
07075	.3937		10.000	10.0	70	22	BALL	30	9.40
07076	.3937		10.000	10.0	100	40	-	-	-
07077	.3937		10.000	10.0	100	22	-	55	9.40
07078	.4724		12.000	12.0	88	26	-	38	11.40
07079	.4724		12.000	12.0	88	26	0.20	38	11.40
07212	.4724		12.000	12.0	88	26	0.50	38	11.40
07081	.4724		12.000	12.0	88	26	1.00	38	11.40
07082	.4724		12.000	12.0	88	26	1.50	38	11.40
07083	.4724		12.000	12.0	88	26	2.00	38	11.40
07084	.4724		12.000	12.0	88	26	3.00	38	11.40
07085	.4724		12.000	12.0	88	26	4.00	38	11.40
07086	.4724		12.000	12.0	88	26	BALL	38	11.40

continued →

Series A3 *(continued)*

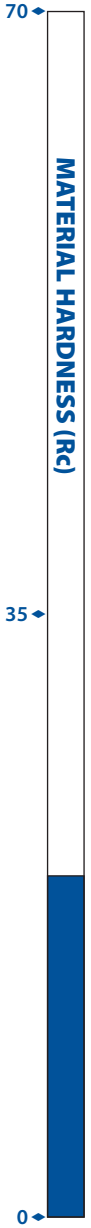
.4724" - .6250"
(12.000mm - 15.875mm)



EDP#	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
07213	.4724		12.000	12.0	88	36	-	-	-
07088	.4724		12.000	12.0	88	36	0.20	-	-
07089	.4724		12.000	12.0	88	36	0.50	-	-
07090	.4724		12.000	12.0	88	36	1.00	-	-
07091	.4724		12.000	12.0	88	36	1.50	-	-
07092	.4724		12.000	12.0	88	36	2.00	-	-
07093	.4724		12.000	12.0	88	36	3.00	-	-
07094	.4724		12.000	12.0	88	36	4.00	-	-
07095	.4724		12.000	12.0	88	36	BALL	-	-
07215	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-
07216	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-
07217	.5000	1/2"	12.700	1/2"	3"	1"	BALL	-	-
07096	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-
07097	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-
07098	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
07099	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
07100	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
07101	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
07102	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.090"	-	-
07103	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-
07218	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-
07104	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.190"	-	-
07105	.5000	1/2"	12.700	1/2"	3"	1-1/4"	BALL	-	-
07219	.5000	1/2"	12.700	1/2"	3"	1/2"	.030"	1-1/2"	.470"
07220	.5000	1/2"	12.700	1/2"	3"	1/2"	.090"	1-1/2"	.470"
NEW 07230	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	-	-	-
07221	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-
07222	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.030"	-	-
07223	.5000	1/2"	12.700	1/2"	4"	1-5/8"	BALL	-	-
07106	.5000	1/2"	12.700	1/2"	4"	2-1/16"	-	-	-
07107	.5000	1/2"	12.700	1/2"	4"	2-1/16"	.015"	-	-
07108	.5000	1/2"	12.700	1/2"	4"	2-1/16"	.030"	-	-
07109	.5000	1/2"	12.700	1/2"	4"	2-1/16"	.060"	-	-
07110	.5000	1/2"	12.700	1/2"	4"	2-1/16"	.120"	-	-
07224	.5000	1/2"	12.700	1/2"	4"	1/2"	.090"	2"	.470"
07225	.5000	1/2"	12.700	1/2"	4"	1/2"	.190"	2"	.470"
07111	.5000	1/2"	12.700	1/2"	4"	5/8"	-	2-1/4"	.475"
07112	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	2-1/4"	.475"
07113	.5000	1/2"	12.700	1/2"	4"	5/8"	.030"	2-1/4"	.475"
07114	.5000	1/2"	12.700	1/2"	4"	5/8"	.060"	2-1/4"	.475"
07115	.5000	1/2"	12.700	1/2"	4"	5/8"	BALL	2-1/4"	.475"
07116	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-
07214	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-
07118	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.060"	-	-
07119	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.090"	-	-
07120	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.120"	-	-
07121	.6250	5/8"	15.875	5/8"	4"	3/4"	-	2-3/8"	.590"
07122	.6250	5/8"	15.875	5/8"	4"	3/4"	.030"	2-3/8"	.590"
07123	.6250	5/8"	15.875	5/8"	4"	3/4"	.060"	2-3/8"	.590"
07124	.6250	5/8"	15.875	5/8"	4"	3/4"	.120"	2-3/8"	.590"
07125	.6250	5/8"	15.875	5/8"	4"	3/4"	.190"	2-3/8"	.590"

† *Metric equivalents are for reference only*

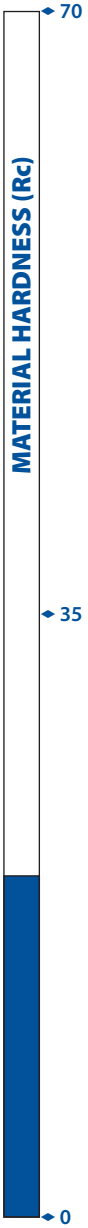
	EDP#	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	07126	.6299		16.000	16.0	100	24	-	50	15.40
	07127	.6299		16.000	16.0	100	24	0.50	50	15.40
	07128	.6299		16.000	16.0	100	24	1.00	50	15.40
	07129	.6299		16.000	16.0	100	24	1.50	50	15.40
	07130	.6299		16.000	16.0	100	24	3.00	50	15.40
NEW	07131	.6299		16.000	16.0	100	24	6.00	50	15.40
	07132	.6299		16.000	16.0	100	32	-	50	15.40
	07133	.6299		16.000	16.0	100	32	0.50	50	15.40
	07134	.6299		16.000	16.0	100	32	1.00	50	15.40
	07135	.6299		16.000	16.0	100	32	1.50	50	15.40
	07136	.6299		16.000	16.0	100	32	3.00	50	15.40
	07137	.6299		16.000	16.0	100	32	6.00	50	15.40
	07138	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-
	07139	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.015"	-	-
	07140	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-
	07141	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.060"	-	-
	07142	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.078"	-	-
	07143	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.094"	-	-
	07144	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.120"	-	-
	07145	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.156"	-	-
	07146	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.190"	-	-
	07147	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.250"	-	-
	07148	.7500	3/4"	19.050	3/4"	4"	1-3/4"	BALL	-	-
	07149	.7500	3/4"	19.050	3/4"	4"	1"	-	2"	.715"
	07150	.7500	3/4"	19.050	3/4"	4"	1"	.030"	2"	.715"
	07151	.7500	3/4"	19.050	3/4"	4"	1"	.060"	2"	.715"
	07152	.7500	3/4"	19.050	3/4"	4"	1"	.090"	2"	.715"
	07153	.7500	3/4"	19.050	3/4"	4"	1"	.120"	2"	.715"
	07154	.7500	3/4"	19.050	3/4"	4"	1"	.125"	2"	.715"
	07155	.7500	3/4"	19.050	3/4"	4"	1"	.160"	2"	.715"
	07156	.7500	3/4"	19.050	3/4"	4"	1"	.190"	2"	.715"
	07157	.7500	3/4"	19.050	3/4"	5"	2-1/4"	-	-	-
	07158	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.030"	-	-
	07159	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.060"	-	-
	07160	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.120"	-	-
	07161	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.125"	-	-
	07162	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.190"	-	-
	07163	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.250"	-	-
	07226	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-
	07164	.7500	3/4"	19.050	3/4"	6"	1"	-	3-3/8"	.715"
	07165	.7500	3/4"	19.050	3/4"	6"	1"	.030"	3-3/8"	.715"
	07166	.7500	3/4"	19.050	3/4"	6"	1"	.060"	3-3/8"	.715"
	07167	.7500	3/4"	19.050	3/4"	6"	1"	.090"	3-3/8"	.715"
	07168	.7500	3/4"	19.050	3/4"	6"	1"	.125"	3-3/8"	.715"
	07169	.7500	3/4"	19.050	3/4"	6"	1"	.250"	3-3/8"	.715"
	07170	.7500	3/4"	19.050	3/4"	6"	1"	BALL	3-3/8"	.715"



continued →

Series A3 *(continued)*

.7874" - 1.000"
(20.000mm - 25.400mm)

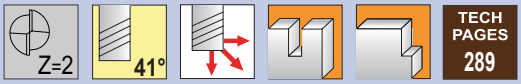


	EDP#	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	07171	.7874		20.000	20.0	100	30	-	50	19.4
	07172	.7874		20.000	20.0	100	30	0.50	50	19.4
	07173	.7874		20.000	20.0	100	30	1.00	50	19.4
	07174	.7874		20.000	20.0	100	30	1.50	50	19.4
	07175	.7874		20.000	20.0	100	30	3.00	50	19.4
	07176	.7874		20.000	20.0	100	30	4.00	50	19.4
	07177	.7874		20.000	20.0	100	30	5.00	50	19.4
	07178	.7874		20.000	20.0	100	30	6.00	50	19.4
	07179	.7874		20.000	20.0	100	30	8.00	50	19.4
	07180	.7874		20.000	20.0	150	30	-	100	19.40
	07181	.7874		20.000	20.0	150	30	0.50	100	19.40
	07182	.7874		20.000	20.0	150	30	1.00	100	19.40
NEW	07183	.7874		20.000	20.0	150	30	1.50	100	19.40
	07184	.7874		20.000	20.0	150	30	3.00	100	19.40
	07185	.7874		20.000	20.0	150	30	4.00	100	19.40
	07186	.7874		20.000	20.0	150	30	5.00	100	19.40
NEW	07187	.7874		20.000	20.0	150	30	6.00	100	19.40
NEW	07188	.7874		20.000	20.0	150	30	8.00	100	19.40
	07189	1.000	1"	25.400	1"	4"	1-1/4"	-	2"	.950"
	07190	1.000	1"	25.400	1"	4"	1-1/4"	.060"	2"	.950"
	07191	1.000	1"	25.400	1"	4-1/2"	1-1/4"	-	2-1/2"	.950"
	07192	1.000	1"	25.400	1"	4-1/2"	1-1/4"	.030"	2-1/2"	.950"
	07193	1.000	1"	25.400	1"	4-1/2"	1-1/4"	.060"	2-1/2"	.950"
	07194	1.000	1"	25.400	1"	4-1/2"	1-1/4"	.120"	2-1/2"	.950"
	07195	1.000	1"	25.400	1"	4-1/2"	1-1/4"	.125"	2-1/2"	.950"
	07196	1.000	1"	25.400	1"	5"	1"	-	2-5/8"	.950"
	07197	1.000	1"	25.400	1"	5"	1"	.030"	2-5/8"	.950"
	07198	1.000	1"	25.400	1"	5"	1"	.060"	2-5/8"	.950"
	07199	1.000	1"	25.400	1"	5"	1"	.125"	2-5/8"	.950"
	07200	1.000	1"	25.400	1"	5"	1"	.250"	2-5/8"	.950"
	07201	1.000	1"	25.400	1"	5"	1"	BALL	2-5/8"	.950"
	07202	1.000	1"	25.400	1"	5"	2-1/4"	-	-	-
	07203	1.000	1"	25.400	1"	5"	2-1/4"	.030"	-	-
	07204	1.000	1"	25.400	1"	5"	2-1/4"	.060"	-	-
	07205	1.000	1"	25.400	1"	5"	2-1/4"	.120"	-	-
	07206	1.000	1"	25.400	1"	5"	2-1/4"	.250"	-	-
	07207	1.000	1"	25.400	1"	6"	3-1/4"	-	-	-
	07208	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	-
	07209	1.000	1"	25.400	1"	6"	3-1/4"	.060"	-	-
NEW	07210	1.000	1"	25.400	1"	6"	3-1/4"	.120"	-	-
	07211	1.000	1"	25.400	1"	6"	3-1/4"	.250"	-	-

† *Metric equivalents are for reference only*

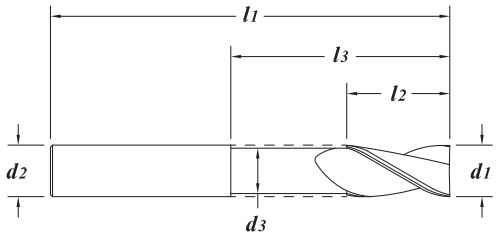
TOLERANCES	
d_1	+.000 –.025mm (+.000" –.001")
d_2	h6

HIGH EFFICIENCY MILLING



TECH PAGES 289

HSAL - Square End - ALUMASTAR Coated
HSAL - Ohne Eckenradius - ALUMASTAR-Beschichtet
HSAL - Extremo Sin Radio - Recubrimiento de ALUMASTAR
HSAL - Extrémité Carré - Revêtement ALUMASTAR
HSAL - Piatte - Rivestimento in ALUMASTAR
HSAL - 平头 - ALUMASTAR 涂层



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

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Spezielle Beschichtung entwickelt zu abstoßen Aluminium
Entwickelt für Vorschübe von 225 - 750 M/Min. (750 – 2500 SFM)
Für die Hochgeschwindigkeitsbearbeitung von Aluminium
Hohe Geschwindigkeit – Hohe Abtragungsraten (Für Spindeldrehzahlen über 10.000 min-1)
Benutzen Sie korrekt gewuchtete Spannmittel
Hilft die Perpendicularität zu halten
Kann mit einer Fläche innerhalb von 48 Stunden warden

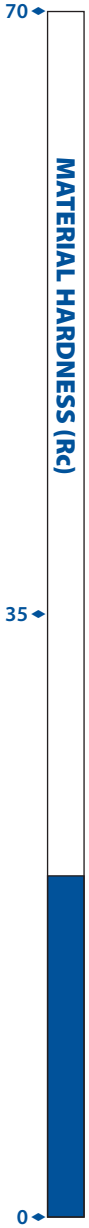
Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Recubrimiento concebido específicamente para repeler el aluminio
Diseñado para trabajar a 225-750 M/Min. (750-2500 SFM)
Para el mecanizado a alta velocidad de aluminio
Alta velocidad – alto índice de desalojo de viruta (Para husillos de 10.000 r.p.m. o mas)
Use portaherramientas adecuadaente equilibrados
Ayuda a mantener la perpendicularidad
Puede ser modificado con un plano en 48 horas

Fraises carbure submicrograin - coupe au centre
Revetement special conçu pour l'aluminium
Developpement pour usiner a 225-750 M/Min. (750-2500 SFM)
Pour haute vitesse usinage pour l'aluminium
Haute velocite et haut volume copeaux (Pour les mandrins 10,000 RPM et plus)
Utilisation avec porte outils équilibrés
Aide a tenir la perpendicularite
Peut etre modifier avec un surface plat sous un delai de 48 heures

Fresa sub-micrograno metallo duro - taglio al centro
Rivestimento specifico costruito per respingere alluminio
Costruito per alta velocità 225-750 M/Min. (750-2500 SFM)
Per lavorazioni ad alta velocità su alluminio
Alta velocità - Alto volume di materiale asportato (Per 10.000 Giri al minuto e superiori)
Usare mandrini bilanciati
Rispettare la perpendicolarità
Può essere modificata in 48 ore

高速加工铝合金整体硬质合金立铣刀 – 中心切削
特殊涂层专为加工铝合金
适用于按750-2500英尺/分(225-750 米/分) 线速度运转的专用涂层
适合高速加工铝合金
高速—高切屑率 用于主轴转速在10,000 RPM及更高
使用动平衡的刀夹
保持垂直
可在48小时内磨成削平柄

EDP#	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter
41222	.1575		4.000	6.0	50	12	-	-
41232	.1575		4.000	6.0	65	6	20	3.7
41282	.1875	3/16"	4.763	3/16"	2"	9/16"	-	-
41342	.1969		5.000	6.0	65	16	-	-
41352	.1969		5.000	6.0	75	8	20	4.7
41402	.2362		6.000	6.0	65	19	-	-
41412	.2362		6.000	6.0	75	10	25	5.7
41462	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-
41542	.2756		7.000	8.0	65	19	-	-
41602	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	-	-
41662	.3150		8.000	8.0	65	19	-	-
41672	.3150		8.000	8.0	75	12	25	7.4
41722	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-
41802	.3937		10.000	10.0	70	24	-	-
41812	.3937		10.000	10.0	75	12	30	9.4
41822	.3937		10.000	10.0	100	12	35	9.4
41882	.4724		12.000	12.0	75	32	-	-
41892	.4724		12.000	12.0	75	16	30	11.4
41902	.4724		12.000	12.0	100	16	35	11.4
41912	.4724		12.000	12.0	100	16	40	11.4
41942	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-
42022	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-
42072	.6299		16.000	16.0	75	16	30	15.4
42082	.6299		16.000	16.0	100	40	-	-
42092	.6299		16.000	16.0	100	20	40	15.4
42102	.6299		16.000	16.0	125	20	60	15.4
42142	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-
42212	.7874		20.000	20.0	100	32	-	-
42222	.7874		20.000	20.0	100	20	40	19
42232	.7874		20.000	20.0	125	20	60	19
42302	1.000	1"	25.400	1"	4"	1-5/8"	-	-



Series 142R

.1575" - .4724"
(4.000mm - 12.000mm)

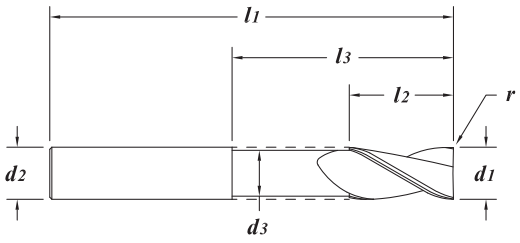
HIGH EFFICIENCY MILLING

Z=2 | 41° | TECH PAGES 289

TOLERANCES

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

HSAL - Corner Radius - ALUMASTAR Coated
HSAL - Eckenradius - ALUMASTAR-Beschichtet
HSAL - Ángulo Redondeado - Recubrimiento de ALUMASTAR
HSAL - Rayon de Coin - Revêtement ALUMASTAR
HSAL - Raggio - Rivestimento in ALUMASTAR
HSAL - 圆角半径 - ALUMASTAR 涂层



MATERIAL HARDNESS (Rc)
70
35
0

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

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Spezielle Beschichtung entwickelt zu abstoßen Aluminium
Entwickelt für Vorschübe von 225 - 750 M/Min. (750 – 2500 SFM)
Für die Hochgeschwindigkeitsbearbeitung von Aluminium
Hohe Geschwindigkeit – Hohe Abtragungsraten
(Für Spindeldrehzahlen über 10.000 min-1)
Benutzen Sie korrekt gewuchtete Spannmittel
Hilft die Perpendicularität zu halten
Kann mit einer Fläche innerhalb von 48 Stunden warden

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Recubrimiento concebido específicamente para repeler el aluminio
Diseñado para trabajar a 225-750 M/Min. (750-2500 SFM)
Para el mecanizado a alta velocidad de aluminio
Alta velocidad – alto índice de desalojo de viruta
(Para husillos de 10.000 r.p.m. o mas)
Use portaherramientas adecuadaente equilibrados
Ayuda a mantener la perpendicularidad
Puede ser modificado con un plano en 48 horas

Fraises carbure submicrograin - coupe au centre
Revetement special conçu pour l'aluminium
Developpement pour usiner a 225-750 M/Min. (750-2500 SFM)
Pour haute vitesse usinage pour l'aluminium
Haute velocite et haut volume copeaux
(Pour les mandrins 10,000 RPM et plus)
Utilisation avec porte outils équilibrés
Aide a tenir la perpendicularite
Peut etre modifier avec un surface plat sous un delai de 48 heures

Fresa sub-micrograno metallo duro - taglio al centro
Rivestimento specifico costruito per respingere alluminio
Costruito per alta velocità 225-750 M/Min. (750-2500 SFM)
Per lavorazioni ad alta velocità su alluminio
Alta velocità - Alto volume di materiale asportato
(Per 10.000 Giri al minuto e superiori)
Usare mandrini bilanciati
Rispettare la perpendicolarità
Può essere modificata in 48 ore

高速加工铝合金整体硬质合金立铣刀 - 中心切削
特殊涂层专为加工铝合金
适用于按750-2500英尺/分 (225-750 米/分) 线速度运转的专用涂层
适合高速加工铝合金
高速一高切屑率 用于主轴转速在10,000 RPM及更高
使用动平衡的刀夹
保持垂直
可在48小时内磨成削平柄

EDP#	d_1 † 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
39222	.1575		4.000	6.0	50	12	0.30	-	-
39232	.1575		4.000	6.0	65	6	0.50	20	3.7
39242	.1575		4.000	6.0	65	6	1.00	20	3.7
39282	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-	-
39342	.1969		5.000	6.0	65	16	0.30	-	-
39352	.1969		5.000	6.0	75	8	0.50	20	4.7
39362	.1969		5.000	6.0	75	8	1.00	20	4.7
39402	.2362		6.000	6.0	65	19	0.30	-	-
39412	.2362		6.000	6.0	75	10	0.50	25	5.7
39422	.2362		6.000	6.0	75	10	1.00	25	5.7
39432	.2362		6.000	6.0	75	10	1.50	25	5.7
39442	.2362		6.000	6.0	75	10	2.00	25	5.7
39462	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-
39602	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.015"	-	-
39662	.3150		8.000	8.0	65	19	0.50	-	-
39672	.3150		8.000	8.0	75	12	0.50	25	7.4
39682	.3150		8.000	8.0	75	12	1.00	25	7.4
39692	.3150		8.000	8.0	75	12	2.00	25	7.4
39702	.3150		8.000	8.0	75	12	3.00	25	7.4
39722	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	-
39802	.3937		10.000	10.0	70	24	0.50	-	-
39812	.3937		10.000	10.0	100	12	1.00	35	9.4
39822	.3937		10.000	10.0	100	12	1.50	35	9.4
39832	.3937		10.000	10.0	100	12	2.00	35	9.4
39842	.3937		10.000	10.0	100	12	3.00	35	9.4
39882	.4724		12.000	12.0	75	32	0.50	-	-
39892	.4724		12.000	12.0	100	16	0.50	40	11.4
39902	.4724		12.000	12.0	100	16	1.00	40	11.4
39912	.4724		12.000	12.0	100	16	1.50	40	11.4
39922	.4724		12.000	12.0	100	16	2.00	40	11.4
39932	.4724		12.000	12.0	100	16	3.00	40	11.4

GARR TOOL®

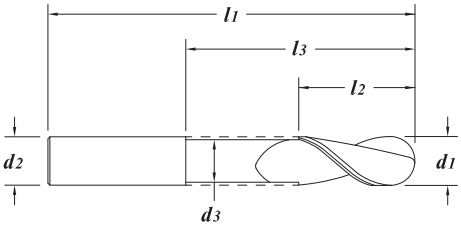
† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
39942	.5000	1/2" 12.700	1/2"	3"	1-1/4"	.030"	-	-
40022	.6250	5/8" 15.875	5/8"	4"	1-5/8"	.030"	-	-
40082	.6299	16.000	16.0	100	40	1.00	-	-
40092	.6299	16.000	16.0	125	20	1.00	60	15.4
40102	.6299	16.000	16.0	125	20	2.00	60	15.4
40142	.7500	3/4" 19.050	3/4"	4"	1-5/8"	.030"	-	-
40182	.7874	20.000	20.0	100	40	1.00	-	-
40192	.7874	20.000	20.0	150	20	1.00	65	19.0
40202	.7874	20.000	20.0	150	20	2.00	65	19.0
40212	.7874	20.000	20.0	150	20	3.00	65	19.0

HIGH EFFICIENCY MILLING

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

HSAL - Ball End - ALUMASTAR Coated
HSAL - Vollradius - ALUMASTAR-Beschichtet
HSAL - Cabeza Esférica - Recubrimiento de ALUMASTAR
HSAL - Hemispherique - Revêtement ALUMASTAR
HSAL - Sferica - Rivestimento in ALUMASTAR
HSAL - 球头 - ALUMASTAR 涂层



MATERIAL HARDNESS (Rc)
70
35
0

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

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Spezielle Beschichtung entwickelt zu abstoßen Aluminium
Entwickelt für Vorschübe von 225 - 750 M/Min. (750 – 2500 SFM)
Für die Hochgeschwindigkeitsbearbeitung von Aluminium
Hohe Geschwindigkeit – Hohe Abtragungsraten (Für Spindeldrehzahlen über 10.000 min^{-1})
Benutzen Sie korrekt gewuchtete Spannmittel
Hilft die Perpendicularität zu halten
Gehonte Schneidkante für einen besseren Oberfläschezustand
Kann mit einer Fläche innerhalb von 48 Stunden warden
Vollradius Toleranz: +0,0000 –0,0127mm (+.0000" –.0005")

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Recubrimiento concebido especificamente para repeler el aluminio
Diseñado para trabajar a 225-750 M/Min. (750-2500 SFM)
Para el mecanizado a alta velocidad de aluminio
Alta velocidad – alto índice de desalojo de viruta (Para husillos de 10.000 r.p.m. o mas)
Use portaherramientas adecuadaente equilibrados
Ayuda a mantener la perpendicularidad
Radio perfilado para un mejor acabado
Puede ser modificado con un plano en 48 horas
Tolerancia de la cabeza esférica +0,0000 –0,0127mm (+.0000" –.0005")

Fraises carbure submicrograin - coupe au centre
Revetement special conçu pour l'aluminium
Developpement pour usiner a 225-750 M/Min. (750-2500 SFM)
Pour haute vitesse usinage pour l'aluminium
Haute velocite et haut volume copeaux (Pour les mandrins 10,000 RPM et plus)
Utilisation avec porte outils équilibrés
Aide a tenir la perpendicularite
Arête de coupe polie sur le rayon pour obtenir un meilleur état de surface
Peut etre modifier avec un surface plat sous un delai de 48 heures
Tolerance du rayon de hemispherique +0,0000 –0,0127mm (+.0000" –.0005")

Fresa sub-micrograno metallo duro - taglio al centro
Rivestimento specifico costruito per respingere alluminio
Costruito per alta velocità 225-750 M/Min. (750-2500 SFM)
Per lavorazioni ad alta velocità su alluminio
Alta velocità - Alto volume di materiale asportato (Per 10.000 Giri al minuto e superiori)
Usare mandrini bilanciati
Rispettare la perpendicolarità
Tagliente onato per una migliore finitura
Può essere modificata in 48 ore
Tolleranza del raggio +0,0000 –0,0127mm (+.0000" –.0005")

高速加工铝合金整体硬质合金立铣刀 - 中心切削
特殊涂层专为加工铝合金
适用于按750-2500英尺/分(225-750 米/分) 线速度运转的专用涂层
适合高速加工铝合金
高速一高切屑率 用于主轴转速在10,000 RPM及更高
使用动平衡的刀夹
保持垂直
研磨圆弧角改善光洁度
可在48小时内磨成削平柄
半径允差 +0,0000 –0,0127mm (+.0000" –.0005")

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
42522	.1575		4.000	6.0	50	12	-	-
42582	.1875	3/16"	4.763	3/16"	2"	9/16"	-	-
42642	.1969		5.000	6.0	65	16	-	-
42702	.2362		6.000	6.0	65	19	-	-
42762	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-
42764	.2500	1/4"	6.350	1/4"	4"	3/8"	1-1/8"	.235"
42842	.2756		7.000	8.0	65	19	-	-
42902	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	-	-
42962	.3150		8.000	8.0	65	19	-	-
43022	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-
43023	.3750	3/8"	9.525	3/8"	4"	1/2"	1-1/8"	.355"
43102	.3937		10.000	10.0	70	24	-	-
43182	.4724		12.000	12.0	75	32	-	-
43242	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-
43243	.5000	1/2"	12.700	1/2"	4"	5/8"	2-1/4"	.475"
43322	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-
43382	.6299		16.000	16.0	100	40	-	-
43442	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-
43444	.7500	3/4"	19.050	3/4"	5"	1"	3-1/16"	.715"
43482	.7874		20.000	20.0	100	32	-	-
43542	.9843		25.000	25.0	100	38	-	-
43602	1.000	1"	25.400	1"	4"	1-5/8"	-	-

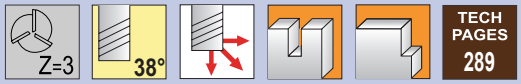
† *Metric equivalents are for reference only*

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

HIGH EFFICIENCY MILLING

Series 143M

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



TECH PAGES 289

HSAL - Square End - ALUMASTAR Coated

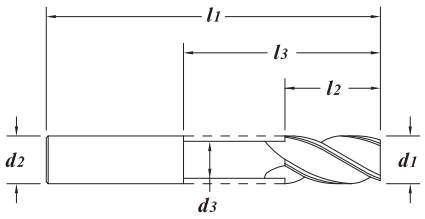
HSAL - Ohne Eckenradius - ALUMASTAR-Beschichtet

HSAL - Extremo Sin Radio - Recubrimiento de ALUMASTAR

HSAL - Extrémité Carré - Revêtement ALUMASTAR

HSAL - Piatte - Rivestimento in ALUMASTAR

HSAL - 平头 - ALUMASTAR 涂层



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 5,000-20,000 RPM)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Spezielle Beschichtung entwickelt zu abstoßen Aluminium
Entwickelt für Vorschübe von 225 - 750 M/Min. (750 – 2500 SFM)
Für die Hochgeschwindigkeitsbearbeitung von Aluminium
Hohe Geschwindigkeit – Hohe Abtragungsraten (Für Spindeldrehzahlen 5.000-20.000 min-1)
Benutzen Sie korrekt gewuchtete Spannmittel
Hilft die Perpendicularität zu halten
Kann mit einer Fläche innerhalb von 48 Stunden warden

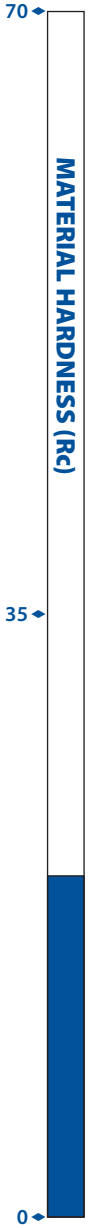
Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Recubrimiento concebido especificamente para repeler el aluminio
Diseñado para trabajar a 225-750 M/Min. (750-2500 SFM)
Para el mecanizado a alta velocidad de aluminio
Alta velocidad – alto índice de desalojo de viruta (Para husillos de 5.000-20.000 r.p.m.)
Use portaherramientas adecuadaente equilibrados
Ayuda a mantener la perpendicularidad
Puede ser modificado con un plano en 48 horas

Fraises carbure submicrograin - coupe au centre
Revetement special conçu pour l'aluminium
Developpement pour usiner a 225-750 M/Min. (750-2500 SFM)
Pour haute vitesse usinage pour l'aluminium
Haute velocite et haut volume copeaux (Pour les mandrins 5,000-20,000 RPM)
Utilisation avec porte outils équilibrés
Aide a tenir la perpendicularite
Peut etre modifier avec un surface plat sous un delai de 48 heures

Fresa sub-micrograno metallo duro - taglio al centro
Rivestimento specifico costruito per respingere alluminio
Costruito per alta velocità 225-750 M/Min. (750-2500 SFM)
Per lavorazioni ad alta velocità su alluminio
Alta velocità - Alto volume di materiale asportato (Per 5.000-20.000 Giri al minuto)
Usare mandrini bilanciati
Rispettare la perpendicolarità
Può essere modificata in 48 ore

高速加工铝合金整体硬质合金立铣刀 - 中心切削
特殊涂层专为加工铝合金
适用于按750-2500英尺/分(225-750 米/分) 线速度运转的专用涂层
适合高速加工铝合金
高速一高切屑率 用于主轴转速在5,000-20,000 RPM
使用动平衡的刀夹
保持垂直
可在48小时内磨成削平柄

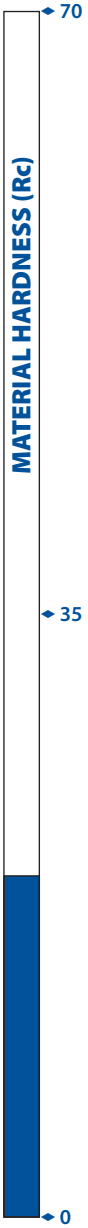
EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter
41173	.1181		3.000	3.0	38	6	-	-
41183	.1181		3.000	3.0	38	12	-	-
41193	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	-	-
41203	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	-	-
41213	.1575		4.000	6.0	50	8	-	-
41223	.1575		4.000	6.0	50	12	-	-
41243	.1575		4.000	6.0	65	6	20	3.7
41273	.1875	3/16"	4.763	3/16"	2"	5/16"	-	-
41283	.1875	3/16"	4.763	3/16"	2"	9/16"	-	-
41303	.1875	3/16"	4.763	3/16"	3"	7/32"	3/4"	.170"
41313	.1875	3/16"	4.763	3/16"	3"	1"	-	-
41343	.1969		5.000	6.0	65	16	-	-
41363	.1969		5.000	6.0	75	8	20	4.7
41403	.2362		6.000	6.0	65	19	-	-
41423	.2362		6.000	6.0	75	10	25	5.7
39735	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-
39737	.2500	1/4"	6.350	1/4"	2"	1/2"	-	-
41453	.2500	1/4"	6.350	1/4"	2-1/2"	3/8"	-	-
41463	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-
41473	.2500	1/4"	6.350	1/4"	3"	1"	-	-
41475	.2500	1/4"	6.350	1/4"	3"	1-1/4"	-	-
41493	.2500	1/4"	6.350	1/4"	4"	3/8"	1-1/8"	.235"
41503	.2500	1/4"	6.350	1/4"	4"	3/8"	2-1/8"	.235"
41511	.2500	1/4"	6.350	1/4"	4"	1-1/2"	-	-
41513	.2500	1/4"	6.350	1/4"	4"	1-5/8"	-	-
41543	.2756		7.000	8.0	65	19	-	-
41563	.2756		7.000	8.0	75	12	25	6.4
41593	.3125	5/16"	7.938	5/16"	2-1/2"	7/16"	-	-
41603	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	-	-
41623	.3125	5/16"	7.938	5/16"	4"	7/16"	1-1/8"	.297"
39739	.3150		8.000	8.0	50	12	-	-
41663	.3150		8.000	8.0	65	19	-	-
41683	.3150		8.000	8.0	75	12	25	7.4
41685	.3150		8.000	8.0	75	26	-	-
41687	.3150		8.000	8.0	75	30	-	-
41693	.3150		8.000	8.0	100	12	55	7.4



continued →

Series 143M *(continued)*

.3750" - .6299"
(9.525mm - 16.000mm)



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
39741	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-
41713	.3750	3/8"	9.525	3/8"	2-1/2"	1/2"	-	-
39743	.3750	3/8"	9.525	3/8"	2-1/2"	3/4"	-	-
41723	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-
41733	.3750	3/8"	9.525	3/8"	3"	1"	-	-
41735	.3750	3/8"	9.525	3/8"	3"	1-1/4"	-	-
41737	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	-	-
41763	.3750	3/8"	9.525	3/8"	4"	1/2"	2-1/8"	.355"
41773	.3750	3/8"	9.525	3/8"	4"	1-5/8"	-	-
42363	.3750	3/8"	9.525	3/8"	4"	2"	-	-
41783	.3750	3/8"	9.525	3/8"	6"	1/2"	4"	.355"
39745	.3937		10.000	10.0	50	14	-	-
41803	.3937		10.000	10.0	70	24	-	-
41805	.3937		10.000	10.0	75	30	-	-
41843	.3937		10.000	10.0	100	12	35	9.4
41853	.3937		10.000	10.0	100	12	55	9.4
41863	.3937		10.000	10.0	150	12	110	9.4
39747	.4724		12.000	12.0	65	16	-	-
39749	.4724		12.000	12.0	75	26	-	-
41883	.4724		12.000	12.0	75	32	-	-
41893	.4724		12.000	12.0	100	50	-	-
41903	.4724		12.000	12.0	100	16	40	11.4
41913	.4724		12.000	12.0	100	16	55	11.4
41923	.4724		12.000	12.0	150	16	110	11.4
39751	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-
39753	.5000	1/2"	12.700	1/2"	2-1/2"	3/4"	-	-
41933	.5000	1/2"	12.700	1/2"	3"	5/8"	-	-
39755	.5000	1/2"	12.700	1/2"	3"	1"	-	-
41943	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-
41945	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	-	-
41963	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-
41965	.5000	1/2"	12.700	1/2"	4"	1-3/4"	-	-
41973	.5000	1/2"	12.700	1/2"	4"	2"	-	-
41983	.5000	1/2"	12.700	1/2"	4"	5/8"	2-1/8"	.475"
41993	.5000	1/2"	12.700	1/2"	6"	5/8"	4-1/8"	.475"
42003	.5000	1/2"	12.700	1/2"	6"	3-1/8"	-	-
39757	.6250	5/8"	15.875	5/8"	3"	3/4"	-	-
42013	.6250	5/8"	15.875	5/8"	3-1/2"	3/4"	-	-
39759	.6250	5/8"	15.875	5/8"	3-1/2"	1"	-	-
42016	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-
42021	.6250	5/8"	15.875	5/8"	4"	1-1/2"	-	-
42023	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-
42025	.6250	5/8"	15.875	5/8"	4"	1-3/4"	-	-
42373	.6250	5/8"	15.875	5/8"	4"	2-1/8"	-	-
42033	.6250	5/8"	15.875	5/8"	6"	3/4"	2-3/8"	.590"
42043	.6250	5/8"	15.875	5/8"	6"	3/4"	4-3/8"	.590"
42053	.6250	5/8"	15.875	5/8"	6"	3-1/4"	-	-
42083	.6299		16.000	16.0	100	40	-	-
42103	.6299		16.000	16.0	100	20	40	15.4
42113	.6299		16.000	16.0	125	20	60	15.4
42123	.6299		16.000	16.0	150	20	110	15.4

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter
42133	.7500	3/4"	19.050	3/4"	4"	1"	-	-
42136	.7500	3/4"	19.050	3/4"	4"	1-1/4"	-	-
42141	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-
42143	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-
42145	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-
42153	.7500	3/4"	19.050	3/4"	5"	2-1/4"	-	-
42155	.7500	3/4"	19.050	3/4"	5"	2-1/2"	-	-
42163	.7500	3/4"	19.050	3/4"	6"	1"	2-1/2"	.715"
42173	.7500	3/4"	19.050	3/4"	6"	1"	4-3/8"	.715"
42193	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-
42203	.7874		20.000	20.0	100	25	-	-
42213	.7874		20.000	20.0	100	32	-	-
42223	.7874		20.000	20.0	100	20	40	19.0
42226	.7874		20.000	20.0	125	20	60	19.0
42233	.7874		20.000	20.0	150	20	85	19.0
42236	.7874		20.000	20.0	150	20	110	19.0
42243	.9843		25.000	25.0	100	38	-	-
42283	.9843		25.000	25.0	100	25	50	24.0
42286	.9843		25.000	25.0	125	25	65	24.0
42291	.9843		25.000	25.0	150	25	90	24.0
42293	1.000	1"	25.400	1"	4"	1"	-	-
42303	1.000	1"	25.400	1"	4"	1-5/8"	-	-
42313	1.000	1"	25.400	1"	5"	2"	-	-
42343	1.000	1"	25.400	1"	6"	1-1/4"	3-3/8"	.960"
42353	1.000	1"	25.400	1"	6"	3-1/4"	-	-

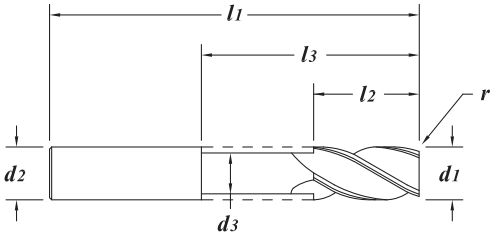
Series 143R

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

HIGH EFFICIENCY MILLING

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

HSAL - Corner Radius - ALUMASTAR Coated
HSAL - Eckenradius - ALUMASTAR-Beschichtet
HSAL - Ángulo Redondeado - Recubrimiento de ALUMASTAR
HSAL - Rayon de Coin - Revêtement ALUMASTAR
HSAL - Raggio - Rivestimento in ALUMASTAR
HSAL - 圆角半径 - ALUMASTAR 涂层



MATERIAL HARDNESS (Rc)
70
35
0

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 5,000-20,000 RPM)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Spezielle Beschichtung entwickelt zu abstoßen Aluminium
Entwickelt für Vorschübe von 225 - 750 M/Min. (750 – 2500 SFM)
Für die Hochgeschwindigkeitsbearbeitung von Aluminium
Hohe Geschwindigkeit – Hohe Abtragungsraten (Für Spindeldrehzahlen 5.000-20.000 min^{-1})
Benutzen Sie korrekt gewuchtete Spannmittel
Hilft die Perpendicularität zu halten
Kann mit einer Fläche innerhalb von 48 Stunden warden

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Recubrimiento concebido específicamente para repeler el aluminio
Diseñado para trabajar a 225-750 M/Min. (750-2500 SFM)
Para el mecanizado a alta velocidad de aluminio
Alta velocidad – alto índice de desalojo de viruta (Para husillos de 5.000-20.000 r.p.m.)
Use portaherramientas adecuadaente equilibrados
Ayuda a mantener la perpendicularidad
Puede ser modificado con un plano en 48 horas

Fraises carbure submicrograin - coupe au centre
Revetement special conçu pour l'aluminium
Developpement pour usiner a 225-750 M/Min. (750-2500 SFM)
Pour haute vitesse usinage pour l'aluminium
Haute velocite et haut volume copeaux (Pour les mandrins 5,000-20,000 RPM)
Utilisation avec porte outils équilibrés
Aide a tenir la perpendicularite
Peut etre modifier avec un surface plat sous un delai de 48 heures

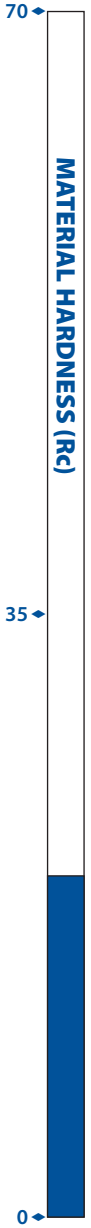
Fresa sub-micrograno metallo duro - taglio al centro
Rivestimento specifico costruito per respingere alluminio
Costruito per alta velocità 225-750 M/Min. (750-2500 SFM)
Per lavorazioni ad alta velocità su alluminio
Alta velocità - Alto volume di materiale asportato (Per 5.000-20.000 Giri al minuto)
Usare mandrini bilanciati
Rispettare la perpendicolarità
Può essere modificata in 48 ore

高速加工铝合金整体硬质合金立铣刀 - 中心切削
特殊涂层专为加工铝合金
适用于按750-2500英尺/分(225-750 米/分) 线速度运转的专用涂层
适合高速加工铝合金
高速一高切屑率 用于主轴转速在5,000-20,000 RPM
使用动平衡的刀夹
保持垂直
可在48小时内磨成削平柄

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
39113	.1181		3.000	3.0	38	6	0.20	-	-
39123	.1181		3.000	3.0	38	6	0.50	-	-
39133	.1181		3.000	3.0	38	12	0.20	-	-
39143	.1181		3.000	3.0	38	12	0.50	-	-
39153	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"	-	-
39163	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.020"	-	-
39173	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	-	-
39183	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	-	-
39193	.1575		4.000	6.0	50	8	0.20	-	-
39203	.1575		4.000	6.0	50	8	0.50	-	-
39213	.1575		4.000	6.0	50	12	0.20	-	-
39223	.1575		4.000	6.0	50	12	0.30	-	-
39225	.1575		4.000	6.0	50	12	0.50	-	-
39243	.1575		4.000	6.0	65	6	0.30	20	3.7
39253	.1575		4.000	6.0	65	6	0.50	20	3.7
39263	.1575		4.000	6.0	65	6	1.00	20	3.7
39265	.1875	3/16"	4.763	3/16"	2"	5/16"	.010"	-	-
39275	.1875	3/16"	4.763	3/16"	2"	5/16"	.020"	-	-
39280	.1875	3/16"	4.763	3/16"	2"	5/16"	.030"	-	-
39283	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-	-
39285	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	-	-
39293	.1875	3/16"	4.763	3/16"	2"	9/16"	.030"	-	-
39303	.1875	3/16"	4.763	3/16"	3"	7/32"	.010"	3/4"	.170"
39313	.1875	3/16"	4.763	3/16"	3"	7/32"	.030"	3/4"	.170"
39343	.1969		5.000	6.0	65	16	0.30	-	-
39363	.1969		5.000	6.0	75	8	0.30	20	4.7
39373	.1969		5.000	6.0	75	8	0.50	20	4.7
39383	.1969		5.000	6.0	75	8	1.00	20	4.7
39403	.2362		6.000	6.0	65	19	0.30	-	-
39423	.2362		6.000	6.0	75	10	0.30	25	5.7
39433	.2362		6.000	6.0	75	10	0.50	25	5.7
39436	.2362		6.000	6.0	75	10	1.00	25	5.7
39439	.2362		6.000	6.0	75	10	1.50	25	5.7
39443	.2362		6.000	6.0	75	10	2.00	25	5.7

† *Metric equivalents are for reference only*

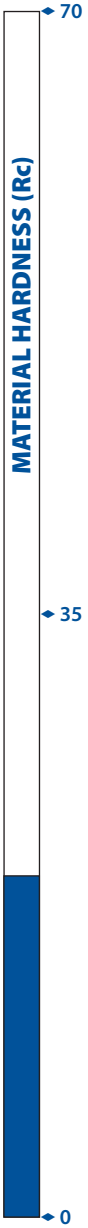
EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
39314	.2500	1/4"	6.350	1/4"	2"	1/2"	.010"	-	-
39316	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"	-	-
39318	.2500	1/4"	6.350	1/4"	2"	1/2"	.020"	-	-
39453	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-
39463	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-
39320	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-
39473	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-
39483	.2500	1/4"	6.350	1/4"	3"	1-1/8"	.030"	-	-
39493	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	1-1/8"	.235"
40403	.2500	1/4"	6.350	1/4"	4"	3/8"	.030"	1-1/8"	.235"
39503	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	2-1/8"	.235"
39543	.2756		7.000	8.0	65	19	0.30	-	-
39563	.2756		7.000	8.0	75	12	0.30	25	6.4
39322	.3125	5/16"	7.938	5/16"	2"	1/2"	.010"	-	-
39324	.3125	5/16"	7.938	5/16"	2"	1/2"	.020"	-	-
39593	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.010"	-	-
39603	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.015"	-	-
39326	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.020"	-	-
39613	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.030"	-	-
39623	.3125	5/16"	7.938	5/16"	4"	7/16"	.015"	1-1/8"	.297"
39633	.3125	5/16"	7.938	5/16"	4"	7/16"	.030"	1-1/8"	.297"
39328	.3150		8.000	8.0	50	12	0.50	-	-
39663	.3150		8.000	8.0	65	19	0.50	-	-
39683	.3150		8.000	8.0	75	12	0.50	25	7.4
39688	.3150		8.000	8.0	75	12	1.00	25	7.4
39693	.3150		8.000	8.0	75	12	2.00	25	7.4
39698	.3150		8.000	8.0	75	12	3.00	25	7.4
39330	.3750	3/8"	9.525	3/8"	2"	1/2"	.010"	-	-
39332	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-
39703	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	-	-
39713	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	-	-
39334	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	-	-
39723	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	-
39733	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	-	-
39734	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.120"	-	-
39738	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"	-	-
39763	.3750	3/8"	9.525	3/8"	4"	1/2"	.030"	2-1/8"	.355"
39773	.3750	3/8"	9.525	3/8"	4"	1/2"	.060"	2-1/8"	.355"
39783	.3750	3/8"	9.525	3/8"	6"	1/2"	.030"	4"	.355"
39336	.3937		10.000	10.0	50	14	0.50	-	-
39803	.3937		10.000	10.0	70	24	0.50	-	-
39843	.3937		10.000	10.0	100	12	0.50	35	9.4
39848	.3937		10.000	10.0	100	12	1.00	35	9.4
39853	.3937		10.000	10.0	100	12	1.50	35	9.4
39863	.3937		10.000	10.0	100	12	2.00	35	9.4
39873	.3937		10.000	10.0	100	12	3.00	35	9.4
39344	.4724		12.000	12.0	65	16	0.50	-	-
39883	.4724		12.000	12.0	75	32	0.50	-	-
39346	.4724		12.000	12.0	75	32	0.75	-	-
39348	.4724		12.000	12.0	75	32	1.00	-	-
39903	.4724		12.000	12.0	100	16	0.50	40	11.4
39907	.4724		12.000	12.0	100	16	1.00	40	11.4
39911	.4724		12.000	12.0	100	16	1.50	40	11.4
39915	.4724		12.000	12.0	100	16	2.00	40	11.4
39919	.4724		12.000	12.0	100	16	3.00	40	11.4



continued →

Series 143R *(continued)*

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



	EDP#	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
	39353	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-
	39355	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-
	39923	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-
	39933	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
	39356	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
	39943	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
	39953	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
	39963	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-
	39965	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-
	39967	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.190"	-	-
	39972	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.015"	-	-
	39973	.5000	1/2"	12.700	1/2"	4"	2"	.010"	-	-
	40413	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-
	40423	.5000	1/2"	12.700	1/2"	4"	2"	.060"	-	-
	40433	.5000	1/2"	12.700	1/2"	4"	5/8"	.010"	2-1/8"	.475"
	39983	.5000	1/2"	12.700	1/2"	4"	5/8"	.030"	2-1/8"	.475"
	40443	.5000	1/2"	12.700	1/2"	4"	5/8"	.060"	2-1/8"	.475"
	40453	.5000	1/2"	12.700	1/2"	4"	5/8"	.120"	2-1/8"	.475"
	39993	.5000	1/2"	12.700	1/2"	6"	5/8"	.030"	4-1/8"	.475"
	39366	.6250	5/8"	15.875	5/8"	3"	3/4"	.010"	-	-
	39368	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"	-	-
	39369	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-
	39370	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-
	40463	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.015"	-	-
	39372	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.020"	-	-
	40023	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-
	40473	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.060"	-	-
	40483	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.120"	-	-
	40485	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.190"	-	-
	40033	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	2-3/8"	.590"
	40043	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-3/8"	.590"
	40083	.6299		16.000	16.0	100	40	1.00	-	-
	40103	.6299		16.000	16.0	100	20	1.00	40	15.4
	40113	.6299		16.000	16.0	125	20	2.00	60	15.4
	40118	.6299		16.000	16.0	125	20	3.00	60	15.4
	40123	.6299		16.000	16.0	125	20	4.00	60	15.4
	39374	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.020"	-	-
	40133	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.015"	-	-
	39376	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.020"	-	-
	40143	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-
	40153	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.060"	-	-
	40493	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.120"	-	-
	40495	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.190"	-	-
	40497	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.250"	-	-
	40503	.7500	3/4"	19.050	3/4"	6"	1"	.015"	2-1/2"	.715"
	40163	.7500	3/4"	19.050	3/4"	6"	1"	.030"	2-1/2"	.715"
	40513	.7500	3/4"	19.050	3/4"	6"	1"	.060"	2-1/2"	.715"
	40523	.7500	3/4"	19.050	3/4"	6"	1"	.120"	2-1/2"	.715"
	40171	.7500	3/4"	19.050	3/4"	6"	1"	.015"	4"	.715"
	40173	.7500	3/4"	19.050	3/4"	6"	1"	.030"	4-3/8"	.715"
	40183	.7874		20.000	20.0	100	32	1.00	-	-
	40223	.7874		20.000	20.0	100	20	1.00	40	19.0
	40225	.7874		20.000	20.0	150	20	1.00	65	19.0
	40226	.7874		20.000	20.0	150	20	2.00	65	19.0
	40229	.7874		20.000	20.0	150	20	3.00	65	19.0
	40231	.7874		20.000	20.0	150	20	4.00	65	19.0
	40243	.9843		25.000	25.0	100	38	1.00	-	-
	40293	1.000	1"	25.400	1"	4"	1-5/8"	.030"	-	-
	40303	1.000	1"	25.400	1"	4"	1-5/8"	.060"	-	-
	40313	1.000	1"	25.400	1"	4"	1-5/8"	.120"	-	-
	40343	1.000	1"	25.400	1"	6"	1-1/4"	.030"	3-3/8"	.960"
	40353	1.000	1"	25.400	1"	6"	1-1/4"	.060"	3-3/8"	.960"
	40363	1.000	1"	25.400	1"	6"	1-1/4"	.120"	3-3/8"	.960"
NEW	40366	1.000	1"	25.400	1"	6"	1-1/4"	.030"	4"	.960"

† *Metric equivalents are for reference only*

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Smart Manufacturing

Series TMS

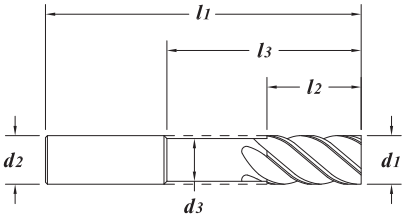
.2362" - .5000"
(6.000mm - 12.700mm)

HIGH EFFICIENCY MILLING

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

TECH PAGES 304-305

Multi-Flute End Mill - Square End - AlCrN-based Coated
Mehrzähne fräser - Ohne Eckenradius - AlCrN-Basierende Beschichtet
Fresa de Multi Labio - Extremo Sin Radio - Recubrimiento Basado en AlCrN
Fraise de Multi-lèvre - Extrémité Carré - Revêtement à base de AlCrN
Fresa di Multitagliente - Piatte - Rivestimento in Base AlCrN
多刃加工铣刀 - 平头 - 涂层铝氮化铬



MATERIAL HARDNESS (Rc)
70
35
0

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
Engineered for High Efficiency Milling
Up to 8% Radial (ap) engagement
Can be used to finish most steels <40Rc, as well as aluminium
Conventional grind for better finish cutting and less push off when finishing
Regrindable

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - ohne zentrumsschnitt
Entwickelt für die Bearbeitung von Titan
Mehr Zähne für höhere Vorschube
Ungleiche Spannutenzahl, um Vibrationen zu vermeiden
Entwickelt für hocheffizientes Fräsen
Bis zu 8% radialen (ap) eintauchen
Geeignet für das Schlichten in den meisten Stählen < 40 HRc, und Aluminium
Konventionelle Konstruktion für einen besseren Oberflächezustand und weniger Schneiddruck auf der Seite
Nachschleifbar

Fresa de submicrograno sólido carburo de alto rendimiento - no corte centrado
Diseñada para Titanio
Múltiples labios para aumentar las gamas de avance
Número de labios impar para rotura natural de armónicos
Diseñado para el fresado de alta eficiencia
Hasta 8% radial (ap)
Puede ser utilizada para acabado en la mayoría de aceros < 40Rc, y Aluminio
Afilado convencional para un mejor acabado y menor empuje
Posibilidad de afilado

Fraises carbure submicrograin - pas de coupe au centre
Développé pour l´usinage du titane
Fraise multi-lèvres pour de plus grandes avances
Nombre impair de lèvres pour empêcher naturellement les vibrations
Conçu pour un fraisage à haute efficacité
Jusqu'à 8% amorce radiale (ap)
Adapté pour un usinage de finition dans la plupart des aciers < 40 HRc, et Aluminium
Construction conventionnelle pour une meilleure finition et moins d´effort de coupe
Affûtable

Fresa sub-micrograno metallo duro - no taglio al centro
Progettata per titanio
Taglienti multipli per alti avanzamenti
Numero taglienti alternato per rompere le vibrazioni armoniche
Progettato per la fresatura ad alta efficienza
Fino a 8% radiale (ap)
Può essere usata per la finitura su acciai <40Hrc, e Alluminio
Affilatura per una migliore finitura
Riaffilabile

高效超细晶粒整体硬质合金立铣刀 - 不切割在中心
专用于钛合金加工
多刃提高进给率
奇数刃自然破坏刀具共振
有效的擺線銑削
设计并已试加工0.08倍径切削宽度
可用于精加工硬度< 40Rc的钢件, 和鋁
常规刃磨提高精加工质量、降低切削阻力
可以重磨

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
98390	.2362		6.000	6.0	50	12	-	-	7
98392	.2362		6.000	6.0	65	19	-	-	7
98394	.2362		6.000	6.0	100	38	-	-	7
98396	.2362		6.000	6.0	100	10	60	5.4	7
98398	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-	7
98400	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	7
98402	.2500	1/4"	6.350	1/4"	4"	1-1/2"	-	-	7
98404	.3125	5/16"	7.938	5/16"	2"	7/16"	-	-	7
98406	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	-	-	7
98408	.3125	5/16"	7.938	5/16"	4"	1-1/2"	-	-	7
98410	.3150		8.000	8.0	50	12	-	-	7
98412	.3150		8.000	8.0	65	22	-	-	7
98414	.3150		8.000	8.0	100	38	-	-	7
98416	.3150		8.000	8.0	100	12	60	7.4	7
98418	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	7
98420	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-	7
98422	.3750	3/8"	9.525	3/8"	3"	1-1/4"	-	-	7
98424	.3750	3/8"	9.525	3/8"	4"	2"	-	-	7
98426	.3937		10.000	10.0	50	16	-	-	7
98428	.3937		10.000	10.0	70	22	-	-	7
98430	.3937		10.000	10.0	100	38	-	-	7
98432	.3937		10.000	10.0	100	50	-	-	7
98434	.3937		10.000	10.0	100	16	60	9.4	7
98436	.4724		12.000	12.0	75	26	-	-	9
98438	.4724		12.000	12.0	75	32	-	-	9
98440	.4724		12.000	12.0	100	42	-	-	9
98442	.4724		12.000	12.0	100	52	-	-	9
98444	.4724		12.000	12.0	150	19	105	11.4	9
98446	.5000	1/2"	12.700	1/2"	3"	1"	-	-	9
98448	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	9
98450	.5000	1/2"	12.700	1/2"	4"	5/8"	2-1/8"	.470"	9
98452	.5000	1/2"	12.700	1/2"	4"	1-1/2"	-	-	9
98454	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	9

† *Metric equivalents are for reference only*

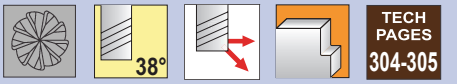
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter	Number Flutes
98456	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	9
98458	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	9
98460	.6250	5/8"	15.875	5/8"	6"	3-1/4"	-	-	9
98462	.6250	5/8"	15.875	5/8"	6"	3/4"	4-1/8"	.590"	9
98464	.6299		16.000	16.0	88	32	-	-	9
98466	.6299		16.000	16.0	100	42	-	-	9
98468	.6299		16.000	16.0	150	60	-	-	9
98470	.6299		16.000	16.0	150	80	-	-	9
98472	.6299		16.000	16.0	150	22	102	15.4	9
98474	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	11
98476	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-	11
98478	.7500	3/4"	19.050	3/4"	5"	2-1/8"	-	-	11
98480	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	11
98484	.7874		20.000	20.0	100	26	-	-	11
98486	.7874		20.000	20.0	100	38	-	-	11
98488	.7874		20.000	20.0	150	60	-	-	11
98490	.7874		20.000	20.0	150	80	-	-	11
98494	1.000	1"	25.400	1"	4"	1-1/2"	-	-	13
98496	1.000	1"	25.400	1"	5"	2-1/4"	-	-	13
98498	1.000	1"	25.400	1"	6"	3-1/4"	-	-	13
98500	1.000	1"	25.400	1"	7"	4-1/4"	-	-	13

Series TMR

.4724"
(12.000mm)

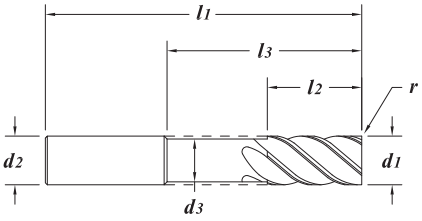
HIGH EFFICIENCY MILLING

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



TECH PAGES 304-305

Multi-Flute End Mill - Corner Radius - AlCrN-based Coated
Mehrzähne fräser - Eckenradius - AlCrN-Basierende Beschichtet
Fresa de Multi Labio - Ángulo Redondeado - Recubrimiento Basado en AlCrN
Fraise de Multi-lèvre - Rayon de Coin - Revêtement à base de AlCrN
Fresa di Multitagliente - Raggio - Rivestimento in Base AlCrN
多刃加工铣刀 - 圆角半径 - 涂层铝氮化铬



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70
35
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Número de labios impar para rotura natural de armónicos
Diseñado para el fresado de alta eficiencia
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Taglienti multipli per alti avanzamenti
Numero taglienti alternato per rompere le vibrazioni armoniche
Progettato per la fresatura ad alta efficienza
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Può essere usata per la finitura su acciai <40Hrc, e Alluminio
Affilatura per una migliore finitura
Riaffilabile

高效超细晶粒整体硬质合金立铣刀 - 不切割在中心
专用于钛合金加工
多刃提高进给率
奇数刃自然破坏刀具共振
有效的摆线铣削
设计并已试加工0.08倍径切削宽度
可用于精加工硬度< 40Rc的钢件, 和铝
常规刃磨提高精加工质量、降低切削阻力
可以重磨

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
98502	.4724	12.000	12.0	75	26	0.30	-	-	7
98504	.4724	12.000	12.0	75	26	0.50	-	-	7
98508	.4724	12.000	12.0	75	26	1.00	-	-	7
98516	.4724	12.000	12.0	75	26	4.00	-	-	7
98518	.4724	12.000	12.0	75	32	0.50	-	-	7
98522	.4724	12.000	12.0	75	32	1.00	-	-	7
98524	.4724	12.000	12.0	75	32	1.50	-	-	7
98528	.4724	12.000	12.0	75	32	3.00	-	-	7
98532	.4724	12.000	12.0	100	42	0.50	-	-	7
98538	.4724	12.000	12.0	100	42	1.50	-	-	7
98544	.4724	12.000	12.0	100	42	4.00	-	-	7
98546	.4724	12.000	12.0	100	52	0.50	-	-	7
98550	.4724	12.000	12.0	100	52	1.00	-	-	7
98552	.4724	12.000	12.0	100	52	1.50	-	-	7
98556	.4724	12.000	12.0	100	52	3.00	-	-	7
98560	.4724	12.000	12.0	150	19	0.50	105	11.4	7
98564	.4724	12.000	12.0	150	19	1.00	105	11.4	7
98570	.4724	12.000	12.0	150	19	3.00	105	11.4	7

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	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	Number Flutes
98574	.5000	1/2"	12.700	1/2"	3"	1"	.010"	-	-	7
98576	.5000	1/2"	12.700	1/2"	3"	1"	.020"	-	-	7
98578	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-	7
98580	.5000	1/2"	12.700	1/2"	3"	1"	.060"	-	-	7
98582	.5000	1/2"	12.700	1/2"	3"	1"	.090"	-	-	7
98584	.5000	1/2"	12.700	1/2"	3"	1"	.120"	-	-	7
98586	.5000	1/2"	12.700	1/2"	3"	1"	.125"	-	-	7
98588	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-	7
98590	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-	7
98592	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	7
98594	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-	7
98598	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-	7
98600	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-	7
98602	.5000	1/2"	12.700	1/2"	4"	5/8"	.010"	2-1/8"	.470"	7
98604	.5000	1/2"	12.700	1/2"	4"	5/8"	.020"	2-1/8"	.470"	7
98606	.5000	1/2"	12.700	1/2"	4"	5/8"	.030"	2-1/8"	.470"	7
98608	.5000	1/2"	12.700	1/2"	4"	5/8"	.060"	2-1/8"	.470"	7
98610	.5000	1/2"	12.700	1/2"	4"	5/8"	.120"	2-1/8"	.470"	7
98612	.5000	1/2"	12.700	1/2"	4"	5/8"	.125"	2-1/8"	.470"	7
98614	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.010"	-	-	7
98616	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.020"	-	-	7
98618	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-	7
98620	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.060"	-	-	7
98622	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.010"	-	-	7
98626	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-	7
98628	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.060"	-	-	7
98630	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.120"	-	-	7
98632	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.125"	-	-	7
98634	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	-	-	7
98636	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-	7
98638	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-	7
98640	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-	7
98642	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-	7
98644	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.125"	-	-	7
98646	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.010"	-	-	7
98648	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.020"	-	-	7
98652	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.060"	-	-	7
98654	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.120"	-	-	7
98658	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.010"	-	-	7
98660	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.020"	-	-	7
98662	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.030"	-	-	7
98666	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.120"	-	-	7
98670	.6250	5/8"	15.875	5/8"	6"	3/4"	.010"	4-1/8"	.590"	7
98672	.6250	5/8"	15.875	5/8"	6"	3/4"	.020"	4-1/8"	.590"	7
98674	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-1/8"	.590"	7
98678	.6250	5/8"	15.875	5/8"	6"	3/4"	.120"	4-1/8"	.590"	7

continued →

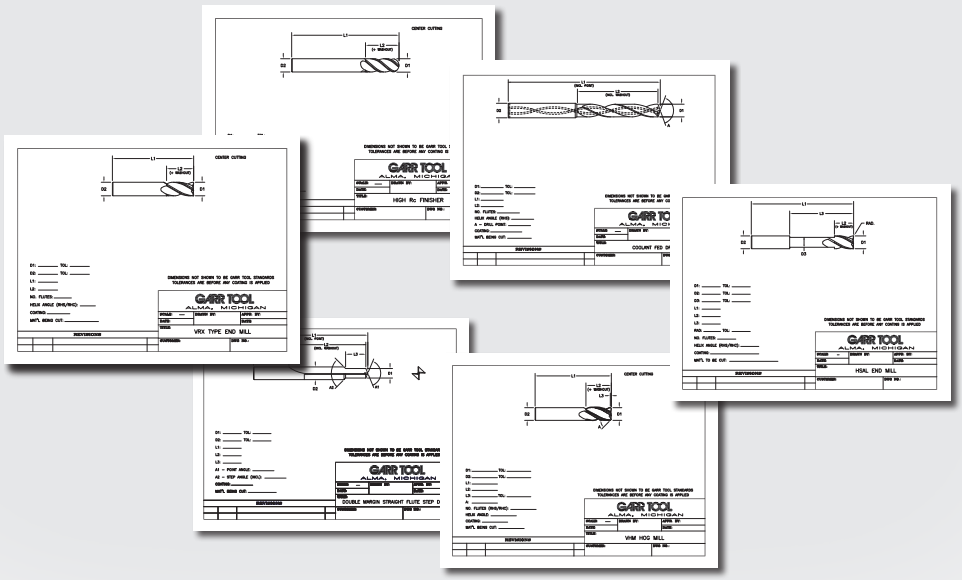
Series TMR *(continued)*

.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
98680	.6299		16.000	16.0	88	32	0.50	-	-	7
98690	.6299		16.000	16.0	88	32	3.00	-	-	7
98696	.6299		16.000	16.0	100	42	0.50	-	-	7
98700	.6299		16.000	16.0	100	42	1.00	-	-	7
98704	.6299		16.000	16.0	100	42	2.00	-	-	7
98706	.6299		16.000	16.0	100	42	3.00	-	-	7
98708	.6299		16.000	16.0	100	42	4.00	-	-	7
98710	.6299		16.000	16.0	100	42	5.00	-	-	7
98712	.6299		16.000	16.0	150	60	0.50	-	-	7
98716	.6299		16.000	16.0	150	60	1.00	-	-	7
98720	.6299		16.000	16.0	150	60	2.00	-	-	7
98722	.6299		16.000	16.0	150	60	3.00	-	-	7
98724	.6299		16.000	16.0	150	60	4.00	-	-	7
98726	.6299		16.000	16.0	150	60	5.00	-	-	7
98732	.6299		16.000	16.0	150	80	1.00	-	-	7
98738	.6299		16.000	16.0	150	80	3.00	-	-	7
98744	.6299		16.000	16.0	150	22	0.50	102	15.4	7
98752	.6299		16.000	16.0	150	22	2.00	102	15.4	7
98754	.6299		16.000	16.0	150	22	3.00	102	15.4	7
98760	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.010"	-	-	9
98764	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-	9
98766	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-	9
98770	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.190"	-	-	9
98772	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.250"	-	-	9
98774	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.010"	-	-	9
98778	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-	9
98784	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.190"	-	-	9
98788	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.010"	-	-	9
98790	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.020"	-	-	9
98794	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.060"	-	-	9
98796	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.120"	-	-	9
98800	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.250"	-	-	9
98802	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.010"	-	-	9
98804	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.020"	-	-	9
98806	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-	9
98808	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.060"	-	-	9
98814	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.250"	-	-	9
98816	.7500	3/4"	19.050	3/4"	6"	1"	.010"	4-1/8"	.720"	9
98820	.7500	3/4"	19.050	3/4"	6"	1"	.030"	4-1/8"	.720"	9
98822	.7500	3/4"	19.050	3/4"	6"	1"	.060"	4-1/8"	.720"	9
98830	.7874		20.000	20.0	100	26	0.50	-	-	9
98834	.7874		20.000	20.0	100	26	1.00	-	-	9
98864	.7874		20.000	20.0	100	38	6.00	-	-	9
98866	.7874		20.000	20.0	150	60	0.50	-	-	9
98876	.7874		20.000	20.0	150	60	3.00	-	-	9
98882	.7874		20.000	20.0	150	60	6.00	-	-	9
98884	.7874		20.000	20.0	150	80	0.50	-	-	9

† *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
98920	1.000	1"	25.400	1"	4"	1-1/2"	.015"	-	-	11
98924	1.000	1"	25.400	1"	4"	1-1/2"	.060"	-	-	11
98928	1.000	1"	25.400	1"	4"	1-1/2"	.120"	-	-	11
98934	1.000	1"	25.400	1"	5"	2-1/4"	.015"	-	-	11
98936	1.000	1"	25.400	1"	5"	2-1/4"	.030"	-	-	11
98942	1.000	1"	25.400	1"	5"	2-1/4"	.120"	-	-	11
98944	1.000	1"	25.400	1"	5"	2-1/4"	.190"	-	-	11
98946	1.000	1"	25.400	1"	5"	2-1/4"	.250"	-	-	11
98948	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	-	11
98950	1.000	1"	25.400	1"	6"	3-1/4"	.060"	-	-	11
98954	1.000	1"	25.400	1"	6"	3-1/4"	.190"	-	-	11
98958	1.000	1"	25.400	1"	7"	4-1/4"	.030"	-	-	11
98966	1.000	1"	25.400	1"	7"	4-1/4"	.250"	-	-	11



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

www.garrtool.com

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

NEW ITEMS

Series V4S, V4R, V4B

.1562" - .2188"
(3.967mm - 5.558mm)

Z=4 | VAR | TECH PAGES 296-297

Variable Helix End Mill - AlCrN-based Coated

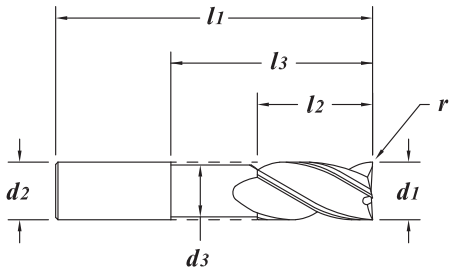
Fräser mit Einer Variablen Spiralgeometrie - AlCrN-Basierende Beschichtet

Fresa de Hélice Variable - Recubrimiento Basado en AlCrN

Fraise Avec un Angle Hélice Variable - Revêtement à base de AlCrN

Fresa ad Elica Variabile - Rivestimento in Base AlCrN

不等螺旋铣刀 - 涂层铝氮化铬



Solid submicron grain carbide end mill - center cutting
Helix geometry varies of length of flutes
Variable flute design helps with chip evacuation in slots and pockets
Variable rake aids in chip formation
Recommended for titanium, inconel, and stainless steel (< 40 Rc)
PCT (Polish Carbide Treatment) enhances tool life
Minimizes burr on part
12mm and larger tools offered with weldon flat
Smaller diameters can be modified with a flat 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

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Empfohlen für Titan, Inconel, und Rostfreien Stahl (<40 Hrc)
PCT (Polish Carbide Treatment, Treatment zum Polieren Hartmetall) steigert die Stanzeit bis zu
Reduziert die Gratbildung am Werkstück
Spiralgeometrie variiert auf der gesamten Schneidenlänge
Variable Spannutgeometrie für eine bessere Spanabfuhr beim Schlitz- und Taschenfräsen
Variabler Winkel für bessere Spangeometrie
Ab Durchmesser 12 mm und grösser können die Werkzeuge mit Weldon-Spannfläche angeboten werden
Kleinere Durchmesser können innerhalb 48 Stunden mit einer Spannfläche geliefert werden
Die Kombination einer verlängerten Spannutlänge mit einer Weldon-Spannfläche kann die Ursache bei Spannut-Auswaschungen bei einigen Fräserspannfuttern sein

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Recomendado para Titanio, Inconel, y Acero Inoxidable (<40 Hrc)
PCT (Polish Carbide Treatment, Tratamiento de pulido) aumenta la vida de la hta. hasta
Minimiza las rebabas en la pieza
La geometría de la hélice varía a lo largo de la longitud del labio
El diseño del labio variable contribuye a la evacuación de la viruta en ranuras y cajeras
El labio con filo variable que contribuye a la buena formación de la viruta
Htas de Ø12 mm. y mayores disponibles con mango Weldon
Es posible añadir un plano Weldon en diámetros menores en 48 horas
La combinación de una gran longitud de corte con un mango con plano Weldon puede causar que del labio alcance el interior de algunos portaherramientas

Fraises carbure submicrograin - coupe au centre
Recommandé pour les titane, inconel, et aciers inoxydables (<40 Hrc)
PCT (le traitement pour polir le carbure) améliore la durée de vie de l'outil
Minimise les bavures sur la pièce
La géométrie de l'hélice varie sur la longueur de l'hélice
Variable des dents de coupe est d'aider à l'évacuation des copeaux de fentes et des poches
Un pas variable améliore la formation des copeaux
Des outils d'un dia. 12 mm ou supérieur sont disponibles avec une queue weldon
Les petits diamètres peuvent être modifies avec une queue Weldon endéans 48 heures
La combinaison d'une grande longueur de goujure avec une queue Weldon peut causer des vibrations qui peuvent se prolonger dans le mandrin

Fresa sub-micrograno metallo duro - taglio al centro
Raccomandata per lavorazioni su titanio, inconel, e inox (<40 Hrc)
PCT (Polish Carbide Treatment, trattamento di lucidatura del metallo duro) incrementa la vita utensile
Non crea bava sul pezzo
La geometria dell'elica varia sulla lunghezza del tagliente
La geometria variabile del tagliente aiuta l'evacuazione del truciolo negli svuotamenti e nelle cave
L'angolo di spoglia variabile aiuta la formazione del truciolo
Dal diametro 12 mm in su disponibili con attacco weldon
Diametri più piccoli possono essere modificati in 48 ore
Estendere la lunghezza del tagliente su un attacco Weldon può causare la rottura dell'utensile in alcune applicazioni

超细晶粒整体硬质合金立铣刀 - 中心切削
推荐的加工钛，铬镍铁合金，不锈钢钢 (<40HRC)
PCT(硬质合金抛光处理) 使刀具寿命提高
使工件的毛刺最少
整个切削刀的螺旋角可变
切削刀螺旋角可变的设计有利于碎屑在加工槽和型腔中排出
可变的前角有利于碎屑的形成
12mm及以上刀具提供侧固槽位设计
可在48小时内生产小直径的平底刀具
过长的刀刃结合侧固槽的刀具可能会导致刀具夹头受到冲击而损坏

	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
	50171	-	.1562	5/32"	3.967	1/4"	2"	1/2"	-	-	-
	50172	-	.1562	5/32"	3.967	1/4"	2"	1/2"	.010"	-	-
	50173	-	.1562	5/32"	3.967	1/4"	2"	1/2"	.015"	-	-
	50174	-	.1562	5/32"	3.967	1/4"	2"	1/2"	.020"	-	-
	50175	-	.1562	5/32"	3.967	1/4"	2"	1/2"	.030"	-	-
	50176	-	.1562	5/32"	3.967	1/4"	2"	1/2"	BALL	-	-
	50177	-	.1575		4.000	6.0	50	12	-	-	-
	50178	-	.1575		4.000	6.0	50	12	0.20	-	-
	50179	-	.1575		4.000	6.0	50	12	0.30	-	-
	50180	-	.1575		4.000	6.0	50	12	0.50	-	-
	50181	-	.1575		4.000	6.0	50	12	BALL	-	-
	50182	-	.1875	3/16"	4.763	1/4"	2"	1/2"	-	-	-
	50183	-	.1875	3/16"	4.763	1/4"	2"	1/2"	.010"	-	-
	50184	-	.1875	3/16"	4.763	1/4"	2"	1/2"	.015"	-	-
	50185	-	.1875	3/16"	4.763	1/4"	2"	1/2"	.020"	-	-
	50186	-	.1875	3/16"	4.763	1/4"	2"	1/2"	.030"	-	-
	50187	-	.1875	3/16"	4.763	1/4"	2"	1/2"	BALL	-	-
	50188	-	.1969		5.000	6.0	65	20	-	-	-
	50189	-	.1969		5.000	6.0	65	20	0.20	-	-
	50190	-	.1969		5.000	6.0	65	20	0.30	-	-
	50191	-	.1969		5.000	6.0	65	20	0.50	-	-
	50192	-	.1969		5.000	6.0	65	20	BALL	-	-
	50193	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	-	-	-
NEW	50194	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.010"	-	-
NEW	50195	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.015"	-	-
NEW	50196	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.020"	-	-
	50197	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.030"	-	-
	50198	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	BALL	-	-

continued →

Series V4S, V4R, V4B *(continued)*

.2362" - .2500"
(6.000mm - 6.350mm)

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
50236	-	.2362		6.000	6.0	65	12	-	-	-
50199	-	.2362		6.000	6.0	65	12	0.30	-	-
50200	-	.2362		6.000	6.0	65	12	0.50	-	-
50201	-	.2362		6.000	6.0	65	12	0.75	-	-
50202	-	.2362		6.000	6.0	65	12	1.00	-	-
50203	-	.2362		6.000	6.0	65	12	1.50	-	-
50252	-	.2362		6.000	6.0	65	12	BALL	-	-
50237	-	.2362		6.000	6.0	65	19	-	-	-
50204	-	.2362		6.000	6.0	65	19	0.30	-	-
50205	-	.2362		6.000	6.0	65	19	0.50	-	-
50206	-	.2362		6.000	6.0	65	19	1.00	-	-
50253	-	.2362		6.000	6.0	65	19	BALL	-	-
50540	-	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-	-
50489	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.010"	-	-
50490	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"	-	-
50491	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	-
50708	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.030"	-	-
50709	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.040"	-	-
50710	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.060"	-	-
50711	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.090"	-	-
50560	-	.2500	1/4"	6.350	1/4"	2"	3/8"	BALL	-	-
50645	-	.2500	1/4"	6.350	1/4"	2"	1/2"	-	-	-
50614	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.010"	-	-
50616	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"	-	-
50618	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.020"	-	-
50712	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.030"	-	-
50713	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.040"	-	-
50714	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.060"	-	-
50715	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.090"	-	-
50238	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	-
50207	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-
50208	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-
50620	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-
50209	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-
50716	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.040"	-	-
50210	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	-	-
50717	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.090"	-	-
50254	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	BALL	-	-
50653	-	.2500	1/4"	6.350	1/4"	3"	1-1/8"	-	-	-
50493	-	.2500	1/4"	6.350	1/4"	3"	1-1/8"	.030"	-	-
50677	-	.2500	1/4"	6.350	1/4"	3"	1-1/8"	BALL	-	-

† *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
	50654	-	.2500	1/4"	6.350	1/4"	4"	1-1/2"	-	-	-
	50681	-	.2500	1/4"	6.350	1/4"	4"	1-1/2"	BALL	-	-
	50655	-	.2500	1/4"	6.350	1/4"	4"	1-3/4"	-	-	-
	50718	-	.2500	1/4"	6.350	1/4"	4"	1-3/4"	.020"	-	-
NEW	50682	-	.2500	1/4"	6.350	1/4"	4"	1-3/4"	BALL	-	-
	50656	-	.2500	1/4"	6.350	1/4"	4"	2"	-	-	-
	50683	-	.2500	1/4"	6.350	1/4"	4"	2"	BALL	-	-
	50651	-	.2500	1/4"	6.350	1/4"	3"	3/8"	-	1-1/8"	.237"
	50678	-	.2500	1/4"	6.350	1/4"	3"	3/8"	BALL	1-1/8"	.237"
	50600	-	.2500	1/4"	6.350	1/4"	4"	3/8"	-	1-1/8"	.237"
	50211	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	1-1/4"	.230"
	50474	-	.2500	1/4"	6.350	1/4"	4"	3/8"	BALL	1-1/8"	.237"
	50679	-	.2500	1/4"	6.350	1/4"	4"	3/8"	BALL	1-1/2"	.237"
	50652	-	.2500	1/4"	6.350	1/4"	4"	3/8"	-	2"	.237"
	50680	-	.2500	1/4"	6.350	1/4"	4"	3/8"	BALL	2"	.237"
	50719	-	.2500	1/4"	6.350	1/4"	6"	3/8"	.010"	4"	.230"
	50684	-	.2500	1/4"	6.350	1/4"	6"	3/8"	BALL	4"	.230"
	50720	-	.3125	5/16"	7.937	5/16"	2"	3/8"	.030"	-	-
	50541	-	.3125	5/16"	7.937	5/16"	2"	7/16"	-	-	-
	50622	-	.3125	5/16"	7.937	5/16"	2"	7/16"	.010"	-	-
	50624	-	.3125	5/16"	7.937	5/16"	2"	7/16"	.015"	-	-
	50492	-	.3125	5/16"	7.937	5/16"	2"	7/16"	.020"	-	-
	50721	-	.3125	5/16"	7.937	5/16"	2"	7/16"	.125"	-	-
	50561	-	.3125	5/16"	7.937	5/16"	2"	7/16"	BALL	-	-
	50239	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	-	-	-
	50626	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.010"	-	-
	50628	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.015"	-	-
	50212	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.020"	-	-
	50213	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.030"	-	-
	50722	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.060"	-	-
	50723	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.125"	-	-
	50255	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	BALL	-	-
	50657	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	-	-	-
	50724	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	.015"	-	-
	50725	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	.030"	-	-
	50726	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	.060"	-	-
	50685	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	BALL	-	-
	50658	-	.3125	5/16"	7.937	5/16"	3"	7/16"	-	1-1/2"	.295"
	50686	-	.3125	5/16"	7.937	5/16"	3"	7/16"	BALL	1-1/2"	.295"
	50602	-	.3150		8.000	8.0	50	12	-	-	-
	50630	-	.3150		8.000	8.0	50	12	0.50	-	-
	50240	-	.3150		8.000	8.0	65	22	-	-	-
	50214	-	.3150		8.000	8.0	65	22	0.50	-	-
	50356	-	.3150		8.000	8.0	65	22	0.75	-	-
	50215	-	.3150		8.000	8.0	65	22	1.00	-	-
	50727	-	.3150		8.000	8.0	65	22	1.20	-	-
	50357	-	.3150		8.000	8.0	65	22	1.50	-	-
	50358	-	.3150		8.000	8.0	65	22	2.00	-	-
	50728	-	.3150		8.000	8.0	65	22	3.00	-	-
	50256	-	.3150		8.000	8.0	65	22	BALL	-	-

continued →

Series V4S, V4R, V4B *(continued)*

.3150" - .3937"
(8.000mm - 10.000mm)

MATERIAL HARDNESS (Rc)
70
35
0

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
50659	-	.3150		8.000	8.0	75	32	-	-	-
50687	-	.3150		8.000	8.0	75	32	BALL	-	-
50660	-	.3150		8.000	8.0	100	12	-	50	7.50
50688	-	.3150		8.000	8.0	100	12	BALL	50	7.50
50542	-	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	-
50632	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.010"	-	-
50729	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.015"	-	-
50494	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-
50634	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"	-	-
50730	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.060"	-	-
50732	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.090"	-	-
50733	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.120"	-	-
50734	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.125"	-	-
50562	-	.3750	3/8"	9.525	3/8"	2"	1/2"	BALL	-	-
50241	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	-	-	-
50216	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.010"	-	-
50735	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.015"	-	-
50217	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.020"	-	-
50218	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.030"	-	-
50736	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.040"	-	-
50219	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.060"	-	-
50636	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.090"	-	-
50737	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.120"	-	-
50738	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.125"	-	-
50257	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	BALL	-	-
50661	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	-	-	-
50739	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.015"	-	-
50637	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"	-	-
50740	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.060"	-	-
50689	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	BALL	-	-
50662	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	-	-	-
50741	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.015"	-	-
50742	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.030"	-	-
50743	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.060"	-	-
50744	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.120"	-	-
50690	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	BALL	-	-
50745	-	.3750	3/8"	9.525	3/8"	6"	2-1/2"	.060	-	-
50604	-	.3750	3/8"	9.525	3/8"	4"	1/2"	-	1-1/8"	.355"
50220	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.020"	1-7/8"	.350"
50476	-	.3750	3/8"	9.525	3/8"	4"	1/2"	BALL	1-1/8"	.355"
50606	-	.3937		10.000	10.0	50	14	-	-	-
50638	-	.3937		10.000	10.0	50	14	0.50	-	-
50242	-	.3937		10.000	10.0	70	22	-	-	-
50746	-	.3937		10.000	10.0	70	22	0.25	-	-
50221	-	.3937		10.000	10.0	70	22	0.50	-	-
50359	-	.3937		10.000	10.0	70	22	0.75	-	-
50360	-	.3937		10.000	10.0	70	22	1.00	-	-
50361	-	.3937		10.000	10.0	70	22	1.50	-	-
50362	-	.3937		10.000	10.0	70	22	2.00	-	-
50747	-	.3937		10.000	10.0	70	22	3.00	-	-
50258	-	.3937		10.000	10.0	70	22	BALL	-	-
50608	-	.3937		10.000	10.0	70	26	-	-	-
NEW 50748	-	.3937		10.000	10.0	70	26	1.50	-	-
50663	-	.3937		10.000	10.0	70	30	-	-	-
50691	-	.3937		10.000	10.0	70	30	BALL	-	-

