

HIGH PERFORMANCE SOLID CARBIDE CUTTING TOOLS



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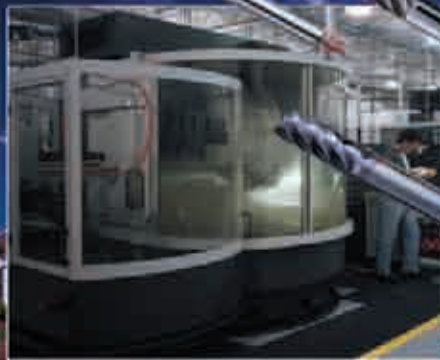
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GARR® TOOL

CATALOG 09
*includes hundreds
of new items!*

GARR TOOL®

Carbide Cutting Tools



For over sixty years, Garr Tool Company has committed to manufacturing the highest quality carbide cutting tools possible, offering competitive prices and providing unequalled customer service.

Our 180,000 square foot facility contains clean, efficient production space and houses state-of-the-art CNC grinding equipment run by conscientious operators. We have dedicated 45,000 square feet of our manufacturing center to the production of solid carbide drills. We have also partnered with Oerlikon Balzers Coating USA to house a coating operations center in our facility. We will continue investing in new technology to meet the future needs of our customers.

We earned our reputation of having fast, reliable deliveries, and we will continue to earn your trust through fast, reliable service. Our standard catalog items are shipped from stock within 24 hours at a 99% fill rate. Garr continues to introduce new series of standard tools to meet the demands of material specific machining. We also take pride in delivering special tools quoted to customer specification within two weeks. Our website, www.garrtool.com, enhances the level of customer service you have come to expect from us.

Our international network of distributors, as well as each of us at Garr Tool, looks forward to servicing your solid carbide round tooling requirements.

TOOL RECOMMENDATIONS

	PAGE
Aluminum	4
Titanium	5
Stainless Steel	6
Cobalt, Nickel, Iron-Based Alloys	7
Brass, Bronze, Copper, Magnesium	8
Hardened Tool Steels	9
Composite Materials	10
Carbon Steels, Medium Alloy Steels	11

DRILLS - HIGH PERFORMANCE

1180	3 Flute	5xD	30° Helix	ALUMASTAR Coated	12
1580H	2 Flute	3xD	30° Helix	HARDLUBE Coated	14
NEW 1580HD	2 Flute	3xD	30° Helix	HELICA Coated	17
NEW 1580KD	2 Flute	3xD	30° Helix	Coolant Fed - HELICA Coated	20
NEW 1580KH	2 Flute	3xD	30° Helix	Coolant Fed - HELICA Coated	23
1280H	2 Flute	5xD	30° Helix	HARDLUBE Coated	25
1280KH	2 Flute	5xD	30° Helix	Coolant Fed - HELICA Coated	28
NEW 1280KD	2 Flute	5xD	30° Helix	Coolant Fed - HELICA Coated	30
1880KH	2 Flute	7xD	30° Helix	Coolant Fed - HELICA Coated	33

DRILLS

1510	2 Flute	3xD	15° Helix		36
1510H	2 Flute	3xD	15° Helix	HARDLUBE Coated	39
1520	2 Flute	3xD	25° Helix		42
1520H	2 Flute	3xD	25° Helix	HARDLUBE Coated	45
1205	2 Flute	5xD	25° Helix		48
1205H	2 Flute	5xD	25° Helix	HARDLUBE Coated	51
1200	2 Flute	5xD	25° Helix		54
1200H	2 Flute	5xD	25° Helix	HARDLUBE Coated	57
1120	3 Flute	3xD	25° Helix		60
1120H	3 Flute	3xD	25° Helix	HARDLUBE Coated	62
1100	3 Flute	5xD	25° Helix		64
1100H	3 Flute	5xD	25° Helix	HARDLUBE Coated	66
1500	2 Flute	3xD	Straight	Hard Metal	68
1500H	2 Flute	3xD	Straight	Hard Metal - HARDLUBE Coated	70
1700	2 Flute	3.5xD	Straight	Double Margin	72
1700K	2 Flute	6xD	Straight	Double Margin/Coolant Fed	73
1800H	2 Flute	8xD	35° Helix	Parabolic - HARDLUBE Coated	74
4000	4 Flute		30° Helix	Core	76
1600	2 Flute		25° Helix	N/C Spotting	77
1400	2 Flute		10° Helix	Combined Drill/Countersink	78
1300	2 Flute		Straight	Spade	79

END MILLS - HIGH PERFORMANCE

142M	2 Flute	Square	41° Helix	ALUMASTAR Coated	80
142B	2 Flute	Ball	41° Helix	ALUMASTAR Coated	81
143M	3 Flute	Square	38° Helix	ALUMASTAR Coated	82
143R	3 Flute	Radius	38° Helix	ALUMASTAR Coated	84
242M/842M	2 Flute	Square	45° Helix		86
253MA/853MA	3 Flute	Square	50° Helix	X.CEED Coated	87
253M/853M	3 Flute	Square	50° Helix		89
253MC	3 Flute	Square	50° Helix	TiCN Coated	91
255MA/855MA	5 Flute	Square	45° Helix	X.CEED Coated	92
255M/855M	5 Flute	Square	45° Helix		94
255MC	5 Flute	Square	45° Helix	TiCN Coated	96
255RA/855RA	5 Flute	Radius	45° Helix	X.CEED Coated	97
263M/863M	3 Flute	Square	60° Helix		99
263MC	3 Flute	Square	60° Helix	TiCN Coated	99
263MA/863MA	3 Flute	Square	60° Helix	X.CEED Coated	99
246M/846M	6 Flute	Square	40° Helix		100
246MC	6 Flute	Square	40° Helix	TiCN Coated	100
246MA/846MA	6 Flute	Square	40° Helix	X.CEED Coated	100
VHM	4 Flute	Chamfer	30° Helix	X.CEED Coated	101
NEW VRX	4 Flute	Square	41° Helix	X.CEED Coated	102
VRX	4 Flute	Radius	41° Helix	X.CEED Coated	103
VRX	4 Flute	Ball	41° Helix	X.CEED Coated	107
545MA	4/5 Flute	Square	45° Helix	X.CEED Coated	108
545RA	4/5 Flute	Radius	45° Helix	X.CEED Coated	109
545BA	4/5 Flute	Ball	45° Helix	X.CEED Coated	110
350MX/950MX	2 Flute	Ball	15° Helix	X.CEED Coated	111
210D	4 Flute	Square	30° Helix	DIAMOND Coated	112
210RD	4 Flute	Radius	30° Helix	DIAMOND Coated	113
310D	4 Flute	Ball	30° Helix	DIAMOND Coated	114
610D	4 Flute	Square	30° Helix	DIAMOND Coated	115
710D	4 Flute	Ball	30° Helix	DIAMOND Coated	116

END MILLS - STUB LENGTH

160M/860M	2 Flute	Square	30° Helix		118
170M/870M	4 Flute	Square	30° Helix		118
160MA/860MA	2 Flute	Square	30° Helix	TiALN Coated	120
170MA/870MA	4 Flute	Square	30° Helix	TiALN Coated	120
180M/980M	2 Flute	Ball	30° Helix		121
190M/990M	4 Flute	Ball	30° Helix		121
180MA/980MA	2 Flute	Ball	30° Helix	TiALN Coated	122
190MA/990MA	4 Flute	Ball	30° Helix	TiALN Coated	122
165M/865M	2 Flute	Square	30° Helix	Double End	123
175M/875M	4 Flute	Square	30° Helix	Double End	123
165MA/865MA	2 Flute	Square	30° Helix	Double End - TiALN Coated	124
175MA/875MA	4 Flute	Square	30° Helix	Double End - TiALN Coated	124
185M/985M	2 Flute	Ball	30° Helix	Double End	125
195M/995M	4 Flute	Ball	30° Helix	Double End	125
185MA/985MA	2 Flute	Ball	30° Helix	Double End - TiALN Coated	126
195MA/995MA	4 Flute	Ball	30° Helix	Double End - TiALN Coated	126

END MILLS - STANDARD LENGTH

220M/820M	2 Flute	Square	30° Helix		127
223M/823M	3 Flute	Square	30° Helix		127
230M/830M	4 Flute	Square	30° Helix		127
220MT	2 Flute	Square	30° Helix	TiN Coated	129
230MT	4 Flute	Square	30° Helix	TiN Coated	129
220MC	2 Flute	Square	30° Helix	TiCN Coated	130
223MC	3 Flute	Square	30° Helix	TiCN Coated	130
230MC	4 Flute	Square	30° Helix	TiCN Coated	130
220MA/820MA	2 Flute	Square	30° Helix	TiALN Coated	131
223MA/823MA	3 Flute	Square	30° Helix	TiALN Coated	131
230MA/830MA	4 Flute	Square	30° Helix	TiALN Coated	131
220R	2 Flute	Radius	30° Helix		133
230R	4 Flute	Radius	30° Helix		133
220RA	2 Flute	Radius	30° Helix	TiALN Coated	135
230RA/830RA	4 Flute	Radius	30° Helix	TiALN Coated	135
320M/920M	2 Flute	Ball	30° Helix		138
323M/923M	3 Flute	Ball	30° Helix		138
330M/930M	4 Flute	Ball	30° Helix		138
320MT	2 Flute	Ball	30° Helix	TiN Coated	140
330MT	4 Flute	Ball	30° Helix	TiN Coated	140
320MC	2 Flute	Ball	30° Helix	TiCN Coated	141
323MC	3 Flute	Ball	30° Helix	TiCN Coated	141
330MC	4 Flute	Ball	30° Helix	TiCN Coated	141
320MA/920MA	2 Flute	Ball	30° Helix	TiALN Coated	142
323MA/923MA	3 Flute	Ball	30° Helix	TiALN Coated	142
330MA/930MA	4 Flute	Ball	30° Helix	TiALN Coated	142
222M	2 Flute	Square	Straight		144
234M	4 Flute	Square	Straight		144
322M	2 Flute	Ball	Straight		144
334M	4 Flute	Ball	Straight		144
273M	3 Flute	Square	30° Helix	Tapered	145
373M	3 Flute	Ball	30° Helix	Tapered	145
280M	2 Flute	Square	30° Helix	N/C Tolerance	146
290M	4 Flute	Square	30° Helix	N/C Tolerance	146
380M	2 Flute	Ball	30° Helix	N/C Tolerance	146
390M	4 Flute	Ball	30° Helix	N/C Tolerance	146
425M	2 Flute	Square	30° Helix	Double End/3/8" Shank	147
435M	4 Flute	Square	30° Helix	Double End/3/8" Shank	147
425MA	2 Flute	Square	30° Helix	Double End/3/8" Shank/TiALN	147
435MA	4 Flute	Square	30° Helix	Double End/3/8" Shank/TiALN	147
525M	2 Flute	Ball	30° Helix	Double End/3/8" Shank	148
535M	4 Flute	Ball	30° Helix	Double End/3/8" Shank	148
525MA	2 Flute	Ball	30° Helix	Double End/3/8" Shank/TiALN	148
535MA	4 Flute	Ball	30° Helix	Double End/3/8" Shank/TiALN	148
420M	2 Flute	Square	30° Helix	Double End	149
430M/450M	4 Flute	Square	30° Helix	Double End	149
420MA	2 Flute	Square	30° Helix	Double End/TiALN Coated	150
430MA/450MA	4 Flute	Square	30° Helix	Double End/TiALN Coated	150
520M	2 Flute	Ball	30° Helix	Double End	151
530M	4 Flute	Ball	30° Helix	Double End	151
520MA	2 Flute	Ball	30° Helix	Double End/TiALN Coated	152
530MA	4 Flute	Ball	30° Helix	Double End/TiALN Coated	152

END MILLS - EXTRA LENGTH

620M/640M	2 Flute	Square	30° Helix		153
623M/643M	3 Flute	Square	30° Helix		153
630M/650M	4 Flute	Square	30° Helix		153
620MC	2 Flute	Square	30° Helix	TiCN Coated	155
623MC	3 Flute	Square	30° Helix	TiCN Coated	155
630MC	4 Flute	Square	30° Helix	TiCN Coated	155
620MA/640MA	2 Flute	Square	30° Helix	TiALN Coated	156
623MA/643MA	3 Flute	Square	30° Helix	TiALN Coated	156
630MA/650MA	4 Flute	Square	30° Helix	TiALN Coated	156
630R	4 Flute	Radius	30° Helix		158
630RA	4 Flute	Radius	30° Helix	TiALN Coated	161
720M/740M	2 Flute	Ball	30° Helix		164
723M/743M	3 Flute	Ball	30° Helix		164
730M/750M	4 Flute	Ball	30° Helix		164
720MC	2 Flute	Ball	30° Helix	TiCN Coated	166
723MC	3 Flute	Ball	30° Helix	TiCN Coated	166
730MC	4 Flute	Ball	30° Helix	TiCN Coated	166
720MA/740MA	2 Flute	Ball	30° Helix	TiALN Coated	167
723MA/743MA	3 Flute	Ball	30° Helix	TiALN Coated	167
730MA/750MA	4 Flute	Ball	30° Helix	TiALN Coated	167

ROTARY FILES

1/4" Diameter	Standard Shapes	Steel Shank	170
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2200M			188
2220M	Engraving	Split Single End	189
2230M	Engraving	Split Double End	190

TECHNICAL DATA

DRILLS

SERIES	PAGE	COATING	DESCRIPTION
1180 	12	ALUMASTAR	Jobber length, 3 flute, High performance
1520 	42	BRIGHT	Stub length, 2 flute, General purpose
1520H 	45	HARDLUBE	Stub length, 2 flute, General purpose
1205 	48	BRIGHT	Jobber length, 2 flute, General purpose
1205H 	51	HARDLUBE	Jobber length, 2 flute, General purpose
1800H 	74	HARDLUBE	Taper length, 2 flute, Parabolic

END MILLS

SERIES	PAGE	COATING	DESCRIPTION
143M 	82	ALUMASTAR	High velocity, 3 flute, High metal removal rate, Square end
143R 	84	ALUMASTAR	High velocity, 3 flute, High metal removal rate, Corner radius
142M 	80	ALUMASTAR	High velocity, 2 flute, High metal removal rate, Square end
142B 	81	ALUMASTAR	High velocity, 2 flute, High metal removal rate, Ball end
242M / 842M 	86	BRIGHT	High performance, 2 flute, For 4000-8000 RPM, Square end
253M / 853M 	89	BRIGHT	High performance, 3 flute, Profiling and finishing, Square end
253MC 	91	TiCN	High performance, 3 flute, Profiling and finishing, Square end
160M / 860M 	118	BRIGHT	Stub length, 2 flute, General purpose, Square end
180M / 980M 	121	BRIGHT	Stub length, 2 flute, General purpose, Ball end
220M / 820M 	127	BRIGHT	Standard length, 2 flute, General purpose, Square end
220MC 	130	TiCN	Standard length, 2 flute, General purpose, Square end
320M / 920M 	138	BRIGHT	Standard length, 2 flute, General purpose, Ball end
320MC 	141	TiCN	Standard length, 2 flute, General purpose, Ball end
620M / 640M 	153	BRIGHT	Extra length, 2 flute, General purpose, Square end
620MC 	155	TiCN	Extra length, 2 flute, General purpose, Square end
720M / 740M 	164	BRIGHT	Extra length, 2 flute, General purpose, Ball end
720MC 	166	TiCN	Extra length, 2 flute, General purpose, Ball end

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1580HD		17	HELICA	Stub length, 2 flute, High performance, Common shank
1580H		14	HARDLUBE	Stub length, 2 flute, High performance
1280H		25	HARDLUBE	Jobber length, 2 flute, High performance
1580KD		20	HELICA	Stub length, 2 flute, High performance, Coolant fed, Common shank
1280KD		30	HELICA	Jobber length, 2 flute, High performance, Coolant fed, Common shank
1580KH		23	HELICA	Stub length, 2 flute, High performance, Coolant fed
1280KH		28	HELICA	Jobber length, 2 flute, High performance, Coolant fed
1880KH		33	HELICA	Taper length, 2 flute, High performance, Coolant fed
1520H		45	HARDLUBE	Stub length, 2 flute, General purpose
1205H		51	HARDLUBE	Jobber length, 2 flute, General Purpose
1180		12	ALUMASTAR	Jobber length, 3 flute, High performance

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
VRX		102 - 107	X.CEED	High performance, 4 flute, Variable flute rougher/finisher,
253MA / 853MA		87	X.CEED	High performance, 3 flute, Profiling and finishing, Square end
255MA / 855MA		92	X.CEED	High performance, 5 flute, Square end
255RA / 855RA		97	X.CEED	High performance, 5 flute, Corner radius
143M		82	ALUMASTAR	High velocity, 3 flute, High metal removal rate, Square end
143R		84	ALUMASTAR	High velocity, 3 flute, High metal removal rate, Corner radius
142M		80	ALUMASTAR	High velocity, 2 flute, High metal removal rate, Square end
142B		81	ALUMASTAR	High velocity, 2 flute, High metal removal rate, Ball end
242M / 842M		86	BRIGHT	High performance, 2 flute, For 4000-8000 RPM, Square end
170MA / 870MA		120	FUTURA	Stub length, 4 flute, General purpose, Square end
190MA / 990MA		122	FUTURA	Stub length, 4 flute, General purpose, Ball end
223MA / 823MA		131	FUTURA	Standard length, 3 flute, General purpose, Square end
230MA / 830MA		131	FUTURA	Standard length, 4 flute, General purpose, Square end
230RA / 830RA		135	FUTURA	Standard length, 4 flute, General purpose, Corner radius
323MA / 923MA		142	FUTURA	Standard length, 3 flute, General purpose, Ball end
330MA / 930MA		142	FUTURA	Standard length, 4 flute, General purpose, Ball end
623MA / 643MA		156	FUTURA	Extra length, 3 flute, General purpose, Square end
630MA / 650MA		156	FUTURA	Extra length, 4 flute, General purpose, Square end
630RA		161	FUTURA	Extra length, 4 flute, General purpose, Corner radius
723MA / 743MA		167	FUTURA	Extra length, 3 flute, General purpose, Ball end
730MA / 750MA		167	FUTURA	Extra length, 4 flute, General purpose, Ball end

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1580HD		17	HELICA	Stub length, 2 flute, High performance, Common shank
1580H		14	HARDLUBE	Stub length, 2 flute, High performance
1280H		25	HARDLUBE	Jobber length, 2 flute, High performance
1580KD		20	HELICA	Stub length, 2 flute, High performance, Coolant fed, Common shank
1280KD		30	HELICA	Jobber length, 2 flute, High performance, Coolant fed, Common shank
1580KH		23	HELICA	Stub length, 2 flute, High performance, Coolant fed
1280KH		28	HELICA	Jobber length, 2 flute, High performance, Coolant fed
1880KH		33	HELICA	Taper length, 2 flute, High performance, Coolant fed
1510H		39	HARDLUBE	Stub length, 2 flute, 15° helix, General purpose
1520H		45	HARDLUBE	Stub length, 2 flute, General purpose
1205H		51	HARDLUBE	Jobber length, 2 flute, General Purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
VRX		102 - 107	X.CEED	High performance, 4 flute, Variable flute rougher/finisher
VHM		101	X.CEED	High performance, 4 flute, Variable flute hog mill rougher
253MA / 853MA		87	X.CEED	High performance, 3 flute, Profiling and finishing, Square end
253MC		91	TiCN	High performance, 3 flute, Profiling and finishing, Square end
255MA / 855MA		92	X.CEED	High performance, 5 flute, Square end
255RA / 855RA		97	X.CEED	High performance, 5 flute, Corner radius
170MA / 870MA		120	FUTURA	Stub length, 4 flute, General purpose, Square end
190MA / 990MA		122	FUTURA	Stub length, 4 flute, General purpose, Ball end
223MA / 823MA		131	FUTURA	Standard length, 3 flute, General purpose, Square end
230MA / 830MA		131	FUTURA	Standard length, 4 flute, General purpose, Square end
230RA / 830RA		135	FUTURA	Standard length, 4 flute, General purpose, Corner radius
323MA / 923MA		142	FUTURA	Standard length, 3 flute, General purpose, Ball end
330MA / 930MA		142	FUTURA	Standard length, 4 flute, General purpose, Ball end
623MA / 643MA		156	FUTURA	Extra length, 3 flute, General purpose, Square end
630MA / 650MA		156	FUTURA	Extra length, 4 flute, General purpose, Square end
630RA		161	FUTURA	Extra length, 4 flute, General purpose, Corner radius
723MA / 743MA		167	FUTURA	Extra length, 3 flute, General purpose, Ball end
730MA / 750MA		167	FUTURA	Extra length, 4 flute, General purpose, Ball end

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1580HD		17	HELICA	Stub length, 2 flute, High performance, Common shank
1580H		14	HARDLUBE	Stub length, 2 flute, High performance
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1580KD		20	HELICA	Stub length, 2 flute, High performance, Coolant fed, Common shank
1280KD		30	HELICA	Jobber length, 2 flute, High performance, Coolant fed, Common shank
1580KH		23	HELICA	Stub length, 2 flute, High performance, Coolant fed
1280KH		28	HELICA	Jobber length, 2 flute, High performance, Coolant fed
1880KH		33	HELICA	Taper length, 2 flute, High performance, Coolant fed
1510H		39	HARDLUBE	Stub length, 2 flute, Slow helix, General purpose
1520H		45	HARDLUBE	Stub length, 2 flute, General purpose
1205H		51	HARDLUBE	Jobber length, 2 flute, General Purpose
1120H		62	HARDLUBE	Stub length, 3 flute, General purpose
1100H		66	HARDLUBE	Jobber length, 3 flute, General Purpose

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
VRX		102 - 107	X.CEED	High performance, 4 flute, Variable flute rougher/finisher
VHM		101	X.CEED	High performance, 4 flute, Variable flute hog mill rougher
255MA / 855MA		92	X.CEED	High performance, 5 flute, Square end
255RA / 855RA		97	X.CEED	High performance, 5 flute, Corner radius
545MA		108	X.CEED	High performance, High Rc finisher, Square end
545RA		109	X.CEED	High performance, High Rc finisher, Corner radius
545BA		110	X.CEED	High performance, High Rc finisher, Ball end
170MA / 870MA		120	FUTURA	Stub length, 4 flute, General purpose, Square end
190MA / 990MA		122	FUTURA	Stub length, 4 flute, General purpose, Ball end
230MA / 830MA		131	FUTURA	Standard length, 4 flute, General purpose, Square end
230RA / 830RA		135	FUTURA	Standard length, 4 flute, General purpose, Corner radius
330MA / 930MA		142	FUTURA	Standard length, 4 flute, General purpose, Ball end
630MA / 650MA		156	FUTURA	Extra length, 4 flute, General purpose, Square end
630RA		161	FUTURA	Extra length, 4 flute, General purpose, Corner radius
730MA / 750MA		167	FUTURA	Extra length, 4 flute, General purpose, Ball end

DRILLS

SERIES	PAGE	COATING	DESCRIPTION
1180 	12	ALUMASTAR	Jobber length, 3 flute, High performance
1520 	42	BRIGHT	Stub length, 2 flute, General purpose
1520H 	45	HARDLUBE	Stub length, 2 flute, General purpose
1205 	48	BRIGHT	Jobber length, 2 flute, General purpose
1205H 	51	HARDLUBE	Jobber length, 2 flute, General purpose
1800H 	74	HARDLUBE	Taper length, 2 flute, Parabolic

END MILLS

SERIES	PAGE	COATING	DESCRIPTION
143M 	82	ALUMASTAR	High velocity, 3 flute, High metal removal rate, Square end
143R 	84	ALUMASTAR	High velocity, 3 flute, High metal removal rate, Corner radius
142M 	80	ALUMASTAR	High velocity, 2 flute, High metal removal rate, Square end
142B 	81	ALUMASTAR	High velocity, 2 flute, High metal removal rate, Ball end
242M / 842M 	86	BRIGHT	High performance, 2 flute, For 4000-8000 RPM, Square end
253M / 853M 	89	BRIGHT	High performance, 3 flute, Profiling and finishing, Square end
253MC 	91	TiCN	High performance, 3 flute, Profiling and finishing, Square end
160M / 860M 	118	BRIGHT	Stub length, 2 flute, General purpose, Square end
180M / 980M 	121	BRIGHT	Stub length, 2 flute, General purpose, Ball end
220M / 820M 	127	BRIGHT	Standard length, 2 flute, General purpose, Square end
220MC 	130	TiCN	Standard length, 2 flute, General purpose, Square end
320M / 920M 	138	BRIGHT	Standard length, 2 flute, General purpose, Ball end
320MC 	141	TiCN	Standard length, 2 flute, General purpose, Ball end
620M / 640M 	153	BRIGHT	Extra length, 2 flute, General purpose, Square end
620MC 	155	TiCN	Extra length, 2 flute, General purpose, Square end
720M / 740M 	164	BRIGHT	Extra length, 2 flute, General purpose, Ball end
720MC 	166	TiCN	Extra length, 2 flute, General purpose, Ball end

DRILLS

SERIES		PAGE	COATING	DESCRIPTION
1580HD		17	HELICA	Stub length, 2 flute, High performance, Common shank
1580H		14	HARDLUBE	Stub length, 2 flute, High performance
1280H		25	HARDLUBE	Jobber length, 2 flute, High performance
1580KD		20	HELICA	Stub length, 2 flute, High performance, Coolant fed, Common shank
1280KD		30	HELICA	Jobber length, 2 flute, High performance, Coolant fed, Common shank
1580KH		23	HELICA	Stub length, 2 flute, High performance, Coolant fed
1280KH		28	HELICA	Jobber length, 2 flute, High performance, Coolant fed
1880KH		33	HELICA	Taper length, 2 flute, High performance, Coolant fed
1500H		70	HARDLUBE	Stub length, 2 flute, straight flute hard metal
1510H		39	HARDLUBE	Stub length, 2 flute, 15° helix, General purpose
1520H		45	HARDLUBE	Jobber length, 2 flute, General purpose
1205H		51	HARDLUBE	Jobber length, 2 flute, High performance

END MILLS

SERIES		PAGE	COATING	DESCRIPTION
545MA		108	X.CEED	High performance, High Rc finisher, Square end
545RA		109	X.CEED	High performance, High Rc finisher, Corner radius
545BA		110	X.CEED	High performance, High Rc finisher, Ball end
VRX		102 - 107	X.CEED	High performance, 4 flute, Variable flute rougher/finisher
350MX / 950MX		111	X.CEED	High performance, High Rc finisher, Ball end
170MA / 870MA		120	FUTURA	Stub length, 4 flute, General purpose, Square end
190MA / 990MA		122	FUTURA	Stub length, 4 flute, General purpose, Ball end
230MA / 830MA		131	FUTURA	Standard length, 4 flute, General purpose, Square end
230RA / 830RA		135	FUTURA	Standard length, 4 flute, General purpose, Corner radius
330MA / 930MA		142	FUTURA	Standard length, 4 flute, General purpose, Ball end
630MA / 650MA		156	FUTURA	Extra length, 4 flute, General purpose, Square end
630RA		161	FUTURA	Extra length, 4 flute, General purpose, Corner radius
730MA / 750MA		167	FUTURA	Extra length, 4 flute, General purpose, Ball end

DRILLS

SERIES	PAGE	COATING	DESCRIPTION
1180 	12	ALUMASTAR	Jobber length, 3 flute, High performance
1520H 	45	HARDLUBE	Stub length, 2 flute, General purpose
1205H 	51	HARDLUBE	Jobber length, 2 flute, General purpose
1120H 	62	HARDLUBE	Stub length, 3 flute, General purpose
1100H 	66	HARDLUBE	Jobber length, 3 flute, General purpose
1800H 	74	HARDLUBE	Taper length, 2 flute, Parabolic

END MILLS

SERIES	PAGE	COATING	DESCRIPTION
210D 	112	DIAMOND	Standard length, 4 flute, Square end
310D 	114	DIAMOND	Standard length, 4 flute, Ball end
210RD 	113	DIAMOND	Standard length, 4 flute, Corner radius
610D 	115	DIAMOND	Extra length, 4 flute, Square end
710D 	116	DIAMOND	Extra length, 4 flute, Ball end
143M 	82	ALUMASTAR	High velocity, 3 flute, High metal removal rate, Square end
143R 	84	ALUMASTAR	High velocity, 3 flute, High metal removal rate, Corner radius
142M 	80	ALUMASTAR	High velocity, 2 flute, High metal removal rate, Square end
142B 	81	ALUMASTAR	High velocity, 2 flute, High metal removal rate, Ball end
253M / 853M 	89	BRIGHT	High performance, 3 flute, Profiling and finishing, Square end
253MC 	91	TiCN	High performance, 3 flute, Profiling and finishing, Square end
255MC 	96	TiCN	High performance, 5 flute, Profiling and finishing, Square end
220MC 	130	TiCN	Standard length, 2 flute, General purpose, Square end
320MC 	141	TiCN	Standard length, 2 flute, General purpose, Ball end
620MC 	155	TiCN	Extra length, 2 flute, General purpose, Square end
720MC 	166	TiCN	Extra length, 2 flute, General purpose, Ball end

DRILLS

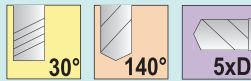
SERIES	PAGE	COATING	DESCRIPTION
1580HD 	17	HELICA	Stub length, 2 flute, High performance, Common shank
1580H 	14	HARDLUBE	Stub length, 2 flute, High performance
1280H 	25	HARDLUBE	Jobber length, 2 flute, High performance
1580KD 	20	HELICA	Stub length, 2 flute, High performance, Coolant fed, Common shank
1280KD 	30	HELICA	Jobber length, 2 flute, High performance, Coolant fed, Common shank
1580KH 	23	HELICA	Stub length, 2 flute, High performance, Coolant fed
1280KH 	28	HELICA	Jobber length, 2 flute, High performance, Coolant fed
1880KH 	33	HELICA	Taper length, 2 flute, High performance, Coolant fed
1510H 	39	HARDLUBE	Stub length, 2 flute, 15° helix, General purpose
1520H 	45	HARDLUBE	Stub length, 2 flute, General purpose
1205H 	51	HARDLUBE	Jobber length, 2 flute, General Purpose

END MILLS

SERIES	PAGE	COATING	DESCRIPTION
VRX 	102 - 107	X.CEED	High performance, 4 flute, Variable flute rougher/finisher
VHM 	101	X.CEED	High performance, 4 flute, Variable flute hog mill rougher
253MA / 853MA 	87	X.CEED	High performance, 3 flute, Profiling and finishing, Square end
255MA / 855MA 	92	X.CEED	High performance, 5 flute, Square end
255RA / 855RA 	97	X.CEED	High performance, 5 flute, Corner radius
170MA / 870MA 	120	FUTURA	Stub length, 4 flute, General purpose, Square end
190MA / 990MA 	122	FUTURA	Stub length, 4 flute, General purpose, Ball end
223MA / 823MA 	131	FUTURA	Standard length, 3 flute, General purpose, Square end
230MA / 830MA 	131	FUTURA	Standard length, 4 flute, General purpose, Square end
230RA / 830RA 	135	FUTURA	Standard length, 4 flute, General purpose, Corner radius
323MA / 923MA 	142	FUTURA	Standard length, 3 flute, General purpose, Ball end
330MA / 930MA 	142	FUTURA	Standard length, 4 flute, General purpose, Ball end
623MA / 643MA 	156	FUTURA	Extra length, 3 flute, General purpose, Square end
630MA / 650MA 	156	FUTURA	Extra length, 4 flute, General purpose, Square end
630RA 	161	FUTURA	Extra length, 4 flute, General purpose, Corner radius
723MA / 743MA 	167	FUTURA	Extra length, 3 flute, General purpose, Ball end
730MA / 750MA 	167	FUTURA	Extra length, 4 flute, General purpose, Ball end

d	+0.000" -0.005" (+0.000 -0.127mm)
l_1	+0.125" -0.125" (+3.175 -3.175mm)
l_2	+0.125" -0.125" (+3.175 -3.175mm)

.1575" - .3150"
(4.00mm - 8.00mm)



ALUMASTAR Coated

High performance solid submicron grain carbide drill

Designed for drilling aluminum and other soft materials

No spot drilling required

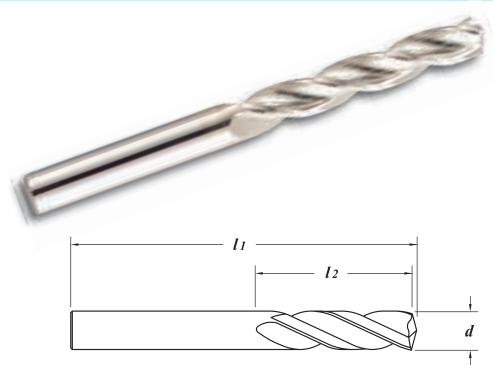
Unique point geometry and coating for higher speeds and feeds

Up to 5x longer tool life than Zrn coated drills

High performance drill point

Live tooling recommended on lathe processes

Shank tolerance: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
70166	.1575	4.00	65	24	39.25	37.54	35.84	34.13
70191	.1772	4.50	65	25	41.46	39.67	37.86	36.06
70211	.1875	3/16"	4.76	2-3/4"	42.57	40.72	38.86	37.01
70216	.1890	#12	4.80	2-3/4"	44.14	42.21	40.30	38.38
70221	.1910	#11	4.85	2-3/4"	44.41	42.47	40.55	38.62
70226	.1935	#10	4.91	2-3/4"	44.70	42.75	40.81	38.86
70231	.1969	5.00	75	32	45.24	43.27	41.31	39.34
70236	.1990	#8	5.05	3"	45.46	43.48	41.51	39.53
70241	.2010	#7	5.10	3"	45.64	43.65	41.66	39.69
70246	.2031	13/64"	5.16	3"	45.96	43.96	41.96	39.97
70251	.2040	#6	5.18	3"	46.27	44.26	42.24	40.24
70256	.2055	#5	5.22	3"	46.57	44.54	42.53	40.50
70261	.2090	#4	5.31	3"	46.85	44.81	42.78	40.74
70266	.2130	#3	5.41	3"	47.14	45.09	43.05	41.00
70271	.2165	5.50	75	35	47.42	45.36	43.30	41.24
70276	.2188	7/32"	5.56	3"	47.70	45.64	43.56	41.49
70281	.2210	#2	5.61	3"	48.66	46.55	44.43	42.32
70286	.2280	#1	5.79	3"	48.89	46.77	44.64	42.52
70296	.2344	15/64"	5.95	3-1/4"	49.89	47.72	45.55	43.38
70301	.2362	6.00	82	38	50.02	47.85	45.68	43.50
70306	.2380	B	6.04	3-1/4"	50.16	47.98	45.80	43.62
70311	.2420	C	6.15	3-1/4"	50.48	48.29	46.09	43.90
70316	.2460	D	6.25	3-1/4"	50.79	48.59	46.37	44.17
70321	.2500	1/4" / E	6.35	3-1/4"	51.05	48.84	46.61	44.40
70326	.2559	6.50	82	41	54.48	52.10	49.74	47.37
70331	.2570	F	6.53	3-1/4"	55.31	52.90	50.50	48.09
70336	.2610	G	6.63	3-1/2"	56.15	53.71	51.27	48.83
70341	.2656	17/64"	6.75	3-1/2"	56.98	54.51	52.03	49.55
70346	.2660	H	6.76	3-1/2"	57.86	55.34	52.82	50.30
70351	.2720	I	6.91	3-1/2"	58.68	56.13	53.57	51.02
70356	.2756	7.00	88	43	59.50	56.91	54.33	51.74
70361	.2770	J	7.03	3-1/2"	60.35	57.73	55.10	52.48
70371	.2812	9/32"	7.14	3-1/2"	62.05	59.35	56.65	53.96
70376	.2900	L	7.37	3-1/2"	62.83	60.09	57.37	54.63
70381	.2953	7.50	95	44	63.65	60.88	58.12	55.35
70386	.2969	19/64"	7.54	3-3/4"	64.20	61.41	58.61	55.83
70391	.3020	N	7.67	3-3/4"	66.53	63.64	60.75	57.86
70396	.3125	5/16"	7.94	3-3/4"	66.72	63.81	60.91	58.01
70401	.3150	8.00	95	48	70.41	67.35	64.28	61.22

1180 - 3 Flute (continued)

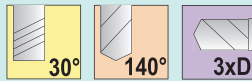
.3160" - .6299"
(8.03mm - 16.00mm)

HIGH PERFORMANCE
DRILLS

EDP#	d^+ Diameter			l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric						
70406	.3160	O	8.03	3-3/4"	1-7/8"	70.41	67.35	64.28	61.22
70411	.3230	P	8.20	3-3/4"	2-3/32"	70.64	67.57	64.49	61.42
70416	.3281	21/64"	8.33	4"	2-3/32"	71.23	68.13	65.03	61.94
70421	.3320	Q	8.43	4"	2-3/32"	72.54	69.39	66.23	63.08
70426	.3346		8.50	100	53	73.03	69.86	66.67	63.50
70431	.3390	R	8.61	4"	2-3/32"	74.86	71.60	68.35	65.09
70436	.3438	11/32"	8.73	4"	2-3/16"	77.29	73.93	70.57	67.22
70441	.3480	S	8.84	4"	2-3/16"	81.75	78.20	74.64	71.09
70446	.3543		9.00	100	55	82.20	78.62	75.06	71.48
70451	.3580	T	9.09	4-1/4"	2-9/32"	86.60	82.84	79.07	75.31
70456	.3594	23/64"	9.13	4-1/4"	2-9/32"	87.07	83.28	79.50	75.71
70461	.3680	U	9.35	4-1/4"	2-9/32"	95.15	91.01	86.87	82.74
70466	.3740		9.50	108	58	95.99	91.82	87.64	83.47
70471	.3750	3/8"	9.52	4-1/4"	2-3/8"	96.87	92.65	88.44	84.23
70476	.3770	V	9.57	4-1/4"	2-3/8"	99.42	95.10	90.78	86.46
70481	.3860	W	9.80	4-1/2"	2-3/8"	101.02	96.63	92.23	87.84
70486	.3906	25/64"	9.92	4-1/2"	2-3/8"	102.14	97.70	93.26	88.82
70491	.3937		10.00	114	60	104.92	100.35	95.79	91.23
70496	.3970	X	10.08	4-1/2"	2-1/2"	107.11	102.45	97.79	93.14
70501	.4040	Y	10.26	4-1/2"	2-9/16"	110.06	105.28	100.50	95.71
70506	.4062	13/32"	10.32	4-1/2"	2-9/16"	110.93	106.10	101.28	96.46
70511	.4134		10.50	114	67	111.86	107.00	102.14	97.27
70516	.4219	27/64"	10.72	4-1/2"	2-11/16"	112.80	107.89	102.99	98.08
70521	.4331		11.00	114	68	120.34	115.11	109.88	104.64
70526	.4375	7/16"	11.11	4-3/4"	2-13/16"	120.79	115.53	110.28	105.03
70531	.4528		11.50	120	70	128.44	122.86	117.27	111.69
70536	.4531	29/64"	11.51	4-3/4"	2-7/8"	128.44	122.86	117.27	111.69
70541	.4688	15/32"	11.91	4-3/4"	2-7/8"	134.43	128.59	122.74	116.90
70546	.4724		12.00	120	73	134.79	128.93	123.07	117.21
70551	.4844	31/64"	12.30	5-5/16"	3"	137.19	131.22	125.26	119.29
70556	.4921		12.50	135	75	138.70	132.67	126.64	120.61
70561	.5000	1/2"	12.70	5-3/8"	3-1/16"	138.96	132.92	126.88	120.84
70566	.5118		13.00	136	78	156.41	149.60	142.80	136.00
70571	.5156	33/64"	13.10	5-3/8"	3-1/8"	159.75	152.81	145.86	138.91
70576	.5312	17/32"	13.49	5-11/16"	3-5/16"	163.20	156.10	149.00	141.91
70581	.5469	35/64"	13.89	5-13/16"	3-3/8"	169.84	162.46	155.07	147.69
70586	.5512		14.00	148	86	173.21	165.68	158.15	150.62
70591	.5625	9/16"	14.29	5-15/16"	3-1/2"	186.19	178.10	170.00	161.91
70596	.5781	37/64"	14.68	6"	3-1/2"	192.54	184.16	175.79	167.42
70601	.5906		15.00	152	90	195.88	187.37	178.85	170.33
70606	.5938	19/32"	15.08	6"	3-9/16"	196.83	188.27	179.71	171.15
70611	.6094	39/64"	15.48	6-3/16"	3-11/16"	213.36	204.08	194.80	185.53
70616	.6250	5/8"	15.87	6-5/16"	3-3/4"	215.22	205.86	196.50	187.15
70621	.6299		16.00	160	95	219.72	210.16	200.62	191.06

d	+0.000" -0.005" (+0.000 -0.127mm)	
l ₁	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)

.1181" - .2280"
(3.00mm - 5.79mm)



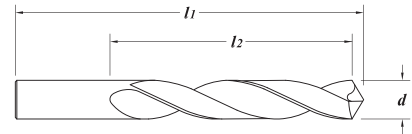
Balinit® HARDLUBE Coated

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

Live tooling recommended on lathe processes

Shank tolerance: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d † Diameter		l ₁ Overall Length	l ₂ Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
20301	.1181	3.00	46	16	28.76	27.51	26.26	25.00
20306	.1200	#31	3.05	1-13/16"	29.04	27.78	26.51	25.25
20311	.1250	1/8"	3.17	1-15/16"	29.31	28.03	26.76	25.48
20316	.1285	#30	3.26	1-15/16"	29.56	28.27	26.99	25.70
20321	.1360	#29	3.45	2-1/16"	29.85	28.55	27.25	25.96
20326	.1378		3.50	52	30.14	28.83	27.52	26.21
20331	.1405	#28	3.57	2-1/16"	30.41	29.09	27.77	26.45
20336	.1406	9/64"	3.57	2-1/16"	30.68	29.35	28.01	26.68
20341	.1440	#27	3.67	2-1/16"	30.95	29.61	28.26	26.92
20346	.1470	#26	3.73	2-3/16"	31.20	29.85	28.49	27.13
20351	.1495	#25	3.80	2-3/16"	31.52	30.15	28.78	27.41
20356	.1520	#24	3.86	2-3/16"	31.78	30.40	29.02	27.63
20361	.1540	#23	3.91	2-3/16"	32.05	30.66	29.27	27.87
20366	.1562	5/32"	3.97	2-3/16"	32.30	30.90	29.49	28.09
20371	.1570	#22	3.99	2-3/16"	32.60	31.19	29.76	28.35
20376	.1575		4.00	56	32.85	31.43	29.99	28.57
20381	.1590	#21	4.04	2-3/16"	33.16	31.71	30.27	28.83
20386	.1610	#20	4.09	2-3/16"	33.43	31.97	30.52	29.07
20391	.1660	#19	4.22	2-9/32"	33.72	32.25	30.78	29.32
20396	.1695	#18	4.30	2-9/32"	33.98	32.50	31.02	29.55
20401	.1719	11/64"	4.37	2-9/32"	34.27	32.78	31.28	29.80
20406	.1730	#17	4.39	2-9/32"	34.54	33.04	31.53	30.04
20411	.1770	#16	4.49	2-9/32"	34.78	33.27	31.75	30.24
20416	.1772		4.50	58	35.08	33.55	32.03	30.50
20421	.1800	#15	4.57	2-9/32"	35.32	33.78	32.25	30.71
20426	.1820	#14	4.62	2-9/32"	35.65	34.10	32.55	31.00
20431	.1850	#13	4.70	2-9/32"	35.90	34.34	32.78	31.22
20436	.1875	3/16"	4.76	2-13/32"	36.19	34.62	33.04	31.47
20441	.1890	#12	4.80	2-13/32"	36.45	34.87	33.28	31.70
20446	.1910	#11	4.85	2-13/32"	36.78	35.18	33.58	31.99
20451	.1935	#10	4.91	2-13/32"	37.00	35.39	33.79	32.18
20456	.1960	#9	4.98	2-13/32"	37.28	35.66	34.04	32.42
20461	.1969		5.00	61	37.48	35.85	34.23	32.59
20466	.1990	#8	5.05	2-13/32"	37.82	36.18	34.54	32.90
20471	.2010	#7	5.10	2-13/32"	37.94	36.29	34.64	32.99
20476	.2031	13/64"	5.16	2-13/32"	38.20	36.54	34.88	33.22
20481	.2040	#6	5.18	2-13/32"	38.45	36.77	35.11	33.44
20486	.2055	#5	5.22	2-13/32"	38.73	37.04	35.36	33.68
20491	.2090	#4	5.31	2-13/32"	38.98	37.28	35.59	33.89
20496	.2130	#3	5.41	2-5/8"	39.23	37.52	35.82	34.11
20501	.2165		5.50	67	39.48	37.76	36.05	34.33
20506	.2188	7/32"	5.56	2-5/8"	39.81	38.08	36.35	34.62
20511	.2210	#2	5.61	2-5/8"	40.10	38.36	36.62	34.87
20516	.2280	#1	5.79	2-5/8"	40.40	38.65	36.89	35.13

1580H - 2 Flute (continued)

.2340" - .5000"
(5.94mm - 12.70mm)

HIGH PERFORMANCE
DRILLS

EDP#	$d^{\dagger}$		Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Diameter							
20521	.2340	A	5.94	2-5/8"	1-3/32"	40.67	38.91	37.14	35.37
20526	.2344	15/64"	5.95	2-5/8"	1-3/32"	40.99	39.21	37.42	35.64
20531	.2362		6.00	67	28	41.28	39.48	37.69	35.89
20536	.2380	B	6.04	2-3/4"	1-7/32"	41.55	39.74	37.94	36.13
20541	.2420	C	6.15	2-3/4"	1-7/32"	41.88	40.06	38.24	36.42
20546	.2460	D	6.25	2-3/4"	1-7/32"	42.12	40.29	38.46	36.63
20551	.2500	1/4" / E	6.35	2-3/4"	1-7/32"	42.48	40.63	38.79	36.94
20556	.2559		6.50	70	31	43.16	41.29	39.41	37.53
20561	.2570	F	6.53	2-3/4"	1-7/32"	43.84	41.93	40.02	38.12
20566	.2610	G	6.63	2-3/4"	1-7/32"	44.50	42.57	40.63	38.70
20571	.2656	17/64"	6.75	2-15/16"	1-11/32"	45.19	43.22	41.26	39.29
20576	.2660	H	6.76	2-15/16"	1-11/32"	45.85	43.86	41.87	39.87
20581	.2720	I	6.91	2-15/16"	1-11/32"	46.53	44.50	42.48	40.46
20586	.2756		7.00	75	34	47.21	45.16	43.10	41.05
20591	.2770	J	7.03	2-15/16"	1-11/32"	47.86	45.78	43.70	41.62
20596	.2810	K	7.14	2-15/16"	1-11/32"	48.56	46.45	44.34	42.22
20601	.2812	9/32"	7.14	2-15/16"	1-11/32"	49.22	47.08	44.94	42.81
20606	.2900	L	7.37	2-15/16"	1-11/32"	49.90	47.73	45.56	43.39
20611	.2950	M	7.49	2-15/16"	1-11/32"	50.87	48.65	46.45	44.23
20616	.2953		7.50	75	34	50.87	48.65	46.45	44.23
20621	.2969	19/64"	7.54	3-3/32"	1-15/32"	51.31	49.08	46.85	44.62
20626	.3020	N	7.67	3-3/32"	1-15/32"	53.61	51.28	48.95	46.62
20631	.3125	5/16"	7.94	3-3/32"	1-15/32"	53.80	51.46	49.12	46.78
20636	.3150		8.00	79	37	57.10	54.61	52.14	49.65
20641	.3160	O	8.03	3-3/32"	1-15/32"	57.10	54.61	52.14	49.65
20646	.3230	P	8.20	3-3/32"	1-15/32"	57.51	55.02	52.51	50.01
20651	.3281	21/64"	8.33	3-3/32"	1-15/32"	58.58	56.04	53.49	50.94
20656	.3320	Q	8.43	3-3/32"	1-15/32"	59.63	57.04	54.44	51.85
20661	.3346		8.50	79	37	59.88	57.28	54.67	52.07
20666	.3390	R	8.61	3-5/16"	1-9/16"	61.48	58.81	56.14	53.47
20671	.3438	11/32"	8.73	3-5/16"	1-9/16"	62.84	60.10	57.38	54.64
20676	.3480	S	8.84	3-5/16"	1-9/16"	64.92	62.10	59.27	56.45
20681	.3543		9.00	84	40	66.57	63.68	60.78	57.89
20686	.3580	T	9.09	3-5/16"	1-9/16"	69.19	66.19	63.17	60.16
20691	.3594	23/64"	9.13	3-5/16"	1-9/16"	69.61	66.58	63.55	60.53
20696	.3680	U	9.35	3-5/16"	1-9/16"	73.23	70.04	66.86	63.68
20701	.3740		9.50	84	40	73.83	70.62	67.41	64.20
20706	.3750	3/8"	9.52	3-1/2"	1-11/16"	74.29	71.05	67.83	64.59
20711	.3770	V	9.57	3-1/2"	1-11/16"	77.13	73.78	70.42	67.07
20716	.3860	W	9.80	3-1/2"	1-11/16"	78.48	75.07	71.66	68.24
20721	.3906	25/64"	9.92	3-1/2"	1-11/16"	79.47	76.01	72.56	69.10
20726	.3937		10.00	89	43	81.87	78.31	74.74	71.19
20731	.3970	X	10.08	3-1/2"	1-11/16"	83.88	80.23	76.59	72.94
20736	.4040	Y	10.26	3-1/2"	1-11/16"	84.45	80.78	77.11	73.43
20741	.4062	13/32"	10.32	3-1/2"	1-11/16"	87.05	83.26	79.48	75.69
20746	.4130	Z	10.49	3-1/2"	1-11/16"	87.85	84.03	80.20	76.39
20751	.4134		10.50	89	43	87.85	84.03	80.20	76.39
20756	.4219	27/64"	10.72	3-3/4"	1-13/16"	88.67	84.81	80.96	77.11
20761	.4331		11.00	95	46	95.19	91.05	86.91	82.77
20766	.4375	7/16"	11.11	3-3/4"	1-13/16"	95.19	91.05	86.91	82.77
20771	.4528		11.50	95	46	102.17	97.73	93.29	88.85
20776	.4531	29/64"	11.51	3-3/4"	1-13/16"	102.17	97.73	93.29	88.85
20781	.4688	15/32"	11.91	4"	1-15/16"	107.35	102.68	98.01	93.35
20786	.4724		12.00	102	49	107.67	102.99	98.31	93.63
20791	.4844	31/64"	12.30	4"	1-15/16"	108.41	103.70	98.99	94.27
20796	.4921		12.50	102	49	109.49	104.73	99.96	95.21
20801	.5000	1/2"	12.70	4"	1-15/16"	110.19	105.39	100.61	95.82

continued →

1580H - 2 Flute (continued)

.5118" - .6299"
(13.00mm - 16.00mm)

EDP#	$d^{\dagger}$		l_1	l_2	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric						
20806	.5118	13.00	107	53	122.31	117.00	111.68	106.36
20811	.5156	33/64"	13.10	4-7/32"	125.18	119.75	114.30	108.86
20816	.5312	17/32"	13.49	4-7/32"	128.08	122.51	116.94	111.37
20821	.5315	13.50	110	56	130.97	125.27	119.58	113.88
20826	.5469	35/64"	13.89	4-5/16"	133.84	128.01	122.20	116.38
20831	.5512	14.00	110	56	136.74	130.79	124.85	118.90
20836	.5625	9/16"	14.29	4-9/16"	147.75	141.33	134.91	128.48
20841	.5709	14.50	116	63	150.53	143.99	137.44	130.89
20846	.5781	37/64"	14.68	4-15/16"	153.22	146.56	139.90	133.23
20851	.5906	15.00	125	65	156.04	149.26	142.47	135.69
20856	.5938	19/32"	15.08	4-15/16"	156.89	150.07	143.25	136.43
20861	.6094	39/64"	15.48	5-1/16"	157.68	150.83	143.98	137.11
20866	.6102	15.50	129	71	158.51	151.61	144.73	137.83
20871	.6250	5/8"	15.87	5-1/4"	159.29	152.36	145.43	138.51
20876	.6299	16.00	133	79	163.13	156.04	148.95	141.86

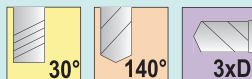


1580HD - 2 Flute

Technical information: page 208-209

3.00mm - 6.35mm
(.1181" - .2500")

