GARR TOOL®

High Performance Solid Carbide



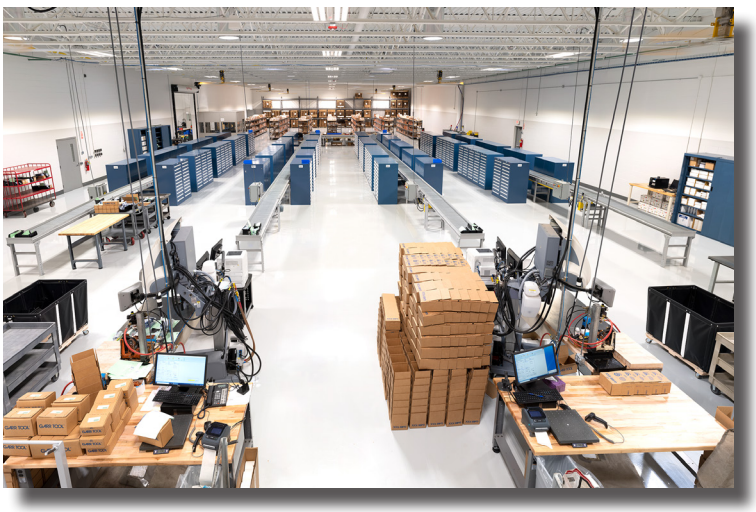
2022i

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 over seventy-seven 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.





A3 Series Page 116

Built for High Efficiency Milling on high RPM machines



V4 Series Page 139

Expanded line of our popular V4 Series



VX-7C Series Page 163

An expansion of the multi-flute HEM VX-7 Series, chip splitters come standard

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	AlTiN-Based Coated	23
	1580HD	2 Flute	3xD	30° Helix	AlTiN-Based Coated	29
	1580H	2 Flute	3xD	30° Helix	AlTiN-Based Coated	32
NEW SIZES	1580KD	2 Flute	3xD	30° Helix	Coolant Fed, AlTiN-Based Coated	37
	1580KH	2 Flute	3xD	30° Helix	Coolant Fed, AlTiN-Based Coated	47
	1250H	2 Flute	5xD	30° Helix	AlTiN-Based Coated	23
	1280H	2 Flute	5xD	30° Helix	AlTiN-Based Coated	32
NEW SIZES	1280KD	2 Flute	5xD	30° Helix	Coolant Fed, AlTiN-Based Coated	37
	1280KH	2 Flute	5xD	30° Helix	Coolant Fed, AlTiN-Based Coated	47
NEW SIZES	1880KD	2 Flute	7xD	30° Helix	Coolant Fed, AlTiN-Based Coated	37
	1880KH	2 Flute	7xD	30° Helix	Coolant Fed, AlTiN-Based Coated	47
	1850H	2 Flute	12xD	30° Helix	AlTiN-Based Coated	23
NEW SIZES	1160	3 Flute	3xD	30° Helix	ALUMASTAR Coated	17
	1180	3 Flute	5xD	30° Helix	ALUMASTAR Coated	17

DRILLS - GENERAL PURPOSE

NEW SIZES	1600	2 Flute		25° Helix	N/C Spotting, Bright Finish	54
	1400	2 Flute		10° Helix	Combined Drill/Countersink, Bright Finish	56
	1500	2 Flute	3xD	Straight	Hard Metal, Bright Finish	57
	1500H	2 Flute	3xD	Straight	Hard Metal, Hardlube Coated	59
	1510	2 Flute	3xD	15° Helix	Slow Spiral, Bright Finish	61
NEW SIZES	1510H	2 Flute	3xD	15° Helix	Slow Spiral, Hardlube Coated	64
NEW SIZES	1520	2 Flute	3xD	25° Helix	Bright Finish	67
NEW SIZES	1520H	2 Flute	3xD	25° Helix	Hardlube Coated	73
	1205	2 Flute	5xD	25° Helix	Bright Finish	67
	1205H	2 Flute	5xD	25° Helix	Hardlube Coated	73
	1200	2 Flute	5xD	25° Helix	Bright Finish	83
	1200H	2 Flute	5xD	25° Helix	Hardlube Coated	86
	1800H	2 Flute	8xD	35° Helix	Parabolic, Hardlube Coated	90
	1100	3 Flute	5xD	25° Helix	Bright Finish	88
	1100H	3 Flute	5xD	25° Helix	Hardlube Coated	79
	1120H	3 Flute	3xD	25° Helix	Hardlube Coated	79

REAMERS

4100	Standard	Bright Finish	92
4100	Standard Metric	Bright Finish	104

DRILL MILLS

152M	2 Flute	Bright Finish - Angle to a Point	106
152MA	2 Flute	TiALN Coated - Angle to a Point	107
152DA	2 Flute	TiALN Coated - 120° Drill Point	110
154M	4 Flute	Bright Finish - Angle to a Point	108
154MA	4 Flute	TiALN Coated - Angle to a Point	109

ROUGHERS

				PAGE
ARC	3 Flute	Chamfer	Staggered, Bright Finish	112
VHM	4 Flute	Chamfer	Staggered, AlTiN Coated	114

END MILLS - HIGH PERFORMANCE - HEM

	142M	2 Flute	Square	ALUMASTAR Coated	121
	142R	2 Flute	Radius	ALUMASTAR Coated	122
	142B	2 Flute	Ball	ALUMASTAR Coated	124
NEW SIZES	A3	3 Flute	S, R, B	Bright Finish	116
	143M	3 Flute	Square	ALUMASTAR Coated	125
	143R	3 Flute	Radius	ALUMASTAR Coated	128
NEW SIZES	V4-S	4 Flute	Square	AlCrN Coated	139
NEW SIZES	V4-R	4 Flute	Radius	AlCrN Coated	139
NEW SIZES	V4-B	4 Flute	Ball	AlCrN Coated	139
NEW SIZES	VRX	4 Flute	S, R, B	AlTiN Coated	164
NEW SIZES	V5	5 Flute	S, R	AlCrN Coated	152
NEW SIZES	V5C (Chip Splitter)	5 Flute	S, R	AlCrN Coated	158
NEW SIZES	VRX-6	6 Flute	S, R	AlTiN Coated	174
NEW SIZES	VX-7	7 Flute	S, R	AlCrN-Based Coated	160
NEW SIZES	VX-7C (Chip Splitter)	7 Flute	S, R	AlCrN-Based Coated	163
	TMS	Multi-Flute	Square	AlCrN Coated	132
	TMR	Multi-Flute	Radius	AlCrN Coated	134

END MILLS - HIGH PERFORMANCE

	242M/842M	2 Flute	Square	Bright Finish	177
	350MX/950MX	2 Flute	Ball	AlTiN Coated	196
	253MA/853MA	3 Flute	Square	AlTiN Coated	178
	253M/853M	3 Flute	Square	Bright Finish	180
	253MC	3 Flute	Square	TiCN Coated	182
	263M	3 Flute	Square	Bright Finish	183
	263MC	3 Flute	Square	TiCN Coated	183
	263MA/863MA	3 Flute	Square	AlTiN Coated	183
	210D	4 Flute	Square	DIAMOND Coated	197
	210RD	4 Flute	Radius	DIAMOND Coated	198
	310D	4 Flute	Ball	DIAMOND Coated	199
	610D	4 Flute	Square	DIAMOND Coated	200
	710D	4 Flute	Ball	DIAMOND Coated	201
	H-45	4 Flute	Radius	AlTiN Coated	195
	545MA	4/5 Flute	Square	AlTiN Coated	192
	545RA	4/5 Flute	Radius	AlTiN Coated	193
	545BA	4/5 Flute	Ball	AlTiN Coated	194
	255MA/855MA	5 Flute	Square	AlTiN Coated	184
	255M/855M	5 Flute	Square	Bright Finish	186
	255MC	5 Flute	Square	TiCN Coated	188
	255RA/855RA	5 Flute	Radius	AlTiN Coated	189
	246M/846M	6 Flute	Square	Bright Finish	191
	246MC	6 Flute	Square	TiCN Coated	191
NEW SIZES	246MA/846MA	6 Flute	Square	AlTiN Coated	191

END MILLS - STUB LENGTH - GENERAL PURPOSE

160M/860M	2 Flute	Square	Bright Finish	207
160MA/860MA	2 Flute	Square	TiAlN Coated	209
180M/980M	2 Flute	Ball	Bright Finish	214
180MA/980MA	2 Flute	Ball	TiAlN Coated	215
170M/870M	4 Flute	Square	Bright Finish	207
170MA/870MA	4 Flute	Square	TiAlN Coated	209
170R/870R	4 Flute	Radius	Bright Finish	210
170RA/870RA	4 Flute	Radius	TiAlN Coated	212
190M/990M	4 Flute	Ball	Bright Finish	214
190MA/990MA	4 Flute	Ball	TiAlN Coated	215

END MILLS - STANDARD LENGTH - GENERAL PURPOSE

				PAGE
220M/820M	2 Flute	Square	Bright Finish	216
220MT	2 Flute	Square	TiN Coated	218
220MC	2 Flute	Square	TiCN Coated	219
220MA/820MA	2 Flute	Square	TiAlN Coated	220
220R/820R	2 Flute	Radius	Bright Finish	222
220RA	2 Flute	Radius	TiAlN Coated	225
320M/920M	2 Flute	Ball	Bright Finish	228
320MT	2 Flute	Ball	TiN Coated	230
320MC	2 Flute	Ball	TiCN Coated	231
320MA/920MA	2 Flute	Ball	TiAlN Coated	232
222M	2 Flute	Square	Straight Flute, Bright Finish	234
280M	2 Flute	Square	N/C Tolerance, Bright Finish	262
380M	2 Flute	Ball	N/C Tolerance, Bright Finish	263
425M	2 Flute	Square	Double End, 3/8" Shank, Bright Finish	254
223M/823M	3 Flute	Square	Bright Finish	216
223MC	3 Flute	Square	TiCN Coated	219
223MA/823MA	3 Flute	Square	TiAlN Coated	220
223R/823R	3 Flute	Radius	Bright Finish	222
223RA/823RA	3 Flute	Radius	TiAlN Coated	225
323M/923M	3 Flute	Ball	Bright Finish	228
323MC	3 Flute	Ball	TiCN Coated	231
323MA/923MA	3 Flute	Ball	TiAlN Coated	232
273M	3 Flute	Square	Tapered, Bright Finish	236
373M	3 Flute	Ball	Tapered, Bright Finish	237
230M/830M	4 Flute	Square	Bright Finish	216
230MT	4 Flute	Square	TiN Coated	218
230MC	4 Flute	Square	TiCN Coated	219
230MA/830MA	4 Flute	Square	TiAlN Coated	220
230R/830R	4 Flute	Radius	Bright Finish	222
230RA/830RA	4 Flute	Radius	TiAlN Coated	225
330M/930M	4 Flute	Ball	Bright Finish	228
330MT	4 Flute	Ball	TiN Coated	230
330MC	4 Flute	Ball	TiCN Coated	231
330MA/930MA	4 Flute	Ball	TiAlN Coated	232
234M	4 Flute	Square	Straight Flute, Bright Finish	234
334MA	4 Flute	Ball	Straight Flute, TiAlN Coated	235
290M	4 Flute	Square	N/C Tolerance, Bright Finish	262
390M	4 Flute	Ball	N/C Tolerance, Bright Finish	263
435M	4 Flute	Square	Double End, 3/8" Shank, Bright Finish	254
435MA	4 Flute	Square	Double End, 3/8" Shank, TiAlN Coated	255
535M	4 Flute	Ball	Double End, 3/8" Shank, Bright Finish	256
535MA	4 Flute	Ball	Double End, 3/8" Shank, TiAlN Coated	257
430M	4 Flute	Square	Double End, Bright Finish	258
430MA/450MA	4 Flute	Square	Double End, TiAlN Coated	259
530M	4 Flute	Ball	Double End, Bright Finish	260
530MA	4 Flute	Ball	Double End, TiAlN Coated	261

ROTARY FILES

1/4" Diameter	Standard Shape	Steel Shank	264
3/16" Diameter		Solid Carbide	276
1/4" Diameter		1/8" Diameter Steel Shank	277
1/8" Diameter		Solid Carbide	278

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	282
Formulas	283
Tool Coating Types	284
SFM/RPM Conversion Charts	285
General Purpose Milling Guide - *fractional*	286
General Purpose Milling Guide - *metric*	287
High Performance Milling Guide - *fractional*	288
High Performance Milling Guide - *metric*	289
Aluminum Milling Guide	290
ARC Milling Guide	293
VHM Milling Guide - *fractional*	294
VHM Milling Guide - *metric*	295
VRX Milling Guide - *fractional*	296
VRX Milling Guide - *metric*	297
V4 High Speed Milling Guide - *fractional*	298
V4 High Speed Milling Guide - *metric*	299
V5 High Speed Milling Guide - *fractional*	300
V5 High Speed Milling Guide - *metric*	301
VRX-6 Milling Guide - *fractional*	302
VRX-6 Milling Guide - *metric*	303
VX-7 Milling Guide - *fractional*	304
VX-7 Milling Guide - *metric*	305
TMS/TMR Milling Guide - *fractional*	306
TMS/TMR Milling Guide - *metric*	307
TMS/TMR Chip Thinning Calculations - *fractional*	308
TMS/TMR Chip Thinning Calculations - *metric*	309
High Rc Finisher Milling Guide - *fractional*	310
High Rc Finisher Milling Guide - *metric*	311
Die Mold Cutter Milling Guide - *fractional*	312
Die Mold Cutter Milling Guide - *metric*	313
High Feed Milling Guide	314
Diamond Coated Milling Guide	315
Reaming Guide - *fractional*	316
Reaming Guide - *metric*	317
Drill Mills, Chamfering - *fractional*	318
Drill Mills, Chamfering - *metric*	319
Drill Mills, Through Hole - *fractional*	320
Drill Mills, Through Hole - *metric*	321
General Purpose Drilling Guide Uncoated - *fractional*	322
General Purpose Drilling Guide Uncoated - *metric*	324
General Purpose Drilling Guide Coated - *fractional*	326
General Purpose Drilling Guide Coated - *metric*	328
High Performance Mini Drills Guide - *fractional*	330
High Performance Mini Drills Guide - *metric*	331
High Performance Drilling Guide - *fractional*	332
High Performance Drilling Guide - *metric*	333
3-Flute for Aluminum Drilling Guide	334
Parameters for Burrs	335
Material Hardness Conversion Chart	336
Decimal Equivalent Chart	337

Series / Page Number Search

Series	Page	Series	Page	Series	Page	Series	Page
142B	124	263M	183	650M	238	980M	214
142M	121	263MA	183	650MA	241	980MA	215
142R	122	263MC	183	710D	201	990M	214
143M	125	273M	236	720M	249	990MA	215
143R	128	280M	262	720MA	252	1100	88
152DA	110	290M	262	720MC	251	1100H	79
152M	106	310D	199	723M	249	1120H	79
152MA	107	320M	228	723MA	252	1160	17
154M	108	320MA	232	723MC	251	1180	17
154MA	109	320MC	231	730M	249	1200	83
160M	207	320MT	230	730MA	252	1200H	86
160MA	209	323M	228	730MC	251	1205	67
170M	207	323MA	232	740M	249	1205H	73
170MA	209	323MC	231	740MA	252	1250H	23
170R	210	330M	228	743M	249	1280H	32
170RA	212	330MA	232	743MA	252	1280KD	37
180M	214	330MC	231	750M	249	1280KH	47
180MA	215	330MT	230	750MA	252	1400	56
190M	214	334MA	235	820M	216	1500	57
190MA	215	350MX	196	820MA	220	1500H	59
210D	197	373M	237	820R	222	1510	61
210RD	198	380M	263	823M	216	1510H	64
220M	216	390M	263	823MA	220	1520	67
220MA	220	425M	254	823R	222	1520H	73
220MC	219	430M	258	823RA	225	1550H	23
220MT	218	430MA	259	830M	216	1580H	32
220R	222	435M	254	830MA	220	1580HD	29
220RA	225	435MA	255	830R	222	1580KD	37
222M	234	450MA	259	830RA	225	1580KH	47
223M	216	530M	260	842M	177	1600	54
223MA	220	530MA	261	846M	191	1800H	90
223MC	219	535M	256	846MA	191	1850H	23
223R	222	535MA	257	853M	180	1880KD	37
223RA	225	545BA	194	853MA	178	1880KH	47
230M	216	545MA	192	855M	186	4100	92
230MA	220	545RA	193	855MA	184	A3	116
230MC	219	610D	200	855RA	189	ARC	112
230MT	218	620M	238	860M	207	BURRS	264
230R	222	620MA	241	860MA	209	H-45	195
230RA	225	620MC	240	863MA	183	TMR	134
234M	234	623M	238	870M	207	TMS	132
242M	177	623MA	241	870MA	209	V4B	149
246M	191	623MC	240	870R	210	V4R	141
246MA	191	630M	238	870RA	212	V4S	139
246MC	191	630MA	241	920M	228	V5	152
253M	180	630MC	240	920MA	232	V5C	158
253MA	178	630R	243	923M	228	VHM	114
253MC	182	630RA	246	923MA	232	VRX	164
255M	186	640M	238	930M	228	VRX-6	174
255MA	184	640MA	241	930MA	232	VX-7	160
255MC	188	643M	238	950MX	196	VX-7C	163
255RA	189	643MA	241				

EDP / Page Number Search

EDP	Page	EDP	Page	EDP	Page	EDP	Page
00***	23	24**0	222	43**0	249	63***	169
01**0	207	24**7	225	43**2	124	64***	160
01**7	209	24**8	198	43**4	251	64***	268
02**0	207	25**0	262	43**7	252	65***	269
02**7	209	25**1, 25**6	47	44**0	249	66***	270
03**0	214	25**5	37	44**4	251	67***	271
03**7	215	26***	37	44**7	252	68***	272
04**0	214	26**0	262	45**0	216	69***	273
04**7	215	26**0, 26**5	45	45**7	220	70***	274
07***	116	26**1, 26**6	47	46***	112	70***	17
08**0	177	27***	38	46**0	216	71***	275
09**0	177	27***	164	46**7	220	72***	276
10**0	180	27**0	263	46**8	197	73***	277
10**7	178	27**5	37	47**0	228	74***	278
10**8	197	28***	168	47**7	232	77**0, 77**5	67
11**0	216	28***	166	48**0	228	77**1, 77**6	73
11**3	218	28**0	263	48**0, 48**5	195	78**1, 78**6	79
11**4	219	28**5	37	48**7	232	79**0	222
11**7	220	29***	43	48**8	199	79**7	225
12**0	216	30***	210	49***	114	80**0	222
12**4	219	30**0	258	49**0	236	80**7	225
12**7	220	30**7	259	50***	139	80**8	198
13**0	216	32**0	260	50***	141	81**0	234
13**3	218	32**7	261	50***	149	82**0	234
13**4	219	33**0	254	50***	152	83**0, 83**7	189
13**7	220	34**0	254	50***	158	84**5, 84**7	235
13**8	197	34**7	255	50**0	237	84**0, 84**7	190
14**0	196	36***	222	51***	152	85**0	177
15**0	196	36***	225	51**0	191	86**0	180
15**8	199	36**0	256	51**4	191	86**4	182
16**0	228	36**7	257	51**7	191	86**7	178
16**3	230	37**0	216	52**0	186	89**0, 89**5	67
16**4	231	37**7	220	52**4	188	89**1, 89**6	73
16**7	232	38**0	228	52**7	184	90**0, 90**5	88
17**0	228	38**7	232	54**0	238	90**1, 90**6	79
17**4	231	38**8	200	54**4	240	91***	54
17**7	232	39***	125	54**7	241	92**0	238
18**0	228	39***	128	55**0	249	92**7	241
18**3	230	39**0	57	55**4	251	93**0	238
18**4	231	39**1	59	55**7	252	93**7	241
18**7	232	39**2	122	56**0, 56**5	83	94**0	238
19**0, 19**5	61	40***	130	56**1, 56**6	86	94**7	241
19**1, 19**6	64	40**0	186	57***	108	94**8	200
20***	29	40**2	123	57***	110	95***	92
20**0	243	40**7	184	57**0	106	96***	99
20**1, 20**6	32	40**8	201	57**7	107	97**0	249
20**7	246	41**0	238	58***	108	97**7	252
21***	31	41**1	125	58***	109	98***	132
21**0	245	41**2	121	58**0	56	98***	134
21**0	192	41**3	125	59**0, 59**5	57	98**0	249
21**2	193	41**4	240	59**1, 59**6	59	98**7	252
21**4	194	41**7	241	60***	174	99**0	249
21**1, 21**6	32	42***	124	60***	264	99**7	252
21**7	247	42**0	238	61***	164	99**8	201
22**0, 22**5	47	42**2	121	61***	265		
22**1, 22**6	90	42**2	124	62***	168		
23**0	183	42**3	126	62***	266		
23**4	183	42**4	240	62**7	168		
23**7	183	42**7	241	63***	267		

Recommended tools for: **ALUMINUM**

Aluminium / Aluminio / Aluminium / Alluminio / 铝

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1160, 1180		17	ALUMASTAR	3 flute, High performance
1520, 1205		67	BRIGHT	2 flute, General purpose
1520H, 1205H		73	HARDLUBE	2 flute, General purpose
1800H		90	HARDLUBE	2 flute, Parabolic

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
A3		116	BRIGHT	High velocity, 3 flute, High metal removal rate
143M, 143R		125, 128	ALUMASTAR	High velocity, 3 flute, High metal removal rate
142B		124	ALUMASTAR	High velocity, 2 flute, High metal removal rate
142M, 142R		121, 122	ALUMASTAR	High velocity, 2 flute, High metal removal rate
242M, 842M		177	BRIGHT	High performance, 2 flute, For 3000-8000 RPM
ARC		112	BRIGHT	High performance, 3 flute, Staggered helix rougher
253M, 853M		180	BRIGHT	High performance, 3 flute, Profiling and finishing
253MC		182	TiCN	High performance, 3 flute, Profiling and finishing
220M, 820M		216	BRIGHT	2 flute, General purpose, Square end
220MC		219	TiCN	2 flute, General purpose, Square end
320M, 920M		228	BRIGHT	2 flute, General purpose, Ball end
320MC		231	TiCN	2 flute, General purpose, Ball end

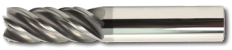
Recommended tools for: **TITANIUM**

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

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580H, 1280H		32	AlTiN-Based	2 flute, High performance
1580KD, 1280KD, 1880KD		37	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		47	AlTiN-Based	2 flute, High performance, Coolant fed
1520H, 1205H		73	HARDLUBE	2 flute, General purpose
1160, 1180		17	ALUMASTAR	3 flute, High performance

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V4		139	AlCrN	High performance, 4 flute, Variable helix
V5		152	AlCrN	High performance, 5 flute, Variable helix
VX-7		160	AlCrN-Based	High performance, 7 flute, Staggered flute
VRX		164	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		174	AlTiN	High performance, 6 flute, Staggered flute
TMS, TMR		132, 134	AlCrN	High performance, Multiple flute finisher
VHM		114	AlTiN	High performance, 4 flute, Staggered flute rougher
255MA, 855MA		184	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		189	AlTiN	High performance, 5 flute, Corner radius
242M, 842M		177	BRIGHT	High performance, 2 flute, For 3000-8000 RPM
246MA, 846MA		191	AlTiN	High performance, 6 flute, Finisher
253MA, 853MA		178	AlTiN	High performance, 3 flute, Profiling and finishing
223MA, 823MA		220	TiAlN	3 flute, General purpose, Square end
230MA, 830MA		220	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		225	TiAlN	4 flute, General purpose, Corner radius
323MA, 923MA		232	TiAlN	3 flute, General purpose, Ball end
330MA, 930MA		232	TiAlN	4 flute, General purpose, Ball end

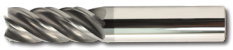
Recommended tools for: **STAINLESS STEEL**

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

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580H, 1280H		32	AlTiN-Based	2 flute, High performance
1580KD, 1280KD, 1880KD		37	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		47	AlTiN-Based	2 flute, High performance, Coolant fed
1520H, 1205H		73	HARDLUBE	2 flute, General purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V4		139	AlCrN	High performance, 4 flute, Variable helix
V5		152	AlCrN	High performance, 5 flute, Variable helix
VX-7		160	AlCrN-Based	High performance, 7flute, Staggered flute
VRX		164	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		174	AlTiN	High performance, 6 flute, Staggered flute
253MA, 853MA		178	AlTiN	High performance, 3 flute, Profiling and finishing
255MA, 855MA		184	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		189	AlTiN	High performance, 5 flute, Corner radius
VHM		114	AlTiN	High performance, 4 flute, Staggered flute rougher
ARC		112	BRIGHT	High performance, 3 flute, Staggered helix rougher
TMS, TMR		132, 134	AlCrN	High performance, Multiple flute finisher
253MC		182	TiCN	High performance, 3 flute, Profiling and finishing
246MA, 846MA		191	AlTiN	High performance, 6 flute, Finisher, Square end
223MA, 823MA		220	TiAlN	3 flute, General purpose, Square end
230MA, 830MA		220	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		225	TiAlN	4 flute, General purpose, Corner radius
323MA, 923MA		232	TiAlN	3 flute, General purpose, Ball end
330MA, 930MA		232	TiAlN	4 flute, General purpose, Ball end

Recommended tools for: **INCONEL, HIGH NICKEL ALLOYS**

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

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580H, 1280H		32	AlTiN-Based	2 flute, High performance
1580KD, 1280KD, 1880KD		37	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		47	AlTiN-Based	2 flute, High performance, Coolant fed
1520H, 1205H		73	HARDLUBE	2 flute, General purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V5		152	AlCrN	High performance, 5 flute, Variable helix
V4		139	AlCrN	High performance, 4 flute, Variable helix
VRX		164	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		174	AlTiN	High performance, 6 flute, Staggered flute
VX-7		160	AlCrN-Based	High performance, 7 flute, Staggered flute
VHM		114	AlTiN	High performance, 4 flute, Staggered flute rougher
255MA, 855MA		184	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		189	AlTiN	High performance, 5 flute, Corner radius
246MA, 846MA		191	AlTiN	High performance, 6 flute, Finisher, Square end
TMS, TMR		132, 134	AlCrN	High performance, Multiple flute finisher
230MA, 830MA		220	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		225	TiAlN	4 flute, General purpose, Corner radius
330MA, 930MA		232	TiAlN	4 flute, General purpose, Ball end

Recommended tools 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

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1160, 1180		17	ALUMASTAR	3 flute, High performance
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1520, 1205		67	BRIGHT	2 flute, General purpose
1520H, 1205H		73	HARDLUBE	2 flute, General purpose
1500H		59	HARDLUBE	2 flute, Straight flute
1800H		90	HARDLUBE	2 flute, Parabolic

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
143M, 143R		125, 128	ALUMASTAR	High velocity, 3 flute, High metal removal rate
142B		124	ALUMASTAR	High velocity, 2 flute, High metal removal rate
142M, 142R		121, 122	ALUMASTAR	High velocity, 2 flute, High metal removal rate
ARC		112	BRIGHT	High performance, 3 flute, Staggered helix rougher
242M, 842M		177	BRIGHT	High performance, 2 flute, For 3000-8000 RPM
253M, 853M		180	BRIGHT	High performance, 3 flute, Profiling and finishing
253MC		182	TiCN	High performance, 3 flute, Profiling and finishing
220M, 820M		216	BRIGHT	2 flute, General purpose, Square end
220MC		219	TiCN	2 flute, General purpose, Square end
320M, 920M		228	BRIGHT	2 flute, General purpose, Ball end
320MC		231	TiCN	2 flute, General purpose, Ball end

Recommended tools for: **HARDENED TOOL STEELS**

(generally over 45 Rc)

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

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1500H		59	HARDLUBE	2 flute, Straight flute
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580H, 1280H		32	AlTiN-Based	2 flute, High performance
1580KD, 1280KD, 1880KD		37	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		47	AlTiN-Based	2 flute, High performance, Coolant fed
1520H, 1205H		73	HARDLUBE	2 flute, General purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
H-45		195	AlTiN	High performance, High feed, Corner radius
350MX, 950MX		196	AlTiN	High performance, High Rc finisher, Die mold
545MA		192	AlTiN	High performance, High Rc finisher, Square end
545RA		193	AlTiN	High performance, High Rc finisher, Corner radius
545BA		194	AlTiN	High performance, High Rc finisher, Ball end
VRX		164	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		174	AlTiN	High performance, 6 flute, Staggered flute
230MA, 830MA		220	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		225	TiAlN	4 flute, General purpose, Corner radius
330MA, 930MA		232	TiAlN	4 flute, General purpose, Ball end

Recommended tools for:

COMPOSITE MATERIALS

(Graphite, Plastics, Carbon Fiber)

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

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1160, 1180		17	ALUMASTAR	3 flute, High performance
154MA		109	TiAlN	4 flute, Center cutting angle
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1520H, 1205H		73	HARDLUBE	2 flute, General purpose
1800H		90	HARDLUBE	2 flute, Parabolic
1500H		59	HARDLUBE	2 flute, Straight flute

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
210D		197	DIAMOND	4 flute, Square end
310D		199	DIAMOND	4 flute, Ball end
210RD		198	DIAMOND	4 flute, Corner radius
143M, 143R		125, 128	ALUMASTAR	High velocity, 3 flute, High metal removal rate
142M, 142R		121, 122	ALUMASTAR	High velocity, 2 flute, High metal removal rate
142B		124	ALUMASTAR	High velocity, 2 flute, High metal removal rate
253M, 853M		180	BRIGHT	High performance, 3 flute, Profiling and finishing
253MC		182	TiCN	High performance, 3 flute, Profiling and finishing
255MC		188	TiCN	High performance, 5 flute, Profiling and finishing
220MC		219	TiCN	2 flute, General purpose, Square end
320MC		231	TiCN	2 flute, General purpose, Ball end
154M, 154MA		108, 109	BRIGHT/TiAlN	4 flute, Drill/Mill, Center cutting to a point
152M, 152MA		106, 107	BRIGHT/TiAlN	2 flute, Drill/Mill, Center cutting to a point

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

(generally under 45 Rc)

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

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580H, 1280H		32	AlTiN-Based	2 flute, High performance
1580KD, 1280KD, 1880KD		37	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank
1580KH, 1280KH, 1880KH		47	AlTiN-Based	2 flute, High performance, Coolant fed
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1520H, 1205H		73	HARDLUBE	2 flute, General purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
V4		139	AlCrN	High performance, 4 flute, Variable helix
V5		152	AlCrN	High performance, 5 flute, Variable helix
VX-7		160	AlCrN-Based	High performance, 7 flute, Staggered flute
VRX		164	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		174	AlTiN	High performance, 6 flute, Staggered flute
VHM		114	AlTiN	High performance, 4 flute, Staggered flute rougher
255MA, 855MA		184	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		189	AlTiN	High performance, 5 flute, Corner radius
253MA, 853MA		178	AlTiN	High performance, 3 flute, Profiling and finishing
230MA, 830MA		220	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		225	TiAlN	4 flute, General purpose, Corner radius
330MA, 930MA		232	TiAlN	4 flute, General purpose, Ball end

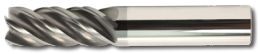
Recommended tools for: **CAST IRON**

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

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1120H, 1100H		79	HARDLUBE	3 flute, General purpose
1520H, 1205H		73	HARDLUBE	2 flute, General purpose
1510H		64	HARDLUBE	2 flute, General purpose, Slow spiral
1580H, 1280H		32	AlTiN-Based	2 flute, High performance
1550H, 1250H, 1850H		23	AlTiN-Based	2 flute, High performance, Small diameter, 1/8" or 3mm shank
1580HD		29	AlTiN-Based	2 flute, High performance, Common shank
1580KH, 1280KH, 1880KH		47	AlTiN-Based	2 flute, High performance, Coolant fed
1580KD, 1280KD, 1880KD		37	AlTiN-Based	2 flute, High performance, Coolant fed, Common shank

END MILLS

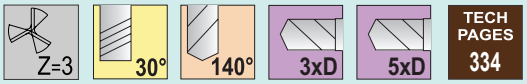
SERIES		PAGE	COATING	DESCRIPTION
VRX		164	AlTiN	High performance, 4 flute, Staggered flute
VRX-6		174	AlTiN	High performance, 6 flute, Staggered flute
V4		139	AlCrN	High performance, 4 flute, Variable helix
V5		152	AlCrN	High performance, 5 flute, Variable helix
VX-7		160	AlCrN-Based	High performance, 7 flute, Staggered flute
255MA, 855MA		184	AlTiN	High performance, 5 flute, Square end
255RA, 855RA		189	AlTiN	High performance, 5 flute, Corner radius
143M, 143R		125, 128	ALUMASTAR	High velocity, 3 flute, High metal removal rate
253MA, 853MA		178	AlTiN	High performance, 3 flute, Profiling and finishing
230MC		219	TiCN	4 flute, General purpose, Square end
230MA, 830MA		220	TiAlN	4 flute, General purpose, Square end
230RA, 830RA		225	TiAlN	4 flute, General purpose, Corner radius

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

NEW ITEMS

Series 1160, 1180

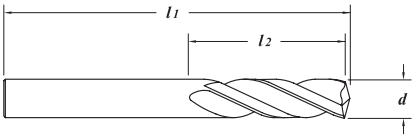
.1562" - .1910"
(3.967mm - 4.851mm)



TECH PAGES 334

ALUMASTAR Coated
ALUMASTAR-Beschichtet
Recubrimiento de ALUMASTAR
Revêtement ALUMASTAR
Rivestimento in 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
Shank tolerance: h6

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
Schaft-Toleranz: h6

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
Tolerancia del vástago: h6

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
Tolerance queue: h6

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
Tolleranza gambo: h6

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
独一无二的刀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
柄部公差： h6

3xD (1160) EDP#	5xD (1180) EDP#	*d* † Diameter Decimal	*d* † Diameter	*d* † Diameter Metric	l_1 Overall Length	l_2 Flute Length
70631		.1562	5/32"	3.967	2-1/16"	9/16"
	70161	.1562	5/32"	3.967	2-1/2"	1"
70633		.1570	#22	3.988	2-1/8"	5/8"
	70163	.1570	#22	3.988	2-1/2"	1"
70635		.1575		4.000	54	16
	70166	.1575		4.000	65	24
70637		.1590	#21	4.039	2-1/8"	5/8"
	70177	.1590	#21	4.039	2-1/2"	1"
70639		.1610	#20	4.089	2-1/8"	5/8"
	70179	.1610	#20	4.089	2-1/2"	1"
70641		.1660	#19	4.216	2-1/8"	5/8"
	70181	.1660	#19	4.216	2-3/4"	1-1/8"
70643		.1695	#18	4.305	2-1/8"	5/8"
	70183	.1695	#18	4.305	2-3/4"	1-1/8"
70645		.1719	11/64"	4.366	2-1/8"	5/8"
	70185	.1719	11/64"	4.366	2-3/4"	1-1/8"
70647		.1730	#17	4.394	2-3/16"	11/16"
	70187	.1730	#17	4.394	2-3/4"	1-1/8"
70649		.1770	#16	4.496	2-3/16"	11/16"
	70189	.1770	#16	4.496	2-3/4"	1-1/8"
70651		.1772		4.500	55	18
	70191	.1772		4.500	65	25
70653		.1800	#15	4.572	2-3/16"	11/16"
	70196	.1800	#15	4.572	2-3/4"	1-1/4"
70655		.1820	#14	4.623	2-3/16"	11/16"
	70201	.1820	#14	4.623	2-3/4"	1-1/4"
70657		.1850	#13	4.700	2-3/16"	11/16"
	70206	.1850	#13	4.700	2-3/4"	1-1/4"
70659		.1875	3/16"	4.763	2-3/16"	11/16"
	70211	.1875	3/16"	4.763	2-3/4"	1-1/4"
70661		.1890	#12	4.801	2-1/4"	3/4"
	70216	.1890	#12	4.801	2-3/4"	1-1/4"
70663		.1910	#11	4.851	2-1/4"	3/4"
	70221	.1910	#11	4.851	2-3/4"	1-1/4"

continued →

Series 1160, 1180 *(continued)*

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

	3xD (1160) EDP#	5xD (1180) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length
	70665		.1935	#10	4.914	2-1/4"	3/4"
		70226	.1935	#10	4.914	2-3/4"	1-1/4"
	70667		.1960	#9	4.978	2-1/4"	3/4"
NEW		70229	.1960	#9	4.978	3"	1-5/16"
	70669		.1969		5.000	57	19
		70231	.1969		5.000	75	32
NEW	70671		.1990	#8	5.055	2-1/4"	3/4"
		70236	.1990	#8	5.055	3"	1-5/16"
	70673		.2010	#7	5.105	2-1/4"	3/4"
		70241	.2010	#7	5.105	3"	1-5/16"
	70675		.2031	13/64"	5.159	2-1/4"	3/4"
		70246	.2031	13/64"	5.159	3"	1-5/16"
	70677		.2040	#6	5.182	2-3/8"	7/8"
		70251	.2040	#6	5.182	3"	1-3/8"
	70679		.2055	#5	5.220	2-3/8"	7/8"
		70256	.2055	#5	5.220	3"	1-3/8"
	70681		.2090	#4	5.309	2-3/8"	7/8"
		70261	.2090	#4	5.309	3"	1-3/8"
	70683		.2130	#3	5.410	2-3/8"	7/8"
		70266	.2130	#3	5.410	3"	1-3/8"
	70685		.2165		5.500	60	22
		70271	.2165		5.500	75	35
	70687		.2188	7/32"	5.558	2-3/8"	7/8"
		70276	.2188	7/32"	5.558	3"	1-3/8"
	70689		.2210	#2	5.613	2-7/16"	15/16"
		70281	.2210	#2	5.613	3"	1-3/8"
	70691		.2280	#1	5.791	2-7/16"	15/16"
		70286	.2280	#1	5.791	3"	1-3/8"
	70693		.2340	A	5.944	2-7/16"	15/16"
		70294	.2340	A	5.944	3-1/4"	1-1/2"
	70695		.2344	15/64"	5.954	2-7/16"	15/16"
		70296	.2344	15/64"	5.954	3-1/4"	1-1/2"
	70697		.2362		6.000	64	26
		70301	.2362		6.000	82	38
	70699		.2380	B	6.045	2-1/2"	1"
		70306	.2380	B	6.045	3-1/4"	1-5/8"
	70701		.2420	C	6.147	2-1/2"	1"
		70311	.2420	C	6.147	3-1/4"	1-5/8"
	70703		.2460	D	6.248	2-1/2"	1"
		70316	.2460	D	6.248	3-1/4"	1-5/8"
	70705		.2500	1/4" / E	6.350	2-1/2"	1"
		70321	.2500	1/4" / E	6.350	3-1/4"	1-5/8"
	70707		.2510		6.375	2-1/2"	1"
		70911	.2510		6.375	3-1/4"	1-5/8"
	70709		.2559		6.500	66	28
		70326	.2559		6.500	82	41
	70711		.2570	F	6.528	2-5/8"	1-1/8"
		70331	.2570	F	6.528	3-1/4"	1-11/16"

† *Metric equivalents are for reference only*

	3xD (1160) EDP#	5xD (1180) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length
	70713		.2610	G	6.629	2-5/8"	1-1/8"
		70336	.2610	G	6.629	3-1/2"	1-11/16"
	70715		.2656	17/64"	6.746	2-5/8"	1-1/8"
		70341	.2656	17/64"	6.746	3-1/2"	1-11/16"
	70717		.2660	H	6.756	2-11/16"	1-3/16"
		70346	.2660	H	6.756	3-1/2"	1-11/16"
	70719		.2720	I	6.909	2-11/16"	1-3/16"
		70351	.2720	I	6.909	3-1/2"	1-11/16"
	70721		.2756		7.000	68	30
		70356	.2756		7.000	88	43
	70723		.2770	J	7.036	2-11/16"	1-3/16"
		70361	.2770	J	7.036	3-1/2"	1-11/16"
	70725		.2812	9/32"	7.142	2-11/16"	1-3/16"
		70371	.2812	9/32"	7.142	3-1/2"	1-3/4"
	70727		.2900	L	7.366	2-3/4"	1-1/4"
		70376	.2900	L	7.366	3-1/2"	1-3/4"
	70728		.2950	M	7.493	2-3/4"	1-1/4"
		70378	.2950	M	7.493	3-3/4"	1-7/8"
NEW	70729		.2953		7.500	70	32
		70381	.2953		7.500	95	44
	70731		.2969	19/64"	7.541	2-3/4"	1-1/4"
		70386	.2969	19/64"	7.541	3-3/4"	1-7/8"
	70733		.3020	N	7.671	2-15/16"	1-7/16"
		70391	.3020	N	7.671	3-3/4"	1-7/8"
	70735		.3125	5/16"	7.938	2-15/16"	1-7/16"
		70396	.3125	5/16"	7.938	3-3/4"	1-7/8"
	70737		.3150		8.000	76	36
		70401	.3150		8.000	95	48
	70739		.3160	O	8.026	2-15/16"	1-7/16"
		70406	.3160	O	8.026	3-3/4"	1-7/8"
	70741		.3230	P	8.204	2-15/16"	1-7/16"
		70411	.3230	P	8.204	3-3/4"	2-3/32"
	70743		.3281	21/64"	8.334	2-15/16"	1-7/16"
		70416	.3281	21/64"	8.334	4"	2-3/32"
	70745		.3320	Q	8.433	3"	1-7/16"
		70421	.3320	Q	8.433	4"	2-3/32"
	70747		.3346		8.500	76	36
		70426	.3346		8.500	100	53
	70749		.3390	R	8.611	3"	1-7/16"
		70431	.3390	R	8.611	4"	2-3/32"
	70751		.3438	11/32"	8.733	3"	1-7/16"
		70436	.3438	11/32"	8.733	4"	2-3/16"
	70753		.3480	S	8.839	3-1/16"	1-1/2"
		70441	.3480	S	8.839	4"	2-3/16"
	70755		.3543		9.000	78	38
		70446	.3543		9.000	100	55
NEW	70757		.3580	T	9.093	3-1/16"	1-1/2"
		70451	.3580	T	9.093	4-1/4"	2-9/32"
	70759		.3594	23/64"	9.129	3-1/16"	1-1/2"
		70456	.3594	23/64"	9.129	4-1/4"	2-9/32"

continued →

Series 1160, 1180 *(continued)*

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

	3xD (1160) EDP#	5xD (1180) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length
	70761		.3680	U	9.347	3-1/8"	1-9/16"
		70461	.3680	U	9.347	4-1/4"	2-9/32"
	70763		.3740		9.500	79	39
		70466	.3740		9.500	108	58
	70765		.3750	3/8"	9.525	3-1/8"	1-9/16"
		70471	.3750	3/8"	9.525	4-1/4"	2-3/8"
	70767		.3760		9.550	3-1/8"	1-9/16"
		70913	.3760		9.550	4-1/4"	2-3/8"
	70769		.3770	V	9.576	3-1/4"	1-5/8"
		70476	.3770	V	9.576	4-1/4"	2-3/8"
	70771		.3860	W	9.804	3-1/4"	1-5/8"
		70481	.3860	W	9.804	4-1/2"	2-3/8"
	70773		.3906	25/64"	9.921	3-1/4"	1-5/8"
		70486	.3906	25/64"	9.921	4-1/2"	2-3/8"
NEW	70775		.3937		10.000	84	43
		70491	.3937		10.000	114	60
	70777		.3970	X	10.084	3-5/16"	1-11/16"
		70496	.3970	X	10.084	4-1/2"	2-1/2"
	70779		.4040	Y	10.262	3-5/16"	1-11/16"
		70501	.4040	Y	10.262	4-1/2"	2-9/16"
	70781		.4062	13/32"	10.317	3-5/16"	1-11/16"
		70506	.4062	13/32"	10.317	4-1/2"	2-9/16"
	70783		.4134		10.500	85	43
		70511	.4134		10.500	114	67
	70785		.4219	27/64"	10.716	3-3/8"	1-11/16"
		70516	.4219	27/64"	10.716	4-1/2"	2-11/16"
NEW	70787		.4331		11.000	87	45
		70521	.4331		11.000	114	68
	70789		.4375	7/16"	11.113	3-7/16"	1-3/4"
		70526	.4375	7/16"	11.113	4-3/4"	2-13/16"
NEW	70791		.4528		11.500	90	47
		70531	.4528		11.500	120	70
	70793		.4531	29/64"	11.509	3-9/16"	1-13/16"
		70536	.4531	29/64"	11.509	4-3/4"	2-7/8"
	70795		.4688	15/32"	11.909	3-11/16"	2-1/16"
		70541	.4688	15/32"	11.909	4-3/4"	2-7/8"
	70797		.4724		12.000	93	53
		70546	.4724		12.000	120	73
	70799		.4844	31/64"	12.304	3-11/16"	2-1/16"
		70551	.4844	31/64"	12.304	5-5/16"	3"
	70801		.4921		12.500	95	53
		70556	.4921		12.500	135	75
	70803		.5000	1/2"	12.700	3-3/4"	2-1/16"
		70561	.5000	1/2"	12.700	5-3/8"	3-1/16"
	70805		.5010		12.725	3-3/4"	2-1/16"
		70915	.5010		12.725	5-3/8"	3-1/16"
NEW	70807		.5118		13.000	107	55
		70566	.5118		13.000	136	78

† *Metric equivalents are for reference only*

	3xD (1160) EDP#	5xD (1180) EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length
	70809		.5156	33/64"	13.096	4-1/4"	2-3/16"
		70571	.5156	33/64"	13.096	5-3/8"	3-1/8"
	70811		.5312	17/32"	13.492	4-1/4"	2-1/4"
		70576	.5312	17/32"	13.492	5-11/16"	3-5/16"
NEW	70813		.5469	35/64"	13.891	4-1/4"	2-1/4"
		70581	.5469	35/64"	13.891	5-13/16"	3-3/8"
	70815		.5512		14.000	107	59
		70586	.5512		14.000	148	86
NEW	70817		.5625	9/16"	14.287	4-1/2"	2-3/8"
		70591	.5625	9/16"	14.287	5-15/16"	3-1/2"
	70819		.5781	37/64"	14.683	4-1/2"	2-1/2"
		70596	.5781	37/64"	14.683	6"	3-1/2"
	70821		.5906		15.000	115	64
		70601	.5906		15.000	152	90
NEW	70823		.5938	19/32"	15.082	4-1/2"	2-1/2"
		70606	.5938	19/32"	15.082	6"	3-9/16"
NEW	70825		.6094	39/64"	15.478	4-1/2"	2-9/16"
		70611	.6094	39/64"	15.478	6-3/16"	3-11/16"
	70827		.6250	5/8"	15.875	4-1/2"	2-5/8"
		70616	.6250	5/8"	15.875	6-5/16"	3-3/4"
	70829		.6299		16.000	115	66
		70621	.6299		16.000	160	95



1180 Series
High Performance Drill in aluminum



Series 1550H,1250H,1850H

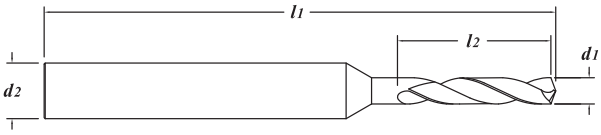
TOLERANCES	
d_1	+.0000" –.0004" (+.000 –.010mm)
d_2	h6
l_1	+.125" –.125" (+3.175 –3.175mm)
l_2	+.125" –.125" (+3.175 –3.175mm)



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

AlTiN-based Coating
AlTiN-basierte-Beschichtet
Recubrimiento a base de AlTiN
Revêtement à base de AlTiN
Rivestimento in a base AlTiN
AlTiN基涂层





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 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
00100			.0312	1/32"	0.792	1/8"	2"	5/32"
	00304		.0312	1/32"	0.792	1/8"	2"	15/64"
		00510	.0312	1/32"	0.792	1/8"	2"	7/16"
	00306		.0315		0.800	3.0	50	6.0
		00512	.0315		0.800	3.0	50	12.0
	00308		.0319		0.810	3.0	50	6.0
00106			.0320	#67	0.812	1/8"	2"	11/64"
	00310		.0320	#67	0.812	1/8"	2"	15/64"
		00516	.0320	#67	0.812	1/8"	2"	7/16"
		00518	.0323		0.820	3.0	50	12.0
00112			.0330	#66	0.838	1/8"	2"	11/64"
	00316		.0330	#66	0.838	1/8"	2"	15/64"
		00522	.0330	#66	0.838	1/8"	2"	7/16"
	00318		.0331		0.840	3.0	50	6.0
		00524	.0331		0.840	3.0	50	12.0
00116			.0335		0.850	3.0	50	4.5
		00526	.0335		0.850	3.0	50	12.0
	00322		.0339		0.860	3.0	50	6.5
		00528	.0339		0.860	3.0	50	13.0
00120			.0343		0.870	3.0	50	4.5
		00530	.0343		0.870	3.0	50	13.0
00122			.0346		0.880	3.0	50	4.5
00124			.0350	#65	0.890	3.0	50	4.5
	00328		.0350	#65	0.890	3.0	50	6.5
		00534	.0350	#65	0.890	3.0	50	13.0
	00330		.0354		0.900	3.0	50	6.5
		00536	.0354		0.900	3.0	50	13.0

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
	00332		.0358		0.910	3.0	50	6.5
00130			.0360	#64	0.914	1/8"	2"	3/16"
	00334		.0360	#64	0.914	1/8"	2"	1/4"
		00540	.0360	#64	0.914	1/8"	2"	1/2"
00134			.0366		0.930	3.0	50	5.0
00136			.0370	#63	0.940	3.0	50	5.0
	00340		.0370	#63	0.940	3.0	50	7.0
		00546	.0370	#63	0.940	3.0	50	14.0
00138			.0374		0.950	3.0	50	5.0
00142			.0380	#62	0.965	1/8"	2"	3/16"
	00346		.0380	#62	0.965	1/8"	2"	17/64"
		00552	.0380	#62	0.965	1/8"	2"	9/16"
		00556	.0386		0.980	3.0	50	14.0
00148			.0390	#61	0.990	3.0	50	5.0
	00352		.0390	#61	0.990	3.0	50	7.0
		00558	.0390	#61	0.990	3.0	50	14.0
00150			.0394		1.000	3.0	50	5.0
	00354		.0394		1.000	3.0	50	7.0
		00560	.0394		1.000	3.0	50	14.0
00152			.0400	#60	1.016	1/8"	2"	13/64"
	00356		.0400	#60	1.016	1/8"	2"	9/32"
		00562	.0400	#60	1.016	1/8"	2"	9/16"
00154			.0410	#59	1.041	1/8"	2"	13/64"
	00358		.0410	#59	1.041	1/8"	2"	9/32"
		00564	.0410	#59	1.041	1/8"	2"	9/16"
00156			.0413		1.050	3.0	50	5.5
	00360		.0413		1.050	3.0	50	7.5
		00566	.0413		1.050	3.0	50	15.0
00158			.0420	#58	1.066	1/8"	2"	7/32"
	00362		.0420	#58	1.066	1/8"	2"	5/16"
00160			.0430	#57	1.092	1/8"	2"	7/32"
	00364		.0430	#57	1.092	1/8"	2"	5/16"
		00570	.0430	#57	1.092	1/8"	2"	9/16"
00162			.0433		1.100	3.0	50	5.5
	00366		.0433		1.100	3.0	50	8.0
		00572	.0433		1.100	3.0	50	16.0
00164			.0453		1.150	3.0	50	6.0
	00368		.0453		1.150	3.0	50	8.0
		00574	.0453		1.150	3.0	50	16.0
00166			.0465	#56	1.181	1/8"	2"	15/64"
	00370		.0465	#56	1.181	1/8"	2"	11/32"
		00576	.0465	#56	1.181	1/8"	2"	5/8"

† *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
00168			.0469	3/64"	1.191	1/8"	2"	15/64"
	00372		.0469	3/64"	1.191	1/8"	2"	11/32"
		00578	.0469	3/64"	1.191	1/8"	2"	5/8"
00170			.0472		1.200	3.0	50	6.0
	00374		.0472		1.200	3.0	50	9.0
		00580	.0472		1.200	3.0	50	18.0
00172			.0492		1.250	3.0	50	6.5
	00376		.0492		1.250	3.0	50	9.0
		00582	.0492		1.250	3.0	50	18.0
00174			.0512		1.300	3.0	50	6.5
	00378		.0512		1.300	3.0	50	9.0
		00584	.0512		1.300	3.0	50	18.0
00176			.0520	#55	1.320	1/8"	2"	17/64"
	00380		.0520	#55	1.320	1/8"	2"	3/8"
		00586	.0520	#55	1.320	1/8"	2"	3/4"
00178			.0531		1.350	3.0	50	6.5
	00382		.0531		1.350	3.0	50	9.5
		00588	.0531		1.350	3.0	50	19.0
00180			.0550	#54	1.397	1/8"	2"	9/32"
	00384		.0550	#54	1.397	1/8"	2"	3/8"
		00590	.0550	#54	1.397	1/8"	2"	3/4"
00182			.0551		1.400	3.0	50	7.0
	00386		.0551		1.400	3.0	50	10.0
		00592	.0551		1.400	3.0	65	20.0
00184			.0571		1.450	3.0	50	7.0
	00388		.0571		1.450	3.0	50	10.5
		00594	.0571		1.450	3.0	65	21.0
00186			.0591		1.500	3.0	50	7.5
	00390		.0591		1.500	3.0	50	10.5
		00596	.0591		1.500	3.0	65	21.0
00188			.0595	#53	1.511	1/8"	2"	19/64"
	00392		.0595	#53	1.511	1/8"	2"	7/16"
		00598	.0595	#53	1.511	1/8"	2-1/2"	13/16"
00190			.0610		1.550	3.0	50	7.5
	00394		.0610		1.550	3.0	50	11.0
		00600	.0610		1.550	3.0	65	22.0
00192			.0625	1/16"	1.587	1/8"	2"	5/16"
	00396		.0625	1/16"	1.587	1/8"	2"	7/16"
		00602	.0625	1/16"	1.587	1/8"	2-1/2"	13/16"
00194			.0630		1.600	3.0	50	7.5
	00398		.0630		1.600	3.0	50	11.0
		00604	.0630		1.600	3.0	65	22.0
00196			.0635	#52	1.613	1/8"	2"	5/16"
	00400		.0635	#52	1.613	1/8"	2"	15/32"
		00606	.0635	#52	1.613	1/8"	2-1/2"	7/8"
00198			.0650		1.650	3.0	50	8.5
	00402		.0650		1.650	3.0	50	11.5
		00608	.0650		1.650	3.0	65	23.0
00200			.0669		1.700	3.0	50	8.5
	00404		.0669		1.700	3.0	50	11.5
		00610	.0669		1.700	3.0	65	23.0
00202			.0670	#51	1.702	1/8"	2"	11/32"
	00406		.0670	#51	1.702	1/8"	2"	15/32"
		00612	.0670	#51	1.702	1/8"	2-1/2"	7/8"
00204			.0689		1.750	3.0	50	9.0
	00408		.0689		1.750	3.0	50	12.0
		00614	.0689		1.750	3.0	65	24.0

continued →

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

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



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

AlTiN-based Coating
AlTiN-basierte-Beschichtet
Recubrimiento a base de AlTiN
Revêtement à base de AlTiN
Rivestimento in a base AlTiN
AlTiN基涂层