† *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
	50749	-	.3937		10.000	10.0	70	22	0.50	30	9.40
	50750	-	.3937		10.000	10.0	100	12	0.30	50	9.40
	50692	-	.3937		10.000	10.0	100	14	BALL	50	9.40
	50450	50449	.4724		12.000	12.0	75	26	-	-	-
	50363	50369	.4724		12.000	12.0	75	26	0.30	-	-
	50364	50370	.4724		12.000	12.0	75	26	0.50	-	-
	50365	50366	.4724		12.000	12.0	75	26	0.75	-	-
	50367	50371	.4724		12.000	12.0	75	26	1.00	-	-
	50372	50373	.4724		12.000	12.0	75	26	1.50	-	-
	50374	50375	.4724		12.000	12.0	75	26	2.00	-	-
	50470	-	.4724		12.000	12.0	75	26	BALL	-	-
	50243	50283	.4724		12.000	12.0	75	32	-	-	-
	50222	50270	.4724		12.000	12.0	75	32	0.50	-	-
	50223	50271	.4724		12.000	12.0	75	32	1.00	-	-
	50259	50291	.4724		12.000	12.0	75	32	BALL	-	-
	50664	-	.4724		12.000	12.0	88	36	-	-	-
	50751	-	.4724		12.000	12.0	88	36	0.30	-	-
	50752	-	.4724		12.000	12.0	88	36	0.50	-	-
	50753	-	.4724		12.000	12.0	88	36	1.00	-	-
	50754	-	.4724		12.000	12.0	88	36	1.50	-	-
	50755	-	.4724		12.000	12.0	88	36	3.00	-	-
	50693	-	.4724		12.000	12.0	88	36	BALL	-	-
	50564	-	.4724		12.000	12.0	100	42	-	-	-
	50566	-	.4724		12.000	12.0	100	42	0.30	-	-
	50568	-	.4724		12.000	12.0	100	42	0.50	-	-
	50570	-	.4724		12.000	12.0	100	42	1.00	-	-
	50572	-	.4724		12.000	12.0	100	42	2.00	-	-
	50574	-	.4724		12.000	12.0	100	42	3.00	-	-
	50576	-	.4724		12.000	12.0	100	42	BALL	-	-
	50665	-	.4724		12.000	12.0	100	48	-	-	-
	50756	-	.4724		12.000	12.0	100	48	0.30	-	-
	50757	-	.4724		12.000	12.0	100	48	0.50	-	-
NEW	50758	-	.4724		12.000	12.0	100	48	1.00	-	-
NEW	50759	-	.4724		12.000	12.0	100	48	1.50	-	-
NEW	50760	-	.4724		12.000	12.0	100	48	3.00	-	-
	50761	-	.4724		12.000	12.0	100	48	4.00	-	-
	50694	-	.4724		12.000	12.0	100	48	BALL	-	-
	50695	-	.4724		12.000	12.0	100	14	BALL	50	11.40
	50543	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-
	50640	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-
	50762	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"	-	-
	50496	50497	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-
	50642	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-
	50763	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"	-	-
	50764	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.090"	-	-
	50765	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.120"	-	-
	50644	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.125"	-	-
	50766	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.156"	-	-
	50767	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.190"	-	-
	50563	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	BALL	-	-

continued →

Series V4S, V4R, V4B *(continued)*

.5000"
(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
50452	50453	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-
50379	50380	.5000	1/2"	12.700	1/2"	3"	1"	.010"	-	-
50768	-	.5000	1/2"	12.700	1/2"	3"	1"	.015"	-	-
50381	50382	.5000	1/2"	12.700	1/2"	3"	1"	.020"	-	-
50383	50384	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-
50385	50386	.5000	1/2"	12.700	1/2"	3"	1"	.060"	-	-
50769	-	.5000	1/2"	12.700	1/2"	3"	1"	.090"	-	-
50770	-	.5000	1/2"	12.700	1/2"	3"	1"	.120"	-	-
50771	-	.5000	1/2"	12.700	1/2"	3"	1"	.125"	-	-
50772	-	.5000	1/2"	12.700	1/2"	3"	1"	.190"	-	-
50472	50473	.5000	1/2"	12.700	1/2"	3"	1"	BALL	-	-
50244	50284	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-
50224	50272	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-
50773	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
50225	50273	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
50226	50274	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
50227	50275	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
50774	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.090"	-	-
50775	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-
50776	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-
50777	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.156"	-	-
50778	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.190"	-	-
50260	50292	.5000	1/2"	12.700	1/2"	3"	1-1/4"	BALL	-	-
50666	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	-	-	-
50779	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.010"	-	-
50780	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.015"	-	-
50781	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.020"	-	-
50782	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.030"	-	-
50783	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.060"	-	-
50784	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.090"	-	-
50785	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.120"	-	-
50696	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	BALL	-	-
50578	50579	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-
50580	50581	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.010"	-	-
50582	50583	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.020"	-	-
50584	50585	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.030"	-	-
50586	50587	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.040"	-	-
50588	50589	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.060"	-	-
50590	50591	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.120"	-	-
50592	50593	.5000	1/2"	12.700	1/2"	4"	1-5/8"	BALL	-	-
50646	-	.5000	1/2"	12.700	1/2"	4"	1-3/4"	-	-	-
50647	-	.5000	1/2"	12.700	1/2"	4"	2"	-	-	-
50245	50285	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	-
50786	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.010"	-	-
50787	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.015"	-	-
50788	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.020"	-	-
50789	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-
50790	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.060"	-	-
50791	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.090"	-	-
50792	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.120"	-	-
50793	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.125"	-	-
50794	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.190"	-	-
50261	50293	.5000	1/2"	12.700	1/2"	4"	2-1/8"	BALL	-	-

† *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
	50668	-	.5000	1/2"	12.700	1/2"	6"	3"	-	-	-
	50795	-	.5000	1/2"	12.700	1/2"	6"	3"	.020"	-	-
	50796	-	.5000	1/2"	12.700	1/2"	6"	3"	.030"	-	-
	50797	-	.5000	1/2"	12.700	1/2"	6"	3"	.060"	-	-
	50798	-	.5000	1/2"	12.700	1/2"	6"	3"	.120"	-	-
	50799	-	.5000	1/2"	12.700	1/2"	6"	3"	.190"	-	-
	50699	-	.5000	1/2"	12.700	1/2"	6"	3"	BALL		
	50610	-	.5000	1/2"	12.700	1/2"	4"	5/8"	-	2-1/4"	.475"
	50228	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.020"	2-1/4"	.470"
	50900	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.030"	2-1/4"	.470"
	50901	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.060"	2-1/4"	.470"
	50902	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.120"	2-1/4"	.470"
	50478	-	.5000	1/2"	12.700	1/2"	4"	5/8"	BALL	2-1/4"	.475"
	50667	-	.5000	1/2"	12.700	1/2"	6"	5/8"	-	3-1/8"	.475"
	50235	-	.5000	1/2"	12.700	1/2"	6"	5/8"	-	4-1/8"	.475"
	50594	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.020"	4-1/8"	.470"
	50596	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.030"	4-1/8"	.470"
NEW	50697	-	.5000	1/2"	12.700	1/2"	6"	5/8"	BALL	3-1/8"	.475"
	50598	-	.5000	1/2"	12.700	1/2"	6"	5/8"	BALL	4-1/8"	.475"
	50698	-	.5000	1/2"	12.700	1/2"	6"	1"	BALL	4-1/2"	.475"
	50545	50546	.6250	5/8"	15.875	5/8"	3"	3/4"	-	-	-
	50903	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.010"	-	-
	50904	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.015"	-	-
	50498	50499	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"	-	-
	50500	50501	.6250	5/8"	15.875	5/8"	3"	3/4"	.030"	-	-
	50502	50503	.6250	5/8"	15.875	5/8"	3"	3/4"	.060"	-	-
NEW	50905	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.090"	-	-
	50906	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.120"	-	-
	50907	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.125"	-	-
NEW	50908	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.156"	-	-
	50909	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.190"	-	-
NEW	50910	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.250"	-	-
	50246	50286	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-
	50911	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	-	-
	50912	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-
	50229	50277	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-
	50534	50535	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-
	50536	50537	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.040"	-	-
	50538	50539	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-
NEW	50913	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.090"	-	-
	50230	50278	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-
	50914	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.125"	-	-
NEW	50915	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.156"	-	-
	50916	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.190"	-	-
	50917	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.250"	-	-
	50262	50294	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	BALL	-	-

continued →

Series V4S, V4R, V4B *(continued)*

.6250" - .6299"
(15.875mm - 16.000mm)

	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
	50669	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	-	-	-
	50918	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.010"	-	-
	50919	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.015"	-	-
NEW	50920	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.020"	-	-
	50921	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.030"	-	-
	50922	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.060"	-	-
NEW	50923	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.090"	-	-
	50924	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.120"	-	-
NEW	50925	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.125"	-	-
NEW	50926	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.156"	-	-
	50927	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.190"	-	-
	50928	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.250"	-	-
	50700	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	BALL	-	-
	50612	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-
	50670	-	.6250	5/8"	15.875	5/8"	4"	1-3/4"	-	-	-
	50701	-	.6250	5/8"	15.875	5/8"	4"	1-3/4"	BALL	-	-
	50547	-	.6299		16.000	16.0	75	19	-	-	-
	50504	-	.6299		16.000	16.0	75	19	0.50	-	-
	50506	-	.6299		16.000	16.0	75	19	1.00	-	-
	50508	-	.6299		16.000	16.0	75	19	3.00	-	-
NEW	50929	-	.6299		16.000	16.0	75	19	4.00	-	-
NEW	50930	-	.6299		16.000	16.0	75	19	5.00	-	-
NEW	50931	-	.6299		16.000	16.0	75	19	6.00	-	-
	50247	50287	.6299		16.000	16.0	88	32	-	-	-
	50231	50279	.6299		16.000	16.0	88	32	0.50	-	-
	50409	50410	.6299		16.000	16.0	88	32	0.75	-	-
	50411	50412	.6299		16.000	16.0	88	32	1.00	-	-
	50413	50414	.6299		16.000	16.0	88	32	1.50	-	-
	50415	50416	.6299		16.000	16.0	88	32	2.00	-	-
	50932	-	.6299		16.000	16.0	88	32	2.50	-	-
	50417	50418	.6299		16.000	16.0	88	32	3.00	-	-
	50933	-	.6299		16.000	16.0	88	32	4.00	-	-
	50934	-	.6299		16.000	16.0	88	32	5.00	-	-
NEW	50935	-	.6299		16.000	16.0	88	32	6.00	-	-
	50263	50295	.6299		16.000	16.0	88	32	BALL	-	-
	50671	-	.6299		16.000	16.0	100	48	-	-	-
	50936	-	.6299		16.000	16.0	100	48	0.50	-	-
	50937	-	.6299		16.000	16.0	100	48	1.00	-	-
	50938	-	.6299		16.000	16.0	100	48	1.50	-	-
	50939	-	.6299		16.000	16.0	100	48	2.00	-	-
	50940	-	.6299		16.000	16.0	100	48	3.00	-	-
	50941	-	.6299		16.000	16.0	100	48	4.00	-	-
	50942	-	.6299		16.000	16.0	100	48	5.00	-	-
	50943	-	.6299		16.000	16.0	100	48	6.00	-	-
	50702	-	.6299		16.000	16.0	100	48	BALL	-	-

† *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
	50548	-	.7500	3/4"	19.050	3/4"	3"	7/8"	-	-	-
NEW	50944	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.010"	-	-
NEW	50945	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.015"	-	-
NEW	50946	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.020"	-	-
	50556	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.030"	-	-
NEW	50947	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.060"	-	-
NEW	50948	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.120"	-	-
	50549	50550	.7500	3/4"	19.050	3/4"	4"	1"	-	-	-
NEW	50949	-	.7500	3/4"	19.050	3/4"	4"	1"	.010"	-	-
NEW	50950	-	.7500	3/4"	19.050	3/4"	4"	1"	.015"	-	-
	50510	50511	.7500	3/4"	19.050	3/4"	4"	1"	.020"	-	-
	50512	50513	.7500	3/4"	19.050	3/4"	4"	1"	.030"	-	-
	50514	50515	.7500	3/4"	19.050	3/4"	4"	1"	.060"	-	-
	50951	-	.7500	3/4"	19.050	3/4"	4"	1"	.090"	-	-
NEW	50952	-	.7500	3/4"	19.050	3/4"	4"	1"	.120"	-	-
	50953	-	.7500	3/4"	19.050	3/4"	4"	1"	.190"	-	-
NEW	50954	-	.7500	3/4"	19.050	3/4"	4"	1"	.250"	-	-
NEW	50955	-	.7500	3/4"	19.050	3/4"	4"	1"	.3125"	-	-
	50248	50288	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-
	50956	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.010"	-	-
NEW	50957	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-
	50516	50517	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.020"	-	-
	50232	50280	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-
	50518	50519	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-
	50958	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.090"	-	-
	50520	50521	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-
	50959	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.125"	-	-
	50960	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.156"	-	-
	50961	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.190"	-	-
	50962	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.250"	-	-
NEW	50963	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.3125"	-	-
	50264	50296	.7500	3/4"	19.050	3/4"	4"	1-1/2"	BALL	-	-
	50551	50552	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-
	50964	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.010"	-	-
	50965	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.015"	-	-
	50522	50523	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.020"	-	-
	50524	50525	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-
	50526	50527	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.060"	-	-
	50966	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.090"	-	-
NEW	50967	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.120"	-	-
	50968	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.125"	-	-
	50969	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.156"	-	-
	50970	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.190"	-	-
	50971	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.250"	-	-
NEW	50972	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.3125"	-	-

continued →

Series V4S, V4R, V4B *(continued)*

.7500" - .7874"
(19.050mm - 20.000mm)

	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
	50553	50554	.7500	3/4"	19.050	3/4"	5"	2-1/8"	-	-	-
	50973	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.010"	-	-
NEW	50974	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.015"	-	-
	50975	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.020"	-	-
	50976	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.030"	-	-
	50977	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.060"	-	-
	50978	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.090"	-	-
NEW	50979	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.120"	-	-
	50980	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.125"	-	-
	50981	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.156"	-	-
NEW	50982	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.190"	-	-
	50983	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.250"	-	-
NEW	50984	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.3125"	-	-
	50672	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	-	-	-
	50985	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.010"	-	-
	50986	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.015"	-	-
	50987	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.020"	-	-
	50988	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.030"	-	-
	50989	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.060"	-	-
	50990	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.090"	-	-
NEW	50991	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.120"	-	-
	50992	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.125"	-	-
NEW	50993	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.156"	-	-
	50994	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.190"	-	-
	50995	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.250"	-	-
NEW	50996	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.3125"	-	-
	50703	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	BALL	-	-
	50555	-	.7874		20.000	20.0	100	25	-	-	-
	50249	50289	.7874		20.000	20.0	100	38	-	-	-
NEW	50997	-	.7874		20.000	20.0	100	38	0.50	-	-
	50528	-	.7874		20.000	20.0	100	38	1.00	-	-
	50530	-	.7874		20.000	20.0	100	38	2.00	-	-
	50998	-	.7874		20.000	20.0	100	38	2.50	-	-
	50532	-	.7874		20.000	20.0	100	38	3.00	-	-
	50999	-	.7874		20.000	20.0	100	38	4.00	-	-
	50121	-	.7874		20.000	20.0	100	38	5.00	-	-
NEW	50122	-	.7874		20.000	20.0	100	38	6.00	-	-
NEW	50123	-	.7874		20.000	20.0	100	38	8.00	-	-
	50265	50297	.7874		20.000	20.0	100	38	BALL	-	-
	50673	-	.7874		20.000	20.0	100	48	-	-	-
	50124	-	.7874		20.000	20.0	100	48	0.50	-	-
NEW	50125	-	.7874		20.000	20.0	100	48	1.00	-	-
	50126	-	.7874		20.000	20.0	100	48	1.50	-	-
	50127	-	.7874		20.000	20.0	100	48	2.00	-	-
	50128	-	.7874		20.000	20.0	100	48	2.50	-	-
	50129	-	.7874		20.000	20.0	100	48	3.00	-	-
	50131	-	.7874		20.000	20.0	100	48	4.00	-	-
	50132	-	.7874		20.000	20.0	100	48	5.00	-	-
NEW	50133	-	.7874		20.000	20.0	100	48	6.00	-	-
NEW	50134	-	.7874		20.000	20.0	100	48	8.00	-	-
	50704	-	.7874		20.000	20.0	100	48	BALL	-	-

† *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
	50674	-	.7874		20.000	20.0	150	60	-	-	-
	50135	-	.7874		20.000	20.0	150	60	0.50	-	-
	50136	-	.7874		20.000	20.0	150	60	1.00	-	-
NEW	50137	-	.7874		20.000	20.0	150	60	3.00	-	-
	50138	-	.7874		20.000	20.0	150	60	6.00	-	-
NEW	50705	-	.7874		20.000	20.0	150	60	BALL	-	-
	50250	50290	1.000	1"	25.400	1"	4"	1-1/2"	-	-	-
NEW	50139	-	1.000	1"	25.400	1"	4"	1-1/2"	.020"		
	50233	50281	1.000	1"	25.400	1"	4"	1-1/2"	.030"	-	-
NEW	50141	-	1.000	1"	25.400	1"	4"	1-1/2"	.060"	-	-
NEW	50142	-	1.000	1"	25.400	1"	4"	1-1/2"	.090"	-	-
NEW	50143	-	1.000	1"	25.400	1"	4"	1-1/2"	.120"	-	-
	50557	-	1.000	1"	25.400	1"	4"	1-1/2"	.125"	-	-
NEW	50144	-	1.000	1"	25.400	1"	4"	1-1/2"	.156"	-	-
	50145	-	1.000	1"	25.400	1"	4"	1-1/2"	.190"	-	-
	50146	-	1.000	1"	25.400	1"	4"	1-1/2"	.250"	-	-
NEW	50147	-	1.000	1"	25.400	1"	4"	1-1/2"	.3125"	-	-
	50148	-	1.000	1"	25.400	1"	4"	1-1/2"	.375"	-	-
	50266	50298	1.000	1"	25.400	1"	4"	1-1/2"	BALL	-	-
	50675	-	1.000	1"	25.400	1"	4-1/2"	2"	-	-	-
NEW	50149	-	1.000	1"	25.400	1"	4-1/2"	2"	.020"		
	50151	-	1.000	1"	25.400	1"	4-1/2"	2"	.030"	-	-
NEW	50152	-	1.000	1"	25.400	1"	4-1/2"	2"	.060"	-	-
NEW	50153	-	1.000	1"	25.400	1"	4-1/2"	2"	.090"	-	-
NEW	50154	-	1.000	1"	25.400	1"	4-1/2"	2"	.120"	-	-
NEW	50155	-	1.000	1"	25.400	1"	4-1/2"	2"	.156"	-	-
NEW	50156	-	1.000	1"	25.400	1"	4-1/2"	2"	.190"	-	-
NEW	50157	-	1.000	1"	25.400	1"	4-1/2"	2"	.250"	-	-
NEW	50158	-	1.000	1"	25.400	1"	4-1/2"	2"	.3125"	-	-
	50706	-	1.000	1"	25.400	1"	4-1/2"	2"	BALL	-	-
	50234	50282	1.000	1"	25.400	1"	5"	2-1/8"	.030"	-	-
	50676	-	1.000	1"	25.400	1"	5"	2-1/2"	-	-	-
NEW	50159	-	1.000	1"	25.400	1"	5"	2-1/2"	.020"	-	-
NEW	50161	-	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-	-
	50162	-	1.000	1"	25.400	1"	5"	2-1/2"	.060"	-	-
NEW	50163	-	1.000	1"	25.400	1"	5"	2-1/2"	.090"	-	-
NEW	50164	-	1.000	1"	25.400	1"	5"	2-1/2"	.120"	-	-
NEW	50165	-	1.000	1"	25.400	1"	5"	2-1/2"	.156"	-	-
NEW	50166	-	1.000	1"	25.400	1"	5"	2-1/2"	.190"	-	-
	50167	-	1.000	1"	25.400	1"	5"	2-1/2"	.250"	-	-
NEW	50168	-	1.000	1"	25.400	1"	5"	2-1/2"	.3125"	-	-
	50707	-	1.000	1"	25.400	1"	5"	2-1/2"	BALL	-	-

NOTES

V4-S series in 1018 material

GARR TOOL is on social media!

Follow us on all your favorite platforms for new product releases, company announcements, machining tips, and so much more! We are also looking to connect with you in any way we can. Don't be afraid to reach out with any questions, concerns, or feedback.

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Send us your videos!

GARR TOOL is always looking for videos of our tools in action. Send us an email with your machine information, speeds and feeds, and a link to your high-quality video to **social@garrtool.com** . We may add it to our online video resource page as well as give you a shout-out on our social media accounts!

Series V5

NEW ITEMS

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

HIGH EFFICIENCY MILLING

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

Z=5 | VAR | TECH PAGES 298-299

Variable Helix End Mill - AlCrN Coated

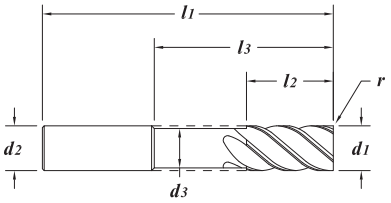
Fräser mit Einer Variablen Spiralgeometrie - AlCrN-Beschichtet

Fresa de Hélice Variable - Recubrimiento de AlCrN

Fraise Avec un Angle Hélice Variable - Revêtement AlCrN

Fresa ad Elica Variabile - Rivestimento in AlCrN

不等螺旋铣刀 - 涂层铝氮化铬



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
Engineered for High Efficiency Milling
Recommended for titanium and tool steels (< 45Rc)
Minimizes burr on part
Helix geometry varies over length of flutes
Staggered flutes to control harmonics
Variable flute design helps with chip evacuation in slots and pockets
Variable rake aids in chip formation
PCT (Polish Carbide Treatment) enhances tool life
12mm and larger tools offered with weldon flat
Smaller diameters can be modified with a flat 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

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Entwickelt für hocheffizientes Fräsen
Empfohlen für Titan und Werkzeugstähle (<45HRc)
PCT (Polish Carbide Treatment) steigert die Werkzeugstandzeit
Reduziert die Gratbildung am Werkstück
Spiralgeometrie variiert auf der gesamten Schneidenlänge
Spezielles Spannut-Design um Vibrationen zu reduzieren
Variable Spannutgeometrie für eine bessere Spanabfuhr beim Schlitz- und Taschenfräsen
Variabler Winkel für bessere Spangeometrie
12 mm oder größere Durchmesser auch mit Weldon Schaft erhältlich
Kleinere Durchmesser können innerhalb 48 Stunden mit einer Spannfläche geliefert werden
Die Kombination einer verlängerten Spannutlänge mit einer Weldon-Spannfläche kann die Ursachebei Spannut-Auswaschungen bei einigen Fräserspannfuttern sein

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Diseñado para el fresado de alta eficiencia
Recomendado para Titanio y Aceros Herramienta (<45 Rc)
PCT (Polish Carbide Treatment, Tratamiento de pulido) aumenta la vida de la hta. hasta
Minimiza las rebabas en la pieza
La geometría de la hélice varía a lo largo de la longitud del labio
Labios escalonados para control de vibraciones
El diseño del labio variable contribuye a la evacuación de la viruta en ranuras y cajeras
El labio con filo variable que contribuye a la buena formación de la viruta
Htas de Ø12 mm. y mayores disponibles con mango Weldon
Es posible añadir un plano Weldon en diámetros menores en 48 horas
La combinación de una gran longitud de corte con un mango con plano Weldon puede causar que del labio alcance el interior de algunos portaherramientas

Fraises carbure submicrograin - coupe au centre
Conçu pour un fraisage à haute efficacité
Recommandé pour les titane et aciers a outils (<45 HRC)
PCT (le traitement pour polir le carbure) améliore la durée de vie de l'outil
Minimise les bavures sur la pièce
La géométrie de l'hélice varie sur la longueur de l'hélice
Une denture variable réduit les vibrations
Un design à denture variable améliore l'évacuation des copeaux lors des opérations de rainurage et d'usinage de poches
Un pas variable améliore la formation des copeaux
Des outils d'un dia. 12 mm ou supérieur sont disponibles avec une queue weldon
Les petits diamètres peuvent être modifies avec une queue Weldon endéans 48 heures
La combinaison d'une grande longueur de goujure avec une queue Weldon peut causer des vibrations qui peuvent se prolonger dans le mandrin

Fresa sub-micrograno metallo duro - taglio al centro
Progettato per la fresatura ad alta efficienza
Raccomandata per lavorazioni su Titanio e Acciaio per utensili (<45 Hrc)
PCT (Polish Carbide Treatment, trattamento di lucidatura del metallo duro) incrementa la vita utensile
Non crea bava sul pezzo
La geometria dell'elica varia sulla lunghezza del tagliente
Taglienti sfalsati per controllare le forze
La geometria variabile del tagliente aiuta l'evacuazione del truciolo negli svuotamenti e nelle cave
L'angolo di spoglia variabile aiuta la formazione del truciolo
Dal diametro 12 mm in su disponibili con attacco weldon
Diametri più piccoli possono essere modificati in 48 ore
Estendere la lunghezza del tagliente su un attacco Weldon può causare la rottura dell'utensile in alcune applicazioni

超细晶粒整体硬质合金立铣刀 - 中心切削
有效的摆线铣削
推荐加工钛 和工具钢 (<45HRC)
PCT (硬质合金抛光处理) 使刀具寿命提高
使工件的毛刺最少
整个切削刃的螺旋角可变
交错式的刀刃能抑制噪音
切削刃螺旋角可变的设计有利于碎屑在加工槽和型腔中排出
可变的前角有利于碎屑的形成
12mm及以上刀具提供侧固槽位设计
可在48小时内生产小直径的平底刀具
过长的刀刃结合侧固槽的刀具可能会导致刀具夹头受到冲击而损坏

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
50000	-	.2362		6.000	6.0	50	13	-	-	-
50001	-	.2362		6.000	6.0	50	13	0.5	-	-
50002	-	.2362		6.000	6.0	65	19	-	-	-
50003	-	.2362		6.000	6.0	65	19	0.5	-	-
50004	-	.2362		6.000	6.0	65	13	-	20	5.4
50005	-	.2362		6.000	6.0	65	13	0.5	20	5.4
50006	-	.2362		6.000	6.0	65	13	1.0	20	5.4
50007	-	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-	-
51000	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.010"	-	-
50008	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"	-	-
51001	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	-
50009	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.030"	-	-
51002	-	.2500	1/4"	6.350	1/4"	2"	1/2"	-	-	-
51003	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.010"	-	-
51004	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"	-	-
50011	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	-
51005	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-
50012	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-
50013	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-
50014	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-
50015	-	.2500	1/4"	6.350	1/4"	3"	1"	-	-	-
51006	-	.2500	1/4"	6.350	1/4"	3"	1"	.010"	-	-
51007	-	.2500	1/4"	6.350	1/4"	3"	1"	.015"	-	-
50016	-	.2500	1/4"	6.350	1/4"	3"	1"	.030"	-	-
50113	-	.2500	1/4"	6.350	1/4"	3"	1-1/8"	.030"	-	-
50017	-	.2500	1/4"	6.350	1/4"	4"	1/2"	.015"	1-1/4"	.235"
51008	-	.2500	1/4"	6.350	1/4"	4"	1/2"	.015"	2-1/8"	.235"
50023	-	.2756		7.000	8.0	65	22	0.2	-	-
50018	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	-	-	-
50019	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.015"	-	-
50021	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	-
50022	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	-	-

† *Metric equivalents are for reference only*

	EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	Diameter	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
	50024	-	.3150		8.000	8.0	65	22	0.2	-	-
	50025	-	.3150		8.000	8.0	65	22	0.5	-	-
	50026	-	.3150		8.000	8.0	75	19	-	26	7.2
	50027	-	.3150		8.000	8.0	75	19	0.5	26	7.2
	50028	-	.3150		8.000	8.0	75	19	1.0	26	7.2
	50029	-	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	-
	50031	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.015"	-	-
	50032	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-
	50033	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"	-	-
	50034	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	-	-	-
	50035	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.015"	-	-
	50036	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.020"	-	-
	50037	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.030"	-	-
	50038	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.060"	-	-
	51009	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.015"	-	-
	50114	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"	-	-
	51010	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.015"	-	-
	50039	-	.3750	3/8"	9.525	3/8"	4"	2"	-	-	-
	50041	-	.3750	3/8"	9.525	3/8"	4"	2"	.030"	-	-
	51011	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.015"	1-1/8"	.355"
	50042	-	.3750	3/8"	9.525	3/8"	4"	7/8"	.015"	1-7/8"	.355"
	51012	-	.3750	3/8"	9.525	3/8"	6"	1/2"	.015"	2-1/8"	.355"
	51013	-	.3750	3/8"	9.525	3/8"	6"	1/2"	.015"	3-1/8"	.355"
	51014	-	.3750	3/8"	9.525	3/8"	6"	1/2"	.015"	4-1/8"	.355"
	50043	-	.3937		10.000	10.0	70	22	-	-	-
	51015	-	.3937		10.000	10.0	70	22	0.30	-	-
	50044	-	.3937		10.000	10.0	70	22	0.50	-	-
	51016	-	.3937		10.000	10.0	70	22	0.75	-	-
	51017	-	.3937		10.000	10.0	70	22	1.00	-	-
	50045	-	.3937		10.000	10.0	75	22	-	32	9.0
	50046	-	.3937		10.000	10.0	75	22	0.50	32	9.0
NEW	51018	-	.3937		10.000	10.0	75	22	0.75	32	9.0
	50047	-	.3937		10.000	10.0	75	22	1.00	32	9.0
	51019	-	.4724		12.000	12.0	65	19	-	-	-
	51020	-	.4724		12.000	12.0	65	19	0.50	-	-
	50484	50485	.4724		12.000	12.0	75	26	-	-	-
	51021	-	.4724		12.000	12.0	75	26	0.30	-	-
	50486	50487	.4724		12.000	12.0	75	26	0.50	-	-
	51022	-	.4724		12.000	12.0	75	26	0.75	-	-
	51023	-	.4724		12.000	12.0	75	26	1.00	-	-
	50112	-	.4724		12.000	12.0	75	26	2.00	-	-
	50115	-	.4724		12.000	12.0	75	26	2.50	-	-
	50048	50299	.4724		12.000	12.0	75	32	-	-	-
	51024	-	.4724		12.000	12.0	75	32	0.30	-	-
	50049	50300	.4724		12.000	12.0	75	32	0.50	-	-
	51025	-	.4724		12.000	12.0	75	32	0.75	-	-
	51026	-	.4724		12.000	12.0	75	32	1.00	-	-
	51027	-	.4724		12.000	12.0	100	38	-	-	-
	51028	-	.4724		12.000	12.0	100	38	0.50	-	-
	50423	-	.4724		12.000	12.0	100	42	-	-	-
	50425	-	.4724		12.000	12.0	100	42	0.30	-	-
	50427	-	.4724		12.000	12.0	100	42	0.50	-	-
	50429	-	.4724		12.000	12.0	100	42	1.00	-	-
	50431	-	.4724		12.000	12.0	100	42	2.00	-	-
	51029	-	.4724		12.000	12.0	100	52	-	-	-
	51030	-	.4724		12.000	12.0	100	52	0.50	-	-
	50051	50301	.4724		12.000	12.0	100	26	-	38	10.8
	50052	50302	.4724		12.000	12.0	100	26	0.50	38	10.8
	50053	50303	.4724		12.000	12.0	100	26	1.00	38	10.8

continued →

Series V5 *(continued)*

.5000"
(12.700mm)

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
50054	50304	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-
50106	50305	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-
50055	50306	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-
50107	50307	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-
50056	50308	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-
50108	50309	.5000	1/2"	12.700	1/2"	3"	1"	.010"	-	-
50057	50310	.5000	1/2"	12.700	1/2"	3"	1"	.020"	-	-
50109	50311	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-
50058	50312	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-
50111	50313	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-
50059	50314	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
50061	50315	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
50062	50316	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
50063	50317	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.045"	-	-
50064	50318	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
50065	50319	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.090"	-	-
50433	50435	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.010"	-	-
51031	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.015"	-	-
51032	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-
50436	50437	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-
50438	50439	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.010"	-	-
50440	50441	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.020"	-	-
50442	50443	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.030"	-	-
50444	50445	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.040"	-	-
50446	50447	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.060"	-	-
50067	50321	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	-
51033	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.015"	-	-
50068	50322	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-
51034	-	.5000	1/2"	12.700	1/2"	6"	1"	.030"	-	-
51035	-	.5000	1/2"	12.700	1/2"	6"	3-1/8"	-	-	-
51036	-	.5000	1/2"	12.700	1/2"	6"	3-1/8"	.030"	-	-
51037	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	1-1/2"	.475"
51038	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	2-1/4"	.475"
50066	50320	.5000	1/2"	12.700	1/2"	4"	1-1/4"	.030"	2-1/4"	.475"
51039	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.015"	3-3/8"	.475"
51040	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.015"	4-1/8"	.475"

MATERIAL HARDNESS (Rc)
70
35
0

† *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
50069	50323	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-
51041	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-
50071	50324	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-
50072	50325	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-
50401	50402	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-
51042	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-
51043	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-
51044	-	.6250	5/8"	15.875	5/8"	4"	2-1/8"	-	-	-
51045	-	.6250	5/8"	15.875	5/8"	4"	2-1/8"	.030"	-	-
51046	-	.6250	5/8"	15.875	5/8"	6"	2-1/2"	.030"	-	-
50403	50404	.6250	5/8"	15.875	5/8"	6"	3-1/8"	.030"	-	-
51047	-	.6250	5/8"	15.875	5/8"	6"	3-1/8"	.060"	-	-
51048	-	.6250	5/8"	15.875	5/8"	6"	3-1/2"	.030"	-	-
51049	-	.6250	5/8"	15.875	5/8"	4"	3/4"	.030"	1-5/8"	.590"
50073	50326	.6250	5/8"	15.875	5/8"	4"	1-1/4"	.030"	2-1/4"	.590"
51050	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	2-3/8"	.590"
51051	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	3-3/8"	.590"
51052	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-1/8"	.590"
51053	-	.6299		16.000	16.0	75	19	-	-	-
51054	-	.6299		16.000	16.0	75	19	0.50	-	-
50074	50327	.6299		16.000	16.0	88	32	-	-	-
50075	50328	.6299		16.000	16.0	88	32	0.50	-	-
50420	-	.6299		16.000	16.0	88	32	1.00	-	-
51055	-	.6299		16.000	16.0	88	32	2.00	-	-
50422	-	.6299		16.000	16.0	88	32	3.00	-	-
50424	-	.6299		16.000	16.0	88	32	4.00	-	-
50430	-	.6299		16.000	16.0	100	40	0.50	-	-
50432	-	.6299		16.000	16.0	100	40	1.00	-	-
50434	-	.6299		16.000	16.0	100	40	3.00	-	-
50076	50329	.6299		16.000	16.0	100	32	-	50	14.4
50077	-	.6299		16.000	16.0	100	32	0.50	50	14.4
50426	-	.6299		16.000	16.0	100	32	1.00	50	14.4
51056	-	.6299		16.000	16.0	100	32	2.00	50	14.4
50428	-	.6299		16.000	16.0	100	32	3.00	50	14.4
50078	-	.7087		18.000	18.0	100	32	0.75	-	-

continued →

Series V5 *(continued)*

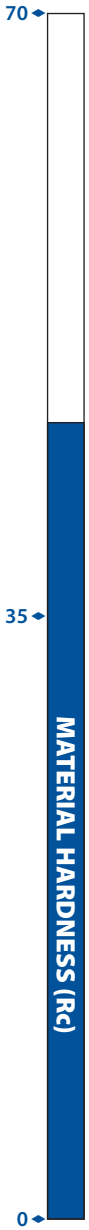
.7500"
(19.050mm)

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
50079	50332	.7500	3/4"	19.050	3/4"	3"	7/8"	-	-	-
51103	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.015"	-	-
50081	50333	.7500	3/4"	19.050	3/4"	3"	7/8"	.030"	-	-
51057	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.060"	-	-
51105	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.120"	-	-
51107	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.015"	-	-
51058	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.030"	-	-
51109	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.060"	-	-
50082	50334	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-
51111	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-
50083	50335	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-
50084	50336	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-
51059	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.078"	-	-
50085	50337	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-
51113	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.190"	-	-
51060	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-	-
51115	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.015"	-	-
51061	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-
51119	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.060"	-	-
51062	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-
51121	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.015"	-	-
51063	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-
51123	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.060"	-	-
50086	50338	.7500	3/4"	19.050	3/4"	5"	2-1/8"	-	-	-
51125	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.015"	-	-
50087	50339	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.030"	-	-
51064	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.060"	-	-
51065	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.120"	-	-
51127	-	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.015"	-	-
51066	-	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.030"	-	-
51129	-	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.060"	-	-
51131	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.015"	-	-
51067	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.030"	-	-
51133	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.060"	-	-
51135	-	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.015"	-	-
51068	-	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.030"	-	-
51137	-	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.060"	-	-
50089	50341	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-
51139	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.015"	-	-
50091	50342	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-
51141	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.060"	-	-
51143	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.015"	-	-
51145	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.030"	-	-
51147	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.060"	-	-
51069	-	.7500	3/4"	19.050	3/4"	4"	1"	.030"	2"	.705"
51070	-	.7500	3/4"	19.050	3/4"	5"	1"	.030"	2-1/2"	.705"
50088	50340	.7500	3/4"	19.050	3/4"	5-1/2"	1-1/2"	.030"	3-1/4"	.705"
51071	-	.7500	3/4"	19.050	3/4"	6"	1"	.030"	4-1/8"	.705"

MATERIAL HARDNESS (Rc)
70
35
0

† *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
	50092	50343	.7874		20.000	20.0	100	38	-	-	-
	51072	-	.7874		20.000	20.0	100	38	0.50	-	-
	50093	50344	.7874		20.000	20.0	100	38	0.75	-	-
	51073	-	.7874		20.000	20.0	100	38	1.00	-	-
	51074	-	.7874		20.000	20.0	100	38	1.50	-	-
	51075	-	.7874		20.000	20.0	100	38	2.00	-	-
	51076	-	.7874		20.000	20.0	100	38	3.00	-	-
	51077	-	.9843		25.000	25.0	100	38	-	-	-
	51078	-	.9843		25.000	25.0	100	38	0.50	-	-
NEW	51079	-	.9843		25.000	25.0	100	38	0.75	-	-
	51080	-	.9843		25.000	25.0	100	38	1.50	-	-
	51081	-	.9843		25.000	25.0	100	38	3.00	-	-
	50094	-	1.000	1"	25.400	1"	4"	1-1/4"	-	-	-
	50095	-	1.000	1"	25.400	1"	4"	1-1/4"	.030"	-	-
NEW	51082	-	1.000	1"	25.400	1"	4"	1-1/4"	.120"	-	-
	-	50348	1.000	1"	25.400	1"	4"	1-1/2"	-	-	-
	-	50349	1.000	1"	25.400	1"	4"	1-1/2"	.030"	-	-
	-	50350	1.000	1"	25.400	1"	4"	1-1/2"	.060"	-	-
	51083	-	1.000	1"	25.400	1"	4"	1-1/2"	.120"	-	-
NEW	50116	-	1.000	1"	25.400	1"	4"	1-1/2"	.125"	-	-
	50097	-	1.000	1"	25.400	1"	4"	1-3/4"	-	-	-
	50098	-	1.000	1"	25.400	1"	4"	1-3/4"	.030"	-	-
	50099	-	1.000	1"	25.400	1"	4"	1-3/4"	.060"	-	-
	51084	-	1.000	1"	25.400	1"	4"	1-3/4"	.120"	-	-
	51085	-	1.000	1"	25.400	1"	4-1/2"	2"	.030"	-	-
	51086	-	1.000	1"	25.400	1"	4-1/2"	2"	.060"	-	-
	51087	-	1.000	1"	25.400	1"	4-1/2"	2"	.120"	-	-
	51088	-	1.000	1"	25.400	1"	4-1/2"	2"	.250"	-	-
	51089	-	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-	-
	51090	-	1.000	1"	25.400	1"	5"	2-5/8"	.030"	-	-
	50104	50354	1.000	1"	25.400	1"	6"	3-1/4"	-	-	-
	50105	-	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	-
	51091	-	1.000	1"	25.400	1"	6"	3-3/8"	.060"	-	-
	51092	-	1.000	1"	25.400	1"	7"	4-1/4"	.030"	-	-
	51093	-	1.000	1"	25.400	1"	7"	4-1/4"	.060"	-	-
	51094	-	1.000	1"	25.400	1"	5"	1-1/4"	.030"	2-5/8"	.940"
	50101	-	1.000	1"	25.400	1"	5-1/2"	1-3/4"	.030"	3-1/4"	.940"
	50102	50352	1.000	1"	25.400	1"	5-1/2"	1-3/4"	.060"	3-1/4"	.940"
	51095	-	1.000	1"	25.400	1"	6"	1-1/4"	.030"	3-3/8"	.940"
	51096	-	1.000	1"	25.400	1"	7"	1-1/4"	.030"	4-1/4"	.940"



Series V5C - Chip Splitter

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

HIGH EFFICIENCY MILLING

Z=5 | VAR | TECH PAGES 298-299

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

Variable Helix End Mill - AlCrN Coated

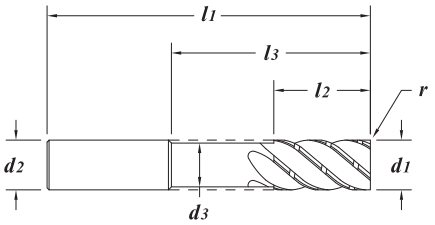
Fräser mit Einer Variablen Spiralgeometrie - AlCrN-Beschichtet

Fresa de Hélice Variable - Recubrimiento de AlCrN

Fraise Avec un Angle Hélice Variable - Revêtement AlCrN

Fresa ad Elica Variabile - Rivestimento in AlCrN

不等螺旋铣刀 - 涂层铝氮化铬



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
Chip splitter to help break long chips
Engineered for High Efficiency Milling
Recommended for titanium and tool steels (< 45Rc)
Staggered flutes to control harmonics
Variable flute design helps with chip evacuation in slots and pockets
PCT (Polish Carbide Treatment) enhances tool life

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Zu helfen, lange chips zu brechen
Entwickelt für hocheffizientes Fräsen
Empfohlen für Titan und Werkzeugstähle (<45HRc)
PCT (Polish Carbide Treatment) steigert die Werkzeugstandzeit
Spezielles Spannut-Design um Vibrationen zu reduzieren
Variable Spannutgeometrie für eine bessere Spanabfuhr beim Schlitz- und Taschenfräsen

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Chip splitter para ayudar a romper chips largas
Diseñado para el fresado de alta eficiencia
Recomendado para Titanio y Aceros Herramienta (<45 Rc)
PCT (Polish Carbide Treatment, Tratamiento de pulido) aumenta la vida de la hta.
Labios escalonados para control de vibraciones
El diseño del labio variable contribuye a la evacuación de la viruta en ranuras y cajeras

Fraises carbure submicrograin - coupe au centre
Pour aider à briser de longues puce
Conçu pour un fraisage à haute efficacité
Recommandé pour les titane et aciers a outils (<45 HRC)
PCT (le traitement pour polir le carbure) améliore la durée de vie de l'outil
Une denture variable réduit les vibrations
Un design à denture variable améliore l'évacuation des copeaux lors des opérations de rainurage et d'usinage de poches

Fresa sub-micrograno metallo duro - taglio al centro
Per aiutare a rompere le lunghe chips
Progettato per la fresatura ad alta efficienza
Raccomandata per lavorazioni su Titanio e Acciaio per utensili (<45 Hrc)
PCT (Polish Carbide Treatment, trattamento di lucidatura del metallo duro) incrementa la vita utensile
Taglienti sfalsati per controllare le forze
La geometria variabile del tagliente aiuta l'evacuazione del truciolo negli svuotamenti e nelle cave

超细晶粒整体硬质合金立铣刀 - 中心切削
芯片分路器有助於打破長芯片
有效的擺線銑削
推荐加工钛 和工具钢 (<45HRC)
PCT (硬质合金抛光处理) 使刀具寿命提高
交错式的刀刃能抑制噪音
切削刃螺旋角可变的设计有利于碎屑在加工槽和型腔中排出

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
50801	.4724		12.000	12.0	100	42	0.30	-	-
50800	.4724		12.000	12.0	100	42	1.00	-	-
50803	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-
50807	.5000	1/2"	12.700	1/2"	3"	1"	.015"	-	-
50805	.5000	1/2"	12.700	1/2"	3"	1"	.020"	-	-
50809	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-
50811	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
50810	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
50815	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
50813	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
50820	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.090"	-	-
50825	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.010"	-	-
50817	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-
50830	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-
50819	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.030"	-	-
50835	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	-
50836	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-
50821	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	1-1/2"	.475"
50823	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-
50840	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-
50827	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-
50829	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-
50845	.6250	5/8"	15.875	5/8"	4"	2-1/8"	.030"	-	-
50831	.6250	5/8"	15.875	5/8"	6"	2-1/2"	.030"	-	-
50833	.6299		16.000	16.0	100	40	0.50	-	-
50837	.6299		16.000	16.0	100	40	1.00	-	-

† *Metric equivalents are for reference only*

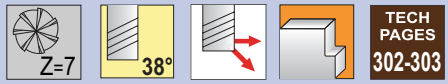
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
50839	.7500	3/4"	19.050	3/4"	3"	7/8"	-	-	-
50841	.7500	3/4"	19.050	3/4"	3"	7/8"	.030"	-	-
50843	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-
50847	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-
50850	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-
50849	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-
50851	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-
50855	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.030"	-	-
50853	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.030"	-	-
50857	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.030"	-	-
50859	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.015"	-	-
50861	.7500	3/4"	19.050	3/4"	5"	2-3/4"	.030"	-	-
50863	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-
50860	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-
50867	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.015"	-	-
50869	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-	-
50871	1.000	1"	25.400	1"	5"	2-5/8"	.030"	-	-
50873	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	-

Series VX-7 NEW ITEMS

.3150" - .4724"
(8.000mm - 12.000mm)

HIGH EFFICIENCY MILLING

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



TECH PAGES 302-303

Square End, Corner Radius - BALIQ® ALCRONOS Coating (AlCrN-based)

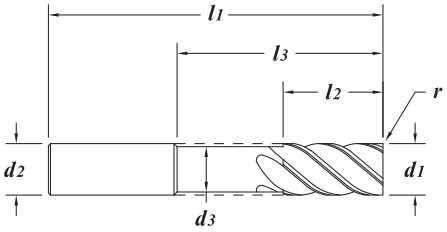
Ohne Eckenradius, Eckenradius - BALIQ® ALCRONOS Beschichtet (AlCrN-Basierende)

Extremo Sin Radio, Ángulo Redondeado - Recubrimiento BALIQ® ALCRONOS (Basado en AlCrN)

Extrémité Carré, Rayon de Coin - BALIQ® ALCRONOS Revêtement (à base de AlCrN)

Piatte, Raggio - BALIQ® ALCRONOS Rivestimento (in Base AlCrN)

平头, 圆角半径 - 涂层 BALIQ® ALCRONOS (铝氮化铬)



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - non-center cutting
Engineered for High Efficiency Milling
Recommended for titanium, stainless steel, and tool steels (< 45Rc)
Multiple flutes for increased feed rates
Staggered flute geometry
PCT (Polish Carbide Treatment) enhances tool life
Up to 15% (ae) Radial engagement

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - ohne zentrumsschnitt
Entwickelt für hocheffizientes Fräsen
Empfohlen für Titan, Rostfreie Stahl, und Werkzeugstähle (<45HRc)
Mehr Zähne für höhere Vorschube
Spezielles Spannut-Design
PCT (Polish Carbide Treatment, Treatment zum Polieren Hartmetall) steigert die Stanzeit
Bis zu 15% radialen (ae) eintauchen

Fresa de submicrograno sólido carburo de alto rendimiento - no corte centrado
Diseñado para el fresado de alta eficiencia
Recomendado para Titanio, Acero Inoxidable, y Aceros Herramienta (<45 Rc)
Múltiples labios para aumentar las gamas de avance
Labios escalonados
PCT (Polish Carbide Treatment, Tratamiento de pulido) aumenta la vida
Hasta 15% radial (ae)

Fraises carbure submicrograin - pas de coupe au centre
Conçu pour un fraisage à haute efficacité
Recommandé pour les titane, aciers inoxydables, et aciers a outils (<45 HRC)
Fraise multi-lèvres pour de plus grandes avances
Une denture variable réduit les vibrations
PCT (le traitement pour polir le carbure) améliore la durée de vie de l'outil
Jusqu'à 15% amorce radiale (ae)

Fresa sub-micrograno metallo duro - no taglio al centro
Progettato per la fresatura ad alta efficienza
Raccomandata per lavorazioni su Titanio, Acciai su inox, e Acciaio per utensili (<45 Hrc)
Taglienti multipli per alti avanzamenti
Taglienti sfalsati per controllare le forze
PCT (Polish Carbide Treatment, trattamento di lucidatura del metallo duro) incrementa la vita utensile
Fino a 15% radiale (ae)

高效超细晶粒整体硬质合金立铣刀 - 不切割在中心
有效的攀線 銑削
推荐加工钛，不锈钢，和工具钢 (<45HRC)
多刃提高进给率
整个切削刃的螺旋角可变
PCT(硬质合金抛光处理) 使刀具寿命提高
设计并已试加工0.15倍径切削宽度

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
64100	.3150		8.000	8.0	65	22	-	-	-
64102	.3150		8.000	8.0	65	22	0.50	-	-
64104	.3150		8.000	8.0	65	22	1.00	-	-
64105	.3150		8.000	8.0	75	27	1.60	-	-
64106	.3150		8.000	8.0	75	32	-	-	-
64108	.3150		8.000	8.0	75	32	0.50	-	-
64110	.3150		8.000	8.0	75	32	1.00	-	-
64267	.3750	3/8"	9.525	3/8"	2"	5/8"	-	-	-
64268	.3750	3/8"	9.525	3/8"	2"	5/8"	.010"	-	-
64269	.3750	3/8"	9.525	3/8"	2"	5/8"	.015"	-	-
64270	.3750	3/8"	9.525	3/8"	2"	5/8"	.020"	-	-
64271	.3750	3/8"	9.525	3/8"	2"	5/8"	.030"	-	-
64112	.3750	3/8"	9.525	3/8"	2-1/2"	1"	-	-	-
64114	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.020"	-	-
64116	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.030"	-	-
64117	.3750	3/8"	9.525	3/8"	3"	1"	.025"	-	-
64118	.3750	3/8"	9.525	3/8"	3"	1-1/2"	-	-	-
64120	.3750	3/8"	9.525	3/8"	3"	1-1/2"	.020"	-	-
64122	.3750	3/8"	9.525	3/8"	3"	1-1/2"	.030"	-	-
64123	.3750	3/8"	9.525	3/8"	3"	1-1/2"	.060"	-	-
64246	.3750	3/8"	9.525	3/8"	4"	7/8"	.015"	1-7/8"	.355"
64124	.3937		10.000	10.0	70	25	-	-	-
64126	.3937		10.000	10.0	70	25	0.50	-	-
64128	.3937		10.000	10.0	70	25	1.00	-	-
64130	.4724		12.000	12.0	75	26	-	-	-
64132	.4724		12.000	12.0	75	26	0.50	-	-
64134	.4724		12.000	12.0	75	26	1.00	-	-
64136	.4724		12.000	12.0	75	32	-	-	-
64138	.4724		12.000	12.0	75	32	0.50	-	-
64140	.4724		12.000	12.0	75	32	1.00	-	-
64141	.4724		12.000	12.0	100	42	1.00	-	-
64142	.4724		12.000	12.0	100	50	-	-	-
64144	.4724		12.000	12.0	100	50	0.50	-	-
64146	.4724		12.000	12.0	100	50	1.00	-	-

† *Metric equivalents are for reference only*

	EDP#	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
	64218	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-
	64220	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"	-	-
	64222	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-
	64223	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"	-	-
	64224	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-
	64226	.5000	1/2"	12.700	1/2"	3"	1"	.015"	-	-
	64228	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-
	64148	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-
	64150	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
	64152	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
	64154	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
	64156	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
	64157	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-
	64158	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	-	-	-
	64160	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.030"	-	-
	64161	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	2-1/8"	.475"
	64242	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-
	64244	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.015"	-	-
	64162	.5000	1/2"	12.700	1/2"	4"	2"	-	-	-
	64163	.5000	1/2"	12.700	1/2"	4"	2"	.015"	-	-
	64164	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-
	64165	.5000	1/2"	12.700	1/2"	4"	2"	.125"	-	-
	64248	.5512		14.000	14.0	88	32	0.50	-	-
	64166	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-
	64168	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-
	64170	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-
NEW	64171	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-
	64172	.6250	5/8"	15.875	5/8"	4"	1-3/4"	-	-	-
	64174	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.030"	-	-
	64176	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.060"	-	-
	64177	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.120"	-	-
	64250	.6250	5/8"	15.875	5/8"	4"	2"	.120"	-	-
	64178	.6299		16.000	16.0	88	32	-	-	-
	64180	.6299		16.000	16.0	88	32	0.50	-	-
	64182	.6299		16.000	16.0	88	32	1.00	-	-
	64230	.6299		16.000	16.0	88	32	2.00	-	-
	64231	.6299		16.000	16.0	100	40	1.00	-	-
	64232	.6299		16.000	16.0	100	40	1.50	-	-
	64234	.6299		16.000	16.0	125	65	0.50	-	-
	64236	.6299		16.000	16.0	125	65	3.00	-	-

continued →

Series VX-7 *(continued)*

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

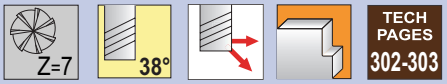
	EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	64252	.7500	3/4"	19.050	3/4"	3"	1"	-	-	-
	64254	.7500	3/4"	19.050	3/4"	3"	1"	.030"	-	-
	64184	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-
	64186	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-
	64188	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-
	64190	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-
	64256	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-
	64258	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-
	64260	.7500	3/4"	19.050	3/4"	5"	1"	.030"	3"	.730"
	64192	.7500	3/4"	19.050	3/4"	5"	2-1/4"	-	-	-
	64194	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.030"	-	-
	64238	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.060"	-	-
NEW	64262	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.120"	-	-
	64264	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.060"	-	-
	64266	.7500	3/4"	19.050	3/4"	6"	1-1/8"	.120"	3-5/8"	.730"
	64196	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-
	64198	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-
	64200	.7874		20.000	20.0	100	38	-	-	-
	64202	.7874		20.000	20.0	100	38	0.50	-	-
	64204	.7874		20.000	20.0	100	38	1.00	-	-
	64206	1.000	1"	25.400	1"	4"	1-1/2"	-	-	-
	64208	1.000	1"	25.400	1"	4"	1-1/2"	.030"	-	-
	64240	1.000	1"	25.400	1"	4"	1-1/2"	.125"	-	-
	64210	1.000	1"	25.400	1"	5"	2"	-	-	-
	64212	1.000	1"	25.400	1"	5"	2-1/2"	-	-	-
	64213	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-	-
	64214	1.000	1"	25.400	1"	6"	3-1/4"	-	-	-
	64216	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	-

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

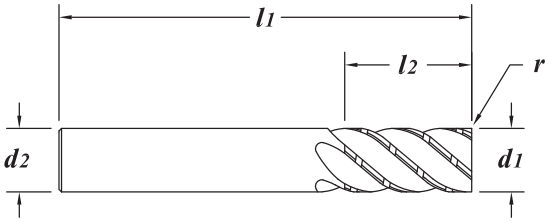
TOLERANCES	
d_1	+.000 –.050mm (+.000" –.002")
d_2	h6
r	+.025 –.025mm (+.001" –.001")

HIGH EFFICIENCY MILLING



TECH PAGES 302-303

Square End, Corner Radius - BALIQ® ALCRONOS Coating (AlCrN-based)
Ohne Eckenradius, Eckenradius - BALIQ® ALCRONOS Beschichtet (AlCrN-Basierende)
Extremo Sin Radio, Ángulo Redondeado - Recubrimiento BALIQ® ALCRONOS (Basado en AlCrN)
Extrémité Carré, Rayon de Coin - BALIQ® ALCRONOS Revêtement (à base de AlCrN)
Piatte, Raggio - BALIQ® ALCRONOS Rivestimento (in Base AlCrN)
平头, 圆角半径 - 涂层 BALIQ® ALCRONOS (铝氮化铬)



Solid submicron grain carbide end mill - non-center cutting
Chip splitter to help break long chips
Engineered for High Efficiency Milling
Recommended for titanium, stainless steel, and tool steels (< 45Rc)
Multiple flutes for increased feed rates
Staggered flute geometry
PCT (Polish Carbide Treatment) enhances tool life
Up to 15% (ae) Radial engagement

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - ohne zentrumsschnitt
Spänespalter zum Brechen langer Späne
Entwickelt für hocheffizientes Fräsen
Empfohlen für Titan, Rostfreie Stahl, und Werkzeugstähle (<45HRc)
Mehr Zähne für höhere Vorschube
Spezielles Spannut-Design
PCT (Polish Carbide Treatment, Treatment zum Polieren Hartmetall) steigert die Stanzeit
Bis zu 15% radialen (ae) eintauchen

Fresa de submicrograno sólido carburo de alto rendimiento - no corte centrado
Divisor de virutas para ayudar a romper virutas largas
Diseñado para el fresado de alta eficiencia
Recomendado para Titanio, Acero Inoxidable, y Aceros Herramienta (<45 Rc)
Múltiples labios para aumentar las gamas de avance
Labios escalonados
PCT (Polish Carbide Treatment, Tratamiento de pulido) aumenta la vida
Hasta 15% radial (ae)

Fraises carbure submicrograin - pas de coupe au centre
Séparateur de copeaux pour aider à briser les copeaux longs
Conçu pour un fraisage à haute efficacité
Recommandé pour les titane, aciers inoxydables, et aciers a outils (<45 HRC)
Fraise multi-lèvres pour de plus grandes avances
Une denture variable réduit les vibrations
PCT (le traitement pour polir le carbure) améliore la durée de vie de l'outil
Jusqu'à 15% amorce radiale (ae)

Fresa sub-micrograno metallo duro - no taglio al centro
Spaccatrucioli per aiutare a rompere i trucioli lunghi
Progettato per la fresatura ad alta efficienza
Raccomandata per lavorazioni su Titanio, Acciai su inox, e Acciaio per utensili (<45 Hrc)
Taglienti multipli per alti avanzamenti
Taglienti sfalsati per controllare le forze
PCT (Polish Carbide Treatment, trattamento di lucidatura del metallo duro) incrementa la vita utensile
Fino a 15% radiale (ae)

高效超细晶粒整体硬质合金立铣刀 - 不切割在中心
切屑分离器有助于分解长切屑
专为高效铣削而设计
推荐加工钛，不锈钢，和工具钢 (<45HRC)
多刃提高进给率
整个切削刃的螺旋角可变
PCT (硬质合金抛光处理) 使刀具寿命提高
设计并已试加工0.15倍径切削宽度

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
64300	.3750	3/8"	9.525	3/8"	2-1/2"	1"	-
64302	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.020"
64304	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.030"
64310	.4724		12.000	12.0	100	50	0.50
64316	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"
64318	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"
64322	.5000	1/2"	12.700	1/2"	3"	1"	.030"
64330	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"
64332	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"
64338	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	-
64342	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.030"
64346	.5000	1/2"	12.700	1/2"	4"	2"	-
64348	.5000	1/2"	12.700	1/2"	4"	2"	.030"
64352	.5000	1/2"	12.700	1/2"	4"	2"	.125"
64360	.6250	5/8"	15.875	5/8"	4"	1-3/4"	-
64364	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.030"
64368	.6299		16.000	16.0	100	40	0.75
64369	.6299		16.000	16.0	100	40	1.00
64372	.6299		16.000	16.0	100	50	1.00
64380	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"
64386	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"
64389	.7874		20.000	20.0	100	38	0.50
64400	1.000	1"	25.400	1"	5"	2-1/2"	.030"

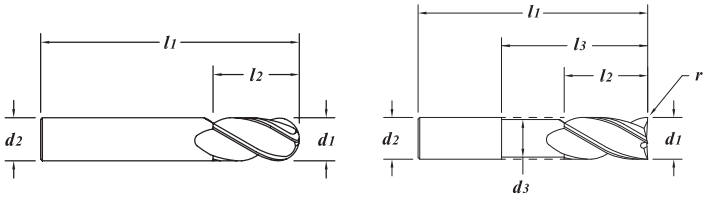
Series VRX

NEW ITEMS

.0591" - .1181"
(1.500mm - 3.000mm)

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

Square End, Corner Radius, Ball End - AlTiN Coated
Ohne Eckenradius, Eckenradius, Vollradius - AlTiN-Beschichtet
Extremo Sin Radio, Ángulo Redondeado, Cabeza Esférica - Recubrimiento de AlTiN
Extrémité Carré, Rayon de Coin, Hemispherique - Revêtement AlTiN
Piatte, Raggio, Sferica - Rivestimento in AlTiN
平头, 圆角半径, 球头 - AlTiN 涂层



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
Engineered for High Efficiency Milling
Reduces vibration for more aggresive machining resulting in less cycle times and greater productivity
Recommended for stainless steel, inconel, pH materials, titanium and tool steels
Variable 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

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Entwickelt für hocheffizientes Fräsen
Reduziert Vibrationen für eine aggressivere Bearbeitung, um Bearbeitungszeit zu reduzieren und eine grössere Produktivität zu erzielen
Empfohlen für Rostfreien Stahl, Inconel, Pulvermetalle, Titan, und Werkzeugstähle
Variable Spannut-Geometrie
Die Kombination einer verlängerten Spannutlänge mit einer Weldon-Spannfläche kann die Ursachebei Spannut-Auswaschungen bei einigen Fräserspannfuttern sein

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Diseñado para el fresado de alta eficiencia
Reduce las vibraciones hasta en los más agresivos mecanizados, obteniéndose bajos tiempos de ciclo y mayor productividad
Recomendado para acero inoxidable, inconel, materiales pH, acero laminado en frio, hierro de fundición y aceros herramienta
Geometria variable de ranura de viruta
La combinación de una gran longitud de corte con un mango con plano Weldon puede causar que del labio alcance el interior de algunos portaherramientas

Fraises carbure submicrograin - coupe au centre
Conçu pour un fraisage à haute efficacité
Reduction des vibrations pour un fraisage plus agressif resultant des temps de cycles plus court et une meilleure productivite
Recommandee pour les aciers inoxydables, Inconel, inoxs pH, aciers a outils, aciers forges, titane, fonts et aciers a outils
Géometrie variable de la helix
La combinaison d'une grande longueur de goujure avec une queue Weldon peut causer des vibrations qui peuvent se prolonger dans le mandrin

Fresa sub-micrograno metallo duro - taglio al centro
Progettato per la fresatura ad alta efficienza
Riduzioni delle vibrazioni per lavorazioni aggressive per ridurre il tempo ciclo ed aumentare la produttività
Raccomandata per lavorazioni su inox, inconel, titanio e acciai per utensili
Geometria ad elica variabile
Estendere la lunghezza del tagliente su un attacco Weldon può causare la rottura dell'utensile in alcune applicazioni

超细晶粒整体硬质合金立铣刀 - 中心切削
高性能铣削的標準
适合更高速度，更大进给的加工，可以减少振动，减少加工时间，提高生产效率
推荐加工不锈钢、铬镍铁耐热耐蚀合金、含磷材质、钛钢 和工具钢
不等分刃设计
过长的刀刃结合侧固槽的刀具可能会导致刀具夹头受到冲击而损坏

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
61084	-	.0591		1.500	3.0	38	3.0	-	-	-
61086	-	.0591		1.500	3.0	38	3.0	0.20	-	-
61088	-	.0591		1.500	3.0	38	3.0	BALL	-	-
61090	-	.0591		1.500	3.0	38	6.0	-	-	-
61092	-	.0591		1.500	3.0	38	6.0	0.20	-	-
61094	-	.0591		1.500	3.0	38	6.0	BALL	-	-
61096	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	-	-	-
61098	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	.010"	-	-
61100	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	BALL	-	-
61102	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	-	-	-
61104	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.010"	-	-
61106	-	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	BALL	-	-
61108	-	.0787		2.000	3.0	38	4.0	-	-	-
61110	-	.0787		2.000	3.0	38	4.0	0.20	-	-
61112	-	.0787		2.000	3.0	38	4.0	BALL	-	-
61114	-	.0787		2.000	3.0	38	8.0	-	-	-
61116	-	.0787		2.000	3.0	38	8.0	0.20	-	-
61118	-	.0787		2.000	3.0	38	8.0	BALL	-	-
61120	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	-	-	-
61122	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	.010"	-	-
61124	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	BALL	-	-
61126	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	-	-	-
61128	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.010"	-	-
61130	-	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	BALL	-	-
61877	-	.1181		3.000	3.0	38	8	-	-	-
27420	-	.1181		3.000	3.0	50	8	0.20	-	-
61132	-	.1181		3.000	3.0	50	8	0.30	-	-
27425	-	.1181		3.000	3.0	50	8	0.50	-	-
61134	-	.1181		3.000	3.0	50	8	BALL	-	-
61887	-	.1181		3.000	3.0	38	12	-	-	-
27430	-	.1181		3.000	3.0	50	12	0.20	-	-
61136	-	.1181		3.000	3.0	50	12	0.30	-	-
27435	-	.1181		3.000	3.0	50	12	0.50	-	-
61138	-	.1181		3.000	3.0	50	12	BALL	-	-

† *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
61917	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	-	-	-
27440	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"	-	-
61140	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.015"	-	-
61073		.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.030"	-	-
61142	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	BALL	-	-
61144	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	-	-	-
61146	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	.010"	-	-
61148	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	.015"	-	-
61074		.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	.030"	-	-
61149	-	.1250	1/8"	3.175	1/8"	1-1/2"	3/8"	BALL	-	-
61927	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	-	-	-
27450	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	-	-
61150	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"	-	-
27455	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	-	-
61075		.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.030"	-	-
61152	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	BALL	-	-
61154	-	.1562	5/32"	3.967	3/16"	2"	5/16"	-	-	-
27460	-	.1562	5/32"	3.967	3/16"	2"	5/16"	.010"	-	-
61156	-	.1562	5/32"	3.967	3/16"	2"	5/16"	.015"	-	-
61076		.1562	5/32"	3.967	3/16"	2"	5/16"	.030"	-	-
61077		.1562	5/32"	3.967	3/16"	2"	5/16"	BALL	-	-
61158	-	.1562	5/32"	3.967	3/16"	2"	1/2"	-	-	-
27470	-	.1562	5/32"	3.967	3/16"	2"	1/2"	.010"	-	-
61160	-	.1562	5/32"	3.967	3/16"	2"	1/2"	.015"	-	-
61078		.1562	5/32"	3.967	3/16"	2"	1/2"	.030"	-	-
61079		.1562	5/32"	3.967	3/16"	2"	1/2"	BALL	-	-
61162	-	.1575		4.000	6.0	50	8	-	-	-
27480	-	.1575		4.000	6.0	50	8	0.30	-	-
61164	-	.1575		4.000	6.0	50	8	0.50	-	-
28470	-	.1575		4.000	6.0	50	8	BALL	-	-
61977	-	.1575		4.000	6.0	50	12	-	-	-
27490	-	.1575		4.000	6.0	50	12	0.30	-	-
27495	-	.1575		4.000	6.0	50	12	0.50	-	-
28480	-	.1575		4.000	6.0	50	12	BALL	-	-
61166	-	.1575		4.000	6.0	65	19	-	-	-
61168	-	.1575		4.000	6.0	65	19	0.30	-	-
62007	-	.1875	3/16"	4.763	3/16"	2"	5/16"	-	-	-
27500	-	.1875	3/16"	4.763	3/16"	2"	5/16"	.010"	-	-
61170	-	.1875	3/16"	4.763	3/16"	2"	5/16"	.015"	-	-
61172	-	.1875	3/16"	4.763	3/16"	2"	5/16"	.020"	-	-
28490	-	.1875	3/16"	4.763	3/16"	2"	5/16"	BALL	-	-
61174	-	.1875	3/16"	4.763	3/16"	2"	7/16"	-	-	-
61176	-	.1875	3/16"	4.763	3/16"	2"	7/16"	.010"	-	-
61178	-	.1875	3/16"	4.763	3/16"	2"	7/16"	.015"	-	-
62017	-	.1875	3/16"	4.763	3/16"	2"	9/16"	-	-	-
27520	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-	-
61180	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.015"	-	-
27521	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	-	-
61182	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.030"	-	-
28500	-	.1875	3/16"	4.763	3/16"	2"	9/16"	BALL	-	-
61184	-	.1875	3/16"	4.763	3/16"	3"	1"	.010"	-	-
61186	-	.1875	3/16"	4.763	3/16"	3"	1-1/4"	.010"	-	-
63100	-	.1875	3/16"	4.763	3/16"	4"	5/16"	.010"	-	-
61188	-	.1969		5.000	6.0	50	10	-	-	-
27522	-	.1969		5.000	6.0	50	10	0.30	-	-
61190	-	.1969		5.000	6.0	50	10	0.50	-	-
28510	-	.1969		5.000	6.0	50	10	BALL	-	-

continued →

Series VRX *(continued)*

.1969" - .2500"
(5.000mm - 6.350mm)

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
62057	-	.1969		5.000	6.0	65	15	-	-	-
27524	-	.1969		5.000	6.0	65	15	0.30	-	-
27526	-	.1969		5.000	6.0	65	15	0.50	-	-
27528	-	.1969		5.000	6.0	65	15	1.00	-	-
28520	-	.1969		5.000	6.0	65	15	BALL	-	-
63110	-	.1969		5.000	6.0	100	10	0.30	-	-
61192	-	.1969		5.000	6.0	100	10	0.30	55	4.70
61194	-	.2188	7/32"	5.558	1/4"	2"	3/8"	-	-	-
61196	-	.2188	7/32"	5.558	1/4"	2"	3/8"	.010"	-	-
27525	-	.2188	7/32"	5.558	1/4"	2"	3/8"	.015"	-	-
61198	-	.2188	7/32"	5.558	1/4"	2"	3/8"	BALL	-	-
61200	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	-	-	-
61202	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.010"	-	-
27530	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.015"	-	-
61204	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.020"	-	-
61206	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	BALL	-	-
61208	-	.2188	7/32"	5.558	1/4"	3"	1-1/4"	.015"	-	-
63120	-	.2188	7/32"	5.558	1/4"	4"	3/8"	.015"	-	-
61210	-	.2188	7/32"	5.558	1/4"	4"	3/8"	.015"	2-1/4"	.205"
62077	-	.2362		6.000	6.0	50	12	-	-	-
27535	-	.2362		6.000	6.0	50	12	0.30	-	-
61212	-	.2362		6.000	6.0	50	12	0.50	-	-
61214	-	.2362		6.000	6.0	50	12	0.75	-	-
28530	-	.2362		6.000	6.0	50	12	BALL	-	-
62087	-	.2362		6.000	6.0	65	19	-	-	-
61216	-	.2362		6.000	6.0	65	19	0.20	-	-
27540	-	.2362		6.000	6.0	65	19	0.30	-	-
27545	-	.2362		6.000	6.0	65	19	0.50	-	-
61218	-	.2362		6.000	6.0	65	19	0.75	-	-
27547	-	.2362		6.000	6.0	65	19	1.00	-	-
27548	-	.2362		6.000	6.0	65	19	1.50	-	-
28540	-	.2362		6.000	6.0	65	19	BALL	-	-
61220	-	.2362		6.000	6.0	75	26	0.30	-	-
61222	-	.2362		6.000	6.0	75	26	0.50	-	-
61224	-	.2362		6.000	6.0	75	38	0.30	-	-
61226	-	.2362		6.000	6.0	75	38	0.50	-	-
63130	-	.2362		6.000	6.0	100	12	0.30	32	5.70
62137	-	.2500	1/4"	6.350	1/4"	2"	3/8"	-	-	-
61228	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.010"	-	-
27560	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"	-	-
61230	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	-
28570	-	.2500	1/4"	6.350	1/4"	2"	3/8"	BALL	-	-
61232	-	.2500	1/4"	6.350	1/4"	2"	1/2"	-	-	-
61234	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"	-	-
62147	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	-
27570	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-
27580	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-
61236	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-
27581	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-
61238	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.040"	-	-
27583	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	-	-
28580	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	BALL	-	-

† *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
61240	-	.2500	1/4"	6.350	1/4"	3"	1"	.015"	-	-
61241	-	.2500	1/4"	6.350	1/4"	3"	1-1/8"	.030"	-	-
61242	-	.2500	1/4"	6.350	1/4"	3"	1-1/2"	.015"	-	-
61244	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	3/4"	.240"
63140	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	1-1/4"	.240"
61246	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	2-1/8"	.240"
27585	-	.2756		7.000	8.0	50	12	0.30	-	-
27590	-	.2756		7.000	8.0	65	22	0.30	-	-
61248	-	.2812	9/32"	7.142	5/16"	2"	7/16"	-	-	-
27595	-	.2812	9/32"	7.142	5/16"	2"	7/16"	.015"	-	-
61250	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	-	-	-
61252	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.010"	-	-
27597	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.015"	-	-
61254	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.020"	-	-
63150	-	.2812	9/32"	7.142	5/16"	4"	7/16"	.015"	-	-
62207	-	.3125	5/16"	7.938	5/16"	2"	7/16"	-	-	-
61256	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.010"	-	-
61258	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.015"	-	-
27600	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-	-
61260	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.030"	-	-
28610	-	.3125	5/16"	7.938	5/16"	2"	7/16"	BALL	-	-
62217	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	-	-	-
27610	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.010"	-	-
61262	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.015"	-	-
27620	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	-
27622	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	-	-
61264	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.040"	-	-
27624	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.060"	-	-
28620	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	BALL	-	-
61266	-	.3125	5/16"	7.938	5/16"	3"	1-1/4"	.015"	-	-
63160	-	.3125	5/16"	7.938	5/16"	4"	7/16"	.020"	1-7/8"	.300"
62257	-	.3150		8.000	8.0	50	12	-	-	-
61268	-	.3150		8.000	8.0	50	12	0.30	-	-
27630	-	.3150		8.000	8.0	50	12	0.50	-	-
61270	-	.3150		8.000	8.0	50	12	0.75	-	-
28630	-	.3150		8.000	8.0	50	12	BALL	-	-
62267	-	.3150		8.000	8.0	65	22	-	-	-
27635	-	.3150		8.000	8.0	65	22	0.30	-	-
27640	-	.3150		8.000	8.0	65	22	0.50	-	-
61272	-	.3150		8.000	8.0	65	22	0.75	-	-
27642	-	.3150		8.000	8.0	65	22	1.00	-	-
27643	-	.3150		8.000	8.0	65	22	1.50	-	-
61274	-	.3150		8.000	8.0	65	22	2.00	-	-
28640	-	.3150		8.000	8.0	65	22	BALL	-	-
61276	-	.3150		8.000	8.0	75	38	0.50	-	-
61278	-	.3150		8.000	8.0	100	50	0.50	-	-
63170	-	.3150		8.000	8.0	100	12	0.50	47	7.60
61280	-	.3438	11/32"	8.733	3/8"	2"	1/2"	-	-	-
27645	-	.3438	11/32"	8.733	3/8"	2"	1/2"	.020"	-	-
61282	-	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	-	-	-
27650	-	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	.020"	-	-
61284	-	.3438	11/32"	8.733	3/8"	3"	1-1/4"	.015"	-	-

continued →

Series VRX *(continued)*

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

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

TECH PAGES 294-295

Square End, Corner Radius, Ball End - AlTiN Coated
Ohne Eckenradius, Eckenradius, Vollradius - AlTiN-Beschichtet
Extremo Sin Radio, Ángulo Redondeado, Cabeza Esférica - Recubrimiento de AlTiN
Extrémité Carré, Rayon de Coin, Hemispherique - Revêtement AlTiN
Piatte, Raggio, Sferica - Rivestimento in AlTiN
平头, 圆角半径, 球头 - AlTiN 涂层

MATERIAL HARDNESS (Rc)
70
35
0

	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
	63180	-	.3438	11/32"	8.733	3/8"	4"	1/2"	.020"	-	-
	27655	-	.3543		9.000	10.0	50	14	0.50	-	-
	62287	-	.3543		9.000	10.0	65	22	-	-	-
	27657	-	.3543		9.000	10.0	65	22	0.50	-	-
	62317	-	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	-
	27658	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.010"	-	-
	61286	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.015"	-	-
	27660	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-
	27662	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"	-	-
	61288	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.060"	-	-
	28670	-	.3750	3/8"	9.525	3/8"	2"	1/2"	BALL	-	-
NEW	28676	-	.3750	3/8"	9.525	3/8"	2"	5/8"	.045"	-	-
	62327	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-	-
	27670	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	-	-
	61290	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	-	-
	27680	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	-	-
	27682	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	-
	61292	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.040"	-	-
	61294	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.050"	-	-
	27684	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	-	-
	61296	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.094"	-	-
	28680	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	BALL	-	-
	61298	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.015"	-	-
	61299	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"	-	-
	61300	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.015"	-	-
	61302	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	BALL	-	-
	61304	-	.3750	3/8"	9.525	3/8"	4"	2"	.015"	-	-
	61306	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.015"	1-1/8"	.360"
	63190	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.020"	1-7/8"	.360"
	61308	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.015"	2-1/8"	.360"
	61310	-	.3750	3/8"	9.525	3/8"	6"	1/2"	.015"	3-1/8"	.360"
	61312	-	.3937		10.000	10.0	50	16	-	-	-
	27690	-	.3937		10.000	10.0	50	16	0.50	-	-
	61314	-	.3937		10.000	10.0	50	16	1.00	-	-
	28690	-	.3937		10.000	10.0	50	16	BALL	-	-
	62397	-	.3937		10.000	10.0	70	22	-	-	-
	27698	-	.3937		10.000	10.0	70	22	0.30	-	-
	27700	-	.3937		10.000	10.0	70	22	0.50	-	-
	61316	-	.3937		10.000	10.0	70	22	0.75	-	-
	27702	-	.3937		10.000	10.0	70	22	1.00	-	-
	28700	-	.3937		10.000	10.0	70	22	BALL	-	-
	61318	-	.3937		10.000	10.0	70	32	0.50	-	-
	61320	-	.3937		10.000	10.0	100	38	0.50	-	-
	61322	-	.3937		10.000	10.0	100	50	0.50	-	-
	63200	-	.3937		10.000	10.0	100	14	0.50	47	9.50

† *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
27705	-	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.020"	-	-
28705	-	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	BALL	-	-
62437	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	-	-	-
27708	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	.010"	-	-
27710	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	.020"	-	-
28710	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	BALL	-	-
63210	-	.4375	7/16"	11.113	7/16"	6"	1"	.020"	-	-
62475	-	.4724		12.000	12.0	65	19	-	-	-
27712	-	.4724		12.000	12.0	65	19	0.30	-	-
27715	-	.4724		12.000	12.0	65	19	0.50	-	-
28715	-	.4724		12.000	12.0	65	19	BALL	-	-
61324	-	.4724		12.000	12.0	75	26	-	-	-
61326	-	.4724		12.000	12.0	75	26	0.50	-	-
62485	-	.4724		12.000	12.0	75	32	-	-	-
27718	-	.4724		12.000	12.0	75	32	0.30	-	-
27720	-	.4724		12.000	12.0	75	32	0.50	-	-
61328	-	.4724		12.000	12.0	75	32	0.75	-	-
27722	-	.4724		12.000	12.0	75	32	1.00	-	-
27730	-	.4724		12.000	12.0	75	32	1.50	-	-
27735	-	.4724		12.000	12.0	75	32	2.00	-	-
61330	-	.4724		12.000	12.0	75	32	3.00	-	-
28720	-	.4724		12.000	12.0	75	32	BALL	-	-
61332	-	.4724		12.000	12.0	100	38	-	-	-
61334	-	.4724		12.000	12.0	100	38	0.50	-	-
61336	-	.4724		12.000	12.0	100	42	-	-	-
61338	-	.4724		12.000	12.0	100	42	0.50	-	-
61340	-	.4724		12.000	12.0	100	52	-	-	-
61342	-	.4724		12.000	12.0	100	52	0.50	-	-
63220	-	.4724		12.000	12.0	150	19	0.50	57	11.50
62525	62527	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-
27739	27738	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-
61344	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"	-	-
27741	27740	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-
27743	27742	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-
61346	-	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"	-	-
28751	28750	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	BALL	-	-
61348	-	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-
61350	-	.5000	1/2"	12.700	1/2"	3"	1"	.015"	-	-
61352	-	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-
61354	-	.5000	1/2"	12.700	1/2"	3"	1"	.060"	-	-
61356	-	.5000	1/2"	12.700	1/2"	3"	1"	.125"	-	-
61358	-	.5000	1/2"	12.700	1/2"	3"	1"	BALL	-	-
62535	62537	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-
27751	27750	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-
61360	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
27761	27760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
27763	27762	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
61362	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.040"	-	-
61364	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.050"	-	-
27767	27764	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
61366	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.078"	-	-
63398	63399	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.090"	-	-

continued →

Series VRX *(continued)*

.5000" - .6250"
(12.700mm - 15.875mm)

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
61368	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.094"	-	-
61370	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.100"	-	-
27769	27768	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-
61372	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-
28761	28760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	BALL	-	-
28771	28770	.5000	1/2"	12.700	1/2"	4"	5/8"	BALL	-	-
61374	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	-	-	-
63401	63400	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.010"	-	-
61376	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.015"	-	-
63411	63410	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-
63421	63420	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.060"	-	-
63424	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.125"	-	-
61378	-	.5000	1/2"	12.700	1/2"	4"	1-1/2"	BALL	-	-
61380	-	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.015"	-	-
61382	-	.5000	1/2"	12.700	1/2"	4"	1-3/4"	.015"	-	-
62565	62567	.5000	1/2"	12.700	1/2"	4"	2"	-	-	-
63431	63430	.5000	1/2"	12.700	1/2"	4"	2"	.010"	-	-
61384	-	.5000	1/2"	12.700	1/2"	4"	2"	.015"	-	-
63441	63440	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-
63451	63450	.5000	1/2"	12.700	1/2"	4"	2"	.060"	-	-
61386	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.015"	-	-
63241	63240	.5000	1/2"	12.700	1/2"	6"	2"	.020"	-	-
61388	-	.5000	1/2"	12.700	1/2"	6"	2-1/2"	.015"	-	-
61390	-	.5000	1/2"	12.700	1/2"	6"	2-1/2"	.030"	-	-
61392	-	.5000	1/2"	12.700	1/2"	6"	3-1/4"	.030"	-	-
61394	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	1-1/2"	.480"
61396	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	2-1/4"	.480"
63231	63230	.5000	1/2"	12.700	1/2"	4"	5/8"	.020"	2-1/4"	.480"
61398	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.015"	3-3/8"	.480"
61400	-	.5000	1/2"	12.700	1/2"	6"	5/8"	.015"	4-1/8"	.480"
27766	27765	.5512		14.000	14.0	75	19	0.50	-	-
28781	28780	.5512		14.000	14.0	75	19	BALL	-	-
27771	27770	.5512		14.000	14.0	88	32	0.50	-	-
28786	28785	.5512		14.000	14.0	88	32	BALL	-	-
63261	63260	.5512		14.000	14.0	150	50	0.50	-	-
63251	-	.5512		14.000	14.0	150	19	0.50	57	13.50
62625	62627	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	-	-	-
61402	-	.6250	5/8"	15.875	5/8"	3"	3/4"	-	-	-
63461	63460	.6250	5/8"	15.875	5/8"	3"	3/4"	.010"	-	-
61404	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.015"	-	-
27781	27780	.6250	5/8"	15.875	5/8"	3"	3/4"	.025"	-	-
61406	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.060"	-	-
28796	28795	.6250	5/8"	15.875	5/8"	3"	3/4"	BALL	-	-
62655	62657	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-
27791	27790	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	-	-
61408	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-
61410	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-
27801	27800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.025"	-	-
61412	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-
61414	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.040"	-	-
27803	27802	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-
61416	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.078"	-	-
61418	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.094"	-	-
27805	27804	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-
61420	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.125"	-	-
28801	28800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	BALL	-	-