**NEW
SERIES**



TOLERANCES

d1	3mm - 6mm	+016 +.004mm (+.00063" +.00015")
	> 6mm - 10mm	+021 +.006mm (+.00082" +.00023")
	> 10mm - 18mm	+025 +.007mm (+.00098" +.00027")
	> 18mm - 20mm	+029 +.008mm (+.00114" +.00031")
d2	6mm	+000 -.008mm (+.00000" -.00030")
	8mm - 10mm	+000 -.009mm (+.00000" -.00035")
	12mm - 18mm	+000 -.011mm (+.00000" -.00040")
	20mm	+000 -.013mm (+.00000" -.00050")

Balinit® HELICA Coated

High performance solid submicron grain carbide drill with reinforced shank

Utilizes DIN standard 6537

Up to 50% faster than standard carbide drills

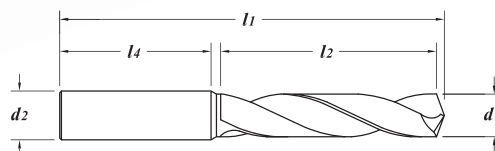
30° helix for better chip evacuation

Honed cutting edge

Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels

Balinit® HELICA is a multi-layer AlCr-based coating designed exclusively for high performance drilling

Live tooling recommended on lathe processes



EDP#	d1 Diameter		d2 Shank Diameter	l1 Overall Length	l2 Flute Length	l4 Shank Length	1-11	12-24	25-49	50-100
	Decimal	Metric								
20085	.1181"	3.00	6.0	62	20	36	50.86	48.64	46.44	44.22
20095	.1220"	3.10	6.0	62	20	36	50.86	48.64	46.44	44.22
20105	.1248"	3.17	6.0	62	20	36	50.86	48.64	46.44	44.22
20115	.1260"	3.20	6.0	62	20	36	50.86	48.64	46.44	44.22
20125	.1280"	3.25	6.0	62	20	36	50.86	48.64	46.44	44.22
20135	.1299"	3.30	6.0	62	20	36	50.86	48.64	46.44	44.22
20145	.1339"	3.40	6.0	62	20	36	50.86	48.64	46.44	44.22
20155	.1378"	3.50	6.0	62	20	36	50.21	48.03	45.84	43.66
20165	.1417"	3.60	6.0	62	20	36	50.21	48.03	45.84	43.66
20175	.1457"	3.70	6.0	62	20	36	50.21	48.03	45.84	43.66
20185	.1476"	3.75	6.0	62	20	36	50.21	48.03	45.84	43.66
20195	.1496"	3.80	6.0	66	24	36	50.21	48.03	45.84	43.66
20205	.1535"	3.90	6.0	66	24	36	50.21	48.03	45.84	43.66
20215	.1575"	4.00	6.0	66	24	36	49.58	47.42	45.26	43.11
20225	.1614"	4.10	6.0	66	24	36	49.58	47.42	45.26	43.11
20235	.1654"	4.20	6.0	66	24	36	49.58	47.42	45.26	43.11
20245	.1673"	4.25	6.0	66	24	36	49.58	47.42	45.26	43.11
20255	.1693"	4.30	6.0	66	24	36	49.58	47.42	45.26	43.11
20265	.1732"	4.40	6.0	66	24	36	49.58	47.42	45.26	43.11
20275	.1772"	4.50	6.0	66	24	36	48.93	46.80	44.68	42.55
20285	.1811"	4.60	6.0	66	24	36	48.93	46.80	44.68	42.55
20295	.1831"	4.65	6.0	66	24	36	48.93	46.80	44.68	42.55
20305	.1850"	4.70	6.0	66	24	36	48.93	46.80	44.68	42.55
20315	.1870"	4.75	6.0	66	24	36	48.93	46.80	44.68	42.55
20325	.1890"	4.80	6.0	66	28	36	48.93	46.80	44.68	42.55
20335	.1929"	4.90	6.0	66	28	36	48.93	46.80	44.68	42.55
20345	.1969"	5.00	6.0	66	28	36	48.30	46.20	44.10	42.00
20355	.2008"	5.10	6.0	66	28	36	48.30	46.20	44.10	42.00
20365	.2027"	5.15	6.0	66	28	36	48.30	46.20	44.10	42.00
20375	.2047"	5.20	6.0	66	28	36	48.30	46.20	44.10	42.00
20385	.2087"	5.30	6.0	66	28	36	48.30	46.20	44.10	42.00
20395	.2165"	5.50	6.0	66	28	36	47.65	45.58	43.51	41.43
20405	.2185"	5.55	6.0	66	28	36	47.65	45.58	43.51	41.43
20408	.2205"	5.60	6.0	66	28	36	47.65	45.58	43.51	41.43
20412	.2244"	5.70	6.0	66	28	36	47.65	45.58	43.51	41.43
20415	.2283"	5.80	6.0	66	28	36	47.65	45.58	43.51	41.43
20425	.2323"	5.90	6.0	66	28	36	47.65	45.58	43.51	41.43
20435	.2342"	5.95	6.0	66	28	36	47.65	45.58	43.51	41.43
20445	.2362"	6.00	6.0	66	28	36	47.02	44.97	42.93	40.88
20448	.2402"	6.10	8.0	79	34	36	67.25	64.32	61.40	58.48
20452	.2441"	6.20	8.0	79	34	36	67.25	64.32	61.40	58.48
20454	.2480"	6.30	8.0	79	34	36	67.25	64.32	61.40	58.48
20455	.2500"	6.35	8.0	79	34	36	67.25	64.32	61.40	58.48

continued →

1580HD - 2 Flute (continued)

6.40mm - 12.00mm
(.2520" - .4724")

EDP#	d1		d2	l1	l2	l4	1-11	12-24	25-49	50-100
	Decimal	Metric								
20462	.2520"	6.40	8.0	79	34	36	67.25	64.32	61.40	58.48
20465	.2559"	6.50	8.0	79	34	36	66.60	63.71	60.81	57.92
20468	.2571"	6.53	8.0	79	34	36	66.60	63.71	60.81	57.92
20472	.2598"	6.60	8.0	79	34	36	66.60	63.71	60.81	57.92
20473	.2638"	6.70	8.0	79	34	36	66.60	63.71	60.81	57.92
20475	.2657"	6.75	8.0	79	34	36	66.60	63.71	60.81	57.92
20485	.2677"	6.80	8.0	79	34	36	66.60	63.71	60.81	57.92
20495	.2717"	6.90	8.0	79	34	36	66.60	63.71	60.81	57.92
20505	.2756"	7.00	8.0	79	34	36	65.99	63.12	60.25	57.38
20515	.2795"	7.10	8.0	79	41	36	65.99	63.12	60.25	57.38
20525	.2815"	7.15	8.0	79	41	36	65.99	63.12	60.25	57.38
20535	.2835"	7.20	8.0	79	41	36	65.99	63.12	60.25	57.38
20542	.2874"	7.30	8.0	79	41	36	65.99	63.12	60.25	57.38
20545	.2913"	7.40	8.0	79	41	36	65.99	63.12	60.25	57.38
20555	.2953"	7.50	8.0	79	41	36	65.31	62.47	59.63	56.79
20565	.2972"	7.55	8.0	79	41	36	65.31	62.47	59.63	56.79
20575	.2992"	7.60	8.0	79	41	36	65.31	62.47	59.63	56.79
20585	.3031"	7.70	8.0	79	41	36	65.31	62.47	59.63	56.79
20595	.3071"	7.80	8.0	79	41	36	65.31	62.47	59.63	56.79
20605	.3130"	7.95	8.0	79	41	36	65.31	62.47	59.63	56.79
20615	.3150"	8.00	8.0	79	41	36	64.68	61.87	59.05	56.24
20622	.3189"	8.10	10.0	89	47	40	93.83	89.75	85.66	81.59
20625	.3228"	8.20	10.0	89	47	40	93.83	89.75	85.66	81.59
20635	.3268"	8.30	10.0	89	47	40	93.83	89.75	85.66	81.59
20645	.3287"	8.35	10.0	89	47	40	93.83	89.75	85.66	81.59
20652	.3307"	8.40	10.0	89	47	40	93.83	89.75	85.66	81.59
20655	.3346"	8.50	10.0	89	47	40	92.87	88.84	84.79	80.76
20665	.3386"	8.60	10.0	89	47	40	92.87	88.84	84.79	80.76
20675	.3425"	8.70	10.0	89	47	40	92.87	88.84	84.79	80.76
20685	.3445"	8.75	10.0	89	47	40	92.87	88.84	84.79	80.76
20695	.3465"	8.80	10.0	89	47	40	92.87	88.84	84.79	80.76
20705	.3504"	8.90	10.0	89	47	40	92.87	88.84	84.79	80.76
20715	.3543"	9.00	10.0	89	47	40	91.92	87.92	83.92	79.92
20725	.3583"	9.10	10.0	89	47	40	91.92	87.92	83.92	79.92
20735	.3602"	9.15	10.0	89	47	40	91.92	87.92	83.92	79.92
20745	.3622"	9.20	10.0	89	47	40	91.92	87.92	83.92	79.92
20755	.3661"	9.30	10.0	89	47	40	91.92	87.92	83.92	79.92
20762	.3701"	9.40	10.0	89	47	40	91.92	87.92	83.92	79.92
20765	.3740"	9.50	10.0	89	47	40	90.95	87.00	83.04	79.08
20775	.3760"	9.55	10.0	89	47	40	90.95	87.00	83.04	79.08
20778	.3780"	9.60	10.0	89	47	40	90.95	87.00	83.04	79.08
20782	.3819"	9.70	10.0	89	47	40	90.95	87.00	83.04	79.08
20785	.3858"	9.80	10.0	89	47	40	90.95	87.00	83.04	79.08
20795	.3898"	9.90	10.0	89	47	40	90.95	87.00	83.04	79.08
20805	.3937"	10.00	10.0	89	47	40	89.99	86.08	82.17	78.25
20812	.3976"	10.10	12.0	102	55	45	122.24	116.93	111.61	106.30
20815	.4016"	10.20	12.0	102	55	45	122.24	116.93	111.61	106.30
20825	.4055"	10.30	12.0	102	55	45	122.24	116.93	111.61	106.30
20835	.4134"	10.50	12.0	102	55	45	120.96	115.70	110.45	105.19
20842	.4173"	10.60	12.0	102	55	45	120.96	115.70	110.45	105.19
20845	.4213"	10.70	12.0	102	55	45	120.96	115.70	110.45	105.19
20855	.4252"	10.80	12.0	102	55	45	120.96	115.70	110.45	105.19
20865	.4331"	11.00	12.0	102	55	45	119.66	114.46	109.25	104.05
20875	.4370"	11.10	12.0	102	55	45	119.66	114.46	109.25	104.05
20885	.4409"	11.20	12.0	102	55	45	119.66	114.46	109.25	104.05
20892	.4488"	11.40	12.0	102	55	45	119.66	114.46	109.25	104.05
20895	.4528"	11.50	12.0	102	55	45	118.39	113.25	108.10	102.95
20905	.4606"	11.70	12.0	102	55	45	118.39	113.25	108.10	102.95
20915	.4685"	11.90	12.0	102	55	45	118.39	113.25	108.10	102.95
20925	.4724"	12.00	12.0	102	55	45	117.07	111.99	106.89	101.81

1580HD - 2 Flute (continued)

12.10mm - 20.00mm
(.4764" - .7874")

HIGH PERFORMANCE
DRILLS

EDP#	d1 Diameter		d2 Shank Diameter	l1 Overall Length	l2 Flute Length	l4 Shank Length	1-11	12-24	25-49	50-100
	Decimal	Metric								
20935	.4764"	12.10	14.0	107	60	45	151.98	145.37	138.76	132.15
20941	.4803"	12.20	14.0	107	60	45	151.98	145.37	138.76	132.15
20945	.4842"	12.30	14.0	107	60	45	151.98	145.37	138.76	132.15
20951	.4882"	12.40	14.0	107	60	45	151.98	145.37	138.76	132.15
20955	.4921"	12.50	14.0	107	60	45	150.68	144.12	137.57	131.02
20961	.4961"	12.60	14.0	107	60	45	150.68	144.12	137.57	131.02
20965	.5000"	12.70	14.0	107	60	45	150.68	144.12	137.57	131.02
20975	.5039"	12.80	14.0	107	60	45	150.68	144.12	137.57	131.02
20978	.5051"	12.83	14.0	107	60	45	150.68	144.12	137.57	131.02
20981	.5079"	12.90	14.0	107	60	45	150.68	144.12	137.57	131.02
20982	.5098"	12.95	14.0	107	60	45	150.68	144.12	137.57	131.02
20985	.5118"	13.00	14.0	107	60	45	149.40	142.90	136.41	129.91
20995	.5157"	13.10	14.0	107	60	45	149.40	142.90	136.41	129.91
20998	.5236"	13.30	14.0	107	60	45	149.40	142.90	136.41	129.91
21005	.5315"	13.50	14.0	107	60	45	148.10	141.66	135.22	128.78
21015	.5394"	13.70	14.0	107	60	45	148.10	141.66	135.22	128.78
21025	.5433"	13.80	14.0	107	60	45	148.10	141.66	135.22	128.78
21035	.5512"	14.00	14.0	107	60	45	146.82	140.43	134.05	127.67
21045	.5551"	14.10	16.0	115	65	48	179.64	171.83	164.02	156.21
21053	.5591"	14.20	16.0	115	65	48	179.64	171.83	164.02	156.21
21055	.5610"	14.25	16.0	115	65	48	179.64	171.83	164.02	156.21
21065	.5630"	14.30	16.0	115	65	48	179.64	171.83	164.02	156.21
21075	.5709"	14.50	16.0	115	65	48	178.34	170.58	162.83	155.07
21085	.5787"	14.70	16.0	115	65	48	178.34	170.58	162.83	155.07
21095	.5827"	14.80	16.0	115	65	48	178.34	170.58	162.83	155.07
21105	.5906"	15.00	16.0	115	65	48	177.06	169.36	161.67	153.96
21115	.5945"	15.10	16.0	115	65	48	177.06	169.36	161.67	153.96
21125	.6102"	15.50	16.0	115	65	48	175.79	168.15	160.50	152.86
21135	.6181"	15.70	16.0	115	65	48	175.79	168.15	160.50	152.86
21145	.6220"	15.80	16.0	115	65	48	175.79	168.15	160.50	152.86
21155	.6299"	16.00	16.0	115	65	48	174.50	166.91	159.33	151.75
21159	.6331"	16.08	18.0	123	73	48	241.88	231.37	220.84	210.33
21161	.6339"	16.10	18.0	123	73	48	241.88	231.37	220.84	210.33
21163	.6378"	16.20	18.0	123	73	48	241.88	231.37	220.84	210.33
21165	.6398"	16.25	18.0	123	73	48	241.88	231.37	220.84	210.33
21175	.6496"	16.50	18.0	123	73	48	239.34	228.92	218.52	208.11
21185	.6555"	16.65	18.0	123	73	48	239.34	228.92	218.52	208.11
21195	.6693"	17.00	18.0	123	73	48	236.71	226.42	216.13	205.84
21205	.6713"	17.05	18.0	123	73	48	236.71	226.42	216.13	205.84
21215	.6870"	17.45	18.0	123	73	48	236.71	226.42	216.13	205.84
21225	.6890"	17.50	18.0	123	73	48	234.20	224.02	213.83	203.65
21235	.7027"	17.85	18.0	123	73	48	234.20	224.02	213.83	203.65
21245	.7087"	18.00	18.0	123	73	48	231.63	221.56	211.48	201.42
21255	.7185"	18.25	20.0	131	79	50	327.45	313.22	298.98	284.74
21265	.7283"	18.50	20.0	131	79	50	324.91	310.78	296.65	282.53
21275	.7342"	18.65	20.0	131	79	50	324.91	310.78	296.65	282.53
21285	.7480"	19.00	20.0	131	79	50	322.34	308.32	294.31	280.29
21295	.7500"	19.05	20.0	131	79	50	322.34	308.32	294.31	280.29
21297	.7520"	19.10	20.0	131	79	50	322.34	308.32	294.31	280.29
21298	.7539"	19.15	20.0	131	79	50	322.34	308.32	294.31	280.29
21299	.7559"	19.20	20.0	131	79	50	322.34	308.32	294.31	280.29
21300	.7579"	19.25	20.0	131	79	50	322.34	308.32	294.31	280.29
21303	.7590"	19.28	20.0	131	79	50	322.34	308.32	294.31	280.29
21304	.7598"	19.30	20.0	131	79	50	322.34	308.32	294.31	280.29
21305	.7638"	19.40	20.0	131	79	50	322.34	308.32	294.31	280.29
21315	.7677"	19.50	20.0	131	79	50	319.79	305.88	291.98	278.08
21323	.7795"	19.80	20.0	131	79	50	319.79	305.88	291.98	278.08
21325	.7815"	19.85	20.0	131	79	50	319.79	305.88	291.98	278.08
21335	.7874"	20.00	20.0	131	79	50	317.20	303.41	289.62	275.83

1580KD - 2 Flute

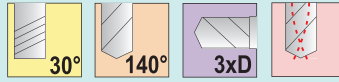
Technical information: page 208-209

TOLERANCES

d1	3mm - 6mm	+0.16 +0.04mm (+.00063" +.0015")
	> 6mm - 10mm	+0.21 +0.06mm (+.00082" +.0023")
	> 10mm - 18mm	+0.25 +0.07mm (+.00098" +.0027")
	> 18mm - 20mm	+0.29 +0.08mm (+.00114" +.0031")
	6mm	+0.00 -0.08mm (+.00000" -.0030")
d2	8mm - 10mm	+0.00 -0.09mm (+.00000" -.0035")
	12mm - 18mm	+0.00 -0.11mm (+.00000" -.0040")
	20mm	+0.00 -0.13mm (+.00000" -.0050")

4.00mm - 7.50mm
(.1575" - .2953")

**NEW
SERIES**



Balinit® HELICA Coated

High performance solid submicron grain carbide drill with reinforced shank

Utilizes DIN standard 6537

Up to 70% faster than standard carbide drills

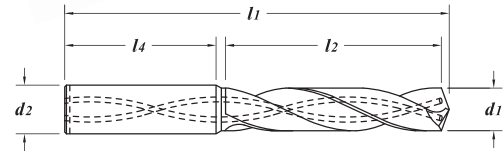
30° helix for better chip evacuation

Honed cutting edge

Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels

Balinit® HELICA is a multi-layer AlCr-based coating designed exclusively for high performance drilling

Live tooling recommended on lathe processes



EDP#	d1 Diameter		d2 Shank Diameter	l1 Overall Length	l2 Flute Length	l4 Shank Length	1-11	12-24	25-49	50-100
	Decimal	Metric								
28135	.1575"	4.00	6.0	66	24	36	62.85	60.11	57.39	54.65
28145	.1614"	4.10	6.0	66	24	36	62.85	60.11	57.39	54.65
28155	.1654"	4.20	6.0	66	24	36	62.85	60.11	57.39	54.65
28165	.1673"	4.25	6.0	66	24	36	62.85	60.11	57.39	54.65
28175	.1693"	4.30	6.0	66	24	36	62.85	60.11	57.39	54.65
28185	.1732"	4.40	6.0	66	24	36	62.85	60.11	57.39	54.65
28195	.1772"	4.50	6.0	66	24	36	62.20	59.50	56.79	54.09
28205	.1811"	4.60	6.0	66	24	36	62.20	59.50	56.79	54.09
28215	.1831"	4.65	6.0	66	24	36	62.20	59.50	56.79	54.09
28225	.1850"	4.70	6.0	66	24	36	62.20	59.50	56.79	54.09
28235	.1870"	4.75	6.0	66	24	36	62.20	59.50	56.79	54.09
28245	.1890"	4.80	6.0	66	28	36	62.20	59.50	56.79	54.09
28255	.1929"	4.90	6.0	66	28	36	62.20	59.50	56.79	54.09
28265	.1969"	5.00	6.0	66	28	36	61.57	58.90	56.21	53.54
28275	.2008"	5.10	6.0	66	28	36	61.57	58.90	56.21	53.54
28285	.2027"	5.15	6.0	66	28	36	61.57	58.90	56.21	53.54
28295	.2047"	5.20	6.0	66	28	36	61.57	58.90	56.21	53.54
28305	.2087"	5.30	6.0	66	28	36	61.57	58.90	56.21	53.54
28315	.2165"	5.50	6.0	66	28	36	60.92	58.27	55.63	52.98
28325	.2185"	5.55	6.0	66	28	36	60.92	58.27	55.63	52.98
28335	.2205"	5.60	6.0	66	28	36	60.92	58.27	55.63	52.98
28345	.2243"	5.70	6.0	66	28	36	60.92	58.27	55.63	52.98
28355	.2283"	5.80	6.0	66	28	36	60.92	58.27	55.63	52.98
28365	.2323"	5.90	6.0	66	28	36	60.92	58.27	55.63	52.98
28375	.2342"	5.95	6.0	66	28	36	60.92	58.27	55.63	52.98
28385	.2362"	6.00	6.0	66	28	36	60.29	57.67	55.05	52.43
28395	.2402"	6.10	8.0	79	34	36	86.57	82.80	79.04	75.28
28405	.2441"	6.20	8.0	79	34	36	86.57	82.80	79.04	75.28
28415	.2480"	6.30	8.0	79	34	36	86.57	82.80	79.04	75.28
28425	.2500"	6.35	8.0	79	34	36	86.57	82.80	79.04	75.28
28435	.2520"	6.40	8.0	79	34	36	86.57	82.80	79.04	75.28
28445	.2559"	6.50	8.0	79	34	36	85.92	82.19	78.46	74.71
28446	.2571"	6.53	8.0	79	34	36	85.92	82.19	78.46	74.71
28455	.2598"	6.60	8.0	79	34	36	85.92	82.19	78.46	74.71
28461	.2638"	6.70	8.0	79	34	36	85.92	82.19	78.46	74.71
28465	.2657"	6.75	8.0	79	34	36	85.92	82.19	78.46	74.71
28475	.2677"	6.80	8.0	79	34	36	85.92	82.19	78.46	74.71
28485	.2717"	6.90	8.0	79	34	36	85.92	82.19	78.46	74.71
28495	.2756"	7.00	8.0	79	34	36	85.30	81.59	77.89	74.17
28505	.2795"	7.10	8.0	79	41	36	85.30	81.59	77.89	74.17
28515	.2815"	7.15	8.0	79	41	36	85.30	81.59	77.89	74.17
28525	.2835"	7.20	8.0	79	41	36	85.30	81.59	77.89	74.17
28535	.2874"	7.30	8.0	79	41	36	85.30	81.59	77.89	74.17
28545	.2913"	7.40	8.0	79	41	36	85.30	81.59	77.89	74.17
28555	.2953"	7.50	8.0	79	41	36	84.62	80.94	77.26	73.59

1580KD - 2 Flute (continued)

7.55mm - 12.95mm
(.2972" - .5098")

HIGH PERFORMANCE
DRILLS

EDP#	<i>d1</i> Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>l4</i> Shank Length	1-11	12-24	25-49	50-100
	Decimal	Metric								
28565	.2972"	7.55	8.0	79	41	36	84.62	80.94	77.26	73.59
28575	.2992"	7.60	8.0	79	41	36	84.62	80.94	77.26	73.59
28585	.3031"	7.70	8.0	79	41	36	84.62	80.94	77.26	73.59
28595	.3071"	7.80	8.0	79	41	36	84.62	80.94	77.26	73.59
28605	.3130"	7.95	8.0	79	41	36	84.62	80.94	77.26	73.59
28615	.3150"	8.00	8.0	79	41	36	83.99	80.34	76.69	73.04
28625	.3189"	8.10	10.0	89	47	40	117.03	111.95	106.85	101.76
28635	.3228"	8.20	10.0	89	47	40	117.03	111.95	106.85	101.76
28645	.3268"	8.30	10.0	89	47	40	117.03	111.95	106.85	101.76
28655	.3287"	8.35	10.0	89	47	40	117.03	111.95	106.85	101.76
28665	.3307"	8.40	10.0	89	47	40	117.03	111.95	106.85	101.76
28675	.3346"	8.50	10.0	89	47	40	116.07	111.03	105.98	100.93
28685	.3386"	8.60	10.0	89	47	40	116.07	111.03	105.98	100.93
28695	.3425"	8.70	10.0	89	47	40	116.07	111.03	105.98	100.93
28725	.3445"	8.75	10.0	89	47	40	116.07	111.03	105.98	100.93
28735	.3465"	8.80	10.0	89	47	40	116.07	111.03	105.98	100.93
28745	.3504"	8.90	10.0	89	47	40	116.07	111.03	105.98	100.93
28755	.3543"	9.00	10.0	89	47	40	115.12	110.12	105.10	100.10
28765	.3583"	9.10	10.0	89	47	40	115.12	110.12	105.10	100.10
28775	.3602"	9.15	10.0	89	47	40	115.12	110.12	105.10	100.10
28815	.3622"	9.20	10.0	89	47	40	115.12	110.12	105.10	100.10
28825	.3661"	9.30	10.0	89	47	40	115.12	110.12	105.10	100.10
28845	.3701"	9.40	10.0	89	47	40	115.12	110.12	105.10	100.10
28855	.3740"	9.50	10.0	89	47	40	114.15	109.19	104.23	99.26
28875	.3760"	9.55	10.0	89	47	40	114.15	109.19	104.23	99.26
28878	.3780"	9.60	10.0	89	47	40	114.15	109.19	104.23	99.26
28882	.3819"	9.70	10.0	89	47	40	114.15	109.19	104.23	99.26
28885	.3858"	9.80	10.0	89	47	40	114.15	109.19	104.23	99.26
28895	.3898"	9.90	10.0	89	47	40	114.15	109.19	104.23	99.26
28905	.3937"	10.00	10.0	89	47	40	113.19	108.27	103.36	98.43
28925	.3976"	10.10	12.0	102	55	45	151.73	145.13	138.53	131.93
28935	.4016"	10.20	12.0	102	55	45	151.73	145.13	138.53	131.93
28945	.4055"	10.30	12.0	102	55	45	151.73	145.13	138.53	131.93
28955	.4134"	10.50	12.0	102	55	45	150.45	143.90	137.36	130.82
28965	.4173"	10.60	12.0	102	55	45	150.45	143.90	137.36	130.82
28975	.4213"	10.70	12.0	102	55	45	150.45	143.90	137.36	130.82
28985	.4252"	10.80	12.0	102	55	45	150.45	143.90	137.36	130.82
28995	.4331"	11.00	12.0	102	55	45	149.15	142.66	136.18	129.70
29005	.4370"	11.10	12.0	102	55	45	149.15	142.66	136.18	129.70
29015	.4409"	11.20	12.0	102	55	45	149.15	142.66	136.18	129.70
29025	.4488"	11.40	12.0	102	55	45	149.15	142.66	136.18	129.70
29035	.4528"	11.50	12.0	102	55	45	147.88	141.45	135.02	128.59
29045	.4606"	11.70	12.0	102	55	45	147.88	141.45	135.02	128.59
29055	.4685"	11.90	12.0	102	55	45	147.88	141.45	135.02	128.59
29065	.4724"	12.00	12.0	102	55	45	146.56	140.18	133.82	127.44
29075	.4764"	12.10	14.0	107	60	45	209.86	200.74	191.61	182.49
29085	.4803"	12.20	14.0	107	60	45	209.86	200.74	191.61	182.49
29095	.4842"	12.30	14.0	107	60	45	209.86	200.74	191.61	182.49
29105	.4882"	12.40	14.0	107	60	45	209.86	200.74	191.61	182.49
29115	.4921"	12.50	14.0	107	60	45	208.56	199.49	190.42	181.36
29125	.4961"	12.60	14.0	107	60	45	208.56	199.49	190.42	181.36
29135	.5000"	12.70	14.0	107	60	45	208.56	199.49	190.42	181.36
29145	.5039"	12.80	14.0	107	60	45	208.56	199.49	190.42	181.36
29148	.5051"	12.83	14.0	107	60	45	208.56	199.49	190.42	181.36
29155	.5079"	12.90	14.0	107	60	45	208.56	199.49	190.42	181.36
29161	.5098"	12.95	14.0	107	60	45	208.56	199.49	190.42	181.36

continued →

1580KD - 2 Flute (continued)

13.00mm - 20.00mm
(.5118" - .7874")

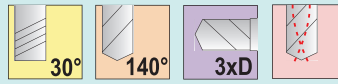
EDP#	<i>d1</i> Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>l4</i> Shank Length	1-11	12-24	25-49	50-100
	Decimal	Metric								
29165	.5118"	13.00	14.0	107	60	45	207.28	198.27	189.26	180.24
29175	.5157"	13.10	14.0	107	60	45	207.28	198.27	189.26	180.24
29181	.5236"	13.30	14.0	107	60	45	207.28	198.27	189.26	180.24
29185	.5315"	13.50	14.0	107	60	45	205.98	197.03	188.07	179.12
29195	.5394"	13.70	14.0	107	60	45	205.98	197.03	188.07	179.12
29205	.5433"	13.80	14.0	107	60	45	205.98	197.03	188.07	179.12
29215	.5512"	14.00	14.0	107	60	45	204.70	195.80	186.90	178.01
29225	.5551"	14.10	16.0	115	65	48	255.36	244.25	233.16	222.05
29235	.5591"	14.20	16.0	115	65	48	255.36	244.25	233.16	222.05
29245	.5610"	14.25	16.0	115	65	48	255.36	244.25	233.16	222.05
29255	.5630"	14.30	16.0	115	65	48	255.36	244.25	233.16	222.05
29265	.5709"	14.50	16.0	115	65	48	254.04	243.00	231.95	220.91
29275	.5787"	14.70	16.0	115	65	48	254.04	243.00	231.95	220.91
29285	.5827"	14.80	16.0	115	65	48	254.04	243.00	231.95	220.91
29305	.5906"	15.00	16.0	115	65	48	252.76	241.77	230.79	219.79
29315	.5945"	15.10	16.0	115	65	48	252.76	241.77	230.79	219.79
29325	.6102"	15.50	16.0	115	65	48	251.49	240.56	229.62	218.69
29335	.6181"	15.70	16.0	115	65	48	251.49	240.56	229.62	218.69
29345	.6220"	15.80	16.0	115	65	48	251.49	240.56	229.62	218.69
29355	.6299"	16.00	16.0	115	65	48	250.21	239.34	228.46	217.58
29363	.6331"	16.08	18.0	123	73	48	326.61	312.42	298.21	284.01
29365	.6339"	16.10	18.0	123	73	48	326.61	312.42	298.21	284.01
29371	.6378"	16.20	18.0	123	73	48	326.61	312.42	298.21	284.01
29375	.6398"	16.25	18.0	123	73	48	326.61	312.42	298.21	284.01
29385	.6496"	16.50	18.0	123	73	48	324.06	309.97	295.88	281.80
29395	.6555"	16.65	18.0	123	73	48	324.06	309.97	295.88	281.80
29405	.6693"	17.00	18.0	123	73	48	321.46	307.49	293.51	279.53
29415	.6713"	17.05	18.0	123	73	48	321.46	307.49	293.51	279.53
29425	.6870"	17.45	18.0	123	73	48	321.46	307.49	293.51	279.53
29435	.6890"	17.50	18.0	123	73	48	318.94	305.07	291.20	277.34
29445	.7027"	17.85	18.0	123	73	48	318.94	305.07	291.20	277.34
29455	.7087"	18.00	18.0	123	73	48	316.37	302.61	288.86	275.10
29465	.7185"	18.25	20.0	131	79	50	428.22	409.60	390.98	372.37
29475	.7283"	18.50	20.0	131	79	50	425.67	407.16	388.66	370.16
29485	.7342"	18.65	20.0	131	79	50	425.67	407.16	388.66	370.16
29495	.7480"	19.00	20.0	131	79	50	423.09	404.70	386.30	367.91
29505	.7500"	19.05	20.0	131	79	50	423.09	404.70	386.30	367.91
29515	.7520"	19.10	20.0	131	79	50	423.09	404.70	386.30	367.91
29525	.7539"	19.15	20.0	131	79	50	423.09	404.70	386.30	367.91
29535	.7559"	19.20	20.0	131	79	50	423.09	404.70	386.30	367.91
29545	.7579"	19.25	20.0	131	79	50	423.09	404.70	386.30	367.91
29546	.7590"	19.28	20.0	131	79	50	423.09	404.70	386.30	367.91
29551	.7598"	19.30	20.0	131	79	50	423.09	404.70	386.30	367.91
29555	.7638"	19.40	20.0	131	79	50	423.09	404.70	386.30	367.91
29565	.7677"	19.50	20.0	131	79	50	420.54	402.26	383.98	365.70
29585	.7795"	19.80	20.0	131	79	50	420.54	402.26	383.98	365.70
29595	.7815"	19.85	20.0	131	79	50	420.54	402.26	383.98	365.70
29605	.7874"	20.00	20.0	131	79	50	417.97	399.80	381.62	363.45

1580KH - 2 Flute

Technical information: page 208-209

.1575" - .2720"
(4.00mm - 6.91mm)

**NEW
SERIES**



TOLERANCES

d	+0.000" -0.005" (+0.000 -0.127mm)
h	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)

Balinit® HELICA Coated

High performance - high penetration solid submicron grain carbide drill

Extended tool life and greater surface finish through faster SFM rates

Up to 70% faster than standard carbide drills

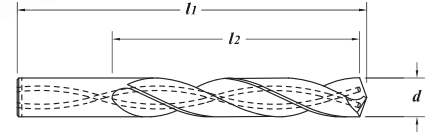
30° helix for better chip evacuation

Honed cutting edge

Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels

Live tooling recommended on lathe processes

Shank tolerance: -.0001" -.0004" (-.0025 / -.0100mm)



HIGH PERFORMANCE
DRILLS

EDP#	d † Diameter		l ₁ Overall Length	l ₂ Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
22085	.1575	4.00	56	21	45.62	43.64	41.66	39.68
22090	.1590	#21	4.04	2-3/16"	46.05	44.04	42.05	40.04
22095	.1610	#20	4.09	2-3/16"	46.43	44.41	42.39	40.37
22100	.1660	#19	4.22	2-9/32"	46.82	44.78	42.75	40.72
22105	.1695	#18	4.30	2-9/32"	47.20	45.15	43.09	41.04
22110	.1719	11/64"	4.37	2-9/32"	47.59	45.52	43.45	41.38
22115	.1730	#17	4.39	2-9/32"	47.98	45.88	43.80	41.71
22120	.1770	#16	4.49	2-9/32"	48.31	46.21	44.11	42.01
22125	.1772		4.50	58	48.72	46.60	44.49	42.37
22130	.1800	#15	4.57	2-9/32"	49.05	46.91	44.78	42.65
22135	.1820	#14	4.62	2-9/32"	49.51	47.36	45.21	43.06
22140	.1850	#13	4.70	2-9/32"	49.86	47.69	45.52	43.36
22145	.1875	3/16"	4.76	2-13/32"	50.26	48.08	45.90	43.71
22150	.1890	#12	4.80	2-13/32"	50.63	48.42	46.23	44.02
22155	.1910	#11	4.85	2-13/32"	51.10	48.87	46.65	44.43
22160	.1935	#10	4.91	2-13/32"	51.40	49.16	46.92	44.69
22165	.1960	#9	4.98	2-13/32"	51.77	49.52	47.27	45.02
22170	.1969		5.00	61	52.06	49.80	47.54	45.27
22175	.1990	#8	5.05	2-13/32"	52.54	50.25	47.98	45.69
22180	.2010	#7	5.10	2-13/32"	52.70	50.41	48.11	45.82
22185	.2031	13/64"	5.16	2-13/32"	53.05	50.74	48.43	46.13
22190	.2040	#6	5.18	2-13/32"	53.40	51.08	48.76	46.44
22195	.2055	#5	5.22	2-13/32"	53.79	51.45	49.11	46.77
22200	.2090	#4	5.31	2-13/32"	54.13	51.78	49.42	47.07
22205	.2130	#3	5.41	2-5/8"	54.49	52.11	49.74	47.38
22210	.2165		5.50	67	54.84	52.46	50.07	47.68
22215	.2188	7/32"	5.56	2-5/8"	55.31	52.90	50.50	48.09
22220	.2210	#2	5.61	2-5/8"	55.70	53.28	50.86	48.43
22225	.2280	#1	5.79	2-5/8"	56.11	53.66	51.23	48.79
22230	.2340	A	5.94	2-5/8"	56.50	54.05	51.59	49.13
22235	.2344	15/64"	5.95	2-5/8"	56.93	54.45	51.98	49.50
22240	.2362		6.00	67	57.32	54.83	52.34	49.85
22245	.2380	B	6.04	2-3/4"	57.71	55.20	52.69	50.18
22250	.2420	C	6.15	2-3/4"	58.18	55.65	53.12	50.59
22255	.2460	D	6.25	2-3/4"	58.51	55.96	53.42	50.88
22260	.2500	1/4" / E	6.35	2-3/4"	59.00	56.43	53.87	51.30
22265	.2559		6.50	70	59.96	57.35	54.75	52.14
22270	.2570	F	6.53	2-3/4"	60.88	58.23	55.59	52.94
22275	.2610	G	6.63	2-3/4"	61.81	59.12	56.43	53.75
22280	.2656	17/64"	6.75	2-15/16"	62.75	60.03	57.29	54.57
22285	.2660	H	6.76	2-15/16"	63.69	60.92	58.15	55.38
22290	.2720	I	6.91	2-15/16"	64.62	61.81	59.00	56.19

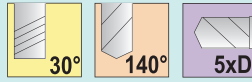
continued →

1580KH - 2 Flute (continued)

.2756" - .6299"
(7.00mm - 16.00mm)

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
22295	.2756	7.00	75	34	65.56	62.71	59.86	57.01
22300	.2770	J	7.03	2-15/16"	66.48	63.59	60.69	57.80
22305	.2810	K	7.14	2-15/16"	67.44	64.51	61.58	58.65
22310	.2812	9/32"	7.14	2-15/16"	68.38	65.41	62.43	59.46
22315	.2900	L	7.37	2-15/16"	69.30	66.28	63.27	60.26
22320	.2950	M	7.49	2-15/16"	70.65	67.58	64.50	61.43
22325	.2953		7.50	75	70.65	67.58	64.50	61.43
22330	.2969	19/64"	7.54	3-3/32"	71.26	68.16	65.06	61.96
22335	.3020	N	7.67	3-3/32"	74.46	71.23	67.98	64.75
22340	.3125	5/16"	7.94	3-3/32"	74.71	71.47	68.21	64.97
22345	.3150		8.00	79	76.13	72.82	69.50	66.20
22350	.3160	O	8.03	3-3/32"	76.13	72.82	69.50	66.20
22355	.3230	P	8.20	3-3/32"	76.69	73.35	70.02	66.68
22360	.3281	21/64"	8.33	3-3/32"	78.11	74.71	71.32	67.92
22365	.3320	Q	8.43	3-3/32"	79.51	76.06	72.59	69.14
22370	.3346		8.50	79	79.84	76.37	72.89	69.43
22375	.3390	R	8.61	3-5/16"	81.98	78.42	74.85	71.29
22380	.3438	11/32"	8.73	3-5/16"	83.78	80.14	76.49	72.85
22385	.3480	S	8.84	3-5/16"	86.56	82.79	79.03	75.26
22390	.3543		9.00	84	88.75	84.90	81.04	77.18
22395	.3580	T	9.09	3-5/16"	92.25	88.23	84.23	80.22
22400	.3594	23/64"	9.13	3-5/16"	92.81	88.77	84.74	80.70
22405	.3680	U	9.35	3-5/16"	97.65	93.40	89.16	84.91
22410	.3740		9.50	84	98.45	94.16	89.89	85.60
22415	.3750	3/8"	9.52	3-1/2"	99.04	94.73	90.43	86.12
22420	.3770	V	9.57	3-1/2"	102.85	98.37	93.90	89.43
22425	.3860	W	9.80	3-1/2"	104.63	100.09	95.53	90.99
22430	.3906	25/64"	9.92	3-1/2"	105.96	101.35	96.74	92.13
22435	.3937		10.00	89	106.33	101.70	97.08	92.46
22440	.3970	X	10.08	3-1/2"	108.93	104.20	99.46	94.72
22445	.4040	Y	10.26	3-1/2"	109.68	104.90	100.14	95.37
22450	.4062	13/32"	10.32	3-1/2"	113.05	108.13	103.22	98.30
22455	.4130	Z	10.49	3-1/2"	114.09	109.13	104.17	99.21
22460	.4134		10.50	89	114.09	109.13	104.17	99.21
22465	.4219	27/64"	10.72	3-3/4"	115.16	110.16	105.14	100.14
22470	.4331		11.00	95	123.61	118.24	112.86	107.49
22475	.4375	7/16"	11.11	3-3/4"	123.61	118.24	112.86	107.49
22480	.4528		11.50	95	132.69	126.92	121.15	115.39
22485	.4531	29/64"	11.51	3-3/4"	132.69	126.92	121.15	115.39
22490	.4688	15/32"	11.91	4"	139.42	133.36	127.30	121.23
22495	.4724		12.00	102	139.84	133.75	127.68	121.60
22500	.4844	31/64"	12.30	4"	150.55	144.01	137.46	130.92
22505	.4921		12.50	102	158.68	151.79	144.88	137.99
22510	.5000	1/2"	12.70	4"	159.69	152.74	145.81	138.86
22515	.5118		13.00	107	177.27	169.56	161.86	154.15
22520	.5156	33/64"	13.10	4-7/32"	181.44	173.54	165.66	157.78
22525	.5312	17/32"	13.49	4-7/32"	185.62	177.55	169.48	161.41
22530	.5315		13.50	110	189.81	181.55	173.31	165.06
22535	.5469	35/64"	13.89	4-5/16"	193.96	185.53	177.09	168.66
22540	.5512		14.00	110	198.16	189.55	180.93	172.32
22545	.5625	9/16"	14.29	4-9/16"	214.14	204.83	195.51	186.20
22550	.5709		14.50	116	218.16	208.68	199.19	189.71
22555	.5781	37/64"	14.68	4-15/16"	222.06	212.41	202.75	193.10
22560	.5906		15.00	125	226.15	216.32	206.48	196.65
22565	.5938	19/32"	15.08	4-15/16"	227.39	217.50	207.62	197.72
22570	.6094	39/64"	15.48	5-1/16"	228.52	218.59	208.64	198.71
22575	.6102		15.50	129	229.72	219.73	209.74	199.75
22580	.6250	5/8"	15.87	5-1/4"	230.84	220.80	210.77	200.73
22585	.6299		16.00	133	236.42	226.15	215.86	205.59

.1181" - .2165"
(3.00mm - 5.50mm)



TOLERANCES		
d	+.0000" - .0005" (+.0000 - .0127mm)	
h	≤ 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)

Balinit® HARDLUBE Coated

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

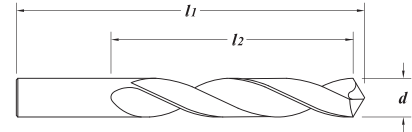
30° helix for better chip evacuation

Honed cutting edge

Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels

Live tooling recommended on lathe processes

Shank tolerance: -.0001" - .0004" (-.0025 / -.0100mm)



EDP#	d †		l ₁ Overall Length	l ₂ Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
21301	.1181	3.00	51	19	30.05	28.74	27.44	26.12
21306	.1200	#31	2"	3/4"	30.28	28.96	27.65	26.33
21311	.1250	1/8"	2"	3/4"	30.52	29.19	27.87	26.54
21316	.1285	#30	2-1/4"	3/4"	30.79	29.45	28.12	26.78
21321	.1360	#29	2-1/4"	7/8"	31.02	29.67	28.33	26.98
21326	.1378	3.50	57	22	31.26	29.90	28.55	27.19
21331	.1405	#28	2-1/4"	7/8"	31.52	30.15	28.78	27.41
21336	.1406	9/64"	2-1/4"	7/8"	31.79	30.41	29.03	27.64
21341	.1440	#27	2-1/4"	7/8"	32.00	30.61	29.21	27.83
21346	.1470	#26	2-1/4"	7/8"	32.27	30.87	29.46	28.06
21351	.1495	#25	2-1/4"	15/16"	32.52	31.11	29.69	28.28
21356	.1520	#24	2-1/4"	15/16"	32.75	31.32	29.90	28.48
21361	.1540	#23	2-1/4"	15/16"	33.02	31.58	30.15	28.71
21366	.1562	5/32"	2-1/2"	15/16"	33.26	31.81	30.37	28.92
21371	.1570	#22	2-1/2"	15/16"	33.50	32.04	30.59	29.13
21376	.1575	4.00	64	24	33.75	32.28	30.82	29.35
21381	.1590	#21	2-1/2"	15/16"	33.99	32.51	31.03	29.56
21386	.1610	#20	2-1/2"	15/16"	34.26	32.77	31.28	29.79
21391	.1660	#19	2-1/2"	1"	34.51	33.01	31.50	30.00
21396	.1695	#18	2-1/2"	1"	34.75	33.24	31.72	30.21
21401	.1719	11/64"	2-1/2"	1"	35.00	33.48	31.95	30.43
21406	.1730	#17	2-1/2"	1"	35.22	33.70	32.16	30.63
21411	.1770	#16	2-1/2"	1"	35.48	33.95	32.40	30.86
21416	.1772	4.50	65	25	35.74	34.20	32.64	31.09
21421	.1800	#15	2-3/4"	1"	35.97	34.41	32.84	31.28
21426	.1820	#14	2-3/4"	1"	36.21	34.64	33.06	31.49
21431	.1850	#13	2-3/4"	1-1/4"	36.48	34.89	33.31	31.72
21436	.1875	3/16"	2-3/4"	1-1/4"	36.74	35.14	33.55	31.95
21441	.1890	#12	2-3/4"	1-1/4"	36.97	35.36	33.76	32.15
21446	.1910	#11	2-3/4"	1-1/4"	37.21	35.59	33.98	32.35
21451	.1935	#10	2-3/4"	1-1/4"	37.47	35.84	34.22	32.58
21456	.1960	#9	3"	1-5/16"	37.70	36.06	34.42	32.78
21461	.1969	5.00	76	33	37.96	36.31	34.66	33.01
21466	.1990	#8	3"	1-5/16"	38.16	36.49	34.84	33.18
21471	.2010	#7	3"	1-5/16"	38.32	36.66	35.00	33.32
21476	.2031	13/64"	3"	1-5/16"	38.60	36.93	35.25	33.57
21481	.2040	#6	3"	1-3/8"	38.90	37.20	35.52	33.82
21486	.2055	#5	3"	1-3/8"	39.16	37.45	35.76	34.05
21491	.2090	#4	3"	1-3/8"	39.41	37.69	35.98	34.27
21496	.2130	#3	3"	1-3/8"	39.68	37.95	36.22	34.50
21501	.2165	5.50	76	35	39.93	38.19	36.45	34.72

continued →

1280H - 2 Flute (continued)

.2188" - .4528"
(5.56mm - 11.50mm)

EDP#	$d^{\dagger}$ Diameter			l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric						
21506	.2188	7/32"	5.56	3"	1-3/8"	40.19	38.44	36.69	34.94
21511	.2210	#2	5.61	3"	1-3/8"	41.05	39.26	37.48	35.69
21516	.2280	#1	5.79	3"	1-3/8"	41.25	39.46	37.66	35.87
21521	.2340	A	5.94	3-1/4"	1-1/2"	41.87	40.05	38.23	36.41
21526	.2344	15/64"	5.95	3-1/4"	1-1/2"	41.98	40.15	38.33	36.50
21531	.2362		6.00	83	38	42.11	40.28	38.45	36.62
21536	.2380	B	6.04	3-1/4"	1-5/8"	42.23	40.39	38.56	36.72
21541	.2420	C	6.15	3-1/4"	1-5/8"	42.52	40.66	38.82	36.97
21546	.2460	D	6.25	3-1/4"	1-5/8"	42.80	40.93	39.07	37.21
21551	.2500	1/4" / E	6.35	3-1/4"	1-5/8"	43.04	41.16	39.29	37.42
21556	.2559		6.50	83	41	43.79	41.89	39.99	38.08
21561	.2570	F	6.53	3-1/4"	1-11/16"	44.54	42.61	40.67	38.73
21566	.2610	G	6.63	3-1/2"	1-11/16"	45.30	43.34	41.36	39.40
21571	.2656	17/64"	6.75	3-1/2"	1-11/16"	46.05	44.04	42.05	40.04
21576	.2660	H	6.76	3-1/2"	1-11/16"	46.83	44.79	42.75	40.73
21581	.2720	I	6.91	3-1/2"	1-11/16"	47.58	45.51	43.44	41.37
21586	.2756		7.00	89	43	48.32	46.22	44.12	42.02
21591	.2770	J	7.03	3-1/2"	1-11/16"	49.09	46.96	44.82	42.68
21596	.2810	K	7.14	3-1/2"	1-3/4"	49.86	47.69	45.52	43.36
21601	.2812	9/32"	7.14	3-1/2"	1-3/4"	50.62	48.41	46.22	44.01
21606	.2900	L	7.37	3-1/2"	1-3/4"	51.31	49.08	46.85	44.62
21611	.2950	M	7.49	3-3/4"	1-3/4"	52.05	49.78	47.53	45.26
21616	.2953		7.50	95	44	52.05	49.78	47.53	45.26
21621	.2969	19/64"	7.54	3-3/4"	1-7/8"	52.55	50.26	47.99	45.70
21626	.3020	N	7.67	3-3/4"	1-7/8"	54.64	52.27	49.89	47.52
21631	.3125	5/16"	7.94	3-3/4"	1-7/8"	54.81	52.43	50.04	47.66
21636	.3150		8.00	95	48	58.14	55.61	53.08	50.55
21641	.3160	O	8.03	3-3/4"	1-7/8"	58.14	55.61	53.08	50.55
21646	.3230	P	8.20	3-3/4"	2-3/32"	58.34	55.81	53.27	50.73
21651	.3281	21/64"	8.33	4"	2-3/32"	58.87	56.32	53.76	51.20
21656	.3320	Q	8.43	4"	2-3/32"	60.05	57.44	54.83	52.22
21661	.3346		8.50	102	53	60.50	57.87	55.23	52.60
21666	.3390	R	8.61	4"	2-3/32"	62.14	59.44	56.73	54.04
21671	.3438	11/32"	8.73	4"	2-3/16"	64.33	61.54	58.74	55.94
21676	.3480	S	8.84	4"	2-3/16"	66.84	63.94	61.03	58.13
21681	.3543		9.00	102	56	67.24	64.31	61.39	58.47
21686	.3580	T	9.09	4-1/4"	2-9/32"	69.90	66.86	63.82	60.78
21691	.3594	23/64"	9.13	4-1/4"	2-9/32"	70.31	67.26	64.20	61.14
21696	.3680	U	9.35	4-1/4"	2-9/32"	77.58	74.21	70.83	67.46
21701	.3740		9.50	108	58	78.34	74.93	71.53	68.12
21706	.3750	3/8"	9.52	4-1/4"	2-3/8"	79.12	75.68	72.24	68.81
21711	.3770	V	9.57	4-1/4"	2-3/8"	81.07	77.54	74.02	70.49
21716	.3860	W	9.80	4-1/2"	2-3/8"	82.50	78.92	75.33	71.74
21721	.3906	25/64"	9.92	4-1/2"	2-3/8"	83.50	79.87	76.24	72.61
21726	.3937		10.00	114	60	86.01	82.26	78.53	74.79
21731	.3970	X	10.08	4-1/2"	2-1/2"	87.99	84.17	80.34	76.51
21736	.4040	Y	10.26	4-1/2"	2-9/16"	90.65	86.70	82.76	78.82
21741	.4062	13/32"	10.32	4-1/2"	2-9/16"	91.43	87.45	83.48	79.50
21746	.4130	Z	10.49	4-1/2"	2-5/8"	92.26	88.24	84.24	80.23
21751	.4134		10.50	114	67	92.26	88.24	84.24	80.23
21756	.4219	27/64"	10.72	4-1/2"	2-11/16"	93.10	89.06	85.01	80.95
21761	.4331		11.00	114	68	99.89	95.54	91.21	86.86
21766	.4375	7/16"	11.11	4-3/4"	2-13/16"	100.29	95.93	91.56	87.20
21771	.4528		11.50	121	71	107.17	102.51	97.85	93.19

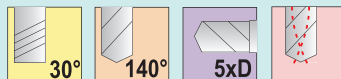
1280H - 2 Flute (continued)

.4531" - .6299"
(11.51mm - 16.00mm)