3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
00206			.0700	#50	1.778	1/8"	2"	23/64"
	00410		.0700	#50	1.778	1/8"	2"	1/2"
		00616	.0700	#50	1.778	1/8"	2-1/2"	1"
00208			.0709		1.800	3.0	50	9.0
	00412		.0709		1.800	3.0	50	13.0
		00618	.0709		1.800	3.0	65	26.0
00210			.0728		1.850	3.0	50	9.5
		00620	.0728		1.850	3.0	65	26.0
00212			.0730	#49	1.854	1/8"	2"	3/8"
	00416		.0730	#49	1.854	1/8"	2"	1/2"
		00622	.0730	#49	1.854	1/8"	2-1/2"	1"
00214			.0748		1.900	3.0	50	9.5
	00418		.0748		1.900	3.0	50	13.5
		00624	.0748		1.900	3.0	65	27.0
00216			.0760	#48	1.930	1/8"	2"	3/8"
	00420		.0760	#48	1.930	1/8"	2"	17/32"
		00626	.0760	#48	1.930	1/8"	2-1/2"	1-1/8"
00218			.0768		1.950	3.0	50	10.0
	00422		.0768		1.950	3.0	50	14.0
		00628	.0768		1.950	3.0	65	28.0
00220			.0781	5/64"	1.983	1/8"	2"	13/32"
	00424		.0781	5/64"	1.983	1/8"	2"	9/16"
		00630	.0781	5/64"	1.983	1/8"	2-1/2"	1-1/8"
00222			.0785	#47	1.994	1/8"	2"	13/32"
	00426		.0785	#47	1.994	1/8"	2"	9/16"
		00632	.0785	#47	1.994	1/8"	2-1/2"	1-1/8"
00224			.0787		2.000	3.0	50	10.0
	00428		.0787		2.000	3.0	50	14.0
		00634	.0787		2.000	3.0	65	28.0
00226			.0807		2.050	3.0	50	10.5
	00430		.0807		2.050	3.0	50	14.0
		00636	.0807		2.050	3.0	65	28.0
00228			.0810	#46	2.057	1/8"	2"	27/64"
	00432		.0810	#46	2.057	1/8"	2"	9/16"
		00638	.0810	#46	2.057	1/8"	2-1/2"	1-1/8"
00230			.0820	#45	2.083	1/8"	2"	27/64"
	00434		.0820	#45	2.083	1/8"	2"	9/16"
		00640	.0820	#45	2.083	1/8"	2-1/2"	1-1/8"
00232			.0827		2.100	3.0	50	10.5
	00436		.0827		2.100	3.0	50	14.5
		00642	.0827		2.100	3.0	65	29.0
00234			.0846		2.150	3.0	50	11.0
	00438		.0846		2.150	3.0	50	14.5
		00644	.0846		2.150	3.0	65	29.0

† *Metric equivalents are for reference only*

3xD (1550H) EDP#	5xD (1250H) EDP#	12xD (1850H) EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
00236			.0860	#44	2.184	1/8"	2"	7/16"
	00440		.0860	#44	2.184	1/8"	2"	19/32"
		00646	.0860	#44	2.184	1/8"	2-1/2"	1-3/16"
00238			.0866		2.200	3.0	50	11.0
	00442		.0866		2.200	3.0	50	15.5
		00648	.0866		2.200	3.0	65	31.0
00240			.0886		2.250	3.0	50	11.5
00242			.0890	#43	2.260	1/8"	2"	29/64"
	00446		.0890	#43	2.260	1/8"	2"	5/8"
		00652	.0890	#43	2.260	1/8"	2-1/2"	1-1/4"
00244			.0906		2.300	3.0	50	11.5
	00448		.0906		2.300	3.0	50	16.0
		00654	.0906		2.300	3.0	65	32.0
00246			.0925		2.350	3.0	50	12.0
	00450		.0925		2.350	3.0	50	16.0
		00656	.0925		2.350	3.0	65	32.0
00248			.0935	#42	2.375	1/8"	2"	31/64"
	00452		.0935	#42	2.375	1/8"	2"	21/32"
		00658	.0935	#42	2.375	1/8"	3"	1-5/16"
00250			.0938	3/32"	2.382	1/8"	2"	31/64"
	00454		.0938	3/32"	2.382	1/8"	2"	21/32"
		00660	.0938	3/32"	2.382	1/8"	3"	1-5/16"
00252			.0945		2.400	3.0	50	12.0
	00456		.0945		2.400	3.0	50	17.0
		00662	.0945		2.400	3.0	75	34.0
00254			.0960	#41	2.438	1/8"	2"	31/64"
	00458		.0960	#41	2.438	1/8"	2"	43/64"
		00664	.0960	#41	2.438	1/8"	3"	1-11/32"
00256			.0965		2.450	3.0	50	12.5
		00666	.0965		2.450	3.0	75	34.0
00258			.0980	#40	2.489	1/8"	2"	1/2"
	00462		.0980	#40	2.489	1/8"	2"	11/16"
		00668	.0980	#40	2.489	1/8"	3"	1-3/8"
00260			.0984		2.500	3.0	50	12.5
	00464		.0984		2.500	3.0	50	17.5
		00670	.0984		2.500	3.0	75	35.0
00262			.0995	#39	2.527	1/8"	2"	1/2"
	00466		.0995	#39	2.527	1/8"	2"	11/16"
		00672	.0995	#39	2.527	1/8"	3"	1-3/8"
00264			.1004		2.550	3.0	50	13.0
	00468		.1004		2.550	3.0	50	17.5
		00674	.1004		2.550	3.0	75	35.0
00266			.1015	#38	2.578	1/8"	2"	17/32"
	00470		.1015	#38	2.578	1/8"	2"	45/64"
		00676	.1015	#38	2.578	1/8"	3"	1-13/32"
00268			.1024		2.600	3.0	50	13.0
	00472		.1024		2.600	3.0	50	18.0
		00678	.1024		2.600	3.0	75	36.0
00270			.1040	#37	2.641	1/8"	2"	17/32"
	00474		.1040	#37	2.641	1/8"	2"	23/32"
		00680	.1040	#37	2.641	1/8"	3"	1-7/16"
00272			.1043		2.650	3.0	50	13.5
	00476		.1043		2.650	3.0	50	18.5
		00682	.1043		2.650	3.0	75	37.0

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	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
00274			.1063		2.700	3.0	50	13.5
	00478		.1063		2.700	3.0	50	19.0
		00684	.1063		2.700	3.0	75	38.0
00276			.1065	#36	2.705	1/8"	2"	17/32"
	00480		.1065	#36	2.705	1/8"	2"	3/4"
		00686	.1065	#36	2.705	1/8"	3"	1-1/2"
00278			.1083		2.750	3.0	50	14.0
	00482		.1083		2.750	3.0	50	19.5
		00688	.1083		2.750	3.0	75	39.0
00280			.1094	7/64"	2.778	1/8"	2"	9/16"
	00484		.1094	7/64"	2.778	1/8"	2"	49/64"
		00690	.1094	7/64"	2.778	1/8"	3"	1-9/16"
00282			.1100	#35	2.794	1/8"	2"	9/16"
	00486		.1100	#35	2.794	1/8"	2"	49/64"
		00692	.1100	#35	2.794	1/8"	3"	1-9/16"
00284			.1102		2.800	3.0	50	14.0
	00488		.1102		2.800	3.0	50	19.5
		00694	.1102		2.800	3.0	75	39.0
00286			.1110	#34	2.819	1/8"	2"	9/16"
	00490		.1110	#34	2.819	1/8"	2"	25/32"
		00696	.1110	#34	2.819	1/8"	3"	1-5/8"
00288			.1122		2.850	3.0	50	14.5
		00698	.1122		2.850	3.0	75	40.0
00290			.1130	#33	2.870	1/8"	2"	19/32"
	00494		.1130	#33	2.870	1/8"	2"	51/64"
		00700	.1130	#33	2.870	1/8"	3"	1-5/8"
00292			.1142		2.900	3.0	50	14.5
	00496		.1142		2.900	3.0	50	20.0
		00702	.1142		2.900	3.0	75	40.0
00294			.1160	#32	2.946	1/8"	2"	19/32"
	00498		.1160	#32	2.946	1/8"	2"	13/16"
		00704	.1160	#32	2.946	1/8"	3"	1-5/8"
00296			.1161		2.950	3.0	50	15.0
		00706	.1161		2.950	3.0	75	42.0
00298			.1181		3.000	3.0	50	15.0
	00502		.1181		3.000	3.0	50	21.0
		00708	.1181		3.000	3.0	75	42.0
00300			.1200	#31	3.048	1/8"	2"	5/8"
	00504		.1200	#31	3.048	1/8"	2"	7/8"
		00710	.1200	#31	3.048	1/8"	3"	1-3/4"
00302			.1250	1/8"	3.175	1/8"	2"	5/8"
	00506		.1250	1/8"	3.175	1/8"	2"	7/8"
		00712	.1250	1/8"	3.175	1/8"	3"	1-3/4"

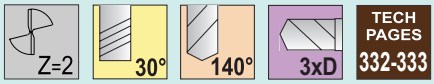
† *Metric equivalents are for reference only*

Series 1580HD

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

TOLERANCES

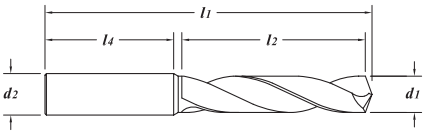
d_1*	3mm - 6mm	+.016mm +.004mm (+.00063" +.00015")
	> 6mm - 10mm	+.021mm +.006mm (+.00082" +.00023")
	> 10mm - 18mm	+.025mm +.007mm (+.00098" +.00027")
	> 18mm - 20mm	+.029mm +.008mm (+.00114" +.00031")
d_2	h6	
l_1	+3.175mm –3.175mm (+.125" –.125")	
l_2	+3.175mm –3.175mm (+.125" –.125")	
l_4	+1.980mm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



TECH PAGES 332-333

AlTiN-based Coating
AlTiN-basierte-Beschichtet
Recubrimiento a base de AlTiN
Revêtement à base de AlTiN
Rivestimento in a base AlTiN
AlTiN基涂层





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

continued →

Series 1580HD *(continued)*

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

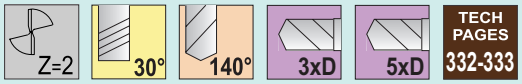
EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length
20445	.2362	6.000	6.0	66	28	36
20448	.2402	6.100	8.0	79	34	36
20452	.2441	6.200	8.0	79	34	36
20454	.2480	6.300	8.0	79	34	36
20455	.2500	6.350	8.0	79	34	36
20462	.2520	6.400	8.0	79	34	36
20465	.2559	6.500	8.0	79	34	36
20468	.2571	6.530	8.0	79	34	36
20472	.2598	6.600	8.0	79	34	36
20473	.2638	6.700	8.0	79	34	36
20475	.2657	6.750	8.0	79	34	36
20485	.2677	6.800	8.0	79	34	36
20495	.2717	6.900	8.0	79	34	36
20505	.2756	7.000	8.0	79	34	36
20515	.2795	7.100	8.0	79	41	36
20525	.2815	7.150	8.0	79	41	36
20535	.2835	7.200	8.0	79	41	36
20542	.2874	7.300	8.0	79	41	36
20545	.2913	7.400	8.0	79	41	36
20555	.2953	7.500	8.0	79	41	36
20565	.2972	7.550	8.0	79	41	36
20575	.2992	7.600	8.0	79	41	36
20585	.3031	7.700	8.0	79	41	36
20595	.3071	7.800	8.0	79	41	36
20605	.3130	7.950	8.0	79	41	36
20615	.3150	8.000	8.0	79	41	36
20622	.3189	8.100	10.0	89	47	40
20625	.3228	8.200	10.0	89	47	40
20635	.3268	8.300	10.0	89	47	40
20645	.3287	8.350	10.0	89	47	40
20652	.3307	8.400	10.0	89	47	40
20655	.3346	8.500	10.0	89	47	40
20665	.3386	8.600	10.0	89	47	40
20675	.3425	8.700	10.0	89	47	40
20685	.3445	8.750	10.0	89	47	40
20695	.3465	8.800	10.0	89	47	40
20705	.3504	8.900	10.0	89	47	40
20715	.3543	9.000	10.0	89	47	40
20725	.3583	9.100	10.0	89	47	40
20735	.3602	9.150	10.0	89	47	40
20745	.3622	9.200	10.0	89	47	40
20755	.3661	9.300	10.0	89	47	40
20762	.3701	9.400	10.0	89	47	40
20765	.3740	9.500	10.0	89	47	40
20775	.3760	9.550	10.0	89	47	40
20778	.3780	9.600	10.0	89	47	40
20782	.3819	9.700	10.0	89	47	40
20785	.3858	9.800	10.0	89	47	40
20795	.3898	9.900	10.0	89	47	40
20805	.3937	10.000	10.0	89	47	40
20812	.3976	10.100	12.0	102	55	45
20815	.4016	10.200	12.0	102	55	45
20825	.4055	10.300	12.0	102	55	45
20835	.4134	10.500	12.0	102	55	45
20842	.4173	10.600	12.0	102	55	45
20845	.4213	10.700	12.0	102	55	45
20855	.4252	10.800	12.0	102	55	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_4 Shank Length
20865	.4331	11.000	12.0	102	55	45
20875	.4370	11.100	12.0	102	55	45
20885	.4409	11.200	12.0	102	55	45
20892	.4488	11.400	12.0	102	55	45
20895	.4528	11.500	12.0	102	55	45
20905	.4606	11.700	12.0	102	55	45
20915	.4685	11.900	12.0	102	55	45
20925	.4724	12.000	12.0	102	55	45
20935	.4764	12.100	14.0	107	60	45
20941	.4803	12.200	14.0	107	60	45
20945	.4842	12.300	14.0	107	60	45
20955	.4921	12.500	14.0	107	60	45
20961	.4961	12.600	14.0	107	60	45
20965	.5000	12.700	14.0	107	60	45
20975	.5039	12.800	14.0	107	60	45
20978	.5051	12.830	14.0	107	60	45
20981	.5079	12.900	14.0	107	60	45
20982	.5098	12.950	14.0	107	60	45
20985	.5118	13.000	14.0	107	60	45
20998	.5236	13.300	14.0	107	60	45
21005	.5315	13.500	14.0	107	60	45
21015	.5394	13.700	14.0	107	60	45
21025	.5433	13.800	14.0	107	60	45
21035	.5512	14.000	14.0	107	60	45
21045	.5551	14.100	16.0	115	65	48
21053	.5591	14.200	16.0	115	65	48
21055	.5610	14.250	16.0	115	65	48
21065	.5630	14.300	16.0	115	65	48
21075	.5709	14.500	16.0	115	65	48
21085	.5787	14.700	16.0	115	65	48
21105	.5906	15.000	16.0	115	65	48
21115	.5945	15.100	16.0	115	65	48
21125	.6102	15.500	16.0	115	65	48
21135	.6181	15.700	16.0	115	65	48
21145	.6220	15.800	16.0	115	65	48
21155	.6299	16.000	16.0	115	65	48
21159	.6331	16.080	18.0	123	73	48
21175	.6496	16.500	18.0	123	73	48
21185	.6555	16.650	18.0	123	73	48
21195	.6693	17.000	18.0	123	73	48
21215	.6870	17.450	18.0	123	73	48
21225	.6890	17.500	18.0	123	73	48
21235	.7027	17.850	18.0	123	73	48
21245	.7087	18.000	18.0	123	73	48
21255	.7185	18.250	20.0	131	79	50
21265	.7283	18.500	20.0	131	79	50
21275	.7342	18.650	20.0	131	79	50
21295	.7500	19.050	20.0	131	79	50
21304	.7598	19.300	20.0	131	79	50
21315	.7677	19.500	20.0	131	79	50
21325	.7815	19.850	20.0	131	79	50
21335	.7874	20.000	20.0	131	79	50

Series 1580H, 1280H

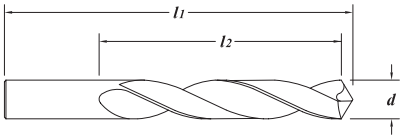
.1181" - .1719"
(3.000mm - 4.366mm)



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

AlTiN-based Coating
AlTiN-basierte-Beschichtet
Recubrimiento a base de AlTiN
Revêtement à base de AlTiN
Rivestimento in a base AlTiN
AlTiN基涂层





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
Shank tolerance: h6

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
Schaft-Toleranz: h6

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
Tolerancia del vástago: h6

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
Tolerance queue: h6

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
Tolleranza gambo: h6

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
柄部公差: h6

3xD (1580H) EDP#	5xD (1280H) EDP#	d † Diameter Decimal		Metric	l_1 Overall Length	l_2 Flute Length
20301		.1181		3.000	46	16
	21301	.1181		3.000	50	19
20306		.1200	#31	3.048	1-13/16"	5/8"
	21306	.1200	#31	3.048	2"	3/4"
20311		.1250	1/8"	3.175	1-15/16"	11/16"
	21311	.1250	1/8"	3.175	2"	3/4"
20316		.1285	#30	3.264	1-15/16"	11/16"
	21316	.1285	#30	3.264	2-1/4"	3/4"
20321		.1360	#29	3.454	2-1/16"	3/4"
	21321	.1360	#29	3.454	2-1/4"	7/8"
20326		.1378		3.500	52	19
	21326	.1378		3.500	57	22
20331		.1405	#28	3.569	2-1/16"	3/4"
	21331	.1405	#28	3.569	2-1/4"	7/8"
20336		.1406	9/64"	3.571	2-1/16"	3/4"
	21336	.1406	9/64"	3.571	2-1/4"	7/8"
20341		.1440	#27	3.658	2-1/16"	3/4"
	21341	.1440	#27	3.658	2-1/4"	7/8"
20346		.1470	#26	3.734	2-3/16"	13/16"
	21346	.1470	#26	3.734	2-1/4"	7/8"
20351		.1495	#25	3.797	2-3/16"	13/16"
	21351	.1495	#25	3.797	2-1/4"	15/16"
20356		.1520	#24	3.861	2-3/16"	13/16"
	21356	.1520	#24	3.861	2-1/4"	15/16"
20361		.1540	#23	3.912	2-3/16"	13/16"
	21361	.1540	#23	3.912	2-1/4"	15/16"
20366		.1562	5/32"	3.967	2-3/16"	13/16"
	21366	.1562	5/32"	3.967	2-1/2"	15/16"
20371		.1570	#22	3.988	2-3/16"	13/16"
	21371	.1570	#22	3.988	2-1/2"	15/16"
20376		.1575		4.000	56	21
	21376	.1575		4.000	65	24
20381		.1590	#21	4.039	2-3/16"	13/16"
	21381	.1590	#21	4.039	2-1/2"	15/16"
20386		.1610	#20	4.089	2-3/16"	13/16"
	21386	.1610	#20	4.089	2-1/2"	15/16"
20391		.1660	#19	4.216	2-9/32"	15/16"
	21391	.1660	#19	4.216	2-1/2"	1"
20396		.1695	#18	4.305	2-9/32"	15/16"
	21396	.1695	#18	4.305	2-1/2"	1"
20401		.1719	11/64"	4.366	2-9/32"	15/16"
	21401	.1719	11/64"	4.366	2-1/2"	1"

† *Metric equivalents are for reference only*

3xD (1580H) EDP#	5xD (1280H) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length
20406		.1730	#17	4.394	2-9/32"	15/16"
	21406	.1730	#17	4.394	2-1/2"	1"
20411		.1770	#16	4.496	2-9/32"	15/16"
	21411	.1770	#16	4.496	2-1/2"	1"
20416		.1772		4.500	58	24
	21416	.1772		4.500	65	25
20421		.1800	#15	4.572	2-9/32"	15/16"
	21421	.1800	#15	4.572	2-3/4"	1"
20426		.1820	#14	4.623	2-9/32"	15/16"
	21426	.1820	#14	4.623	2-3/4"	1"
20431		.1850	#13	4.700	2-9/32"	15/16"
	21431	.1850	#13	4.700	2-3/4"	1-1/4"
20436		.1875	3/16"	4.763	2-13/32"	1"
	21436	.1875	3/16"	4.763	2-3/4"	1-1/4"
20441		.1890	#12	4.801	2-13/32"	1"
	21441	.1890	#12	4.801	2-3/4"	1-1/4"
20446		.1910	#11	4.851	2-13/32"	1"
	21446	.1910	#11	4.851	2-3/4"	1-1/4"
20451		.1935	#10	4.915	2-13/32"	1"
	21451	.1935	#10	4.915	2-3/4"	1-1/4"
20456		.1960	#9	4.978	2-13/32"	1"
	21456	.1960	#9	4.978	3"	1-5/16"
20461		.1969		5.000	61	25
	21461	.1969		5.000	75	33
20466		.1990	#8	5.055	2-13/32"	1"
	21466	.1990	#8	5.055	3"	1-5/16"
20471		.2010	#7	5.105	2-13/32"	1"
	21471	.2010	#7	5.105	3"	1-5/16"
20476		.2031	13/64"	5.159	2-13/32"	1"
	21476	.2031	13/64"	5.159	3"	1-5/16"
20481		.2040	#6	5.182	2-13/32"	1"
	21481	.2040	#6	5.182	3"	1-3/8"
20486		.2055	#5	5.220	2-13/32"	1"
	21486	.2055	#5	5.220	3"	1-3/8"
20491		.2090	#4	5.309	2-13/32"	1"
	21491	.2090	#4	5.309	3"	1-3/8"
20496		.2130	#3	5.410	2-5/8"	1-3/32"
	21496	.2130	#3	5.410	3"	1-3/8"
20501		.2165		5.500	67	28
	21501	.2165		5.500	75	35
20506		.2188	7/32"	5.558	2-5/8"	1-3/32"
	21506	.2188	7/32"	5.558	3"	1-3/8"
20511		.2210	#2	5.613	2-5/8"	1-3/32"
	21511	.2210	#2	5.613	3"	1-3/8"
20516		.2280	#1	5.791	2-5/8"	1-3/32"
	21516	.2280	#1	5.791	3"	1-3/8"
20521		.2340	A	5.944	2-5/8"	1-3/32"
	21521	.2340	A	5.944	3-1/4"	1-1/2"
20526		.2344	15/64"	5.954	2-5/8"	1-3/32"
	21526	.2344	15/64"	5.954	3-1/4"	1-1/2"
20531		.2362		6.000	67	28
	21531	.2362		6.000	80	38
20536		.2380	B	6.045	2-3/4"	1-7/32"
	21536	.2380	B	6.045	3-1/4"	1-5/8"

continued →

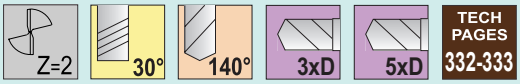
Series 1580H, 1280H *(continued)*

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

3xD (1580H) EDP#	5xD (1280H) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length
20541		.2420	C	6.147	2-3/4"	1-7/32"
	21541	.2420	C	6.147	3-1/4"	1-5/8"
20546		.2460	D	6.248	2-3/4"	1-7/32"
	21546	.2460	D	6.248	3-1/4"	1-5/8"
20551		.2500	1/4" / E	6.350	2-3/4"	1-7/32"
	21551	.2500	1/4" / E	6.350	3-1/4"	1-5/8"
20556		.2559		6.500	70	31
	21556	.2559		6.500	80	41
20561		.2570	F	6.528	2-3/4"	1-7/32"
	21561	.2570	F	6.528	3-1/4"	1-11/16"
20566		.2610	G	6.629	2-3/4"	1-7/32"
	21566	.2610	G	6.629	3-1/2"	1-11/16"
20571		.2656	17/64"	6.746	2-15/16"	1-11/32"
	21571	.2656	17/64"	6.746	3-1/2"	1-11/16"
20576		.2660	H	6.756	2-15/16"	1-11/32"
	21576	.2660	H	6.756	3-1/2"	1-11/16"
20581		.2720	I	6.909	2-15/16"	1-11/32"
	21581	.2720	I	6.909	3-1/2"	1-11/16"
20586		.2756		7.000	75	34
	21586	.2756		7.000	88	43
20591		.2770	J	7.036	2-15/16"	1-11/32"
	21591	.2770	J	7.036	3-1/2"	1-11/16"
20596		.2810	K	7.137	2-15/16"	1-11/32"
	21596	.2810	K	7.137	3-1/2"	1-3/4"
20601		.2812	9/32"	7.142	2-15/16"	1-11/32"
	21601	.2812	9/32"	7.142	3-1/2"	1-3/4"
20606		.2900	L	7.366	2-15/16"	1-11/32"
	21606	.2900	L	7.366	3-1/2"	1-3/4"
20611		.2950	M	7.493	2-15/16"	1-11/32"
	21611	.2950	M	7.493	3-3/4"	1-3/4"
20616		.2953		7.500	75	34
	21616	.2953		7.500	95	44
20621		.2969	19/64"	7.541	3-3/32"	1-15/32"
	21621	.2969	19/64"	7.541	3-3/4"	1-7/8"
20626		.3020	N	7.671	3-3/32"	1-15/32"
	21626	.3020	N	7.671	3-3/4"	1-7/8"
20631		.3125	5/16"	7.938	3-3/32"	1-15/32"
	21631	.3125	5/16"	7.938	3-3/4"	1-7/8"
20636		.3150		8.000	79	37
	21636	.3150		8.000	95	48
20641		.3160	O	8.026	3-3/32"	1-15/32"
	21641	.3160	O	8.026	3-3/4"	1-7/8"
20646		.3230	P	8.204	3-3/32"	1-15/32"
	21646	.3230	P	8.204	3-3/4"	2-3/32"
20651		.3281	21/64"	8.334	3-3/32"	1-15/32"
	21651	.3281	21/64"	8.334	4"	2-3/32"
20656		.3320	Q	8.433	3-3/32"	1-15/32"
	21656	.3320	Q	8.433	4"	2-3/32"
20661		.3346		8.500	79	37
	21661	.3346		8.500	100	53
20666		.3390	R	8.611	3-5/16"	1-9/16"
	21666	.3390	R	8.611	4"	2-3/32"
20671		.3438	11/32"	8.733	3-5/16"	1-9/16"
	21671	.3438	11/32"	8.733	4"	2-3/16"

† *Metric equivalents are for reference only*

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



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

AlTiN-based Coating
AlTiN-basierte-Beschichtet
Recubrimiento a base de AlTiN
Revêtement à base de AlTiN
Rivestimento in a base AlTiN
AlTiN基涂层



3xD (1580H) EDP#	5xD (1280H) EDP#	d † Diameter Decimal		Metric	l_1 Overall Length	l_2 Flute Length
20676		.3480	S	8.839	3-5/16"	1-9/16"
	21676	.3480	S	8.839	4"	2-3/16"
20681		.3543		9.000	84	40
	21681	.3543		9.000	100	56
20686		.3580	T	9.093	3-5/16"	1-9/16"
	21686	.3580	T	9.093	4-1/4"	2-9/32"
20691		.3594	23/64"	9.129	3-5/16"	1-9/16"
	21691	.3594	23/64"	9.129	4-1/4"	2-9/32"
20696		.3680	U	9.347	3-5/16"	1-9/16"
	21696	.3680	U	9.347	4-1/4"	2-9/32"
20701		.3740		9.500	84	40
	21701	.3740		9.500	105	58
20706		.3750	3/8"	9.525	3-1/2"	1-11/16"
	21706	.3750	3/8"	9.525	4-1/4"	2-3/8"
20711		.3770	V	9.576	3-1/2"	1-11/16"
	21711	.3770	V	9.576	4-1/4"	2-3/8"
20716		.3860	W	9.804	3-1/2"	1-11/16"
	21716	.3860	W	9.804	4-1/2"	2-3/8"
20721		.3906	25/64"	9.921	3-1/2"	1-11/16"
	21721	.3906	25/64"	9.921	4-1/2"	2-3/8"
20726		.3937		10.000	89	43
	21726	.3937		10.000	115	60
20731		.3970	X	10.084	3-1/2"	1-11/16"
	21731	.3970	X	10.084	4-1/2"	2-1/2"
20736		.4040	Y	10.262	3-1/2"	1-11/16"
	21736	.4040	Y	10.262	4-1/2"	2-9/16"
20741		.4062	13/32"	10.317	3-1/2"	1-11/16"
	21741	.4062	13/32"	10.317	4-1/2"	2-9/16"
20746		.4130	Z	10.490	3-1/2"	1-11/16"
	21746	.4130	Z	10.490	4-1/2"	2-5/8"
20751		.4134		10.500	89	43
	21751	.4134		10.500	115	67
20756		.4219	27/64"	10.716	3-3/4"	1-13/16"
	21756	.4219	27/64"	10.716	4-1/2"	2-11/16"
20761		.4331		11.000	95	46
	21761	.4331		11.000	115	68
20766		.4375	7/16"	11.113	3-3/4"	1-13/16"
	21766	.4375	7/16"	11.113	4-3/4"	2-13/16"
20771		.4528		11.500	95	46
	21771	.4528		11.500	120	71
20776		.4531	29/64"	11.509	3-3/4"	1-13/16"
	21776	.4531	29/64"	11.509	4-3/4"	2-7/8"

continued →

Series 1580H, 1280H *(continued)*

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

3xD (1580H) EDP#	5xD (1280H) EDP#	*d* † Diameter Decimal	*d* † Diameter	*d* † Diameter Metric	*l1* Overall Length	*l2* Flute Length
20781		.4688	15/32"	11.908	4"	1-15/16"
	21781	.4688	15/32"	11.908	4-3/4"	2-7/8"
20786		.4724		12.000	102	49
	21786	.4724		12.000	120	73
20791		.4844	31/64"	12.304	4"	1-15/16"
	21791	.4844	31/64"	12.304	5-5/16"	3"
20796		.4921		12.500	102	49
	21796	.4921		12.500	135	76
20801		.5000	1/2"	12.700	4"	1-15/16"
	21801	.5000	1/2"	12.700	5-3/8"	3-1/16"
20806		.5118		13.000	107	53
	21806	.5118		13.000	135	78
20811		.5156	33/64"	13.096	4-7/32"	2-3/32"
	21811	.5156	33/64"	13.096	5-3/8"	3-1/8"
20816		.5312	17/32"	13.492	4-7/32"	2-3/32"
	21816	.5312	17/32"	13.492	5-11/16"	3-5/16"
20821		.5315		13.500	110	56
	21821	.5315		13.500	145	84
20826		.5469	35/64"	13.891	4-5/16"	2-7/32"
	21826	.5469	35/64"	13.891	5-13/16"	3-3/8"
20831		.5512		14.000	110	56
	21831	.5512		14.000	145	86
20836		.5625	9/16"	14.288	4-9/16"	2-15/32"
	21836	.5625	9/16"	14.288	5-15/16"	3-1/2"
20841		.5709		14.500	116	63
	21841	.5709		14.500	150	89
20846		.5781	37/64"	14.684	4-15/16"	2-9/16"
	21846	.5781	37/64"	14.684	6"	3-1/2"
20851		.5906		15.000	125	65
	21851	.5906		15.000	150	90
20856		.5938	19/32"	15.083	4-15/16"	2-9/16"
	21856	.5938	19/32"	15.083	6"	3-9/16"
20861		.6094	39/64"	15.479	5-1/16"	2-13/16"
	21861	.6094	39/64"	15.479	6-3/16"	3-11/16"
20866		.6102		15.500	129	71
	21866	.6102		15.500	160	94
20871		.6250	5/8"	15.875	5-1/4"	3-1/8"
	21871	.6250	5/8"	15.875	6-5/16"	3-3/4"
20876		.6299		16.000	133	79
	21876	.6299		16.000	160	95

† *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	+3.175mm –3.175mm (+.125" –.125")	
l_2	+3.175mm –3.175mm (+.125" –.125")	
l_4	+1.980mm –.000mm (+.078" –.000")	

NEW ITEMS

Series 1580KD, 1280KD, 1880KD

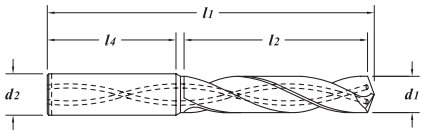
.1181" - .1470"
(3.000mm - 3.734mm)

30° | 140° | 3xD | 5xD | 7xD

TECH PAGES 332-333

AlTiN-based Coating
AlTiN-basierte-Beschichtet
Recubrimiento a base de AlTiN
Revêtement à base de AlTiN
Rivestimento in a base AlTiN
AlTiN基涂层





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

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

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

continued →

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

.1476" - .1820"
(3.750mm - 4.622mm)

	3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	*d1* Diameter Decimal		*d1* Diameter Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l4* Shank Length
	28095			.1476		3.750	6.0	62	20	36
		25165		.1476		3.750	6.0	66	28	36
NEW			26972	.1476		3.750	6.0	75	37	36
NEW	28098			.1495	(#25)	3.797	6.0	62	20	36
NEW		25172		.1495	(#25)	3.797	6.0	66	28	36
NEW			26978	.1495	(#25)	3.797	6.0	75	37	36
	28105			.1496		3.800	6.0	66	24	36
		25175		.1496		3.800	6.0	74	36	36
	28115			.1535		3.900	6.0	66	24	36
		25185		.1535		3.900	6.0	74	36	36
NEW			26982	.1535		3.900	6.0	75	37	36
NEW	28118			.1562	(5/32")	3.967	6.0	66	24	36
NEW		25192		.1562	(5/32")	3.967	6.0	74	36	36
NEW			26984	.1562	(5/32")	3.967	6.0	75	37	36
	28125			.1563		3.970	6.0	66	24	36
		25195		.1563		3.970	6.0	74	36	36
	28135			.1575		4.000	6.0	66	24	36
		25205		.1575		4.000	6.0	74	36	36
NEW			26986	.1575		4.000	6.0	75	37	36
NEW	28138			.1590	(#21)	4.038	6.0	66	24	36
NEW		25208		.1590	(#21)	4.038	6.0	74	36	36
NEW			26988	.1590	(#21)	4.038	6.0	75	37	36
NEW	28140			.1610	(#20)	4.089	6.0	66	24	36
NEW		25212		.1610	(#20)	4.089	6.0	74	36	36
NEW			26990	.1610	(#20)	4.089	6.0	75	37	36
	28145			.1614		4.100	6.0	66	24	36
		25215		.1614		4.100	6.0	74	36	36
NEW			26992	.1614		4.100	6.0	75	37	36
	28155			.1654		4.200	6.0	66	24	36
		25225		.1654		4.200	6.0	74	36	36
NEW			26994	.1654		4.200	6.0	75	37	36
NEW	28158			.1660	(#19)	4.216	6.0	66	24	36
NEW		25228		.1660	(#19)	4.216	6.0	74	36	36
NEW			26996	.1660	(#19)	4.216	6.0	85	45	36
	28165			.1673		4.250	6.0	66	24	36
		25235		.1673		4.250	6.0	74	36	36
NEW			26998	.1673		4.250	6.0	85	45	36
	28175			.1693		4.300	6.0	66	24	36
		25245		.1693		4.300	6.0	74	36	36
NEW	28178			.1719	(11/64")	4.366	6.0	66	24	36
NEW		25248		.1719	(11/64")	4.366	6.0	74	36	36
NEW			27002	.1719	(11/64")	4.366	6.0	85	45	36
	28185			.1732		4.400	6.0	66	24	36
		25255		.1732		4.400	6.0	74	36	36
NEW			27004	.1732		4.400	6.0	85	45	36
NEW	28188			.1770	(#16)	4.496	6.0	66	24	36
NEW		25262		.1770	(#16)	4.496	6.0	74	36	36
NEW			27006	.1770	(#16)	4.496	6.0	85	45	36
	28195			.1772		4.500	6.0	66	24	36
		25265		.1772		4.500	6.0	74	36	36
NEW			27008	.1772		4.500	6.0	85	45	36
	28205			.1811		4.600	6.0	66	24	36
		25275		.1811		4.600	6.0	74	36	36
NEW			27011	.1811		4.600	6.0	85	45	36
NEW	28208			.1820	(#14)	4.622	6.0	66	24	36
NEW		25280		.1820	(#14)	4.622	6.0	74	36	36
NEW			27012	.1820	(#14)	4.622	6.0	90	50	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	*l4* Shank Length
		25285		.1831		4.650	6.0	74	36	36
NEW			27014	.1831		4.650	6.0	90	50	36
	28225			.1850		4.700	6.0	66	24	36
		25295		.1850		4.700	6.0	74	36	36
	28235			.1870		4.750	6.0	66	24	36
		25305		.1870		4.750	6.0	74	36	36
NEW			27016	.1870		4.750	6.0	90	50	36
NEW	28238			.1875	(3/16")	4.762	6.0	66	28	36
NEW		25310		.1875	(3/16")	4.762	6.0	74	36	36
NEW			27018	.1875	(3/16")	4.762	6.0	90	50	36
	28245			.1890	(#12)	4.800	6.0	66	28	36
		25315		.1890	(#12)	4.800	6.0	82	44	36
NEW			27021	.1890	(#12)	4.800	6.0	90	50	36
	28255			.1929		4.900	6.0	66	28	36
		25325		.1929		4.900	6.0	82	44	36
NEW			27022	.1929		4.900	6.0	90	50	36
NEW	28258			.1960	(#9)	4.978	6.0	66	28	36
NEW		25330		.1960	(#9)	4.978	6.0	82	44	36
NEW			27024	.1960	(#9)	4.978	6.0	90	50	36
	28265			.1969		5.000	6.0	66	28	36
		25335		.1969		5.000	6.0	82	44	36
NEW			27026	.1969		5.000	6.0	90	50	36
	28275			.2008		5.100	6.0	66	28	36
		25345		.2008		5.100	6.0	82	44	36
NEW	28278			.2010	(#7)	5.105	6.0	66	28	36
NEW		25348		.2010	(#7)	5.105	6.0	82	44	36
NEW			27031	.2010	(#7)	5.105	6.0	97	57	36
	28285			.2027		5.150	6.0	66	28	36
		25355		.2027		5.150	6.0	82	44	36
	28295			.2047		5.200	6.0	66	28	36
		25365		.2047		5.200	6.0	82	44	36
	28305			.2087		5.300	6.0	66	28	36
		25375		.2087		5.300	6.0	82	44	36
NEW	28308			.2130	(#3)	5.410	6.0	66	28	36
NEW		25380		.2130	(#3)	5.410	6.0	82	44	36
NEW			27036	.2130	(#3)	5.410	6.0	97	57	36
	28315			.2165		5.500	6.0	66	28	36
		25385		.2165		5.500	6.0	82	44	36
NEW			27038	.2165		5.500	6.0	97	57	36
	28325			.2185		5.550	6.0	66	28	36
		25395		.2185		5.550	6.0	82	44	36
NEW	28328			.2188	(7/32")	5.557	6.0	66	28	36
NEW		25398		.2188	(7/32")	5.557	6.0	82	44	36
NEW			27041	.2188	(7/32")	5.557	6.0	97	57	36
	28335			.2205		5.600	6.0	66	28	36
		25397		.2205		5.600	6.0	82	44	36
NEW			27042	.2205		5.600	6.0	97	57	36
	28345			.2244		5.700	6.0	66	28	36
		25400		.2244		5.700	6.0	82	44	36
NEW			27044	.2244		5.700	6.0	97	57	36
NEW	28348			.2280	(#1)	5.791	6.0	66	28	36
NEW		25403		.2280	(#1)	5.791	6.0	82	44	36
NEW			27046	.2280	(#1)	5.791	6.0	97	57	36
	28355			.2283		5.800	6.0	66	28	36
		25405		.2283		5.800	6.0	82	44	36
			27048	.2283		5.800	6.0	97	57	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		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_4 Shank Length
	28365			.2323		5.900	6.0	66	28	36
		25415		.2323		5.900	6.0	82	44	36
NEW			27051	.2323		5.900	6.0	97	57	36
	28375			.2342		5.950	6.0	66	28	36
		25425		.2342		5.950	6.0	82	44	36
NEW			27052	.2342		5.950	6.0	97	57	36
	28385			.2362		6.000	6.0	66	28	36
		25435		.2362		6.000	6.0	82	44	36
NEW			27054	.2362		6.000	6.0	97	57	36
	28395			.2402		6.100	8.0	79	34	36
		25437		.2402		6.100	8.0	91	53	36
	28405			.2441		6.200	8.0	79	34	36
		25440		.2441		6.200	8.0	91	53	36
	28415			.2480		6.300	8.0	79	34	36
		25443		.2480		6.300	8.0	91	53	36
	28425			.2500	(1/4")	6.350	8.0	79	34	36
		25445		.2500	(1/4")	6.350	8.0	91	53	36
NEW			27056	.2500	(1/4")	6.350	8.0	106	66	36
	28435			.2520		6.400	8.0	79	34	36
		25450		.2520		6.400	8.0	91	53	36
NEW			27058	.2520		6.400	8.0	106	66	36
	28445			.2559		6.500	8.0	79	34	36
		25455		.2559		6.500	8.0	91	53	36
NEW			27061	.2559		6.500	8.0	106	66	36
	28446			.2571		6.530	8.0	79	34	36
		25457		.2571		6.530	8.0	91	53	36
NEW			27062	.2571		6.530	8.0	106	66	36
	28455			.2598		6.600	8.0	79	34	36
		25460		.2598		6.600	8.0	91	53	36
NEW			27064	.2598		6.600	8.0	106	66	36
		25463		.2638		6.700	8.0	91	53	36
NEW			27066	.2638		6.700	8.0	106	66	36
NEW	28463			.2656	(17/64")	6.746	8.0	79	34	36
NEW		25464		.2656	(17/64")	6.746	8.0	91	53	36
NEW			27068	.2656	(17/64")	6.746	8.0	106	66	36
	28465			.2657		6.750	8.0	79	34	36
		25465		.2657		6.750	8.0	91	53	36
	28475			.2677		6.800	8.0	79	34	36
		25475		.2677		6.800	8.0	91	53	36
NEW			27071	.2677		6.800	8.0	106	66	36
	28485			.2717		6.900	8.0	79	34	36
		25485		.2717		6.900	8.0	91	53	36
NEW			27072	.2717		6.900	8.0	116	76	36
	28495			.2756		7.000	8.0	79	34	36
		25495		.2756		7.000	8.0	91	53	36
NEW			27074	.2756		7.000	8.0	116	76	36
NEW	28498			.2770	(J)	7.035	8.0	79	41	36
NEW		25498		.2770	(J)	7.035	8.0	91	53	36
NEW			27076	.2770	(J)	7.035	8.0	116	76	36
	28505			.2795		7.100	8.0	79	41	36
		25505		.2795		7.100	8.0	91	53	36
NEW	28508			.2812	(9/32")	7.142	8.0	79	41	36
NEW		25512		.2812	(9/32")	7.142	8.0	91	53	36
NEW			27079	.2812	(9/32")	7.142	8.0	116	76	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	*l4* Shank Length
	28515			.2815		7.150	8.0	79	41	36
		25515		.2815		7.150	8.0	91	53	36
NEW			27082	.2815		7.150	8.0	116	76	36
	28525			.2835		7.200	8.0	79	41	36
		25525		.2835		7.200	8.0	91	53	36
	28535			.2874		7.300	8.0	79	41	36
		25530		.2874		7.300	8.0	91	53	36
	28545			.2913		7.400	8.0	79	41	36
		25535		.2913		7.400	8.0	91	53	36
	28555			.2953		7.500	8.0	79	41	36
		25545		.2953		7.500	8.0	91	53	36
NEW			27086	.2953		7.500	8.0	116	76	36
	28565			.2972		7.550	8.0	79	41	36
		25555		.2972		7.550	8.0	91	53	36
NEW			27088	.2972		7.550	8.0	116	76	36
	28575			.2992		7.600	8.0	79	41	36
		25565		.2992		7.600	8.0	91	53	36
NEW	28578			.3020	(N)	7.670	8.0	79	41	36
NEW		25570		.3020	(N)	7.670	8.0	91	53	36
NEW			27092	.3020	(N)	7.670	8.0	116	76	36
	28585			.3031		7.700	8.0	79	41	36
		25575		.3031		7.700	8.0	91	53	36
	28595			.3071		7.800	8.0	79	41	36
		25585		.3071		7.800	8.0	91	53	36
NEW			27096	.3071		7.800	8.0	116	76	36
NEW	28602			.3125	(5/16")	7.937	8.0	79	41	36
NEW		25593		.3125	(5/16")	7.937	8.0	91	53	36
NEW			27101	.3125	(5/16")	7.937	8.0	116	76	36
	28605			.3130		7.950	8.0	79	41	36
		25595		.3130		7.950	8.0	91	53	36
NEW			27102	.3130		7.950	8.0	116	76	36
	28615			.3150		8.000	8.0	79	41	36
		25605		.3150		8.000	8.0	91	53	36
NEW			27104	.3150		8.000	8.0	116	76	36
	28625			.3189		8.100	10.0	89	47	40
		25610		.3189		8.100	10.0	103	61	40
	28635			.3228		8.200	10.0	89	47	40
		25615		.3228		8.200	10.0	103	61	40
NEW	28638			.3230	(P)	8.204	10.0	89	47	40
NEW		25618		.3230	(P)	8.204	10.0	103	61	40
NEW			27108	.3230	(P)	8.204	10.0	131	87	40
	28645			.3268		8.300	10.0	89	47	40
		25625		.3268		8.300	10.0	103	61	40
NEW	28648			.3281	(21/64")	8.333	10.0	89	47	40
NEW		25628		.3281	(21/64")	8.333	10.0	103	61	40
NEW			27112	.3281	(21/64")	8.333	10.0	131	87	40
	28655			.3287		8.350	10.0	89	47	40
		25635		.3287		8.350	10.0	103	61	40
NEW			27114	.3287		8.350	10.0	131	87	40
	28665			.3307		8.400	10.0	89	47	40
		25640		.3307		8.400	10.0	103	61	40
	28675			.3346		8.500	10.0	89	47	40
		25645		.3346		8.500	10.0	103	61	40
NEW			27118	.3346		8.500	10.0	131	87	40
	28685			.3386		8.600	10.0	89	47	40
		25655		.3386		8.600	10.0	103	61	40
NEW			27121	.3386		8.600	10.0	131	87	40

continued →

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

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

	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_4 Shank Length
NEW	28688			.3390	(R)	8.610	10.0	89	47	40
NEW		25658		.3390	(R)	8.610	10.0	103	61	40
NEW			27122	.3390	(R)	8.610	10.0	131	87	40
	28695			.3425		8.700	10.0	89	47	40
		25665		.3425		8.700	10.0	103	61	40
NEW			27124	.3425		8.700	10.0	131	87	40
NEW	28698			.3438	(11/32")	8.732	10.0	89	47	40
NEW		25670		.3438	(11/32")	8.732	10.0	103	61	40
NEW			27126	.3438	(11/32")	8.732	10.0	131	87	40
	28725			.3445		8.750	10.0	89	47	40
		25675		.3445		8.750	10.0	103	61	40
NEW			27128	.3445		8.750	10.0	131	87	40
	28735			.3465		8.800	10.0	89	47	40
		25685		.3465		8.800	10.0	103	61	40
NEW			27130	.3465		8.800	10.0	131	87	40
	28745			.3504		8.900	10.0	89	47	40
		25695		.3504		8.900	10.0	103	61	40
	28755			.3543		9.000	10.0	89	47	40
		25705		.3543		9.000	10.0	103	61	40
NEW			27134	.3543		9.000	10.0	131	87	40
	28765			.3583		9.100	10.0	89	47	40
		25715		.3583		9.100	10.0	103	61	40
NEW	28768			.3594	(23/64")	9.128	10.0	89	47	40
NEW		25720		.3594	(23/64")	9.128	10.0	103	61	40
NEW			27138	.3594	(23/64")	9.128	10.0	139	95	40
		25725		.3602		9.150	10.0	103	61	40
NEW			27140	.3602		9.150	10.0	139	95	40
	28815			.3622		9.200	10.0	89	47	40
		25735		.3622		9.200	10.0	103	61	40
	28825			.3661		9.300	10.0	89	47	40
		25745		.3661		9.300	10.0	103	61	40
	28845			.3701		9.400	10.0	89	47	40
		25750		.3701		9.400	10.0	103	61	40
	28855			.3740		9.500	10.0	89	47	40
		25755		.3740		9.500	10.0	103	61	40
NEW			27146	.3740		9.500	10.0	139	95	40
NEW	28858			.3750	(3/8")	9.525	10.0	89	47	40
NEW		25760		.3750	(3/8")	9.525	10.0	103	61	40
NEW			27148	.3750	(3/8")	9.525	10.0	139	95	40
	28875			.3760		9.550	10.0	89	47	40
		25765		.3760		9.550	10.0	103	61	40
NEW			27150	.3760		9.550	10.0	139	95	40
	28878			.3780		9.600	10.0	89	47	40
		25767		.3780		9.600	10.0	103	61	40
NEW			27152	.3780		9.600	10.0	139	95	40
	28882			.3819		9.700	10.0	89	47	40
		25770		.3819		9.700	10.0	103	61	40
	28885			.3858		9.800	10.0	89	47	40
		25775		.3858		9.800	10.0	103	61	40
	28895			.3898		9.900	10.0	89	47	40
		25785		.3898		9.900	10.0	103	61	40
NEW			27160	.3898		9.900	10.0	139	95	40
NEW	28898			.3906	(25/64")	9.920	10.0	89	47	40
NEW		25787		.3906	(25/64")	9.920	10.0	103	61	40
NEW			27162	.3906	(25/64")	9.920	10.0	139	95	40

† *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	*l4* Shank Length
	28905			.3937		10.000	10.0	89	47	40
		25795		.3937		10.000	10.0	103	61	40
NEW			27164	.3937		10.000	10.0	139	95	40
	28925			.3976		10.100	12.0	102	55	45
		25800		.3976		10.100	12.0	118	71	45
	28935			.4016		10.200	12.0	102	55	45
		25805		.4016		10.200	12.0	118	71	45
	28945			.4055		10.300	12.0	102	55	45
		25815		.4055		10.300	12.0	118	71	45
NEW			27170	.4055		10.300	12.0	155	106	45
NEW	28948			.4062	(13/32")	10.317	12.0	102	55	45
NEW		25817		.4062	(13/32")	10.317	12.0	118	71	45
NEW			27172	.4062	(13/32")	10.317	12.0	155	106	45
NEW	28953			.4130	(Z)	10.490	12.0	102	55	45
NEW		25823		.4130	(Z)	10.490	12.0	118	71	45
NEW			27178	.4130	(Z)	10.490	12.0	155	106	45
	28955			.4134		10.500	12.0	102	55	45
		25825		.4134		10.500	12.0	118	71	45
NEW			27180	.4134		10.500	12.0	155	106	45
	28965			.4173		10.600	12.0	102	55	45
		25830		.4173		10.600	12.0	118	71	45
NEW			27182	.4173		10.600	12.0	155	106	45
	28975			.4213		10.700	12.0	102	55	45
		25835		.4213		10.700	12.0	118	71	45
NEW			27184	.4213		10.700	12.0	155	106	45
NEW	28978			.4219	(27/64")	10.716	12.0	102	55	45
NEW		25838		.4219	(27/64")	10.716	12.0	118	71	45
NEW			27186	.4219	(27/64")	10.716	12.0	155	106	45
	28985			.4252		10.800	12.0	102	55	45
		25845		.4252		10.800	12.0	118	71	45
	28995			.4331		11.000	12.0	102	55	45
		25855		.4331		11.000	12.0	118	71	45
NEW			27190	.4331		11.000	12.0	163	114	45
	29005			.4370		11.100	12.0	102	55	45
		25865		.4370		11.100	12.0	118	71	45
NEW	29008			.4375	(7/16")	11.112	12.0	102	55	45
NEW		25868		.4375	(7/16")	11.112	12.0	118	71	45
NEW			27194	.4375	(7/16")	11.112	12.0	163	114	45
	29015			.4409		11.200	12.0	102	55	45
		25875		.4409		11.200	12.0	118	71	45
	29025			.4488		11.400	12.0	102	55	45
		25880		.4488		11.400	12.0	118	71	45
	29035			.4528		11.500	12.0	102	55	45
		25885		.4528		11.500	12.0	118	71	45
NEW	29038			.4531	(29/64")	11.508	12.0	102	55	45
NEW		25888		.4531	(29/64")	11.508	12.0	118	71	45
NEW			27200	.4531	(29/64")	11.508	12.0	163	114	45
	29045			.4606		11.700	12.0	102	55	45
		25895		.4606		11.700	12.0	118	71	45
	29055			.4685		11.900	12.0	102	55	45
NEW	29058			.4688	(15/32")	11.907	12.0	102	55	45
NEW		25910		.4688	(15/32")	11.907	12.0	118	71	45
NEW			27208	.4688	(15/32")	11.907	12.0	163	114	45

continued →

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

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

	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_4 Shank Length
	29065			.4724		12.000	12.0	102	55	45
		25915		.4724		12.000	12.0	118	71	45
NEW			27210	.4724		12.000	12.0	163	114	45
	29075			.4764		12.100	14.0	107	60	45
		25925		.4764		12.100	14.0	124	77	45
	29085			.4803		12.200	14.0	107	60	45
		25930		.4803		12.200	14.0	124	77	45
	29095			.4842		12.300	14.0	107	60	45
		25935		.4842		12.300	14.0	124	77	45
NEW	29098			.4844	(31/64")	12.303	14.0	107	60	45
NEW		25937		.4844	(31/64")	12.303	14.0	124	77	45
NEW			27214	.4844	(31/64")	12.303	14.0	182	133	45
	29115			.4921		12.500	14.0	107	60	45
		25945		.4921		12.500	14.0	124	77	45
NEW			27218	.4921		12.500	14.0	182	133	45
	29125			.4961		12.600	14.0	107	60	45
		25950		.4961		12.600	14.0	124	77	45
	29135			.5000	(1/2")	12.700	14.0	107	60	45
		25955		.5000	(1/2")	12.700	14.0	124	77	45
NEW			27220	.5000	(1/2")	12.700	14.0	182	133	45
	29145			.5039		12.800	14.0	107	60	45
		25960		.5039		12.800	14.0	124	77	45
	29148			.5051		12.830	14.0	107	60	45
		25961		.5051		12.830	14.0	124	77	45
NEW			27224	.5051		12.830	14.0	182	133	45
	29155			.5079		12.900	14.0	107	60	45
NEW			27226	.5079		12.900	14.0	182	133	45
	29161			.5098		12.950	14.0	107	60	45
NEW			27228	.5098		12.950	14.0	182	133	45
	29165			.5118		13.000	14.0	107	60	45
		25965		.5118		13.000	14.0	124	77	45
NEW			27230	.5118		13.000	14.0	182	133	45
	29175			.5157		13.100	14.0	107	60	45
		25975		.5157		13.100	14.0	124	77	45
	29181			.5236		13.300	14.0	107	60	45
NEW	29184			.5312	(17/32")	13.492	14.0	107	60	45
NEW		25983		.5312	(17/32")	13.492	14.0	124	77	45
NEW			27238	.5312	(17/32")	13.492	14.0	182	133	45
	29185			.5315		13.500	14.0	107	60	45
		25985		.5315		13.500	14.0	124	77	45
NEW			27240	.5315		13.500	14.0	182	133	45
	29195			.5394		13.700	14.0	107	60	45
		25995		.5394		13.700	14.0	124	77	45
	29205			.5433		13.800	14.0	107	60	45
		26005		.5433		13.800	14.0	124	77	45
	29215			.5512		14.000	14.0	107	60	45
		26015		.5512		14.000	14.0	124	77	45
NEW			27250	.5512		14.000	14.0	182	133	45
	29225			.5551		14.100	16.0	115	65	48
		26025		.5551		14.100	16.0	133	83	48
	29235			.5591		14.200	16.0	115	65	48
		26027		.5591		14.200	16.0	133	83	48
	29245			.5610		14.250	16.0	115	65	48