† *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
61422	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	-	-	-
63501	63500	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.010"	-	-
61424	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.015"	-	-
63511	63510	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.030"	-	-
63521	63520	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.060"	-	-
61426	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-
61428	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.015"	-	-
61430	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-
61432	-	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.060"	-	-
62675	62677	.6250	5/8"	15.875	5/8"	4"	1-3/4"	-	-	-
63531	63530	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.010"	-	-
63541	63540	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.030"	-	-
63551	63550	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.060"	-	-
63281	63280	.6250	5/8"	15.875	5/8"	6"	2"	.025"	-	-
63283	-	.6250	5/8"	15.875	5/8"	6"	2"	.090"	-	-
63285	-	.6250	5/8"	15.875	5/8"	6"	2"	.125"	-	-
28806	28805	.6250	5/8"	15.875	5/8"	6"	2"	BALL	-	-
61434	-	.6250	5/8"	15.875	5/8"	6"	2-1/2"	.030"	-	-
61436	-	.6250	5/8"	15.875	5/8"	6"	3-1/4"	.030"	-	-
61438	-	.6250	5/8"	15.875	5/8"	4"	3/4"	.030"	1-5/8"	.600"
61440	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	2-3/8"	.600"
63271	63270	.6250	5/8"	15.875	5/8"	6"	3/4"	.025"	3-1/4"	.600"
61442	-	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-1/8"	.600"
61444	-	.6299		16.000	16.0	75	19	-	-	-
27809	-	.6299		16.000	16.0	75	19	0.30	-	-
27811	27810	.6299		16.000	16.0	75	19	0.50	-	-
61446	-	.6299		16.000	16.0	75	19	1.00	-	-
28811	28810	.6299		16.000	16.0	75	19	BALL	-	-
62715	62717	.6299		16.000	16.0	88	32	-	-	-
27819	27818	.6299		16.000	16.0	88	32	0.30	-	-
27821	27820	.6299		16.000	16.0	88	32	0.50	-	-
61448	-	.6299		16.000	16.0	88	32	0.75	-	-
27823	27822	.6299		16.000	16.0	88	32	1.00	-	-
61450	-	.6299		16.000	16.0	88	32	1.50	-	-
27825	27824	.6299		16.000	16.0	88	32	2.00	-	-
61452	-	.6299		16.000	16.0	88	32	3.00	-	-
28821	28820	.6299		16.000	16.0	88	32	BALL	-	-
63581	63580	.6299		16.000	16.0	100	38	0.30	-	-
61454	-	.6299		16.000	16.0	100	38	0.50	-	-
61456	-	.6299		16.000	16.0	100	42	0.50	-	-
63291	63290	.6299		16.000	16.0	150	19	0.50	82	15.25
27831	-	.7087		18.000	18.0	75	22	0.80	-	-
28831	-	.7087		18.000	18.0	75	22	BALL	-	-
27836	27835	.7087		18.000	18.0	100	38	0.80	-	-
28836	28835	.7087		18.000	18.0	100	38	BALL	-	-
63301	-	.7087		18.000	18.0	150	25	0.80	82	17.25
61458	-	.7500	3/4"	19.050	3/4"	3"	7/8"	-	-	-
27841	27840	.7500	3/4"	19.050	3/4"	3"	7/8"	.030"	-	-
61460	-	.7500	3/4"	19.050	3/4"	3"	7/8"	.060"	-	-
28841	28840	.7500	3/4"	19.050	3/4"	3"	7/8"	BALL	-	-
61462	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	-	-	-
61464	-	.7500	3/4"	19.050	3/4"	4"	1-1/4"	.030"	-	-
62775	62777	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-
27851	27850	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-
27861	27860	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-
27865	27864	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-
27867	27866	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-
28861	28860	.7500	3/4"	19.050	3/4"	4"	1-1/2"	BALL	-	-

continued →

Series VRX *(continued)*

.7500" - .8661"
(19.050mm - 22.000mm)

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
61466	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	-	-
61468	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.015"	-	-
61470	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-
61472	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.060"	-	-
61474	-	.7500	3/4"	19.050	3/4"	4"	1-5/8"	BALL	-	-
62785	62787	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-
63601	63600	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.015"	-	-
27869	27868	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-
63611	63610	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.060"	-	-
61476	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.094"	-	-
63621	63620	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.120"	-	-
61478	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.190"	-	-
61480	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	BALL	-	-
62795	62797	.7500	3/4"	19.050	3/4"	5"	2"	-	-	-
63631	63630	.7500	3/4"	19.050	3/4"	5"	2"	.015"	-	-
63311	63310	.7500	3/4"	19.050	3/4"	5"	2"	.030"	-	-
63641	63640	.7500	3/4"	19.050	3/4"	5"	2"	.060"	-	-
61482	-	.7500	3/4"	19.050	3/4"	5"	2"	.094"	-	-
61484	-	.7500	3/4"	19.050	3/4"	5"	2"	.125"	-	-
28866	28865	.7500	3/4"	19.050	3/4"	5"	2"	BALL	-	-
61486	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	-	-	-
61488	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.030"	-	-
62805	62807	.7500	3/4"	19.050	3/4"	6"	3"	-	-	-
63651	63650	.7500	3/4"	19.050	3/4"	6"	3"	.015"	-	-
63661	63660	.7500	3/4"	19.050	3/4"	6"	3"	.030"	-	-
63671	63670	.7500	3/4"	19.050	3/4"	6"	3"	.060"	-	-
61490	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-
61492	-	.7500	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-
61494	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	-	-	-
61496	-	.7500	3/4"	19.050	3/4"	7"	4-1/4"	.030"	-	-
63321	63320	.7500	3/4"	19.050	3/4"	6"	1"	.030"	3-1/4"	.730"
63323	-	.7500	3/4"	19.050	3/4"	6"	1"	.060"	3-1/4"	.730"
63325	-	.7500	3/4"	19.050	3/4"	6"	1"	.090"	3-1/4"	.730"
63327	-	.7500	3/4"	19.050	3/4"	6"	1"	.125"	3-1/4"	.730"
NEW 63329	-	.7500	3/4"	19.050	3/4"	6"	1"	.190"	3-1/4"	.730"
61498	-	.7874		20.000	20.0	75	22	-	-	-
61500	-	.7874		20.000	20.0	75	22	0.50	-	-
27871	27870	.7874		20.000	20.0	75	22	1.00	-	-
28871	28870	.7874		20.000	20.0	75	22	BALL	-	-
62825	62827	.7874		20.000	20.0	100	38	-	-	-
27879	27878	.7874		20.000	20.0	100	38	0.50	-	-
61502	-	.7874		20.000	20.0	100	38	0.75	-	-
27881	27880	.7874		20.000	20.0	100	38	1.00	-	-
27891	27890	.7874		20.000	20.0	100	38	1.50	-	-
61504	-	.7874		20.000	20.0	100	38	3.00	-	-
28881	28880	.7874		20.000	20.0	100	38	BALL	-	-
61506	-	.7874		20.000	20.0	100	42	0.50	-	-
61508	-	.7874		20.000	20.0	125	52	0.50	-	-
63331	63330	.7874		20.000	20.0	150	25	1.00	82	19.30
27911	-	.8661		22.000	22.0	100	38	1.00	-	-

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
	61510	-	.9843		25.000	25.0	100	26	-	-	-
	61512	-	.9843		25.000	25.0	100	26	0.50	-	-
	62855	62857	.9843		25.000	25.0	100	38	-	-	-
	61514	-	.9843		25.000	25.0	100	38	0.50	-	-
	27941	27940	.9843		25.000	25.0	100	38	1.00	-	-
	27951	-	.9843		25.000	25.0	100	38	1.50	-	-
	61516	-	.9843		25.000	25.0	100	38	3.00	-	-
	28901	28900	.9843		25.000	25.0	100	38	BALL	-	-
	61518	-	.9843		25.000	25.0	100	42	-	-	-
NEW	61520	-	.9843		25.000	25.0	100	42	0.50	-	-
	61522	-	.9843		25.000	25.0	125	50	0.50	-	-
	63351	63350	.9843		25.000	25.0	125	50	1.00	-	-
	63361	63360	.9843		25.000	25.0	150	32	1.00	82	24.40
	61524	-	1.000	1"	25.400	1"	4"	1"	-	-	-
	27959	27958	1.000	1"	25.400	1"	4"	1"	.015"	-	-
	27961	27960	1.000	1"	25.400	1"	4"	1"	.035"	-	-
	-	27962	1.000	1"	25.400	1"	4"	1"	.060"	-	-
	28911	28910	1.000	1"	25.400	1"	4"	1"	BALL	-	-
	62885	62887	1.000	1"	25.400	1"	4"	1-1/2"	-	-	-
	27967	27966	1.000	1"	25.400	1"	4"	1-1/2"	.015"	-	-
	61526	-	1.000	1"	25.400	1"	4"	1-1/2"	.025"	-	-
	27971	27970	1.000	1"	25.400	1"	4"	1-1/2"	.035"	-	-
	27981	27980	1.000	1"	25.400	1"	4"	1-1/2"	.060"	-	-
	27991	-	1.000	1"	25.400	1"	4"	1-1/2"	.090"	-	-
	61528	-	1.000	1"	25.400	1"	4"	1-1/2"	.125"	-	-
	61530	-	1.000	1"	25.400	1"	4"	1-1/2"	.190"	-	-
	61532	-	1.000	1"	25.400	1"	4"	1-1/2"	.250"	-	-
	28916	28915	1.000	1"	25.400	1"	4"	1-1/2"	BALL	-	-
	61534	-	1.000	1"	25.400	1"	4"	1-5/8"	.030"	-	-
	62895	62897	1.000	1"	25.400	1"	4"	1-3/4"	-	-	-
	28001	28000	1.000	1"	25.400	1"	4"	1-3/4"	.015"	-	-
	61536	-	1.000	1"	25.400	1"	4"	1-3/4"	.030"	-	-
	28011	28012	1.000	1"	25.400	1"	4"	1-3/4"	.060"	-	-
	28021	-	1.000	1"	25.400	1"	4"	1-3/4"	.090"	-	-
	61538	-	1.000	1"	25.400	1"	4"	1-3/4"	.125"	-	-
	61540	-	1.000	1"	25.400	1"	4"	1-3/4"	.190"	-	-
	61542	-	1.000	1"	25.400	1"	4"	1-3/4"	.250"	-	-
	62905	62907	1.000	1"	25.400	1"	5"	2"	-	-	-
	63369	63368	1.000	1"	25.400	1"	5"	2"	.015"	-	-
	63371	63370	1.000	1"	25.400	1"	5"	2"	.035"	-	-
	63373	63372	1.000	1"	25.400	1"	5"	2"	.060"	-	-
	63375	63374	1.000	1"	25.400	1"	5"	2"	.090"	-	-
	61544	-	1.000	1"	25.400	1"	5"	2"	.125"	-	-
	61546	-	1.000	1"	25.400	1"	5"	2"	.250"	-	-
	28931	28930	1.000	1"	25.400	1"	5"	2"	BALL	-	-
	61548	-	1.000	1"	25.400	1"	5"	2-1/2"	-	-	-
	61550	-	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-	-
	62915	62917	1.000	1"	25.400	1"	6"	3"	-	-	-
	61552	-	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	-
	61554	-	1.000	1"	25.400	1"	7"	4-1/4"	.030"	-	-
	61556	-	1.000	1"	25.400	1"	7"	4-1/4"	.060"	-	-
	61558	-	1.000	1"	25.400	1"	6"	1-1/4"	.030"	2-5/8"	.980"
	63381	63380	1.000	1"	25.400	1"	6"	1-1/4"	.035"	3-1/4"	.980"
	61560	-	1.000	1"	25.400	1"	6"	1-1/4"	.060"	3-1/4"	.980"
	61562	-	1.000	1"	25.400	1"	7"	1-1/4"	.030"	4-1/4"	.980"

Series VRX-6

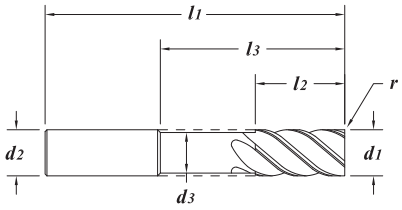
.2362" - .4724"
(6.000mm - 12.000mm)

HIGH EFFICIENCY MILLING

TECH PAGES 300-301

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

Square End, Corner Radius - AlTiN Coated
Ohne Eckenradius, Eckenradius - AlTiN-Beschichtet
Extremo Sin Radio, Ángulo Redondeado - Recubrimiento de AlTiN
Extrémité Carré, Rayon de Coin - Revêtement AlTiN
Piatte, Raggio - Rivestimento in AlTiN
平头，圆角半径 - AlTiN 涂层



MATERIAL HARDNESS (Rc)

70

Solid submicron grain carbide end mill - center cutting
Reduces vibration for more aggresive machining resulting in less cycle times and greater productivity
Recommended for stainless steel, inconel, titanium and tool steels
Staggered flute geometry
Engineered for High Efficiency Milling

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Reduziert Vibrationen für eine aggressivere Bearbeitung, um Bearbeitungszeit zu reduzieren und eine grössere Produktivität zu erzielen
Empfohlen für Rostfreien Stahl, Inconel, Titan, und Werkzeugstähle
Entwickelt für hocheffizientes Fräsen

35

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Reduce las vibraciones hasta en los más agresivos mecanizados, obteniéndose bajos tiempos de ciclo y mayor productividad
Recomendado para acero inoxidable, inconel, acero laminado en frío, hierro de fundición y aceros herramienta
Diseñado para el fresado de alta eficiencia

Fraises carbure submicrograin - coupe au centre
Reduction des vibrations pour un fraisage plus agressif resultant des temps de cycles plus court et une meilleure productivite
Recommandee pour les aciers inoxydables, Inconel, aciers a outils, aciers forges, titane, fonts et aciers a outils
Conçu pour un fraisage à haute efficacité

Fresa sub-micrograno metallo duro - taglio al centro
Riduzioni delle vibrazioni per lavorazioni aggressive per ridurre il tempo ciclo ed aumentare la produttività
Raccomandata per lavorazioni su inox, inconel, titanio e acciai per utensili
Progettato per la fresatura ad alta efficienza

0

超细晶粒整体硬质合金立铣刀 - 中心切削
适合更高速度，更大进给的加工，可以减少振动，减少加工时间，提高生产效率
推荐加工不锈钢、铬镍铁耐热耐蚀合金、含磷材质、钛钢 和工具钢
有效的擺線銑削

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
60101	.2362		6.000	6.0	65	20	-	-	-
60103	.2362		6.000	6.0	65	20	0.50	-	-
60100	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	-
60102	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-
60104	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-
60105	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-
60106	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-
60162	.3150		8.000	8.0	65	22	-	-	-
60107	.3150		8.000	8.0	65	22	0.50	-	-
60109	.3750	3/8"	9.525	3/8"	2"	1/2"	-	-	-
60111	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-
60108	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	-	-
60110	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	-	-
60113	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	-	-
60112	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	-
60114	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	-	-
60184	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"	-	-
60164	.3937		10.000	10.0	70	22	-	-	-
60115	.3937		10.000	10.0	70	22	0.50	-	-
60117	.3937		10.000	10.0	70	22	1.00	-	-
60119	.4724		12.000	12.0	65	20	-	-	-
60121	.4724		12.000	12.0	65	20	0.50	-	-
60123	.4724		12.000	12.0	75	26	-	-	-
60125	.4724		12.000	12.0	75	26	0.75	-	-
60166	.4724		12.000	12.0	75	32	-	-	-
60127	.4724		12.000	12.0	75	32	0.50	-	-
60129	.4724		12.000	12.0	75	32	1.00	-	-

† 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	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
60131	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-
60185	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-
60157	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"	-	-
60133	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-
60159	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-
60189	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"	-	-
60186	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.125"	-	-
60135	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-
60201	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-
60116	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-
60118	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-
60120	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-
60122	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-
60124	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-
60126	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-
60128	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-
60137	.5000	1/2"	12.700	1/2"	4"	1-1/2"	-	-	-
60139	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	-
60190	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-
60194	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.030"	-	-
60196	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.060"	-	-
60130	.5000	1/2"	12.700	1/2"	4"	2-1/8"	-	-	-
60132	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.010"	-	-
60134	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.020"	-	-
60136	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-
60200	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.060"	-	-
60141	.6250	5/8"	15.875	5/8"	3"	3/4"	-	-	-
60143	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"	-	-
60138	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-
60140	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	-	-
60145	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-
60142	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-
60144	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-
60146	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.125"	-	-
60148	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	-	-
60150	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-
60168	.6299		16.000	16.0	88	32	-	-	-
60170	.6299		16.000	16.0	88	32	0.50	-	-
60174	.6299		16.000	16.0	100	40	-	-	-
60176	.6299		16.000	16.0	100	40	0.50	-	-
60180	.6299		16.000	16.0	100	32	-	50	14.50
60182	.6299		16.000	16.0	100	32	0.50	50	14.50
60152	.7500	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-
60154	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-
60147	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.020"	-	-
60156	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-
60158	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-
60160	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.125"	-	-
60149	.7500	3/4"	19.050	3/4"	6"	3"	-	-	-
60151	.7500	3/4"	19.050	3/4"	6"	3"	.030"	-	-
60188	1.000	1"	25.400	1"	4"	1-1/2"	.125"	-	-
60153	1.000	1"	25.400	1"	6"	3"	.030"	-	-
60155	1.000	1"	25.400	1"	7"	1-1/4"	-	4-1/8"	.980"

European facility based in High Wycombe, England

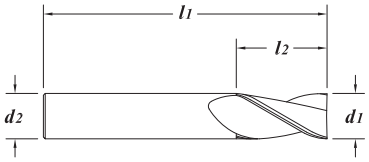
Garr Tool Company has made a significant investment in the future by establishing a sales and stock centre in the UK. This facility is our commitment to providing the best service to our European distributors. Security of supply is important to our customers and we want to build confidence that we will supply your round tooling needs.

- Over 8,000 products in stock
- 99.7% fill rate
- Next day shipping throughout Europe
- Order up to 17:30 CET
- Inside sales support
- Same day quotes

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

Z=2 | 45° | TECH PAGES 288

Square End
Ohne Eckenradius
Extremo Sin Radio
Extrémité Carré
Piatte
平头



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
Recommended for aluminum and titanium
Sharp corners (Can be modified with a corner radius)
Designed for spindle speeds between 3,000 - 8,000 RPM, 1% diameter for chip load

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !
Exzellente Wahl zum Nutfräsen
Polierter Durchmesser O.D. Führungsfase reduziert Vibrationen
Empfohlen für Aluminium und Titan
Scharfe Schneidecken (Kann mit einem Eckenradius modifiziert werden)
Entwickelt für Drehzahlen von 3.000 bis 8.000 min-1, 1% Durchmesser für Spanformung

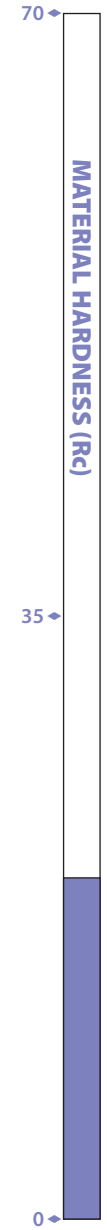
Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Excelente elección para ranurado
El margen de D.E. cilíndrico pulido reduce las vibraciones
Recomendado para aluminio y titanio
Esquinas afiladas (Se puede modificar con un ángulo redondeado)
Diseñado para velocidades de cabezal entre 3000-8000 RPM, 1% del diámetro para evacuación de viruta

Fraises carbure submicrograin - coupe au centre
Pour haute performance l'usinage
Le serrage et la stabilite de la piece, la rigidite de la machine et l'atatchment de l'outil sont tres importantes
Choix excellent pour le rainurage
La marge sur le diamètre contribue à réduire les bavardages
Recommandee pour l'aluminium et titane
Angles pointus (Peut etre modifier avec un rayon de coin)
Conçu pour des vitesses de broches de 3000 a 8000 Tours / minute, 1% du diamètre pour la charge de copeaux

Fresa sub-micrograno metallo duro - taglio al centro
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Scelta eccellente per cave
Il margine cilindrico lucidato di O.D. riduce la vibrazione
Raccomandata per alte prestazioni per lavorazioni di alluminio e titanio
Tagliente vivo (Può essere modificata con un raggio)
Progettato per impiego su mandrini tra 3.000-8.000 giri al minuto

高效超细晶粒整体硬质合金立铣刀 - 中心切削
推荐加工高效加工铝材质和钛材质
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
外圆余量经过抛光可减少振纹
是铣槽的极好选择
尖角（可以改为圆角）
适合转速3,000 - 8,000转/分，1%直径用于切屑负载

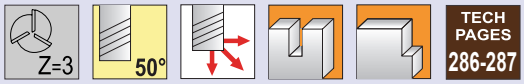
EDP#	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
08910	.1181		3.000	3.0	38	8
08920	.1181		3.000	3.0	50	12
85160	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"
85170	.1250	1/8"	3.175	1/8"	2"	1/2"
08950	.1575		4.000	6.0	50	8
08960	.1575		4.000	6.0	50	12
85180	.1875	3/16"	4.763	3/16"	2"	5/16"
85190	.1875	3/16"	4.763	3/16"	2"	9/16"
08990	.1969		5.000	6.0	50	10
09000	.1969		5.000	6.0	65	15
09010	.2362		6.000	6.0	50	12
09020	.2362		6.000	6.0	65	25
09030	.2362		6.000	6.0	100	50
85200	.2500	1/4"	6.350	1/4"	2"	1/2"
85220	.2500	1/4"	6.350	1/4"	2-1/2"	1"
85240	.2500	1/4"	6.350	1/4"	4"	2"
85300	.3125	5/16"	7.938	5/16"	3"	1-1/8"
09240	.3150		8.000	8.0	65	20
09040	.3150		8.000	8.0	75	30
09050	.3150		8.000	8.0	100	50
85400	.3750	3/8"	9.525	3/8"	2"	5/8"
85420	.3750	3/8"	9.525	3/8"	2-1/2"	1"
85440	.3750	3/8"	9.525	3/8"	4"	2"
09060	.3937		10.000	10.0	50	16
09070	.3937		10.000	10.0	70	25
09080	.3937		10.000	10.0	100	50
09090	.4724		12.000	12.0	65	20
09100	.4724		12.000	12.0	75	32
09110	.4724		12.000	12.0	100	50
85500	.5000	1/2"	12.700	1/2"	2-1/2"	3/4"
85520	.5000	1/2"	12.700	1/2"	3"	1-1/4"
85540	.5000	1/2"	12.700	1/2"	4"	2"
85600	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"
85620	.6250	5/8"	15.875	5/8"	6"	3"
09120	.6299		16.000	16.0	88	40
09130	.6299		16.000	16.0	150	75
09140	.7087		18.000	18.0	100	45
85700	.7500	3/4"	19.050	3/4"	4"	1-3/4"
85720	.7500	3/4"	19.050	3/4"	6"	3"
09350	.7874		20.000	20.0	100	38
09150	.7874		20.000	20.0	150	75
09160	.9843		25.000	25.0	100	45
09170	.9843		25.000	25.0	150	75
85800	1.000	1"	25.400	1"	4"	1-3/4"
85820	1.000	1"	25.400	1"	6"	3"



Series 253MA, 853MA

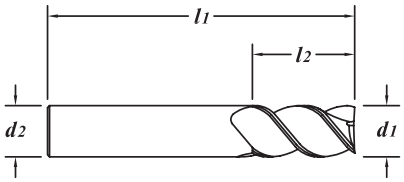
.1181" - .5512"
(3.000mm - 14.000mm)

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



TECH PAGES 286-287

Square End - AlTiN Coated
Ohne Eckenradius - AlTiN-Beschichtet
Extremo Sin Radio - Recubrimiento de AlTiN
Extrémité Carré - Revêtement AlTiN
Piatte - Rivestimento in AlTiN
平头 - AlTiN 涂层



MATERIAL HARDNESS (Rc)
70
35
0

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
Recommended for stainless steel
Sharp corners (Can be modified with a corner radius)
Bright Finish - page 182
TiCN Coated - page 184

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !
Trocken oder Halbtrockene Bearbeitung
Nutfräsen von Rostfreiem Stahl mit einer Axialzustellung von 25% des Durchmessers
Empfohlen für Rostfreiem Stahl
Scharfe Schneidecken (Kann mit einem Eckenradius modifiziert werden)
Bright Fertig (Ohne Beschichtung) - Seite 182
TiCN-Beschichtet - Seite 184

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Mecanizado seco o semiseco
Ranurado de acero inoxidable a una profundidad axial del 25% del diámetro
Recomendado para acero inoxidable
Esquinas afiladas (Se puede modificar con un ángulo redondeado)
Acabado Brillante (Sin Recubrimiento) - Página 182
Recubrimiento de TiCN - Página 184

Fraises carbure submicrograin - coupe au centre
Pour haute performance l'usinage
Le serrage et la stabilite de la piece, la rigidite de la machine et l'atatchment de l'outil sont tres importantes
Usinage a sec ou avec l'air
Rainurage de l'acier inoxydable avec profondeur de coupe axiale equivalente a 25% du diametre
Recommandee pour aciers inoxydables
Angles pointus (Peut etre modifier avec un rayon de coin)
Finition Brillante (Sans Revêtement) - Page 182
Revêtement TiCN - Page 184

Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni di inox
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Lavorazione a secco o a umido
Lavorazione dal pieno su inox con profondità di taglio consigliata pari al 25% del diametro
Raccomandata per lavorazioni su inox
Tagliente vivo (Può essere modificata con un raggio)
Eccellente Finitura (Non Rivestito) - Pagina 182
Rivestimento in TiCN - Pagina 184

高效超细晶粒整体硬质合金立铣刀 - 中心切削
高效加工铝合金
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素!
干式或半干式机加工
以25%直径的轴向深度在铝材上铣槽
推荐加工不锈钢
尖角（可以改为圆角）
高亮光洁度(未涂层) - 182页
TiCN 涂层 - 184页

EDP#	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
10347	.1181		3.000	3.0	38	8
10357	.1181		3.000	3.0	50	12
86137	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"
86147	.1250	1/8"	3.175	1/8"	2"	1/2"
10387	.1575		4.000	6.0	50	8
10397	.1575		4.000	6.0	50	12
86157	.1875	3/16"	4.763	3/16"	2"	5/16"
86167	.1875	3/16"	4.763	3/16"	2"	9/16"
86187	.1875	3/16"	4.763	3/16"	3"	1"
10407	.1969		5.000	5.0	50	8
10417	.1969		5.000	5.0	50	14
10507	.1969		5.000	6.0	50	8
10517	.1969		5.000	6.0	65	16
10017	.2362		6.000	6.0	50	12
10027	.2362		6.000	6.0	65	19
10037	.2362		6.000	6.0	75	32
86207	.2500	1/4"	6.350	1/4"	2"	1/2"
86227	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
86247	.2500	1/4"	6.350	1/4"	3"	1-1/4"
86267	.3125	5/16"	7.938	5/16"	2"	7/16"
86277	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"
86287	.3125	5/16"	7.938	5/16"	4"	1-1/4"
10427	.3150		8.000	8.0	50	11
10047	.3150		8.000	8.0	65	20
10057	.3150		8.000	8.0	75	32
86307	.3750	3/8"	9.525	3/8"	2"	1/2"
86327	.3750	3/8"	9.525	3/8"	2-1/2"	1"
86347	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"
10067	.3937		10.000	10.0	50	12
10077	.3937		10.000	10.0	75	25
10087	.3937		10.000	10.0	88	38
86367	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"
86377	.4375	7/16"	11.113	7/16"	2-3/4"	1"
86387	.4375	7/16"	11.113	7/16"	4"	2"
10097	.4724		12.000	12.0	65	16
10107	.4724		12.000	12.0	75	26
10117	.4724		12.000	12.0	100	50
86407	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"
86427	.5000	1/2"	12.700	1/2"	3"	1"
86447	.5000	1/2"	12.700	1/2"	4"	2"
10437	.5512		14.000	14.0	65	16
10447	.5512		14.000	14.0	75	25
10457	.5512		14.000	14.0	100	50

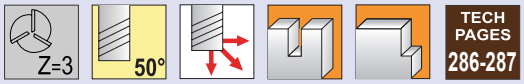
† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
86467	.5625	9/16"	14.288	9/16"	3"	7/8"
86477	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"
86507	.6250	5/8"	15.875	5/8"	3"	7/8"
86527	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
86547	.6250	5/8"	15.875	5/8"	6"	2-1/2"
10137	.6299		16.000	16.0	88	32
10147	.6299		16.000	16.0	150	65
10167	.7087		18.000	18.0	100	38
86607	.7500	3/4"	19.050	3/4"	3-1/2"	1"
86627	.7500	3/4"	19.050	3/4"	4"	1-1/2"
86647	.7500	3/4"	19.050	3/4"	6"	3"
10187	.7874		20.000	20.0	100	38
10197	.7874		20.000	20.0	150	75
86697	1.000	1"	25.400	1"	4"	1-1/8"
86727	1.000	1"	25.400	1"	4"	2"
86747	1.000	1"	25.400	1"	6"	3-1/4"

Series 253M, 853M

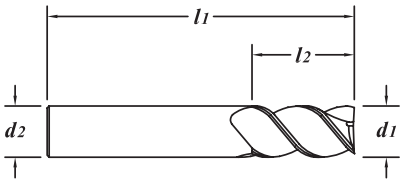
.1181" - .5512"
(3.000mm - 14.000mm)

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



TECH PAGES 286-287

Square End
Ohne Eckenradius
Extremo Sin Radio
Extrémité Carré
Piatte
平头



70

Solid submicron grain carbide end mill - center cutting
High performance milling
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)
Recommended for steels, stainless steel and exotics
AlTiN Coated - page 180
TiCN Coated - page 184

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !
Verbessertes Schlichten von Titan
Starker Kern, Scharfe Schneidecken
Empfohlen für Stahl, Rostfreiem Stahl und exotischen Werkstoffen
AlTiN-Beschichtet - Seite 180
TiCN-Beschichtet - Seite 184

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Acabados mejorados en titanio
Núcleo pesado, Esquinas afiladas
Recomendado para aceros, acero inoxidable y materiales exóticos
Recubrimiento de AlTiN - Página 180
Recubrimiento de TiCN - Página 184

35

Fraises carbure submicrograin - coupe au centre
Pour haute performance fraisage
Le serrage et la stabilite de la piece, la rigidite de la machine et l'atatchment de l'outil sont tres importantes
Amelioration des finitions dans le Titane
Angles pointus
Recommandee pour aciers, aciers inoxydables et alliages exotiques
Revêtement AlTiN - Page 180
Revêtement TiCN - Page 184

Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni di acciai, inox e materiali esotici
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Consigliata per una migliore finitura sul titanio
Nocciolo rinforzato
Tagliente vivo
Rivestimento in AlTiN - Pagina 180
Rivestimento in TiCN - Pagina 184

高效超细晶粒整体硬质合金立铣刀 – 中心切削
在钢件、不锈钢和稀有材质上作高效铣削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素!
改善钛合金的光洁度
强力芯部
尖角
AlTiN 涂层 - 180页
TiCN 涂层 - 184页

0

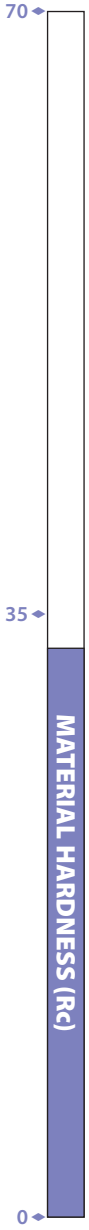
MATERIAL HARDNESS (Rc)

EDP#	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
10340	.1181		3.000	3.0	38	8
10350	.1181		3.000	3.0	50	12
86130	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"
86140	.1250	1/8"	3.175	1/8"	2"	1/2"
10380	.1575		4.000	6.0	50	8
10390	.1575		4.000	6.0	50	12
86150	.1875	3/16"	4.763	3/16"	2"	5/16"
86160	.1875	3/16"	4.763	3/16"	2"	9/16"
86180	.1875	3/16"	4.763	3/16"	3"	1"
10400	.1969		5.000	5.0	50	8
10410	.1969		5.000	5.0	50	14
10010	.2362		6.000	6.0	50	12
10020	.2362		6.000	6.0	65	19
10030	.2362		6.000	6.0	75	32
86200	.2500	1/4"	6.350	1/4"	2"	1/2"
86220	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
86240	.2500	1/4"	6.350	1/4"	3"	1-1/4"
86260	.3125	5/16"	7.938	5/16"	2"	7/16"
86270	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"
86280	.3125	5/16"	7.938	5/16"	4"	1-1/4"
10420	.3150		8.000	8.0	50	11
10040	.3150		8.000	8.0	65	20
10050	.3150		8.000	8.0	75	32
86300	.3750	3/8"	9.525	3/8"	2"	1/2"
86320	.3750	3/8"	9.525	3/8"	2-1/2"	1"
86340	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"
10060	.3937		10.000	10.0	50	12
10070	.3937		10.000	10.0	75	25
10080	.3937		10.000	10.0	88	38
86360	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"
86370	.4375	7/16"	11.113	7/16"	2-3/4"	1"
86380	.4375	7/16"	11.113	7/16"	4"	2"
10090	.4724		12.000	12.0	65	16
10100	.4724		12.000	12.0	75	26
10110	.4724		12.000	12.0	100	50
86400	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"
86420	.5000	1/2"	12.700	1/2"	3"	1"
86440	.5000	1/2"	12.700	1/2"	4"	2"
10430	.5512		14.000	14.0	65	16
10440	.5512		14.000	14.0	75	25
10450	.5512		14.000	14.0	100	50

† *Metric equivalents are for reference only*

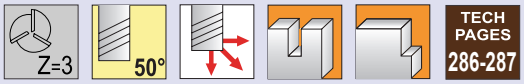
.5625" - 1.000"
(14.288mm - 25.400mm)

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
86460	.5625	9/16"	14.288	9/16"	3"	7/8"
86470	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"
86480	.5625	9/16"	14.288	9/16"	6"	2-1/2"
86500	.6250	5/8"	15.875	5/8"	3"	7/8"
86520	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
86540	.6250	5/8"	15.875	5/8"	6"	2-1/2"
10120	.6299		16.000	16.0	75	20
10130	.6299		16.000	16.0	88	32
10140	.6299		16.000	16.0	150	65
10160	.7087		18.000	18.0	100	38
10170	.7087		18.000	18.0	150	75
86600	.7500	3/4"	19.050	3/4"	3-1/2"	1"
86620	.7500	3/4"	19.050	3/4"	4"	1-1/2"
86640	.7500	3/4"	19.050	3/4"	6"	3"
10460	.7874		20.000	20.0	75	22
10180	.7874		20.000	20.0	100	38
10190	.7874		20.000	20.0	150	75
10480	.9843		25.000	25.0	100	50
10490	.9843		25.000	25.0	150	82
86690	1.000	1"	25.400	1"	4"	1-1/8"
86720	1.000	1"	25.400	1"	4"	2"
86740	1.000	1"	25.400	1"	6"	3-1/4"



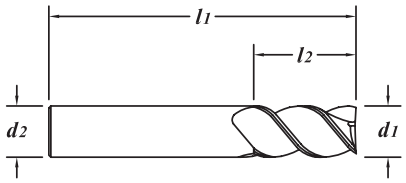
Series 253MC

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



TECH PAGES 286-287

Square End - TiCN Coated
Ohne Eckenradius - TiCN-Beschichtet
Extremo Sin Radio - Recubrimiento de TiCN
Extrémité Carré - Revêtement TiCN
Piatte - Rivestimento in TiCN
平头 - TiCN 涂层



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
Recommended for aluminum and stainless steel
Sharp corners (Can be modified with a corner radius)
AlTiN Coated - page 180
Bright Finish - page 182

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !
Verbesserte Verschleissbeständigkeit und Schmiereienschaft
Nutfräsen von Rostfreiem Stahl und Aluminium mit einer Axialzustellung von 25% des Durchmessers
Empfohlen für Rostfreiem Stahl und Aluminium
Scharfe Schneidecken (Kann mit einem Eckenradius modifiziert werden)
AlTiN-Beschichtet - Seite 180
Bright Fertig (Ohne Beschichtung) - Seite 182

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Mejoradas la resistencia a la abrasión y la lubricación
Ranurado de acero inoxidable y aluminio a una profundidad axial del 25% del diámetro
Recomendado para acero inoxidable y aluminio
Esquinas afiladas (Se puede modificar con un ángulo redondeado)
Recubrimiento de AlTiN - Página 180
Acabado Brillante (Sin Recubrimiento) - Página 182

Fraises carbure submicrograin - coupe au centre
Pour haute performance l'usinage
Le serrage et la stabilite de la piece, la rigidite de la machine et l'atatchment de l'outil sont tres importantes
Amelioration de la resistance a l'abrasion et au glissement
Rainurage de l'acier inoxydable et aluminium avec profondeur de coupe axiale equivalente a 25% du diametre
Recommandee pour aciers inoxydables et aluminium
Angles pointus (Peut etre modifier avec un rayon de coin)
Revêtement AlTiN - Page 180
Finition Brillante (Sans Revêtement) - Page 182

Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni di inox e alluminio
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Maggiore resistenza all'abrasione
Lavorazione dal pieno su alluminio con profondità di taglio consigliata pari al 25% del diametro
Raccomandata per lavorazioni su inox e alluminio
Tagliente vivo (Può essere modificata con un raggio)
Rivestimento in AlTiN - Pagina 180
Eccellente Finitura (Non Rivestito) - Pagina 182

高效超细晶粒整体硬质合金立铣刀 - 中心切削
高效加工铝合金
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素!
改善耐磨性和润滑性
以25%直径的轴向深度在铝材上铣槽
推荐加工不锈钢，铝
尖角（可以改为圆角）
AlTiN 涂层 - 180页
高亮光洁度(未涂层) - 182页

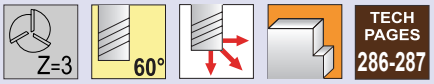
EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
86154	.1875	3/16"	4.763	3/16"	2"	5/16"
86164	.1875	3/16"	4.763	3/16"	2"	9/16"
86184	.1875	3/16"	4.763	3/16"	3"	1"
86204	.2500	1/4"	6.350	1/4"	2"	1/2"
86224	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
86244	.2500	1/4"	6.350	1/4"	3"	1-1/4"
86264	.3125	5/16"	7.938	5/16"	2"	7/16"
86274	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"
86284	.3125	5/16"	7.938	5/16"	4"	1-1/4"
86304	.3750	3/8"	9.525	3/8"	2"	1/2"
86324	.3750	3/8"	9.525	3/8"	2-1/2"	1"
86344	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"
86364	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"
86374	.4375	7/16"	11.113	7/16"	2-3/4"	1"
86384	.4375	7/16"	11.113	7/16"	4"	2"
86404	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"
86424	.5000	1/2"	12.700	1/2"	3"	1"
86444	.5000	1/2"	12.700	1/2"	4"	2"
86464	.5625	9/16	14.288	9/16"	3"	7/8"
86474	.5625	9/16	14.288	9/16"	3-1/2"	1-1/4"
86484	.5625	9/16	14.288	9/16"	6"	2-1/2"
86504	.6250	5/8"	15.875	5/8"	3"	7/8"
86524	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
86544	.6250	5/8"	15.875	5/8"	6"	2-1/2"
86604	.7500	3/4"	19.050	3/4"	3-1/2"	1"
86624	.7500	3/4"	19.050	3/4"	4"	1-1/2"
86644	.7500	3/4"	19.050	3/4"	6"	3"
86694	1.000	1"	25.400	1"	4"	1-1/8"
86724	1.000	1"	25.400	1"	4"	2"
86744	1.000	1"	25.400	1"	6"	3-1/4"

GARR TOOL®

† *Metric equivalents are for reference only*

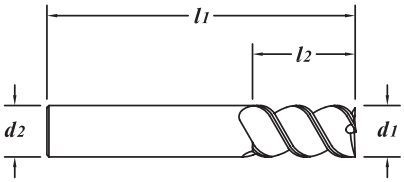
TOLERANCES	
d_1	+.000 –.050mm (+.000" –.002")
d_2	h6

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



TECH PAGES 286-287

Square End
Ohne Eckenradius
Extremo Sin Radio
Extrémité Carré
Piatte
平头



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
Recommended for steels, stainless steel and high-temperature alloys
Can be modified with a corner radius
Bright Finish
TiCN Coated
AlTiN Coated

Vollhartmetallbohrer aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !
Modifizierte Endgeometrie – Schneidet keine quadratischen Ecken
Empfohlen für Stahl, Rostfreiem Stahl und Hochwarmfesten Legierungen
Kann mit einem Eckenradius modifiziert werden
Bright Fertig (Ohne Beschichtung)
TiCN-Beschichtet
AlTiN-Beschichtet

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Acanaladura final modificada – No adecuada para cortar en esquinas cuadradas
Recomendado para aceros, acero inoxidable y aleaciones de alta temperatura
Se puede modificar con un ángulo redondeado
Acabado Brillante (Sin Recubrimiento)
Recubrimiento de TiCN
Recubrimiento de AlTiN

Fraises carbure submicrograin - coupe au centre
Haute performance pour l'usinage
Le serrage et la stabilite de la piece, la rigidite de la machine et l'atatchment de l'outil sont tres importantes
Coupe au centre spécifique
Recommandee pour aciers, aciers inoxydables et alliages hautes temperatures
Peut etre modifier avec un rayon de coin
Finition Brillante (Sans Revêtement)
Revêtement TiCN
Revêtement AlTiN

Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni in contornitura su acciaio, inox, superleghe
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Non consigliata per lavorazioni assiali
Può essere modificata con un raggio
Eccellente Finitura (Non Rivestito)
Rivestimento in TiCN
Rivestimento in AlTiN

高效超细晶粒整体硬质合金立铣刀 - 中心切削
在钢件、不锈钢和耐高温合金钢上作仿形切削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素!
修整底端面—不能切削直形角
可以改为圆角
高亮光洁度(未涂层)
TiCN 涂层
AlTiN 涂层

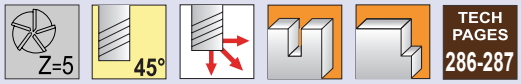
(263M) BRIGHT EDP#	(263MC) TiCN EDP#	(263MA/863MA) AlTiN EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
23010	-	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
23020	-	-	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
23030	-	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
23040	-	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"
23050	-	-	.5000	1/2"	12.700	1/2"	3"	1"
23060	-	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
23070	-	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"
23080	-	-	1.000	1"	25.400	1"	4"	1-1/2"
-	23014	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
-	23024	-	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
-	23034	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
-	23044	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"
-	23054	-	.5000	1/2"	12.700	1/2"	3"	1"
-	23064	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
-	23074	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"
-	23084	-	1.000	1"	25.400	1"	4"	1-1/2"
-	-	23517	.2362		6.000	6.0	65	13
-	-	23017	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
-	-	23027	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
-	-	23527	.3150		8.000	8.0	65	19
-	-	23037	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
-	-	23537	.3937		10.000	10.0	70	22
-	-	23047	.4375	7/16"	11.113	7/16"	2-3/4"	1"
-	-	23547	.4724		12.000	12.0	75	26
-	-	23057	.5000	1/2"	12.700	1/2"	3"	1"
-	-	23067	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
-	-	23557	.6299		16.000	16.0	88	32
-	-	23077	.7500	3/4"	19.050	3/4"	4"	1-1/2"
-	-	23087	1.000	1"	25.400	1"	4"	1-1/2"

MATERIAL HARDNESS (Rc)
70
35
0

Series 255MA, 855MA

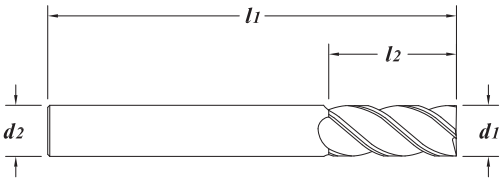
.1181" - .4724"
(3.000mm - 12.000mm)

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



TECH PAGES 286-287

Square End - AlTiN Coated
Ohne Eckenradius - AlTiN-Beschichtet
Extremo Sin Radio - Recubrimiento de AlTiN
Extrémité Carré - Revêtement AlTiN
Piatte - Rivestimento in AlTiN
平头 - AlTiN 涂层



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
Recommended for steels, stainless steel and exotics
Bright Finish - page 188
TiCN Coated - page 190

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !
Trocken oder Halbtrockene Bearbeitung
Verbessertes Schlichten von Titan
Starker Kern, Scharfe Schneidecken
Empfohlen für Stahl, Rostfreiem Stahl und exotischen Werkstoffen
Bright Fertig (Ohne Beschichtung) - Seite 188
TiCN-Beschichtet - Seite 190

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Mecanizado seco o semiseco
Acabados mejorados en titanio
Núcleo pesado, Esquinas afiladas
Recomendado para aceros, acero inoxidable y materiales exóticos
Acabado Brillante (Sin Recubrimiento) - Página 188
Recubrimiento de TiCN - Página 190

Fraises carbure submicrograin - coupe au centre
Pour haute performance fraisage
Le serrage et la stabilite de la piece, la rigidite de la machine et l'atatchment de l'outil sont tres importantes
Usinage a sec ou avec l'air
Amelioration des finitions dans le Titane
Angles pointus
Recommandee pour aciers, aciers inoxydables et alliages exotiques
Finition Brillante (Sans Revêtement) - Page 188
Revêtement TiCN - Page 190

Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Lavorazione a secco o a umido
Migliore finitura sul titanio
Dovere nucleo pesante, tagliente vivo
Consigliata per una di acciai, inox e materiali esotici
Eccellente Finitura (Non Rivestito) - Pagina 188
Rivestimento in TiCN - Pagina 190

高效超细晶粒整体硬质合金立铣刀 - 中心切削
在钢件、不锈钢和稀有材质上作高效铣削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素!
干式或半干式机加工
改善钛合金的光洁度
强力芯部
尖角
高亮光洁度(未涂层) - 188页
TiCN 涂层 - 190页

EDP#	d_1 † Diameter Decimal	Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
40047	.1181		3.000	3.0	38	8
40057	.1181		3.000	3.0	50	12
52087	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"
52097	.1250	1/8"	3.175	1/8"	2"	1/2"
40087	.1575		4.000	6.0	50	8
40097	.1575		4.000	6.0	50	12
52107	.1875	3/16"	4.763	3/16"	2"	5/16"
52127	.1875	3/16"	4.763	3/16"	2"	9/16"
40107	.1969		5.000	5.0	50	8
40127	.1969		5.000	5.0	50	14
40117	.1969		5.000	6.0	50	8
40137	.1969		5.000	6.0	65	16
40207	.2362		6.000	6.0	50	10
40227	.2362		6.000	6.0	65	20
40247	.2362		6.000	6.0	100	32
52207	.2500	1/4"	6.350	1/4"	2"	3/8"
52227	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
52237	.2500	1/4"	6.350	1/4"	3"	1-1/8"
52247	.2500	1/4"	6.350	1/4"	4"	1-1/4"
52307	.3125	5/16"	7.938	5/16"	2"	7/16"
52327	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"
52347	.3125	5/16"	7.938	5/16"	4"	1-1/4"
40307	.3150		8.000	8.0	50	11
40327	.3150		8.000	8.0	65	21
40347	.3150		8.000	8.0	100	32
40367	.3543		9.000	10.0	65	22
52407	.3750	3/8"	9.525	3/8"	2"	1/2"
52427	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
52437	.3750	3/8"	9.525	3/8"	3"	1-1/4"
52447	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"
40407	.3937		10.000	10.0	50	12
40427	.3937		10.000	10.0	70	22
40447	.3937		10.000	10.0	88	38
52507	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"
52527	.4375	7/16"	11.113	7/16"	2-3/4"	1"
52547	.4375	7/16"	11.113	7/16"	4"	2"
40507	.4724		12.000	12.0	65	16
40527	.4724		12.000	12.0	75	32
40547	.4724		12.000	12.0	100	50

GARR TOOL®

† Metric equivalents are for reference only

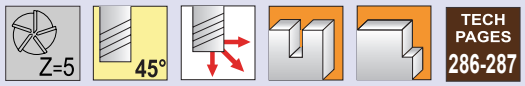
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
52607	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"
52627	.5000	1/2"	12.700	1/2"	3"	1-1/4"
52647	.5000	1/2"	12.700	1/2"	4"	2"
52707	.6250	5/8"	15.875	5/8"	3"	3/4"
52727	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"
52747	.6250	5/8"	15.875	5/8"	6"	2-1/2"
40607	.6299		16.000	16.0	75	20
40627	.6299		16.000	16.0	88	41
40647	.6299		16.000	16.0	150	63
52807	.7500	3/4"	19.050	3/4"	3"	7/8"
52827	.7500	3/4"	19.050	3/4"	4"	1-5/8"
52837	.7500	3/4"	19.050	3/4"	5"	2"
52847	.7500	3/4"	19.050	3/4"	6"	3-1/4"
40727	.7874		20.000	20.0	100	41
40747	.7874		20.000	20.0	150	82
40787	.9843		25.000	25.0	100	28
40827	.9843		25.000	25.0	100	50
40847	.9843		25.000	25.0	150	82
52897	1.000	1"	25.400	1"	4"	1-1/8"
52927	1.000	1"	25.400	1"	4"	2"
52947	1.000	1"	25.400	1"	6"	3-1/4"

End Mill Manufacturing

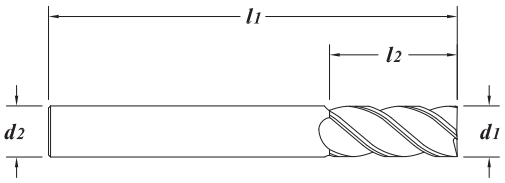
Series 255M, 855M

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

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



Square End
Ohne Eckenradius
Extremo Sin Radio
Extrémité Carré
Piatte
平头



MATERIAL HARDNESS (Rc)
70
35
0

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
Recommended for steels, stainless steel and exotics
AlTiN Coated - page 186
TiCN Coated - page 190

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !
Verbessertes Schlichten von Titan
Starker Kern, Scharfe Schneidecken
Empfohlen für Stahl, Rostfreiem Stahl und exotischen Werkstoffen
AlTiN-Beschichtet - Seite 186
TiCN-Beschichtet - Seite 190

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Acabados mejorados en titanio
Núcleo pesado, Esquinas afiladas
Recomendado para aceros, acero inoxidable y materiales exóticos
Recubrimiento de AlTiN - Página 186
Recubrimiento de TiCN - Página 190

Fraises carbure submicrograin - coupe au centre
Pour haute performance fraisage
Le serrage et la stabilite de la piece, la rigidite de la machine et l'atatchment de l'outil sont tres importantes
Amelioration des finitions dans le Titane
Angles pointus
Recommandee pour aciers, aciers inoxydables et alliages exotiques
Revêtement AlTiN - Page 186
Revêtement TiCN - Page 190

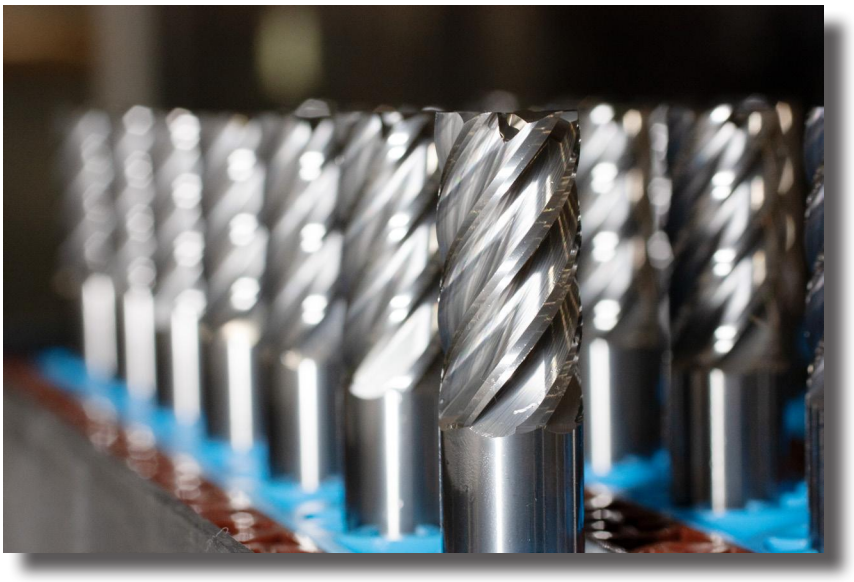
Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Migliore finitura sul titanio
Dovere nucleo pesante, tagliente vivo
Consigliata per una di acciai, inox e materiali esotici
Rivestimento in AlTiN - Pagina 186
Rivestimento in TiCN - Pagina 190

高效超细晶粒整体硬质合金立铣刀 – 中心切削
在钢件、不锈钢和稀有材质上作高效铣削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素!
改善钛合金的光洁度
强力芯部
尖角
AlTiN 涂层 - 186页
TiCN 涂层 - 190页

EDP#	d_1 † Diameter Decimal	Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
40040	.1181		3.000	3.0	38	8
40050	.1181		3.000	3.0	50	12
52080	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"
52090	.1250	1/8"	3.175	1/8"	2"	1/2"
40080	.1575		4.000	6.0	50	8
40090	.1575		4.000	6.0	50	12
52100	.1875	3/16"	4.763	3/16"	2"	5/16"
52120	.1875	3/16"	4.763	3/16"	2"	9/16"
40100	.1969		5.000	5.0	50	8
40120	.1969		5.000	5.0	50	14
40200	.2362		6.000	6.0	50	10
40220	.2362		6.000	6.0	65	20
40240	.2362		6.000	6.0	100	32
52200	.2500	1/4"	6.350	1/4"	2"	3/8"
52220	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
52240	.2500	1/4"	6.350	1/4"	4"	1-1/4"
52300	.3125	5/16"	7.938	5/16"	2"	7/16"
52320	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"
52340	.3125	5/16"	7.938	5/16"	4"	1-1/4"
40320	.3150		8.000	8.0	65	21
40340	.3150		8.000	8.0	100	32
52400	.3750	3/8"	9.525	3/8"	2"	1/2"
52420	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
52440	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"
40420	.3937		10.000	10.0	70	22
40440	.3937		10.000	10.0	88	38
52500	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"
52520	.4375	7/16"	11.113	7/16"	2-3/4"	1"
52540	.4375	7/16"	11.113	7/16"	4"	2"
40520	.4724		12.000	12.0	75	32
40540	.4724		12.000	12.0	100	50
52600	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"
52620	.5000	1/2"	12.700	1/2"	3"	1-1/4"
52640	.5000	1/2"	12.700	1/2"	4"	2"

† *Metric equivalents are for reference only*

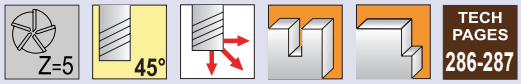
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
52700	.6250	5/8"	15.875	5/8"	3"	3/4"
52720	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"
52740	.6250	5/8"	15.875	5/8"	6"	2-1/2"
40600	.6299		16.000	16.0	75	20
40620	.6299		16.000	16.0	88	41
40640	.6299		16.000	16.0	150	63
52800	.7500	3/4"	19.050	3/4"	3"	7/8"
52820	.7500	3/4"	19.050	3/4"	4"	1-5/8"
52830	.7500	3/4"	19.050	3/4"	5"	2"
52840	.7500	3/4"	19.050	3/4"	6"	3-1/4"
40700	.7874		20.000	20.0	75	22
40720	.7874		20.000	20.0	100	41
40740	.7874		20.000	20.0	150	82
40780	.9843		25.000	25.0	100	28
40820	.9843		25.000	25.0	100	50
40840	.9843		25.000	25.0	150	82
52890	1.000	1"	25.400	1"	4"	1-1/8"
52920	1.000	1"	25.400	1"	4"	2"
52940	1.000	1"	25.400	1"	6"	3-1/4"



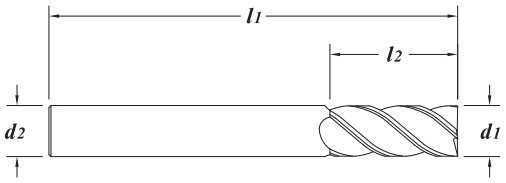
Series 255MC

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

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



Square End - TiCN Coated
Ohne Eckenradius - TiCN-Beschichtet
Extremo Sin Radio - Recubrimiento de TiCN
Extrémité Carré - Revêtement TiCN
Piatte - Rivestimento in TiCN
平头 - TiCN 涂层



70

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
Recommended for steels, stainless steel and exotics
AlTiN Coated - page 186
Bright Finish - page 188

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !
Verbesserte Verschleissbeständigkeit und Schmiereienschaft
Verbessertes Schlichten von Titan
Starker Kern, Scharfe Schneidecken
Empfohlen für Stahl, Rostfreiem Stahl und exotischen Werkstoffen
AlTiN-Beschichtet - Seite 186
Bright Fertig (Ohne Beschichtung) - Seite 188

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Mejoradas la resistencia a la abrasión y la lubricación
Acabados mejorados en titanio
Núcleo pesado, Esquinas afiladas
Recomendado para aceros, acero inoxidable y materiales exóticos
Recubrimiento de AlTiN - Página 186
Acabado Brillante (Sin Recubrimiento) - Página 188

35

Fraises carbure submicrograin - coupe au centre
Pour haute performance fraisage
Le serrage et la stabilite de la piece, la rigidite de la machine et l'atatchment de l'outil sont tres importantes
Amelioration de la resistance a l'abrasion et au glissement
Amelioration des finitions dans le Titane
Angles pointus
Recommandee pour aciers, aciers inoxydables et alliages exotiques
Revêtement AlTiN - Page 186
Finition Brillante (Sans Revêtement) - Page 188

Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Lavorazione a secco o a umido
Migliore finitura sul titanio
Dovere nucleo pesante, tagliente vivo
Consigliata per una di acciai, inox e materiali esotici
Rivestimento in AlTiN - Pagina 186
Eccellente Finitura (Non Rivestito) - Pagina 188

高效超细晶粒整体硬质合金立铣刀 - 中心切削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
改善耐磨性和润滑性
改善钛合金的光洁度
强力芯部
尖角
在钢件、不锈钢和稀有材质上作高效铣削
AlTiN 涂层 - 186页
高亮光洁度(未涂层) - 188页

0

MATERIAL HARDNESS (Rc)

EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
52104	.1875	3/16"	4.763	3/16"	2"	5/16"
52124	.1875	3/16"	4.763	3/16"	2"	9/16"
52204	.2500	1/4"	6.350	1/4"	2"	3/8"
52224	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
52244	.2500	1/4"	6.350	1/4"	4"	1-1/4"
52304	.3125	5/16"	7.938	5/16"	2"	7/16"
52324	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"
52344	.3125	5/16"	7.938	5/16"	4"	1-1/4"
52404	.3750	3/8"	9.525	3/8"	2"	1/2"
52424	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
52444	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"
52504	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"
52524	.4375	7/16"	11.113	7/16"	2-3/4"	1"
52544	.4375	7/16"	11.113	7/16"	4"	2"
52604	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"
52624	.5000	1/2"	12.700	1/2"	3"	1-1/4"
52644	.5000	1/2"	12.700	1/2"	4"	2"
52704	.6250	5/8"	15.875	5/8"	3"	3/4"
52724	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"
52744	.6250	5/8"	15.875	5/8"	6"	2-1/2"
52804	.7500	3/4"	19.050	3/4"	3"	7/8"
52824	.7500	3/4"	19.050	3/4"	4"	1-5/8"
52844	.7500	3/4"	19.050	3/4"	6"	3-1/4"
52894	1.000	1"	25.400	1"	4"	1-1/8"
52924	1.000	1"	25.400	1"	4"	2"
52944	1.000	1"	25.400	1"	6"	3-1/4"

† *Metric equivalents are for reference only*

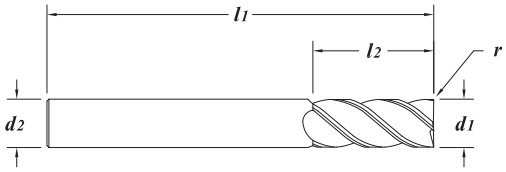
TOLERANCES	
d_1	+.000 –.050mm (+.000" –.002")
d_2	h6
r	+.025 –.025mm (+.001" –.001")

Series 255RA, 855RA

.1181" - .3125"
(3.000mm - 7.938mm)

TECH PAGES 286-287

Corner Radius - AlTiN Coated
Eckenradius - AlTiN-Beschichtet
Ángulo Redondeado - Recubrimiento de AlTiN
Rayon de Coin - Revêtement AlTiN
Raggio - Rivestimento in AlTiN
圆角半径 - AlTiN 涂层



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
An ideal tool for finishing applications after using the VRX end mill
Recommended for steels, stainless steel and exotics

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !
Trocken oder Halbtrockene Bearbeitung
Verbessertes Schlichten von Titan
Starker Kern
Ein ideales Werkzeug zum Schlichten nach der Benutzung des VRX Fräsers
Empfohlen für Stahl, Rostfreiem Stahl und exotischen Werkstoffen

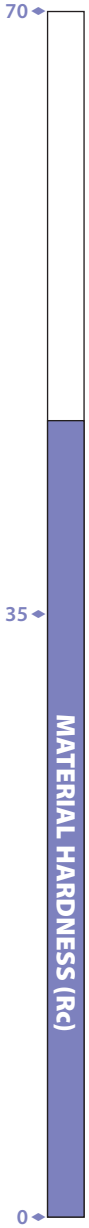
Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Mecanizado seco o semiseco
Acabados mejorados en titanio
Núcleo pesado
Herramienta ideal para aplicaciones de acabado después de la utilización de fresas VRX
Recomendado para aceros, acero inoxidable y materiales exóticos

Fraises carbure submicrograin - coupe au centre
Pour haute performance fraisage
Le serrage et la stabilite de la piece, la rigidite de la machine et l'atatchment de l'outil sont tres importantes
Usinage a sec ou avec l'air
Amelioration des finitions dans le Titane
Un outil ideal pour la finition apres l'utilisation des fraises VRX
Recommandee pour aciers, aciers inoxydables et alliages exotiques

Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Lavorazione a secco o a umido
Migliore finitura sul titanio
Dovere nucleo pesante
Utensile ideale per operazioni di finitura dopo l'utilizzo della fresa VRX
Consigliata per una di acciai, inox e materiali esotici

高效超细晶粒整体硬质合金立铣刀 - 中心切削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素!
干式或半干式机加工
改善钛合金的光洁度
强力芯部
VRX立铣刀是一种理想刀具，适合精加工
在钢件、不锈钢和稀有材质上作高效铣削

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
83527	.1181		3.000	3.0	38	8	0.20
83537	.1181		3.000	3.0	38	8	0.50
83547	.1181		3.000	3.0	50	12	0.20
83550	.1181		3.000	3.0	50	12	0.30
83557	.1181		3.000	3.0	50	12	0.50
83567	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"
83577	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.020"
83587	.1250	1/8"	3.175	1/8"	2"	1/2"	.010"
83597	.1250	1/8"	3.175	1/8"	2"	1/2"	.020"
83600	.1250	1/8"	3.175	1/8"	2"	1/2"	.030"
83607	.1575		4.000	6.0	50	8	0.30
83617	.1575		4.000	6.0	50	8	0.50
83627	.1575		4.000	6.0	50	12	0.30
83637	.1575		4.000	6.0	50	12	0.50
83647	.1875	3/16"	4.763	3/16"	2"	5/16"	.010"
83657	.1875	3/16"	4.763	3/16"	2"	5/16"	.020"
83667	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"
83677	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"
83680	.1875	3/16"	4.763	3/16"	2"	9/16"	.030"
83707	.1969		5.000	6.0	65	15	0.30
83717	.1969		5.000	6.0	65	15	0.50
83767	.2362		6.000	6.0	50	12	0.30
83777	.2362		6.000	6.0	50	12	0.50
83780	.2362		6.000	6.0	65	19	0.20
83787	.2362		6.000	6.0	65	19	0.30
83797	.2362		6.000	6.0	65	19	0.50
83807	.2362		6.000	6.0	65	19	1.00
83827	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"
83837	.2500	1/4"	6.350	1/4"	2"	3/8"	.030"
83845	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"
83847	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"
83857	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"
83877	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"
83907	.2500	1/4"	6.350	1/4"	3"	1-1/8"	.030"
83927	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"
83937	.3125	5/16"	7.938	5/16"	2"	7/16"	.030"
83940	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.010"
83947	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"
83957	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"
83977	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.060"



continued →

Series 255RA, 855RA *(continued)*

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

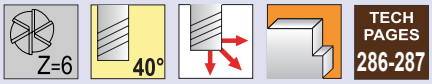
EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
83987	.3150		8.000	8.0	50	12	0.50
83997	.3150		8.000	8.0	50	12	1.00
84000	.3150		8.000	8.0	65	22	0.30
84007	.3150		8.000	8.0	65	22	0.50
84017	.3150		8.000	8.0	65	22	1.00
84027	.3150		8.000	8.0	65	22	1.50
84087	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"
84097	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"
84100	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"
84107	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"
84117	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"
84137	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"
84147	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.030"
84167	.3937		10.000	10.0	70	22	0.50
84177	.3937		10.000	10.0	70	22	1.00
84257	.4724		12.000	12.0	75	32	0.30
84267	.4724		12.000	12.0	75	32	0.50
84277	.4724		12.000	12.0	75	32	1.00
84287	.4724		12.000	12.0	75	32	1.50
84307	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"
84317	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"
84327	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"
84337	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"
84357	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"
84367	.5000	1/2"	12.700	1/2"	4"	2"	.030"
84377	.5000	1/2"	12.700	1/2"	4"	2"	.060"
84397	.5000	1/2"	12.700	1/2"	4"	2"	.120"
84467	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"
84487	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"
84497	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"
84507	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"
84567	.6299		16.000	16.0	88	32	1.00
84577	.6299		16.000	16.0	88	32	2.00
84587	.6299		16.000	16.0	150	65	1.00
84597	.6299		16.000	16.0	150	65	2.00
84667	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"
84687	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"
84697	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"
84700	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"
84707	.7500	3/4"	19.050	3/4"	5"	2"	.030"
84717	.7500	3/4"	19.050	3/4"	5"	2"	.060"
84747	.7500	3/4"	19.050	3/4"	5"	2"	.120"
84757	.7500	3/4"	19.050	3/4"	5"	2"	.190"
84767	.7874		20.000	20.0	100	38	1.00
84777	.7874		20.000	20.0	100	38	3.00
84887	.9843		25.000	25.0	100	38	1.00
84897	.9843		25.000	25.0	100	38	3.00
84957	1.000	1"	25.400	1"	4"	1-1/2"	.015"
84967	1.000	1"	25.400	1"	4"	1-1/2"	.030"
84970	1.000	1"	25.400	1"	4"	1-1/2"	.060"
84977	1.000	1"	25.400	1"	4"	1-1/2"	.120"
84987	1.000	1"	25.400	1"	5"	2"	.030"
84990	1.000	1"	25.400	1"	5"	2"	.060"
84997	1.000	1"	25.400	1"	5"	2"	.120"
85007	1.000	1"	25.400	1"	5"	2"	.190"

† *Metric equivalents are for reference only*

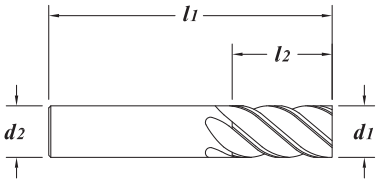
Series 246M, 246MC, 246MA, 846M, 846MA

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

NEW ITEM



Square End
Ohne Eckenradius
Extremo Sin Radio
Extrémité Carré
Piatte
平头



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
Bright Finish
TiCN Coated
AlTiN Coated

Vollhartmetallbohrer aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung für Stahl
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !
Ausgezeichnete Haltbarkeit
Bright Fertig (Ohne Beschichtung)
TiCN-Beschichtet
AlTiN-Beschichtet

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento para aceros
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Excelente durabilidad
Acabado Brillante (Sin Recubrimiento)
Recubrimiento de TiCN
Recubrimiento de AlTiN

Fraises carbure submicrograin - coupe au centre
Haute performance pour la finition pour aciers
Le serrage et la stabilite de la piece, la rigidite de la machine et l'atatchment de l'outil sont tres importantes
Excellente duree de vie
Finition Brillante (Sans Revêtement)
Revêtement TiCN
Revêtement AlTiN

Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni di utensile di finitura su acciaio
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Eccellente durata di vita utensile
Eccellente Finitura (Non Rivestito)
Rivestimento in TiCN
Rivestimento in AlTiN

高效超细晶粒整体硬质合金立铣刀 - 中心切削
在钢件、高效精加工刀具
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！
耐用性极好
高亮光洁度(未涂层)
TiCN 涂层
AlTiN 涂层

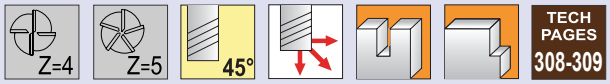
	(246M/846M) BRIGHT EDP#	(246MC) TiCN EDP#	(246MA/846MA) AlTiN EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	51110	-	-	.1875	3/16"	4.763	3/16"	2"	5/8"
	51510	-	-	.1969		5.000	5.0	50	16
	51520	-	-	.2362		6.000	6.0	65	20
	51150	-	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
	51190	-	-	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
	51530	-	-	.3150		8.000	8.0	65	22
	51230	-	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
	51540	-	-	.3937		10.000	10.0	70	25
	51270	-	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"
	51310	-	-	.5000	1/2"	12.700	1/2"	3"	1"
	51330	-	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
	51560	-	-	.6299		16.000	16.0	88	32
	51350	-	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"
	51370	-	-	1.000	1"	25.400	1"	4"	1-1/2"
	51400	-	-	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"
	51430	-	-	1.250	1-1/4"	31.750	1-1/4"	6"	3"
	-	51114	-	.1875	3/16"	4.763	3/16"	2"	5/8"
	-	51154	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
	-	51194	-	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
	-	51234	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
	-	51274	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"
	-	51314	-	.5000	1/2"	12.700	1/2"	3"	1"
	-	51334	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
	-	51354	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"
	-	51374	-	1.000	1"	25.400	1"	4"	1-1/2"
	-	51404	-	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"
	-	51434	-	1.250	1-1/4"	31.750	1-1/4"	6"	3"
	-	-	51117	.1875	3/16"	4.763	3/16"	2"	5/8"
	-	-	51517	.1969		5.000	5.0	50	16
NEW	-	-	51597	.1969		5.000	6.0	65	16
	-	-	51527	.2362		6.000	6.0	65	20
	-	-	51157	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
	-	-	51197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
	-	-	51537	.3150		8.000	8.0	65	22
	-	-	51237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
	-	-	51547	.3937		10.000	10.0	70	25
	-	-	51277	.4375	7/16"	11.113	7/16"	2-3/4"	1"
	-	-	51557	.4724		12.000	12.0	75	26
	-	-	51317	.5000	1/2"	12.700	1/2"	3"	1"
	-	-	51337	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
	-	-	51567	.6299		16.000	16.0	88	32
	-	-	51357	.7500	3/4"	19.050	3/4"	4"	1-1/2"
	-	-	51577	.7874		20.000	20.0	100	38
	-	-	51587	.9843		25.000	25.0	100	38
	-	-	51377	1.000	1"	25.400	1"	4"	1-1/2"
	-	-	51407	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"
	-	-	51437	1.250	1-1/4"	31.750	1-1/4"	6"	3"

MATERIAL HARDNESS (Rc)
70
35
0

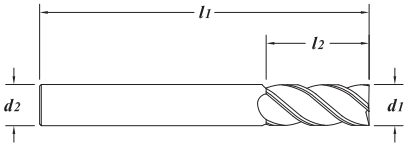
Series 545MA

HIGH ROCKWELL END MILLS

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



Square End - BALINIT® Durana Coated
Ohne Eckenradius - BALINIT® Durana-Beschichtet
Extremo Sin Radio - Recubrimiento de BALINIT® Durana
Extrémité Carré - Revêtement BALINIT® Durana
Piatte - Rivestimento in BALINIT® Durana
平头 - BALINIT® Durana 涂层



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
High performance tool for use in high Rockwell materials
Recommended for inconel, tool steels, and hardened die mold above 45 Rc
Corner Radius - page 195
Ball End - page 196

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für die Bearbeitung von gehärteten Werkstoffen
Empfohlen für Empfohlen für die Bearbeitung von gehärteten Formenbaustählen, Inconel und Werkzeugstählen über 45 HRc
Schaftfräser mit Eckenradius - Seite 195
Vollradiusfräser - Seite 196

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Para uso con materiales de alta dureza Rockwell
Recomendadas para trabajar troqueles endurecidos, inconel y aceros de herramientas alrededor de 45Rc
Fresa de vástago con radio de cantos - Página 195
Fresadora de radios - Página 196

Fraises carbure submicrograin - coupe au centre
Haute performance outil pour durs material
Recommandee pour utilisation dans aciers a moules a haute durete, inconel, et aciers a outillage au dessus de 45HRC
Rayon de Coin - Page 195
Hemispherique - Page 196

Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni da impiegare su materiali temprati
Raccomandata per lavorazioni su acciai temprati, inconel e acciai per utensili superiori a 45 Hrc
Toriche - Pagina 195
Sferiche - Pagina 196

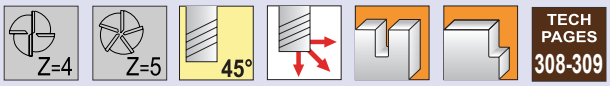
高效超细晶粒整体硬质合金立铣刀 – 中心切削
适合加工洛氏硬度高的材质
推荐加工淬硬模具、铬镍铁耐热耐蚀合金和洛氏硬度45以上的工具钢
圆弧角 - 195页
球头 - 196页

EDP#	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	Number of Flutes
21200	.1181		3.000	3.0	38	12	4
21230	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	4
21260	.1575		4.000	6.0	50	12	4
21290	.1875	3/16"	4.763	3/16"	2"	9/16"	4
21320	.1969		5.000	6.0	65	15	4
21350	.2362		6.000	6.0	65	19	4
21380	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	4
21410	.2756		7.000	8.0	65	22	5
21440	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	5
21470	.3150		8.000	8.0	65	22	5
21500	.3543		9.000	10.0	65	22	5
21530	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	5
21560	.3937		10.000	10.0	70	22	5
21620	.4724		12.000	12.0	75	32	5
21660	.5000	1/2"	12.700	1/2"	3"	1-1/4"	5
21710	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	5
21740	.6299		16.000	16.0	88	32	5
21800	.7500	3/4"	19.050	3/4"	4"	1-1/2"	5
21830	.7874		20.000	20.0	100	38	5
21890	.9843		25.000	25.0	100	38	5
21920	1.000	1"	25.400	1"	4"	1-1/2"	5

† *Metric equivalents are for reference only*

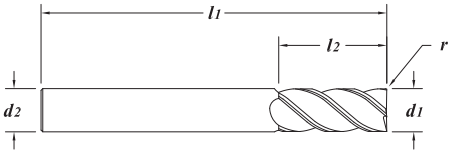
TOLERANCES	
d_1	+.000 –.050mm (+.000" –.002")
d_2	h6
r	+.025 –.025mm (+.001" –.001")

HIGH ROCKWELL END MILLS



TECH PAGES 308-309

Corner Radius - BALINIT® Durana Coated
Eckenradius - BALINIT® Durana-Beschichtet
Ángulo Redondeado - Recubrimiento de BALINIT® Durana
Rayon de Coin - Revêtement BALINIT® Durana
Raggio - Rivestimento in BALINIT® Durana
圆角半径 - BALINIT® Durana 涂层



Solid submicron grain carbide end mill - center cutting
High performance tool for use in high Rockwell materials
Recommended for inconel, tool steels, and hardened die mold above 45 Rc
Square End - page 194
Ball End - page 196

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für die Bearbeitung von gehärteten Werkstoffen
Empfohlen für Empfohlen für die Bearbeitung von gehärteten Formenbaustählen, Inconel und Werkzeugstählen über 45 HRc
Schaftfräser ohne Eckenradius - Seite 194
Vollradiusfräser - Seite 196

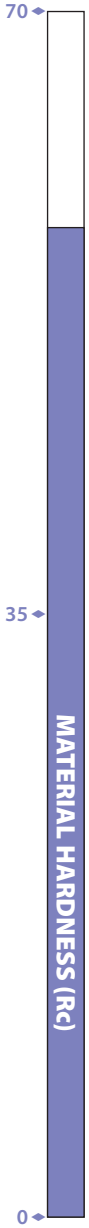
Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Para uso con materiales de alta dureza Rockwell
Recomendadas para trabajar troqueles endurecidos, inconel y aceros de herramientas alrededor de 45Rc
Fresa de vástago sin radio de cantos - Página 194
Fresadora de radios - Página 196

Fraises carbure submicrograin - coupe au centre
Haute performance outil pour durs material
Recommandee pour utilisation dans aciers a moules a haute durete, inconel, et aciers a outillage au dessus de 45HRC
Extrémité carré - Page 194
Hemispherique - Page 196

Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni da impiegare su materiali temprati
Raccomandata per lavorazioni su acciai temprati, inconel e acciai per utensili superiori a 45 Hrc
Piatte - Pagina 194
Sferiche - Pagina 196

高效超细晶粒整体硬质合金立铣刀 - 中心切削
适合加工洛氏硬度高的材质
推荐加工淬硬模具、铬镍铁耐热耐蚀合金和洛氏硬度45以上的工具钢
平头 - 194页
球头 - 196页

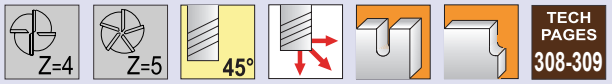
EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	Number of Flutes
21202	.1181		3.000	3.0	38	12	0.20	4
21212	.1181		3.000	3.0	38	12	0.50	4
21232	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	4
21242	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	4
21262	.1575		4.000	6.0	50	12	0.30	4
21292	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	4
21302	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	4
21322	.1969		5.000	6.0	65	15	0.30	4
21342	.2362		6.000	6.0	65	19	0.20	4
21352	.2362		6.000	6.0	65	19	0.50	4
21372	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	4
21382	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	4
21392	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	4
21412	.2756		7.000	8.0	65	22	0.50	5
21432	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.010"	5
21442	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.015"	5
21452	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	5
21462	.3150		8.000	8.0	65	22	0.20	5
21472	.3150		8.000	8.0	65	22	0.50	5
21502	.3543		9.000	10.0	65	22	0.50	5
21522	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	5
21532	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	5
21542	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	5
21552	.3937		10.000	10.0	70	22	0.20	5
21562	.3937		10.000	10.0	70	22	0.50	5
21612	.4724		12.000	12.0	75	32	0.50	5
21622	.4724		12.000	12.0	75	32	1.00	5
21642	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	5
21652	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	5
21662	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	5
21672	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	5
21692	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	5
21702	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	5
21712	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	5
21722	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	5
21732	.6299		16.000	16.0	88	32	0.50	5
21742	.6299		16.000	16.0	88	32	1.00	5
21772	.7087		18.000	18.0	100	38	0.50	5
21802	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	5
21812	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	5
21822	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	5
21832	.7874		20.000	20.0	100	38	0.50	5
21922	1.000	1"	25.400	1"	4"	1-1/2"	.015"	5
21932	1.000	1"	25.400	1"	4"	1-1/2"	.030"	5
21942	1.000	1"	25.400	1"	4"	1-1/2"	.060"	5



Series **545BA**

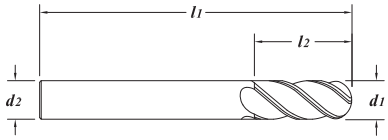
HIGH ROCKWELL END MILLS

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



TECH PAGES 308-309

Ball End - BALINIT® Durana Coated
Vollradius - BALINIT® Durana-Beschichtet
Cabeza Esférica - Recubrimiento de BALINIT® Durana
Hemispherique - Revêtement BALINIT® Durana
Sferica - Rivestimento in BALINIT® Durana
球头 - BALINIT® Durana 涂层



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
High performance tool for use in high Rockwell materials
Recommended for inconel, tool steels, and hardened die mold above 45 Rc
Square End - page 194
Corner Radius - page 195

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für die Bearbeitung von gehärteten Werkstoffen
Empfohlen für Empfohlen für die Bearbeitung von gehärteten Formenbaustählen, Inconel und Werkzeugstählen über 45 HRc
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
Schaftfräser ohne Eckenradius - Seite 194
Schaftfräser mit Eckenradius - Seite 195

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Para uso con materiales de alta dureza Rockwell
Recomendadas para trabajar troqueles endurecidos, inconel y aceros de herramientas alrededor de 45Rc
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Fresa de vástago sin radio de cantos - Página 194
Fresa de vástago con radio de cantos - Página 195

Fraises carbure submicrograin - coupe au centre
Haute performance outil pour durs material
Recommandee pour utilisation dans aciers a moules a haute durete, inconel, et aciers a outillage au dessus de 45HRC
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")
Extrémité carré - Page 194
Rayon de Coin - Page 195

Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni da impiegare su materiali temprati
Raccomandata per lavorazioni su acciai temprati, inconel e acciai per utensili superiori a 45 Hrc
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Piatte - Pagina 194
Toriche - Pagina 195

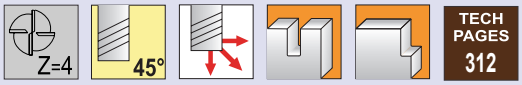
高效超细晶粒整体硬质合金立铣刀 - 中心切削
适合加工洛氏硬度高的材质
推荐加工淬硬模具、铬镍铁耐热耐蚀合金和洛氏硬度45以上的工具钢
半径允差 +0,000 /–0,025 (+.000"–.001")
平头 - 194页
圆弧角 - 195页

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	Number of Flutes
21204	.1181		3.000	3.0	38	12	4
21234	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	4
21264	.1575		4.000	6.0	50	12	4
21294	.1875	3/16"	4.763	3/16"	2"	9/16"	4
21324	.1969		5.000	6.0	65	15	4
21354	.2362		6.000	6.0	65	19	4
21384	.2500	1/4"	6.353	1/4"	2-1/2"	3/4"	4
21414	.2756		7.000	8.0	65	22	5
21444	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	5
21474	.3150		8.000	8.0	65	22	5
21504	.3543		9.000	10.0	65	22	5
21534	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	5
21564	.3937		10.000	10.0	70	22	5
21624	.4724		12.000	12.0	75	32	5
21664	.5000	1/2"	12.700	1/2"	3"	1-1/4"	5
21714	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	5
21744	.6299		16.000	16.0	88	32	5
21774	.7087		18.000	18.0	100	38	5
21804	.7500	3/4"	19.050	3/4"	4"	1-1/2"	5
21924	1.000	1"	25.400	1"	4"	1-1/2"	5

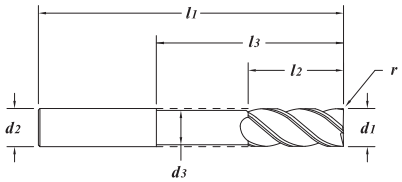
† *Metric equivalents are for reference only*

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

HIGH FEED END MILLS



Corner Radius - BALINIT® Durana Coated
Eckenradius - BALINIT® Durana-Beschichtet
Ángulo Redondeado - Recubrimiento de BALINIT® Durana
Rayon de Coin - Revêtement BALINIT® Durana
Raggio - Rivestimento in BALINIT® Durana
圆角半径 - BALINIT® Durana 涂层



Solid submicron grain carbide end mill - center cutting
For light axial / radial depths of cut
Recommended for die mold applications
Rigid work holding, machine stability and part integrity are critical!

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

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungswerkzeug für die Bearbeitung von Teilen mit kleinen axialen Schnittiefen
Empfohlen für Werkzeuganwendungen
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !

* - Das Werkzeug hat einen konischen Hals von 3°
* - Das Werkzeug hat einen reduzierten Schaftdurchmesser

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Herramienta de alto rendimiento para uso en profundidades axiales ligeras de corte
Recomendado para aplicaciones de Moldes
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales

* - la herramienta tiene un ángulo de mezcla de 3 ° con el vástago
* - la herramienta tiene un vástago de diámetro reducido

Fraises carbure submicrograin - coupe au centre
Outil haute performance pour un usinage avec des petites profondeurs de coupe axiales
Recommandé pour les applications de matrices
Le serrage et la stabilite de la piece, la rigidite de la machine et l'atatchment de l'outil sont tres importantes

* - L'outil a un angle de dégagement de 3° sur la queue
* - L'outil a un diamètre de queue réduit

Fresa sub-micrograno metallo duro - taglio al centro
Utensile ad alte prestazioni per piccole profondità di taglio
Consigliato per le applicazioni Die Mold
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!

* - utensile con 3° di inclinazione rispetto al gambo
* - utensile con diametro ridotto del gambo

超细晶粒整体硬质合金立铣刀 - 中心切削
适用于轴向小切深加工的高性能铣刀
推薦用於模具應用
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素！

* - 部分型号柄部有3°过渡角
* - 部分型号柄径小于刃径

	EDP#	d_1 † 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
	48300	.1181		3.000	6.0	65	3	0.75	15.0	2.80
	48305	.1250	1/8"	3.175	1/8"	3"	1/8"	.015"	-	-
	48310	.1250	1/8"	3.175	1/8"	3"	1/8"	.030"	-	-
	48315	.1250	1/8"	3.175	3/16"	2-1/2"	1/8"	.010"	3/4"	.115"
	48320	.1250	1/8"	3.175	3/16"	2-1/2"	1/8"	.015"	3/4"	.115"
	48325	.1250	1/8"	3.175	3/16"	2-1/2"	1/8"	.020"	3/4"	.115"
*	48330	.1250	1/8"	3.175	3/16"	3"	1/8"	.030"	*	-
	48335	.1575		4.000	6.0	65	4	1.00	20.0	3.70
	48340	.1875	3/16"	4.763	3/16"	3"	3/16"	.015"	-	-
	48345	.1875	3/16"	4.763	3/16"	3"	3/16"	.030"	-	-
	48350	.1875	3/16"	4.763	3/16"	3"	3/16"	.060"	-	-
	48355	.1875	3/16"	4.763	1/4"	2-1/2"	3/16"	.020"	7/8"	.175"
	48360	.1875	3/16"	4.763	1/4"	2-1/2"	3/16"	.030"	7/8"	.175"
	48365	.1875	3/16"	4.763	1/4"	2-1/2"	3/16"	.060"	7/8"	.175"
	48370	.1875	3/16"	4.763	1/4"	4"	3/16"	.020"	1-1/2"	.175"
	48375	.1875	3/16"	4.763	1/4"	4"	3/16"	.030"	1-1/2"	.175"
*	48380	.1875	3/16"	4.763	1/4"	4"	3/16"	.030"	*	-
*	48385	.1969		5.000	6.0	100	5	1.20	*10.0	4.90
	48390	.2362		6.000	6.0	100	6	1.50	30.0	5.70
	48395	.2500	1/4"	6.350	1/4"	3"	1/4"	.015"	-	-
	48400	.2500	1/4"	6.350	1/4"	3"	1/4"	.030"	-	-
	48405	.2500	1/4"	6.350	1/4"	3"	1/4"	.060"	-	-
*	48410	.2756		7.000	6.0	100	7	1.50	*	-
	48415	.3125	5/16"	7.938	5/16"	2-1/2"	5/16"	.020"	-	-
	48420	.3125	5/16"	7.938	5/16"	3"	5/16"	.078"	1-5/8"	.300"
	48425	.3125	5/16"	7.938	5/16"	3"	5/16"	.094"	1-5/8"	.300"
	48430	.3150		8.000	8.0	75	8	2.00	-	-
	48435	.3150		8.000	8.0	100	8	2.00	40.0	7.70
	48440	.3750	3/8"	9.525	3/8"	3"	3/8"	.015"	-	-
	48445	.3750	3/8"	9.525	3/8"	3"	3/8"	.030"	-	-
	48450	.3750	3/8"	9.525	3/8"	3"	3/8"	.060"	-	-
	48455	.3750	3/8"	9.525	3/8"	3"	3/8"	.094"	2.00"	.365"
	48460	.3750	3/8"	9.525	3/8"	4"	3/8"	.030"	2-1/2"	.365"
	48465	.3750	3/8"	9.525	3/8"	4"	3/8"	.094"	2-1/2"	.365"
	48470	.3937		10.000	10.0	100	10	2.00	50.0	9.70
	48475	.4724		12.000	12.0	100	12	3.00	60.0	11.70
	48480	.5000	1/2"	12.700	1/2"	3"	1/2"	.015"	-	-
	48485	.5000	1/2"	12.700	1/2"	3"	1/2"	.030"	-	-
	48490	.5000	1/2"	12.700	1/2"	3"	1/2"	.060"	-	-
	48495	.5000	1/2"	12.700	1/2"	3"	1/2"	.125"	-	-
	48500	.5000	1/2"	12.700	1/2"	4"	1/2"	.125"	-	-

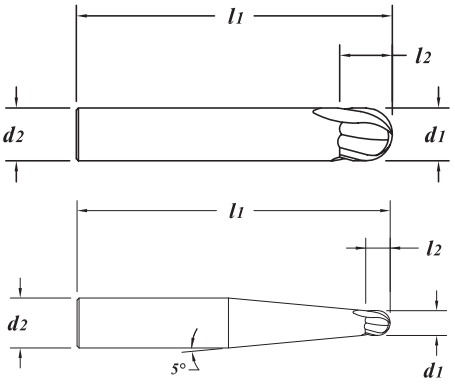
Series 350MX, 950MX

DIE MOLD CUTTERS

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

TECH PAGES 310-311

Die Mold Cutter - Ball End - BALINIT® Durana Coated
Formenbau Werkzeuge - Vollradius - BALINIT® Durana-Beschichtet
Fresas Para Moldes Troquelados - Cabeza Esférica - Recubrimiento de BALINIT® Durana
Fraises pour Moules et Outillages - Hemispherique - Revêtement BALINIT® Durana
Utensile per Stampi - Sferica - Rivestimento in BALINIT® Durana
模具刀具 - 球头 - BALINIT® Durana 涂层



MATERIAL HARDNESS (Rc)
70
35
0

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!
≤5.0mm (.1969") diameter have 5° taper to shank
Recommended for high Rockwell materials
Can be modified with a neck in 48 hours

Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung in der Formenbau Industrie
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !
≤5,0mm (.1969") Durchmesser und kleiner haben 5° Kegel zum Schaft
Empfohlen für Gehärtete Werkstoffe
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Vollradius Toleranz: +0,0000 / –0,0127 (+.0000" –.0005")

Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento para la industria troqueladora
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Diámetro de 5,0mm (.1969") e inferiores cuentan con un ahusamiento de 5° hasta el mango
Recomendado para materiales de alta Rc
Puede ser modificado con un cuello en 48 horas
Tolerancia de la cabeza esférica +0,0000 / –0,0127 (+.0000" –.0005")

Fraises carbure submicrograin - coupe au centre
Haute performance pour le fraisage dans l'industrie du moule
Le serrage et la stabilite de la piece, la rigidite de la machine et l'atatchment de l'outil sont tres importantes
Diametre 5,0mm (.1969") et plus petit ont un angle de depouille conique de 5° sur le queue
Recommandee pour matieres a haute durete
Peut etre modifier avec un col degage sous un delai de 48 heures
Tolerance du rayon de hemispherique +0,0000 / –0,0127 (+.0000" –.0005")

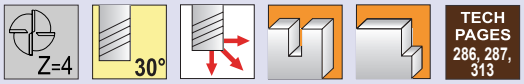
Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni di stampi
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
I diametri inferiori a 6mm sono rastremati a 5°
Materiali temprati
Può essere modificata in 48 ore
Tolleranza del raggio +0,0000 / –0,0127 (+.0000" –.0005")

高效超细晶粒整体硬质合金立铣刀 - 中心切削
用于模具行业高效机加工
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素!
为特定用途测试并选择硬质合金
5,0mm (.1969")直径和大于5,0mm (.1969")直径都有一个5°锥度直到柄部
洛氏硬度高的材质
可用轴颈进行修正
半径允差 +0,0000 / –0,0127 (+.0000"–.0005")

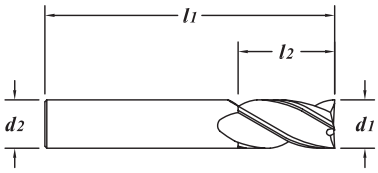
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
14210	.0312	1/32"	0.792	1/4"	3"	1/32"
15210	.0394		1.000	6.0	75	1
15220	.0591		1.500	6.0	75	1.5
14220	.0625	1/16"	1.588	1/4"	3"	1/16"
15230	.0787		2.000	6.0	75	2
14230	.0938	3/32"	2.383	1/4"	3"	3/32"
15240	.1181		3.000	6.0	75	3
14240	.1250	1/8"	3.175	1/4"	3"	1/8"
15250	.1575		4.000	6.0	75	4
14250	.1875	3/16"	4.763	1/4"	3"	3/16"
15260	.1969		5.000	6.0	75	5
15270	.2362		6.000	6.0	75	6
14260	.2500	1/4"	6.350	1/4"	3"	1/4"
14270	.3125	5/16"	7.938	5/16"	4"	5/16"
15280	.3150		8.000	8.0	100	8
14280	.3750	3/8"	9.525	3/8"	4"	3/8"
15290	.3937		10.000	10.0	100	10
15300	.4724		12.000	12.0	100	12
14290	.5000	1/2"	12.700	1/2"	4"	1/2"

† *Metric equivalents are for reference only*

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



Square End - Diamond Coated
Ohne Eckenradius - Diamant-Beschichtet
Extremo Sin Radio - Recubrimiento de Diamante
Extrémité Carré - Revêtement Diamant
Piatte - Rivestimento in Diamante
平头 - Diamond 涂层



Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating
Recommended for graphite, fiber-reinforced plastics, carbon fiber

Hochleistungs- Vollhartmetallfräser Sorte C-2 - Zentrumsschnitt
Krystalline Beschichtung
Empfohlen für Grafit, Faserverstärkte Kunststoffe, Carbonfaserwerkstoffe

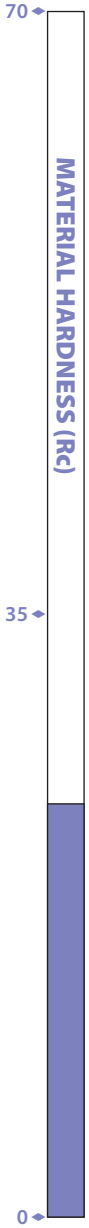
Fresa de grado C-2 sólido carburo de alto rendimiento - corte centrado
Recubrimiento cristalino
Recomendado para grafito, plásticos reforzados con fibra, fibra de carbono

Carbure de classe C-2 - coupe au centre
Revêtement Crystalline
Recommandee pour graphite, plastiques renforcés par des fibres et fibre de carbone

Fresa metallo duro di classificazione C-2 - taglio al centro
Rivestimento al diamante
Alte prestazioni per lavorazioni di Grafite, resine, fibre di carbonio

高效C-2级硬质合金立铣刀 - 中心切削
晶体涂层
推荐加工石墨、纤维补强塑料、碳素纤维

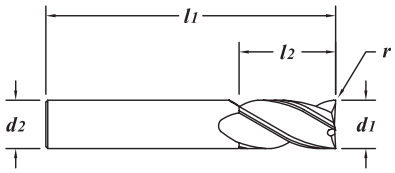
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
10018	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"
46018	.0394		1.000	3.0	38	4
10028	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"
46028	.0591		1.500	3.0	38	6
10038	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
46038	.0787		2.000	3.0	38	8
10058	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"
46058	.1181		3.000	3.0	38	12
10078	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
46078	.1575		4.000	4.0	50	14
10118	.1875	3/16"	4.763	3/16"	2"	5/8"
46098	.1969		5.000	5.0	50	16
46108	.2362		6.000	6.0	65	20
10158	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
10198	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
46128	.3150		8.000	8.0	65	20
10238	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
46148	.3937		10.000	10.0	70	25
46168	.4724		12.000	12.0	75	25
10318	.5000	1/2"	12.700	1/2"	3"	1"
13338	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
46188	.6299		16.000	16.0	88	32
13358	.7500	3/4"	19.050	3/4"	4"	1-1/2"
13378	1.000	1"	25.400	1"	4"	1-1/2"



Series 210RD

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

Corner Radius - Diamond Coated
Eckenradius - Diamant-Beschichtet
Ángulo Redondeado - Recubrimiento de Diamante
Rayon de Coin - Revêtement Diamant
Raggio - Rivestimento in Diamante
圆角半径 – Diamond 涂层



MATERIAL HARDNESS (Rc)
70
35
0

Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating
For stronger corners and part radius
Recommended for graphite, fiber-reinforced plastics, carbon fiber

Hochleistungs- Vollhartmetallfräser Sorte C-2 - Zentrumsschnitt
Krystalline Beschichtung
Für stärkere Schneidecken und Radiusteile
Empfohlen für Grafit, Faserverstärkte Kunststoffe, Carbonfaserwerkstoffe

Fresa de grado C-2 sólido carburo de alto rendimiento - corte centrado
Recubrimiento cristalino
Para un mejor refuerzo de esquinas y zonas curvas
Recomendado para grafito, plásticos reforzados con fibra, fibra de carbono

Carbure de classe C-2 - coupe au centre
Revêtement Crystalline
Pour rayons de pièce et angles renforcés
Recommandee pour graphite, plastiques renforcés par des fibres et fibre de carbone

Fresa metallo duro di classificazione C-2 - taglio al centro
Rivestimento al diamante
Raggi rinforzati
Alte prestazioni per lavorazioni di Grafite, resine, fibre di carbonio

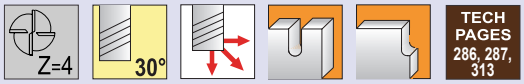
高效C-2级硬质合金立铣刀 - 中心切削
晶体涂层
用于强化圆角和零件半径
推荐加工石墨、纤维补强塑料、碳素纤维

EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
24118	.1181		3.000	3.0	38	12	0.50
80018	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"
80028	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"
24148	.1575		4.000	4.0	50	14	0.30
24158	.1575		4.000	4.0	50	14	0.50
80058	.1875	3/16"	4.763	3/16"	2"	5/8"	.015"
80068	.1875	3/16"	4.763	3/16"	2"	5/8"	.020"
24178	.2362		6.000	6.0	65	20	0.50
24208	.2362		6.000	6.0	65	20	1.50
80108	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"
80118	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"
80128	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"
24248	.3150		8.000	8.0	65	20	1.00
80248	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"
80258	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"
24318	.3937		10.000	10.0	70	25	1.00
24378	.4724		12.000	12.0	75	25	0.50
24398	.4724		12.000	12.0	75	25	1.00
80328	.5000	1/2"	12.700	1/2"	3"	1"	.030"
80348	.5000	1/2"	12.700	1/2"	3"	1"	.060"

† *Metric equivalents are for reference only*

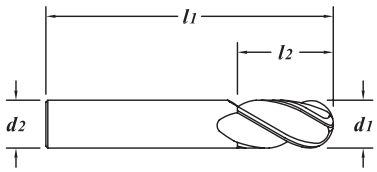
HIGH PERFORMANCE END MILLS

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



TECH PAGES 286, 287, 313

Ball End - Diamond Coated
Vollradius - Diamant-Beschichtet
Cabeza Esférica - Recubrimiento de Diamante
Hemispherique - Revêtement Diamant
Sferica - Rivestimento in Diamante
球头 - Diamond 涂层



Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating
Recommended for graphite, fiber-reinforced plastics, carbon fiber

Hochleistungs- Vollhartmetallfräser Sorte C-2 - Zentrumsschnitt
Krystalline Beschichtung
Empfohlen für Grafit, Faserverstärkte Kunststoffe, Carbonfaserwerkstoffe
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")

Fresa de grado C-2 sólido carburo de alto rendimiento - corte centrado
Recubrimiento cristalino
Recomendado para grafito, plásticos reforzados con fibra, fibra de carbono
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")

Carbure de classe C-2 - coupe au centre
Revêtement Crystalline
Recommandee pour graphite, plastiques renforcés par des fibres et fibre de carbone
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")

Fresa metallo duro di classificazione C-2 - taglio al centro
Rivestimento al diamante
Alte prestazioni per lavorazioni di Grafite, resine, fibre di carbonio
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")

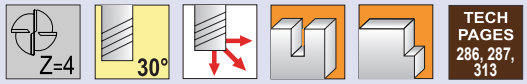
高效C-2级硬质合金立铣刀 - 中心切削
晶体涂层
推荐加工石墨、纤维补强塑料、碳素纤维
半径允差 +0,000 /–0,025 (+.000"–.001")

EDP#	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
15018	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"
48018	.0394		1.000	3.0	38	4
15028	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"
48028	.0591		1.500	3.0	38	6
15038	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
48038	.0787		2.000	3.0	38	8
15058	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"
48058	.1181		3.000	3.0	38	12
15078	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
48078	.1575		4.000	4.0	50	14
15118	.1875	3/16"	4.763	3/16"	2"	5/8"
48098	.1969		5.000	5.0	50	16
48108	.2362		6.000	6.0	65	20
15158	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
15198	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
48128	.3150		8.000	8.0	65	20
15238	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
48168	.4724		12.000	12.0	75	25
15318	.5000	1/2"	12.700	1/2"	3"	1"

MATERIAL HARDNESS (Rc)
70
35
0

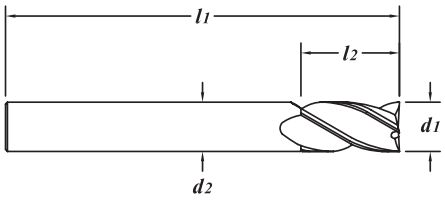
Series 610D

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



TECH PAGES 286, 287, 313

Extra Length - Square End - Diamond Coated
Extra Länge - Ohne Eckenradius - Diamant-Beschichtet
Longitud Extra - Extremo Sin Radio - Recubrimiento de Diamante
Extra Longue - Extrémité Carré - Revêtement Diamant
Lunghezza Extra - Piatte - Rivestimento in Diamante
超长 - 平头 - Diamond 涂层



MATERIAL HARDNESS (Rc)

70

Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating
Recommended for graphite, fiber-reinforced plastics, carbon fiber
Can be modified with a neck in 48 hours

Hochleistungs- Vollhartmetallfräser Sorte C-2 - Zentrumsschnitt
Krystalline Beschichtung
Empfohlen für Grafit, Faserverstärkte Kunststoffe, Carbonfaserwerkstoffe
Kann innerhalb 48 Stunden am Schaft verjüngt werden

Fresa de grado C-2 sólido carburo de alto rendimiento - corte centrado
Recubrimiento cristalino
Recomendado para grafito, plásticos reforzados con fibra, fibra de carbono
Puede ser modificado con un cuello en 48 horas

35

Carbure de classe C-2 - coupe au centre
Revêtement Crystalline
Recommandee pour graphite, plastiques renforcés par des fibres et fibre de carbone
Modification possible : gorge de dégagement (sous 48 Heures)

Fresa metallo duro di classificazione C-2 - taglio al centro
Rivestimento al diamante
Alte prestazioni per lavorazioni di Grafite, resine, fibre di carbonio
Può essere modificata in 48 ore

高效C-2级硬质合金立铣刀 - 中心切削
晶体涂层
推荐加工石墨、纤维补强塑料、碳素纤维
可用轴颈进行修正

0

EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
94028	.1181		3.000	3.0	75	20
38038	.1250	1/8"	3.175	1/8"	3"	1"
94068	.1575		4.000	4.0	75	25
38048	.1875	3/16"	4.763	3/16"	4"	1"
38058	.2500	1/4"	6.350	1/4"	3"	1"
38068	.2500	1/4"	6.350	1/4"	4"	1"
38078	.2500	1/4"	6.350	1/4"	6"	1-1/2"
38098	.3125	5/16"	7.938	5/16"	4"	1"
94168	.3150		8.000	8.0	100	25
38128	.3750	3/8"	9.525	3/8"	4"	1"
38138	.3750	3/8"	9.525	3/8"	6"	1-1/2"
94208	.3937		10.000	10.0	100	25
94248	.4724		12.000	12.0	100	25
38168	.5000	1/2"	12.700	1/2"	4"	1"
38178	.5000	1/2"	12.700	1/2"	4"	2"

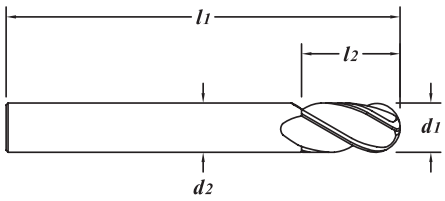
† *Metric equivalents are for reference only*

TOLERANCES

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

TECH PAGES 286, 287, 313

Extra Length - Ball End - Diamond Coated
Extra Länge - Vollradius - Diamant-Beschichtet
Longitud Extra - Cabeza Esférica - Recubrimiento de Diamante
Extra Longue - Hemispherique - Revêtement Diamant
Lunghezza Extra - Sferica - Rivestimento in Diamante
超长 - 球头 - Diamond 涂层



Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating
Recommended for graphite, fiber-reinforced plastics, carbon fiber
Can be modified with a neck in 48 hours

Hochleistungs- Vollhartmetallfräser Sorte C-2 - Zentrumsschnitt
Krystalline Beschichtung
Empfohlen für Grafit, Faserverstärkte Kunststoffe, Carbonfaserwerkstoffe
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")

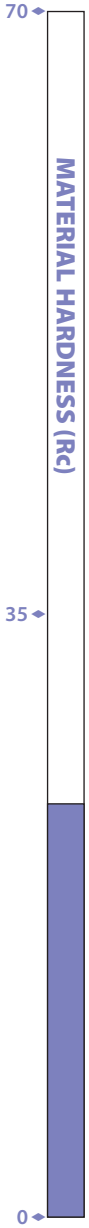
Fresa de grado C-2 sólido carburo de alto rendimiento - corte centrado
Recubrimiento cristalino
Recomendado para grafito, plásticos reforzados con fibra, fibra de carbono
Puede ser modificado con un cuello en 48 horas
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")

Carbure de classe C-2 - coupe au centre
Revêtement Crystalline
Recommandee pour graphite, plastiques renforcés par des fibres et fibre de carbone
Modification possible : gorge de dégagement (sous 48 Heures)
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")

Fresa metallo duro di classificazione C-2 - taglio al centro
Rivestimento al diamante
Alte prestazioni per lavorazioni di Grafite, resine, fibre di carbonio
Può essere modificata in 48 ore
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")

高效C-2级硬质合金立铣刀 - 中心切削
晶体涂层
推荐加工石墨、纤维补强塑料、碳素纤维
可用轴颈进行修正
半径允差 +0,000 /–0,025 (+.000"–.001")

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
99028	.1181		3.000	3.0	75	20
40038	.1250	1/8"	3.175	1/8"	3"	1"
99068	.1575		4.000	4.0	75	25
40048	.1875	3/16"	4.763	3/16"	4"	1"
99108	.2362		6.000	6.0	100	25
99128	.2362		6.000	6.0	150	38
40058	.2500	1/4"	6.350	1/4"	3"	1"
40068	.2500	1/4"	6.350	1/4"	4"	1"
40078	.2500	1/4"	6.350	1/4"	6"	1-1/2"
40098	.3125	5/16"	7.938	5/16"	4"	1"
99168	.3150		8.000	8.0	100	25
40128	.3750	3/8"	9.525	3/8"	4"	1"
40138	.3750	3/8"	9.525	3/8"	6"	1-1/2"
99208	.3937		10.000	10.0	100	25
40168	.5000	1/2"	12.700	1/2"	4"	1"
40178	.5000	1/2"	12.700	1/2"	4"	2"



INTRODUCING . . .

GARR Technical Advisor

Features ease of use, including an extensive material list and setup versatility

Uses a dynamic function based on spindle interface, toolholding, stability of workpiece and *most importantly*, specific material condition

Adaptability of the GARR Technical Advisor is beneficial when setup factors are sub-optimal

CHECK IT OUT ON OUR WEBSITE

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 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 BALINIT® MAYURA 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

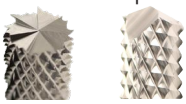
Please specify what coating, if any, your job requires:

- Polycrystalline Diamond
- Amorphous Diamond / BALINIT® MAYURA
- 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 / BALINIT® MAYURA
- AlCrN Coated

SERIES 704 - COMPRESSION ROUTER - 4 FLUTE

For profile milling of carbon fiber

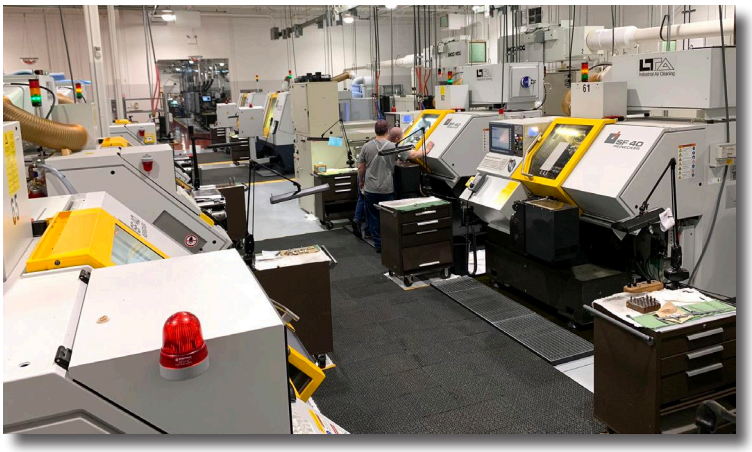
SERIES 705 - COMPRESSION ROUTER - 2 FLUTE

For slotting of carbon fiber

SERIES 706 - SINGLE FLUTE ROUTER

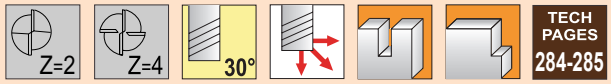
For aluminum and soft plastics

Blank Prep



Series 160M, 170M, 860M, 870M

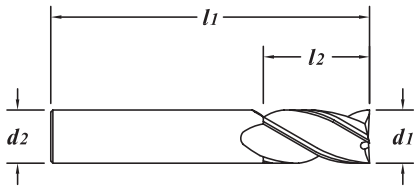
TOLERANCES		
d_1	≤ .030"	+.000 –.025mm (+.000" –.001")
	≥ 1/32"	+.000 –.050mm (+.000" –.002")
d_2	h6	



TECH PAGES 284-285

.0200" - .2362"
(0.508mm - 6.000mm)

Stub Length - Square End
Kurze Länge - Ohne Eckenradius
Longitud Corta - Extremo Sin Radio
Longueur Courte - Extrémité Carré
Serie Corta - Piatte
短柱长度 - 平头



Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
TiAlN Coated - page 211
Standard Length - page 218
Extended Length - page 238

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Kürzere Spannuten für höhere Stabilität
Extrem Vielseitig
TiAlN-Beschichtet - Seite 211
Standard Länge - Seite 218
Extra Länge - Seite 238

Fresa de submicrograno sólido carburo - corte centrado
Longitud de ranura más corta para proporcionar mayor rigidez
Extremadamente versátil
Recubrimiento de TiAlN - Página 211
Longitud Estándar - Página 218
Longitud Extra - Página 238

Fraises carbure submicrograin - coupe au centre
Longueur de coupe courte pour plus de rigidite
Utilisations variables
Revêtement TiAlN - Page 211
Longueur Standart - Page 218
Longueur Extra - Page 238

Fresa sub-micrograno metallo duro - taglio al centro
Tagliente più corto per maggiore rigidità
Estremamente varsatile
Rivestimento in TiAlN - Pagina 211
Lunghezza Standard - Pagina 218
Lunghezza Extra - Pagina 238

超细晶粒整体硬质合金立铣刀 - 中心切削
为了增加刚性应缩短出屑槽长度
功能极多
TiAlN 涂层 - 211页
标准长度 - 218页
超长 - 238页

(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
01350	-	.0200	.0200"	0.508	1/8"	1-1/2"	.030"
01360	-	.0210	.0210"	0.533	1/8"	1-1/2"	.032"
01370	-	.0220	.0220"	0.559	1/8"	1-1/2"	.033"
01380	-	.0230	.0230"	0.584	1/8"	1-1/2"	.035"
01390	-	.0240	.0240"	0.610	1/8"	1-1/2"	.036"
01400	-	.0250	.0250"	0.635	1/8"	1-1/2"	.038"
01410	-	.0260	.0260"	0.660	1/8"	1-1/2"	.039"
01420	-	.0270	.0270"	0.686	1/8"	1-1/2"	.041"
01430	-	.0280	.0280"	0.711	1/8"	1-1/2"	.042"
01440	-	.0290	.0290"	0.737	1/8"	1-1/2"	.044"
01450	-	.0300	.0300"	0.762	1/8"	1-1/2"	.045"
01010	02010	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"
01510	02510	.0394		1.000	3.0	38	2
01020	02020	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"
01520	02520	.0591		1.500	3.0	38	3
01030	02030	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"
01530	02530	.0787		2.000	3.0	38	4
01040	02040	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"
01540	02540	.0984		2.500	3.0	38	5
01550	02550	.1181		3.000	3.0	38	6
01050	02050	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"
01560	02560	.1378		3.500	4.0	50	7
01060	02060	.1562	5/32"	3.967	3/16"	2"	5/16"
01570	02570	.1575		4.000	4.0	50	8
01580	02580	.1772		4.500	5.0	50	9.5
01070	02070	.1875	3/16"	4.763	3/16"	2"	3/8"
01590	02590	.1969		5.000	5.0	50	10
01080	02080	.2188	7/32"	5.558	1/4"	2"	7/16"
01600	02600	.2362		6.000	6.0	50	12

continued →

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

.2500" - 1.000"
(6.350mm - 25.400mm)

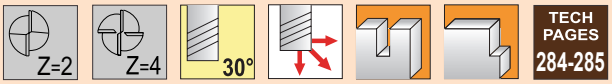
(160M/860M) 2 Flute EDP#	(170M/870M) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
01090	02090	.2500	1/4"	6.350	1/4"	2"	1/2"
01610	02610	.2756		7.000	7.0	50	12
01100	02100	.3125	5/16"	7.938	5/16"	2"	1/2"
01620	02620	.3150		8.000	8.0	50	12
01630	02630	.3543		9.000	9.0	50	14
01110	02110	.3750	3/8"	9.525	3/8"	2"	5/8"
01640	02640	.3937		10.000	10.0	50	16
01650	02650	.4331		11.000	11.0	65	19
01120	02120	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"
01660	02660	.4724		12.000	12.0	65	19
01130	02130	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"
01140	02140	.6250	5/8"	15.875	5/8"	3"	3/4"
-	02670	.6299		16.000	16.0	75	19
01150	02150	.7500	3/4"	19.050	3/4"	3"	1"
-	02680	.7874		20.000	20.0	75	25
-	02160	1.000	1"	25.400	1"	3"	1"

Micro Tool Manufacturing

† *Metric equivalents are for reference only*

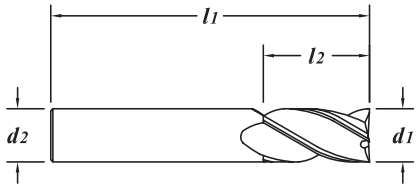
TOLERANCES	
d_1	+.000 –.050mm (+.000" –.002")
d_2	h6

Series 160MA, 170MA, 860MA, 870MA



TECH PAGES 284-285

Stub Length - Square End - TiALN Coated
Kurze Länge - Ohne Eckenradius - TiALN-Beschichtet
Longitud Corta - Extremo Sin Radio - Recubrimiento de TiALN
Longueur Courte - Extrémité Carré - Revêtement TiALN
Serie Corta - Piatte - Rivestimento in TiALN
短柱长度 - 平头 - TiALN 涂层



Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Dry or semi-dry machining
Extremely versatile
Bright Finish - page 209
Standard Length - page 222
Extended Length - page 241

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Kürzere Spannuten für höhere Stabilität
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Bright Fertig (Ohne Beschichtung) - Seite 209
Standard Länge - Seite 222
Extra Länge - Seite 241

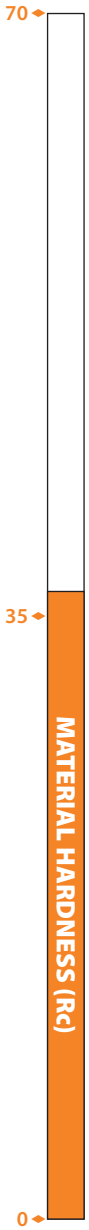
Fresa de submicrograno sólido carburo - corte centrado
Longitud de ranura más corta para proporcionar mayor rigidez
Mecanizado seco o semiseco
Extremadamente versátil
Acabado Brillante (Sin Recubrimiento) - Página 209
Longitud Estándar - Página 222
Longitud Extra - Página 241

Fraises carbure submicrograin - coupe au centre
Longueur de coupe courte pour plus de rigidite
Usinage a sec ou avec l'air
Utilisations variables
Finition Brillante (Sans Revêtement) - Page 209
Longueur Standart - Page 222
Longueur Extra - Page 241

Fresa sub-micrograno metallo duro - taglio al centro
Tagliente più corto per maggiore rigidità
Lavorazione a secco o a umido
Estremamente varsatile
Eccellente Finitura (Non Rivestito) - Pagina 209
Lunghezza Standard - Pagina 222
Lunghezza Extra - Pagina 241

超细晶粒整体硬质合金立铣刀 - 中心切削
为了增加刚性应缩短出屑槽长度
干式或半干式机加工
功能极多
高亮光洁度 (未涂层) - 209页
标准长度 - 222页
超长 - 241页

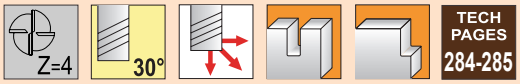
(160MA/860MA) 2 Flute EDP#	(170MA/870MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
01017	02017	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"
01517	02517	.0394		1.000	3.0	38	2
01027	02027	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"
01527	02527	.0591		1.500	3.0	38	3
01037	02037	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"
01537	02537	.0787		2.000	3.0	38	4
01047	02047	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"
01547	02547	.0984		2.500	3.0	38	5
01557	02557	.1181		3.000	3.0	38	6
01057	02057	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"
01567	02567	.1378		3.500	4.0	50	7
01067	02067	.1562	5/32"	3.967	3/16"	2"	5/16"
01577	02577	.1575		4.000	4.0	50	8
01587	02587	.1772		4.500	5.0	50	9.5
01077	02077	.1875	3/16"	4.763	3/16"	2"	3/8"
01597	02597	.1969		5.000	5.0	50	10
01087	02087	.2188	7/32"	5.558	1/4"	2"	7/16"
01607	02607	.2362		6.000	6.0	50	12
01097	02097	.2500	1/4"	6.350	1/4"	2"	1/2"
01617	02617	.2756		7.000	7.0	50	12
01107	02107	.3125	5/16"	7.938	5/16"	2"	1/2"
01627	02627	.3150		8.000	8.0	50	12
01637	02637	.3543		9.000	9.0	50	14
01117	02117	.3750	3/8"	9.525	3/8"	2"	5/8"
01647	02647	.3937		10.000	10.0	50	16
01657	02657	.4331		11.000	11.0	65	19
01127	02127	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"
01667	02667	.4724		12.000	12.0	65	19
01137	02137	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"
01147	02147	.6250	5/8"	15.875	5/8"	3"	3/4"
-	02677	.6299		16.000	16.0	75	19
01157	02157	.7500	3/4"	19.050	3/4"	3"	1"
-	02687	.7874		20.000	20.0	75	25
-	02167	1.000	1"	25.400	1"	3"	1"



Series 170R, 870R

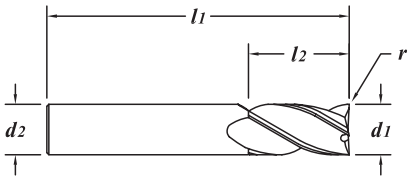
.0625" - .3150"
(1.588mm - 8.000mm)

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



TECH PAGES 284-285

Stub Length - Corner Radius
Kurze Länge - Eckenradius
Longitud Corta - Ángulo Redondeado
Longueur Courte - Rayon de Coin
Serie Corta - Raggio
短柱长度 - 圆角半径



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Extremely versatile
TiAlN Coated - page 214
Standard Length - page 224
Extended Length - page 243

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für stärkere Schneidecken und Radiusteile
Extrem Vielseitig
TiAlN-Beschichtet - Seite 214
Standard Länge - Seite 224
Extra Länge - Seite 243

Fresa de submicrograno sólido carburo - corte centrado
Para un mejor refuerzo de esquinas y zonas curvas
Extremadamente versátil
Recubrimiento de TiAlN - Página 214
Longitud Estándar - Página 224
Longitud Extra - Página 243

Fraises carbure submicrograin - coupe au centre
Rayon de coin renforces
Utilisations variables
Revêtement TiAlN - Page 214
Longueur Standart - Page 224
Extra Longueur - Page 243

Fresa sub-micrograno metallo duro - taglio al centro
Raggi rinforzati
Estremamente varsatile
Rivestimento in TiAlN - Pagina 214
Lunghezza Standard - Pagina 224
Lunghezza Extra - Pagina 243

超细晶粒整体硬质合金立铣刀 - 中心切削
用于强化圆角和零件半径
功能极多
TiAlN 涂层 - 214页
标准长度 - 224页
超长 - 243页

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
30701	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	.010"
30703	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	.015"
30705	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	.010"
30707	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	.015"
30709	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	.020"
30711	.1181		3.000	3.0	38	6	0.20
30713	.1181		3.000	3.0	38	6	0.50
30715	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"
30717	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.015"
30719	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.020"
30721	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.030"
30904	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.040"
30909	.1562	5/32"	3.967	3/16"	2"	5/16"	.015"
30911	.1562	5/32"	3.967	3/16"	2"	5/16"	.030"
30913	.1562	5/32"	3.967	3/16"	2"	5/16"	.060"
30723	.1575		4.000	4.0	50	8	0.30
30725	.1575		4.000	4.0	50	8	0.50
30727	.1875	3/16"	4.763	3/16"	2"	3/8"	.010"
30729	.1875	3/16"	4.763	3/16"	2"	3/8"	.015"
30731	.1875	3/16"	4.763	3/16"	2"	3/8"	.020"
30733	.1875	3/16"	4.763	3/16"	2"	3/8"	.030"
30735	.1969		5.000	5.0	50	10	0.30
30737	.1969		5.000	5.0	50	10	0.50
30739	.2362		6.000	6.0	50	12	0.50
30741	.2362		6.000	6.0	50	12	0.80
30743	.2362		6.000	6.0	50	12	1.00
30745	.2362		6.000	6.0	50	12	1.50
30747	.2362		6.000	6.0	50	12	2.00
30749	.2500	1/4"	6.350	1/4"	2"	1/2"	.010"
30751	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"
30753	.2500	1/4"	6.350	1/4"	2"	1/2"	.020"
30755	.2500	1/4"	6.350	1/4"	2"	1/2"	.030"
30757	.2500	1/4"	6.350	1/4"	2"	1/2"	.045"
30759	.2500	1/4"	6.350	1/4"	2"	1/2"	.060"
30761	.3125	5/16"	7.938	5/16"	2"	1/2"	.015"
30763	.3125	5/16"	7.938	5/16"	2"	1/2"	.020"
30765	.3125	5/16"	7.938	5/16"	2"	1/2"	.030"
30767	.3125	5/16"	7.938	5/16"	2"	1/2"	.045"
30769	.3125	5/16"	7.938	5/16"	2"	1/2"	.060"
30771	.3150		8.000	8.0	50	12	0.50
30773	.3150		8.000	8.0	50	12	0.80
30775	.3150		8.000	8.0	50	12	1.00
30777	.3150		8.000	8.0	50	12	1.50
30779	.3150		8.000	8.0	50	12	2.00
30781	.3150		8.000	8.0	50	12	2.50
30783	.3150		8.000	8.0	50	12	3.00

GARR TOOL®

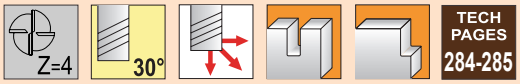
† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
30785	.3750	3/8"	9.525	3/8"	2"	5/8"	.010"
30787	.3750	3/8"	9.525	3/8"	2"	5/8"	.015"
30789	.3750	3/8"	9.525	3/8"	2"	5/8"	.020"
30791	.3750	3/8"	9.525	3/8"	2"	5/8"	.030"
30793	.3750	3/8"	9.525	3/8"	2"	5/8"	.045"
30795	.3750	3/8"	9.525	3/8"	2"	5/8"	.060"
30797	.3937		10.000	10.0	50	16	0.50
30799	.3937		10.000	10.0	50	16	0.80
30801	.3937		10.000	10.0	50	16	1.00
30803	.3937		10.000	10.0	50	16	1.50
30805	.3937		10.000	10.0	50	16	2.00
30807	.3937		10.000	10.0	50	16	2.50
30809	.3937		10.000	10.0	50	16	3.00
30811	.3937		10.000	10.0	50	16	3.20
30813	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.010"
30815	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.015"
30817	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.020"
30819	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.030"
30821	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.045"
30823	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.060"
30825	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.090"
30827	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.125"
30829	.4724		12.000	12.0	65	19	0.50
30831	.4724		12.000	12.0	65	19	0.80
30833	.4724		12.000	12.0	65	19	1.00
30835	.4724		12.000	12.0	65	19	1.50
30837	.4724		12.000	12.0	65	19	2.00
30839	.4724		12.000	12.0	65	19	2.50
30841	.4724		12.000	12.0	65	19	3.00
30843	.4724		12.000	12.0	65	19	3.20
30845	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"
30847	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"
30849	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"
30851	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"
30853	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.045"
30855	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"
30857	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.090"
30859	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.125"
30861	.6250	5/8"	15.875	5/8"	3"	3/4"	.015"
30863	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"
30865	.6250	5/8"	15.875	5/8"	3"	3/4"	.030"
30867	.6250	5/8"	15.875	5/8"	3"	3/4"	.045"
30869	.6250	5/8"	15.875	5/8"	3"	3/4"	.060"
30871	.6250	5/8"	15.875	5/8"	3"	3/4"	.090"
30873	.6299		16.000	16.0	75	19	0.50
30875	.6299		16.000	16.0	75	19	1.00
30877	.6299		16.000	16.0	75	19	2.00
30879	.6299		16.000	16.0	75	19	2.50
30881	.6299		16.000	16.0	75	19	3.00
30883	.6299		16.000	16.0	75	19	4.00
30885	.6299		16.000	16.0	75	19	5.00
30887	.7500	3/4"	19.050	3/4"	3"	1"	.015"
30889	.7500	3/4"	19.050	3/4"	3"	1"	.020"
30891	.7500	3/4"	19.050	3/4"	3"	1"	.030"
30893	.7500	3/4"	19.050	3/4"	3"	1"	.045"
30895	.7500	3/4"	19.050	3/4"	3"	1"	.060"
30897	.7500	3/4"	19.050	3/4"	3"	1"	.090"
30899	.7500	3/4"	19.050	3/4"	3"	1"	.125"
30901	.7500	3/4"	19.050	3/4"	3"	1"	.250"

Series 170RA, 870RA

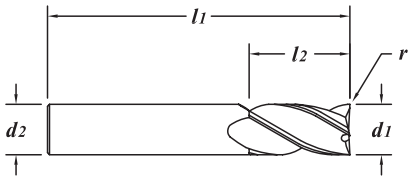
.0625" - .3150"
(1.588mm - 8.000mm)

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



TECH PAGES 284-285

Stub Length - Corner Radius - TiALN Coated
Kurze Länge - Eckenradius - TiALN-Beschichtet
Longitud Corta - Ángulo Redondeado - Recubrimiento de TiALN
Longueur Courte - Rayon de Coin - Revêtement TiALN
Serie Corta - Raggio - Rivestimento in TiALN
短柱长度 - 圆角半径 - TiALN 涂层



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Dry or semi-dry machining
Extremely versatile
Bright Finish - page 212
Standard Length - page 227
Extended Length - page 246

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für stärkere Schneidecken und Radiusteile
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Bright Fertig (Ohne Beschichtung) - Seite 212
Standard Länge - Seite 227
Extra Länge - Seite 246

Fresa de submicrograno sólido carburo - corte centrado
Para un mejor refuerzo de esquinas y zonas curvas
Mecanizado seco o semiseco
Extremadamente versátil
Acabado Brillante (Sin Recubrimiento) - Página 212
Longitud Estándar - Página 227
Longitud Extra - Página 246

Fraises carbure submicrograin - coupe au centre
Rayon de coin renforces
Usinage a sec ou avec l'air
Utilisations variables
Finition Brillante (Sans Revêtement) - Page 212
Longueur Standart - Page 227
Extra Longueur - Page 246

Fresa sub-micrograno metallo duro - taglio al centro
Raggi rinforzati
Lavorazione a secco o a umido
Estremamente varsatile
Eccellente Finitura (Non Rivestito) - Pagina 212
Lunghezza Standard - Pagina 227
Lunghezza Extra - Pagina 246

超细晶粒整体硬质合金立铣刀 - 中心切削
用于强化圆角和零件半径
干式或半干式机加工
功能极多
高亮光洁度(未涂层) - 212页
标准长度 - 227页
超长 - 246页

EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
30702	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	.010"
30704	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	.015"
30706	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	.010"
30708	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	.015"
30710	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	.020"
30712	.1181		3.000	3.0	38	6	0.20
30714	.1181		3.000	3.0	38	6	0.50
30716	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"
30718	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.015"
30720	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.020"
30722	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.030"
30906	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.040"
30910	.1562	5/32"	3.967	3/16"	2"	5/16"	.015"
30912	.1562	5/32"	3.967	3/16"	2"	5/16"	.030"
30914	.1562	5/32"	3.967	3/16"	2"	5/16"	.060"
30724	.1575		4.000	4.0	50	8	0.30
30726	.1575		4.000	4.0	50	8	0.50
30728	.1875	3/16"	4.763	3/16"	2"	3/8"	.010"
30730	.1875	3/16"	4.763	3/16"	2"	3/8"	.015"
30732	.1875	3/16"	4.763	3/16"	2"	3/8"	.020"
30734	.1875	3/16"	4.763	3/16"	2"	3/8"	.030"
30736	.1969		5.000	5.0	50	10	0.30
30738	.1969		5.000	5.0	50	10	0.50
24117	.1969		5.000	5.0	50	16	0.30
30740	.2362		6.000	6.0	50	12	0.50
30742	.2362		6.000	6.0	50	12	0.80
30744	.2362		6.000	6.0	50	12	1.00
30746	.2362		6.000	6.0	50	12	1.50
30748	.2362		6.000	6.0	50	12	2.00
30750	.2500	1/4"	6.350	1/4"	2"	1/2"	.010"
30752	.2500	1/4"	6.350	1/4"	2"	1/2"	.015"
30754	.2500	1/4"	6.350	1/4"	2"	1/2"	.020"
30756	.2500	1/4"	6.350	1/4"	2"	1/2"	.030"
30758	.2500	1/4"	6.350	1/4"	2"	1/2"	.045"
30760	.2500	1/4"	6.350	1/4"	2"	1/2"	.060"
30762	.3125	5/16"	7.938	5/16"	2"	1/2"	.015"
30764	.3125	5/16"	7.938	5/16"	2"	1/2"	.020"
30766	.3125	5/16"	7.938	5/16"	2"	1/2"	.030"
30768	.3125	5/16"	7.938	5/16"	2"	1/2"	.045"
30770	.3125	5/16"	7.938	5/16"	2"	1/2"	.060"
30772	.3150		8.000	8.0	50	12	0.50
30774	.3150		8.000	8.0	50	12	0.80
30776	.3150		8.000	8.0	50	12	1.00
30778	.3150		8.000	8.0	50	12	1.50
30780	.3150		8.000	8.0	50	12	2.00
30782	.3150		8.000	8.0	50	12	2.50
30784	.3150		8.000	8.0	50	12	3.00

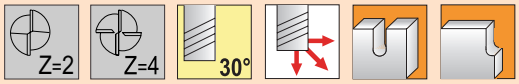
GARR TOOL®

† 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	r Corner Radius
30786	.3750	3/8"	9.525	3/8"	2"	5/8"	.010"
30788	.3750	3/8"	9.525	3/8"	2"	5/8"	.015"
30790	.3750	3/8"	9.525	3/8"	2"	5/8"	.020"
30792	.3750	3/8"	9.525	3/8"	2"	5/8"	.030"
30794	.3750	3/8"	9.525	3/8"	2"	5/8"	.045"
30796	.3750	3/8"	9.525	3/8"	2"	5/8"	.060"
30798	.3937		10.000	10.0	50	16	0.50
30800	.3937		10.000	10.0	50	16	0.80
30802	.3937		10.000	10.0	50	16	1.00
30804	.3937		10.000	10.0	50	16	1.50
30806	.3937		10.000	10.0	50	16	2.00
30808	.3937		10.000	10.0	50	16	2.50
30810	.3937		10.000	10.0	50	16	3.00
30812	.3937		10.000	10.0	50	16	3.20
30814	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.010"
30816	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.015"
30818	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.020"
30820	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.030"
30822	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.045"
30824	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.060"
30826	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.090"
30828	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.125"
30830	.4724		12.000	12.0	65	19	0.50
30832	.4724		12.000	12.0	65	19	0.80
30834	.4724		12.000	12.0	65	19	1.00
30836	.4724		12.000	12.0	65	19	1.50
30838	.4724		12.000	12.0	65	19	2.00
30840	.4724		12.000	12.0	65	19	2.50
30842	.4724		12.000	12.0	65	19	3.00
30844	.4724		12.000	12.0	65	19	3.20
30846	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"
30848	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.015"
30850	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"
30852	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"
30854	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.045"
30856	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.060"
30858	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.090"
30860	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.125"
30862	.6250	5/8"	15.875	5/8"	3"	3/4"	.015"
30864	.6250	5/8"	15.875	5/8"	3"	3/4"	.020"
30866	.6250	5/8"	15.875	5/8"	3"	3/4"	.030"
30868	.6250	5/8"	15.875	5/8"	3"	3/4"	.045"
30870	.6250	5/8"	15.875	5/8"	3"	3/4"	.060"
30872	.6250	5/8"	15.875	5/8"	3"	3/4"	.090"
30874	.6299		16.000	16.0	75	19	0.50
30876	.6299		16.000	16.0	75	19	1.00
30878	.6299		16.000	16.0	75	19	2.00
30880	.6299		16.000	16.0	75	19	2.50
30882	.6299		16.000	16.0	75	19	3.00
30884	.6299		16.000	16.0	75	19	4.00
30886	.6299		16.000	16.0	75	19	5.00
30888	.7500	3/4"	19.050	3/4"	3"	1"	.015"
30890	.7500	3/4"	19.050	3/4"	3"	1"	.020"
30892	.7500	3/4"	19.050	3/4"	3"	1"	.030"
30894	.7500	3/4"	19.050	3/4"	3"	1"	.045"
30896	.7500	3/4"	19.050	3/4"	3"	1"	.060"
30898	.7500	3/4"	19.050	3/4"	3"	1"	.090"
30900	.7500	3/4"	19.050	3/4"	3"	1"	.125"
30902	.7500	3/4"	19.050	3/4"	3"	1"	.250"

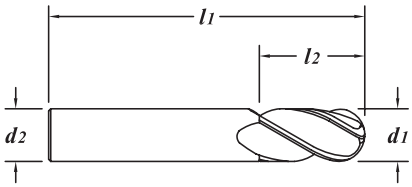
Series 180M, 190M, 980M, 990M

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



TECH PAGES 284-285

Stub Length - Ball End
Kurze Länge - Vollradius
Longitud Corta - Cabeza Esférica
Longueur Courte - Hemispherique
Serie Corta - Sferica
短柱长度 - 双头



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
Radius Tolerance: +0,000 / –0.025mm (+.000" –.001")
TiAlN Coated - page 217
Standard Length - page 230
Extended Length - Page 249

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Kürzere Spannuten für höhere Stabilität
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025mm (+.000" –.001")
TiAlN-Beschichtet - Seite 217
Standard Länge - Seite 230
Extra Länge - Seite 249

Fresa de submicrograno sólido carburo - corte centrado
Longitud de ranura más corta para proporcionar mayor rigidez
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025mm (+.000" –.001")
Recubrimiento de TiAlN - Página 217
Longitud Estándar - Página 230
Longitud Extra - Página 249

Fraises carbure submicrograin - coupe au centre
Longueur de coupe courte pour plus de rigidite
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025mm (+.000" –.001")
Revêtement TiAlN - Page 217
Longueur Standart - Page 230
Longueur Extra - Page 249

Fresa sub-micrograno metallo duro - taglio al centro
Tagliente più corto per maggiore rigidità
Estremamente versatile
Tolleranza del raggio +0,000 / –0,025mm (+.000" –.001")
Rivestimento in TiAlN - Pagina 217
Lunghezza Standard - Pagina 230
Lunghezza Extra - Pagina 249

超细晶粒整体硬质合金立铣刀 - 中心切削
为了增加刚性应缩短出屑槽长度
功能极多
半径允差 +0,000 /–0,025mm (+.000"–.001")
TiAlN 涂层 - 217页
标准长度 - 230页
超长 - 249页

(180M/980M) 2 Flute EDP#	(190M/990M) 4 Flute EDP#	d_1 † Decimal	d_1 † Diameter	d_1 † Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
03350	-	.0200	.0200"	0.508	1/8"	1-1/2"	.030"
03400	-	.0250	.0250"	0.635	1/8"	1-1/2"	.038"
03450	-	.0300	.0300"	0.762	1/8"	1-1/2"	.045"
03010	04010	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"
03510	04510	.0394		1.000	3.0	38	2
03020	04020	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"
03520	-	.0591		1.500	3.0	38	3
03030	04030	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"
03530	04530	.0787		2.000	3.0	38	4
03040	04040	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"
03540	04540	.0984		2.500	3.0	38	5
03550	04550	.1181		3.000	3.0	38	6
03050	04050	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"
03560	04560	.1378		3.500	4.0	50	7
03060	04060	.1562	5/32"	3.967	3/16"	2"	5/16"
03570	04570	.1575		4.000	4.0	50	8
03580	04580	.1772		4.500	5.0	50	9.5
03070	04070	.1875	3/16"	4.763	3/16"	2"	3/8"
03590	04590	.1969		5.000	5.0	50	10
03080	04080	.2188	7/32"	5.558	1/4"	2"	7/16"
03600	04600	.2362		6.000	6.0	50	12
03090	04090	.2500	1/4"	6.350	1/4"	2"	1/2"
03610	04610	.2756		7.000	7.0	50	12
03100	04100	.3125	5/16"	7.938	5/16"	2"	1/2"
03620	04620	.3150		8.000	8.0	50	12
03630	04630	.3543		9.000	9.0	50	14
03110	04110	.3750	3/8"	9.525	3/8"	2"	5/8"
03640	04640	.3937		10.000	10.0	50	16
03120	04120	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"
03660	04660	.4724		12.000	12.0	65	19
03130	04130	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"
03150	04150	.7500	3/4"	19.050	3/4"	3"	1"

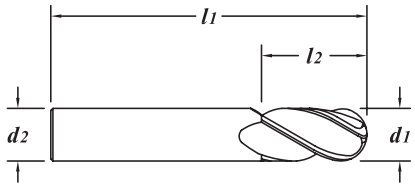
GARR TOOL®

† *Metric equivalents are for reference only*

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

Z=2 | Z=4 | 30° | TECH PAGES 284-285

Stub Length - Ball End - TiALN Coated
Kurze Länge - Vollradius - TiALN-Beschichtet
Longitud Corta - Cabeza Esférica - Recubrimiento de TiALN
Longueur Courte - Hemispherique - Revêtement TiALN
Serie Corta - Sferica - Rivestimento in TiALN
短柱长度 - 双头 - TiALN 涂层



Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Dry or semi-dry machining
Extremely versatile
Radius Tolerance: +0.000 / –0.025mm (+.000" –.001")
Bright Finish - page 216
Standard Length - page 234
Extended Length - page 252

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Kürzere Spannuten für höhere Stabilität
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025mm (+.000" –.001")
Bright Fertig (Ohne Beschichtung) - Seite 216
Standard Länge - Seite 234
Extra Länge - Seite 252

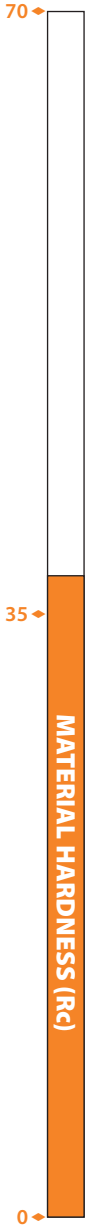
Fresa de submicrograno sólido carburo - corte centrado
Longitud de ranura más corta para proporcionar mayor rigidez
Mecanizado seco o semiseco
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025mm (+.000" –.001")
Acabado Brillante (Sin Recubrimiento) - Página 216
Longitud Estándar - Página 234
Longitud Extra - Página 252

Fraises carbure submicrograin - coupe au centre
Longueur de coupe courte pour plus de rigidite
Usinage a sec ou avec l'air
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025mm (+.000" –.001")
Finition Brillante (Sans Revêtement) - Page 216
Longueur Standart - Page 234
Longueur Extra - Page 252

Fresa sub-micrograno metallo duro - taglio al centro
Tagliente più corto per maggiore rigidità
Lavorazione a secco o a umido
Estremamente varsatile
Tolleranza del raggio +0,000 / –0,025mm (+.000" –.001")
Eccellente Finitura (Non Rivestito) - Pagina 216
Lunghezza Standard - Pagina 234
Lunghezza Extra - Pagina 252

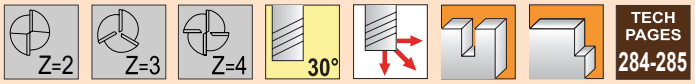
超细晶粒整体硬质合金立铣刀 - 中心切削
为了增加刚性应缩短出屑槽长度
干式或半干式机加工
功能极多
半径允差 +0,000 /–0,025mm (+.000"–.001")
高亮光洁度 (未涂层) - 216页
标准长度 - 234页
超长 - 252页

(180MA/980MA) 2 Flute EDP#	(190MA/990MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
03017	04017	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"
03517	04517	.0394		1.000	3.0	38	2
03027	04027	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"
03527	04527	.0591		1.500	3.0	38	3
03037	04037	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"
03537	04537	.0787		2.000	3.0	38	4
03047	04047	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"
03547	04547	.0984		2.500	3.0	38	5
03557	04557	.1181		3.000	3.0	38	6
03057	04057	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"
03567	04567	.1378		3.500	4.0	50	7
03067	04067	.1562	5/32"	3.967	3/16"	2"	5/16"
03577	04577	.1575		4.000	4.0	50	8
03587	04587	.1772		4.500	5.0	50	9.5
03077	04077	.1875	3/16"	4.763	3/16"	2"	3/8"
03597	04597	.1969		5.000	5.0	50	10
03087	04087	.2188	7/32"	5.558	1/4"	2"	7/16"
03607	04607	.2362		6.000	6.0	50	12
03097	04097	.2500	1/4"	6.350	1/4"	2"	1/2"
03617	04617	.2756		7.000	7.0	50	12
03107	04107	.3125	5/16"	7.938	5/16"	2"	1/2"
03627	04627	.3150		8.000	8.0	50	12
03637	04637	.3543		9.000	9.0	50	14
03117	04117	.3750	3/8"	9.525	3/8"	2"	5/8"
03647	04647	.3937		10.000	10.0	50	16
03657	04657	.4331		11.000	11.0	65	19
03127	04127	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"
03667	04667	.4724		12.000	12.0	65	19
03137	04137	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"
-	04147	.6250	5/8"	15.875	5/8"	3"	3/4"
-	04157	.7500	3/4"	19.050	3/4"	3"	1"
-	04687	.7874		20.000	20.0	75	25



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

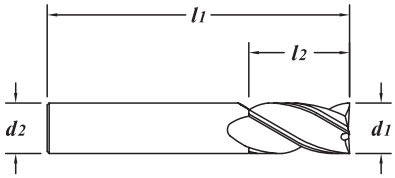
.0200" - .2362"
(0.508mm - 6.000mm)



TECH PAGES 284-285

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

Standard Length - Square End
Standard Länge - Ohne Eckenradius
Longitud Estándar - Extremo Sin Radio
Longueur Standart - Extrémité Carré
Lunghezza Standard - Piatte
标准长度 - 平头



MATERIAL HARDNESS (Rc) 70 35 0

Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiN Coated - page 220
TiCN Coated - page 221
TiAlN Coated - page 222
Stub Length - page 209
Extended Length - page 238

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Extrem Vielseitig
TiN-Beschichtet - Seite 220
TiCN-Beschichtet - Seite 221
TiAlN-Beschichtet - Seite 222
Kurze Länge - Seite 209
Extra Länge - Seite 238

Fresa de submicrograno sólido carburo - corte centrado
Extremadamente versátil
Recubrimiento de TiN - Página 220
Recubrimiento de TiCN - Página 221
Recubrimiento de TiAlN - Página 222
Longitud Corta - Página 209
Longitud Extra - Página 238

Fraises carbure submicrograin - coupe au centre
Utilisations variables
Revêtement TiN - Page 220
Revêtement TiCN - Page 221
Revêtement TiAlN - Page 222
Longueur Courte - Page 209
Longueur Extra - Page 238

Fresa sub-micrograno metallo duro - taglio al centro
Estremamente versatile
Rivestimento in TiN - Pagina 220
Rivestimento in TiCN - Pagina 221
Rivestimento in TiAlN - Pagina 222
Serie Corta - Pagina 209
Lunghezza Extra - Pagina 238

超细晶粒整体硬质合金立铣刀 - 中心切削
功能极多
TiN 涂层 - 220页
TiCN 涂层 - 221页
TiAlN 涂层 - 222页
短柱长度 - 209页
超长 - 238页

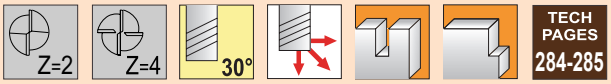
(220M/820M) 2 Flute EDP#	(223M/823M) 3 Flute EDP#	(230M/830M) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
11650	-	13650	.0200	.0200"	0.508	1/8"	1-1/2"	.060"
11660	-	-	.0210	.0210"	0.533	1/8"	1-1/2"	.063"
11670	-	-	.0220	.0220"	0.559	1/8"	1-1/2"	.066"
11680	-	-	.0230	.0230"	0.584	1/8"	1-1/2"	.069"
11690	-	-	.0240	.0240"	0.610	1/8"	1-1/2"	.072"
11700	-	13700	.0250	.0250"	0.635	1/8"	1-1/2"	.075"
11710	-	-	.0260	.0260"	0.660	1/8"	1-1/2"	.078"
11720	-	-	.0270	.0270"	0.686	1/8"	1-1/2"	.081"
11730	-	-	.0280	.0280"	0.711	1/8"	1-1/2"	.084"
11740	-	-	.0290	.0290"	0.737	1/8"	1-1/2"	.087"
11750	-	13750	.0300	.0300"	0.762	1/8"	1-1/2"	.090"
11010	12010	13010	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"
45010	37010	46010	.0394		1.000	3.0	38	4
11020	12020	13020	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"
45020	37020	46020	.0591		1.500	3.0	38	6
11030	12030	13030	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
11040	12040	13040	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"
45030	37030	46030	.0787		2.000	3.0	38	8
11050	12050	13050	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"
45040	37040	46040	.0984		2.500	3.0	38	12
11060	12060	13060	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"
45050	37050	46050	.1181		3.000	3.0	38	12
11070	12070	13070	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
45060	37060	46060	.1378		3.500	4.0	50	12
11080	12080	13080	.1406	9/64"	3.571	3/16"	2"	9/16"
11090	12090	13090	.1562	5/32"	3.967	3/16"	2"	9/16"
45070	37070	46070	.1575		4.000	4.0	50	14
11100	12100	13100	.1719	11/64"	4.366	3/16"	2"	9/16"
45080	37080	46080	.1772		4.500	5.0	50	14
11110	12110	13110	.1875	3/16"	4.763	3/16"	2"	5/8"
92070	93070	94070	.1969		5.000	5.0	50	16
45090	37090	46090	.1969		5.000	5.0	65	16
11120	12120	13120	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"
11130	12130	13130	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"
11140	12140	13140	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"
45100	37100	46100	.2362		6.000	6.0	65	19

† *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	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
11150	12150	13150	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
11160	12160	13160	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"
45110	37110	46110	.2756		7.000	7.0	65	22
11170	12170	13170	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"
11180	12180	13180	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"
11190	12190	13190	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
45120	37120	46120	.3150		8.000	8.0	65	22
11200	12200	13200	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"
11210	12210	13210	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"
45130	37130	46130	.3543		9.000	9.0	65	22
11220	12220	13220	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"
11230	12230	13230	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
11240	12240	13240	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"
45140	37140	46140	.3937		10.000	10.0	70	25
11250	12250	13250	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"
11260	12260	13260	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"
45150	37150	46150	.4331		11.000	11.0	75	25
11270	12270	13270	.4375	7/16"	11.113	7/16"	2-3/4"	1"
11280	12280	13280	.4531	29/64"	11.509	1/2"	3"	1"
11290	-	13290	.4688	15/32"	11.908	1/2"	3"	1"
45160	37160	46160	.4724		12.000	12.0	75	25
11300	12300	13300	.4844	31/64"	12.304	1/2"	3"	1"
11310	12310	13310	.5000	1/2"	12.700	1/2"	3"	1"
45170	37170	46170	.5512		14.000	14.0	88	32
11320	12320	13320	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"
11330	12330	13330	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
45180	37180	46180	.6299		16.000	16.0	88	38
11340	12340	13340	.6875	11/16"	17.463	3/4"	4"	1-1/2"
45190	37190	46190	.7087		18.000	18.0	100	38
11350	12350	13350	.7500	3/4"	19.050	3/4"	4"	1-1/2"
45200	37200	46200	.7874		20.000	20.0	100	38
45210	37210	46210	.8661		22.000	22.0	100	38
11360	12360	13360	.8750	7/8"	22.225	7/8"	4"	1-1/2"
45220	37220	46220	.9843		25.000	25.0	100	38
11370	12370	13370	1.000	1"	25.400	1"	4"	1-1/2"
-	-	13390	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"

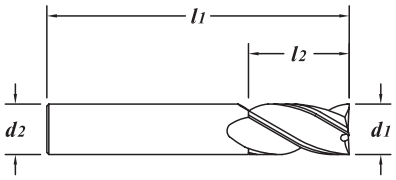
Series 220MT, 230MT

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



TECH PAGES 284-285

Standard Length - Square End - TiN Coated
Standard Länge - Ohne Eckenradius - TiN-Beschichtet
Longitud Estándar - Extremo Sin Radio - Recubrimiento de TiN
Longueur Standart - Extrémité Carré - Revêtement TiN
Lunghezza Standard - Piatte - Rivestimento in TiN
标准长度 - 平头 - TiN 涂层



70

Solid submicron grain carbide end mill - center cutting
Improved lubricity
Extremely versatile
Bright Finish - page 218
TiCN Coated - page 221
TiAlN Coated - page 222

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Verbessere Schmiereingenschaft
Extrem Vielseitig
Bright Fertig (Ohne Beschichtung) - Seite 218
TiCN-Beschichtet - Seite 221
TiAlN-Beschichtet - Seite 222

Fresa de submicrograno sólido carburo - corte centrado
Majorada la lubricación
Extremadamente versátil
Acabado Brillante (Sin Recubrimiento) - Página 218
Recubrimiento de TiCN - Página 221
Recubrimiento de TiAlN - Página 222

35

Fraises carbure submicrograin - coupe au centre
Amelioration du glissement
Utilisations variables
Finition Brillante (Sans Revêtement) - Page 218
Revêtement TiCN - Page 221
Revêtement TiAlN - Page 222

Fresa sub-micrograno metallo duro - taglio al centro
Migliore autolubrificazione
Estremamente versatile
Eccellente Finitura (Non Rivestito) - Pagina 218
Rivestimento in TiCN - Pagina 221
Rivestimento in TiAlN - Pagina 222

超细晶粒整体硬质合金立铣刀 - 中心切削
改善润滑性能
功能极多
高亮光洁度(未涂层) - 218页
TiCN 涂层 - 221页
TiAlN 涂层 - 222页

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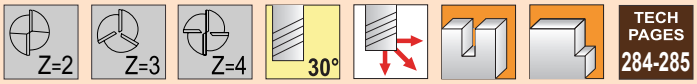
MATERIAL HARDNESS (Rc)

(220MT) 2 Flute EDP#	(230MT) 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
11073	13073	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
11113	13113	.1875	3/16"	4.763	3/16"	2"	5/8"
11153	13153	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
11193	13193	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
11233	13233	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
11273	13273	.4375	7/16"	11.113	7/16"	2-3/4"	1"
11313	13313	.5000	1/2"	12.700	1/2"	3"	1"
11333	13333	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
11353	13353	.7500	3/4"	19.050	3/4"	4"	1-1/2"
-	13373	1.000	1"	25.400	1"	4"	1-1/2"

GARR TOOL®

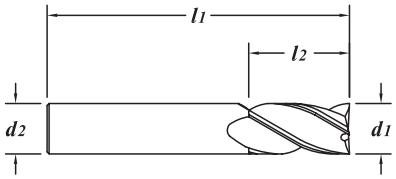
† Metric equivalents are for reference only

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



TECH PAGES 284-285

Standard Length - Square End - TiCN Coated
Standard Länge - Ohne Eckenradius - TiCN-Beschichtet
Longitud Estándar - Extremo Sin Radio - Recubrimiento de TiCN
Longueur Standart - Extrémité Carré - Revêtement TiCN
Lunghezza Standard - Piatte - Rivestimento in TiCN
标准长度 - 平头 - TiCN 涂层



Solid submicron grain carbide end mill - center cutting
Improved abrasion resistance and lubricity
Extremely versatile
Bright Finish - page 218
TiN Coated - page 220
TiALN Coated - page 222
Extended Length - Page 240

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Verbesserte Verschleissbeständigkeit und Schmiereienschaft
Extrem Vielseitig
Bright Fertig (Ohne Beschichtung) - Seite 218
TiN-Beschichtet - Seite 220
TiALN-Beschichtet - Seite 222
Extra Länge - Seite 240

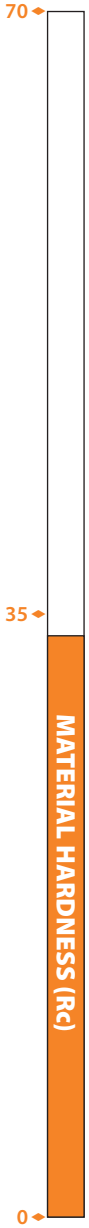
Fresa de submicrograno sólido carburo - corte centrado
Mejoradas la resistencia a la abrasión y la lubricación
Extremadamente versátil
Acabado Brillante (Sin Recubrimiento) - Página 218
Recubrimiento de TiN - Página 220
Recubrimiento de TiALN - Página 222
Longitud Extra - Página 240

Fraises carbure submicrograin - coupe au centre
Amelioration de la resistance a l'abrasion et au glissement
Utilisations variables
Finition Brillante (Sans Revêtement) - Page 218
Revêtement TiN - Page 220
Revêtement TiALN - Page 222
Extra Longue - Page 240

Fresa sub-micrograno metallo duro - taglio al centro
Maggiore resistenza all'abrasione
Estremamente varsatile
Eccellente Finitura (Non Rivestito) - Pagina 218
Rivestimento in TiN - Pagina 220
Rivestimento in TiALN - Pagina 222
Lunghezza Extra - Pagina 240

超细晶粒整体硬质合金立铣刀 - 中心切削
改善耐磨性和润滑性
功能极多
高亮光洁度(未涂层) - 218页
TiN 涂层 - 220页
TiALN 涂层 - 222页
超长 - 240页

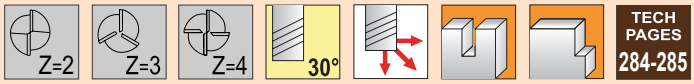
(220MC) 2 Flute EDP#	(223MC) 3 Flute EDP#	(230MC) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
11014	12014	13014	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"
11024	12024	13024	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"
11034	12034	13034	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
11044	12044	13044	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"
11054	12054	13054	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"
11064	12064	13064	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"
11074	12074	13074	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
11084	12084	13084	.1406	9/64"	3.571	3/16"	2"	9/16"
11094	12094	13094	.1562	5/32"	3.967	3/16"	2"	9/16"
11104	12104	13104	.1719	11/64"	4.366	3/16"	2"	9/16"
11114	12114	13114	.1875	3/16"	4.763	3/16"	2"	5/8"
11124	12124	13124	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"
11134	12134	13134	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"
11144	12144	13144	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"
11154	12154	13154	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
11164	12164	13164	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"
11174	12174	13174	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"
11184	12184	13184	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"
11194	12194	13194	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
11204	12204	13204	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"
11214	12214	13214	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"
11224	12224	13224	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"
11234	12234	13234	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
11244	12244	13244	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"
11254	12254	13254	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"
11264	-	13264	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"
11274	12274	13274	.4375	7/16"	11.113	7/16"	2-3/4"	1"
11284	-	13284	.4531	29/64"	11.509	1/2"	3"	1"
11294	12294	13294	.4688	15/32"	11.908	1/2"	3"	1"
-	12304	13304	.4844	31/64"	12.304	1/2"	3"	1"
11314	12314	13314	.5000	1/2"	12.700	1/2"	3"	1"
11324	12324	13324	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"
11334	12334	13334	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
11344	-	13344	.6875	11/16"	17.463	3/4"	4"	1-1/2"
11354	12354	13354	.7500	3/4"	19.050	3/4"	4"	1-1/2"
11364	-	13364	.8750	7/8"	22.225	7/8"	4"	1-1/2"
11374	12374	13374	1.000	1"	25.400	1"	4"	1-1/2"
-	-	13394	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"



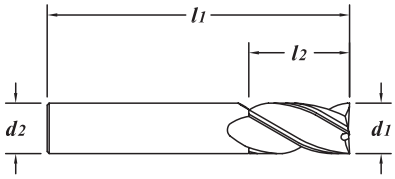
Series 220MA, 223MA, 230MA, 820MA, 823MA, 830MA

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

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



Standard Length - Square End - TiALN Coated
Standard Länge - Ohne Eckenradius - TiALN-Beschichtet
Longitud Estándar - Extremo Sin Radio - Recubrimiento de TiALN
Longueur Standart - Extrémité Carré - Revêtement TiALN
Lunghezza Standard - Piatte - Rivestimento in TiALN
标准长度 - TiALN 涂层



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Bright Finish - page 218
TiN Coated - page 220
TiCN Coated - page 221
Stub Length - page 211
Extended Length - page 241

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Bright Fertig (Ohne Beschichtung) - Seite 218
TiN-Beschichtet - Seite 220
TiCN-Beschichtet - Seite 221
Kurze Länge - Seite 211
Extra Länge - Seite 241

Fresa de submicrograno sólido carburo - corte centrado
Mecanizado seco o semiseco
Extremadamente versátil
Acabado Brillante (Sin Recubrimiento) - Página 218
Recubrimiento de TiN - Página 220
Recubrimiento de TiCN - Página 221
Longitud Corta - Página 211
Longitud Extra - Página 241

Fraises carbure submicrograin - coupe au centre
Usinage a sec ou avec l'air
Utilisations variables
Finition Brillante (Sans Revêtement) - Page 218
Revêtement TiN - Page 220
Revêtement TiCN - Page 221
Longueur Courte - Page 211
Longueur Extra - Page 241

Fresa sub-micrograno metallo duro - taglio al centro
Lavorazione a secco o a umido
Estremamente versatile
Eccellente Finitura (Non Rivestito) - Pagina 218
Rivestimento in TiN - Pagina 220
Rivestimento in TiCN - Pagina 221
Serie Corta - Pagina 211
Lunghezza Extra - Pagina 241

超细晶粒整体硬质合金立铣刀 - 中心切削
干式或半干式机加工
功能极多
高亮光洁度(未涂层) - 218页
TiN 涂层 - 220页
TiCN 涂层 - 221页
短柱长度 - 211页
超长 - 241页

(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
11017	12017	13017	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"
45017	37017	46017	.0394		1.000	3.0	38	4
11027	12027	13027	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"
45027	37027	46027	.0591		1.500	3.0	38	6
11037	12037	13037	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
11047	12047	13047	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"
45037	37037	46037	.0787		2.000	3.0	38	8
11057	12057	13057	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"
45047	37047	46047	.0984		2.500	3.0	38	12
11067	12067	13067	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"
45057	37057	46057	.1181		3.000	3.0	38	12
11077	12077	13077	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
45067	37067	46067	.1378		3.500	4.0	50	12
11087	12087	13087	.1406	9/64"	3.571	3/16"	2"	9/16"
11097	12097	13097	.1562	5/32"	3.967	3/16"	2"	9/16"
45077	37077	46077	.1575		4.000	4.0	50	14
11107	12107	13107	.1719	11/64"	4.366	3/16"	2"	9/16"
45087	37087	46087	.1772		4.500	5.0	50	14
11117	12117	13117	.1875	3/16"	4.763	3/16"	2"	5/8"
92077	93077	94077	.1969		5.000	5.0	50	16
45097	37097	46097	.1969		5.000	5.0	65	16
11127	12127	13127	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"
11137	12137	13137	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"
11147	12147	13147	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"
45107	37107	46107	.2362		6.000	6.0	65	19
11157	12157	13157	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
11167	12167	13167	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"
45117	37117	46117	.2756		7.000	7.0	65	22
11177	12177	13177	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"
11187	12187	13187	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"
11197	12197	13197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
45127	37127	46127	.3150		8.000	8.0	65	22
11207	12207	13207	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"
11217	12217	13217	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"
45137	37137	46137	.3543		9.000	9.0	65	22
11227	12227	13227	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"

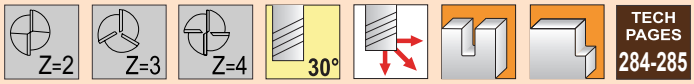
† *Metric equivalents are for reference only*

(220MA/820MA) 2 Flute EDP#	(223MA/823MA) 3 Flute EDP#	(230MA/830MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
11237	12237	13237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
11247	12247	13247	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"
45147	37147	46147	.3937		10.000	10.0	70	25
11257	12257	13257	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"
11267	12267	13267	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"
45157	37157	46157	.4331		11.000	11.0	75	25
11277	12277	13277	.4375	7/16"	11.113	7/16"	2-3/4"	1"
11287	12287	13287	.4531	29/64"	11.509	1/2"	3"	1"
11297	12297	13297	.4688	15/32"	11.908	1/2"	3"	1"
45167	37167	46167	.4724		12.000	12.0	75	25
11307	12307	13307	.4844	31/64"	12.304	1/2"	3"	1"
11317	12317	13317	.5000	1/2"	12.700	1/2"	3"	1"
45177	37177	46177	.5512		14.000	14.0	88	32
11327	12327	13327	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"
11337	12337	13337	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
45187	37187	46187	.6299		16.000	16.0	88	38
11347	12347	13347	.6875	11/16"	17.463	3/4"	4"	1-1/2"
45197	37197	46197	.7087		18.000	18.0	100	38
11357	12357	13357	.7500	3/4"	19.050	3/4"	4"	1-1/2"
45207	37207	46207	.7874		20.000	20.0	100	38
45217	37217	46217	.8661		22.000	22.0	100	38
11367	12367	13367	.8750	7/8"	22.225	7/8"	4"	1-1/2"
45227	37227	46227	.9843		25.000	25.0	100	38
11377	12377	13377	1.000	1"	25.400	1"	4"	1-1/2"
-	-	13397	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"

End Mill Manufacturing

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

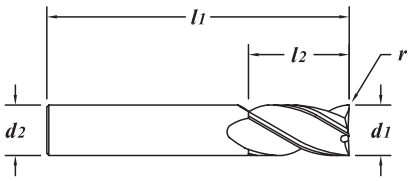
.0625" - .3125"
(1.588mm - 7.938mm)



TECH PAGES 284-285

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

Standard Length - Corner Radius
Standard Länge - Eckenradius
Longitud Estándar - Ángulo Redondeado
Longueur Standart - Rayon de Coin
Lunghezza Standard - Raggio
标准长度 - 圆角半径



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Extremely versatile
TiAlN Coated - page 227
Stub Length - page 212
Extended Length - page 243

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für stärkere Schneidecken und Radiusteile
Extrem Vielseitig
TiAlN-Beschichtet - Seite 227
Kurze Länge - Seite 212
Extra Länge - Seite 243

Fresa de submicrograno sólido carburo - corte centrado
Para un mejor refuerzo de esquinas y zonas curvas
Extremadamente versátil
Recubrimiento de TiAlN - Página 227
Longitud Corta - Página 212
Longitud Extra - Página 243

Fraises carbure submicrograin - coupe au centre
Rayon de coin renforces
Utilisations variables
Revêtement TiAlN - Page 227
Longueur Courte - Page 212
Extra Longueur - Page 243

Fresa sub-micrograno metallo duro - taglio al centro
Raggi rinforzati
Estremamente varsatile
Rivestimento in TiAlN - Pagina 227
Serie Corta - Pagina 212
Lunghezza Extra - Pagina 243

超细晶粒整体硬质合金立铣刀 - 中心切削
用于强化圆角和零件半径
功能极多
TiAlN 涂层 - 227页
短柱长度 - 212页
超长 - 243页

(220R/820R) 2 Flute EDP#	(223R/823R) 3 Flute EDP#	(230R/830R) 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	r Corner Radius
79580	36100	80580	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.010"
79590	36102	80590	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.015"
79600	36104	80600	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.010"
79610	36106	80610	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.015"
79620	36108	80620	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.020"
36500	36110	24070	.1181		3.000	3.0	38	12	0.20
36502	36112	24080	.1181		3.000	3.0	38	12	0.50
79000	36114	80000	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"
79010	36116	80010	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"
79020	36118	80020	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"
79030	36120	80030	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.030"
-	-	80035	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.040"
36504	36122	24090	.1575		4.000	4.0	50	14	0.30
36506	36124	24100	.1575		4.000	4.0	50	14	0.50
79040	36126	80040	.1875	3/16"	4.763	3/16"	2"	5/8"	.010"
79050	36128	80050	.1875	3/16"	4.763	3/16"	2"	5/8"	.015"
79060	36130	80060	.1875	3/16"	4.763	3/16"	2"	5/8"	.020"
79070	36132	80070	.1875	3/16"	4.763	3/16"	2"	5/8"	.030"
-	-	80080	.1875	3/16"	4.763	3/16"	2"	5/8"	.060"
36508	36134	24110	.1969		5.000	5.0	65	16	0.30
36510	36136	24120	.1969		5.000	5.0	65	16	0.50
36512	36138	24170	.2362		6.000	6.0	65	19	0.50
36514	36140	24180	.2362		6.000	6.0	65	19	0.80
36516	36142	24190	.2362		6.000	6.0	65	19	1.00
36518	36144	24200	.2362		6.000	6.0	65	19	1.50
36520	36146	24210	.2362		6.000	6.0	65	19	2.00
36522	36148	80090	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"
79100	36150	80100	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"
79110	36152	80110	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"
79120	36154	80120	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"
79130	36156	80130	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.045"
79140	36158	80140	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"
79160	36160	80160	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.015"
79170	36162	80170	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.020"
79180	36164	80180	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.030"
79190	36166	80190	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.045"
79200	36168	80200	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.060"