EDP#	$d^{\dagger}$		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric						
21776	.4531	29/64"	11.51	4-3/4"	2-7/8"	107.17	102.51	97.85
21781	.4688	15/32"	11.91	4-3/4"	2-7/8"	112.57	107.67	102.78
21786	.4724		12.00	121	73	112.89	107.98	103.07
21791	.4844	31/64"	12.30	5-5/16"	3"	114.15	109.19	104.23
21796	.4921		12.50	135	76	115.51	110.49	105.47
21801	.5000	1/2"	12.70	5-3/8"	3-1/16"	115.75	110.72	105.68
21806	.5118		13.00	137	78	128.75	123.16	117.55
21811	.5156	33/64"	13.10	5-3/8"	3-1/8"	131.77	126.04	120.31
21816	.5312	17/32"	13.49	5-11/16"	3-5/16"	134.86	128.99	123.13
21821	.5315		13.50	144	84	137.84	131.85	125.85
21826	.5469	35/64"	13.89	5-13/16"	3-3/8"	140.84	134.71	128.59
21831	.5512		14.00	148	86	143.88	137.62	131.37
21836	.5625	9/16"	14.29	5-15/16"	3-1/2"	155.56	148.80	142.03
21841	.5709		14.50	151	89	158.42	151.54	144.64
21846	.5781	37/64"	14.68	6"	3-1/2"	161.27	154.26	147.25
21851	.5906		15.00	152	90	164.28	157.13	149.99
21856	.5938	19/32"	15.08	6"	3-9/16"	165.13	157.96	150.77
21861	.6094	39/64"	15.48	6-3/16"	3-11/16"	178.95	171.17	163.39
21866	.6102		15.50	157	94	179.78	171.96	164.15
21871	.6250	5/8"	15.87	6-5/16"	3-3/4"	180.62	172.76	164.91
21876	.6299		16.00	160	95	184.66	176.63	168.60

d	+0.000" -0.005" (+0.000 -0.127mm)	
l ₁	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)

.1575" - .2756"
(4.00mm - 7.00mm)



Balinit® HELICA Coated

High performance - high penetration solid submicron grain carbide drill

Coolant through capabilities for high pressure coolant systems

Up to 70% faster than standard carbide drills

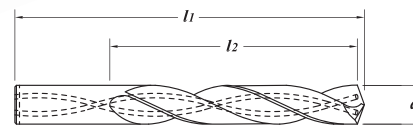
30° helix for better chip evacuation

Honed cutting edge

Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels

Live tooling recommended on lathe processes

Shank tolerance: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d †		l ₁	l ₂	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric						
NEW 25441	.1575	4.00	64	24	47.54	45.47	43.41	41.34
NEW 25446	.1590	#21	2-1/2"	15/16"	47.86	45.78	43.70	41.62
NEW 25451	.1610	#20	2-1/2"	15/16"	48.24	46.13	44.04	41.94
NEW 25456	.1660	#19	2-1/2"	1"	48.59	46.48	44.37	42.26
NEW 25461	.1695	#18	2-1/2"	1"	48.94	46.81	44.69	42.56
NEW 25466	.1719	11/64"	2-1/2"	1"	49.29	47.14	45.00	42.86
NEW 25471	.1730	#17	2-1/2"	1"	49.61	47.46	45.29	43.14
NEW 25476	.1770	#16	2-1/2"	1"	49.98	47.81	45.64	43.46
NEW 25481	.1772	4.50	64	25	50.36	48.16	45.98	43.78
NEW 25486	.1800	#15	2-3/4"	1"	50.68	48.47	46.27	44.06
NEW 25491	.1820	#14	2-3/4"	1"	51.01	48.80	46.57	44.36
NEW 25496	.1850	#13	2-3/4"	1-1/4"	51.37	49.13	46.90	44.67
NEW 25501	.1875	3/16"	2-3/4"	1-1/4"	51.75	49.50	47.25	45.00
NEW 25506	.1890	#12	2-3/4"	1-1/4"	52.07	49.81	47.55	45.28
NEW 25511	.1910	#11	2-3/4"	1-1/4"	52.41	50.13	47.85	45.57
NEW 25516	.1935	#10	2-3/4"	1-1/4"	52.78	50.48	48.19	45.90
NEW 25521	.1960	#9	3"	1-5/16"	53.09	50.78	48.47	46.17
NEW 25526	.1969	5.00	76	33	53.47	51.14	48.82	46.49
NEW 25531	.1990	#8	3"	1-5/16"	53.74	51.40	49.07	46.73
NEW 25536	.2010	#7	3"	1-5/16"	53.98	51.63	49.29	46.94
NEW 25541	.2031	13/64"	3"	1-5/16"	54.37	52.01	49.64	47.28
NEW 25546	.2040	#6	3"	1-3/8"	54.78	52.40	50.01	47.63
NEW 25551	.2055	#5	3"	1-3/8"	55.15	52.75	50.36	47.95
NEW 25556	.2090	#4	3"	1-3/8"	55.50	53.09	50.68	48.27
NEW 25561	.2130	#3	3"	1-3/8"	55.88	53.45	51.02	48.59
NEW 25566	.2165	5.50	76	35	56.22	53.78	51.33	48.89
25571	.2188	7/32"	3"	1-3/8"	56.36	53.90	51.46	49.00
25576	.2210	#2	3"	1-3/8"	57.30	54.81	52.32	49.83
25581	.2280	#1	3"	1-3/8"	57.51	55.02	52.51	50.01
25586	.2340	A	3-1/4"	1-1/2"	64.55	61.74	58.94	56.13
25591	.2344	15/64"	3-1/4"	1-1/2"	64.67	61.86	59.04	56.23
25596	.2362	6.00	83	38	64.82	62.00	59.19	56.37
25601	.2380	B	3-1/4"	1-5/8"	66.94	64.03	61.12	58.21
25606	.2420	C	3-1/4"	1-5/8"	67.27	64.34	61.42	58.49
25611	.2460	D	3-1/4"	1-5/8"	67.56	64.63	61.68	58.75
25616	.2500	1/4" / E	3-1/4"	1-5/8"	67.84	64.89	61.94	58.99
25621	.2559	6.50	83	41	68.67	65.69	62.70	59.72
25626	.2570	F	3-1/4"	1-11/16"	70.26	67.20	64.15	61.10
25631	.2610	G	3-1/2"	1-11/16"	71.13	68.04	64.94	61.85
25636	.2656	17/64"	3-1/2"	1-11/16"	71.95	68.82	65.69	62.57
25641	.2660	H	3-1/2"	1-11/16"	72.81	69.65	66.48	63.32
25646	.2720	I	3-1/2"	1-11/16"	72.89	69.72	66.55	63.39
25651	.2756	7.00	89	43	73.73	70.52	67.32	64.11

1280KH - 2 Flute (continued)

.2770" - .6299"
(7.03mm - 16.00mm)

HIGH PERFORMANCE
DRILLS

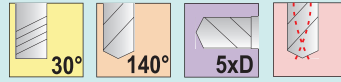
EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
25656	.2770	J	7.03	3-1/2"	1-11/16"	77.47	74.10	70.73
25661	.2810	K	7.14	3-1/2"	1-3/4"	78.31	74.91	71.50
25666	.2812	9/32"	7.14	3-1/2"	1-3/4"	79.16	75.72	72.28
25671	.2900	L	7.37	3-1/2"	1-3/4"	79.52	76.07	72.60
25676	.2950	M	7.49	3-3/4"	1-3/4"	79.99	76.51	73.03
25681	.2953		7.50	95	44	79.99	76.51	73.03
25686	.2969	19/64"	7.54	3-3/4"	1-7/8"	85.45	81.73	78.02
25691	.3020	N	7.67	3-3/4"	1-7/8"	87.38	83.58	79.78
25696	.3125	5/16"	7.94	3-3/4"	1-7/8"	87.57	83.76	79.96
25701	.3150		8.00	95	48	91.27	87.30	83.34
25706	.3160	O	8.03	3-3/4"	1-7/8"	92.09	88.09	84.08
25711	.3230	P	8.20	3-3/4"	2-3/32"	92.33	88.32	84.30
25716	.3281	21/64"	8.33	4"	2-3/32"	92.94	88.90	84.86
25721	.3320	Q	8.43	4"	2-3/32"	93.46	89.40	85.33
25726	.3346		8.50	102	53	93.95	89.87	85.78
25731	.3390	R	8.61	4"	2-3/32"	98.08	93.82	89.55
25736	.3438	11/32"	8.73	4"	2-3/16"	100.52	96.15	91.78
25741	.3480	S	8.84	4"	2-3/16"	102.77	98.30	93.84
25746	.3543		9.00	102	56	103.22	98.73	94.24
25751	.3580	T	9.09	4-1/4"	2-9/32"	105.16	100.59	96.02
25756	.3594	23/64"	9.13	4-1/4"	2-9/32"	105.56	100.97	96.38
25761	.3680	U	9.35	4-1/4"	2-9/32"	111.88	107.02	102.15
25766	.3740		9.50	108	58	112.43	107.55	102.66
25771	.3750	3/8"	9.52	4-1/4"	2-3/8"	115.22	110.21	105.21
25776	.3770	V	9.57	4-1/4"	2-3/8"	115.60	110.57	105.54
25781	.3860	W	9.80	4-1/2"	2-3/8"	116.88	111.79	106.71
25786	.3906	25/64"	9.92	4-1/2"	2-3/8"	117.75	112.63	107.50
25791	.3937		10.00	114	60	118.82	113.65	108.48
25796	.3970	X	10.08	4-1/2"	2-1/2"	124.17	118.77	113.37
25801	.4040	Y	10.26	4-1/2"	2-9/16"	124.72	119.30	113.87
25806	.4062	13/32"	10.32	4-1/2"	2-9/16"	127.11	121.59	116.05
25811	.4130	Z	10.49	4-1/2"	2-5/8"	129.12	123.50	117.88
25816	.4134		10.50	114	67	129.12	123.50	117.88
25821	.4219	27/64"	10.72	4-1/2"	2-11/16"	130.95	125.26	119.56
25826	.4331		11.00	114	68	135.65	129.75	123.85
25831	.4375	7/16"	11.11	4-3/4"	2-13/16"	138.40	132.38	126.37
25836	.4528		11.50	121	71	143.34	137.11	130.87
25841	.4531	29/64"	11.51	4-3/4"	2-7/8"	148.23	141.78	135.35
25846	.4688	15/32"	11.91	4-3/4"	2-7/8"	151.63	145.04	138.44
25851	.4724		12.00	121	73	154.90	148.16	141.43
25856	.4844	31/64"	12.30	5-5/16"	3"	165.29	158.10	150.91
25861	.4921		12.50	135	76	177.41	169.70	161.99
25866	.5000	1/2"	12.70	5-3/8"	3-1/16"	179.09	171.30	163.52
25871	.5118		13.00	137	78	203.11	194.28	185.45
25876	.5156	33/64"	13.10	5-3/8"	3-1/8"	211.69	202.49	193.28
25881	.5312	17/32"	13.49	5-11/16"	3-5/16"	215.11	205.76	196.40
25886	.5315		13.50	144	84	218.42	208.93	199.43
25891	.5469	35/64"	13.89	5-13/16"	3-3/8"	230.40	220.39	210.36
25896	.5512		14.00	148	86	233.78	223.62	213.45
25901	.5625	9/16"	14.29	5-15/16"	3-1/2"	253.39	242.37	231.35
25906	.5709		14.50	151	89	255.38	244.28	233.18
25911	.5781	37/64"	14.68	6"	3-1/2"	256.07	244.93	233.80
25916	.5906		15.00	152	90	259.40	248.12	236.84
25921	.5938	19/32"	15.08	6"	3-9/16"	266.16	254.58	243.02
25926	.6094	39/64"	15.48	6-3/16"	3-11/16"	299.54	286.52	273.49
25931	.6102		15.50	157	94	300.36	287.30	274.25
25936	.6250	5/8"	15.87	6-5/16"	3-3/4"	308.65	295.24	281.81
25941	.6299		16.00	160	95	312.70	299.10	285.50

1280KD - 2 Flute

Technical information: page 208-209

4.00mm - 7.50mm
(.1575" - .2953")

**NEW
SERIES**



TOLERANCES

d1	3mm - 6mm	+0.16 +0.04mm (+.0063" +.0015")
	> 6mm - 10mm	+0.21 +0.06mm (+.0082" +.0023")
	> 10mm - 18mm	+0.25 +0.07mm (+.0098" +.0027")
	> 18mm - 20mm	+0.29 +0.08mm (+.0114" +.0031")
d2	6mm	+0.00 -0.08mm (+.0000" -.0030")
	8mm - 10mm	+0.00 -0.09mm (+.0000" -.0035")
	12mm - 18mm	+0.00 -0.11mm (+.0000" -.0040")
	20mm	+0.00 -0.13mm (+.0000" -.0050")

Balinit® HELICA Coated

High performance solid submicron grain carbide drill with reinforced shank

Utilizes DIN standard 6537

Up to 70% faster than standard carbide drills

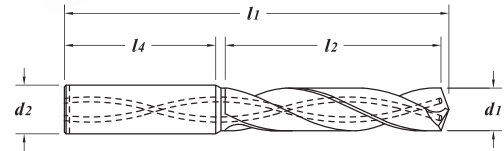
30° helix for better chip evacuation

Honed cutting edge

Recommended to run in high nickel, high temperature alloys, cobalt-based alloys, stainless steels and tool steels

Balinit® HELICA is a multi-layer AlCr-based coating designed exclusively for high performance drilling

Live tooling recommended on lathe processes



EDP#	d1 Diameter		d2 Shank Diameter	l1 Overall Length	l2 Flute Length	l4 Shank Length	1-11	12-24	25-49	50-100
	Decimal	Metric								
25205	.1575"	4.00	6.0	74	36	36	78.86	75.43	72.01	68.58
25215	.1614"	4.10	6.0	74	36	36	78.86	75.43	72.01	68.58
25225	.1654"	4.20	6.0	74	36	36	78.86	75.43	72.01	68.58
25235	.1673"	4.25	6.0	74	36	36	78.86	75.43	72.01	68.58
25245	.1693"	4.30	6.0	74	36	36	78.86	75.43	72.01	68.58
25255	.1732"	4.40	6.0	74	36	36	78.86	75.43	72.01	68.58
25265	.1772"	4.50	6.0	74	36	36	78.20	74.80	71.40	68.00
25275	.1811"	4.60	6.0	74	36	36	78.20	74.80	71.40	68.00
25285	.1831"	4.65	6.0	74	36	36	78.20	74.80	71.40	68.00
25295	.1850"	4.70	6.0	74	36	36	78.20	74.80	71.40	68.00
25305	.1870"	4.75	6.0	74	36	36	78.20	74.80	71.40	68.00
25315	.1890"	4.80	6.0	82	44	36	78.20	74.80	71.40	68.00
25325	.1929"	4.90	6.0	82	44	36	78.20	74.80	71.40	68.00
25335	.1969"	5.00	6.0	82	44	36	77.56	74.19	70.81	67.44
25345	.2008"	5.10	6.0	82	44	36	77.56	74.19	70.81	67.44
25355	.2027"	5.15	6.0	82	44	36	77.56	74.19	70.81	67.44
25365	.2047"	5.20	6.0	82	44	36	77.56	74.19	70.81	67.44
25375	.2087"	5.30	6.0	82	44	36	77.56	74.19	70.81	67.44
25385	.2165"	5.50	6.0	82	44	36	74.36	71.13	67.89	64.66
25395	.2185"	5.55	6.0	82	44	36	74.36	71.13	67.89	64.66
25397	.2205"	5.60	6.0	82	44	36	74.36	71.13	67.89	64.66
25400	.2243"	5.70	6.0	82	44	36	74.36	71.13	67.89	64.66
25405	.2283"	5.80	6.0	82	44	36	74.36	71.13	67.89	64.66
25415	.2323"	5.90	6.0	82	44	36	74.36	71.13	67.89	64.66
25425	.2342"	5.95	6.0	82	44	36	74.36	71.13	67.89	64.66
25435	.2362"	6.00	6.0	82	44	36	71.17	68.07	64.98	61.88
25437	.2402"	6.10	8.0	91	53	36	109.05	104.31	99.57	94.83
25440	.2441"	6.20	8.0	91	53	36	109.05	104.31	99.57	94.83
25443	.2480"	6.30	8.0	91	53	36	109.05	104.31	99.57	94.83
25445	.2500"	6.35	8.0	91	53	36	109.05	104.31	99.57	94.83
25450	.2520"	6.40	8.0	91	53	36	106.81	102.16	97.52	92.87
25455	.2559"	6.50	8.0	91	53	36	106.81	102.16	97.52	92.87
25457	.2571"	6.53	8.0	91	53	36	106.81	102.16	97.52	92.87
25460	.2598"	6.60	8.0	91	53	36	106.81	102.16	97.52	92.87
25463	.2638"	6.70	8.0	91	53	36	106.81	102.16	97.52	92.87
25465	.2657"	6.75	8.0	91	53	36	106.81	102.16	97.52	92.87
25475	.2677"	6.80	8.0	91	53	36	106.81	102.16	97.52	92.87
25485	.2717"	6.90	8.0	91	53	36	106.81	102.16	97.52	92.87
25495	.2756"	7.00	8.0	91	53	36	104.54	100.00	95.45	90.91
25505	.2795"	7.10	8.0	91	53	36	104.54	100.00	95.45	90.91
25515	.2815"	7.15	8.0	91	53	36	104.54	100.00	95.45	90.91
25525	.2835"	7.20	8.0	91	53	36	104.54	100.00	95.45	90.91
25530	.2874"	7.30	8.0	91	53	36	104.54	100.00	95.45	90.91
25535	.2913"	7.40	8.0	91	53	36	104.54	100.00	95.45	90.91
25545	.2953"	7.50	8.0	91	53	36	102.30	97.85	93.41	88.96

1280KD - 2 Flute (continued)

7.55mm - 12.95mm
(.2972" - .5098")

HIGH PERFORMANCE
DRILLS

EDP#	<i>d1</i> Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>l4</i> Shank Length	1-11	12-24	25-49	50-100
	Decimal	Metric								
25555	.2972"	7.55	8.0	91	53	36	102.30	97.85	93.41	88.96
25565	.2992"	7.60	8.0	91	53	36	102.30	97.85	93.41	88.96
25575	.3031"	7.70	8.0	91	53	36	102.30	97.85	93.41	88.96
25585	.3071"	7.80	8.0	91	53	36	102.30	97.85	93.41	88.96
25595	.3130"	7.95	8.0	91	53	36	102.30	97.85	93.41	88.96
25605	.3150"	8.00	8.0	91	53	36	100.08	95.73	91.37	87.03
25610	.3189"	8.10	10.0	103	61	40	139.15	133.10	127.05	121.00
25615	.3228"	8.20	10.0	103	61	40	139.15	133.10	127.05	121.00
25625	.3268"	8.30	10.0	103	61	40	139.15	133.10	127.05	121.00
25635	.3287"	8.35	10.0	103	61	40	139.15	133.10	127.05	121.00
25640	.3307"	8.40	10.0	103	61	40	136.59	130.66	124.72	118.78
25645	.3346"	8.50	10.0	103	61	40	136.59	130.66	124.72	118.78
25655	.3386"	8.60	10.0	103	61	40	136.59	130.66	124.72	118.78
25665	.3425"	8.70	10.0	103	61	40	136.59	130.66	124.72	118.78
25675	.3445"	8.75	10.0	103	61	40	136.59	130.66	124.72	118.78
25685	.3465"	8.80	10.0	103	61	40	136.59	130.66	124.72	118.78
25695	.3504"	8.90	10.0	103	61	40	136.59	130.66	124.72	118.78
25705	.3543"	9.00	10.0	103	61	40	134.05	128.22	122.39	116.56
25715	.3583"	9.10	10.0	103	61	40	134.05	128.22	122.39	116.56
25725	.3602"	9.15	10.0	103	61	40	134.05	128.22	122.39	116.56
25735	.3622"	9.20	10.0	103	61	40	134.05	128.22	122.39	116.56
25745	.3661"	9.30	10.0	103	61	40	134.05	128.22	122.39	116.56
25750	.3701"	9.40	10.0	103	61	40	131.47	125.75	120.04	114.32
25755	.3740"	9.50	10.0	103	61	40	131.47	125.75	120.04	114.32
25765	.3760"	9.55	10.0	103	61	40	131.47	125.75	120.04	114.32
25767	.3780"	9.60	10.0	103	61	40	131.47	125.75	120.04	114.32
25770	.3819"	9.70	10.0	103	61	40	131.47	125.75	120.04	114.32
25775	.3858"	9.80	10.0	103	61	40	131.47	125.75	120.04	114.32
25785	.3898"	9.90	10.0	103	61	40	131.47	125.75	120.04	114.32
25795	.3937"	10.00	10.0	103	61	40	128.92	123.31	117.71	112.10
25800	.3976"	10.10	12.0	118	71	45	179.09	171.30	163.52	155.73
25805	.4016"	10.20	12.0	118	71	45	179.09	171.30	163.52	155.73
25815	.4055"	10.30	12.0	118	71	45	179.09	171.30	163.52	155.73
25825	.4134"	10.50	12.0	118	71	45	175.88	168.24	160.59	152.94
25830	.4173"	10.60	12.0	118	71	45	175.88	168.24	160.59	152.94
25835	.4213"	10.70	12.0	118	71	45	175.88	168.24	160.59	152.94
25845	.4252"	10.80	12.0	118	71	45	175.88	168.24	160.59	152.94
25855	.4331"	11.00	12.0	118	71	45	172.67	165.16	157.65	150.14
25865	.4370"	11.10	12.0	118	71	45	172.67	165.16	157.65	150.14
25875	.4409"	11.20	12.0	118	71	45	172.67	165.16	157.65	150.14
25880	.4488"	11.40	12.0	118	71	45	169.49	162.12	154.75	147.38
25885	.4528"	11.50	12.0	118	71	45	169.49	162.12	154.75	147.38
25895	.4606"	11.70	12.0	118	71	45	169.49	162.12	154.75	147.38
25905	.4685"	11.90	12.0	118	71	45	169.49	162.12	154.75	147.38
25915	.4724"	12.00	12.0	118	71	45	166.26	159.04	151.81	144.58
25925	.4764"	12.10	14.0	124	77	45	258.16	246.94	235.71	224.48
25930	.4803"	12.20	14.0	124	77	45	258.16	246.94	235.71	224.48
25935	.4842"	12.30	14.0	124	77	45	258.16	246.94	235.71	224.48
25940	.4882"	12.40	14.0	124	77	45	254.97	243.88	232.79	221.71
25945	.4921"	12.50	14.0	124	77	45	254.97	243.88	232.79	221.71
25950	.4961"	12.60	14.0	124	77	45	254.97	243.88	232.79	221.71
25955	.5000"	12.70	14.0	124	77	45	254.97	243.88	232.79	221.71
25960	.5039"	12.80	14.0	124	77	45	254.97	243.88	232.79	221.71
25961	.5051"	12.83	14.0	124	77	45	254.97	243.88	232.79	221.71
25963	.5079"	12.90	14.0	124	77	45	254.97	243.88	232.79	221.71
25964	.5098"	12.95	14.0	124	77	45	254.97	243.88	232.79	221.71

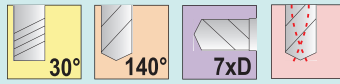
continued →

1280KD - 2 Flute (continued)

13.00mm - 20.00mm
(.5118" - .7874")

EDP#	<i>d1</i> Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>l4</i> Shank Length	1-11	12-24	25-49	50-100
	Decimal	Metric								
25965	.5118"	13.00	14.0	124	77	45	251.77	240.82	229.88	218.93
25975	.5157"	13.10	14.0	124	77	45	251.77	240.82	229.88	218.93
25981	.5236"	13.30	14.0	124	77	45	251.77	240.82	229.88	218.93
25985	.5315"	13.50	14.0	124	77	45	248.54	237.73	226.93	216.12
25995	.5394"	13.70	14.0	124	77	45	248.54	237.73	226.93	216.12
26005	.5433"	13.80	14.0	124	77	45	248.54	237.73	226.93	216.12
26015	.5512"	14.00	14.0	124	77	45	245.34	234.67	224.01	213.34
26025	.5551"	14.10	16.0	133	83	48	340.30	325.50	310.71	295.91
26027	.5591"	14.20	16.0	133	83	48	340.30	325.50	310.71	295.91
26035	.5610"	14.25	16.0	133	83	48	340.30	325.50	310.71	295.91
26045	.5630"	14.30	16.0	133	83	48	340.30	325.50	310.71	295.91
26055	.5709"	14.50	16.0	133	83	48	336.77	322.13	307.49	292.84
26065	.5787"	14.70	16.0	133	83	48	336.77	322.13	307.49	292.84
26067	.5827"	14.80	16.0	133	83	48	336.77	322.13	307.49	292.84
26075	.5906"	15.00	16.0	133	83	48	333.27	318.78	304.28	289.80
26085	.5945"	15.10	16.0	133	83	48	333.27	318.78	304.28	289.80
26095	.6102"	15.50	16.0	133	83	48	329.71	315.38	301.04	286.71
26105	.6181"	15.70	16.0	133	83	48	329.71	315.38	301.04	286.71
26107	.6220"	15.80	16.0	133	83	48	329.71	315.38	301.04	286.71
26115	.6299"	16.00	16.0	133	83	48	326.21	312.02	297.84	283.66
26118	.6331"	16.08	18.0	143	93	48	413.72	395.73	377.75	359.76
26119	.6339"	16.10	18.0	143	93	48	413.72	395.73	377.75	359.76
26123	.6378"	16.20	18.0	143	93	48	413.72	395.73	377.75	359.76
26125	.6398"	16.25	18.0	143	93	48	413.72	395.73	377.75	359.76
26135	.6496"	16.50	18.0	143	93	48	407.28	389.57	371.86	354.16
26145	.6555"	16.65	18.0	143	93	48	407.28	389.57	371.86	354.16
26155	.6693"	17.00	18.0	143	93	48	400.74	383.32	365.89	348.47
26165	.6713"	17.05	18.0	143	93	48	400.74	383.32	365.89	348.47
26175	.6870"	17.45	18.0	143	93	48	400.74	383.32	365.89	348.47
26185	.6890"	17.50	18.0	143	93	48	394.35	377.20	360.06	342.91
26195	.7027"	17.85	18.0	143	93	48	394.35	377.20	360.06	342.91
26205	.7087"	18.00	18.0	143	93	48	387.83	370.97	354.10	337.24
26215	.7185"	18.25	20.0	153	101	50	497.32	475.70	454.07	432.45
26225	.7283"	18.50	20.0	153	101	50	490.74	469.40	448.07	426.73
26235	.7342"	18.65	20.0	153	101	50	490.74	469.40	448.07	426.73
26245	.7480"	19.00	20.0	153	101	50	484.36	463.30	442.24	421.18
26255	.7500"	19.05	20.0	153	101	50	484.36	463.30	442.24	421.18
26256	.7520"	19.10	20.0	153	101	50	484.36	463.30	442.24	421.18
26257	.7539"	19.15	20.0	153	101	50	484.36	463.30	442.24	421.18
26258	.7559"	19.20	20.0	153	101	50	484.36	463.30	442.24	421.18
26259	.7579"	19.25	20.0	153	101	50	484.36	463.30	442.24	421.18
26260	.7590"	19.28	20.0	153	101	50	484.36	463.30	442.24	421.18
26261	.7598"	19.30	20.0	153	101	50	484.36	463.30	442.24	421.18
26265	.7638"	19.40	20.0	153	101	50	484.36	463.30	442.24	421.18
26275	.7677"	19.50	20.0	153	101	50	477.42	456.66	435.91	415.15
26281	.7795"	19.80	20.0	153	101	50	477.42	456.66	435.91	415.15
26285	.7815"	19.85	20.0	153	101	50	477.42	456.66	435.91	415.15
26295	.7874"	20.00	20.0	153	101	50	470.75	450.28	429.81	409.34

.1575" - .2810"
(4.00mm - 7.14mm)



TOLERANCES		
d	+.0000" -.0005" (+.0000 -.0127mm)	
h	≤ 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)

Balinit® HELICA Coated

High performance - high penetration solid submicron grain carbide drill

Coolant through capabilities

Up to 70% faster than standard carbide drills

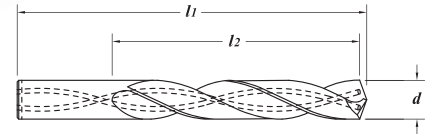
30° helix for better chip evacuation

Honed cutting edge

Recommended to run in high nickel, high temperature alloys,
cobalt-based alloys, stainless steels and tool steels

Live tooling recommended on lathe processes

Shank tolerance: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d †		l ₁	l ₂	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric	Overall Length	Flute Length				
NEW 26441	.1575	4.00	76	38	51.12	48.89	46.68	44.45
NEW 26446	.1590	#21	4.04	3"	1-1/2"	51.46	49.22	46.99
NEW 26451	.1610	#20	4.09	3"	1-1/2"	51.88	49.62	47.36
NEW 26456	.1660	#19	4.22	3"	1-1/2"	52.25	49.98	47.70
NEW 26461	.1695	#18	4.30	3-1/2"	1-3/4"	52.61	50.33	48.04
NEW 26466	.1719	11/64"	4.37	3-1/2"	1-3/4"	53.00	50.69	48.39
NEW 26471	.1730	#17	4.39	3-1/2"	1-3/4"	53.34	51.02	48.70
NEW 26476	.1770	#16	4.49	3-1/2"	1-3/4"	53.75	51.41	49.08
NEW 26481	.1772		4.50	88	45	54.14	51.79	49.43
NEW 26486	.1800	#15	4.57	3-1/2"	1-3/4"	54.49	52.11	49.74
NEW 26491	.1820	#14	4.62	3-1/2"	1-3/4"	54.85	52.47	50.08
NEW 26496	.1850	#13	4.70	3-1/2"	1-3/4"	55.23	52.83	50.43
NEW 26501	.1875	3/16"	4.76	4"	2"	55.65	53.23	50.81
NEW 26506	.1890	#12	4.80	4"	2"	55.99	53.56	51.13
NEW 26511	.1910	#11	4.85	4"	2"	56.36	53.90	51.46
NEW 26516	.1935	#10	4.91	4"	2"	56.75	54.29	51.81
NEW 26521	.1960	#9	4.98	4"	2"	57.09	54.60	52.12
NEW 26526	.1969		5.00	102	50	57.48	54.98	52.48
NEW 26531	.1990	#8	5.05	4"	2"	57.78	55.27	52.76
NEW 26536	.2010	#7	5.10	4"	2"	58.04	55.52	53.00
NEW 26541	.2031	13/64"	5.16	4"	2"	58.46	55.92	53.37
NEW 26546	.2040	#6	5.18	4"	2"	58.91	56.35	53.78
NEW 26551	.2055	#5	5.22	4"	2"	59.30	56.72	54.14
NEW 26556	.2090	#4	5.31	4"	2"	59.69	57.09	54.50
NEW 26561	.2130	#3	5.41	4"	2"	60.09	57.48	54.87
NEW 26566	.2165		5.50	102	50	60.46	57.82	55.20
26571	.2188	7/32"	5.56	4"	2"	60.82	58.18	55.53
26576	.2210	#2	5.61	4"	2"	61.78	59.09	56.40
26581	.2280	#1	5.79	4-1/8"	2-1/8"	70.78	67.70	64.63
26586	.2340	A	5.94	4-1/8"	2-1/8"	74.72	71.48	68.22
26591	.2344	15/64"	5.95	4-1/8"	2-1/8"	74.85	71.59	68.34
26596	.2362		6.00	105	55	75.00	71.74	68.48
26601	.2380	B	6.04	4-1/8"	2-1/8"	78.27	74.87	71.47
26606	.2420	C	6.15	4-1/4"	2-1/4"	78.58	75.16	71.75
26611	.2460	D	6.25	4-1/4"	2-1/4"	78.87	75.44	72.01
26616	.2500	1/4" / E	6.35	4-1/4"	2-1/4"	79.15	75.71	72.27
26621	.2559		6.50	108	58	79.99	76.51	73.03
26626	.2570	F	6.53	4-3/8"	2-3/8"	83.06	79.46	75.84
26631	.2610	G	6.63	4-3/8"	2-3/8"	83.91	80.26	76.61
26636	.2656	17/64"	6.75	4-3/8"	2-3/8"	84.74	81.06	77.37
26641	.2660	H	6.76	4-3/8"	2-3/8"	85.61	81.89	78.17
26646	.2720	I	6.91	4-3/8"	2-3/8"	85.70	81.97	78.24
26651	.2756		7.00	111	61	86.52	82.75	79.00
26656	.2770	J	7.03	4-3/8"	2-3/8"	90.89	86.93	82.98
26661	.2810	K	7.14	4-7/16"	2-7/16"	91.75	87.76	83.77

continued →

1880KH - 2 Flute (continued)

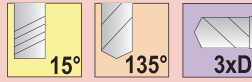
.2812" - .6299"
(7.14mm - 16.00mm)

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
26666	.2812	9/32"	7.14	4-7/16"	2-7/16"	92.59	88.57	84.54
26671	.2900	L	7.37	4-7/16"	2-7/16"	92.96	88.91	84.87
26676	.2950	M	7.49	4-7/16"	2-7/16"	93.42	89.36	85.30
26681	.2953		7.50	116	66	93.42	89.36	85.30
26686	.2969	19/64"	7.54	4-9/16"	2-9/16"	100.85	96.46	92.08
26691	.3020	N	7.67	4-9/16"	2-9/16"	102.78	98.31	93.85
26696	.3125	5/16"	7.94	4-11/16"	2-9/16"	102.98	98.50	94.03
26701	.3150		8.00	119	69	106.67	102.03	97.40
26706	.3160	O	8.03	4-11/16"	2-11/16"	108.46	103.75	99.03
26711	.3230	P	8.20	4-11/16"	2-11/16"	108.69	103.97	99.24
26716	.3281	21/64"	8.33	4-11/16"	2-11/16"	109.30	104.55	99.80
26721	.3320	Q	8.43	4-15/16"	2-15/16"	109.84	105.07	100.30
26726	.3346		8.50	125	75	110.32	105.53	100.73
26731	.3390	R	8.61	4-15/16"	2-15/16"	115.54	110.52	105.50
26736	.3438	11/32"	8.73	4-15/16"	2-15/16"	117.99	112.86	107.72
26741	.3480	S	8.84	5"	3"	120.23	115.00	109.78
26746	.3543		9.00	127	77	120.68	115.43	110.19
26751	.3580	T	9.09	5"	3"	132.42	126.66	120.91
26756	.3594	23/64"	9.13	5"	3"	132.90	127.12	121.35
26761	.3680	U	9.35	5"	3"	140.60	134.48	128.37
26766	.3740		9.50	130	80	141.49	135.34	129.19
26771	.3750	3/8"	9.52	5-1/8"	3-1/8"	145.22	138.90	132.59
26776	.3770	V	9.57	5-1/8"	3-1/8"	147.50	141.09	134.68
26781	.3860	W	9.80	5-1/8"	3-1/8"	148.00	141.56	135.13
26786	.3906	25/64"	9.92	5-1/4"	3-1/4"	148.91	142.43	135.96
26791	.3937		10.00	133	83	151.83	145.23	138.62
26796	.3970	X	10.08	5-1/4"	3-1/4"	156.88	150.06	143.24
26801	.4040	Y	10.26	5-3/8"	3-3/8"	159.99	153.04	146.08
26806	.4062	13/32"	10.32	5-3/8"	3-3/8"	160.90	153.90	146.91
26811	.4130	Z	10.49	5-3/8"	3-3/8"	163.56	156.45	149.33
26816	.4134		10.50	137	86	163.56	156.45	149.33
26821	.4219	27/64"	10.72	5-7/16"	3-7/16"	165.60	158.40	151.20
26826	.4331		11.00	138	88	172.01	164.53	157.05
26831	.4375	7/16"	11.11	5-7/16"	3-7/16"	175.68	168.04	160.40
26836	.4528		11.50	141	91	181.94	174.02	166.12
26841	.4531	29/64"	11.51	5-9/16"	3-13/16"	187.62	179.46	171.30
26846	.4688	15/32"	11.91	5-9/16"	3-13/16"	192.31	183.94	175.58
26851	.4724		12.00	141	98	197.25	188.67	180.10
26856	.4844	31/64"	12.30	5-9/16"	3-13/16"	202.36	193.56	184.77
26861	.4921		12.50	152	102	203.49	194.64	185.80
26866	.5000	1/2"	12.70	6"	4"	204.22	195.34	186.46
26871	.5118		13.00	152	102	213.81	204.52	195.22
26876	.5156	33/64"	13.10	6"	4"	222.80	213.12	203.42
26881	.5312	17/32"	13.49	6-1/8"	4-1/8"	226.43	216.58	206.74
26886	.5315		13.50	156	105	229.93	219.94	209.93
26891	.5469	35/64"	13.89	6-1/8"	4-1/8"	242.53	231.98	221.44
26896	.5512		14.00	156	105	246.08	235.38	224.68
26901	.5625	9/16"	14.29	6-1/4"	4-3/8"	266.73	255.13	243.54
26906	.5709		14.50	159	109	268.83	257.14	245.45
26911	.5781	37/64"	14.68	6-1/4"	4-3/8"	269.55	257.83	246.11
26916	.5906		15.00	162	112	273.06	261.19	249.32
26921	.5938	19/32"	15.08	6-3/8"	4-3/8"	280.16	267.98	255.79
26926	.6094	39/64"	15.48	6-7/16"	4-7/16"	315.28	301.57	287.86
26931	.6102		15.50	164	113	316.15	302.40	288.66
26936	.6250	5/8"	15.87	6-9/16"	4-9/16"	324.90	310.77	296.64
26941	.6299		16.00	167	117	329.16	314.85	300.54



1510 - 2 Flute

Technical information: page 204-207



.0625" - .1575"
(1.59mm - 4.00mm)

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

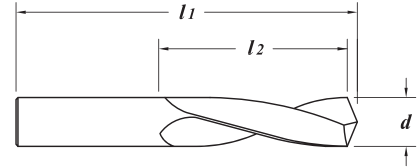
Heavy web for extra rigidity and added strength

Thinned point

Recommended to run in titanium, inconel, hastalloy, waspalloy, and stainless steel

Live tooling recommended on lathe processes

Shank tolerance: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d †		l ₁	l ₂	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric						
19070	.0625	1/16"	1.59	1-5/8"	5/8"	6.22	5.95	5.68
19075	.0635	#52	1.61	1-11/16"	11/16"	6.31	6.04	5.76
19080	.0670	#51	1.70	1-11/16"	11/16"	6.41	6.13	5.84
19085	.0700	#50	1.78	1-11/16"	11/16"	6.56	6.28	5.99
19090	.0730	#49	1.85	1-11/16"	11/16"	6.72	6.43	6.14
19095	.0760	#48	1.93	1-11/16"	11/16"	6.95	6.65	6.34
19100	.0781	5/64"	1.98	1-11/16"	11/16"	7.21	6.90	6.58
19105	.0785	#47	1.99	1-3/4"	3/4"	7.45	7.12	6.80
19115	.0787		2.00	45	19	7.57	7.24	6.92
19120	.0810	#46	2.06	1-3/4"	3/4"	7.69	7.35	7.02
19125	.0820	#45	2.08	1-3/4"	3/4"	7.91	7.57	7.23
19130	.0860	#44	2.18	1-3/4"	3/4"	8.18	7.83	7.48
19135	.0890	#43	2.26	1-3/4"	3/4"	8.42	8.06	7.70
19140	.0935	#42	2.37	1-3/4"	3/4"	8.53	8.15	7.79
19145	.0938	3/32"	2.38	1-3/4"	3/4"	8.74	8.35	7.98
19150	.0960	#41	2.44	1-13/16"	13/16"	8.80	8.41	8.03
19155	.0980	#40	2.49	1-13/16"	13/16"	8.92	8.54	8.14
19160	.0984		2.50	46	21	8.99	8.59	8.21
19165	.0995	#39	2.53	1-13/16"	13/16"	9.02	8.62	8.24
19170	.1015	#38	2.58	1-13/16"	13/16"	9.10	8.70	8.31
19175	.1040	#37	2.64	1-13/16"	13/16"	9.17	8.78	8.37
19180	.1065	#36	2.71	1-13/16"	13/16"	9.25	8.84	8.44
19185	.1094	7/64"	2.78	1-13/16"	13/16"	9.30	8.89	8.49
19190	.1100	#35	2.79	1-7/8"	7/8"	9.35	8.94	8.54
19195	.1110	#34	2.82	1-7/8"	7/8"	9.46	9.05	8.64
19200	.1130	#33	2.87	1-7/8"	7/8"	9.54	9.12	8.70
19205	.1160	#32	2.95	1-7/8"	7/8"	9.60	9.18	8.77
19210	.1181		3.00	48	22	9.70	9.28	8.86
19215	.1200	#31	3.05	1-7/8"	7/8"	9.79	9.36	8.93
19220	.1250	1/8"	3.17	1-7/8"	7/8"	9.89	9.46	9.03
19225	.1285	#30	3.26	1-15/16"	15/16"	10.15	9.71	9.27
19230	.1360	#29	3.45	1-15/16"	15/16"	10.42	9.96	9.52
19235	.1378		3.50	49	24	10.75	10.29	9.82
19240	.1405	#28	3.57	1-15/16"	15/16"	10.90	10.42	9.95
19245	.1406	9/64"	3.57	1-15/16"	15/16"	11.00	10.52	10.05
19250	.1440	#27	3.66	2-1/16"	1"	11.98	11.46	10.94
19255	.1470	#26	3.73	2-1/16"	1"	12.11	11.58	11.06
19260	.1495	#25	3.80	2-1/16"	1"	12.26	11.73	11.19
19265	.1520	#24	3.86	2-1/16"	1"	12.28	11.75	11.21
19270	.1540	#23	3.91	2-1/16"	1"	12.37	11.82	11.29
19275	.1562	5/32"	3.97	2-1/16"	1"	12.44	11.90	11.36
19280	.1570	#22	3.99	2-1/8"	1-1/16"	13.22	12.65	12.06
19285	.1575		4.00	54	27	13.38	12.80	12.22
								11.64

1510 - 2 Flute

.1590" - .3346"
(4.04mm - 8.50mm)

EDP#	$d^{\dagger}$		Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Diameter							
19290	.1590	#21	4.04	2-1/8"	1-1/16"	13.55	12.96	12.38	11.78
19295	.1610	#20	4.09	2-1/8"	1-1/16"	13.66	13.06	12.47	11.88
19300	.1660	#19	4.22	2-1/8"	1-1/16"	14.21	13.59	12.97	12.36
19305	.1695	#18	4.30	2-1/8"	1-1/16"	14.37	13.75	13.12	12.50
19310	.1719	11/64"	4.37	2-1/8"	1-1/16"	14.66	14.03	13.38	12.75
19315	.1730	#17	4.39	2-3/16"	1-1/8"	14.88	14.24	13.59	12.94
19320	.1770	#16	4.49	2-3/16"	1-1/8"	15.05	14.39	13.74	13.08
19325	.1772		4.50	56	29	15.12	14.47	13.81	13.15
19330	.1800	#15	4.57	2-3/16"	1-1/8"	15.19	14.53	13.87	13.21
19335	.1820	#14	4.62	2-3/16"	1-1/8"	15.53	14.85	14.18	13.50
19340	.1850	#13	4.70	2-3/16"	1-1/8"	15.65	14.98	14.29	13.61
19345	.1875	3/16"	4.76	2-3/16"	1-1/8"	15.70	15.02	14.34	13.66
19350	.1890	#12	4.80	2-1/4"	1-3/16"	16.23	15.53	14.82	14.11
19355	.1910	#11	4.85	2-1/4"	1-3/16"	16.42	15.70	15.00	14.28
19360	.1935	#10	4.91	2-1/4"	1-3/16"	17.17	16.42	15.67	14.93
19365	.1960	#9	4.98	2-1/4"	1-3/16"	17.62	16.85	16.09	15.32
19370	.1969		5.00	57	30	17.71	16.94	16.17	15.40
19375	.1990	#8	5.05	2-1/4"	1-3/16"	17.85	17.07	16.30	15.52
19380	.2010	#7	5.10	2-1/4"	1-3/16"	18.37	17.57	16.76	15.97
19385	.2031	13/64"	5.16	2-1/4"	1-3/16"	18.50	17.70	16.89	16.09
19390	.2040	#6	5.18	2-3/8"	1-1/4"	18.89	18.06	17.24	16.42
19395	.2055	#5	5.22	2-3/8"	1-1/4"	19.27	18.43	17.60	16.75
19400	.2090	#4	5.31	2-3/8"	1-1/4"	19.61	18.76	17.91	17.06
19405	.2130	#3	5.41	2-3/8"	1-1/4"	19.96	19.09	18.22	17.36
19410	.2165		5.50	60	32	20.10	19.23	18.36	17.48
19415	.2188	7/32"	5.56	2-3/8"	1-1/4"	20.26	19.38	18.50	17.62
19420	.2210	#2	5.61	2-7/16"	1-5/16"	20.74	19.83	18.94	18.03
19425	.2280	#1	5.79	2-7/16"	1-5/16"	20.88	19.98	19.06	18.16
19430	.2340	A	5.94	2-7/16"	1-5/16"	20.91	20.01	19.09	18.19
19435	.2344	15/64"	5.95	2-7/16"	1-5/16"	20.97	20.05	19.15	18.23
19440	.2362		6.00	64	35	21.03	20.11	19.20	18.28
19445	.2380	B	6.04	2-1/2"	1-3/8"	21.11	20.20	19.27	18.36
19450	.2420	C	6.15	2-1/2"	1-3/8"	21.27	20.34	19.42	18.49
19455	.2460	D	6.25	2-1/2"	1-3/8"	21.43	20.50	19.57	18.64
19460	.2500	1/4" / E	6.35	2-1/2"	1-3/8"	21.56	20.62	19.69	18.75
19465	.2559		6.50	67	37	22.09	21.13	20.17	19.21
19470	.2570	F	6.53	2-5/8"	1-7/16"	22.56	21.58	20.59	19.61
19475	.2610	G	6.63	2-5/8"	1-7/16"	23.02	22.02	21.02	20.01
19480	.2656	17/64"	6.75	2-5/8"	1-7/16"	23.47	22.45	21.43	20.42
19485	.2660	H	6.76	2-11/16"	1-1/2"	24.15	23.10	22.05	21.00
19490	.2720	I	6.91	2-11/16"	1-1/2"	24.42	23.36	22.30	21.24
19495	.2756		7.00	68	38	24.64	23.57	22.50	21.42
19500	.2770	J	7.03	2-11/16"	1-1/2"	24.86	23.77	22.69	21.61
19505	.2810	K	7.14	2-11/16"	1-1/2"	25.06	23.97	22.88	21.80
19510	.2812	9/32"	7.14	2-11/16"	1-1/2"	25.20	24.11	23.00	21.91
19515	.2900	L	7.37	2-3/4"	1-9/16"	26.14	25.00	23.86	22.72
19520	.2950	M	7.49	2-3/4"	1-9/16"	27.97	26.75	25.53	24.32
19525	.2953		7.50	70	40	27.97	26.75	25.53	24.32
19530	.2969	19/64"	7.54	2-3/4"	1-9/16"	28.12	26.89	25.68	24.45
19535	.3020	N	7.67	2-13/16"	1-5/8"	29.63	28.34	27.05	25.76
19540	.3125	5/16"	7.94	2-13/16"	1-5/8"	29.73	28.44	27.14	25.85
19545	.3150		8.00	75	43	31.90	30.51	29.12	27.74
19550	.3160	O	8.03	2-15/16"	1-11/16"	31.90	30.51	29.12	27.74
19555	.3230	P	8.20	2-15/16"	1-11/16"	32.18	30.77	29.38	27.98
19560	.3281	21/64"	8.33	2-15/16"	1-11/16"	32.38	30.97	29.56	28.15
19565	.3320	Q	8.43	3"	1-11/16"	33.11	31.68	30.23	28.80
19570	.3346		8.50	76	43	33.44	31.98	30.52	29.08

continued →

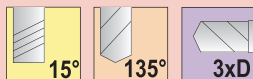
1510 - 2 Flute (continued)

.3390" - .6299"
(8.61mm - 16.00mm)

DRILLS

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric							
19575	.3390	R	8.61	3"	1-11/16"	34.48	32.98	31.48	29.98
19580	.3438	11/32"	8.73	3"	1-11/16"	35.88	34.32	32.76	31.20
19585	.3480	S	8.84	3-1/16"	1-3/4"	36.37	34.79	33.21	31.63
19590	.3543		9.00	78	44	36.60	35.01	33.42	31.82
19595	.3580	T	9.09	3-1/16"	1-3/4"	36.73	35.13	33.54	31.94
19600	.3594	23/64"	9.13	3-1/16"	1-3/4"	36.98	35.37	33.77	32.16
19605	.3680	U	9.35	3-1/8"	1-13/16"	40.51	38.75	36.98	35.22
19610	.3740		9.50	79	46	40.89	39.11	37.34	35.56
19615	.3750	3/8"	9.52	3-1/8"	1-13/16"	41.20	39.42	37.62	35.83
19620	.3770	V	9.57	3-1/4"	1-7/8"	42.01	40.18	38.36	36.52
19625	.3860	W	9.80	3-1/4"	1-7/8"	42.89	41.03	39.16	37.29
19630	.3906	25/64"	9.92	3-1/4"	1-7/8"	43.52	41.63	39.74	37.85
19635	.3937		10.00	84	49	45.09	43.13	41.17	39.21
19640	.3970	X	10.08	3-5/16"	1-15/16"	46.40	44.39	42.37	40.35
19645	.4040	Y	10.26	3-5/16"	1-15/16"	46.78	44.74	42.71	40.67
19650	.4062	13/32"	10.32	3-5/16"	1-15/16"	48.47	46.36	44.26	42.15
19655	.4130	Z	10.49	3-3/8"	2"	48.98	46.85	44.72	42.60
19660	.4134		10.50	86	51	48.98	46.85	44.72	42.60
19665	.4219	27/64"	10.72	3-3/8"	2"	49.52	47.37	45.22	43.07
19670	.4331		11.00	87	52	53.80	51.46	49.12	46.78
19675	.4375	7/16"	11.11	3-7/16"	2-1/16"	53.80	51.46	49.12	46.78
19680	.4528		11.50	91	54	58.34	55.81	53.27	50.73
19685	.4531	29/64"	11.51	3-9/16"	2-1/8"	58.34	55.81	53.27	50.73
19690	.4688	15/32"	11.91	3-5/8"	2-1/8"	61.71	59.03	56.35	53.66
19695	.4724		12.00	94	56	61.93	59.24	56.54	53.85
19700	.4844	31/64"	12.30	3-11/16"	2-3/16"	62.42	59.71	56.99	54.28
19705	.4921		12.50	95	56	63.12	60.37	57.63	54.88
19710	.5000	1/2"	12.70	3-3/4"	2-1/4"	63.56	60.80	58.04	55.28
19715	.5118		13.00	107	60	83.21	79.59	75.97	72.35
19720	.5156	33/64"	13.10	4-1/4"	2-3/8"	85.43	81.71	78.00	74.29
19725	.5312	17/32"	13.49	4-1/4"	2-3/8"	87.65	83.84	80.03	76.22
19730	.5315		13.50	107	60	89.89	85.98	82.07	78.17
19735	.5469	35/64"	13.89	4-1/4"	2-3/8"	92.11	88.11	84.10	80.10
19740	.5512		14.00	107	60	94.37	90.26	86.16	82.06
19745	.5625	9/16"	14.29	4-1/2"	2-1/2"	102.91	98.44	93.96	89.48
19750	.5709		14.50	115	65	105.04	100.47	95.91	91.34
19755	.5781	37/64"	14.68	4-1/2"	2-1/2"	107.19	102.53	97.87	93.22
19760	.5906		15.00	115	65	109.38	104.62	99.86	95.11
19765	.5938	19/32"	15.08	4-1/2"	2-1/2"	110.01	105.23	100.44	95.66
19770	.6094	39/64"	15.48	4-1/2"	2-1/2"	110.61	105.81	100.99	96.19
19775	.6102		15.50	115	65	111.25	106.41	101.58	96.74
19780	.6250	5/8"	15.87	4-1/2"	2-1/2"	111.87	107.01	102.15	97.28
19785	.6299		16.00	115	65	114.85	109.86	104.86	99.87

.0625" - .1575"
(1.59mm - 4.00mm)



TOLERANCES

d	+0.000" -0.0005" (+0.000 -0.127mm)
h	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)

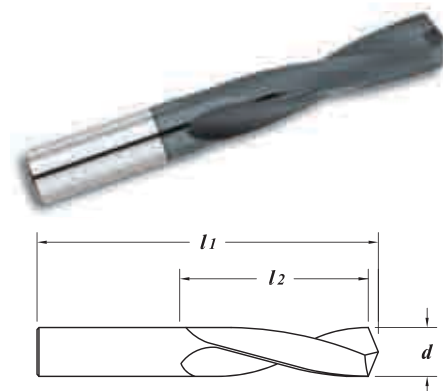
Balinit® HARDLUBE Coated

Solid submicron grain carbide drill
Excellent heat resistance and lubricity
Up to 40% faster than uncoated
Heavy web for extra rigidity and added strength
Thinned point