† *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	*l4* Shank Length
NEW	29250			.5625	(9/16")	14.287	16.0	115	65	48
NEW		26042		.5625	(9/16")	14.287	16.0	133	83	48
NEW			27254	.5625	(9/16")	14.287	16.0	204	152	48
	29255			.5630		14.300	16.0	115	65	48
		26045		.5630		14.300	16.0	133	83	48
	29265			.5709		14.500	16.0	115	65	48
		26055		.5709		14.500	16.0	133	83	48
NEW			27258	.5709		14.500	16.0	204	152	48
	29275			.5787		14.700	16.0	115	65	48
		26065		.5787		14.700	16.0	133	83	48
	29285			.5827		14.800	16.0	115	65	48
		26067		.5827		14.800	16.0	133	83	48
	29305			.5906		15.000	16.0	115	65	48
		26075		.5906		15.000	16.0	133	83	48
NEW			27264	.5906		15.000	16.0	204	152	48
NEW	29308			.5938	(19/32")	15.082	16.0	115	65	48
NEW		26083		.5938	(19/32")	15.082	16.0	133	83	48
NEW			27266	.5938	(19/32")	15.082	16.0	204	152	48
	29315			.5945		15.100	16.0	115	65	48
		26085		.5945		15.100	16.0	133	83	48
NEW			27268	.5945		15.100	16.0	204	152	48
	29325			.6102		15.500	16.0	115	65	48
		26095		.6102		15.500	16.0	133	83	48
		26105		.6181		15.700	16.0	133	83	48
	29345			.6220		15.800	16.0	115	65	48
		26107		.6220		15.800	16.0	133	83	48
NEW			27276	.6220		15.800	16.0	204	152	48
NEW	29348			.6250	(5/8")	15.875	16.0	115	65	48
NEW		26108		.6250	(5/8")	15.875	16.0	133	83	48
NEW			27278	.6250	(5/8")	15.875	16.0	204	152	48
		26115		.6299		16.000	16.0	133	83	48
NEW			27282	.6299		16.000	16.0	204	152	48
	29363			.6331		16.080	18.0	123	73	48
		26118		.6331		16.080	18.0	143	93	48
	29365			.6339		16.100	18.0	123	73	48
		26119		.6339		16.100	18.0	143	93	48
		26123		.6378		16.200	18.0	143	93	48
	29375			.6398		16.250	18.0	123	73	48
		26125		.6398		16.250	18.0	143	93	48
	29385			.6496		16.500	18.0	123	73	48
		26135		.6496		16.500	18.0	143	93	48
	29395			.6555		16.650	18.0	123	73	48
		26145		.6555		16.650	18.0	143	93	48
	29405			.6693		17.000	18.0	123	73	48
		26155		.6693		17.000	18.0	143	93	48
	29415			.6713		17.050	18.0	123	73	48
		26165		.6713		17.050	18.0	143	93	48
	29425			.6870		17.450	18.0	123	73	48
		26175		.6870		17.450	18.0	143	93	48
	29435			.6890		17.500	18.0	123	73	48
		26185		.6890		17.500	18.0	143	93	48
	29445			.7027		17.850	18.0	123	73	48
		26195		.7027		17.850	18.0	143	93	48
	29455			.7087		18.000	18.0	123	73	48
		26205		.7087		18.000	18.0	143	93	48
		26215		.7185		18.250	20.0	153	101	50
		26225		.7283		18.500	20.0	153	101	50

continued →

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

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

3xD (1580KD) EDP#	5xD (1280KD) EDP#	7xD (1880KD) EDP#	*d1* Diameter Decimal		*d1* Diameter Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*l4* Shank Length
	26235		.7342		18.650	20.0	153	101	50
	26245		.7480		19.000	20.0	153	101	50
29505			.7500	(3/4")	19.050	20.0	131	79	50
	26255		.7500	(3/4")	19.050	20.0	153	101	50
29545			.7579		19.250	20.0	131	79	50
29546			.7590		19.280	20.0	131	79	50
	26260		.7590		19.280	20.0	153	101	50
29551			.7598		19.300	20.0	131	79	50
	26261		.7598		19.300	20.0	153	101	50
29565			.7677		19.500	20.0	131	79	50
	26281		.7795		19.800	20.0	153	101	50
29595			.7815		19.850	20.0	131	79	50
29605			.7874		20.000	20.0	131	79	50



† *Metric equivalents are for reference only*

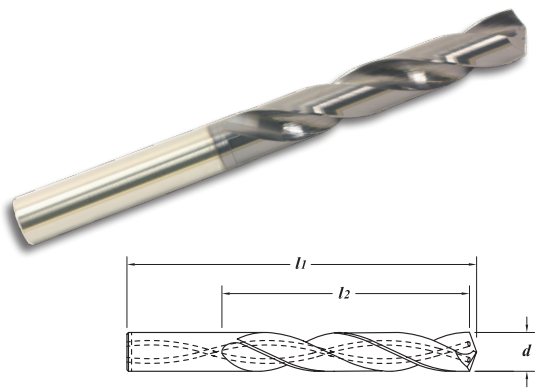
Series 1580KH, 1280KH, 1880KH

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



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

AlTiN-based Coating
AlTiN-basierte-Beschichtet
Recubrimiento a base de AlTiN
Revêtement à base de AlTiN
Rivestimento in a base AlTiN
AlTiN基涂层



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
Shank tolerance: h6

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
Schaft-Toleranz: h6

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
Tolerancia del vástago: h6

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
Tolerance queue: h6

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
Tolleranza gambo: h6

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
柄部公差: h6

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length
22010			.1181		3.000	46	16
	25366		.1181		3.000	50	19
		26366	.1181		3.000	65	28
22015			.1200	#31	3.048	1-13/16"	5/8"
	25371		.1200	#31	3.048	2"	3/4"
		26371	.1200	#31	3.048	2-1/2"	1-1/8"
22020			.1250	1/8"	3.175	1-15/16"	11/16"
	25376		.1250	1/8"	3.175	2"	3/4"
		26376	.1250	1/8"	3.175	2-1/2"	1-1/8"
22025			.1285	#30	3.264	1-15/16"	11/16"
	25381		.1285	#30	3.264	2-1/4"	3/4"
		26381	.1285	#30	3.264	2-1/2"	1-1/8"
22030			.1360	#29	3.454	2-1/16"	3/4"
	25386		.1360	#29	3.454	2-1/4"	7/8"
		26386	.1360	#29	3.454	3"	1-1/4"
22035			.1378		3.500	52	19
	25391		.1378		3.500	57	22
		26391	.1378		3.500	75	32
22040			.1405	#28	3.569	2-1/16"	3/4"
	25396		.1405	#28	3.569	2-1/4"	7/8"
		26396	.1405	#28	3.569	3"	1-1/4"
22045			.1406	9/64"	3.571	2-1/16"	3/4"
	25401		.1406	9/64"	3.571	2-1/4"	7/8"
		26401	.1406	9/64"	3.571	3"	1-1/4"
22050			.1440	#27	3.658	2-1/16"	3/4"
	25406		.1440	#27	3.658	2-1/4"	7/8"
		26406	.1440	#27	3.658	3"	1-3/8"
22055			.1470	#26	3.734	2-3/16"	13/16"
	25411		.1470	#26	3.734	2-1/4"	7/8"
		26411	.1470	#26	3.734	3"	1-3/8"
22060			.1495	#25	3.797	2-3/16"	13/16"
	25416		.1495	#25	3.797	2-1/4"	15/16"
		26416	.1495	#25	3.797	3"	1-3/8"
22065			.1520	#24	3.861	2-3/16"	13/16"
	25421		.1520	#24	3.861	2-1/4"	15/16"
		26421	.1520	#24	3.861	3"	1-1/2"
22070			.1540	#23	3.912	2-3/16"	13/16"
	25426		.1540	#23	3.912	2-1/4"	15/16"
		26426	.1540	#23	3.912	3"	1-1/2"

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
22075			.1562	5/32"	3.967	2-3/16"	13/16"
	25431		.1562	5/32"	3.967	2-1/2"	15/16"
		26431	.1562	5/32"	3.967	3"	1-1/2"
22080			.1570	#22	3.988	2-3/16"	13/16"
	25436		.1570	#22	3.988	2-1/2"	15/16"
		26436	.1570	#22	3.988	3"	1-1/2"
22085			.1575		4.000	56	21
	25441		.1575		4.000	65	24
		26441	.1575		4.000	75	38
22090			.1590	#21	4.039	2-3/16"	13/16"
	25446		.1590	#21	4.039	2-1/2"	15/16"
		26446	.1590	#21	4.039	3"	1-1/2"
22095			.1610	#20	4.089	2-3/16"	13/16"
	25451		.1610	#20	4.089	2-1/2"	15/16"
		26451	.1610	#20	4.089	3"	1-1/2"
22100			.1660	#19	4.216	2-9/32"	15/16"
	25456		.1660	#19	4.216	2-1/2"	1"
		26456	.1660	#19	4.216	3"	1-1/2"
22105			.1695	#18	4.305	2-9/32"	15/16"
	25461		.1695	#18	4.305	2-1/2"	1"
		26461	.1695	#18	4.305	3-1/2"	1-3/4"
22110			.1719	11/64"	4.366	2-9/32"	15/16"
	25466		.1719	11/64"	4.366	2-1/2"	1"
		26466	.1719	11/64"	4.366	3-1/2"	1-3/4"
22115			.1730	#17	4.394	2-9/32"	15/16"
	25471		.1730	#17	4.394	2-1/2"	1"
		26471	.1730	#17	4.394	3-1/2"	1-3/4"
22120			.1770	#16	4.496	2-9/32"	15/16"
	25476		.1770	#16	4.496	2-1/2"	1"
		26476	.1770	#16	4.496	3-1/2"	1-3/4"
22125			.1772		4.500	58	24
	25481		.1772		4.500	65	25
		26481	.1772		4.500	88	45
22130			.1800	#15	4.572	2-9/32"	15/16"
	25486		.1800	#15	4.572	2-3/4"	1"
		26486	.1800	#15	4.572	3-1/2"	1-3/4"
22135			.1820	#14	4.623	2-9/32"	15/16"
	25491		.1820	#14	4.623	2-3/4"	1"
		26491	.1820	#14	4.623	3-1/2"	1-3/4"
22140			.1850	#13	4.699	2-9/32"	15/16"
	25496		.1850	#13	4.699	2-3/4"	1-1/4"
		26496	.1850	#13	4.699	3-1/2"	1-3/4"
22145			.1875	3/16"	4.763	2-13/32"	1"
	25501		.1875	3/16"	4.763	2-3/4"	1-1/4"
		26501	.1875	3/16"	4.763	4"	2"
22150			.1890	#12	4.801	2-13/32"	1"
	25506		.1890	#12	4.801	2-3/4"	1-1/4"
		26506	.1890	#12	4.801	4"	2"
22155			.1910	#11	4.851	2-13/32"	1"
	25511		.1910	#11	4.851	2-3/4"	1-1/4"
		26511	.1910	#11	4.851	4"	2"
22160			.1935	#10	4.915	2-13/32"	1"
	25516		.1935	#10	4.915	2-3/4"	1-1/4"
		26516	.1935	#10	4.915	4"	2"

† *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
22165			.1960	#9	4.978	2-13/32"	1"
	25521		.1960	#9	4.978	3"	1-5/16"
		26521	.1960	#9	4.978	4"	2"
22170			.1969		5.000	61	25
	25526		.1969		5.000	75	33
		26526	.1969		5.000	100	50
22175			.1990	#8	5.055	2-13/32"	1"
	25531		.1990	#8	5.055	3"	1-5/16"
		26531	.1990	#8	5.055	4"	2"
22180			.2010	#7	5.105	2-13/32"	1"
	25536		.2010	#7	5.105	3"	1-5/16"
		26536	.2010	#7	5.105	4"	2"
22185			.2031	13/64"	5.159	2-13/32"	1"
	25541		.2031	13/64"	5.159	3"	1-5/16"
		26541	.2031	13/64"	5.159	4"	2"
22190			.2040	#6	5.182	2-13/32"	1"
	25546		.2040	#6	5.182	3"	1-3/8"
		26546	.2040	#6	5.182	4"	2"
22195			.2055	#5	5.220	2-13/32"	1"
	25551		.2055	#5	5.220	3"	1-3/8"
		26551	.2055	#5	5.220	4"	2"
22200			.2090	#4	5.309	2-13/32"	1"
	25556		.2090	#4	5.309	3"	1-3/8"
		26556	.2090	#4	5.309	4"	2"
22205			.2130	#3	5.410	2-5/8"	1-3/32"
	25561		.2130	#3	5.410	3"	1-3/8"
		26561	.2130	#3	5.410	4"	2"
22210			.2165		5.500	67	28
	25566		.2165		5.500	75	35
		26566	.2165		5.500	100	50
22215			.2188	7/32"	5.558	2-5/8"	1-3/32"
	25571		.2188	7/32"	5.558	3"	1-3/8"
		26571	.2188	7/32"	5.558	4"	2"
22220			.2210	#2	5.613	2-5/8"	1-3/32"
	25576		.2210	#2	5.613	3"	1-3/8"
		26576	.2210	#2	5.613	4"	2"
22225			.2280	#1	5.791	2-5/8"	1-3/32"
	25581		.2280	#1	5.791	3"	1-3/8"
		26581	.2280	#1	5.791	4-1/8"	2-1/8"
22230			.2340	A	5.944	2-5/8"	1-3/32"
	25586		.2340	A	5.944	3-1/4"	1-1/2"
		26586	.2340	A	5.944	4-1/8"	2-1/8"
22235			.2344	15/64"	5.954	2-5/8"	1-3/32"
	25591		.2344	15/64"	5.954	3-1/4"	1-1/2"
		26591	.2344	15/64"	5.954	4-1/8"	2-1/8"
22240			.2362		6.000	67	28
	25596		.2362		6.000	80	38
		26596	.2362		6.000	105	55
22245			.2380	B	6.045	2-3/4"	1-7/32"
	25601		.2380	B	6.045	3-1/4"	1-5/8"
		26601	.2380	B	6.045	4-1/8"	2-1/8"
22250			.2420	C	6.147	2-3/4"	1-7/32"
	25606		.2420	C	6.147	3-1/4"	1-5/8"
		26606	.2420	C	6.147	4-1/4"	2-1/4"

continued →

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

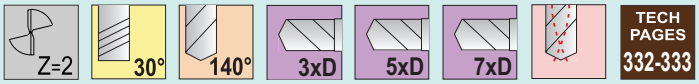
.2460" - .3125"
(6.248mm - 7.938mm)

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length
22255			.2460	D	6.248	2-3/4"	1-7/32"
	25611		.2460	D	6.248	3-1/4"	1-5/8"
		26611	.2460	D	6.248	4-1/4"	2-1/4"
22260			.2500	1/4" / E	6.350	2-3/4"	1-7/32"
	25616		.2500	1/4" / E	6.350	3-1/4"	1-5/8"
		26616	.2500	1/4" / E	6.350	4-1/4"	2-1/4"
22265			.2559		6.500	70	31
	25621		.2559		6.500	80	41
		26621	.2559		6.500	105	58
22270			.2570	F	6.528	2-3/4"	1-7/32"
	25626		.2570	F	6.528	3-1/4"	1-11/16"
		26626	.2570	F	6.528	4-3/8"	2-3/8"
22275			.2610	G	6.629	2-3/4"	1-7/32"
	25631		.2610	G	6.629	3-1/2"	1-11/16"
		26631	.2610	G	6.629	4-3/8"	2-3/8"
22280			.2656	17/64"	6.746	2-15/16"	1-11/32"
	25636		.2656	17/64"	6.746	3-1/2"	1-11/16"
		26636	.2656	17/64"	6.746	4-3/8"	2-3/8"
22285			.2660	H	6.756	2-15/16"	1-11/32"
	25641		.2660	H	6.756	3-1/2"	1-11/16"
		26641	.2660	H	6.756	4-3/8"	2-3/8"
22290			.2720	I	6.909	2-15/16"	1-11/32"
	25646		.2720	I	6.909	3-1/2"	1-11/16"
		26646	.2720	I	6.909	4-3/8"	2-3/8"
22295			.2756		7.000	75	34
	25651		.2756		7.000	88	43
		26651	.2756		7.000	110	61
22300			.2770	J	7.036	2-15/16"	1-11/32"
	25656		.2770	J	7.036	3-1/2"	1-11/16"
		26656	.2770	J	7.036	4-3/8"	2-3/8"
22305			.2810	K	7.137	2-15/16"	1-11/32"
	25661		.2810	K	7.137	3-1/2"	1-3/4"
		26661	.2810	K	7.137	4-7/16"	2-7/16"
22310			.2812	9/32"	7.142	2-15/16"	1-11/32"
	25666		.2812	9/32"	7.142	3-1/2"	1-3/4"
		26666	.2812	9/32"	7.142	4-7/16"	2-7/16"
22315			.2900	L	7.366	2-15/16"	1-11/32"
	25671		.2900	L	7.366	3-1/2"	1-3/4"
		26671	.2900	L	7.366	4-7/16"	2-7/16"
22320			.2950	M	7.493	2-15/16"	1-11/32"
	25676		.2950	M	7.493	3-3/4"	1-3/4"
		26676	.2950	M	7.493	4-7/16"	2-7/16"
22325			.2953		7.500	75	34
	25681		.2953		7.500	95	44
		26681	.2953		7.500	115	66
22330			.2969	19/64"	7.541	3-3/32"	1-15/32"
	25686		.2969	19/64"	7.541	3-3/4"	1-7/8"
		26686	.2969	19/64"	7.541	4-9/16"	2-9/16"
22335			.3020	N	7.671	3-3/32"	1-15/32"
	25691		.3020	N	7.671	3-3/4"	1-7/8"
		26691	.3020	N	7.671	4-9/16"	2-9/16"
22340			.3125	5/16"	7.938	3-3/32"	1-15/32"
	25696		.3125	5/16"	7.938	3-3/4"	1-7/8"
		26696	.3125	5/16"	7.938	4-11/16"	2-9/16"

† *Metric equivalents are for reference only*

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

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



TECH PAGES 332-333

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

AlTiN-based Coating
AlTiN-basierte-Beschichtet
Recubrimiento a base de AlTiN
Revêtement à base de AlTiN
Rivestimento in a base AlTiN
AlTiN基涂层



3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length
22345			.3150		8.000	79	37
	25701		.3150		8.000	95	48
		26701	.3150		8.000	120	69
22350			.3160	O	8.026	3-3/32"	1-15/32"
	25706		.3160	O	8.026	3-3/4"	1-7/8"
		26706	.3160	O	8.026	4-11/16"	2-11/16"
22355			.3230	P	8.204	3-3/32"	1-15/32"
	25711		.3230	P	8.204	3-3/4"	2-3/32"
		26711	.3230	P	8.204	4-11/16"	2-11/16"
22360			.3281	21/64"	8.334	3-3/32"	1-15/32"
	25716		.3281	21/64"	8.334	4"	2-3/32"
		26716	.3281	21/64"	8.334	4-11/16"	2-11/16"
22365			.3320	Q	8.433	3-3/32"	1-15/32"
	25721		.3320	Q	8.433	4"	2-3/32"
		26721	.3320	Q	8.433	4-15/16"	2-15/16"
22370			.3346		8.500	79	37
	25726		.3346		8.500	100	53
		26726	.3346		8.500	125	75
22375			.3390	R	8.611	3-5/16"	1-9/16"
	25731		.3390	R	8.611	4"	2-3/32"
		26731	.3390	R	8.611	4-15/16"	2-15/16"
22380			.3438	11/32"	8.733	3-5/16"	1-9/16"
	25736		.3438	11/32"	8.733	4"	2-3/16"
		26736	.3438	11/32"	8.733	4-15/16"	2-15/16"
22385			.3480	S	8.839	3-5/16"	1-9/16"
	25741		.3480	S	8.839	4"	2-3/16"
		26741	.3480	S	8.839	5"	3"
22390			.3543		9.000	84	40
	25746		.3543		9.000	100	56
		26746	.3543		9.000	125	77
22395			.3580	T	9.093	3-5/16"	1-9/16"
	25751		.3580	T	9.093	4-1/4"	2-9/32"
		26751	.3580	T	9.093	5"	3"
22400			.3594	23/64"	9.129	3-5/16"	1-9/16"
	25756		.3594	23/64"	9.129	4-1/4"	2-9/32"
		26756	.3594	23/64"	9.129	5"	3"
22405			.3680	U	9.347	3-5/16"	1-9/16"
	25761		.3680	U	9.347	4-1/4"	2-9/32"
		26761	.3680	U	9.347	5"	3"
22410			.3740		9.500	84	40
	25766		.3740		9.500	105	58
		26766	.3740		9.500	130	80
22415			.3750	3/8"	9.525	3-1/2"	1-11/16"
	25771		.3750	3/8"	9.525	4-1/4"	2-3/8"
		26771	.3750	3/8"	9.525	5-1/8"	3-1/8"

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
22420			.3770	V	9.576	3-1/2"	1-11/16"
	25776		.3770	V	9.576	4-1/4"	2-3/8"
		26776	.3770	V	9.576	5-1/8"	3-1/8"
22425			.3860	W	9.804	3-1/2"	1-11/16"
	25781		.3860	W	9.804	4-1/2"	2-3/8"
		26781	.3860	W	9.804	5-1/8"	3-1/8"
22430			.3906	25/64"	9.921	3-1/2"	1-11/16"
	25786		.3906	25/64"	9.921	4-1/2"	2-3/8"
		26786	.3906	25/64"	9.921	5-1/4"	3-1/4"
22435			.3937		10.000	89	43
	25791		.3937		10.000	115	60
		26791	.3937		10.000	135	83
22440			.3970	X	10.084	3-1/2"	1-11/16"
	25796		.3970	X	10.084	4-1/2"	2-1/2"
		26796	.3970	X	10.084	5-1/4"	3-1/4"
22445			.4040	Y	10.262	3-1/2"	1-11/16"
	25801		.4040	Y	10.262	4-1/2"	2-9/16"
		26801	.4040	Y	10.262	5-3/8"	3-3/8"
22450			.4062	13/32"	10.317	3-1/2"	1-11/16"
	25806		.4062	13/32"	10.317	4-1/2"	2-9/16"
		26806	.4062	13/32"	10.317	5-3/8"	3-3/8"
22455			.4130	Z	10.490	3-1/2"	1-11/16"
	25811		.4130	Z	10.490	4-1/2"	2-5/8"
		26811	.4130	Z	10.490	5-3/8"	3-3/8"
22460			.4134		10.500	89	43
	25816		.4134		10.500	115	67
		26816	.4134		10.500	135	86
22465			.4219	27/64"	10.716	3-3/4"	1-13/16"
	25821		.4219	27/64"	10.716	4-1/2"	2-11/16"
		26821	.4219	27/64"	10.716	5-7/16"	3-7/16"
22470			.4331		11.000	95	46
	25826		.4331		11.000	115	68
		26826	.4331		11.000	135	88
22475			.4375	7/16"	11.113	3-3/4"	1-13/16"
	25831		.4375	7/16"	11.113	4-3/4"	2-13/16"
		26831	.4375	7/16"	11.113	5-7/16"	3-7/16"
22480			.4528		11.500	95	46
	25836		.4528		11.500	120	71
		26836	.4528		11.500	140	91
22485			.4531	29/64"	11.509	3-3/4"	1-13/16"
	25841		.4531	29/64"	11.509	4-3/4"	2-7/8"
		26841	.4531	29/64"	11.509	5-9/16"	3-13/16"
22490			.4688	15/32"	11.908	4"	1-15/16"
	25846		.4688	15/32"	11.908	4-3/4"	2-7/8"
		26846	.4688	15/32"	11.908	5-9/16"	3-13/16"
22495			.4724		12.000	102	49
	25851		.4724		12.000	120	73
		26851	.4724		12.000	140	98
22500			.4844	31/64"	12.304	4"	1-15/16"
	25856		.4844	31/64"	12.304	5-5/16"	3"
		26856	.4844	31/64"	12.304	5-9/16"	3-13/16"
22505			.4921		12.500	102	49
	25861		.4921		12.500	135	76
		26861	.4921		12.500	150	102

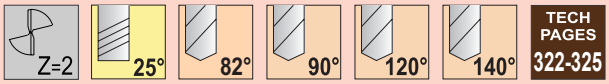
† *Metric equivalents are for reference only*

3xD (1580KH) EDP#	5xD (1280KH) EDP#	7xD (1880KH) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length
22510			.5000	1/2"	12.700	4"	1-15/16"
	25866		.5000	1/2"	12.700	5-3/8"	3-1/16"
		26866	.5000	1/2"	12.700	6"	4"
22515			.5118		13.000	107	53
	25871		.5118		13.000	135	78
		26871	.5118		13.000	150	102
22520			.5156	33/64"	13.096	4-7/32"	2-3/32"
	25876		.5156	33/64"	13.096	5-3/8"	3-1/8"
		26876	.5156	33/64"	13.096	6"	4"
22525			.5312	17/32"	13.492	4-7/32"	2-3/32"
	25881		.5312	17/32"	13.492	5-11/16"	3-5/16"
		26881	.5312	17/32"	13.492	6-1/8"	4-1/8"
22530			.5315		13.500	110	56
	25886		.5315		13.500	145	84
		26886	.5315		13.500	155	105
22535			.5469	35/64"	13.891	4-5/16"	2-7/32"
	25891		.5469	35/64"	13.891	5-13/16"	3-3/8"
		26891	.5469	35/64"	13.891	6-1/8"	4-1/8"
22540			.5512		14.000	110	56
	25896		.5512		14.000	145	86
		26896	.5512		14.000	155	105
22545			.5625	9/16"	14.288	4-9/16"	2-15/32"
	25901		.5625	9/16"	14.288	5-15/16"	3-1/2"
		26901	.5625	9/16"	14.288	6-1/4"	4-3/8"
22550			.5709		14.500	116	63
	25906		.5709		14.500	150	89
		26906	.5709		14.500	160	109
22555			.5781	37/64"	14.684	4-15/16"	2-9/16"
	25911		.5781	37/64"	14.684	6"	3-1/2"
		26911	.5781	37/64"	14.684	6-1/4"	4-3/8"
22560			.5906		15.000	125	65
	25916		.5906		15.000	150	90
		26916	.5906		15.000	160	112
22565			.5938	19/32"	15.083	4-15/16"	2-9/16"
	25921		.5938	19/32"	15.083	6"	3-9/16"
		26921	.5938	19/32"	15.083	6-3/8"	4-3/8"
22570			.6094	39/64"	15.479	5-1/16"	2-13/16"
	25926		.6094	39/64"	15.479	6-3/16"	3-11/16"
		26926	.6094	39/64"	15.479	6-7/16"	4-7/16"
22575			.6102		15.500	129	71
	25931		.6102		15.500	160	94
		26931	.6102		15.500	165	113
22580			.6250	5/8"	15.875	5-1/4"	3-1/8"
	25936		.6250	5/8"	15.875	6-5/16"	3-3/4"
		26936	.6250	5/8"	15.875	6-9/16"	4-9/16"
22585			.6299		16.000	133	79
	25941		.6299		16.000	160	95
		26941	.6299		16.000	165	117

Series 1600

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

NEW ITEMS



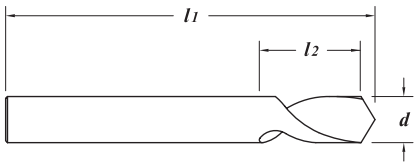
TECH PAGES 322-325

TOLERANCES

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

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
Shank tolerance: h6

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
Schaft-Toleranz: h6

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
Tolerancia del vástago: h6

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
Tolerance queue: h6

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
Tolleranza gambo: h6

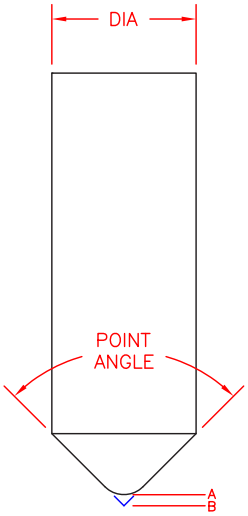
整体硬质合金钻头
定位稳定长钻头
可用于创建倒角
粗加工面、斜面或者球面
没有外径间隙
供准确位置上定位用
不建议在车床，或工具必须纺纱
柄部公差: h6

	82° EDP#	90° EDP#	120° EDP#	140° EDP#	d † Diameter Decimal		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"
NEW	-	91507	-	-	.1181		3.000	38	6
	-	91510	91580	91250	.1181		3.000	50	10
NEW	-	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
NEW	-	91532	-	-	.1969		5.000	75	15
	-	91534	-	-	.2362		6.000	50	12
	91664	91540	91610	91300	.2362		6.000	65	20
NEW	-	91542	-	-	.2362		6.000	75	20
NEW	-	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"
NEW	-	91024	-	-	.3125	5/16"	7.938	2-1/2"	5/8"
	91668	91025	91125	91315	.3125	5/16"	7.938	3"	1"
NEW	-	91026	-	-	.3125	5/16"	7.938	4"	1"
NEW	-	91548	-	-	.3150		8.000	50	12
NEW	-	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#	140° EDP#	*d* † 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
NEW	-	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"
NEW	-	91077	-	-	.6299		16.000	75	20
NEW	-	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
NEW	-	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"
NEW	-	91159	-	-	.7874		20.000	100	25
	-	91160	91230	91430	.7874		20.000	125	30
NEW	-	91161	-	-	.7874		20.000	150	30

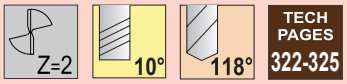
DIAMETER		DRILL POINT ANGLE			
		82°	90°	120°	140°
2mm	.0787	.003	.002	.001	.001
3/32"	.0938	.003	.003	.002	.001
3mm	.1181	.004	.004	.002	.001
1/8"	.1250	.004	.004	.002	.001
4mm	.1575	.005	.005	.003	.002
3/16"	.1875	.006	.006	.003	.002
5mm	.1969	.007	.006	.003	.002
6mm	.2362	.008	.007	.004	.003
1/4"	.2500	.009	.008	.004	.003
5/16"	.3125	.011	.009	.005	.003
8mm	.3150	.011	.009	.005	.003
3/8"	.3750	.013	.011	.006	.004
10mm	.3937	.014	.012	.007	.004
7/16"	.4375	.015	.013	.008	.005
12mm	.4724	.016	.014	.008	.005
1/2"	.5000	.017	.015	.009	.005
14mm	.5512	.019	.017	.010	.006
9/16"	.5625	.019	.017	.010	.006
5/8"	.6250	.022	.019	.011	.007
16mm	.6299	.022	.019	.011	.007
18mm	.7087	.024	.021	.012	.008
3/4"	.7500	.026	.023	.013	.008
20mm	.7874	.027	.024	.014	.009



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

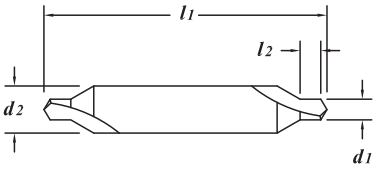
TOLERANCES	
d_1	+.003" –.000" (+.0762 –.0000mm)
d_2	h6
l_1	+.125" –.125" (+3.175 –3.175mm)
l_2	+.008" –.008" (+.203 –.203mm)



TECH PAGES 322-325

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



Tool prep, Coating inspection

† *Metric equivalents are for reference only*

TOLERANCES

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

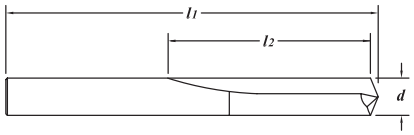
Series 1500

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



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
Shank tolerance: h6
Hardlube Coating - 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
Schaft-Toleranz: h6
Hardlube Beschichtung - 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
Tolerancia del vástago: h6
Recubrimiento de Hardlube - Página 59

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
Tolerance queue: h6
Revêtement Hardlube - Page 59

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
Tolleranza gambo: h6
Rivestimento in Hardlube - 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
柄部公差: h6
涂层 Hardlube - 59页

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

continued →

Series 1500 *(continued)*

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

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

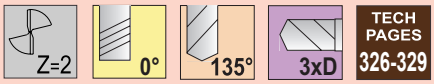
† *Metric equivalents are for reference only*

TOLERANCES

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

Series 1500H

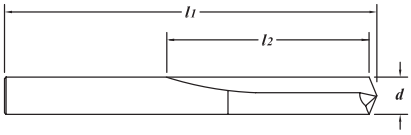
.0625" - .1660"
(1.588mm - 4.216mm)



TECH PAGES 326-329

Hard Metal - Hardlube Coated
Hartmetall - Hardlube-Beschichtet
Metal Duro - Recubrimiento de Hardlube
Métal Dur - Revêtement Hardlube
Metallo Duro - Rivestimento in Hardlube
硬金属 - Hardlube 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
Shank tolerance: h6
Uncoated - Page 57

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
Schaft-Toleranz: h6
Unbeschichtet - Seite 57

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
Tolerancia del vástago: h6
Sin recubrimiento - Página 57

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
Tolerance queue: h6
Non revêtu - Page 57

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
Tolleranza gambo: h6
Non rivestito - Pagina 57

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
柄部公差: h6
无涂层 - 57页

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

continued →

Series 1500H *(continued)*

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

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

† *Metric equivalents are for reference only*

TOLERANCES

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

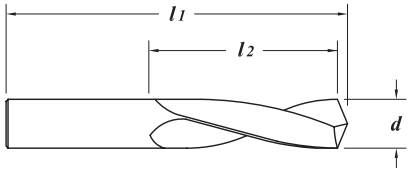
Series 1510

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



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
Shank tolerance: h6
Hardlube Coating - page 64

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
Schaft-Toleranz: h6
Hardlube-Beschichtet - Seite 64

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
Tolerancia del vástago: h6
Recubrimiento de Hardlube - Página 64

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
Tolerance queue: h6
Revêtement Hardlube - Page 64

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
Tolleranza gambo: h6
Rivestimento in Hardlube - Pagina 64

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
柄部公差: h6
Hardlube 涂层 - 64页

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

continued →

Series 1510 *(continued)*

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

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

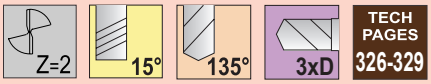
† *Metric equivalents are for reference only*

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

Series 1510H

NEW ITEMS

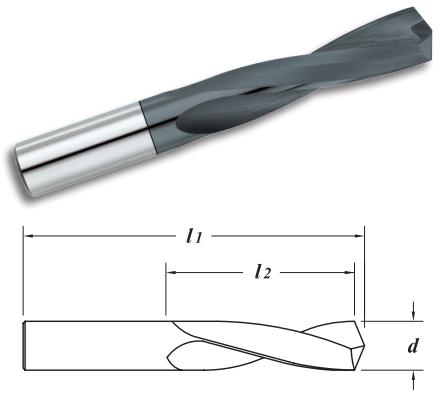
.0625" - .1575"
(1.588mm - 4.000mm)



TECH PAGES 326-329

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

Slow Helix - HARDLUBE Coated
Reduzierte Helix - HARDLUBE-Beschichtet
Hélice Lenta - Recubrimiento de HARDLUBE
Hélice Réduite - Revêtement HARDLUBE
Elica Dolce - Rivestimento in HARDLUBE
缓螺旋 - HARDLUBE 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
Shank tolerance: h6
Uncoated - page 61

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
Schaft-Toleranz: h6
Unbeschichtet - Seite 61

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
Tolerancia del vástago: h6
Sin recubrimiento - Página 61

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
Tolerance queue: h6
Sans revêtement - Page 61

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
Tolleranza gambo: h6
Non Rivestito - Pagina 61

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
柄部公差: h6
未涂层 - 61页

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

† *Metric equivalents are for reference only*

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

continued →

Series 1510H *(continued)*

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

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

† *Metric equivalents are for reference only*

TOLERANCES

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

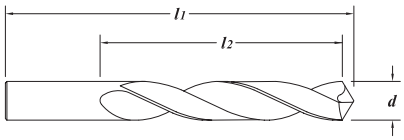
NEW ITEMS

Z=2 | 25° | 135° | 3xD | 5xD | TECH PAGES 322-325

Series 1520, 1205

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





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
Shank tolerance: h6
Hardlube Coating - page 73

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
Schaft-Toleranz: h6
Hardlube-Beschichtet - Seite 73

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
Tolerancia del vástago: h6
Recubrimiento de Hardlube - Página 73

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
Tolerance queue: h6
Revêtement Hardlube - Page 73

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
Tolleranza gambo: h6
Rivestimento in Hardlube - Pagina 73

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
柄部公差: h6
Hardlube 涂层 - 73页

3xD (1520) EDP#	5xD (1205) EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length
77165		.0625	1/16"	1.588	1-3/4"	5/8"
	89165	.0625	1/16"	1.588	1-3/4"	3/4"
77170		.0635	#52	1.613	1-3/4"	11/16"
	89170	.0635	#52	1.613	1-3/4"	3/4"
77175		.0670	#51	1.702	1-3/4"	11/16"
	89175	.0670	#51	1.702	1-3/4"	3/4"
77180		.0700	#50	1.778	1-3/4"	11/16"
	89180	.0700	#50	1.778	1-3/4"	7/8"
77185		.0730	#49	1.854	1-3/4"	11/16"
	89185	.0730	#49	1.854	1-3/4"	7/8"
77190		.0760	#48	1.930	1-3/4"	11/16"
	89190	.0760	#48	1.930	1-3/4"	7/8"
77195		.0781	5/64"	1.984	1-3/4"	11/16"
	89195	.0781	5/64"	1.984	1-3/4"	7/8"
77200		.0785	#47	1.994	1-3/4"	3/4"
	89200	.0785	#47	1.994	1-3/4"	7/8"
77205		.0787		2.000	44	19
	89205	.0787		2.000	44	22
77210		.0810	#46	2.057	1-3/4"	3/4"
	89210	.0810	#46	2.057	1-3/4"	7/8"
77215		.0820	#45	2.083	1-3/4"	3/4"
	89215	.0820	#45	2.083	1-3/4"	7/8"
77220		.0860	#44	2.184	1-3/4"	3/4"
	89220	.0860	#44	2.184	2"	1"
77225		.0890	#43	2.261	1-3/4"	3/4"
	89225	.0890	#43	2.261	2"	1"
77230		.0935	#42	2.375	1-3/4"	3/4"
	89230	.0935	#42	2.375	2"	1"
77235		.0938	3/32"	2.383	1-3/4"	3/4"
	89235	.0938	3/32"	2.383	2"	1"
77240		.0960	#41	2.438	1-13/16"	13/16"
	89240	.0960	#41	2.438	2"	1"
77245		.0980	#40	2.489	1-13/16"	13/16"
	89245	.0980	#40	2.489	2"	1"
77250		.0984		2.500	46	21
	89250	.0984		2.500	57	32
77255		.0995	#39	2.527	1-13/16"	13/16"
	89255	.0995	#39	2.527	2-1/4"	1-1/4"
77260		.1015	#38	2.578	1-13/16"	13/16"
	89260	.1015	#38	2.578	2-1/4"	1-1/4"

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
77265		.1040	#37	2.642	1-13/16"	13/16"
	89265	.1040	#37	2.642	2-1/4"	1-1/4"
77270		.1065	#36	2.705	1-13/16"	13/16"
	89270	.1065	#36	2.705	2-1/4"	1-1/4"
77275		.1094	7/64"	2.779	1-13/16"	13/16"
	89275	.1094	7/64"	2.779	2-1/4"	1-1/4"
77280		.1100	#35	2.794	1-7/8"	7/8"
	89280	.1100	#35	2.794	2-1/4"	1-1/4"
77285		.1110	#34	2.819	1-7/8"	7/8"
	89285	.1110	#34	2.819	2-1/4"	1-1/4"
77290		.1130	#33	2.870	1-7/8"	7/8"
	89290	.1130	#33	2.870	2-1/4"	1-1/4"
77295		.1160	#32	2.946	1-7/8"	7/8"
	89295	.1160	#32	2.946	2-1/4"	1-1/4"
77300		.1181		3.000	48	22
	89300	.1181		3.000	57	32
77305		.1200	#31	3.048	1-7/8"	7/8"
	89305	.1200	#31	3.048	2-1/4"	1-1/4"
77310		.1250	1/8"	3.175	1-7/8"	7/8"
	89310	.1250	1/8"	3.175	2-1/4"	1-1/4"
77315		.1285	#30	3.264	1-15/16"	15/16"
	89315	.1285	#30	3.264	2-1/4"	1-1/4"
77320		.1360	#29	3.454	1-15/16"	15/16"
	89320	.1360	#29	3.454	2-1/2"	1-3/8"
77325		.1378		3.500	49	24
	89325	.1378		3.500	63	35
77330		.1405	#28	3.569	1-15/16"	15/16"
	89330	.1405	#28	3.569	2-1/2"	1-3/8"
77335		.1406	9/64"	3.571	1-15/16"	15/16"
	89335	.1406	9/64"	3.571	2-1/2"	1-3/8"
77340		.1440	#27	3.658	2-1/16"	1"
	89340	.1440	#27	3.658	2-1/2"	1-3/8"
77345		.1470	#26	3.734	2-1/16"	1"
	89345	.1470	#26	3.734	2-1/2"	1-3/8"
77350		.1495	#25	3.797	2-1/16"	1"
	89350	.1495	#25	3.797	2-1/2"	1-3/8"
77355		.1520	#24	3.861	2-1/16"	1"
	89355	.1520	#24	3.861	2-1/2"	1-3/8"
77360		.1540	#23	3.912	2-1/16"	1"
	89360	.1540	#23	3.912	2-1/2"	1-3/8"
77365		.1562	5/32"	3.967	2-1/16"	1"
	89365	.1562	5/32"	3.967	2-1/2"	1-3/8"
77370		.1570	#22	3.988	2-1/8"	1-1/16"
	89370	.1570	#22	3.988	2-1/2"	1-3/8"
77375		.1575		4.000	54	27
	89375	.1575		4.000	63	35
77380		.1590	#21	4.039	2-1/8"	1-1/16"
	89380	.1590	#21	4.039	2-1/2"	1-3/8"
77385		.1610	#20	4.089	2-1/8"	1-1/16"
	89385	.1610	#20	4.089	2-1/2"	1-3/8"
77390		.1660	#19	4.216	2-1/8"	1-1/16"
	89390	.1660	#19	4.216	2-3/4"	1-5/8"
77395		.1695	#18	4.305	2-1/8"	1-1/16"
	89395	.1695	#18	4.305	2-3/4"	1-5/8"
77400		.1719	11/64"	4.366	2-1/8"	1-1/16"
	89400	.1719	11/64"	4.366	2-3/4"	1-5/8"

† *Metric equivalents are for reference only*

3xD (1520) EDP#	5xD (1205) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length
77405		.1730	#17	4.394	2-3/16"	1-1/8"
	89405	.1730	#17	4.394	2-3/4"	1-5/8"
77410		.1770	#16	4.496	2-3/16"	1-1/8"
	89410	.1770	#16	4.496	2-3/4"	1-5/8"
77415		.1772		4.500	56	29
	89415	.1772		4.500	70	41
77420		.1800	#15	4.572	2-3/16"	1-1/8"
	89420	.1800	#15	4.572	2-3/4"	1-5/8"
77425		.1820	#14	4.623	2-3/16"	1-1/8"
	89425	.1820	#14	4.623	2-3/4"	1-5/8"
77430		.1850	#13	4.700	2-3/16"	1-1/8"
	89430	.1850	#13	4.700	2-3/4"	1-5/8"
77435		.1875	3/16"	4.763	2-3/16"	1-1/8"
	89435	.1875	3/16"	4.763	2-3/4"	1-5/8"
77440		.1890	#12	4.801	2-1/4"	1-3/16"
	89440	.1890	#12	4.801	2-3/4"	1-5/8"
77445		.1910	#11	4.851	2-1/4"	1-3/16"
	89445	.1910	#11	4.851	2-3/4"	1-5/8"
77450		.1935	#10	4.915	2-1/4"	1-3/16"
	89450	.1935	#10	4.915	2-3/4"	1-5/8"
77455		.1960	#9	4.978	2-1/4"	1-3/16"
	89455	.1960	#9	4.978	3"	1-3/4"
77460		.1969		5.000	57	30
	89460	.1969		5.000	76	44
77465		.1990	#8	5.055	2-1/4"	1-3/16"
	89465	.1990	#8	5.055	3"	1-3/4"
77470		.2010	#7	5.105	2-1/4"	1-3/16"
	89470	.2010	#7	5.105	3"	1-3/4"
77475		.2031	13/64"	5.159	2-1/4"	1-3/16"
	89475	.2031	13/64"	5.159	3"	1-3/4"
77480		.2040	#6	5.182	2-3/8"	1-1/4"
	89480	.2040	#6	5.182	3"	1-3/4"
77485		.2055	#5	5.220	2-3/8"	1-1/4"
	89485	.2055	#5	5.220	3"	1-3/4"
77490		.2090	#4	5.309	2-3/8"	1-1/4"
	89490	.2090	#4	5.309	3"	1-3/4"
77495		.2130	#3	5.410	2-3/8"	1-1/4"
	89495	.2130	#3	5.410	3"	1-3/4"
77500		.2165		5.500	60	32
	89500	.2165		5.500	76	44
77505		.2188	7/32"	5.558	2-3/8"	1-1/4"
	89505	.2188	7/32"	5.558	3"	1-3/4"
77510		.2210	#2	5.613	2-7/16"	1-5/16"
	89510	.2210	#2	5.613	3"	1-3/4"
77515		.2280	#1	5.791	2-7/16"	1-5/16"
	89515	.2280	#1	5.791	3"	1-3/4"
77520		.2340	A	5.944	2-7/16"	1-5/16"
	89520	.2340	A	5.944	3-1/4"	2"
77525		.2344	15/64"	5.954	2-7/16"	1-5/16"
	89525	.2344	15/64"	5.954	3-1/4"	2"
77530		.2362		6.000	64	35
	89530	.2362		6.000	82	50
77535		.2380	B	6.045	2-1/2"	1-3/8"
	89535	.2380	B	6.045	3-1/4"	2"
77540		.2420	C	6.147	2-1/2"	1-3/8"
	89540	.2420	C	6.147	3-1/4"	2"

continued →

Series 1520, 1205 *(continued)*

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

3xD (1520) EDP#	5xD (1205) EDP#	*d* † Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length
77545		.2460	D	6.248	2-1/2"	1-3/8"
	89545	.2460	D	6.248	3-1/4"	2"
77550		.2500	1/4" / E	6.350	2-1/2"	1-3/8"
	89550	.2500	1/4" / E	6.350	3-1/4"	2"
77555		.2559		6.500	67	37
	89555	.2559		6.500	82	50
77560		.2570	F	6.528	2-5/8"	1-7/16"
	89560	.2570	F	6.528	3-1/4"	2"
77565		.2610	G	6.629	2-5/8"	1-7/16"
	89565	.2610	G	6.629	3-1/2"	2-1/8"
77570		.2656	17/64"	6.746	2-5/8"	1-7/16"
	89570	.2656	17/64"	6.746	3-1/2"	2-1/8"
77575		.2660	H	6.756	2-11/16"	1-1/2"
	89575	.2660	H	6.756	3-1/2"	2-1/8"
77580		.2720	I	6.909	2-11/16"	1-1/2"
	89580	.2720	I	6.909	3-1/2"	2-1/8"
77585		.2756		7.000	68	38
	89585	.2756		7.000	88	54
77590		.2770	J	7.036	2-11/16"	1-1/2"
	89590	.2770	J	7.036	3-1/2"	2-1/8"
77595		.2810	K	7.137	2-11/16"	1-1/2"
	89595	.2810	K	7.137	3-1/2"	2-1/8"
77600		.2812	9/32"	7.142	2-11/16"	1-1/2"
	89600	.2812	9/32"	7.142	3-1/2"	2-1/8"
77605		.2900	L	7.366	2-3/4"	1-9/16"
	89605	.2900	L	7.366	3-1/2"	2-1/8"
77610		.2950	M	7.493	2-3/4"	1-9/16"
	89610	.2950	M	7.493	3-3/4"	2-3/8"
77615		.2953		7.500	70	40
	89615	.2953		7.500	95	60
77620		.2969	19/64"	7.541	2-3/4"	1-9/16"
	89620	.2969	19/64"	7.541	3-3/4"	2-3/8"
77625		.3020	N	7.671	2-15/16"	1-5/8"
	89625	.3020	N	7.671	3-3/4"	2-3/8"
77630		.3125	5/16"	7.938	2-15/16"	1-5/8"
	89630	.3125	5/16"	7.938	3-3/4"	2-3/8"
77635		.3150		8.000	75	43
	89635	.3150		8.000	95	60
77640		.3160	O	8.026	2-15/16"	1-11/16"
	89640	.3160	O	8.026	3-3/4"	2-3/8"
77645		.3230	P	8.204	2-15/16"	1-11/16"
	89645	.3230	P	8.204	3-3/4"	2-3/8"
77650		.3281	21/64"	8.334	2-15/16"	1-11/16"
	89650	.3281	21/64"	8.334	4"	2-1/2"
77655		.3320	Q	8.433	3"	1-11/16"
	89655	.3320	Q	8.433	4"	2-1/2"
77660		.3346		8.500	76	43
	89660	.3346		8.500	101	63
77665		.3390	R	8.611	3"	1-11/16"
	89665	.3390	R	8.611	4"	2-1/2"
77670		.3438	11/32"	8.733	3"	1-11/16"
	89670	.3438	11/32"	8.733	4"	2-1/2"
77675		.3480	S	8.839	3-1/16"	1-3/4"
	89675	.3480	S	8.839	4"	2-1/2"
77680		.3543		9.000	78	44
	89680	.3543		9.000	101	63

† *Metric equivalents are for reference only*

3xD (1520) EDP#	5xD (1205) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length
77685		.3580	T	9.093	3-1/16"	1-3/4"
	89685	.3580	T	9.093	4-1/4"	2-3/4"
77690		.3594	23/64"	9.129	3-1/16"	1-3/4"
	89690	.3594	23/64"	9.129	4-1/4"	2-3/4"
77695		.3680	U	9.347	3-1/8"	1-13/16"
	89695	.3680	U	9.347	4-1/4"	2-3/4"
77700		.3740		9.500	79	46
	89700	.3740		9.500	107	70
77705		.3750	3/8"	9.525	3-1/8"	1-13/16"
	89705	.3750	3/8"	9.525	4-1/4"	2-3/4"
77710		.3770	V	9.576	3-1/4"	1-7/8"
	89710	.3770	V	9.576	4-1/4"	2-3/4"
77715		.3860	W	9.804	3-1/4"	1-7/8"
	89715	.3860	W	9.804	4-1/2"	2-7/8"
77720		.3906	25/64"	9.921	3-1/4"	1-7/8"
	89720	.3906	25/64"	9.921	4-1/2"	2-7/8"
77725		.3937		10.000	84	49
	89725	.3937		10.000	114	73
77730		.3970	X	10.084	3-5/16"	1-15/16"
	89730	.3970	X	10.084	4-1/2"	2-7/8"
	89735	.4040	Y	10.262	4-1/2"	2-7/8"
77740		.4062	13/32"	10.317	3-5/16"	1-15/16"
	89740	.4062	13/32"	10.317	4-1/2"	2-7/8"
77745		.4130	Z	10.490	3-3/8"	2"
	89745	.4130	Z	10.490	4-1/2"	2-7/8"
77750		.4134		10.500	86	51
	89750	.4134		10.500	114	73
77755		.4219	27/64"	10.716	3-3/8"	2"
	89755	.4219	27/64"	10.716	4-1/2"	2-7/8"
77760		.4331		11.000	87	52
	89760	.4331		11.000	114	73
77765		.4375	7/16"	11.113	3-7/16"	2-1/16"
	89765	.4375	7/16"	11.113	4-1/2"	2-7/8"
77770		.4528		11.500	91	54
	89770	.4528		11.500	120	76
77775		.4531	29/64"	11.509	3-9/16"	2-1/8"
	89775	.4531	29/64"	11.509	4-3/4"	3"
77780		.4688	15/32"	11.908	3-5/8"	2-1/8"
	89780	.4688	15/32"	11.908	4-3/4"	3"
77785		.4724		12.000	94	56
	89785	.4724		12.000	120	76
77790		.4844	31/64"	12.304	3-11/16"	2-3/16"
	89790	.4844	31/64"	12.304	4-3/4"	3"
77795		.4921		12.500	95	56
	89795	.4921		12.500	120	76
77800		.5000	1/2"	12.700	3-3/4"	2-1/4"
	89800	.5000	1/2"	12.700	4-3/4"	3"
77805		.5118		13.000	107	60
	89805	.5118		13.000	127	83
77810		.5156	33/64"	13.096	4-1/4"	2-3/8"
	89810	.5156	33/64"	13.096	5"	3-1/4"
77815		.5312	17/32"	13.492	4-1/4"	2-3/8"
	89815	.5312	17/32"	13.492	5"	3-1/4"
77820		.5315		13.500	107	60
	89820	.5315		13.500	127	83