† Metric equivalents are for reference only

(220R/820R) 2 Flute EDP#	(223R/823R) 3 Flute EDP#	(230R/830R) 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	r Corner Radius
36524	36170	24220	.3150		8.000	8.0	65	22	0.50
36526	36172	24230	.3150		8.000	8.0	65	22	0.80
36528	36174	24240	.3150		8.000	8.0	65	22	1.00
36530	36176	24250	.3150		8.000	8.0	65	22	1.50
36532	36178	24260	.3150		8.000	8.0	65	22	2.00
36534	36180	24270	.3150		8.000	8.0	65	22	2.50
36536	36182	24280	.3150		8.000	8.0	65	22	3.00
36538	36184	80220	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"
79230	36186	80230	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"
79240	36188	80240	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"
79250	36190	80250	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"
79260	36192	80260	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.045"
79270	36194	80270	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"
36540	36196	24290	.3937		10.000	10.0	70	25	0.50
36542	36198	24300	.3937		10.000	10.0	70	25	0.80
36544	36200	24310	.3937		10.000	10.0	70	25	1.00
36546	36202	24320	.3937		10.000	10.0	70	25	1.50
36548	36204	24330	.3937		10.000	10.0	70	25	2.00
36550	36206	24340	.3937		10.000	10.0	70	25	2.50
36552	36208	24350	.3937		10.000	10.0	70	25	3.00
36554	36210	24360	.3937		10.000	10.0	70	25	3.20
36556	36212	80700	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.010"
36558	36214	80705	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.015"
36560	36216	80710	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.020"
36562	36218	80715	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.030"
36564	36220	80720	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.045"
36566	36222	80725	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.060"
36568	36224	80730	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.090"
36570	36226	80735	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.125"
36572	36228	24370	.4724		12.000	12.0	75	25	0.50
36574	36230	24380	.4724		12.000	12.0	75	25	0.80
36576	36232	24390	.4724		12.000	12.0	75	25	1.00
36578	36234	24400	.4724		12.000	12.0	75	25	1.50
36580	36236	24410	.4724		12.000	12.0	75	25	2.00
36582	36238	24420	.4724		12.000	12.0	75	25	2.50
36584	36240	24430	.4724		12.000	12.0	75	25	3.00
36586	36242	24440	.4724		12.000	12.0	75	25	3.20
36588	36244	80290	.5000	1/2"	12.700	1/2"	3"	1"	.010"
79300	36246	80300	.5000	1/2"	12.700	1/2"	3"	1"	.015"
79310	36248	80310	.5000	1/2"	12.700	1/2"	3"	1"	.020"
79320	36250	80320	.5000	1/2"	12.700	1/2"	3"	1"	.030"
79330	36252	80330	.5000	1/2"	12.700	1/2"	3"	1"	.045"
79340	36254	80340	.5000	1/2"	12.700	1/2"	3"	1"	.060"
79350	36256	80350	.5000	1/2"	12.700	1/2"	3"	1"	.090"
79360	36258	80360	.5000	1/2"	12.700	1/2"	3"	1"	.125"
79370	36260	80370	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"
79380	36262	80380	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"
79390	36264	80390	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"
79400	36266	80400	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.045"
79410	36268	80410	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"
79420	36270	80420	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.090"

continued →

Series 220R, 223R, 230R, 820R, 823R, 830R *(continued)*

.6299" - 1.000"
(16.000mm - 25.400mm)

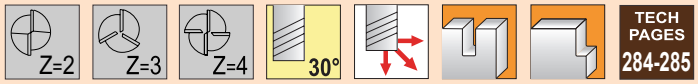
(220R/820R) 2 Flute EDP#	(223R/823R) 3 Flute EDP#	(230R/830R) 4 Flute EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
36590	36272	24450	.6299		16.000	16.0	88	38	0.50
36592	36274	24460	.6299		16.000	16.0	88	38	1.00
36594	36276	24470	.6299		16.000	16.0	88	38	2.00
36596	36278	24480	.6299		16.000	16.0	88	38	2.50
36598	36280	24490	.6299		16.000	16.0	88	38	3.00
36600	36282	24500	.6299		16.000	16.0	88	38	4.00
36602	36284	24510	.6299		16.000	16.0	88	38	5.00
79440	36286	80440	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"
79450	36288	80450	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.020"
79460	36290	80460	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"
79470	36292	80470	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.045"
79480	36294	80480	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"
79490	36296	80490	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.090"
79500	36298	80500	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.125"
79630	36300	80630	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.250"
36604	36302	24520	.7874		20.000	20.0	100	38	0.50
36606	36304	24530	.7874		20.000	20.0	100	38	1.00
36608	36306	24540	.7874		20.000	20.0	100	38	2.00
36610	36308	24550	.7874		20.000	20.0	100	38	3.00
36612	36310	24560	.7874		20.000	20.0	100	38	5.00
79510	36312	80510	1.000	1"	25.400	1"	4"	1-1/2"	.015"
79520	36314	80520	1.000	1"	25.400	1"	4"	1-1/2"	.020"
79530	36316	80530	1.000	1"	25.400	1"	4"	1-1/2"	.030"
79540	36318	80540	1.000	1"	25.400	1"	4"	1-1/2"	.045"
79550	36320	80550	1.000	1"	25.400	1"	4"	1-1/2"	.060"
79560	36322	80560	1.000	1"	25.400	1"	4"	1-1/2"	.090"
79570	36324	80570	1.000	1"	25.400	1"	4"	1-1/2"	.125"
79640	36326	80640	1.000	1"	25.400	1"	4"	1-1/2"	.250"

† *Metric equivalents are for reference only*

Series 220RA, 223RA, 230RA, 823RA, 830RA

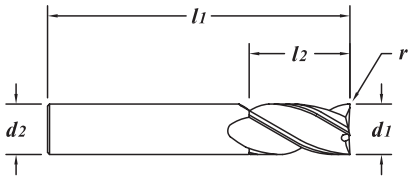
TOLERANCES	
d_1	+.000 –.050mm (+.000" –.002")
d_2	h6
r	+.025 –.025mm (+.001" –.001")

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



TECH PAGES 284-285

Standard Length - Corner Radius - TiALN Coated
Standard Länge - Eckenradius - TiALN-Beschichtet
Longitud Estándar - Ángulo Redondeado - Recubrimiento de TiALN
Longueur Standart - Rayon de Coin - Revêtement TiALN
Lunghezza Standard - Raggio - Rivestimento in TiALN
标准长度 - 圆角半径 - TiALN 涂层



Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Dry or semi-dry machining
Extremely versatile
Bright Finish - page 224
Stub Length - page 214
Extended Length - page 246

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für stärkere Schneidecken und Radiusteile
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Bright Fertig (Ohne Beschichtung) - Seite 224
Kurze Länge - Seite 214
Extra Länge - Seite 246

Fresa de submicrograno sólido carburo - corte centrado
Para un mejor refuerzo de esquinas y zonas curvas
Mecanizado seco o semiseco
Extremadamente versátil
Acabado Brillante (Sin Recubrimiento) - Página 224
Longitud Corta - Página 214
Longitud Extra - Página 246

Fraises carbure submicrograin - coupe au centre
Rayon de coin renforces
Usinage a sec ou avec l'air
Utilisations variables
Finition Brillante (Sans Revêtement) - Page 224
Longueur Courte - Page 214
Extra Longueur - Page 246

Fresa sub-micrograno metallo duro - taglio al centro
Raggi rinforzati
Lavorazione a secco o a umido
Estremamente versatile
Eccellente Finitura (Non Rivestito) - Pagina 224
Serie Corta - Pagina 214
Lunghezza Extra - Pagina 246

超细晶粒整体硬质合金立铣刀 - 中心切削
用于强化圆角和零件半径
干式或半干式机加工
功能极多
高亮光洁度 (未涂层) - 224页
短柱长度 - 214页
超长 - 246页

(220RA) 2 Flute EDP#	(223RA/823RA) 3 Flute EDP#	(230RA/830RA) 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
79587	36101	80587	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.010"
79597	36103	80597	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.015"
79607	36105	80607	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.010"
79617	36107	80617	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.015"
79627	36109	80627	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.020"
-	36111	24077	.1181		3.000	3.0	38	12	0.20
-	36113	24087	.1181		3.000	3.0	38	12	0.50
79007	36115	80007	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"
79017	36117	80017	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"
79027	36119	80027	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"
79037	36121	80037	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.030"
-	-	80038	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.040"
-	36123	24097	.1575		4.000	4.0	50	14	0.30
-	36125	24107	.1575		4.000	4.0	50	14	0.50
79047	36127	80047	.1875	3/16"	4.763	3/16"	2"	5/8"	.010"
79057	36129	80057	.1875	3/16"	4.763	3/16"	2"	5/8"	.015"
79067	36131	80067	.1875	3/16"	4.763	3/16"	2"	5/8"	.020"
79077	36133	80077	.1875	3/16"	4.763	3/16"	2"	5/8"	.030"
-	-	80087	.1875	3/16"	4.763	3/16"	2"	5/8"	.060"
-	-	24117	.1969		5.000	5.0	50	16	0.30
-	36135	24119	.1969		5.000	5.0	65	16	0.30
-	36137	24127	.1969		5.000	5.0	65	16	0.50
-	36139	24177	.2362		6.000	6.0	65	19	0.50
-	36141	24187	.2362		6.000	6.0	65	19	0.80
-	36143	24197	.2362		6.000	6.0	65	19	1.00
-	36145	24207	.2362		6.000	6.0	65	19	1.50
-	36147	24217	.2362		6.000	6.0	65	19	2.00
-	36149	80097	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"
79107	36151	80107	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"
79117	36153	80117	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"
79127	36155	80127	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"
79137	36157	80137	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.045"
79147	36159	80147	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"
79167	36161	80167	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.015"
79177	36163	80177	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.020"
79187	36165	80187	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.030"
79197	36167	80197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.045"
79207	36169	80207	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.060"

continued →

MATERIAL HARDNESS (Rc)
70
35
0

Series 220RA, 223RA, 230RA, 823RA, 830RA *(continued)*

.3150" - .6299"
(8.000mm - 16.000mm)

(220RA) 2 Flute EDP#	(223RA/823RA) 3 Flute EDP#	(230RA/830RA) 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	r Corner Radius
-	36171	24227	.3150		8.000	8.0	65	22	0.50
-	36173	24237	.3150		8.000	8.0	65	22	0.80
-	36175	24247	.3150		8.000	8.0	65	22	1.00
-	36177	24257	.3150		8.000	8.0	65	22	1.50
-	36179	24267	.3150		8.000	8.0	65	22	2.00
-	36181	24277	.3150		8.000	8.0	65	22	2.50
-	36183	24287	.3150		8.000	8.0	65	22	3.00
-	36185	80227	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"
79237	36187	80237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"
79247	36189	80247	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"
79257	36191	80257	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"
79267	36193	80267	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.045"
79277	36195	80277	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"
-	36197	24297	.3937		10.000	10.0	70	25	0.50
-	36199	24307	.3937		10.000	10.0	70	25	0.80
-	36201	24317	.3937		10.000	10.0	70	25	1.00
-	36203	24327	.3937		10.000	10.0	70	25	1.50
-	36205	24337	.3937		10.000	10.0	70	25	2.00
-	36207	24347	.3937		10.000	10.0	70	25	2.50
-	36209	24357	.3937		10.000	10.0	70	25	3.00
-	36211	24367	.3937		10.000	10.0	70	25	3.20
-	36213	80279	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.010"
-	36215	80281	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.015"
-	36217	80283	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.020"
-	36219	80285	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.030"
-	36221	80287	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.045"
-	36223	80289	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.060"
-	36225	80291	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.090"
-	36227	80293	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.125"
-	36229	24377	.4724		12.000	12.0	75	25	0.50
-	36231	24387	.4724		12.000	12.0	75	25	0.80
-	36233	24397	.4724		12.000	12.0	75	25	1.00
-	36235	24407	.4724		12.000	12.0	75	25	1.50
-	36237	24417	.4724		12.000	12.0	75	25	2.00
-	36239	24427	.4724		12.000	12.0	75	25	2.50
-	36241	24437	.4724		12.000	12.0	75	25	3.00
-	36243	24447	.4724		12.000	12.0	75	25	3.20
-	36245	80297	.5000	1/2"	12.700	1/2"	3"	1"	.010"
79307	36247	80307	.5000	1/2"	12.700	1/2"	3"	1"	.015"
79317	36249	80317	.5000	1/2"	12.700	1/2"	3"	1"	.020"
79327	36251	80327	.5000	1/2"	12.700	1/2"	3"	1"	.030"
79337	36253	80337	.5000	1/2"	12.700	1/2"	3"	1"	.045"
79347	36255	80347	.5000	1/2"	12.700	1/2"	3"	1"	.060"
79357	36257	80357	.5000	1/2"	12.700	1/2"	3"	1"	.090"
79367	36259	80367	.5000	1/2"	12.700	1/2"	3"	1"	.125"
79377	36261	80377	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"
-	36263	80387	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"
79397	36265	80397	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"
79407	36267	80407	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.045"
79417	36269	80417	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"
79427	36271	80427	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.090"
-	36273	24457	.6299		16.000	16.0	88	38	0.50
-	36275	24467	.6299		16.000	16.0	88	38	1.00
-	36277	24477	.6299		16.000	16.0	88	38	2.00
-	36279	24487	.6299		16.000	16.0	88	38	2.50
-	36281	24497	.6299		16.000	16.0	88	38	3.00
-	36283	24507	.6299		16.000	16.0	88	38	4.00
-	36285	24517	.6299		16.000	16.0	88	38	5.00

† *Metric equivalents are for reference only*

(220RA) 2 Flute EDP#	(223RA/823RA) 3 Flute EDP#	(230RA/830RA) 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	r Corner Radius
79447	36287	80447	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"
79457	36289	80457	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.020"
79467	36291	80467	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"
79477	36293	80477	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.045"
79487	36295	80487	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"
79497	36297	80497	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.090"
79507	36299	80507	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.125"
79637	36301	80637	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.250"
-	36303	24527	.7874		20.000	20.0	100	38	0.50
-	36305	24537	.7874		20.000	20.0	100	38	1.00
-	36307	24547	.7874		20.000	20.0	100	38	2.00
-	36309	24557	.7874		20.000	20.0	100	38	3.00
-	36311	24567	.7874		20.000	20.0	100	38	5.00
-	36313	80517	1.000	1"	25.400	1"	4"	1-1/2"	.015"
-	36315	80527	1.000	1"	25.400	1"	4"	1-1/2"	.020"
79537	36317	80537	1.000	1"	25.400	1"	4"	1-1/2"	.030"
-	36319	80547	1.000	1"	25.400	1"	4"	1-1/2"	.045"
79557	36321	80557	1.000	1"	25.400	1"	4"	1-1/2"	.060"
-	36323	80567	1.000	1"	25.400	1"	4"	1-1/2"	.090"
79577	36325	80577	1.000	1"	25.400	1"	4"	1-1/2"	.125"
79647	36327	80647	1.000	1"	25.400	1"	4"	1-1/2"	.250"

End Mill Manufacturing

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

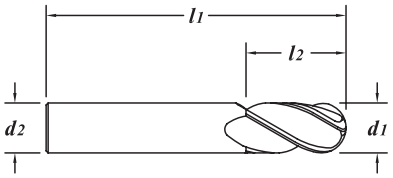
.0200" - .2656"
(0.508mm - 6.746mm)

Z=2 Z=3 Z=4 30°

TECH PAGES 284-285

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

Standard Length - Ball End
Standard Länge - Vollradius
Longitud Estándar - Cabeza Esférica
Longueur Standart - Hemispherique
Lunghezza Standard - Sferica
标准长度 - 球头



MATERIAL HARDNESS (Rc) 70 35 0

Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiN Coated - page 232
TiCN Coated - page 233
TiAlN Coated - page 234
Stub Length - page 216
Extended Length - page 249

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
TiN-Beschichtet - Seite 232
TiCN-Beschichtet - Seite 233
TiAlN-Beschichtet - Seite 234
Kurze Länge - Seite 216
Extra Länge - Seite 249

Fresa de submicrograno sólido carburo - corte centrado
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Recubrimiento de TiN - Página 232
Recubrimiento de TiCN - Página 233
Recubrimiento de TiAlN - Página 234
Longitud Corta - Página 216
Longitud Extra - Página 249

Fraises carbure submicrograin - coupe au centre
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")
Revêtement TiN - Page 232
Revêtement TiCN - Page 233
Revêtement TiAlN - Page 234
Longueur Courte - Page 216
Longueur Extra - Page 249

Fresa sub-micrograno metallo duro - taglio al centro
Estremamente varsatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Rivestimento in TiN - Pagina 232
Rivestimento in TiCN - Pagina 233
Rivestimento in TiAlN - Pagina 234
Serie Corta - Pagina 216
Lunghezza Extra - Pagina 249

超细晶粒整体硬质合金立铣刀 - 中心切削
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
TiN 涂层 - 232页
TiCN 涂层 - 233页
TiAlN 涂层 - 234页
短柱长度 - 216页
超长 - 249页

(320M/920M) 2 Flute EDP#	(323M/923M) 3 Flute EDP#	(330M/930M) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
16650	-	-	.0200	.0200"	0.508	1/8"	1-1/2"	.060"
16700	-	-	.0250	.0250"	0.635	1/8"	1-1/2"	.075"
16750	-	-	.0300	.0300"	0.762	1/8"	1-1/2"	.090"
16010	17010	18010	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"
47010	38010	48010	.0394		1.000	3.0	38	4
16020	17020	18020	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"
47020	38020	48020	.0591		1.500	3.0	38	6
16030	17030	18030	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
16040	17040	18040	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"
47030	38030	48030	.0787		2.000	3.0	38	8
16050	17050	18050	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"
47040	38040	48040	.0984		2.500	3.0	38	12
16060	17060	18060	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"
47050	38050	48050	.1181		3.000	3.0	38	12
16070	17070	18070	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
47060	38060	48060	.1378		3.500	4.0	50	12
16080	17080	18080	.1406	9/64"	3.571	3/16"	2"	9/16"
16090	17090	18090	.1562	5/32"	3.967	3/16"	2"	9/16"
47070	38070	48070	.1575		4.000	4.0	50	14
16100	17100	18100	.1719	11/64"	4.366	3/16"	2"	9/16"
47080	38080	48080	.1772		4.500	5.0	50	14
16110	17110	18110	.1875	3/16"	4.763	3/16"	2"	5/8"
97070	98070	99070	.1969		5.000	5.0	50	16
47090	38090	48090	.1969		5.000	5.0	65	16
16120	17120	18120	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"
16130	17130	18130	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"
16140	17140	18140	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"
47100	38100	48100	.2362		6.000	6.0	65	19
16150	17150	18150	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
16160	17160	18160	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"

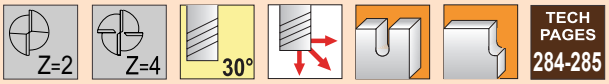
GARR TOOL®

† Metric equivalents are for reference only

(320M/920M) 2 Flute EDP#	(323M/923M) 3 Flute EDP#	(330M/930M) 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
47110	38110	48110	.2756		7.000	7.0	65	22
16170	17170	18170	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"
16180	-	18180	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"
16190	17190	18190	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
47120	38120	48120	.3150		8.000	8.0	65	22
16200	17200	18200	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"
16210	17210	18210	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"
47130	38130	48130	.3543		9.000	9.0	65	22
16220	-	18220	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"
16230	17230	18230	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
16240	17240	18240	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"
47140	38140	48140	.3937		10.000	10.0	70	25
16250	17250	18250	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"
16260	17260	18260	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"
47150	38150	48150	.4331		11.000	11.0	75	25
16270	17270	18270	.4375	7/16"	11.113	7/16"	2-3/4"	1"
16280	-	18280	.4531	29/64"	11.509	1/2"	3"	1"
16290	17290	18290	.4688	15/32"	11.908	1/2"	3"	1"
47160	38160	48160	.4724		12.000	12.0	75	25
16300	-	18300	.4844	31/64"	12.304	1/2"	3"	1"
16310	17310	18310	.5000	1/2"	12.700	1/2"	3"	1"
47170	38170	48170	.5512		14.000	14.0	88	32
16320	17320	18320	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"
16330	17330	18330	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
47180	38180	48180	.6299		16.000	16.0	88	38
16340	17340	18340	.6875	11/16"	17.463	3/4"	4"	1-1/2"
47190	-	48190	.7087		18.000	18.0	100	38
16350	17350	18350	.7500	3/4"	19.050	3/4"	4"	1-1/2"
47200	38200	48200	.7874		20.000	20.0	100	38
47210	-	48210	.8661		22.000	22.0	100	38
16360	17360	18360	.8750	7/8"	22.225	7/8"	4"	1-1/2"
47220	-	-	.9843		25.000	25.0	100	38
16370	17370	18370	1.000	1"	25.400	1"	4"	1-1/2"

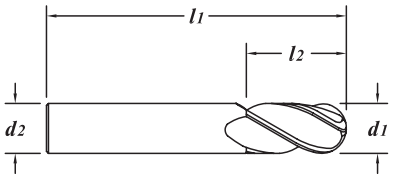
Series 320MT, 330MT

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



TECH PAGES 284-285

Standard Length - Ball End - TiN Coated
Standard Länge - Vollradius - TiN-Beschichtet
Longitud Estándar - Cabeza Esférica - Recubrimiento de TiN
Longueur Standart - Hemispherique - Revêtement TiN
Lunghezza Standard - Sferica - Rivestimento in TiN
标准长度 - 球头 - TiN 涂层



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
Improved lubricity
Extremely versatile
Bright Finish - page 230
TiCN Coated - page 233
TiAlN Coated - page 234

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Verbessere Schmiereingenschaft
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
Bright Fertig (Ohne Beschichtung) - Seite 230
TiCN-Beschichtet - Seite 233
TiAlN-Beschichtet - Seite 234

Fresa de submicrograno sólido carburo - corte centrado
Majorada la lubricación
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Acabado Brillante (Sin Recubrimiento) - Página 230
Recubrimiento de TiCN - Página 233
Recubrimiento de TiAlN - Página 234

Fraises carbure submicrograin - coupe au centre
Amelioration du glissement
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")
Finition Brillante (Sans Revêtement) - Page 230
Revêtement TiCN - Page 233
Revêtement TiAlN - Page 234

Fresa sub-micrograno metallo duro - taglio al centro
Migliore autolubrificazione
Estremamente versatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Eccellente Finitura (Non Rivestito) - Pagina 230
Rivestimento in TiCN - Pagina 233
Rivestimento in TiAlN - Pagina 234

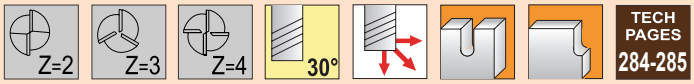
超细晶粒整体硬质合金立铣刀 - 中心切削
改善润滑性能
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
高亮光洁度(未涂层) - 230页
TiCN 涂层 - 233页
TiAlN 涂层 - 234页

(320MT) 2 Flute EDP#	(330MT) 4 Flute EDP#	d_1 † Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
16073	18073	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
16113	18113	.1875	3/16"	4.763	3/16"	2"	5/8"
16153	18153	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
16193	18193	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
16233	18233	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
16273	18273	.4375	7/16"	11.113	7/16"	2-3/4"	1"
16313	18313	.5000	1/2"	12.700	1/2"	3"	1"
16333	18333	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
16353	18353	.7500	3/4"	19.050	3/4"	4"	1-1/2"
16373	18373	1.000	1"	25.400	1"	4"	1-1/2"

† *Metric equivalents are for reference only*

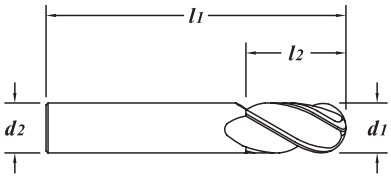
TOLERANCES	
d_1	+.000 –.050mm (+.000" –.002")
d_2	h6
ball radius	+.000 –.025mm (+.000" –.001")

Series 320MC, 323MC, 330MC



TECH PAGES 284-285

Standard Length - Ball End - TiCN Coated
Standard Länge - Vollradius - TiCN-Beschichtet
Longitud Estándar - Cabeza Esférica - Recubrimiento de TiCN
Longueur Standart - Hemispherique - Revêtement TiCN
Lunghezza Standard - Sferica - Rivestimento in TiCN
标准长度 - 球头 - TiCN 涂层



Solid submicron grain carbide end mill - center cutting
Improved abrasion resistance and lubricity
Extremely versatile
Bright Finish - page 230
TiN Coated - page 232
TiALN Coated - page 234
Extended Length - Page 251

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Verbesserte Verschleissbeständigkeit und Schmiereieneschaft
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
Bright Fertig (Ohne Beschichtung) - Seite 230
TiN-Beschichtet - Seite 232
TiALN-Beschichtet - Seite 234
Extra Länge - Seite 251

Fresa de submicrograno sólido carburo - corte centrado
Mejoradas la resistencia a la abrasión y la lubricación
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Acabado Brillante (Sin Recubrimiento) - Página 230
Recubrimiento de TiN - Página 232
Recubrimiento de TiALN - Página 234
Longitud Extra - Página 251

Fraises carbure submicrograin - coupe au centre
Amelioration de la resistance a l'abrasion et au glissement
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")
Finition Brillante (Sans Revêtement) - Page 230
Revêtement TiN - Page 232
Revêtement TiALN - Page 234
Extra Longue - Page 251

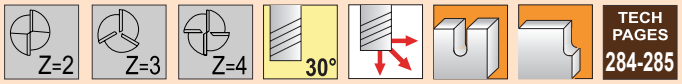
Fresa sub-micrograno metallo duro - taglio al centro
Maggiore resistenza all'abrasione
Estremamente versatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Eccellente Finitura (Non Rivestito) - Pagina 230
Rivestimento in TiN - Pagina 232
Rivestimento in TiALN - Pagina 234
Lunghezza Extra - Pagina 251

超细晶粒整体硬质合金立铣刀 - 中心切削
改善耐磨性和润滑性
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
高亮光洁度(未涂层) - 230页
TiN 涂层 - 232页
TiALN 涂层 - 234页
超长 - 251页

(320MC) 2 Flute EDP#	(323MC) 3 Flute EDP#	(330MC) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
16014	17014	18014	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"
16024	17024	18024	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"
16034	17034	18034	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
16044	17044	18044	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"
16054	17054	18054	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"
16064	17064	18064	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"
16074	17074	18074	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
16084	17084	18084	.1406	9/64"	3.571	3/16"	2"	9/16"
16094	17094	18094	.1562	5/32"	3.967	3/16"	2"	9/16"
16104	-	18104	.1719	11/64"	4.366	3/16"	2"	9/16"
16114	17114	18114	.1875	3/16"	4.763	3/16"	2"	5/8"
16124	17124	18124	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"
16134	17134	18134	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"
16144	17144	18144	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"
16154	17154	18154	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
-	17164	18164	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"
16174	17174	18174	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"
-	-	18184	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"
16194	17194	18194	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
16204	-	-	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"
-	17214	18214	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"
16224	-	18224	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"
16234	17234	18234	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
16244	-	18244	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"
16254	17254	18254	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"
-	-	18264	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"
16274	17274	18274	.4375	7/16"	11.113	7/16"	2-3/4"	1"
-	-	18284	.4531	29/64"	11.509	1/2"	3"	1"
-	17294	18294	.4688	15/32"	11.908	1/2"	3"	1"
16304	17304	18304	.4844	31/64"	12.304	1/2"	3"	1"
16314	17314	18314	.5000	1/2"	12.700	1/2"	3"	1"
16324	17324	18324	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"
16334	17334	18334	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
-	17344	-	.6875	11/16"	17.463	3/4"	4"	1-1/2"
16354	17354	18354	.7500	3/4"	19.050	3/4"	4"	1-1/2"
16364	17364	18364	.8750	7/8"	22.225	7/8"	4"	1-1/2"
16374	17374	18374	1.000	1"	25.400	1"	4"	1-1/2"

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

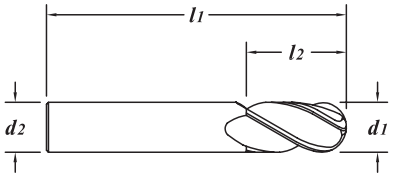
.0312" - .3150"
(0.792mm - 8.000mm)



TECH PAGES 284-285

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

Standard Length - Ball End - TiALN Coated
Standard Länge - Vollradius - TiALN-Beschichtet
Longitud Estándar - Cabeza Esférica - Recubrimiento de TiALN
Longueur Standart - Hemispherique - Revêtement TiALN
Lunghezza Standard - Sferica - Rivestimento in TiALN
标准长度 - 球头 - TiALN 涂层



MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Bright Finish - page 230
TiN Coated - page 232
TiCN Coated - page 233
Stub Length - page 217
Extended Length - page 252

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
Bright Fertig (Ohne Beschichtung) - Seite 230
TiN-Beschichtet - Seite 232
TiCN-Beschichtet - Seite 233
Kurze Länge - Seite 217
Extra Länge - Seite 252

Fresa de submicrograno sólido carburo - corte centrado
Mecanizado seco o semiseco
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Acabado Brillante (Sin Recubrimiento) - Página 230
Recubrimiento de TiN - Página 232
Recubrimiento de TiCN - Página 233
Longitud Corta - Página 217
Longitud Extra - Página 252

Fraises carbure submicrograin - coupe au centre
Usinage a sec ou avec l'air
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")
Finition Brillante (Sans Revêtement) - Page 230
Revêtement TiN - Page 232
Revêtement TiCN - Page 233
Longueur Courte - Page 217
Longueur Extra - Page 252

Fresa sub-micrograno metallo duro - taglio al centro
Lavorazione a secco o a umido
Estremamente varsatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Eccellente Finitura (Non Rivestito) - Pagina 230
Rivestimento in TiN - Pagina 232
Rivestimento in TiCN - Pagina 233
Serie Corta - Pagina 217
Lunghezza Extra - Pagina 252

超细晶粒整体硬质合金立铣刀 - 中心切削
干式或半干式机加工
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
高亮光洁度 (未涂层) - 230页
TiN 涂层 - 232页
TiCN 涂层 - 233页
短柱长度 - 217页
超长 - 252页

(320MA/920MA) 2 Flute EDP#	(323MA/923MA) 3 Flute EDP#	(330MA/930MA) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
16017	17017	18017	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"
47017	38017	48017	.0394		1.000	3.0	38	4
16027	17027	18027	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"
47027	38027	48027	.0591		1.500	3.0	38	6
16037	17037	18037	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
16047	17047	18047	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"
47037	38037	48037	.0787		2.000	3.0	38	8
16057	17057	18057	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"
47047	38047	48047	.0984		2.500	3.0	38	12
16067	17067	18067	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"
47057	38057	48057	.1181		3.000	3.0	38	12
16077	17077	18077	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
47067	38067	48067	.1378		3.500	4.0	50	12
16087	17087	18087	.1406	9/64"	3.571	3/16"	2"	9/16"
16097	17097	18097	.1562	5/32"	3.967	3/16"	2"	9/16"
47077	38077	48077	.1575		4.000	4.0	50	14
16107	17107	18107	.1719	11/64"	4.366	3/16"	2"	9/16"
47087	38087	48087	.1772		4.500	5.0	50	14
16117	17117	18117	.1875	3/16"	4.763	3/16"	2"	5/8"
97077	98077	99077	.1969		5.000	5.0	50	16
47097	38097	48097	.1969		5.000	5.0	65	16
16127	17127	18127	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"
16137	17137	18137	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"
16147	17147	18147	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"
47107	38107	48107	.2362		6.000	6.0	65	19
16157	17157	18157	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
16167	17167	18167	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"
47117	38117	48117	.2756		7.000	7.0	65	22
16177	17177	18177	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"
16187	17187	18187	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"
16197	17197	18197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
47127	38127	48127	.3150		8.000	8.0	65	22

GARR TOOL®

† Metric equivalents are for reference only

(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
16207	17207	18207	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"
16217	17217	18217	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"
47137	38137	48137	.3543		9.000	9.0	65	22
16227	17227	18227	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"
16237	17237	18237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
16247	17247	18247	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"
47147	38147	48147	.3937		10.000	10.0	70	25
16257	17257	18257	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"
16267	-	18267	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"
47157	38157	48157	.4331		11.000	11.0	75	25
16277	17277	18277	.4375	7/16"	11.113	7/16"	2-3/4"	1"
16287	17287	18287	.4531	29/64"	11.509	1/2"	3"	1"
16297	17297	18297	.4688	15/32"	11.908	1/2"	3"	1"
47167	38167	48167	.4724		12.000	12.0	75	25
16307	17307	18307	.4844	31/64"	12.304	1/2"	3"	1"
16317	17317	18317	.5000	1/2"	12.700	1/2"	3"	1"
47177	38177	48177	.5512		14.000	14.0	88	32
16327	17327	18327	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"
16337	17337	18337	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
47187	38187	48187	.6299		16.000	16.0	88	38
16347	17347	18347	.6875	11/16"	17.463	3/4"	4"	1-1/2"
47197	38197	48197	.7087		18.000	18.0	100	38
16357	17357	18357	.7500	3/4"	19.050	3/4"	4"	1-1/2"
47207	38207	48207	.7874		20.000	20.0	100	38
47217	38217	48217	.8661		22.000	22.0	100	38
-	17367	18367	.8750	7/8"	22.225	7/8"	4"	1-1/2"
47227	38227	48227	.9843		25.000	25.0	100	38
16377	17377	18377	1.000	1"	25.400	1"	4"	1-1/2"

Series 222M, 234M, 334MA

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

TECH PAGES 284,285, 308,309

Standard Length - Straight Flute - Square End (Ball End - TiALN Coated)

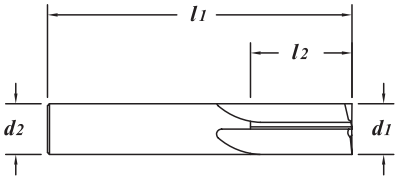
Standard Länge - Gerade Spannut - Ohne Eckenradius (Vollradius - TiALN-Beschichtet)

Longitud Estándar - Ranura Recta - Extremo Sin Radio (Cabeza Esférica - Recubrimiento de TiALN)

Longueur Standart - Goujures Droite - Extrémité Carré (Hemispherique - Revêtement TiALN)

Lunghezza Standard - Tagliente Dritto - Piatte (Sferica - Rivestimento in TiALN)

标准长度 - 直排屑槽 - 平头 (球头 - TiALN 涂层)



MATERIAL HARDNESS (Rc)

70

35

0

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
81070	82070	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
81110	82110	.1875	3/16"	4.763	3/16"	2"	5/8"
81150	82150	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
81190	82190	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
81230	82230	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
81270	82270	.4375	7/16"	11.113	7/16"	2-3/4"	1"
81310	82310	.5000	1/2"	12.700	1/2"	3"	1"
81330	82330	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"
81350	82350	.7500	3/4"	19.050	3/4"	4"	1-1/2"
81370	82370	1.000	1"	25.400	1"	4"	1-1/2"

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für die Bearbeitung von gehärten Stählen
Hilft die Perpendicularität zu halten

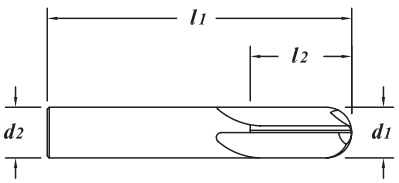
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")

Fresa de submicrograno sólido carburo - corte centrado
Para corte de materiales de alta dureza Rc
Ayuda a mantener la perpendicularidad

Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")

Fraises carbure submicrograin - coupe au centre
Pour la coupe de materiaux a haute durete
Aide a tenir la perpendicularite

Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")



Fresa sub-micrograno metallo duro - taglio al centro
Per lavorazioni su materiali temprati
Taglio perpendicolare

Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")

(334MA) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
84077	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
84115	.1875	3/16"	4.763	3/16"	2"	5/8"
84157	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
84237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"

超细晶粒整体硬质合金立铣刀 - 中心切削
用于切削洛氏硬度高的材料
协助保持垂直度

半径允差 +0,000 /–0,025 (+.000" -.001")

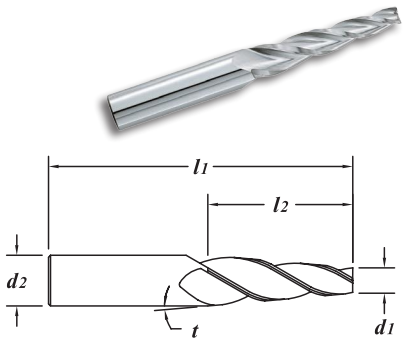
† Metric equivalents are for reference only

TOLERANCES

d1	+.075 –.000mm (+.003" –.000")
d2	h6
tip radius	+.075 –.000mm (+.003" –.000")

TECH PAGES 284-285

Standard Length - Tapered - Square End , Ball End
Standard Länge - Kegelig - Ohne Eckenradius , Vollradius
Longitud Estándar - Cónica - Extremo Sin Radio , Cabeza Esférica
Longueur Standart - Conique - Extrémité Carré , Hemispherique
Lunghezza Standard - Frese per Nervature - Piatte , Sferica
标准长度 - 锥度 - 平头 , 球头



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

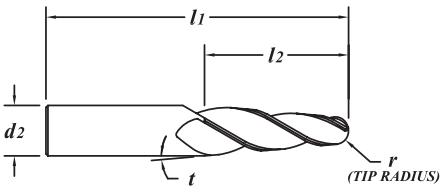
(273M) EDP#	*d2* Shank Diameter	*t* Taper Per Side	*d1* † Tip Diameter Decimal	*d1* † Tip Diameter Metric	*l1* Overall Length	*l2* Approx. Flute Length
49010	1/4"	1°	.1250	1/8" 3.175	3"	1-1/2"
49020	1/4"	1° 30'	.1250	1/8" 3.175	3"	1-1/2"
49030	1/4"	2°	.1250	1/8" 3.175	3"	1"
49040	1/4"	3°	.1250	1/8" 3.175	3"	1-1/4"
49050	1/4"	5°	.1250	1/8" 3.175	3"	3/4"
49060	1/4"	7°	.1250	1/8" 3.175	3"	1/2"
49070	3/8"	1°	.1875	3/16" 4.763	3-1/2"	1-3/4"
49080	3/8"	1° 30'	.1875	3/16" 4.763	3-1/2"	1-3/4"
49090	3/8"	2°	.1875	3/16" 4.763	3-1/2"	1-3/4"
49100	3/8"	3°	.1562	5/32" 3.967	3-1/2"	1-3/4"
49110	3/8"	5°	.1250	1/8" 3.175	3-1/2"	1-1/2"
49120	3/8"	7°	.1562	5/32" 3.967	3-1/2"	1"
49130	1/2"	3°	.2500	1/4" 6.350	4"	2"
49140	1/2"	5°	.2500	1/4" 6.350	4"	1-1/2"
49150	1/2"	7°	.1875	3/16" 4.763	4"	1-5/16"

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Ausgezeichnet zum halten von Entwurfwinkel bei Formenbau Anwendungen

Vollradius Toleranz: +0,075 / –0,000 (+.003" –.000")

Fresa de submicrograno sólido carburo - corte centrado
Excelente para mantener ángulos de desmoldeo en aplicaciones de troquelado

Tolerancia de la cabeza esférica +0,075 / –0,000 (+.003" –.000")



Fraises carbure submicrograin - coupe au centre
Excellent pour la tenue des arêtes en applications moules et outillages

Tolerance du rayon de hemispherique +0,075 / –0,000 (+.003" –.000")

(373M) EDP#	*d2* Shank Diameter	*t* Taper Per Side	*r* † Tip Radius Decimal	*r* † Tip Radius Metric	*l1* Overall Length	*l2* Approx. Flute Length
50010	1/4"	1°	.0620	.062" 1.575	3"	1-1/2"
50020	1/4"	1° 30'	.0620	.062" 1.575	3"	1-1/2"
50030	1/4"	2°	.0620	.062" 1.575	3"	1"
50040	1/4"	3°	.0620	.062" 1.575	3"	1-1/4"
50050	1/4"	5°	.0620	.062" 1.575	3"	3/4"
50060	1/4"	7°	.0620	.062" 1.575	3"	1/2"
50070	3/8"	1°	.0930	.093" 2.362	3-1/2"	1-3/4"
50080	3/8"	1° 30'	.0930	.093" 2.362	3-1/2"	1-3/4"
50090	3/8"	2°	.0930	.093" 2.362	3-1/2"	1-3/4"
50100	3/8"	3°	.0780	.078" 1.981	3-1/2"	1-3/4"
50110	3/8"	5°	.0620	.062" 1.575	3-1/2"	1-1/2"
50120	3/8"	7°	.0780	.078" 1.981	3-1/2"	1"
50130	1/2"	3°	.1250	.125" 3.175	4"	2"
50140	1/2"	5°	.1250	.125" 3.175	4"	1-1/2"
50150	1/2"	7°	.0930	.093" 2.362	4"	1-5/16"

Fresa sub-micrograno metallo duro - taglio al centro
Eccellente per lavorazioni di pareti inclinate sugli stampi

Tolleranza del raggio +0,075 / –0,000 (+.003" –.000")

超细晶粒整体硬质合金立铣刀 - 中心切削
在模具用途中对于保持拔模角度非常好

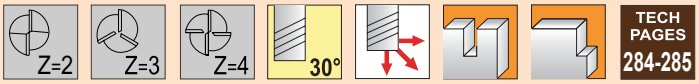
半径允差 +0,075 / –0,000 (+.003" –.000")

MATERIAL HARDNESS (Rc)
70
35
0

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

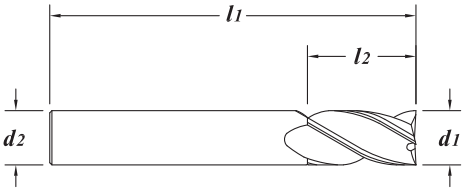
TOLERANCES	
d_1	+.000 –.050mm (+.000" –.002")
d_2	h6

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



TECH PAGES 284-285

Extra Length - Square End
Extra Länge - Ohne Eckenradius
Longitud Extra - Extremo Sin Radio
Extra Longue - Extrémité Carré
Lunghezza Extra - Piatte
超长 - 平头



Solid submicron grain carbide end mill - center cutting
Extended reach
Can be modified with a neck within 48 hours
Extremely versatile
TiCN Coated - page 240
TiAlN Coated - page 241
Stub Length - page 209
Standard Length - page 218

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
TiCN-Beschichtet - Seite 240
TiAlN-Beschichtet - Seite 241
Kurze Länge - Seite 209
Standard Länge - Seite 218

Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Recubrimiento de TiCN - Página 240
Recubrimiento de TiAlN - Página 241
Longitud Corta - Página 209
Longitud Estándar - Página 218

Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Peut etre modifier avec un col degage sous un delai de 48 heures
Utilisations variables
Revêtement TiCN - Page 240
Revêtement TiAlN - Page 241
Longueur Courte - Page 209
Longueur Standart - Page 218

Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Può essere modificata in 48 ore
Estremamente versatile
Rivestimento in TiCN - Pagina 240
Rivestimento in TiAlN - Pagina 241
Serie Corta - Pagina 209
Lunghezza Standard - Pagina 218

超细晶粒整体硬质合金立铣刀 - 中心切削
加长
可以在48小时内用轴颈进行修正
功能极多
TiCN 涂层 - 240页
TiAlN 涂层 - 241页
短柱长度 - 209页
标准长度 - 218页

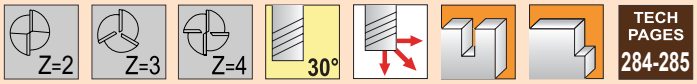
(620M/640M) 2 Flute EDP#	(623M/643M) 3 Flute EDP#	(630M/650M) 4 Flute EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
92010	93010	94010	.1181		3.000	3.0	50	16
92020	93020	94020	.1181		3.000	3.0	75	20
92030	93030	94030	.1181		3.000	3.0	75	25
41010	54510	42010	.1250	1/8"	3.175	1/8"	2"	5/8"
41020	54520	42020	.1250	1/8"	3.175	1/8"	3"	3/4"
41030	54530	42030	.1250	1/8"	3.175	1/8"	3"	1"
92040	93040	94040	.1575		4.000	4.0	50	16
92050	93050	94050	.1575		4.000	4.0	75	20
92060	93060	94060	.1575		4.000	4.0	75	25
41040	54540	42040	.1875	3/16"	4.763	3/16"	3"	1"
41050	54550	42050	.1875	3/16"	4.763	3/16"	3"	1-1/8"
41060	54560	42060	.1875	3/16"	4.763	3/16"	4"	1"
92080	93080	94080	.1969		5.000	5.0	75	20
92090	93090	94090	.1969		5.000	5.0	75	25
92100	93100	94100	.2362		6.000	6.0	75	25
92110	93110	94110	.2362		6.000	6.0	100	25
92120	93120	94120	.2362		6.000	6.0	100	32
92130	93130	94130	.2362		6.000	6.0	150	38
41070	54570	42070	.2500	1/4"	6.350	1/4"	3"	1"
41080	54580	42080	.2500	1/4"	6.350	1/4"	4"	1"
41090	54590	42090	.2500	1/4"	6.350	1/4"	4"	1-1/2"
41100	54600	42100	.2500	1/4"	6.350	1/4"	6"	1-1/2"
41110	54610	42110	.3125	5/16"	7.938	5/16"	3"	1"
41120	54620	42120	.3125	5/16"	7.938	5/16"	4"	1"
41130	54630	42130	.3125	5/16"	7.938	5/16"	4"	1-5/8"
41140	54640	42140	.3125	5/16"	7.938	5/16"	6"	1-1/2"
92140	93140	94140	.3150		8.000	8.0	75	25
92150	93150	94150	.3150		8.000	8.0	100	25
92160	93160	94160	.3150		8.000	8.0	100	41
92170	93170	94170	.3150		8.000	8.0	150	50

† *Metric equivalents are for reference only*

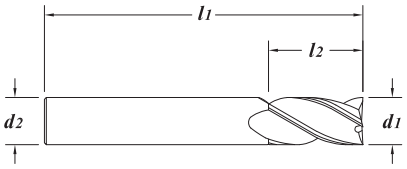
(620M/640M) 2 Flute EDP#	(623M/643M) 3 Flute EDP#	(630M/650M) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
41150	54650	42150	.3750	3/8"	9.525	3/8"	3"	1"
41160	54660	42160	.3750	3/8"	9.525	3/8"	4"	1"
41170	54670	42170	.3750	3/8"	9.525	3/8"	4"	2"
41180	54680	42180	.3750	3/8"	9.525	3/8"	6"	1-1/2"
41190	54690	42190	.3750	3/8"	9.525	3/8"	6"	3"
92180	93180	94180	.3937		10.000	10.0	75	25
92190	93190	94190	.3937		10.000	10.0	100	25
92200	93200	94200	.3937		10.000	10.0	100	50
92210	93210	94210	.3937		10.000	10.0	150	38
92220	93220	94220	.3937		10.000	10.0	150	75
41200	54700	42200	.4375	7/16"	11.113	7/16"	4"	1"
41210	54710	42210	.4375	7/16"	11.113	7/16"	4"	2"
41220	54720	42220	.4375	7/16"	11.113	7/16"	6"	1-1/2"
41230	54730	42230	.4375	7/16"	11.113	7/16"	6"	3"
92230	93230	94230	.4724		12.000	12.0	100	25
92240	93240	94240	.4724		12.000	12.0	100	50
92250	93250	94250	.4724		12.000	12.0	150	50
92260	93260	94260	.4724		12.000	12.0	150	75
41240	54740	42240	.5000	1/2"	12.700	1/2"	4"	1"
41250	54750	42250	.5000	1/2"	12.700	1/2"	4"	2"
41260	54760	42260	.5000	1/2"	12.700	1/2"	6"	1-1/2"
41270	54770	42270	.5000	1/2"	12.700	1/2"	6"	3"
92270	93270	94270	.5512		14.000	14.0	100	25
92280	93280	94280	.5512		14.000	14.0	100	50
92290	93290	94290	.5512		14.000	14.0	150	50
92300	93300	94300	.5512		14.000	14.0	150	75
41280	54780	42280	.5625	9/16"	14.288	9/16"	6"	2"
41290	54790	42290	.5625	9/16"	14.288	9/16"	6"	3"
41300	54800	42300	.6250	5/8"	15.875	5/8"	6"	2"
41310	54810	42310	.6250	5/8"	15.875	5/8"	6"	3"
92310	93310	94310	.6299		16.000	16.0	150	50
92320	93320	94320	.6299		16.000	16.0	150	75
92330	93330	94330	.7087		18.000	18.0	150	50
92340	93340	94340	.7087		18.000	18.0	150	75
41320	54820	42320	.7500	3/4"	19.050	3/4"	6"	2"
41330	54830	42330	.7500	3/4"	19.050	3/4"	6"	3"
92350	93350	94350	.7874		20.000	20.0	150	50
92360	93360	94360	.7874		20.000	20.0	150	75
92370	93370	94370	.9843		25.000	25.0	150	50
-	93380	94380	.9843		25.000	25.0	150	75
41340	54840	42340	1.000	1"	25.400	1"	6"	2"
41350	54850	42350	1.000	1"	25.400	1"	6"	3"
-	-	42360	1.000	1"	25.400	1"	6"	4"
-	-	42390	1.250	1-1/4"	31.750	1-1/4"	6"	3"

Series 620MC, 623MC, 630MC

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



Extra Length - Square End - TiCN Coated
Extra Länge - Ohne Eckenradius - TiCN-Beschichtet
Longitud Extra - Extremo Sin Radio - Recubrimiento de TiCN
Extra Longue - Extrémité Carré - Revêtement TiCN
Lunghezza Extra - Piatte - Rivestimento in TiCN
超长 - 平头 - TiCN 涂层



MATERIAL HARDNESS (Rc)
70
35
0

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
Bright Finish - page 238
TiAlN Coated - page 241
Standard Length - page 221

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Verbesserte Verschleissbeständigkeit und Schmiereienschaft
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Bright Fertig (Ohne Beschichtung) - Seite 238
TiAlN-Beschichtet - Seite 241
Standard Länge - Seite 221

Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Mejoradas la resistencia a la abrasión y la lubricación
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Acabado Brillante (Sin Recubrimiento) - Página 238
Recubrimiento de TiAlN - Página 241
Longitud Estándar - Página 221

Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Amelioration de la resistance a l'abrasion et au glissement
Peut etre modifier avec un col degage sous un delai de 48 heures
Utilisations variables
Finition Brillante (Sans Revêtement) - Page 238
Revêtement TiAlN - Page 241
Longueur Standart - Page 221

Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Maggiore resistenza all'abrasione
Può essere modificata in 48 ore
Estremamente versatile
Eccellente Finitura (Non Rivestito) - Pagina 238
Rivestimento in TiAlN - Pagina 241
Lunghezza Standard - Pagina 221

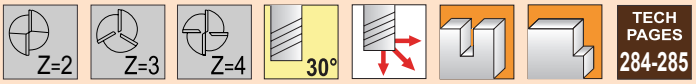
超细晶粒整体硬质合金立铣刀 - 中心切削
加长
改善耐磨性和润滑性
可以在48小时内用轴颈进行修正
功能极多
高亮光洁度(未涂层) - 238页
TiAlN 涂层 - 241页
标准长度 - 221页

(620MC) 2 Flute EDP#	(623MC) 3 Flute EDP#	(630MC) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
41014	54514	42014	.1250	1/8"	3.175	1/8"	2"	5/8"
41024	54524	42024	.1250	1/8"	3.175	1/8"	3"	3/4"
41034	54534	42034	.1250	1/8"	3.175	1/8"	3"	1"
41044	54544	42044	.1875	3/16"	4.763	3/16"	3"	1"
41054	54554	42054	.1875	3/16"	4.763	3/16"	3"	1-1/8"
41064	54564	42064	.1875	3/16"	4.763	3/16"	4"	1"
41074	54574	42074	.2500	1/4"	6.350	1/4"	3"	1"
41084	54584	42084	.2500	1/4"	6.350	1/4"	4"	1"
41094	54594	42094	.2500	1/4"	6.350	1/4"	4"	1-1/2"
41104	54604	42104	.2500	1/4"	6.350	1/4"	6"	1-1/2"
41114	54614	42114	.3125	5/16"	7.938	5/16"	3"	1"
41124	54624	42124	.3125	5/16"	7.938	5/16"	4"	1"
41134	54634	42134	.3125	5/16"	7.938	5/16"	4"	1-5/8"
41144	54644	42144	.3125	5/16"	7.938	5/16"	6"	1-1/2"
41154	54654	42154	.3750	3/8"	9.525	3/8"	3"	1"
41164	54664	42164	.3750	3/8"	9.525	3/8"	4"	1"
41174	54674	42174	.3750	3/8"	9.525	3/8"	4"	2"
41184	54684	42184	.3750	3/8"	9.525	3/8"	6"	1-1/2"
41194	54694	42194	.3750	3/8"	9.523	3/8"	6"	3"
41204	54704	42204	.4375	7/16"	11.113	7/16"	4"	1"
41214	54714	42214	.4375	7/16"	11.113	7/16"	4"	2"
41224	54724	42224	.4375	7/16"	11.113	7/16"	6"	1-1/2"
-	54734	42234	.4375	7/16"	11.113	7/16"	6"	3"
41244	54744	42244	.5000	1/2"	12.700	1/2"	4"	1"
41254	54754	42254	.5000	1/2"	12.700	1/2"	4"	2"
41264	54764	42264	.5000	1/2"	12.700	1/2"	6"	1-1/2"
41274	54774	42274	.5000	1/2"	12.700	1/2"	6"	3"
41284	54784	42284	.5625	9/16"	14.288	9/16"	6"	2"
41294	-	42294	.5625	9/16"	14.288	9/16"	6"	3"
41304	54804	42304	.6250	5/8"	15.875	5/8"	6"	2"
41314	54814	42314	.6250	5/8"	15.875	5/8"	6"	3"
41324	54824	42324	.7500	3/4"	19.050	3/4"	6"	2"
41334	54834	42334	.7500	3/4"	19.050	3/4"	6"	3"
41344	54844	42344	1.000	1"	25.400	1"	6"	2"
41354	54854	42354	1.000	1"	25.400	1"	6"	3"
-	-	42364	1.000	1"	25.400	1"	6"	4"
-	-	42394	1.250	1-1/4"	31.750	1-1/4"	6"	3"

† *Metric equivalents are for reference only*

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

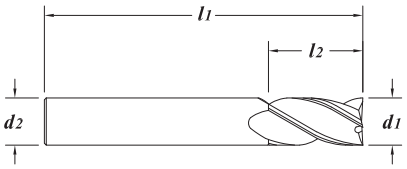
Series 620MA, 623MA, 630MA, 640MA, 643MA, 650MA



TECH PAGES 284-285

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

Extra Length - Square End - TiALN Coated
Extra Länge - Ohne Eckenradius - TiALN-Beschichtet
Longitud Extra - Extremo Sin Radio - Recubrimiento de TiALN
Extra Longue - Extrémité Carré - Revêtement TiALN
Lunghezza Extra - Piatte - Rivestimento in TiALN
超长 - 平头 - TiALN 涂层



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
Bright Finish - page 238
TiCN Coated - page 240
Stub Length - Page 211
Standard Length - Page 222

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Trocken oder Halbtrockene Bearbeitung
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Bright Fertig (Ohne Beschichtung) - Seite 238
TiCN-Beschichtet - Seite 240
Kurze Länge - Seite 211
Standard Länge - Seite 222

Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Mecanizado seco o semiseco
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Acabado Brillante (Sin Recubrimiento) - Página 238
Recubrimiento de TiCN - Página 240
Longitud Corta - Página 211
Longitud Estándar - Página 222

Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Usinage a sec ou avec l'air
Peut etre modifier avec un col degage sous un delai de 48 heures
Utilisations variables
Finition Brillante (Sans Revêtement) - Page 238
Revêtement TiCN - Page 240
Longueur Courte - Page 211
Longueur Standart - Page 222

Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Lavorazione a secco o a umido
Può essere modificata in 48 ore
Estremamente varsatile
Eccellente Finitura (Non Rivestito) - Pagina 238
Rivestimento in TiCN - Pagina 240
Serie Corta - Pagina 211
Lunghezza Standard - Pagina 222

超细晶粒整体硬质合金立铣刀 - 中心切削
加长
干式或半干式机加工
可以在48小时内用轴颈进行修正
功能极多
高亮光洁度(未涂层) - 238页
TiCN 涂层 - 240页
短柱长度 - 211页
标准长度 - 222页

(620MA/640MA) 2 Flute EDP#	(623MA/643MA) 3 Flute EDP#	(630MA/650MA) 4 Flute EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
92017	93017	94017	.1181		3.000	3.0	50	16
92027	93027	94027	.1181		3.000	3.0	75	20
92037	93037	94037	.1181		3.000	3.0	75	25
41017	54517	42017	.1250	1/8"	3.175	1/8"	2"	5/8"
41027	54527	42027	.1250	1/8"	3.175	1/8"	3"	3/4"
41037	54537	42037	.1250	1/8"	3.175	1/8"	3"	1"
92047	93047	94047	.1575		4.000	4.0	50	16
92057	93057	94057	.1575		4.000	4.0	75	20
92067	93067	94067	.1575		4.000	4.0	75	25
41047	54547	42047	.1875	3/16"	4.763	3/16"	3"	1"
41057	54557	42057	.1875	3/16"	4.763	3/16"	3"	1-1/8"
41067	54567	42067	.1875	3/16"	4.763	3/16"	4"	1"
92087	93087	94087	.1969		5.000	5.0	75	20
92097	93097	94097	.1969		5.000	5.0	75	25
92107	93107	94107	.2362		6.000	6.0	75	25
92117	93117	94117	.2362		6.000	6.0	100	25
92127	93127	94127	.2362		6.000	6.0	100	32
92137	93137	94137	.2362		6.000	6.0	150	38
41077	54577	42077	.2500	1/4"	6.350	1/4"	3"	1"
41087	54587	42087	.2500	1/4"	6.350	1/4"	4"	1"
41097	54597	42097	.2500	1/4"	6.350	1/4"	4"	1-1/2"
41107	54607	42107	.2500	1/4"	6.350	1/4"	6"	1-1/2"
41117	54617	42117	.3125	5/16"	7.938	5/16"	3"	1"
41127	54627	42127	.3125	5/16"	7.938	5/16"	4"	1"
41137	54637	42137	.3125	5/16"	7.938	5/16"	4"	1-5/8"
41147	54647	42147	.3125	5/16"	7.938	5/16"	6"	1-1/2"
92147	93147	94147	.3150		8.000	8.0	75	25
92157	93157	94157	.3150		8.000	8.0	100	25
92167	93167	94167	.3150		8.000	8.0	100	41
92177	93177	94177	.3150		8.000	8.0	150	50

continued →

MATERIAL HARDNESS (Rc)
70
35
0

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

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

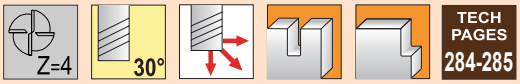
(620MA/640MA) 2 Flute EDP#	(623MA/643MA) 3 Flute EDP#	(630MA/650MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
41157	54657	42157	.3750	3/8"	9.525	3/8"	3"	1"
41167	54667	42167	.3750	3/8"	9.525	3/8"	4"	1"
41177	54677	42177	.3750	3/8"	9.525	3/8"	4"	2"
41187	54687	42187	.3750	3/8"	9.525	3/8"	6"	1-1/2"
41197	54697	42197	.3750	3/8"	9.525	3/8"	6"	3"
92187	93187	94187	.3937		10.000	10.0	75	25
92197	93197	94197	.3937		10.000	10.0	100	25
92207	93207	94207	.3937		10.000	10.0	100	50
92217	93217	94217	.3937		10.000	10.0	150	38
92227	93227	94227	.3937		10.000	10.0	150	75
41207	54707	42207	.4375	7/16"	11.113	7/16"	4"	1"
41217	54717	42217	.4375	7/16"	11.113	7/16"	4"	2"
41227	54727	42227	.4375	7/16"	11.113	7/16"	6"	1-1/2"
41237	54737	42237	.4375	7/16"	11.113	7/16"	6"	3"
92237	93237	94237	.4724		12.000	12.0	100	25
92247	93247	94247	.4724		12.000	12.0	100	50
92257	93257	94257	.4724		12.000	12.0	150	50
92267	93267	94267	.4724		12.000	12.0	150	75
41247	54747	42247	.5000	1/2"	12.700	1/2"	4"	1"
41257	54757	42257	.5000	1/2"	12.700	1/2"	4"	2"
41267	54767	42267	.5000	1/2"	12.700	1/2"	6"	1-1/2"
41277	54777	42277	.5000	1/2"	12.700	1/2"	6"	3"
92277	93277	94277	.5512		14.000	14.0	100	25
92287	93287	94287	.5512		14.000	14.0	100	50
-	93297	94297	.5512		14.000	14.0	150	50
92307	93307	94307	.5512		14.000	14.0	150	75
41287	54787	42287	.5625	9/16"	14.288	9/16"	6"	2"
-	54797	42297	.5625	9/16"	14.288	9/16"	6"	3"
41307	54807	42307	.6250	5/8"	15.875	5/8"	6"	2"
41317	54817	42317	.6250	5/8"	15.875	5/8"	6"	3"
92317	93317	94317	.6299		16.000	16.0	150	50
92327	93327	94327	.6299		16.000	16.0	150	75
-	-	94337	.7087		18.000	18.0	150	50
-	93347	94347	.7087		18.000	18.0	150	75
41327	54827	42327	.7500	3/4"	19.050	3/4"	6"	2"
41337	54837	42337	.7500	3/4"	19.050	3/4"	6"	3"
92357	93357	94357	.7874		20.000	20.0	150	50
92367	93367	94367	.7874		20.000	20.0	150	75
-	93377	94377	.9843		25.000	25.0	150	50
92387	93387	94387	.9843		25.000	25.0	150	75
41347	54847	42347	1.000	1"	25.400	1"	6"	2"
41357	54857	42357	1.000	1"	25.400	1"	6"	3"
-	-	42367	1.000	1"	25.400	1"	6"	4"
-	-	42397	1.250	1-1/4"	31.750	1-1/4"	6"	3"

† *Metric equivalents are for reference only*

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

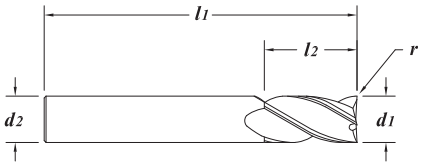
Series 630R

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



TECH PAGES 284-285

Extra Length - Corner Radius
Extra Länge - Eckenradius
Longitud Extra - Ángulo Redondeado
Extra Longue - Rayon de Coin
Lunghezza Extra - Raggio
超长 - 圆角半径



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 Coated - page 246
Stub Length - page 212
Standard Length - page 224

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Für stärkere Schneidecken und Radiusteile
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
TiAlN-Beschichtet - Seite 246
Kurze Länge - Seite 212
Standard Länge - Seite 224

Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Para un mejor refuerzo de esquinas y zonas curvas
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Recubrimiento de TiAlN - Página 246
Longitud Corta - Página 212
Longitud Estándar - Página 224

Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Rayon de coin renforces
Peut etre modifier avec un col degage sous un delai de 48 heures
Utilisations variables
Revêtement TiAlN - Page 246
Longueur Courte - Page 212
Longueur Standart - Page 224

Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Raggi rinforzati
Può essere modificata in 48 ore
Estremamente varsatile
Rivestimento in TiAlN - Pagina 246
Serie Corta - Pagina 212
Lunghezza Standard - Pagina 224

超细晶粒整体硬质合金立铣刀 - 中心切削
加长
用于强化圆角和零件半径
可以在48小时内用轴颈进行修正
功能极多
TiAlN 涂层 - 246页
短柱长度 - 212页
标准长度 - 224页

EDP#	d_1 † Diameter Decimal	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
20100	.1250	1/8" 3.175	1/8"	3"	1"	.010"
20110	.1250	1/8" 3.175	1/8"	3"	1"	.015"
20120	.1250	1/8" 3.175	1/8"	3"	1"	.020"
20130	.1250	1/8" 3.175	1/8"	3"	1"	.030"
20140	.1250	1/8" 3.175	1/8"	3"	1"	.045"
20150	.1875	3/16" 4.763	3/16"	3"	1"	.010"
20160	.1875	3/16" 4.763	3/16"	3"	1"	.015"
20170	.1875	3/16" 4.763	3/16"	3"	1"	.020"
20180	.1875	3/16" 4.763	3/16"	3"	1"	.030"
20190	.1875	3/16" 4.763	3/16"	3"	1"	.045"
20200	.1875	3/16" 4.763	3/16"	3"	1"	.060"
20210	.1875	3/16" 4.763	3/16"	4"	1"	.010"
20220	.1875	3/16" 4.763	3/16"	4"	1"	.015"
20230	.1875	3/16" 4.763	3/16"	4"	1"	.020"
20240	.1875	3/16" 4.763	3/16"	4"	1"	.030"
20250	.1875	3/16" 4.763	3/16"	4"	1"	.045"
20260	.1875	3/16" 4.763	3/16"	4"	1"	.060"
20270	.2500	1/4" 6.350	1/4"	3"	1"	.010"
20280	.2500	1/4" 6.350	1/4"	3"	1"	.020"
20290	.2500	1/4" 6.350	1/4"	3"	1"	.030"
20300	.2500	1/4" 6.350	1/4"	3"	1"	.045"
20310	.2500	1/4" 6.350	1/4"	3"	1"	.060"
20320	.2500	1/4" 6.350	1/4"	4"	1"	.010"
20330	.2500	1/4" 6.350	1/4"	4"	1"	.020"
20340	.2500	1/4" 6.350	1/4"	4"	1"	.030"
20350	.2500	1/4" 6.350	1/4"	4"	1"	.045"
20360	.2500	1/4" 6.350	1/4"	4"	1"	.060"
20370	.2500	1/4" 6.350	1/4"	6"	1-1/2"	.010"
20380	.2500	1/4" 6.350	1/4"	6"	1-1/2"	.020"
20390	.2500	1/4" 6.350	1/4"	6"	1-1/2"	.030"
20400	.2500	1/4" 6.350	1/4"	6"	1-1/2"	.045"
20410	.2500	1/4" 6.350	1/4"	6"	1-1/2"	.060"
20420	.3125	5/16" 7.938	5/16"	4"	1-5/8"	.010"
20430	.3125	5/16" 7.938	5/16"	4"	1-5/8"	.020"
20440	.3125	5/16" 7.938	5/16"	4"	1-5/8"	.030"
20450	.3125	5/16" 7.938	5/16"	4"	1-5/8"	.045"
20460	.3125	5/16" 7.938	5/16"	4"	1-5/8"	.060"
20470	.3125	5/16" 7.938	5/16"	4"	1-5/8"	.090"
20480	.3125	5/16" 7.938	5/16"	4"	1-5/8"	.125"

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
20490	.3750	3/8"	9.525	3/8"	4"	1"	.010"
20500	.3750	3/8"	9.525	3/8"	4"	1"	.020"
20510	.3750	3/8"	9.525	3/8"	4"	1"	.030"
20520	.3750	3/8"	9.525	3/8"	4"	1"	.045"
20530	.3750	3/8"	9.525	3/8"	4"	1"	.060"
20540	.3750	3/8"	9.525	3/8"	4"	1"	.090"
20550	.3750	3/8"	9.525	3/8"	4"	1"	.125"
20560	.3750	3/8"	9.525	3/8"	4"	2"	.010"
20570	.3750	3/8"	9.525	3/8"	4"	2"	.020"
20580	.3750	3/8"	9.525	3/8"	4"	2"	.030"
20590	.3750	3/8"	9.525	3/8"	4"	2"	.045"
20600	.3750	3/8"	9.525	3/8"	4"	2"	.060"
20610	.3750	3/8"	9.525	3/8"	4"	2"	.090"
20620	.3750	3/8"	9.525	3/8"	4"	2"	.125"
20630	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.010"
20640	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.020"
20650	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.030"
20660	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.045"
20670	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.060"
20680	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.090"
20690	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.125"
20700	.5000	1/2"	12.700	1/2"	4"	1"	.015"
20710	.5000	1/2"	12.700	1/2"	4"	1"	.020"
20720	.5000	1/2"	12.700	1/2"	4"	1"	.030"
20730	.5000	1/2"	12.700	1/2"	4"	1"	.045"
20740	.5000	1/2"	12.700	1/2"	4"	1"	.060"
20750	.5000	1/2"	12.700	1/2"	4"	1"	.090"
20760	.5000	1/2"	12.700	1/2"	4"	1"	.125"
20770	.5000	1/2"	12.700	1/2"	4"	2"	.015"
20780	.5000	1/2"	12.700	1/2"	4"	2"	.020"
20790	.5000	1/2"	12.700	1/2"	4"	2"	.030"
20800	.5000	1/2"	12.700	1/2"	4"	2"	.045"
20810	.5000	1/2"	12.700	1/2"	4"	2"	.060"
20820	.5000	1/2"	12.700	1/2"	4"	2"	.090"
20830	.5000	1/2"	12.700	1/2"	4"	2"	.125"
20840	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.015"
20850	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.020"
20860	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"
20870	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.045"
20880	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.060"
20890	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.090"
20900	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.125"
20910	.6250	5/8"	15.875	5/8"	6"	2"	.010"
20920	.6250	5/8"	15.875	5/8"	6"	2"	.015"
20930	.6250	5/8"	15.875	5/8"	6"	2"	.020"
20940	.6250	5/8"	15.875	5/8"	6"	2"	.030"
20950	.6250	5/8"	15.875	5/8"	6"	2"	.045"
20960	.6250	5/8"	15.875	5/8"	6"	2"	.060"
20970	.6250	5/8"	15.875	5/8"	6"	2"	.090"
20980	.6250	5/8"	15.875	5/8"	6"	2"	.125"

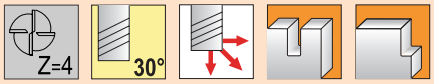
† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
20990	.7500	3/4"	19.050	3/4"	6"	3"	.015"
21000	.7500	3/4"	19.050	3/4"	6"	3"	.020"
21010	.7500	3/4"	19.050	3/4"	6"	3"	.030"
21020	.7500	3/4"	19.050	3/4"	6"	3"	.045"
21030	.7500	3/4"	19.050	3/4"	6"	3"	.060"
21040	.7500	3/4"	19.050	3/4"	6"	3"	.090"
21050	.7500	3/4"	19.050	3/4"	6"	3"	.125"
21140	.7500	3/4"	19.050	3/4"	6"	3"	.250"
21060	1.000	1"	25.400	1"	6"	3"	.015"
21070	1.000	1"	25.400	1"	6"	3"	.020"
21080	1.000	1"	25.400	1"	6"	3"	.030"
21090	1.000	1"	25.400	1"	6"	3"	.045"
21100	1.000	1"	25.400	1"	6"	3"	.060"
21110	1.000	1"	25.400	1"	6"	3"	.090"
21120	1.000	1"	25.400	1"	6"	3"	.125"
21130	1.000	1"	25.400	1"	6"	3"	.250"

Series 630RA

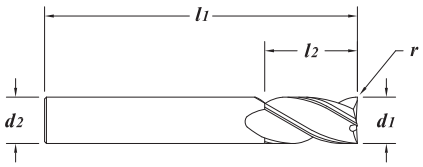
.1250" - .3125"
(3.175mm - 7.938mm)

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



TECH PAGES 284-285

Extra Length - Corner Radius - TiALN Coated
Extra Länge - Eckenradius - TiALN-Beschichtet
Longitud Extra - Ángulo Redondeado - Recubrimiento de TiALN
Extra Longue - Rayon de Coin - Revêtement TiALN
Lunghezza Extra - Raggio - Rivestimento in TiALN
超长 - 圆角半径 - TiALN 涂层



MATERIAL HARDNESS (Rc) 70 35 0

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
Bright Finish - page 243
Stub Length - page 214
Standard Length - page 227

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Für stärkere Schneidecken und Radiusteile
Trocken oder Halbtrockene Bearbeitung
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Bright Fertig (Ohne Beschichtung) - Seite 243
Kurze Länge - Seite 214
Standard Länge - Seite 227

Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Para un mejor refuerzo de esquinas y zonas curvas
Mecanizado seco o semiseco
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Acabado Brillante (Sin Recubrimiento) - Página 243
Longitud Corta - Página 214
Longitud Estándar - Página 227

Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Rayon de coin renforces
Usinage a sec ou avec l'air
Peut etre modifier avec un col degage sous un delai de 48 heures
Utilisations variables
Finition Brillante (Sans Revêtement) - Page 243
Longueur Courte - Page 214
Longueur Standart - Page 227

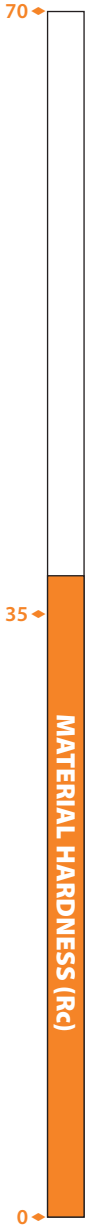
Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Raggi rinforzati
Lavorazione a secco o a umido
Può essere modificata in 48 ore
Estremamente varsatile
Eccellente Finitura (Non Rivestito) - Pagina 243
Serie Corta - Pagina 214
Lunghezza Standard - Pagina 227

超细晶粒整体硬质合金立铣刀 - 中心切削
加长
用于强化圆角和零件半径
干式或半干式机加工
可以在48小时内用轴颈进行修正
功能极多
高亮光洁度(未涂层) - 243页
短柱长度 - 214页
标准长度 - 227页

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
20107	.1250	1/8"	3.175	1/8"	3"	1"	.010"
20117	.1250	1/8"	3.175	1/8"	3"	1"	.015"
20127	.1250	1/8"	3.175	1/8"	3"	1"	.020"
20137	.1250	1/8"	3.175	1/8"	3"	1"	.030"
20147	.1250	1/8"	3.175	1/8"	3"	1"	.045"
20157	.1875	3/16"	4.763	3/16"	3"	1"	.010"
20167	.1875	3/16"	4.763	3/16"	3"	1"	.015"
20177	.1875	3/16"	4.763	3/16"	3"	1"	.020"
20187	.1875	3/16"	4.763	3/16"	3"	1"	.030"
20197	.1875	3/16"	4.763	3/16"	3"	1"	.045"
20207	.1875	3/16"	4.763	3/16"	3"	1"	.060"
20217	.1875	3/16"	4.763	3/16"	4"	1"	.010"
20227	.1875	3/16"	4.763	3/16"	4"	1"	.015"
20237	.1875	3/16"	4.763	3/16"	4"	1"	.020"
20247	.1875	3/16"	4.763	3/16"	4"	1"	.030"
20257	.1875	3/16"	4.763	3/16"	4"	1"	.045"
20267	.1875	3/16"	4.763	3/16"	4"	1"	.060"
20277	.2500	1/4"	6.350	1/4"	3"	1"	.010"
20287	.2500	1/4"	6.350	1/4"	3"	1"	.020"
20297	.2500	1/4"	6.350	1/4"	3"	1"	.030"
20307	.2500	1/4"	6.350	1/4"	3"	1"	.045"
20317	.2500	1/4"	6.350	1/4"	3"	1"	.060"
20327	.2500	1/4"	6.350	1/4"	4"	1"	.010"
20337	.2500	1/4"	6.350	1/4"	4"	1"	.020"
20347	.2500	1/4"	6.350	1/4"	4"	1"	.030"
20357	.2500	1/4"	6.350	1/4"	4"	1"	.045"
20367	.2500	1/4"	6.350	1/4"	4"	1"	.060"
20377	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.010"
20387	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.020"
20397	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.030"
20407	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.045"
20417	.2500	1/4"	6.350	1/4"	6"	1-1/2"	.060"
20427	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.010"
20437	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.020"
20447	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.030"
20457	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.045"
20467	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.060"
20477	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.090"
20487	.3125	5/16"	7.938	5/16"	4"	1-5/8"	.125"

† *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
20497	.3750	3/8"	9.525	3/8"	4"	1"	.010"
20507	.3750	3/8"	9.525	3/8"	4"	1"	.020"
20517	.3750	3/8"	9.525	3/8"	4"	1"	.030"
20527	.3750	3/8"	9.525	3/8"	4"	1"	.045"
20537	.3750	3/8"	9.525	3/8"	4"	1"	.060"
20547	.3750	3/8"	9.525	3/8"	4"	1"	.090"
20557	.3750	3/8"	9.525	3/8"	4"	1"	.125"
20567	.3750	3/8"	9.525	3/8"	4"	2"	.010"
20577	.3750	3/8"	9.525	3/8"	4"	2"	.020"
20587	.3750	3/8"	9.525	3/8"	4"	2"	.030"
20597	.3750	3/8"	9.525	3/8"	4"	2"	.045"
20607	.3750	3/8"	9.525	3/8"	4"	2"	.060"
20617	.3750	3/8"	9.525	3/8"	4"	2"	.090"
20627	.3750	3/8"	9.525	3/8"	4"	2"	.125"
20637	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.010"
20647	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.020"
20657	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.030"
20667	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.045"
20677	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.060"
20687	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.090"
20697	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.125"
21157	.4375	7/16"	11.113	7/16"	4"	1"	.010"
21167	.4375	7/16"	11.113	7/16"	4"	1"	.015"
21177	.4375	7/16"	11.113	7/16"	4"	1"	.020"
21187	.4375	7/16"	11.113	7/16"	4"	1"	.030"
21227	.4375	7/16"	11.113	7/16"	4"	1"	.125"
20707	.5000	1/2"	12.700	1/2"	4"	1"	.015"
20717	.5000	1/2"	12.700	1/2"	4"	1"	.020"
20727	.5000	1/2"	12.700	1/2"	4"	1"	.030"
20737	.5000	1/2"	12.700	1/2"	4"	1"	.045"
20747	.5000	1/2"	12.700	1/2"	4"	1"	.060"
20757	.5000	1/2"	12.700	1/2"	4"	1"	.090"
20767	.5000	1/2"	12.700	1/2"	4"	1"	.125"
20777	.5000	1/2"	12.700	1/2"	4"	2"	.015"
20787	.5000	1/2"	12.700	1/2"	4"	2"	.020"
20797	.5000	1/2"	12.700	1/2"	4"	2"	.030"
20807	.5000	1/2"	12.700	1/2"	4"	2"	.045"
20817	.5000	1/2"	12.700	1/2"	4"	2"	.060"
20827	.5000	1/2"	12.700	1/2"	4"	2"	.090"
20837	.5000	1/2"	12.700	1/2"	4"	2"	.125"
20847	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.015"
20857	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.020"
20867	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"
20877	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.045"
20887	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.060"
20897	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.090"
20907	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.125"
20917	.6250	5/8"	15.875	5/8"	6"	2"	.010"
20927	.6250	5/8"	15.875	5/8"	6"	2"	.015"
20937	.6250	5/8"	15.875	5/8"	6"	2"	.020"
20947	.6250	5/8"	15.875	5/8"	6"	2"	.030"
20957	.6250	5/8"	15.875	5/8"	6"	2"	.045"
20967	.6250	5/8"	15.875	5/8"	6"	2"	.060"
20977	.6250	5/8"	15.875	5/8"	6"	2"	.090"
20987	.6250	5/8"	15.875	5/8"	6"	2"	.125"

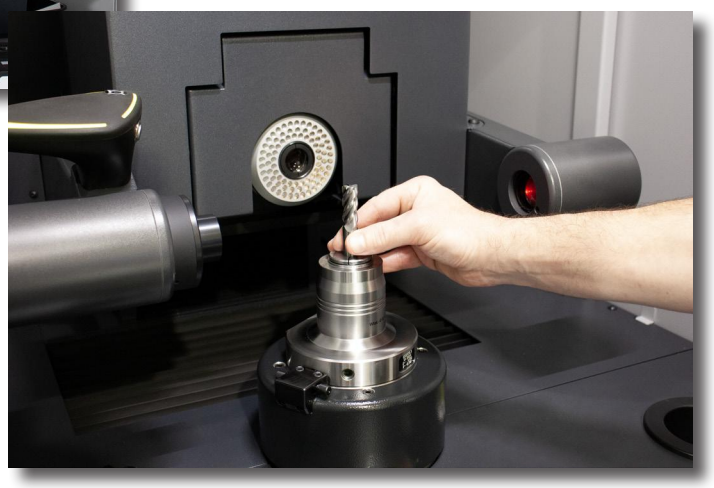


continued →

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
20997	.7500	3/4"	19.050	3/4"	6"	3"	.015"
21007	.7500	3/4"	19.050	3/4"	6"	3"	.020"
21017	.7500	3/4"	19.050	3/4"	6"	3"	.030"
21027	.7500	3/4"	19.050	3/4"	6"	3"	.045"
21037	.7500	3/4"	19.050	3/4"	6"	3"	.060"
21047	.7500	3/4"	19.050	3/4"	6"	3"	.090"
21057	.7500	3/4"	19.050	3/4"	6"	3"	.125"
21147	.7500	3/4"	19.050	3/4"	6"	3"	.250"
21067	1.000	1"	25.400	1"	6"	3"	.015"
21077	1.000	1"	25.400	1"	6"	3"	.020"
21087	1.000	1"	25.400	1"	6"	3"	.030"
21097	1.000	1"	25.400	1"	6"	3"	.045"
21107	1.000	1"	25.400	1"	6"	3"	.060"
21117	1.000	1"	25.400	1"	6"	3"	.090"
21127	1.000	1"	25.400	1"	6"	3"	.125"
21137	1.000	1"	25.400	1"	6"	3"	.250"

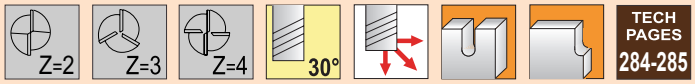


† *Metric equivalents are for reference only*

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

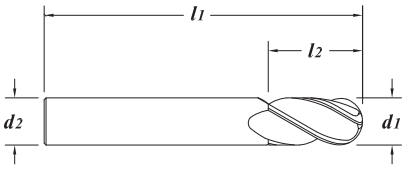
Series 720M, 723M, 730M, 740M, 743M, 750M

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



TECH PAGES 284-285

Extra Length - Ball End
Extra Länge - Vollradius
Longitud Extra - Cabeza Esférica
Extra Longue - Hemispherique
Lunghezza Extra - Sferica
超长 - 球头



Solid submicron grain carbide end mill - center cutting
Extended reach
Can be modified with a neck within 48 hours
Extremely versatile
TiCN Coated - page 251
TiAlN Coated - page 252
Stub Length - page 230
Standard Length - page 230

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
TiCN-Beschichtet - Seite 251
TiAlN-Beschichtet - Seite 252
Kurze Länge - Seite 216
Standard Länge - Seite 230

Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Recubrimiento de TiCN - Página 251
Recubrimiento de TiAlN - Página 252
Longitud Corta - Página 216
Longitud Estándar - Página 230

Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Peut etre modifier avec un col degage sous un delai de 48 heures
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")
Revêtement TiCN - Page 251
Revêtement TiAlN - Page 252
Longueur Courte - Page 216
Longueur Standart - Page 230

Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Può essere modificata in 48 ore
Estremamente varsatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Rivestimento in TiCN - Pagina 251
Rivestimento in TiAlN - Pagina 252
Serie Corta - Pagina 216
Lunghezza Standard - Pagina 230

超细晶粒整体硬质合金立铣刀 - 中心切削
加长
可以在48小时内用轴颈进行修正
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
TiCN 涂层 - 251页
TiAlN 涂层 - 252页
短柱长度 - 216页
标准长度 - 230页

(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
97010	98010	99010	.1181		3.000	3.0	50	16
97020	98020	99020	.1181		3.000	3.0	75	20
97030	98030	99030	.1181		3.000	3.0	75	25
43010	55510	44010	.1250	1/8"	3.175	1/8"	2"	5/8"
43020	55520	44020	.1250	1/8"	3.175	1/8"	3"	3/4"
43030	55530	44030	.1250	1/8"	3.175	1/8"	3"	1"
97040	98040	99040	.1575		4.000	4.0	50	16
97050	98050	99050	.1575		4.000	4.0	75	20
97060	98060	99060	.1575		4.000	4.0	75	25
43040	55540	44040	.1875	3/16"	4.763	3/16"	3"	1"
43050	55550	44050	.1875	3/16"	4.763	3/16"	3"	1-1/8"
43060	55560	44060	.1875	3/16"	4.763	3/16"	4"	1"
97080	98080	99080	.1969		5.000	5.0	75	20
97090	98090	99090	.1969		5.000	5.0	75	25
97100	98100	99100	.2362		6.000	6.0	75	25
97110	98110	99110	.2362		6.000	6.0	100	25
97120	98120	99120	.2362		6.000	6.0	100	32
97130	98130	99130	.2362		6.000	6.0	150	38
43070	55570	44070	.2500	1/4"	6.350	1/4"	3"	1"
43080	55580	44080	.2500	1/4"	6.350	1/4"	4"	1"
43090	55590	44090	.2500	1/4"	6.350	1/4"	4"	1-1/2"
43100	55600	44100	.2500	1/4"	6.350	1/4"	6"	1-1/2"
43110	55610	44110	.3125	5/16"	7.938	5/16"	3"	1"
43120	55620	44120	.3125	5/16"	7.938	5/16"	4"	1"
43130	55630	44130	.3125	5/16"	7.938	5/16"	4"	1-5/8"
43140	55640	44140	.3125	5/16"	7.938	5/16"	6"	1-1/2"
97140	98140	99140	.3150		8.000	8.0	75	25
97150	98150	99150	.3150		8.000	8.0	100	25
97160	98160	99160	.3150		8.000	8.0	100	41
97170	98170	99170	.3150		8.000	8.0	150	50

continued →

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

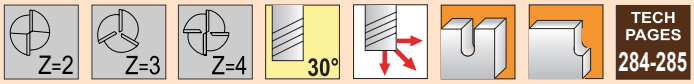
.3750" - 1.000"
(9.525mm - 25.400mm)