Recommended to run in titanium, inconel, hastalloy, waspalloy, and stainless steel

Live tooling recommended on lathe processes

Shank tolerance: -.0001" - .0004" (-.0025 / -.0100mm)



EDP#	d †		L ₁ Overall Length	L ₂ Flute Length	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric						
19071	.0625	1/16"	1.59	1-5/8"	5/8"	7.88	7.54	7.20
19076	.0635	#52	1.61	1-11/16"	11/16"	7.98	7.63	7.28
19081	.0670	#51	1.70	1-11/16"	11/16"	8.07	7.72	7.37
19086	.0700	#50	1.78	1-11/16"	11/16"	8.23	7.87	7.51
19091	.0730	#49	1.85	1-11/16"	11/16"	8.39	8.03	7.66
19096	.0760	#48	1.93	1-11/16"	11/16"	8.61	8.24	7.86
19101	.0781	5/64"	1.98	1-11/16"	11/16"	8.87	8.49	8.10
19106	.0785	#47	1.99	1-3/4"	3/4"	9.11	8.72	8.32
19116	.0787		2.00	45	19	9.24	8.83	8.43
19121	.0810	#46	2.06	1-3/4"	3/4"	9.35	8.94	8.54
19126	.0820	#45	2.08	1-3/4"	3/4"	9.59	9.17	8.76
19131	.0860	#44	2.18	1-3/4"	3/4"	9.84	9.41	8.99
19136	.0890	#43	2.26	1-3/4"	3/4"	10.08	9.64	9.20
19141	.0935	#42	2.37	1-3/4"	3/4"	10.19	9.74	9.31
19146	.0938	3/32"	2.38	1-3/4"	3/4"	10.39	9.94	9.48
19151	.0960	#41	2.44	1-13/16"	13/16"	10.46	10.00	9.56
19156	.0980	#40	2.49	1-13/16"	13/16"	10.60	10.14	9.67
19161	.0984		2.50	46	21	10.65	10.18	9.72
19166	.0995	#39	2.53	1-13/16"	13/16"	10.69	10.22	9.77
19171	.1015	#38	2.58	1-13/16"	13/16"	10.76	10.30	9.83
19176	.1040	#37	2.64	1-13/16"	13/16"	10.84	10.37	9.89
19181	.1065	#36	2.71	1-13/16"	13/16"	10.91	10.43	9.96
19186	.1094	7/64"	2.78	1-13/16"	13/16"	10.97	10.49	10.02
19191	.1100	#35	2.79	1-7/8"	7/8"	11.01	10.54	10.06
19196	.1110	#34	2.82	1-7/8"	7/8"	11.13	10.64	10.16
19201	.1130	#33	2.87	1-7/8"	7/8"	11.19	10.70	10.21
19206	.1160	#32	2.95	1-7/8"	7/8"	11.26	10.77	10.29
19211	.1181		3.00	48	22	11.37	10.87	10.38
19216	.1200	#31	3.05	1-7/8"	7/8"	11.45	10.95	10.45
19221	.1250	1/8"	3.17	1-7/8"	7/8"	11.55	11.06	10.55
19226	.1285	#30	3.26	1-15/16"	15/16"	11.81	11.30	10.78
19231	.1360	#29	3.45	1-15/16"	15/16"	12.08	11.55	11.03
19236	.1378		3.50	49	24	12.42	11.88	11.34
19241	.1405	#28	3.57	1-15/16"	15/16"	12.56	12.01	11.47
19246	.1406	9/64"	3.57	1-15/16"	15/16"	12.67	12.12	11.56
19251	.1440	#27	3.66	2-1/16"	1"	13.64	13.05	12.46
19256	.1470	#26	3.73	2-1/16"	1"	13.77	13.17	12.57
19261	.1495	#25	3.80	2-1/16"	1"	13.93	13.32	12.72
19266	.1520	#24	3.86	2-1/16"	1"	13.95	13.34	12.73
19271	.1540	#23	3.91	2-1/16"	1"	14.03	13.42	12.81
19276	.1562	5/32"	3.97	2-1/16"	1"	14.10	13.49	12.88
19281	.1570	#22	3.99	2-1/8"	1-1/16"	14.88	14.24	13.59
19286	.1575		4.00	54	27	15.05	14.39	13.74

continued →

1510H - 2 Flute (continued)

.1590" - .3346"
(4.04mm - 8.50mm)

DRILLS

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
19291	.1590	#21	4.04	2-1/8"	1-1/16"	15.22	14.55	13.89
19296	.1610	#20	4.09	2-1/8"	1-1/16"	15.32	14.65	13.99
19301	.1660	#19	4.22	2-1/8"	1-1/16"	15.87	15.18	14.49
19306	.1695	#18	4.30	2-1/8"	1-1/16"	16.04	15.34	14.64
19311	.1719	11/64"	4.37	2-1/8"	1-1/16"	16.33	15.62	14.90
19316	.1730	#17	4.39	2-3/16"	1-1/8"	16.54	15.82	15.10
19321	.1770	#16	4.49	2-3/16"	1-1/8"	16.71	15.98	15.26
19326	.1772		4.50	56	29	16.78	16.05	15.32
19331	.1800	#15	4.57	2-3/16"	1-1/8"	16.85	16.12	15.38
19336	.1820	#14	4.62	2-3/16"	1-1/8"	17.20	16.45	15.70
19341	.1850	#13	4.70	2-3/16"	1-1/8"	17.32	16.57	15.81
19346	.1875	3/16"	4.76	2-3/16"	1-1/8"	17.37	16.61	15.86
19351	.1890	#12	4.80	2-1/4"	1-3/16"	19.10	18.27	17.44
19356	.1910	#11	4.85	2-1/4"	1-3/16"	19.29	18.45	17.62
19361	.1935	#10	4.91	2-1/4"	1-3/16"	20.06	19.19	18.31
19366	.1960	#9	4.98	2-1/4"	1-3/16"	20.50	19.60	18.72
19371	.1969		5.00	57	30	20.59	19.70	18.80
19376	.1990	#8	5.05	2-1/4"	1-3/16"	20.72	19.81	18.92
19381	.2010	#7	5.10	2-1/4"	1-3/16"	21.26	20.33	19.41
19386	.2031	13/64"	5.16	2-1/4"	1-3/16"	21.37	20.45	19.51
19391	.2040	#6	5.18	2-3/8"	1-1/4"	21.76	20.81	19.86
19396	.2055	#5	5.22	2-3/8"	1-1/4"	22.15	21.18	20.23
19401	.2090	#4	5.31	2-3/8"	1-1/4"	22.48	21.51	20.53
19406	.2130	#3	5.41	2-3/8"	1-1/4"	22.83	21.84	20.84
19411	.2165		5.50	60	32	22.98	21.99	20.99
19416	.2188	7/32"	5.56	2-3/8"	1-1/4"	23.13	22.12	21.12
19421	.2210	#2	5.61	2-7/16"	1-5/16"	23.62	22.59	21.57
19426	.2280	#1	5.79	2-7/16"	1-5/16"	23.75	22.72	21.68
19431	.2340	A	5.94	2-7/16"	1-5/16"	23.81	22.77	21.74
19436	.2344	15/64"	5.95	2-7/16"	1-5/16"	23.84	22.80	21.77
19441	.2362		6.00	64	35	23.91	22.87	21.83
19446	.2380	B	6.04	2-1/2"	1-3/8"	23.99	22.95	21.90
19451	.2420	C	6.15	2-1/2"	1-3/8"	24.14	23.09	22.04
19456	.2460	D	6.25	2-1/2"	1-3/8"	24.30	23.24	22.19
19461	.2500	1/4" / E	6.35	2-1/2"	1-3/8"	24.45	23.39	22.33
19466	.2559		6.50	67	37	27.20	26.01	24.84
19471	.2570	F	6.53	2-5/8"	1-7/16"	27.66	26.46	25.26
19476	.2610	G	6.63	2-5/8"	1-7/16"	28.12	26.89	25.68
19481	.2656	17/64"	6.75	2-5/8"	1-7/16"	28.59	27.34	26.10
19486	.2660	H	6.76	2-11/16"	1-1/2"	29.26	27.99	26.71
19491	.2720	I	6.91	2-11/16"	1-1/2"	29.53	28.25	26.96
19496	.2756		7.00	68	38	29.73	28.44	27.14
19501	.2770	J	7.03	2-11/16"	1-1/2"	29.96	28.66	27.35
19506	.2810	K	7.14	2-11/16"	1-1/2"	30.17	28.86	27.55
19511	.2812	9/32"	7.14	2-11/16"	1-1/2"	30.30	28.97	27.66
19516	.2900	L	7.37	2-3/4"	1-9/16"	31.24	29.88	28.53
19521	.2950	M	7.49	2-3/4"	1-9/16"	33.07	31.64	30.19
19526	.2953		7.50	70	40	33.07	31.64	30.19
19531	.2969	19/64"	7.54	2-3/4"	1-9/16"	33.22	31.77	30.33
19536	.3020	N	7.67	2-13/16"	1-5/8"	34.74	33.23	31.72
19541	.3125	5/16"	7.94	2-13/16"	1-5/8"	34.84	33.32	31.81
19546	.3150		8.00	75	43	37.00	35.39	33.79
19551	.3160	O	8.03	2-15/16"	1-11/16"	37.00	35.39	33.79
19556	.3230	P	8.20	2-15/16"	1-11/16"	37.28	35.66	34.04
19561	.3281	21/64"	8.33	2-15/16"	1-11/16"	37.48	35.85	34.23
19566	.3320	Q	8.43	3"	1-11/16"	38.22	36.56	34.89
19571	.3346		8.50	76	43	38.53	36.86	35.18

1510H - 2 Flute (continued)

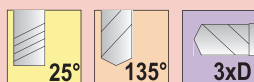
.3390" - .6299"
(8.61mm - 16.00mm)

EDP#	d^+ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
19576	.3390	R	8.61	3"	1-11/16"	39.59	37.87	36.15
19581	.3438	11/32"	8.73	3"	1-11/16"	40.99	39.21	37.42
19586	.3480	S	8.84	3-1/16"	1-3/4"	43.28	41.40	39.52
19591	.3543		9.00	78	44	43.52	41.63	39.74
19596	.3580	T	9.09	3-1/16"	1-3/4"	43.64	41.75	39.84
19601	.3594	23/64"	9.13	3-1/16"	1-3/4"	43.91	42.00	40.09
19606	.3680	U	9.35	3-1/8"	1-13/16"	47.42	45.36	43.30
19611	.3740		9.50	79	46	47.81	45.73	43.65
19616	.3750	3/8"	9.52	3-1/8"	1-13/16"	48.13	46.04	43.95
19621	.3770	V	9.57	3-1/4"	1-7/8"	49.93	47.76	45.59
19626	.3860	W	9.80	3-1/4"	1-7/8"	50.80	48.60	46.38
19631	.3906	25/64"	9.92	3-1/4"	1-7/8"	51.44	49.20	46.97
19636	.3937		10.00	84	49	53.01	50.70	48.40
19641	.3970	X	10.08	3-5/16"	1-15/16"	54.33	51.97	49.61
19646	.4040	Y	10.26	3-5/16"	1-15/16"	54.70	52.32	49.95
19651	.4062	13/32"	10.32	3-5/16"	1-15/16"	56.38	53.92	51.48
19656	.4130	Z	10.49	3-3/8"	2"	56.92	54.44	51.97
19661	.4134		10.50	86	51	56.92	54.44	51.97
19666	.4219	27/64"	10.72	3-3/8"	2"	57.46	54.96	52.47
19671	.4331		11.00	87	52	61.71	59.03	56.35
19676	.4375	7/16"	11.11	3-7/16"	2-1/16"	61.71	59.03	56.35
19681	.4528		11.50	91	54	66.27	63.39	60.51
19686	.4531	29/64"	11.51	3-9/16"	2-1/8"	66.27	63.39	60.51
19691	.4688	15/32"	11.91	3-5/8"	2-1/8"	69.63	66.60	63.58
19696	.4724		12.00	94	56	69.86	66.82	63.78
19701	.4844	31/64"	12.30	3-11/16"	2-3/16"	70.34	67.28	64.22
19706	.4921		12.50	95	56	71.04	67.95	64.86
19711	.5000	1/2"	12.70	3-3/4"	2-1/4"	71.50	68.39	65.28
19716	.5118		13.00	107	60	94.69	90.57	86.46
19721	.5156	33/64"	13.10	4-1/4"	2-3/8"	96.91	92.70	88.48
19726	.5312	17/32"	13.49	4-1/4"	2-3/8"	99.13	94.83	90.51
19731	.5315		13.50	107	60	101.37	96.96	92.55
19736	.5469	35/64"	13.89	4-1/4"	2-3/8"	103.59	99.09	94.59
19741	.5512		14.00	107	60	105.85	101.24	96.65
19746	.5625	9/16"	14.29	4-1/2"	2-1/2"	114.39	109.42	104.45
19751	.5709		14.50	115	65	116.52	111.46	106.39
19756	.5781	37/64"	14.68	4-1/2"	2-1/2"	118.67	113.52	108.36
19761	.5906		15.00	115	65	120.86	115.61	110.34
19766	.5938	19/32"	15.08	4-1/2"	2-1/2"	121.49	116.21	110.93
19771	.6094	39/64"	15.48	4-1/2"	2-1/2"	122.10	116.79	111.48
19776	.6102		15.50	115	65	122.73	117.40	112.06
19781	.6250	5/8"	15.87	4-1/2"	2-1/2"	123.35	117.99	112.63
19786	.6299		16.00	115	65	126.33	120.84	115.35

1520 - 2 Flute

Technical information: page 204-207

.0625" - .1575"
(1.59mm - 4.00mm)



TOLERANCES

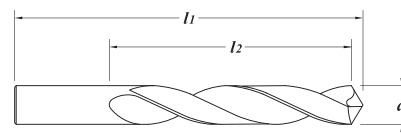
d	+.0000" - .0005" (+.0000 - .0127mm)	
l ₁	≤ 1/8"	+.125" - .062" (+3.175 - 1.588mm)
	> 1/8"	+.125" - .125" (+3.175 - 3.175mm)
l ₂	≤ 1/8"	+.125" - .062" (+3.175 - 1.588mm)
	> 1/8"	+.125" - .125" (+3.175 - 3.175mm)

Solid submicron grain carbide drill
No spotting required in most applications
4-facet self-centering point

Recommended to run in stainless steel alloys, mild steels and titanium alloys

Live tooling recommended on lathe processes

Shank tolerance: -.0001" - .0004" (-.0025 / -.0100mm)



EDP#	d †		l ₁ Overall Length	l ₂ Flute Length	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric						
77165	.0625	1/16"	1.59	1-5/8"	5/8"	5.90	5.64	5.39
77170	.0635	#52	1.61	1-11/16"	11/16"	5.99	5.73	5.47
77175	.0670	#51	1.70	1-11/16"	11/16"	6.08	5.82	5.55
77180	.0700	#50	1.78	1-11/16"	11/16"	6.23	5.96	5.69
77185	.0730	#49	1.85	1-11/16"	11/16"	6.40	6.12	5.84
77190	.0760	#48	1.93	1-11/16"	11/16"	6.60	6.31	6.03
77195	.0781	5/64"	1.98	1-11/16"	11/16"	6.85	6.55	6.26
77200	.0785	#47	1.99	1-3/4"	3/4"	7.08	6.77	6.47
77205	.0787		2.00	45	19	7.19	6.87	6.56
77210	.0810	#46	2.06	1-3/4"	3/4"	7.31	6.99	6.68
77215	.0820	#45	2.08	1-3/4"	3/4"	7.52	7.20	6.86
77220	.0860	#44	2.18	1-3/4"	3/4"	7.78	7.44	7.10
77225	.0890	#43	2.26	1-3/4"	3/4"	7.99	7.64	7.29
77230	.0935	#42	2.37	1-3/4"	3/4"	8.10	7.75	7.39
77235	.0938	3/32"	2.38	1-3/4"	3/4"	8.29	7.92	7.57
77240	.0960	#41	2.44	1-13/16"	13/16"	8.36	8.00	7.63
77245	.0980	#40	2.49	1-13/16"	13/16"	8.50	8.12	7.76
77250	.0984		2.50	46	21	8.53	8.15	7.79
77255	.0995	#39	2.53	1-13/16"	13/16"	8.56	8.18	7.81
77260	.1015	#38	2.58	1-13/16"	13/16"	8.64	8.27	7.89
77265	.1040	#37	2.64	1-13/16"	13/16"	8.70	8.33	7.95
77270	.1065	#36	2.71	1-13/16"	13/16"	8.78	8.39	8.02
77275	.1094	7/64"	2.78	1-13/16"	13/16"	8.83	8.44	8.06
77280	.1100	#35	2.79	1-7/8"	7/8"	8.88	8.50	8.11
77285	.1110	#34	2.82	1-7/8"	7/8"	9.00	8.60	8.22
77290	.1130	#33	2.87	1-7/8"	7/8"	9.06	8.66	8.27
77295	.1160	#32	2.95	1-7/8"	7/8"	9.11	8.72	8.32
77300	.1181		3.00	48	22	9.22	8.82	8.42
77305	.1200	#31	3.05	1-7/8"	7/8"	9.28	8.87	8.47
77310	.1250	1/8"	3.17	1-7/8"	7/8"	9.39	8.99	8.57
77315	.1285	#30	3.26	1-15/16"	15/16"	9.64	9.22	8.80
77320	.1360	#29	3.45	1-15/16"	15/16"	9.89	9.46	9.03
77325	.1378		3.50	49	24	10.21	9.77	9.33
77330	.1405	#28	3.57	1-15/16"	15/16"	10.35	9.90	9.44
77335	.1406	9/64"	3.57	1-15/16"	15/16"	10.45	9.99	9.55
77340	.1440	#27	3.66	2-1/16"	1"	11.38	10.88	10.39
77345	.1470	#26	3.73	2-1/16"	1"	11.49	10.99	10.49
77350	.1495	#25	3.80	2-1/16"	1"	11.64	11.13	10.63
77355	.1520	#24	3.86	2-1/16"	1"	11.66	11.15	10.65
77360	.1540	#23	3.91	2-1/16"	1"	11.74	11.23	10.72
77365	.1562	5/32"	3.97	2-1/16"	1"	11.81	11.30	10.78
77370	.1570	#22	3.99	2-1/8"	1-1/16"	12.56	12.01	11.47
77375	.1575		4.00	54	27	12.71	12.16	11.61

1520 - 2 Flute (continued)

.1590" - .3346"
(4.04mm - 8.50mm)

EDP#	d^+ Diameter		Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal								
77380	.1590	#21	4.04	2-1/8"	1-1/16"	12.86	12.30	11.74	11.19
77385	.1610	#20	4.09	2-1/8"	1-1/16"	12.97	12.41	11.85	11.27
77390	.1660	#19	4.22	2-1/8"	1-1/16"	13.49	12.91	12.31	11.73
77395	.1695	#18	4.30	2-1/8"	1-1/16"	13.66	13.06	12.47	11.88
77400	.1719	11/64"	4.37	2-1/8"	1-1/16"	13.94	13.33	12.72	12.12
77405	.1730	#17	4.39	2-3/16"	1-1/8"	14.13	13.52	12.91	12.29
77410	.1770	#16	4.49	2-3/16"	1-1/8"	14.29	13.67	13.05	12.43
77415	.1772		4.50	56	29	14.36	13.74	13.11	12.49
77420	.1800	#15	4.57	2-3/16"	1-1/8"	14.42	13.80	13.17	12.54
77425	.1820	#14	4.62	2-3/16"	1-1/8"	14.76	14.11	13.48	12.83
77430	.1850	#13	4.70	2-3/16"	1-1/8"	14.86	14.22	13.57	12.93
77435	.1875	3/16"	4.76	2-3/16"	1-1/8"	14.92	14.28	13.62	12.98
77440	.1890	#12	4.80	2-1/4"	1-3/16"	15.41	14.75	14.07	13.41
77445	.1910	#11	4.85	2-1/4"	1-3/16"	15.60	14.92	14.25	13.56
77450	.1935	#10	4.91	2-1/4"	1-3/16"	16.33	15.62	14.90	14.20
77455	.1960	#9	4.98	2-1/4"	1-3/16"	16.74	16.02	15.29	14.56
77460	.1969		5.00	57	30	16.84	16.11	15.37	14.64
77465	.1990	#8	5.05	2-1/4"	1-3/16"	16.95	16.21	15.48	14.74
77470	.2010	#7	5.10	2-1/4"	1-3/16"	17.45	16.69	15.93	15.17
77475	.2031	13/64"	5.16	2-1/4"	1-3/16"	17.59	16.82	16.06	15.29
77480	.2040	#6	5.18	2-3/8"	1-1/4"	17.94	17.16	16.38	15.60
77485	.2055	#5	5.22	2-3/8"	1-1/4"	18.31	17.51	16.72	15.92
77490	.2090	#4	5.31	2-3/8"	1-1/4"	18.64	17.83	17.01	16.20
77495	.2130	#3	5.41	2-3/8"	1-1/4"	18.96	18.14	17.31	16.48
77500	.2165		5.50	60	32	19.10	18.27	17.44	16.61
77505	.2188	7/32"	5.56	2-3/8"	1-1/4"	19.24	18.41	17.57	16.73
77510	.2210	#2	5.61	2-7/16"	1-5/16"	19.71	18.86	17.99	17.14
77515	.2280	#1	5.79	2-7/16"	1-5/16"	19.83	18.97	18.11	17.24
77520	.2340	A	5.94	2-7/16"	1-5/16"	19.87	19.01	18.15	17.28
77525	.2344	15/64"	5.95	2-7/16"	1-5/16"	19.92	19.05	18.18	17.32
77530	.2362		6.00	64	35	19.99	19.12	18.25	17.38
77535	.2380	B	6.04	2-1/2"	1-3/8"	20.06	19.19	18.31	17.44
77540	.2420	C	6.15	2-1/2"	1-3/8"	20.20	19.32	18.44	17.57
77545	.2460	D	6.25	2-1/2"	1-3/8"	20.35	19.47	18.58	17.70
77550	.2500	1/4" / E	6.35	2-1/2"	1-3/8"	20.50	19.60	18.72	17.83
77555	.2559		6.50	67	37	20.99	20.07	19.17	18.25
77560	.2570	F	6.53	2-5/8"	1-7/16"	21.43	20.50	19.57	18.64
77565	.2610	G	6.63	2-5/8"	1-7/16"	21.85	20.90	19.95	19.00
77570	.2656	17/64"	6.75	2-5/8"	1-7/16"	22.31	21.34	20.36	19.40
77575	.2660	H	6.76	2-11/16"	1-1/2"	22.94	21.94	20.95	19.95
77580	.2720	I	6.91	2-11/16"	1-1/2"	23.20	22.19	21.18	20.18
77585	.2756		7.00	68	38	23.39	22.37	21.35	20.34
77590	.2770	J	7.03	2-11/16"	1-1/2"	23.62	22.59	21.57	20.54
77595	.2810	K	7.14	2-11/16"	1-1/2"	23.83	22.79	21.76	20.72
77600	.2812	9/32"	7.14	2-11/16"	1-1/2"	23.94	22.90	21.86	20.82
77605	.2900	L	7.37	2-3/4"	1-9/16"	24.82	23.74	22.66	21.59
77610	.2950	M	7.49	2-3/4"	1-9/16"	26.56	25.41	24.25	23.10
77615	.2953		7.50	70	40	26.56	25.41	24.25	23.10
77620	.2969	19/64"	7.54	2-3/4"	1-9/16"	26.71	25.54	24.39	23.22
77625	.3020	N	7.67	2-13/16"	1-5/8"	28.14	26.92	25.70	24.47
77630	.3125	5/16"	7.94	2-13/16"	1-5/8"	28.25	27.02	25.79	24.56
77635	.3150		8.00	75	43	30.30	28.97	27.66	26.34
77640	.3160	O	8.03	2-15/16"	1-11/16"	30.30	28.97	27.66	26.34
77645	.3230	P	8.20	2-15/16"	1-11/16"	30.56	29.22	27.90	26.57
77650	.3281	21/64"	8.33	2-15/16"	1-11/16"	30.75	29.41	28.08	26.74
77655	.3320	Q	8.43	3"	1-11/16"	31.47	30.10	28.74	27.36
77660	.3346		8.50	76	43	31.75	30.37	29.00	27.61

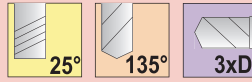
continued →

1520 - 2 Flute (continued)

.3390" - .5000"
(8.61mm - 12.70mm)

EDP#	$d^{\dagger}$			l_1	l_2	1-11	12-24	25-49	50-100
	Decimal	Diameter	Metric						
77665	.3390	R	8.61	3"	1-11/16"	32.76	31.34	29.91	28.49
77670	.3438	11/32"	8.73	3"	1-11/16"	34.10	32.61	31.14	29.65
77675	.3480	S	8.84	3-1/16"	1-3/4"	34.55	33.05	31.54	30.05
77680	.3543		9.00	78	44	34.77	33.26	31.74	30.23
77685	.3580	T	9.09	3-1/16"	1-3/4"	34.90	33.38	31.87	30.35
77690	.3594	23/64"	9.13	3-1/16"	1-3/4"	35.14	33.61	32.08	30.56
77695	.3680	U	9.35	3-1/8"	1-13/16"	38.49	36.82	35.14	33.47
77700	.3740		9.50	79	46	38.84	37.16	35.46	33.78
77705	.3750	3/8"	9.52	3-1/8"	1-13/16"	39.15	37.44	35.74	34.04
77710	.3770	V	9.57	3-1/4"	1-7/8"	39.89	38.16	36.42	34.69
77715	.3860	W	9.80	3-1/4"	1-7/8"	40.74	38.97	37.19	35.42
77720	.3906	25/64"	9.92	3-1/4"	1-7/8"	41.35	39.55	37.75	35.95
77725	.3937		10.00	84	49	42.83	40.97	39.10	37.24
77730	.3970	X	10.08	3-5/16"	1-15/16"	44.09	42.17	40.25	38.33
77735	.4040	Y	10.26	3-5/16"	1-15/16"	44.44	42.50	40.57	38.65
77740	.4062	13/32"	10.32	3-5/16"	1-15/16"	46.05	44.04	42.05	40.04
77745	.4130	Z	10.49	3-3/8"	2"	46.55	44.52	42.50	40.48
77750	.4134		10.50	86	51	46.55	44.52	42.50	40.48
77755	.4219	27/64"	10.72	3-3/8"	2"	47.05	45.00	42.96	40.91
77760	.4331		11.00	87	52	51.10	48.87	46.65	44.43
77765	.4375	7/16"	11.11	3-7/16"	2-1/16"	51.10	48.87	46.65	44.43
77770	.4528		11.50	91	54	55.43	53.02	50.62	48.20
77775	.4531	29/64"	11.51	3-9/16"	2-1/8"	55.43	53.02	50.62	48.20
77780	.4688	15/32"	11.91	3-5/8"	2-1/8"	58.62	56.08	53.53	50.98
77785	.4724		12.00	94	56	58.84	56.28	53.73	51.17
77790	.4844	31/64"	12.30	3-11/16"	2-3/16"	59.30	56.72	54.14	51.56
77795	.4921		12.50	95	56	59.97	57.36	54.76	52.15
77800	.5000	1/2"	12.70	3-3/4"	2-1/4"	60.40	57.77	55.15	52.52

.0625" - .1575"
(1.59mm - 4.00mm)



TOLERANCES

d	+0.000" -0.005" (+0.000 -0.127mm)
h	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)

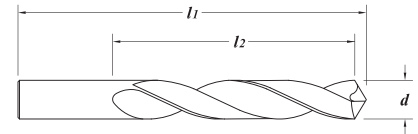
Balinit® HARDLUBE Coated

Solid submicron grain carbide drill
Excellent heat resistance and lubricity
No spotting required in most applications
4-facet self-centering point

Recommended to run in stainless steel alloys, mild steels and titanium alloys

Live tooling recommended on lathe processes

Shank tolerance: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d † Diameter		l ₁ Overall Length	l ₂ Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
77166	.0625	1/16"	1.59	1-5/8"	5/8"	7.57	7.24	6.92
77171	.0635	#52	1.61	1-11/16"	11/16"	7.66	7.33	7.00
77176	.0670	#51	1.70	1-11/16"	11/16"	7.76	7.43	7.08
77181	.0700	#50	1.78	1-11/16"	11/16"	7.89	7.55	7.21
77186	.0730	#49	1.85	1-11/16"	11/16"	8.06	7.71	7.36
77191	.0760	#48	1.93	1-11/16"	11/16"	8.27	7.90	7.55
77196	.0781	5/64"	1.98	1-11/16"	11/16"	8.52	8.14	7.78
77201	.0785	#47	1.99	1-3/4"	3/4"	8.75	8.36	7.99
77206	.0787		2.00	45	19	8.86	8.48	8.09
77211	.0810	#46	2.06	1-3/4"	3/4"	8.98	8.58	8.20
77216	.0820	#45	2.08	1-3/4"	3/4"	9.18	8.79	8.38
77221	.0860	#44	2.18	1-3/4"	3/4"	9.43	9.03	8.61
77226	.0890	#43	2.26	1-3/4"	3/4"	9.65	9.24	8.81
77231	.0935	#42	2.37	1-3/4"	3/4"	9.78	9.35	8.92
77236	.0938	3/32"	2.38	1-3/4"	3/4"	9.96	9.53	9.10
77241	.0960	#41	2.44	1-13/16"	13/16"	10.03	9.59	9.15
77246	.0980	#40	2.49	1-13/16"	13/16"	10.15	9.71	9.27
77251	.0984		2.50	46	21	10.19	9.74	9.31
77256	.0995	#39	2.53	1-13/16"	13/16"	10.23	9.79	9.34
77261	.1015	#38	2.58	1-13/16"	13/16"	10.32	9.87	9.42
77266	.1040	#37	2.64	1-13/16"	13/16"	10.37	9.92	9.46
77271	.1065	#36	2.71	1-13/16"	13/16"	10.44	9.98	9.54
77276	.1094	7/64"	2.78	1-13/16"	13/16"	10.49	10.04	9.58
77281	.1100	#35	2.79	1-7/8"	7/8"	10.55	10.09	9.63
77286	.1110	#34	2.82	1-7/8"	7/8"	10.66	10.19	9.73
77291	.1130	#33	2.87	1-7/8"	7/8"	10.71	10.24	9.78
77296	.1160	#32	2.95	1-7/8"	7/8"	10.78	10.32	9.85
77301	.1181		3.00	48	22	10.89	10.41	9.94
77306	.1200	#31	3.05	1-7/8"	7/8"	10.94	10.46	9.99
77311	.1250	1/8"	3.17	1-7/8"	7/8"	11.07	10.59	10.10
77316	.1285	#30	3.26	1-15/16"	15/16"	11.30	10.82	10.32
77321	.1360	#29	3.45	1-15/16"	15/16"	11.55	11.06	10.55
77326	.1378		3.50	49	24	11.89	11.37	10.86
77331	.1405	#28	3.57	1-15/16"	15/16"	12.01	11.49	10.97
77336	.1406	9/64"	3.57	1-15/16"	15/16"	12.12	11.59	11.07
77341	.1440	#27	3.66	2-1/16"	1"	13.04	12.47	11.91
77346	.1470	#26	3.73	2-1/16"	1"	13.17	12.59	12.02
77351	.1495	#25	3.80	2-1/16"	1"	13.30	12.72	12.15
77356	.1520	#24	3.86	2-1/16"	1"	13.32	12.74	12.17
77361	.1540	#23	3.91	2-1/16"	1"	13.41	12.82	12.24
77366	.1562	5/32"	3.97	2-1/16"	1"	13.48	12.90	12.30
77371	.1570	#22	3.99	2-1/8"	1-1/16"	14.22	13.60	12.98
77376	.1575		4.00	54	27	14.37	13.75	13.12

continued →

1520H - 2 Flute (continued)

.1590" - .3346"
(4.04mm - 8.50mm)

DRILLS

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
77381	.1590	#21	4.04	2-1/8"	1-1/16"	14.54	13.90	13.27
77386	.1610	#20	4.09	2-1/8"	1-1/16"	14.64	14.01	13.37
77391	.1660	#19	4.22	2-1/8"	1-1/16"	15.15	14.50	13.83
77396	.1695	#18	4.30	2-1/8"	1-1/16"	15.32	14.65	13.99
77401	.1719	11/64"	4.37	2-1/8"	1-1/16"	15.60	14.92	14.25
77406	.1730	#17	4.39	2-3/16"	1-1/8"	15.80	15.11	14.42
77411	.1770	#16	4.49	2-3/16"	1-1/8"	15.95	15.26	14.57
77416	.1772		4.50	56	29	16.03	15.33	14.63
77421	.1800	#15	4.57	2-3/16"	1-1/8"	16.10	15.40	14.70
77426	.1820	#14	4.62	2-3/16"	1-1/8"	16.42	15.70	15.00
77431	.1850	#13	4.70	2-3/16"	1-1/8"	16.53	15.81	15.09
77436	.1875	3/16"	4.76	2-3/16"	1-1/8"	16.59	15.87	15.14
77441	.1890	#12	4.80	2-1/4"	1-3/16"	18.30	17.50	16.71
77446	.1910	#11	4.85	2-1/4"	1-3/16"	18.47	17.67	16.87
77451	.1935	#10	4.91	2-1/4"	1-3/16"	19.20	18.37	17.52
77456	.1960	#9	4.98	2-1/4"	1-3/16"	19.61	18.76	17.91
77461	.1969		5.00	57	30	19.71	18.86	17.99
77466	.1990	#8	5.05	2-1/4"	1-3/16"	19.82	18.96	18.10
77471	.2010	#7	5.10	2-1/4"	1-3/16"	20.33	19.45	18.56
77476	.2031	13/64"	5.16	2-1/4"	1-3/16"	20.46	19.56	18.68
77481	.2040	#6	5.18	2-3/8"	1-1/4"	20.81	19.91	19.00
77486	.2055	#5	5.22	2-3/8"	1-1/4"	21.18	20.26	19.34
77491	.2090	#4	5.31	2-3/8"	1-1/4"	21.52	20.58	19.65
77496	.2130	#3	5.41	2-3/8"	1-1/4"	21.83	20.88	19.93
77501	.2165		5.50	60	32	21.99	21.03	20.07
77506	.2188	7/32"	5.56	2-3/8"	1-1/4"	22.11	21.15	20.19
77511	.2210	#2	5.61	2-7/16"	1-5/16"	22.58	21.60	20.61
77516	.2280	#1	5.79	2-7/16"	1-5/16"	22.71	21.73	20.74
77521	.2340	A	5.94	2-7/16"	1-5/16"	22.74	21.76	20.77
77526	.2344	15/64"	5.95	2-7/16"	1-5/16"	22.80	21.81	20.81
77531	.2362		6.00	64	35	22.86	21.86	20.87
77536	.2380	B	6.04	2-1/2"	1-3/8"	22.93	21.93	20.94
77541	.2420	C	6.15	2-1/2"	1-3/8"	23.09	22.08	21.08
77546	.2460	D	6.25	2-1/2"	1-3/8"	23.22	22.21	21.21
77551	.2500	1/4" / E	6.35	2-1/2"	1-3/8"	23.37	22.35	21.34
77556	.2559		6.50	67	37	26.09	24.96	23.83
77561	.2570	F	6.53	2-5/8"	1-7/16"	26.53	25.38	24.22
77566	.2610	G	6.63	2-5/8"	1-7/16"	26.96	25.78	24.62
77571	.2656	17/64"	6.75	2-5/8"	1-7/16"	27.41	26.22	25.03
77576	.2660	H	6.76	2-11/16"	1-1/2"	28.05	26.83	25.60
77581	.2720	I	6.91	2-11/16"	1-1/2"	28.31	27.08	25.84
77586	.2756		7.00	68	38	28.50	27.26	26.02
77591	.2770	J	7.03	2-11/16"	1-1/2"	28.71	27.47	26.22
77596	.2810	K	7.14	2-11/16"	1-1/2"	28.92	27.66	26.41
77601	.2812	9/32"	7.14	2-11/16"	1-1/2"	29.05	27.79	26.52
77606	.2900	L	7.37	2-3/4"	1-9/16"	29.92	28.62	27.32
77611	.2950	M	7.49	2-3/4"	1-9/16"	31.66	30.28	28.90
77616	.2953		7.50	70	40	31.66	30.28	28.90
77621	.2969	19/64"	7.54	2-3/4"	1-9/16"	31.81	30.43	29.05
77626	.3020	N	7.67	2-13/16"	1-5/8"	33.25	31.80	30.36
77631	.3125	5/16"	7.94	2-13/16"	1-5/8"	33.35	31.91	30.45
77636	.3150		8.00	75	43	35.40	33.86	32.32
77641	.3160	O	8.03	2-15/16"	1-11/16"	35.40	33.86	32.32
77646	.3230	P	8.20	2-15/16"	1-11/16"	35.66	34.11	32.56
77651	.3281	21/64"	8.33	2-15/16"	1-11/16"	35.86	34.30	32.74
77656	.3320	Q	8.43	3"	1-11/16"	36.58	34.99	33.39
77661	.3346		8.50	76	43	36.86	35.26	33.65

1520H - 2 Flute (continued)

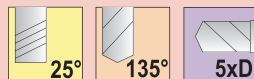
.3390" - .5000"
(8.61mm - 12.70mm)

EDP#	d^+ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
77666	.3390	R	8.61	3"	1-11/16"	37.87	36.22	34.57
77671	.3438	11/32"	8.73	3"	1-11/16"	39.21	37.50	35.80
77676	.3480	S	8.84	3-1/16"	1-3/4"	41.46	39.67	37.86
77681	.3543		9.00	78	44	41.68	39.87	38.05
77686	.3580	T	9.09	3-1/16"	1-3/4"	41.81	39.99	38.17
77691	.3594	23/64"	9.13	3-1/16"	1-3/4"	42.07	40.24	38.41
77696	.3680	U	9.35	3-1/8"	1-13/16"	45.40	43.42	41.44
77701	.3740		9.50	79	46	45.76	43.77	41.78
77706	.3750	3/8"	9.52	3-1/8"	1-13/16"	46.06	44.05	42.06
77711	.3770	V	9.57	3-1/4"	1-7/8"	47.83	45.75	43.67
77716	.3860	W	9.80	3-1/4"	1-7/8"	48.66	46.55	44.43
77721	.3906	25/64"	9.92	3-1/4"	1-7/8"	49.26	47.12	44.98
77726	.3937		10.00	84	49	50.76	48.56	46.35
77731	.3970	X	10.08	3-5/16"	1-15/16"	52.00	49.74	47.48
77736	.4040	Y	10.26	3-5/16"	1-15/16"	52.36	50.09	47.81
77741	.4062	13/32"	10.32	3-5/16"	1-15/16"	53.98	51.63	49.29
77746	.4130	Z	10.49	3-3/8"	2"	54.46	52.09	49.73
77751	.4134		10.50	86	51	54.46	52.09	49.73
77756	.4219	27/64"	10.72	3-3/8"	2"	54.98	52.59	50.20
77761	.4331		11.00	87	52	59.02	56.45	53.89
77766	.4375	7/16"	11.11	3-7/16"	2-1/16"	59.02	56.45	53.89
77771	.4528		11.50	91	54	63.36	60.60	57.84
77776	.4531	29/64"	11.51	3-9/16"	2-1/8"	63.36	60.60	57.84
77781	.4688	15/32"	11.91	3-5/8"	2-1/8"	66.56	63.67	60.77
77786	.4724		12.00	94	56	66.76	63.86	60.95
77791	.4844	31/64"	12.30	3-11/16"	2-3/16"	67.22	64.29	61.37
77796	.4921		12.50	95	56	67.88	64.93	61.97
77801	.5000	1/2"	12.70	3-3/4"	2-1/4"	68.32	65.34	62.38

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)

.0625" - .1575"
(1.59mm - 4.00mm)

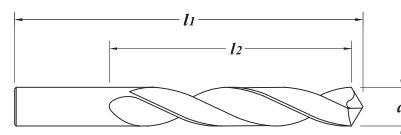


Solid submicron grain carbide drill
No spotting required in most applications
4-facet self-centering point
Adaptability when converting from high-speed steel

Recommended to run in stainless steel alloys, mild steels and titanium alloys

Live tooling recommended on lathe processes

Shank tolerance: -.0001" - .0004" (-.0025 / -.0100mm)



EDP#	d †		l ₁ Overall Length	l ₂ Flute Length	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric						
89165	.0625	1/16"	1.59	1-5/8"	3/4"	5.90	5.64	5.39
89170	.0635	#52	1.61	1-11/16"	3/4"	5.99	5.73	5.47
89175	.0670	#51	1.70	1-11/16"	3/4"	6.08	5.82	5.55
89180	.0700	#50	1.78	1-11/16"	7/8"	6.23	5.96	5.69
89185	.0730	#49	1.85	1-11/16"	7/8"	6.40	6.12	5.84
89190	.0760	#48	1.93	1-11/16"	7/8"	6.60	6.31	6.03
89195	.0781	5/64"	1.98	1-11/16"	7/8"	6.85	6.55	6.26
89200	.0785	#47	1.99	1-3/4"	7/8"	7.08	6.77	6.47
89205	.0787		2.00	44	22	7.19	6.87	6.56
89210	.0810	#46	2.06	1-3/4"	7/8"	7.31	6.99	6.68
89215	.0820	#45	2.08	1-3/4"	7/8"	7.52	7.20	6.86
89220	.0860	#44	2.18	2"	1"	7.78	7.44	7.10
89225	.0890	#43	2.26	2"	1"	7.99	7.64	7.29
89230	.0935	#42	2.37	2"	1"	8.10	7.75	7.39
89235	.0938	3/32"	2.38	2"	1"	8.29	7.92	7.57
89240	.0960	#41	2.44	2"	1"	8.36	8.00	7.63
89245	.0980	#40	2.49	2"	1"	8.50	8.12	7.76
89250	.0984		2.50	57	32	8.53	8.15	7.79
89255	.0995	#39	2.53	2-1/4"	1-1/4"	8.56	8.18	7.81
89260	.1015	#38	2.58	2-1/4"	1-1/4"	8.68	8.31	7.92
89265	.1040	#37	2.64	2-1/4"	1-1/4"	8.79	8.40	8.03
89270	.1065	#36	2.71	2-1/4"	1-1/4"	8.90	8.52	8.13
89275	.1094	7/64"	2.78	2-1/4"	1-1/4"	9.06	8.66	8.27
89280	.1100	#35	2.79	2-1/4"	1-1/4"	9.15	8.76	8.35
89285	.1110	#34	2.82	2-1/4"	1-1/4"	9.26	8.85	8.46
89290	.1130	#33	2.87	2-1/4"	1-1/4"	9.42	9.02	8.60
89295	.1160	#32	2.95	2-1/4"	1-1/4"	9.54	9.12	8.70
89300	.1181		3.00	57	32	9.63	9.21	8.79
89305	.1200	#31	3.05	2-1/4"	1-1/4"	9.70	9.28	8.86
89310	.1250	1/8"	3.17	2-1/4"	1-1/4"	9.81	9.38	8.95
89315	.1285	#30	3.26	2-1/4"	1-1/4"	10.06	9.62	9.18
89320	.1360	#29	3.45	2-1/2"	1-3/8"	10.37	9.92	9.46
89325	.1378		3.50	63	35	10.70	10.23	9.78
89330	.1405	#28	3.57	2-1/2"	1-3/8"	10.83	10.36	9.88
89335	.1406	9/64"	3.57	2-1/2"	1-3/8"	10.93	10.45	9.98
89340	.1440	#27	3.66	2-1/2"	1-3/8"	11.38	10.88	10.39
89345	.1470	#26	3.73	2-1/2"	1-3/8"	11.49	10.99	10.49
89350	.1495	#25	3.80	2-1/2"	1-3/8"	11.64	11.13	10.63
89355	.1520	#24	3.86	2-1/2"	1-3/8"	11.66	11.15	10.65
89360	.1540	#23	3.91	2-1/2"	1-3/8"	11.74	11.23	10.72
89365	.1562	5/32"	3.97	2-1/2"	1-3/8"	11.81	11.30	10.78
89370	.1570	#22	3.99	2-1/2"	1-3/8"	12.56	12.01	11.47
89375	.1575		4.00	63	35	12.71	12.16	11.61

1205 - 2 Flute (continued)

.1590" - .3346"
(4.04mm - 8.50mm)

EDP#	d^+ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
89380	.1590	#21	4.04	2-1/2"	1-3/8"	12.86	12.30	11.74
89385	.1610	#20	4.09	2-1/2"	1-3/8"	12.97	12.41	11.85
89390	.1660	#19	4.22	2-3/4"	1-5/8"	13.49	12.91	12.31
89395	.1695	#18	4.30	2-3/4"	1-5/8"	13.66	13.06	12.47
89400	.1719	11/64"	4.37	2-3/4"	1-5/8"	13.94	13.33	12.72
89405	.1730	#17	4.39	2-3/4"	1-5/8"	14.13	13.52	12.91
89410	.1770	#16	4.49	2-3/4"	1-5/8"	14.29	13.67	13.05
89415	.1772		4.50	70	41	14.36	13.74	13.11
89420	.1800	#15	4.57	2-3/4"	1-5/8"	14.42	13.80	13.17
89425	.1820	#14	4.62	2-3/4"	1-5/8"	14.76	14.11	13.48
89430	.1850	#13	4.70	2-3/4"	1-5/8"	14.86	14.22	13.57
89435	.1875	3/16"	4.76	2-3/4"	1-5/8"	14.92	14.28	13.62
89440	.1890	#12	4.80	2-3/4"	1-5/8"	15.41	14.75	14.07
89445	.1910	#11	4.85	2-3/4"	1-5/8"	15.60	14.92	14.25
89450	.1935	#10	4.91	2-3/4"	1-5/8"	16.33	15.62	14.90
89455	.1960	#9	4.98	3"	1-3/4"	16.74	16.02	15.29
89460	.1969		5.00	76	44	16.84	16.11	15.37
89465	.1990	#8	5.05	3"	1-3/4"	16.95	16.21	15.48
89470	.2010	#7	5.10	3"	1-3/4"	17.45	16.69	15.93
89475	.2031	13/64"	5.16	3"	1-3/4"	17.59	16.82	16.06
89480	.2040	#6	5.18	3"	1-3/4"	17.94	17.16	16.38
89485	.2055	#5	5.22	3"	1-3/4"	18.31	17.51	16.72
89490	.2090	#4	5.31	3"	1-3/4"	18.64	17.83	17.01
89495	.2130	#3	5.41	3"	1-3/4"	18.96	18.14	17.31
89500	.2165		5.50	76	44	19.10	18.27	17.44
89505	.2188	7/32"	5.56	3"	1-3/4"	19.24	18.41	17.57
89510	.2210	#2	5.61	3"	1-3/4"	19.71	18.86	17.99
89515	.2280	#1	5.79	3"	1-3/4"	19.83	18.97	18.11
89520	.2340	A	5.94	3-1/4"	2"	20.06	19.19	18.31
89525	.2344	15/64"	5.95	3-1/4"	2"	20.11	19.24	18.37
89530	.2362		6.00	82	50	20.19	19.31	18.43
89535	.2380	B	6.04	3-1/4"	2"	20.26	19.38	18.50
89540	.2420	C	6.15	3-1/4"	2"	20.42	19.53	18.64
89545	.2460	D	6.25	3-1/4"	2"	20.56	19.67	18.77
89550	.2500	1/4" / E	6.35	3-1/4"	2"	20.71	19.80	18.91
89555	.2559		6.50	82	50	21.21	20.28	19.36
89560	.2570	F	6.53	3-1/4"	2"	21.65	20.71	19.77
89565	.2610	G	6.63	3-1/2"	2-1/8"	22.09	21.13	20.17
89570	.2656	17/64"	6.75	3-1/2"	2-1/8"	22.54	21.56	20.58
89575	.2660	H	6.76	3-1/2"	2-1/8"	23.18	22.17	21.16
89580	.2720	I	6.91	3-1/2"	2-1/8"	23.44	22.42	21.40
89585	.2756		7.00	88	54	23.63	22.60	21.57
89590	.2770	J	7.03	3-1/2"	2-1/8"	23.84	22.80	21.77
89595	.2810	K	7.14	3-1/2"	2-1/8"	24.06	23.00	21.96
89600	.2812	9/32"	7.14	3-1/2"	2-1/8"	24.19	23.14	22.09
89605	.2900	L	7.37	3-1/2"	2-1/8"	25.06	23.97	22.88
89610	.2950	M	7.49	3-3/4"	2-3/8"	26.82	25.66	24.49
89615	.2953		7.50	95	60	26.82	25.66	24.49
89620	.2969	19/64"	7.54	3-3/4"	2-3/8"	26.82	25.66	24.49
89625	.3020	N	7.67	3-3/4"	2-3/8"	28.43	27.20	25.96
89630	.3125	5/16"	7.94	3-3/4"	2-3/8"	28.54	27.30	26.05
89635	.3150		8.00	95	60	30.62	29.29	27.96
89640	.3160	O	8.03	3-3/4"	2-3/8"	30.62	29.29	27.96
89645	.3230	P	8.20	3-3/4"	2-3/8"	30.62	29.29	27.96
89650	.3281	21/64"	8.33	4"	2-1/2"	31.08	29.72	28.37
89655	.3320	Q	8.43	4"	2-1/2"	31.79	30.41	29.03
89660	.3346		8.50	101	63	32.07	30.68	29.29

continued →

1205 - 2 Flute (continued)

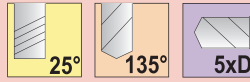
.3390" - .6299"
(8.61mm - 16.00mm)

DRILLS

EDP#	$d^{\dagger}$ Diameter			l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric						
89665	.3390	R	8.61	4"	2-1/2"	33.09	31.66	30.21	28.78
89670	.3438	11/32"	8.73	4"	2-1/2"	34.44	32.95	31.45	29.95
89675	.3480	S	8.84	4"	2-1/2"	34.55	33.05	31.54	30.05
89680	.3543		9.00	101	63	34.77	33.26	31.74	30.23
89685	.3580	T	9.09	4-1/4"	2-3/4"	35.08	33.55	32.03	30.50
89690	.3594	23/64"	9.13	4-1/4"	2-3/4"	35.32	33.78	32.25	30.71
89695	.3680	U	9.35	4-1/4"	2-3/4"	40.09	38.34	36.61	34.86
89700	.3740		9.50	107	70	40.46	38.70	36.94	35.18
89705	.3750	3/8"	9.52	4-1/4"	2-3/4"	40.79	39.01	37.24	35.46
89710	.3770	V	9.57	4-1/4"	2-3/4"	41.55	39.74	37.94	36.13
89715	.3860	W	9.80	4-1/2"	2-7/8"	42.43	40.59	38.74	36.90
89720	.3906	25/64"	9.92	4-1/2"	2-7/8"	43.07	41.19	39.32	37.45
89725	.3937		10.00	114	73	44.63	42.68	40.75	38.80
89730	.3970	X	10.08	4-1/2"	2-7/8"	45.93	43.93	41.93	39.94
89735	.4040	Y	10.26	4-1/2"	2-7/8"	46.30	44.28	42.28	40.26
89740	.4062	13/32"	10.32	4-1/2"	2-7/8"	47.98	45.88	43.80	41.71
89745	.4130	Z	10.49	4-1/2"	2-7/8"	48.48	46.37	44.27	42.16
89750	.4134		10.50	114	73	48.48	46.37	44.27	42.16
89755	.4219	27/64"	10.72	4-1/2"	2-7/8"	49.03	46.89	44.76	42.63
89760	.4331		11.00	114	73	53.24	50.92	48.61	46.29
89765	.4375	7/16"	11.11	4-1/2"	2-7/8"	53.24	50.92	48.61	46.29
89770	.4528		11.50	120	76	57.74	55.23	52.72	50.21
89775	.4531	29/64"	11.51	4-3/4"	3"	57.74	55.23	52.72	50.21
89780	.4688	15/32"	11.91	4-3/4"	3"	61.08	58.43	55.76	53.11
89785	.4724		12.00	120	76	61.29	58.62	55.96	53.29
89790	.4844	31/64"	12.30	4-3/4"	3"	61.29	58.62	55.96	53.29
89795	.4921		12.50	120	76	62.91	60.17	57.44	54.70
89800	.5000	1/2"	12.70	4-3/4"	3"	62.91	60.17	57.44	54.70
89805	.5118		13.00	127	83	79.04	75.61	72.17	68.73
89810	.5156	33/64"	13.10	5"	3-1/4"	81.16	77.64	74.10	70.57
89815	.5312	17/32"	13.49	5"	3-1/4"	83.27	79.65	76.03	72.42
89820	.5315		13.50	127	83	85.39	81.68	77.97	74.26
89825	.5469	35/64"	13.89	5"	3-1/4"	87.52	83.71	79.90	76.10
89830	.5512		14.00	127	83	89.65	85.75	81.85	77.96
89835	.5625	9/16"	14.29	5"	3-1/4"	97.76	93.51	89.26	85.01
89840	.5709		14.50	127	83	99.80	95.46	91.12	86.78
89845	.5781	37/64"	14.68	5-1/4"	3-1/2"	101.84	97.41	92.98	88.56
89850	.5906		15.00	133	89	103.91	99.39	94.87	90.36
89855	.5938	19/32"	15.08	5-1/4"	3-1/2"	104.51	99.96	95.42	90.88
89860	.6094	39/64"	15.48	5-1/4"	3-1/2"	105.09	100.53	95.95	91.38
89865	.6102		15.50	133	89	105.70	101.10	96.50	91.90
89870	.6250	5/8"	15.87	5-1/4"	3-1/2"	106.28	101.66	97.03	92.41
89875	.6299		16.00	133	89	109.11	104.36	99.62	94.88