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
NEW	77825		.5469	35/64"	13.891	4-1/4"	2-3/8"
		89825	.5469	35/64"	13.891	5"	3-1/4"
NEW	77830		.5512		14.000	107	60
		89830	.5512		14.000	127	83
NEW	77835		.5625	9/16"	14.287	4-1/2"	2-1/2"
		89835	.5625	9/16"	14.287	5"	3-1/4"
NEW	77840		.5709		14.500	115	65
		89840	.5709		14.500	127	83
NEW	77845		.5781	37/64"	14.683	4-1/2"	2-1/2"
		89845	.5781	37/64"	14.683	5-1/4"	3-1/2"
NEW	77850		.5906		15.000	115	65
		89850	.5906		15.000	133	89
NEW	77855		.5938	19/32"	15.082	4-1/2"	2-1/2"
		89855	.5938	19/32"	15.082	5-1/4"	3-1/2"
NEW	77860		.6094	39/64"	15.478	4-1/2"	2-1/2"
		89860	.6094	39/64"	15.478	5-1/4"	3-1/2"
NEW	77865		.6102		15.500	115	65
		89865	.6102		15.500	133	89
NEW	77870		.6250	5/8"	15.875	4-1/2"	2-1/2"
		89870	.6250	5/8"	15.875	5-1/4"	3-1/2"
NEW	77875		.6299		16.000	115	65
		89875	.6299		16.000	133	89



Drill and Reamer Manufacturing

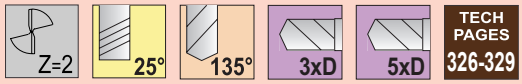
† *Metric equivalents are for reference only*

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

NEW ITEMS

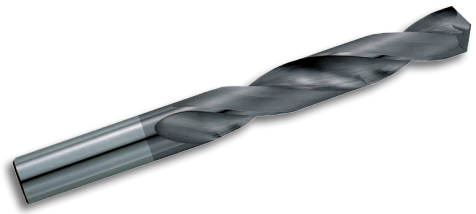
Series 1520H, 1205H

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



TECH PAGES 326-329

HARDLUBE Coated
HARDLUBE-Beschichtet
Recubrimiento de HARDLUBE
Revêtement HARDLUBE
Rivestimento in HARDLUBE
HARDLUBE 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
Shank tolerance: h6
Uncoated - page 67

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
Schaft-Toleranz: h6
Unbeschichtet - Seite 67

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
Tolerancia del vástago: h6
Sin recubrimiento - Página 67

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
Tolerance queue: h6
Sans revêtement - Page 67

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
Tolleranza gambo: h6
Non Rivestito - Pagina 67

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
柄部公差: h6
未涂层 - 677页

3xD (1520H) EDP#	5xD (1205H) EDP#	*d* † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length
77166		.0625	1/16"	1.588	1-3/4"	5/8"
	89166	.0625	1/16"	1.588	1-3/4"	3/4"
77171		.0635	#52	1.613	1-3/4"	11/16"
	89171	.0635	#52	1.613	1-3/4"	3/4"
77176		.0670	#51	1.702	1-3/4"	11/16"
	89176	.0670	#51	1.702	1-3/4"	3/4"
77181		.0700	#50	1.778	1-3/4"	11/16"
	89181	.0700	#50	1.778	1-3/4"	7/8"
77186		.0730	#49	1.854	1-3/4"	11/16"
	89186	.0730	#49	1.854	1-3/4"	7/8"
77191		.0760	#48	1.930	1-3/4"	11/16"
	89191	.0760	#48	1.930	1-3/4"	7/8"
77196		.0781	5/64"	1.984	1-3/4"	11/16"
	89196	.0781	5/64"	1.984	1-3/4"	7/8"
77201		.0785	#47	1.994	1-3/4"	3/4"
	89201	.0785	#47	1.994	1-3/4"	7/8"
77206		.0787		2.000	44	19
	89206	.0787		2.000	44	22
77211		.0810	#46	2.057	1-3/4"	3/4"
	89211	.0810	#46	2.057	1-3/4"	7/8"
77216		.0820	#45	2.083	1-3/4"	3/4"
	89216	.0820	#45	2.083	1-3/4"	7/8"
77221		.0860	#44	2.184	1-3/4"	3/4"
	89221	.0860	#44	2.184	2"	1"
77226		.0890	#43	2.261	1-3/4"	3/4"
	89226	.0890	#43	2.261	2"	1"
77231		.0935	#42	2.375	1-3/4"	3/4"
	89231	.0935	#42	2.375	2"	1"
77236		.0938	3/32"	2.383	1-3/4"	3/4"
	89236	.0938	3/32"	2.383	2"	1"
77241		.0960	#41	2.438	1-13/16"	13/16"
	89241	.0960	#41	2.438	2"	1"
77246		.0980	#40	2.489	1-13/16"	13/16"
	89246	.0980	#40	2.489	2"	1"
77251		.0984		2.500	46	21
	89251	.0984		2.500	57	32
77256		.0995	#39	2.527	1-13/16"	13/16"
	89256	.0995	#39	2.527	2-1/4"	1-1/4"
77261		.1015	#38	2.578	1-13/16"	13/16"
	89261	.1015	#38	2.578	2-1/4"	1-1/4"

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
77266		.1040	#37	2.642	1-13/16"	13/16"
	89266	.1040	#37	2.642	2-1/4"	1-1/4"
77271		.1065	#36	2.705	1-13/16"	13/16"
	89271	.1065	#36	2.705	2-1/4"	1-1/4"
77276		.1094	7/64"	2.779	1-13/16"	13/16"
	89276	.1094	7/64"	2.779	2-1/4"	1-1/4"
77281		.1100	#35	2.794	1-7/8"	7/8"
	89281	.1100	#35	2.794	2-1/4"	1-1/4"
77286		.1110	#34	2.819	1-7/8"	7/8"
	89286	.1110	#34	2.819	2-1/4"	1-1/4"
77291		.1130	#33	2.870	1-7/8"	7/8"
	89291	.1130	#33	2.870	2-1/4"	1-1/4"
77296		.1160	#32	2.946	1-7/8"	7/8"
	89296	.1160	#32	2.946	2-1/4"	1-1/4"
77301		.1181		3.000	48	22
	89301	.1181		3.000	57	32
77306		.1200	#31	3.048	1-7/8"	7/8"
	89306	.1200	#31	3.048	2-1/4"	1-1/4"
77311		.1250	1/8"	3.175	1-7/8"	7/8"
	89311	.1250	1/8"	3.175	2-1/4"	1-1/4"
77316		.1285	#30	3.264	1-15/16"	15/16"
	89316	.1285	#30	3.264	2-1/4"	1-1/4"
77321		.1360	#29	3.454	1-15/16"	15/16"
	89321	.1360	#29	3.454	2-1/2"	1-3/8"
77326		.1378		3.500	49	24
	89326	.1378		3.500	63	35
77331		.1405	#28	3.569	1-15/16"	15/16"
	89331	.1405	#28	3.569	2-1/2"	1-3/8"
77336		.1406	9/64"	3.571	1-15/16"	15/16"
	89336	.1406	9/64"	3.571	2-1/2"	1-3/8"
77341		.1440	#27	3.658	2-1/16"	1"
	89341	.1440	#27	3.658	2-1/2"	1-3/8"
77346		.1470	#26	3.734	2-1/16"	1"
	89346	.1470	#26	3.734	2-1/2"	1-3/8"
77351		.1495	#25	3.797	2-1/16"	1"
	89351	.1495	#25	3.797	2-1/2"	1-3/8"
77356		.1520	#24	3.861	2-1/16"	1"
	89356	.1520	#24	3.861	2-1/2"	1-3/8"
77361		.1540	#23	3.912	2-1/16"	1"
	89361	.1540	#23	3.912	2-1/2"	1-3/8"
77366		.1562	5/32"	3.967	2-1/16"	1"
	89366	.1562	5/32"	3.967	2-1/2"	1-3/8"
77371		.1570	#22	3.988	2-1/8"	1-1/16"
	89371	.1570	#22	3.988	2-1/2"	1-3/8"
77376		.1575		4.000	54	27
	89376	.1575		4.000	63	35
77381		.1590	#21	4.039	2-1/8"	1-1/16"
	89381	.1590	#21	4.039	2-1/2"	1-3/8"
77386		.1610	#20	4.089	2-1/8"	1-1/16"
	89386	.1610	#20	4.089	2-1/2"	1-3/8"
77391		.1660	#19	4.216	2-1/8"	1-1/16"
	89391	.1660	#19	4.216	2-3/4"	1-5/8"
77396		.1695	#18	4.305	2-1/8"	1-1/16"
	89396	.1695	#18	4.305	2-3/4"	1-5/8"
77401		.1719	11/64"	4.366	2-1/8"	1-1/16"
	89401	.1719	11/64"	4.366	2-3/4"	1-5/8"

† *Metric equivalents are for reference only*

3xD (1520H) EDP#	5xD (1205H) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length
77406		.1730	#17	4.394	2-3/16"	1-1/8"
	89406	.1730	#17	4.394	2-3/4"	1-5/8"
77411		.1770	#16	4.496	2-3/16"	1-1/8"
	89411	.1770	#16	4.496	2-3/4"	1-5/8"
77416		.1772		4.500	56	29
	89416	.1772		4.500	70	41
77421		.1800	#15	4.572	2-3/16"	1-1/8"
	89421	.1800	#15	4.572	2-3/4"	1-5/8"
77426		.1820	#14	4.623	2-3/16"	1-1/8"
	89426	.1820	#14	4.623	2-3/4"	1-5/8"
77431		.1850	#13	4.700	2-3/16"	1-1/8"
	89431	.1850	#13	4.700	2-3/4"	1-5/8"
77436		.1875	3/16"	4.763	2-3/16"	1-1/8"
	89436	.1875	3/16"	4.763	2-3/4"	1-5/8"
77441		.1890	#12	4.801	2-1/4"	1-3/16"
	89441	.1890	#12	4.801	2-3/4"	1-5/8"
77446		.1910	#11	4.851	2-1/4"	1-3/16"
	89446	.1910	#11	4.851	2-3/4"	1-5/8"
77451		.1935	#10	4.915	2-1/4"	1-3/16"
	89451	.1935	#10	4.915	2-3/4"	1-5/8"
77456		.1960	#9	4.978	2-1/4"	1-3/16"
	89456	.1960	#9	4.978	3"	1-3/4"
77461		.1969		5.000	57	30
	89461	.1969		5.000	76	44
77466		.1990	#8	5.055	2-1/4"	1-3/16"
	89466	.1990	#8	5.055	3"	1-3/4"
77471		.2010	#7	5.105	2-1/4"	1-3/16"
	89471	.2010	#7	5.105	3"	1-3/4"
77476		.2031	13/64"	5.159	2-1/4"	1-3/16"
	89476	.2031	13/64"	5.159	3"	1-3/4"
77481		.2040	#6	5.182	2-3/8"	1-1/4"
	89481	.2040	#6	5.182	3"	1-3/4"
77486		.2055	#5	5.220	2-3/8"	1-1/4"
	89486	.2055	#5	5.220	3"	1-3/4"
77491		.2090	#4	5.309	2-3/8"	1-1/4"
	89491	.2090	#4	5.309	3"	1-3/4"
77496		.2130	#3	5.410	2-3/8"	1-1/4"
	89496	.2130	#3	5.410	3"	1-3/4"
77501		.2165		5.500	60	32
	89501	.2165		5.500	76	44
77506		.2188	7/32"	5.558	2-3/8"	1-1/4"
	89506	.2188	7/32"	5.558	3"	1-3/4"
77511		.2210	#2	5.613	2-7/16"	1-5/16"
	89511	.2210	#2	5.613	3"	1-3/4"
77516		.2280	#1	5.791	2-7/16"	1-5/16"
	89516	.2280	#1	5.791	3"	1-3/4"
77521		.2340	A	5.944	2-7/16"	1-5/16"
	89521	.2340	A	5.944	3-1/4"	2"
77526		.2344	15/64"	5.954	2-7/16"	1-5/16"
	89526	.2344	15/64"	5.954	3-1/4"	2"
77531		.2362		6.000	64	35
	89531	.2362		6.000	82	50
77536		.2380	B	6.045	2-1/2"	1-3/8"
	89536	.2380	B	6.045	3-1/4"	2"
77541		.2420	C	6.147	2-1/2"	1-3/8"
	89541	.2420	C	6.147	3-1/4"	2"

continued →

Series 1520H, 1205H *(continued)*

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

3xD (1520H) EDP#	5xD (1205H) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length
77546		.2460	D	6.248	2-1/2"	1-3/8"
	89546	.2460	D	6.248	3-1/4"	2"
77551		.2500	1/4" / E	6.350	2-1/2"	1-3/8"
	89551	.2500	1/4" / E	6.350	3-1/4"	2"
77556		.2559		6.500	67	37
	89556	.2559		6.500	82	50
77561		.2570	F	6.528	2-5/8"	1-7/16"
	89561	.2570	F	6.528	3-1/4"	2"
77566		.2610	G	6.629	2-5/8"	1-7/16"
	89566	.2610	G	6.629	3-1/2"	2-1/8"
77571		.2656	17/64"	6.746	2-5/8"	1-7/16"
	89571	.2656	17/64"	6.746	3-1/2"	2-1/8"
77576		.2660	H	6.756	2-11/16"	1-1/2"
	89576	.2660	H	6.756	3-1/2"	2-1/8"
77581		.2720	I	6.909	2-11/16"	1-1/2"
	89581	.2720	I	6.909	3-1/2"	2-1/8"
77586		.2756		7.000	68	38
	89586	.2756		7.000	88	54
77591		.2770	J	7.036	2-11/16"	1-1/2"
	89591	.2770	J	7.036	3-1/2"	2-1/8"
77596		.2810	K	7.137	2-11/16"	1-1/2"
	89596	.2810	K	7.137	3-1/2"	2-1/8"
77601		.2812	9/32"	7.142	2-11/16"	1-1/2"
	89601	.2812	9/32"	7.142	3-1/2"	2-1/8"
77606		.2900	L	7.366	2-3/4"	1-9/16"
	89606	.2900	L	7.366	3-1/2"	2-1/8"
77611		.2950	M	7.493	2-3/4"	1-9/16"
	89611	.2950	M	7.493	3-3/4"	2-3/8"
77616		.2953		7.500	70	40
	89616	.2953		7.500	95	60
77621		.2969	19/64"	7.541	2-3/4"	1-9/16"
	89621	.2969	19/64"	7.541	3-3/4"	2-3/8"
77626		.3020	N	7.671	2-15/16"	1-5/8"
	89626	.3020	N	7.671	3-3/4"	2-3/8"
77631		.3125	5/16"	7.938	2-15/16"	1-5/8"
	89631	.3125	5/16"	7.938	3-3/4"	2-3/8"
77636		.3150		8.000	75	43
	89636	.3150		8.000	95	60
77641		.3160	O	8.026	2-15/16"	1-11/16"
	89641	.3160	O	8.026	3-3/4"	2-3/8"
77646		.3230	P	8.204	2-15/16"	1-11/16"
	89646	.3230	P	8.204	3-3/4"	2-3/8"
77651		.3281	21/64"	8.334	2-15/16"	1-11/16"
	89651	.3281	21/64"	8.334	4"	2-1/2"
77656		.3320	Q	8.433	3"	1-11/16"
	89656	.3320	Q	8.433	4"	2-1/2"
77661		.3346		8.500	76	43
	89661	.3346		8.500	101	63
77666		.3390	R	8.611	3"	1-11/16"
	89666	.3390	R	8.611	4"	2-1/2"
77671		.3438	11/32"	8.733	3"	1-11/16"
	89671	.3438	11/32"	8.733	4"	2-1/2"
77676		.3480	S	8.839	3-1/16"	1-3/4"
	89676	.3480	S	8.839	4"	2-1/2"
77681		.3543		9.000	78	44
	89681	.3543		9.000	101	63

† *Metric equivalents are for reference only*

3xD (1520H) EDP#	5xD (1205H) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length
77686		.3580	T	9.093	3-1/16"	1-3/4"
	89686	.3580	T	9.093	4-1/4"	2-3/4"
77691		.3594	23/64"	9.129	3-1/16"	1-3/4"
	89691	.3594	23/64"	9.129	4-1/4"	2-3/4"
77696		.3680	U	9.347	3-1/8"	1-13/16"
	89696	.3680	U	9.347	4-1/4"	2-3/4"
77701		.3740		9.500	79	46
	89701	.3740		9.500	107	70
77706		.3750	3/8"	9.525	3-1/8"	1-13/16"
	89706	.3750	3/8"	9.525	4-1/4"	2-3/4"
77711		.3770	V	9.576	3-1/4"	1-7/8"
	89711	.3770	V	9.576	4-1/4"	2-3/4"
77716		.3860	W	9.804	3-1/4"	1-7/8"
	89716	.3860	W	9.804	4-1/2"	2-7/8"
77721		.3906	25/64"	9.921	3-1/4"	1-7/8"
	89721	.3906	25/64"	9.921	4-1/2"	2-7/8"
77726		.3937		10.000	84	49
	89726	.3937		10.000	114	73
77731		.3970	X	10.084	3-5/16"	1-15/16"
	89731	.3970	X	10.084	4-1/2"	2-7/8"
77736		.4040	Y	10.262	3-5/16"	1-15/16"
	89736	.4040	Y	10.262	4-1/2"	2-7/8"
77741		.4062	13/32"	10.317	3-5/16"	1-15/16"
	89741	.4062	13/32"	10.317	4-1/2"	2-7/8"
77746		.4130	Z	10.490	3-3/8"	2"
	89746	.4130	Z	10.490	4-1/2"	2-7/8"
77751		.4134		10.500	86	51
	89751	.4134		10.500	114	73
77756		.4219	27/64"	10.716	3-3/8"	2"
	89756	.4219	27/64"	10.716	4-1/2"	2-7/8"
77761		.4331		11.000	87	52
	89761	.4331		11.000	114	73
77766		.4375	7/16"	11.113	3-7/16"	2-1/16"
	89766	.4375	7/16"	11.113	4-1/2"	2-7/8"
77771		.4528		11.500	91	54
	89771	.4528		11.500	120	76
77776		.4531	29/64"	11.509	3-9/16"	2-1/8"
	89776	.4531	29/64"	11.509	4-3/4"	3"
77781		.4688	15/32"	11.908	3-5/8"	2-1/8"
	89781	.4688	15/32"	11.908	4-3/4"	3"
77786		.4724		12.000	94	56
	89786	.4724		12.000	120	76
77791		.4844	31/64"	12.304	3-11/16"	2-3/16"
	89791	.4844	31/64"	12.304	4-3/4"	3"
77796		.4921		12.500	95	56
	89796	.4921		12.500	120	76
77801		.5000	1/2"	12.700	3-3/4"	2-1/4"
	89801	.5000	1/2"	12.700	4-3/4"	3"
77806		.5118		13.000	107	60
	89806	.5118		13.000	127	83
77811		.5156	33/64"	13.096	4-1/4"	2-3/8"
	89811	.5156	33/64"	13.096	5"	3-1/4"
77816		.5312	17/32"	13.492	4-1/4"	2-3/8"
	89816	.5312	17/32"	13.492	5"	3-1/4"
77821		.5315		13.500	107	60
	89821	.5315		13.500	127	83

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
NEW	77826		.5469	35/64"	13.891	4-1/4"	2-3/8"
		89826	.5469	35/64"	13.891	5"	3-1/4"
NEW	77831		.5512		14.000	107	60
		89831	.5512		14.000	127	83
NEW	77836		.5625	9/16"	14.287	4-1/2"	2-1/2"
		89836	.5625	9/16"	14.287	5"	3-1/4"
NEW	77841		.5709		14.500	115	65
		89841	.5709		14.500	127	83
NEW	77846		.5781	37/64"	14.683	4-1/2"	2-1/2"
		89846	.5781	37/64"	14.683	5-1/4"	3-1/2"
NEW	77851		.5906		15.000	115	65
		89851	.5906		15.000	133	89
NEW	77856		.5938	19/32"	15.082	4-1/2"	2-1/2"
		89856	.5938	19/32"	15.082	5-1/4"	3-1/2"
NEW	77861		.6094	39/64"	15.478	4-1/2"	2-1/2"
		89861	.6094	39/64"	15.478	5-1/4"	3-1/2"
NEW	77866		.6102		15.500	115	65
		89866	.6102		15.500	133	89
NEW	77871		.6250	5/8"	15.875	4-1/2"	2-1/2"
		89871	.6250	5/8"	15.875	5-1/4"	3-1/2"
NEW	77876		.6299		16.000	115	65
		89876	.6299		16.000	133	89



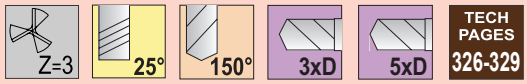
† *Metric equivalents are for reference only*

Series 1120H, 1100H

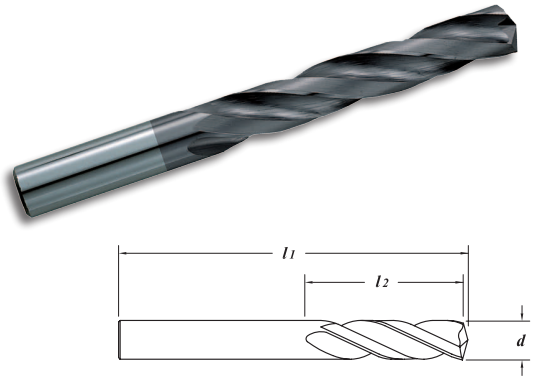
.1094" - .1575"
(2.779mm - 4.000mm)

TOLERANCES

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



HARDLUBE Coated
HARDLUBE-Beschichtet
Recubrimiento de HARDLUBE
Revêtement HARDLUBE
Rivestimento in HARDLUBE
HARDLUBE 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
Shank tolerance: h6
Uncoated - page 88

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
Schaft-Toleranz: h6
Unbeschichtet - Seite 88

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
Tolerancia del vástago: h6
Sin recubrimiento - Página 88

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
Tolerance queue: h6
Sans revêtement - Page 88

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
Tolleranza gambo: h6
Non Rivestito - Pagina 88

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
柄部公差: h6
未涂层 - 88页

3xD (1120H) EDP#	5xD (1100H) EDP#	*d* † Diameter Decimal		Metric	l_1 Overall Length	l_2 Flute Length
78276		.1094	7/64"	2.779	1-13/16"	13/16"
	90276	.1094	7/64"	2.779	2-1/4"	1-1/4"
78281		.1100	#35	2.794	1-7/8"	7/8"
	90281	.1100	#35	2.794	2-1/4"	1-1/4"
78286		.1110	#34	2.819	1-7/8"	7/8"
78291		.1130	#33	2.870	1-7/8"	7/8"
	90291	.1130	#33	2.870	2-1/4"	1-1/4"
78296		.1160	#32	2.946	1-7/8"	7/8"
	90296	.1160	#32	2.946	2-1/4"	1-1/4"
78301		.1181		3.000	48	22
	90301	.1181		3.000	57	32
78306		.1200	#31	3.048	1-7/8"	7/8"
	90306	.1200	#31	3.048	2-1/4"	1-1/4"
78311		.1250	1/8"	3.175	1-7/8"	7/8"
	90311	.1250	1/8"	3.175	2-1/4"	1-1/4"
78316		.1285	#30	3.264	1-15/16"	15/16"
	90316	.1285	#30	3.264	2-1/4"	1-1/4"
78321		.1360	#29	3.454	1-15/16"	15/16"
	90321	.1360	#29	3.454	2-1/2"	1-3/8"
78326		.1378		3.500	49	24
	90326	.1378		3.500	63	35
78331		.1405	#28	3.569	1-15/16"	15/16"
	90331	.1405	#28	3.569	2-1/2"	1-3/8"
78336		.1406	9/64"	3.571	1-15/16"	15/16"
	90336	.1406	9/64"	3.571	2-1/2"	1-3/8"
78341		.1440	#27	3.658	2-1/16"	1"
	90341	.1440	#27	3.658	2-1/2"	1-3/8"
78346		.1470	#26	3.734	2-1/16"	1"
	90346	.1470	#26	3.734	2-1/2"	1-3/8"
78351		.1495	#25	3.797	2-1/16"	1"
	90351	.1495	#25	3.797	2-1/2"	1-3/8"
78356		.1520	#24	3.861	2-1/16"	1"
	90356	.1520	#24	3.861	2-1/2"	1-3/8"
78361		.1540	#23	3.912	2-1/16"	1"
	90361	.1540	#23	3.912	2-1/2"	1-3/8"
78366		.1562	5/32"	3.967	2-1/16"	1"
	90366	.1562	5/32"	3.967	2-1/2"	1-3/8"
78371		.1570	#22	3.988	2-1/8"	1-1/16"
	90371	.1570	#22	3.988	2-1/2"	1-3/8"
78376		.1575		4.000	54	27
	90376	.1575		4.000	63	35

continued →

Series 1120H, 1100H *(continued)*

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

3xD (1120H) EDP#	5xD (1100H) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length
78381		.1590	#21	4.039	2-1/8"	1-1/16"
	90381	.1590	#21	4.039	2-1/2"	1-3/8"
78386		.1610	#20	4.089	2-1/8"	1-1/16"
	90386	.1610	#20	4.089	2-1/2"	1-3/8"
78391		.1660	#19	4.216	2-1/8"	1-1/16"
	90391	.1660	#19	4.216	2-3/4"	1-5/8"
78396		.1695	#18	4.305	2-1/8"	1-1/16"
	90396	.1695	#18	4.305	2-3/4"	1-5/8"
78401		.1719	11/64"	4.366	2-1/8"	1-1/16"
	90401	.1719	11/64"	4.366	2-3/4"	1-5/8"
78406		.1730	#17	4.394	2-3/16"	1-1/8"
	90406	.1730	#17	4.394	2-3/4"	1-5/8"
78411		.1770	#16	4.496	2-3/16"	1-1/8"
	90411	.1770	#16	4.496	2-3/4"	1-5/8"
78416		.1772		4.500	56	29
	90416	.1772		4.500	70	41
78421		.1800	#15	4.572	2-3/16"	1-1/8"
	90421	.1800	#15	4.572	2-3/4"	1-5/8"
78426		.1820	#14	4.623	2-3/16"	1-1/8"
	90426	.1820	#14	4.623	2-3/4"	1-5/8"
78431		.1850	#13	4.700	2-3/16"	1-1/8"
	90431	.1850	#13	4.700	2-3/4"	1-5/8"
78436		.1875	3/16"	4.763	2-3/16"	1-1/8"
	90436	.1875	3/16"	4.763	2-3/4"	1-5/8"
78441		.1890	#12	4.801	2-1/4"	1-3/16"
	90441	.1890	#12	4.801	2-3/4"	1-5/8"
78446		.1910	#11	4.851	2-1/4"	1-3/16"
	90446	.1910	#11	4.851	2-3/4"	1-5/8"
78451		.1935	#10	4.915	2-1/4"	1-3/16"
	90451	.1935	#10	4.915	2-3/4"	1-5/8"
78456		.1960	#9	4.978	2-1/4"	1-3/16"
	90456	.1960	#9	4.978	3"	1-3/4"
78461		.1969		5.000	57	30
	90461	.1969		5.000	76	44
78466		.1990	#8	5.055	2-1/4"	1-3/16"
	90466	.1990	#8	5.055	3"	1-3/4"
78471		.2010	#7	5.105	2-1/4"	1-3/16"
	90471	.2010	#7	5.105	3"	1-3/4"
78476		.2031	13/64"	5.159	2-1/4"	1-3/16"
	90476	.2031	13/64"	5.159	3"	1-3/4"
	90481	.2040	#6	5.182	3"	1-3/4"
78486		.2055	#5	5.220	2-3/8"	1-1/4"
	90486	.2055	#5	5.220	3"	1-3/4"
78491		.2090	#4	5.309	2-3/8"	1-1/4"
	90491	.2090	#4	5.309	3"	1-3/4"
78496		.2130	#3	5.410	2-3/8"	1-1/4"
	90496	.2130	#3	5.410	3"	1-3/4"
78501		.2165		5.500	60	32
	90501	.2165		5.500	76	44
78506		.2188	7/32"	5.558	2-3/8"	1-1/4"
	90506	.2188	7/32"	5.558	3"	1-3/4"
78511		.2210	#2	5.613	2-7/16"	1-5/16"
	90511	.2210	#2	5.613	3"	1-3/4"
78516		.2280	#1	5.791	2-7/16"	1-5/16"
	90516	.2280	#1	5.791	3"	1-3/4"
78521		.2340	A	5.944	2-7/16"	1-5/16"
	90521	.2340	A	5.944	3-1/4"	2"
78526		.2344	15/64"	5.954	2-7/16"	1-5/16"
	90526	.2344	15/64"	5.954	3-1/4"	2"
78531		.2362		6.000	64	35
	90531	.2362		6.000	82	50

† *Metric equivalents are for reference only*

3xD (1120H) EDP#	5xD (1100H) EDP#	*d* † Diameter Decimal	Diameter	Metric	*l1* Overall Length	*l2* Flute Length
78536		.2380	B	6.045	2-1/2"	1-3/8"
	90536	.2380	B	6.045	3-1/4"	2"
78541		.2420	C	6.147	2-1/2"	1-3/8"
	90541	.2420	C	6.147	3-1/4"	2"
78546		.2460	D	6.248	2-1/2"	1-3/8"
	90546	.2460	D	6.248	3-1/4"	2"
78551		.2500	1/4" / E	6.350	2-1/2"	1-3/8"
	90551	.2500	1/4" / E	6.350	3-1/4"	2"
78556		.2559		6.500	67	37
	90556	.2559		6.500	82	50
78561		.2570	F	6.528	2-5/8"	1-7/16"
	90561	.2570	F	6.528	3-1/4"	2"
78566		.2610	G	6.629	2-5/8"	1-7/16"
	90566	.2610	G	6.629	3-1/2"	2-1/8"
78571		.2656	17/64"	6.746	2-5/8"	1-7/16"
	90571	.2656	17/64"	6.746	3-1/2"	2-1/8"
78576		.2660	H	6.756	2-11/16"	1-1/2"
	90576	.2660	H	6.756	3-1/2"	2-1/8"
78581		.2720	I	6.909	2-11/16"	1-1/2"
	90581	.2720	I	6.909	3-1/2"	2-1/8"
78586		.2756		7.000	68	38
	90586	.2756		7.000	88	54
78591		.2770	J	7.036	2-11/16"	1-1/2"
	90591	.2770	J	7.036	3-1/2"	2-1/8"
78596		.2810	K	7.137	2-11/16"	1-1/2"
	90596	.2810	K	7.137	3-1/2"	2-1/8"
78601		.2812	9/32"	7.142	2-11/16"	1-1/2"
	90601	.2812	9/32"	7.142	3-1/2"	2-1/8"
78606		.2900	L	7.366	2-3/4"	1-9/16"
	90606	.2900	L	7.366	3-1/2"	2-1/8"
78611		.2950	M	7.493	2-3/4"	1-9/16"
	90611	.2950	M	7.493	3-3/4"	2-3/8"
78616		.2953		7.500	70	40
	90616	.2953		7.500	95	60
78621		.2969	19/64"	7.541	2-3/4"	1-9/16"
	90621	.2969	19/64"	7.541	3-3/4"	2-3/8"
78626		.3020	N	7.671	2-15/16"	1-5/8"
	90626	.3020	N	7.671	3-3/4"	2-3/8"
78631		.3125	5/16"	7.938	2-15/16"	1-5/8"
	90631	.3125	5/16"	7.938	3-3/4"	2-3/8"
78636		.3150		8.000	75	43
	90636	.3150		8.000	95	60
78641		.3160	O	8.026	2-15/16"	1-11/16"
	90641	.3160	O	8.026	3-3/4"	2-3/8"
78646		.3230	P	8.204	2-15/16"	1-11/16"
	90646	.3230	P	8.204	3-3/4"	2-3/8"
78651		.3281	21/64"	8.334	2-15/16"	1-11/16"
	90651	.3281	21/64"	8.334	4"	2-1/2"
78656		.3320	Q	8.433	3"	1-11/16"
	90656	.3320	Q	8.433	4"	2-1/2"
78661		.3346		8.500	76	43
	90661	.3346		8.500	101	63
78666		.3390	R	8.611	3"	1-11/16"
	90666	.3390	R	8.611	4"	2-1/2"
78671		.3438	11/32"	8.733	3"	1-11/16"
	90671	.3438	11/32"	8.733	4"	2-1/2"
78676		.3480	S	8.839	3-1/16"	1-3/4"
	90676	.3480	S	8.839	4"	2-1/2"
78681		.3543		9.000	78	44
	90681	.3543		9.000	101	63

continued →

Series 1120H, 1100H *(continued)*

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

3xD (1120H) EDP#	5xD (1100H) EDP#	Decimal	*d* † Diameter	Metric	*l1* Overall Length	*l2* Flute Length
78686		.3580	T	9.093	3-1/16"	1-3/4"
78691		.3594	23/64"	9.129	3-1/16"	1-3/4"
	90691	.3594	23/64"	9.129	4-1/4"	2-3/4"
78696		.3680	U	9.347	3-1/8"	1-13/16"
	90696	.3680	U	9.347	4-1/4"	2-3/4"
78701		.3740		9.500	79	46
	90701	.3740		9.500	107	70
78706		.3750	3/8"	9.525	3-1/8"	1-13/16"
	90706	.3750	3/8"	9.525	4-1/4"	2-3/4"
78711		.3770	V	9.576	3-1/4"	1-7/8"
	90711	.3770	V	9.576	4-1/4"	2-3/4"
78716		.3860	W	9.804	3-1/4"	1-7/8"
	90716	.3860	W	9.804	4-1/2"	2-7/8"
78721		.3906	25/64"	9.921	3-1/4"	1-7/8"
	90721	.3906	25/64"	9.921	4-1/2"	2-7/8"
78726		.3937		10.000	84	49
	90726	.3937		10.000	114	73
78736		.4040	Y	10.262	3-5/16"	1-15/16"
	90736	.4040	Y	10.262	4-1/2"	2-7/8"
78741		.4062	13/32"	10.317	3-5/16"	1-15/16"
	90741	.4062	13/32"	10.317	4-1/2"	2-7/8"
78746		.4130	Z	10.490	3-3/8"	2"
	90746	.4130	Z	10.490	4-1/2"	2-7/8"
78751		.4134		10.500	86	51
	90751	.4134		10.500	114	73
78756		.4219	27/64"	10.716	3-3/8"	2"
	90756	.4219	27/64"	10.716	4-1/2"	2-7/8"
78761		.4331		11.000	87	52
	90761	.4331		11.000	114	73
78766		.4375	7/16"	11.113	3-7/16"	2-1/16"
	90766	.4375	7/16"	11.113	4-1/2"	2-7/8"
	90771	.4528		11.500	120	76
78776		.4531	29/64"	11.509	3-9/16"	2-1/8"
	90776	.4531	29/64"	11.509	4-3/4"	3"
78781		.4688	15/32"	11.908	3-5/8"	2-1/8"
	90781	.4688	15/32"	11.908	4-3/4"	3"
78786		.4724		12.000	94	56
	90786	.4724		12.000	120	76
78791		.4844	31/64"	12.304	3-11/16"	2-3/16"
	90791	.4844	31/64"	12.304	4-3/4"	3"
78796		.4921		12.500	95	56
	90796	.4921		12.500	120	76
78801		.5000	1/2"	12.700	3-3/4"	2-1/4"
	90801	.5000	1/2"	12.700	4-3/4"	3"

† *Metric equivalents are for reference only*

Series 1200

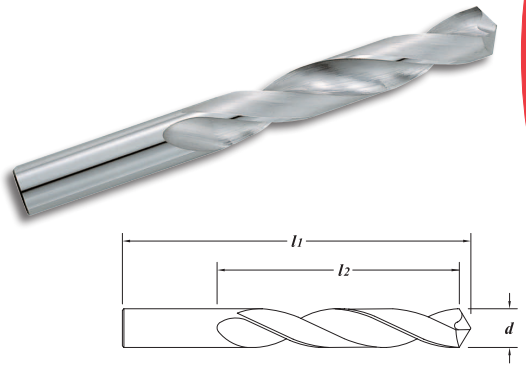
.0625" - .1575"
(1.588mm - 4.000mm)

TOLERANCES

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



TECH PAGES 322-325



Solid submicron grain carbide drill
General purpose jobber style
Cam point (≤1/8" diameter - 4-facet point)
Live tooling recommended on lathe processes
Shank tolerance: h6
Hardlube Coated - page 86

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
Schaft-Toleranz: h6
Hardlube-Beschichtet - Seite 86

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
Tolerancia del vástago: h6
Recubrimiento de Hardlube - Página 86

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
Tolerance queue: h6
Revêtement Hardlube - Page 86

Punte in sub-micro grana
Punta per impieghi generali
Affilatura a 118° punto
Utensili rotanti sono consigliate se usato su un tornio
Tolleranza gambo: h6
Rivestimento in Hardlube - Pagina 86

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
柄部公差: h6
Hardlube 涂层 - 86页

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

continued →

Series 1200 *(continued)*

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

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

† *Metric equivalents are for reference only*

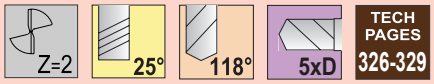
EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length
56665	.3390	R	8.611	4"	2-1/2"
56670	.3438	11/32"	8.733	4"	2-1/2"
56675	.3480	S	8.839	4"	2-1/2"
56680	.3543		9.000	101	63
56685	.3580	T	9.093	4-1/4"	2-3/4"
56690	.3594	23/64"	9.129	4-1/4"	2-3/4"
56695	.3680	U	9.347	4-1/4"	2-3/4"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



Drill Manufacturing

Series 1200H

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

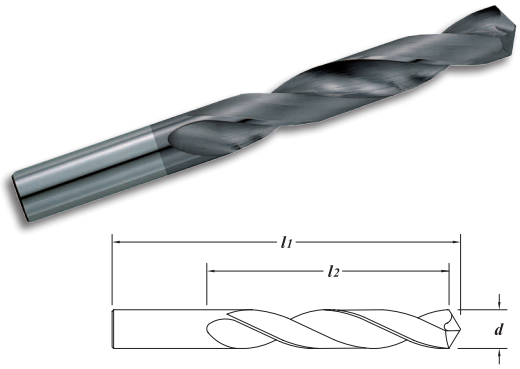


TECH PAGES 326-329

TOLERANCES

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

HARDLUBE Coated
HARDLUBE-Beschichtet
Recubrimiento de HARDLUBE
Revêtement HARDLUBE
Rivestimento in HARDLUBE
HARDLUBE 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
Shank tolerance: h6
Uncoated - page 83

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
Schaft-Toleranz: h6
Unbeschichtet - Seite 83

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
Tolerancia del vástago: h6
Sin recubrimiento - Página 83

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
Tolerance queue: h6
Sans revêtement - Page 83

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
Tolleranza gambo: h6
Non Rivestito - Pagina 83

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-小平面刀尖)
不建议在车床，或工具必须纺纱
柄部公差: h6
未涂层 - 83页

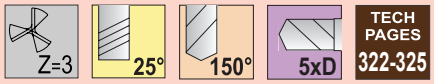
EDP#	d † Diameter Decimal	Diameter	Metric	l_1 Overall Length	l_2 Flute Length
56166	.0625	1/16"	1.588	1-3/4"	3/4"
56171	.0635	#52	1.613	1-3/4"	3/4"
56181	.0700	#50	1.778	1-3/4"	7/8"
56186	.0730	#49	1.854	1-3/4"	7/8"
56191	.0760	#48	1.930	1-3/4"	7/8"
56196	.0781	5/64"	1.984	1-3/4"	7/8"
56206	.0787		2.000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

† *Metric equivalents are for reference only*

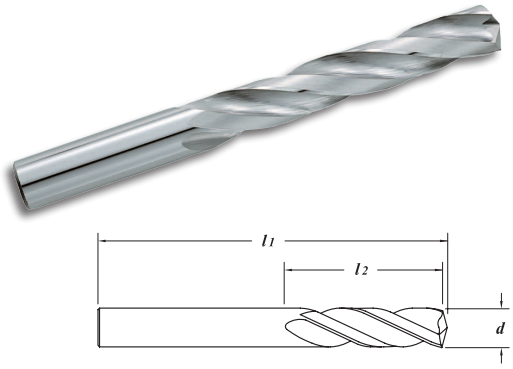
EDP#	*d* † Diameter Decimal		Metric	*l1* Overall Length	*l2* Flute Length
56381	.1590	#21	4.039	2-1/2"	1-3/8"
56386	.1610	#20	4.089	2-1/2"	1-3/8"
56391	.1660	#19	4.216	2-3/4"	1-5/8"
56396	.1695	#18	4.305	2-3/4"	1-5/8"
56401	.1719	11/64"	4.366	2-3/4"	1-5/8"
56411	.1770	#16	4.496	2-3/4"	1-5/8"
56421	.1800	#15	4.572	2-3/4"	1-5/8"
56426	.1820	#14	4.623	2-3/4"	1-5/8"
56436	.1875	3/16"	4.763	2-3/4"	1-5/8"
56441	.1890	#12	4.801	2-3/4"	1-5/8"
56446	.1910	#11	4.851	2-3/4"	1-5/8"
56451	.1935	#10	4.915	2-3/4"	1-5/8"
56471	.2010	#7	5.105	3"	1-3/4"
56481	.2040	#6	5.182	3"	1-3/4"
56486	.2055	#5	5.220	3"	1-3/4"
56491	.2090	#4	5.309	3"	1-3/4"
56496	.2130	#3	5.410	3"	1-3/4"
56506	.2188	7/32"	5.558	3"	1-3/4"
56516	.2280	#1	5.791	3"	1-3/4"
56526	.2344	15/64"	5.954	3-1/4"	2"
56541	.2420	C	6.147	3-1/4"	2"
56551	.2500	1/4" / E	6.350	3-1/4"	2"
56561	.2570	F	6.528	3-1/4"	2"
56566	.2610	G	6.629	3-1/2"	2-1/8"
56571	.2656	17/64"	6.746	3-1/2"	2-1/8"
56601	.2812	9/32"	7.142	3-1/2"	2-1/8"
56606	.2900	L	7.366	3-1/2"	2-1/8"
56626	.3020	N	7.671	3-3/4"	2-3/8"
56631	.3125	5/16"	7.938	3-3/4"	2-3/8"
56646	.3230	P	8.204	3-3/4"	2-3/8"
56651	.3281	21/64"	8.334	4"	2-1/2"
56671	.3438	11/32"	8.733	4"	2-1/2"
56696	.3680	U	9.347	4-1/4"	2-3/4"
56706	.3750	3/8"	9.525	4-1/4"	2-3/4"
56731	.3970	X	10.084	4-1/2"	2-7/8"
56741	.4062	13/32"	10.317	4-1/2"	2-7/8"
56756	.4219	27/64"	10.716	4-1/2"	2-7/8"
56766	.4375	7/16"	11.113	4-1/2"	2-7/8"
56801	.5000	1/2"	12.700	4-3/4"	3"

Series 1100

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



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



Solid submicron grain carbide drill
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
Shank tolerance: h6
Hardlube Coated - page 79

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
Schaft-Toleranz: h6
Hardlube-Beschichtet - Seite 79

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
Tolerancia del vástago: h6
Recubrimiento de Hardlube - Página 79

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
Tolerance queue: h6
Revêtement Hardlube - Page 79

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
Tolleranza gambo: h6
Rivestimento in Hardlube - Pagina 79

整体硬质合金钻头
自定心刃尖
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
柄部公差: h6
Hardlube 涂层 - 79页

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

† *Metric equivalents are for reference only*

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

Series 1800H

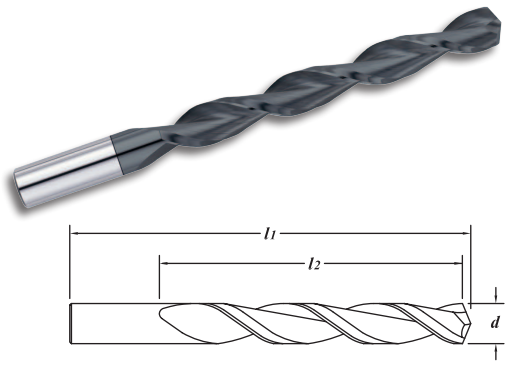
.1875" - .3125"
(4.763mm - 7.938mm)

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



TECH PAGES 326-329

Parabolic - HARDLUBE Coated
Parabolische - HARDLUBE-Beschichtet
Parabólica - Recubrimiento de HARDLUBE
Parabolique - Revêtement HARDLUBE
Elicoidale - Rivestimento in HARDLUBE
抛物线排屑槽 - HARDLUBE 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
Shank tolerance: h6

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
Schaft-Toleranz: h6

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
Tolerancia del vástago: h6

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
Tolerance queue: h6

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
Tolleranza gambo: h6

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
柄部公差: h6

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

† *Metric equivalents are for reference only*

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



Series 4100

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

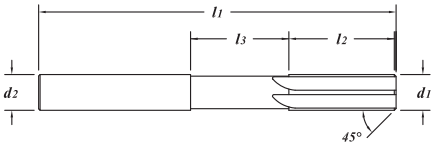


TOLERANCES

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

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
直线型一洛氏硬度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	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes
95066	.0590		1.499	.0590"	1-1/2"	3/8"	.250"	4
95069	.0591		1.500	.0591"	1-1/2"	3/8"	.250"	4
95072	.0595	#53	1.511	.0595"	1-1/2"	3/8"	.250"	4
95075	.0600		1.524	.0600"	1-1/2"	3/8"	.250"	4
95078	.0605		1.537	.0605"	1-1/2"	3/8"	.250"	4
95081	.0610		1.549	.0610"	1-1/2"	3/8"	.250"	4
95084	.0615		1.562	.0615"	1-1/2"	3/8"	.250"	4
95087	.0620		1.575	.0620"	1-1/2"	3/8"	.250"	4
95090	.0625	1/16"	1.588	.0625"	1-1/2"	3/8"	.250"	4
95093	.0630		1.600	.0630"	1-1/2"	3/8"	.250"	4
95096	.0635	#52	1.613	.0635"	1-1/2"	3/8"	.250"	4
95099	.0640		1.626	.0640"	1-1/2"	3/8"	.250"	4
95102	.0645		1.638	.0645"	1-1/2"	3/8"	.250"	4
95105	.0650		1.651	.0650"	1-1/2"	3/8"	.250"	4
95108	.0660		1.676	.0660"	1-3/4"	1/2"	.250"	4
95111	.0670	#51	1.702	.0670"	1-3/4"	1/2"	.250"	4
95114	.0680		1.727	.0680"	1-3/4"	1/2"	.375"	4
95117	.0690		1.753	.0690"	1-3/4"	1/2"	.375"	4
95120	.0700	#50	1.778	.0700"	1-3/4"	1/2"	.375"	4
95123	.0710		1.803	.0710"	1-3/4"	1/2"	.375"	4
95126	.0720		1.829	.0720"	1-3/4"	1/2"	.375"	4
95129	.0730	#49	1.854	.0730"	1-3/4"	1/2"	.375"	4
95132	.0740		1.880	.0740"	1-3/4"	1/2"	.375"	4
95135	.0750		1.905	.0750"	1-3/4"	1/2"	.375"	4
95138	.0760	#48	1.930	.0760"	1-3/4"	1/2"	.375"	4
95141	.0770		1.956	.0770"	1-3/4"	1/2"	.375"	4
95144	.0780		1.981	.0780"	1-3/4"	1/2"	.375"	4
95147	.0781	5/64"	1.984	.0781"	1-3/4"	1/2"	.375"	4
95150	.0785	#47	1.994	.0785"	1-3/4"	1/2"	.375"	4
95153	.0787		2.000	.0787"	1-3/4"	1/2"	.375"	4
95156	.0790		2.007	.0790"	1-3/4"	1/2"	.375"	4
95159	.0800		2.032	.0800"	1-3/4"	1/2"	.375"	4
95162	.0810	#46	2.057	.0810"	2"	1/2"	.375"	4
95165	.0820	#45	2.083	.0820"	2"	1/2"	.375"	4