(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
43150	55650	44150	.3750	3/8"	9.525	3/8"	3"	1"
43160	55660	44160	.3750	3/8"	9.525	3/8"	4"	1"
43170	55670	44170	.3750	3/8"	9.525	3/8"	4"	2"
43180	55680	44180	.3750	3/8"	9.525	3/8"	6"	1-1/2"
43190	55690	44190	.3750	3/8"	9.525	3/8"	6"	3"
97180	98180	99180	.3937		10.000	10.0	75	25
97190	98190	99190	.3937		10.000	10.0	100	25
97200	98200	99200	.3937		10.000	10.0	100	50
97210	98210	99210	.3937		10.000	10.0	150	38
97220	98220	99220	.3937		10.000	10.0	150	75
43200	55700	44200	.4375	7/16"	11.113	7/16"	4"	1"
43210	55710	44210	.4375	7/16"	11.113	7/16"	4"	2"
43220	-	44220	.4375	7/16"	11.113	7/16"	6"	1-1/2"
43230	-	44230	.4375	7/16"	11.113	7/16"	6"	3"
97230	98230	99230	.4724		12.000	12.0	100	25
97240	98240	99240	.4724		12.000	12.0	100	50
97250	98250	99250	.4724		12.000	12.0	150	50
97260	98260	99260	.4724		12.000	12.0	150	75
43240	55740	44240	.5000	1/2"	12.700	1/2"	4"	1"
43250	55750	44250	.5000	1/2"	12.700	1/2"	4"	2"
43260	55760	44260	.5000	1/2"	12.700	1/2"	6"	1-1/2"
43270	55770	44270	.5000	1/2"	12.700	1/2"	6"	3"
97270	98270	-	.5512		14.000	14.0	100	25
97280	-	-	.5512		14.000	14.0	100	50
97290	-	99290	.5512		14.000	14.0	150	50
97300	98300	-	.5512		14.000	14.0	150	75
43280	55780	44280	.5625	9/16"	14.288	9/16"	6"	2"
-	55790	44290	.5625	9/16"	14.288	9/16"	6"	3"
43300	55800	44300	.6250	5/8"	15.875	5/8"	6"	2"
43310	55810	44310	.6250	5/8"	15.875	5/8"	6"	3"
97310	98310	99310	.6299		16.000	16.0	150	50
97320	98320	99320	.6299		16.000	16.0	150	75
97340	98340	99340	.7087		18.000	18.0	150	75
43320	55820	44320	.7500	3/4"	19.050	3/4"	6"	2"
43330	55830	44330	.7500	3/4"	19.050	3/4"	6"	3"
97350	98350	99350	.7874		20.000	20.0	150	50
97360	98360	99360	.7874		20.000	20.0	150	75
-	98370	-	.9843		25.000	25.0	150	50
97380	98380	-	.9843		25.000	25.0	150	75
43340	55840	44340	1.000	1"	25.400	1"	6"	2"
43350	55850	44350	1.000	1"	25.400	1"	6"	3"

MATERIAL HARDNESS (Rc)
70
35
0

† *Metric equivalents are for reference only*

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



TECH PAGES 284-285

Extra Length - Ball End - TiCN Coated

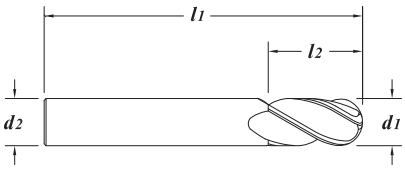
Extra Länge - Vollradius - TiCN-Beschichtet

Longitud Extra - Cabeza Esférica - Recubrimiento de TiCN

Extra Longue - Hemispherique - Revêtement TiCN

Lunghezza Extra - Sferica - Rivestimento in TiCN

超长 - 球头 - TiCN 涂层



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
Bright Finish - page 249
TiAlN Coated - page 252
Standard Length - page 233

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Verbesserte Verschleissbeständigkeit und Schmiereienschaft
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
Bright Fertig (Ohne Beschichtung) - Seite 249
TiAlN-Beschichtet - Seite 252
Standard Länge - Seite 233

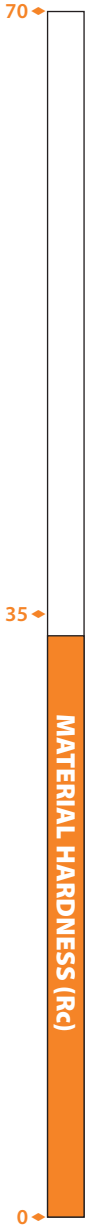
Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Mejoradas la resistencia a la abrasión y la lubricación
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Acabado Brillante (Sin Recubrimiento) - Página 249
Recubrimiento de TiAlN - Página 252
Longitud Estándar - Página 233

Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Amelioration de la resistance a l'abrasion et au glissement
Peut etre modifier avec un col degage sous un delai de 48 heures
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")
Finition Brillante (Sans Revêtement) - Page 249
Revêtement TiAlN - Page 252
Longueur Standart - Page 233

Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Maggiore resistenza all'abrasione
Può essere modificata in 48 ore
Estremamente versatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Eccellente Finitura (Non Rivestito) - Pagina 249
Rivestimento in TiAlN - Pagina 252
Lunghezza Standard - Pagina 233

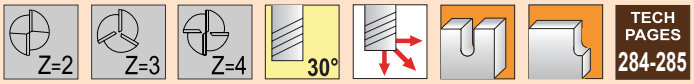
超细晶粒整体硬质合金立铣刀 - 中心切削
加长
改善耐磨性和润滑性
可以在48小时内用轴颈进行修正
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
高亮光洁度(未涂层) - 249页
TiAlN 涂层 - 252页
标准长度 - 233页

(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
43014	55514	44014	.1250	3.175	1/8"	2"	5/8"
43024	55524	44024	.1250	3.175	1/8"	3"	3/4"
43034	55534	44034	.1250	3.175	1/8"	3"	1"
43044	55544	44044	.1875	4.763	3/16"	3"	1"
43054	55554	44054	.1875	4.763	3/16"	3"	1-1/8"
43064	55564	44064	.1875	4.763	3/16"	4"	1"
43074	55574	44074	.2500	6.350	1/4"	3"	1"
43084	55584	44084	.2500	6.350	1/4"	4"	1"
43094	55594	44094	.2500	6.350	1/4"	4"	1-1/2"
43104	55604	44104	.2500	6.350	1/4"	6"	1-1/2"
43114	55614	44114	.3125	7.938	5/16"	3"	1"
43124	55624	44124	.3125	7.938	5/16"	4"	1"
43134	-	44134	.3125	7.938	5/16"	4"	1-5/8"
43144	55644	44144	.3125	7.938	5/16"	6"	1-1/2"
43154	55654	44154	.3750	9.525	3/8"	3"	1"
43164	55664	44164	.3750	9.525	3/8"	4"	1"
43174	55674	44174	.3750	9.525	3/8"	4"	2"
43184	55684	44184	.3750	9.525	3/8"	6"	1-1/2"
-	55694	44194	.3750	9.525	3/8"	6"	3"
-	-	44204	.4375	11.113	7/16"	4"	1"
-	-	44214	.4375	11.113	7/16"	4"	2"
43224	55724	44224	.4375	11.113	7/16"	6"	1-1/2"
-	-	44234	.4375	11.113	7/16"	6"	3"
43244	55744	44244	.5000	12.700	1/2"	4"	1"
43254	55754	44254	.5000	12.700	1/2"	4"	2"
43264	55764	44264	.5000	12.700	1/2"	6"	1-1/2"
43274	55774	44274	.5000	12.700	1/2"	6"	3"
-	-	44284	.5625	14.288	9/16"	6"	2"
-	-	44294	.5625	14.288	9/16"	6"	3"
43304	55804	44304	.6250	15.875	5/8"	6"	2"
-	-	44314	.6250	15.875	5/8"	6"	3"
43324	55824	44324	.7500	19.050	3/4"	6"	2"
43334	55834	44334	.7500	19.050	3/4"	6"	3"
-	55844	44344	1.000	25.400	1"	6"	2"
43354	55854	44354	1.000	25.400	1"	6"	3"



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

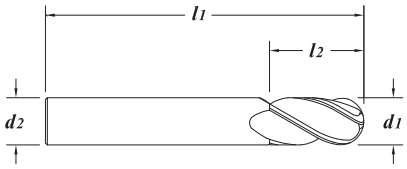
.1181" - .3150"
(3.000mm - 8.000mm)



TECH PAGES 284-285

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

Extra Length - Ball End - TiALN Coated
Extra Länge - Vollradius - TiALN-Beschichtet
Longitud Extra - Cabeza Esférica - Recubrimiento de TiALN
Extra Longue - Hemispherique - Revêtement TiALN
Lunghezza Extra - Sferica - Rivestimento in TiALN
超长 - 球头 - TiALN 涂层



MATERIAL HARDNESS (Rc)
70
35
0

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
Bright Finish - page 249
TiCN Coated - page 251
Stub Length - page 217
Standard Length - page 234

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Trocken oder Halbtrockene Bearbeitung
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
Bright Fertig (Ohne Beschichtung) - Seite 249
TiCN-Beschichtet - Seite 251
Kurze Länge - Seite 217
Standard Länge - Seite 234

Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Mecanizado seco o semiseco
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Acabado Brillante (Sin Recubrimiento) - Página 249
Recubrimiento de TiCN - Página 251
Longitud Corta - Página 217
Longitud Estándar - Página 234

Fraises carbure submicrograin - coupe au centre
Extension supplémentaire
Usinage a sec ou avec l'air
Peut etre modifier avec un col degage sous un delai de 48 heures
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")
Finition Brillante (Sans Revêtement) - Page 249
Revêtement TiCN - Page 251
Longueur Courte - Page 217
Longueur Standart - Page 234

Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Lavorazione a secco o a umido
Può essere modificata in 48 ore
Estremamente varsatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Eccellente Finitura (Non Rivestito) - Pagina 249
Rivestimento in TiCN - Pagina 251
Serie Corta - Pagina 217
Lunghezza Standard - Pagina 234

超细晶粒整体硬质合金立铣刀 - 中心切削
加长
干式或半干式机加工
可以在48小时内用轴颈进行修正
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
高亮光洁度(未涂层) - 249页
TiCN 涂层 - 251页
短柱长度 - 217页
标准长度 - 234页

(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
97017	98017	99017	.1181		3.000	3.0	50	16
97027	98027	99027	.1181		3.000	3.0	75	20
97037	98037	99037	.1181		3.000	3.0	75	25
43017	55517	44017	.1250	1/8"	3.175	1/8"	2"	5/8"
43027	55527	44027	.1250	1/8"	3.175	1/8"	3"	3/4"
43037	55537	44037	.1250	1/8"	3.175	1/8"	3"	1"
97047	98047	99047	.1575		4.000	4.0	50	16
97057	98057	99057	.1575		4.000	4.0	75	20
97067	98067	99067	.1575		4.000	4.0	75	25
43047	55547	44047	.1875	3/16"	4.763	3/16"	3"	1"
43057	55557	44057	.1875	3/16"	4.763	3/16"	3"	1-1/8"
43067	55567	44067	.1875	3/16"	4.763	3/16"	4"	1"
97087	98087	99087	.1969		5.000	5.0	75	20
97097	98097	99097	.1969		5.000	5.0	75	25
97107	98107	99107	.2362		6.000	6.0	75	25
97117	98117	99117	.2362		6.000	6.0	100	25
97127	98127	99127	.2362		6.000	6.0	100	32
97137	98137	99137	.2362		6.000	6.0	150	38
43077	55577	44077	.2500	1/4"	6.350	1/4"	3"	1"
43087	55587	44087	.2500	1/4"	6.350	1/4"	4"	1"
43097	55597	44097	.2500	1/4"	6.350	1/4"	4"	1-1/2"
43107	55607	44107	.2500	1/4"	6.350	1/4"	6"	1-1/2"
43117	-	44117	.3125	5/16"	7.938	5/16"	3"	1"
43127	55627	44127	.3125	5/16"	7.938	5/16"	4"	1"
43137	55637	44137	.3125	5/16"	7.938	5/16"	4"	1-5/8"
43147	55647	44147	.3125	5/16"	7.938	5/16"	6"	1-1/2"
97147	98147	99147	.3150		8.000	8.0	75	25
97157	98157	99157	.3150		8.000	8.0	100	25
97167	98167	99167	.3150		8.000	8.0	100	41
97177	98177	99177	.3150		8.000	8.0	150	50

GARR TOOL®

† Metric equivalents are for reference only

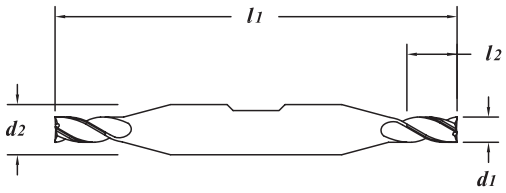
(720MA/740MA) 2 Flute EDP#	(723MA/743MA) 3 Flute EDP#	(730MA/750MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
43157	55657	44157	.3750	3/8"	9.525	3/8"	3"	1"
43167	55667	44167	.3750	3/8"	9.525	3/8"	4"	1"
43177	55677	44177	.3750	3/8"	9.525	3/8"	4"	2"
43187	55687	44187	.3750	3/8"	9.525	3/8"	6"	1-1/2"
43197	55697	44197	.3750	3/8"	9.525	3/8"	6"	3"
97187	98187	99187	.3937		10.000	10.0	75	25
97197	98197	99197	.3937		10.000	10.0	100	25
97207	98207	99207	.3937		10.000	10.0	100	50
97217	98217	99217	.3937		10.000	10.0	150	38
97227	98227	99227	.3937		10.000	10.0	150	75
43207	-	44207	.4375	7/16"	11.113	7/16"	4"	1"
-	55717	44217	.4375	7/16"	11.113	7/16"	4"	2"
43227	-	44227	.4375	7/16"	11.113	7/16"	6"	1-1/2"
43237	55737	44237	.4375	7/16"	11.113	7/16"	6"	3"
97237	-	99237	.4724		12.000	12.0	100	25
97247	98247	99247	.4724		12.000	12.0	100	50
97257	98257	99257	.4724		12.000	12.0	150	50
97267	98267	99267	.4724		12.000	12.0	150	75
43247	55747	44247	.5000	1/2"	12.700	1/2"	4"	1"
43257	55757	44257	.5000	1/2"	12.700	1/2"	4"	2"
43267	55767	44267	.5000	1/2"	12.700	1/2"	6"	1-1/2"
43277	55777	44277	.5000	1/2"	12.700	1/2"	6"	3"
97277	-	99277	.5512		14.000	14.0	100	25
-	-	99287	.5512		14.000	14.0	100	50
97297	-	99297	.5512		14.000	14.0	150	50
-	-	99307	.5512		14.000	14.0	150	75
43287	-	44287	.5625	9/16"	14.288	9/16"	6"	2"
43297	-	44297	.5625	9/16"	14.288	9/16"	6"	3"
43307	55807	44307	.6250	5/8"	15.875	5/8"	6"	2"
43317	55817	44317	.6250	5/8"	15.875	5/8"	6"	3"
97317	98317	99317	.6299		16.000	16.0	150	50
97327	98327	99327	.6299		16.000	16.0	150	75
-	98337	99337	.7087		18.000	18.0	150	50
-	-	99347	.7087		18.000	18.0	150	75
43327	55827	44327	.7500	3/4"	19.050	3/4"	6"	2"
43337	55837	44337	.7500	3/4"	19.050	3/4"	6"	3"
97357	98357	99357	.7874		20.000	20.0	150	50
97367	98367	99367	.7874		20.000	20.0	150	75
-	-	99377	.9843		25.000	25.0	150	50
-	-	99387	.9843		25.000	25.0	150	75
-	55847	44347	1.000	1"	25.400	1"	6"	2"
43357	55857	44357	1.000	1"	25.400	1"	6"	3"

Series 435M, 435MA

TOLERANCES	
d_1	+.000 –.050mm (+.000" –.002")
d_2	-.0025 - .0127mm (-.0001" -.0005")

Z=4 | 30° | TECH PAGES 284-285

Standard Length - Double End - 3/8" Shank (TiALN Coated)
Standard Länge - Dopple Ende - 3/8" Schaft (TiALN-Beschichtet)
Longitud Estándar - Doble Punta - Espiga de 3/8" (Recubrimiento de TiALN)
Longueur Standart - Double Extrémité - 3/8" Diametre de la Tige (Revêtement TiALN)
Lunghezza Standard - Doppia Fresa - Stelo 3/8" (Rivestimento in TiALN)
标准长度 - 双头 - 3/8" 刀杆 (TiALN 涂层)



MATERIAL HARDNESS (Rc)
70
35
0

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

TiALN Coated
Dry or semi-dry machining

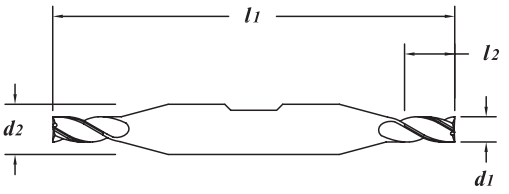
(435M) EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
34010	.1250	1/8" 3.175	3/8"	3"	3/8"
34020	.1562	5/32" 3.967	3/8"	3"	7/16"
34030	.1875	3/16" 4.763	3/8"	3"	1/2"
34050	.2500	1/4" 6.350	3/8"	3"	5/8"
34060	.2812	9/32" 7.142	3/8"	4"	11/16"
34070	.3125	5/16" 7.938	3/8"	4"	3/4"
34090	.3750	3/8" 9.525	3/8"	4"	3/4"

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Gängiger 3/8" Schaft mit Weldon Spannfläche
Für Stärke und Anpassungsfähigkeit beim Umstieg von Hochleistungsschnellstahl (HSS)

TiALN-Beschichtet
Trocken oder Halbtrockene Bearbeitung

Fresa de submicrograno sólido carburo - corte centrado
Espiga común de 3/8" con rebaje weldon
Para mayor resistencia y adaptabilidad al convertir de acero de alta velocidad

Recubrimiento de TiALN
Mecanizado seco o semiseco



Fraises carbure submicrograin - coupe au centre
Queue de diametre 3/8 avec meplat weldon
Alternative au fraises HSS

Revêtement TiALN
Usinage a sec ou avec l'air

Fresa sub-micrograno metallo duro - taglio al centro
Diametro 3/8" con attacco weldon
Alternativa alle frese tradizionali in HSS

Rivestimento in TiALN
Lavorazione a secco o a umido

(435MA) EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
34017	.1250	1/8" 3.175	3/8"	3"	3/8"
34027	.1562	5/32" 3.967	3/8"	3"	7/16"
34037	.1875	3/16" 4.763	3/8"	3"	1/2"
34047	.2188	7/32" 5.558	3/8"	3"	9/16"
34057	.2500	1/4" 6.350	3/8"	3"	5/8"
34067	.2812	9/32" 7.142	3/8"	4"	11/16"
34077	.3125	5/16" 7.938	3/8"	4"	3/4"
34097	.3750	3/8" 9.525	3/8"	4"	3/4"

超细晶粒整体硬质合金立铣刀 - 中心切削
具有Weldon平面（驱动平面一译注）的3/8"直径常用刀柄
从高速钢转换时用于增加强度、提高适应性

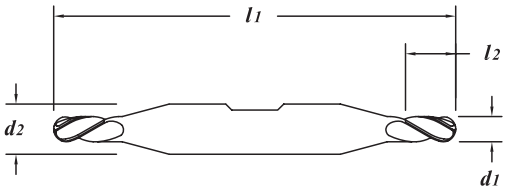
TiALN 涂层
干式或半干式机加工

† Metric equivalents are for reference only

TOLERANCES	
d_1	+.000 –.050mm (+.000" –.002")
d_2	-.0025 - .0127mm (-.0001" -.0005")
ball radius	+.000 –.025mm (+.000" –.001")

TECH PAGES 284-285

Standard Length - Double End - 3/8" Shank - Ball End (TiALN Coated)
Standard Länge - Dopple Ende - 3/8" Schaft - Vollradius (TiALN-Beschichtet)
Longitud Estándar - Doble Punta - Espiga de 3/8" - Cabeza Esférica (Recubrimiento de TiALN)
Longueur Standart - Double Extrémité - 3/8" Diametre de la Tige - Hemispherique (Revêtement TiALN)
Lunghezza Standard - Doppia Fresa - Stelo 3/8" - Sferica (Rivestimento in TiALN)
标准长度 - 双头 - 3/8" 刀杆 - 球头 (TiALN 涂层)



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

TiALN Coated
Dry or semi-dry machining

(535M) EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
36010	.1250	1/8" 3.175	3/8"	3"	3/8"
36030	.1875	3/16" 4.763	3/8"	3"	1/2"

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Gängiger 3/8" Schaft mit Weldon Spannfläche
Für Stärke und Anpassungsfähigkeit beim Umstieg von Hochleistungsschnellstahl (HSS)
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")

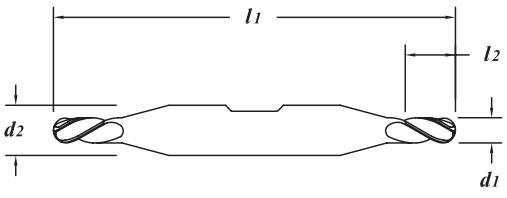
TiALN-Beschichtet
Trocken oder Halbtrockene Bearbeitung

Fresa de submicrograno sólido carburo - corte centrado
Espiga común de 3/8" con rebaje weldon
Para mayor resistencia y adaptabilidad al convertir de acero de alta velocidad
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")

Recubrimiento de TiALN
Mecanizado seco o semiseco

Fraises carbure submicrograin - coupe au centre
Queue de diametre 3/8 avec meplat weldon
Alternative au fraises HSS
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")

Revêtement TiALN
Usinage a sec ou avec l'air



Fresa sub-micrograno metallo duro - taglio al centro
Diametro 3/8" con attacco weldon
Alternativa alle frese tradizionali in HSS
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")

Rivestimento in TiALN
Lavorazione a secco o a umido

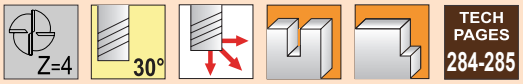
(535MA) EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
36017	.1250	1/8" 3.175	3/8"	3"	3/8"
36027	.1562	5/32" 3.967	3/8"	3"	7/16"
36037	.1875	3/16" 4.763	3/8"	3"	1/2"
36057	.2500	1/4" 6.350	3/8"	3"	5/8"
36077	.3125	5/16" 7.938	3/8"	4"	3/4"

超细晶粒整体硬质合金立铣刀 - 中心切削
具有Weldon平面（驱动平面—译注）的3/8"直径常用刀柄
从高速钢转换时用于增加强度、提高适应性
半径允差 +0,000 /–0,025 (+.000"-.001")

TiALN 涂层
干式或半干式机加工

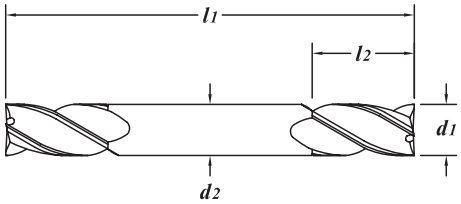
Series 430M

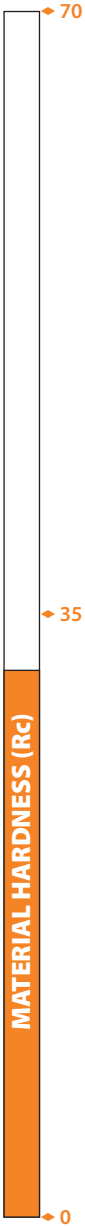
TOLERANCES	
d_1	+.000 –.050mm (+.000" –.002")
d_2	h6



TECH PAGES 284-285

Standard Length - Square End - Double End
Standard Länge - Ohne Eckenradius - Dopple Ende
Longitud Estándar - Extremo Sin Radio - Doble Punta
Longueur Standart - Extrémité Carré - Double Extrémité
Lunghezza Standard - Piatte - Doppia Fresa
标准长度 - 平头 - 球头





Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiAlN Coated - page 257

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Extrem Vielseitig
TiAlN-Beschichtet - Seite 257

Fresa de submicrograno sólido carburo - corte centrado
Extremadamente versátil
Recubrimiento de TiAlN - Página 257

Fraises carbure submicrograin - coupe au centre
Utilisations variables
Revêtement TiAlN - Page 257

Fresa sub-micrograno metallo duro - taglio al centro
Estremamente varsatile
Rivestimento in TiAlN - Pagina 257

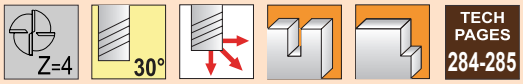
超细晶粒整体硬质合金立铣刀 - 中心切削
功能极多
TiAlN 涂层 - 257页

EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
30030	.0625	1/16" 1.588	1/8"	2"	3/16"
30040	.0938	3/32" 2.383	1/8"	2"	1/4"
30050	.1250	1/8" 3.175	1/8"	2"	3/8"
30060	.1562	5/32" 3.967	3/16"	2-1/2"	7/16"
30070	.1875	3/16" 4.763	3/16"	2-1/2"	1/2"
30090	.2500	1/4" 6.350	1/4"	2-1/2"	5/8"
30100	.3125	5/16" 7.938	5/16"	3-1/2"	3/4"
30110	.3750	3/8" 9.525	3/8"	3-1/2"	3/4"
30130	.5000	1/2" 12.700	1/2"	4"	1"

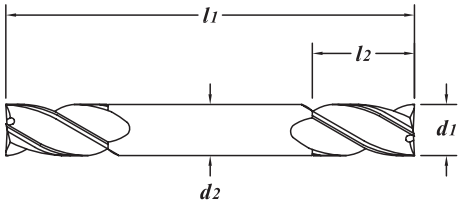
† *Metric equivalents are for reference only*

TOLERANCES

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



Standard Length - Square End - Double End - TiALN Coated
Standard Länge - Ohne Eckenradius - Dopple Ende - TiALN-Beschichtet
Longitud Estándar - Extremo Sin Radio - Doble Punta - Recubrimiento de TiALN
Longueur Standart - Extrémité Carré - Double Extrémité - Revêtement TiALN
Lunghezza Standard - Piatte - Doppia Fresa - Rivestimento in TiALN
标准长度 - 平头 - 球头 - TiALN 涂层



Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Bright Finish - page 256

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Bright Fertig (Ohne Beschichtung) - Seite 256

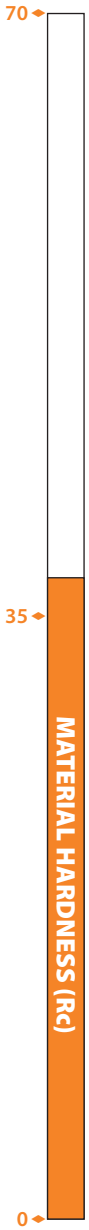
Fresa de submicrograno sólido carburo - corte centrado
Mecanizado seco o semiseco
Extremadamente versátil
Acabado Brillante (Sin Recubrimiento) - Página 256

Fraises carbure submicrograin - coupe au centre
Usinage a sec ou avec l'air
Utilisations variables
Finition Brillante (Sans Revêtement) - Page 256

Fresa sub-micrograno metallo duro - taglio al centro
Lavorazione a secco o a umido
Estremamente varsatile
Eccellente Finitura (Non Rivestito) - Pagina 256

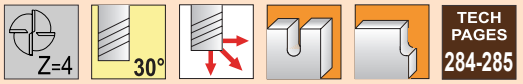
超细晶粒整体硬质合金立铣刀 - 中心切削
干式或半干式机加工
功能极多
高亮光洁度 (未涂层) - 256页

(430MA/450MA) EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
30017	.0312	1/32"	0.792	1/8"	2"	3/32"
30027	.0469	3/64"	1.191	1/8"	2"	1/8"
30037	.0625	1/16"	1.588	1/8"	2"	3/16"
30047	.0938	3/32"	2.383	1/8"	2"	1/4"
30057	.1250	1/8"	3.175	1/8"	2"	3/8"
30067	.1562	5/32"	3.967	3/16"	2-1/2"	7/16"
30077	.1875	3/16"	4.763	3/16"	2-1/2"	1/2"
30087	.2188	7/32"	5.558	1/4"	2-1/2"	9/16"
30607	.2362		6.000	6.0	65	16
30097	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"
30107	.3125	5/16"	7.938	5/16"	3-1/2"	3/4"
30117	.3750	3/8"	9.525	3/8"	3-1/2"	3/4"
30127	.4375	7/16"	11.113	7/16"	4"	7/8"
30137	.5000	1/2"	12.700	1/2"	4"	1"

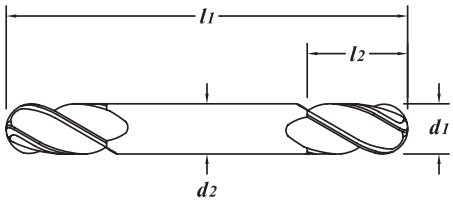


Series 530M

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



Standard Length - Double End - Ball End
Standard Länge - Dopple Ende - Vollradius
Longitud Estándar - Doble Punta - Cabeza Esférica
Longueur Standart - Double Extrémité - Hemispherique
Lunghezza Standard - Doppia Fresa - Sferica
标准长度 - 球头 - 双头



70

Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiAlN Coated - page 259

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
TiAlN-Beschichtet - Seite 259

Fresa de submicrograno sólido carburo - corte centrado
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Recubrimiento de TiAlN - Página 259

35

Fraises carbure submicrograin - coupe au centre
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")
Revêtement TiAlN - Page 259

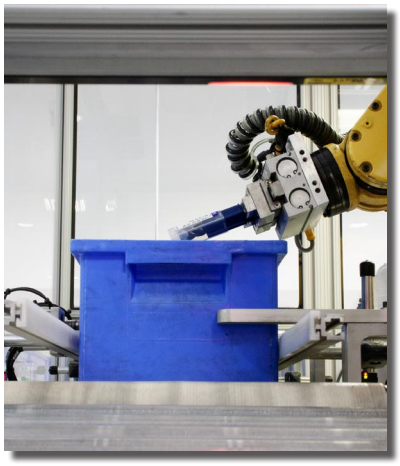
Fresa sub-micrograno metallo duro - taglio al centro
Estremamente varsatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Rivestimento in TiAlN - Pagina 259

超细晶粒整体硬质合金立铣刀 - 中心切削
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
TiAlN 涂层 - 259页

0

MATERIAL HARDNESS (Rc)

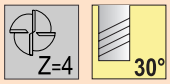
EDP#	d_1 † Diameter Decimal	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
32050	.1250	1/8"	3.175	1/8"	2"	3/8"
32070	.1875	3/16"	4.763	3/16"	2-1/2"	1/2"
32090	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"
32110	.3750	3/8"	9.525	3/8"	3-1/2"	3/4"
32130	.5000	1/2"	12.700	1/2"	4"	1"



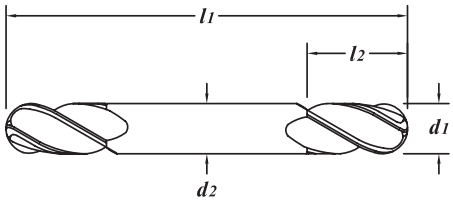
Tool Packaging

† Metric equivalents are for reference only

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



Standard Length - Double End - Ball End - TiALN Coated
Standard Länge - Dopple Ende - Vollradius - TiALN-Beschichtet
Longitud Estándar - Doble Punta - Cabeza Esférica - Recubrimiento de TiALN
Longueur Standart - Double Extrémité - Hemispherique - Revêtement TiALN
Lunghezza Standard - Doppia Fresa - Sferica - Rivestimento in TiALN
标准长度 - 球头 - 双头 - TiALN 涂层



Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Bright Finish - page 258

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
Bright Fertig (Ohne Beschichtung) - Seite 258

Fresa de submicrograno sólido carburo - corte centrado
Mecanizado seco o semiseco
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Acabado Brillante (Sin Recubrimiento) - Página 258

Fraises carbure submicrograin - coupe au centre
Usinage a sec ou avec l'air
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")
Finition Brillante (Sans Revêtement) - Page 258

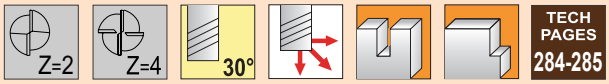
Fresa sub-micrograno metallo duro - taglio al centro
Lavorazione a secco o a umido
Estremamente varsatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Eccellente Finitura (Non Rivestito) - Pagina 258

超细晶粒整体硬质合金立铣刀 - 中心切削
干式或半干式机加工
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
高亮光洁度(未涂层) - 258页

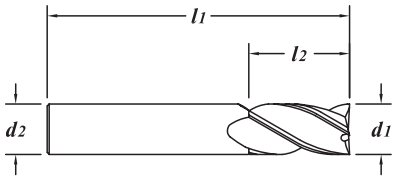
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
32017	.0312	1/32"	0.792	1/8"	2"	3/32"
32027	.0469	3/64"	1.191	1/8"	2"	1/8"
32037	.0625	1/16"	1.588	1/8"	2"	3/16"
32047	.0938	3/32"	2.383	1/8"	2"	1/4"
32057	.1250	1/8"	3.175	1/8"	2"	3/8"
32067	.1562	5/32"	3.967	3/16"	2-1/2"	7/16"
32077	.1875	3/16"	4.763	3/16"	2-1/2"	1/2"
32097	.2500	1/4"	6.350	1/4"	2-1/2"	5/8"
32117	.3750	3/8"	9.525	3/8"	3-1/2"	3/4"
32137	.5000	1/2"	12.700	1/2"	4"	1"

Series 280M, 290M

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



Standard Length - N/C Tolerance - Square End
Standard Länge - N/C Toleranz - Ohne Eckenradius
Longitud Estándar - Tolerancia N/C - Extremo Sin Radio
Longueur Standart - Tolerance NC - Extrémité Carré
Lunghezza Standard - Precisa - Piatte
标准长度 - 数控允差 - 平头



MATERIAL HARDNESS (Rc)
70
35
0

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

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Ausgezeichnet für Keilnuten
Enge Toleranzen für präzise Bearbeitung
Wenn nötig zum zusammenlegen von Werkzeugen

Fresa de submicrograno sólido carburo - corte centrado
Excelente para chaveteras
Tolerancia ajustada para mecanizado de precisión
Para uso en aplicaciones de machihembrado

Fraises carbure submicrograin - coupe au centre
Excellent pour rainures de clavettes
Haute tolerance pour usinage de precision
Pour l'usage quand les outils assortis sont nécessaires

Fresa sub-micrograno metallo duro - taglio al centro
Eccellente per piccole cave
Alta tolleranza per lavorazioni di precisione
Consigliabile per esecuzione di chiavette

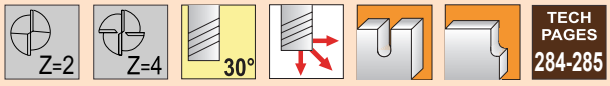
超细晶粒整体硬质合金立铣刀 - 中心切削
铣键槽极好
在精加工时保持紧公差
在需要匹配刀具时可供使用

(280M) 2 Flute EDP#	(290M) 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
25010	26010	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
25020	26020	.0938	3/32"	2.383	1/8"	1-1/2"	5/16"
25030	26030	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
25040	26040	.1875	3/16"	4.763	3/16"	2"	9/16"
* 25050	* 26050	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
* 25070	* 26070	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
25090	* 26090	.5000	1/2"	12.700	1/2"	3"	1"
-	26100	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"

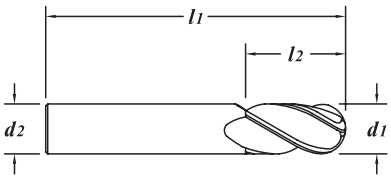
* - Tools with weldon flats

† Metric equivalents are for reference only

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



Standard Length - N/C Tolerance - Ball End
Standard Länge - N/C Toleranz - Vollradius
Longitud Estándar - Tolerancia N/C - Cabeza Esférica
Longueur Standart - Tolerance NC - Hemispherique
Lunghezza Standard - Precisa - Sferica
标准长度 - 数控允差 - 球头



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 +0.0127mm –0.0000mm (+.0005" –.0000")

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Ausgezeichnet für Keilnuten
Enge Toleranzen für präzise Bearbeitung
Wenn nötig zum zusammenlegen von Werkzeugen
Vollradius Toleranz: +0,0127 / –0,0000 (+.0005" –.0000")

Fresa de submicrograno sólido carburo - corte centrado
Excelente para chaveteras
Tolerancia ajustada para mecanizado de precisión
Para uso en aplicaciones de machihembrado
Tolerancia de la cabeza esférica +0,0127 / –0,0000 (+.0005" –.0000")

Fraises carbure submicrograin - coupe au centre
Excellent pour rainures de clavettes
Haute tolerance pour usinage de precision
Pour l'usage quand les outils assortis sont nécessaires
Tolerance du rayon de hemispherique +0,0127 / –0,0000 (+.0005" –.0000")

Fresa sub-micrograno metallo duro - taglio al centro
Eccellente per piccole cave
Alta tolleranza per lavorazioni di precisione
Consigliabile per esecuzione di chiavette
Tolleranza del raggio +0,0127 / –0,0000 (+.0005" –.0000")

超细晶粒整体硬质合金立铣刀 - 中心切削
铣键槽极好
在精加工时保持紧公差
在需要匹配刀具时可供使用
半径允差 +0,0127 / –0,0000 (+.0005" –.0000")

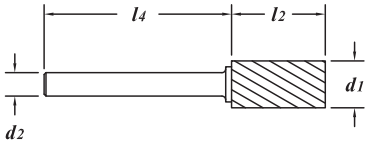
(380M) 2 Flute EDP#	(390M) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
27010	28010	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"
27030	28030	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
-	28040	.1875	3/16"	4.763	3/16"	2"	9/16"
27050	28050	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
* -	* 28060	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
27070	* 28070	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
-	* 28090	.5000	1/2"	12.700	1/2"	3"	1"
-	28100	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"

70
35
0
MATERIAL HARDNESS (Rc)

* - Tools with weldon flats

SA (1/4" Steel Shank)

Carbide Rotary Files - Cylindrical Shape
Rotierende Hartmetallwerkzeuge - Zylindrische Form
Limas Rotativas de Carburo - Forma Cilíndrica
Fraises Limes Rotatives Carbure - Forme Cylindrique
Lime Rotative in Metallo Duro - Geometria Cilindrica
硬质合金回转锉刀 - 圆柱形



Submicron Grain Carbide
1/4" (6,35mm) steel shank
A - Aluminum Cut
D - Double Cut
* - Solid Carbide

Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
A - Aluminiumbearbeitung
D - Doppelte Bearbeitung
* - Vollhartmetall

Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
A - Corte de aluminio
D - Corte doble
* - Carburo sólido

Carbure submicrograin
Queue acier 1/4" (6,35mm)
A - Coupe Aluminium
D - Double Coupe
* - Carbure Plein

Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro

超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	*d1* † Diameter Decimal	*d1* † Diameter Metric	*d2* Shank Diameter	*l2* Flute Length	*l4* Shank Length
60010	* SA-14	.1875	3/16"	4.763	1/4"	5/8"	1-3/8"
60012	* SA-14D	.1875	3/16"	4.763	1/4"	5/8"	1-3/8"
60020	* SA-1	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"
60021	* SA-1A	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"
60022	* SA-1D	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"
60030	SA-2	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"
60032	SA-2D	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"
60040	SA-3	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
60041	SA-3A	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
60042	SA-3D	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
60050	SA-4	.4375	7/16"	11.113	1/4"	1"	1-3/4"
60052	SA-4D	.4375	7/16"	11.113	1/4"	1"	1-3/4"
60060	SA-5	.5000	1/2"	12.700	1/4"	1"	1-3/4"
60061	SA-5A	.5000	1/2"	12.700	1/4"	1"	1-3/4"
60062	SA-5D	.5000	1/2"	12.700	1/4"	1"	1-3/4"
60070	SA-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"
60071	SA-6A	.6250	5/8"	15.875	1/4"	1"	1-3/4"
60072	SA-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"
60080	SA-7	.7500	3/4"	19.050	1/4"	1"	1-3/4"
60081	SA-7A	.7500	3/4"	19.050	1/4"	1"	1-3/4"
60082	SA-7D	.7500	3/4"	19.050	1/4"	1"	1-3/4"
60090	SA-9	1.000	1"	25.400	1/4"	1"	1-3/4"
60091	SA-9A	1.000	1"	25.400	1/4"	1"	1-3/4"
60092	SA-9D	1.000	1"	25.400	1/4"	1"	1-3/4"

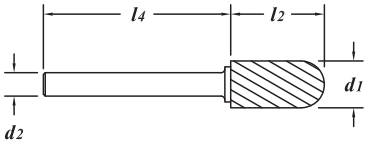
Basic Rotary File Cut Styles Available

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
Rotierende Hartmetallwerkzeuge - Zylindrische Radius Form
Limas Rotativas de Carburo - Forma Cilíndrica-Redondeada
Fraises Limes Rotatives Carbure - Forme Cylindrique - Hemispherique
Lime Rotative in Metallo Duro - Geometria Cilindrica-Raggio
硬质合金回转锉刀 - 圆柱一半径形状



Submicron Grain Carbide
1/4" (6,35mm) steel shank
A - Aluminum Cut
D - Double Cut
* - Solid Carbide

Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
A - Aluminiumbearbeitung
D - Doppelte Bearbeitung
* - Vollhartmetall

Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
A - Corte de aluminio
D - Corte doble
* - Carburo sólido

Carbure submicrograin
Queue acier 1/4" (6,35mm)
A - Coupe Aluminium
D - Double Coupe
* - Carbure Plein

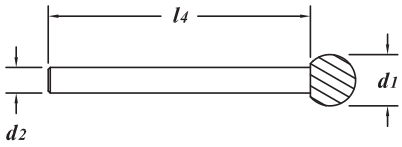
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro

超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	*d1* † Diameter Decimal	*d1* † Diameter Metric	*d2* Shank Diameter	*l2* Flute Length	*l4* Shank Length
61010	* SC-14	.1875	4.763	1/4"	5/8"	1-3/8"
61012	* SC-14D	.1875	4.763	1/4"	5/8"	1-3/8"
61020	* SC-1	.2500	6.350	1/4"	5/8"	1-3/8"
61021	* SC-1A	.2500	6.350	1/4"	5/8"	1-3/8"
61022	* SC-1D	.2500	6.350	1/4"	5/8"	1-3/8"
61030	SC-2	.3125	7.938	1/4"	3/4"	1-3/4"
61032	SC-2D	.3125	7.938	1/4"	3/4"	1-3/4"
61040	SC-3	.3750	9.525	1/4"	3/4"	1-3/4"
61041	SC-3A	.3750	9.525	1/4"	3/4"	1-3/4"
61042	SC-3D	.3750	9.525	1/4"	3/4"	1-3/4"
61050	SC-4	.4375	11.113	1/4"	1"	1-3/4"
61052	SC-4D	.4375	11.113	1/4"	1"	1-3/4"
61060	SC-5	.5000	12.700	1/4"	1"	1-3/4"
61061	SC-5A	.5000	12.700	1/4"	1"	1-3/4"
61062	SC-5D	.5000	12.700	1/4"	1"	1-3/4"
61070	SC-6	.6250	15.875	1/4"	1"	1-3/4"
61071	SC-6A	.6250	15.875	1/4"	1"	1-3/4"
61072	SC-6D	.6250	15.875	1/4"	1"	1-3/4"
61080	SC-7	.7500	19.050	1/4"	1"	1-3/4"
61081	SC-7A	.7500	19.050	1/4"	1"	1-3/4"
61082	SC-7D	.7500	19.050	1/4"	1"	1-3/4"

SD (1/4" Steel Shank)

Carbide Rotary Files - Ball Shape
Rotierende Hartmetallwerkzeuge - Vollradiusform
Limas Rotativas de Carburo - Forma Esférica
Fraises Limes Rotatives Carbure - Forme Cylindrique a Bout Hemispherique
Lime Rotative in Metallo Duro - Geometria Sferica
硬质合金回转锉刀 - 球型



Submicron Grain Carbide
1/4" (6,35mm) steel shank
A - Aluminum Cut
D - Double Cut
* - Solid Carbide

Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
A - Aluminiumbearbeitung
D - Doppelte Bearbeitung
* - Vollhartmetall

Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
A - Corte de aluminio
D - Corte doble
* - Carburo sólido

Carbure submicrograin
Queue acier 1/4" (6,35mm)
A - Coupe Aluminium
D - Double Coupe
* - Carbure Plein

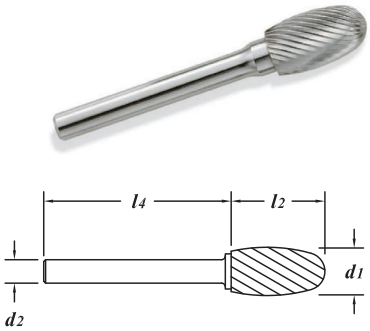
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro

超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	*d1* † Diameter Decimal	*d1* † Diameter Metric	*d2* Shank Diameter	*l2* Flute Length	*l4* Shank Length
62010	* SD-14	.1875	3/16"	4.763	1/4"	-	2"
62012	* SD-14D	.1875	3/16"	4.763	1/4"	-	2"
62020	* SD-1	.2500	1/4"	6.350	1/4"	-	2"
62021	* SD-1A	.2500	1/4"	6.350	1/4"	-	2"
62022	* SD-1D	.2500	1/4"	6.350	1/4"	-	2"
62030	SD-2	.3125	5/16"	7.938	1/4"	-	1-3/4"
62032	SD-2D	.3125	5/16"	7.938	1/4"	-	1-3/4"
62040	SD-3	.3750	3/8"	9.525	1/4"	-	1-3/4"
62041	SD-3A	.3750	3/8"	9.525	1/4"	-	1-3/4"
62042	SD-3D	.3750	3/8"	9.525	1/4"	-	1-3/4"
62050	SD-4	.4375	7/16"	11.113	1/4"	-	1-3/4"
62052	SD-4D	.4375	7/16"	11.113	1/4"	-	1-3/4"
62060	SD-5	.5000	1/2"	12.700	1/4"	-	1-3/4"
62061	SD-5A	.5000	1/2"	12.700	1/4"	-	1-3/4"
62062	SD-5D	.5000	1/2"	12.700	1/4"	-	1-3/4"
62070	SD-6	.6250	5/8"	15.875	1/4"	-	1-3/4"
62071	SD-6A	.6250	5/8"	15.875	1/4"	-	1-3/4"
62072	SD-6D	.6250	5/8"	15.875	1/4"	-	1-3/4"
62080	SD-7	.7500	3/4"	19.050	1/4"	-	1-3/4"
62082	SD-7D	.7500	3/4"	19.050	1/4"	-	1-3/4"
62090	SD-9	1.000	1"	25.400	1/4"	-	1-3/4"
62092	SD-9D	1.000	1"	25.400	1/4"	-	1-3/4"

† *Metric equivalents are for reference only*

Carbide Rotary Files - Egg Shape
Rotierende Hartmetallwerkzeuge - Eiform
Limas Rotativas de Carburo - Forma Ovalada
Fraises Limes Rotatives Carbure - Forme Ovale
Lime Rotative in Metallo Duro - Geometria Ovale
硬质合金回转锉刀 - 蛋型



Submicron Grain Carbide
1/4" (6,35mm) steel shank
A - Aluminum Cut
D - Double Cut
* - Solid Carbide

Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
A - Aluminiumbearbeitung
D - Doppelte Bearbeitung
* - Vollhartmetall

Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
A - Corte de aluminio
D - Corte doble
* - Carburo sólido

Carbure submicrograin
Queue acier 1/4" (6,35mm)
A - Coupe Aluminium
D - Double Coupe
* - Carbure Plein

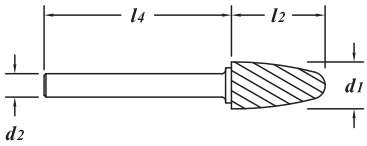
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro

超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	*d1* † Diameter Decimal	*d1* † Diameter	*d1* † Diameter Metric	*d2* Shank Diameter	*l2* Flute Length	*l4* Shank Length
63010	* SE-1	.2500	1/4"	6.350	1/4"	3/8"	2"
63012	* SE-1D	.2500	1/4"	6.350	1/4"	3/8"	2"
63020	SE-3	.3750	3/8"	9.525	1/4"	5/8"	1-3/4"
63021	SE-3A	.3750	3/8"	9.525	1/4"	5/8"	1-3/4"
63022	SE-3D	.3750	3/8"	9.525	1/4"	5/8"	1-3/4"
63030	SE-5	.5000	1/2"	12.700	1/4"	7/8"	1-3/4"
63031	SE-5A	.5000	1/2"	12.700	1/4"	7/8"	1-3/4"
63032	SE-5D	.5000	1/2"	12.700	1/4"	7/8"	1-3/4"
63040	SE-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"
63041	SE-6A	.6250	5/8"	15.875	1/4"	1"	1-3/4"
63042	SE-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"
63050	SE-7	.7500	3/4"	19.050	1/4"	1"	1-3/4"
63052	SE-7D	.7500	3/4"	19.050	1/4"	1"	1-3/4"

SF (1/4" Steel Shank)

Carbide Rotary Files - Tree-Radius Shape
Rotierende Hartmetallwerkzeuge - Baumradiusform
Limas Rotativas de Carburo - Forma de Árbol-Redondeada
Fraises Limes Rotatives Carbure - Forme Ogive a Bout Hemispherique
Lime Rotative in Metallo Duro - Geometria Raggio-Albero
硬质合金回转锉刀 - 树一半径型



Submicron Grain Carbide
1/4" (6,35mm) steel shank
A - Aluminum Cut
D - Double Cut
* - Solid Carbide

Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
A - Aluminiumbearbeitung
D - Doppelte Bearbeitung
* - Vollhartmetall

Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
A - Corte de aluminio
D - Corte doble
* - Carburo sólido

Carbure submicrograin
Queue acier 1/4" (6,35mm)
A - Coupe Aluminium
D - Double Coupe
* - Carbure Plein

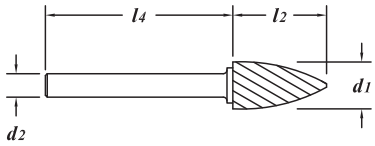
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro

超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	*d1* † Diameter Decimal	*d1* † Diameter Metric	*d2* Shank Diameter	*l2* Flute Length	*l4* Shank Length
64010	* SF-1	.2500	6.350	1/4"	5/8"	2"
64011	* SF-1A	.2500	6.350	1/4"	5/8"	2"
64012	* SF-1D	.2500	6.350	1/4"	5/8"	2"
64020	SF-3	.3750	9.525	1/4"	3/4"	1-3/4"
64021	SF-3A	.3750	9.525	1/4"	3/4"	1-3/4"
64022	SF-3D	.3750	9.525	1/4"	3/4"	1-3/4"
64030	SF-5	.5000	12.700	1/4"	1"	1-3/4"
64031	SF-5A	.5000	12.700	1/4"	1"	1-3/4"
64032	SF-5D	.5000	12.700	1/4"	1"	1-3/4"
64040	SF-6	.6250	15.875	1/4"	1"	1-3/4"
64041	SF-6A	.6250	15.875	1/4"	1"	1-3/4"
64042	SF-6D	.6250	15.875	1/4"	1"	1-3/4"
64050	SF-14	.7500	19.050	1/4"	1-1/4"	1-3/4"
64052	SF-14D	.7500	19.050	1/4"	1-1/4"	1-3/4"

† *Metric equivalents are for reference only*

Carbide Rotary Files - Tree-Pointed Shape
Rotierende Hartmetallwerkzeuge - Baumpunktform
Limas Rotativas de Carburo - Forma de Árbol con Punta
Fraises Limes Rotatives Carbure - Forme Ogive a Bout Pointu
Lime Rotative in Metallo Duro - Geometria a Punta
硬质合金回转锉刀 - 树—尖端型



Submicron Grain Carbide
1/4" (6,35mm) steel shank
D - Double Cut
* - Solid Carbide

Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
D - Doppelte Bearbeitung
* - Vollhartmetall

Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
D - Corte doble
* - Carburo sólido

Carbure submicrograin
Queue acier 1/4" (6,35mm)
D - Double Coupe
* - Carbure Plein

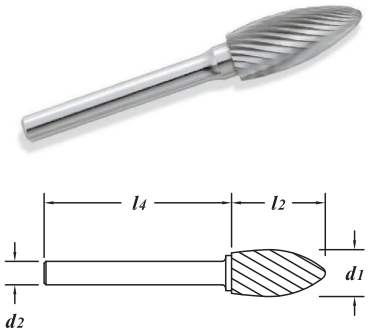
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
* - Metallo duro

超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	*d1* † Diameter Decimal	*d1* † Diameter Metric	*d2* Shank Diameter	*l2* Flute Length	*l4* Shank Length
65010	* SG-1	.2500	6.350	1/4"	5/8"	2"
65012	* SG-1D	.2500	6.350	1/4"	5/8"	2"
65020	SG-3	.3750	9.525	1/4"	3/4"	1-3/4"
65022	SG-3D	.3750	9.525	1/4"	3/4"	1-3/4"
65030	SG-13	.5000	12.700	1/4"	3/4"	1-3/4"
65032	SG-13D	.5000	12.700	1/4"	3/4"	1-3/4"
65040	SG-5	.5000	12.700	1/4"	1"	1-3/4"
65042	SG-5D	.5000	12.700	1/4"	1"	1-3/4"
65050	SG-6	.6250	15.875	1/4"	1"	1-3/4"
65052	SG-6D	.6250	15.875	1/4"	1"	1-3/4"
65060	SG-7	.7500	19.050	1/4"	1"	1-3/4"
65062	SG-7D	.7500	19.050	1/4"	1"	1-3/4"

SH (1/4" Steel Shank)

Carbide Rotary Files - Flame Shape
Rotierende Hartmetallwerkzeuge - Flammenform
Limas Rotativas de Carburo - Forma de Flama
Fraises Limes Rotatives Carbure - Forme Flamme
Lime Rotative in Metallo Duro - Geometria a Fiamma
硬质合金回转锉刀 - 火焰型



Submicron Grain Carbide
1/4" (6,35mm) steel shank
D - Double Cut

Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
D - Doppelte Bearbeitung

Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
D - Corte doble

Carbure submicrograin
Queue acier 1/4" (6,35mm)
D - Double Coupe

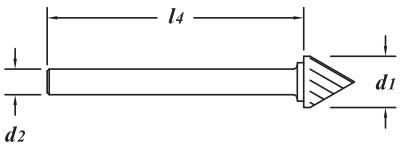
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente

超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削

EDP#	TOOL #	*d1* † Diameter Decimal	*d1* † Diameter Metric	*d2* Shank Diameter	*l2* Flute Length	*l4* Shank Length
66010	SH-2	.3125	5/16" 7.938	1/4"	3/4"	1-3/4"
66012	SH-2D	.3125	5/16" 7.938	1/4"	3/4"	1-3/4"
66020	SH-5	.5000	1/2" 12.700	1/4"	1-1/4"	1-3/4"
66022	SH-5D	.5000	1/2" 12.700	1/4"	1-1/4"	1-3/4"
66030	SH-6	.6250	5/8" 15.875	1/4"	1-7/16"	1-3/4"
66032	SH-6D	.6250	5/8" 15.875	1/4"	1-7/16"	1-3/4"
66040	SH-7	.7500	3/4" 19.050	1/4"	1-5/8"	1-3/4"
66042	SH-7D	.7500	3/4" 19.050	1/4"	1-5/8"	1-3/4"

† *Metric equivalents are for reference only*

Carbide Rotary Files - Taper Shape *(60° Included Angle)*
Rotierende Hartmetallwerkzeuge - Kegelzapfenform *(60° inclusive Winkel)*
Limas Rotativas de Carburo - Forma Cónica *(Ángulo de cara de 60°)*
Fraises Limes Rotatives Carbure - Forme Conique *(Forme conique a 60°)*
Lime Rotative in Metallo Duro - Geometria Conica *(Angolo a 60°)*
硬质合金回转锉刀 - 退拔型 *(60° 夹角)*



Submicron Grain Carbide
1/4" (6,35mm) steel shank
D - Double Cut
** - Solid Carbide/Double End

Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
D - Doppelte Bearbeitung
** - Vollhartmetall / Doppel ende

Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
D - Corte doble
** - Carburo sólido / Doble punta

Carbure submicrograin
Queue acier 1/4" (6,35mm)
D - Double Coupe
** - Carbure Plein / Double Extremite

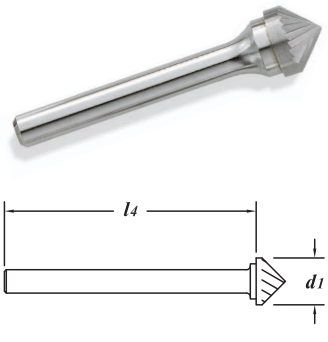
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
** - Metallo duro / Doppia fresa

超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削
** - 整体硬质合金 / 双头

EDP#	TOOL #	*d1* † Diameter Decimal	*d1* † Diameter Metric	*d2* Shank Diameter	*l4* Shank Length
67010	** SJ-1	.2500	6.350	1/4"	1-11/16"
67012	** SJ-1D	.2500	6.350	1/4"	1-11/16"
67020	SJ-3	.3750	9.525	1/4"	1-3/4"
67022	SJ-3D	.3750	9.525	1/4"	1-3/4"
67030	SJ-5	.5000	12.700	1/4"	1-3/4"
67032	SJ-5D	.5000	12.700	1/4"	1-3/4"
67040	SJ-6	.6250	15.875	1/4"	1-3/4"
67042	SJ-6D	.6250	15.875	1/4"	1-3/4"
67050	SJ-7	.7500	19.050	1/4"	1-3/4"
67052	SJ-7D	.7500	19.050	1/4"	1-3/4"

SK (1/4" Steel Shank)

Carbide Rotary Files - Taper Shape *(90° Included Angle)*
Rotierende Hartmetallwerkzeuge - Kegelzapfenform *(90° inclusive Winkel)*
Limas Rotativas de Carburo - Forma Cónica *(Ángulo de cara de 90°)*
Fraises Limes Rotatives Carbure - Forme Conique *(Forme conique a 90°)*
Lime Rotative in Metallo Duro - Geometria Conica *(Angolo a 90°)*
硬质合金回转锉刀 - 退拔型 *(90° 夹角)*



Submicron Grain Carbide
1/4" (6,35mm) steel shank
D - Double Cut
** - Solid Carbide/Double End

Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
D - Doppelte Bearbeitung
** - Vollhartmetall / Doppel ende

Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
D - Corte doble
** - Carburo sólido / Doble punta

Carbure submicrograin
Queue acier 1/4" (6,35mm)
D - Double Coupe
** - Carbure Plein / Double Extremite

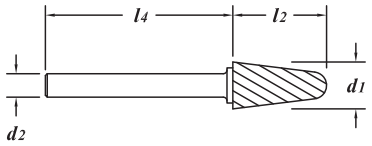
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
** - Metallo duro / Doppia fresa

超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削
** - 整体硬质合金 / 双头

EDP#	TOOL #	*d1* † Diameter Decimal	*d1* † Diameter Metric	*d2* Shank Diameter	*l4* Shank Length
68010	**SK-1	.2500	1/4"	6.350	1/4"	1-11/16"
68012	**SK-1D	.2500	1/4"	6.350	1/4"	1-11/16"
68020	SK-3	.3750	3/8"	9.525	1/4"	1-3/4"
68022	SK-3D	.3750	3/8"	9.525	1/4"	1-3/4"
68030	SK-5	.5000	1/2"	12.700	1/4"	1-3/4"
68032	SK-5D	.5000	1/2"	12.700	1/4"	1-3/4"
68040	SK-6	.6250	5/8"	15.875	1/4"	1-3/4"
68042	SK-6D	.6250	5/8"	15.875	1/4"	1-3/4"
68050	SK-7	.7500	3/4"	19.050	1/4"	1-3/4"
68052	SK-7D	.7500	3/4"	19.050	1/4"	1-3/4"
68070	SK-9	1.000	1"	25.400	1/4"	1-3/4"
68072	SK-9D	1.000	1"	25.400	1/4"	1-3/4"

† *Metric equivalents are for reference only*

Carbide Rotary Files - Cone-Radius Shape *(14° included angle)*
Rotierende Hartmetallwerkzeuge - Kegel-Radiusform *(14° inclusive Winkel)*
Limas Rotativas de Carburo - Forma Cónica-Redondeada *(Ángulo de cara de 14°)*
Fraises Limes Rotatives Carbure - Forme Conique a Bout Hemispherique *(forme conique a 14°)*
Lime Rotative in Metallo Duro - Geometria Raggio Conica *(Angolo a 14°)*
硬质合金回转锉刀 - 圆锥—半径型 *(14° 夹角)*



Submicron Grain Carbide
1/4" (6,35mm) steel shank
A - Aluminum Cut
D - Double Cut
* - Solid Carbide

Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
A - Aluminiumbearbeitung
D - Doppelte Bearbeitung
* - Vollhartmetall

Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
A - Corte de aluminio
D - Corte doble
* - Carburo sólido

Carbure submicrograin
Queue acier 1/4" (6,35mm)
A - Coupe Aluminium
D - Double Coupe
* - Carbure Plein

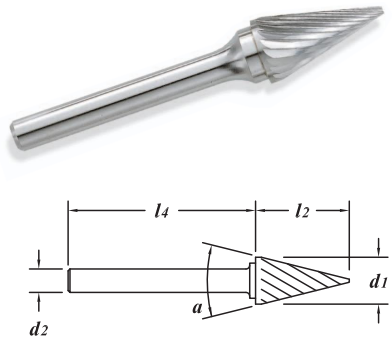
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro

超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金

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
69010	* SL-1	.2500	1/4"	6.350	1/4"	5/8"	2"
69012	* SL-1D	.2500	1/4"	6.350	1/4"	5/8"	2"
69020	SL-2	.3125	5/16"	7.938	1/4"	7/8"	1-3/4"
69022	SL-2D	.3125	5/16"	7.938	1/4"	7/8"	1-3/4"
69030	SL-3	.3750	3/8"	9.525	1/4"	1-1/16"	1-3/4"
69031	SL-3A	.3750	3/8"	9.525	1/4"	1-1/16"	1-3/4"
69032	SL-3D	.3750	3/8"	9.525	1/4"	1-1/16"	1-3/4"
69040	SL-4	.5000	1/2"	12.700	1/4"	1-1/8"	1-3/4"
69041	SL-4A	.5000	1/2"	12.700	1/4"	1-1/8"	1-3/4"
69042	SL-4D	.5000	1/2"	12.700	1/4"	1-1/8"	1-3/4"
69050	SL-5	.6250	5/8"	15.875	1/4"	1-3/16"	1-3/4"
69051	SL-5A	.6250	5/8"	15.875	1/4"	1-3/16"	1-3/4"
69052	SL-5D	.6250	5/8"	15.875	1/4"	1-3/16"	1-3/4"
69060	SL-7	.7500	3/4"	19.050	1/4"	1-1/2"	1-3/4"
69062	SL-7D	.7500	3/4"	19.050	1/4"	1-1/2"	1-3/4"

SM (1/4" Steel Shank)

Carbide Rotary Files - Cone Flat Shape *(no radius)*
Rotierende Hartmetallwerkzeuge - Kegel-Flache Form *(Ohne Radius)*
Limas Rotativas de Carburo - Forma Cónica-Plana *(no redondeada)*
Fraises Limes Rotatives Carbure - Forme Conique a Bout Plat *(Pas de rayon)*
Lime Rotative in Metallo Duro - Geometria piatta conica *(piatta)*
硬质合金回转锉刀 - 圆锥—平面型 *(无圆角半径)*



Submicron Grain Carbide
1/4" (6,35mm) steel shank
D - Double Cut
* - Solid Carbide

Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
D - Doppelte Bearbeitung
* - Vollhartmetall

Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
D - Corte doble
* - Carburo sólido

Carbure submicrograin
Queue acier 1/4" (6,35mm)
D - Double Coupe
* - Carbure Plein

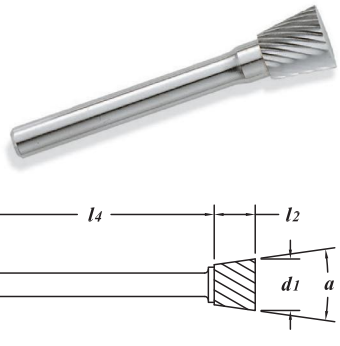
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
* - Metallo duro

超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	*d1* † Diameter Decimal	*d1* † Diameter	Metric	*d2* Shank Diameter	*a* Included Angle	*l2* Flute Length	*l4* Shank Length
70010	* SM-1	.2500	1/4"	6.350	1/4"	22°	1/2"	2"
70012	* SM-1D	.2500	1/4"	6.350	1/4"	22°	1/2"	2"
70020	SM-4	.3750	3/8"	9.525	1/4"	28°	5/8"	1-3/4"
70022	SM-4D	.3750	3/8"	9.525	1/4"	28°	5/8"	1-3/4"
70030	SM-5	.5000	1/2"	12.700	1/4"	28°	7/8"	1-3/4"
70032	SM-5D	.5000	1/2"	12.700	1/4"	28°	7/8"	1-3/4"
70040	SM-6	.6250	5/8"	15.875	1/4"	31°	1"	1-3/4"
70042	SM-6D	.6250	5/8"	15.875	1/4"	31°	1"	1-3/4"

† *Metric equivalents are for reference only*

Carbide Rotary Files - Inverted Cone Shape
Rotierende Hartmetallwerkzeuge - Umgekehrte Kegelform
Limas Rotativas de Carburo - Forma Cónica Invertida
Fraises Limes Rotatives Carbure - Forme Conique Inversee
Lime Rotative in Metallo Duro - Geometria conica invertita
硬质合金回转锉刀 - 倒圆锥型



Submicron Grain Carbide
1/4" (6,35mm) steel shank
D - Double Cut
* - Solid Carbide

Feinkornhartmetall
1/4" (6,35mm) Stahlschaft
D - Doppelte Bearbeitung
* - Vollhartmetall

Submicrograno carburo
Espigas de acero de 1/4" (6,35mm)
D - Corte doble
* - Carburo sólido

Carbure submicrograin
Queue acier 1/4" (6,35mm)
D - Double Coupe
* - Carbure Plein

Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
* - Metallo duro

超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削
* - 整体硬质合金

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
71010	* SN-1	.2500	1/4"	6.350	1/4"	10°	5/16"	2"
71012	* SN-1D	.2500	1/4"	6.350	1/4"	10°	5/16"	2"
71020	SN-2	.3750	3/8"	9.525	1/4"	13°	3/8"	1-3/4"
71022	SN-2D	.3750	3/8"	9.525	1/4"	13°	3/8"	1-3/4"
71030	SN-3	.5000	1/2"	12.700	1/4"	16°	1/2"	1-3/4"
71032	SN-3D	.5000	1/2"	12.700	1/4"	16°	1/2"	1-3/4"

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

Solid Carbide Rotary Files
Rotierende Vollhartmetallwerkzeuge
Limas Rotativas de Carburo Sólido
Fraises Limes Rotatives Plein Carbure
Lime Rotative in Metallo Duro Solido
整体硬质合金回转锉刀

Solid Submicron Grain Carbide
3/16" (4,762mm) shank
D - Double Cut

Vollhartmetall aus Feinkornhartmetall
3/16" (4,762mm) Schaft
D - Doppelte Bearbeitung

Carburo sólido de grano submicrónico
Espigas de 3/16" (4,762mm)
D - Corte doble

Carbure plein submicrograin
Queue 3/16" (4,762mm)
D - Double Coupe

Super sub-micrograno metallo duro
Stelo da 3/16" (4,762mm)
D - Doppio tagliente

优质超细晶粒
3/16" (4,762mm) 刀柄
D - 双切削

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

† *Metric equivalents are for reference only*

Carbide Rotary Files
Rotierende Hartmetallwerkzeuge
Limas Rotativas de Carburo
Fraises Limes Rotatives Carbure
Lime Rotative in Metallo Duro
硬质合金回转锉刀

SA-51
SB-51
SC-51
SD-51
SE-51

SF-51
SG-51
SM-51
SN-51

Submicron Grain Carbide
1/8" (3,175mm) steel shank
D - Double Cut

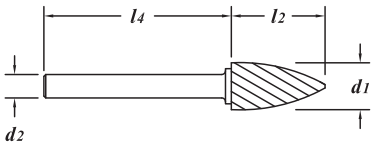
Feinkornhartmetall
1/8" (3,175mm) Stahlschaft
D - Doppelte Bearbeitung

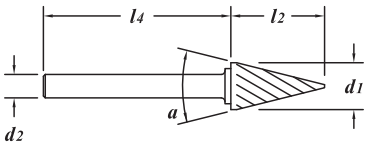
Submicrograno carburo
Espigas de acero de 1/8" (3,175mm)
D - Corte doble

Carbure submicrograin
Queue acier 1/8" (3,175mm)
D - Double Coupe

Sub-micrograno metallo duro
Stelo in acciaio da 1/8" (3,175mm)
D - Doppio tagliente

超细晶粒硬质合金
1/8" (3,175mm) 钢质刀柄
D - 双切削





EDP#	TOOL #	d1 † Diameter Decimal	d1 † Diameter	d1 † Diameter Metric	d2 Shank Diameter	a Included Angle	l2 Flute Length	l4 Shank Length
73010	SA-51	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73012	SA-51D	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73020	SB-51	.2500	1/4"	6.350	1/8"	-	3/16"	1-1/2"
73022	SB-51D	.2500	1/4"	6.350	1/8"	-	3/16"	1-1/2"
73030	SC-51	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73032	SC-51D	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73040	SD-51	.2500	1/4"	6.350	1/8"	-	-	1-1/2"
73042	SD-51D	.2500	1/4"	6.350	1/8"	-	-	1-1/2"
73050	SE-51	.2500	1/4"	6.350	1/8"	-	3/8"	1-1/2"
73052	SE-51D	.2500	1/4"	6.350	1/8"	-	3/8"	1-1/2"
73060	SF-51	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73062	SF-51D	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73070	SG-51	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73072	SG-51D	.2500	1/4"	6.350	1/8"	-	1/2"	1-1/2"
73080	SM-51	.2500	1/4"	6.350	1/8"	22°	1/2"	1-1/2"
73082	SM-51D	.2500	1/4"	6.350	1/8"	22°	1/2"	1-1/2"
73090	SN-51	.2500	1/4"	6.350	1/8"	10°	1/4"	1-1/2"
73092	SN-51D	.2500	1/4"	6.350	1/8"	10°	1/4"	1-1/2"

CAD drawings representative for dimension placement

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

Solid Carbide Rotary Files
Rotierende Vollhartmetallwerkzeuge
Limas Rotativas de Carburo Sólido
Fraises Limes Rotatives Plein Carbure
Lime Rotative in Metallo Duro Solido
整体硬质合金回转锉刀

Solid Submicron Grain Carbide
1/8" (3,175mm) shank
D - Double Cut

Vollhartmetall aus Feinkornhartmetall
1/8" (3,175mm) Schaft
D - Doppelte Bearbeitung

Carburo sólido de grano submicrónico
Espigas de 1/8" (3,175mm)
D - Corte doble

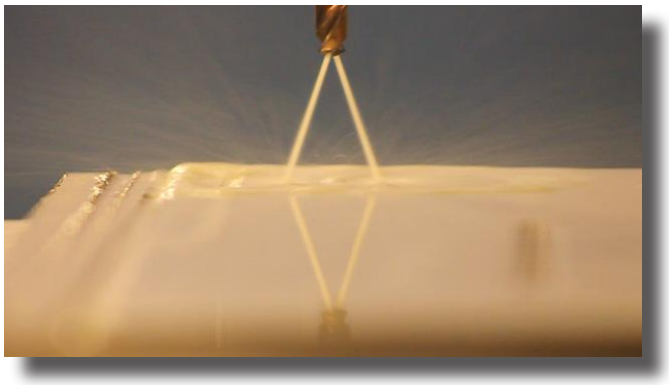
Carbure plein submicrograin
Queue 1/8" (3,175mm)
D - Double Coupe

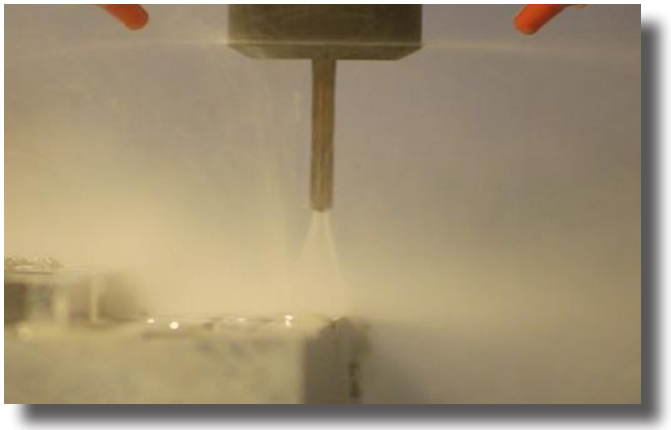
Super sub-micrograno metallo duro
Stelo da 1/8" (3,175mm)
D - Doppio tagliente

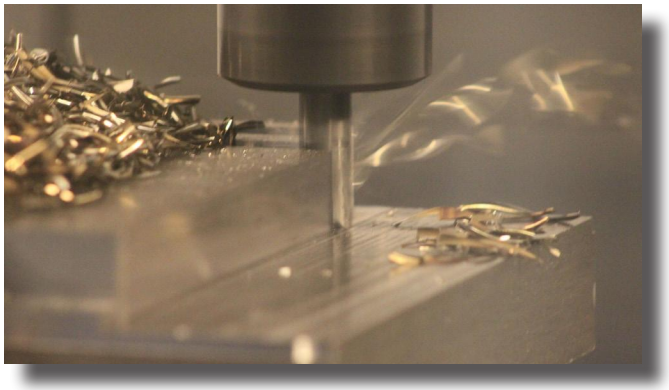
优质超细晶粒
1/8" (3,175mm) 刀柄
D - 双切削

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

† *Metric equivalents are for reference only*







Troubleshooting Guides	278
Weldon Flat Specs	280
Formulas	281
Definitions of Tool Coatings	282
SFM/RPM Conversion Charts	283
General Purpose Milling Guide - *fractional*	284
General Purpose Milling Guide - *metric*	285
High Performance Milling Guide - *fractional*	286
High Performance Milling Guide - *metric*	287
Aluminum High Performance Milling Guide	288
ARC High Performance Milling Guide	291
VHM High Performance Milling Guide - *fractional*	292
VHM High Performance Milling Guide - *metric*	293
VRX High Performance Milling Guide - *fractional*	294
VRX High Performance Milling Guide - *metric*	295
V4 High Speed Milling Guide - *fractional*	296
V4 High Speed Milling Guide - *metric*	297
V5 High Speed Milling Guide - *fractional*	298
V5 High Speed Milling Guide - *metric*	299
VRX-6 High Performance Milling Guide - *fractional*	300
VRX-6 High Performance Milling Guide - *metric*	301
VX-7 High Performance Milling Guide - *fractional*	302
VX-7 High Performance Milling Guide - *metric*	303
TMS/TMR High Performance Milling Guide - *fractional*	304
TMS/TMR High Performance Milling Guide - *metric*	305
TMS/TMR Chip Thinning Calculations - *fractional*	306
TMS/TMR Chip Thinning Calculations - *metric*	307
High Rc Finisher Milling Guide - *fractional*	308
High Rc Finisher Milling Guide - *metric*	309
Die Mold Cutter Milling Guide - *fractional*	310
Die Mold Cutter Milling Guide - *metric*	311
High Feed Milling Guide	312
Diamond Coated Milling Guide	313
Reaming Guide - *fractional*	314
Reaming Guide - *metric*	315
Drill Mills, Chamfering Milling Guide - *fractional*	316
Drill Mills, Chamfering Milling Guide - *metric*	317
Drill Mills, Through Hole Drilling Guide - *fractional*	318
Drill Mills, Through Hole Drilling Guide - *metric*	319
General Purpose Drilling Guide Bright Finish - *fractional*	320
General Purpose Drilling Guide Bright Finish - *metric*	322
General Purpose Drilling Guide Coated - *fractional*	324
General Purpose Drilling Guide Coated - *metric*	326
Mini Drills High Performance Drilling Guide - *fractional*	328
Mini Drills High Performance Drilling Guide - *metric*	329
HTD 12 High Performance Drilling Guide - *fractional*	330
HTD 12 High Performance Drilling Guide - *metric*	331
High Performance Drilling Guide - *fractional*	332
High Performance Drilling Guide - *metric*	333
3-Flute for Aluminum High Performance Drilling Guide	334
Parameters for Burrs	335
Material Hardness Conversion Chart	336
Decimal Equivalent Chart	337

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

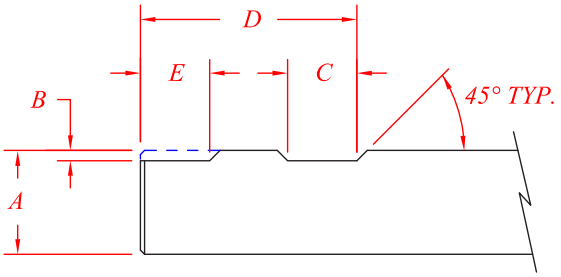
PROBLEM	SUGGESTIONS
Chipping	Check part rigidity
	Verify speeds and feeds
	Confirm concentricity of end mill in holder
	Decrease ramp angle or slow down approach
	Check coolant flow and location
Breakage	Decrease feed rate
	Decrease axial depth
	Use shorter tool or stub holder
	Resharpen earlier
Chattering	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

Weldon Flat Specs

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 306-307)

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"

Definitions of Tool Coatings on GARR TOOL Standard Products

TiN
(Titanium Nitride)

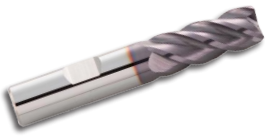
A general purpose coating, BALINIT® A has low heat resistance and good lubricity.

TiCN
(Titanium Carbonitride)

With good abrasion resistance, BALINIT® B is recommended for aluminum, brass and bronze applications. It has low heat resistance and good lubricity.

TiAlN
(Titanium Aluminum Nitride)

BALINIT® FUTURA is a multi-layer coating with good thermal stability for increased speeds and feeds. It is designed for semi-dry to dry cutting of most steels, high-nickel alloys, stainless steel and cast iron and has excellent heat resistance, good lubricity. It is useful in materials that are 40Rc and under.



AlTiN
(Aluminum Titanium Nitride)

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

ALUMASTAR®
(Titanium Diboride)

A thin film coating with a low affinity for aluminum, ALUMASTAR® is ideal for machining aluminum alloys. The resistance to adhesion of aluminum allows higher speeds or feeds. Its 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 Nitride)

Aluminum Chromium-based coatings have excellent wear resistance, thermal shock stability, and hot hardness. BALINIT® ALNOVA is well suited for Titanium, Inconel, and carbon fiber.

DURANA
(AlTiN-based with TiSiXN)

With a combination of AlTiN-based and TiSiXN layers, BALINIT® DURANA has a high degree of ductility and superior abrasive wear resistance even at extreme service temperatures, resulting in vastly improved performance during demanding machining operations and longer tool service life.

ALTINOS
(AlTiN-based)

This premium AlTiN-based coating, BALIQ® ALTINOS is highly wear-resistant, even at high operating temperatures, making it particularly beneficial even up to HRC 56. With its perfectly smooth surface, this coating offers significant performance advantages such as optimum chip removal and reduced built-up edge formation.

ALCRONOS
(AlCrN-based)

BALIQ® ALCRONOS, an AlCrN-based coating is considerably less prone to built-up edge formation. Its revolutionary smooth coating, with excellent adhesion to the substrate, ensures outstanding surfaces and high production quality, especially in ductile alloys like 300 series stainless and steels up to HRC 50.

SFM (M/Min.) / RPM Conversion Charts

	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

	DIAMETER														
	.0394"	.0787"	.1181"	.1575"	.1969"	.2362"	.3150"	.3937"	.4724"	.5512"	.6299"	.7087"	.7874"	.8661"	.9843"
	1.0mm	2.0mm	3.0mm	4.0mm	5.0mm	6.0mm	8.0mm	10.0mm	12.0mm	14.0mm	16.0mm	18.0mm	20.0mm	22.0mm	25.0mm
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

GARR TOOL General Purpose Milling Guide

	ISO Material	HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)									
				1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**												
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	60 - 90	.0004" - .0008"	.0004" - .0008"	.0004" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0018"	.0015" - .0030"	.0020" - .0030"	.0025" - .0035"	.0025" - .0035"
		> 40	50 - 80	.0003" - .0006"	.0003" - .0006"	.0003" - .0006"	.0003" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0025"	.0015" - .0020"	.0015" - .0020"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金												
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	55 - 90	.0004" - .0008"	.0004" - .0008"	.0004" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0018"	.0015" - .0030"	.0020" - .0030"	.0025" - .0035"	.0025" - .0035"
		> 40	45 - 80	.0003" - .0006"	.0003" - .0006"	.0003" - .0006"	.0003" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0025"	.0015" - .0020"	.0015" - .0020"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金												
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40	55 - 90	.0004" - .0008"	.0004" - .0008"	.0004" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0018"	.0015" - .0030"	.0020" - .0030"	.0025" - .0035"	.0025" - .0035"
		> 40	50 - 80	.0003" - .0006"	.0003" - .0006"	.0003" - .0006"	.0003" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0025"	.0015" - .0020"	.0015" - .0020"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金												
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		100 - 150	.0003" - .0008"	.0003" - .0008"	.0005" - .0012"	.0005" - .0012"	.0008" - .0015"	.0010" - .0015"	.0013" - .0020"	.0018" - .0025"	.0020" - .0030"	.0025" - .0035"
	5553 / Beta Titanium		90 - 120	.0003" - .0008"	.0003" - .0008"	.0004" - .0010"	.0004" - .0010"	.0005" - .0012"	.0008" - .0014"	.0010" - .0016"	.0010" - .0020"	.0015" - .0025"	.0015" - .0025"
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**												
	13/8, 15/5, 17-4, pH Types	< 40	100 - 150	.0002" - .0005"	.0003" - .0006"	.0003" - .0007"	.0006" - .0009"	.0008" - .0012"	.0013" - .0018"	.0010" - .0020"	.0012" - .0025"	.0012" - .0020"	.0020" - .0028"
		> 40	80 - 100	.0002" - .0004"	.0002" - .0004"	.0002" - .0006"	.0003" - .0007"	.0004" - .0008"	.0007" - .0012"	.0008" - .0015"	.0010" - .0016"	.0013" - .0017"	.0015" - .0020"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	100 - 150	.0003" - .0006"	.0003" - .0007"	.0005" - .0010"	.0008" - .0015"	.0009" - .0013"	.0010" - .0018"	.0015" - .0020"	.0018" - .0022"	.0018" - .0035"	.0023" - .0036"
		> 40	80 - 100	.0002" - .0004"	.0002" - .0005"	.0004" - .0007"	.0005" - .0010"	.0005" - .0010"	.0007" - .0010"	.0009" - .0015"	.0012" - .0018"	.0015" - .0025"	.0020" - .0030"
	400 Series - 403, 405, 420, 455	< 40	150 - 200	.0005" - .0008"	.0007" - .0010"	.0009" - .0015"	.0009" - .0014"	.0011" - .0015"	.0013" - .0018"	.0015" - .0025"	.0020" - .0035"	.0022" - .0040"	.0030" - .0046"
		> 40	100 - 150	.0003" - .0007"	.0004" - .0008"	.0006" - .0010"	.0007" - .0011"	.0008" - .0012"	.0009" - .0015"	.0012" - .0020"	.0018" - .0030"	.0020" - .0035"	.0024" - .0042"
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**												
	A2, D2, P20, H13, S7, O1	< 40	150 - 200	.0003" - .0008"	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"	.0022" - .0030"
		> 40	100 - 150	.0003" - .0005"	.0003" - .0005"	.0003" - .0008"	.0005" - .0010"	.0005" - .0010"	.0005" - .0010"	.0010" - .0015"	.0012" - .0018"	.0014" - .0020"	.0015" - .0022"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢												
	4140, 4340, 52100, 6150, 8620	< 40	150 - 200	.0003" - .0008"	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"	.0022" - .0030"
		> 40	100 - 150	.0003" - .0005"	.0003" - .0005"	.0003" - .0008"	.0005" - .0010"	.0005" - .0010"	.0005" - .0010"	.0010" - .0015"	.0012" - .0018"	.0014" - .0020"	.0015" - .0022"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢												
	1000's - 1018, 1020, 12L14	< 40	150 - 200	.0003" - .0008"	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"	.0022" - .0030"
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**												
	Ductile Iron		175 - 225	.0005" - .0008"	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	.0045" - .0055"
	Gray Iron		175 - 225	.0005" - .0008"	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	.0045" - .0055"
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**												
	Aluminum		300 - 500	.0003" - .0005"	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
	Magnesium		300 - 500	.0003" - .0005"	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
	Copper		250 - 450	.0003" - .0005"	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
	Brass, Bronze		200 - 400	.0003" - .0005"	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**												
	Fiberglass, Plastics, G10		200 - 400	.0003" - .0005"	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
	Graphite	(See Graphite Chart - page 313)											

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.

	ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz) 1,5mm	3,0mm	5,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**												
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	24 - 35 20 - 31	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,013 - 0,025 0,008 - 0,020	0,020 - 0,038 0,013 - 0,025	0,025 - 0,046 0,020 - 0,038	0,038 - 0,076 0,025 - 0,038	0,051 - 0,076 0,038 - 0,064	0,064 - 0,089 0,038 - 0,051	0,064 - 0,089 0,038 - 0,051
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金												
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	22 - 35 18 - 31	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,013 - 0,025 0,008 - 0,020	0,020 - 0,038 0,013 - 0,025	0,025 - 0,046 0,020 - 0,038	0,038 - 0,076 0,025 - 0,038	0,051 - 0,076 0,038 - 0,064	0,064 - 0,089 0,038 - 0,051	0,064 - 0,089 0,038 - 0,051
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金												
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	22 - 35 20 - 31	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,010 - 0,020 0,008 - 0,015	0,013 - 0,025 0,008 - 0,020	0,020 - 0,038 0,013 - 0,025	0,025 - 0,046 0,020 - 0,038	0,038 - 0,076 0,025 - 0,038	0,051 - 0,076 0,038 - 0,064	0,064 - 0,089 0,038 - 0,051	0,064 - 0,089 0,038 - 0,051
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金												
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		39 - 59	0,008 - 0,020	0,008 - 0,020	0,013 - 0,030	0,013 - 0,030	0,020 - 0,038	0,025 - 0,038	0,033 - 0,051	0,046 - 0,064	0,051 - 0,076	0,064 - 0,089
	5553 / Beta Titanium		35 - 47	0,008 - 0,020	0,008 - 0,020	0,010 -0,025	0,010 - 0,025	0,013 - 0,030	0,020 - 0,036	0,025 - 0,041	0,025 - 0,051	0,038 - 0,064	0,038 - 0,064
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**												
	13/8, 15/5, 17-4, pH Types	< 40 > 40	39 - 59 31 - 39	0,005 - 0,013 0,005 - 0,010	0,008 - 0,015 0,005 - 0,010	0,008 - 0,018 0,005 - 0,015	0,015 - 0,023 0,008 - 0,018	0,020 - 0,030 0,010 - 0,020	0,033 - 0,046 0,018 - 0,030	0,025 - 0,051 0,020 - 0,038	0,030 - 0,064 0,025 - 0,041	0,030 - 0,051 0,033 - 0,043	0,051 - 0,071 0,038 - 0,051
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	39 - 59 31 - 39	0,008 - 0,015 0,005 - 0,010	0,008 - 0,018 0,005 - 0,013	0,013 - 0,025 0,010 - 0,018	0,020 - 0,038 0,013 - 0,025	0,023 - 0,033 0,013 - 0,025	0,025 - 0,046 0,018 - 0,025	0,038 - 0,051 0,023 - 0,038	0,046 - 0,056 0,030 - 0,046	0,046 - 0,089 0,038 - 0,064	0,058 - 0,091 0,051 - 0,076
	400 Series - 403, 405, 420, 455	< 40 > 40	59 - 79 39 - 59	0,013 - 0,020 0,008 - 0,018	0,018 - 0,025 0,010 - 0,020	0,023 - 0,038 0,015 - 0,025	0,023 - 0,036 0,018 - 0,028	0,028 - 0,038 0,020 - 0,030	0,033 - 0,046 0,023 - 0,038	0,038 - 0,064 0,030 - 0,051	0,051 - 0,089 0,046 - 0,076	0,056 - 0,102 0,051 - 0,089	0,076 - 0,117 0,061 - 0,107
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**												
	A2, D2, P20, H13, S7, O1	< 40 > 40	59 - 79 39 - 59	0,008 - 0,020 0,008 - 0,013	0,008 - 0,020 0,008 - 0,013	0,013 - 0,025 0,008 - 0,020	0,025 - 0,038 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,036 - 0,061 0,025 - 0,038	0,046 - 0,066 0,030 - 0,046	0,051 - 0,071 0,036 - 0,051	0,056 - 0,076 0,038 - 0,056
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢												
	4140, 4340, 52100, 6150, 8620	< 40 > 40	59 - 79 39 - 59	0,008 - 0,020 0,008 - 0,013	0,008 - 0,020 0,008 - 0,013	0,013 - 0,025 0,008 - 0,020	0,025 - 0,038 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,030 - 0,051 0,013 - 0,025	0,036 - 0,061 0,025 - 0,038	0,046 - 0,066 0,030 - 0,046	0,051 - 0,071 0,036 - 0,051	0,056 - 0,076 0,038 - 0,056
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢												
	1000's - 1018, 1020, 12L14	< 40	59 - 79	0,008 - 0,020	0,008 - 0,020	0,013 - 0,025	0,025 - 0,038	0,030 - 0,051	0,030 - 0,051	0,036 - 0,061	0,046 - 0,066	0,051 - 0,071	0,056 - 0,076
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**												
	Ductile Iron		69 - 89	0,013 - 0,020	0,020 - 0,031	0,025 - 0,038	0,038 - 0,064	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,089 - 0,114	0,089 - 0,114	0,114 - 0,140
	Gray Iron		69 - 89	0,013 - 0,020	0,020 - 0,031	0,025 - 0,038	0,038 - 0,064	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,089 - 0,114	0,089 - 0,114	0,114 - 0,140
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**												
	Aluminum		118 - 197	0,008 - 0,013	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Magnesium		118 - 197	0,008 - 0,013	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Copper		98 - 177	0,008 - 0,013	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Brass, Bronze		79 - 157	0,008 - 0,013	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**												
	Fiberglass, Plastics, G10		79 - 157	0,008 - 0,013	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Graphite	(See Graphite Chart - page 313)											

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.

GARR TOOL High Performance Milling Guide for 246MA, 253MA, 255MA, 263MA

	ISO Material	HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)								
				1/8″	3/16″	1/4″	5/16″	3/8″	1/2″	5/8″	3/4″	1″
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**											
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	70 - 110	.0008″ - .0020″	.0004″ - .0010″	.0007″ - .0012″	.0010″ - .0018″	.0010″ - .0020″	.0018″ - .0028″	.0023″ - .0031″	.0027″ - .0034″	.0029″ - .0036″
		> 40	50 - 90	.0005″ - .0015″	.0004″ - .0007″	.0005″ - .0011″	.0008″ - .0014″	.0010″ - .0017″	.0015″ - .0025″	.0021″ - .0028″	.0024″ - .0030″	.0025″ - .0031″
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金											
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	65 - 110	.0005″ - .0009″	.0005″ - .0009″	.0007″ - .0013″	.0010″ - .0017″	.0010″ - .0020″	.0020″ - .0028″	.0025″ - .0032″	.0029″ - .0036″	.0030″ - .0038″
		> 40	55 - 90	.0003″ - .0008″	.0004″ - .0007″	.0007″ - .0012″	.0009″ - .0015″	.0010″ - .0018″	.0015″ - .0025″	.0022″ - .0030″	.0026″ - .0033″	.0029″ - .0035″
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金											
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40	65 - 110	.0005″ - .0010″	.0008″ - .0010″	.0006″ - .0012″	.0007″ - .0015″	.0011″ - .0016″	.0018″ - .0026″	.0025″ - .0030″	.0026″ - .0034″	.0032″ - .0038″
		> 40	55 - 90	.0003″ - .0008″	.0004″ - .0008″	.0005″ - .0010″	.0006″ - .0013″	.0008″ - .0014″	.0013″ - .0023″	.0022″ - .0028″	.0025″ - .0031″	.0030″ - .0035″
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金											
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		125 - 175	.0005″ - .0010″	.0005″ - .0012″	.0008″ - .0015″	.0010″ - .0022″	.0018″ - .0027″	.0023″ - .0032″	.0025″ - .0033″	.0027″ - .0035″	.0028″ - .0037″
	5553 / Beta Titanium		100 - 150	.0004″ - .0010″	.0004″ - .0010″	.0006″ - .0014″	.0008″ - .0017″	.0015″ - .0025″	.0022″ - .0028″	.0024″ - .0030″	.0026″ - .0032″	.0028″ - .0035″
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**											
	13/8, 15/5, 17-4, PH Types	< 40	175 - 225	.0005″ - .0007″	.0004″ - .0008″	.0007″ - .0010″	.0008″ - .0012″	.0013″ - .0018″	.0010″ - .0020″	.0012″ - .0025″	.0012″ - .0020″	.0020″ - .0028″
		> 40	135 - 175	.0002″ - .0004″	.0002″ - .0006″	.0003″ - .0007″	.0004″ - .0008″	.0007″ - .0012″	.0008″ - .0015″	.0010″ - .0016″	.0013″ - .0017″	.0015″ - .0020″
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	200 - 225	.0003″ - .0007″	.0005″ - .0010″	.0008″ - .0015″	.0009″ - .0013″	.0010″ - .0018″	.0015″ - .0020″	.0018″ - .0022″	.0018″ - .0035″	.0023″ - .0036″
		> 40	155 - 200	.0002″ - .0005″	.0004″ - .0007″	.0005″ - .0010″	.0005″ - .0010″	.0007″ - .0010″	.0009″ - .0015″	.0012″ - .0018″	.0015″ - .0025″	.0020″ - .0030″
	400 Series - 403, 405, 420, 455	< 40	200 - 225	.0007″ - .0010″	.0009″ - .0015″	.0009″ - .0014″	.0011″ - .0015″	.0013″ - .0018″	.0015″ - .0025″	.0020″ - .0035″	.0022″ - .0040″	.0030″ - .0046″
		> 40	150 - 200	.0004″ - .0008″	.0006″ - .0010″	.0007″ - .0011″	.0008″ - .0012″	.0009″ - .0015″	.0012″ - .0020″	.0018″ - .0030″	.0020″ - .0035″	.0024″ - .0042″
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**											
	A2, D2, P20, H13, S2, O1	< 40	225 - 325	.0005″ - .0008″	.0008″ - .0015″	.0015″ - .0020″	.0015″ - .0023″	.0015″ - .0025″	.0020″ - .0030″	.0020″ - .0030″	.0025″ - .0035″	.0030″ - .0040″
		> 40	150 - 225	.0003″ - .0005″	.0005″ - .0010″	.0008″ - .0012″	.0010″ - .0015″	.0010″ - .0018″	.0015″ - .0020″	.0015″ - .0020″	.0018″ - .0025″	.0020″ - .0030″
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢											
	4140, 4340, 52100, 6150, 8620	< 40	225 - 325	.0005″ - .0008″	.0008″ - .0015″	.0015″ - .0020″	.0015″ - .0023″	.0015″ - .0025″	.0020″ - .0030″	.0020″ - .0030″	.0025″ - .0035″	.0030″ - .0040″
		> 40	150 - 225	.0003″ - .0005″	.0005″ - .0010″	.0008″ - .0012″	.0010″ - .0015″	.0010″ - .0018″	.0015″ - .0020″	.0015″ - .0020″	.0018″ - .0025″	.0020″ - .0030″
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢											
	1000's - 1018, 1020, 12L14	< 40	225 - 325	.0005″ - .0008″	.0008″ - .0015″	.0015″ - .0020″	.0015″ - .0023″	.0015″ - .0025″	.0020″ - .0030″	.0020″ - .0030″	.0025″ - .0035″	.0030″ - .0040″
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**											
	Ductile Iron		225 - 325	.0010″ - .0015″	.0015″ - .0020″	.0020″ - .0030″	.0025″ - .0035″	.0025″ - .0035″	.0030″ - .0045″	.0040″ - .0050″	.0040″ - .0050″	.0050″ - .0060″
	Gray Iron		300 - 400	.0015″ - .0025″	.0020″ - .0030″	.0025″ - .0035″	.0030″ - .0040″	.0030″ - .0040″	.0040″ - .0050″	.0050″ - .0060″	.0060″ - .0070″	.0060″ - .0070″
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**											
	Aluminum		300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
	Magnesium		300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
	Copper		250 - 450	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
	Brass, Bronze		200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**											
	Fiberglass, Plastics, G10		200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	.0068" - .0090"
	Graphite	(See Graphite Chart - page 313)										

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.

GARR TOOL High Performance Milling Guide for 846MA, 853MA, 855MA, 863MA

	ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)							
				3,0mm	5,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**											
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	28 - 43 20 - 35	0,020 - 0,051 0,013 - 0,038	0,010 - 0,025 0,010 - 0,018	0,018 - 0,030 0,013 - 0,028	0,025 - 0,046 0,020 - 0,036	0,025 - 0,051 0,025 - 0,043	0,046 - 0,071 0,038 - 0,064	0,058 - 0,079 0,053 - 0,071	0,069 - 0,086 0,061 - 0,076	0,074 - 0,091 0,064 - 0,079
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金											
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	26 - 43 22 - 35	0,013 - 0,023 0,008 - 0,020	0,013 - 0,023 0,010 - 0,018	0,018 - 0,033 0,018 - 0,030	0,025 - 0,041 0,023 - 0,038	0,025 - 0,051 0,025 - 0,046	0,051 - 0,071 0,038 - 0,064	0,064 - 0,081 0,056 - 0,076	0,074 - 0,091 0,066 - 0,084	0,076 - 0,097 0,074 - 0,089
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金											
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	26 - 43 22 - 35	0,013 - 0,025 0,008 - 0,020	0,020 - 0,025 0,010 - 0,020	0,015 - 0,030 0,013 - 0,025	0,018 - 0,038 0,015 - 0,033	0,028 - 0,041 0,020 - 0,036	0,046 - 0,066 0,033 - 0,058	0,064 - 0,076 0,056 - 0,071	0,066 - 0,086 0,064 - 0,079	0,081 - 0,097 0,076 - 0,089
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金											
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		49 - 69	0,013 - 0,025	0,013 - 0,030	0,020 - 0,038	0,025 - 0,056	0,046 - 0,069	0,058 - 0,081	0,064 - 0,084	0,069 - 0,089	0,071 - 0,094
	5553 / Beta Titanium		39 - 59	0,010 - 0,025	0,010 - 0,025	0,015 - 0,036	0,020 - 0,041	0,038 - 0,064	0,056 - 0,071	0,061 - 0,076	0,066 - 0,081	0,071 - 0,089
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**											
	13/8, 15/5, 17-4, PH Types	< 40 > 40	69 - 89 53 - 69	0,013 - 0,018 0,005 - 0,010	0,010 - 0,020 0,005 - 0,015	0,018 - 0,025 0,007 - 0,018	0,020 - 0,030 0,010 - 0,020	0,033 - 0,046 0,018 - 0,030	0,025 - 0,051 0,020 - 0,038	0,030 - 0,064 0,025 - 0,041	0,030 - 0,051 0,033 - 0,043	0,051 - 0,071 0,038 - 0,051
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	79 - 89 61 - 79	0,008 - 0,018 0,005 - 0,013	0,013 - 0,025 0,010 - 0,018	0,020 - 0,038 0,013 - 0,025	0,023 - 0,033 0,013 - 0,025	0,025 - 0,046 0,018 - 0,025	0,038 - 0,051 0,023 - 0,038	0,046 - 0,056 0,030 - 0,046	0,046 - 0,089 0,038 - 0,064	0,058 - 0,091 0,051 - 0,076
	400 Series - 403, 405, 420, 455	< 40 > 40	79 - 89 59 - 79	0,018 - 0,025 0,010 - 0,020	0,023 - 0,038 0,015 - 0,025	0,023 - 0,036 0,018 - 0,028	0,028 - 0,038 0,020 - 0,030	0,033 - 0,046 0,023 - 0,038	0,038 - 0,064 0,030 - 0,051	0,051 - 0,089 0,046 - 0,076	0,056 - 0,102 0,051 - 0,089	0,076 - 0,117 0,061 - 0,107
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**											
	A2, D2, P20, H13, S2, O1	< 40 > 40	89 - 128 59 - 89	0,013 - 0,020 0,008 - 0,013	0,020 - 0,038 0,013 - 0,025	0,038 - 0,051 0,020 - 0,030	0,038 - 0,058 0,025 - 0,038	0,038 - 0,064 0,025 - 0,046	0,051 - 0,076 0,038 - 0,051	0,051 - 0,076 0,038 - 0,051	0,064 - 0,089 0,046 - 0,064	0,076 - 0,102 0,051 - 0,076
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢											
	4140, 4340, 52100, 6150, 8620	< 40 > 40	89 - 128 59 - 89	0,013 - 0,020 0,008 - 0,013	0,020 - 0,038 0,013 - 0,025	0,038 - 0,051 0,020 - 0,030	0,038 - 0,058 0,025 - 0,038	0,038 - 0,064 0,025 - 0,046	0,051 - 0,076 0,038 - 0,051	0,051 - 0,076 0,038 - 0,051	0,064 - 0,089 0,046 - 0,064	0,076 - 0,102 0,051 - 0,076
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢											
	1000's - 1018, 1020, 12L14	< 40	89 - 128	0,013 - 0,020	0,020 - 0,038	0,038 - 0,051	0,038 - 0,058	0,038 - 0,064	0,051 - 0,076	0,051 - 0,076	0,064 - 0,089	0,076 - 0,102
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**											
	Ductile Iron		89 - 128	0,025 - 0,038	0,038 - 0,051	0,051 - 0,076	0,064 - 0,089	0,064 - 0,089	0,076 - 0,114	0,102 - 0,127	0,102 - 0,127	0,127 - 0,152
	Gray Iron		118 - 157	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,076 - 0,102	0,076 - 0,102	0,102 - 0,127	0,127 - 0,152	0,152 - 0,178	0,152 - 0,178
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**											
	Aluminum		118 - 197	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Magnesium		118 - 197	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Copper		98 - 177	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Brass, Bronze		79 - 157	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**											
	Fiberglass, Plastics, G10		79 - 157	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178	0,173 - 0,229
	Graphite	(See Graphite Chart - page 313)										

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.

GARR TOOL Milling Guide for Aluminum (Machining Centers with Low-Range HP/Torque)

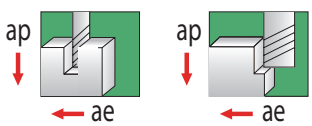
Series 242M/842M/A3 End Mills

NOTES: **Spindle interface must be scrutinized when using 5/8" diameter and larger end mills**

	SLOTTING		PROFILING
	Axial = .5xD	Axial = 1xD	Axial ≤ 1xD Radial ≤ .5xD
	SFM = 400 - 600	SFM = 300 - 450	SFM = 500 - 650
Diameter	CPT (Fz) = .5% - 1.5% of diameter	CPT (Fz) = .5% - 1% of diameter	CPT (Fz) = 1% - 2% of diameter
1/8"	.0006" - .0018"	.0006" - .0012"	.0012" - .0024"
3/16"	.0009" - .0028"	.0009" - .0018"	.0018" - .0036"
1/4"	.0013" - .0038"	.0013" - .0025"	.0025" - .0050"
5/16"	.0016" - .0047"	.0016" - .0031"	.0031" - .0062"
3/8"	.0019" - .0056"	.0019" - .0037"	.0037" - .0074"
1/2"	.0025" - .0075"	.0025" - .0050"	.0050" - .0100"
5/8"	.0031" - .0094"	.0031" - .0062"	.0062" - .0120"
3/4"	.0038" - .0110"	.0038" - .0075"	.0075" - .0150"
1"	.0050" - .0150"	.0050" - .0100"	.0100" - .0200"

	SLOTTING		PROFILING
	Axial = .5xD	Axial = 1xD	Axial ≤ 1xD Radial ≤ 0.5xD
	M/Min. = 125 - 180	M/Min. = 90 - 140	M/Min. = 150 - 200
Diameter	CPT (Fz) = .5% - 1.5% of diameter	CPT (Fz) = .5% - 1% of diameter	CPT (Fz) = 1% - 2% of diameter
3,0mm	0,015 - 0,045	0,015 - 0,030	0,030 - 0,060
4,0mm	0,020 - 0,060	0,020 - 0,040	0,040 - 0,080
6,0mm	0,030 - 0,090	0,030 - 0,060	0,060 - 0,120
8,0mm	0,040 - 0,120	0,040 - 0,080	0,080 - 0,160
10,0mm	0,050 - 0,150	0,050 - 0,100	0,100 - 0,200
12,0mm	0,060 - 0,180	0,060 - 0,120	0,120 - 0,240
16,0mm	0,080 - 0,240	0,080 - 0,160	0,160 - 0,320
20,0mm	0,100 - 0,300	0,100 - 0,200	0,200 - 0,400
25,0mm	0,125 - 0,375	0,125 - 0,250	0,250 - 0,500

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



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

GARR TOOL Milling Guide for Aluminum (Machining Centers with Mid-Range HP/Torque)

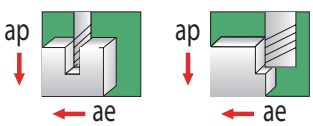
Series 142M/143M/A3 End Mills

NOTES: In cases for tools with slower SFM (M/Min.), reference Series 242M/842M
Spindle interface must be scrutinized when using 5/8" diameter and larger end mills

	SLOTTING		PROFILING
	Axial = .5xD	Axial = 1xD	Axial ≤ 1xD Radial ≤ .5xD
	SFM = 1500 - 2000	SFM = 750 - 1500	SFM = 1500 - 2000
Diameter	CPT (Fz) = 1.5% - 2.5% of diameter	CPT (Fz) = 1% - 2% of diameter	CPT (Fz) = 1.5% - 2.5% of diameter
1/8"	.0019" - .0031"	.0013" - .0025"	.0019" - .0031"
3/16"	.0028" - .0047"	.0018" - .0037"	.0028" - .0047"
1/4"	.0037" - .0062"	.0025" - .0050"	.0037" - .0062"
5/16"	.0052" - .0078"	.0031" - .0062"	.0052" - .0078"
3/8"	.0055" - .0094"	.0037" - .0074"	.0055" - .0094"
1/2"	.0075" - .0125"	.0050" - .0100"	.0075" - .0125"
5/8"	.0093" - .0156"	.0062" - .0125"	.0093" - .0156"
3/4"	.0112" - .0188"	.0075" - .0150"	.0112" - .0188"
1"	.0150" - .0250"	.0100" - .0200"	.0150" - .0250"

	SLOTTING		PROFILING
	Axial = .5xD	Axial = 1xD	Axial ≤ 1xD Radial ≤ 0.5xD
	M/Min. = 450 - 760	M/Min. = 225 - 450	M/Min. = 450 - 760
Diameter	CPT (Fz) = 1.5% - 2.5% of diameter	CPT (Fz) = 1% - 2% of diameter	CPT (Fz) = 1.5% - 2.5% of diameter
3,0mm	0,045 - 0,075	0,030 - 0,060	0,045 - 0,075
4,0mm	0,060 - 0,100	0,040 - 0,080	0,060 - 0,100
6,0mm	0,090 - 0,150	0,060 - 0,120	0,090 - 0,150
8,0mm	0,120 - 0,200	0,080 - 0,160	0,120 - 0,200
10,0mm	0,150 - 0,250	0,100 - 0,200	0,150 - 0,250
12,0mm	0,180 - 0,300	0,120 - 0,240	0,180 - 0,300
16,0mm	0,240 - 0,400	0,160 - 0,320	0,240 - 0,400
20,0mm	0,300 - 0,500	0,200 - 0,400	0,300 - 0,500
25,0mm	0,375 - 0,625	0,250 - 0,500	0,375 - 0,625

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



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

GARR TOOL Milling Guide for Aluminum (Machining Centers with High-Range HP/Torque)

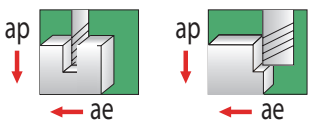
Series A3 End Mills

NOTES: Contact your OEM for your machine's optimal running parameters
CPT parameters shown are for 2xD LOC tooling and 2.5xD Reach Lengths
Spindle interface must be scrutinized when using 5/8" diameter and larger end mills
Preferred tool holders: Rego Fix powRgrip or Shrink Fit

	SLOTTING		PROFILING	FINISHING
	Axial = .5xD	Axial = 1xD	Axial = 2xD Radial = 30%-40%xD	Axial = Max LOC Radial = 2.5%xD
	SFM = Maximum RPM	SFM = Maximum RPM	SFM = Maximum RPM	SFM = up to 80% Max RPM
Diameter	CPT (Fz) = 1.5% - 3% of diameter	CPT (Fz) = 1% - 2% of diameter	CPT (Fz) = 2% - 3% of diameter	CPT (Fz) = 1% of diameter
3/16"	.0028" - .0056"	.0018" - .0037"	.0037" - .0056"	.0018"
1/4"	.0037" - .0074"	.0025" - .0050"	.0050" - .0075"	.0025"
5/16"	.0052" - .0104"	.0031" - .0062"	.0062" - .0094"	.0031"
3/8"	.0055" - .0110"	.0037" - .0074"	.0075" - .0112"	.0037"
1/2"	.0075" - .0150"	.0050" - .0100"	.0100" - .0150"	.0050"
5/8"	.0093" - .0186"	.0062" - .0125"	.0125" - .0187"	.0062"
3/4"	.0112" - .0224"	.0075" - .0150"	.0150" - .0225"	.0075"
1"	.0150" - .0300"	.0100" - .0200"	.0200" - .0300"	.0100"

	SLOTTING		PROFILING	FINISHING
	Axial = .5xD	Axial = 1xD	Axial = 2xD Radial = 30%-40%xD	Axial = Max LOC Radial = 2.5%xD
	M/Min. = Maximum RPM	M/Min. = Maximum RPM	M/Min. = Maximum RPM	M/Min. = up to 80% Max RPM
Diameter	CPT (Fz) = 1.5% - 3% of diameter	CPT (Fz) = 1% - 2% of diameter	CPT (Fz) = 2% - 3% of diameter	CPT (Fz) = 1% of diameter
4,0mm	0,060 - 0,120	0,040 - 0,080	0,080 - 0,120	0,040
6,0mm	0,090 - 0,180	0,060 - 0,120	0,120 - 0,180	0,060
8,0mm	0,120 - 0,240	0,080 - 0,160	0,160 - 0,240	0,080
10,0mm	0,150 - 0,300	0,100 - 0,200	0,200 - 0,300	0,100
12,0mm	0,180 - 0,360	0,120 - 0,240	0,240 - 0,360	0,120
16,0mm	0,240 - 0,480	0,160 - 0,320	0,320 - 0,480	0,160
20,0mm	0,300 - 0,600	0,200 - 0,400	0,400 - 0,600	0,200
25,0mm	0,375 - 0,750	0,250 - 0,500	0,500 - 0,750	0,250

	Slotting Pocket Milling	Profiling Side Milling
Axial (ap)	up to 1xD	up to 2xD
Radial (ae)	1xD	up to 50% of Dia.



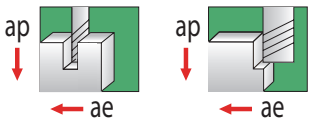
NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for ARC Series 3-Flute Rougher

	ISO Material	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)							
			3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
S	**TITANIUM ALLOYS** / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Titanium: 6AL4V, CP	150 - 250	.0005" - .0008"	.0007" - .0010"	.0008" - .0013"	.0012" - .0018"	.0015" - .0023"	.0018" - .0028"	.0020" - .0035"	.0025" - .0045"
N	**NON-FERROUS** / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属									
	Aluminum	700 - 1000	.0010" - .0020"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0030" - .0040"	.0040" - .0050"	.0050" - .0060"	.0060" - .0070
	Copper, Brass, Bronze	300 - 500	.0008" - .0013"	.0012" - .0018"	.0015" - .0023"	.0018" - .0028"	.0020" - .0035"	.0025" - .0045"	.0030" - .0050"	.0040" - .0060"

	ISO Material	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)							
			4,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	**TITANIUM ALLOYS** / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Titanium: 6AL4V, CP	40 - 80	0,010 - 0,020	0,015 - 0,025	0,020 - 0,035	0,025 - 0,050	0,035 - 0,055	0,045 - 0,075	0,050 - 0,090	0,060 - 0,115
N	**NON-FERROUS** / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属									
	Aluminum	200 - 350	0,025 - 0,050	0,040 - 0,065	0,050 - 0,075	0,060 - 0,090	0,075 - 0,100	0,100 - 0,125	0,125 - 0,150	0,150 - 0,180
	Copper, Brass, Bronze	80 - 150	0,020 - 0,035	0,025 - 0,050	0,035 - 0,055	0,045 - 0,075	0,050 - 0,090	0,060 - 0,115	0,075 - 0,125	0,100 - 0,150

	Slotting	Profiling
Axial (ap)	1xD	2xD
Radial (ae)	1xD	0.5xD



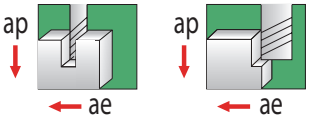
ARC SERIES TOOLS ARE NOT DESIGNED FOR OVER 28Rc MATERIALS

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

GARR TOOL Milling Guide for VHM Series 4-Flute Rougher

ISO Material		SFM (Vc)	CHIPLOAD PER TOOTH (Fz)							
			3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
S	**NICKEL BASE ALLOYS**									
	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 ALLOYS									
	Titanium: 6AL4V, CP	150 - 200	.0008" - .0010"	.0010" - .0015"	.0010" - .0020"	.0015" - .0020"	.0020" - .0030"	.0025" - .0030"	.0030" - .0035"	.0030" - .0040"
M	**STAINLESS STEELS**									
	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"
P	**HIGH STRENGTH TOOL STEELS**									
	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"
	CARBON STEELS									
	Carbon Steels: 1000 Series	275 - 425	.0006" - .0008"	.0008" - .0012"	.0010" - .0015"	.0010" - .0020"	.0015" - .0025"	.0020" - .0025"	.0020" - .0030"	.0025" - .0035"
K	**CAST MATERIAL**									
	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



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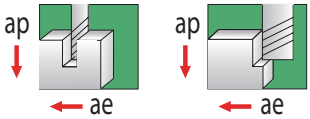
GARR TOOL Milling Guide for VHM Series 4-Flute Rougher

	ISO Material	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)							
			4.0mm	5.0mm	6.0mm	8.0mm	10.0mm	12.0mm	16.0mm	20.0mm	25.0mm
S	**NICKEL BASE ALLOYS**										
	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 ALLOYS										
	Titanium: 6AL4V, CP	45 - 60	.010 - .020	.020 - .025	.025 - .038	.025 - .050	.038 - .050	.050 - .076	.063 - .076	.076 - .089	.076 - .102
M	**STAINLESS STEELS**										
	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, 8620, 17/4, 15/5, 13/8, PH Mat'l	60 - 75	.008 - .015	.015 - .020	.018 - .025	.020 - .025	.025 - .038	.025 - .050	.038 - .063	.050 - .076	.050 - .076
P	**HIGH STRENGTH TOOL STEELS**										
	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
	CARBON STEELS										
	Carbon Steels: 1000 Series	85 - 130	.008 - .015	.015 - .020	.020 - .030	.025 - .038	.025 - .050	.038 - .063	.050 - .063	.050 - .076	.063 - .089
K	**CAST MATERIAL**										
	Cast Iron	125 - 150	.013 - .025	.025 - .050	.025 - .050	.038 - .050	.038 - .063	.050 - .089	.063 - .089	.076 - .102	.102 - .127

	Slotting	Profiling
Axial (ap)	0.5xD	2xD
Radial (ae)	1xD	0.2xD



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

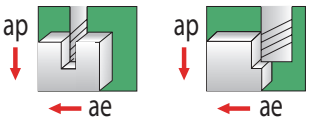
GARR TOOL High Performance Milling Guide for VRX

NOTE - DATA DOES NOT REFLECT CHIP THINNING

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)									
				1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**												
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	75 - 150	.0003" - .0006"	.0004" - .0007"	.0005" - .0008"	.0007" - .0012"	.0008" - .0015"	.0010" - .0019"	.0014" - .0024"	.0016" - .0030"	.0020" - .0038"	.0028" - .0048"
		> 40	60 - 125	.0003" - .0005"	.0003" - .0006"	.0004" - .0007"	.0006" - .0010"	.0007" - .0013"	.0009" - .0017"	.0012" - .0020"	.0014" - .0026"	.0018" - .0034"	.0024" - .0040"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金												
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	75 - 150	.0003" - .0006"	.0004" - .0007"	.0005" - .0008"	.0007" - .0012"	.0008" - .0015"	.0010" - .0019"	.0014" - .0024"	.0016" - .0030"	.0020" - .0038"	.0028" - .0048"
		> 40	60 - 125	.0003" - .0005"	.0003" - .0006"	.0004" - .0007"	.0006" - .0010"	.0007" - .0013"	.0009" - .0017"	.0012" - .0020"	.0014" - .0026"	.0018" - .0034"	.0024" - .0040"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金												
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40	75 - 150	.0003" - .0006"	.0004" - .0007"	.0005" - .0008"	.0007" - .0012"	.0008" - .0015"	.0010" - .0019"	.0014" - .0024"	.0016" - .0030"	.0020" - .0038"	.0028" - .0048"
		> 40	60 - 125	.0003" - .0005"	.0003" - .0006"	.0004" - .0007"	.0006" - .0010"	.0007" - .0013"	.0009" - .0017"	.0012" - .0020"	.0014" - .0026"	.0018" - .0034"	.0024" - .0040"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金												
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		175 - 300	.0003" - .0006"	.0004" - .0007"	.0005" - .0008"	.0007" - .0014"	.0008" - .0017"	.0010" - .0021"	.0014" - .0028"	.0016" - .0034"	.0020" - .0042"	.0028" - .0056"
	5553 / Beta Titanium		125 - 225	.0003" - .0006"	.0003" - .0007"	.0004" - .0008"	.0007" - .0012"	.0008" - .0015"	.0010" - .0019"	.0014" - .0024"	.0016" - .0030"	.0020" - .0038"	.0028" - .0048"
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**												
	13/8, 15/5, 17-4, pH Types	< 40	175 - 300	.0003" - .0006"	.0004" - .0007"	.0005" - .0008"	.0007" - .0012"	.0008" - .0015"	.0010" - .0019"	.0014" - .0024"	.0016" - .0030"	.0020" - .0038"	.0028" - .0048"
		> 40	150 - 225	.0003" - .0005"	.0003" - .0006"	.0004" - .0007"	.0006" - .0010"	.0007" - .0013"	.0009" - .0017"	.0012" - .0020"	.0014" - .0026"	.0018" - .0034"	.0022" - .0040"
	300 Series, 304L, Nitronic 50 Duplex, Super-Austenitic	< 40	200 - 325	.0003" - .0006"	.0004" - .0007"	.0005" - .0008"	.0007" - .0012"	.0008" - .0015"	.0010" - .0019"	.0014" - .0024"	.0016" - .0030"	.0020" - .0038"	.0028" - .0048"
		> 40	175 - 250	.0003" - .0005"	.0003" - .0006"	.0004" - .0007"	.0006" - .0011"	.0007" - .0014"	.0009" - .0018"	.0012" - .0022"	.0014" - .0028"	.0018" - .0036"	.0024" - .0044"
	400 Series - 403, 405, 420, 455	< 40	225 - 350	.0003" - .0006"	.0004" - .0007"	.0005" - .0008"	.0007" - .0013"	.0008" - .0016"	.0010" - .0020"	.0014" - .0026"	.0016" - .0032"	.0024" - .0043"	.0028" - .0052"
		> 40	175 - 250	.0003" - .0005"	.0003" - .0006"	.0004" - .0007"	.0006" - .0011"	.0007" - .0014"	.0009" - .0018"	.0012" - .0022"	.0014" - .0028"	.0018" - .0036"	.0024" - .0044"
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**												
	A2, D2, P20, H13, S7, O1	< 40	175 - 300	.0004" - .0007"	.0005" - .0008"	.0006" - .0010"	.0008" - .0013"	.0009" - .0016"	.0011" - .0020"	.0016" - .0026"	.0018" - .0032"	.0022" - .0040"	.0032" - .0052"
		> 40	125 - 275	.0003" - .0005"	.0003" - .0005"	.0005" - .0008"	.0007" - .0010"	.0008" - .0013"	.0010" - .0017"	.0014" - .0020"	.0016" - .0026"	.0020" - .0034"	.0028" - .0040"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢												
	4140, 4340, 52100, 6150, 8620	< 40	250 - 400	.0004" - .0007"	.0005" - .0008"	.0006" - .0010"	.0008" - .0014"	.0009" - .0017"	.0011" - .0021"	.0016" - .0026"	.0018" - .0034"	.0022" - .0042"	.0032" - .0056"
		> 40	225 - 300	.0003" - .0005"	.0003" - .0005"	.0005" - .0008"	.0007" - .0011"	.0008" - .0014"	.0010" - .0018"	.0014" - .0022"	.0016" - .0028"	.0020" - .0036"	.0028" - .0044"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢												
	1000's - 1018, 1020, 12L14	< 40	300 - 425	.0004" - .0007"	.0005" - .0008"	.0006" - .0010"	.0008" - .0015"	.0009" - .0018"	.0011" - .0022"	.0016" - .0030"	.0018" - .0036"	.0022" - .0044"	.0032" - .0060"
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**												
	Ductile Iron		300 - 425	.0004" - .0007"	.0005" - .0008"	.0006" - .0010"	.0009" - .0016"	.0010" - .0019"	.0012" - .0023"	.0018" - .0032"	.0020" - .0038"	.0024" - .0046"	.0036" - .0064"
	Gray Iron		325 - 475	.0005" - .0008"	.0007" - .0010"	.0007" - .0012"	.0010" - .0017"	.0011" - .0020"	.0013" - .0024"	.0020" - .0034"	.0022" - .0040"	.0026" - .0048"	.0040" - .0068"

	Slotting Pocket Milling	Profiling Side Milling
Axial (ap)	up to 1.5xD	up to 2xD
Radial (ae)	1xD	5% - 15% of Dia.



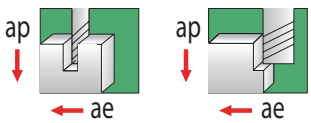
NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

NOTE - DATA DOES NOT REFLECT CHIP THINNING

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS

	ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz) 1,5mm	3,0mm	5,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**												
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	25 - 45	0,008 - 0,015	0,010 - 0,018	0,013 - 0,020	0,018 - 0,030	0,020 - 0,038	0,025 - 0,048	0,036 - 0,061	0,041 - 0,076	0,051 - 0,097	0,071 - 0,122
		> 40	20 - 40	0,008 - 0,012	0,008 - 0,015	0,010 - 0,018	0,015 - 0,025	0,018 - 0,033	0,023 - 0,043	0,030 - 0,051	0,036 - 0,066	0,046 - 0,086	0,061 - 0,102
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金												
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	25 - 45	0,008 - 0,015	0,010 - 0,018	0,013 - 0,020	0,018 - 0,030	0,020 - 0,038	0,025 - 0,048	0,036 - 0,061	0,041 - 0,076	0,051 - 0,097	0,071 - 0,122
		> 40	20 - 40	0,008 - 0,012	0,008 - 0,015	0,010 - 0,018	0,015 - 0,025	0,018 - 0,033	0,023 - 0,043	0,030 - 0,051	0,036 - 0,066	0,046 - 0,086	0,061 - 0,102
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金												
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40	25 - 45	0,008 - 0,015	0,010 - 0,018	0,013 - 0,020	0,018 - 0,030	0,020 - 0,038	0,025 - 0,048	0,036 - 0,061	0,041 - 0,076	0,051 - 0,097	0,071 - 0,122
		> 40	20 - 40	0,008 - 0,012	0,008 - 0,015	0,010 - 0,018	0,015 - 0,025	0,018 - 0,033	0,023 - 0,043	0,030 - 0,051	0,036 - 0,066	0,046 - 0,086	0,061 - 0,102
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金												
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		55 - 90	0,008 - 0,015	0,010 - 0,018	0,013 - 0,020	0,018 - 0,036	0,020 - 0,043	0,025 - 0,053	0,036 - 0,071	0,041 - 0,086	0,051 - 0,107	0,071 - 0,142
	5553 / Beta Titanium		40 - 70	0,008 - 0,015	0,008 - 0,018	0,010 - 0,020	0,018 - 0,030	0,020 - 0,038	0,025 - 0,048	0,036 - 0,061	0,041 - 0,076	0,051 - 0,097	0,071 - 0,122
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**												
	13/8, 15/5, 17-4, pH Types	< 40	55 - 90	0,008 - 0,015	0,010 - 0,018	0,013 - 0,020	0,018 - 0,030	0,020 - 0,038	0,025 - 0,048	0,036 - 0,061	0,041 - 0,076	0,051 - 0,097	0,071 - 0,122
		> 40	45 - 70	0,008 - 0,013	0,008 - 0,015	0,010 - 0,018	0,015 - 0,025	0,018 - 0,033	0,023 - 0,043	0,030 - 0,051	0,036 - 0,066	0,046 - 0,086	0,056 - 0,102
	300 Series, 304L, Nitronic 50 Duplex, Super-Austenitic	< 40	60 - 100	0,008 - 0,015	0,010 - 0,018	0,013 - 0,020	0,018 - 0,030	0,020 - 0,038	0,025 - 0,048	0,036 - 0,061	0,041 - 0,076	0,051 - 0,097	0,071 - 0,122
		> 40	55 - 75	0,008 - 0,013	0,008 - 0,015	0,010 - 0,018	0,015 - 0,028	0,018 - 0,036	0,023 - 0,046	0,030 - 0,056	0,036 - 0,071	0,046 - 0,091	0,061 - 0,112
	400 Series - 403, 405, 420, 455	< 40	70 - 110	0,008 - 0,015	0,010 - 0,018	0,013 - 0,020	0,018 - 0,033	0,020 - 0,041	0,025 - 0,051	0,036 - 0,066	0,041 - 0,081	0,061 - 0,109	0,071 - 0,132
		> 40	55 - 75	0,008 - 0,013	0,008 - 0,015	0,010 - 0,018	0,015 - 0,028	0,018 - 0,036	0,023 - 0,046	0,030 - 0,056	0,036 - 0,071	0,046 - 0,091	0,061 - 0,112
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**												
	A2, D2, P20, H13, S7, O1	< 40	55 - 90	0,010 - 0,018	0,013 - 0,020	0,015 - 0,025	0,020 - 0,033	0,023 - 0,041	0,028 - 0,051	0,041 - 0,066	0,046 - 0,081	0,056 - 0,102	0,081 - 0,132
		> 40	40 - 85	0,008 - 0,013	0,008 - 0,013	0,013 - 0,020	0,018 - 0,025	0,020 - 0,033	0,025 - 0,043	0,036 - 0,051	0,041 - 0,066	0,051 - 0,086	0,071 - 0,102
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢												
	4140, 4340, 52100, 6150, 8620	< 40	75 - 120	0,010 - 0,018	0,013 - 0,020	0,015 - 0,025	0,020 - 0,036	0,023 - 0,043	0,028 - 0,053	0,041 - 0,071	0,046 - 0,086	0,056 - 0,107	0,081 - 0,142
		> 40	70 - 90	0,008 - 0,013	0,008 - 0,013	0,013 - 0,020	0,018 - 0,028	0,020 - 0,036	0,025 - 0,046	0,036 - 0,056	0,041 - 0,071	0,051 - 0,091	0,071 - 0,112
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢												
	1000's - 1018, 1020, 12L14	< 40	90 - 130	0,010 - 0,018	0,013 - 0,020	0,015 - 0,025	0,020 - 0,038	0,023 - 0,046	0,028 - 0,056	0,041 - 0,076	0,046 - 0,091	0,056 - 0,112	0,081 - 0,152
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**												
	Ductile Iron		90 - 130	0,010 - 0,018	0,013 - 0,020	0,015 - 0,025	0,023 - 0,041	0,025 - 0,048	0,030 - 0,058	0,046 - 0,081	0,051 - 0,097	0,061 - 0,117	0,091 - 0,163
	Gray Iron		100 - 145	0,013 - 0,020	0,018 - 0,025	0,018 - 0,030	0,025 - 0,043	0,028 - 0,051	0,033 - 0,061	0,051 - 0,086	0,056 - 0,102	0,066 - 0,122	0,102 - 0,173

	Slotting Pocket Milling	Profiling Side Milling
Axial (ap)	up to 1.5xD	up to 2xD
Radial (ae)	1xD	5% - 15% of Dia.



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

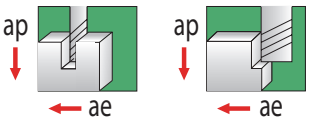
GARR TOOL High Performance Milling Guide for V4

NOTE - DATA DOES NOT REFLECT CHIP THINNING

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

ISO Material		HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)						
				1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**									
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	90 - 185	.0008" - .0015"	.0009" - .0018"	.0011" - .0022"	.0016" - .0030"	.0018" - .0036"	.0022" - .0044"	.0032" - .0060"
		> 40	75 - 150	.0006" - .0013"	.0007" - .0016"	.0009" - .0020"	.0012" - .0026"	.0014" - .0032"	.0018" - .0040"	.0024" - .0052"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金									
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	90 - 185	.0008" - .0015"	.0009" - .0018"	.0011" - .0022"	.0016" - .0030"	.0018" - .0036"	.0022" - .0044"	.0032" - .0060"
		> 40	75 - 150	.0006" - .0013"	.0007" - .0016"	.0009" - .0020"	.0012" - .0026"	.0014" - .0032"	.0018" - .0040"	.0024" - .0052"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金									
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40	90 - 185	.0008" - .0015"	.0009" - .0018"	.0011" - .0022"	.0016" - .0030"	.0018" - .0036"	.0022" - .0044"	.0032" - .0060"
		> 40	75 - 150	.0006" - .0013"	.0007" - .0016"	.0009" - .0020"	.0012" - .0026"	.0014" - .0032"	.0018" - .0040"	.0024" - .0052"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		200 - 375	.0009" - .0017"	.0010" - .0020"	.0012" - .0024"	.0018" - .0034"	.0020" - .0040"	.0024" - .0048"	.0036" - .0068"
	5553 / Beta Titanium		150 - 280	.0009" - .0015"	.0010" - .0018"	.0012" - .0022"	.0018" - .0030"	.0020" - .0036"	.0024" - .0044"	.0032" - .0060"
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**									
	13/8, 15/5, 17-4, pH Types	< 40	225 - 375	.0008" - .0015"	.0009" - .0018"	.0011" - .0022"	.0016" - .0030"	.0018" - .0036"	.0022" - .0044"	.0032" - .0060"
		> 40	175 - 275	.0006" - .0013"	.0007" - .0016"	.0009" - .0020"	.0012" - .0026"	.0014" - .0032"	.0018" - .0040"	.0024" - .0052"
	300 Series, 304L, Nitronic 50 Duplex, Super-Austenitic	< 40	250 - 400	.0008" - .0016"	.0009" - .0018"	.0011" - .0022"	.0016" - .0030"	.0018" - .0036"	.0022" - .0044"	.0032" - .0060"
		> 40	175 - 275	.0006" - .0013"	.0007" - .0016"	.0009" - .0020"	.0012" - .0026"	.0014" - .0032"	.0018" - .0040"	.0024" - .0052"
	400 Series - 403, 405, 420, 455	< 40	225 - 425	.0008" - .0016"	.0009" - .0019"	.0011" - .0023"	.0016" - .0032"	.0018" - .0038"	.0022" - .0046"	.0032" - .0064"
		> 40	175 - 325	.0006" - .0014"	.0007" - .0017"	.0009" - .0021"	.0012" - .0028"	.0014" - .0034"	.0018" - .0042"	.0024" - .0056"
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**									
	A2, D2, P20, H13, S7, O1	< 40	225 - 400	.0008" - .0016"	.0011" - .0019"	.0013" - .0023"	.0016" - .0032"	.0022" - .0038"	.0026" - .0056"	.0040" - .0064"
		> 40	150 - 325	.0006" - .0013"	.0010" - .0016"	.0012" - .0020"	.0012" - .0026"	.0020" - .0032"	.0024" - .0040"	.0036" - .0052"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢									
	4140, 4340, 52100, 6150, 8620	< 40	350 - 500	.0008" - .0017"	.0011" - .0020"	.0013" - .0024"	.0016" - .0034"	.0022" - .0040"	.0026" - .0048"	.0040" - .0068"
		> 40	250 - 375	.0006" - .0014"	.0010" - .0017"	.0012" - .0020"	.0012" - .0028"	.0020" - .0034"	.0024" - .0040"	.0036" - .0056"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢									
	1000's - 1018, 1020, 12L14	< 40	375 - 600	.0010" - .0018"	.0011" - .0021"	.0013" - .0025"	.0020" - .0036"	.0022" - .0042"	.0026" - .0050"	.0040" - .0072"
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**									
	Ductile Iron		350 - 525	.0010" - .0018"	.0013" - .0022"	.0015" - .0026"	.0020" - .0036"	.0026" - .0044"	.0030" - .0052"	.0040" - .0072"
	Gray Iron		450 - 590	.0011" - .0020"	.0014" - .0023"	.0016" - .0027"	.0022" - .0040"	.0028" - .0046"	.0032" - .0054"	.0044" - .0080"

	Slotting Pocket Milling	Profiling Side Milling
Axial (ap)	up to 1.5xD	up to 2xD
Radial (ae)	1xD	5% - 15% of Dia.



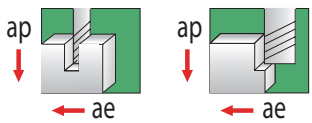
NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

NOTE - DATA DOES NOT REFLECT CHIP THINNING

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS

	ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz) 6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**									
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	27 - 57 25 - 45	0,020 - 0,038 0,015 - 0,033	0,023 - 0,046 0,018 - 0,041	0,028 - 0,056 0,023 - 0,051	0,041 - 0,076 0,030 - 0,066	0,046 - 0,091 0,036 - 0,081	0,056 - 0,112 0,046 - 0,102	0,081 - 0,152 0,061 - 0,132
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金									
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	27 - 57 25 - 45	0,020 - 0,038 0,015 - 0,033	0,023 - 0,046 0,018 - 0,041	0,028 - 0,056 0,023 - 0,051	0,041 - 0,076 0,030 - 0,066	0,046 - 0,091 0,036 - 0,081	0,056 - 0,112 0,046 - 0,102	0,081 - 0,152 0,061 - 0,132
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金									
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	27 - 57 25 - 45	0,020 - 0,038 0,015 - 0,033	0,023 - 0,046 0,018 - 0,041	0,028 - 0,056 0,023 - 0,051	0,041 - 0,076 0,030 - 0,066	0,046 - 0,091 0,036 - 0,081	0,056 - 0,112 0,046 - 0,102	0,081 - 0,152 0,061 - 0,132
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		60 - 115	0,023 - 0,043	0,025 - 0,051	0,030 - 0,061	0,046 - 0,086	0,051 - 0,102	0,061 - 0,122	0,091 - 0,173
	5553 / Beta Titanium		45 - 85	0,023 - 0,038	0,025 - 0,046	0,030 - 0,056	0,046 - 0,076	0,051 - 0,091	0,061 - 0,112	0,081 - 0,152
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**									
	13/8, 15/5, 17-4, pH Types	< 40 > 40	70 - 115 55 - 85	0,020 - 0,038 0,015 - 0,033	0,023 - 0,046 0,018 - 0,041	0,028 - 0,056 0,023 - 0,051	0,041 - 0,076 0,030 - 0,066	0,046 - 0,091 0,036 - 0,081	0,056 - 0,112 0,046 - 0,102	0,081 - 0,152 0,061 - 0,132
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	75 - 120 55 - 85	0,020 - 0,038 0,015 - 0,033	0,023 - 0,046 0,018 - 0,041	0,028 - 0,056 0,023 - 0,051	0,041 - 0,076 0,030 - 0,066	0,046 - 0,091 0,036 - 0,081	0,056 - 0,112 0,046 - 0,102	0,081 - 0,152 0,061 - 0,132
	400 Series - 403, 405, 420, 455	< 40 > 40	70 - 130 55 - 100	0,020 - 0,041 0,015 - 0,036	0,023 - 0,048 0,018 - 0,043	0,028 - 0,058 0,023 - 0,053	0,041 - 0,081 0,030 - 0,071	0,046 - 0,097 0,036 - 0,086	0,056 - 0,117 0,046 - 0,107	0,081 - 0,163 0,061 - 0,142
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**									
	A2, D2, P20, H13, S7, O1	< 40 > 40	70 - 120 45 - 100	0,020 - 0,041 0,015 - 0,033	0,028 - 0,048 0,025 - 0,041	0,033 - 0,058 0,030 - 0,051	0,041 - 0,081 0,030 - 0,066	0,056 - 0,097 0,051 - 0,081	0,066 - 0,142 0,061 - 0,102	0,102 - 0,163 0,091 - 0,132
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢									
	4140, 4340, 52100, 6150, 8620	< 40 > 40	110 - 150 75 - 115	0,020 - 0,043 0,015 - 0,036	0,028 - 0,051 0,025 - 0,043	0,033 - 0,061 0,030 - 0,051	0,041 - 0,086 0,030 - 0,071	0,056 - 0,102 0,051 - 0,086	0,066 - 0,122 0,061 - 0,102	0,102 - 0,173 0,091 - 0,142
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢									
	1000's - 1018, 1020, 12L14	< 40	115 - 180	0,025 - 0,046	0,028 - 0,053	0,033 - 0,064	0,051 - 0,091	0,056 - 0,107	0,066 - 0,127	0,102 - 0,183
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**									
	Ductile Iron		110 - 160	0,025 - 0,046	0,033 - 0,056	0,038 - 0,066	0,051 - 0,091	0,066 - 0,112	0,076 - 0,132	0,102 - 0,183
	Gray Iron		135 - 180	0,028 - 0,051	0,036 - 0,058	0,041 - 0,069	0,056 - 0,102	0,071 - 0,117	0,081 - 0,137	0,112 - 0,203

	Slotting Pocket Milling	Profiling Side Milling
Axial (ap)	up to 1.5xD	up to 2xD
Radial (ae)	1xD	5% - 15% of Dia.



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

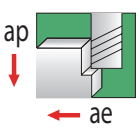
GARR TOOL High Performance Milling Guide for V5, V5C
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

	ISO Material	HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)						
				1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**									
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	105 - 220 90 - 180	.0009" - .0016" .0007" - .0014"	.0010" - .0019" .0008" - .0017"	.0012" - .0023" .0010" - .0021"	.0018" - .0032" .0014" - .0028"	.0020" - .0038" .0016" - .0034"	.0024" - .0046" .0020" - .0042"	.0036" - .0064" .0028" - .0056"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金									
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	105 - 220 90 - 180	.0009" - .0016" .0007" - .0014"	.0010" - .0019" .0008" - .0017"	.0012" - .0023" .0010" - .0021"	.0018" - .0032" .0014" - .0028"	.0020" - .0038" .0016" - .0034"	.0024" - .0046" .0020" - .0042"	.0036" - .0064" .0028" - .0056"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金									
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	105 - 220 90 - 180	.0009" - .0016" .0007" - .0014"	.0010" - .0019" .0008" - .0017"	.0012" - .0023" .0010" - .0021"	.0018" - .0032" .0014" - .0028"	.0020" - .0038" .0016" - .0034"	.0024" - .0046" .0020" - .0042"	.0036" - .0064" .0028" - .0056"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		240 - 450	.0010" - .0018"	.0011" - .0021"	.0013" - .0025"	.0020" - .0036"	.0022" - .0042"	.0026" - .0050"	.0040" - .0072"
	5553 / Beta Titanium		180 - 340	.0010" - .0016"	.0011" - .0019"	.0013" - .0023"	.0020" - .0032"	.0022" - .0038"	.0026" - .0046"	.0040" - .0064"
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**									
	13/8, 15/5, 17-4, pH Types	< 40 > 40	300 - 450 210 - 330	.0009" - .0016" .0007" - .0014"	.0010" - .0019" .0008" - .0017"	.0012" - .0023" .0010" - .0021"	.0018" - .0032" .0014" - .0028"	.0020" - .0038" .0016" - .0034"	.0024" - .0046" .0020" - .0042"	.0036" - .0064" .0028" - .0056"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	300 - 480 210 - 330	.0009" - .0016" .0007" - .0014"	.0010" - .0019" .0008" - .0017"	.0012" - .0023" .0010" - .0021"	.0018" - .0032" .0014" - .0028"	.0020" - .0038" .0016" - .0034"	.0024" - .0046" .0020" - .0042"	.0036" - .0064" .0028" - .0056"
	400 Series - 403, 405, 420, 455	< 40 > 40	270 - 510 210 - 390	.0009" - .0017" .0007" - .0015"	.0010" - .0020" .0008" - .0018"	.0012" - .0024" .0010" - .0022"	.0018" - .0034" .0014" - .0030"	.0020" - .0040" .0016" - .0036"	.0024" - .0048" .0020" - .0044"	.0036" - .0068" .0028" - .0060"
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**									
	A2, D2, P20, H13, S7, O1	< 40 > 40	270 - 480 180 - 390	.0009" - .0017" .0007" - .0014"	.0010" - .0020" .0008" - .0017"	.0012" - .0024" .0010" - .0021"	.0018" - .0034" .0014" - .0028"	.0020" - .0040" .0016" - .0034"	.0024" - .0048" .0020" - .0042"	.0036" - .0068" .0028" - .0056"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢									
	4140, 4340, 52100, 6150, 8620	< 40 > 40	420 - 600 300 - 450	.0009" - .0018" .0007" - .0015"	.0010" - .0021" .0008" - .0018"	.0012" - .0025" .0010" - .0022"	.0018" - .0036" .0014" - .0030"	.0020" - .0042" .0016" - .0036"	.0024" - .0050" .0020" - .0044"	.0036" - .0072" .0028" - .0060"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢									
	1000's - 1018, 1020, 12L14	< 40	450 - 720	.0011" - .0019"	.0012" - .0022"	.0014" - .0026"	.0022" - .0038"	.0024" - .0044"	.0028" - .0052"	.0044" - .0076"
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**									
	Ductile Iron		420 - 630	.0011" - .0019"	.0012" - .0022"	.0014" - .0026"	.0022" - .0038"	.0024" - .0044"	.0028" - .0052"	.0044" - .0076"
	Gray Iron		540 - 710	.0012" - .0021"	.0013" - .0024"	.0015" - .0028"	.0024" - .0042"	.0026" - .0048"	.0030" - .0056"	.0048" - .0084"

	Profile/Trochoidal Milling
Axial (ap)	up to 2xD
Radial (ae)	5% - 15% of Dia.



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

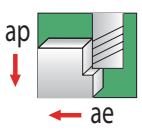
GARR TOOL High Performance Milling Guide for V5, V5C
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS

	ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz) 6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**									
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	30 - 70 27 - 55	0,023 - 0,041 0,018 - 0,036	0,025 - 0,048 0,020 - 0,043	0,030 - 0,058 0,025 - 0,053	0,046 - 0,081 0,036 - 0,071	0,051 - 0,097 0,041 - 0,086	0,061 - 0,117 0,051 - 0,107	0,091 - 0,163 0,071 - 0,142
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金									
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	30 - 70 27 - 55	0,023 - 0,041 0,018 - 0,036	0,025 - 0,048 0,020 - 0,043	0,030 - 0,058 0,025 - 0,053	0,046 - 0,081 0,036 - 0,071	0,051 - 0,097 0,041 - 0,086	0,061 - 0,117 0,051 - 0,107	0,091 - 0,163 0,071 - 0,142
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金									
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	30 - 70 27 - 55	0,023 - 0,041 0,018 - 0,036	0,025 - 0,048 0,020 - 0,043	0,030 - 0,058 0,025 - 0,053	0,046 - 0,081 0,036 - 0,071	0,051 - 0,097 0,041 - 0,086	0,061 - 0,117 0,051 - 0,107	0,091 - 0,163 0,071 - 0,142
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		75 - 135	0,025 - 0,046	0,028 - 0,053	0,033 - 0,064	0,051 - 0,091	0,056 - 0,107	0,066 - 0,127	0,102 - 0,183
	5553 / Beta Titanium		55 - 105	0,025 - 0,041	0,028 - 0,048	0,033 - 0,058	0,051 - 0,081	0,056 - 0,097	0,066 - 0,117	0,102 - 0,163
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**									
	13/8, 15/5, 17-4, pH Types	< 40 > 40	90 - 135 65 - 100	0,023 - 0,041 0,018 - 0,036	0,025 - 0,048 0,020 - 0,043	0,030 - 0,058 0,025 - 0,053	0,046 - 0,081 0,036 - 0,071	0,051 - 0,097 0,041 - 0,086	0,061 - 0,117 0,051 - 0,107	0,091 - 0,163 0,071 - 0,142
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	90 - 145 65 - 100	0,023 - 0,041 0,018 - 0,036	0,025 - 0,048 0,020 - 0,043	0,030 - 0,058 0,025 - 0,053	0,046 - 0,081 0,036 - 0,071	0,051 - 0,097 0,041 - 0,086	0,061 - 0,117 0,051 - 0,107	0,091 - 0,163 0,071 - 0,142
	400 Series - 403, 405, 420, 455	< 40 > 40	85 - 155 65 - 120	0,023 - 0,043 0,018 - 0,038	0,025 - 0,051 0,020 - 0,046	0,030 - 0,061 0,025 - 0,056	0,046 - 0,086 0,036 - 0,076	0,051 - 0,102 0,041 - 0,091	0,061 - 0,122 0,051 - 0,112	0,091 - 0,173 0,071 - 0,152
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**									
	A2, D2, P20, H13, S7, O1	< 40 > 40	85 - 145 55 - 120	0,023 - 0,043 0,018 - 0,036	0,025 - 0,051 0,020 - 0,043	0,030 - 0,061 0,025 - 0,053	0,046 - 0,086 0,036 - 0,071	0,051 - 0,102 0,041 - 0,086	0,061 - 0,122 0,051 - 0,107	0,091 - 0,173 0,071 - 0,142
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢									
	4140, 4340, 52100, 6150, 8620	< 40 > 40	130 - 180 90 - 135	0,023 - 0,046 0,018 - 0,038	0,025 - 0,053 0,020 - 0,046	0,030 - 0,064 0,025 - 0,056	0,046 - 0,091 0,036 - 0,076	0,051 - 0,107 0,041 - 0,091	0,061 - 0,127 0,051 - 0,112	0,091 - 0,183 0,071 - 0,152
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢									
	1000's - 1018, 1020, 12L14	< 40	135 - 220	0,028 - 0,048	0,030 - 0,056	0,036 - 0,066	0,056 - 0,097	0,061 - 0,112	0,071 - 0,132	0,112 - 0,193
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**									
	Ductile Iron		130 - 190	0,028 - 0,048	0,030 - 0,056	0,036 - 0,066	0,056 - 0,097	0,061 - 0,112	0,071 - 0,132	0,112 - 0,193
	Gray Iron		170 - 215	0,030 - 0,053	0,033 - 0,061	0,038 - 0,071	0,061 - 0,107	0,066 - 0,122	0,076 - 0,142	0,122 - 0,213

	Profile/Trochoidal Milling
Axial (ap)	up to 2xD
Radial (ae)	5% - 15% of Dia.



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

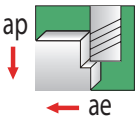
GARR TOOL High Performance Milling Guide for VRX-6
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

	ISO Material	HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz) 1/4"	3/8"	1/2"	5/8"	3/4"	1"
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**								
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	115 - 230	.0006" - .0012"	.0006" - .0014"	.0011" - .0023"	.0011" - .0023"	.0012" - .0028"	.0022" - .0046"
		> 40	95 - 190	.0004" - .0010"	.0005" - .0013"	.0008" - .0020"	.0009" - .0021"	.0010" - .0026"	.0016" - .0040"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金								
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	115 - 230	.0006" - .0013"	.0008" - .0016"	.0012" - .0024"	.0012" - .0025"	.0016" - .0032"	.0024" - .0048"
		> 40	95 - 190	.0003" - .0007"	.0007" - .0015"	.0008" - .0020"	.0011" - .0022"	.0014" - .0030"	.0016" - .0040"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金								
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40	115 - 230	.0006" - .0012"	.0008" - .0014"	.0011" - .0023"	.0012" - .0024"	.0016" - .0028"	.0022" - .0046"
		> 40	95 - 190	.0003" - .0007"	.0005" - .0013"	.0007" - .0019"	.0010" - .0022"	.0010" - .0026"	.0014" - .0038"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金								
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		250 - 470	.0010" - .0015"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0030" - .0050"	.0040" - .0060"
	5553 / Beta Titanium		185 - 350	.0008" - .0014"	.0012" - .0022"	.0016" - .0028"	.0023" - .0034"	.0024" - .0044"	.0032" - .0056"
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**								
	13/8, 15/5, 17-4, pH Types	< 40	280 - 470	.0008" - .0015"	.0010" - .0017"	.0016" - .0030"	.0018" - .0031"	.0020" - .0034"	.0032" - .0060"
		> 40	215 - 345	.0006" - .0013"	.0009" - .0016"	.0012" - .0026"	.0013" - .0028"	.0018" - .0032"	.0024" - .0052"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	310 - 500	.0008" - .0015"	.0010" - .0017"	.0016" - .0030"	.0017" - .0028"	.0020" - .0034"	.0032" - .0060"
		> 40	215 - 345	.0006" - .0013"	.0008" - .0015"	.0012" - .0026"	.0014" - .0024"	.0016" - .0030"	.0022" - .0038"
	400 Series - 403, 405, 420, 455	< 40	280 - 530	.0008" - .0016"	.0010" - .0018"	.0016" - .0032"	.0020" - .0035"	.0020" - .0036"	.0032" - .0064"
		> 40	215 - 405	.0006" - .0014"	.0009" - .0017"	.0012" - .0028"	.0013" - .0030"	.0018" - .0034"	.0024" - .0056"
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**								
	A2, D2, P20, H13, S7, O1	< 40	280 - 500	.0008" - .0015"	.0013" - .0023"	.0018" - .0024"	.0024" - .0034"	.0034" - .0044"	.0036" - .0048"
		> 40	185 - 410	.0006" - .0013"	.0012" - .0020"	.0016" - .0022"	.0020" - .0028"	.0024" - .0032"	.0030" - .0040"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢								
	4140, 4340, 52100, 6150, 8620	< 40	435 - 625	.0010" - .0016"	.0013" - .0024"	.0018" - .0024"	.0024" - .0034"	.0034" - .0044"	.0036" - .0048"
		> 40	310 - 470	.0007" - .0012"	.0012" - .0020"	.0016" - .0022"	.0020" - .0028"	.0024" - .0032"	.0030" - .0040"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢								
	1000's - 1018, 1020, 12L14	< 40	465 - 750	.0010" - .0017"	.0013" - .0025"	.0018" - .0024"	.0024" - .0034"	.0034" - .0044"	.0036" - .0048"
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**								
	Ductile Iron		435 - 660	.0012" - .0019"	.0015" - .0026"	.0024" - .0038"	.0026" - .0050"	.0030" - .0052"	.0048" - .0076"
	Gray Iron		560 - 740	.0013" - .0021"	.0016" - .0027"	.0026" - .0042"	.0028" - .0052"	.0032" - .0064"	.0052" - .0084"

	Profile/Trochoidal Milling
Axial (ap)	up to 2xD
Radial (ae)	5% - 15% of Dia.



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

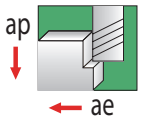
GARR TOOL High Performance Milling Guide for VRX-6
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS

	ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz) 6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**									
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	35 - 70 30 - 57	0,015 - 0,030 0,010 - 0,025	0,015 - 0,033 0,010 - 0,030	0,015 - 0,036 0,013 - 0,033	0,028 - 0,058 0,020 - 0,051	0,028 - 0,058 0,023 - 0,053	0,030 - 0,071 0,025 - 0,066	0,056 - 0,117 0,041 - 0,102
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金									
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	35 - 70 30 - 57	0,015 - 0,033 0,008 - 0,018	0,020 - 0,035 0,013 - 0,028	0,020 - 0,041 0,018 - 0,038	0,030 - 0,061 0,020 - 0,051	0,030 - 0,064 0,028 - 0,056	0,041 - 0,081 0,036 - 0,076	0,061 - 0,122 0,041 - 0,102
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金									
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	35 - 70 30 - 57	0,015 - 0,030 0,008 - 0,018	0,020 - 0,033 0,010 - 0,025	0,020 - 0,036 0,013 - 0,033	0,028 - 0,058 0,018 - 0,048	0,030 - 0,061 0,025 - 0,056	0,041 - 0,071 0,025 - 0,066	0,056 - 0,117 0,036 - 0,097
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		75 - 140	0,025 - 0,038	0,030 - 0,050	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,076 - 0,127	0,102 - 0,152
	5553 / Beta Titanium		57 - 110	0,020 - 0,036	0,025 - 0,046	0,030 - 0,056	0,041 - 0,071	0,058 - 0,086	0,061 - 0,112	0,081 - 0,142
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**									
	13/8, 15/5, 17-4, pH Types	< 40 > 40	85 - 140 65 - 105	0,020 - 0,038 0,015 - 0,033	0,023 - 0,040 0,020 - 0,038	0,025 - 0,043 0,023 - 0,041	0,041 - 0,076 0,030 - 0,066	0,046 - 0,079 0,033 - 0,071	0,051 - 0,086 0,046 - 0,081	0,081 - 0,152 0,061 - 0,132
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	95 - 150 65 - 105	0,020 - 0,038 0,015 - 0,033	0,023 - 0,040 0,018 - 0,035	0,025 - 0,043 0,020 - 0,038	0,041 - 0,076 0,030 - 0,066	0,043 - 0,071 0,036 - 0,061	0,051 - 0,086 0,041 - 0,076	0,081 - 0,152 0,056 - 0,097
	400 Series - 403, 405, 420, 455	< 40 > 40	85 - 160 65 - 125	0,020 - 0,041 0,015 - 0,036	0,023 - 0,043 0,020 - 0,040	0,025 - 0,046 0,023 - 0,043	0,041 - 0,081 0,030 - 0,071	0,051 - 0,089 0,033 - 0,076	0,051 - 0,091 0,046 - 0,086	0,081 - 0,163 0,061 - 0,142
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**									
	A2, D2, P20, H13, S7, O1	< 40 > 40	85 - 150 57 - 125	0,020 - 0,038 0,015 - 0,033	0,025 - 0,048 0,022 - 0,042	0,033 - 0,058 0,030 - 0,051	0,046 - 0,061 0,041 - 0,056	0,061 - 0,086 0,051 - 0,071	0,086 - 0,112 0,061 - 0,081	0,091 - 0,122 0,076 - 0,102
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢									
	4140, 4340, 52100, 6150, 8620	< 40 > 40	130 - 190 95 - 140	0,025 - 0,041 0,018 - 0,030	0,029 - 0,051 0,025 - 0,041	0,033 - 0,061 0,030 - 0,051	0,046 - 0,061 0,041 - 0,056	0,061 - 0,086 0,051 - 0,071	0,086 - 0,112 0,061 - 0,081	0,091 - 0,122 0,076 - 0,102
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢									
	1000's - 1018, 1020, 12L14	< 40	140 - 230	0,025 - 0,043	0,029 - 0,053	0,033 - 0,064	0,046 - 0,061	0,061 - 0,086	0,086 - 0,112	0,091 - 0,122
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**									
	Ductile Iron		130 - 200	0,030 - 0,048	0,034 - 0,056	0,038 - 0,066	0,061 - 0,097	0,066 - 0,127	0,076 - 0,132	0,122 - 0,193
	Gray Iron		170 - 225	0,033 - 0,053	0,037 - 0,061	0,041 - 0,069	0,066 - 0,107	0,071 - 0,132	0,081 - 0,163	0,132 - 0,213

	Profile/Trochoidal Milling
Axial (ap)	up to 2xD
Radial (ae)	5% - 15% of Dia.



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

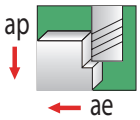
GARR TOOL High Performance Milling Guide for VX-7, VX-7C
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

	ISO Material	HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)				
				3/8"	1/2"	5/8"	3/4"	1"
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**							
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	120 - 240	.0013" - .0026"	.0019" - .0036"	.0021" - .0043"	.0026" - .0052"	.0038" - .0072"
		> 40	100 - 195	.0010" - .0024"	.0014" - .0031"	.0017" - .0038"	.0020" - .0048"	.0028" - .0062"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金							
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	120 - 240	.0013" - .0026"	.0019" - .0036"	.0021" - .0043"	.0026" - .0052"	.0038" - .0072"
		> 40	100 - 195	.0010" - .0024"	.0014" - .0031"	.0017" - .0038"	.0020" - .0048"	.0028" - .0062"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金							
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40	120 - 240	.0013" - .0026"	.0019" - .0036"	.0021" - .0043"	.0026" - .0052"	.0038" - .0072"
		> 40	100 - 195	.0010" - .0024"	.0014" - .0031"	.0017" - .0038"	.0020" - .0048"	.0028" - .0062"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金							
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		260 - 490	.0014" - .0028"	.0021" - .0040"	.0026" - .0048"	.0028" - .0056"	.0042" - .0080"
	5553 / Beta Titanium		195 - 365	.0014" - .0026"	.0021" - .0036"	.0026" - .0043"	.0028" - .0052"	.0042" - .0072"
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**							
	13/8, 15/5, 17-4, pH Types	< 40	290 - 490	.0013" - .0026"	.0019" - .0036"	.0022" - .0043"	.0026" - .0052"	.0038" - .0072"
		> 40	225 - 360	.0010" - .0024"	.0014" - .0031"	.0017" - .0039"	.0020" - .0048"	.0028" - .0062"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	325 - 520	.0013" - .0026"	.0019" - .0036"	.0022" - .0043"	.0026" - .0052"	.0038" - .0072"
		> 40	225 - 360	.0010" - .0024"	.0014" - .0031"	.0017" - .0039"	.0020" - .0048"	.0028" - .0062"
	400 Series - 403, 405, 420, 455	< 40	290 - 555	.0013" - .0028"	.0019" - .0038"	.0022" - .0046"	.0026" - .0056"	.0038" - .0076"
		> 40	225 - 425	.0010" - .0025"	.0014" - .0034"	.0017" - .0041"	.0020" - .0050"	.0028" - .0068"
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**							
	A2, D2, P20, H13, S7, O1	< 40	290 - 520	.0016" - .0028"	.0024" - .0038"	.0026" - .0046"	.0032" - .0056"	.0048" - .0076"
		> 40	195 - 425	.0014" - .0024"	.0022" - .0031"	.0024" - .0038"	.0028" - .0048"	.0044" - .0062"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢							
	4140, 4340, 52100, 6150, 8620	< 40	455 - 650	.0016" - .0029"	.0024" - .0040"	.0026" - .0048"	.0032" - .0058"	.0048" - .0080"
		> 40	325 - 490	.0014" - .0024"	.0022" - .0033"	.0024" - .0040"	.0028" - .0048"	.0044" - .0066"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢							
	1000's - 1018, 1020, 12L14	< 40	490 - 780	.0016" - .0030"	.0024" - .0043"	.0026" - .0050"	.0032" - .0060"	.0048" - .0086"
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**							
	Ductile Iron		455 - 685	.0018" - .0031"	.0029" - .0046"	.0031" - .0053"	.0036" - .0062"	.0058" - .0092"
	Gray Iron		585 - 770	.0019" - .0032"	.0031" - .0048"	.0034" - .0055"	.0038" - .0064"	.0062" - .0096"

	Profile/Trochoidal Milling
Axial (ap)	up to 2xD
Radial (ae)	5% - 15% of Dia.



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

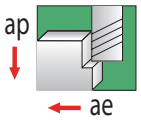
GARR TOOL High Performance Milling Guide for VX-7, VX-7C
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING

SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS

	ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)					
				8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**								
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	35 - 75	0,024 - 0,046	0,033 - 0,066	0,048 - 0,091	0,053 - 0,109	0,066 - 0,132	0,097 - 0,183
		> 40	30 - 60	0,018 - 0,040	0,025 - 0,061	0,036 - 0,079	0,043 - 0,097	0,051 - 0,122	0,071 - 0,157
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金								
	Inconel-625/718, Waspaloy, Invar Rene, Hastelloy, Monel	< 40	35 - 75	0,024 - 0,046	0,033 - 0,066	0,048 - 0,091	0,053 - 0,109	0,066 - 0,132	0,097 - 0,183
		> 40	30 - 60	0,018 - 0,040	0,025 - 0,061	0,036 - 0,079	0,043 - 0,097	0,051 - 0,122	0,071 - 0,157
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金								
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40	35 - 75	0,024 - 0,046	0,033 - 0,066	0,048 - 0,091	0,053 - 0,109	0,066 - 0,132	0,097 - 0,183
		> 40	30 - 60	0,018 - 0,040	0,025 - 0,061	0,036 - 0,079	0,043 - 0,097	0,051 - 0,122	0,071 - 0,157
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金								
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		80 - 150	0,026 - 0,051	0,036 - 0,071	0,053 - 0,102	0,066 - 0,122	0,071 - 0,142	0,107 - 0,203
	5553 / Beta Titanium		60 - 110	0,026 - 0,046	0,036 - 0,066	0,053 - 0,091	0,066 - 0,109	0,071 - 0,132	0,107 - 0,183
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**								
	13/8, 15/5, 17-4, pH Types	< 40	90 - 150	0,024 - 0,046	0,033 - 0,066	0,048 - 0,091	0,056 - 0,109	0,066 - 0,132	0,097 - 0,183
		> 40	70 - 110	0,018 - 0,040	0,025 - 0,061	0,036 - 0,079	0,043 - 0,099	0,051 - 0,122	0,071 - 0,157
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	100 - 160	0,024 - 0,052	0,033 - 0,066	0,048 - 0,091	0,056 - 0,109	0,066 - 0,132	0,097 - 0,183
		> 40	70 - 110	0,018 - 0,040	0,025 - 0,061	0,036 - 0,079	0,043 - 0,099	0,051 - 0,122	0,071 - 0,157
	400 Series - 403, 405, 420, 455	< 40	90 - 170	0,024 - 0,051	0,033 - 0,071	0,048 - 0,097	0,056 - 0,117	0,066 - 0,142	0,097 - 0,193
		> 40	70 - 130	0,018 - 0,043	0,025 - 0,064	0,036 - 0,086	0,043 - 0,104	0,051 - 0,127	0,071 - 0,173
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**								
	A2, D2, P20, H13, S7, O1	< 40	90 - 160	0,032 - 0,051	0,041 - 0,071	0,061 - 0,097	0,066 - 0,117	0,081 - 0,142	0,122 - 0,193
		> 40	60 - 130	0,026 - 0,040	0,036 - 0,061	0,056 - 0,079	0,061 - 0,097	0,071 - 0,122	0,112 - 0,157
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils allié / Acciaio da utensili di media durezza / 中碳合金钢								
	4140, 4340, 52100, 6150, 8620	< 40	140 - 200	0,032 - 0,053	0,041 - 0,074	0,061 - 0,102	0,066 - 0,122	0,081 - 0,147	0,122 - 0,203
		> 40	100 - 150	0,026 - 0,040	0,036 - 0,061	0,056 - 0,084	0,061 - 0,102	0,071 - 0,122	0,112 - 0,168
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢								
	1000's - 1018, 1020, 12L14	< 40	150 - 240	0,032 - 0,053	0,041 - 0,076	0,061 - 0,109	0,066 - 0,127	0,081 - 0,152	0,122 - 0,218
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**								
	Ductile Iron		140 - 210	0,035 - 0,057	0,046 - 0,079	0,074 - 0,117	0,079 - 0,135	0,091 - 0,157	0,147 - 0,234
	Gray Iron		180 - 235	0,036 - 0,060	0,048 - 0,081	0,079 - 0,122	0,086 - 0,140	0,097 - 0,163	0,157 - 0,244

	Profile/Trochoidal Milling
Axial (ap)	up to 2xD
Radial (ae)	5% - 15% of Dia.