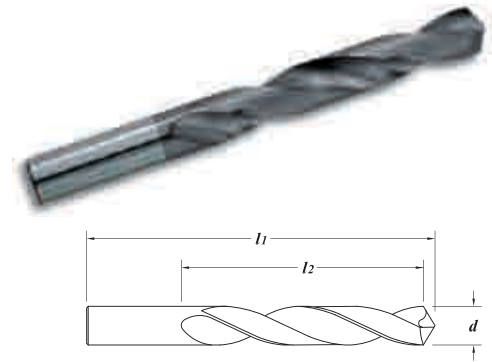
d	+0.000" -0.0005" (+0.000 -0.0127mm)
h	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)

.0625" - .1575"
(1.59mm - 4.00mm)



Balinit® HARDLUBE Coated

Solid submicron grain carbide drill
Excellent heat resistance and lubricity
Up to 40% faster than uncoated
No spotting required in most applications
4-facet self-centering point
Adaptability when converting from high-speed steel
Recommended to run in stainless steel alloys, mild steels and titanium alloys
Live tooling recommended on lathe processes
Shank tolerance: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d †		l ₁	l ₂	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric	Overall Length	Flute Length				
89166	.0625	1/16"	1.59	1-5/8"	3/4"	7.57	7.24	6.92
89171	.0635	#52	1.61	1-11/16"	3/4"	7.66	7.33	7.00
89176	.0670	#51	1.70	1-11/16"	3/4"	7.76	7.43	7.08
89181	.0700	#50	1.78	1-11/16"	7/8"	7.89	7.55	7.21
89186	.0730	#49	1.85	1-11/16"	7/8"	8.07	7.72	7.37
89191	.0760	#48	1.93	1-11/16"	7/8"	8.27	7.90	7.55
89196	.0781	5/64"	1.98	1-11/16"	7/8"	8.53	8.15	7.79
89201	.0785	#47	1.99	1-3/4"	7/8"	8.77	8.38	8.01
89206	.0787		2.00	44	22	8.86	8.48	8.09
89211	.0810	#46	2.06	1-3/4"	7/8"	8.99	8.59	8.21
89216	.0820	#45	2.08	1-3/4"	7/8"	9.19	8.80	8.39
89221	.0860	#44	2.18	2"	1"	9.45	9.04	8.63
89226	.0890	#43	2.26	2"	1"	9.66	9.25	8.82
89231	.0935	#42	2.37	2"	1"	9.78	9.35	8.92
89236	.0938	3/32"	2.38	2"	1"	9.96	9.53	9.10
89241	.0960	#41	2.44	2"	1"	10.05	9.61	9.17
89246	.0980	#40	2.49	2"	1"	10.17	9.72	9.29
89251	.0984		2.50	57	32	10.19	9.74	9.31
89256	.0995	#39	2.53	2-1/4"	1-1/4"	10.23	9.79	9.34
89261	.1015	#38	2.58	2-1/4"	1-1/4"	10.36	9.91	9.45
89266	.1040	#37	2.64	2-1/4"	1-1/4"	10.45	9.99	9.55
89271	.1065	#36	2.71	2-1/4"	1-1/4"	10.58	10.12	9.66
89276	.1094	7/64"	2.78	2-1/4"	1-1/4"	10.73	10.26	9.80
89281	.1100	#35	2.79	2-1/4"	1-1/4"	10.83	10.36	9.88
89286	.1110	#34	2.82	2-1/4"	1-1/4"	10.92	10.44	9.97
89291	.1130	#33	2.87	2-1/4"	1-1/4"	11.10	10.62	10.13
89296	.1160	#32	2.95	2-1/4"	1-1/4"	11.19	10.70	10.21
89301	.1181		3.00	57	32	11.29	10.81	10.32
89306	.1200	#31	3.05	2-1/4"	1-1/4"	11.38	10.88	10.39
89311	.1250	1/8"	3.17	2-1/4"	1-1/4"	11.47	10.97	10.47
89316	.1285	#30	3.26	2-1/4"	1-1/4"	11.73	11.22	10.71
89321	.1360	#29	3.45	2-1/2"	1-3/8"	12.04	11.52	10.99
89326	.1378		3.50	63	35	12.38	11.84	11.30
89331	.1405	#28	3.57	2-1/2"	1-3/8"	12.50	11.96	11.41
89336	.1406	9/64"	3.57	2-1/2"	1-3/8"	12.62	12.06	11.52
89341	.1440	#27	3.66	2-1/2"	1-3/8"	13.05	12.48	11.92
89346	.1470	#26	3.73	2-1/2"	1-3/8"	13.17	12.59	12.02
89351	.1495	#25	3.80	2-1/2"	1-3/8"	13.30	12.72	12.15
89356	.1520	#24	3.86	2-1/2"	1-3/8"	13.34	12.76	12.18
89361	.1540	#23	3.91	2-1/2"	1-3/8"	13.42	12.83	12.25
89366	.1562	5/32"	3.97	2-1/2"	1-3/8"	13.48	12.90	12.30
89371	.1570	#22	3.99	2-1/2"	1-3/8"	14.22	13.60	12.98
89376	.1575		4.00	63	35	14.38	13.76	13.14

continued →

1205H - 2 Flute (continued)

.1590" - .3346"
(4.04mm - 8.50mm)

DRILLS

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
89381	.1590	#21	4.04	2-1/2"	1-3/8"	14.54	13.90	13.27
89386	.1610	#20	4.09	2-1/2"	1-3/8"	14.64	14.01	13.37
89391	.1660	#19	4.22	2-3/4"	1-5/8"	15.16	14.51	13.84
89396	.1695	#18	4.30	2-3/4"	1-5/8"	15.32	14.65	13.99
89401	.1719	11/64"	4.37	2-3/4"	1-5/8"	15.60	14.92	14.25
89406	.1730	#17	4.39	2-3/4"	1-5/8"	15.82	15.13	14.45
89411	.1770	#16	4.49	2-3/4"	1-5/8"	15.95	15.26	14.57
89416	.1772		4.50	70	41	16.04	15.34	14.64
89421	.1800	#15	4.57	2-3/4"	1-5/8"	16.10	15.40	14.70
89426	.1820	#14	4.62	2-3/4"	1-5/8"	16.42	15.70	15.00
89431	.1850	#13	4.70	2-3/4"	1-5/8"	16.54	15.82	15.10
89436	.1875	3/16"	4.76	2-3/4"	1-5/8"	16.60	15.88	15.15
89441	.1890	#12	4.80	2-3/4"	1-5/8"	18.30	17.50	16.71
89446	.1910	#11	4.85	2-3/4"	1-5/8"	18.47	17.67	16.87
89451	.1935	#10	4.91	2-3/4"	1-5/8"	19.20	18.37	17.52
89456	.1960	#9	4.98	3"	1-3/4"	19.61	18.76	17.91
89461	.1969		5.00	76	44	19.71	18.86	17.99
89466	.1990	#8	5.05	3"	1-3/4"	19.80	18.94	18.08
89471	.2010	#7	5.10	3"	1-3/4"	20.32	19.44	18.55
89476	.2031	13/64"	5.16	3"	1-3/4"	20.46	19.56	18.68
89481	.2040	#6	5.18	3"	1-3/4"	20.81	19.91	19.00
89486	.2055	#5	5.22	3"	1-3/4"	21.18	20.26	19.34
89491	.2090	#4	5.31	3"	1-3/4"	21.52	20.58	19.65
89496	.2130	#3	5.41	3"	1-3/4"	21.83	20.88	19.93
89501	.2165		5.50	76	44	21.98	21.02	20.06
89506	.2188	7/32"	5.56	3"	1-3/4"	22.10	21.14	20.18
89511	.2210	#2	5.61	3"	1-3/4"	22.57	21.59	20.60
89516	.2280	#1	5.79	3"	1-3/4"	22.70	21.72	20.73
89521	.2340	A	5.94	3-1/4"	2"	23.03	22.03	21.02
89526	.2344	15/64"	5.95	3-1/4"	2"	23.10	22.09	21.09
89531	.2362		6.00	82	50	23.17	22.16	21.15
89536	.2380	B	6.04	3-1/4"	2"	23.22	22.21	21.21
89541	.2420	C	6.15	3-1/4"	2"	23.38	22.36	21.35
89546	.2460	D	6.25	3-1/4"	2"	23.54	22.52	21.49
89551	.2500	1/4" / E	6.35	3-1/4"	2"	23.67	22.64	21.61
89556	.2559		6.50	82	50	26.64	25.49	24.33
89561	.2570	F	6.53	3-1/4"	2"	27.10	25.93	24.74
89566	.2610	G	6.63	3-1/2"	2-1/8"	27.52	26.32	25.13
89571	.2656	17/64"	6.75	3-1/2"	2-1/8"	27.98	26.76	25.54
89576	.2660	H	6.76	3-1/2"	2-1/8"	28.62	27.37	26.14
89581	.2720	I	6.91	3-1/2"	2-1/8"	28.88	27.62	26.37
89586	.2756		7.00	88	54	29.08	27.81	26.55
89591	.2770	J	7.03	3-1/2"	2-1/8"	29.28	28.01	26.73
89596	.2810	K	7.14	3-1/2"	2-1/8"	29.49	28.22	26.93
89601	.2812	9/32"	7.14	3-1/2"	2-1/8"	29.63	28.34	27.05
89606	.2900	L	7.37	3-1/2"	2-1/8"	30.52	29.19	27.87
89611	.2950	M	7.49	3-3/4"	2-3/8"	32.27	30.87	29.46
89616	.2953		7.50	95	60	32.27	30.87	29.46
89621	.2969	19/64"	7.54	3-3/4"	2-3/8"	32.27	30.87	29.46
89626	.3020	N	7.67	3-3/4"	2-3/8"	33.87	32.40	30.93
89631	.3125	5/16"	7.94	3-3/4"	2-3/8"	33.99	32.51	31.03
89636	.3150		8.00	95	60	36.05	34.48	32.92
89641	.3160	O	8.03	3-3/4"	2-3/8"	36.05	34.48	32.92
89646	.3230	P	8.20	3-3/4"	2-3/8"	36.05	34.48	32.92
89651	.3281	21/64"	8.33	4"	2-1/2"	36.50	34.91	33.33
89656	.3320	Q	8.43	4"	2-1/2"	37.23	35.61	34.00
89661	.3346		8.50	101	63	37.50	35.87	34.24

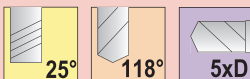
1205H - 2 Flute (continued)

.3390" - .6299"
(8.61mm - 16.00mm)

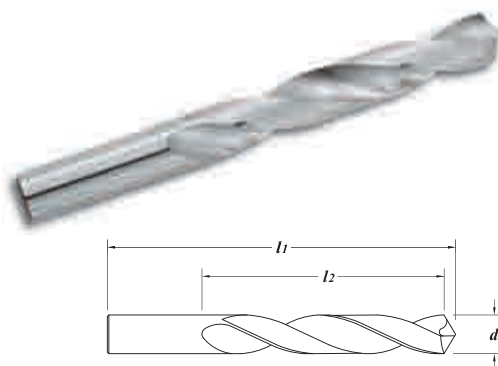
EDP#	d^+ Diameter			l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric						
89666	.3390	R	8.61	4"	2-1/2"	38.52	36.85	35.17	33.50
89671	.3438	11/32"	8.73	4"	2-1/2"	39.88	38.15	36.42	34.68
89676	.3480	S	8.84	4"	2-1/2"	41.45	39.66	37.85	36.05
89681	.3543		9.00	101	63	41.69	39.88	38.06	36.25
89686	.3580	T	9.09	4-1/4"	2-3/4"	43.35	41.46	39.58	37.69
89691	.3594	23/64"	9.13	4-1/4"	2-3/4"	43.61	41.71	39.81	37.92
89696	.3680	U	9.35	4-1/4"	2-3/4"	48.38	46.28	44.17	42.07
89701	.3740		9.50	107	70	48.72	46.60	44.49	42.37
89706	.3750	3/8"	9.52	4-1/4"	2-3/4"	49.06	46.92	44.79	42.66
89711	.3770	V	9.57	4-1/4"	2-3/4"	50.25	48.07	45.88	43.70
89716	.3860	W	9.80	4-1/2"	2-7/8"	51.16	48.93	46.71	44.48
89721	.3906	25/64"	9.92	4-1/2"	2-7/8"	51.77	49.52	47.27	45.02
89726	.3937		10.00	114	73	53.33	51.01	48.69	46.37
89731	.3970	X	10.08	4-1/2"	2-7/8"	54.62	52.25	49.87	47.50
89736	.4040	Y	10.26	4-1/2"	2-7/8"	55.01	52.61	50.22	47.83
89741	.4062	13/32"	10.32	4-1/2"	2-7/8"	56.68	54.22	51.75	49.29
89746	.4130	Z	10.49	4-1/2"	2-7/8"	57.20	54.71	52.23	49.74
89751	.4134		10.50	114	73	57.20	54.71	52.23	49.74
89756	.4219	27/64"	10.72	4-1/2"	2-7/8"	57.73	55.22	52.71	50.20
89761	.4331		11.00	114	73	61.93	59.24	56.54	53.85
89766	.4375	7/16"	11.11	4-1/2"	2-7/8"	61.93	59.24	56.54	53.85
89771	.4528		11.50	120	76	66.45	63.55	60.66	57.78
89776	.4531	29/64"	11.51	4-3/4"	3"	66.45	63.55	60.66	57.78
89781	.4688	15/32"	11.91	4-3/4"	3"	69.78	66.75	63.71	60.68
89786	.4724		12.00	120	76	69.99	66.94	63.91	60.86
89791	.4844	31/64"	12.30	4-3/4"	3"	69.99	66.94	63.91	60.86
89796	.4921		12.50	120	76	71.61	68.50	65.38	62.28
89801	.5000	1/2"	12.70	4-3/4"	3"	71.61	68.50	65.38	62.28
89806	.5118		13.00	127	83	90.13	86.21	82.28	78.37
89811	.5156	33/64"	13.10	5"	3-1/4"	92.25	88.23	84.23	80.22
89816	.5312	17/32"	13.49	5"	3-1/4"	94.37	90.26	86.16	82.06
89821	.5315		13.50	127	83	96.48	92.29	88.09	83.90
89826	.5469	35/64"	13.89	5"	3-1/4"	98.60	94.32	90.03	85.74
89831	.5512		14.00	127	83	100.73	96.36	91.98	87.60
89836	.5625	9/16"	14.29	5"	3-1/4"	108.85	104.11	99.38	94.65
89841	.5709		14.50	127	83	110.88	106.06	101.24	96.42
89846	.5781	37/64"	14.68	5-1/4"	3-1/2"	112.92	108.01	103.11	98.20
89851	.5906		15.00	133	89	114.98	109.98	104.99	99.99
89856	.5938	19/32"	15.08	5-1/4"	3-1/2"	115.61	110.58	105.55	100.53
89861	.6094	39/64"	15.48	5-1/4"	3-1/2"	116.18	111.12	106.08	101.03
89866	.6102		15.50	133	89	116.78	111.71	106.63	101.55
89871	.6250	5/8"	15.87	5-1/4"	3-1/2"	117.36	112.26	107.16	102.06
89876	.6299		16.00	133	89	120.20	114.97	109.75	104.52

d	+0.000" -0.005" (+0.000 -0.127mm)	
l_1	$\leq 1/8"$	+0.125" -0.062" (+3.175 -1.588mm)
	$> 1/8"$	+0.125" -0.125" (+3.175 -3.175mm)
l_2	$\leq 1/8"$	+0.125" -0.062" (+3.175 -1.588mm)
	$> 1/8"$	+0.125" -0.125" (+3.175 -3.175mm)

.0625" - .1575"
(1.59mm - 4.00mm)



Solid submicron grain carbide drill
General purpose jobber style
Cam point ($\leq 1/8"$ diameter - 4-facet point)
Live tooling recommended on lathe processes
Shank tolerance: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d †		Overall Length l_1	Flute Length l_2	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric						
56165	.0625	1/16"	1.59	1-5/8"	3/4"	5.90	5.64	5.39
56170	.0635	#52	1.61	1-11/16"	3/4"	5.99	5.73	5.47
56175	.0670	#51	1.70	1-11/16"	3/4"	6.08	5.82	5.55
56180	.0700	#50	1.78	1-11/16"	7/8"	6.23	5.96	5.69
56185	.0730	#49	1.85	1-11/16"	7/8"	6.40	6.12	5.84
56190	.0760	#48	1.93	1-11/16"	7/8"	6.60	6.31	6.03
56195	.0781	5/64"	1.98	1-11/16"	7/8"	6.85	6.55	6.26
56200	.0785	#47	1.99	1-3/4"	7/8"	7.08	6.77	6.47
56205	.0787		2.00	44	22	7.19	6.87	6.56
56210	.0810	#46	2.06	1-3/4"	7/8"	7.31	6.99	6.68
56215	.0820	#45	2.08	1-3/4"	7/8"	7.52	7.20	6.86
56220	.0860	#44	2.18	2"	1"	7.78	7.44	7.10
56225	.0890	#43	2.26	2"	1"	7.99	7.64	7.29
56230	.0935	#42	2.37	2"	1"	8.10	7.75	7.39
56235	.0938	3/32"	2.38	2"	1"	8.29	7.92	7.57
56240	.0960	#41	2.44	2"	1"	8.36	8.00	7.63
56245	.0980	#40	2.49	2"	1"	8.50	8.12	7.76
56250	.0984		2.50	57	32	8.53	8.15	7.79
56255	.0995	#39	2.53	2-1/4"	1-1/4"	8.56	8.18	7.81
56260	.1015	#38	2.58	2-1/4"	1-1/4"	8.68	8.31	7.92
56265	.1040	#37	2.64	2-1/4"	1-1/4"	8.79	8.40	8.03
56270	.1065	#36	2.71	2-1/4"	1-1/4"	8.90	8.52	8.13
56275	.1094	7/64"	2.78	2-1/4"	1-1/4"	9.06	8.66	8.27
56280	.1100	#35	2.79	2-1/4"	1-1/4"	9.15	8.76	8.35
56285	.1110	#34	2.82	2-1/4"	1-1/4"	9.26	8.85	8.46
56290	.1130	#33	2.87	2-1/4"	1-1/4"	9.42	9.02	8.60
56295	.1160	#32	2.95	2-1/4"	1-1/4"	9.54	9.12	8.70
56300	.1181		3.00	57	32	9.63	9.21	8.79
56305	.1200	#31	3.05	2-1/4"	1-1/4"	9.70	9.28	8.86
56310	.1250	1/8"	3.17	2-1/4"	1-1/4"	9.81	9.38	8.95
56315	.1285	#30	3.26	2-1/4"	1-1/4"	10.06	9.62	9.18
56320	.1360	#29	3.45	2-1/2"	1-3/8"	10.37	9.92	9.46
56325	.1378		3.50	63	35	10.70	10.23	9.78
56330	.1405	#28	3.57	2-1/2"	1-3/8"	10.83	10.36	9.88
56335	.1406	9/64"	3.57	2-1/2"	1-3/8"	10.93	10.45	9.98
56340	.1440	#27	3.66	2-1/2"	1-3/8"	11.38	10.88	10.39
56345	.1470	#26	3.73	2-1/2"	1-3/8"	11.49	10.99	10.49
56350	.1495	#25	3.80	2-1/2"	1-3/8"	11.64	11.13	10.63
56355	.1520	#24	3.86	2-1/2"	1-3/8"	11.66	11.15	10.65
56360	.1540	#23	3.91	2-1/2"	1-3/8"	11.74	11.23	10.72
56365	.1562	5/32"	3.97	2-1/2"	1-3/8"	11.81	11.30	10.78
56370	.1570	#22	3.99	2-1/2"	1-3/8"	12.56	12.01	11.47
56375	.1575		4.00	63	35	12.71	12.16	11.61

1200 - 2 Flute (continued)

.1590" - .3346"
(4.04mm - 8.50mm)

EDP#	d^+ Diameter		Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal								
56380	.1590	#21	4.04	2-1/2"	1-3/8"	12.86	12.30	11.74	11.19
56385	.1610	#20	4.09	2-1/2"	1-3/8"	12.97	12.41	11.85	11.27
56390	.1660	#19	4.22	2-3/4"	1-5/8"	13.49	12.91	12.31	11.73
56395	.1695	#18	4.30	2-3/4"	1-5/8"	13.66	13.06	12.47	11.88
56400	.1719	11/64"	4.37	2-3/4"	1-5/8"	13.94	13.33	12.72	12.12
56405	.1730	#17	4.39	2-3/4"	1-5/8"	14.13	13.52	12.91	12.29
56410	.1770	#16	4.49	2-3/4"	1-5/8"	14.29	13.67	13.05	12.43
56415	.1772		4.50	70	41	14.36	13.74	13.11	12.49
56420	.1800	#15	4.57	2-3/4"	1-5/8"	14.42	13.80	13.17	12.54
56425	.1820	#14	4.62	2-3/4"	1-5/8"	14.76	14.11	13.48	12.83
56430	.1850	#13	4.70	2-3/4"	1-5/8"	14.86	14.22	13.57	12.93
56435	.1875	3/16"	4.76	2-3/4"	1-5/8"	14.92	14.28	13.62	12.98
56440	.1890	#12	4.80	2-3/4"	1-5/8"	15.41	14.75	14.07	13.41
56445	.1910	#11	4.85	2-3/4"	1-5/8"	15.60	14.92	14.25	13.56
56450	.1935	#10	4.91	2-3/4"	1-5/8"	16.33	15.62	14.90	14.20
56455	.1960	#9	4.98	3"	1-3/4"	16.74	16.02	15.29	14.56
56460	.1969		5.00	76	44	16.84	16.11	15.37	14.64
56465	.1990	#8	5.05	3"	1-3/4"	16.95	16.21	15.48	14.74
56470	.2010	#7	5.10	3"	1-3/4"	17.45	16.69	15.93	15.17
56475	.2031	13/64"	5.16	3"	1-3/4"	17.59	16.82	16.06	15.29
56480	.2040	#6	5.18	3"	1-3/4"	17.94	17.16	16.38	15.60
56485	.2055	#5	5.22	3"	1-3/4"	18.31	17.51	16.72	15.92
56490	.2090	#4	5.31	3"	1-3/4"	18.64	17.83	17.01	16.20
56495	.2130	#3	5.41	3"	1-3/4"	18.96	18.14	17.31	16.48
56500	.2165		5.50	76	44	19.10	18.27	17.44	16.61
56505	.2188	7/32"	5.56	3"	1-3/4"	19.24	18.41	17.57	16.73
56510	.2210	#2	5.61	3"	1-3/4"	19.71	18.86	17.99	17.14
56515	.2280	#1	5.79	3"	1-3/4"	19.83	18.97	18.11	17.24
56520	.2340	A	5.94	3-1/4"	2"	20.06	19.19	18.31	17.44
56525	.2344	15/64"	5.95	3-1/4"	2"	20.11	19.24	18.37	17.49
56530	.2362		6.00	82	50	20.19	19.31	18.43	17.56
56535	.2380	B	6.04	3-1/4"	2"	20.26	19.38	18.50	17.62
56540	.2420	C	6.15	3-1/4"	2"	20.42	19.53	18.64	17.75
56545	.2460	D	6.25	3-1/4"	2"	20.56	19.67	18.77	17.88
56550	.2500	1/4" / E	6.35	3-1/4"	2"	20.71	19.80	18.91	18.00
56555	.2559		6.50	82	50	21.21	20.28	19.36	18.44
56560	.2570	F	6.53	3-1/4"	2"	21.65	20.71	19.77	18.82
56565	.2610	G	6.63	3-1/2"	2-1/8"	22.09	21.13	20.17	19.21
56570	.2656	17/64"	6.75	3-1/2"	2-1/8"	22.54	21.56	20.58	19.59
56575	.2660	H	6.76	3-1/2"	2-1/8"	23.18	22.17	21.16	20.16
56580	.2720	I	6.91	3-1/2"	2-1/8"	23.44	22.42	21.40	20.38
56585	.2756		7.00	88	54	23.63	22.60	21.57	20.55
56590	.2770	J	7.03	3-1/2"	2-1/8"	23.84	22.80	21.77	20.73
56595	.2810	K	7.14	3-1/2"	2-1/8"	24.06	23.00	21.96	20.91
56600	.2812	9/32"	7.14	3-1/2"	2-1/8"	24.19	23.14	22.09	21.04
56605	.2900	L	7.37	3-1/2"	2-1/8"	25.06	23.97	22.88	21.80
56610	.2950	M	7.49	3-3/4"	2-3/8"	26.82	25.66	24.49	23.33
56615	.2953		7.50	95	60	26.82	25.66	24.49	23.33
56620	.2969	19/64"	7.54	3-3/4"	2-3/8"	26.82	25.66	24.49	23.33
56625	.3020	N	7.67	3-3/4"	2-3/8"	28.43	27.20	25.96	24.72
56630	.3125	5/16"	7.94	3-3/4"	2-3/8"	28.54	27.30	26.05	24.81
56635	.3150		8.00	95	60	30.62	29.29	27.96	26.62
56640	.3160	O	8.03	3-3/4"	2-3/8"	30.62	29.29	27.96	26.62
56645	.3230	P	8.20	3-3/4"	2-3/8"	30.62	29.29	27.96	26.62
56650	.3281	21/64"	8.33	4"	2-1/2"	31.08	29.72	28.37	27.02
56655	.3320	Q	8.43	4"	2-1/2"	31.79	30.41	29.03	27.64
56660	.3346		8.50	101	63	32.07	30.68	29.29	27.89

continued →

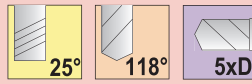
1200 - 2 Flute (continued)

.3390" - .5000"
(8.61mm - 12.70mm)

DRILLS

EDP#	$d^{\dagger}$		l_1	l_2	1-11	12-24	25-49	50-100	
	Decimal	Diameter							Metric
56665	.3390	R	8.61	4"	2-1/2"	33.09	31.66	30.21	28.78
56670	.3438	11/32"	8.73	4"	2-1/2"	34.44	32.95	31.45	29.95
56675	.3480	S	8.84	4"	2-1/2"	34.55	33.05	31.54	30.05
56680	.3543		9.00	101	63	34.77	33.26	31.74	30.23
56685	.3580	T	9.09	4-1/4"	2-3/4"	35.08	33.55	32.03	30.50
56690	.3594	23/64"	9.13	4-1/4"	2-3/4"	35.32	33.78	32.25	30.71
56695	.3680	U	9.35	4-1/4"	2-3/4"	40.09	38.34	36.61	34.86
56700	.3740		9.50	107	70	40.46	38.70	36.94	35.18
56705	.3750	3/8"	9.52	4-1/4"	2-3/4"	40.79	39.01	37.24	35.46
56710	.3770	V	9.57	4-1/4"	2-3/4"	41.55	39.74	37.94	36.13
56715	.3860	W	9.80	4-1/2"	2-7/8"	42.43	40.59	38.74	36.90
56720	.3906	25/64"	9.92	4-1/2"	2-7/8"	43.07	41.19	39.32	37.45
56725	.3937		10.00	114	73	44.63	42.68	40.75	38.80
56730	.3970	X	10.08	4-1/2"	2-7/8"	45.93	43.93	41.93	39.94
56735	.4040	Y	10.26	4-1/2"	2-7/8"	46.30	44.28	42.28	40.26
56740	.4062	13/32"	10.32	4-1/2"	2-7/8"	47.98	45.88	43.80	41.71
56745	.4130	Z	10.49	4-1/2"	2-7/8"	48.48	46.37	44.27	42.16
56750	.4134		10.50	114	73	48.48	46.37	44.27	42.16
56755	.4219	27/64"	10.72	4-1/2"	2-7/8"	49.03	46.89	44.76	42.63
56760	.4331		11.00	114	73	53.24	50.92	48.61	46.29
56765	.4375	7/16"	11.11	4-1/2"	2-7/8"	53.24	50.92	48.61	46.29
56770	.4528		11.50	120	76	57.74	55.23	52.72	50.21
56775	.4531	29/64"	11.51	4-3/4"	3"	57.74	55.23	52.72	50.21
56780	.4688	15/32"	11.91	4-3/4"	3"	61.08	58.43	55.76	53.11
56785	.4724		12.00	120	76	61.29	58.62	55.96	53.29
56790	.4844	31/64"	12.30	4-3/4"	3"	61.29	58.62	55.96	53.29
56795	.4921		12.50	120	76	62.91	60.17	57.44	54.70
56800	.5000	1/2"	12.70	4-3/4"	3"	62.91	60.17	57.44	54.70

.0625" - .1575"
(1.59mm - 4.00mm)

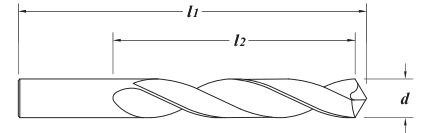


TOLERANCES

d	+0.000" -0.005" (+0.000 -0.127mm)
h	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8" +.125" -0.062" (+3.175 -1.588mm)
	> 1/8" +.125" -0.125" (+3.175 -3.175mm)

Balinit® HARDLUBE Coated

Solid submicron grain carbide drill
General purpose jobber style
Excellent heat resistance and lubricity
Up to 40% faster than uncoated
Cam point (≤1/8" diameter is with 4-facet point)
Live tooling recommended on lathe processes
Shank tolerance: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d † Diameter		l ₁ Overall Length	l ₂ Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
56166	.0625	1/16"	1.59	1-5/8"	3/4"	7.57	7.24	6.92
56171	.0635	#52	1.61	1-11/16"	3/4"	7.66	7.33	7.00
56176	.0670	#51	1.70	1-11/16"	3/4"	7.76	7.43	7.08
56181	.0700	#50	1.78	1-11/16"	7/8"	7.89	7.55	7.21
56186	.0730	#49	1.85	1-11/16"	7/8"	8.07	7.72	7.37
56191	.0760	#48	1.93	1-11/16"	7/8"	8.27	7.90	7.55
56196	.0781	5/64"	1.98	1-11/16"	7/8"	8.53	8.15	7.79
56201	.0785	#47	1.99	1-3/4"	7/8"	8.77	8.38	8.01
56206	.0787		2.00	44	22	8.86	8.48	8.09
56211	.0810	#46	2.06	1-3/4"	7/8"	8.99	8.59	8.21
56216	.0820	#45	2.08	1-3/4"	7/8"	9.19	8.80	8.39
56221	.0860	#44	2.18	2"	1"	9.45	9.04	8.63
56226	.0890	#43	2.26	2"	1"	9.66	9.25	8.82
56231	.0935	#42	2.37	2"	1"	9.78	9.35	8.92
56236	.0938	3/32"	2.38	2"	1"	9.96	9.53	9.10
56241	.0960	#41	2.44	2"	1"	10.05	9.61	9.17
56246	.0980	#40	2.49	2"	1"	10.17	9.72	9.29
56251	.0984		2.50	57	32	10.19	9.74	9.31
56256	.0995	#39	2.53	2-1/4"	1-1/4"	10.23	9.79	9.34
56261	.1015	#38	2.58	2-1/4"	1-1/4"	10.36	9.91	9.45
56266	.1040	#37	2.64	2-1/4"	1-1/4"	10.45	9.99	9.55
56271	.1065	#36	2.71	2-1/4"	1-1/4"	10.58	10.12	9.66
56276	.1094	7/64"	2.78	2-1/4"	1-1/4"	10.73	10.26	9.80
56281	.1100	#35	2.79	2-1/4"	1-1/4"	10.83	10.36	9.88
56286	.1110	#34	2.82	2-1/4"	1-1/4"	10.92	10.44	9.97
56291	.1130	#33	2.87	2-1/4"	1-1/4"	11.10	10.62	10.13
56296	.1160	#32	2.95	2-1/4"	1-1/4"	11.19	10.70	10.21
56301	.1181		3.00	57	32	11.29	10.81	10.32
56306	.1200	#31	3.05	2-1/4"	1-1/4"	11.38	10.88	10.39
56311	.1250	1/8"	3.17	2-1/4"	1-1/4"	11.47	10.97	10.47
56316	.1285	#30	3.26	2-1/4"	1-1/4"	11.73	11.22	10.71
56321	.1360	#29	3.45	2-1/2"	1-3/8"	12.04	11.52	10.99
56326	.1378		3.50	63	35	12.38	11.84	11.30
56331	.1405	#28	3.57	2-1/2"	1-3/8"	12.50	11.96	11.41
56336	.1406	9/64"	3.57	2-1/2"	1-3/8"	12.62	12.06	11.52
56341	.1440	#27	3.66	2-1/2"	1-3/8"	13.05	12.48	11.92
56346	.1470	#26	3.73	2-1/2"	1-3/8"	13.17	12.59	12.02
56351	.1495	#25	3.80	2-1/2"	1-3/8"	13.30	12.72	12.15
56356	.1520	#24	3.86	2-1/2"	1-3/8"	13.34	12.76	12.18
56361	.1540	#23	3.91	2-1/2"	1-3/8"	13.42	12.83	12.25
56366	.1562	5/32"	3.97	2-1/2"	1-3/8"	13.48	12.90	12.30
56371	.1570	#22	3.99	2-1/2"	1-3/8"	14.22	13.60	12.98
56376	.1575		4.00	63	35	14.38	13.76	13.14

continued →

1200H - 2 Flute (continued)

.1590" - .3346"
(4.04mm - 8.50mm)

DRILLS

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
56381	.1590	#21	4.04	2-1/2"	1-3/8"	14.54	13.90	13.27
56386	.1610	#20	4.09	2-1/2"	1-3/8"	14.64	14.01	13.37
56391	.1660	#19	4.22	2-3/4"	1-5/8"	15.16	14.51	13.84
56396	.1695	#18	4.30	2-3/4"	1-5/8"	15.32	14.65	13.99
56401	.1719	11/64"	4.37	2-3/4"	1-5/8"	15.60	14.92	14.25
56406	.1730	#17	4.39	2-3/4"	1-5/8"	15.82	15.13	14.45
56411	.1770	#16	4.49	2-3/4"	1-5/8"	15.95	15.26	14.57
56416	.1772		4.50	70	41	16.04	15.34	14.64
56421	.1800	#15	4.57	2-3/4"	1-5/8"	16.10	15.40	14.70
56426	.1820	#14	4.62	2-3/4"	1-5/8"	16.42	15.70	15.00
56431	.1850	#13	4.70	2-3/4"	1-5/8"	16.54	15.82	15.10
56436	.1875	3/16"	4.76	2-3/4"	1-5/8"	16.60	15.88	15.15
56441	.1890	#12	4.80	2-3/4"	1-5/8"	18.30	17.50	16.71
56446	.1910	#11	4.85	2-3/4"	1-5/8"	18.47	17.67	16.87
56451	.1935	#10	4.91	2-3/4"	1-5/8"	19.20	18.37	17.52
56456	.1960	#9	4.98	3"	1-3/4"	19.61	18.76	17.91
56461	.1969		5.00	76	44	19.71	18.86	17.99
56466	.1990	#8	5.05	3"	1-3/4"	19.80	18.94	18.08
56471	.2010	#7	5.10	3"	1-3/4"	20.32	19.44	18.55
56476	.2031	13/64"	5.16	3"	1-3/4"	20.46	19.56	18.68
56481	.2040	#6	5.18	3"	1-3/4"	20.81	19.91	19.00
56486	.2055	#5	5.22	3"	1-3/4"	21.18	20.26	19.34
56491	.2090	#4	5.31	3"	1-3/4"	21.52	20.58	19.65
56496	.2130	#3	5.41	3"	1-3/4"	21.83	20.88	19.93
56501	.2165		5.50	76	44	21.98	21.02	20.06
56506	.2188	7/32"	5.56	3"	1-3/4"	22.10	21.14	20.18
56511	.2210	#2	5.61	3"	1-3/4"	22.57	21.59	20.60
56516	.2280	#1	5.79	3"	1-3/4"	22.70	21.72	20.73
56521	.2340	A	5.94	3-1/4"	2"	23.03	22.03	21.02
56526	.2344	15/64"	5.95	3-1/4"	2"	23.10	22.09	21.09
56531	.2362		6.00	82	50	23.17	22.16	21.15
56536	.2380	B	6.04	3-1/4"	2"	23.22	22.21	21.21
56541	.2420	C	6.15	3-1/4"	2"	23.38	22.36	21.35
56546	.2460	D	6.25	3-1/4"	2"	23.54	22.52	21.49
56551	.2500	1/4" / E	6.35	3-1/4"	2"	23.67	22.64	21.61
56556	.2559		6.50	82	50	26.64	25.49	24.33
56561	.2570	F	6.53	3-1/4"	2"	27.10	25.93	24.74
56566	.2610	G	6.63	3-1/2"	2-1/8"	27.52	26.32	25.13
56571	.2656	17/64"	6.75	3-1/2"	2-1/8"	27.98	26.76	25.54
56576	.2660	H	6.76	3-1/2"	2-1/8"	28.62	27.37	26.14
56581	.2720	I	6.91	3-1/2"	2-1/8"	28.88	27.62	26.37
56586	.2756		7.00	88	54	29.08	27.81	26.55
56591	.2770	J	7.03	3-1/2"	2-1/8"	29.28	28.01	26.73
56596	.2810	K	7.14	3-1/2"	2-1/8"	29.49	28.22	26.93
56601	.2812	9/32"	7.14	3-1/2"	2-1/8"	29.63	28.34	27.05
56606	.2900	L	7.37	3-1/2"	2-1/8"	30.52	29.19	27.87
56611	.2950	M	7.49	3-3/4"	2-3/8"	32.27	30.87	29.46
56616	.2953		7.50	95	60	32.27	30.87	29.46
56621	.2969	19/64"	7.54	3-3/4"	2-3/8"	32.27	30.87	29.46
56626	.3020	N	7.67	3-3/4"	2-3/8"	33.87	32.40	30.93
56631	.3125	5/16"	7.94	3-3/4"	2-3/8"	33.99	32.51	31.03
56636	.3150		8.00	95	60	36.05	34.48	32.92
56641	.3160	O	8.03	3-3/4"	2-3/8"	36.05	34.48	32.92
56646	.3230	P	8.20	3-3/4"	2-3/8"	36.05	34.48	32.92
56651	.3281	21/64"	8.33	4"	2-1/2"	36.50	34.91	33.33
56656	.3320	Q	8.43	4"	2-1/2"	37.23	35.61	34.00
56661	.3346		8.50	101	63	37.50	35.87	34.24

1200H - 2 Flute (continued)

.3390" - .5000"
(8.61mm - 12.70mm)

EDP#	d^+ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
56666	.3390	R	8.61	4"	2-1/2"	38.52	36.85	35.17
56671	.3438	11/32"	8.73	4"	2-1/2"	39.88	38.15	36.42
56676	.3480	S	8.84	4"	2-1/2"	41.45	39.66	37.85
56681	.3543		9.00	101	63	41.69	39.88	38.06
56686	.3580	T	9.09	4-1/4"	2-3/4"	43.35	41.46	39.58
56691	.3594	23/64"	9.13	4-1/4"	2-3/4"	43.61	41.71	39.81
56696	.3680	U	9.35	4-1/4"	2-3/4"	48.38	46.28	44.17
56701	.3740		9.50	107	70	48.72	46.60	44.49
56706	.3750	3/8"	9.52	4-1/4"	2-3/4"	49.06	46.92	44.79
56711	.3770	V	9.57	4-1/4"	2-3/4"	50.25	48.07	45.88
56716	.3860	W	9.80	4-1/2"	2-7/8"	51.16	48.93	46.71
56721	.3906	25/64"	9.92	4-1/2"	2-7/8"	51.77	49.52	47.27
56726	.3937		10.00	114	73	53.33	51.01	48.69
56731	.3970	X	10.08	4-1/2"	2-7/8"	54.62	52.25	49.87
56736	.4040	Y	10.26	4-1/2"	2-7/8"	55.01	52.61	50.22
56741	.4062	13/32"	10.32	4-1/2"	2-7/8"	56.68	54.22	51.75
56746	.4130	Z	10.49	4-1/2"	2-7/8"	57.20	54.71	52.23
56751	.4134		10.50	114	73	57.20	54.71	52.23
56756	.4219	27/64"	10.72	4-1/2"	2-7/8"	57.73	55.22	52.71
56761	.4331		11.00	114	73	61.93	59.24	56.54
56766	.4375	7/16"	11.11	4-1/2"	2-7/8"	61.93	59.24	56.54
56771	.4528		11.50	120	76	66.45	63.55	60.66
56776	.4531	29/64"	11.51	4-3/4"	3"	66.45	63.55	60.66
56781	.4688	15/32"	11.91	4-3/4"	3"	69.78	66.75	63.71
56786	.4724		12.00	120	76	69.99	66.94	63.91
56791	.4844	31/64"	12.30	4-3/4"	3"	69.99	66.94	63.91
56796	.4921		12.50	120	76	71.61	68.50	65.38
56801	.5000	1/2"	12.70	4-3/4"	3"	71.61	68.50	65.38

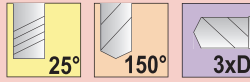
1120 - 3 Flute

Technical information: page 204-207

TOLERANCES

d	+0.000" -0.005" (+0.000 -0.127mm)	
l ₁	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)

.1094" - .2165"
(2.78mm - 5.50mm)



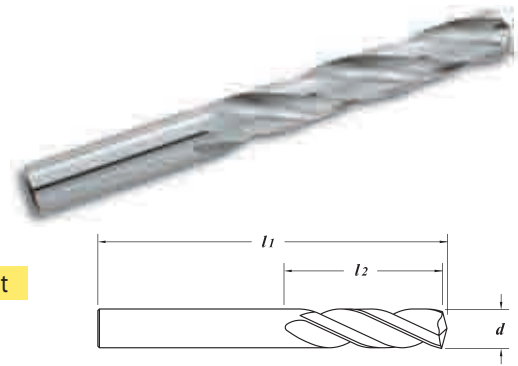
DRILLS

Solid submicron grain carbide drill
Near reamer finishes
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: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d †			l ₁ Overall Length	l ₂ Flute Length	1-11	12-24	25-49	50-100
	Decimal	Diameter	Metric						
78275	.1094	7/64"	2.78	1-13/16"	13/16"	10.58	10.12	9.66	9.19
78280	.1100	#35	2.79	1-7/8"	7/8"	10.69	10.22	9.77	9.30
78285	.1110	#34	2.82	1-7/8"	7/8"	10.83	10.36	9.88	9.41
78290	.1130	#33	2.87	1-7/8"	7/8"	11.01	10.54	10.06	9.58
78295	.1160	#32	2.95	1-7/8"	7/8"	11.17	10.68	10.20	9.71
78300	.1181		3.00	48	22	11.26	10.77	10.29	9.80
78305	.1200	#31	3.05	1-7/8"	7/8"	11.35	10.86	10.36	9.87
78310	.1250	1/8"	3.17	1-7/8"	7/8"	11.49	10.99	10.49	9.99
78315	.1285	#30	3.26	1-15/16"	15/16"	11.79	11.28	10.76	10.25
78320	.1360	#29	3.45	1-15/16"	15/16"	12.11	11.58	11.06	10.52
78325	.1378		3.50	49	24	12.50	11.96	11.41	10.87
78330	.1405	#28	3.57	1-15/16"	15/16"	12.66	12.11	11.55	11.00
78335	.1406	9/64"	3.57	1-15/16"	15/16"	12.81	12.25	11.70	11.14
78340	.1440	#27	3.66	2-1/16"	1"	13.81	13.21	12.62	12.01
78345	.1470	#26	3.73	2-1/16"	1"	14.00	13.38	12.78	12.17
78350	.1495	#25	3.80	2-1/16"	1"	14.12	13.51	12.90	12.28
78355	.1520	#24	3.86	2-1/16"	1"	14.14	13.53	12.92	12.30
78360	.1540	#23	3.91	2-1/16"	1"	14.28	13.66	13.04	12.42
78365	.1562	5/32"	3.97	2-1/16"	1"	14.34	13.72	13.09	12.47
78370	.1570	#22	3.99	2-1/8"	1-1/16"	15.25	14.58	13.93	13.26
78375	.1575		4.00	54	27	15.25	14.58	13.93	13.26
78380	.1590	#21	4.04	2-1/8"	1-1/16"	15.61	14.93	14.25	13.57
78385	.1610	#20	4.09	2-1/8"	1-1/16"	15.61	14.93	14.25	13.57
78390	.1660	#19	4.22	2-1/8"	1-1/16"	15.74	15.05	14.36	13.69
78395	.1695	#18	4.30	2-1/8"	1-1/16"	15.84	15.15	14.47	13.77
78400	.1719	11/64"	4.37	2-1/8"	1-1/16"	15.94	15.25	14.56	13.86
78405	.1730	#17	4.39	2-3/16"	1-1/8"	16.67	15.94	15.23	14.50
78410	.1770	#16	4.49	2-3/16"	1-1/8"	16.85	16.12	15.38	14.65
78415	.1772		4.50	56	29	16.93	16.19	15.45	14.73
78420	.1800	#15	4.57	2-3/16"	1-1/8"	17.01	16.28	15.54	14.80
78425	.1820	#14	4.62	2-3/16"	1-1/8"	17.40	16.64	15.89	15.13
78430	.1850	#13	4.70	2-3/16"	1-1/8"	17.49	16.73	15.97	15.22
78435	.1875	3/16"	4.76	2-3/16"	1-1/8"	17.49	16.73	15.97	15.22
78440	.1890	#12	4.80	2-1/4"	1-3/16"	17.63	16.86	16.10	15.33
78445	.1910	#11	4.85	2-1/4"	1-3/16"	17.83	17.05	16.28	15.50
78450	.1935	#10	4.91	2-1/4"	1-3/16"	18.67	17.86	17.05	16.23
78455	.1960	#9	4.98	2-1/4"	1-3/16"	19.13	18.29	17.46	16.63
78460	.1969		5.00	57	30	19.24	18.41	17.57	16.73
78465	.1990	#8	5.05	2-1/4"	1-3/16"	19.38	18.53	17.69	16.85
78470	.2010	#7	5.10	2-1/4"	1-3/16"	19.96	19.09	18.22	17.36
78475	.2031	13/64"	5.16	2-1/4"	1-3/16"	20.72	19.81	18.92	18.01
78480	.2040	#6	5.18	2-3/8"	1-1/4"	20.83	19.93	19.02	18.12
78485	.2055	#5	5.22	2-3/8"	1-1/4"	20.94	20.02	19.12	18.20
78490	.2090	#4	5.31	2-3/8"	1-1/4"	21.29	20.36	19.44	18.51
78495	.2130	#3	5.41	2-3/8"	1-1/4"	21.66	20.72	19.78	18.83
78500	.2165		5.50	60	32	21.83	20.88	19.93	18.98

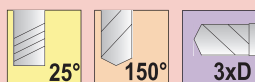
1120 - 3 Flute (continued)

.2188" - .5000"
(5.56mm - 12.70mm)

EDP#	$d^{\dagger}$ Diameter			l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric						
78505	.2188	7/32"	5.56	2-3/8"	1-1/4"	22.01	21.05	20.09	19.14
78510	.2210	#2	5.61	2-7/16"	1-5/16"	22.55	21.57	20.58	19.60
78515	.2280	#1	5.79	2-7/16"	1-5/16"	22.65	21.66	20.69	19.70
78520	.2340	A	5.94	2-7/16"	1-5/16"	22.78	21.79	20.80	19.80
78525	.2344	15/64"	5.95	2-7/16"	1-5/16"	22.89	21.89	20.90	19.91
78530	.2362		6.00	64	35	22.95	21.95	20.96	19.96
78535	.2380	B	6.04	2-1/2"	1-3/8"	23.05	22.05	21.04	20.04
78540	.2420	C	6.15	2-1/2"	1-3/8"	23.21	22.20	21.20	20.19
78545	.2460	D	6.25	2-1/2"	1-3/8"	23.37	22.35	21.34	20.32
78550	.2500	1/4" / E	6.35	2-1/2"	1-3/8"	23.54	22.52	21.49	20.47
78555	.2559		6.50	67	37	24.13	23.08	22.03	20.98
78560	.2570	F	6.53	2-5/8"	1-7/16"	24.63	23.56	22.48	21.41
78565	.2610	G	6.63	2-5/8"	1-7/16"	25.00	23.91	22.83	21.74
78570	.2656	17/64"	6.75	2-5/8"	1-7/16"	25.49	24.38	23.28	22.16
78575	.2660	H	6.76	2-11/16"	1-1/2"	26.23	25.08	23.95	22.81
78580	.2720	I	6.91	2-11/16"	1-1/2"	26.55	25.40	24.24	23.09
78585	.2756		7.00	68	38	26.74	25.57	24.41	23.25
78590	.2770	J	7.03	2-11/16"	1-1/2"	26.97	25.79	24.63	23.45
78595	.2810	K	7.14	2-11/16"	1-1/2"	27.22	26.03	24.85	23.67
78600	.2812	9/32"	7.14	2-11/16"	1-1/2"	28.17	26.95	25.72	24.50
78605	.2900	L	7.37	2-3/4"	1-9/16"	29.23	27.97	26.70	25.42
78610	.2950	M	7.49	2-3/4"	1-9/16"	30.07	28.76	27.46	26.15
78615	.2953		7.50	70	40	30.07	28.76	27.46	26.15
78620	.2969	19/64"	7.54	2-3/4"	1-9/16"	30.07	28.76	27.46	26.15
78625	.3020	N	7.67	2-13/16"	1-5/8"	31.26	29.90	28.55	27.19
78630	.3125	5/16"	7.94	2-13/16"	1-5/8"	31.40	30.04	28.66	27.30
78635	.3150		8.00	75	43	33.66	32.20	30.74	29.28
78640	.3160	O	8.03	2-15/16"	1-11/16"	33.66	32.20	30.74	29.28
78645	.3230	P	8.20	2-15/16"	1-11/16"	33.66	32.20	30.74	29.28
78650	.3281	21/64"	8.33	2-15/16"	1-11/16"	35.14	33.61	32.08	30.56
78655	.3320	Q	8.43	3"	1-11/16"	35.96	34.40	32.83	31.27
78660	.3346		8.50	76	43	36.30	34.72	33.14	31.56
78665	.3390	R	8.61	3"	1-11/16"	37.41	35.79	34.15	32.53
78670	.3438	11/32"	8.73	3"	1-11/16"	38.97	37.27	35.58	33.88
78675	.3480	S	8.84	3-1/16"	1-3/4"	41.95	40.13	38.30	36.48
78680	.3543		9.00	78	44	42.23	40.39	38.56	36.72
78685	.3580	T	9.09	3-1/16"	1-3/4"	42.36	40.52	38.68	36.84
78690	.3594	23/64"	9.13	3-1/16"	1-3/4"	42.71	40.85	39.00	37.14
78695	.3680	U	9.35	3-1/8"	1-13/16"	45.59	43.61	41.63	39.64
78700	.3740		9.50	79	46	46.38	44.37	42.35	40.33
78705	.3750	3/8"	9.52	3-1/8"	1-13/16"	46.38	44.37	42.35	40.33
78710	.3770	V	9.57	3-1/4"	1-7/8"	46.94	44.90	42.86	40.81
78715	.3860	W	9.80	3-1/4"	1-7/8"	49.98	47.81	45.64	43.46
78720	.3906	25/64"	9.92	3-1/4"	1-7/8"	50.71	48.51	46.30	44.10
78725	.3937		10.00	84	49	52.54	50.25	47.98	45.69
78730	.3970	X	10.08	3-5/16"	1-15/16"	54.11	51.76	49.41	47.05
78735	.4040	Y	10.26	3-5/16"	1-15/16"	54.53	52.16	49.78	47.41
78740	.4062	13/32"	10.32	3-5/16"	1-15/16"	56.50	54.05	51.59	49.13
78745	.4130	Z	10.49	3-3/8"	2"	57.09	54.60	52.12	49.64
78750	.4134		10.50	86	51	57.09	54.60	52.12	49.64
78755	.4219	27/64"	10.72	3-3/8"	2"	57.74	55.23	52.72	50.21
78760	.4331		11.00	87	52	62.05	59.35	56.65	53.96
78765	.4375	7/16"	11.11	3-7/16"	2-1/16"	62.05	59.35	56.65	53.96
78770	.4528		11.50	91	54	67.31	64.39	61.45	58.53
78775	.4531	29/64"	11.51	3-9/16"	2-1/8"	67.31	64.39	61.45	58.53
78780	.4688	15/32"	11.91	3-5/8"	2-1/8"	71.22	68.12	65.02	61.93
78785	.4724		12.00	94	56	71.44	68.33	65.23	62.12
78790	.4844	31/64"	12.30	3-11/16"	2-3/16"	71.69	68.57	65.46	62.34
78795	.4921		12.50	95	56	72.90	69.73	66.56	63.40
78800	.5000	1/2"	12.70	3-3/4"	2-1/4"	73.33	70.14	66.96	63.76

d	+0.000" -0.005" (+0.000 -0.127mm)	
l ₁	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)