† *Metric equivalents are for reference only*

EDP#	d_1 † Diameter Decimal		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes
95168	.0830		2.108	.0830"	2"	1/2"	.375"	4
95171	.0840		2.134	.0840"	2"	1/2"	.375"	4
95174	.0850		2.159	.0850"	2"	1/2"	.375"	4
95177	.0860	#44	2.184	.0860"	2"	1/2"	.375"	4
95180	.0870		2.210	.0870"	2"	1/2"	.375"	4
95183	.0880		2.235	.0880"	2"	1/2"	.375"	4
95186	.0890	#43	2.261	.0890"	2"	1/2"	.375"	4
95189	.0900		2.286	.0900"	2"	1/2"	.375"	4
95192	.0910		2.311	.0910"	2"	1/2"	.375"	4
95195	.0915		2.324	.0915"	2"	1/2"	.375"	4
95198	.0920		2.337	.0920"	2"	1/2"	.375"	4
95201	.0925		2.350	.0925"	2"	1/2"	.375"	4
95204	.0930		2.362	.0930"	2"	1/2"	.375"	4
95207	.0935	#42	2.375	.0935"	2"	1/2"	.375"	4
95210	.0938	3/32"	2.383	.0938"	2"	1/2"	.375"	4
95213	.0940		2.388	.0940"	2"	1/2"	.375"	4
95216	.0945		2.400	.0945"	2"	1/2"	.375"	4
95219	.0950		2.413	.0950"	2"	1/2"	.375"	4
95222	.0960	#41	2.438	.0960"	2-1/4"	5/8"	.375"	4
95225	.0970		2.464	.0970"	2-1/4"	5/8"	.375"	4
95228	.0980	#40	2.489	.0980"	2-1/4"	5/8"	.375"	4
95231	.0984		2.500	.0984"	2-1/4"	5/8"	.375"	4
95234	.0990		2.515	.0990"	2-1/4"	5/8"	.500"	4
95237	.0995	#39	2.527	.0995"	2-1/4"	5/8"	.500"	4
95240	.1000		2.540	.1000"	2-1/4"	5/8"	.500"	4
95243	.1010		2.565	.1010"	2-1/4"	5/8"	.500"	4
95246	.1015	#38	2.578	.1015"	2-1/4"	5/8"	.500"	4
95249	.1020		2.591	.1020"	2-1/4"	5/8"	.500"	4
95252	.1030		2.616	.1030"	2-1/4"	5/8"	.500"	4
95255	.1040	#37	2.642	.1040"	2-1/4"	5/8"	.500"	4
95258	.1050		2.667	.1050"	2-1/4"	5/8"	.500"	4
95261	.1060		2.692	.1060"	2-1/4"	5/8"	.500"	4
95264	.1065	#36	2.705	.1065"	2-1/4"	5/8"	.500"	4
95267	.1070		2.718	.1070"	2-1/4"	5/8"	.500"	4
95270	.1080		2.743	.1080"	2-1/4"	5/8"	.500"	4
95273	.1090		2.769	.1090"	2-1/4"	5/8"	.500"	4
95276	.1094	7/64"	2.779	.1094"	2-1/4"	5/8"	.500"	4
95279	.1100	#35	2.794	.1100"	2-1/4"	5/8"	.500"	4
95282	.1110	#34	2.819	.1110"	2-1/4"	5/8"	.500"	4
95285	.1120		2.845	.1120"	2-1/4"	5/8"	.500"	4
95288	.1130	#33	2.870	.1130"	2-1/4"	5/8"	.500"	4
95291	.1140		2.896	.1140"	2-1/4"	5/8"	.500"	4
95294	.1150		2.921	.1150"	2-1/4"	5/8"	.500"	4
95297	.1160	#32	2.946	.1160"	2-1/4"	5/8"	.500"	4
95300	.1170		2.972	.1170"	2-1/4"	5/8"	.500"	4
95303	.1180		2.997	.1180"	2-1/4"	5/8"	.500"	4
95306	.1181		3.000	.1181"	2-1/4"	5/8"	.500"	4
95309	.1190		3.023	.1190"	2-1/4"	5/8"	.500"	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 Neck Length	Number Flutes
95312	.1200	#31	3.048	.1200"	2-1/4"	5/8"	.500"	4
95315	.1210		3.073	.1210"	2-1/4"	5/8"	.500"	4
95318	.1220		3.099	.1220"	2-1/4"	5/8"	.500"	4
95321	.1230		3.124	.1230"	2-1/4"	5/8"	.500"	4
95324	.1235		3.137	.1235"	2-1/4"	5/8"	.500"	4
95327	.1240		3.150	.1240"	2-1/4"	5/8"	.500"	4
95330	.1245		3.162	.1245"	2-1/4"	5/8"	.500"	4
95333	.1248		3.170	.1248"	2-1/4"	5/8"	.500"	4
95336	.1250	1/8"	3.175	.1250"	2-1/4"	5/8"	.500"	4
95339	.1255		3.188	.1255"	2-1/4"	5/8"	.500"	4
95342	.1260		3.200	.1260"	2-1/4"	5/8"	.500"	4
95345	.1265		3.213	.1265"	2-1/4"	5/8"	.500"	4
95348	.1270		3.226	.1270"	2-1/4"	5/8"	.500"	4
95351	.1275		3.239	.1275"	2-1/4"	5/8"	.500"	4
95354	.1280		3.251	.1280"	2-1/4"	5/8"	.500"	4
95357	.1285	#30	3.264	.1285"	2-1/4"	5/8"	.500"	4
95360	.1290		3.277	.1290"	2-1/4"	5/8"	.500"	4
95363	.1300		3.302	.1300"	2-1/4"	5/8"	.500"	4
95366	.1310		3.327	.1310"	2-1/2"	3/4"	.500"	4
95369	.1320		3.353	.1320"	2-1/2"	3/4"	.500"	4
95372	.1330		3.378	.1330"	2-1/2"	3/4"	.500"	4
95375	.1340		3.404	.1340"	2-1/2"	3/4"	.500"	4
95378	.1350		3.429	.1350"	2-1/2"	3/4"	.500"	4
95381	.1360	#29	3.454	.1360"	2-1/2"	3/4"	.500"	4
95384	.1370		3.480	.1370"	2-1/2"	3/4"	.500"	4
95387	.1378		3.500	.1378"	2-1/2"	3/4"	.500"	4
95390	.1380		3.505	.1380"	2-1/2"	3/4"	.500"	4
95393	.1390		3.531	.1390"	2-1/2"	3/4"	.500"	4
95396	.1400		3.556	.1400"	2-1/2"	3/4"	.500"	4
95399	.1405	#28	3.569	.1405"	2-1/2"	3/4"	.500"	4
95402	.1406	9/64"	3.571	.1406"	2-1/2"	3/4"	.500"	4
95405	.1410		3.581	.1410"	2-1/2"	3/4"	.500"	4
95408	.1420		3.607	.1420"	2-1/2"	3/4"	.500"	4
95411	.1430		3.632	.1430"	2-1/2"	3/4"	.500"	4
95414	.1440	#27	3.658	.1440"	2-1/2"	3/4"	.500"	4
95417	.1450		3.683	.1450"	2-1/2"	3/4"	.500"	4
95420	.1460		3.708	.1460"	2-1/2"	3/4"	.500"	4
95423	.1470	#26	3.734	.1470"	2-1/2"	3/4"	.500"	4
95426	.1480		3.759	.1480"	2-1/2"	3/4"	.500"	4
95429	.1490		3.785	.1490"	2-1/2"	3/4"	.500"	4
95432	.1495	#25	3.797	.1495"	2-1/2"	3/4"	.500"	4
95435	.1500		3.810	.1500"	2-1/2"	3/4"	.500"	4
95438	.1510		3.835	.1510"	2-1/2"	3/4"	.500"	4
95441	.1520	#24	3.861	.1520"	2-1/2"	3/4"	.500"	4
95444	.1530		3.886	.1530"	2-1/2"	3/4"	.500"	4
95447	.1540	#23	3.912	.1540"	2-1/2"	3/4"	.500"	4
95450	.1545		3.924	.1545"	2-1/2"	3/4"	.500"	4
95453	.1550		3.937	.1550"	2-1/2"	3/4"	.500"	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 Neck Length	Number Flutes
95456	.1555		3.950	.1555"	2-1/2"	3/4"	.500"	4
95459	.1560		3.962	.1560"	2-1/2"	3/4"	.500"	4
95462	.1562	5/32"	3.967	.1562"	2-1/2"	3/4"	.500"	4
95465	.1565		3.975	.1565"	2-1/2"	3/4"	.500"	4
95468	.1570	#22	3.988	.1570"	2-1/2"	3/4"	.500"	4
95471	.1575		4.000	.1575"	2-1/2"	3/4"	.500"	4
95474	.1580		4.013	.1580"	2-1/2"	3/4"	.500"	4
95477	.1590	#21	4.039	.1590"	2-1/2"	3/4"	.500"	4
95480	.1600		4.064	.1600"	2-3/4"	7/8"	.625"	4
95483	.1610	#20	4.089	.1610"	2-3/4"	7/8"	.625"	4
95486	.1620		4.115	.1620"	2-3/4"	7/8"	.625"	4
95489	.1630		4.140	.1630"	2-3/4"	7/8"	.625"	4
95492	.1640		4.166	.1640"	2-3/4"	7/8"	.625"	4
95495	.1650		4.191	.1650"	2-3/4"	7/8"	.625"	4
95498	.1660	#19	4.216	.1660"	2-3/4"	7/8"	.625"	4
95501	.1670		4.242	.1670"	2-3/4"	7/8"	.625"	4
95504	.1680		4.267	.1680"	2-3/4"	7/8"	.625"	4
95507	.1690		4.293	.1690"	2-3/4"	7/8"	.625"	4
95510	.1695	#18	4.305	.1695"	2-3/4"	7/8"	.625"	4
95513	.1700		4.318	.1700"	2-3/4"	7/8"	.625"	4
95516	.1710		4.343	.1710"	2-3/4"	7/8"	.625"	4
95519	.1719	11/64"	4.366	.1719"	2-3/4"	7/8"	.625"	4
95522	.1720		4.369	.1720"	2-3/4"	7/8"	.625"	4
95525	.1730	#17	4.394	.1730"	2-3/4"	7/8"	.625"	4
95528	.1740		4.420	.1740"	2-3/4"	7/8"	.625"	4
95531	.1750		4.445	.1750"	2-3/4"	7/8"	.625"	4
95534	.1760		4.470	.1760"	2-3/4"	7/8"	.625"	4
95537	.1770	#16	4.496	.1770"	2-3/4"	7/8"	.625"	4
95540	.1772		4.500	.1772"	2-3/4"	7/8"	.625"	4
95543	.1780		4.521	.1780"	2-3/4"	7/8"	.625"	4
95546	.1790		4.547	.1790"	2-3/4"	7/8"	.625"	4
95549	.1800	#15	4.572	.1800"	2-3/4"	7/8"	.625"	4
95552	.1810		4.597	.1810"	2-3/4"	7/8"	.625"	4
95555	.1820	#14	4.623	.1820"	2-3/4"	7/8"	.625"	4
95558	.1830		4.648	.1830"	2-3/4"	7/8"	.625"	4
95561	.1840		4.674	.1840"	2-3/4"	7/8"	.625"	4
95564	.1850	#13	4.699	.1850"	2-3/4"	7/8"	.625"	4
95567	.1855		4.712	.1855"	2-3/4"	7/8"	.625"	4
95570	.1860		4.724	.1860"	2-3/4"	7/8"	.625"	4
95573	.1865		4.737	.1865"	2-3/4"	7/8"	.625"	4
95576	.1870		4.750	.1870"	2-3/4"	7/8"	.625"	4
95577	.1873		4.757	.1873"	2-3/4"	7/8"	.625"	4
95579	.1875	3/16"	4.763	.1875"	2-3/4"	7/8"	.625"	4
95582	.1880		4.775	.1880"	2-3/4"	7/8"	.625"	4
95585	.1885		4.788	.1885"	2-3/4"	7/8"	.625"	4
95588	.1890	#12	4.801	.1890"	2-3/4"	7/8"	.625"	4
95591	.1900		4.826	.1900"	2-3/4"	7/8"	.625"	4
95594	.1910	#11	4.851	.1910"	2-3/4"	7/8"	.625"	4

continued →

Series 4100 *(continued)*

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









TECH PAGES 316-317

TOLERANCES

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

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 Neck Length	Number Flutes
95597	.1920		4.877	.1920"	2-3/4"	7/8"	.625"	4
95600	.1930		4.902	.1930"	2-3/4"	7/8"	.625"	4
95603	.1935	#10	4.915	.1935"	2-3/4"	7/8"	.625"	4
95606	.1940		4.928	.1940"	2-3/4"	7/8"	.625"	4
95609	.1950		4.953	.1950"	2-3/4"	7/8"	.625"	4
95612	.1960	#9	4.978	.1960"	3"	1"	.625"	4
95615	.1969		5.000	.1969"	3"	1"	.625"	4
95618	.1970		5.004	.1970"	3"	1"	.625"	4
95621	.1980		5.029	.1980"	3"	1"	.625"	4
95624	.1990	#8	5.055	.1990"	3"	1"	.625"	4
95627	.2000		5.080	.2000"	3"	1"	.625"	4
95630	.2010	#7	5.105	.2010"	3"	1"	.625"	4
95633	.2020		5.131	.2020"	3"	1"	.625"	4
95636	.2030		5.156	.2030"	3"	1"	.625"	4
95639	.2031	13/64"	5.159	.2031"	3"	1"	.625"	4
95642	.2040	#6	5.182	.2040"	3"	1"	.625"	4
95645	.2050		5.207	.2050"	3"	1"	.625"	4
95648	.2055	#5	5.220	.2055"	3"	1"	.625"	4
95651	.2060		5.232	.2060"	3"	1"	.625"	4
95654	.2070		5.258	.2070"	3"	1"	.625"	4
95657	.2080		5.283	.2080"	3"	1"	.625"	4
95660	.2090	#4	5.309	.2090"	3"	1"	.625"	4
95663	.2100		5.334	.2100"	3"	1"	.625"	4
95666	.2110		5.359	.2110"	3"	1"	.625"	4
95669	.2120		5.385	.2120"	3"	1"	.625"	4
95672	.2130	#3	5.410	.2130"	3"	1"	.625"	4
95675	.2140		5.436	.2140"	3"	1"	.625"	4
95678	.2150		5.461	.2150"	3"	1"	.625"	4
95681	.2160		5.486	.2160"	3"	1"	.625"	4
95684	.2165		5.500	.2165"	3"	1"	.625"	4
95687	.2170		5.512	.2170"	3"	1"	.625"	4
95690	.2180		5.537	.2180"	3"	1"	.625"	4
95693	.2188	7/32"	5.558	.2188"	3"	1"	.625"	4
95696	.2190		5.563	.2190"	3"	1"	.625"	4
95699	.2200		5.588	.2200"	3"	1"	.625"	4
95702	.2210	#2	5.613	.2210"	3"	1"	.625"	4
95705	.2220		5.639	.2220"	3"	1"	.625"	4
95708	.2230		5.664	.2230"	3"	1"	.625"	4
95711	.2240		5.690	.2240"	3"	1"	.625"	4
95714	.2250		5.715	.2250"	3"	1"	.625"	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 Neck Length	Number Flutes
95717	.2260		5.740	.2260"	3"	1"	.625"	4
95720	.2270		5.766	.2270"	3"	1"	.625"	4
95723	.2280	#1	5.791	.2280"	3"	1"	.625"	4
95726	.2290		5.817	.2290"	3"	1"	.625"	4
95729	.2300		5.842	.2300"	3"	1"	.625"	4
95732	.2310		5.867	.2310"	3"	1"	.625"	4
95735	.2320		5.893	.2320"	3"	1"	.625"	4
95738	.2330		5.918	.2330"	3"	1"	.625"	4
95741	.2340	A	5.944	.2340"	3"	1"	.625"	4
95744	.2344	15/64"	5.954	.2344"	3"	1"	.625"	4
95747	.2350		5.969	.2350"	3"	1"	.625"	4
95750	.2360		5.994	.2360"	3"	1"	.625"	4
95753	.2362		6.000	.2362"	3"	1"	.625"	4
95756	.2370		6.020	.2370"	3"	1"	.625"	4
95759	.2380	B	6.045	.2380"	3"	1"	.625"	4
95762	.2390		6.071	.2390"	3"	1"	.625"	4
95765	.2400		6.096	.2400"	3"	1"	.625"	4
95768	.2410		6.121	.2410"	3"	1"	.625"	4
95771	.2420	C	6.147	.2420"	3"	1"	.625"	4
95774	.2430		6.172	.2430"	3"	1"	.625"	4
95777	.2440		6.198	.2440"	3"	1"	.625"	4
95780	.2450		6.223	.2450"	3"	1"	.625"	4
95783	.2460	D	6.248	.2460"	3"	1"	.625"	4
95786	.2470		6.274	.2470"	3"	1"	.625"	4
95789	.2480		6.299	.2480"	3"	1"	.625"	4
95792	.2485		6.312	.2485"	3"	1"	.625"	4
95795	.2490		6.325	.2490"	3"	1"	.625"	4
95798	.2495		6.337	.2495"	3"	1"	.625"	4
95799	.2498		6.345	.2498"	3"	1"	.625"	4
95801	.2500	1/4" / E	6.350	.2500"	3"	1"	.625"	4
95802	.2502		6.355	.2502"	3"	1"	.625"	4
95804	.2505		6.363	.2505"	3"	1"	.625"	4
95807	.2510		6.375	.2510"	3"	1"	.625"	4
95810	.2515		6.388	.2515"	3"	1"	.625"	4
95813	.2520		6.401	.2520"	3"	1"	.625"	4
95816	.2530		6.426	.2530"	3"	1"	.625"	4
95819	.2540		6.452	.2540"	3"	1"	.625"	4
95822	.2550		6.477	.2550"	3-1/4"	1-1/8"	.625"	6
95825	.2559		6.500	.2559"	3-1/4"	1-1/8"	.625"	6
95828	.2560		6.502	.2560"	3-1/4"	1-1/8"	.625"	6
95831	.2570	F	6.528	.2570"	3-1/4"	1-1/8"	.625"	6
95834	.2580		6.553	.2580"	3-1/4"	1-1/8"	.625"	6
95837	.2590		6.579	.2590"	3-1/4"	1-1/8"	.625"	6
95840	.2600		6.604	.2600"	3-1/4"	1-1/8"	.625"	6
95843	.2610	G	6.629	.2610"	3-1/4"	1-1/8"	.625"	6
95846	.2620		6.655	.2620"	3-1/4"	1-1/8"	.625"	6
95849	.2630		6.680	.2630"	3-1/4"	1-1/8"	.625"	6
95852	.2640		6.706	.2640"	3-1/4"	1-1/8"	.625"	6

continued →

Series 4100 *(continued)*

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

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

† *Metric equivalents are for reference only*

EDP#	d_1 † Decimal	d_1 † Diameter	d_1 † Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes
95999	.3080		7.823	.3080"	3-1/4"	1-1/8"	.750"	6
96002	.3090		7.849	.3090"	3-1/4"	1-1/8"	.750"	6
96005	.3100		7.874	.3100"	3-1/4"	1-1/8"	.750"	6
96006	.3105		7.887	.3105"	3-1/4"	1-1/8"	.750"	6
96008	.3110		7.899	.3110"	3-1/4"	1-1/8"	.750"	6
96011	.3115		7.912	.3115"	3-1/4"	1-1/8"	.750"	6
96014	.3120		7.925	.3120"	3-1/4"	1-1/8"	.750"	6
96015	.3123		7.932	.3123"	3-1/4"	1-1/8"	.750"	6
96017	.3125	5/16"	7.938	.3125"	3-1/4"	1-1/8"	.750"	6
96021	.3130		7.950	.3130"	3-1/4"	1-1/8"	.750"	6
96023	.3135		7.963	.3135"	3-1/4"	1-1/8"	.750"	6
96026	.3140		7.976	.3140"	3-1/4"	1-1/8"	.750"	6
96029	.3150		8.000	.3150"	3-1/4"	1-1/8"	.750"	6
96032	.3160	O	8.026	.3160"	3-1/4"	1-1/8"	.750"	6
96035	.3170		8.052	.3170"	3-1/4"	1-1/8"	.750"	6
96038	.3180		8.077	.3180"	3-1/4"	1-1/8"	.750"	6
96041	.3190		8.103	.3190"	3-1/2"	1-1/4"	.750"	6
96044	.3200		8.128	.3200"	3-1/2"	1-1/4"	.750"	6
96047	.3210		8.153	.3210"	3-1/2"	1-1/4"	.750"	6
96050	.3220		8.179	.3220"	3-1/2"	1-1/4"	.750"	6
96053	.3230	P	8.204	.3230"	3-1/2"	1-1/4"	.750"	6
96056	.3240		8.230	.3240"	3-1/2"	1-1/4"	.750"	6
96059	.3250		8.255	.3250"	3-1/2"	1-1/4"	.750"	6
96062	.3260		8.280	.3260"	3-1/2"	1-1/4"	.750"	6
96065	.3270		8.306	.3270"	3-1/2"	1-1/4"	.750"	6
96068	.3280		8.331	.3280"	3-1/2"	1-1/4"	.750"	6
96071	.3281	21/64"	8.334	.3281"	3-1/2"	1-1/4"	.750"	6
96074	.3290		8.357	.3290"	3-1/2"	1-1/4"	.750"	6
96077	.3300		8.382	.3300"	3-1/2"	1-1/4"	.750"	6
96079	.3310		8.407	.3310"	3-1/2"	1-1/4"	.750"	6
96083	.3320	Q	8.433	.3320"	3-1/2"	1-1/4"	.750"	6
96086	.3330		8.458	.3330"	3-1/2"	1-1/4"	.750"	6
96089	.3340		8.484	.3340"	3-1/2"	1-1/4"	.750"	6
96092	.3346		8.500	.3346"	3-1/2"	1-1/4"	.750"	6
96095	.3350		8.509	.3350"	3-1/2"	1-1/4"	.750"	6
96098	.3360		8.534	.3360"	3-1/2"	1-1/4"	.750"	6
96101	.3370		8.560	.3370"	3-1/2"	1-1/4"	.750"	6
96104	.3380		8.585	.3380"	3-1/2"	1-1/4"	.750"	6
96107	.3390	R	8.611	.3390"	3-1/2"	1-1/4"	.750"	6
96110	.3400		8.636	.3400"	3-1/2"	1-1/4"	.750"	6
96113	.3410		8.661	.3410"	3-1/2"	1-1/4"	.750"	6
96116	.3420		8.687	.3420"	3-1/2"	1-1/4"	.750"	6
96119	.3430		8.712	.3430"	3-1/2"	1-1/4"	.750"	6
96122	.3438	11/32"	8.733	.3438"	3-1/2"	1-1/4"	.750"	6
96125	.3440		8.738	.3440"	3-1/2"	1-1/4"	.750"	6
96128	.3450		8.763	.3450"	3-1/2"	1-1/4"	.750"	6
96131	.3460		8.788	.3460"	3-1/2"	1-1/4"	.750"	6
96134	.3470		8.814	.3470"	3-1/2"	1-1/4"	.750"	6

continued →

Series 4100 *(continued)*

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









TECH PAGES 316-317

TOLERANCES

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

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



EDP#	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	Number Flutes
96137	.3480	S	8.839	.3480"	3-1/2"	1-1/4"	.750"	6
96141	.3490		8.865	.3490"	3-1/2"	1-1/4"	.750"	6
96143	.3500		8.890	.3500"	3-1/2"	1-1/4"	.750"	6
96146	.3510		8.915	.3510"	3-1/2"	1-1/4"	.750"	6
96149	.3520		8.941	.3520"	3-1/2"	1-1/4"	.750"	6
96152	.3530		8.966	.3530"	3-1/2"	1-1/4"	.750"	6
96155	.3540		8.992	.3540"	3-1/2"	1-1/4"	.750"	6
96158	.3543		9.000	.3543"	3-1/2"	1-1/4"	.750"	6
96161	.3550		9.017	.3550"	3-1/2"	1-1/4"	.750"	6
96164	.3560		9.042	.3560"	3-1/2"	1-1/4"	.750"	6
96167	.3570		9.068	.3570"	3-1/2"	1-1/4"	.750"	6
96170	.3580	T	9.093	.3580"	3-1/2"	1-1/4"	.750"	6
96173	.3590		9.119	.3590"	3-1/2"	1-1/4"	.750"	6
96176	.3594	23/64"	9.129	.3594"	3-1/2"	1-1/4"	.750"	6
96179	.3600		9.144	.3600"	3-1/2"	1-1/4"	.750"	6
96182	.3610		9.169	.3610"	3-1/2"	1-1/4"	.750"	6
96185	.3620		9.195	.3620"	3-1/2"	1-1/4"	.750"	6
96191	.3640		9.246	.3640"	3-1/2"	1-1/4"	.750"	6
96194	.3650		9.271	.3650"	3-1/2"	1-1/4"	.750"	6
96197	.3660		9.296	.3660"	3-1/2"	1-1/4"	.750"	6
96199	.3670		9.322	.3670"	3-1/2"	1-1/4"	.750"	6
96203	.3680	U	9.347	.3680"	3-1/2"	1-1/4"	.750"	6
96206	.3690		9.373	.3690"	3-1/2"	1-1/4"	.750"	6
96209	.3700		9.398	.3700"	3-1/2"	1-1/4"	.750"	6
96212	.3710		9.423	.3710"	3-1/2"	1-1/4"	.750"	6
96215	.3720		9.449	.3720"	3-1/2"	1-1/4"	.750"	6
96218	.3730		9.474	.3730"	3-1/2"	1-1/4"	.750"	6
96221	.3740		9.500	.3740"	3-1/2"	1-1/4"	.750"	6
96224	.3745		9.512	.3745"	3-1/2"	1-1/4"	.750"	6
96225	.3748		9.520	.3748"	3-1/2"	1-1/4"	.750"	6
96227	.3750	3/8"	9.525	.3750"	3-1/2"	1-1/4"	.750"	6
96230	.3755		9.538	.3755"	3-1/2"	1-1/4"	.750"	6
96233	.3760		9.550	.3760"	3-1/2"	1-1/4"	.750"	6
96236	.3765		9.563	.3765"	3-1/2"	1-1/4"	.750"	6
96239	.3770	V	9.576	.3770"	3-1/2"	1-1/4"	.750"	6
96242	.3780		9.601	.3780"	3-1/2"	1-1/4"	.750"	6
96245	.3790		9.627	.3790"	3-1/2"	1-1/4"	.750"	6
96248	.3800		9.652	.3800"	3-1/2"	1-1/4"	.750"	6
96251	.3810		9.677	.3810"	3-1/2"	1-1/4"	.750"	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 Neck Length	Number Flutes
96254	.3820		9.703	.3820"	3-1/2"	1-1/4"	.750"	6
96257	.3830		9.728	.3830"	3-1/2"	1-1/4"	.750"	6
96260	.3840		9.754	.3840"	3-1/2"	1-1/4"	.750"	6
96263	.3850		9.779	.3850"	3-1/2"	1-1/4"	.750"	6
96266	.3860	W	9.804	.3860"	3-1/2"	1-1/4"	.750"	6
96269	.3870		9.830	.3870"	3-1/2"	1-1/4"	.750"	6
96272	.3880		9.855	.3880"	3-1/2"	1-1/4"	.750"	6
96275	.3890		9.881	.3890"	3-1/2"	1-1/4"	.750"	6
96278	.3900		9.906	.3900"	3-1/2"	1-1/4"	.750"	6
96281	.3906	25/64"	9.921	.3906"	3-1/2"	1-1/4"	.750"	6
96284	.3910		9.931	.3910"	3-1/2"	1-1/4"	.750"	6
96287	.3920		9.957	.3920"	3-1/2"	1-1/4"	.750"	6
96290	.3930		9.982	.3930"	3-1/2"	1-1/4"	.750"	6
96293	.3937		10.000	.3937"	3-1/2"	1-1/4"	.750"	6
96296	.3940		10.008	.3940"	3-1/2"	1-1/4"	.750"	6
96299	.3950		10.033	.3950"	3-1/2"	1-1/4"	.750"	6
96302	.3960		10.058	.3960"	3-1/2"	1-1/4"	.750"	6
96305	.3970	X	10.084	.3970"	3-1/2"	1-1/4"	.750"	6
96308	.3980		10.109	.3980"	3-1/2"	1-1/4"	.750"	6
96311	.3990		10.135	.3990"	3-1/2"	1-1/4"	.750"	6
96314	.4000		10.160	.4000"	3-1/2"	1-1/4"	.750"	6
96317	.4010		10.185	.4010"	3-1/2"	1-1/4"	.750"	6
96319	.4020		10.211	.4020"	3-1/2"	1-1/4"	.750"	6
96323	.4030		10.236	.4030"	3-1/2"	1-1/4"	.750"	6
96326	.4040	Y	10.262	.4040"	3-1/2"	1-1/4"	.750"	6
96329	.4050		10.287	.4050"	3-1/2"	1-1/4"	.750"	6
96332	.4060		10.312	.4060"	3-1/2"	1-1/4"	.750"	6
96335	.4062	13/32"	10.317	.4062"	3-1/2"	1-1/4"	.750"	6
96338	.4070		10.338	.4070"	3-1/2"	1-1/4"	.750"	6
96341	.4080		10.363	.4080"	3-1/2"	1-1/4"	.750"	6
96344	.4090		10.389	.4090"	3-1/2"	1-1/4"	.750"	6
96347	.4100		10.414	.4100"	3-1/2"	1-1/4"	.750"	6
96350	.4110		10.439	.4110"	3-1/2"	1-1/4"	.750"	6
96353	.4120		10.465	.4120"	3-1/2"	1-1/4"	.750"	6
96356	.4130	Z	10.490	.4130"	3-1/2"	1-1/4"	.750"	6
96359	.4134		10.500	.4134"	3-1/2"	1-1/4"	.750"	6
96362	.4140		10.516	.4140"	3-1/2"	1-1/4"	.750"	6
96365	.4150		10.541	.4150"	3-1/2"	1-1/4"	.750"	6
96366	.4160		10.566	.4160"	4"	1-3/8"	.750"	6
96367	.4170		10.592	.4170"	4"	1-3/8"	.750"	6
96369	.4190		10.643	.4190"	4"	1-3/8"	.750"	6
96374	.4210		10.693	.4210"	4"	1-3/8"	.750"	6
96377	.4219	27/64"	10.716	.4219"	4"	1-3/8"	.750"	6
96380	.4220		10.719	.4220"	4"	1-3/8"	.750"	6
96383	.4230		10.744	.4230"	4"	1-3/8"	.750"	6
96386	.4240		10.770	.4240"	4"	1-3/8"	.750"	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 Neck Length	Number Flutes
96389	.4250		10.795	.4250"	4"	1-3/8"	.750"	6
96392	.4260		10.820	.4260"	4"	1-3/8"	.750"	6
96395	.4270		10.846	.4270"	4"	1-3/8"	.750"	6
96398	.4280		10.871	.4280"	4"	1-3/8"	.750"	6
96404	.4300		10.922	.4300"	4"	1-3/8"	.750"	6
96407	.4310		10.947	.4310"	4"	1-3/8"	.750"	6
96410	.4320		10.973	.4320"	4"	1-3/8"	.750"	6
96413	.4330		10.998	.4330"	4"	1-3/8"	.750"	6
96416	.4331		11.000	.4331"	4"	1-3/8"	.750"	6
96419	.4340		11.024	.4340"	4"	1-3/8"	.750"	6
96422	.4350		11.049	.4350"	4"	1-3/8"	.750"	6
96425	.4360		11.074	.4360"	4"	1-3/8"	.750"	6
96428	.4365		11.087	.4365"	4"	1-3/8"	.750"	6
96431	.4370		11.100	.4370"	4"	1-3/8"	.750"	6
96432	.4373		11.107	.4373"	4"	1-3/8"	.750"	6
96434	.4375	7/16"	11.113	.4375"	4"	1-3/8"	.750"	6
96437	.4380		11.125	.4380"	4"	1-3/8"	.750"	6
96440	.4385		11.138	.4385"	4"	1-3/8"	.750"	6
96443	.4390		11.151	.4390"	4"	1-3/8"	.750"	6
96446	.4400		11.176	.4400"	4"	1-3/8"	.750"	6
96449	.4410		11.201	.4410"	4"	1-3/8"	.750"	6
96455	.4430		11.252	.4430"	4"	1-3/8"	.750"	6
96458	.4440		11.278	.4440"	4"	1-3/8"	.750"	6
96461	.4450		11.303	.4450"	4"	1-3/8"	.750"	6
96467	.4470		11.354	.4470"	4"	1-3/8"	.750"	6
96470	.4480		11.379	.4480"	4"	1-3/8"	.750"	6
96473	.4490		11.405	.4490"	4"	1-3/8"	.750"	6
96476	.4500		11.430	.4500"	4"	1-3/8"	.750"	6
96479	.4510		11.455	.4510"	4"	1-3/8"	.750"	6
96485	.4528		11.500	.4528"	4"	1-3/8"	.750"	6
96488	.4530		11.506	.4530"	4"	1-3/8"	.750"	6
96491	.4531	29/64"	11.509	.4531"	4"	1-3/8"	.750"	6
96494	.4540		11.532	.4540"	4"	1-3/8"	.750"	6
96497	.4550		11.557	.4550"	4"	1-3/8"	.750"	6
96500	.4560		11.582	.4560"	4"	1-3/8"	.750"	6
96503	.4570		11.608	.4570"	4"	1-3/8"	.750"	6
96506	.4580		11.633	.4580"	4"	1-3/8"	.750"	6
96512	.4600		11.684	.4600"	4"	1-3/8"	.750"	6
96515	.4610		11.709	.4610"	4"	1-3/8"	.750"	6
96527	.4650		11.811	.4650"	4"	1-3/8"	.750"	6
96530	.4660		11.836	.4660"	4"	1-3/8"	.750"	6
96533	.4670		11.862	.4670"	4"	1-3/8"	.750"	6
96539	.4688	15/32"	11.908	.4688"	4"	1-3/8"	.750"	6
96542	.4690		11.913	.4690"	4"	1-3/8"	.750"	6
96545	.4700		11.938	.4700"	4"	1-1/2"	.750"	6
96548	.4710		11.963	.4710"	4"	1-1/2"	.750"	6
96551	.4720		11.989	.4720"	4"	1-1/2"	.750"	6
96554	.4724		12.000	.4724"	4"	1-1/2"	.750"	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 Neck Length	Number Flutes
96557	.4730		12.014	.4730"	4"	1-1/2"	.750"	6
96561	.4740		12.040	.4740"	4"	1-1/2"	.750"	6
96563	.4750		12.065	.4750"	4"	1-1/2"	.750"	6
96566	.4760		12.090	.4760"	4"	1-1/2"	.750"	6
96569	.4770		12.116	.4770"	4"	1-1/2"	.750"	6
96572	.4780		12.141	.4780"	4"	1-1/2"	.750"	6
96578	.4800		12.192	.4800"	4"	1-1/2"	.750"	6
96581	.4810		12.217	.4810"	4"	1-1/2"	.750"	6
96584	.4820		12.243	.4820"	4"	1-1/2"	.750"	6
96590	.4840		12.294	.4840"	4"	1-1/2"	.750"	6
96593	.4844	31/64"	12.304	.4844"	4"	1-1/2"	.750"	6
96596	.4850		12.319	.4850"	4"	1-1/2"	.750"	6
96602	.4870		12.370	.4870"	4"	1-1/2"	.750"	6
96608	.4890		12.421	.4890"	4"	1-1/2"	.750"	6
96617	.4920		12.497	.4920"	4"	1-1/2"	.750"	6
96620	.4921		12.500	.4921"	4"	1-1/2"	.750"	6
96623	.4930		12.522	.4930"	4"	1-1/2"	.750"	6
96629	.4950		12.573	.4950"	4"	1-1/2"	.750"	6
96632	.4960		12.598	.4960"	4"	1-1/2"	.750"	6
96635	.4970		12.624	.4970"	4"	1-1/2"	.750"	6
96638	.4980		12.649	.4980"	4"	1-1/2"	.750"	6
96641	.4990		12.675	.4990"	4"	1-1/2"	.750"	6
96644	.4995		12.687	.4995"	4"	1-1/2"	.750"	6
96645	.4998		12.695	.4998"	4"	1-1/2"	.750"	6
96647	.5000	1/2"	12.700	.5000"	4"	1-1/2"	.750"	6
96650	.5005		12.713	.5005"	4"	1-1/2"	.750"	6
96653	.5010		12.725	.5010"	4"	1-1/2"	.750"	6
96656	.5020		12.751	.5020"	4"	1-1/2"	.750"	6

Series 4100 (Metric)

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

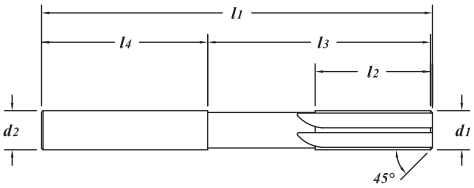
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TOLERANCES

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
直线型一洛氏硬度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	l_4 Shank Length	Number Flutes
96659	.07835	1.990	1.990	50	12	32	18	4
96662	.07874	2.000	2.000	50	12	32	18	4
96665	.07913	2.010	2.010	50	12	32	18	4
96668	.07953	2.020	2.020	50	12	32	18	4
96671	.11772	2.990	2.990	65	16	36	29	4
96674	.11811	3.000	3.000	65	16	36	29	4
96677	.11850	3.010	3.010	65	16	36	29	4
96680	.11890	3.020	3.020	65	16	36	29	4
96683	.15709	3.990	3.990	75	20	45	30	4
96686	.15748	4.000	4.000	75	20	45	30	4
96689	.15787	4.010	4.010	75	20	45	30	4
96692	.15827	4.020	4.020	75	20	45	30	4
96695	.15866	4.030	4.030	75	20	45	30	4
96698	.19646	4.990	4.990	100	25	60	40	4
96701	.19685	5.000	5.000	100	25	60	40	4
96704	.19724	5.010	5.010	100	25	60	40	4
96707	.19764	5.020	5.020	100	25	60	40	4
96710	.19803	5.030	5.030	100	25	60	40	4
96713	.23583	5.990	5.990	100	25	60	40	4
96716	.23622	6.000	6.000	100	25	60	40	4
96719	.23661	6.010	6.010	100	25	60	40	4
96722	.23701	6.020	6.020	100	25	60	40	4
96725	.27559	7.000	7.000	100	25	60	40	6
96728	.31457	7.990	7.990	120	32	75	45	6
96731	.31496	8.000	8.000	120	32	75	45	6
96734	.31535	8.010	8.010	120	32	75	45	6
96737	.31575	8.020	8.020	120	32	75	45	6
96740	.31614	8.030	8.030	120	32	75	45	6
96743	.35433	9.000	9.000	120	32	75	45	6
96746	.39291	9.980	9.980	130	32	75	55	6
96749	.39331	9.990	9.990	130	32	75	55	6
96752	.39370	10.000	10.000	130	32	75	55	6
96755	.39409	10.010	10.010	130	32	75	55	6
96758	.39449	10.020	10.020	130	32	75	55	6
96761	.39488	10.030	10.030	130	32	75	55	6
96764	.39528	10.040	10.040	130	32	75	55	6

EDP#	d_1 Decimal	d_1 Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	l_4 Shank Length	Number Flutes
96767	.47165	11.980	11.980	150	40	100	50	6
96770	.47205	11.990	11.990	150	40	100	50	6
96773	.47244	12.000	12.000	150	40	100	50	6
96776	.47283	12.010	12.010	150	40	100	50	6
96779	.47323	12.020	12.020	150	40	100	50	6
96782	.47362	12.030	12.030	150	40	100	50	6



Reamer Manufacturing



LHS / RHC

STR / RHC

RHS / RHC

Special Reamers - Solid Carbide - 2 Week Delivery

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

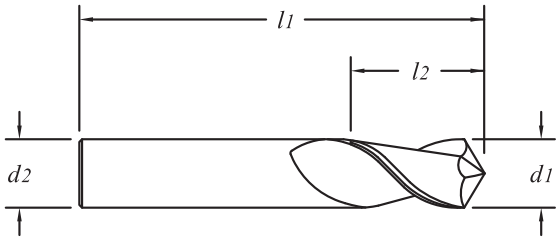
Diameter Decimal	Diameter Metric	Overall Length	Flute Length	No. of Flutes
.0590" - .0650"	1.499 - 1.651	1-1/2"	3/8"	4
.0660" - .0800"	1.676 - 2.032	1-3/4"	1/2"	4
.0810" - .0950"	2.057 - 2.413	2"	1/2"	4
.0960" - .1300"	2.438 - 3.302	2-1/4"	5/8"	4
.1310" - .1590"	3.327 - 4.039	2-1/2"	3/4"	4
.1600" - .1950"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

Series 152M

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

Z=2 | 30° | 90° | TECH PAGES 318-319





MATERIAL HARDNESS (Rc)
70
35
0

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'

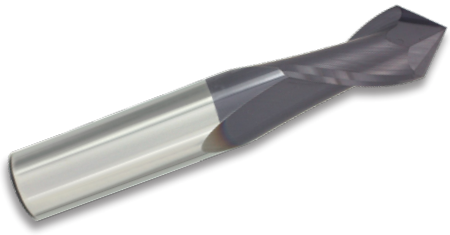
EDP#	d_1 † Diameter Decimal	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
57200	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"
57210	.1875	3/16"	4.763	3/16"	2"	5/8"
57220	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"
57230	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"
57240	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
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"

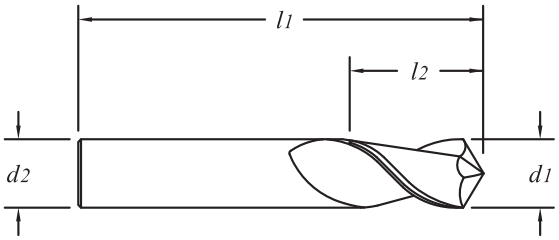
† *Metric equivalents are for reference only*

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

Z=2 | 30° | 90° | TECH PAGES 318-319

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'

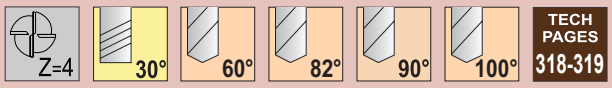
整体硬质合金立铣刀/钻头
夹角逐渐变细并形成尖端 – 中心切削
刀具没有钻尖部份
功能极多
钻点允差: ±0°30'

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"

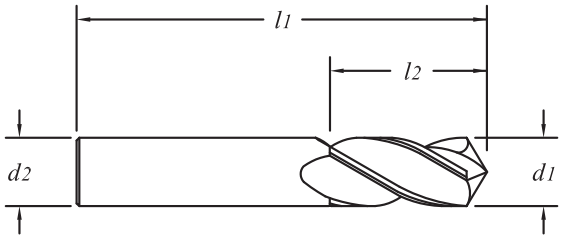
MATERIAL HARDNESS (Rc)
70
35
0

Series 154M

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







MATERIAL HARDNESS (Rc)
70
35
0

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'

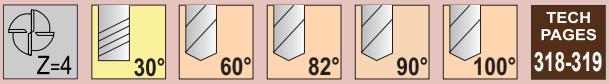
Punte / Fresa de sub-micro grano metallo duro
Incluso l'angolo al punto - taglio al centro
Gli utensili non hanno la geometria drill point
Estremamente varsatile
Tolleranza punto: ±0°30'

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	d_1 † Diameter	d_1 † 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"

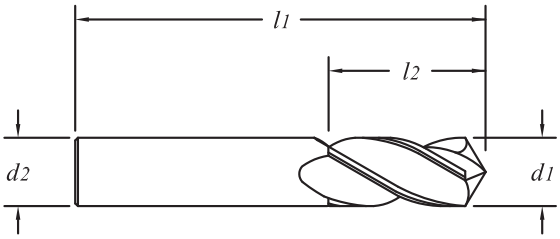
† *Metric equivalents are for reference only*

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



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'

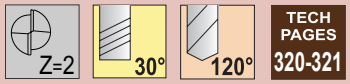
整体硬质合金立铣刀/钻头
夹角逐渐变细并形成尖端 – 中心切削
刀具没有钻尖部份
功能极多
钻点允差: ±0°30'

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

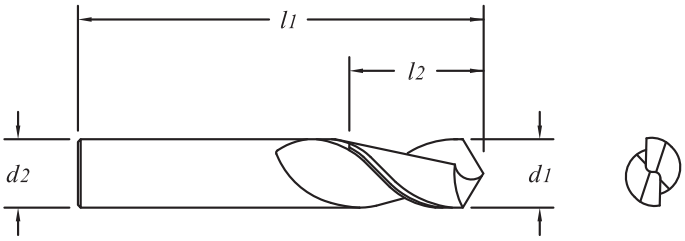
TOLERANCES	
d_1	+.000" –.002" (+.000 /–.050mm)
d_2	h6



TECH PAGES 320-321

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





MATERIAL HARDNESS (Rc)
70
35
0

Solid submicron grain carbide drill/end mill
Recommended for drilling and milling of mild steels and non-ferrous materials
4-facet drill point geometry
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
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
Extremadamente versátil
Tolerancia del punta: ±1°

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
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
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
功能极多
钻点允差: ±1°

EDP#	d_1 † Diameter Decimal		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*


Sfar
NTG6RL


630XW
ROLLOMATIC


TXcell


MX7

Series ARC

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

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



TECH PAGES 293

Aluminum Rough Cut Mill - Bright Finish (Uncoated)
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

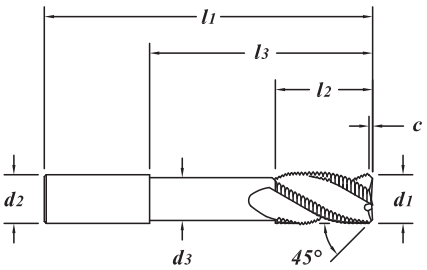
Hochleistungs- Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Standard 45° Führungsfase
Schruppprofil entwickelt, um die Spänne zu brechen
Jede Spannnute hat einen Spiralwinkel, um die Vibrationen zu vermeiden
Reduziert den Druck auf das Werkzeug und erfordert weniger Maschinenleistung
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"

† *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
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)

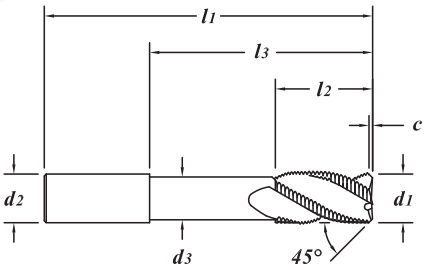
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
d_3	+.000" –.005" (+.000 –.127mm)



TECH PAGES 294-295

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

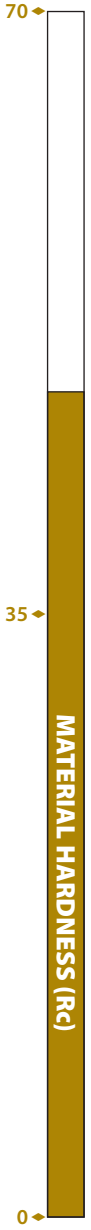
超细晶粒整体硬质合金立铣刀 - 中心切削
最先进的整体硬质合金粗切刀具/用途 VRX 技术
减少刀具压力，用于更高速度，更大进给的加工
推荐加工不锈钢、铬镍铁耐热耐蚀合金、含磷材质、冷轧钢、钛钢、铸铁和工具钢
不等分刃设计

EDP#	d_1 † 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	-	-

GARR TOOL®

† Metric equivalents are for reference only

EDP#	*d1* † Diameter Decimal	Diameter	Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*c* Chamfer Length	*l3* Reach Length	*d3* 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

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

NEW ITEMS

HIGH EFFICIENCY MILLING

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

Z=3 | VAR | TECH PAGES 290-292

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

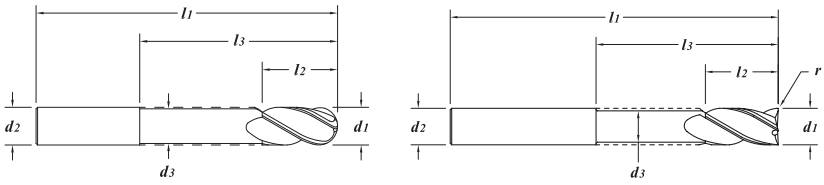
Hochleistungs - Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Entwickelt für die Hochgeschwindigkeitsbearbeitung von Aluminium
Proprietäre Geometrie mit polierten Flöten bricht Harmonische auf
Die verbesserte End geometrie bietet hervorragende Bodenbeläge und erhöhte Eintauchraten
Kann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

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

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

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

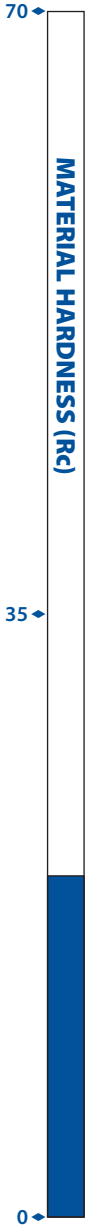
超细晶粒整体硬质合金立铣刀 - 中心切削
专为铝的高速加工而设计
专有的几何形状和抛光的凹槽可以消除谐波
改进的端部几何形状可提供出色的地板光洁度和增加的切入率
能够运行高达40,000RPM-减少振动和平衡问题
切屑分离器和刀柄上的颈部可在48小时内添加



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
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
NEW 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
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"

† 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
	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"
NEW	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"
NEW	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 →

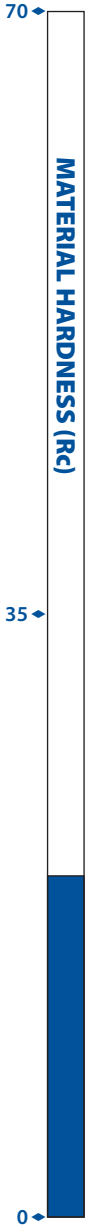
Series A3 *(continued)*

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

	EDP#	d_1 † Diameter Decimal	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	-	-
NEW	07215	.5000	1/2"	12.700	1/2"	3"	1"	-	-	-
NEW	07216	.5000	1/2"	12.700	1/2"	3"	1"	.030"	-	-
NEW	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"	-	-
NEW	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	-	-
NEW	07219	.5000	1/2"	12.700	1/2"	3"	1/2"	.030"	1-1/2"	.470"
NEW	07220	.5000	1/2"	12.700	1/2"	3"	1/2"	.090"	1-1/2"	.470"
NEW	07221	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-
NEW	07222	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.030"	-	-
NEW	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"	-	-
NEW	07224	.5000	1/2"	12.700	1/2"	4"	1/2"	.090"	2"	.470"
NEW	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"	-	-
NEW	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"
NEW	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
NEW	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
NEW	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"	-	-
NEW	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"	-	-
NEW	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"
NEW	07155	.7500	3/4"	19.050	3/4"	4"	1"	.160"	2"	.715"
NEW	07156	.7500	3/4"	19.050	3/4"	4"	1"	.190"	2"	.715"
NEW	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"	-	-
NEW	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)

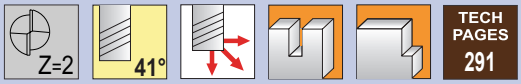
MATERIAL HARDNESS (Rc)
70
35
0

	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
	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
NEW	07184	.7874		20.000	20.0	150	30	3.00	100	19.40
NEW	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"
NEW	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"
NEW	07196	1.000	1"	25.400	1"	5"	1"	-	2-5/8"	.950"
NEW	07197	1.000	1"	25.400	1"	5"	1"	.030"	2-5/8"	.950"
NEW	07198	1.000	1"	25.400	1"	5"	1"	.060"	2-5/8"	.950"
NEW	07199	1.000	1"	25.400	1"	5"	1"	.125"	2-5/8"	.950"
NEW	07200	1.000	1"	25.400	1"	5"	1"	.250"	2-5/8"	.950"
NEW	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"	-	-
NEW	07205	1.000	1"	25.400	1"	5"	2-1/4"	.120"	-	-
NEW	07206	1.000	1"	25.400	1"	5"	2-1/4"	.250"	-	-
NEW	07207	1.000	1"	25.400	1"	6"	3-1/4"	-	-	-
NEW	07208	1.000	1"	25.400	1"	6"	3-1/4"	.030"	-	-
NEW	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" –.001" (+.000 –.025mm)
d_2	h6

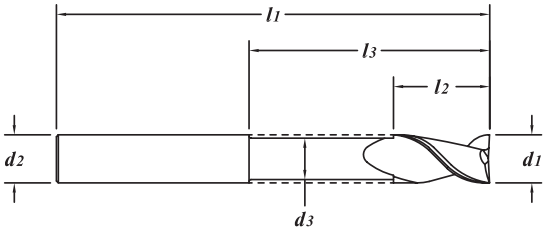
HIGH EFFICIENCY MILLING



TECH PAGES 291

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

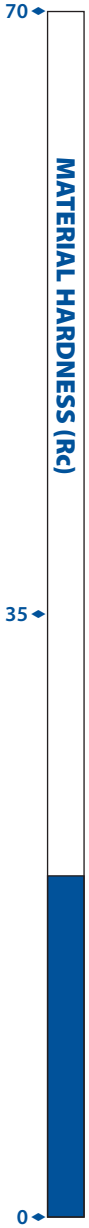
Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Recubrimiento concebido específicamente para repeler el aluminio
Diseñado para trabajar a 225-750 M/Min. (750-2500 SFM)
Para el mecanizado a alta velocidad de aluminio
Alta velocidad – alto índice de desalojo de viruta (Para husillos 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 † Diameter Decimal	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)

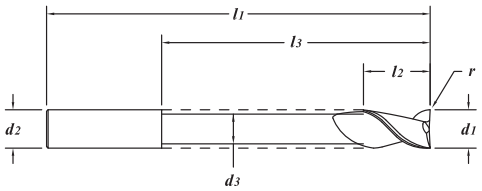
HIGH EFFICIENCY MILLING



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

HSAL - Corner Radius - ALUMASTAR Coated
HSAL - Eckenradius - ALUMASTAR-Beschichtet
HSAL - Ángulo Redondeado - Recubrimiento de ALUMASTAR
HSAL - Rayon de Coin - Revêtement ALUMASTAR
HSAL - Torica - 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 † 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
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

† 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



Series 142B

HIGH EFFICIENCY MILLING

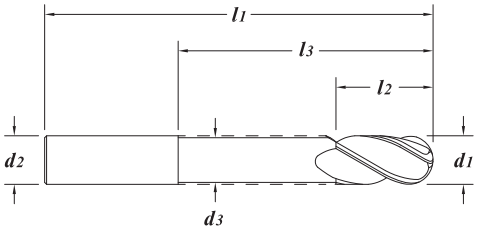
TOLERANCES	
d_1	+.000" –.001" (+.000 –.025mm)
d_2	h6
ball radius	+.0000" –.0005" (+.0000 –.0127mm)



TECH PAGES 291

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 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
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—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	Diameter	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"	-	-

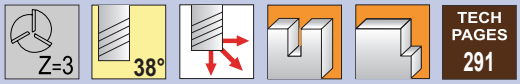
† *Metric equivalents are for reference only*

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

HIGH EFFICIENCY MILLING

Series 143M

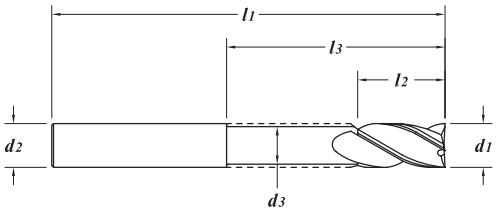
.1181" - .3150"
(3.000mm - 8.000mm)



TECH PAGES 291

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





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Hilft die Perpendicularität zu halten
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Ayuda a mantener la perpendicularidad
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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

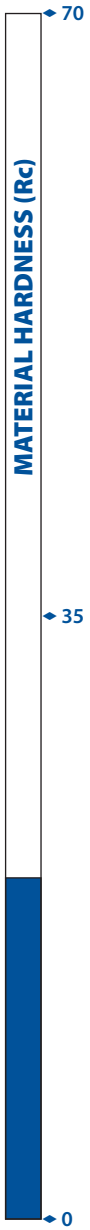
	EDP#	d_1 † Decimal	d_1 † Diameter	d_1 † Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter
	41173	.1181		3.000	3.0	38	6	-	-
	41183	.1181		3.000	3.0	38	12	-	-
	41193	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	-	-
	41203	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	-	-
	41213	.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
NEW	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

MATERIAL HARDNESS (Rc)
70
35
0

continued →

Series 143M *(continued)*

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



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
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	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"	-	-
NEW	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"	-	-



70
MATERIAL HARDNESS (Rc)
35
0

Series 143R

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

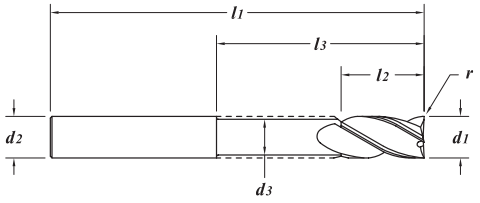
HIGH EFFICIENCY MILLING



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

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





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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

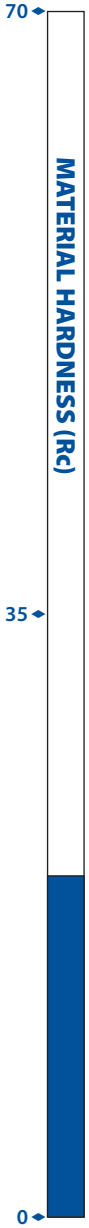
Fresa sub-micrograno metallo duro - taglio al centro
Rivestimento specifico costruito per respingere alluminio
Costruito per alta velocità 225-750 M/Min. (750-2500 SFM)
Per lavorazioni ad alta velocità su alluminio
Alta velocità - Alto volume di materiale asportato (Per 5.000-20.000 Giri al minuto)
Usare 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—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	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
	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
NEW	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"	-	-
NEW	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	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"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	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

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Series TMS

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

HIGH EFFICIENCY MILLING

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

TECH PAGES 306-307

Multi-Flute End Mill - Square End - AlCrN-based Coated

Mehrzähne fräser - Ohne Eckenradius - AlCrN-Basierende Beschichtet

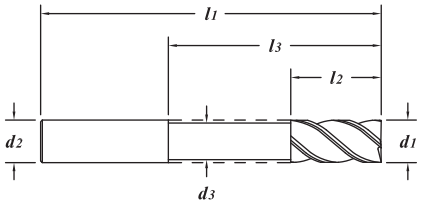
Fresa de Multi Labio - Extremo Sin Radio - Recubrimiento Basado en AlCrN