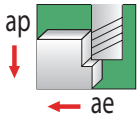


NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for TMS / TMR
(High Efficiency Milling)

NOTE - CHIP THINNING CALCULATION ALREADY APPLIED
CHIPLOAD PER TOOTH (Fz) AT 2% RADIAL ENGAGEMENT (USING PROGRAMMED CALCULATION - SEE PAGE 306)
SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS

ISO Material		SFM (Vc)	CHIPLOAD PER TOOTH (Fz)						
			1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"
S	**TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金**								
	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"
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**								
	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"
P	**MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢**								
	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 / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢								
	1000 Series, A36, 12L14	300 - 500	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
	CAST STEELS / Gegossenes Stahl / Acero bastidor vertidos / Acier fontes / Acciaio fuso / 铸钢								
	Steel	250 - 350	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**								
	Ductile Iron	250 - 350	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
	Gray Iron	250 - 350	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**								
	Aluminum (6061-T6)	300 - 500	.0020" - .0042"	.0027" - .0052"	.0035" - .0065"	.0043" - .0078"	.0052" - .0095"	.0065" - .0115"	.0080" - .0143"
	Copper, Brass	175 - 350	.0017" - .0042"	.0025" - .0052"	.0030" - .0065"	.0035" - .0078"	.0043" - .0095"	.0052" - .0115"	.0065" - .0143"

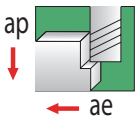


ap = full flute length
ae = 2%

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

NOTE - CHIP THINNING CALCULATION ALREADY APPLIED
CHIPLOAD PER TOOTH (Fz) AT 2% RADIAL ENGAGEMENT (USING PROGRAMMED CALCULATION - SEE PAGE 307)
SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS

ISO Material		M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)						
			6,0mm	8,0mm	10,0mm	12,0mm	16,0mm	20,0mm	25,0mm
S	**TITANIUM ALLOYS** / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金								
	6Al-4V	98 - 157	0,051 - 0,107	0,076 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292	0,132 - 0,363
	5553	59 - 98	0,038 - 0,071	0,046 - 0,089	0,064 - 0,109	0,076 - 0,140	0,089 - 0,165	0,107 - 0,203	0,132 - 0,241
M	**STAINLESS STEELS** / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金								
	Free Machining (303)	118 - 157	0,051 - 0,107	0,069 - 132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292	0,132 - 0,363
	Austenitic (304 / 304L)	89 - 138	0,043 - 0,089	0,064 - 0,109	0,076 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292
	Martensitic (17-4 / 416)	79 - 98	0,038 - 0,071	0,046 - 0,089	0,064 - 0,109	0,076 - 0,140	0,089 - 0,165	0,107 - 0,203	0,132 - 0,241
P	**MEDIUM ALLOY TOOL STEELS** / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢								
	8620	98 - 157	0,043 - 0,089	0,064 - 0,109	0,076 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292
	4140, D2, S7	98 - 138	0,038 - 0,071	0,046 - 0,089	0,064 - 0,109	0,076 - 0,140	0,089 - 0,165	0,107 - 0,203	0,132 - 0,241
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢								
	1000 Series, A36, 12L14	118 - 197	0,051 - 0,107	0,069 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292	0,203 - 0,363
	CAST STEELS / Gegossenes Stahl / Acero bastidor vertidos / Acier fontes / Acciaio fuso / 铸钢								
	Steel	98 - 138	0,051 - 0,107	0,069 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292	0,203 - 0,363
K	**CAST MATERIAL** / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件								
	Ductile Iron	98 - 138	0,051 - 0,107	0,069 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292	0,203 - 0,363
	Gray Iron	98 - 138	0,051 - 0,107	0,069 - 0,132	0,089 - 0,165	0,109 - 0,198	0,132 - 0,241	0,165 - 0,292	0,203 - 0,363
N	**NON-FERROUS** / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属								
	Aluminum (6061-T6)	90 - 150	0,050 - 0,105	0,075 - 0,130	0,090 - 0,165	0,105 - 0,200	0,130 - 0,240	0,165 - 0,292	0,203 - 0,363
	Copper, Brass	60 - 110	0,043 - 0,105	0,064 - 0,130	0,076 - 0,165	0,089 - 0,200	0,109 - 0,240	0,132 - 0,292	0,165 - 0,363

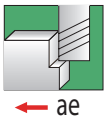


ap = full flute length
ae = 2%

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

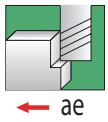
Chip Thinning Calculations for TMS / TMR End Mills

ae = 3%



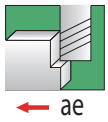
3% Radial Engagement (.03 x d)	
Actual (CPT)	Programmed (CPT)
.0002"	.0005"
.0003"	.0010"
.0005"	.0015"
.0007"	.0020"
.0009"	.0025"
.0010"	.0030"
.0012"	.0035"
.0014"	.0040"
.0015"	.0045"
.0017"	.0050"
.0019"	.0055"
.0020"	.0060"
.0022"	.0065"
.0024"	.0070"
.0026"	.0075"
.0027"	.0080"
.0029"	.0085"
.0031"	.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"

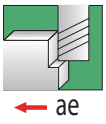
ae = 1%



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"

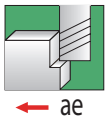
Chip Thinning Calculations for TMS / TMR End Mills

ae = 3%



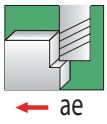
3% Radial Engagement (.03 x d)	
Actual (CPT)	Programmed (CPT)
0,0043mm	0,0127mm
0,0086mm	0,0254mm
0,0130mm	0,0381mm
0,0173mm	0,0508mm
0,0216mm	0,0635mm
0,0259mm	0,0762mm
0,0302mm	0,0889mm
0,0345mm	0,1016mm
0,0389mm	0,1143mm
0,0432mm	0,1270mm
0,0475mm	0,1397mm
0,0518mm	0,1524mm
0,0561mm	0,1651mm
0,0605mm	0,1778mm
0,0648mm	0,1905mm
0,0691mm	0,2032mm
0,0734mm	0,2159mm
0,0777mm	0,2286mm
0,0820mm	0,2413mm
0,0864mm	0,2540mm
0,0907mm	0,2667mm
0,0950mm	0,2794mm
0,0993mm	0,2921mm
0,1036mm	0,3048mm
0,1080mm	0,3175mm
0,1123mm	0,3302mm
0,1166mm	0,3429mm
0,1209mm	0,3556mm
0,1252mm	0,3683mm
0,1295mm	0,3810mm
0,1339mm	0,3937mm
0,1382mm	0,4064mm
0,1425mm	0,4191mm
0,1468mm	0,4318mm
0,1511mm	0,4445mm
0,1554mm	0,4572mm
0,1598mm	0,4699mm
0,1641mm	0,4826mm
0,1684mm	0,4953mm
0,1727mm	0,5080mm

ae = 2%



2% Radial Engagement (.02 x d)	
Actual (CPT)	Programmed (CPT)
0,0036mm	0,0127mm
0,0071mm	0,0254mm
0,0107mm	0,0381mm
0,0142mm	0,0508mm
0,0178mm	0,0635mm
0,0213mm	0,0762mm
0,0249mm	0,0889mm
0,0284mm	0,1016mm
0,0320mm	0,1143mm
0,0356mm	0,1270mm
0,0391mm	0,1397mm
0,0427mm	0,1524mm
0,0462mm	0,1651mm
0,0498mm	0,1778mm
0,0533mm	0,1905mm
0,0569mm	0,2032mm
0,0605mm	0,2159mm
0,0640mm	0,2286mm
0,0676mm	0,2413mm
0,0711mm	0,2540mm
0,0747mm	0,2667mm
0,0782mm	0,2794mm
0,0818mm	0,2921mm
0,0853mm	0,3048mm
0,0889mm	0,3175mm
0,0925mm	0,3302mm
0,0960mm	0,3429mm
0,0996mm	0,3556mm
0,1031mm	0,3683mm
0,1067mm	0,3810mm
0,1102mm	0,3937mm
0,1138mm	0,4064mm
0,1173mm	0,4191mm
0,1209mm	0,4318mm
0,1245mm	0,4445mm
0,1280mm	0,4572mm
0,1316mm	0,4699mm
0,1351mm	0,4826mm
0,1387mm	0,4953mm
0,1422mm	0,5080mm

ae = 1%



1% Radial Engagement (.01 x d)	
Actual (CPT)	Programmed (CPT)
0,0025mm	0,0127mm
0,0051mm	0,0254mm
0,0076mm	0,0381mm
0,0102mm	0,0508mm
0,0127mm	0,0635mm
0,0152mm	0,0762mm
0,0178mm	0,0889mm
0,0203mm	0,1016mm
0,0229mm	0,1143mm
0,0254mm	0,1270mm
0,0279mm	0,1397mm
0,0305mm	0,1524mm
0,0330mm	0,1651mm
0,0356mm	0,1778mm
0,0381mm	0,1905mm
0,0406mm	0,2032mm
0,0432mm	0,2159mm
0,0457mm	0,2286mm
0,0483mm	0,2413mm
0,0508mm	0,2540mm
0,0533mm	0,2667mm
0,0559mm	0,2794mm
0,0584mm	0,2921mm
0,0610mm	0,3048mm
0,0635mm	0,3175mm
0,0660mm	0,3302mm
0,0686mm	0,3429mm
0,0711mm	0,3556mm
0,0737mm	0,3683mm
0,0762mm	0,3810mm
0,0787mm	0,3937mm
0,0813mm	0,4064mm
0,0838mm	0,4191mm
0,0864mm	0,4318mm
0,0889mm	0,4445mm
0,0914mm	0,4572mm
0,0940mm	0,4699mm
0,0965mm	0,4826mm
0,0991mm	0,4953mm
0,1016mm	0,5080mm

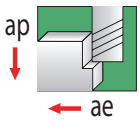
GARR TOOL Milling Guide for High Rc Finishers in Hardened Steel

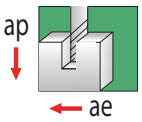
(Reference Series: 545MA, 545BA, 545RA, VRX)

	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 Milling
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 Milling
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.

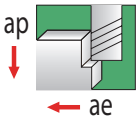
NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for High Rc Finishers in Hardened Steel

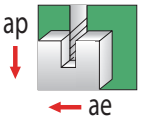
(Reference Series: 545MA, 545BA, 545RA, VRX)

	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)
3,0mm	14500	0,025	8100	0,020	5650	0,015	4050	0,010	2400	0,008	1950	0,007
4,0mm	10900	0,030	6100	0,025	4200	0,020	3000	0,015	1800	0,010	1450	0,008
6,0mm	7300	0,035	4050	0,030	2800	0,025	2000	0,020	1200	0,015	970	0,010
8,0mm	5450	0,040	3000	0,035	2100	0,030	1500	0,025	900	0,020	725	0,015
12,0mm	3650	0,055	2000	0,045	1400	0,035	1000	0,030	600	0,025	480	0,020
16,0mm	2700	0,065	1500	0,055	1050	0,050	750	0,045	450	0,030	360	0,025
18,0mm	2400	0,075	1350	0,065	950	0,060	675	0,055	400	0,045	320	0,030
20,0mm	2150	0,078	1200	0,070	850	0,065	600	0,058	360	0,050	290	0,040
25,0mm	1750	0,080	1000	0,075	700	0,070	500	0,060	300	0,055	250	0,045

	Profiling / Side Milling
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)
3,0mm	38800	0,020	32300	0,015	25800	0,008	19400	0,008	14500	0,007	12100	0,005
4,0mm	29100	0,025	24200	0,020	19400	0,015	14500	0,010	10900	0,008	9100	0,007
6,0mm	19400	0,030	16100	0,025	12900	0,020	9700	0,015	7300	0,010	6050	0,008
8,0mm	14500	0,035	12100	0,030	9700	0,025	7250	0,020	5450	0,015	4500	0,010
12,0mm	9700	0,045	8075	0,035	6450	0,030	4850	0,025	3650	0,020	3000	0,015
16,0mm	7250	0,055	6050	0,045	4850	0,035	3600	0,030	2700	0,025	2300	0,020
18,0mm	6450	0,065	5400	0,055	4300	0,050	3200	0,045	2400	0,030	2000	0,025
20,0mm	5800	0,070	4850	0,060	3850	0,055	2900	0,050	2150	0,040	1800	0,028
25,0mm	4650	0,075	3870	0,065	3100	0,060	2300	0,055	1750	0,045	1450	0,030

	Profiling / Side Milling
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.

GARR TOOL Milling Guide for Die Mold Cutters

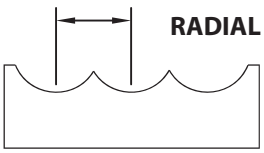
Roughing

(Reference series: 350MX)

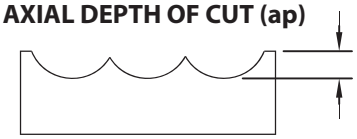
	RPM		CHIPLOAD PER TOOTH (Fz)	
DIAMETER	40 - 50 HRC	50 - 60 HRC	40 - 50 HRC	50 - 60 HRC
1/32"	20,000 - 40,000	20,000 - 40,000	.0005" - .0007"	.0004" - .0005"
1/16"	20,000 - 40,000	20,000 - 40,000	.0010" - .0015"	.0008" - .0010"
3/32"	20,000 - 32,000	20,000 - 30,000	.0015" - .0020"	.0010" - .0015"
1/8"	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 TOOTH (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.

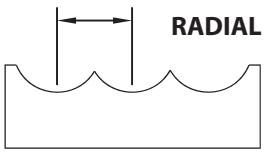
Roughing

(Reference series: 950MX)

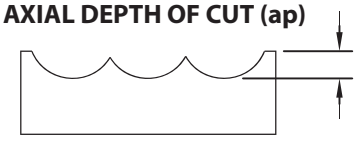
	RPM		CHIPLOAD PER TOOTH (Fz)	
DIAMETER	40 - 50 HRC	50 - 60 HRC	40 - 50 HRC	50 - 60 HRC
1,0mm	20,000 - 40,000	20,000 - 40,000	0,013 - 0,018	0,010 - 0,013
1,5mm	20,000 - 40,000	20,000 - 40,000	0,025 - 0,038	0,020 - 0,025
2,0mm	20,000 - 32,000	20,000 - 30,000	0,038 - 0,050	0,025 - 0,038
3,0mm	18,000 - 24,000	15,000 - 20,000	0,050 - 0,065	0,038 - 0,050
4,0mm	12,000 - 16,000	10,000 - 14,000	0,075 - 0,100	0,050 - 0,075
6,0mm	9,000 - 12,000	7,500 - 10,000	0,100 - 0,125	0,065 - 0,100
8,0mm	7,000 - 10,000	6,000 - 8,500	0,125 - 0,165	0,088 - 0,125
10,0mm	6,000 - 8,000	5,000 - 7,000	0,150 - 0,190	0,110 - 0,150
12,0mm	4,500 - 6,000	4,000 - 5,500	0,200 - 0,250	0,140 - 0,200
16,0mm	3,500 - 5,000	3,000 - 4,500	0,225 - 0,275	0,165 - 0,225
20,0mm	3,000 - 4,000	2,500 - 3,500	0,250 - 0,300	0,190 - 0,250
25,0mm	2,300 - 3,000	2,000 - 2,500	0,275 - 0,325	0,215 - 0,275

Semi-Finishing and Finishing

	RPM		CHIPLOAD PER TOOTH (Fz)	
DIAMETER	40 - 50 HRC	50 - 60 HRC	40 - 50 HRC	50 - 60 HRC
1,0mm	20,000 - 40,000	20,000 - 40,000	0,010 - 0,013	0,008 - 0,010
1,5mm	20,000 - 40,000	20,000 - 40,000	0,020 - 0,025	0,013 - 0,020
2,0mm	20,000 - 40,000	20,000 - 40,000	0,025 - 0,038	0,020 - 0,030
3,0mm	20,000 - 40,000	20,000 - 36,000	0,038 - 0,050	0,025 - 0,038
4,0mm	20,000 - 32,000	20,000 - 25,000	0,050 - 0,075	0,038 - 0,050
6,0mm	18,000 - 25,000	15,000 - 18,000	0,065 - 0,100	0,050 - 0,075
8,0mm	14,000 - 19,000	12,000 - 14,000	0,088 - 0,125	0,065 - 0,100
10,0mm	12,000 - 16,000	10,000 - 12,000	0,110 - 0,150	0,075 - 0,110
12,0mm	9,000 - 12,000	7,500 - 9,000	0,140 - 0,200	0,100 - 0,150
16,0mm	6,500 - 9,000	5,000 - 7,000	0,165 - 0,225	0,125 - 0,175
20,0mm	5,500 - 7,500	4,000 - 6,000	0,190 - 0,250	0,150 - 0,200
25,0mm	4,000 - 6,000	3,500 - 5,500	0,215 - 0,275	0,175 - 0,225



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.

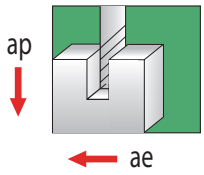
High pressure air is recommended for clearing chips away from the cut.

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

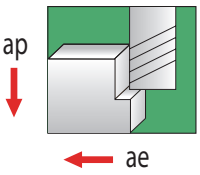
GARR TOOL Milling Guide for H-45 High Feed End Mills

	UP TO 40 HRC			40 - 45 HRC			45 - 55 HRC			55 - 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
3,0mm	16000	-	3100	13000	-	2032	11300	-	1778	9700	-	889
1/8"	15200	120	-	12000	80	-	10700	70	-	9200	35	-
4,0mm	12100	-	3700	9700	-	2540	8500	-	2159	7300	-	1016
3/16"	10200	160	-	8200	110	-	7100	90	-	6100	45	-
5,0mm	9700	-	4000	7700	-	2667	6800	-	2286	5800	-	1143
6,0mm	8100	-	4600	6500	-	3048	5700	-	2540	4900	-	1270
1/4"	7650	180	-	6100	120	-	5400	100	-	4600	50	-
5/16"	6100	195	-	4900	130	-	4300	110	-	3700	55	-
8,0mm	6050	-	4950	4850	-	3302	4300	-	2794	3650	-	1397
3/8"	5100	200	-	4100	135	-	3600	115	-	3100	60	-
10,0mm	4850	-	5100	3900	-	3429	3400	-	2921	2900	-	1524
12,0mm	4050	-	6400	3200	-	4064	2800	-	3429	2400	-	1651
1/2"	3800	240	-	3100	160	-	2700	135	-	2300	65	-

	Slotting Pocket Milling
Axial (ap)	0.3 x Radius
Radial (ae)	1 x D



	Profiling Side Milling
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.

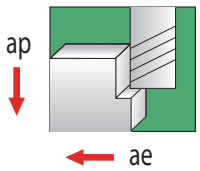
GARR TOOL Milling Guide for Diamond Coated End Mills in Graphite

DIAMETER	RPM	CHIPLOAD PER TOOTH (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"

DIAMETER	RPM	CHIPLOAD PER TOOTH (Fz)
1,0 - 3,0mm	15,000 - 35,000	0,015 - 0,030
3,0 - 6,0mm	8,000 - 31,000	0,030 - 0,050
6,0 - 10,0mm	6,000 - 31,000	0,050 - 0,100
10,0 - 12,0mm	6,000 - 25,000	0,080 - 0,130
16,0 - 20,0mm	4,500 - 15,000	0,130 - 0,150
20,0 - 25,0mm	4,500 - 12,000	0,150 - 0,200

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

	ISO Material	HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)			
				.0590" - .1250"	.1251" - .2500"	.2501" - .3750"	.3751" - .5020"
S	**COBALT BASE ALLOYS** / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金						
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	80 - 120 60 - 80	.0003" - .0008"	.0005" - .0010"	.0008" - .0012"	.0010" - .0015"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金						
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	100 - 125 80 - 110	.0003" - .0008"	.0005" - .0010"	.0008" - .0012"	.0010" - .0015"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金						
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	150 - 175 120 - 150	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金						
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		120 - 150	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
	5553 / Beta Titanium		90 - 110	.0004" - .0007"	.0006" - .0010"	.0009" - .0011"	.0010" - .0015"
M	**STAINLESS STEELS** / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金						
	13/8, 15/5, 17-4, pH Types	< 40 > 40	100 - 125 80 - 110	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	100 - 125 80 - 110	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
	400 Series - 403, 405, 420, 455	< 40 > 40	100 - 125 80 - 110	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
P	**HIGH STRENGTH TOOL STEELS** / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢						
	A2, D2, P20, H13, S7, O1	< 40 > 40	100 - 125 80 - 110	.0003" - .0008"	.0005" - .0010"	.0008" - .0012"	.0010" - .0015"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢						
	4140, 4340, 52100, 6150, 8620	< 40 > 40	100 - 125 80 - 110	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢						
	1000's - 1018, 1020, 12L14	< 40	100 - 125	.0004" - .0009"	.0006" - .0012"	.0009" - .0013"	.0010" - .0017"
K	**CAST MATERIAL** / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件						
	Ductile Iron		150 - 225	.0005" - .0010"	.0007" - .0012"	.0010" - .0015"	.0010" - .0018"
	Gray Iron		125 - 200	.0005" - .0010"	.0007" - .0012"	.0010" - .0015"	.0010" - .0018"
N	**NON-FERROUS** / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属						
	Aluminum (6061, 7075)		225	.0005" - .0010"	.0007" - .0012"	.0010" - .0015"	.0010" - .0018"
	Magnesium		225	.0005" - .0010"	.0007" - .0012"	.0010" - .0015"	.0010" - .0018"
	Copper		225	.0005" - .0010"	.0007" - .0012"	.0010" - .0015"	.0010" - .0018"
	Brass, Bronze		125 - 200	.0005" - .0010"	.0007" - .0012"	.0010" - .0015"	.0010" - .0018"
O	**COMPOSITE (non-ISO)** / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料						
	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.

ISO Material		HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)			
				1,50 - 3,00mm	3,01 - 6,00mm	6,01 - 9,00mm	9,01 - 13,00mm
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**						
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	25 - 40 15 - 25	0,008 - 0,020	0,013 - 0,025	0,020 - 0,030	0,025 - 0,040
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金						
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	30 - 40 25 - 35	0,008 - 0,020	0,013 - 0,025	0,020 - 0,030	0,025 - 0,040
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金						
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	45 - 50 35 - 45	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金						
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		40 - 45	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
	5553 / Beta Titanium		30 - 35	0,010 - 0,020	0,015 - 0,025	0,023 - 0,030	0,025 - 0,040
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**						
	13/8, 15/5, 17-4, pH Types	< 40 > 40	30 - 40 25 - 35	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	30 - 40 25 - 35	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
	400 Series - 403, 405, 420, 455	< 40 > 40	30 - 40 25 - 35	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**						
	A2, D2, P20, H13, S7, O1	< 40 > 40	30 - 40 25 - 35	0,008 - 0,020	0,013 - 0,025	0,020 - 0,030	0,025 - 0,040
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢						
	4140, 4340, 52100, 6150, 8620	< 40 > 40	30 - 40 25 - 35	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢						
	1000's - 1018, 1020, 12L14	< 40	30 - 40	0,010 - 0,023	0,015 - 0,030	0,023 - 0,035	0,025 - 0,045
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**						
	Ductile Iron		45 - 70	0,013 - 0,025	0,018 - 0,025	0,025 - 0,040	0,025 - 0,050
	Gray Iron		35 - 70	0,013 - 0,025	0,018 - 0,025	0,025 - 0,040	0,025 - 0,050
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**						
	Aluminum (6061, 7075)		70	0,013 - 0,025	0,018 - 0,025	0,025 - 0,040	0,025 - 0,050
	Magnesium		70	0,013 - 0,025	0,018 - 0,025	0,025 - 0,040	0,025 - 0,050
	Copper		70	0,013 - 0,025	0,018 - 0,025	0,025 - 0,040	0,025 - 0,050
	Brass, Bronze		40 - 60	0,013 - 0,025	0,018 - 0,025	0,025 - 0,040	0,025 - 0,050
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**						
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		40 - 45	0,008 - 0,020	0,013 - 0,025	0,020 - 0,030	0,025 - 0,040

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

GARR TOOL Milling Guide for Drill Mills

* Chamfering *

	ISO Material	HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)							
			154M, 154MA 152M, 152MA	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**										
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	60 - 90 50 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金										
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	55 - 90 45 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金										
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	55 - 90 50 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金										
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		100 - 150	.0003" - .0008"	.0005" - .0012"	.0005" - .0012"	.0008" - .0015"	.0010" - .0015"	.0013" - .0020"	.0018" - .0025"	.0025" - .0035"
	5553 / Beta Titanium		90 - 120	.0003" - .0008"	.0004" - .0010"	.0004" - .0010"	.0005" - .0012"	.0008" - .0014"	.0010" - .0016"	.0010" - .0020"	.0015" - .0025"
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**										
	13/8, 15/5, 17-4, pH Types	< 40 > 40	100 - 150 80 - 100	.0003" - .0006" .0002" - .0004"	.0003" - .0007" .0002" - .0006"	.0006" - .0009" .0003" - .0007"	.0008" - .0012" .0004" - .0008"	.0013" - .0018" .0007" - .0012"	.0010" - .0020" .0008" - .0015"	.0012" - .0025" .0010" - .0016"	.0012" - .0020" .0013" - .0017"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	150 - 225 125 - 220	.0002" - .0006" .0003" - .0005"	.0005" - .0008" .0003" - .0007"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0012"	.0010" - .0018" .0009" - .0015"	.0015" - .0025" .0013" - .0018"	.0018" - .0028" .0013" - .0018"	.0022" - .0032" .0017" - .0025"
	400 Series - 403, 405, 420, 455	< 40 > 40	150 - 200 100 - 150	.0007" - .0010" .0004" - .0008"	.0009" - .0015" .0006" - .0010"	.0009" - .0014" .0007" - .0011"	.0011" - .0015" .0008" - .0012"	.0013" - .0018" .0009" - .0015"	.0015" - .0025" .0012" - .0020"	.0020" - .0035" .0018" - .0030"	.0030" - .0046" .0024" - .0042"
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**										
	A2, D2, P20, H13, S7, O1	< 40 > 40	150 - 200 100 - 150	.0003" - .0008" .0003" - .0005"	.0005" - .0010" .0003" - .0008"	.0010" - .0015" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0014" - .0024" .0010" - .0015"	.0018" - .0026" .0012" - .0018"	.0020" - .0028" .0015" - .0022"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢										
	200, 250, 300, 8620	< 40 > 40	150 - 200 100 - 150	.0003" - .0008" .0003" - .0005"	.0005" - .0010" .0003" - .0008"	.0010" - .0015" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0014" - .0024" .0010" - .0015"	.0018" - .0026" .0012" - .0018"	.0020" - .0028" .0015" - .0022"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢										
	1000's - 1018, 1020, 12L14	< 40	150 - 200	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**										
	Ductile Iron		175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"
	Gray Iron		175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**										
	Aluminum (6061, 7075)		300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
	Magnesium		300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
	Copper		250 - 450	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
	Brass, Bronze		200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**										
	Glass Epoxy, Fiberglass, Plastics		200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"

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

* Chamfering *

	ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)								
			154M, 154MA 152M, 152MA	3,0mm	4,0mm	5,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,00mm	20,0mm
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**											
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	24 - 35	0,010 - 0,020	0,010 - 0,020	0,010 - 0,020	0,013 - 0,025	0,020 - 0,038	0,025 - 0,046	0,038 - 0,076	0,051 - 0,076	0,064 - 0,089
		> 40	20 - 31	0,008 - 0,015	0,008 - 0,015	0,008 - 0,015	0,008 - 0,020	0,013 - 0,025	0,020 - 0,038	0,025 - 0,038	0,038 - 0,064	0,038 - 0,051
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金											
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	22 - 35	0,010 - 0,020	0,010 - 0,020	0,010 - 0,020	0,013 - 0,025	0,020 - 0,038	0,025 - 0,046	0,038 - 0,076	0,051 - 0,076	0,064 - 0,089
		> 40	18 - 31	0,008 - 0,015	0,008 - 0,015	0,008 - 0,015	0,008 - 0,020	0,013 - 0,025	0,020 - 0,038	0,025 - 0,038	0,038 - 0,064	0,038 - 0,051
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金											
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40	22 - 35	0,010 - 0,020	0,010 - 0,020	0,010 - 0,020	0,013 - 0,025	0,020 - 0,038	0,025 - 0,046	0,038 - 0,076	0,051 - 0,076	0,064 - 0,089
		> 40	20 - 31	0,008 - 0,015	0,008 - 0,015	0,008 - 0,015	0,008 - 0,020	0,013 - 0,025	0,020 - 0,038	0,025 - 0,038	0,038 - 0,064	0,038 - 0,051
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金											
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		20 - 31	0,008 - 0,020	0,008 - 0,020	0,013 - 0,030	0,013 - 0,030	0,020 - 0,038	0,025 - 0,038	0,033 - 0,051	0,046 - 0,064	0,051 - 0,076
	5553 / Beta Titanium		35 - 47	0,008 - 0,020	0,008 - 0,020	0,010 - 0,025	0,010 - 0,025	0,013 - 0,030	0,020 - 0,036	0,025 - 0,041	0,025 - 0,051	0,038 - 0,064
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**											
	13/8, 15/5, 17-4, pH Types	< 40	39 - 59	0,008 - 0,015	0,008 - 0,015	0,008 - 0,018	0,015 - 0,023	0,020 - 0,030	0,033 - 0,046	0,025 - 0,051	0,030 - 0,064	0,030 - 0,051
		> 40	31 - 39	0,005 - 0,010	0,005 - 0,010	0,005 - 0,015	0,008 - 0,018	0,010 - 0,020	0,018 - 0,030	0,020 - 0,038	0,025 - 0,041	0,033 - 0,043
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	59 - 89	0,005 - 0,015	0,005 - 0,015	0,013 - 0,020	0,020 - 0,038	0,038 - 0,046	0,025 - 0,046	0,038 - 0,064	0,046 - 0,071	0,056 - 0,081
		> 40	49 - 87	0,008 - 0,013	0,008 - 0,013	0,008 - 0,018	0,013 - 0,025	0,020 - 0,030	0,018 - 0,030	0,033 - 0,046	0,038 - 0,058	0,043 - 0,064
	400 Series - 403, 405, 420, 455	< 40	59 - 79	0,018 - 0,025	0,018 - 0,025	0,023 - 0,038	0,023 - 0,036	0,028 - 0,038	0,033 - 0,046	0,038 - 0,064	0,051 - 0,089	0,056 - 0,102
		> 40	39 - 59	0,010 - 0,020	0,010 - 0,020	0,015 - 0,025	0,018 - 0,028	0,020 - 0,030	0,023 - 0,038	0,030 - 0,051	0,046 - 0,076	0,051 - 0,089
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**											
	A2, D2, P20, H13, S7, O1	< 40	59 - 79	0,008 - 0,020	0,008 - 0,020	0,013 - 0,025	0,025 - 0,038	0,030 - 0,051	0,030 - 0,051	0,036 - 0,061	0,046 - 0,066	0,051 - 0,071
		> 40	39 - 59	0,008 - 0,013	0,008 - 0,013	0,008 - 0,020	0,013 - 0,025	0,013 - 0,025	0,013 - 0,025	0,025 - 0,038	0,030 - 0,046	0,036 - 0,051
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢											
	4140, 4340, 52100, 6150, 8620	< 40	59 - 79	0,008 - 0,020	0,008 - 0,020	0,013 - 0,025	0,025 - 0,038	0,030 - 0,051	0,030 - 0,051	0,036 - 0,061	0,046 - 0,066	0,051 - 0,071
		> 40	39 - 59	0,008 - 0,013	0,008 - 0,013	0,008 - 0,020	0,013 - 0,025	0,013 - 0,025	0,013 - 0,025	0,025 - 0,038	0,030 - 0,046	0,036 - 0,051
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢											
	1000's - 1018, 1020, 12L14	< 40	59 - 79	0,008 - 0,020	0,008 - 0,020	0,013 - 0,025	0,025 - 0,038	0,030 - 0,051	0,030 - 0,051	0,036 - 0,061	0,046 - 0,066	0,051 - 0,071
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**											
	Ductile Iron		69 - 89	0,020 - 0,031	0,023 - 0,035	0,025 - 0,038	0,038 - 0,064	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,089 - 0,114	0,089 - 0,114
	Gray Iron		69 - 89	0,020 - 0,031	0,023 - 0,035	0,025 - 0,038	0,038 - 0,064	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,089 - 0,114	0,089 - 0,114
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**											
	Aluminum (6061, 7075)		118 - 197	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
	Magnesium		118 - 197	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
	Copper		98 - 177	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
	Brass, Bronze		98 - 157	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**											
	Glass Epoxy, Fiberglass, Plastics		79 - 157	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178

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

GARR TOOL Drilling Guide for Drill Mills

* Through Hole *

	ISO Material	HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)							
			152DA	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**										
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	60 - 90 50 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金										
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	55 - 90 45 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金										
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	55 - 90 50 - 80	.0004" - .0008" .0003" - .0006"	.0004" - .0008" .0003" - .0006"	.0005" - .0010" .0003" - .0008"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0015"	.0015" - .0030" .0010" - .0015"	.0020" - .0030" .0015" - .0025"	.0025" - .0035" .0015" - .0020"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金										
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		100 - 150	.0003" - .0008"	.0005" - .0012"	.0005" - .0012"	.0008" - .0015"	.0010" - .0015"	.0013" - .0020"	.0018" - .0025"	.0025" - .0035"
	5553 / Beta Titanium		90 - 120	.0003" - .0008"	.0004" - .0010"	.0004" - .0010"	.0005" - .0012"	.0008" - .0014"	.0010" - .0016"	.0010" - .0020"	.0015" - .0025"
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**										
	13/8, 15/5, 17-4, pH Types	< 40 > 40	100 - 150 80 - 100	.0003" - .0006" .0002" - .0004"	.0003" - .0007" .0002" - .0006"	.0006" - .0009" .0003" - .0007"	.0008" - .0012" .0004" - .0008"	.0013" - .0018" .0007" - .0012"	.0010" - .0020" .0008" - .0015"	.0012" - .0025" .0010" - .0016"	.0012" - .0020" .0013" - .0017"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	150 - 225 125 - 220	.0002" - .0006" .0003" - .0005"	.0005" - .0008" .0003" - .0007"	.0008" - .0015" .0005" - .0010"	.0010" - .0018" .0008" - .0012"	.0010" - .0018" .0009" - .0015"	.0015" - .0025" .0013" - .0018"	.0018" - .0028" .0013" - .0018"	.0022" - .0032" .0017" - .0025"
	400 Series - 403, 405, 420, 455	< 40 > 40	150 - 200 100 - 150	.0007" - .0010" .0004" - .0008"	.0009" - .0015" .0006" - .0010"	.0009" - .0014" .0007" - .0011"	.0011" - .0015" .0008" - .0012"	.0013" - .0018" .0009" - .0015"	.0015" - .0025" .0012" - .0020"	.0020" - .0035" .0018" - .0030"	.0030" - .0046" .0024" - .0042"
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**										
	A2, D2, P20, H13, S7, O1	< 40 > 40	150 - 200 100 - 150	.0003" - .0008" .0003" - .0005"	.0005" - .0010" .0003" - .0008"	.0010" - .0015" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0014" - .0024" .0010" - .0015"	.0018" - .0026" .0012" - .0018"	.0020" - .0028" .0015" - .0022"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢										
	4140, 4340, 52100, 6150, 8620	< 40 > 40	150 - 200 100 - 150	.0003" - .0008" .0003" - .0005"	.0005" - .0010" .0003" - .0008"	.0010" - .0015" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0012" - .0020" .0005" - .0010"	.0014" - .0024" .0010" - .0015"	.0018" - .0026" .0012" - .0018"	.0020" - .0028" .0015" - .0022"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢										
	1000's - 1018, 1020, 12L14	< 40	150 - 200	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**										
	Ductile Iron		175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"
	Gray Iron		175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**										
	Aluminum (6061, 7075)		300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
	Magnesium		300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
	Copper		250 - 450	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
	Brass, Bronze		200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**										
	Glass Epoxy, Fiberglass, Plastics		200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"

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

* Through Hole *

	ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)								
			152DA	3,0mm	4,0mm	5,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,00mm	20,0mm
S	**COBALT BASE ALLOYS** / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金											
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	24 - 35	0,010 - 0,020	0,010 - 0,020	0,010 - 0,020	0,013 - 0,025	0,020 - 0,038	0,025 - 0,046	0,038 - 0,076	0,051 - 0,076	0,064 - 0,089
		> 40	20 - 31	0,008 - 0,015	0,008 - 0,015	0,008 - 0,015	0,008 - 0,020	0,013 - 0,025	0,020 - 0,038	0,025 - 0,038	0,038 - 0,064	0,038 - 0,051
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金											
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	22 - 35	0,010 - 0,020	0,010 - 0,020	0,010 - 0,020	0,013 - 0,025	0,020 - 0,038	0,025 - 0,046	0,038 - 0,076	0,051 - 0,076	0,064 - 0,089
		> 40	18 - 31	0,008 - 0,015	0,008 - 0,015	0,008 - 0,015	0,008 - 0,020	0,013 - 0,025	0,020 - 0,038	0,025 - 0,038	0,038 - 0,064	0,038 - 0,051
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金											
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40	22 - 35	0,010 - 0,020	0,010 - 0,020	0,010 - 0,020	0,013 - 0,025	0,020 - 0,038	0,025 - 0,046	0,038 - 0,076	0,051 - 0,076	0,064 - 0,089
		> 40	20 - 31	0,008 - 0,015	0,008 - 0,015	0,008 - 0,015	0,008 - 0,020	0,013 - 0,025	0,020 - 0,038	0,025 - 0,038	0,038 - 0,064	0,038 - 0,051
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金											
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		20 - 31	0,008 - 0,020	0,008 - 0,020	0,013 - 0,030	0,013 - 0,030	0,020 - 0,038	0,025 - 0,038	0,033 - 0,051	0,046 - 0,064	0,051 - 0,076
	5553 / Beta Titanium		35 - 47	0,008 - 0,020	0,008 - 0,020	0,010 - 0,025	0,010 - 0,025	0,013 - 0,030	0,020 - 0,036	0,025 - 0,041	0,025 - 0,051	0,038 - 0,064
M	**STAINLESS STEELS** / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金											
	13/8, 15/5, 17-4, pH Types	< 40	39 - 59	0,008 - 0,015	0,008 - 0,015	0,008 - 0,018	0,015 - 0,023	0,020 - 0,030	0,033 - 0,046	0,025 - 0,051	0,030 - 0,064	0,030 - 0,051
		> 40	31 - 39	0,005 - 0,010	0,005 - 0,010	0,005 - 0,015	0,008 - 0,018	0,010 - 0,020	0,018 - 0,030	0,020 - 0,038	0,025 - 0,041	0,033 - 0,043
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	59 - 89	0,005 - 0,015	0,005 - 0,015	0,013 - 0,020	0,020 - 0,038	0,038 - 0,046	0,025 - 0,046	0,038 - 0,064	0,046 - 0,071	0,056 - 0,081
		> 40	49 - 87	0,008 - 0,013	0,008 - 0,013	0,008 - 0,018	0,013 - 0,025	0,020 - 0,030	0,018 - 0,030	0,033 - 0,046	0,038 - 0,058	0,043 - 0,064
	400 Series - 403, 405, 420, 455	< 40	59 - 79	0,018 - 0,025	0,018 - 0,025	0,023 - 0,038	0,023 - 0,036	0,028 - 0,038	0,033 - 0,046	0,038 - 0,064	0,051 - 0,089	0,056 - 0,102
		> 40	39 - 59	0,010 - 0,020	0,010 - 0,020	0,015 - 0,025	0,018 - 0,028	0,020 - 0,030	0,023 - 0,038	0,030 - 0,051	0,046 - 0,076	0,051 - 0,089
P	**HIGH STRENGTH TOOL STEELS** / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢											
	A2, D2, P20, H13, S7, O1	< 40	59 - 79	0,008 - 0,020	0,008 - 0,020	0,013 - 0,025	0,025 - 0,038	0,030 - 0,051	0,030 - 0,051	0,036 - 0,061	0,046 - 0,066	0,051 - 0,071
		> 40	39 - 59	0,008 - 0,013	0,008 - 0,013	0,008 - 0,020	0,013 - 0,025	0,013 - 0,025	0,013 - 0,025	0,025 - 0,038	0,030 - 0,046	0,036 - 0,051
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢											
	4140, 4340, 52100, 6150, 8620	< 40	59 - 79	0,008 - 0,020	0,008 - 0,020	0,013 - 0,025	0,025 - 0,038	0,030 - 0,051	0,030 - 0,051	0,036 - 0,061	0,046 - 0,066	0,051 - 0,071
		> 40	39 - 59	0,008 - 0,013	0,008 - 0,013	0,008 - 0,020	0,013 - 0,025	0,013 - 0,025	0,013 - 0,025	0,025 - 0,038	0,030 - 0,046	0,036 - 0,051
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢											
	1000's - 1018, 1020, 12L14	< 40	59 - 79	0,008 - 0,020	0,008 - 0,020	0,013 - 0,025	0,025 - 0,038	0,030 - 0,051	0,030 - 0,051	0,036 - 0,061	0,046 - 0,066	0,051 - 0,071
K	**CAST MATERIAL** / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件											
	Ductile Iron		69 - 89	0,020 - 0,031	0,023 - 0,035	0,025 - 0,038	0,038 - 0,064	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,089 - 0,114	0,089 - 0,114
	Gray Iron		69 - 89	0,020 - 0,031	0,023 - 0,035	0,025 - 0,038	0,038 - 0,064	0,038 - 0,064	0,051 - 0,076	0,064 - 0,089	0,089 - 0,114	0,089 - 0,114
N	**NON-FERROUS** / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属											
	Aluminum (6061, 7075)		118 - 197	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
	Magnesium		118 - 197	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
	Copper		98 - 177	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
	Brass, Bronze		98 - 157	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178
O	**COMPOSITE (non-ISO)** / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料											
	Glass Epoxy, Fiberglass, Plastics		79 - 157	0,015 - 0,025	0,015 - 0,025	0,020 - 0,036	0,030 - 0,051	0,036 - 0,071	0,051 - 0,076	0,089 - 0,122	0,127 - 0,152	0,147 - 0,178

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

GARR TOOL General Purpose Drilling Guide (Bright Finish)

ISO Material		HRC	SFM (by Series)			
			1100	1200, 1205, 1520	1500, 1510	1600
S	**COBALT BASE ALLOYS** / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	- -	45 - 70 35 - 60	45 - 70 35 - 60	30 - 55 20 - 45
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	- -	45 - 70 35 - 60	45 - 70 35 - 60	30 - 55 20 - 45
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	- -	45 - 70 35 - 60	45 - 70 35 - 60	30 - 55 20 - 45
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		-	60 - 90	60 - 90	45 - 75
	5553 / Beta Titanium		-	45 - 65	45 - 65	30 - 50
M	**STAINLESS STEELS** / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	- -	50 - 80 35 - 60	50 - 80 35 - 60	35 - 65 20 - 45
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	- -	45 - 75 35 - 55	45 - 75 35 - 55	30 - 60 20 - 40
	400 Series - 403, 405, 420, 455	< 40 > 40	- -	60 - 90 40 - 65	60 - 90 40 - 65	45 - 75 25 - 50
P	**HIGH STRENGTH TOOL STEELS** / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢					
	A2, D2, P20, H13, S7, O1	< 40 > 40	- -	80 - 130 60 - 110	80 - 130 60 - 110	65 - 110 45 - 90
	Thompson Shaft, Armor Plate (Class 1)	> 50	-	-	45 - 80	30 - 60
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	- -	100 - 140 70 - 120	100 - 140 70 - 120	65 - 120 55 - 100
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020, 12L14	< 40	-	120 - 170	120 - 170	105 - 150
K	**CAST MATERIAL** / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件					
	Ductile Iron		70 - 140	120 - 170	120 - 170	105 - 150
	Gray Iron		70 - 165	120 - 190	120 - 190	105 - 170
N	**NON-FERROUS** / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属					
	Aluminum (6061, 7075)		-	200 - 300	-	160 - 250
	Magnesium		-	120 - 215	-	80 - 165
	Copper		-	100 - 165	-	60 - 125
	Brass, Bronze		-	120 - 215	-	80 - 165
O	**COMPOSITE (non-ISO)** / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料					
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		140	100 - 230	105 - 230	-

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

GARR TOOL General Purpose Drilling Guide (Bright Finish)

ISO Material		HRC	CHIPLOAD PER TOOTH (Fz)				
			1/16" - 1/8"	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 5/8"
S	**COBALT BASE ALLOYS** / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金						
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	.0003" - .0008" .0002" - .0006"	.0006" - .0011" .0004" - .0009"	.0010" - .0017" .0008" - .0015"	.0014" - .0024" .0012" - .0022"	.0019" - .0032" .0017" - .0030"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金						
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	.0003" - .0008" .0002" - .0006"	.0006" - .0011" .0004" - .0009"	.0010" - .0017" .0008" - .0015"	.0014" - .0024" .0012" - .0022"	.0019" - .0032" .0017" - .0030"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金						
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	.0003" - .0008" .0002" - .0006"	.0006" - .0011" .0004" - .0009"	.0010" - .0017" .0008" - .0015"	.0014" - .0024" .0012" - .0022"	.0019" - .0032" .0017" - .0030"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金						
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		.0004" - .0009"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
	5553 / Beta Titanium		.0003" - .0007"	.0006" - .0011"	.0010" - .0017"	.0014" - .0024"	.0019" - .0030"
M	**STAINLESS STEELS** / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金						
	13/8, 15/5, 17-4, pH Types	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	400 Series - 403, 405, 420, 455	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
P	**HIGH STRENGTH TOOL STEELS** / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢						
	A2, D2, P20, H13, S7, O1	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	Thompson Shaft, Armor Plate (Class 1)	> 50	.0002" - .0006"	.0005" - .0009"	.0009" - .0015"	.0013" - .0022"	.0018" - .0028"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢						
	4140, 4340, 52100, 6150, 8620	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢						
	1000's - 1018, 1020, 12L14	< 40	.0005" - .0010"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
K	**CAST MATERIAL** / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件						
	Ductile Iron		.0005" - .0010"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
	Gray Iron		.0005" - .0010"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
N	**NON-FERROUS** / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属						
	Aluminum (6061, 7075)		.0006" - .0011"	.0009" - .0015"	.0013" - .0021"	.0017" - .0028"	.0022" - .0034"
	Magnesium		.0005" - .0010"	.0009" - .0014"	.0013" - .0020"	.0017" - .0027"	.0022" - .0033"
	Copper		.0004" - .0008"	.0008" - .0012"	.0012" - .0018"	.0016" - .0025"	.0021" - .0031"
	Brass, Bronze		.0005" - .0009"	.0009" - .0013"	.0013" - .0019"	.0017" - .0026"	.0022" - .0032"
O	**COMPOSITE (non-ISO)** / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料						
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		.0003" - .0008"	.0007" - .0012"	.0011" - .0018"	.0015" - .0025"	.0020" - .0031"

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

GARR TOOL General Purpose Drilling Guide (Bright Finish)

ISO Material		HRC	M/Min. (by Series)			
			1100	1200, 1205, 1520	1500, 1510	1600
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	- -	14 - 21 10 - 18	14 - 21 10 - 18	10 - 17 6 - 14
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	- -	14 - 21 10 - 18	14 - 21 10 - 18	10 - 17 6 - 14
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	- -	14 - 21 10 - 18	14 - 21 10 - 18	10 - 17 6 - 14
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		-	18 - 27	18 - 27	14 - 23
	5553 / Beta Titanium		-	14 - 20	14 - 20	10 - 15
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	-	15 - 25 10 - 18	15 - 25 10 - 18	10 - 20 6 - 14
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	-	14 - 23 10 - 17	14 - 23 10 - 17	10 - 18 6 - 12
	400 Series - 403, 405, 420, 455	< 40 > 40	-	18 - 27 12 - 20	18 - 27 12 - 20	14 - 23 8 - 15
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**					
	A2, D2, P20, H13, S7, O1	< 40 > 40	- -	25 - 40 18 - 34	25 - 40 18 - 34	20 - 34 14 - 27
	Thompson Shaft, Armor Plate (Class 1)	> 50	-	-	14 - 25	10 - 20
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	-	30 - 43 21 - 37	30 - 43 21 - 37	20 - 37 17 - 30
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020, 12L14	< 40	-	37 - 52	37 - 52	32 - 45
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**					
	Ductile Iron		21 - 43	37 - 52	37 - 52	32 - 45
	Gray Iron		21 - 50	37 - 58	37 - 58	32 - 52
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**					
	Aluminum (6061, 7075)		-	60 - 90	-	50 - 75
	Magnesium		-	37 - 65	-	25 - 50
	Copper		-	30 - 50	-	18 - 38
	Brass, Bronze		-	37 - 65	-	25 - 50
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**					
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		43	30 - 70	32 - 70	-

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

GARR TOOL General Purpose Drilling Guide (Bright Finish)

	ISO Material	HRC	CHIPLOAD PER TOOTH (Fz)				
			2,0 - 3,0mm	3,0 - 6,0mm	6,0 - 10,0mm	10,0 - 13,0mm	13,0 - 16,0mm
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**						
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	0,008 - 0,020 0,005 - 0,015	0,015 - 0,028 0,010 - 0,023	0,025 - 0,043 0,020 - 0,038	0,036 - 0,061 0,030 - 0,056	0,048 - 0,081 0,043 - 0,076
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金						
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	0,008 - 0,020 0,005 - 0,015	0,015 - 0,028 0,010 - 0,023	0,025 - 0,043 0,020 - 0,038	0,036 - 0,061 0,030 - 0,056	0,048 - 0,081 0,043 - 0,076
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金						
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	0,008 - 0,020 0,005 - 0,015	0,015 - 0,028 0,010 - 0,023	0,025 - 0,043 0,020 - 0,038	0,036 - 0,061 0,030 - 0,056	0,048 - 0,081 0,043 - 0,076
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金						
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		0,010 - 0,023	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069	0,053 - 0,084
	5553 / Beta Titanium		0,008 - 0,018	0,015 - 0,028	0,025 - 0,043	0,036 - 0,061	0,048 - 0,076
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**						
	13/8, 15/5, 17-4, pH Types	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061	0,051 - 0,081 0,048 - 0,076
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061	0,051 - 0,081 0,048 - 0,076
	400 Series - 403, 405, 420, 455	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061	0,051 - 0,081 0,048 - 0,076
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**						
	A2, D2, P20, H13, S7, O1	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061	0,051 - 0,081 0,048 - 0,076
	Thompson Shaft, Armor Plate (Class 1)	> 50	0,005 - 0,015	0,013 - 0,023	0,023 - 0,038	0,033 - 0,056	0,046 - 0,071
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢						
	4140, 4340, 52100, 6150, 8620	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061	0,051 - 0,081 0,048 - 0,076
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢						
	1000's - 1018, 1020, 12L14	< 40	0,013 - 0,025	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069	0,053 - 0,084
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**						
	Ductile Iron		0,013 - 0,025	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069	0,053 - 0,084
	Gray Iron		0,013 - 0,025	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069	0,053 - 0,084
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**						
	Aluminum (6061, 7075)		0,015 - 0,028	0,023 - 0,038	0,033 - 0,053	0,043 - 0,071	0,056 - 0,086
	Magnesium		0,013 - 0,025	0,023 - 0,036	0,033 - 0,051	0,043 - 0,069	0,056 - 0,084
	Copper		0,010 - 0,020	0,020 - 0,030	0,030 - 0,046	0,041 - 0,064	0,053 - 0,079
	Brass, Bronze		0,013 - 0,023	0,023 - 0,033	0,033 - 0,048	0,043 - 0,066	0,056 - 0,081
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**						
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		0,008 - 0,020	0,018 - 0,030	0,028 - 0,046	0,038 - 0,064	0,051 - 0,079

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

GARR TOOL General Purpose Drilling Guide (Durana Coated)

	ISO Material	HRC	SFM (by Series)			
			1100H, 1120H	1200H, 1205H, 1520H	1500H, 1510H	1800H
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	- -	55 - 75 45 - 65	55 - 75 45 - 65	- -
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	- -	55 - 80 45 - 70	55 - 80 45 - 70	- -
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	- -	55 - 80 45 - 70	55 - 80 45 - 70	- -
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		-	70 - 100	70 - 100	-
	5553 / Beta Titanium		-	55 - 75	55 - 75	-
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	- -	60 - 90 45 - 70	60 - 90 45 - 70	- -
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	- -	55 - 85 45 - 65	55 - 85 45 - 65	- -
	400 Series - 403, 405, 420, 455	< 40 > 40	- -	70 - 100 50 - 75	70 - 100 50 - 75	- -
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**					
	A2, D2, P20, H13, S7, O1	< 40 > 40	- -	90 - 140 70 - 120	90 - 140 70 - 120	- -
	Thompson Shaft, Armor Plate (Class 1)	> 50	-	-	55 - 90	- -
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	- -	110 - 150 80 - 130	110 - 150 80 - 130	- -
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020, 12L14	< 40	-	130 - 180	130 - 180	-
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**					
	Ductile Iron		80 - 150	130 - 180	130 - 180	-
	Gray Iron		80 - 150	130 - 200	130 - 200	-
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**					
	Aluminum (6061, 7075)		-	200 - 300	-	200 - 300
	Magnesium		-	130 - 225	-	130 - 225
	Copper		-	110 - 175	-	110 - 175
	Brass, Bronze		-	130 - 225	-	130 - 325
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**					
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		160	125 - 250	125 - 250	-

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

GARR TOOL General Purpose Drilling Guide (Durana Coated)

ISO Material		HRC	CHIPLOAD PER TOOTH (Fz)				
			1/16" - 1/8"	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 5/8"
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**						
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	.0003" - .0008" .0002" - .0006"	.0006" - .0011" .0004" - .0009"	.0010" - .0017" .0008" - .0015"	.0014" - .0024" .0012" - .0022"	.0019" - .0032" .0017" - .0030"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金						
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	.0003" - .0008" .0002" - .0006"	.0006" - .0011" .0004" - .0009"	.0010" - .0017" .0008" - .0015"	.0014" - .0024" .0012" - .0022"	.0019" - .0032" .0017" - .0030"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金						
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	.0003" - .0008" .0002" - .0006"	.0006" - .0011" .0004" - .0009"	.0010" - .0017" .0008" - .0015"	.0014" - .0024" .0012" - .0022"	.0019" - .0032" .0017" - .0030"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金						
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		.0004" - .0009"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
	5553 / Beta Titanium		.0003" - .0007"	.0006" - .0011"	.0010" - .0017"	.0014" - .0024"	.0019" - .0030"
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**						
	13/8, 15/5, 17-4, pH Types	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	400 Series - 403, 405, 420, 455	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**						
	A2, D2, P20, H13, S7, O1	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	Thompson Shaft, Armor Plate (Class 1)	> 50	.0002" - .0006"	.0005" - .0009"	.0009" - .0015"	.0013" - .0022"	.0018" - .0028"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢						
	4140, 4340, 52100, 6150, 8620	< 40 > 40	.0004" - .0009" .0003" - .0007"	.0007" - .0013" .0006" - .0011"	.0011" - .0019" .0010" - .0017"	.0015" - .0026" .0014" - .0024"	.0020" - .0032" .0019" - .0030"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢						
	1000's - 1018, 1020, 12L14	< 40	.0005" - .0010"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**						
	Ductile Iron		.0005" - .0010"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
	Gray Iron		.0005" - .0010"	.0008" - .0014"	.0012" - .0020"	.0016" - .0027"	.0021" - .0033"
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**						
	Aluminum (6061, 7075)		.0006" - .0011"	.0009" - .0015"	.0013" - .0021"	.0017" - .0028"	.0022" - .0034"
	Magnesium		.0005" - .0010"	.0009" - .0014"	.0013" - .0020"	.0017" - .0027"	.0022" - .0033"
	Copper		.0004" - .0008"	.0008" - .0012"	.0012" - .0018"	.0016" - .0025"	.0021" - .0031"
	Brass, Bronze		.0005" - .0009"	.0009" - .0013"	.0013" - .0019"	.0017" - .0026"	.0022" - .0032"
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**						
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		.0003" - .0008"	.0007" - .0012"	.0011" - .0018"	.0015" - .0025"	.0020" - .0031"

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

GARR TOOL General Purpose Drilling Guide (Durana Coated)

ISO Material		HRC	M/Min. (by Series)			
			1100H, 1120H	1200H, 1205H, 1520H	1500H, 1510H	1800H
S	**COBALT BASE ALLOYS** / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	- -	17 - 23 13 - 20	17 - 23 13 - 20	- -
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	- -	17 - 25 13 - 21	17 - 25 13 - 21	- -
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	- -	17 - 25 13 - 21	17 - 25 13 - 21	- -
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		-	21 - 30	21 - 30	-
	5553 / Beta Titanium		-	17 - 23	17 - 23	-
M	**STAINLESS STEELS** / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	- -	18 - 27 13 - 21	18 - 27 13 - 21	- -
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	- -	17 - 26 13 - 20	17 - 26 13 - 20	- -
	400 Series - 403, 405, 420, 455	< 40 > 40	- -	21 - 30 15 - 23	21 - 30 15 - 23	- -
P	**HIGH STRENGTH TOOL STEELS** / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢					
	A2, D2, P20, H13, S7, O1	< 40 > 40	- -	27 - 43 21 - 37	27 - 43 21 - 37	- -
	Thompson Shaft, Armor Plate (Class 1)	> 50	-	-	17 - 27	-
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	- -	34 - 45 25 - 40	34 - 45 25 - 40	- -
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020, 12L14	< 40	-	40 - 55	40 - 55	-
K	**CAST MATERIAL** / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件					
	Ductile Iron		25 - 45	40 - 55	40 - 55	-
	Gray Iron		25 - 53	40 - 60	40 - 60	-
N	**NON-FERROUS** / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属					
	Aluminum (6061, 7075)		-	60 - 90	-	60 - 90
	Magnesium		-	40 - 68	-	40 - 68
	Copper		-	34 - 53	-	34 - 53
	Brass, Bronze		-	40 - 68	-	40 - 68
O	**COMPOSITE (non-ISO)** / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料					
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		50	38 - 75	-	-

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

GARR TOOL General Purpose Drilling Guide (Durana Coated)

ISO Material		HRC	CHIPLOAD PER TOOTH (Fz)				
			2,0 - 3,0mm	3,0 - 6,0mm	6,0 - 10,0mm	10,0 - 13,0mm	13,0 - 16,0mm
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**						
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	0,008 - 0,020 0,005 - 0,015	0,015 - 0,028 0,010 - 0,023	0,025 - 0,043 0,020 - 0,038	0,036 - 0,061 0,030 - 0,056	0,048 - 0,081 0,043 - 0,076
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金						
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	0,008 - 0,020 0,005 - 0,015	0,015 - 0,028 0,010 - 0,023	0,025 - 0,043 0,020 - 0,038	0,036 - 0,061 0,030 - 0,056	0,048 - 0,081 0,043 - 0,076
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金						
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	0,008 - 0,020 0,005 - 0,015	0,015 - 0,028 0,010 - 0,023	0,025 - 0,043 0,020 - 0,038	0,036 - 0,061 0,030 - 0,056	0,048 - 0,081 0,043 - 0,076
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金						
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		0,010 - 0,023	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069	0,053 - 0,084
	5553 / Beta Titanium		0,008 - 0,018	0,015 - 0,028	0,025 - 0,043	0,036 - 0,061	0,048 - 0,076
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**						
	13/8, 15/5, 17-4, pH Types	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061	0,051 - 0,081 0,048 - 0,076
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061	0,051 - 0,081 0,048 - 0,076
	400 Series - 403, 405, 420, 455	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061	0,051 - 0,081 0,048 - 0,076
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**						
	A2, D2, P20, H13, S7, O1	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061	0,051 - 0,081 0,048 - 0,076
	Thompson Shaft, Armor Plate (Class 1)	> 50	0,005 - 0,015	0,013 - 0,023	0,023 - 0,038	0,033 - 0,056	0,046 - 0,071
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢						
	4140, 4340, 52100, 6150, 8620	< 40 > 40	0,010 - 0,023 0,008 - 0,018	0,018 - 0,033 0,015 - 0,028	0,028 - 0,048 0,025 - 0,043	0,038 - 0,066 0,036 - 0,061	0,051 - 0,081 0,048 - 0,076
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢						
	1000's - 1018, 1020, 12L14	< 40	0,013 - 0,025	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069	0,053 - 0,084
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**						
	Ductile Iron		0,013 - 0,025	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069	0,053 - 0,084
	Gray Iron		0,013 - 0,025	0,020 - 0,036	0,030 - 0,051	0,041 - 0,069	0,053 - 0,084
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**						
	Aluminum (6061, 7075)		0,015 - 0,028	0,023 - 0,038	0,033 - 0,053	0,043 - 0,071	0,056 - 0,086
	Magnesium		0,013 - 0,025	0,023 - 0,036	0,033 - 0,051	0,043 - 0,069	0,056 - 0,084
	Copper		0,010 - 0,020	0,020 - 0,030	0,030 - 0,046	0,041 - 0,064	0,053 - 0,079
	Brass, Bronze		0,013 - 0,023	0,023 - 0,033	0,033 - 0,048	0,043 - 0,066	0,056 - 0,081
O	**COMPOSITE (non-ISO) / Verbundwerkstoff / material compuesto / matériau composite / materiale composito / 复合材料**						
	Glass Epoxy, Fiberglass, Plastics, Graphite, G10		0,008 - 0,020	0,018 - 0,030	0,028 - 0,046	0,038 - 0,064	0,051 - 0,079

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

GARR TOOL High Performance Drilling Guide for Mini Drills

(Series 1550H,1250H,1850H)

	ISO Material	HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)		
				.0312" - .0390"	.0394" - .0787"	.0791" - .1250"
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	70 - 100 50 - 85	.0002" - .0004" .0002" - .0004"	.0004" - .0007" .0003" - .0006"	.0006" - .0010" .0005" - .0009"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	70 - 100 50 - 85	.0002" - .0004" .0002" - .0004"	.0004" - .0007" .0003" - .0006"	.0006" - .0010" .0005" - .0009"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	70 - 100 50 - 85	.0002" - .0004" .0002" - .0004"	.0004" - .0007" .0003" - .0006"	.0006" - .0010" .0005" - .0009"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		90 - 130	.0003" - .0006"	.0004" - .0008"	.0006" - .0012"
	5553 / Beta Titanium		75 - 115	.0002" - .0004"	.0003" - .0006"	.0005" - .0010"
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	95 - 135 80 - 125	.0002" - .0004" .0002" - .0004"	.0004" - .0007" .0003" - .0006"	.0006" - .0010" .0005" - .0009"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	90 - 125 80 - 115	.0002" - .0004" .0002" - .0004"	.0004" - .0007" .0003" - .0006"	.0006" - .0010" .0005" - .0009"
	400 Series - 403, 405, 420, 455	< 40 > 40	100 - 150 80 - 125	.0002" - .0004" .0002" - .0004"	.0004" - .0007" .0003" - .0006"	.0006" - .0010" .0005" - .0009"
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**					
	A2, D2, P20, H13, S7, O1	< 40 > 40	100 - 175 60 - 80	.0003" - .0006" .0002" - .0004"	.0004" - .0008" .0003" - .0006"	.0006" - .0012" .0005" - .0010"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	125 - 175 80 - 125	.0004" - .0008" .0003" - .0005"	.0006" - .0012" .0004" - .0008"	.0008" - .0015" .0006" - .0012"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020,12L14	< 40	125 - 175	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**					
	Ductile Iron		100 - 200	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
	Gray Iron		80 - 175	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**					
	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		125 - 250	.0004" - .0008"	.0006" - .0012"	.0008" - .0015"
	Brass		100 - 250	.0003" - .0008"	.0004" - .0012"	.0006" - .0015"
	Bronze		80 - 250	.0003" - .0008"	.0004" - .0012"	.0006" - .0015"

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

GARR TOOL High Performance Drilling Guide for Mini Drills

(Series 1550H,1250H,1850H)

	ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)		
				0,79 - 0,99mm	1,00 - 2,00mm	2,01 - 3,17mm
S	**COBALT BASE ALLOYS / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金**					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	20 - 30 15 - 25	0,005 - 0,010 0,005 - 0,010	0,010 - 0,018 0,008 - 0,015	0,015 - 0,025 0,013 - 0,023
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	20 - 30 15 - 25	0,008 - 0,013 0,005 - 0,010	0,010 - 0,018 0,008 - 0,015	0,015 - 0,025 0,013 - 0,023
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	20 - 30 15 - 25	0,005 - 0,013 0,005 - 0,010	0,010 - 0,020 0,008 - 0,018	0,013 - 0,025 0,010 - 0,023
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		25 - 40	0,008 - 0,015	0,010 - 0,020	0,015 - 0,030
	5553 / Beta Titanium		20 - 35	0,005 - 0,010	0,008 - 0,015	0,013 - 0,025
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	30 - 40 25 - 40	0,005 - 0,010 0,005 - 0,010	0,010 - 0,018 0,008 - 0,015	0,015 - 0,025 0,013 - 0,023
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	25 - 40 25 - 35	0,005 - 0,010 0,005 - 0,010	0,010 - 0,018 0,008 - 0,015	0,015 - 0,025 0,013 - 0,023
	400 Series - 403, 405, 420, 455	< 40 > 40	30 - 45 25 - 40	0,005 - 0,010 0,005 - 0,010	0,010 - 0,018 0,008 - 0,015	0,015 - 0,025 0,013 - 0,023
P	**HIGH STRENGTH TOOL STEELS / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**					
	A2, D2, P20, H13, S7, O1	< 40 > 40	30 - 50 20 - 25	0,008 - 0,015 0,005 - 0,010	0,010 - 0,020 0,008 - 0,015	0,015 - 0,030 0,013 - 0,025
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	40 - 50 25 - 40	0,010 - 0,020 0,008 - 0,013	0,015 - 0,030 0,010 - 0,020	0,020 - 0,038 0,015 - 0,030
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢					
	1000's - 1018, 1020, 12L14	< 40	40 - 50	0,010 - 0,020	0,015 - 0,030	0,020 - 0,038
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**					
	Ductile Iron		30 - 60	0,010 - 0,020	0,015 - 0,030	0,020 - 0,038
	Gray Iron		25 - 50	0,010 - 0,020	0,015 - 0,030	0,020 - 0,038
N	**NON-FERROUS / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属**					
	Aluminum 2014, 2024, 6061-(T1-T6), 7075, Extruded		40 - 90	0,010 - 0,020	0,015 - 0,030	0,020 - 0,038
	Magnesium		40 - 75	0,010 - 0,020	0,015 - 0,030	0,020 - 0,038
	Copper		40 - 75	0,010 - 0,020	0,015 - 0,030	0,020 - 0,038
	Brass		30 - 75	0,008 - 0,020	0,010 - 0,030	0,015 - 0,038
	Bronze		25 - 75	0,008 - 0,020	0,010 - 0,030	0,015 - 0,038

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

GARR TOOL HTD 12 High Performance Drilling Guide

	ISO Material	HRC	SFM (Vc)	CHIPLOAD PER TOOTH (Fz)		
				1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"
S	**COBALT BASE ALLOYS**					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	110 70	.0006" - .0016" .0004" - .0012"	.0016" - .0022" .0012" - .0018"	.0022" - .0035" .0018" - .0031"
	NICKEL BASE ALLOYS					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	120 80	.0006" - .0016" .0004" - .0012"	.0016" - .0022" .0012" - .0018"	.0022" - .0035" .0018" - .0031"
	IRON BASE ALLOYS					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	120 80	.0006" - .0016" .0004" - .0012"	.0016" - .0022" .0012" - .0018"	.0022" - .0035" .0018" - .0031"
	TITANIUM ALLOYS					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		170	.0006" - .0026"	.0026" - .0040"	.0040" - .0055"
	5553 / Beta Titanium		120	.0005" - .0023"	.0023" - .0034"	.0034" - .0047"
M	**STAINLESS STEELS**					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	150 105	.0006" - .0018" .0005" - .0013"	.0018" - .0035" .0013" - .0030"	.0035" - .0049" .0030" - .0043"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	150 105	.0006" - .0018" .0005" - .0013"	.0018" - .0035" .0013" - .0030"	.0035" - .0049" .0030" - .0043"
	400 Series - 403, 405, 420, 455	< 40 > 40	160 105	.0006" - .0018" .0005" - .0013"	.0018" - .0035" .0013" - .0030"	.0035" - .0049" .0030" - .0043"
P	**HIGH STRENGTH TOOL STEELS**					
	A2, D2, P20, H13, S7, O1	< 40 > 40	170 105	.0008" - .0026" .0006" - .0020"	.0026" - .0038" .0020" - .0032"	.0038" - .0050" .0032" - .0043"
	MEDIUM ALLOY TOOL STEELS					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	260 110	.0008" - .0026" .0006" - .0020"	.0026" - .0038" .0020" - .0032"	.0038" - .0050" .0032" - .0043"
	CARBON STEELS					
	1000's - 1018, 1020, 12L14	< 40	320	.0008" - .0029"	.0030" - .0045"	.0045" - .0060"
K	**CAST MATERIAL**					
	Ductile Iron		340	.0008" - .0029"	.0029" - .0045"	.0045" - .0060"
	Gray Iron		350	.0008" - .0029"	.0029" - .0045"	.0045" - .0060"
N	**NON-FERROUS**					
	Aluminum 2014, 2024, 6061-(T1-T6), 7075		400	.0016" - .0030"	.0030" - .0046"	.0046" - .0062"
	Aluminum Die Cast		375	.0014" - .0027"	.0027" - .0040"	.0040" - .0054"
	Magnesium		275	.0014" - .0026"	.0026" - .0037"	.0037" - .0049"
	Copper		250	.0013" - .0024"	.0024" - .0031"	.0031" - .0044"
	Brass		360	.0016" - .0030"	.0030" - .0044"	.0044" - .0060"
	Bronze		260	.0013" - .0024"	.0024" - .0031"	.0031" - .0044"

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

GARR TOOL HTD 12 High Performance Drilling Guide

	ISO Material	HRC	M/Min. (Vc)	CHIPLOAD PER TOOTH (Fz)		
				3.0 - 6.0mm	6.0 - 10.0mm	10.0 - 13.0mm
S	**COBALT BASE ALLOYS**					
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	33 21	0.015 - 0.041 0.010 - 0.030	0.041 - 0.056 0.030 - 0.046	0.056 - 0.089 0.046 - 0.079
	NICKEL BASE ALLOYS					
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	36 24	0.015 - 0.041 0.010 - 0.030	0.041 - 0.056 0.030 - 0.046	0.056 - 0.089 0.046 - 0.079
	IRON BASE ALLOYS					
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	36 24	0.015 - 0.041 0.010 - 0.030	0.041 - 0.056 0.030 - 0.046	0.056 - 0.089 0.046 - 0.079
	TITANIUM ALLOYS					
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		52	0.015 - 0.066	0.066 - 0.102	0.102 - 0.140
	5553 / Beta Titanium		36	0.013 - 0.058	0.058 - 0.086	0.086 - 0.119
M	**STAINLESS STEELS**					
	13/8, 15/5, 17-4, pH Types	< 40 > 40	45 32	0.015 - 0.046 0.013 - 0.033	0.046 - 0.089 0.033 - 0.076	0.089 - 0.124 0.076 - 0.109
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	45 32	0.015 - 0.046 0.013 - 0.033	0.046 - 0.089 0.033 - 0.076	0.089 - 0.124 0.076 - 0.109
	400 Series - 403, 405, 420, 455	< 40 > 40	48 32	0.015 - 0.046 0.013 - 0.033	0.046 - 0.089 0.033 - 0.076	0.089 - 0.124 0.076 - 0.109
P	**HIGH STRENGTH TOOL STEELS**					
	A2, D2, P20, H13, S7, O1	< 40 > 40	52 32	0.020 - 0.066 0.015 - 0.051	0.066 - 0.097 0.051 - 0.081	0.097 - 0.127 0.081 - 0.109
	MEDIUM ALLOY TOOL STEELS					
	4140, 4340, 52100, 6150, 8620	< 40 > 40	79 33	0.020 - 0.066 0.015 - 0.051	0.066 - 0.097 0.051 - 0.081	0.097 - 0.127 0.081 - 0.109
	CARBON STEELS					
	1000's - 1018, 1020, 12L14	< 40	97	0.020 - 0.074	0.074 - 0.114	0.114 - 0.152
K	**CAST MATERIAL**					
	Ductile Iron		103	0.020 - 0.074	0.074 - 0.114	0.114 - 0.152
	Gray Iron		106	0.020 - 0.074	0.074 - 0.114	0.114 - 0.152
N	**NON-FERROUS**					
	Aluminum 2014, 2024, 6061-(T1-T6), 7075		122	0.041 - 0.076	0.076 - 0.117	0.117 - 0.157
	Aluminum Die Cast		114	0.036 - 0.069	0.069 - 0.102	0.102 - 0.137
	Magnesium		83	0.036 - 0.066	0.066 - 0.094	0.094 - 0.124
	Copper		76	0.033 - 0.061	0.061 - 0.079	0.079 - 0.112
	Brass		109	0.041 - 0.076	0.076 - 0.112	0.112 - 0.152
	Bronze		79	0.033 - 0.061	0.061 - 0.079	0.079 - 0.112

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

GARR TOOL High Performance Drilling Guide

ISO Material		HRC	SFM (Vc)		CHIPLOAD PER TOOTH (Fz)				
			NON-COOLANT	COOLANT FED	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 5/8"	5/8" - 3/4"
S	**COBALT BASE ALLOYS** / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金								
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	80	100	.0008" - .0015"	.0012" - .0020"	.0017" - .0026"	.0022" - .0032"	.0027" - .0038"
		> 40	60	75	.0005" - .0012"	.0009" - .0017"	.0014" - .0023"	.0019" - .0029"	.0024" - .0035"
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金								
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	90	110	.0008" - .0015"	.0012" - .0020"	.0017" - .0026"	.0022" - .0032"	.0027" - .0038"
		> 40	70	75	.0005" - .0012"	.0009" - .0017"	.0014" - .0023"	.0019" - .0029"	.0024" - .0035"
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金								
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40	90	115	.0008" - .0015"	.0012" - .0020"	.0017" - .0026"	.0022" - .0032"	.0027" - .0038"
		> 40	60	75	.0005" - .0012"	.0009" - .0017"	.0014" - .0023"	.0019" - .0029"	.0024" - .0035"
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金								
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		110	135	.0010" - .0018"	.0015" - .0023"	.0020" - .0029"	.0025" - .0035"	.0030" - .0041"
	5553 / Beta Titanium		70	100	.0008" - .0015"	.0012" - .0020"	.0017" - .0026"	.0022" - .0032"	.0027" - .0038"
M	**STAINLESS STEELS** / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金								
	13/8, 15/5, 17-4, pH Types	< 40	100	120	.0010" - .0017"	.0014" - .0022"	.0019" - .0028"	.0024" - .0034"	.0029" - .0040"
		> 40	80	90	.0007" - .0015"	.0011" - .0020"	.0016" - .0026"	.0021" - .0032"	.0026" - .0038"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	90	110	.0010" - .0017"	.0014" - .0022"	.0019" - .0028"	.0024" - .0034"	.0029" - .0040"
		> 40	70	80	.0007" - .0015"	.0011" - .0020"	.0016" - .0026"	.0021" - .0032"	.0026" - .0038"
	400 Series - 403, 405, 420, 455	< 40	110	130	.0010" - .0017"	.0014" - .0022"	.0019" - .0028"	.0024" - .0034"	.0029" - .0040"
		> 40	80	105	.0007" - .0015"	.0011" - .0020"	.0016" - .0026"	.0021" - .0032"	.0026" - .0038"
P	**HIGH STRENGTH TOOL STEELS** / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢								
	A2, D2, P20, H13, S7, O1	< 40	160	200	.0011" - .0020"	.0015" - .0025"	.0020" - .0031"	.0025" - .0037"	.0030" - .0043"
		> 40	130	150	.0007" - .0014"	.0011" - .0019"	.0016" - .0025"	.0021" - .0031"	.0026" - .0037"
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢								
	4140, 4340, 52100, 6150, 8620	< 40	175	215	.0011" - .0020"	.0015" - .0025"	.0020" - .0031"	.0025" - .0037"	.0030" - .0043"
		> 40	145	170	.0007" - .0014"	.0011" - .0019"	.0016" - .0025"	.0021" - .0031"	.0026" - .0037"
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢								
	1000's - 1018, 1020, 12L14	< 40	225	275	.0014" - .0023"	.0018" - .0027"	.0023" - .0033"	.0028" - .0039"	.0033" - .0045"
K	**CAST MATERIAL** / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件								
	Ductile Iron		250	350	.0015" - .0023"	.0019" - .0028"	.0024" - .0034"	.0029" - .0040"	.0034" - .0046"
	Gray Iron		275	375	.0016" - .0024"	.0020" - .0029"	.0025" - .0035"	.0030" - .0041"	.0035" - .0047"
N	**NON-FERROUS** / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属								
	Aluminum 2014, 2024, 6061-(T1-T6), 7075		350	425	.0023" - .0033"	.0027" - .0038"	.0033" - .0044"	.0038" - .0050"	.0043" - .0056"
	Aluminum Die Cast		300	375	.0018" - .0028"	.0022" - .0033"	.0027" - .0039"	.0032" - .0045"	.0037" - .0051"
	Magnesium		275	350	.0020" - .0030"	.0024" - .0035"	.0029" - .0041"	.0034" - .0047"	.0039" - .0053"
	Copper		200	300	.0017" - .0025"	.0021" - .0030"	.0026" - .0036"	.0031" - .0042"	.0036" - .0048"
	Brass		250	350	.0020" - .0032"	.0024" - .0037"	.0029" - .0043"	.0034" - .0049"	.0039" - .0055"
	Bronze		200	275	.0018" - .0025"	.0022" - .0030"	.0027" - .0036"	.0032" - .0042"	.0037" - .0048"

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

ISO Material		HRC	M/Min. (Vc)		CHIPLOAD PER TOOTH (Fz)				
			NON-COOLANT	COOLANT FED	3,0 - 6,0mm	6,0 - 10,0mm	10,0 - 13,0mm	13,0 - 16,0mm	16,0 - 20,0mm
S	**COBALT BASE ALLOYS** / Kobaltlegierungen / Aleaciones del cobalto / Alliages de cobalt / Leghe del cobalto / 钴基合金								
	Haynes 25/188, Stellite 21, Cobalt Chrome	< 40 > 40	25 20	30 25	0,020 - 0,038 0,013 - 0,030	0,030 - 0,051 0,023 - 0,043	0,043 - 0,066 0,036 - 0,058	0,056 - 0,081 0,048 - 0,074	0,069 - 0,097 0,061 - 0,089
	NICKEL BASE ALLOYS / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金								
	Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40 > 40	25 20	35 25	0,020 - 0,038 0,013 - 0,030	0,030 - 0,051 0,023 - 0,043	0,043 - 0,066 0,036 - 0,058	0,056 - 0,081 0,048 - 0,074	0,069 - 0,097 0,061 - 0,089
	IRON BASE ALLOYS / Eisenlegierungen / Aleaciones ferrosas / Alliages ferreux / Leghe ferrose / 铁基合金								
	A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy	< 40 > 40	25 20	35 25	0,020 - 0,038 0,013 - 0,030	0,030 - 0,051 0,023 - 0,043	0,043 - 0,066 0,036 - 0,058	0,056 - 0,081 0,048 - 0,074	0,069 - 0,097 0,061 - 0,089
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金								
	Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si		35	40	0,025 - 0,046	0,038 - 0,058	0,051 - 0,074	0,064 - 0,089	0,076 - 0,104
	5553 / Beta Titanium		20	30	0,020 - 0,038	0,030 - 0,051	0,043 - 0,066	0,056 - 0,081	0,069 - 0,097
M	**STAINLESS STEELS** / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金								
	13/8, 15/5, 17-4, pH Types	< 40 > 40	30 25	35 25	0,025 - 0,043 0,018 - 0,038	0,036 - 0,056 0,028 - 0,051	0,048 - 0,071 0,041 - 0,066	0,061 - 0,086 0,053 - 0,081	0,074 - 0,102 0,066 - 0,097
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	25 20	35 25	0,025 - 0,043 0,018 - 0,038	0,036 - 0,056 0,028 - 0,051	0,048 - 0,071 0,041 - 0,066	0,061 - 0,086 0,053 - 0,081	0,074 - 0,102 0,066 - 0,097
	400 Series - 403, 405, 420, 455	< 40 > 40	35 25	40 30	0,025 - 0,043 0,018 - 0,038	0,036 - 0,056 0,028 - 0,051	0,048 - 0,071 0,041 - 0,066	0,061 - 0,086 0,053 - 0,081	0,074 - 0,102 0,066 - 0,097
P	**HIGH STRENGTH TOOL STEELS** / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢								
	A2, D2, P20, H13, S7, O1	< 40 > 40	50 40	60 45	0,028 - 0,051 0,018 - 0,036	0,038 - 0,064 0,028 - 0,048	0,051 - 0,079 0,041 - 0,064	0,064 - 0,094 0,053 - 0,079	0,076 - 0,109 0,066 - 0,094
	MEDIUM ALLOY TOOL STEELS / Mittel Legierte Werkzeugstähle / Aceros herramienta medios de la aleación / Aciers à outils alliés / Acciaio da utensili di media durezza / 中碳合金钢								
	4140, 4340, 52100, 6150, 8620	< 40 > 40	55 45	65 50	0,028 - 0,051 0,018 - 0,036	0,038 - 0,064 0,028 - 0,048	0,051 - 0,079 0,041 - 0,064	0,064 - 0,094 0,053 - 0,079	0,076 - 0,109 0,066 - 0,094
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢								
	1000's - 1018, 1020, 12L14	< 40	70	85	0,036 - 0,058	0,048 - 0,069	0,058 - 0,064	0,071 - 0,099	0,084 - 0,114
K	**CAST MATERIAL** / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件								
	Ductile Iron		75	105	0,038 - 0,058	0,048 - 0,071	0,061 - 0,086	0,074 - 0,102	0,086 - 0,117
	Gray Iron		85	115	0,041 - 0,061	0,051 - 0,074	0,064 - 0,089	0,076 - 0,104	0,089 - 0,119
N	**NON-FERROUS** / Nichteisenmetalle / Metal no ferroso / métal non ferreux / metallo non ferroso / 有色金属								
	Aluminum 2014, 2024, 6061-(T1-T6), 7075		105	130	0,058 - 0,084	0,069 - 0,097	0,084 - 0,112	0,097 - 0,127	0,109 - 0,142
	Aluminum Die Cast		90	115	0,046 - 0,071	0,056 - 0,084	0,069 - 0,099	0,081 - 0,114	0,094 - 0,130
	Magnesium		85	105	0,051 - 0,076	0,061 - 0,089	0,074 - 0,104	0,086 - 0,119	0,099 - 0,135
	Copper		60	90	0,043 - 0,064	0,053 - 0,076	0,066 - 0,091	0,079 - 0,107	0,091 - 0,122
	Brass		75	105	0,051 - 0,081	0,061 - 0,094	0,074 - 0,109	0,086 - 0,124	0,099 - 0,140
	Bronze		60	85	0,048 - 0,064	0,056 - 0,076	0,069 - 0,091	0,081 - 0,107	0,094 - 0,122

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

GARR TOOL Drilling Guide for Aluminum Series 3-Flute Drills

			CHIPLOAD PER TOOTH (Fz)					
Material	Type	SFM (Vc)	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"

			CHIPLOAD PER TOOTH (Fz)					
Material	Type	M/Min. (Vc)	4,0mm	6,0mm	8,0mm	10,0mm	12,0mm	16,0mm
Aluminum Alloy	6061	140 - 200	0,050 - 0,100	0,065 - 0,125	0,090 - 0,150	0,115 - 0,175	0,150 - 0,200	0,165 - 0,250
Cast Aluminum	380	90 - 150	0,038 - 0,075	0,050 - 0,100	0,075 - 0,125	0,075 - 0,150	0,090 - 0,175	0,100 - 0,200
Magnesium		75 - 150	0,038 - 0,075	0,050 - 0,100	0,075 - 0,125	0,075 - 0,150	0,090 - 0,175	0,100 - 0,200
Copper, Brass		75 - 120	0,025 - 0,060	0,050 - 0,075	0,050 - 0,075	0,050 - 0,100	0,075 - 0,125	0,075 - 0,150
Titanium	6Al-4V	30 - 90	0,025 - 0,050	0,050 - 0,075	0,050 - 0,075	0,050 - 0,100	0,075 - 0,125	0,075 - 0,150

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

GARR TOOL Parameters for Burrs

OPERATING PARAMETERS		
TOOL DIAMETER	Vc	
	1500 SFM	3000 SFM
	RPM (n)	
1/16"	45,000	90,000
1/8"	45,000	90,000
3/16"	30,000	60,000
1/4"	23,000	45,000
3/8"	15,000	30,000
1/2"	11,000	22,000
3/4"	7,500	15,000
1"	5,500	10,000

Speeds and Feeds

Carbide burrs typically operate between 1500 and 3000 SFM. Solid carbide burrs that are 1/8" diameter or less can typically be run at speeds up to 75,000 RPM (n). Burrs ranging in size from 3/16" to 3/8" diameter can utilize a 30,000 RPM (n) grinder. Burrs ranging in size from 1/4" to 1/2" diameter can utilize a 22,000 RPM (n) grinder. These are general speed recommendations that may need to be adjusted for optimal performance.

Safety Information

Always wear the appropriate personal protective equipment, such as safety glasses and protective clothing, when using solid carbide or HSS cutting tools. Machines should be fully guarded. Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

BURR TROUBLESHOOTING OPTIONS	
PROBLEM	POSSIBLE SOLUTIONS
Broken Braze	Excessive Force Heat from rubbing shank Dull tool
Chatter	Improper location in collet Bad grinder bearings Bent shank Unstable control of process Lack of rigid setup
Plugged Flutes	Use coarser burr Working in soft material Use an anti-stick agent Faster RPM Slower RPM Lighter cuts
Excessive Vibration	Improper location in collet Bad grinder bearings Bent shank Unstable control of process Faster RPM Slower RPM Faster feed Slower feed Lack of rigid setup
Poor Finish	Improper location in collet Bad grinder bearings Bent shank Unstable control of process Faster RPM Slower RPM Switch to finer cut Don't use double cut Faster feed Lack of rigid setup
Poor Tool Life	Heat from rubbing shank Improper location in collet Bad grinder bearings Bent shank Unstable control of process Faster RPM Slower RPM Don't use double cut Faster feed Slower feed Cutting abrasive material Lack of rigid setup

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

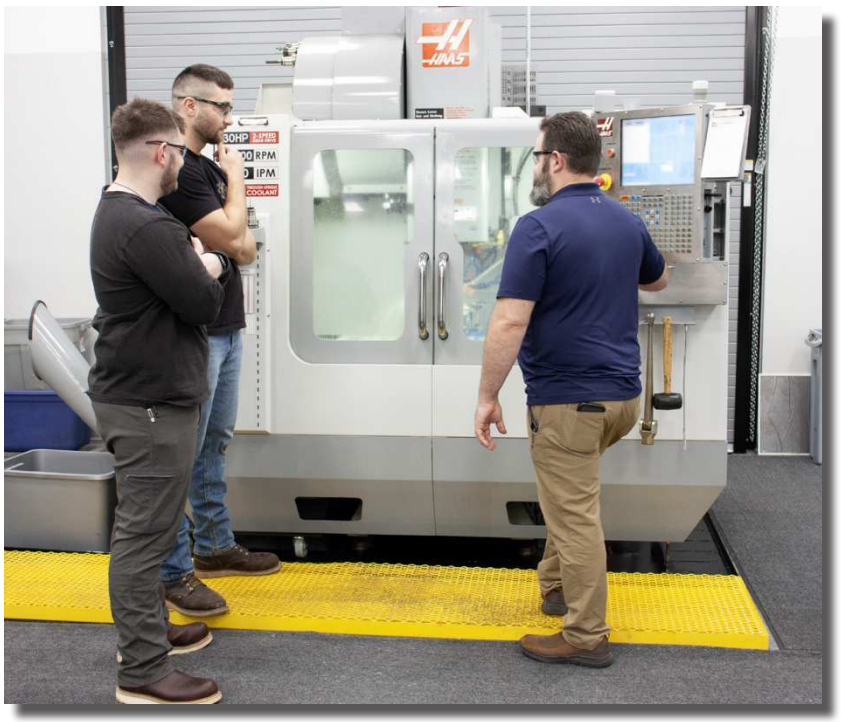
Diameter	Decimal Equiv.
#49	.0730
1.90mm	.0748
#48	.0760
1.95mm	.0768
5/64"	.0781
#47	.0785
2.00mm	.0787
2.05mm	.0807
#46	.0810
#45	.0820
2.10mm	.0827
2.15mm	.0846
#44	.0860
2.20mm	.0866
2.25mm	.0886
#43	.0890
2.30mm	.0906
2.35mm	.0925
#42	.0935
3/32"	.0938
2.40mm	.0945
#41	.0960
2.45mm	.0965
#40	.0980
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

GARR TOOL Training Centre



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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.

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