.1094" - .2165"
(2.78mm - 5.50mm)



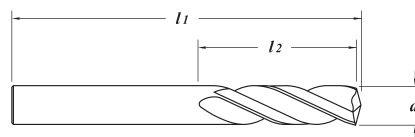
Balinit® HARDLUBE Coated

Solid submicron grain carbide drill
Near reamer finishes
Excellent heat resistance and lubricity
Up to 40% faster than uncoated
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: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d † Diameter			l ₁ Overall Length	l ₂ Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric						
78276	.1094	7/64"	2.78	1-13/16"	13/16"	12.25	11.72	11.19	10.65
78281	.1100	#35	2.79	1-7/8"	7/8"	12.36	11.81	11.28	10.74
78286	.1110	#34	2.82	1-7/8"	7/8"	12.49	11.95	11.41	10.86
78291	.1130	#33	2.87	1-7/8"	7/8"	12.68	12.13	11.58	11.02
78296	.1160	#32	2.95	1-7/8"	7/8"	12.83	12.27	11.72	11.16
78301	.1181		3.00	48	22	12.93	12.37	11.80	11.24
78306	.1200	#31	3.05	1-7/8"	7/8"	13.01	12.45	11.88	11.32
78311	.1250	1/8"	3.17	1-7/8"	7/8"	13.17	12.59	12.02	11.45
78316	.1285	#30	3.26	1-15/16"	15/16"	13.46	12.88	12.28	11.70
78321	.1360	#29	3.45	1-15/16"	15/16"	13.77	13.17	12.57	11.97
78326	.1378		3.50	49	24	14.18	13.56	12.94	12.32
78331	.1405	#28	3.57	1-15/16"	15/16"	14.32	13.70	13.07	12.45
78336	.1406	9/64"	3.57	1-15/16"	15/16"	14.48	13.84	13.22	12.58
78341	.1440	#27	3.66	2-1/16"	1"	15.48	14.80	14.13	13.46
78346	.1470	#26	3.73	2-1/16"	1"	15.65	14.98	14.29	13.61
78351	.1495	#25	3.80	2-1/16"	1"	15.79	15.10	14.41	13.73
78356	.1520	#24	3.86	2-1/16"	1"	15.82	15.13	14.45	13.76
78361	.1540	#23	3.91	2-1/16"	1"	15.94	15.25	14.56	13.86
78366	.1562	5/32"	3.97	2-1/16"	1"	16.02	15.32	14.62	13.93
78371	.1570	#22	3.99	2-1/8"	1-1/16"	16.92	16.18	15.45	14.72
78376	.1575		4.00	54	27	16.92	16.18	15.45	14.72
78381	.1590	#21	4.04	2-1/8"	1-1/16"	17.27	16.53	15.78	15.02
78386	.1610	#20	4.09	2-1/8"	1-1/16"	17.27	16.53	15.78	15.02
78391	.1660	#19	4.22	2-1/8"	1-1/16"	17.40	16.64	15.89	15.13
78396	.1695	#18	4.30	2-1/8"	1-1/16"	17.49	16.73	15.97	15.22
78401	.1719	11/64"	4.37	2-1/8"	1-1/16"	17.61	16.84	16.08	15.31
78406	.1730	#17	4.39	2-3/16"	1-1/8"	18.34	17.53	16.74	15.94
78411	.1770	#16	4.49	2-3/16"	1-1/8"	18.51	17.71	16.90	16.10
78416	.1772		4.50	56	29	18.60	17.78	16.98	16.17
78421	.1800	#15	4.57	2-3/16"	1-1/8"	18.68	17.87	17.06	16.24
78426	.1820	#14	4.62	2-3/16"	1-1/8"	19.06	18.23	17.41	16.58
78431	.1850	#13	4.70	2-3/16"	1-1/8"	19.16	18.32	17.49	16.66
78436	.1875	3/16"	4.76	2-3/16"	1-1/8"	19.16	18.32	17.49	16.66
78441	.1890	#12	4.80	2-1/4"	1-3/16"	20.51	19.61	18.73	17.84
78446	.1910	#11	4.85	2-1/4"	1-3/16"	20.71	19.80	18.91	18.00
78451	.1935	#10	4.91	2-1/4"	1-3/16"	21.54	20.60	19.67	18.73
78456	.1960	#9	4.98	2-1/4"	1-3/16"	22.00	21.04	20.08	19.13
78461	.1969		5.00	57	30	22.11	21.15	20.19	19.23
78466	.1990	#8	5.05	2-1/4"	1-3/16"	22.26	21.29	20.32	19.35
78471	.2010	#7	5.10	2-1/4"	1-3/16"	22.83	21.84	20.84	19.85
78476	.2031	13/64"	5.16	2-1/4"	1-3/16"	23.59	22.56	21.54	20.51
78481	.2040	#6	5.18	2-3/8"	1-1/4"	23.71	22.68	21.65	20.62
78486	.2055	#5	5.22	2-3/8"	1-1/4"	23.82	22.78	21.75	20.71
78491	.2090	#4	5.31	2-3/8"	1-1/4"	24.17	23.12	22.07	21.02
78496	.2130	#3	5.41	2-3/8"	1-1/4"	24.54	23.47	22.41	21.34
78501	.2165		5.50	60	32	24.70	23.63	22.55	21.48

1120H - 3 Flute (continued)

.2188" - .5000"
(5.56mm - 12.70mm)

EDP#	$d^{\dagger}$ Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
78506	.2188	7/32"	5.56	2-3/8"	1-1/4"	24.88	23.80	22.63
78511	.2210	#2	5.61	2-7/16"	1-5/16"	25.42	24.32	23.20
78516	.2280	#1	5.79	2-7/16"	1-5/16"	25.52	24.41	23.31
78521	.2340	A	5.94	2-7/16"	1-5/16"	25.66	24.54	23.42
78526	.2344	15/64"	5.95	2-7/16"	1-5/16"	25.76	24.64	23.52
78531	.2362		6.00	64	35	25.83	24.71	23.59
78536	.2380	B	6.04	2-1/2"	1-3/8"	25.92	24.79	23.66
78541	.2420	C	6.15	2-1/2"	1-3/8"	26.09	24.96	23.83
78546	.2460	D	6.25	2-1/2"	1-3/8"	26.24	25.10	23.96
78551	.2500	1/4" / E	6.35	2-1/2"	1-3/8"	26.41	25.26	24.11
78556	.2559		6.50	67	37	29.23	27.97	26.70
78561	.2570	F	6.53	2-5/8"	1-7/16"	29.72	28.43	27.13
78566	.2610	G	6.63	2-5/8"	1-7/16"	30.09	28.78	27.47
78571	.2656	17/64"	6.75	2-5/8"	1-7/16"	30.60	29.27	27.93
78576	.2660	H	6.76	2-11/16"	1-1/2"	31.34	29.97	28.61
78581	.2720	I	6.91	2-11/16"	1-1/2"	31.65	30.27	28.89
78586	.2756		7.00	68	38	31.83	30.45	29.07
78591	.2770	J	7.03	2-11/16"	1-1/2"	32.07	30.68	29.29
78596	.2810	K	7.14	2-11/16"	1-1/2"	32.32	30.92	29.52
78601	.2812	9/32"	7.14	2-11/16"	1-1/2"	33.28	31.83	30.39
78606	.2900	L	7.37	2-3/4"	1-9/16"	34.33	32.83	31.35
78611	.2950	M	7.49	2-3/4"	1-9/16"	35.17	33.64	32.12
78616	.2953		7.50	70	40	35.17	33.64	32.12
78621	.2969	19/64"	7.54	2-3/4"	1-9/16"	35.17	33.64	32.12
78626	.3020	N	7.67	2-13/16"	1-5/8"	36.37	34.79	33.21
78631	.3125	5/16"	7.94	2-13/16"	1-5/8"	36.50	34.91	33.33
78636	.3150		8.00	75	43	38.77	37.09	35.40
78641	.3160	O	8.03	2-15/16"	1-11/16"	38.77	37.09	35.40
78646	.3230	P	8.20	2-15/16"	1-11/16"	38.77	37.09	35.40
78651	.3281	21/64"	8.33	2-15/16"	1-11/16"	40.25	38.50	36.74
78656	.3320	Q	8.43	3"	1-11/16"	41.07	39.28	37.50
78661	.3346		8.50	76	43	41.40	39.60	37.80
78666	.3390	R	8.61	3"	1-11/16"	42.52	40.66	38.82
78671	.3438	11/32"	8.73	3"	1-11/16"	44.08	42.16	40.24
78676	.3480	S	8.84	3-1/16"	1-3/4"	49.88	47.70	45.54
78681	.3543		9.00	78	44	50.15	47.96	45.79
78686	.3580	T	9.09	3-1/16"	1-3/4"	50.28	48.10	45.92
78691	.3594	23/64"	9.13	3-1/16"	1-3/4"	50.63	48.42	46.23
78696	.3680	U	9.35	3-1/8"	1-13/16"	53.52	51.19	48.87
78701	.3740		9.50	79	46	54.30	51.94	49.58
78706	.3750	3/8"	9.52	3-1/8"	1-13/16"	54.30	51.94	49.58
78711	.3770	V	9.57	3-1/4"	1-7/8"	54.85	52.47	50.08
78716	.3860	W	9.80	3-1/4"	1-7/8"	57.91	55.39	52.87
78721	.3906	25/64"	9.92	3-1/4"	1-7/8"	58.62	56.08	53.53
78726	.3937		10.00	84	49	60.46	57.82	55.20
78731	.3970	X	10.08	3-5/16"	1-15/16"	62.04	59.34	56.64
78736	.4040	Y	10.26	3-5/16"	1-15/16"	62.44	59.73	57.01
78741	.4062	13/32"	10.32	3-5/16"	1-15/16"	64.43	61.63	58.82
78746	.4130	Z	10.49	3-3/8"	2"	65.00	62.17	59.35
78751	.4134		10.50	86	51	65.00	62.17	59.35
78756	.4219	27/64"	10.72	3-3/8"	2"	65.67	62.81	59.96
78761	.4331		11.00	87	52	69.97	66.92	63.89
78766	.4375	7/16"	11.11	3-7/16"	2-1/16"	69.97	66.92	63.89
78771	.4528		11.50	91	54	75.24	71.97	68.70
78776	.4531	29/64"	11.51	3-9/16"	2-1/8"	75.24	71.97	68.70
78781	.4688	15/32"	11.91	3-5/8"	2-1/8"	79.14	75.70	72.26
78786	.4724		12.00	94	56	79.36	75.91	72.46
78791	.4844	31/64"	12.30	3-11/16"	2-3/16"	79.60	76.14	72.68
78796	.4921		12.50	95	56	80.84	77.32	73.81
78801	.5000	1/2"	12.70	3-3/4"	2-1/4"	81.24	77.71	74.18

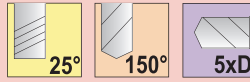
1100 - 3 Flute

Technical information: page 204-207

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)

.1094" - .2165"
(2.78mm - 5.50mm)



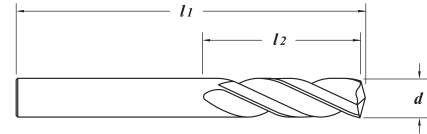
DRILLS

Solid submicron grain carbide drill
Near reamer finishes
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: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d [†]		l ₁	l ₂	1-11	12-24	25-49	50-100
	Decimal	Metric						
90275	.1094	7/64"	2.78	2-1/4"	1-1/4"	10.99	10.51	10.04
90280	.1100	#35	2.79	2-1/4"	1-1/4"	11.10	10.62	10.13
90285	.1110	#34	2.82	2-1/4"	1-1/4"	11.24	10.75	10.26
90290	.1130	#33	2.87	2-1/4"	1-1/4"	11.43	10.93	10.43
90295	.1160	#32	2.95	2-1/4"	1-1/4"	11.58	11.08	10.57
90300	.1181		3.00	57	32	11.67	11.16	10.65
90305	.1200	#31	3.05	2-1/4"	1-1/4"	11.75	11.24	10.73
90310	.1250	1/8"	3.17	2-1/4"	1-1/4"	11.91	11.39	10.87
90315	.1285	#30	3.26	2-1/4"	1-1/4"	12.20	11.67	11.14
90320	.1360	#29	3.45	2-1/2"	1-3/8"	12.58	12.03	11.49
90325	.1378		3.50	63	35	12.99	12.43	11.86
90330	.1405	#28	3.57	2-1/2"	1-3/8"	13.14	12.56	11.99
90335	.1406	9/64"	3.57	2-1/2"	1-3/8"	13.29	12.71	12.14
90340	.1440	#27	3.66	2-1/2"	1-3/8"	13.81	13.21	12.62
90345	.1470	#26	3.73	2-1/2"	1-3/8"	14.00	13.38	12.78
90350	.1495	#25	3.80	2-1/2"	1-3/8"	14.12	13.51	12.90
90355	.1520	#24	3.86	2-1/2"	1-3/8"	14.14	13.53	12.92
90360	.1540	#23	3.91	2-1/2"	1-3/8"	14.28	13.66	13.04
90365	.1562	5/32"	3.97	2-1/2"	1-3/8"	14.34	13.72	13.09
90370	.1570	#22	3.99	2-1/2"	1-3/8"	15.25	14.58	13.93
90375	.1575		4.00	63	35	15.25	14.58	13.93
90380	.1590	#21	4.04	2-1/2"	1-3/8"	15.61	14.93	14.25
90385	.1610	#20	4.09	2-1/2"	1-3/8"	15.61	14.93	14.25
90390	.1660	#19	4.22	2-3/4"	1-5/8"	15.74	15.05	14.36
90395	.1695	#18	4.30	2-3/4"	1-5/8"	15.84	15.15	14.47
90400	.1719	11/64"	4.37	2-3/4"	1-5/8"	15.94	15.25	14.56
90405	.1730	#17	4.39	2-3/4"	1-5/8"	16.67	15.94	15.23
90410	.1770	#16	4.49	2-3/4"	1-5/8"	16.85	16.12	15.38
90415	.1772		4.50	70	41	16.93	16.19	15.45
90420	.1800	#15	4.57	2-3/4"	1-5/8"	17.01	16.28	15.54
90425	.1820	#14	4.62	2-3/4"	1-5/8"	17.40	16.64	15.89
90430	.1850	#13	4.70	2-3/4"	1-5/8"	17.49	16.73	15.97
90435	.1875	3/16"	4.76	2-3/4"	1-5/8"	17.49	16.73	15.97
90440	.1890	#12	4.80	2-3/4"	1-5/8"	17.63	16.86	16.10
90445	.1910	#11	4.85	2-3/4"	1-5/8"	17.83	17.05	16.28
90450	.1935	#10	4.91	2-3/4"	1-5/8"	18.67	17.86	17.05
90455	.1960	#9	4.98	3"	1-3/4"	19.13	18.29	17.46
90460	.1969		5.00	76	44	19.24	18.41	17.57
90465	.1990	#8	5.05	3"	1-3/4"	19.38	18.53	17.69
90470	.2010	#7	5.10	3"	1-3/4"	19.96	19.09	18.22
90475	.2031	13/64"	5.16	3"	1-3/4"	20.72	19.81	18.92
90480	.2040	#6	5.18	3"	1-3/4"	20.83	19.93	19.02
90485	.2055	#5	5.22	3"	1-3/4"	20.94	20.02	19.12
90490	.2090	#4	5.31	3"	1-3/4"	21.29	20.36	19.44
90495	.2130	#3	5.41	3"	1-3/4"	21.66	20.72	19.78
90500	.2165		5.50	76	44	21.83	20.88	19.93

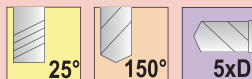
1100 - 3 Flute (continued)

.2188" - .5000"
(5.56mm - 12.70mm)

EDP#	$d^{\dagger}$ Diameter			l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric						
90505	.2188	7/32"	5.56	3"	1-3/4"	22.01	21.05	20.09	19.14
90510	.2210	#2	5.61	3"	1-3/4"	22.55	21.57	20.58	19.60
90515	.2280	#1	5.79	3"	1-3/4"	22.65	21.66	20.69	19.70
90520	.2340	A	5.94	3-1/4"	2"	22.90	21.90	20.91	19.92
90525	.2344	15/64"	5.95	3-1/4"	2"	22.99	22.00	21.00	20.00
90530	.2362		6.00	82	50	23.07	22.07	21.06	20.06
90535	.2380	B	6.04	3-1/4"	2"	23.17	22.16	21.15	20.14
90540	.2420	C	6.15	3-1/4"	2"	23.33	22.31	21.30	20.28
90545	.2460	D	6.25	3-1/4"	2"	23.49	22.47	21.46	20.43
90550	.2500	1/4" / E	6.35	3-1/4"	2"	23.66	22.63	21.60	20.57
90555	.2559		6.50	82	50	24.24	23.19	22.13	21.08
90560	.2570	F	6.53	3-1/4"	2"	24.74	23.67	22.59	21.52
90565	.2610	G	6.63	3-1/2"	2-1/8"	26.04	24.91	23.77	22.64
90570	.2656	17/64"	6.75	3-1/2"	2-1/8"	26.55	25.40	24.24	23.09
90575	.2660	H	6.76	3-1/2"	2-1/8"	27.32	26.14	24.95	23.75
90580	.2720	I	6.91	3-1/2"	2-1/8"	27.65	26.45	25.25	24.04
90585	.2756		7.00	88	54	27.85	26.64	25.43	24.22
90590	.2770	J	7.03	3-1/2"	2-1/8"	28.09	26.87	25.65	24.43
90595	.2810	K	7.14	3-1/2"	2-1/8"	28.35	27.11	25.89	24.65
90600	.2812	9/32"	7.14	3-1/2"	2-1/8"	29.36	28.08	26.81	25.53
90605	.2900	L	7.37	3-1/2"	2-1/8"	30.45	29.13	27.80	26.48
90610	.2950	M	7.49	3-3/4"	2-3/8"	32.32	30.92	29.52	28.11
90615	.2953		7.50	95	60	32.32	30.92	29.52	28.11
90620	.2969	19/64"	7.54	3-3/4"	2-3/8"	32.32	30.92	29.52	28.11
90625	.3020	N	7.67	3-3/4"	2-3/8"	32.56	31.15	29.73	28.32
90630	.3125	5/16"	7.94	3-3/4"	2-3/8"	32.61	31.20	29.78	28.36
90635	.3150		8.00	95	60	35.00	33.48	31.95	30.43
90640	.3160	O	8.03	3-3/4"	2-3/8"	35.00	33.48	31.95	30.43
90645	.3230	P	8.20	3-3/4"	2-3/8"	35.00	33.48	31.95	30.43
90650	.3281	21/64"	8.33	4"	2-1/2"	36.61	35.02	33.43	31.83
90655	.3320	Q	8.43	4"	2-1/2"	37.47	35.84	34.22	32.58
90660	.3346		8.50	101	63	37.80	36.16	34.52	32.87
90665	.3390	R	8.61	4"	2-1/2"	38.98	37.28	35.59	33.89
90670	.3438	11/32"	8.73	4"	2-1/2"	40.59	38.82	37.07	35.30
90675	.3480	S	8.84	4"	2-1/2"	41.95	40.13	38.30	36.48
90680	.3543		9.00	101	63	42.23	40.39	38.56	36.72
90685	.3580	T	9.09	4-1/4"	2-3/4"	42.58	40.73	38.88	37.02
90690	.3594	23/64"	9.13	4-1/4"	2-3/4"	42.91	41.05	39.18	37.32
90695	.3680	U	9.35	4-1/4"	2-3/4"	45.83	43.84	41.85	39.85
90700	.3740		9.50	107	70	46.61	44.58	42.56	40.53
90705	.3750	3/8"	9.52	4-1/4"	2-3/4"	46.61	44.58	42.56	40.53
90710	.3770	V	9.57	4-1/4"	2-3/4"	48.39	46.29	44.18	42.08
90715	.3860	W	9.80	4-1/2"	2-7/8"	51.52	49.29	47.04	44.80
90720	.3906	25/64"	9.92	4-1/2"	2-7/8"	52.28	50.00	47.74	45.46
90725	.3937		10.00	114	73	54.18	51.82	49.47	47.11
90730	.3970	X	10.08	4-1/2"	2-7/8"	55.79	53.36	50.94	48.51
90735	.4040	Y	10.26	4-1/2"	2-7/8"	56.21	53.77	51.32	48.88
90740	.4062	13/32"	10.32	4-1/2"	2-7/8"	58.26	55.72	53.20	50.66
90745	.4130	Z	10.49	4-1/2"	2-7/8"	58.85	56.30	53.74	51.18
90750	.4134		10.50	114	73	58.85	56.30	53.74	51.18
90755	.4219	27/64"	10.72	4-1/2"	2-7/8"	59.53	56.94	54.35	51.76
90760	.4331		11.00	114	73	64.64	61.83	59.02	56.20
90765	.4375	7/16"	11.11	4-1/2"	2-7/8"	64.64	61.83	59.02	56.20
90770	.4528		11.50	120	76	70.12	67.07	64.02	60.98
90775	.4531	29/64"	11.51	4-3/4"	3"	70.12	67.07	64.02	60.98
90780	.4688	15/32"	11.91	4-3/4"	3"	74.18	70.96	67.74	64.51
90785	.4724		12.00	120	76	74.41	71.18	67.94	64.71
90790	.4844	31/64"	12.30	4-3/4"	3"	74.41	71.18	67.94	64.71
90795	.4921		12.50	120	76	76.39	73.07	69.74	66.42
90800	.5000	1/2"	12.70	4-3/4"	3"	76.39	73.07	69.74	66.42

d	+0.000" -0.005" (+0.000 -0.127mm)	
l ₁	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)

.1094" - .2165"
(2.78mm - 5.50mm)



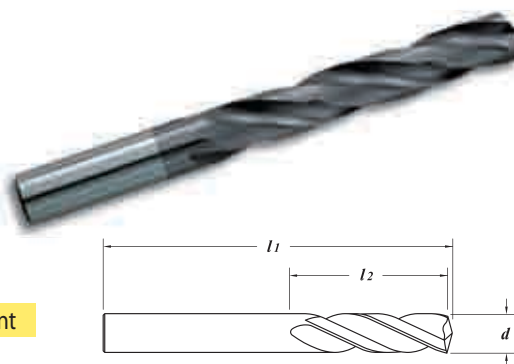
Balinit® HARDLUBE Coated

Solid submicron grain carbide drill
Near reamer finishes
Excellent heat resistance and lubricity
Up to 40% faster than uncoated
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: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d †		l ₁	l ₂	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric						
90276	.1094	7/64"	2.78	2-1/4"	1-1/4"	12.66	12.11	11.55
90281	.1100	#35	2.79	2-1/4"	1-1/4"	12.77	12.22	11.66
90286	.1110	#34	2.82	2-1/4"	1-1/4"	12.92	12.36	11.79
90291	.1130	#33	2.87	2-1/4"	1-1/4"	13.10	12.53	11.96
90296	.1160	#32	2.95	2-1/4"	1-1/4"	13.24	12.67	12.08
90301	.1181		3.00	57	32	13.34	12.76	12.18
90306	.1200	#31	3.05	2-1/4"	1-1/4"	13.45	12.86	12.28
90311	.1250	1/8"	3.17	2-1/4"	1-1/4"	13.57	12.98	12.40
90316	.1285	#30	3.26	2-1/4"	1-1/4"	13.87	13.27	12.67
90321	.1360	#29	3.45	2-1/2"	1-3/8"	14.27	13.64	13.03
90326	.1378		3.50	63	35	14.66	14.03	13.38
90331	.1405	#28	3.57	2-1/2"	1-3/8"	14.82	14.18	13.53
90336	.1406	9/64"	3.57	2-1/2"	1-3/8"	14.96	14.30	13.66
90341	.1440	#27	3.66	2-1/2"	1-3/8"	15.49	14.81	14.14
90346	.1470	#26	3.73	2-1/2"	1-3/8"	15.67	14.99	14.31
90351	.1495	#25	3.80	2-1/2"	1-3/8"	15.80	15.11	14.42
90356	.1520	#24	3.86	2-1/2"	1-3/8"	15.82	15.13	14.45
90361	.1540	#23	3.91	2-1/2"	1-3/8"	15.95	15.26	14.57
90366	.1562	5/32"	3.97	2-1/2"	1-3/8"	16.02	15.32	14.62
90371	.1570	#22	3.99	2-1/2"	1-3/8"	16.92	16.18	15.45
90376	.1575		4.00	63	35	16.92	16.18	15.45
90381	.1590	#21	4.04	2-1/2"	1-3/8"	17.30	16.55	15.79
90386	.1610	#20	4.09	2-1/2"	1-3/8"	17.30	16.55	15.79
90391	.1660	#19	4.22	2-3/4"	1-5/8"	17.41	16.65	15.89
90396	.1695	#18	4.30	2-3/4"	1-5/8"	17.51	16.75	16.00
90401	.1719	11/64"	4.37	2-3/4"	1-5/8"	17.61	16.84	16.08
90406	.1730	#17	4.39	2-3/4"	1-5/8"	18.34	17.53	16.74
90411	.1770	#16	4.49	2-3/4"	1-5/8"	18.52	17.72	16.91
90416	.1772		4.50	70	41	18.61	17.79	16.98
90421	.1800	#15	4.57	2-3/4"	1-5/8"	18.69	17.88	17.07
90426	.1820	#14	4.62	2-3/4"	1-5/8"	19.07	18.24	17.42
90431	.1850	#13	4.70	2-3/4"	1-5/8"	19.16	18.32	17.49
90436	.1875	3/16"	4.76	2-3/4"	1-5/8"	19.16	18.32	17.49
90441	.1890	#12	4.80	2-3/4"	1-5/8"	20.50	19.60	18.72
90446	.1910	#11	4.85	2-3/4"	1-5/8"	20.70	19.79	18.90
90451	.1935	#10	4.91	2-3/4"	1-5/8"	21.54	20.60	19.67
90456	.1960	#9	4.98	3"	1-3/4"	22.00	21.04	20.08
90461	.1969		5.00	76	44	22.10	21.14	20.18
90466	.1990	#8	5.05	3"	1-3/4"	22.25	21.28	20.31
90471	.2010	#7	5.10	3"	1-3/4"	22.83	21.84	20.84
90476	.2031	13/64"	5.16	3"	1-3/4"	23.58	22.55	21.53
90481	.2040	#6	5.18	3"	1-3/4"	23.71	22.68	21.65
90486	.2055	#5	5.22	3"	1-3/4"	23.81	22.77	21.74
90491	.2090	#4	5.31	3"	1-3/4"	24.17	23.12	22.07
90496	.2130	#3	5.41	3"	1-3/4"	24.54	23.47	22.41
90501	.2165		5.50	76	44	24.70	23.63	22.55

1100H - 3 Flute (continued)

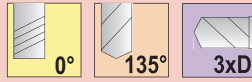
.2188" - .5000"
(5.56mm - 12.70mm)

EDP#	$d^{\dagger}$ Diameter			l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric						
90506	.2188	7/32"	5.56	3"	1-3/4"	24.88	23.80	22.71	21.63
90511	.2210	#2	5.61	3"	1-3/4"	25.41	24.30	23.20	22.09
90516	.2280	#1	5.79	3"	1-3/4"	25.52	24.41	23.31	22.19
90521	.2340	A	5.94	3-1/4"	2"	25.86	24.74	23.62	22.50
90526	.2344	15/64"	5.95	3-1/4"	2"	25.96	24.82	23.70	22.57
90531	.2362		6.00	82	50	26.04	24.91	23.77	22.64
90536	.2380	B	6.04	3-1/4"	2"	26.14	25.00	23.86	22.72
90541	.2420	C	6.15	3-1/4"	2"	26.29	25.15	24.00	22.86
90546	.2460	D	6.25	3-1/4"	2"	26.47	25.31	24.17	23.02
90551	.2500	1/4" / E	6.35	3-1/4"	2"	26.62	25.47	24.30	23.15
90556	.2559		6.50	82	50	29.69	28.40	27.11	25.82
90561	.2570	F	6.53	3-1/4"	2"	30.17	28.86	27.55	26.24
90566	.2610	G	6.63	3-1/2"	2-1/8"	31.48	30.11	28.75	27.37
90571	.2656	17/64"	6.75	3-1/2"	2-1/8"	31.99	30.60	29.21	27.82
90576	.2660	H	6.76	3-1/2"	2-1/8"	32.75	31.32	29.90	28.48
90581	.2720	I	6.91	3-1/2"	2-1/8"	33.09	31.66	30.21	28.78
90586	.2756		7.00	88	54	33.30	31.86	30.41	28.95
90591	.2770	J	7.03	3-1/2"	2-1/8"	33.55	32.09	30.63	29.17
90596	.2810	K	7.14	3-1/2"	2-1/8"	33.80	32.33	30.86	29.39
90601	.2812	9/32"	7.14	3-1/2"	2-1/8"	34.82	33.30	31.79	30.27
90606	.2900	L	7.37	3-1/2"	2-1/8"	35.90	34.34	32.78	31.22
90611	.2950	M	7.49	3-3/4"	2-3/8"	37.77	36.13	34.49	32.84
90616	.2953		7.50	95	60	37.77	36.13	34.49	32.84
90621	.2969	19/64"	7.54	3-3/4"	2-3/8"	37.77	36.13	34.49	32.84
90626	.3020	N	7.67	3-3/4"	2-3/8"	38.02	36.37	34.72	33.06
90631	.3125	5/16"	7.94	3-3/4"	2-3/8"	38.05	36.40	34.75	33.09
90636	.3150		8.00	95	60	40.44	38.68	36.92	35.16
90641	.3160	O	8.03	3-3/4"	2-3/8"	40.44	38.68	36.92	35.16
90646	.3230	P	8.20	3-3/4"	2-3/8"	40.44	38.68	36.92	35.16
90651	.3281	21/64"	8.33	4"	2-1/2"	42.05	40.22	38.39	36.57
90656	.3320	Q	8.43	4"	2-1/2"	42.91	41.05	39.18	37.32
90661	.3346		8.50	101	63	43.24	41.36	39.48	37.61
90666	.3390	R	8.61	4"	2-1/2"	44.43	42.49	40.57	38.64
90671	.3438	11/32"	8.73	4"	2-1/2"	46.03	44.03	42.03	40.03
90676	.3480	S	8.84	4"	2-1/2"	48.87	46.75	44.62	42.49
90681	.3543		9.00	101	63	49.14	47.01	44.87	42.73
90686	.3580	T	9.09	4-1/4"	2-3/4"	50.86	48.64	46.44	44.22
90691	.3594	23/64"	9.13	4-1/4"	2-3/4"	51.18	48.95	46.73	44.50
90696	.3680	U	9.35	4-1/4"	2-3/4"	54.09	51.74	49.39	47.04
90701	.3740		9.50	107	70	54.88	52.50	50.11	47.73
90706	.3750	3/8"	9.52	4-1/4"	2-3/4"	54.88	52.50	50.11	47.73
90711	.3770	V	9.57	4-1/4"	2-3/4"	57.10	54.61	52.14	49.65
90716	.3860	W	9.80	4-1/2"	2-7/8"	60.23	57.61	54.98	52.37
90721	.3906	25/64"	9.92	4-1/2"	2-7/8"	60.99	58.33	55.68	53.03
90726	.3937		10.00	114	73	62.88	60.14	57.41	54.67
90731	.3970	X	10.08	4-1/2"	2-7/8"	64.49	61.68	58.88	56.08
90736	.4040	Y	10.26	4-1/2"	2-7/8"	64.92	62.10	59.27	56.45
90741	.4062	13/32"	10.32	4-1/2"	2-7/8"	66.97	64.05	61.14	58.23
90746	.4130	Z	10.49	4-1/2"	2-7/8"	67.55	64.62	61.67	58.74
90751	.4134		10.50	114	73	67.55	64.62	61.67	58.74
90756	.4219	27/64"	10.72	4-1/2"	2-7/8"	68.23	65.27	62.30	59.33
90761	.4331		11.00	114	73	73.33	70.14	66.96	63.76
90766	.4375	7/16"	11.11	4-1/2"	2-7/8"	73.33	70.14	66.96	63.76
90771	.4528		11.50	120	76	78.83	75.40	71.98	68.55
90776	.4531	29/64"	11.51	4-3/4"	3"	78.83	75.40	71.98	68.55
90781	.4688	15/32"	11.91	4-3/4"	3"	82.90	79.29	75.69	72.08
90786	.4724		12.00	120	76	83.11	79.50	75.88	72.27
90791	.4844	31/64"	12.30	4-3/4"	3"	83.11	79.50	75.88	72.27
90796	.4921		12.50	120	76	85.09	81.39	77.69	74.00
90801	.5000	1/2"	12.70	4-3/4"	3"	85.09	81.39	77.69	74.00

TOLERANCES

d	+0.000" -0.005" (+0.000 -0.127mm)	
l ₁	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)

.0625" - .1660"
(1.59mm - 4.22mm)



Hard Metal

Solid submicron grain carbide drill

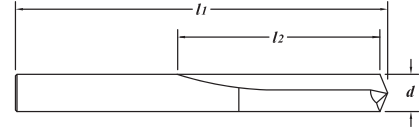
Straight flute design provides excellent rigidity

Materials 40 Rc and higher

Recommended for high nickel, cobalt based and powdered metals

Live tooling recommended on lathe processes

Shank tolerance: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d †			l ₁	l ₂				
	Decimal	Diameter	Metric	Overall Length	Flute Length	1-11	12-24	25-49	50-100
59165	.0625	1/16"	1.59	1-5/8"	5/8"	8.46	8.09	7.72	7.35
59180	.0700	#50	1.78	1-11/16"	3/4"	8.46	8.09	7.72	7.35
59185	.0730	#49	1.85	1-11/16"	3/4"	8.46	8.09	7.72	7.35
59190	.0760	#48	1.93	1-11/16"	3/4"	8.46	8.09	7.72	7.35
59195	.0781	5/64"	1.98	1-11/16"	3/4"	8.46	8.09	7.72	7.35
59200	.0785	#47	1.99	1-3/4"	7/8"	8.46	8.09	7.72	7.35
39000	.0787		2.00	50	22	8.46	8.09	7.72	7.35
59210	.0810	#46	2.06	2"	7/8"	8.46	8.09	7.72	7.35
59215	.0820	#45	2.08	2"	7/8"	8.46	8.09	7.72	7.35
59220	.0860	#44	2.18	2"	7/8"	8.46	8.09	7.72	7.35
59225	.0890	#43	2.26	2"	7/8"	8.46	8.09	7.72	7.35
59230	.0935	#42	2.37	2"	7/8"	8.46	8.09	7.72	7.35
59235	.0938	3/32"	2.38	2"	7/8"	8.46	8.09	7.72	7.35
59240	.0960	#41	2.44	2"	7/8"	9.63	9.21	8.79	8.37
59245	.0980	#40	2.49	2"	7/8"	9.63	9.21	8.79	8.37
39050	.0984		2.50	50	22	9.63	9.21	8.79	8.37
59255	.0995	#39	2.53	2"	7/8"	9.63	9.21	8.79	8.37
59260	.1015	#38	2.58	2"	7/8"	9.63	9.21	8.79	8.37
59265	.1040	#37	2.64	2"	7/8"	9.63	9.21	8.79	8.37
59270	.1065	#36	2.71	2"	7/8"	9.63	9.21	8.79	8.37
59275	.1094	7/64"	2.78	2"	1"	9.63	9.21	8.79	8.37
59280	.1100	#35	2.79	2"	1"	10.02	9.58	9.14	8.70
59285	.1110	#34	2.82	2"	1"	10.02	9.58	9.14	8.70
59290	.1130	#33	2.87	2"	1"	10.02	9.58	9.14	8.70
59295	.1160	#32	2.95	2"	1"	10.02	9.58	9.14	8.70
39100	.1181		3.00	50	25	10.02	9.58	9.14	8.70
59305	.1200	#31	3.05	2"	1"	10.02	9.58	9.14	8.70
59310	.1250	1/8"	3.17	2"	1"	9.24	8.83	8.43	8.03
59315	.1285	#30	3.26	2"	1"	10.90	10.42	9.95	9.47
59320	.1360	#29	3.45	2"	1"	10.90	10.42	9.95	9.47
39150	.1378		3.50	50	25	10.90	10.42	9.95	9.47
59330	.1405	#28	3.57	2"	1"	10.90	10.42	9.95	9.47
59335	.1406	9/64"	3.57	2"	1"	10.90	10.42	9.95	9.47
59340	.1440	#27	3.66	2"	1"	11.18	10.69	10.21	9.72
59345	.1470	#26	3.73	2"	1"	11.75	11.24	10.73	10.22
59350	.1495	#25	3.80	2"	1"	11.75	11.24	10.73	10.22
59355	.1520	#24	3.86	2"	1"	11.75	11.24	10.73	10.22
59360	.1540	#23	3.91	2"	1"	11.75	11.24	10.73	10.22
59365	.1562	5/32"	3.97	2-1/2"	1-1/8"	11.75	11.24	10.73	10.22
59370	.1570	#22	3.99	2-1/2"	1-1/8"	12.73	12.18	11.63	11.07
39200	.1575		4.00	63	28	12.73	12.18	11.63	11.07
59380	.1590	#21	4.04	2-1/2"	1-1/8"	13.02	12.46	11.89	11.33
59385	.1610	#20	4.09	2-1/2"	1-1/8"	13.02	12.46	11.89	11.33
59390	.1660	#19	4.22	2-1/2"	1-1/8"	13.52	12.93	12.34	11.75

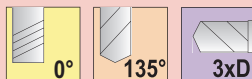
1500 - 2 Flute (continued)

.1695" - .5000"
(4.30mm - 12.70mm)

EDP#	d^+ Diameter		Metric	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal								
59395	.1695	#18	4.30	2-1/2"	1-3/16"	13.52	12.93	12.34	11.75
59400	.1719	11/64"	4.37	2-1/2"	1-3/16"	13.52	12.93	12.34	11.75
59405	.1730	#17	4.39	2-1/2"	1-3/16"	13.81	13.21	12.62	12.01
59410	.1770	#16	4.49	2-1/2"	1-3/16"	13.81	13.21	12.62	12.01
39250	.1772		4.50	63	28	13.81	13.21	12.62	12.01
59420	.1800	#15	4.57	2-1/2"	1-3/16"	13.81	13.21	12.62	12.01
59425	.1820	#14	4.62	2-1/2"	1-3/16"	14.58	13.95	13.31	12.68
59430	.1850	#13	4.70	2-1/2"	1-3/16"	14.58	13.95	13.31	12.68
59435	.1875	3/16"	4.76	2-1/2"	1-3/16"	14.01	13.40	12.79	12.18
59440	.1890	#12	4.80	2-1/2"	1-3/16"	14.49	13.85	13.23	12.59
59445	.1910	#11	4.85	2-1/2"	1-3/16"	14.49	13.85	13.23	12.59
59450	.1935	#10	4.91	2-1/2"	1-1/4"	15.34	14.67	14.01	13.34
59455	.1960	#9	4.98	2-1/2"	1-1/4"	15.34	14.67	14.01	13.34
39300	.1969		5.00	63	32	15.34	14.67	14.01	13.34
59465	.1990	#8	5.05	2-1/2"	1-1/4"	15.85	15.16	14.47	13.78
59470	.2010	#7	5.10	2-1/2"	1-1/4"	15.85	15.16	14.47	13.78
59475	.2031	13/64"	5.16	2-1/2"	1-1/4"	15.85	15.16	14.47	13.78
59480	.2040	#6	5.18	2-1/2"	1-1/4"	16.72	16.00	15.27	14.54
59485	.2055	#5	5.22	2-1/2"	1-1/4"	16.72	16.00	15.27	14.54
59490	.2090	#4	5.31	2-1/2"	1-1/4"	16.72	16.00	15.27	14.54
59495	.2130	#3	5.41	2-1/2"	1-1/4"	16.72	16.00	15.27	14.54
39350	.2165		5.50	63	32	16.72	16.00	15.27	14.54
59505	.2188	7/32"	5.56	2-1/2"	1-1/2"	16.72	16.00	15.27	14.54
59510	.2210	#2	5.61	2-1/2"	1-1/2"	17.89	17.11	16.33	15.56
59515	.2280	#1	5.79	2-1/2"	1-1/2"	17.89	17.11	16.33	15.56
59525	.2344	15/64"	5.95	2-1/2"	1-1/2"	19.93	19.06	18.19	17.33
39400	.2362		6.00	63	38	19.93	19.06	18.19	17.33
59550	.2500	1/4"	6.35	2-1/2"	1-1/2"	18.76	17.95	17.13	16.32
39450	.2559		6.50	63	38	22.74	21.76	20.77	19.78
59570	.2656	17/64"	6.75	2-1/2"	1-1/2"	22.74	21.76	20.77	19.78
39500	.2756		7.00	63	38	23.33	22.31	21.30	20.28
59600	.2812	9/32"	7.14	2-1/2"	1-1/2"	23.33	22.31	21.30	20.28
39520	.2953		7.50	63	41	24.49	23.43	22.36	21.30
59620	.2969	19/64"	7.54	2-1/2"	1-5/8"	24.49	23.43	22.36	21.30
59630	.3125	5/16"	7.94	2-1/2"	1-5/8"	24.49	23.43	22.36	21.30
39540	.3150		8.00	63	41	25.77	24.65	23.54	22.41
59650	.3281	21/64"	8.33	3"	1-5/8"	26.53	25.38	24.22	23.07
39560	.3346		8.50	76	41	29.64	28.35	27.06	25.77
59670	.3438	11/32"	8.73	3"	1-5/8"	29.64	28.35	27.06	25.77
39580	.3543		9.00	76	41	32.18	30.77	29.38	27.98
59690	.3594	23/64"	9.13	3"	1-3/4"	32.18	30.77	29.38	27.98
39600	.3740		9.50	76	41	35.09	33.56	32.04	30.51
59705	.3750	3/8"	9.52	3"	1-3/4"	35.09	33.56	32.04	30.51
59720	.3906	25/64"	9.92	3"	1-3/4"	39.64	37.92	36.20	34.48
39620	.3937		10.00	76	44	39.64	37.92	36.20	34.48
59740	.4062	13/32"	10.32	3"	1-3/4"	44.31	42.39	40.46	38.53
39640	.4134		10.50	76	44	46.37	44.36	42.34	40.32
59755	.4219	27/64"	10.72	3"	1-3/4"	48.80	46.68	44.55	42.43
39660	.4331		11.00	76	44	49.67	47.51	45.35	43.19
59765	.4375	7/16"	11.11	3"	1-3/4"	49.67	47.51	45.35	43.19
39680	.4528		11.50	76	44	51.11	48.88	46.66	44.44
59775	.4531	29/64"	11.51	3"	1-3/4"	52.08	49.82	47.56	45.29
59780	.4688	15/32"	11.91	3"	1-3/4"	52.08	49.82	47.56	45.29
39700	.4724		12.00	76	44	52.08	49.82	47.56	45.29
59790	.4844	31/64"	12.30	3"	1-3/4"	52.08	49.82	47.56	45.29
39720	.4921		12.50	76	44	53.26	50.94	48.63	46.31
59800	.5000	1/2"	12.70	3"	1-3/4"	53.26	50.94	48.63	46.31

d	+0.000" -0.005" (+0.000 -0.127mm)	
l ₁	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)
l ₂	≤ 1/8"	+0.125" -0.062" (+3.175 -1.588mm)
	> 1/8"	+0.125" -0.125" (+3.175 -3.175mm)

.0625" - .1660"
(1.59mm - 4.22mm)



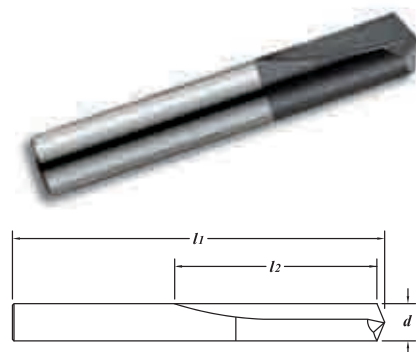
Hard Metal - *Balinit*® HARDLUBE Coated

Solid submicron grain carbide drill
Straight flute design provides excellent rigidity
Materials 40 Rc and higher
Excellent heat resistance and lubricity
Up to 40% faster than uncoated

Recommended for high nickel, cobalt based and powdered metals

Live tooling recommended on lathe processes

Shank tolerance: -.0001" -.0004" (-.0025 / -.0100mm)



EDP#	d † Diameter		l ₁ Overall Length	l ₂ Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric						
59166	.0625	1/16"	1.59	1-5/8"	5/8"	10.14	9.70	9.26
59181	.0700	#50	1.78	1-11/16"	3/4"	10.14	9.70	9.26
59186	.0730	#49	1.85	1-11/16"	3/4"	10.14	9.70	9.26
59191	.0760	#48	1.93	1-11/16"	3/4"	10.14	9.70	9.26
59196	.0781	5/64"	1.98	1-11/16"	3/4"	10.14	9.70	9.26
59201	.0785	#47	1.99	1-3/4"	7/8"	10.14	9.70	9.26
39001	.0787		2.00	50	22	10.14	9.70	9.26
59211	.0810	#46	2.06	2"	7/8"	10.14	9.70	9.26
59216	.0820	#45	2.08	2"	7/8"	10.14	9.70	9.26
59221	.0860	#44	2.18	2"	7/8"	10.14	9.70	9.26
59226	.0890	#43	2.26	2"	7/8"	10.14	9.70	9.26
59231	.0935	#42	2.37	2"	7/8"	10.14	9.70	9.26
59236	.0938	3/32"	2.38	2"	7/8"	10.14	9.70	9.26
59241	.0960	#41	2.44	2"	7/8"	11.29	10.81	10.32
59246	.0980	#40	2.49	2"	7/8"	11.29	10.81	10.32
39051	.0984		2.50	50	22	11.29	10.81	10.32
59256	.0995	#39	2.53	2"	7/8"	11.29	10.81	10.32
59261	.1015	#38	2.58	2"	7/8"	11.29	10.81	10.32
59266	.1040	#37	2.64	2"	7/8"	11.29	10.81	10.32
59271	.1065	#36	2.71	2"	7/8"	11.29	10.81	10.32
59276	.1094	7/64"	2.78	2"	1"	11.29	10.81	10.32
59281	.1100	#35	2.79	2"	1"	11.70	11.19	10.68
59286	.1110	#34	2.82	2"	1"	11.70	11.19	10.68
59291	.1130	#33	2.87	2"	1"	11.70	11.19	10.68
59296	.1160	#32	2.95	2"	1"	11.70	11.19	10.68
39101	.1181		3.00	50	25	11.70	11.19	10.68
59306	.1200	#31	3.05	2"	1"	11.70	11.19	10.68
59311	.1250	1/8"	3.17	2"	1"	10.91	10.43	9.96
59316	.1285	#30	3.26	2"	1"	12.56	12.01	11.47
59321	.1360	#29	3.45	2"	1"	12.56	12.01	11.47
39151	.1378		3.50	50	25	12.56	12.01	11.47
59331	.1405	#28	3.57	2"	1"	12.56	12.01	11.47
59336	.1406	9/64"	3.57	2"	1"	12.56	12.01	11.47
59341	.1440	#27	3.66	2"	1"	12.84	12.28	11.73
59346	.1470	#26	3.73	2"	1"	13.45	12.86	12.28
59351	.1495	#25	3.80	2"	1"	13.45	12.86	12.28
59356	.1520	#24	3.86	2"	1"	13.45	12.86	12.28
59361	.1540	#23	3.91	2"	1"	13.45	12.86	12.28
59366	.1562	5/32"	3.97	2-1/2"	1-1/8"	13.45	12.86	12.28
59371	.1570	#22	3.99	2-1/2"	1-1/8"	14.40	13.78	13.16
39201	.1575		4.00	63	28	14.40	13.78	13.16
59381	.1590	#21	4.04	2-1/2"	1-1/8"	14.70	14.06	13.42
59386	.1610	#20	4.09	2-1/2"	1-1/8"	14.70	14.06	13.42
59391	.1660	#19	4.22	2-1/2"	1-1/8"	15.19	14.53	13.87

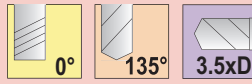
1500H - 2 Flute (continued)

.1695" - .5000"
(4.30mm - 12.70mm)

EDP#	$d^{\dagger}$		l_1	l_2	1-11	12-24	25-49	50-100
	Decimal	Diameter	Metric	Overall Length	Flute Length			
59396	.1695	#18	4.30	2-1/2"	1-3/16"	15.19	14.53	13.21
59401	.1719	11/64"	4.37	2-1/2"	1-3/16"	15.19	14.53	13.21
59406	.1730	#17	4.39	2-1/2"	1-3/16"	15.49	14.81	13.47
59411	.1770	#16	4.49	2-1/2"	1-3/16"	15.49	14.81	13.47
39251	.1772		4.50	63	28	15.49	14.81	13.47
59421	.1800	#15	4.57	2-1/2"	1-3/16"	15.49	14.81	13.47
59426	.1820	#14	4.62	2-1/2"	1-3/16"	16.24	15.54	14.12
59431	.1850	#13	4.70	2-1/2"	1-3/16"	16.24	15.54	14.12
59436	.1875	3/16"	4.76	2-1/2"	1-3/16"	15.68	15.00	13.63
59441	.1890	#12	4.80	2-1/2"	1-3/16"	17.35	16.59	15.08
59446	.1910	#11	4.85	2-1/2"	1-3/16"	17.35	16.59	15.08
59451	.1935	#10	4.91	2-1/2"	1-1/4"	18.21	17.42	16.63
59456	.1960	#9	4.98	2-1/2"	1-1/4"	18.21	17.42	16.63
39301	.1969		5.00	63	32	18.21	17.42	16.63
59466	.1990	#8	5.05	2-1/2"	1-1/4"	18.71	17.90	17.09
59471	.2010	#7	5.10	2-1/2"	1-1/4"	18.71	17.90	17.09
59476	.2031	13/64"	5.16	2-1/2"	1-1/4"	18.71	17.90	17.09
59481	.2040	#6	5.18	2-1/2"	1-1/4"	19.59	18.74	17.89
59486	.2055	#5	5.22	2-1/2"	1-1/4"	19.59	18.74	17.89
59491	.2090	#4	5.31	2-1/2"	1-1/4"	19.59	18.74	17.89
59496	.2130	#3	5.41	2-1/2"	1-1/4"	19.59	18.74	17.89
39351	.2165		5.50	63	32	19.59	18.74	17.89
59506	.2188	7/32"	5.56	2-1/2"	1-1/2"	19.59	18.74	17.89
59511	.2210	#2	5.61	2-1/2"	1-1/2"	20.78	19.87	18.97
59516	.2280	#1	5.79	2-1/2"	1-1/2"	20.78	19.87	18.97
59526	.2344	15/64"	5.95	2-1/2"	1-1/2"	22.80	21.81	20.81
39401	.2362		6.00	63	38	22.80	21.81	20.81
59551	.2500	1/4"	6.35	2-1/2"	1-1/2"	21.63	20.70	19.75
39451	.2559		6.50	63	38	27.87	26.66	25.45
59571	.2656	17/64"	6.75	2-1/2"	1-1/2"	27.87	26.66	25.45
39501	.2756		7.00	63	38	28.43	27.20	25.96
59601	.2812	9/32"	7.14	2-1/2"	1-1/2"	28.43	27.20	25.96
39521	.2953		7.50	63	41	29.61	28.32	27.03
59621	.2969	19/64"	7.54	2-1/2"	1-5/8"	29.61	28.32	27.03
59631	.3125	5/16"	7.94	2-1/2"	1-5/8"	29.61	28.32	27.03
39541	.3150		8.00	63	41	30.89	29.55	28.20
59651	.3281	21/64"	8.33	3"	1-5/8"	31.64	30.26	28.88
39561	.3346		8.50	76	41	34.76	33.25	31.73
59671	.3438	11/32"	8.73	3"	1-5/8"	34.76	33.25	31.73
39581	.3543		9.00	76	41	37.61	35.97	34.34
59691	.3594	23/64"	9.13	3"	1-3/4"	37.61	35.97	34.34
39601	.3740		9.50	76	41	40.53	38.77	37.00
59706	.3750	3/8"	9.52	3"	1-3/4"	40.53	38.77	37.00
59721	.3906	25/64"	9.92	3"	1-3/4"	45.54	43.57	41.58
39621	.3937		10.00	76	44	45.54	43.57	41.58
59741	.4062	13/32"	10.32	3"	1-3/4"	50.21	48.03	45.84
39641	.4134		10.50	76	44	52.27	49.99	47.73
59756	.4219	27/64"	10.72	3"	1-3/4"	54.70	52.32	49.95
39661	.4331		11.00	76	44	55.57	53.15	50.73
59766	.4375	7/16"	11.11	3"	1-3/4"	55.57	53.15	50.73
39681	.4528		11.50	76	44	57.00	54.53	52.04
59776	.4531	29/64"	11.51	3"	1-3/4"	57.98	55.46	52.94
59781	.4688	15/32"	11.91	3"	1-3/4"	57.98	55.46	52.94
39701	.4724		12.00	76	44	57.98	55.46	52.94
59791	.4844	31/64"	12.30	3"	1-3/4"	57.98	55.46	52.94
39721	.4921		12.50	76	44	59.14	56.58	54.00
59801	.5000	1/2"	12.70	3"	1-3/4"	59.14	56.58	54.00