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 Oberfläschezustand 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)

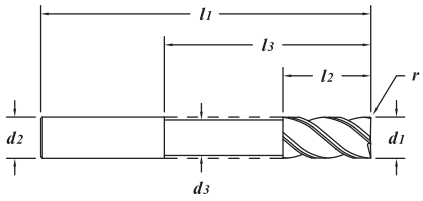
HIGH EFFICIENCY MILLING

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

TECH PAGES 306-307

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 - Torico - Rivestimento in Base AlCrN
多刃加工铣刀 - 圆角半径 - 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	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
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	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	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 →

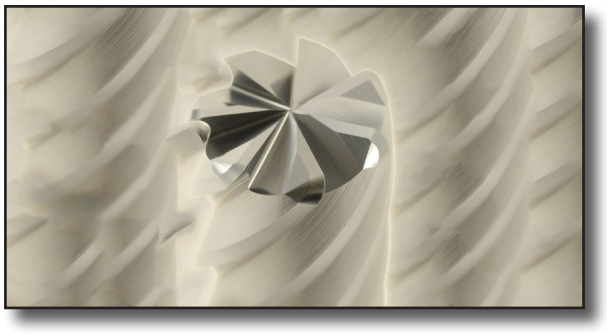
Series TMR *(continued)*

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

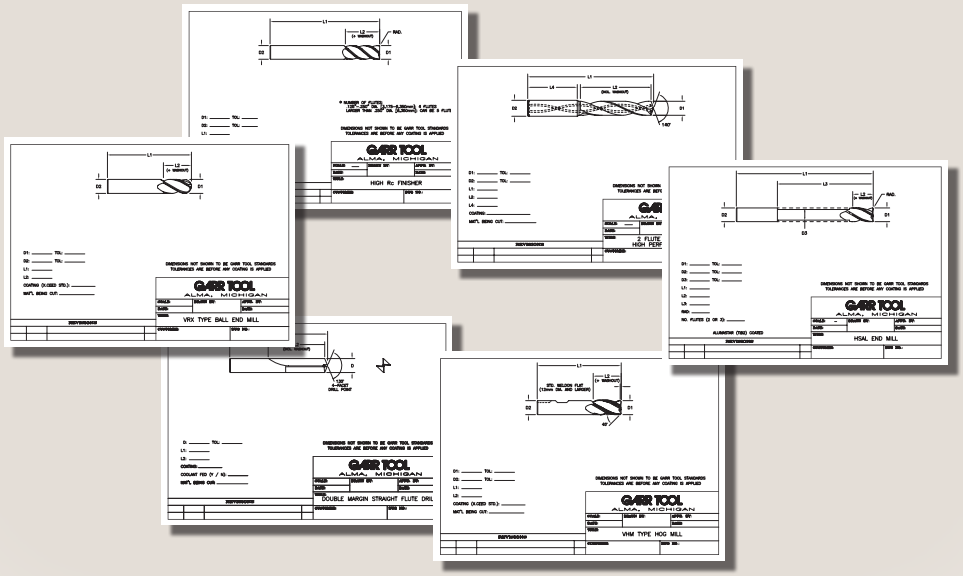
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	Number Flutes
98680	.6299		16.000	16.0	88	32	0.50	-	-	7
98690	.6299		16.000	16.0	88	32	3.00	-	-	7
98696	.6299		16.000	16.0	100	42	0.50	-	-	7
98700	.6299		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" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)
ball radius	+.000" –.001" (+.000 –.025mm)

HIGH EFFICIENCY MILLING

Z=4 | VAR | TECH PAGES 298-299

Series V4S, V4R, V4B

NEW ITEMS

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

Variable Helix End Mill - AlCrN-based Coated

Fräser mit Einer Variablen Spiralgeometrie - AlCrN-Basierende Beschichtet

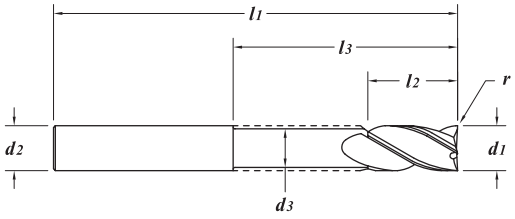
Fresa de Hélice Variable - Recubrimiento Basado en AlCrN

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，镍镍铁合金，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
整个切削刃的螺旋角可变
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	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
NEW	50171	-	.1562	5/32"	3.967	1/4"	2"	1/2"	-	-	-
NEW	50172	-	.1562	5/32"	3.967	1/4"	2"	1/2"	.010"	-	-
NEW	50173	-	.1562	5/32"	3.967	1/4"	2"	1/2"	.015"	-	-
NEW	50174	-	.1562	5/32"	3.967	1/4"	2"	1/2"	.020"	-	-
NEW	50175	-	.1562	5/32"	3.967	1/4"	2"	1/2"	.030"	-	-
NEW	50176	-	.1562	5/32"	3.967	1/4"	2"	1/2"	BALL	-	-
NEW	50177	-	.1575		4.000	6.0	50	12	-	-	-
NEW	50178	-	.1575		4.000	6.0	50	12	0.20	-	-
NEW	50179	-	.1575		4.000	6.0	50	12	0.30	-	-
NEW	50180	-	.1575		4.000	6.0	50	12	0.50	-	-
NEW	50181	-	.1575		4.000	6.0	50	12	BALL	-	-
NEW	50182	-	.1875	3/16"	4.763	1/4"	2"	1/2"	-	-	-
NEW	50183	-	.1875	3/16"	4.763	1/4"	2"	1/2"	.010"	-	-
NEW	50184	-	.1875	3/16"	4.763	1/4"	2"	1/2"	.015"	-	-
NEW	50185	-	.1875	3/16"	4.763	1/4"	2"	1/2"	.020"	-	-
NEW	50186	-	.1875	3/16"	4.763	1/4"	2"	1/2"	.030"	-	-
NEW	50187	-	.1875	3/16"	4.763	1/4"	2"	1/2"	BALL	-	-
NEW	50188	-	.1969		5.000	6.0	65	20	-	-	-
NEW	50189	-	.1969		5.000	6.0	65	20	0.20	-	-
NEW	50190	-	.1969		5.000	6.0	65	20	0.30	-	-
NEW	50191	-	.1969		5.000	6.0	65	20	0.50	-	-
NEW	50192	-	.1969		5.000	6.0	65	20	BALL	-	-
NEW	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"	-	-
NEW	50197	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.030"	-	-
NEW	50198	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	BALL	-	-

70
35
0
MATERIAL HARDNESS (Rc)

continued →

Series V4S, V4R, V4B *(continued)*

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

	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
	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"	-	-
NEW	50708	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.030"	-	-
NEW	50709	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.040"	-	-
NEW	50710	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.060"	-	-
NEW	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"	-	-
NEW	50712	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.030"	-	-
NEW	50713	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.040"	-	-
NEW	50714	-	.2500	1/4"	6.350	1/4"	2"	1/2"	.060"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	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	-	-
NEW	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"	-	-
NEW	50677	-	.2500	1/4"	6.350	1/4"	3"	1-1/8"	BALL	-	-

† *Metric equivalents are for reference only*

Series V4S, V4R, V4B *(continued)*

.2500" - .3150"
(6.350mm - 8.000mm)

	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
NEW	50654	-	.2500	1/4"	6.350	1/4"	4"	1-1/2"	-	-	-
NEW	50681	-	.2500	1/4"	6.350	1/4"	4"	1-1/2"	BALL	-	-
NEW	50655	-	.2500	1/4"	6.350	1/4"	4"	1-3/4"	-	-	-
NEW	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	-	-
NEW	50656	-	.2500	1/4"	6.350	1/4"	4"	2"	-	-	-
NEW	50683	-	.2500	1/4"	6.350	1/4"	4"	2"	BALL	-	-
NEW	50651	-	.2500	1/4"	6.350	1/4"	3"	3/8"	-	1-1/8"	.237"
NEW	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"
NEW	50679	-	.2500	1/4"	6.350	1/4"	4"	3/8"	BALL	1-1/2"	.237"
NEW	50652	-	.2500	1/4"	6.350	1/4"	4"	3/8"	-	2"	.237"
NEW	50680	-	.2500	1/4"	6.350	1/4"	4"	3/8"	BALL	2"	.237"
NEW	50719	-	.2500	1/4"	6.350	1/4"	6"	3/8"	.010"	4"	.230"
NEW	50680	-	.2500	1/4"	6.350	1/4"	6"	3/8"	BALL	4"	.230"
NEW	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"	-	-
NEW	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"	-	-
NEW	50722	-	.3125	5/16"	7.937	5/16"	2-1/2"	13/16"	.060"	-	-
NEW	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	-	-
NEW	50657	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	-	-	-
NEW	50724	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	.015"	-	-
NEW	50725	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	.030"	-	-
NEW	50726	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	.060"	-	-
NEW	50685	-	.3125	5/16"	7.937	5/16"	3"	1-1/4"	BALL	-	-
NEW	50658	-	.3125	5/16"	7.937	5/16"	3"	7/16"	-	1-1/2"	.295"
NEW	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	-	-
NEW	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	-	-
NEW	50728	-	.3150		8.000	8.0	65	22	3.00	-	-
	50256	-	.3150		8.000	8.0	65	22	BALL	-	-



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Series V4S, V4R, V4B *(continued)*

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

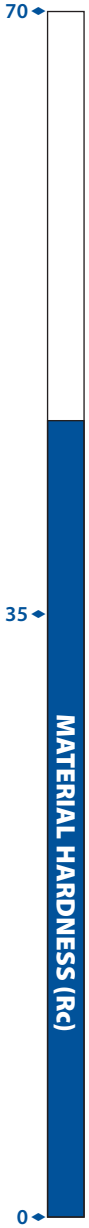
	EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
NEW	50659	-	.3150		8.000	8.0	75	32	-	-	-
NEW	50687	-	.3150		8.000	8.0	75	32	BALL	-	-
NEW	50660	-	.3150		8.000	8.0	100	12	-	50	7.50
NEW	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"	-	-
NEW	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"	-	-
NEW	50730	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.060"	-	-
NEW	50732	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.090"	-	-
NEW	50733	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.120"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	50737	-	.3750	3/8"	9.525	3/8"	2-1/2"	1"	.120"	-	-
NEW	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	-	-
NEW	50661	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	-	-	-
NEW	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"	-	-
NEW	50740	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.060"	-	-
NEW	50689	-	.3750	3/8"	9.525	3/8"	3"	1-1/4"	BALL	-	-
NEW	50662	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	-	-	-
NEW	50741	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.015"	-	-
NEW	50742	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.030"	-	-
NEW	50743	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.060"	-	-
NEW	50744	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	.120"	-	-
NEW	50690	-	.3750	3/8"	9.525	3/8"	4"	1-1/2"	BALL	-	-
NEW	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	-	-	-
NEW	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	-	-
NEW	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	-	-
NEW	50663	-	.3937		10.000	10.0	70	30	-	-	-
NEW	50691	-	.3937		10.000	10.0	70	30	BALL	-	-

† *Metric equivalents are for reference only*

Series V4S, V4R, V4B *(continued)*

.3937" - .5000"
(10.000mm - 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
NEW	50749	-	.3937	10.000	10.0	70	22	0.50	30	9.40
NEW	50750	-	.3937	10.000	10.0	100	12	0.30	50	9.40
NEW	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	-	-
NEW	50664	-	.4724	12.000	12.0	88	36	-	-	-
NEW	50751	-	.4724	12.000	12.0	88	36	0.30	-	-
NEW	50752	-	.4724	12.000	12.0	88	36	0.50	-	-
NEW	50753	-	.4724	12.000	12.0	88	36	1.00	-	-
NEW	50754	-	.4724	12.000	12.0	88	36	1.50	-	-
NEW	50755	-	.4724	12.000	12.0	88	36	3.00	-	-
NEW	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	-	-
NEW	50665	-	.4724	12.000	12.0	100	48	-	-	-
NEW	50756	-	.4724	12.000	12.0	100	48	0.30	-	-
NEW	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	-	-
NEW	50761	-	.4724	12.000	12.0	100	48	4.00	-	-
NEW	50694	-	.4724	12.000	12.0	100	48	BALL	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	50763	-	.5000	1/2" 12.700	1/2"	2-1/2"	5/8"	.060"	-	-
NEW	50764	-	.5000	1/2" 12.700	1/2"	2-1/2"	5/8"	.090"	-	-
NEW	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"	-	-
NEW	50766	-	.5000	1/2" 12.700	1/2"	2-1/2"	5/8"	.156"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	50769	-	.5000	1/2"	12.700	1/2"	3"	1"	.090"	-	-
NEW	50770	-	.5000	1/2"	12.700	1/2"	3"	1"	.120"	-	-
NEW	50771	-	.5000	1/2"	12.700	1/2"	3"	1"	.125"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	50774	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.090"	-	-
NEW	50775	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-
NEW	50776	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.125"	-	-
NEW	50777	-	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.156"	-	-
NEW	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	-	-
NEW	50666	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	-	-	-
NEW	50779	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.010"	-	-
NEW	50780	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.015"	-	-
NEW	50781	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.020"	-	-
NEW	50782	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.030"	-	-
NEW	50783	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.060"	-	-
NEW	50784	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.090"	-	-
NEW	50785	-	.5000	1/2"	12.700	1/2"	3-1/2"	1-1/2"	.120"	-	-
NEW	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"	-	-	-
NEW	50786	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.010"	-	-
NEW	50787	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.015"	-	-
NEW	50788	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.020"	-	-
NEW	50789	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-
NEW	50790	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.060"	-	-
NEW	50791	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.090"	-	-
NEW	50792	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.120"	-	-
NEW	50793	-	.5000	1/2"	12.700	1/2"	4"	2-1/8"	.125"	-	-
NEW	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	-	-

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
NEW	50668	-	.5000	1/2"	12.700	1/2"	6"	3"	-	-	-
NEW	50795	-	.5000	1/2"	12.700	1/2"	6"	3"	.020"	-	-
NEW	50796	-	.5000	1/2"	12.700	1/2"	6"	3"	.030"	-	-
NEW	50797	-	.5000	1/2"	12.700	1/2"	6"	3"	.060"	-	-
NEW	50798	-	.5000	1/2"	12.700	1/2"	6"	3"	.120"	-	-
NEW	50799	-	.5000	1/2"	12.700	1/2"	6"	3"	.190"	-	-
NEW	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"
NEW	50900	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.030"	2-1/4"	.470"
NEW	50901	-	.5000	1/2"	12.700	1/2"	4"	5/8"	.060"	2-1/4"	.470"
NEW	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"
NEW	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"
NEW	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"	-	-	-
NEW	50903	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.010"	-	-
NEW	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"	-	-
NEW	50906	-	.6250	5/8"	15.875	5/8"	3"	3/4"	.120"	-	-
NEW	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"	-	-
NEW	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"	-	-	-
NEW	50911	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	50916	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.190"	-	-
NEW	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	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
NEW	50669	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	-	-	-
NEW	50918	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.010"	-	-
NEW	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"	-	-
NEW	50921	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.030"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	50927	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.190"	-	-
NEW	50928	-	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.250"	-	-
NEW	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"	-	-	-
NEW	50670	-	.6250	5/8"	15.875	5/8"	4"	1-3/4"	-	-	-
NEW	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	-	-
NEW	50932	-	.6299		16.000	16.0	88	32	2.50	-	-
	50417	50418	.6299		16.000	16.0	88	32	3.00	-	-
NEW	50933	-	.6299		16.000	16.0	88	32	4.00	-	-
NEW	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	-	-
NEW	50671	-	.6299		16.000	16.0	100	48	-	-	-
NEW	50936	-	.6299		16.000	16.0	100	48	0.50	-	-
NEW	50937	-	.6299		16.000	16.0	100	48	1.00	-	-
NEW	50938	-	.6299		16.000	16.0	100	48	1.50	-	-
NEW	50939	-	.6299		16.000	16.0	100	48	2.00	-	-
NEW	50940	-	.6299		16.000	16.0	100	48	3.00	-	-
NEW	50941	-	.6299		16.000	16.0	100	48	4.00	-	-
NEW	50942	-	.6299		16.000	16.0	100	48	5.00	-	-
NEW	50943	-	.6299		16.000	16.0	100	48	6.00	-	-
NEW	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	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"	-	-
NEW	50951	-	.7500	3/4"	19.050	3/4"	4"	1"	.090"	-	-
NEW	50952	-	.7500	3/4"	19.050	3/4"	4"	1"	.120"	-	-
NEW	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"	-	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	50959	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.125"	-	-
NEW	50960	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.156"	-	-
NEW	50961	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.190"	-	-
NEW	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"	-	-	-
NEW	50964	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.010"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	50968	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.125"	-	-
NEW	50969	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.156"	-	-
NEW	50970	-	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.190"	-	-
NEW	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"
(19.050 - 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"	-	-	-
NEW	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"	-	-
NEW	50975	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.020"	-	-
NEW	50976	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.030"	-	-
NEW	50977	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.060"	-	-
NEW	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"	-	-
NEW	50980	-	.7500	3/4"	19.050	3/4"	5"	2-1/8"	.125"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	50672	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	-	-	-
NEW	50985	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.010"	-	-
NEW	50986	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.015"	-	-
NEW	50987	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.020"	-	-
NEW	50988	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.030"	-	-
NEW	50989	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.060"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	50994	-	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.190"	-	-
NEW	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"	-	-
NEW	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	-	-
NEW	50998	-	.7874		20.000	20.0	100	38	2.50	-	-
	50532	-	.7874		20.000	20.0	100	38	3.00	-	-
NEW	50999	-	.7874		20.000	20.0	100	38	4.00	-	-
NEW	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	-	-
NEW	50673	-	.7874		20.000	20.0	100	48	-	-	-
NEW	50124	-	.7874		20.000	20.0	100	48	0.50	-	-
NEW	50125	-	.7874		20.000	20.0	100	48	1.00	-	-
NEW	50126	-	.7874		20.000	20.0	100	48	1.50	-	-
NEW	50127	-	.7874		20.000	20.0	100	48	2.00	-	-
NEW	50128	-	.7874		20.000	20.0	100	48	2.50	-	-
NEW	50129	-	.7874		20.000	20.0	100	48	3.00	-	-
NEW	50131	-	.7874		20.000	20.0	100	48	4.00	-	-
NEW	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	-	-
NEW	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 Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
NEW	50674	-	.7874		20.000	20.0	150	60	-	-	-
NEW	50135	-	.7874		20.000	20.0	150	60	0.50	-	-
NEW	50136	-	.7874		20.000	20.0	150	60	1.00	-	-
NEW	50137	-	.7874		20.000	20.0	150	60	3.00	-	-
NEW	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"	-	-
NEW	50145	-	1.000	1"	25.400	1"	4"	1-1/2"	.190"	-	-
NEW	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"	-	-
NEW	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	-	-
NEW	50675	-	1.000	1"	25.400	1"	4-1/2"	2"	-	-	-
NEW	50149	-	1.000	1"	25.400	1"	4-1/2"	2"	.020"		
NEW	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"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	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"	-	-
NEW	50707	-	1.000	1"	25.400	1"	5"	2-1/2"	BALL	-	-



NOTES



V4-S series in 1018 material

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Series V5

NEW ITEMS

HIGH EFFICIENCY MILLING

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

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

Z=5 | VAR | TECH PAGES 300-301

Variable Helix End Mill - AlCrN Coated

Fräser mit Einer Variablen Spiralgeometrie - AlCrN-Beschichtet

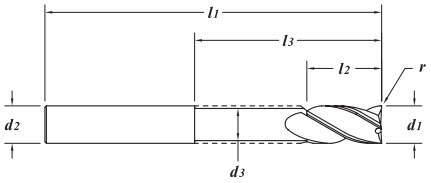
Fresa de Hélice Variable - Recubrimiento de AlCrN

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, inconel, and stainless steel (< 40Rc)
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, Inconel, und Rostfreie Stahl (<40HRc)
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, Inconel, y Acero Inoxidable (<40 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, inconel, et aciers (<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
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, Inconel, e Acciai (<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
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
推荐的加工钛，铬镍铁合金，不锈钢 (<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		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
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"	-	-

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† *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
	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

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Series V5 *(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
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"

† *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	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

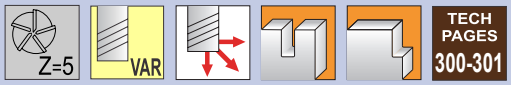
† *Metric equivalents are for reference only*

	EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	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
	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



TECH PAGES 300-301

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

Variable Helix End Mill - AlCrN Coated

Fräser mit Einer Variablen Spiralgeometrie - AlCrN-Beschichtet

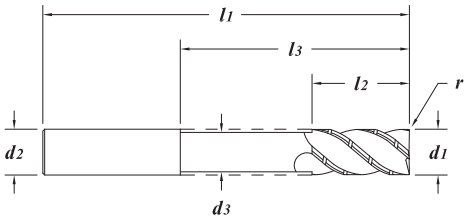
Fresa de Hélice Variable - Recubrimiento de AlCrN

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, inconel, and stainless steel (< 40Rc)
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, Inconel, und Rostfreie Stahl (<40HRc)
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, Inconel, y Acero Inoxidable (<40 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, inconel, et aciers (<40 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, Inconel, e Acciai (<40 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
推荐的加工钛，铬镍铁合金，不锈钢 (<40HRC)
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"	-	-
NEW	50869	1.000	1"	25.400	1"	5"	2-1/2"	.030"	-	-
NEW	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 HIGH EFFICIENCY MILLING

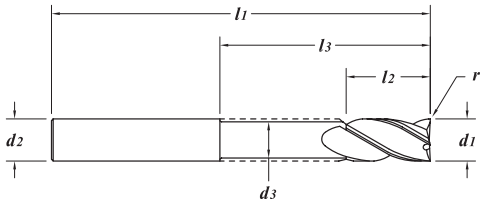
.3150" - .5000"
(8.000mm - 12.700mm)

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

Z=7 | 38° | TECH PAGES 304-305

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





70
35
0
MATERIAL HARDNESS (Rc)

Solid submicron grain carbide end mill - non-center cutting
Engineered for High Efficiency Milling
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
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
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
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
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
有效的摆线 铣削
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	-	-
NEW	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	-	-
	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"	-	-
NEW	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"	-	-
NEW	64123	.3750	3/8"	9.525	3/8"	3"	1-1/2"	.060"	-	-
NEW	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	-	-
NEW	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	-	-
	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"	-	-
NEW	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"	-	-

† 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	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
	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"	-	-
NEW	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"	-	-
NEW	64161	.5000	1/2"	12.700	1/2"	4"	5/8"	.015"	2-1/8"	.475"
NEW	64242	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	-	-
NEW	64244	.5000	1/2"	12.700	1/2"	4"	1-5/8"	.015"	-	-
	64162	.5000	1/2"	12.700	1/2"	4"	2"	-	-	-
NEW	64163	.5000	1/2"	12.700	1/2"	4"	2"	.015"	-	-
	64164	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-
NEW	64165	.5000	1/2"	12.700	1/2"	4"	2"	.125"	-	-
NEW	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"	-	-
NEW	64177	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.120"	-	-
NEW	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	-	-
NEW	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	-	-
NEW	64252	.7500	3/4"	19.050	3/4"	3"	1"	-	-	-
NEW	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"	-	-
NEW	64256	.7500	3/4"	19.050	3/4"	4"	1-3/4"	-	-	-
NEW	64258	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-
NEW	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"	-	-
NEW	64264	.7500	3/4"	19.050	3/4"	5"	2-1/2"	.060"	-	-
NEW	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"	-	-

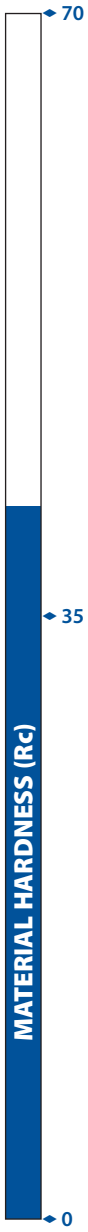


continued →

Series VX-7 *(continued)*

.7874" - 1.0000"
(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
	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"	-	-	-
NEW	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"	-	-



† *Metric equivalents are for reference only*

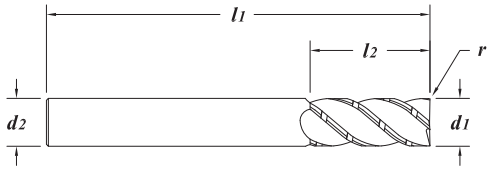
TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

HIGH EFFICIENCY MILLING

Z=7 | 38° | TECH PAGES 304-305

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





Solid submicron grain carbide end mill - non-center cutting
Chip splitter to help break long chips
Engineered for High Efficiency Milling
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
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
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
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
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
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"
NEW 64389	.7874	20.000	20.0	100	38	0.50
64400	1.000	1" 25.400	1"	5"	2-1/2"	.030"

70 ◆ 35 ◆ 0

Series VRX

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

NEW ITEMS

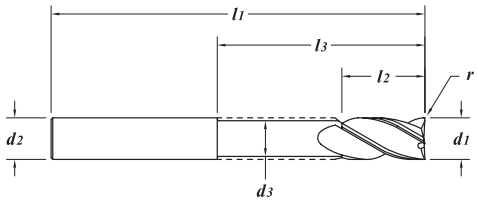
HIGH EFFICIENCY MILLING

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

Z=4 | 41° | TECH PAGES 296-297

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, Torico, 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 frío, 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
高性能铣削的标準
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)	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
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*

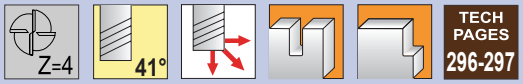
EDP# (plain)	EDP# (weldon)	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter
61240	-	.2500	1/4"	6.350	1/4"	3"	1"	.015"	-	-
61241	-	.2500	1/4"	6.350	1/4"	3"	1-1/8"	.030"	-	-
61242	-	.2500	1/4"	6.350	1/4"	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 →

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

HIGH EFFICIENCY MILLING

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



TECH PAGES 296-297

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, Torico, Sferica - Rivestimento in AlTiN
平头, 圆角半径, 球头 - AlTiN 涂层



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	-	-
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)	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
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)	*d1* † Diameter Decimal	*d1* † Diameter	*d1* † Diameter Metric	*d2* Shank Diameter	*l1* Overall Length	*l2* Flute Length	*r* Corner Radius	*l3* Reach Length	*d3* 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	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
	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	-	-

† *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	-	-	-
NEW	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	-	-
NEW	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"	-	-
NEW	61540	-	1.000	1"	25.400	1"	4"	1-3/4"	.190"	-	-
NEW	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"	-	-
NEW	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"
NEW	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

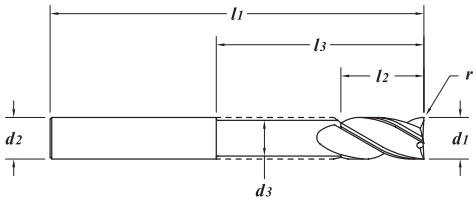


TECH PAGES 302-303

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

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, Torico - Rivestimento in AlTiN
平头，圆角半径 - AlTiN 涂层





MATERIAL HARDNESS (Rc)
70
35
0

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

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

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
有效的摆线铣削

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
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"	-	-	-
NEW	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"	-	-
NEW	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"	-	-	-
NEW	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
NEW	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"	-	-
NEW	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

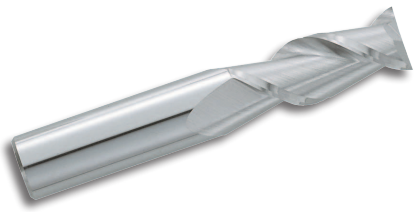


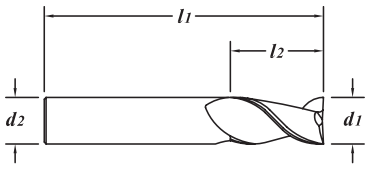
HIGH PERFORMANCE END MILLS

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

TECH PAGES 290

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

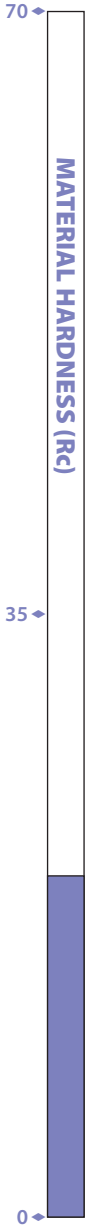
Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Excelente elección para ranurado
El margen de D.E. cilíndrico pulido reduce las vibraciones
Recomendado 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

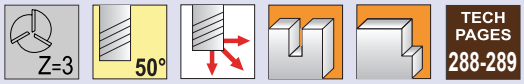
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
08910	.1181		3.000	3.0	38	8
08920	.1181		3.000	3.0	50	12
85160	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"
85170	.1250	1/8"	3.175	1/8"	2"	1/2"
08950	.1575		4.000	6.0	50	8
08960	.1575		4.000	6.0	50	12
85180	.1875	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)

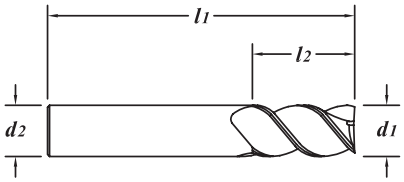
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



TECH PAGES 288-289

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)
Uncoated - page 180
TiCN Coated - page 182

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)
Unbeschichtet - Seite 180
TiCN-Beschichtet - 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
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)
Sin recubrimiento - Página 180
Recubrimiento de TiCN - 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
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)
Sans revêtement - Page 180
Revêtement TiCN - Page 182

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)
Non Rivestito - Pagina 180
Rivestimento in TiCN - 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!
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）
未涂层 - 180页
TiCN 涂层 - 182页

EDP#	d_1 † Diameter Decimal	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

GARR TOOL®

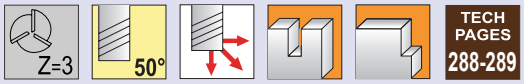
† Metric equivalents are for reference only

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
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)

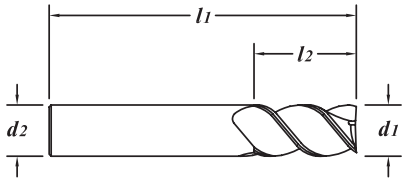
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



TECH PAGES 288-289

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 178
TiCN Coated - page 182

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 178
TiCN-Beschichtet - Seite 182

35

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 178
Recubrimiento de TiCN - Página 182

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 178
Revêtement TiCN - Page 182

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 178
Rivestimento in TiCN - Pagina 182

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 - 178页
TiCN 涂层 - 182页

0

MATERIAL HARDNESS (Rc)

EDP#	d_1 † Diameter Decimal	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

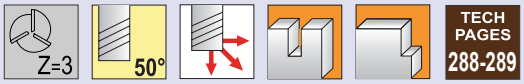
† *Metric equivalents are for reference only*

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

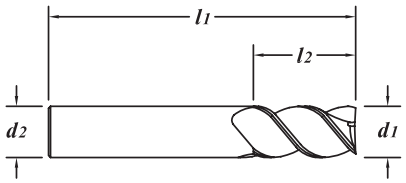
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



TECH PAGES 288-289

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 178
Uncoated - page 180

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 178
Unbeschichtet - Seite 180

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 178
Sin recubrimiento - Página 180

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 178
Sans revêtement - Page 180

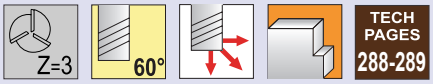
Fresa sub-micrograno metallo duro - taglio al centro
Alte prestazioni per lavorazioni di inox e alluminio
Serraggio rigido, macchina stabile e ottimo bloccaggio del pezzo sono necessari!
Maggiore resistenza all'abrasione
Lavorazione dal pieno su alluminio con profondità di taglio consigliata pari al 25% del diametro
Raccomandata per lavorazioni su inox e alluminio
Tagliente vivo (Può essere modificata con un raggio)
Rivestimento in AlTiN - Pagina 178
Non Rivestito - Pagina 180

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 - 178页
未涂层 - 180页

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

† *Metric equivalents are for reference only*

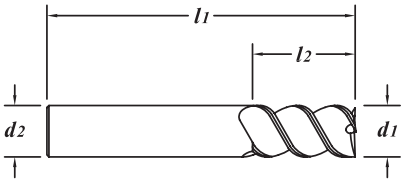
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



TECH PAGES 288-289



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
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
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
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
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
Rivestimento in TiCN
Rivestimento in AlTiN

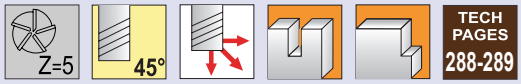
高效超细晶粒整体硬质合金立铣刀 - 中心切削
在钢件、不锈钢和耐高温合金钢上作仿形切削
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素!
修整底端面—不能切削直形角
可以改为圆角
TiCN 涂层
AlTiN 涂层

(263M) UNCOATED 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"

Series 255MA, 855MA

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

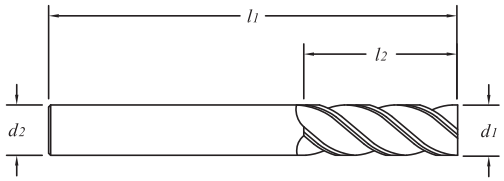
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



TECH PAGES 288-289

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 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
Uncoated - page 186
TiCN Coated - page 188

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
Unbeschichtet - Seite 186
TiCN-Beschichtet - 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
Mecanizado seco o semiseco
Acabados mejorados en titanio
Núcleo pesado, Esquinas afiladas
Recomendado para aceros, acero inoxidable y materiales exóticos
Sin recubrimiento - Página 186
Recubrimiento de TiCN - Página 188

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
Sans revêtement - Page 186
Revêtement TiCN - 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
Non Rivestito - Pagina 186
Rivestimento in TiCN - Pagina 188

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
未涂层 - 186页
TiCN 涂层 - 188页

EDP#	d_1 † Diameter Decimal		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"

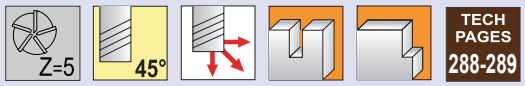


End Mill Manufacturing

Series 255M, 855M

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

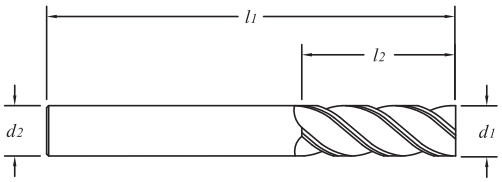
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



TECH PAGES 288-289

Square End
Ohne Eckenradius
Extremo Sin Radio
Extrémité Carré
Piatte
平头





70
35
0

MATERIAL HARDNESS (Rc)

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 184
TiCN Coated - page 188

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 184
TiCN-Beschichtet - 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
Acabados mejorados en titanio
Núcleo pesado, Esquinas afiladas
Recomendado para aceros, acero inoxidable y materiales exóticos
Recubrimiento de AlTiN - Página 184
Recubrimiento de TiCN - Página 188

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 184
Revêtement TiCN - 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!
Migliore finitura sul titanio
Dovere nucleo pesante, tagliente vivo
Consigliata per una di acciai, inox e materiali esotici
Rivestimento in AlTiN - Pagina 184
Rivestimento in TiCN - Pagina 188

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 - 184页
TiCN 涂层 - 188页

EDP#	d_1 † Diameter Decimal	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*

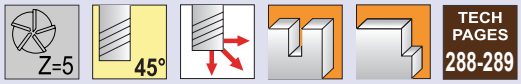
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
52700	.6250	5/8"	15.875	5/8"	3"	3/4"
52720	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"
52740	.6250	5/8"	15.875	5/8"	6"	2-1/2"
40600	.6299		16.000	16.0	75	20
40620	.6299		16.000	16.0	88	41
40640	.6299		16.000	16.0	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

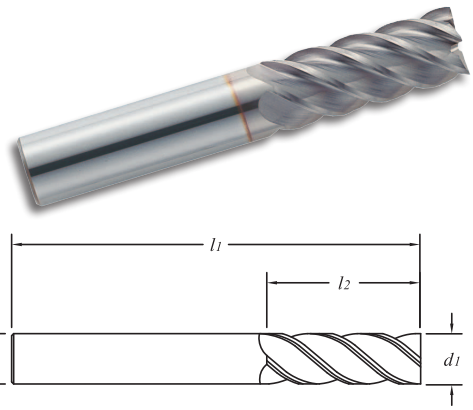
.1875" - 1.000"
(4.763mm - 25.400mm)

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



TECH PAGES 288-289

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 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 184
Uncoated - page 186

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 184
Unbeschichtet - Seite 186

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 184
Sin recubrimiento - Página 186

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 184
Sans revêtement - Page 186

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 184
Non Rivestito - Pagina 186

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 - 184页
未涂层 - 186页

EDP#	d_1 † Diameter Decimal	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"

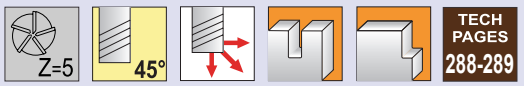
GARR TOOL®

† *Metric equivalents are for reference only*

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

Series 255RA, 855RA

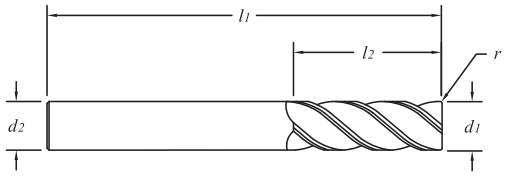
.1181" - .3125"
(3.000mm - 7.938mm)



TECH PAGES 288-289

Corner Radius - AlTiN Coated
Eckenradius - AlTiN-Beschichtet
Ángulo Redondeado - Recubrimiento de AlTiN
Rayon de Coin - Revêtement AlTiN
Torica - 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"

70
35
0
MATERIAL HARDNESS (Rc)

continued →

Series 255RA, 855RA *(continued)*

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

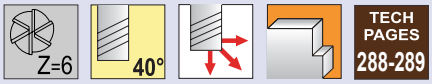
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
83987	.3150		8.000	8.0	50	12	0.50
83997	.3150		8.000	8.0	50	12	1.00
84000	.3150		8.000	8.0	65	22	0.30
84007	.3150		8.000	8.0	65	22	0.50
84017	.3150		8.000	8.0	65	22	1.00
84027	.3150		8.000	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*

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

NEW ITEM

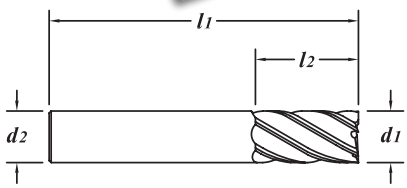
Series 246M, 246MC, 246MA, 846M, 846MA



TECH PAGES 288-289

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
TiCN Coated
AlTiN Coated

Vollhartmetallbohrer aus Feinkornhartmetall - Zentrumsschnitt
Hochleistungsbearbeitung für Stahl
Gute Werkstückspannung, Machschinenstabilität und Teileintegration sind entscheidend !
Ausgezeichnete Haltbarkeit
TiCN-Beschichtet
AlTiN-Beschichtet

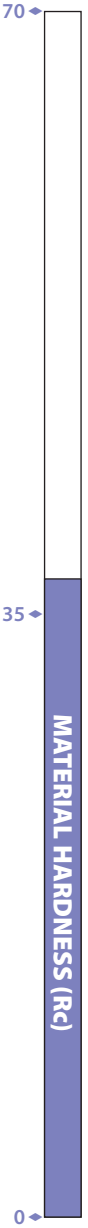
Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Mecanizado de alto rendimiento para aceros
La sujección firme del útil, la estabilidad de la máquina y la integridad de las piezas son cruciales
Excelente durabilidad
Recubrimiento de TiCN
Recubrimiento de AlTiN

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
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
Rivestimento in TiCN
Rivestimento in AlTiN

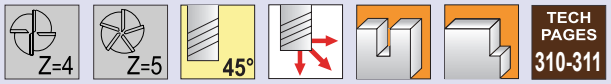
高效超细晶粒整体硬质合金立铣刀 - 中心切削
在钢件、高效精加工刀具
高刚性工件夹持、机床稳定性以及零件的牢固性是至关重要的因素!
耐用性极好
TiCN 涂层
AlTiN 涂层

(246M/846M) UNCOATED EDP#	(246MC) TiCN EDP#	(246MA/846MA) AlTiN EDP#	d_1 † Diameter Decimal	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
-	-	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"



HIGH ROCKWELL END MILLS

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



Square End - AlTiN Coated

Ohne Eckenradius - AlTiN-Beschichtet

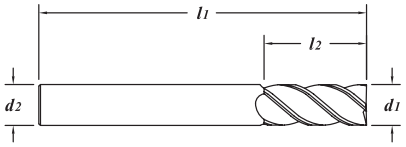
Extremo Sin Radio - Recubrimiento de AlTiN

Extrémité Carré - Revêtement AlTiN

Piatte - Rivestimento in AlTiN

平头 - AlTiN 涂层





Solid submicron grain carbide end mill - center cutting
High performance tool for use in high Rockwell materials
Recommended for inconel, tool steels, and hardened die mold above 45 Rc
Corner Radius - page 193
Ball End - page 194

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 193
Vollradiusfräser - Seite 194

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 193
Fresadora de radios - Página 194

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 193
Hemispherique - Page 194

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 193
Sferiche - Pagina 194

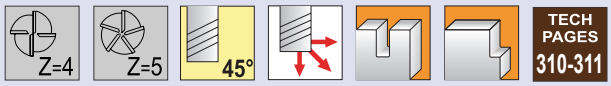
高效超细晶粒整体硬质合金立铣刀 – 中心切削
适合加工洛氏硬度高的材质
推荐加工淬硬模具、铬镍铁耐热耐蚀合金和洛氏硬度45以上的工具钢
圆弧角 - 193页
球头 - 194页

EDP#	d_1 † Diameter Decimal		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" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

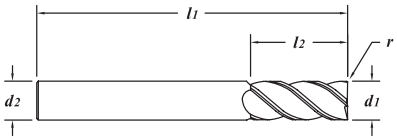
HIGH ROCKWELL END MILLS



TECH PAGES 310-311

Corner Radius - AlTiN Coated
Eckenradius - AlTiN-Beschichtet
Ángulo Redondeado - Recubrimiento de AlTiN
Rayon de Coin - Revêtement AlTiN
Torico - Rivestimento in AlTiN
圆角半径 - AlTiN 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 192
Ball End - page 194

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 192
Vollradiusfräser - Seite 194

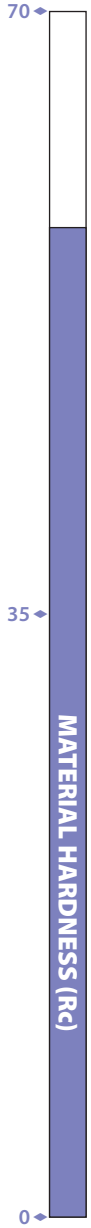
Fresa de submicrograno sólido carburo de alto rendimiento - corte centrado
Para uso con materiales de alta dureza Rockwell
Recomendadas para trabajar troqueles endurecidos, inconel y aceros de herramientas alrededor de 45Rc
Fresa de vástago sin radio de cantos - Página 192
Fresadora de radios - Página 194

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 192
Hemispherique - Page 194

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 192
Sferiche - Pagina 194

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 - 192页
球头 - 194页

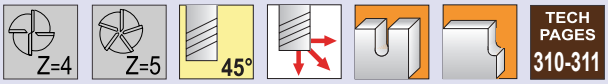
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	Number of Flutes
21202	.1181		3.000	3.0	38	12	0.20	4
21212	.1181		3.000	3.0	38	12	0.50	4
21232	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	4
21242	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	4
21262	.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

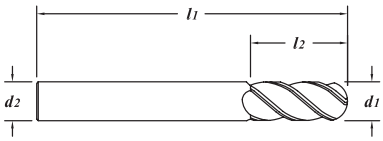
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)



TECH PAGES 310-311

Ball End - AlTiN Coated
Vollradius - AlTiN-Beschichtet
Cabeza Esférica - Recubrimiento de AlTiN
Hemispherique - Revêtement AlTiN
Sferica - Rivestimento in AlTiN
球头 - AlTiN 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 192
Corner Radius - page 193

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 192
Schaftfräser mit Eckenradius - Seite 193

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 192
Fresa de vástago con radio de cantos - Página 193

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 192
Rayon de Coin - Page 193

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 192
Toriche - Pagina 193

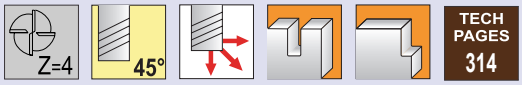
高效超细晶粒整体硬质合金立铣刀 - 中心切削
适合加工洛氏硬度高的材质
推荐加工淬硬模具、铬镍铁耐热耐蚀合金和洛氏硬度45以上的工具钢
半径允差 +0,000 /–0,025 (+.000"–.001")
平头 - 192页
圆弧角 - 193页

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

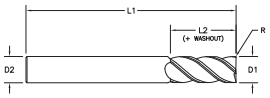
TOLERANCES	
d_1	+.000" –.002" (+.000mm –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)

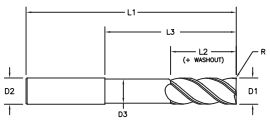
HIGH FEED END MILLS

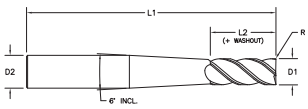


Corner Radius - AlTiN Coated
Eckenradius - AlTiN-Beschichtet
Ángulo Redondeado - Recubrimiento de AlTiN
Rayon de Coin - Revêtement AlTiN
Torico - Rivestimento in AlTiN
圆角半径 - AlTiN 涂层









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!

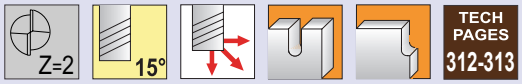
* - 部分型号柄部有3°过渡角
* - 部分型号柄径小于刃径

EDP#	d_1 † 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
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	5.00
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

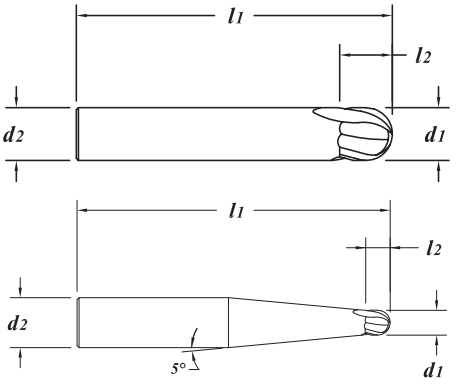
TOLERANCES	
d_1	+.000" –.001" (+.000 –.025mm)
d_2	h6
ball radius	+.0000" –.0005" (+.0000 –.0127mm)



TECH PAGES 312-313

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

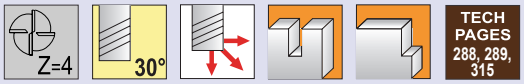
EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
14210	.0312	1/32"	0.792	1/4"	3"	1/32"
15210	.0394		1.000	6.0	75	1
15220	.0591		1.500	6.0	75	1.5
14220	.0625	1/16"	1.588	1/4"	3"	1/16"
15230	.0787		2.000	6.0	75	2
14230	.0938	3/32"	2.383	1/4"	3"	3/32"
15240	.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"

GARR TOOL®

† Metric equivalents are for reference only

TOLERANCES

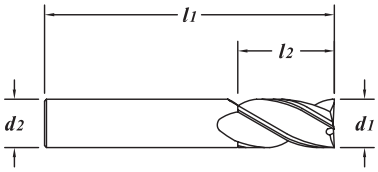
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



TECH PAGES 288, 289, 315

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

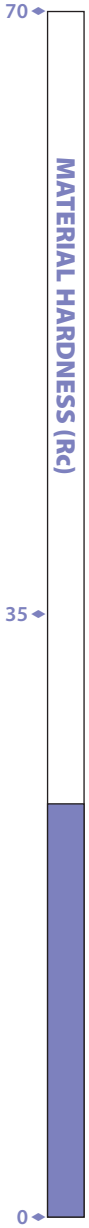
Fresa de grado C-2 sólido carburo de alto rendimiento - corte centrado
Recubrimiento cristalino
Recomendado para grafito, plásticos reforzados con fibra, fibra de carbono

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

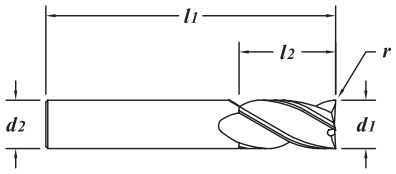
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)



TECH PAGES 288, 289, 315

Corner Radius - Diamond Coated
Eckenradius - Diamant-Beschichtet
Ángulo Redondeado - Recubrimiento de Diamante
Rayon de Coin - Revêtement Diamant
Torica - 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	Diameter	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"

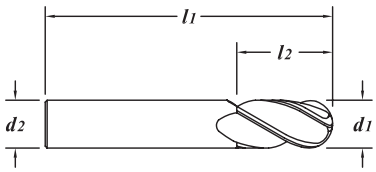
† *Metric equivalents are for reference only*

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

Z=4 | 30° | TECH PAGES 288, 289, 315

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")

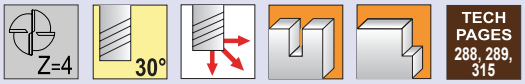
高效C-2级硬质合金立铣刀 - 中心切削
晶体涂层
推荐加工石墨、纤维补强塑料、碳素纤维
半径允差 +0,000 /–0,025 (+.000"–.001")

EDP#	d_1 † Diameter Decimal		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

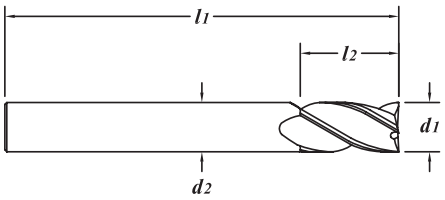
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



TECH PAGES 288, 289, 315

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
35
0

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

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

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*

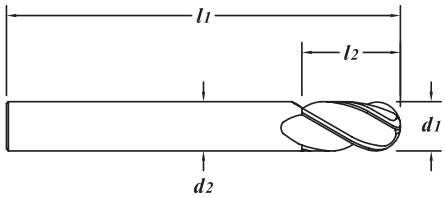
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)



TECH PAGES 288, 289, 315

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")

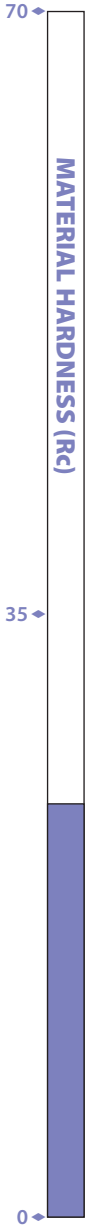
Fresa de grado C-2 sólido carburo de alto rendimiento - corte centrado
Recubrimiento cristalino
Recomendado para grafito, plásticos reforzados con fibra, fibra de carbono
Puede ser modificado con un cuello en 48 horas
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")

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"



HARD CARBON COATING

An addition to the Garr Tool lineup of quality coating options

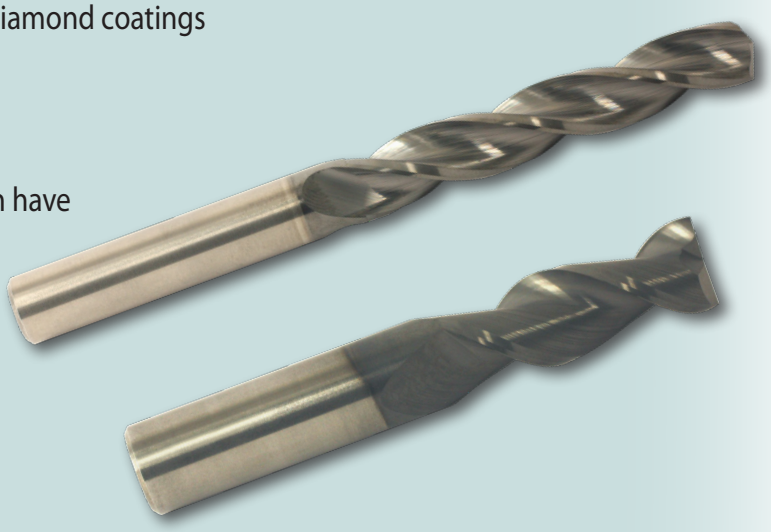


Recommended applications:

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

Advantages of using Hard Carbon:

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



**** Sample Pricing:***

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

<13157> 230MA 1/4" TiAlN Coated - $18.16 each
<13150> 230M 1/4" add Hard Carbon Coating - $24.74 each
<10158> 210D 1/4" Diamond Coated - $107.53 each

* Pricing listed as of 5/16/2022, and is meant for comparison only.
For specific and current pricing, please contact our sales office to request a quote.

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

These specials are built to order uncoated in two weeks

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

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



SERIES 780 - 8-FACET POINT

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

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

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

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



SERIES 805 - CARBON FIBER

Designed for drilling CFRP and plastics

Good in both multidirectional fibers and unidirectional fibers

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

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

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

ROUTERS

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

These specials are built to order uncoated in two weeks

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

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

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

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

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

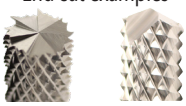
- Polycrystalline Diamond
- Amorphous Diamond / Hard Carbon
- AlCrN Coated



SERIES 700 - FIBERGLASS ROUTER

For cutting glass-filled epoxies

End cut examples



Burr Type | Drill Point



SERIES 701 - KEVLAR ROUTER

Gives a clean edge when trimming
Aramid Fibers (Kevlar)

End cut examples



Burr Type | Drill Point



SERIES 702 - CARBON FIBER ROUTER

For trim milling of single-layer panels



SERIES 703 - CARBON FIBER ROUTER

For rough cutting of stacked panels
with or without honeycomb cores

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

These specials are built to order uncoated in two weeks

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

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

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

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

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

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



SERIES 704 - COMPRESSION ROUTER - 4 FLUTE

For profile milling of carbon fiber





SERIES 705 - COMPRESSION ROUTER - 2 FLUTE

For slotting of carbon fiber





SERIES 706 - SINGLE FLUTE ROUTER

For aluminum and soft plastics









Blank Prep



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

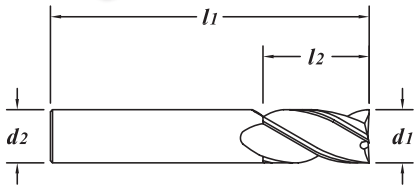
Series 160M, 170M, 860M, 870M

.0200" - .2362"
(0.508mm - 6.000mm)

Z=2 | Z=4 | 30° | TECH PAGES 286-287

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 209
Standard Length - page 216
Extended Length - page 238

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Kürzere Spannuten für höhere Stabilität
Extrem Vielseitig
TiAlN-Beschichtet - Seite 209
Standard Länge - Seite 216
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 209
Longitud Estándar - Página 216
Longitud Extra - Página 238

Fraises carbure submicrograin - coupe au centre
Longueur de coupe courte pour plus de rigidite
Utilisations variables
Revêtement TiAlN - Page 209
Longueur Standart - Page 216
Longueur Extra - Page 238

Fresa sub-micrograno metallo duro - taglio al centro
Tagliente più corto per maggiore rigidità
Estremamente versatile
Rivestimento in TiAlN - Pagina 209
Lunghezza Standard - Pagina 216
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 - 209页
标准长度 - 216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 →

MATERIAL HARDNESS (Rc)
70
35
0

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	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"

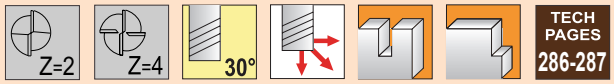


End Mill Manufacturing

† *Metric equivalents are for reference only*

TOLERANCES

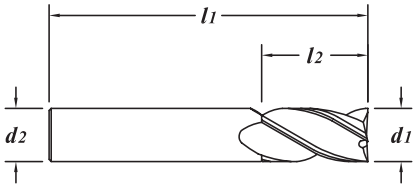
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



TECH PAGES 286-287

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
Uncoated - page 207
Standard Length - page 220
Extended Length - page 241

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Kürzere Spannuten für höhere Stabilität
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Unbeschichtet - Seite 207
Standard Länge - Seite 220
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
Sin recubrimiento - Página 207
Longitud Estándar - Página 220
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
Sans revêtement - Page 207
Longueur Standart - Page 220
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
Non Rivestito - Pagina 207
Lunghezza Standard - Pagina 220
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
未涂层 - 207页
标准长度 - 220页
超长 - 241页

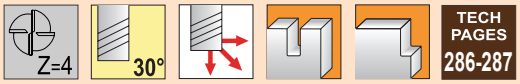
(160MA/860MA) 2 Flute EDP#	(170MA/870MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
01017	02017	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"
01517	02517	.0394		1.000	3.0	38	2
01027	02027	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"
01527	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"

70
35
0
MATERIAL HARDNESS (Rc)

Series 170R, 870R

.0625" - .3150"
(1.588mm - 8.000mm)

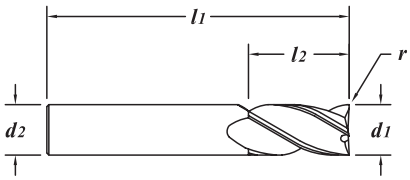
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
r	+.001" –.001" (+.025 –.025mm)



TECH PAGES 286-287

Stub Length - Corner Radius
Kurze Länge - Eckenradius
Longitud Corta - Ángulo Redondeado
Longueur Courte - Rayon de Coin
Serie Corta - Torico
短柱长度 - 圆角半径





70
35
0

MATERIAL HARDNESS (Rc)

Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Extremely versatile
TiAlN Coated - page 212
Standard Length - page 222
Extended Length - page 243

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für stärkere Schneidecken und Radiusteile
Extrem Vielseitig
TiAlN-Beschichtet - Seite 212
Standard Länge - Seite 222
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 212
Longitud Estándar - Página 222
Longitud Extra - Página 243

Fraises carbure submicrograin - coupe au centre
Rayon de coin renforces
Utilisations variables
Revêtement TiAlN - Page 212
Longueur Standart - Page 222
Extra Longueur - Page 243

Fresa sub-micrograno metallo duro - taglio al centro
Raggi rinforzati
Estremamente varsatile
Rivestimento in TiAlN - Pagina 212
Lunghezza Standard - Pagina 222
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 - 212页
标准长度 - 222页
超长 - 243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
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®

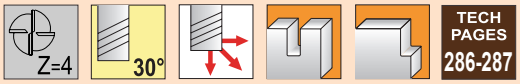
† *Metric equivalents are for reference only*

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

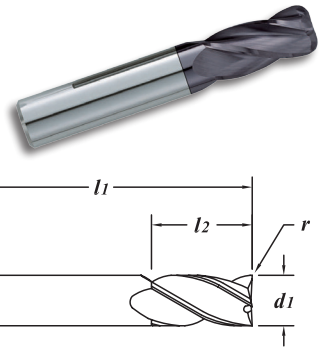
.0625" - .3150"
(1.588mm - 8.000mm)

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



TECH PAGES 286-287

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 - Torico - 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
Uncoated - page 210
Standard Length - page 225
Extended Length - page 246

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für stärkere Schneidecken und Radiusteile
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Unbeschichtet - Seite 210
Standard Länge - Seite 225
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
Sin recubrimiento - Página 210
Longitud Estándar - Página 225
Longitud Extra - Página 246

Fraises carbure submicrograin - coupe au centre
Rayon de coin renforces
Usinage a sec ou avec l'air
Utilisations variables
Sans revêtement - Page 210
Longueur Standart - Page 225
Extra Longueur - Page 246

Fresa sub-micrograno metallo duro - taglio al centro
Raggi rinforzati
Lavorazione a secco o a umido
Estremamente varsatile
Non Rivestito - Pagina 210
Lunghezza Standard - Pagina 225
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
未涂层 - 210页
标准长度 - 225页
超长 - 246页

EDP#	d_1 † Diameter Decimal	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

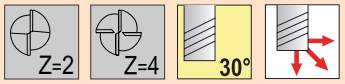
GARR TOOL®

† *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

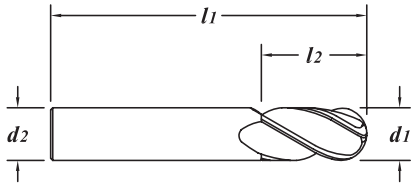
TOLERANCES		
d_1	≤ .030"	+.000" –.001" (+.000 –.025mm)
	≥ 1/32"	+.000" –.002" (+.000 –.050mm)
d_2	h6	
ball radius	+.000" –.001" (+.000 –.025mm)	



TECH PAGES 286-287

Stub Length - Ball End
Kurze Länge - Vollradius
Longitud Corta - Cabeza Esférica
Longueur Courte - Hemispherique
Serie Corta - Sferica
短柱长度 - 双头





70

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 215
Standard Length - page 228
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 215
Standard Länge - Seite 228
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 215
Longitud Estándar - Página 228
Longitud Extra - Página 249

35

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 215
Longueur Standart - Page 228
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 215
Lunghezza Standard - Pagina 228
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 - 215页
标准长度 - 228页
超长 - 249页

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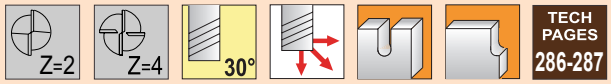
MATERIAL HARDNESS (Rc)

(180M/980M) 2 Flute EDP#	(190M/990M) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	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

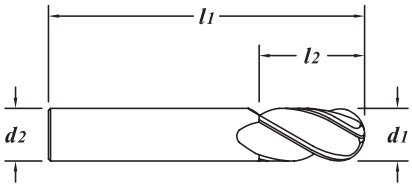
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)



TECH PAGES 286-287

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")
Uncoated - page 214
Standard Length - page 232
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")
Unbeschichtet - Seite 214
Standard Länge - Seite 232
Extra Länge - Seite 252

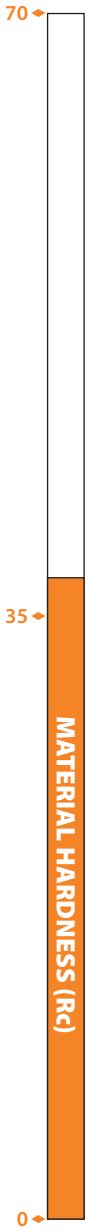
Fresa de submicrograno sólido carburo - corte centrado
Longitud de ranura más corta para proporcionar mayor rigidez
Mecanizado seco o semiseco
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025mm (+.000" –.001")
Sin recubrimiento - Página 214
Longitud Estándar - Página 232
Longitud 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")
Sans revêtement - Page 214
Longueur Standart - Page 232
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")
Non Rivestito - Pagina 214
Lunghezza Standard - Pagina 232
Lunghezza Extra - Pagina 252

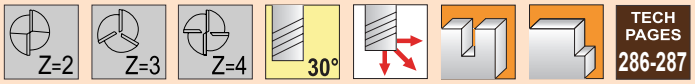
超细晶粒整体硬质合金立铣刀 - 中心切削
为了增加刚性应缩短出屑槽长度
干式或半干式机加工
功能极多
半径允差 +0,000 /–0,025mm (+.000"–.001")
未涂层 - 214页
标准长度 - 232页
超长 - 252页

(180MA/980MA) 2 Flute EDP#	(190MA/990MA) 4 Flute EDP#	d_1 † Diameter Decimal	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)

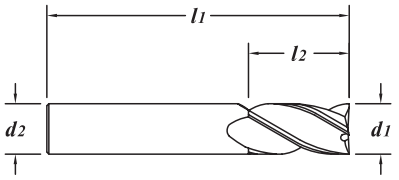


TECH PAGES 286-287

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





70
35
0

MATERIAL HARDNESS (Rc)

Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiN Coated - page 218
TiCN Coated - page 219
TiAlN Coated - page 220
Stub Length - page 207
Extended Length - page 238

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Extrem Vielseitig
TiN-Beschichtet - Seite 218
TiCN-Beschichtet - Seite 219
TiAlN-Beschichtet - Seite 220
Kurze Länge - Seite 207
Extra Länge - Seite 238

Fresa de submicrograno sólido carburo - corte centrado
Extremadamente versátil
Recubrimiento de TiN - Página 218
Recubrimiento de TiCN - Página 219
Recubrimiento de TiAlN - Página 220
Longitud Corta - Página 207
Longitud Extra - Página 238

Fraises carbure submicrograin - coupe au centre
Utilisations variables
Revêtement TiN - Page 218
Revêtement TiCN - Page 219
Revêtement TiAlN - Page 220
Longueur Courte - Page 207
Longueur Extra - Page 238

Fresa sub-micrograno metallo duro - taglio al centro
Estremamente varsatile
Rivestimento in TiN - Pagina 218
Rivestimento in TiCN - Pagina 219
Rivestimento in TiAlN - Pagina 220
Serie Corta - Pagina 207
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 - 218页
TiCN 涂层 - 219页
TiAlN 涂层 - 220页
短柱长度 - 207页
超长 - 238页

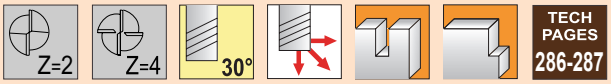
	(220M/820M) 2 Flute EDP#	(223M/823M) 3 Flute EDP#	(230M/830M) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
	11650	-	13650	.0200	.0200"	0.508	1/8"	1-1/2"	.060"
	11660	-	-	.0210	.0210"	0.533	1/8"	1-1/2"	.063"
	11670	-	-	.0220	.0220"	0.559	1/8"	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"
NEW	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

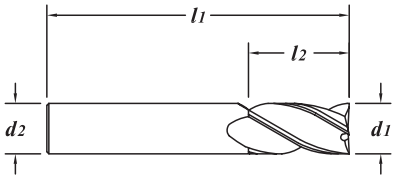
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



TECH PAGES 286-287

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
Uncoated - page 216
TiCN Coated - page 219
TiAlN Coated - page 220

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Verbessere Schmiereingenschaft
Extrem Vielseitig
Unbeschichtet - Seite 216
TiCN-Beschichtet - Seite 219
TiAlN-Beschichtet - Seite 220

Fresa de submicrograno sólido carburo - corte centrado
Majorada la lubricación
Extremadamente versátil
Sin recubrimiento - Página 216
Recubrimiento de TiCN - Página 219
Recubrimiento de TiAlN - Página 220

35

Fraises carbure submicrograin - coupe au centre
Amelioration du glissement
Utilisations variables
Sans revêtement - Page 216
Revêtement TiCN - Page 219
Revêtement TiAlN - Page 220

Fresa sub-micrograno metallo duro - taglio al centro
Migliore autolubrificazione
Estremamente versatile
Non Rivestito - Pagina 216
Rivestimento in TiCN - Pagina 219
Rivestimento in TiAlN - Pagina 220

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
未涂层 - 216页
TiCN 涂层 - 219页
TiAlN 涂层 - 220页

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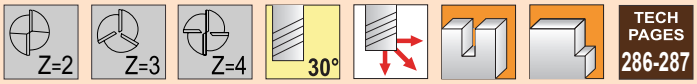
MATERIAL HARDNESS (Rc)

(220MT) 2 Flute EDP#	(230MT) 4 Flute EDP#	d_1 † Diameter Decimal	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"

† *Metric equivalents are for reference only*

TOLERANCES

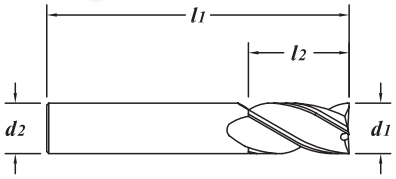
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



TECH PAGES 286-287

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
Uncoated - page 216
TiN Coated - page 218
TiALN Coated - page 220
Extended Length - Page 240

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Verbesserte Verschleissbeständigkeit und Schmiereienschaft
Extrem Vielseitig
Unbeschichtet - Seite 216
TiN-Beschichtet - Seite 218
TiALN-Beschichtet - Seite 220
Extra Länge - Seite 240

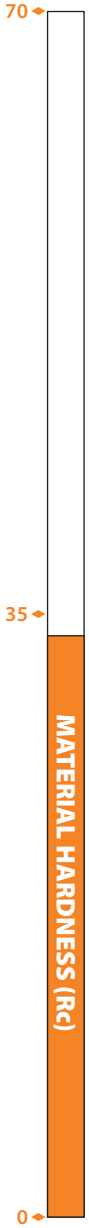
Fresa de submicrograno sólido carburo - corte centrado
Mejoradas la resistencia a la abrasión y la lubricación
Extremadamente versátil
Sin recubrimiento - Página 216
Recubrimiento de TiN - Página 218
Recubrimiento de TiALN - Página 220
Longitud Extra - Página 240

Fraises carbure submicrograin - coupe au centre
Amelioration de la resistance a l'abrasion et au glissement
Utilisations variables
Sans revêtement - Page 216
Revêtement TiN - Page 218
Revêtement TiALN - Page 220
Extra Longue - Page 240

Fresa sub-micrograno metallo duro - taglio al centro
Maggiore resistenza all'abrasione
Estremamente versatile
Non Rivestito - Pagina 216
Rivestimento in TiN - Pagina 218
Rivestimento in TiALN - Pagina 220
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
未涂层 - 216页
TiN 涂层 - 218页
TiALN 涂层 - 220页
超长 - 240页

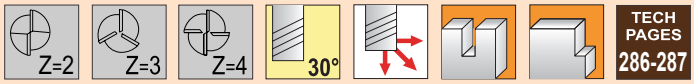
(220MC) 2 Flute EDP#	(223MC) 3 Flute EDP#	(230MC) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
11014	12014	13014	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"
11024	12024	13024	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"
11034	12034	13034	.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

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

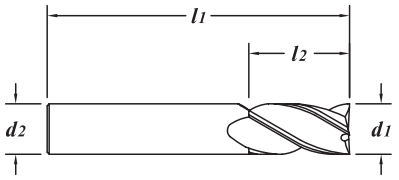
.0312" - .3594"
(0.792mm - 9.129mm)



TECH PAGES 286-287

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
Uncoated - page 216
TiN Coated - page 218
TiCN Coated - page 219
Stub Length - page 209
Extended Length - page 241

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Unbeschichtet - Seite 216
TiN-Beschichtet - Seite 218
TiCN-Beschichtet - Seite 219
Kurze Länge - Seite 209
Extra Länge - Seite 241

Fresa de submicrograno sólido carburo - corte centrado
Mecanizado seco o semiseco
Extremadamente versátil
Sin recubrimiento - Página 216
Recubrimiento de TiN - Página 218
Recubrimiento de TiCN - Página 219
Longitud Corta - Página 209
Longitud Extra - Página 241

Fraises carbure submicrograin - coupe au centre
Usinage a sec ou avec l'air
Utilisations variables
Sans revêtement - Page 216
Revêtement TiN - Page 218
Revêtement TiCN - Page 219
Longueur Courte - Page 209
Longueur Extra - Page 241

Fresa sub-micrograno metallo duro - taglio al centro
Lavorazione a secco o a umido
Estremamente varsatile
Non Rivestito - Pagina 216
Rivestimento in TiN - Pagina 218
Rivestimento in TiCN - Pagina 219
Serie Corta - Pagina 209
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
未涂层 - 216页
TiN 涂层 - 218页
TiCN 涂层 - 219页
短柱长度 - 209页
超长 - 241页

(220MA/820MA) 2 Flute EDP#	(223MA/823MA) 3 Flute EDP#	(230MA/830MA) 4 Flute EDP#	d_1 † Diameter Decimal	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"

GARR TOOL®

† *Metric equivalents are for reference only*

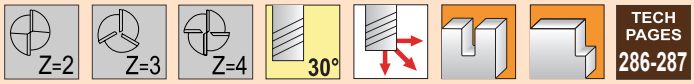
(220MA/820MA) 2 Flute EDP#	(223MA/823MA) 3 Flute EDP#	(230MA/830MA) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
11237	12237	13237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"
11247	12247	13247	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"
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)

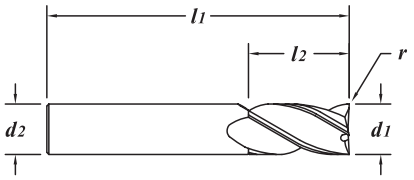


TECH PAGES 286-287

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

Standard Length - Corner Radius
Standard Länge - Eckenradius
Longitud Estándar - Ángulo Redondeado
Longueur Standart - Rayon de Coin
Lunghezza Standard - Torico
标准长度 - 圆角半径





70

Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Extremely versatile
TiAlN Coated - page 225
Stub Length - page 243
Extended Length - page 243

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für stärkere Schneidecken und Radiusteile
Extrem Vielseitig
TiAlN-Beschichtet - Seite 225
Kurze Länge - Seite 210
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 225
Longitud Corta - Página 210
Longitud Extra - Página 243

35

Fraises carbure submicrograin - coupe au centre
Rayon de coin renforces
Utilisations variables
Revêtement TiAlN - Page 225
Longueur Courte - Page 210
Extra Longueur - Page 243

Fresa sub-micrograno metallo duro - taglio al centro
Raggi rinforzati
Estremamente versatile
Rivestimento in TiAlN - Pagina 225
Serie Corta - Pagina 210
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 - 225页
短柱长度 - 210页
超长 - 243页

0

MATERIAL HARDNESS (Rc)

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

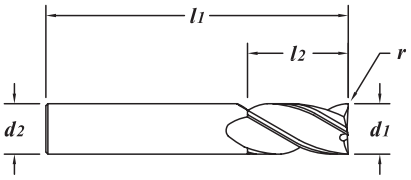
.0625" - .3125"
(1.588mm - 7.938mm)

Z=2 Z=3 Z=4 30°

TECH PAGES 286-287

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 - Torico - 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
Uncoated - page 222
Stub Length - page 212
Extended Length - page 246

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für stärkere Schneidecken und Radiusteile
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Unbeschichtet - Seite 222
Kurze Länge - Seite 212
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
Sin recubrimiento - Página 222
Longitud Corta - Página 212
Longitud Extra - Página 246

Fraises carbure submicrograin - coupe au centre
Rayon de coin renforces
Usinage a sec ou avec l'air
Utilisations variables
Sans revêtement - Page 222
Longueur Courte - Page 212
Extra Longueur - Page 246

Fresa sub-micrograno metallo duro - taglio al centro
Raggi rinforzati
Lavorazione a secco o a umido
Estremamente versatile
Non Rivestito - Pagina 222
Serie Corta - Pagina 212
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
未涂层 - 222页
短柱长度 - 212页
超长 - 246页

(220RA) 2 Flute EDP#	(223RA/823RA) 3 Flute EDP#	(230RA/830RA) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
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"
-	-	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 →

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°

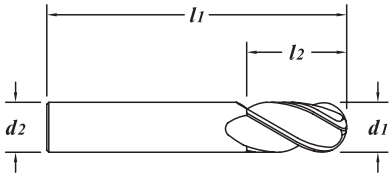
TECH PAGES 286-287

TOLERANCES

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

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 230
TiCN Coated - page 231
TiAlN Coated - page 232
Stub Length - page 214
Extended Length - page 249

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
TiN-Beschichtet - Seite 230
TiCN-Beschichtet - Seite 231
TiAlN-Beschichtet - Seite 232
Kurze Länge - Seite 214
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 230
Recubrimiento de TiCN - Página 231
Recubrimiento de TiAlN - Página 232
Longitud Corta - Página 214
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 230
Revêtement TiCN - Page 231
Revêtement TiAlN - Page 232
Longueur Courte - Page 214
Longueur Extra - Page 249

Fresa sub-micrograno metallo duro - taglio al centro
Estremamente versatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Rivestimento in TiN - Pagina 230
Rivestimento in TiCN - Pagina 231
Rivestimento in TiAlN - Pagina 232
Serie Corta - Pagina 214
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 - 230页
TiCN 涂层 - 231页
TiAlN 涂层 - 232页
短柱长度 - 214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®

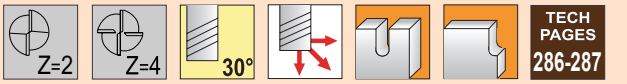
† *Metric equivalents are for reference only*

(320M/920M) 2 Flute EDP#	(323M/923M) 3 Flute EDP#	(330M/930M) 4 Flute EDP#	Decimal	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

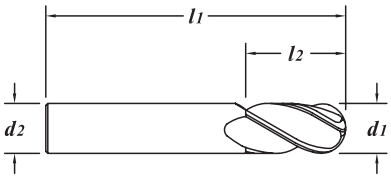
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)



TECH PAGES 286-287

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





70
35
0

MATERIAL HARDNESS (Rc)

Solid submicron grain carbide end mill - center cutting
Improved lubricity
Extremely versatile
Uncoated - page 228
TiCN Coated - page 231
TiAlN Coated - page 232

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Verbessere Schmiereingenschaft
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
Unbeschichtet - Seite 228
TiCN-Beschichtet - Seite 231
TiAlN-Beschichtet - Seite 232

Fresa de submicrograno sólido carburo - corte centrado
Majorada la lubricación
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Sin recubrimiento - Página 228
Recubrimiento de TiCN - Página 231
Recubrimiento de TiAlN - Página 232

Fraises carbure submicrograin - coupe au centre
Amelioration du glissement
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")
Sans revêtement - Page 228
Revêtement TiCN - Page 231
Revêtement TiAlN - Page 232

Fresa sub-micrograno metallo duro - taglio al centro
Migliore autolubrificazione
Estremamente versatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Non Rivestito - Pagina 228
Rivestimento in TiCN - Pagina 231
Rivestimento in TiAlN - Pagina 232

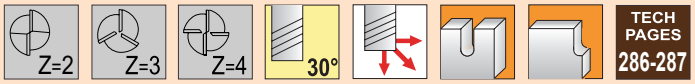
超细晶粒整体硬质合金立铣刀 - 中心切削
改善润滑性能
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
未涂层 - 228页
TiCN 涂层 - 231页
TiAlN 涂层 - 232页

(320MT) 2 Flute EDP#	(330MT) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	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

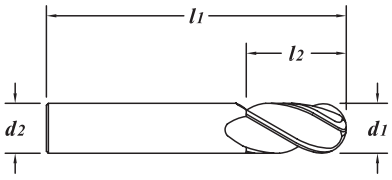
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)



TECH PAGES 286-287

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
Uncoated - page 228
TiN Coated - page 230
TiALN Coated - page 232
Extended Length - Page 251

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Verbesserte Verschleissbeständigkeit und Schmiereienschaft
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
Unbeschichtet - Seite 228
TiN-Beschichtet - Seite 230
TiALN-Beschichtet - Seite 232
Extra Länge - Seite 251

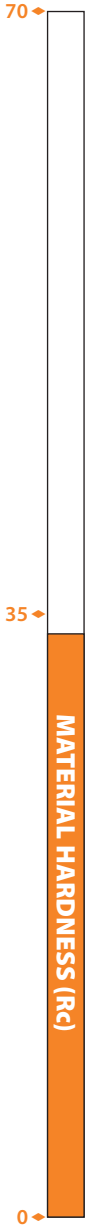
Fresa de submicrograno sólido carburo - corte centrado
Mejoradas la resistencia a la abrasión y la lubricación
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Sin recubrimiento - Página 228
Recubrimiento de TiN - Página 230
Recubrimiento de TiALN - Página 232
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")
Sans revêtement - Page 228
Revêtement TiN - Page 230
Revêtement TiALN - Page 232
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")
Non Rivestito - Pagina 228
Rivestimento in TiN - Pagina 230
Rivestimento in TiALN - Pagina 232
Lunghezza Extra - Pagina 251

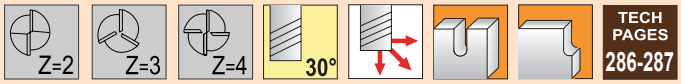
超细晶粒整体硬质合金立铣刀 - 中心切削
改善耐磨性和润滑性
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
未涂层 - 228页
TiN 涂层 - 230页
TiALN 涂层 - 232页
超长 - 251页

(320MC) 2 Flute EDP#	(323MC) 3 Flute EDP#	(330MC) 4 Flute EDP#	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
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)

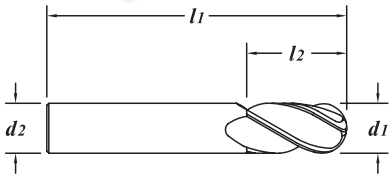


TECH PAGES 286-287

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

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
Uncoated - page 228
TiN Coated - page 230
TiCN Coated - page 231
Stub Length - page 215
Extended Length - page 252

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
Unbeschichtet - Seite 228
TiN-Beschichtet - Seite 230
TiCN-Beschichtet - Seite 231
Kurze Länge - Seite 215
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")
Sin recubrimiento - Página 228
Recubrimiento de TiN - Página 230
Recubrimiento de TiCN - Página 231
Longitud Corta - Página 215
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")
Sans revêtement - Page 228
Revêtement TiN - Page 230
Revêtement TiCN - Page 231
Longueur Courte - Page 215
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")
Non Rivestito - Pagina 228
Rivestimento in TiN - Pagina 230
Rivestimento in TiCN - Pagina 231
Serie Corta - Pagina 215
Lunghezza Extra - Pagina 252

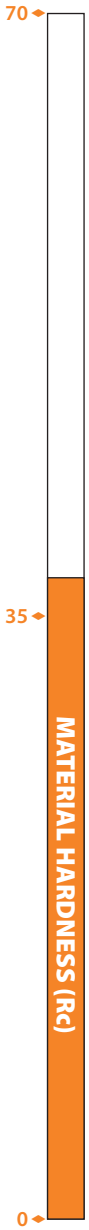
超细晶粒整体硬质合金立铣刀 - 中心切削
干式或半干式机加工
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
未涂层 - 228页
TiN 涂层 - 230页
TiCN 涂层 - 231页
短柱长度 - 215页
超长 - 252页

(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
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®

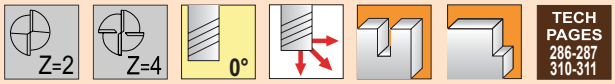
† Metric equivalents are for reference only

(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"



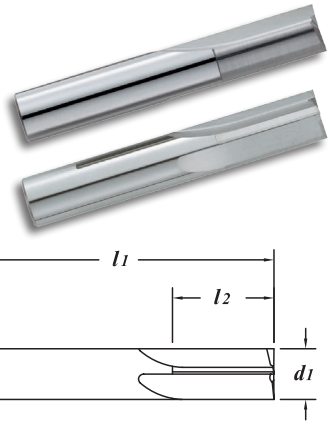
Series 222M, 234M

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



TECH PAGES 286-287 310-311

Standard Length - Straight Flute - Square End
Standard Länge - Gerade Spannut - Ohne Eckenradius
Longitud Estándar - Ranura Recta - Extremo Sin Radio
Longueur Standart - Goujures Droite - Extrémité Carré
Lunghezza Standard - Tagliente Dritto - Piatte
标准长度 - 直排屑槽 - 平头





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



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Für die Bearbeitung von gehärten Stählen
Hilft die Perpendicularität zu halten



Fresa de submicrograno sólido carburo - corte centrado
Para corte de materiales de alta dureza Rc
Ayuda a mantener la perpendicularidad



Fraises carbure submicrograin - coupe au centre
Pour la coupe de materiaux a haute durete
Aide a tenir la perpendicularite



Fresa sub-micrograno metallo duro - taglio al centro
Per lavorazioni su materiali temprati
Taglio perpendicolare



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

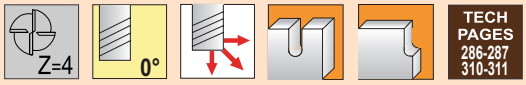
MATERIAL HARDNESS (Rc)
70
35
0

(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"

† *Metric equivalents are for reference only*

TOLERANCES

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



Standard Length - Straight Flute - Ball End - TiALN Coated

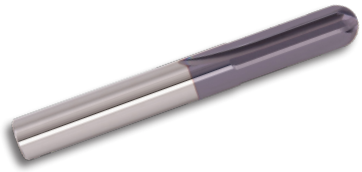
Standard Länge - Gerade Spannut - Vollradius - TiALN-Beschichtet

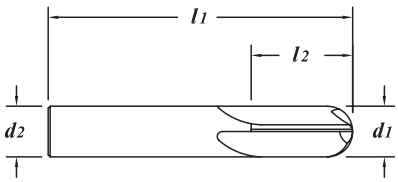
Longitud Estándar - Ranura Recta - Cabeza Esférica - Recubrimiento de TiALN

Longueur Standart - Goujures Droite - Hemispherique - Revêtement TiALN

Lunghezza Standard - Tagliente Dritto - Sferica - Rivestimento in TiALN

标准长度 - 直排屑槽 - 球头 - TiALN 涂层





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

(334MA) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
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"

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")

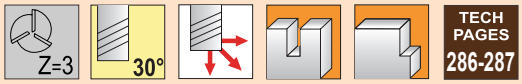
Fresa sub-micrograno metallo duro - taglio al centro
Per lavorazioni su materiali temprati
Taglio perpendicolare
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")

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")

70
35
0
MATERIAL HARDNESS (Rc)

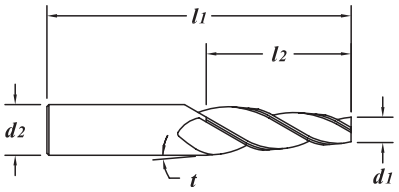
Series 273M

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



Standard Length - Tapered - Square End
Standard Länge - Kegelig - Ohne Eckenradius
Longitud Estándar - Cónica - Extremo Sin Radio
Longueur Standart - Conique - Extrémité Carré
Lunghezza Standard - Frese per Nervature - Piatte
标准长度 - 锥度 - 平头





273M EDP#	d_2 Shank Diameter	t Taper Per Side	d_1 † Tip Diameter Decimal	Tip Diameter Metric	l_1 Overall Length	l_2 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"

MATERIAL HARDNESS (Rc)

70

35

0

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

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Ausgezeichnet zum halten von Entwurfwinkel bei Formenbau Anwendungen

Fresa de submicrograno sólido carburo - corte centrado
Excelente para mantener ángulos de desmoldeo en aplicaciones de troquelado

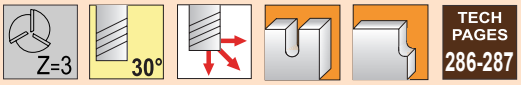
Fraises carbure submicrograin - coupe au centre
Excellent pour la tenue des arêtes en applications moules et outillages

Fresa sub-micrograno metallo duro - taglio al centro
Eccellente per lavorazioni di pareti inclinate sugli stampi

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

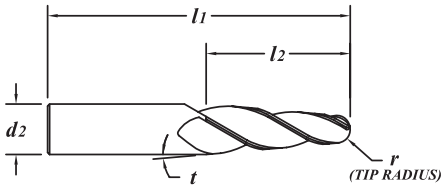
† *Metric equivalents are for reference only*

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



Standard Length - Tapered - Ball End
Standard Länge - Kegelig - Vollradius
Longitud Estándar - Cónica - Cabeza Esférica
Longueur Standart - Conique - Hemispherique
Lunghezza Standard - Frese per Nervature - Sferica
标准长度 - 锥度 - 球头





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

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Ausgezeichnet zum halten von Entwurfwinkel bei Formenbau Anwendungen

Fresa de submicrograno sólido carburo - corte centrado
Excelente para mantener ángulos de desmoldeo en aplicaciones de troquelado

Fraises carbure submicrograin - coupe au centre
Excellent pour la tenue des arêtes en applications moules et outillages

Fresa sub-micrograno metallo duro - taglio al centro
Eccellente per lavorazioni di pareti inclinate sugli stampi

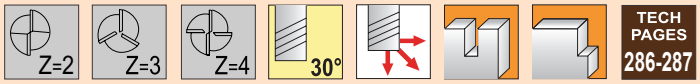
超细晶粒整体硬质合金立铣刀 - 中心切削
在模具用途中对于保持拔模角度非常好

373M EDP#	d_2 Shank Diameter	t Taper Per Side	r † Tip Radius Decimal	Tip Radius Metric	l_1 Overall Length	l_2 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"

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

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

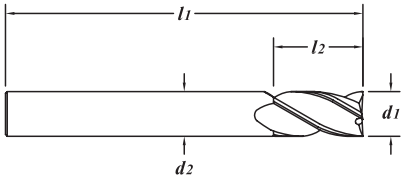
.1181" - .3150"
(3.000mm - 8.000mm)



TECH PAGES 286-287

Extra Length - Square End
Extra Länge - Ohne Eckenradius
Longitud Extra - Extremo Sin Radio
Extra Longue - Extrémité Carré
Lunghezza Extra - Piatte
超长 - 平头





MATERIAL HARDNESS (Rc)
70
35
0

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 207
Standard Length - page 216

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 207
Standard Länge - Seite 216

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 207
Longitud Estándar - Página 216

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 207
Longueur Standart - Page 216

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 207
Lunghezza Standard - Pagina 216

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 - 207页
标准长度 - 216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

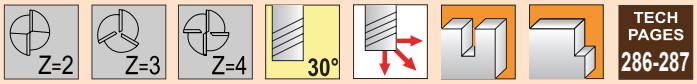
† *Metric equivalents are for reference only*

(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"



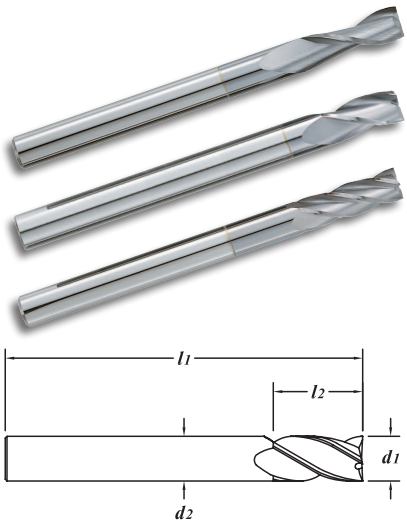
Series 620MC, 623MC, 630MC

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



TECH PAGES 286-287

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



Solid submicron grain carbide end mill - center cutting
Extended reach
Improved abrasion resistance and lubricity
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 238
TiAlN Coated - page 241
Standard Length - page 219

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Verbesserte Verschleissbeständigkeit und Schmiereienschaft
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Unbeschichtet - Seite 238
TiAlN-Beschichtet - Seite 241
Standard Länge - Seite 219

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
Sin recubrimiento - Página 238
Recubrimiento de TiAlN - Página 241
Longitud Estándar - Página 219

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
Sans revêtement - Page 238
Revêtement TiAlN - Page 241
Longueur Standart - Page 219

Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Maggiore resistenza all'abrasione
Può essere modificata in 48 ore
Estremamente varsatile
Non Rivestito - Pagina 238
Rivestimento in TiAlN - Pagina 241
Lunghezza Standard - Pagina 219

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
未涂层 - 238页
TiAlN 涂层 - 241页
标准长度 - 219页

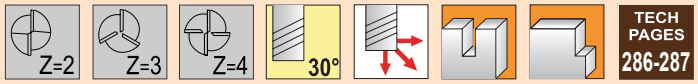
(620MC) 2 Flute EDP#	(623MC) 3 Flute EDP#	(630MC) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
41014	54514	42014	.1250	1/8" 3.175	1/8"	2"	5/8"
41024	54524	42024	.1250	1/8" 3.175	1/8"	3"	3/4"
41034	54534	42034	.1250	1/8" 3.175	1/8"	3"	1"
41044	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"

GARR TOOL®

† *Metric equivalents are for reference only*

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

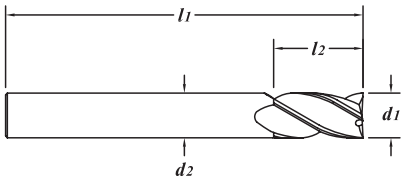
Series 620MA, 623MA, 630MA, 640MA, 643MA, 650MA



.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
Uncoated - page 238
TiCN Coated - page 240
Stub Length - Page 209
Standard Length - Page 220

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Trocken oder Halbtrockene Bearbeitung
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Unbeschichtet - Seite 238
TiCN-Beschichtet - Seite 240
Kurze Länge - Seite 209
Standard Länge - Seite 220

Fresa de submicrograno sólido carburo - corte centrado
Mayor alcance
Mecanizado seco o semiseco
Puede ser modificado con un cuello en 48 horas
Extremadamente versátil
Sin recubrimiento - Página 238
Recubrimiento de TiCN - Página 240
Longitud Corta - Página 209
Longitud Estándar - Página 220

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
Sans revêtement - Page 238
Revêtement TiCN - Page 240
Longueur Courte - Page 209
Longueur Standart - Page 220

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
Non Rivestito - Pagina 238
Rivestimento in TiCN - Pagina 240
Serie Corta - Pagina 209
Lunghezza Standard - Pagina 220

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
未涂层 - 238页
TiCN 涂层 - 240页
短柱长度 - 209页
标准长度 - 220页

(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
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 →

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

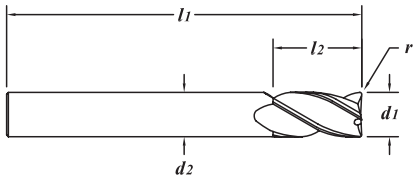
Series 630R

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

Z=4 | 30° | TECH PAGES 286-287

Extra Length - Corner Radius
Extra Länge - Eckenradius
Longitud Extra - Ángulo Redondeado
Extra Longue - Rayon de Coin
Lunghezza Extra - Torico
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 210
Standard Length - page 222

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 210
Standard Länge - Seite 222

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 210
Longitud Estándar - Página 222

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 210
Longueur Standart - Page 222

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 210
Lunghezza Standard - Pagina 222

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 - 210页
标准长度 - 222页

EDP#	d_1 † Diameter Decimal	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"

70
35
0
MATERIAL HARDNESS (Rc)

continued →

Series 630R *(continued)*

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

EDP#	d_1 † Diameter Decimal		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*

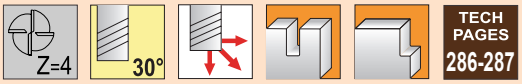
EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius
20990	.7500	3/4"	19.050	3/4"	6"	3"	.015"
21000	.7500	3/4"	19.050	3/4"	6"	3"	.020"
21010	.7500	3/4"	19.050	3/4"	6"	3"	.030"
21020	.7500	3/4"	19.050	3/4"	6"	3"	.045"
21030	.7500	3/4"	19.050	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"



End Mill Reconditioning

Series 630RA

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



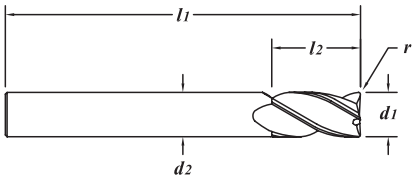
TECH PAGES 286-287

TOLERANCES

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

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 - Torico - Rivestimento in TiALN
超长 - 圆角半径 - TiALN 涂层





70
35
0

MATERIAL HARDNESS (Rc)

Solid submicron grain carbide end mill - center cutting
Extended reach
For stronger corners and part radius
Dry or semi-dry machining
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 243
Stub Length - page 212
Standard Length - page 225

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
Unbeschichtet - Seite 243
Kurze Länge - Seite 212
Standard Länge - Seite 225

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
Sin recubrimiento - Página 243
Longitud Corta - Página 212
Longitud Estándar - Página 225

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
Sans revêtement - Page 243
Longueur Courte - Page 212
Longueur Standart - Page 225

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 versatile
Non Rivestito - Pagina 243
Serie Corta - Pagina 212
Lunghezza Standard - Pagina 225

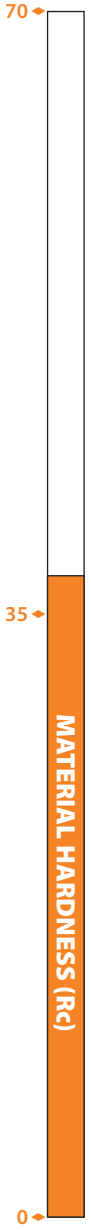
超细晶粒整体硬质合金立铣刀 - 中心切削
加长
用于强化圆角和零件半径
干式或半干式机加工
可以在48小时内用轴颈进行修正
功能极多
未涂层 - 243页
短柱长度 - 212页
标准长度 - 225页

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"

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
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"

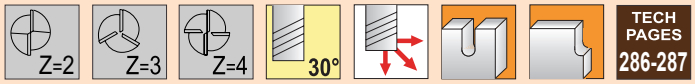


† *Metric equivalents are for reference only*

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

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

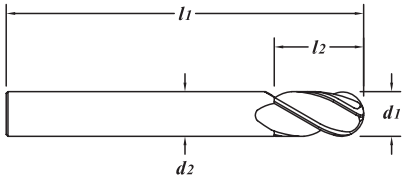
.1181" - .3150"
(3.000mm - 8.000mm)



TECH PAGES 286-287

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 214
Standard Length - page 228

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 214
Standard Länge - Seite 228

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 214
Longitud Estándar - Página 228

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 214
Longueur Standart - Page 228

Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Può essere modificata in 48 ore
Estremamente versatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Rivestimento in TiCN - Pagina 251
Rivestimento in TiAlN - Pagina 252
Serie Corta - Pagina 214
Lunghezza Standard - Pagina 228

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 - 214页
标准长度 - 228页

(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
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"

† *Metric equivalents are for reference only*

TOLERANCES

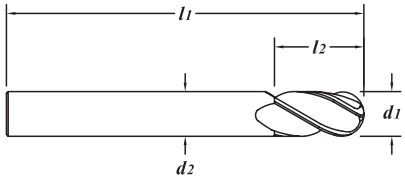
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)

Z=2 | Z=3 | Z=4 | 30°

TECH PAGES 286-287

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
Uncoated - page 249
TiAlN Coated - page 252
Standard Length - page 231

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Erweiterte Reichweite
Verbesserte Verschleissbeständigkeit und Schmiereieneschaft
Kann innerhalb 48 Stunden am Schaft verjüngt werden
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
Unbeschichtet - Seite 249
TiAlN-Beschichtet - Seite 252
Standard Länge - Seite 231

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")
Sin recubrimiento - Página 249
Recubrimiento de TiAlN - Página 252
Longitud Estándar - Página 231

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")
Sans revêtement - Page 249
Revêtement TiAlN - Page 252
Longueur Standart - Page 231

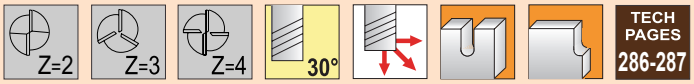
Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Maggiore resistenza all'abrasione
Può essere modificata in 48 ore
Estremamente varsatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Non Rivestito - Pagina 249
Rivestimento in TiAlN - Pagina 252
Lunghezza Standard - Pagina 231

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")
未涂层 - 249页
TiAlN 涂层 - 252页
标准长度 - 231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	1/8"	3.175	1/8"	2"	5/8"
43024	55524	44024	.1250	1/8"	3.175	1/8"	3"	3/4"
43034	55534	44034	.1250	1/8"	3.175	1/8"	3"	1"
43044	55544	44044	.1875	3/16"	4.763	3/16"	3"	1"
43054	55554	44054	.1875	3/16"	4.763	3/16"	3"	1-1/8"
43064	55564	44064	.1875	3/16"	4.763	3/16"	4"	1"
43074	55574	44074	.2500	1/4"	6.350	1/4"	3"	1"
43084	55584	44084	.2500	1/4"	6.350	1/4"	4"	1"
43094	55594	44094	.2500	1/4"	6.350	1/4"	4"	1-1/2"
43104	55604	44104	.2500	1/4"	6.350	1/4"	6"	1-1/2"
43114	55614	44114	.3125	5/16"	7.938	5/16"	3"	1"
43124	55624	44124	.3125	5/16"	7.938	5/16"	4"	1"
43134	-	44134	.3125	5/16"	7.938	5/16"	4"	1-5/8"
43144	55644	44144	.3125	5/16"	7.938	5/16"	6"	1-1/2"
43154	55654	44154	.3750	3/8"	9.525	3/8"	3"	1"
43164	55664	44164	.3750	3/8"	9.525	3/8"	4"	1"
43174	55674	44174	.3750	3/8"	9.525	3/8"	4"	2"
43184	55684	44184	.3750	3/8"	9.525	3/8"	6"	1-1/2"
-	55694	44194	.3750	3/8"	9.525	3/8"	6"	3"
-	-	44204	.4375	7/16"	11.113	7/16"	4"	1"
-	-	44214	.4375	7/16"	11.113	7/16"	4"	2"
43224	55724	44224	.4375	7/16"	11.113	7/16"	6"	1-1/2"
-	-	44234	.4375	7/16"	11.113	7/16"	6"	3"
43244	55744	44244	.5000	1/2"	12.700	1/2"	4"	1"
43254	55754	44254	.5000	1/2"	12.700	1/2"	4"	2"
43264	55764	44264	.5000	1/2"	12.700	1/2"	6"	1-1/2"
43274	55774	44274	.5000	1/2"	12.700	1/2"	6"	3"
-	-	44284	.5625	9/16"	14.288	9/16"	6"	2"
-	-	44294	.5625	9/16"	14.288	9/16"	6"	3"
43304	55804	44304	.6250	5/8"	15.875	5/8"	6"	2"
-	-	44314	.6250	5/8"	15.875	5/8"	6"	3"
43324	55824	44324	.7500	3/4"	19.050	3/4"	6"	2"
43334	55834	44334	.7500	3/4"	19.050	3/4"	6"	3"
-	55844	44344	1.000	1"	25.400	1"	6"	2"
43354	55854	44354	1.000	1"	25.400	1"	6"	3"

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

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



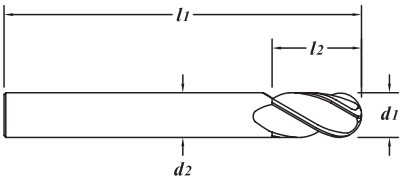
TECH PAGES 286-287

TOLERANCES

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

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
Uncoated - page 249
TiCN Coated - page 251
Stub Length - page 215
Standard Length - page 232

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")
Unbeschichtet - Seite 249
TiCN-Beschichtet - Seite 251
Kurze Länge - Seite 215
Standard Länge - Seite 232

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")
Sin recubrimiento - Página 249
Recubrimiento de TiCN - Página 251
Longitud Corta - Página 215
Longitud Estándar - Página 232

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")
Sans revêtement - Page 249
Revêtement TiCN - Page 251
Longueur Courte - Page 215
Longueur Standart - Page 232

Fresa sub-micrograno metallo duro - taglio al centro
Estensione più grande
Lavorazione a secco o a umido
Può essere modificata in 48 ore
Estremamente versatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Non Rivestito - Pagina 249
Rivestimento in TiCN - Pagina 251
Serie Corta - Pagina 215
Lunghezza Standard - Pagina 232

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")
未涂层 - 249页
TiCN 涂层 - 251页
短柱长度 - 215页
标准长度 - 232页

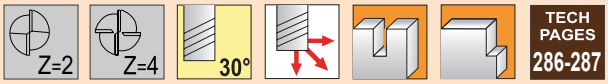
(720MA/740MA) 2 Flute EDP#	(723MA/743MA) 3 Flute EDP#	(730MA/750MA) 4 Flute EDP#	d_1 † Diameter Decimal		d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
97017	98017	99017	.1181		3.000	3.0	50	16
97027	98027	99027	.1181		3.000	3.0	75	20
97037	98037	99037	.1181		3.000	3.0	75	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

† *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"

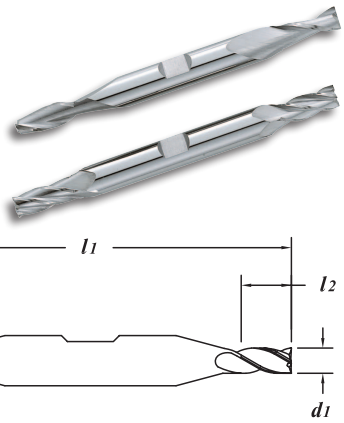
Series 425M, 435M

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	-.0001" -.0005" (-.0025 - .0127mm)



TECH PAGES 286-287

Standard Length - Double End - 3/8" Shank
Standard Länge - Dopple Ende - 3/8" Schaft
Longitud Estándar - Doble Punta - Espiga de 3/8"
Longueur Standart - Double Extrémité - 3/8" Diametre de la Tige
Lunghezza Standard - Doppia Fresa - Stelo 3/8"
标准长度 - 双头 - 3/8" 刀杆



70

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

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Gängiger 3/8" Schaft mit Weldon Spannfläche
Für Stärke und Anpassungsfähigkeit beim Umstieg von Hochleistungsschnellstahl (HSS)

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

35

Fraises carbure submicrograin - coupe au centre
Queue de diametre 3/8 avec meplat weldon
Alternative au fraises HSS

Fresa sub-micrograno metallo duro - taglio al centro
Diametro 3/8" con attacco weldon
Alternativa alle frese tradizionali in HSS

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

0

MATERIAL HARDNESS (Rc)

(425M) 2 Flute EDP#	(435M) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
33010	34010	.1250	1/8"	3.175	3/8"	3"	3/8"
33020	34020	.1562	5/32"	3.967	3/8"	3"	7/16"
33030	34030	.1875	3/16"	4.763	3/8"	3"	1/2"
33050	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"

† *Metric equivalents are for reference only*

TOLERANCES

d_1	+.000" –.002" (+.000 –.050mm)
d_2	-.0001" -.0005" (-.0025 - .0127mm)



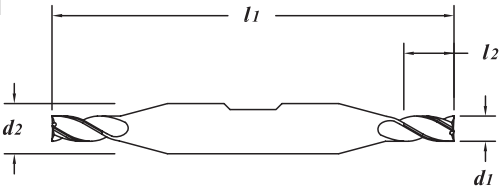





TECH PAGES 286-287

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





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

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Gängiger 3/8" Schaft mit Weldon Spannfläche
Für Stärke und Anpassungsfähigkeit beim Umstieg von Hochleistungsschnellstahl (HSS)
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
Mecanizado seco o semiseco

Fraises carbure submicrograin - coupe au centre
Queue de diametre 3/8 avec meplat weldon
Alternative au fraises HSS
Usinage a sec ou avec l'air

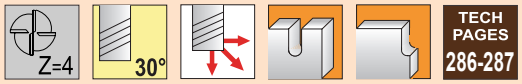
Fresa sub-micrograno metallo duro - taglio al centro
Diametro 3/8" con attacco weldon
Alternativa alle frese tradizionali in HSS
Lavorazione a secco o a umido

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
干式或半干式机加工

(435MA) 4 Flute 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"

Series 535M

TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	-.0001" -.0005" (-.0025 - .0127mm)
ball radius	+.000" –.001" (+.000 –.025mm)



TECH PAGES 286-287



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

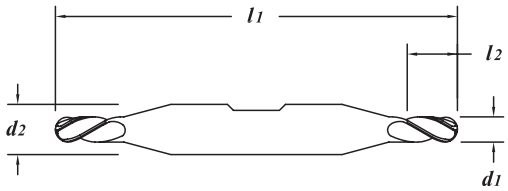
Standard Länge - Dopple Ende - 3/8" Schaft - Vollradius

Longitud Estándar - Doble Punta - Espiga de 3/8" - Cabeza Esférica

Longueur Standart - Double Extrémité - 3/8" Diametre de la Tige - Hemispherique

Lunghezza Standard - Doppia Fresa - Stelo 3/8" - Sferica

标准长度 - 双头 - 3/8" 刀杆 - 球头



70

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

EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
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")

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")

35

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")

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")

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
半径允差 +0,000 /–0,025 (+.000"-.001")

0

MATERIAL HARDNESS (Rc)

† *Metric equivalents are for reference only*

TOLERANCES

d_1	+.000" –.002" (+.000 –.050mm)
d_2	-.0001" -.0005" (-.0025 - .0127mm)
ball radius	+.000" –.001" (+.000 –.025mm)

Z=4 | 30° | TECH PAGES 286-287



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

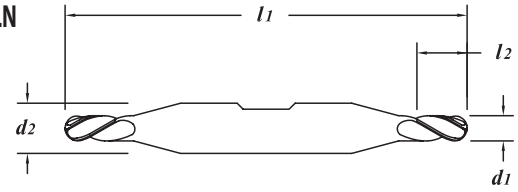
Standard Länge - Dopple Ende - 3/8" Schaft - Vollradius - TiALN-Beschichtet

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
Dry or semi-dry machining

EDP#	d_1 † Diameter Decimal	d_1 † 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"