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)



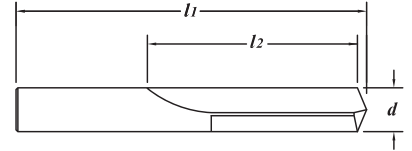
Double Margin

Solid submicron grain carbide drill
Strong core geometry with double margins for chip breakage and clearance
'G' style flutes
4-facet point

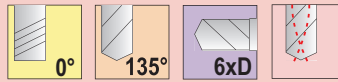
Recommended for fast drilling in aircraft alloys, cast aluminum and high silicon content materials

Live tooling recommended on lathe processes

Shank tolerance: -.0001" - .0004" (-.0025 / -.0100mm)



EDP#	d †		l ₁ Overall Length	l ₂ Flute Length	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric						
57460	.1250	1/8"	3.17	3-1/4"	14.93	14.29	13.63	12.99
57470	.1575		4.00	86	17.06	16.32	15.57	14.83
57480	.1875	3/16"	4.76	3-5/8"	19.41	18.56	17.72	16.88
57490	.1969		5.00	95	20.91	20.01	19.09	18.19
57500	.2362		6.00	101	24.02	22.98	21.93	20.89
57510	.2500	1/4"	6.35	4"	24.63	23.56	22.48	21.41
57520	.3125	5/16"	7.94	4-3/8"	37.55	35.92	34.29	32.66
57530	.3150		8.00	111	39.93	38.19	36.45	34.72
57540	.3750	3/8"	9.52	4-3/4"	49.40	47.25	45.10	42.95
57550	.3937		10.00	124	57.02	54.55	52.06	49.59
57560	.4375	7/16"	11.11	5-1/8"	68.55	65.56	62.59	59.60
57570	.4724		12.00	136	77.28	73.92	70.56	67.20
57580	.5000	1/2"	12.70	5-1/2"	79.25	75.81	72.35	68.91
57590	.5512		14.00	150	107.40	102.73	98.06	93.39
57600	.5625	9/16"	14.29	6"	116.51	111.45	106.38	101.32
57610	.5906		15.00	157	135.90	129.99	124.08	118.18
57620	.6250	5/8"	15.87	6-3/8"	139.18	133.13	127.08	121.02
57630	.6299		16.00	164	142.38	136.19	130.00	123.80



TOLERANCES

d	+.0000" - .0005" (+.0000 - .0127mm)	
h	$\leq 1/8"$	$+.125" - .062" (+3.175 - 1.588\text{mm})$
	$> 1/8"$	$+.125" - .125" (+3.175 - 3.175\text{mm})$
l	$\leq 1/8"$	$+.125" - .062" (+3.175 - 1.588\text{mm})$
	$> 1/8"$	$+.125" - .125" (+3.175 - 3.175\text{mm})$

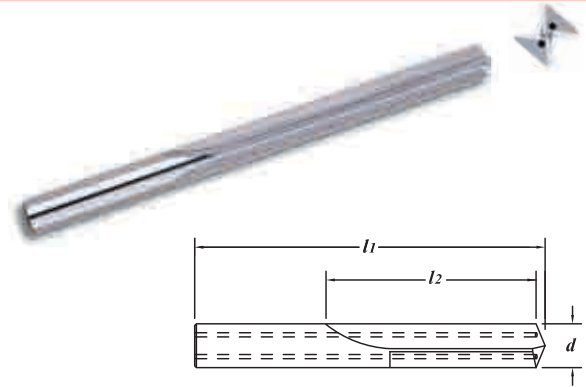
Double Margin

Solid submicron grain carbide drill
Coolant fed for accelerated feed rates and chip clearance
Strong core geometry with double margins for chip breakage and clearance
'G' style flutes
4-facet point

Recommended for fast drilling in aircraft alloys, cast aluminum and high silicon content materials

Live tooling recommended on lathe processes

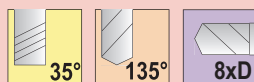
Shank tolerance: $-.0001" - .0004" (-.0025 / -.0100\text{mm})$



EDP#	$d^{\dagger}$		l_1	l_2	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric						
57710	.2362	6.00	110	59	44.80	42.86	40.90	38.96
57720	.2500	1/4"	6.35	4-1/2"	49.31	47.16	45.02	42.88
57730	.3125	5/16"	7.94	5"	58.31	55.78	53.24	50.71
57740	.3150		8.00	129	60.68	58.04	55.41	52.77
57750	.3750	3/8"	9.52	5-1/2"	75.48	72.20	68.92	65.63
57760	.3937		10.00	144	81.84	78.28	74.72	71.17
57770	.4375	7/16"	11.11	6"	96.45	92.26	88.07	83.87
57780	.4724		12.00	160	156.52	149.72	142.91	136.10
57790	.5000	1/2"	12.70	6-1/2"	165.56	158.36	151.16	143.97
57800	.5512		14.00	179	205.64	196.70	187.76	178.82
57810	.5625	9/16"	14.29	7-1/8"	227.38	217.48	207.60	197.71
57820	.5906		15.00	187	230.04	220.03	210.04	200.03
57830	.6250	5/8"	15.87	7-5/8"	249.38	238.53	227.70	216.85
57840	.6299		16.00	195	252.58	241.60	230.62	219.64

d	$+0.000" -0.005" (+0.000 -0.127\text{mm})$
l_1	$+0.125" -0.125" (+3.175 -3.175\text{mm})$
l_2	$+0.125" -0.125" (+3.175 -3.175\text{mm})$

.1875" - .3230"
(4.76mm - 8.20mm)



Parabolic - *Balinit*® HARDLUBE Coated

Solid submicron grain carbide drill

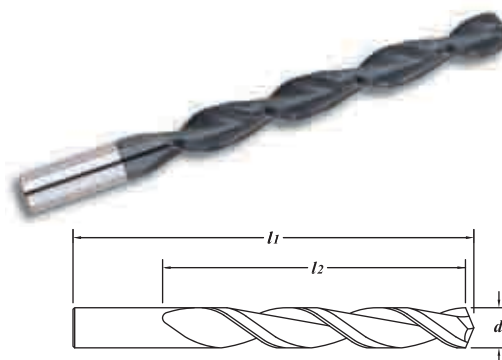
Wide open flutes and high helix remove chips quickly

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

4-facet point

Live tooling recommended on lathe processes

Shank tolerance: $-0.0001" -0.0004" (-0.0025 / -0.0100\text{mm})$

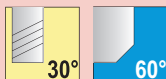


EDP#	d † Diameter			l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric						
22436	.1875	3/16"	4.76	3-13/16"	2-5/16"	20.59	19.70	18.80	17.91
22441	.1890	#12	4.80	3-13/16"	2-5/16"	21.07	20.16	19.24	18.32
22446	.1910	#11	4.85	3-13/16"	2-5/16"	21.55	20.61	19.68	18.74
22451	.1935	#10	4.91	3-15/16"	2-7/16"	22.03	21.07	20.11	19.16
22456	.1960	#9	4.98	3-15/16"	2-7/16"	22.52	21.54	20.56	19.58
22461	.1969		5.00	100	62	22.99	22.00	21.00	20.00
22466	.1990	#8	5.05	3-15/16"	2-7/16"	23.39	22.37	21.35	20.34
22471	.2010	#7	5.10	3-15/16"	2-7/16"	23.81	22.77	21.74	20.70
22476	.2031	13/64"	5.16	3-15/16"	2-7/16"	24.19	23.14	22.09	21.04
22481	.2040	#6	5.18	3-15/16"	2-7/16"	24.59	23.51	22.44	21.38
22486	.2055	#5	5.22	4"	2-1/2"	25.00	23.91	22.83	21.74
22491	.2090	#4	5.31	4"	2-1/2"	25.39	24.28	23.18	22.08
22496	.2130	#3	5.41	4"	2-1/2"	25.78	24.66	23.54	22.42
22501	.2165		5.50	102	64	26.20	25.05	23.92	22.78
22506	.2188	7/32"	5.56	4"	2-1/2"	26.58	25.43	24.27	23.12
22511	.2210	#2	5.61	4"	2-1/2"	26.98	25.80	24.63	23.46
22516	.2280	#1	5.79	4-1/8"	2-5/8"	27.39	26.20	25.01	23.82
22521	.2340	A	5.94	4-1/8"	2-5/8"	27.78	26.57	25.37	24.16
22526	.2344	15/64"	5.95	4-1/8"	2-5/8"	28.17	26.95	25.72	24.50
22531	.2362		6.00	105	67	28.63	27.38	26.15	24.90
22536	.2380	B	6.04	4-1/8"	2-5/8"	28.79	27.54	26.28	25.03
22541	.2420	C	6.15	4-1/4"	2-3/4"	28.94	27.68	26.43	25.17
22546	.2460	D	6.25	4-1/4"	2-3/4"	29.09	27.82	26.56	25.29
22551	.2500	1/4" / E	6.35	4-1/4"	2-3/4"	29.23	27.97	26.70	25.42
22556	.2559		6.50	108	70	30.20	28.89	27.57	26.26
22561	.2570	F	6.53	4-3/8"	2-7/8"	31.48	30.11	28.75	27.37
22566	.2610	G	6.63	4-3/8"	2-7/8"	32.32	30.92	29.52	28.11
22571	.2656	17/64"	6.75	4-3/8"	2-7/8"	33.27	31.82	30.38	28.93
22576	.2660	H	6.76	4-3/8"	2-7/8"	34.36	32.86	31.38	29.88
22581	.2720	I	6.91	4-3/8"	2-7/8"	35.39	33.85	32.31	30.77
22586	.2756		7.00	111	73	36.45	34.87	33.28	31.70
22591	.2770	J	7.03	4-3/8"	2-7/8"	37.25	35.63	34.02	32.40
22596	.2810	K	7.14	4-7/16"	2-15/16"	38.05	36.40	34.75	33.09
22601	.2812	9/32"	7.14	4-7/16"	2-15/16"	38.90	37.20	35.52	33.82
22606	.2900	L	7.37	4-7/16"	2-15/16"	39.73	38.00	36.28	34.55
22611	.2950	M	7.49	4-7/16"	2-15/16"	40.53	38.77	37.00	35.25
22616	.2953		7.50	116	78	41.33	39.53	37.73	35.94
22621	.2969	19/64"	7.54	4-9/16"	3-1/16"	41.41	39.61	37.81	36.02
22626	.3020	N	7.67	4-9/16"	3-1/16"	41.51	39.70	37.90	36.09
22631	.3125	5/16"	7.94	4-11/16"	3-3/16"	41.54	39.73	37.93	36.12
22636	.3150		8.00	119	81	43.92	42.01	40.10	38.19
22641	.3160	O	8.03	4-11/16"	3-3/16"	44.92	42.96	41.01	39.06
22646	.3230	P	8.20	4-11/16"	3-3/16"	45.93	43.93	41.93	39.94

1800H - 2 Flute (continued)

.3281" - .6299"
(8.33mm - 16.00mm)

EDP#	d^+ Diameter			l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric						
22651	.3281	21/64"	8.33	4-11/16"	3-3/16"	46.94	44.90	42.86	40.81
22656	.3320	Q	8.43	4-15/16"	3-7/16"	47.98	45.88	43.80	41.71
22661	.3346		8.50	125	87	48.96	46.83	44.71	42.58
22666	.3390	R	8.61	4-15/16"	3-7/16"	50.50	48.31	46.11	43.92
22671	.3438	11/32"	8.73	4-15/16"	3-7/16"	52.01	49.75	47.49	45.23
22676	.3480	S	8.84	5"	3-1/2"	53.58	51.25	48.92	46.59
22681	.3543		9.00	127	89	55.12	52.73	50.33	47.93
22686	.3580	T	9.09	5"	3-1/2"	55.35	52.95	50.53	48.13
22691	.3594	23/64"	9.13	5"	3-1/2"	55.58	53.16	50.74	48.33
22696	.3680	U	9.35	5"	3-1/2"	55.79	53.36	50.94	48.51
22701	.3740		9.50	130	92	56.00	53.57	51.14	48.70
22706	.3750	3/8"	9.52	5-1/8"	3-5/8"	56.26	53.82	51.38	48.92
22711	.3770	V	9.57	5-1/8"	3-5/8"	58.13	55.60	53.07	50.54
22716	.3860	W	9.80	5-1/8"	3-5/8"	59.97	57.36	54.76	52.15
22721	.3906	25/64"	9.92	5-1/4"	3-3/4"	61.87	59.18	56.49	53.80
22726	.3937		10.00	133	95	63.71	60.94	58.17	55.40
22731	.3970	X	10.08	5-1/4"	3-3/4"	66.11	63.24	60.36	57.49
22736	.4040	Y	10.26	5-3/8"	3-7/8"	68.49	65.52	62.54	59.56
22741	.4062	13/32"	10.32	5-3/8"	3-7/8"	70.94	67.85	64.77	61.68
22746	.4130	Z	10.49	5-3/8"	3-7/8"	74.73	71.49	68.23	64.99
22751	.4134		10.50	137	98	74.73	71.49	68.23	64.99
22756	.4219	27/64"	10.72	5-7/16"	3-15/16"	78.15	74.74	71.35	67.95
22761	.4331		11.00	138	100	80.56	77.05	73.55	70.05
22766	.4375	7/16"	11.11	5-7/16"	3-15/16"	80.56	77.05	73.55	70.05
22771	.4528		11.50	141	103	81.70	78.15	74.60	71.04
22776	.4531	29/64"	11.51	5-9/16"	4-5/16"	81.70	78.15	74.60	71.04
22781	.4688	15/32"	11.91	5-9/16"	4-5/16"	82.83	79.23	75.62	72.02
22786	.4724		12.00	141	110	83.97	80.32	76.67	73.02
22791	.4844	31/64"	12.30	5-9/16"	4-5/16"	83.97	80.32	76.67	73.02
22796	.4921		12.50	152	114	85.94	82.20	78.46	74.72
22801	.5000	1/2"	12.70	6"	4-1/2"	85.94	82.20	78.46	74.72
22806	.5118		13.00	152	114	102.37	97.92	93.46	89.01
22811	.5156	33/64"	13.10	6"	4-1/2"	108.62	103.90	99.17	94.45
22816	.5312	17/32"	13.49	6-1/8"	4-5/8"	114.88	109.89	104.88	99.89
22821	.5315		13.50	156	117	114.88	109.89	104.88	99.89
22826	.5469	35/64"	13.89	6-1/8"	4-5/8"	121.14	115.88	110.60	105.34
22831	.5512		14.00	156	117	127.35	121.82	116.27	110.74
22836	.5625	9/16"	14.29	6-1/4"	4-3/4"	136.45	130.52	124.58	118.65
22841	.5709		14.50	159	121	140.92	134.79	128.67	122.54
22846	.5781	37/64"	14.68	6-1/4"	4-3/4"	141.66	135.50	129.34	123.18
22851	.5906		15.00	162	124	145.33	139.01	132.69	126.37
22856	.5938	19/32"	15.08	6-3/8"	4-7/8"	145.33	139.01	132.69	126.37
22861	.6094	39/64"	15.48	6-7/16"	4-15/16"	146.96	140.58	134.18	127.80
22866	.6102		15.50	164	125	146.96	140.58	134.18	127.80
22871	.6250	5/8"	15.87	6-9/16"	5-1/16"	148.61	142.15	135.68	129.22
22876	.6299		16.00	167	129	151.79	145.18	138.59	131.99



TOLERANCES

d	$+0.000" -0.005" (+0.000 -0.127\text{mm})$
l_1	$+0.125" -0.125" (+3.175 -3.175\text{mm})$
l_2	$+0.125" -0.125" (+3.175 -3.175\text{mm})$

Core

Solid submicron grain carbide drill

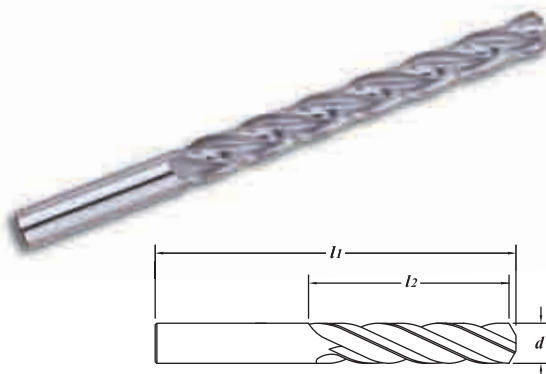
Cored applications only

Gets to finish diameter when too much material remains for reamer

60° lead chamfer allows easy follow through from existing hole

Live tooling recommended on lathe processes

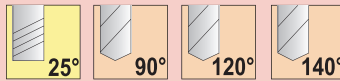
Shank tolerance: $-0.0001" -0.0004" (-0.0025 / -0.0100\text{mm})$



EDP#	$d^{\dagger}$ Diameter			l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric						
58500	.1875	3/16"	4.76	4"	2-1/2"	18.90	18.08	17.25	16.43
58510	.1969		5.00	102	64	19.38	18.53	17.69	16.85
58520	.2362		6.00	102	64	20.88	19.98	19.06	18.16
58530	.2500	1/4"	6.35	4"	2-1/2"	20.95	20.03	19.13	18.21
58540	.2756		7.00	102	64	25.96	24.82	23.70	22.57
58550	.3125	5/16"	7.94	4"	2-1/2"	28.54	27.30	26.05	24.81
58560	.3150		8.00	102	64	28.76	27.51	26.26	25.00
58570	.3543		9.00	127	89	39.48	37.76	36.05	34.33
58580	.3750	3/8"	9.52	5"	3-1/2"	44.08	42.16	40.24	38.32
58590	.3937		10.00	127	89	50.71	48.51	46.30	44.10
58600	.4331		11.00	127	89	54.75	52.36	49.98	47.60
58610	.4375	7/16"	11.11	5"	3-1/2"	55.33	52.93	50.51	48.11
58620	.4724		12.00	127	89	61.87	59.18	56.49	53.80
58630	.5000	1/2"	12.70	5"	3-1/2"	64.02	61.24	58.46	55.67
58640	.5118		13.00	152	114	79.84	76.37	72.89	69.43
58650	.5512		14.00	152	114	90.56	86.62	82.69	78.75
58660	.5625	9/16"	14.29	6"	4-1/2"	98.76	94.46	90.17	85.87
58670	.5906		15.00	152	114	104.96	100.39	95.83	91.27
58680	.6250	5/8"	15.87	6"	4-1/2"	107.35	102.68	98.01	93.35
58690	.6299		16.00	152	114	110.21	105.41	100.62	95.84

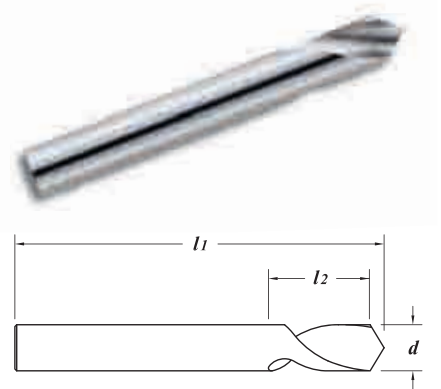
TOLERANCES

d	$+0.000" -0.005" (+0.000 -0.127\text{mm})$
l_1	$+0.125" -0.125" (+3.175 -3.175\text{mm})$

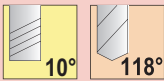


N/C Spotting

Solid submicron grain carbide drill
 For spotting to stabilize long drills
 Rough, angled or spherical surfaces
 No O.D. clearance
 For locating on true position
 Live tooling recommended on lathe processes
 Shank tolerance: $-0.0001" -0.0004" (-0.0025 / -0.0100\text{mm})$



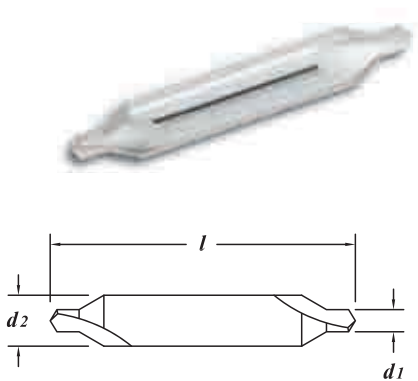
90° EDP#	120° EDP#	NEW 140° EDP#	d † Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal	Metric						
91510	91580	91250	.1181	3.00	50	10	10.93	10.45	9.98	9.51
91000	91100	91260	.1250	3.17	2"	3/8"	10.93	10.45	9.98	9.51
91520	91590	91270	.1575	4.00	50	12	14.30	13.68	13.05	12.44
91010	91110	91280	.1875	4.76	3"	3/4"	14.30	13.68	13.05	12.44
91530	91600	91290	.1969	5.00	65	15	15.05	14.39	13.74	13.08
91540	91610	91300	.2362	6.00	65	20	16.98	16.24	15.51	14.77
91020	91120	91310	.2500	6.35	3"	3/4"	16.98	16.24	15.51	14.77
91550	91620	91320	.3150	8.00	75	25	20.55	19.66	18.76	17.87
91030	91130	91330	.3750	9.52	3"	1"	22.28	21.31	20.34	19.38
91560	91630	91340	.3937	10.00	88	25	30.75	29.41	28.08	26.74
91570	91640	91350	.4724	12.00	100	30	36.96	35.35	33.75	32.14
91040	91140	91360	.5000	12.70	4"	1"	38.44	36.76	35.10	33.43
91050	91170	91370	.5512	14.00	100	30	66.24	63.36	60.48	57.60
91060	91180	91380	.5625	14.29	4"	1"	72.23	69.09	65.95	62.81
91070	91190	91390	.6250	15.87	5"	1"	88.63	84.77	80.92	77.06
91080	91200	91400	.6299	16.00	125	30	90.99	87.04	83.08	79.12
91090	91210	91410	.7087	18.00	125	30	124.83	119.40	113.97	108.54
91150	91220	91420	.7500	19.05	5"	1"	128.21	122.64	117.06	111.49
91160	91230	91430	.7874	20.00	125	30	138.81	132.78	126.73	120.70



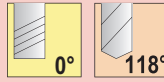
TOLERANCES	
d_1	$+0.003" - .000" (+.0076 - .0000\text{mm})$
d_2	$-.0001" - .0004" (-.0025 - .0102\text{mm})$

Combined Drill and Countersink

Solid submicron grain carbide drill
 For center drilling applications
 60° included countersink angle
 Live tooling recommended on lathe processes



EDP #	Number	d_1 † Diameter			d_2 Shank Diameter	l Overall Length	1-11	12-24	25-49	50-100
		Decimal		Metric						
58030	1	.0469	3/64"	1.19	1/8"	1-1/2"	12.28	11.75	11.21	10.68
58040	2	.0781	5/64"	1.98	3/16"	2"	19.32	18.48	17.64	16.81
58050	3	.1094	7/64"	2.78	1/4"	2"	22.02	21.06	20.10	19.15
58060	4	.1250	1/8"	3.17	5/16"	2-1/8"	30.83	29.48	28.14	26.80
58070	5	.1875	3/16"	4.76	7/16"	2-3/4"	44.02	42.11	40.20	38.28
58080	6	.2188	7/32"	5.56	1/2"	3"	58.60	56.06	53.51	50.96
58090	7	.2500	1/4"	6.35	5/8"	3-1/8"	78.44	75.03	71.61	68.20
58100	8	.3125	5/16"	7.94	3/4"	3-3/8"	99.73	95.39	91.05	86.72



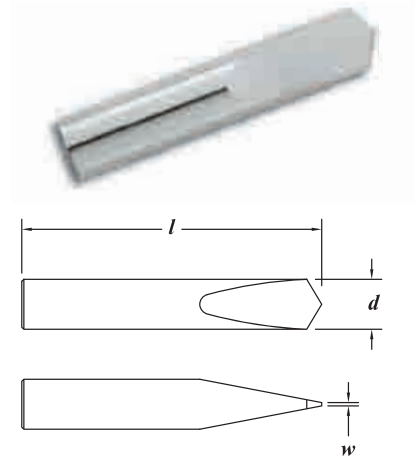
Spade

Solid submicron grain carbide drill

For shallow hole drilling / burnishing to a depth of 1 to 1.5 times the diameter

Live tooling recommended on lathe processes

Shank tolerance: $-.0001" - .0004" (-.0025 / -.0100\text{mm})$



EDP#	$d^{\dagger}$			l Overall Length	w Spade Width	1-11	12-24	25-49	50-100
	Decimal	Diameter	Metric						
57030	.0625	1/16"	1.59	1-5/8"	.010"	5.98	5.72	5.46	5.20
57040	.0781	5/64"	1.98	1-11/16"	.010"	6.30	6.03	5.75	5.48
57050	.0938	3/32"	2.38	1-11/16"	.015"	6.30	6.03	5.75	5.48
57060	.1094	7/64"	2.78	1-11/16"	.015"	6.97	6.67	6.36	6.06
57070	.1250	1/8"	3.17	1-11/16"	.015"	6.97	6.67	6.36	6.06
57080	.1562	5/32"	3.97	1-11/16"	.020"	7.31	6.99	6.68	6.35
57090	.1875	3/16"	4.76	2"	.020"	7.81	7.47	7.13	6.79
57100	.2188	7/32"	5.56	2"	.025"	10.74	10.28	9.81	9.34
57110	.2500	1/4"	6.35	2"	.025"	12.54	12.00	11.45	10.91
57120	.2812	9/32"	7.14	2"	.030"	14.48	13.84	13.22	12.58
57130	.3125	5/16"	7.94	2"	.030"	17.47	16.71	15.95	15.19
57140	.3438	11/32"	8.73	2-1/2"	.035"	18.91	18.09	17.26	16.44
57150	.3750	3/8"	9.52	2-1/2"	.035"	20.36	19.48	18.60	17.71
57160	.4062	13/32"	10.32	2-1/2"	.045"	24.28	23.22	22.17	21.11
57170	.4375	7/16"	11.11	2-1/2"	.050"	27.21	26.02	24.85	23.66
57180	.4688	15/32"	11.91	2-1/2"	.055"	31.39	30.02	28.66	27.29
57190	.5000	1/2"	12.70	3"	.060"	34.17	32.69	31.20	29.71



TOLERANCES

$d1$	$+0.000'' -0.001'' (+0.000 -0.025\text{mm})$
$d2$	$3\text{mm} - 6\text{mm} \quad +0.0000'' -0.0003'' (+0.0000 -0.0075\text{mm})$
	$1/4'' - 1'' \quad -0.0001'' -0.0004'' (-0.0025 -0.0100\text{mm})$

HSAL - ALUMASTAR Coated

Solid submicron grain carbide end mill - center cutting

Specific coating engineered to repel aluminum

Engineered to run at 750-2500 SFM (225-750 M/Min.)

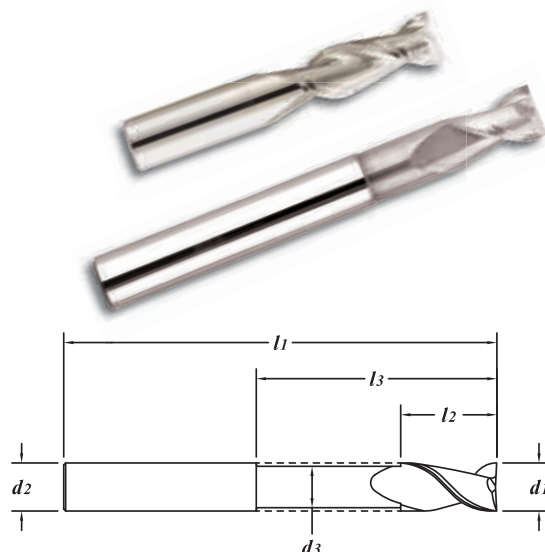
For high speed machining of aluminum

High velocity - high metal removal rate (for spindles 10,000 RPM and above)

Need to use properly balanced holders

Holds perpendicularity

Flats can be added within 48 hours



EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100
	Decimal	Metric									
41222	.1575	4.00	6.0	50	12	-	-	21.48	20.54	19.60	18.68
NEW 41232	.1575	4.00	6.0	65	6	16	3.7	26.88	25.72	24.54	23.38
41282	.1875 3/16"	4.76	3/16"	2"	9/16"	-	-	16.19	15.49	14.79	14.08
41342	.1969	5.00	6.0	65	16	-	-	22.16	21.20	20.24	19.27
NEW 41352	.1969	5.00	6.0	75	8	20	4.7	37.69	36.05	34.41	32.77
41402	.2362	6.00	6.0	65	19	-	-	21.46	20.52	19.59	18.66
NEW 41412	.2362	6.00	6.0	75	10	25	5.7	36.48	34.89	33.31	31.72
41462	.2500 1/4"	6.35	1/4"	2-1/2"	3/4"	-	-	20.38	19.50	18.62	17.72
41542	.2756	7.00	8.0	65	19	-	-	32.91	31.47	30.05	28.61
41602	.3125 5/16"	7.94	5/16"	2-1/2"	3/4"	-	-	28.31	27.08	25.84	24.62
41662	.3150	8.00	8.0	65	19	-	-	29.81	28.51	27.22	25.92
NEW 41672	.3150	8.00	8.0	75	12	25	7.4	44.98	43.02	41.07	39.11
41722	.3750 3/8"	9.52	3/8"	2-1/2"	7/8"	-	-	33.26	31.81	30.37	28.92
41802	.3937	10.00	10.0	70	24	-	-	50.06	47.88	45.70	43.52
NEW 41812	.3937	10.00	10.0	75	12	30	9.4	55.42	53.01	50.61	48.19
NEW 41822	.3937	10.00	10.0	100	12	35	9.4	66.73	63.82	60.92	58.02
41882	.4724	12.00	12.0	75	32	-	-	55.98	53.55	51.12	48.68
NEW 41892	.4724	12.00	12.0	75	16	30	11.4	60.26	57.64	55.02	52.40
NEW 41902	.4724	12.00	12.0	100	16	35	11.4	82.21	78.63	75.07	71.49
NEW 41912	.4724	12.00	12.0	100	16	40	11.4	82.21	78.63	75.07	71.49
41942	.5000 1/2"	12.70	1/2"	3"	1-1/4"	-	-	53.19	50.88	48.56	46.25
42022	.6250 5/8"	15.87	5/8"	4"	1-5/8"	-	-	106.00	101.39	96.78	92.18
NEW 42072	.6299	16.00	16.0	75	16	30	15.4	105.00	100.43	95.87	91.30
42082	.6299	16.00	16.0	100	40	-	-	111.57	106.72	101.87	97.02
NEW 42092	.6299	16.00	16.0	100	20	40	15.4	115.85	110.81	105.77	100.73
NEW 42102	.6299	16.00	16.0	125	20	60	15.4	148.03	141.60	135.16	128.72
42142	.7500 3/4"	19.05	3/4"	4"	1-5/8"	-	-	135.64	129.74	123.84	117.95
42212	.7874	20.00	20.0	100	32	-	-	182.10	174.19	166.26	158.35
NEW 42222	.7874	20.00	20.0	100	20	40	19	186.37	178.27	170.16	162.06
NEW 42232	.7874	20.00	20.0	125	20	60	19	215.82	206.44	197.05	187.67
42242	.9843	25.00	25.0	100	38	-	-	210.11	200.98	191.84	182.71
42302	1.000 1"	25.40	1"	4"	1-5/8"	-	-	203.86	195.00	186.13	177.27



TOLERANCES

d_1	+.000" - .001" (+.000 - .025mm)	
d_2	3mm - 6mm	+.0000" - .0003" (+.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)
Ball radius	+.0000" - .0005" (+.0000 - .0127mm)	

HSAL - Ball End - ALUMASTAR Coated

Solid submicron grain carbide end mill - center cutting

Specific coating engineered to repel aluminum

Engineered to run at 750-2500 SFM (225-750 M/Min.)

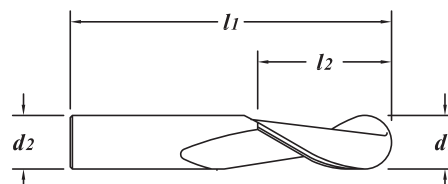
For high speed machining of aluminum

High velocity - high metal removal rate (for spindles 10,000 RPM and above)

Need to use properly balanced holders

Holds perpendicularity

Flats can be added within 48 hours



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
42522	.1575	4.00	6.0	50	12	25.13	24.03	22.94	21.85
42582	.1875	3/16"	4.76	3/16"	2"	18.65	17.84	17.02	16.21
42642	.1969	5.00	6.0	65	16	25.93	24.80	23.67	22.55
42702	.2362	6.00	6.0	65	19	25.11	24.01	22.92	21.83
42762	.2500	1/4"	6.35	1/4"	2-1/2"	23.85	22.81	21.78	20.74
42842	.2756	7.00	8.0	65	19	36.50	34.91	33.33	31.74
42902	.3125	5/16"	7.94	5/16"	2-1/2"	31.55	30.18	28.81	27.44
42962	.3150	8.00	8.0	65	19	33.22	31.77	30.33	28.88
43022	.3750	3/8"	9.52	3/8"	2-1/2"	36.77	35.17	33.58	31.98
43102	.3937	10.00	10.0	70	24	56.40	53.94	51.49	49.05
43182	.4724	12.00	12.0	75	32	69.77	66.74	63.71	60.67
43242	.5000	1/2"	12.70	1/2"	3"	66.28	63.40	60.52	57.64
43322	.6250	5/8"	15.87	5/8"	4"	114.66	109.68	104.69	99.70
43382	.6299	16.00	16.0	100	40	120.70	115.45	110.21	104.96
43442	.7500	3/4"	19.05	3/4"	4"	148.80	142.33	135.87	129.40
43482	.7874	20.00	20.0	100	32	208.88	199.80	190.72	181.64
43542	.9843	25.00	25.0	100	38	241.70	231.19	220.68	210.17
43602	1.000	1"	25.40	1"	4"	253.78	242.75	231.71	220.68

$d1$	$+0.000" - .001" (+.000 - .025mm)$
$d2$	$3mm - 6mm +.0000" - .0003" (+.0000 - .0075mm)$
	$1/4" - 1" -.0001" - .0004" (-.0025 - .0100mm)$

.1575" - .3937"
(4.00mm - 10.00mm)

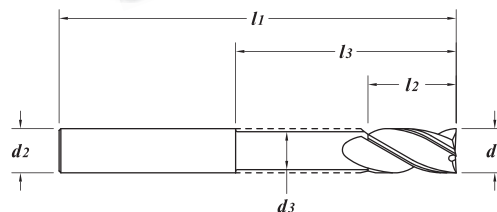


HSAL - ALUMASTAR Coated

Solid submicron grain carbide end mill - center cutting
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)

For high speed machining of aluminum

High velocity - high metal removal rate (for 5,000-25,000 RPM spindles)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours



EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100
	Decimal	Metric									
41223	.1575	4.00	6.0	50	12	-	-	21.48	20.54	19.60	18.68
41243	.1575	4.00	6.0	65	6	16	3.7	26.88	25.72	24.54	23.38
NEW 41273	.1875	3/16"	4.76	3/16"	2"	5/16"	-	16.19	15.49	14.79	14.08
41283	.1875	3/16"	4.76	3/16"	2"	9/16"	-	16.19	15.49	14.79	14.08
41303	.1875	3/16"	4.76	3/16"	3"	7/32"	3/4"	30.39	29.07	27.75	26.43
41313	.1875	3/16"	4.76	3/16"	3"	1"	-	26.12	24.99	23.86	22.71
41343	.1969	5.00	6.0	65	16	-	-	22.16	21.20	20.24	19.27
41363	.1969	5.00	6.0	75	8	20	4.7	37.69	36.05	34.41	32.77
41403	.2362	6.00	6.0	65	19	-	-	21.46	20.52	19.59	18.66
41423	.2362	6.00	6.0	75	10	25	5.7	36.48	34.89	33.31	31.72
NEW 41453	.2500	1/4"	6.35	1/4"	2-1/2"	3/8"	-	20.38	19.50	18.62	17.72
41463	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	-	20.38	19.50	18.62	17.72
NEW 41473	.2500	1/4"	6.35	1/4"	3"	1"	-	30.91	29.57	28.23	26.87
41493	.2500	1/4"	6.35	1/4"	4"	3/8"	1-1/8"	36.85	35.25	33.64	32.04
41503	.2500	1/4"	6.35	1/4"	4"	3/8"	2-1/8"	41.12	39.33	37.54	35.76
41513	.2500	1/4"	6.35	1/4"	4"	1-5/8"	-	32.58	31.17	29.75	28.33
41543	.2756	7.00	8.0	65	19	-	-	32.91	31.47	30.05	28.61
41563	.2756	7.00	8.0	75	12	25	6.4	49.43	47.28	45.14	42.98
NEW 41593	.3125	5/16"	7.94	5/16"	2-1/2"	7/16"	-	28.31	27.08	25.84	24.62
41603	.3125	5/16"	7.94	5/16"	2-1/2"	3/4"	-	28.31	27.08	25.84	24.62
41623	.3125	5/16"	7.94	5/16"	4"	7/16"	1-1/8"	48.34	46.24	44.14	42.04
41663	.3150	8.00	8.0	65	19	-	-	29.81	28.51	27.22	25.92
41683	.3150	8.00	8.0	75	12	25	7.4	44.98	43.02	41.07	39.11
NEW 41693	.3150	8.00	8.0	100	12	55	7.4	55.16	52.76	50.37	47.96
NEW 41713	.3750	3/8"	9.52	3/8"	2-1/2"	1/2"	-	33.26	31.81	30.37	28.92
41723	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	-	33.26	31.81	30.37	28.92
NEW 41733	.3750	3/8"	9.52	3/8"	3"	1"	-	42.89	41.03	39.16	37.29
41763	.3750	3/8"	9.52	3/8"	4"	1/2"	2-1/8"	56.21	53.77	51.32	48.88
41773	.3750	3/8"	9.52	3/8"	4"	1-5/8"	-	47.67	45.60	43.52	41.45
NEW 42363	.3750	3/8"	9.52	3/8"	4"	2"	-	47.67	45.60	43.52	41.45
41783	.3750	3/8"	9.52	3/8"	6"	1/2"	4"	85.16	81.45	77.75	74.05
41803	.3937	10.00	10.0	70	24	-	-	50.06	47.88	45.70	43.52
41843	.3937	10.00	10.0	100	12	35	9.4	66.73	63.82	60.92	58.02
NEW 41853	.3937	10.00	10.0	100	12	55	9.4	70.99	67.90	64.81	61.73
NEW 41863	.3937	10.00	10.0	150	12	110	9.4	99.48	95.15	90.82	86.50

143M - 3 Flute

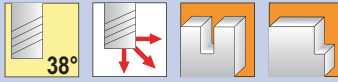
.4724" - 1.000"
(12.00mm - 25.40mm)

HIGH PERFORMANCE
END MILLS

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
	Decimal	Metric									
41883	.4724	12.00	12.0	75	32	-	-	55.98	53.55	51.12	48.68
NEW 41893	.4724	12.00	12.0	100	50	-	-	73.20	70.01	66.83	63.65
41903	.4724	12.00	12.0	100	16	35	11.4	82.21	78.63	75.07	71.49
NEW 41913	.4724	12.00	12.0	100	16	55	11.4	82.21	78.63	75.07	71.49
NEW 41923	.4724	12.00	12.0	150	16	110	11.4	125.67	120.21	114.74	109.28
NEW 41933	.5000	1/2"	12.70	1/2"	3"	5/8"	-	53.19	50.88	48.56	46.25
41943	.5000	1/2"	12.70	1/2"	3"	1-1/4"	-	53.19	50.88	48.56	46.25
NEW 41963	.5000	1/2"	12.70	1/2"	4"	1-5/8"	-	69.53	66.51	63.49	60.47
41973	.5000	1/2"	12.70	1/2"	4"	2"	-	69.53	66.51	63.49	60.47
41983	.5000	1/2"	12.70	1/2"	4"	5/8"	2-1/8"	.475"	78.08	74.69	71.29
41993	.5000	1/2"	12.70	1/2"	6"	5/8"	4-1/8"	.475"	119.39	114.20	109.01
42003	.5000	1/2"	12.70	1/2"	6"	3-1/8"	-	102.30	97.85	93.41	88.96
NEW 42013	.6250	5/8"	15.87	5/8"	3-1/2"	3/4"	-	106.00	101.39	96.78	92.18
42023	.6250	5/8"	15.87	5/8"	4"	1-5/8"	-	106.00	101.39	96.78	92.18
NEW 42373	.6250	5/8"	15.87	5/8"	4"	2-1/8"	-	106.00	101.39	96.78	92.18
42033	.6250	5/8"	15.87	5/8"	6"	3/4"	2-3/8"	.590"	147.96	141.52	135.10
42043	.6250	5/8"	15.87	5/8"	6"	3/4"	4-3/8"	.590"	156.51	149.71	142.90
42053	.6250	5/8"	15.87	5/8"	6"	3-1/4"	-	139.42	133.36	127.30	121.23
42083	.6299	16.00	16.0	100	40	-	-	111.57	106.72	101.87	97.02
42103	.6299	16.00	16.0	100	20	40	15.4	115.85	110.81	105.77	100.73
NEW 42113	.6299	16.00	16.0	125	20	60	15.4	148.03	141.60	135.16	128.72
NEW 42123	.6299	16.00	16.0	150	20	110	15.4	164.75	157.58	150.42	143.26
NEW 42133	.7500	3/4"	19.05	3/4"	4"	1"	-	135.64	129.74	123.84	117.95
42143	.7500	3/4"	19.05	3/4"	4"	1-5/8"	-	135.64	129.74	123.84	117.95
42153	.7500	3/4"	19.05	3/4"	5"	2-1/4"	-	179.10	171.31	163.52	155.74
42163	.7500	3/4"	19.05	3/4"	6"	1"	2-1/2"	.715"	194.83	186.36	177.89
42173	.7500	3/4"	19.05	3/4"	6"	1"	4-3/8"	.715"	200.87	192.13	183.39
NEW 42193	.7500	3/4"	19.05	3/4"	6"	3-1/4"	-	188.86	180.65	172.44	164.23
NEW 42203	.7874	20.00	20.0	100	25	-	-	182.10	174.19	166.26	158.35
42213	.7874	20.00	20.0	100	32	-	-	182.10	174.19	166.26	158.35
42223	.7874	20.00	20.0	100	20	40	19.0	186.37	178.27	170.16	162.06
NEW 42226	.7874	20.00	20.0	125	20	60	19.0	215.82	206.44	197.05	187.67
NEW 42233	.7874	20.00	20.0	150	20	85	19.0	250.10	239.22	228.35	217.47
NEW 42236	.7874	20.00	20.0	150	20	110	19.0	254.36	243.31	232.24	221.19
42243	.9843	25.00	25.0	100	38	-	-	210.11	200.98	191.84	182.71
42283	.9843	25.00	25.0	100	25	50	24.0	214.39	205.07	195.74	186.42
NEW 42286	.9843	25.00	25.0	125	25	65	24.0	267.97	256.32	244.66	233.01
NEW 42291	.9843	25.00	25.0	150	25	90	24.0	336.14	321.53	306.90	292.29
NEW 42293	1.000	1"	25.40	1"	4"	1"	-	203.86	195.00	186.13	177.27
42303	1.000	1"	25.40	1"	4"	1-5/8"	-	203.86	195.00	186.13	177.27
NEW 42313	1.000	1"	25.40	1"	5"	2"	-	251.65	240.71	229.77	218.83
42343	1.000	1"	25.40	1"	6"	1-1/4"	3-3/8"	.960"	326.05	311.88	297.70
42353	1.000	1"	25.40	1"	6"	3-1/4"	-	313.25	299.62	286.01	272.39

d_1	+.000" -.001" (+.000 -.025mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
r	+.0005" -.0005" (+.0127 -.0127mm)	

.1575" - .4724"
(4.00mm - 12.00mm)



HSAL - Corner Radius - ALUMASTAR Coated

Solid submicron grain carbide end mill - center cutting

Specific coating engineered to repel aluminum

Engineered to run at 750-2500 SFM (225-750 M/Min.)