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Gängiger 3/8" Schaft mit Weldon Spannfläche
Für Stärke und Anpassungsfähigkeit beim Umstieg von Hochleistungsschnellstahl (HSS)
Trocken oder Halbtrockene Bearbeitung
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")

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
Mecanizado seco o semiseco
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")

Fraises carbure submicrograin - coupe au centre
Queue de diametre 3/8 avec meplat weldon
Alternative au fraises HSS
Usinage a sec ou avec l'air
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")

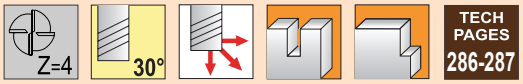
Fresa sub-micrograno metallo duro - taglio al centro
Diametro 3/8" con attacco weldon
Alternativa alle frese tradizionali in HSS
Lavorazione a secco o a umido
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")

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
干式或半干式机加工
半径允差 +0,000 /–0,025 (+.000"-.001")

70
35
0
MATERIAL HARDNESS (Rc)

Series 430M

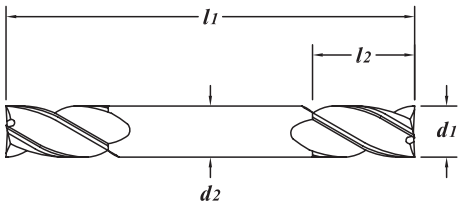
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6



TECH PAGES 286-287

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





70

Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiAlN Coated - page 259

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Extrem Vielseitig
TiAlN-Beschichtet - Seite 237
Kurze Länge - Seite 202

Fresa de submicrograno sólido carburo - corte centrado
Extremadamente versátil
Recubrimiento de TiAlN - Página 237
Longitud Corta - Página 202

35

Fraises carbure submicrograin - coupe au centre
Utilisations variables
Revêtement TiAlN - Page 237
Longueur Courte - Page 202

Fresa sub-micrograno metallo duro - taglio al centro
Estremamente varsatile
Rivestimento in TiAlN - Pagina 237
Serie Corta - Pagina 202

超细晶粒整体硬质合金立铣刀 - 中心切削
功能极多
TiAlN 涂层 - 237页
短柱长度 - 202页

0

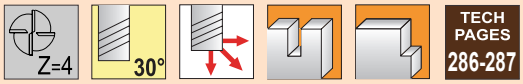
MATERIAL HARDNESS (Rc)

EDP#	d_1 † Diameter Decimal	d_1 † Diameter Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
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*

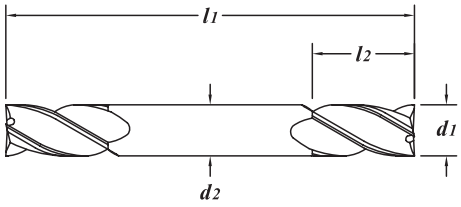
TOLERANCES

d_1	+.000" –.002" (+.000 –.050mm)
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
Uncoated - page 258

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Unbeschichtet - Seite 236
Kurze Länge - Seite 203

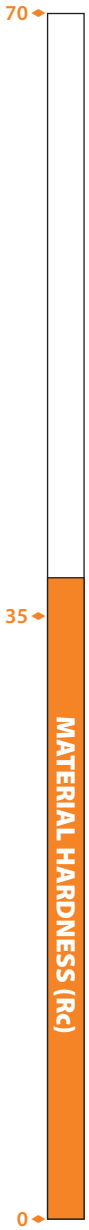
Fresa de submicrograno sólido carburo - corte centrado
Mecanizado seco o semiseco
Extremadamente versátil
Sin recubrimiento - Página 236
Longitud Corta - Página 203

Fraises carbure submicrograin - coupe au centre
Usinage a sec ou avec l'air
Utilisations variables
Sans revêtement - Page 236
Longueur Courte - Page 203

Fresa sub-micrograno metallo duro - taglio al centro
Lavorazione a secco o a umido
Estremamente varsatile
Non Rivestito - Pagina 236
Serie Corta - Pagina 203

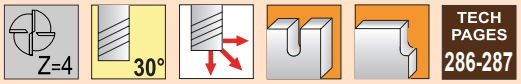
超细晶粒整体硬质合金立铣刀 - 中心切削
干式或半干式机加工
功能极多
未涂层 - 236页
短柱长度 - 203页

(430MA/450MA) EDP#	d_1 † Diameter Decimal	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

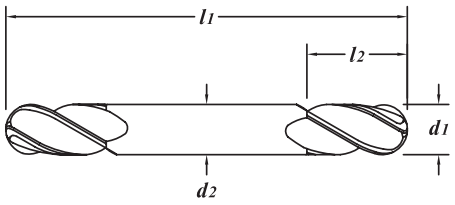
TOLERANCES	
d_1	+.000" –.002" (+.000 –.050mm)
d_2	h6
ball radius	+.000" –.001" (+.000 –.025mm)



TECH PAGES 286-287

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







Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiAlN Coated - page 261



Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
TiAlN-Beschichtet - Seite 261



Fresa de submicrograno sólido carburo - corte centrado
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Recubrimiento de TiAlN - Página 261



Fraises carbure submicrograin - coupe au centre
Utilisations variables
Tolerance du rayon de hemispherique +0,000 / –0,025 (+.000" –.001")
Revêtement TiAlN - Page 261



Fresa sub-micrograno metallo duro - taglio al centro
Estremamente varsatile
Tolleranza del raggio +0,000 / –0,025 (+.000" –.001")
Rivestimento in TiAlN - Pagina 261



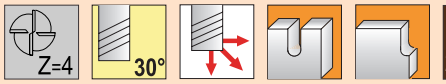
超细晶粒整体硬质合金立铣刀 - 中心切削
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
TiAlN 涂层 - 261页

MATERIAL HARDNESS (Rc)
70
35
0

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"

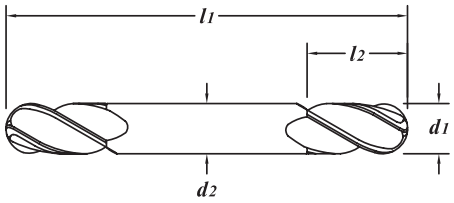
† *Metric equivalents are for reference only*

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



Standard Length - Double End - Ball End - TiALN 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
Uncoated - page 260

Vollhartmetallfräser aus Feinkornhartmetall - Zentrumsschnitt
Trocken oder Halbtrockene Bearbeitung
Extrem Vielseitig
Vollradius Toleranz: +0,000 / –0,025 (+.000" –.001")
Unbeschichtet - Seite 260

Fresa de submicrograno sólido carburo - corte centrado
Mecanizado seco o semiseco
Extremadamente versátil
Tolerancia de la cabeza esférica +0,000 / –0,025 (+.000" –.001")
Sin recubrimiento - Página 260

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")
Sans revêtement - Page 260

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")
Non Rivestito - Pagina 260

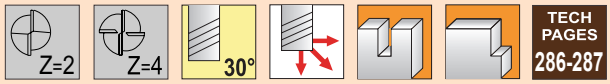
超细晶粒整体硬质合金立铣刀 - 中心切削
干式或半干式机加工
功能极多
半径允差 +0,000 /–0,025 (+.000"–.001")
未涂层 - 260页

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

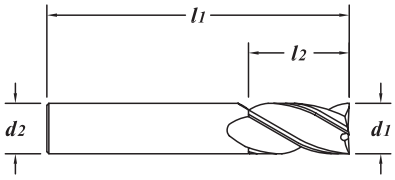
TOLERANCES

d_1	+.001" –.000" (+.025 –.000mm)
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







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

MATERIAL HARDNESS (Rc)
70
35
0

(280M) 2 Flute EDP#	(290M) 4 Flute EDP#	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length
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"

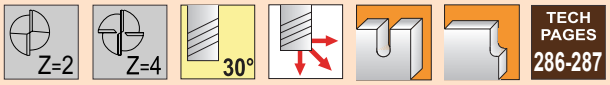
* - Tools with weldon flats

GARR TOOL®

† Metric equivalents are for reference only

TOLERANCES

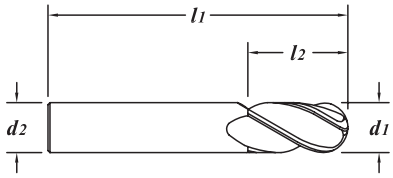
d_1	+.001" –.000" (+.025 –.000mm)
d_2	h6



TECH PAGES 286-287

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"

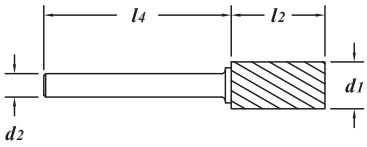
70
35
0
MATERIAL HARDNESS (Rc)

* - 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	*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

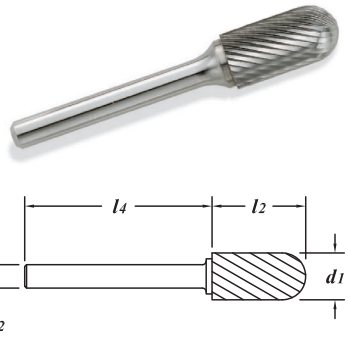


Standard Cut | Chipbreaker Cut | Double Cut (D) | Diamond Cut (add 20%) | Aluminum Cut (A) | End Cut (add 10%)

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-Torica
硬质合金回转锉刀 - 圆柱—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

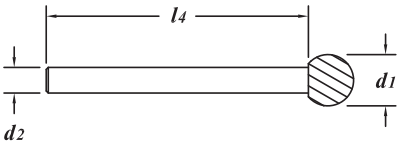
超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
A - 铝材切削
D - 双切削
* - 整体硬质合金

EDP#	TOOL #	*d1* † Diameter Decimal	*d1* † Diameter	Metric	*d2* Shank Diameter	*l2* Flute Length	*l4* Shank Length
61010	* SC-14	.1875	3/16"	4.763	1/4"	5/8"	1-3/8"
61012	* SC-14D	.1875	3/16"	4.763	1/4"	5/8"	1-3/8"
61020	* SC-1	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"
61021	* SC-1A	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"
61022	* SC-1D	.2500	1/4"	6.350	1/4"	5/8"	1-3/8"
61030	SC-2	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"
61032	SC-2D	.3125	5/16"	7.938	1/4"	3/4"	1-3/4"
61040	SC-3	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
61041	SC-3A	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
61042	SC-3D	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
61050	SC-4	.4375	7/16"	11.113	1/4"	1"	1-3/4"
61052	SC-4D	.4375	7/16"	11.113	1/4"	1"	1-3/4"
61060	SC-5	.5000	1/2"	12.700	1/4"	1"	1-3/4"
61061	SC-5A	.5000	1/2"	12.700	1/4"	1"	1-3/4"
61062	SC-5D	.5000	1/2"	12.700	1/4"	1"	1-3/4"
61070	SC-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"
61071	SC-6A	.6250	5/8"	15.875	1/4"	1"	1-3/4"
61072	SC-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"
61080	SC-7	.7500	3/4"	19.050	1/4"	1"	1-3/4"
61081	SC-7A	.7500	3/4"	19.050	1/4"	1"	1-3/4"
61082	SC-7D	.7500	3/4"	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

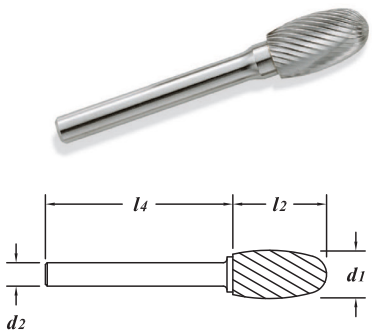
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro

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

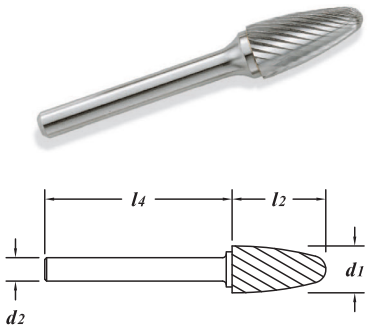
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro

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 Metric	*d2* Shank Diameter	*l2* Flute Length	*l4* Shank Length
63010	* SE-1	.2500	6.350	1/4"	3/8"	2"
63012	* SE-1D	.2500	6.350	1/4"	3/8"	2"
63020	SE-3	.3750	9.525	1/4"	5/8"	1-3/4"
63021	SE-3A	.3750	9.525	1/4"	5/8"	1-3/4"
63022	SE-3D	.3750	9.525	1/4"	5/8"	1-3/4"
63030	SE-5	.5000	12.700	1/4"	7/8"	1-3/4"
63031	SE-5A	.5000	12.700	1/4"	7/8"	1-3/4"
63032	SE-5D	.5000	12.700	1/4"	7/8"	1-3/4"
63040	SE-6	.6250	15.875	1/4"	1"	1-3/4"
63041	SE-6A	.6250	15.875	1/4"	1"	1-3/4"
63042	SE-6D	.6250	15.875	1/4"	1"	1-3/4"
63050	SE-7	.7500	19.050	1/4"	1"	1-3/4"
63052	SE-7D	.7500	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 a Tre Raggi
硬质合金回转锉刀 - 树—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

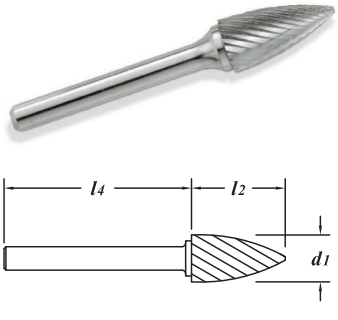
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro

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	Diameter Metric	*d2* Shank Diameter	*l2* Flute Length	*l4* Shank Length
64010	* SF-1	.2500	1/4" 6.350	1/4"	5/8"	2"
64011	* SF-1A	.2500	1/4" 6.350	1/4"	5/8"	2"
64012	* SF-1D	.2500	1/4" 6.350	1/4"	5/8"	2"
64020	SF-3	.3750	3/8" 9.525	1/4"	3/4"	1-3/4"
64021	SF-3A	.3750	3/8" 9.525	1/4"	3/4"	1-3/4"
64022	SF-3D	.3750	3/8" 9.525	1/4"	3/4"	1-3/4"
64030	SF-5	.5000	1/2" 12.700	1/4"	1"	1-3/4"
64031	SF-5A	.5000	1/2" 12.700	1/4"	1"	1-3/4"
64032	SF-5D	.5000	1/2" 12.700	1/4"	1"	1-3/4"
64040	SF-6	.6250	5/8" 15.875	1/4"	1"	1-3/4"
64041	SF-6A	.6250	5/8" 15.875	1/4"	1"	1-3/4"
64042	SF-6D	.6250	5/8" 15.875	1/4"	1"	1-3/4"
64050	SF-14	.7500	3/4" 19.050	1/4"	1-1/4"	1-3/4"
64052	SF-14D	.7500	3/4" 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

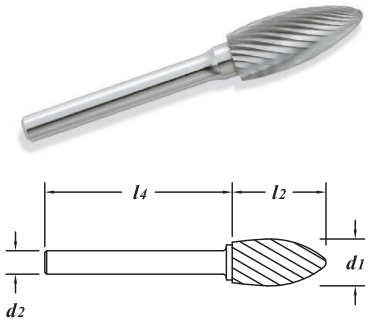
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
* - Metallo duro

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	Diameter	Metric	*d2* Shank Diameter	*l2* Flute Length	*l4* Shank Length
65010	* SG-1	.2500	1/4"	6.350	1/4"	5/8"	2"
65012	* SG-1D	.2500	1/4"	6.350	1/4"	5/8"	2"
65020	SG-3	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
65022	SG-3D	.3750	3/8"	9.525	1/4"	3/4"	1-3/4"
65030	SG-13	.5000	1/2"	12.700	1/4"	3/4"	1-3/4"
65032	SG-13D	.5000	1/2"	12.700	1/4"	3/4"	1-3/4"
65040	SG-5	.5000	1/2"	12.700	1/4"	1"	1-3/4"
65042	SG-5D	.5000	1/2"	12.700	1/4"	1"	1-3/4"
65050	SG-6	.6250	5/8"	15.875	1/4"	1"	1-3/4"
65052	SG-6D	.6250	5/8"	15.875	1/4"	1"	1-3/4"
65060	SG-7	.7500	3/4"	19.050	1/4"	1"	1-3/4"
65062	SG-7D	.7500	3/4"	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

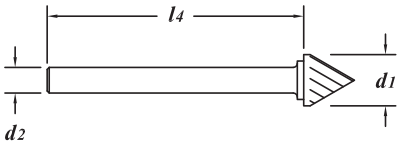
超细晶粒硬质合金
1/4" (6,35mm) 钢质刀柄
D - 双切削

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

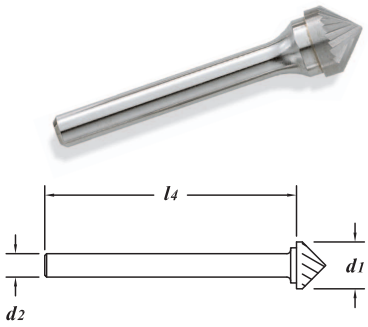
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
** - Metallo duro / Doppia fresa

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 #	d_1 † Diameter Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_4 Shank Length
67010	** SJ-1	.2500	1/4"	6.350	1/4"	1-11/16"
67012	** SJ-1D	.2500	1/4"	6.350	1/4"	1-11/16"
67020	SJ-3	.3750	3/8"	9.525	1/4"	1-3/4"
67022	SJ-3D	.3750	3/8"	9.525	1/4"	1-3/4"
67030	SJ-5	.5000	1/2"	12.700	1/4"	1-3/4"
67032	SJ-5D	.5000	1/2"	12.700	1/4"	1-3/4"
67040	SJ-6	.6250	5/8"	15.875	1/4"	1-3/4"
67042	SJ-6D	.6250	5/8"	15.875	1/4"	1-3/4"
67050	SJ-7	.7500	3/4"	19.050	1/4"	1-3/4"
67052	SJ-7D	.7500	3/4"	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 #	d_1 † Diameter Decimal	Diameter	Metric	d_2 Shank Diameter	l_4 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)*

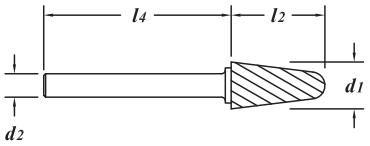
Limas Rotativas de Carburo - Forma Cónica-Redondeada *(Ángulo de cara de 14°)*

Fraises Limes Rotatives Carbure - Forme Conique a Bout Hemispherique *(forme conique a 14°)*

Lime Rotative in Metallo Duro - Geometria torica 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

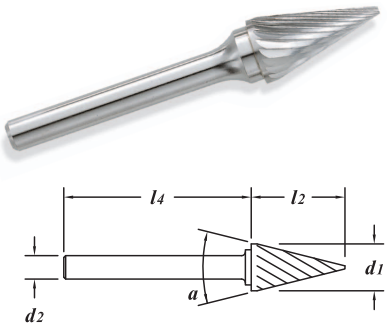
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
A - Taglio per alluminio
D - Doppio tagliente
* - Metallo duro

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	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

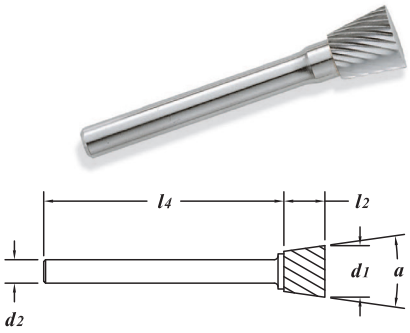
Sub-micrograno metallo duro
Stelo in acciaio da 1/4" (6,35mm)
D - Doppio tagliente
* - Metallo duro

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 #	*d1* † Diameter Decimal	*d1* † Diameter Metric	*d2* Shank Diameter	*a* Included Angle	*l2* Flute Length	*l4* Shank Length
71010	* SN-1	.2500	6.350	1/4"	10°	5/16"	2"
71012	* SN-1D	.2500	6.350	1/4"	10°	5/16"	2"
71020	SN-2	.3750	9.525	1/4"	13°	3/8"	1-3/4"
71022	SN-2D	.3750	9.525	1/4"	13°	3/8"	1-3/4"
71030	SN-3	.5000	12.700	1/4"	16°	1/2"	1-3/4"
71032	SN-3D	.5000	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	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

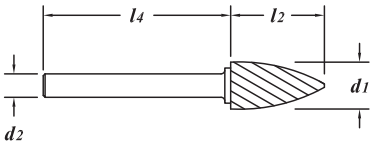
Feinkornhartmetall
1/8" (3,175mm) Stahlschaft
D - Doppelte Bearbeitung

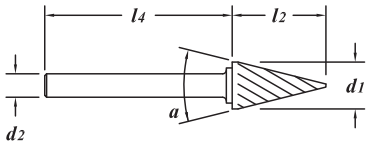
Submicrograno carburo
Espigas de acero de 1/8" (3,175mm)
D - Corte doble

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 #	d_1 † Diameter Decimal	d_1 † Diameter Metric	d_2 Shank Diameter	a Included Angle	l_2 Flute Length	l_4 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



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



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

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

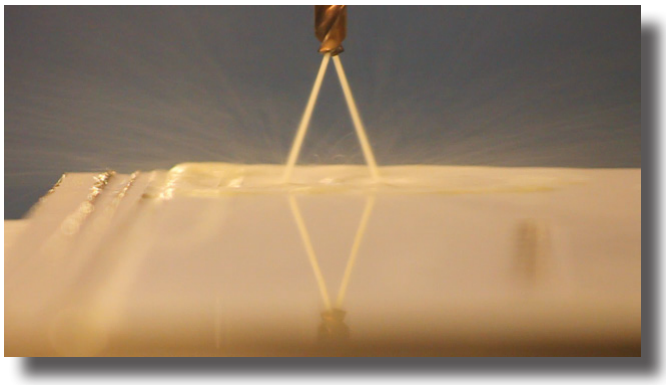
Carbure plein submicrograin
Queue 1/8" (3,175mm)
D - Double Coupe

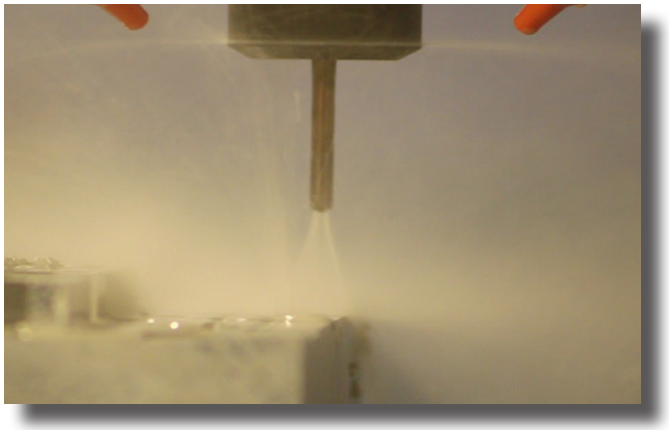
Super sub-micrograno metallo duro
Stelo da 1/8" (3,175mm)
D - Doppio tagliente

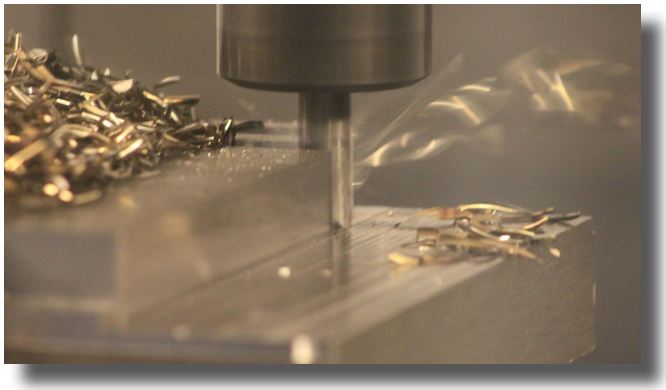
优质超细晶粒
1/8" (3,175mm) 刀柄
D - 双切削

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 Guide - Drills	280
Troubleshooting Guide - End Mills	281
Troubleshooting Guide - Reamers	282
Weldon Flat Specs	282
Formulas	283
Tool Coating Types	284
SFM/RPM Conversion Charts	285
General Purpose Milling Guide - *fractional*	286
General Purpose Milling Guide - *metric*	287
High Performance Milling Guide - *fractional*	288
High Performance Milling Guide - *metric*	289
Aluminum Milling Guide	290
ARC Milling Guide	293
VHM Milling Guide - *fractional*	294
VHM Milling Guide - *metric*	295
VRX Milling Guide - *fractional*	296
VRX Milling Guide - *metric*	297
V4 High Speed Milling Guide - *fractional*	298
V4 High Speed Milling Guide - *metric*	299
V5 High Speed Milling Guide - *fractional*	300
V5 High Speed Milling Guide - *metric*	301
VRX-6 Milling Guide - *fractional*	302
VRX-6 Milling Guide - *metric*	303
VX-7 Milling Guide - *fractional*	304
VX-7 Milling Guide - *metric*	305
TMS/TMR Milling Guide - *fractional*	306
TMS/TMR Milling Guide - *metric*	307
TMS/TMR Chip Thinning Calculations - *fractional*	308
TMS/TMR Chip Thinning Calculations - *metric*	309
High Rc Finisher Milling Guide - *fractional*	310
High Rc Finisher Milling Guide - *metric*	311
Die Mold Cutter Milling Guide - *fractional*	312
Die Mold Cutter Milling Guide - *metric*	313
High Feed Milling Guide	314
Diamond Coated Milling Guide	315
Reaming Guide - *fractional*	316
Reaming Guide - *metric*	317
Drill Mills, Chamfering - *fractional*	318
Drill Mills, Chamfering - *metric*	319
Drill Mills, Through Hole - *fractional*	320
Drill Mills, Through Hole - *metric*	321
General Purpose Drilling Guide Uncoated - *fractional*	322
General Purpose Drilling Guide Uncoated - *metric*	324
General Purpose Drilling Guide Coated - *fractional*	326
General Purpose Drilling Guide Coated - *metric*	328
High Performance Mini Drills Guide - *fractional*	330
High Performance Mini Drills Guide - *metric*	331
High Performance Drilling Guide - *fractional*	332
High Performance Drilling Guide - *metric*	333
3-Flute for Aluminum 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

Troubleshooting for End Mills

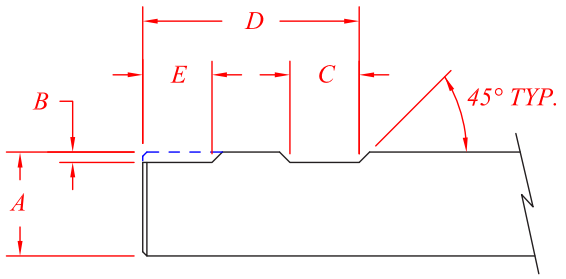
PROBLEM	SUGGESTIONS
Chipping	Check part rigidity
	Verify speeds and feeds
	Confirm concentricity of end mill in holder
	Decrease ramp angle or slow down approach
	Check coolant flow and location
Breakage	Decrease feed rate
	Decrease axial depth
	Use shorter tool or stub holder
	Resharpen earlier
Chattering	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"



$$SFM = \frac{\pi \times Diameter \times RPM}{12} \qquad CPT = \frac{IPM}{RPM \times Number\ of\ Teeth}$$

$$RPM = \frac{SFM \times 3.82}{Diameter} \qquad IPM = RPM \times Number\ of\ Teeth \times CPT$$

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:

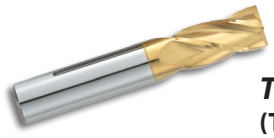
$$\frac{.50\left(\frac{0.50}{.015}\right)}{\sqrt{\left(\frac{0.50}{.015}\right)-1}} = \frac{16.667}{5.6} = 2.93 \times .0015 = .0045$$

(Chip Thinning reference charts on pages 308-309)

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

h6 TOLERANCE FOR SHRINK FIT HOLDERS *(as taken from the Machinery's Handbook)*		
SHANK DIAMETER		TOLERANCE
Decimal	Nominal	
≤ .1181"	≤ 3mm	-.00000" / -.00024"
> .1181" - .2362"	> 3mm - 6mm	-.00000" / -.00032"
> .2362" - .3937"	> 6mm - 10mm	-.00000" / -.00035"
> .3937" - .7087"	> 10mm - 18mm	-.00000" / -.00043"
> .7087" - 1.1811"	> 18mm - 30mm	-.00000" / -.00050"
> 1.1811"	> 30mm	-.00000" / -.00050"

Tool Coatings for Standard Products



TiN
(Titanium Nitride)

General purpose coating - low heat resistance. Good lubricity.



TiCN
(Titanium Carbonitride)

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



TiAlN
(Titanium Aluminum Nitride)

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



AlTiN
(Aluminum Titanium Nitride)

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



ALUMASTAR®
(Titanium Diboride - TiB_2)

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



CRYSTALLINE DIAMOND
(CVD)

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



AlCrN
(Aluminum Chromium Nitride)

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



HARDLUBE

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



AlTiN-based

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



AlCrN-based

High wear resistance even under severe thermal stress. Revolutionary smooth coating with outstanding adhesion. Prevents sticking and build-up on edges. Precise high-performance coating. Maintains sharp edges. Primarily for high-temp alloys, stainless, and tool steels.

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 315)											

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	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	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	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	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	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	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	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		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	39 - 59	0,005 - 0,013	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	0,051 - 0,071
		> 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	0,038 - 0,051
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	39 - 59	0,008 - 0,015	0,008 - 0,018	0,013 - 0,025	0,020 - 0,038	0,023 - 0,033	0,025 - 0,046	0,038 - 0,051	0,046 - 0,056	0,046 - 0,089	0,058 - 0,091
		> 40	31 - 39	0,005 - 0,010	0,005 - 0,013	0,010 - 0,018	0,013 - 0,025	0,013 - 0,025	0,018 - 0,025	0,023 - 0,038	0,030 - 0,046	0,038 - 0,064	0,051 - 0,076
	400 Series - 403, 405, 420, 455	< 40	59 - 79	0,013 - 0,020	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	0,076 - 0,117
		> 40	39 - 59	0,008 - 0,018	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	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	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
		> 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	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	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
		> 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	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 315)											

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-25N-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 315)									

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 315)										

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)

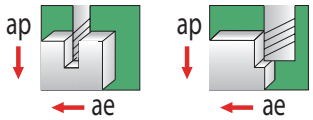
Series 242M/842M/A3 End Mills

NOTES: Climb milling recommended for best finish
Contact your OEM for your machine's optimal running parameters
Figures shown are based on 6061 / 7075
CAT 50 Taper holders are recommended for 3/4" and 1" diameter end mills
For CAT 40 machines using tools over 5/8" diameter, speeds and feeds may need to be reduced by as much as 50%

	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)

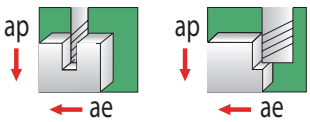
Series 142M/143M/A3 End Mills

NOTES:
- Climb milling recommended for best finish
- Contact your OEM for your machine's optimal running parameters
- Figures shown are based on 6061 / 7075
- CAT 50 Taper holders are recommended for 3/4" and 1" diameter end mills
- In controlled slotting tests, 4000 SFM, 1% diameter Chipload Per Tooth and 50% of Dia. axial depth were obtained
- In cases for tools with slower SFM (M/Min.), reference Series 242M/842M
- For CAT 40 machines using tools over 5/8" diameter, speeds and feeds may need to be reduced by as much as 50%

	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)

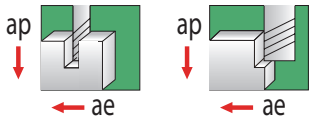
Series A3 End Mills

NOTES: Climb milling recommended for best finish
Contact your OEM for your machine's optimal running parameters
CPT parameters shown are for 2xD LOC tooling and 2.5xD Reach Lengths
CPT may need to be reduced based on machine/tool holding connection
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.



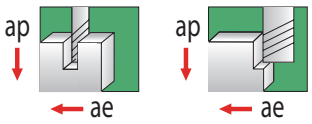
NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

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



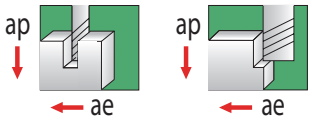
ARC SERIES TOOLS ARE NOT DESIGNED FOR OVER 28Rc MATERIALS

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 / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金**									
	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 / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金									
	Titanium: 6AL4V, CP	150 - 200	.0008" - .0010"	.0010" - .0015"	.0010" - .0020"	.0015" - .0020"	.0020" - .0030"	.0025" - .0030"	.0030" - .0035"	.0030" - .0040"
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**									
	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 / Hochfeste Werkzeugstähle / Herramienta aceros de alto dureza / Aciers à outils a haute résistance / Acciaio da utensili molto duro / 高强度工具钢**									
	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 / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢									
	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 / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**									
	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

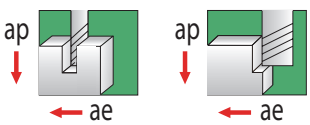


NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for VHM Series 4-Flute Rougher

	ISO Material	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 / Nickellegierungen / Aleaciones de níquel / Alliage de nickel / Leghe di nichel / 高镍基合金**										
	High Temperature Alloys: Inconel 625/718, A286	30 - 55	0,008 - 0,015	0,018 - 0,025	0,020 - 0,025	0,025 - 0,038	0,025 - 0,038	0,025 - 0,038	0,030 - 0,050	0,038 - 0,063	0,038 - 0,063
	TITANIUM ALLOYS / Titanlegierungen / Aleaciones de Titanio / Alliage de Titane / Leghe di Titanio / 钛合金										
	Titanium: 6AL4V, CP	45 - 60	0,010 - 0,020	0,020 - 0,025	0,025 - 0,038	0,025 - 0,050	0,038 - 0,050	0,050 - 0,076	0,063 - 0,076	0,076 - 0,089	0,076 - 0,102
M	**STAINLESS STEELS / Rostfreie Stähle / Acero Inoxidable / Acier Inoxydable / Acciaio Inox / 不锈钢合金**										
	Stainless Steel: 303	90 - 115	0,010 - 0,020	0,020 - 0,025	0,025 - 0,038	0,033 - 0,050	0,038 - 0,050	0,050 - 0,076	0,063 - 0,089	0,076 - 0,102	0,089 - 0,114
	Stainless Steel: 304, 316, 400 Series, Kovar, Invar	75 - 90	0,008 - 0,015	0,015 - 0,025	0,020 - 0,038	0,025 - 0,050	0,030 - 0,050	0,038 - 0,050	0,050 - 0,063	0,063 - 0,076	0,063 - 0,089
	Stainless Steel: 304L, 316L, 8620, 17/4, 15/5, 13/8, PH Mat'l	60 - 75	0,008 - 0,015	0,015 - 0,020	0,018 - 0,025	0,020 - 0,025	0,025 - 0,038	0,025 - 0,050	0,038 - 0,063	0,050 - 0,076	0,050 - 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**										
	High Strength Tool Steel: 4130, 4140, A2, D2, P20, H13	75 - 125	0,006 - 0,015	0,015 - 0,020	0,018 - 0,025	0,020 - 0,025	0,025 - 0,038	0,025 - 0,050	0,038 - 0,063	0,050 - 0,076	0,050 - 0,076
	CARBON STEELS / Kohlenstoffstahl / Acero de carbón / Acier du carbone / Acciaio al carbonio / 碳钢										
	Carbon Steels: 1000 Series	85 - 130	0,008 - 0,015	0,015 - 0,020	0,020 - 0,030	0,025 - 0,038	0,025 - 0,050	0,038 - 0,063	0,050 - 0,063	0,050 - 0,076	0,063 - 0,089
K	**CAST MATERIAL / Gegossenes Material / Material bastidor vertidos / Materiaux fontes / Materiale fuso / 铸造件**										
	Cast Iron	125 - 150	0,013 - 0,025	0,025 - 0,050	0,025 - 0,050	0,038 - 0,050	0,038 - 0,063	0,050 - 0,089	0,063 - 0,089	0,076 - 0,102	0,102 - 0,127

	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.

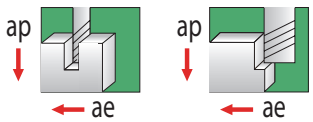
GARR TOOL High Performance Milling Guide for VRX
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

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.

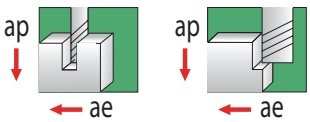
GARR TOOL High Performance Milling Guide for VRX
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

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.

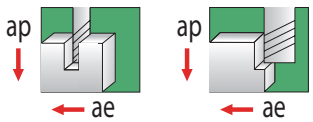
GARR TOOL High Performance Milling Guide for V4
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

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.

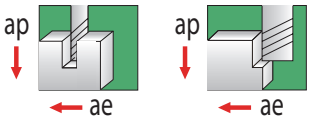
GARR TOOL High Performance Milling Guide for V4
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

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	27 - 57	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
		> 40	25 - 45	0,015 - 0,033	0,018 - 0,041	0,023 - 0,051	0,030 - 0,066	0,036 - 0,081	0,046 - 0,102	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	27 - 57	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
		> 40	25 - 45	0,015 - 0,033	0,018 - 0,041	0,023 - 0,051	0,030 - 0,066	0,036 - 0,081	0,046 - 0,102	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	27 - 57	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
		> 40	25 - 45	0,015 - 0,033	0,018 - 0,041	0,023 - 0,051	0,030 - 0,066	0,036 - 0,081	0,046 - 0,102	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	70 - 115	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
		> 40	55 - 85	0,015 - 0,033	0,018 - 0,041	0,023 - 0,051	0,030 - 0,066	0,036 - 0,081	0,046 - 0,102	0,061 - 0,132
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	75 - 120	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
		> 40	55 - 85	0,015 - 0,033	0,018 - 0,041	0,023 - 0,051	0,030 - 0,066	0,036 - 0,081	0,046 - 0,102	0,061 - 0,132
	400 Series - 403, 405, 420, 455	< 40	70 - 130	0,020 - 0,041	0,023 - 0,048	0,028 - 0,058	0,041 - 0,081	0,046 - 0,097	0,056 - 0,117	0,081 - 0,163
		> 40	55 - 100	0,015 - 0,036	0,018 - 0,043	0,023 - 0,053	0,030 - 0,071	0,036 - 0,086	0,046 - 0,107	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	70 - 120	0,020 - 0,041	0,028 - 0,048	0,033 - 0,058	0,041 - 0,081	0,056 - 0,097	0,066 - 0,142	0,102 - 0,163
		> 40	45 - 100	0,015 - 0,033	0,025 - 0,041	0,030 - 0,051	0,030 - 0,066	0,051 - 0,081	0,061 - 0,102	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	110 - 150	0,020 - 0,043	0,028 - 0,051	0,033 - 0,061	0,041 - 0,086	0,056 - 0,102	0,066 - 0,122	0,102 - 0,173
		> 40	75 - 115	0,015 - 0,036	0,025 - 0,043	0,030 - 0,051	0,030 - 0,071	0,051 - 0,086	0,061 - 0,102	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.

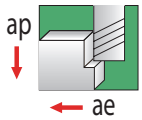
GARR TOOL High Performance Milling Guide for V5, V5C
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

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.

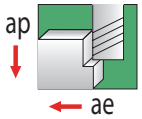
GARR TOOL High Performance Milling Guide for V5, V5C
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

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.

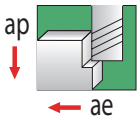
GARR TOOL High Performance Milling Guide for VRX-6
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

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.

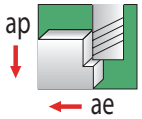
GARR TOOL High Performance Milling Guide for VRX-6
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

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.

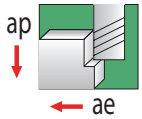
GARR TOOL High Performance Milling Guide for VX-7, VX-7C
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

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 > 40	120 - 240 100 - 195	.0013" - .0026" .0010" - .0024"	.0019" - .0036" .0014" - .0031"	.0021" - .0043" .0017" - .0038"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .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 > 40	120 - 240 100 - 195	.0013" - .0026" .0010" - .0024"	.0019" - .0036" .0014" - .0031"	.0021" - .0043" .0017" - .0038"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .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 > 40	120 - 240 100 - 195	.0013" - .0026" .0010" - .0024"	.0019" - .0036" .0014" - .0031"	.0021" - .0043" .0017" - .0038"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .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 > 40	290 - 490 225 - 360	.0013" - .0026" .0010" - .0024"	.0019" - .0036" .0014" - .0031"	.0022" - .0043" .0017" - .0039"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .0028" - .0062"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	325 - 520 225 - 360	.0013" - .0026" .0010" - .0024"	.0019" - .0036" .0014" - .0031"	.0022" - .0043" .0017" - .0039"	.0026" - .0052" .0020" - .0048"	.0038" - .0072" .0028" - .0062"
	400 Series - 403, 405, 420, 455	< 40 > 40	290 - 555 225 - 425	.0013" - .0028" .0010" - .0025"	.0019" - .0038" .0014" - .0034"	.0022" - .0046" .0017" - .0041"	.0026" - .0056" .0020" - .0050"	.0038" - .0076" .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 > 40	290 - 520 195 - 425	.0016" - .0028" .0014" - .0024"	.0024" - .0038" .0022" - .0031"	.0026" - .0046" .0024" - .0038"	.0032" - .0056" .0028" - .0048"	.0048" - .0076" .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 / 中强合金钢							
	4140, 4340, 52100, 6150, 8620	< 40 > 40	455 - 650 325 - 490	.0016" - .0029" .0014" - .0024"	.0024" - .0040" .0022" - .0033"	.0026" - .0048" .0024" - .0040"	.0032" - .0058" .0028" - .0048"	.0048" - .0080" .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

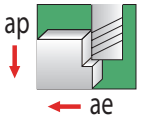
(High Efficiency Milling)

NOTE - DATA DOES NOT REFLECT CHIP THINNING. SEE GARR TOOL'S NEW CALCULATOR ON OUR WEBSITE.

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 > 40	35 - 75 30 - 60	0,024 - 0,046 0,018 - 0,040	0,033 - 0,066 0,025 - 0,061	0,048 - 0,091 0,036 - 0,079	0,053 - 0,109 0,043 - 0,097	0,066 - 0,132 0,051 - 0,122	0,097 - 0,183 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 > 40	35 - 75 30 - 60	0,024 - 0,046 0,018 - 0,040	0,033 - 0,066 0,025 - 0,061	0,048 - 0,091 0,036 - 0,079	0,053 - 0,109 0,043 - 0,097	0,066 - 0,132 0,051 - 0,122	0,097 - 0,183 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 > 40	35 - 75 30 - 60	0,024 - 0,046 0,018 - 0,040	0,033 - 0,066 0,025 - 0,061	0,048 - 0,091 0,036 - 0,079	0,053 - 0,109 0,043 - 0,097	0,066 - 0,132 0,051 - 0,122	0,097 - 0,183 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 > 40	90 - 150 70 - 110	0,024 - 0,046 0,018 - 0,040	0,033 - 0,066 0,025 - 0,061	0,048 - 0,091 0,036 - 0,079	0,056 - 0,109 0,043 - 0,099	0,066 - 0,132 0,051 - 0,122	0,097 - 0,183 0,071 - 0,157
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	100 - 160 70 - 110	0,024 - 0,052 0,018 - 0,040	0,033 - 0,066 0,025 - 0,061	0,048 - 0,091 0,036 - 0,079	0,056 - 0,109 0,043 - 0,099	0,066 - 0,132 0,051 - 0,122	0,097 - 0,183 0,071 - 0,157
	400 Series - 403, 405, 420, 455	< 40 > 40	90 - 170 70 - 130	0,024 - 0,051 0,018 - 0,043	0,033 - 0,071 0,025 - 0,064	0,048 - 0,097 0,036 - 0,086	0,056 - 0,117 0,043 - 0,104	0,066 - 0,142 0,051 - 0,127	0,097 - 0,193 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 > 40	90 - 160 60 - 130	0,032 - 0,051 0,026 - 0,040	0,041 - 0,071 0,036 - 0,061	0,061 - 0,097 0,056 - 0,079	0,066 - 0,117 0,061 - 0,097	0,081 - 0,142 0,071 - 0,122	0,122 - 0,193 0,112 - 0,157
	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	140 - 200 100 - 150	0,032 - 0,053 0,026 - 0,040	0,041 - 0,074 0,036 - 0,061	0,061 - 0,102 0,056 - 0,084	0,066 - 0,122 0,061 - 0,102	0,081 - 0,147 0,071 - 0,122	0,122 - 0,203 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.

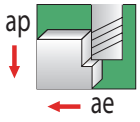


NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

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 308)
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"

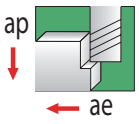


ap = full flute length
ae = 2%

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 309)
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

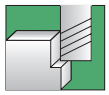


ap = full flute length
ae = 2%

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

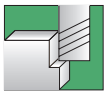
Chip Thinning Calculations for TMS / TMR End Mills

ae = 3%



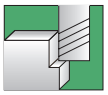
3% Radial Engagement (.03 x d)	
Actual (CPT)	Programmed (CPT)
.0002"	.0005"
.0003"	.0010"
.0005"	.0015"
.0007"	.0020"
.0009"	.0025"
.0010"	.0030"
.0012"	.0035"
.0014"	.0040"
.0015"	.0045"
.0017"	.0050"
.0019"	.0055"
.0020"	.0060"
.0022"	.0065"
.0024"	.0070"
.0026"	.0075"
.0027"	.0080"
.0029"	.0085"
.0031"	.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"

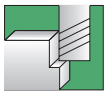
ae = 1%



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"

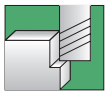
Chip Thinning Calculations for TMS / TMR End Mills

ae = 3%



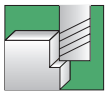
3% Radial Engagement (.03 x d)	
Actual (CPT)	Programmed (CPT)
0,0043mm	0,0127mm
0,0086mm	0,0254mm
0,0130mm	0,0381mm
0,0173mm	0,0508mm
0,0216mm	0,0635mm
0,0259mm	0,0762mm
0,0302mm	0,0889mm
0,0345mm	0,1016mm
0,0389mm	0,1143mm
0,0432mm	0,1270mm
0,0475mm	0,1397mm
0,0518mm	0,1524mm
0,0561mm	0,1651mm
0,0605mm	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

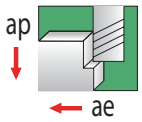
GARR TOOL Milling Guide for High Rc Finishers in Hardened Steel

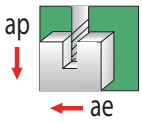
(Reference Series: 545MA, 545BA, 545RA, VRX)

	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.**

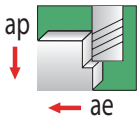
NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

GARR TOOL Milling Guide for High Rc Finishers in Hardened Steel

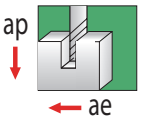
(Reference Series: 545MA, 545BA, 545RA, VRX)

	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

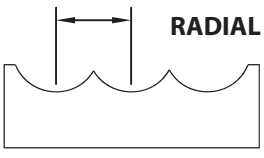
Roughing

(Reference series: 350MX)

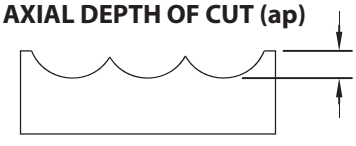
	RPM		CHIPLOAD PER TOOTH (Fz)	
DIAMETER	40 - 50 HRC	50 - 60 HRC	40 - 50 HRC	50 - 60 HRC
1/32"	20,000 - 40,000	20,000 - 40,000	.0005" - .0007"	.0004" - .0005"
1/16"	20,000 - 40,000	20,000 - 40,000	.0010" - .0015"	.0008" - .0010"
3/32"	20,000 - 32,000	20,000 - 30,000	.0015" - .0020"	.0010" - .0015"
1/8"	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.

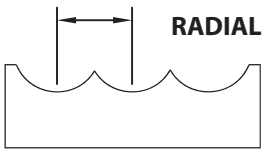
Roughing

(Reference series: 950MX)

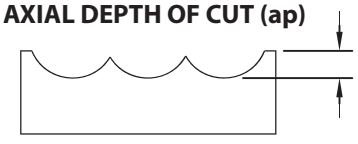
	RPM		CHIPLOAD PER TOOTH (Fz)	
DIAMETER	40 - 50 HRC	50 - 60 HRC	40 - 50 HRC	50 - 60 HRC
1,0mm	20,000 - 40,000	20,000 - 40,000	0,013 - 0,018	0,010 - 0,013
1,5mm	20,000 - 40,000	20,000 - 40,000	0,025 - 0,038	0,020 - 0,025
2,0mm	20,000 - 32,000	20,000 - 30,000	0,038 - 0,050	0,025 - 0,038
3,0mm	18,000 - 24,000	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.

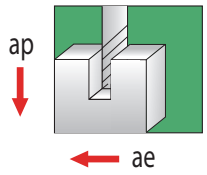
High pressure air is recommended for clearing chips away from the cut.

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

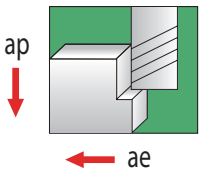
GARR TOOL Milling Guide for H-45 High Feed End Mills

	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.

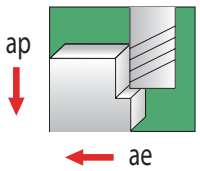
GARR TOOL Milling Guide for Diamond Coated End Mills in Graphite

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 > 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
	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
	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
	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 > 40	39 - 59 31 - 39	0,008 - 0,015 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
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	59 - 89 49 - 87	0,005 - 0,015 0,008 - 0,013	0,005 - 0,015 0,008 - 0,013	0,013 - 0,020 0,008 - 0,018	0,020 - 0,038 0,013 - 0,025	0,038 - 0,046 0,020 - 0,030	0,025 - 0,046 0,018 - 0,030	0,038 - 0,064 0,033 - 0,046	0,046 - 0,071 0,038 - 0,058	0,056 - 0,081 0,043 - 0,064
	400 Series - 403, 405, 420, 455	< 40 > 40	59 - 79 39 - 59	0,018 - 0,025 0,010 - 0,020	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
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
	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
	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-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 General Purpose Drilling Guide (Uncoated)

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.

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 (Uncoated)

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.

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-2SN-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 (Hardlube 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

	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 (Hardlube 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.

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-2SN-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 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 > 40	80 60	100 75	.0008" - .0015" .0005" - .0012"	.0012" - .0020" .0009" - .0017"	.0017" - .0026" .0014" - .0023"	.0022" - .0032" .0019" - .0029"	.0027" - .0038" .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 > 40	90 70	110 75	.0008" - .0015" .0005" - .0012"	.0012" - .0020" .0009" - .0017"	.0017" - .0026" .0014" - .0023"	.0022" - .0032" .0019" - .0029"	.0027" - .0038" .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 > 40	90 60	115 75	.0008" - .0015" .0005" - .0012"	.0012" - .0020" .0009" - .0017"	.0017" - .0026" .0014" - .0023"	.0022" - .0032" .0019" - .0029"	.0027" - .0038" .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 > 40	100 80	120 90	.0010" - .0017" .0007" - .0015"	.0014" - .0022" .0011" - .0020"	.0019" - .0028" .0016" - .0026"	.0024" - .0034" .0021" - .0032"	.0029" - .0040" .0026" - .0038"
	300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40 > 40	90 70	110 80	.0010" - .0017" .0007" - .0015"	.0014" - .0022" .0011" - .0020"	.0019" - .0028" .0016" - .0026"	.0024" - .0034" .0021" - .0032"	.0029" - .0040" .0026" - .0038"
	400 Series - 403, 405, 420, 455	< 40 > 40	110 80	130 105	.0010" - .0017" .0007" - .0015"	.0014" - .0022" .0011" - .0020"	.0019" - .0028" .0016" - .0026"	.0024" - .0034" .0021" - .0032"	.0029" - .0040" .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 > 40	160 130	200 150	.0011" - .0020" .0007" - .0014"	.0015" - .0025" .0011" - .0019"	.0020" - .0031" .0016" - .0025"	.0025" - .0037" .0021" - .0031"	.0030" - .0043" .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 > 40	175 145	215 170	.0011" - .0020" .0007" - .0014"	.0015" - .0025" .0011" - .0019"	.0020" - .0031" .0016" - .0025"	.0025" - .0037" .0021" - .0031"	.0030" - .0043" .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.

GARR TOOL High Performance Drilling Guide

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-25N-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 CENTER

Standards

Every GARR carbide cutting tool is manufactured from premium submicron grain carbide, unless otherwise noted.

Each of our styles of end mills is center cutting, unless otherwise noted.

Altered Standards - 48 Hour Delivery

Many special tooling needs can be satisfied by adding a flat, a corner radius, or by making a minor diameter change to one of our standard tools. Garr Tool Company will ship altered standards within 48 hours - 12 pieces or less. Contact us for pricing.

GARR TOOL cannot be responsible for tools altered by other parties.

Solid Carbide Specials - 2 Week Delivery

Blueprint and non-blueprint specials will be quoted within 24 hours. Uncoated tooling made from stock material will be manufactured to your specifications within two weeks.

Solid carbide cutting tools which are 1" or less in diameter and up to 12" in length can be produced from premium submicron grain carbide in the time it takes most manufacturers to quote and order material.

Garr Tool Company can take care of your special round tooling needs. We deliver!

Reconditioning Service

With our state-of-the-art reconditioning department, you can expect quality reground tools at competitive prices. Let us be your 'local' source for regrinding.

Check Us Out

Our web site, *www.garrtool.com*, enhances the level of customer service you have come to expect from us. Increase the speed and accuracy of special pricing requests by e-mailing prints for quote to *sales@garrtool.com*.

A collection of 'fill-in-the-blank' prints is available for download from our website to aid in quoting of specials.

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⚠ **WARNING**: Our products can expose you to chemicals including cobalt, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov
Please see our Safety Data Sheet at sds.garrtool.com

+1 989-463-6171 fax **+1 989-463-3609**

GARR TOOL®

High Performance Solid Carbide

HEADQUARTERS / MANUFACTURING

7800 N Alger Road
Alma, Michigan USA 48801
Tel: +1 989-463-6171
Fax: +1 989-463-3609

EUROPEAN DISTRIBUTION CENTRE

4 Genoa Way
High Wycombe
HP11 1NY
United Kingdom
Tel: +44 (0) 1494 418160

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