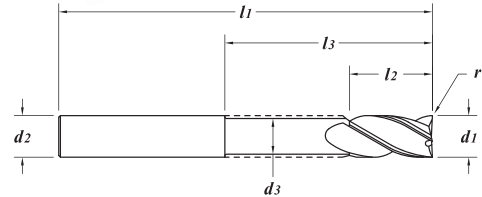
For high speed machining of aluminum

High velocity - high metal removal rate (for 5,000-25,000 RPM spindles)

Need to use properly balanced holders

Holds perpendicularity

Flats can be added within 48 hours



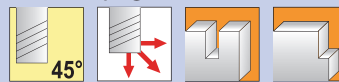
EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
	Decimal	Metric										
39223	.1575	4.00	6.0	50	12	0.3	-	-	25.13	24.03	22.94	21.85
39243	.1575	4.00	6.0	65	6	0.3	16	3.7	30.72	29.39	28.05	26.72
39283	.1875	3/16"	4.76	3/16"	2"	9/16"	.010"	-	18.65	17.84	17.02	16.21
NEW 39293	.1875	3/16"	4.76	3/16"	2"	9/16"	.030"	-	18.65	17.84	17.02	16.21
39303	.1875	3/16"	4.76	3/16"	3"	7/32"	.010"	3/4"	34.12	32.64	31.16	29.67
NEW 39313	.1875	3/16"	4.76	3/16"	3"	7/32"	.030"	3/4"	34.12	32.64	31.16	29.67
39343	.1969	5.00	6.0	65	16	0.3	-	-	25.93	24.80	23.67	22.55
39363	.1969	5.00	6.0	75	8	0.3	20	4.7	42.36	40.52	38.68	36.84
39403	.2362	6.00	6.0	65	19	0.3	-	-	25.11	24.01	22.92	21.83
39423	.2362	6.00	6.0	75	10	0.3	25	5.7	41.01	39.23	37.44	35.66
NEW 39453	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.010"	-	23.85	22.81	21.78	20.74
39463	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.015"	-	23.85	22.81	21.78	20.74
NEW 39473	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.030"	-	23.85	22.81	21.78	20.74
39493	.2500	1/4"	6.35	1/4"	4"	3/8"	.015"	1-1/8"	41.31	39.51	37.72	35.92
NEW 40403	.2500	1/4"	6.35	1/4"	4"	3/8"	.030"	1-1/8"	41.31	39.51	37.72	35.92
39503	.2500	1/4"	6.35	1/4"	4"	3/8"	.015"	2-1/8"	45.58	43.60	41.62	39.63
39543	.2756	7.00	8.0	65	19	0.3	-	-	36.50	34.91	33.33	31.74
39563	.2756	7.00	8.0	75	12	0.3	25	6.4	55.62	53.20	50.78	48.36
NEW 39593	.3125	5/16"	7.94	5/16"	2-1/2"	3/4"	.010"	-	31.55	30.18	28.81	27.44
39603	.3125	5/16"	7.94	5/16"	2-1/2"	3/4"	.015"	-	31.55	30.18	28.81	27.44
NEW 39613	.3125	5/16"	7.94	5/16"	2-1/2"	3/4"	.030"	-	31.55	30.18	28.81	27.44
39623	.3125	5/16"	7.94	5/16"	4"	7/16"	.015"	1-1/8"	54.31	51.95	49.59	47.23
NEW 39633	.3125	5/16"	7.94	5/16"	4"	7/16"	.030"	1-1/8"	54.31	51.95	49.59	47.23
39663	.3150	8.00	8.0	65	19	0.5	-	-	33.22	31.77	30.33	28.88
39683	.3150	8.00	8.0	75	12	0.5	25	7.4	50.61	48.40	46.21	44.00
NEW 39703	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.010"	-	36.77	35.17	33.58	31.98
NEW 39713	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.015"	-	36.77	35.17	33.58	31.98
39723	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.030"	-	36.77	35.17	33.58	31.98
NEW 39733	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.060"	-	36.77	35.17	33.58	31.98
39763	.3750	3/8"	9.52	3/8"	4"	1/2"	.030"	2-1/8"	62.82	60.08	57.36	54.62
NEW 39773	.3750	3/8"	9.52	3/8"	4"	1/2"	.060"	2-1/8"	62.82	60.08	57.36	54.62
39783	.3750	3/8"	9.52	3/8"	6"	1/2"	.030"	4"	91.71	87.72	83.73	79.75
39803	.3937	10.00	10.0	70	24	0.5	-	-	56.40	53.94	51.49	49.05
39843	.3937	10.00	10.0	100	12	0.5	35	9.4	75.83	72.53	69.23	65.94
39883	.4724	12.00	12.0	75	32	0.5	-	-	69.77	66.74	63.71	60.67
39903	.4724	12.00	12.0	100	16	0.5	35	11.4	89.68	85.78	81.88	77.98

143R - 3 Flute (continued)

.5000" - 1.000"
(12.70mm - 25.40mm)

HIGH PERFORMANCE
END MILLS

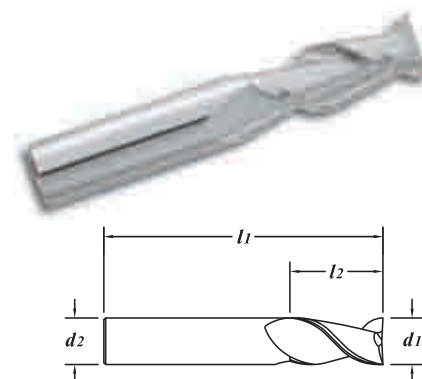
EDP#	$d1$ † Diameter				$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100
	Decimal			Metric										
NEW	39923	.5000	1/2"	12.70	1/2"	3"	1-1/4"	.010"	-	-	66.28	63.40	60.52	57.64
NEW	39933	.5000	1/2"	12.70	1/2"	3"	1-1/4"	.015"	-	-	66.28	63.40	60.52	57.64
	39943	.5000	1/2"	12.70	1/2"	3"	1-1/4"	.030"	-	-	66.28	63.40	60.52	57.64
NEW	39953	.5000	1/2"	12.70	1/2"	3"	1-1/4"	.060"	-	-	66.28	63.40	60.52	57.64
NEW	39963	.5000	1/2"	12.70	1/2"	3"	1-1/4"	.120"	-	-	66.28	63.40	60.52	57.64
NEW	39973	.5000	1/2"	12.70	1/2"	4"	2"	.010"	-	-	76.65	73.32	69.98	66.65
NEW	40413	.5000	1/2"	12.70	1/2"	4"	2"	.030"	-	-	76.65	73.32	69.98	66.65
NEW	40423	.5000	1/2"	12.70	1/2"	4"	2"	.060"	-	-	76.65	73.32	69.98	66.65
NEW	40433	.5000	1/2"	12.70	1/2"	4"	5/8"	.010"	2-1/8"	.475"	85.19	81.48	77.78	74.08
	39983	.5000	1/2"	12.70	1/2"	4"	5/8"	.030"	2-1/8"	.475"	85.19	81.48	77.78	74.08
NEW	40443	.5000	1/2"	12.70	1/2"	4"	5/8"	.060"	2-1/8"	.475"	85.19	81.48	77.78	74.08
NEW	40453	.5000	1/2"	12.70	1/2"	4"	5/8"	.120"	2-1/8"	.475"	85.19	81.48	77.78	74.08
	39993	.5000	1/2"	12.70	1/2"	6"	5/8"	.030"	4-1/8"	.475"	127.84	122.28	116.72	111.17
NEW	40463	.6250	5/8"	15.87	5/8"	4"	1-5/8"	.015"	-	-	114.66	109.68	104.69	99.70
	40023	.6250	5/8"	15.87	5/8"	4"	1-5/8"	.030"	-	-	114.66	109.68	104.69	99.70
NEW	40473	.6250	5/8"	15.87	5/8"	4"	1-5/8"	.060"	-	-	114.66	109.68	104.69	99.70
NEW	40483	.6250	5/8"	15.87	5/8"	4"	1-5/8"	.120"	-	-	114.66	109.68	104.69	99.70
	40033	.6250	5/8"	15.87	5/8"	6"	3/4"	.030"	2-3/8"	.590"	163.95	156.82	149.69	142.56
	40043	.6250	5/8"	15.87	5/8"	6"	3/4"	.030"	4-3/8"	.590"	172.49	165.00	157.50	150.00
	40083	.6299		16.00	16.0	100	40	1.0	-	-	120.70	115.45	110.21	104.96
	40103	.6299		16.00	16.0	100	20	1.0	40	15.4	124.97	119.54	114.10	108.67
NEW	40133	.7500	3/4"	19.05	3/4"	4"	1-5/8"	.015"	-	-	148.80	142.33	135.87	129.40
	40143	.7500	3/4"	19.05	3/4"	4"	1-5/8"	.030"	-	-	148.80	142.33	135.87	129.40
NEW	40153	.7500	3/4"	19.05	3/4"	4"	1-5/8"	.060"	-	-	148.80	142.33	135.87	129.40
NEW	40493	.7500	3/4"	19.05	3/4"	4"	1-5/8"	.120"	-	-	148.80	142.33	135.87	129.40
NEW	40503	.7500	3/4"	19.05	3/4"	6"	1"	.015"	2-1/2"	.715"	221.76	212.12	202.48	192.84
	40163	.7500	3/4"	19.05	3/4"	6"	1"	.030"	2-1/2"	.715"	221.76	212.12	202.48	192.84
NEW	40513	.7500	3/4"	19.05	3/4"	6"	1"	.060"	2-1/2"	.715"	221.76	212.12	202.48	192.84
NEW	40523	.7500	3/4"	19.05	3/4"	6"	1"	.120"	2-1/2"	.715"	221.76	212.12	202.48	192.84
	40173	.7500	3/4"	19.05	3/4"	6"	1"	.030"	4-3/8"	.715"	227.79	217.89	207.98	198.08
	40183	.7874		20.00	20.0	100	32	1.0	-	-	208.88	199.80	190.72	181.64
	40223	.7874		20.00	20.0	100	20	1.0	40	19.0	213.15	203.88	194.62	185.35
	40243	.9843		25.00	25.0	100	38	1.0	-	-	241.70	231.19	220.68	210.17
	40283	.9843		25.00	25.0	100	25	1.0	50	24.0	245.97	235.28	224.58	213.89
	40293	1.000	1"	25.40	1"	4"	1-5/8"	.030"	-	-	253.78	242.75	231.71	220.68
	40303	1.000	1"	25.40	1"	4"	1-5/8"	.060"	-	-	253.78	242.75	231.71	220.68
NEW	40313	1.000	1"	25.40	1"	4"	1-5/8"	.120"	-	-	253.78	242.75	231.71	220.68
	40343	1.000	1"	25.40	1"	6"	1-1/4"	.030"	3-3/8"	.960"	371.90	355.73	339.56	323.40
NEW	40353	1.000	1"	25.40	1"	6"	1-1/4"	.060"	3-3/8"	.960"	371.90	355.73	339.56	323.40
NEW	40363	1.000	1"	25.40	1"	6"	1-1/4"	.120"	3-3/8"	.960"	371.90	355.73	339.56	323.40



TOLERANCES

d_1	$+0.000" -0.001" (+0.000 -0.025mm)$
d_2	$3mm - 6mm \quad +0.0000" -0.0003" (+0.0000 -0.0075mm)$
	$1/4" - 1" \quad -0.0001" -0.0004" (-0.0025 -0.0100mm)$

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 spindles between 4,000-8,000 RPM, 1% diameter for chip load

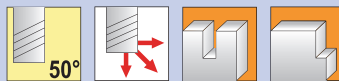


EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
NEW 08910	.1181	3.00	3.0	38	8	9.63	9.21	8.79	8.37
NEW 08920	.1181	3.00	3.0	50	12	11.61	11.10	10.60	10.09
NEW 85160	.1250 1/8"	3.17	1/8"	1-1/2"	1/4"	9.04	8.64	8.25	7.86
NEW 85170	.1250 1/8"	3.17	1/8"	2"	1/2"	10.90	10.42	9.95	9.47
NEW 08950	.1575	4.00	6.0	50	8	15.65	14.98	14.29	13.61
NEW 08960	.1575	4.00	6.0	50	12	15.65	14.98	14.29	13.61
NEW 85180	.1875 3/16"	4.76	3/16"	2"	5/16"	11.89	11.37	10.86	10.34
NEW 85190	.1875 3/16"	4.76	3/16"	2"	9/16"	11.89	11.37	10.86	10.34
NEW 08990	.1969	5.00	6.0	50	10	14.74	14.09	13.46	12.81
NEW 09000	.1969	5.00	6.0	65	15	16.37	15.66	14.94	14.24
09010	.2362	6.00	6.0	50	12	12.53	11.99	11.44	10.90
09020	.2362	6.00	6.0	65	25	13.48	12.90	12.30	11.72
09030	.2362	6.00	6.0	100	50	24.42	23.36	22.30	21.24
85200	.2500 1/4"	6.35	1/4"	2"	1/2"	11.89	11.37	10.86	10.34
85220	.2500 1/4"	6.35	1/4"	2-1/2"	1"	12.84	12.28	11.73	11.17
85240	.2500 1/4"	6.35	1/4"	4"	2"	23.20	22.19	21.18	20.18
85300	.3125 5/16"	7.94	5/16"	3"	1-1/8"	27.11	25.94	24.75	23.58
09240	.3150	8.00	8.0	65	20	18.92	18.10	17.27	16.45
09040	.3150	8.00	8.0	75	30	28.57	27.33	26.08	24.85
09050	.3150	8.00	8.0	100	50	31.88	30.49	29.10	27.72
85400	.3750 3/8"	9.52	3/8"	2"	5/8"	20.09	19.22	18.35	17.47
85420	.3750 3/8"	9.52	3/8"	2-1/2"	1"	22.43	21.46	20.48	19.51
85440	.3750 3/8"	9.52	3/8"	4"	2"	33.52	32.06	30.61	29.15
09060	.3937	10.00	10.0	50	16	23.37	22.35	21.34	20.32
09070	.3937	10.00	10.0	70	25	27.32	26.14	24.95	23.75
09080	.3937	10.00	10.0	100	50	42.72	40.86	39.01	37.15
09090	.4724	12.00	12.0	65	20	34.90	33.38	31.87	30.35
09100	.4724	12.00	12.0	75	32	37.74	36.10	34.46	32.82
09110	.4724	12.00	12.0	100	50	52.00	49.74	47.48	45.22
85500	.5000 1/2"	12.70	1/2"	2-1/2"	3/4"	32.98	31.54	30.11	28.67
85520	.5000 1/2"	12.70	1/2"	3"	1-1/4"	35.94	34.38	32.81	31.25
85540	.5000 1/2"	12.70	1/2"	4"	2"	49.06	46.92	44.79	42.66
85600	.6250 5/8"	15.87	5/8"	3-1/2"	1-5/8"	69.31	66.29	63.27	60.27
85620	.6250 5/8"	15.87	5/8"	6"	3"	101.11	96.71	92.32	87.92
09120	.6299	16.00	16.0	88	40	72.78	69.62	66.45	63.28
09130	.6299	16.00	16.0	150	75	101.11	96.71	92.32	87.92
09140	.7087	18.00	18.0	100	45	106.71	102.08	97.44	92.80
85700	.7500 3/4"	19.05	3/4"	4"	1-3/4"	101.63	97.21	92.79	88.37
85720	.7500 3/4"	19.05	3/4"	6"	3"	161.08	154.08	147.07	140.07
09350	.7874	20.00	20.0	100	38	135.68	129.78	123.88	117.98
09150	.7874	20.00	20.0	150	75	169.69	162.31	154.93	147.56
09160	.9843	25.00	25.0	100	45	157.62	150.77	143.92	137.06
09170	.9843	25.00	25.0	150	75	261.48	250.11	238.74	227.38
85800	1.000 1"	25.40	1"	4"	1-3/4"	152.03	145.41	138.81	132.19
85820	1.000 1"	25.40	1"	6"	3"	273.86	261.96	250.05	238.14

253MA (853MA metric) - 3 Flute

.1181" - .6250"
(3.00mm - 15.87mm)

Technical information:
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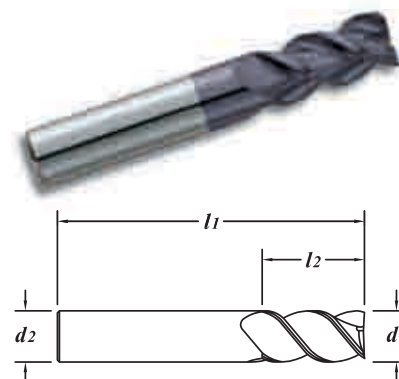
TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$3\text{mm} - 6\text{mm} \quad +0.0000" - .0003" (+.0000 - .0075\text{mm})$ $1/4" - 1" \quad -.0001" - .0004" (-.0025 - .0100\text{mm})$

Balinit® X.CEED Coated

Uncoated - page 89
TiCN Coated - page 91

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
Up to 40% faster than uncoated
Slots stainless steel at an axial depth of 25% of diameter
Recommended for stainless steel
Sharp corners (Can be modified with a corner radius)



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
NEW 10347	.1181	3.00	3.0	38	8	11.79	11.28	10.76	10.25
NEW 10357	.1181	3.00	3.0	50	12	14.21	13.59	12.97	12.36
NEW 86137	.1250 1/8"	3.17	1/8"	1-1/2"	1/4"	11.21	10.72	10.23	9.74
NEW 86147	.1250 1/8"	3.17	1/8"	2"	1/2"	13.50	12.92	12.32	11.74
NEW 10387	.1575	4.00	6.0	50	8	19.05	18.22	17.40	16.57
NEW 10397	.1575	4.00	6.0	50	12	19.05	18.22	17.40	16.57
86157	.1875 3/16"	4.76	3/16"	2"	5/16"	12.80	12.24	11.69	11.13
86167	.1875 3/16"	4.76	3/16"	2"	9/16"	12.80	12.24	11.69	11.13
86187	.1875 3/16"	4.76	3/16"	3"	1"	22.32	21.35	20.37	19.41
10407	.1969	5.00	5.0	50	8	15.16	14.51	13.84	13.19
10417	.1969	5.00	5.0	50	14	15.16	14.51	13.84	13.19
10017	.2362	6.00	6.0	50	12	15.87	15.18	14.49	13.80
10027	.2362	6.00	6.0	65	19	17.89	17.11	16.33	15.56
10037	.2362	6.00	6.0	75	32	27.57	26.37	25.17	23.97
86207	.2500 1/4"	6.35	1/4"	2"	1/2"	15.23	14.56	13.90	13.24
86227	.2500 1/4"	6.35	1/4"	2-1/2"	3/4"	17.27	16.53	15.78	15.02
86247	.2500 1/4"	6.35	1/4"	3"	1-1/4"	26.41	25.26	24.11	22.96
86267	.3125 5/16"	7.94	5/16"	2"	7/16"	21.05	20.13	19.22	18.30
86277	.3125 5/16"	7.94	5/16"	2-1/2"	13/16"	24.64	23.57	22.50	21.42
86287	.3125 5/16"	7.94	5/16"	4"	1-1/4"	38.69	37.00	35.33	33.64
10427	.3150	8.00	8.0	50	11	21.91	20.96	20.01	19.05
10047	.3150	8.00	8.0	65	20	25.52	24.41	23.31	22.19
10057	.3150	8.00	8.0	75	32	35.17	33.64	32.12	30.59
86307	.3750 3/8"	9.52	3/8"	2"	1/2"	24.88	23.80	22.71	21.63
86327	.3750 3/8"	9.52	3/8"	2-1/2"	1"	29.07	27.80	26.54	25.27
86347	.3750 3/8"	9.52	3/8"	3-1/2"	1-1/2"	41.93	40.11	38.28	36.46
10067	.3937	10.00	10.0	50	12	28.79	27.54	26.28	25.03
10077	.3937	10.00	10.0	75	25	40.65	38.89	37.12	35.35
10087	.3937	10.00	10.0	88	38	51.48	49.24	47.01	44.76
86367	.4375 7/16"	11.11	7/16"	2-1/2"	9/16"	34.92	33.40	31.89	30.37
86377	.4375 7/16"	11.11	7/16"	2-3/4"	1"	34.92	33.40	31.89	30.37
86387	.4375 7/16"	11.11	7/16"	4"	2"	55.86	53.42	51.00	48.57
10097	.4724	12.00	12.0	65	16	42.42	40.58	38.73	36.89
10107	.4724	12.00	12.0	75	25	45.27	43.31	41.33	39.36
10117	.4724	12.00	12.0	100	50	61.77	59.08	56.40	53.71
86407	.5000 1/2"	12.70	1/2"	2-1/2"	5/8"	40.67	38.91	37.14	35.37
86427	.5000 1/2"	12.70	1/2"	3"	1"	43.46	41.57	39.69	37.79
86447	.5000 1/2"	12.70	1/2"	4"	2"	58.81	56.25	53.70	51.14
10437	.5512	14.00	14.0	65	16	63.34	60.58	57.82	55.08
10447	.5512	14.00	14.0	75	25	67.82	64.86	61.92	58.97
10457	.5512	14.00	14.0	100	50	82.31	78.73	75.15	71.57
86467	.5625 9/16"	14.29	9/16"	3"	7/8"	68.02	65.06	62.10	59.14
86477	.5625 9/16"	14.29	9/16"	3-1/2"	1-1/4"	72.26	69.12	65.98	62.84
86487	.5625 9/16"	14.29	9/16"	6"	2-1/2"	109.30	104.55	99.80	95.05
86507	.6250 5/8"	15.87	5/8"	3"	7/8"	72.10	68.97	65.83	62.70
86527	.6250 5/8"	15.87	5/8"	3-1/2"	1-1/4"	80.19	76.71	73.22	69.73
86547	.6250 5/8"	15.87	5/8"	6"	2-1/2"	117.28	112.18	107.08	101.98

continued →

253MA (853MA metric) - 3 Flute (continued)

.6299" - 1.000"
(16.00mm - 25.40mm)

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
10127	.6299	16.00	16.0	75	20	75.43	72.16	68.87	65.59
10137	.6299	16.00	16.0	88	32	83.66	80.02	76.38	72.75
10147	.6299	16.00	16.0	150	65	117.28	112.18	107.08	101.98
10167	.7087	18.00	18.0	100	38	119.54	114.34	109.14	103.95
10177	.7087	18.00	18.0	150	75	170.74	163.31	155.89	148.47
86607	.7500	3/4"	19.05	3/4"	3-1/2"	1"	114.47	109.49	104.52
86627	.7500	3/4"	19.05	3/4"	4"	1-1/2"	114.47	109.49	104.52
86647	.7500	3/4"	19.05	3/4"	6"	3"	179.81	171.98	164.17
10467	.7874	20.00	20.0	75	22	138.64	132.61	126.59	120.56
10187	.7874	20.00	20.0	100	38	154.66	147.93	141.21	134.48
10197	.7874	20.00	20.0	150	75	193.99	185.56	177.12	168.69
10217	.9843	25.00	25.0	100	28	176.60	168.93	161.24	153.57
10487	.9843	25.00	25.0	100	50	176.60	168.93	161.24	153.57
10497	.9843	25.00	25.0	150	82	285.78	273.35	260.93	248.51
86697	1.000	1"	25.40	1"	4"	1-1/8"	171.01	163.57	156.14
86727	1.000	1"	25.40	1"	4"	2"	171.01	163.57	156.14
86747	1.000	1"	25.40	1"	6"	3-1/4"	298.18	285.21	272.25



253M (853M metric) - 3 Flute

.1181" - .6250"
(3.00mm - 15.87mm)

Technical information:
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TOLERANCES

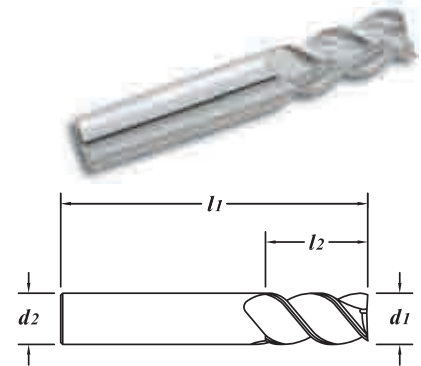
d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$3\text{mm} - 6\text{mm} \quad +0.0000" - .0003" (+.0000 - .0075\text{mm})$ $1/4" - 1" \quad -.0001" - .0004" (-.0025 - .0100\text{mm})$

X.CEED Coated - page 87
TiCN Coated - page 91

Solid submicron grain carbide end mill - center cutting
High performance machining
Rigid work holding, machine stability and part integrity are critical!
Slots aluminum at an axial depth of 25% of diameter

Recommended for aluminum and stainless steel

Sharp corners (Can be modified with a corner radius)



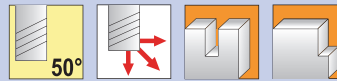
EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
NEW 10340	.1181	3.00	3.0	38	8	9.63	9.21	8.79	8.37
NEW 10350	.1181	3.00	3.0	50	12	11.61	11.10	10.60	10.09
NEW 86130	.1250 1/8"	3.17	1/8"	1-1/2"	1/4"	9.04	8.64	8.25	7.86
NEW 86140	.1250 1/8"	3.17	1/8"	2"	1/2"	10.90	10.42	9.95	9.47
NEW 10380	.1575	4.00	6.0	50	8	15.65	14.98	14.29	13.61
NEW 10390	.1575	4.00	6.0	50	12	15.65	14.98	14.29	13.61
86150	.1875 3/16"	4.76	3/16"	2"	5/16"	10.65	10.18	9.72	9.26
86160	.1875 3/16"	4.76	3/16"	2"	9/16"	10.65	10.18	9.72	9.26
86180	.1875 3/16"	4.76	3/16"	3"	1"	18.98	18.16	17.33	16.50
10400	.1969	5.00	5.0	50	8	11.82	11.32	10.80	10.29
10410	.1969	5.00	5.0	50	14	11.82	11.32	10.80	10.29
10010	.2362	6.00	6.0	50	12	12.53	11.99	11.44	10.90
10020	.2362	6.00	6.0	65	19	13.48	12.90	12.30	11.72
10030	.2362	6.00	6.0	75	32	23.14	22.13	21.13	20.12
86200	.2500 1/4"	6.35	1/4"	2"	1/2"	11.89	11.37	10.86	10.34
86220	.2500 1/4"	6.35	1/4"	2-1/2"	3/4"	12.84	12.28	11.73	11.17
86240	.2500 1/4"	6.35	1/4"	3"	1-1/4"	22.00	21.04	20.08	19.13
86260	.3125 5/16"	7.94	5/16"	2"	7/16"	16.27	15.56	14.85	14.14
86270	.3125 5/16"	7.94	5/16"	2-1/2"	13/16"	18.02	17.24	16.45	15.67
86280	.3125 5/16"	7.94	5/16"	4"	1-1/4"	30.27	28.95	27.64	26.32
10420	.3150	8.00	8.0	50	11	17.14	16.39	15.65	14.90
10040	.3150	8.00	8.0	65	20	18.92	18.10	17.27	16.45
10050	.3150	8.00	8.0	75	32	28.57	27.33	26.08	24.85
86300	.3750 3/8"	9.52	3/8"	2"	1/2"	20.09	19.22	18.35	17.47
86320	.3750 3/8"	9.52	3/8"	2-1/2"	1"	22.43	21.46	20.48	19.51
86340	.3750 3/8"	9.52	3/8"	3-1/2"	1-1/2"	33.52	32.06	30.61	29.15
10060	.3937	10.00	10.0	50	12	23.37	22.35	21.34	20.32
10070	.3937	10.00	10.0	75	25	33.13	31.69	30.25	28.81
10080	.3937	10.00	10.0	88	38	41.72	39.92	38.10	36.29
86360	.4375 7/16"	11.11	7/16"	2-1/2"	9/16"	27.39	26.20	25.01	23.82
86370	.4375 7/16"	11.11	7/16"	2-3/4"	1"	27.39	26.20	25.01	23.82
86380	.4375 7/16"	11.11	7/16"	4"	2"	46.11	44.11	42.10	40.10
10090	.4724	12.00	12.0	65	16	34.90	33.38	31.87	30.35
10100	.4724	12.00	12.0	75	25	37.74	36.10	34.46	32.82
10110	.4724	12.00	12.0	100	50	52.00	49.74	47.48	45.22
86400	.5000 1/2"	12.70	1/2"	2-1/2"	5/8"	33.16	31.71	30.27	28.83
86420	.5000 1/2"	12.70	1/2"	3"	1"	35.94	34.38	32.81	31.25
86440	.5000 1/2"	12.70	1/2"	4"	2"	49.06	46.92	44.79	42.66
10430	.5512	14.00	14.0	65	16	54.61	52.24	49.86	47.49
10440	.5512	14.00	14.0	75	25	59.07	56.50	53.93	51.37
10450	.5512	14.00	14.0	100	50	71.43	68.32	65.22	62.11
86460	.5625 9/16"	14.29	9/16"	3"	7/8"	59.30	56.72	54.14	51.56
86470	.5625 9/16"	14.29	9/16"	3-1/2"	1-1/4"	61.38	58.71	56.05	53.37
86480	.5625 9/16"	14.29	9/16"	6"	2-1/2"	93.13	89.09	85.03	80.98
86500	.6250 5/8"	15.87	5/8"	3"	7/8"	63.39	60.63	57.88	55.12
86520	.6250 5/8"	15.87	5/8"	3-1/2"	1-1/4"	69.31	66.29	63.27	60.27
86540	.6250 5/8"	15.87	5/8"	6"	2-1/2"	101.11	96.71	92.32	87.92

continued →

253M (853M metric) - 3 Flute (continued)

.6299" - 1.000"
(16.00mm - 25.40mm)

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
10120	.6299	16.00	16.0	75	20	66.72	63.81	60.91	58.01
10130	.6299	16.00	16.0	88	32	72.78	69.62	66.45	63.28
10140	.6299	16.00	16.0	150	65	101.11	96.71	92.32	87.92
10160	.7087	18.00	18.0	100	38	106.69	102.06	97.42	92.78
10170	.7087	18.00	18.0	150	75	152.03	145.41	138.81	132.19
86600	.7500	3/4"	19.05	3-1/2"	1"	101.63	97.21	92.79	88.37
86620	.7500	3/4"	19.05	4"	1-1/2"	101.63	97.21	92.79	88.37
86640	.7500	3/4"	19.05	6"	3"	161.08	154.08	147.07	140.07
10460	.7874	20.00	20.0	75	22	123.64	118.26	112.88	107.50
10180	.7874	20.00	20.0	100	38	135.68	129.78	123.88	117.98
10190	.7874	20.00	20.0	150	75	169.69	162.31	154.93	147.56
10210	.9843	25.00	25.0	100	28	157.62	150.77	143.92	137.06
10480	.9843	25.00	25.0	100	50	157.62	150.77	143.92	137.06
10490	.9843	25.00	25.0	150	82	261.48	250.11	238.74	227.38
86690	1.000	1"	25.40	4"	1-1/8"	152.03	145.41	138.81	132.19
86720	1.000	1"	25.40	4"	2"	152.03	145.41	138.81	132.19
86740	1.000	1"	25.40	6"	3-1/4"	273.86	261.96	250.05	238.14



TOLERANCES

d_1	$+0.000'' -0.002'' (+0.000 -0.050\text{mm})$
d_2	$3\text{mm} - 6\text{mm} \quad +0.0000'' -0.0003'' (+0.0000 -0.0075\text{mm})$
	$1/4'' - 1'' \quad -0.0001'' -0.0004'' (-0.0025 -0.0100\text{mm})$

TiCN Coated

X.CEED Coated - page 87
Uncoated - page 89

Solid submicron grain carbide end mill - center cutting

High performance machining

Rigid work holding, machine stability and part integrity are critical!

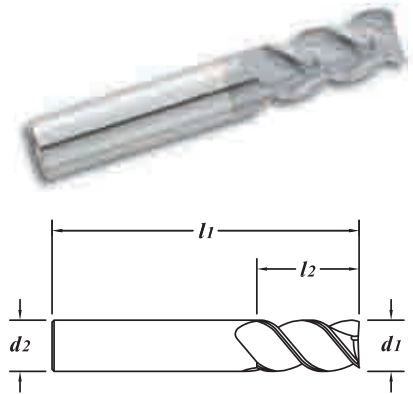
Improved abrasion resistance and lubricity

Up to 25% faster than uncoated

Slots aluminum and stainless steel at an axial depth of 25% of diameter

Recommended for aluminum and 303 stainless steel

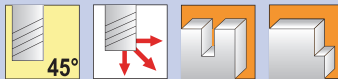
Sharp corners (Can be modified with a corner radius)



EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric							
86154	.1875	3/16"	4.76	3/16"	2"	5/16"	12.53	11.99	11.44	10.90
86164	.1875	3/16"	4.76	3/16"	2"	9/16"	12.53	11.99	11.44	10.90
86184	.1875	3/16"	4.76	3/16"	3"	1"	21.63	20.70	19.75	18.81
86204	.2500	1/4"	6.35	1/4"	2"	1/2"	14.54	13.90	13.27	12.65
86224	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	16.68	15.95	15.24	14.51
86244	.2500	1/4"	6.35	1/4"	3"	1-1/4"	25.82	24.70	23.58	22.45
86264	.3125	5/16"	7.94	5/16"	2"	7/16"	20.42	19.53	18.64	17.75
86274	.3125	5/16"	7.94	5/16"	2-1/2"	13/16"	23.14	22.13	21.13	20.12
86284	.3125	5/16"	7.94	5/16"	4"	1-1/4"	36.65	35.06	33.47	31.87
86304	.3750	3/8"	9.52	3/8"	2"	1/2"	24.24	23.19	22.13	21.08
86324	.3750	3/8"	9.52	3/8"	2-1/2"	1"	26.58	25.43	24.27	23.12
86344	.3750	3/8"	9.52	3/8"	3-1/2"	1-1/2"	39.88	38.15	36.42	34.68
86364	.4375	7/16"	11.11	7/16"	2-1/2"	9/16"	33.55	32.09	30.63	29.17
86374	.4375	7/16"	11.11	7/16"	2-3/4"	1"	33.55	32.09	30.63	29.17
86384	.4375	7/16"	11.11	7/16"	4"	2"	53.80	51.46	49.12	46.78
86404	.5000	1/2"	12.70	1/2"	2-1/2"	5/8"	39.30	37.60	35.88	34.17
86424	.5000	1/2"	12.70	1/2"	3"	1"	42.09	40.26	38.43	36.60
86444	.5000	1/2"	12.70	1/2"	4"	2"	56.75	54.29	51.81	49.35
86464	.5625	9/16"	14.29	9/16"	3"	7/8"	67.55	64.62	61.67	58.74
86474	.5625	9/16"	14.29	9/16"	3-1/2"	1-1/4"	70.97	67.88	64.80	61.71
86484	.5625	9/16"	14.29	9/16"	6"	2-1/2"	106.57	101.93	97.30	92.66
86504	.6250	5/8"	15.87	5/8"	3"	7/8"	71.65	68.53	65.42	62.30
86524	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	78.88	75.45	72.02	68.60
86544	.6250	5/8"	15.87	5/8"	6"	2-1/2"	114.56	109.57	104.59	99.61
86604	.7500	3/4"	19.05	3/4"	3-1/2"	1"	112.59	107.69	102.80	97.91
86624	.7500	3/4"	19.05	3/4"	4"	1-1/2"	112.59	107.69	102.80	97.91
86644	.7500	3/4"	19.05	3/4"	6"	3"	176.43	168.75	161.09	153.41
86694	1.000	1"	25.40	1"	4"	1-1/8"	168.50	161.18	153.85	146.53
86724	1.000	1"	25.40	1"	4"	2"	168.50	161.18	153.85	146.53
86744	1.000	1"	25.40	1"	6"	3-1/4"	295.56	282.70	269.86	257.00

255MA (855MA metric) - 5 Flute

Technical information:
page 193, 195



TOLERANCES

d_1	$+0.000'' - 0.002'' (+0.000 - 0.050\text{mm})$
d_2	$3\text{mm} - 6\text{mm} \quad +0.0000'' - 0.0003'' (+0.0000 - 0.0075\text{mm})$
	$1/4'' - 1'' \quad -0.0001'' - 0.0004'' (-0.0025 - 0.0100\text{mm})$

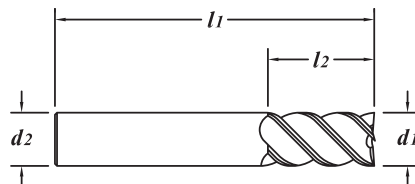
.1181" - .6250"
(3.00mm - 15.87mm)

Balinit® X.CEED Coated

Uncoated - page 94
TiCN Coated - page 96

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
Up to 40% faster than uncoated
Improved finishes in titanium
Heavy core, Sharp corners

Recommended for steels, stainless steel and exotics



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
NEW 40047	.1181	3.00	3.0	38	8	11.79	11.28	10.76	10.25
NEW 40057	.1181	3.00	3.0	50	12	14.21	13.59	12.97	12.36
NEW 52087	.1250 1/8"	3.17	1/8"	1-1/2"	1/4"	11.21	10.72	10.23	9.74
NEW 52097	.1250 1/8"	3.17	1/8"	2"	1/2"	13.50	12.92	12.32	11.74
NEW 40087	.1575	4.00	6.0	50	8	19.05	18.22	17.40	16.57
NEW 40097	.1575	4.00	6.0	50	12	19.05	18.22	17.40	16.57
52107	.1875 3/16"	4.76	3/16"	2"	5/16"	12.80	12.24	11.69	11.13
52127	.1875 3/16"	4.76	3/16"	2"	9/16"	12.80	12.24	11.69	11.13
40107	.1969	5.00	5.0	50	8	15.16	14.51	13.84	13.19
40127	.1969	5.00	5.0	50	14	15.16	14.51	13.84	13.19
40207	.2362	6.00	6.0	50	10	15.87	15.18	14.49	13.80
40227	.2362	6.00	6.0	65	20	17.89	17.11	16.33	15.56
40247	.2362	6.00	6.0	100	32	29.61	28.32	27.03	25.75
52207	.2500 1/4"	6.35	1/4"	2"	3/8"	15.23	14.56	13.90	13.24
52227	.2500 1/4"	6.35	1/4"	2-1/2"	3/4"	17.27	16.53	15.78	15.02
52247	.2500 1/4"	6.35	1/4"	4"	1-1/4"	28.39	27.15	25.93	24.69
52307	.3125 5/16"	7.94	5/16"	2"	7/16"	21.05	20.13	19.22	18.30
52327	.3125 5/16"	7.94	5/16"	2-1/2"	13/16"	24.64	23.57	22.50	21.42
52347	.3125 5/16"	7.94	5/16"	4"	1-1/4"	38.69	37.00	35.33	33.64
40307	.3150	8.00	8.0	50	11	21.91	20.96	20.01	19.05
40327	.3150	8.00	8.0	65	21	25.52	24.41	23.31	22.19
40347	.3150	8.00	8.0	100	32	40.28	38.53	36.77	35.03
52407	.3750 3/8"	9.52	3/8"	2"	1/2"	24.88	23.80	22.71	21.63
52427	.3750 3/8"	9.52	3/8"	2-1/2"	7/8"	29.07	27.80	26.54	25.27
52447	.3750 3/8"	9.52	3/8"	3-1/2"	1-1/2"	41.93	40.11	38.28	36.46
40407	.3937	10.00	10.0	50	12	28.79	27.54	26.28	25.03
40427	.3937	10.00	10.0	70	22	34.84	33.32	31.81	30.30
40447	.3937	10.00	10.0	88	38	51.48	49.24	47.01	44.76
52507	.4375 7/16"	11.11	7/16"	2-1/2"	9/16"	34.92	33.40	31.89	30.37
52527	.4375 7/16"	11.11	7/16"	2-3/4"	1"	34.92	33.40	31.89	30.37
52547	.4375 7/16"	11.11	7/16"	4"	2"	55.86	53.42	51.00	48.57
40507	.4724	12.00	12.0	65	16	42.42	40.58	38.73	36.89
40527	.4724	12.00	12.0	75	32	45.27	43.31	41.33	39.36
40547	.4724	12.00	12.0	100	50	61.77	59.08	56.40	53.71
52607	.5000 1/2"	12.70	1/2"	2-1/2"	5/8"	40.67	38.91	37.14	35.37
52627	.5000 1/2"	12.70	1/2"	3"	1-1/4"	43.46	41.57	39.69	37.79
52647	.5000 1/2"	12.70	1/2"	4"	2"	58.81	56.25	53.70	51.14
52707	.6250 5/8"	15.87	5/8"	3"	3/4"	72.10	68.97	65.83	62.70
52727	.6250 5/8"	15.87	5/8"	3-1/2"	1-5/8"	80.19	76.71	73.22	69.73
52747	.6250 5/8"	15.87	5/8"	6"	2-1/2"	117.28	112.18	107.08	101.98

255MA (855MA metric) - 5 Flute (continued)

.6299" - 1.000"
(16.00mm - 25.40mm)

HIGH PERFORMANCE
END MILLS

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
40607	.6299	16.00	16.0	75	20	75.43	72.16	68.87	65.59
40627	.6299	16.00	16.0	88	41	83.66	80.02	76.38	72.75
40647	.6299	16.00	16.0	150	63	117.28	112.18	107.08	101.98
52807	.7500	3/4"	19.05	3"	7/8"	101.60	97.18	92.76	88.35
52827	.7500	3/4"	19.05	4"	1-5/8"	114.47	109.49	104.52	99.54
52837	.7500	3/4"	19.05	5"	2"	153.64	146.96	140.28	133.60
52847	.7500	3/4"	19.05	6"	3-1/4"	179.81	171.98	164.17	156.35
40707	.7874	20.00	20.0	75	22	138.64	132.61	126.59	120.56
40727	.7874	20.00	20.0	100	41	154.66	147.93	141.21	134.48
40747	.7874	20.00	20.0	150	82	193.99	185.56	177.12	168.69
40787	.9843	25.00	25.0	100	28	176.60	168.93	161.24	153.57
40827	.9843	25.00	25.0	100	50	176.60	168.93	161.24	153.57
40847	.9843	25.00	25.0	150	82	285.78	273.35	260.93	248.51
52897	1.000	1"	25.40	1"	4"	171.01	163.57	156.14	148.70
52927	1.000	1"	25.40	1"	4"	171.01	163.57	156.14	148.70
52947	1.000	1"	25.40	1"	6"	298.18	285.21	272.25	259.28

255M (855M metric) - 5 Flute

Technical information:

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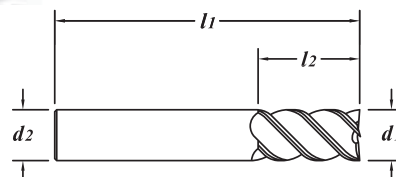
TOLERANCES

d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)

.1181" - .6250"
(3.00mm - 15.87mm)

X.CEED Coated - page 92

TiCN Coated - page 96



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

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
NEW 40040	.1181	3.00	3.0	38	8	9.63	9.21	8.79	8.37
NEW 40050	.1181	3.00	3.0	50	12	11.61	11.10	10.60	10.09
NEW 52080	.1250 1/8"	3.17	1/8"	1-1/2"	1/4"	9.04	8.64	8.25	7.86
NEW 52090	.1250 1/8"	3.17	1/8"	2"	1/2"	10.90	10.42	9.95	9.47
NEW 40080	.1575	4.00	6.0	50	8	15.65	14.98	14.29	13.61
NEW 40090	.1575	4.00	6.0	50	12	15.65	14.98	14.29	13.61
52100	.1875 3/16"	4.76	3/16"	2"	5/16"	10.65	10.18	9.72	9.26
52120	.1875 3/16"	4.76	3/16"	2"	9/16"	10.65	10.18	9.72	9.26
40100	.1969	5.00	5.0	50	8	11.82	11.32	10.80	10.29
40120	.1969	5.00	5.0	50	14	11.82	11.32	10.80	10.29
40200	.2362	6.00	6.0	50	10	12.53	11.99	11.44	10.90
40220	.2362	6.00	6.0	65	20	13.48	12.90	12.30	11.72
40240	.2362	6.00	6.0	100	32	24.42	23.36	22.30	21.24
52200	.2500 1/4"	6.35	1/4"	2"	3/8"	11.89	11.37	10.86	10.34
52220	.2500 1/4"	6.35	1/4"	2-1/2"	3/4"	12.84	12.28	11.73	11.17
52240	.2500 1/4"	6.35	1/4"	4"	1-1/4"	23.20	22.19	21.18	20.18
52300	.3125 5/16"	7.94	5/16"	2"	7/16"	16.27	15.56	14.85	14.14
52320	.3125 5/16"	7.94	5/16"	2-1/2"	13/16"	18.02	17.24	16.45	15.67
52340	.3125 5/16"	7.94	5/16"	4"	1-1/4"	30.27	28.95	27.64	26.32
40300	.3150	8.00	8.0	50	11	17.14	16.39	15.65	14.90
40320	.3150	8.00	8.0	65	21	18.92	18.10	17.27	16.45
40340	.3150	8.00	8.0	100	32	31.88	30.49	29.10	27.72
52400	.3750 3/8"	9.52	3/8"	2"	1/2"	20.09	19.22	18.35	17.47
52420	.3750 3/8"	9.52	3/8"	2-1/2"	7/8"	22.43	21.46	20.48	19.51
52440	.3750 3/8"	9.52	3/8"	3-1/2"	1-1/2"	33.52	32.06	30.61	29.15
40400	.3937	10.00	10.0	50	12	23.37	22.35	21.34	20.32
40420	.3937	10.00	10.0	70	22	27.32	26.14	24.95	23.75
40440	.3937	10.00	10.0	88	38	41.72	39.92	38.10	36.29
52500	.4375 7/16"	11.11	7/16"	2-1/2"	9/16"	27.39	26.20	25.01	23.82
52520	.4375 7/16"	11.11	7/16"	2-3/4"	1"	27.39	26.20	25.01	23.82
52540	.4375 7/16"	11.11	7/16"	4"	2"	46.11	44.11	42.10	40.10
40500	.4724	12.00	12.0	65	16	34.90	33.38	31.87	30.35
40520	.4724	12.00	12.0	75	32	37.74	36.10	34.46	32.82
40540	.4724	12.00	12.0	100	50	52.00	49.74	47.48	45.22
52600	.5000 1/2"	12.70	1/2"	2-1/2"	5/8"	33.16	31.71	30.27	28.83
52620	.5000 1/2"	12.70	1/2"	3"	1-1/4"	35.94	34.38	32.81	31.25
52640	.5000 1/2"	12.70	1/2"	4"	2"	49.06	46.92	44.79	42.66
52700	.6250 5/8"	15.87	5/8"	3"	3/4"	63.39	60.63	57.88	55.12
52720	.6250 5/8"	15.87	5/8"	3-1/2"	1-5/8"	69.31	66.29	63.27	60.27
52740	.6250 5/8"	15.87	5/8"	6"	2-1/2"	101.11	96.71	92.32	87.92

255M (855M metric) - 5 Flute (continued)

.6299" - 1.000"
(16.00mm - 25.40mm)

HIGH PERFORMANCE
END MILLS

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
40600	.6299	16.00	16.0	75	20	66.72	63.81	60.91	58.01
40620	.6299	16.00	16.0	88	41	72.78	69.62	66.45	63.28
40640	.6299	16.00	16.0	150	63	101.11	96.71	92.32	87.92
52800	.7500	3/4"	19.05	3/4"	3"	7/8"	91.15	87.18	83.22
52820	.7500	3/4"	19.05	3/4"	4"	1-5/8"	101.63	97.21	92.79
52830	.7500	3/4"	19.05	3/4"	5"	2"	137.57	131.59	125.61
52840	.7500	3/4"	19.05	3/4"	6"	3-1/4"	161.08	154.08	147.07
40700	.7874	20.00	20.0	75	22	123.64	118.26	112.88	107.50
40720	.7874	20.00	20.0	100	41	135.68	129.78	123.88	117.98
40740	.7874	20.00	20.0	150	82	169.69	162.31	154.93	147.56
40780	.9843	25.00	25.0	100	28	157.62	150.77	143.92	137.06
40820	.9843	25.00	25.0	100	50	157.62	150.77	143.92	137.06
40840	.9843	25.00	25.0	150	82	261.48	250.11	238.74	227.38
52890	1.000	1"	25.40	1"	4"	1-1/8"	152.03	145.41	138.81
52920	1.000	1"	25.40	1"	4"	2"	152.03	145.41	138.81
52940	1.000	1"	25.40	1"	6"	3-1/4"	273.86	261.96	250.05



TOLERANCES

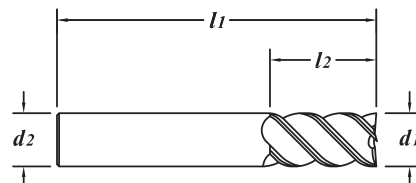
d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$3\text{mm} - 6\text{mm} \quad +.0000" - .0003" (+.0000 - .0075\text{mm})$
	$1/4" - 1" \quad -.0001" - .0004" (-.0025 - .0100\text{mm})$

TiCN Coated

X.CEED Coated - page 92
Uncoated - page 94

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
Up to 25% faster than uncoated
Improved finishes in titanium
Heavy core
Sharp corners

Recommended for steels, stainless steel and exotics



EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Diameter	Metric							
52104	.1875	3/16"	4.76	3/16"	2"	5/16"	12.53	11.99	11.44	10.90
52124	.1875	3/16"	4.76	3/16"	2"	9/16"	12.53	11.99	11.44	10.90
52204	.2500	1/4"	6.35	1/4"	2"	3/8"	14.54	13.90	13.27	12.65
52224	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	16.68	15.95	15.24	14.51
52244	.2500	1/4"	6.35	1/4"	4"	1-1/4"	27.35	26.17	24.97	23.78
52304	.3125	5/16"	7.94	5/16"	2"	7/16"	20.42	19.53	18.64	17.75
52324	.3125	5/16"	7.94	5/16"	2-1/2"	13/16"	23.14	22.13	21.13	20.12
52344	.3125	5/16"	7.94	5/16"	4"	1-1/4"	36.65	35.06	33.47	31.87
52404	.3750	3/8"	9.52	3/8"	2"	1/2"	24.24	23.19	22.13	21.08
52424	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	27.57	26.37	25.17	23.97
52444	.3750	3/8"	9.52	3/8"	3-1/2"	1-1/2"	39.88	38.15	36.42	34.68
52504	.4375	7/16"	11.11	7/16"	2-1/2"	9/16"	33.55	32.09	30.63	29.17
52524	.4375	7/16"	11.11	7/16"	2-3/4"	1"	33.55	32.09	30.63	29.17
52544	.4375	7/16"	11.11	7/16"	4"	2"	53.80	51.46	49.12	46.78
52604	.5000	1/2"	12.70	1/2"	2-1/2"	5/8"	39.30	37.60	35.88	34.17
52624	.5000	1/2"	12.70	1/2"	3"	1-1/4"	42.09	40.26	38.43	36.60
52644	.5000	1/2"	12.70	1/2"	4"	2"	56.75	54.29	51.81	49.35
52704	.6250	5/8"	15.87	5/8"	3"	3/4"	71.65	68.53	65.42	62.30
52724	.6250	5/8"	15.87	5/8"	3-1/2"	1-5/8"	78.88	75.45	72.02	68.60
52744	.6250	5/8"	15.87	5/8"	6"	2-1/2"	114.56	109.57	104.59	99.61
52804	.7500	3/4"	19.05	3/4"	3"	7/8"	101.32	96.91	92.51	88.10
52824	.7500	3/4"	19.05	3/4"	4"	1-5/8"	112.59	107.69	102.80	97.91
52844	.7500	3/4"	19.05	3/4"	6"	3-1/4"	176.43	168.75	161.09	153.41
52894	1.000	1"	25.40	1"	4"	1-1/8"	168.50	161.18	153.85	146.53
52924	1.000	1"	25.40	1"	4"	2"	168.50	161.18	153.85	146.53
52944	1.000	1"	25.40	1"	6"	3-1/4"	295.56	282.70	269.86	257.00

255RA (855RA metric) - 5 Flute

Technical information:
page 193, 195



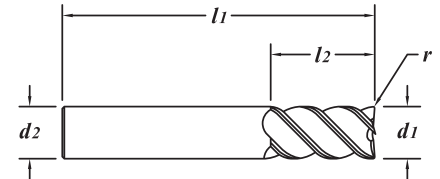
.1181" - .3125"
(3.00mm - 7.94mm)

TOLERANCES		
d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
r	+.001" -.001" (+.025 -.025mm)	

Corner Radius - Balinit® X.CEED Coated

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
Up to 40% faster than uncoated
Improved finishes in titanium
Heavy core
An ideal tool for finishing applications after using the VRX end mill (see page 103)

Recommended for steels, stainless steel and exotics



EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100		
	Decimal	Diameter									Metric	
NEW	83527	.1181	3.00	3.0	38	8	0.2	12.89	12.32	11.76	11.20	
	83537	.1181	3.00	3.0	38	8	0.5	12.89	12.32	11.76	11.20	
	83547	.1181	3.00	3.0	50	12	0.2	15.43	14.76	14.09	13.42	
	83550	.1181	3.00	3.0	50	12	0.3	15.43	14.76	14.09	13.42	
	83557	.1181	3.00	3.0	50	12	0.5	15.43	14.76	14.09	13.42	
NEW	83567	.1250	1/8"	3.17	1/8"	1-1/2"	1/4"	.010"	12.23	11.70	11.17	10.64
	83577	.1250	1/8"	3.17	1/8"	1-1/2"	1/4"	.020"	12.23	11.70	11.17	10.64
	83587	.1250	1/8"	3.17	1/8"	2"	1/2"	.010"	15.05	14.39	13.74	13.08
	83597	.1250	1/8"	3.17	1/8"	2"	1/2"	.020"	15.05	14.39	13.74	13.08
	83600	.1250	1/8"	3.17	1/8"	2"	1/2"	.030"	15.05	14.39	13.74	13.08
NEW	83607	.1575		4.00	6.0	50	8	0.3	20.76	19.85	18.95	18.05
	83617	.1575		4.00	6.0	50	8	0.5	20.76	19.85	18.95	18.05
	83627	.1575		4.00	6.0	50	12	0.3	20.76	19.85	18.95	18.05
	83637	.1575		4.00	6.0	50	12	0.5	20.76	19.85	18.95	18.05
	83647	.1875	3/16"	4.76	3/16"	2"	5/16"	.010"	15.38	14.72	14.04	13.37
NEW	83657	.1875	3/16"	4.76	3/16"	2"	5/16"	.020"	15.38	14.72	14.04	13.37
	83667	.1875	3/16"	4.76	3/16"	2"	9/16"	.010"	15.38	14.72	14.04	13.37
	83677	.1875	3/16"	4.76	3/16"	2"	9/16"	.020"	15.38	14.72	14.04	13.37
	83680	.1875	3/16"	4.76	3/16"	2"	9/16"	.030"	15.38	14.72	14.04	13.37
	83707	.1969		5.00	6.0	65	15	0.3	22.64	21.65	20.68	19.69
NEW	83717	.1969		5.00	6.0	65	15	0.5	22.64	21.65	20.68	19.69
	83767	.2362		6.00	6.0	50	12	0.3	19.53	18.68	17.84	16.98
	83777	.2362		6.00	6.0	50	12	0.5	19.53	18.68	17.84	16.98
	83780	.2362		6.00	6.0	65	19	0.2	21.93	20.98	20.03	19.07
	83787	.2362		6.00	6.0	65	19	0.3	21.93	20.98	20.03	19.07
NEW	83797	.2362		6.00	6.0	65	19	0.5	21.93	20.98	20.03	19.07
	83807	.2362		6.00	6.0	65	19	1.0	21.93	20.98	20.03	19.07
	83827	.2500	1/4"	6.35	1/4"	2"	3/8"	.015"	18.80	17.98	17.17	16.35
	83837	.2500	1/4"	6.35	1/4"	2"	3/8"	.030"	18.80	17.98	17.17	16.35
	83845	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.010"	21.12	20.21	19.28	18.37
NEW	83847	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.015"	21.12	20.21	19.28	18.37
	83857	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.030"	21.12	20.21	19.28	18.37
	83877	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.060"	21.12	20.21	19.28	18.37
	83927	.3125	5/16"	7.94	5/16"	2"	7/16"	.020"	25.67	24.55	23.43	22.32
	83937	.3125	5/16"	7.94	5/16"	2"	7/16"	.030"	25.67	24.55	23.43	22.32
NEW	83940	.3125	5/16"	7.94	5/16"	2-1/2"	13/16"	.010"	28.61	27.36	26.12	24.88
	83947	.3125	5/16"	7.94	5/16"	2-1/2"	13/16"	.020"	28.61	27.36	26.12	24.88
	83957	.3125	5/16"	7.94	5/16"	2-1/2"	13/16"	.030"	28.61	27.36	26.12	24.88
	83977	.3125	5/16"	7.94	5/16"	2-1/2"	13/16"	.060"	28.61	27.36	26.12	24.88

continued →

255RA (855RA metric) - 5 Flute (continued)

.3150" - 1.000"
(8.00mm - 25.40mm)

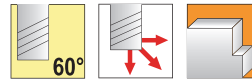
EDP#	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	1-11	12-24	25-49	50-100	
	Decimal		Metric									
NEW	83987	.3150		8.00	8.0	50	12	0.5	26.61	25.46	24.29	23.14
	83997	.3150		8.00	8.0	50	12	1.0	26.61	25.46	24.29	23.14
	84000	.3150		8.00	8.0	65	22	0.3	29.68	28.39	27.10	25.81
	84007	.3150		8.00	8.0	65	22	0.5	29.68	28.39	27.10	25.81
NEW	84017	.3150		8.00	8.0	65	22	1.0	29.68	28.39	27.10	25.81
	84027	.3150		8.00	8.0	65	22	1.5	29.68	28.39	27.10	25.81
	84087	.3750	3/8"	9.52	3/8"	2"	1/2"	.020"	30.26	28.94	27.63	26.31
NEW	84097	.3750	3/8"	9.52	3/8"	2"	1/2"	.030"	30.26	28.94	27.63	26.31
	84100	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.010"	33.28	31.83	30.39	28.94
	84107	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.020"	33.28	31.83	30.39	28.94
NEW	84117	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.030"	33.28	31.83	30.39	28.94
	84137	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.060"	33.28	31.83	30.39	28.94
	84167	.3937		10.00	10.0	70	22	0.5	40.22	38.47	36.72	34.98
NEW	84177	.3937		10.00	10.0	70	22	1.0	40.22	38.47	36.72	34.98
	84257	.4724		12.00	12.0	75	32	0.3	58.83	56.27	53.72	51.16
	84267	.4724		12.00	12.0	75	32	0.5	58.83	56.27	53.72	51.16
NEW	84277	.4724		12.00	12.0	75	32	1.0	58.83	56.27	53.72	51.16
	84287	.4724		12.00	12.0	75	32	1.5	58.83	56.27	53.72	51.16
	84307	.5000	1/2"	12.70	1/2"	3"	1-1/4"	.010"	56.45	54.00	51.54	49.09
NEW	84317	.5000	1/2"	12.70	1/2"	3"	1-1/4"	.020"	56.45	54.00	51.54	49.09
	84327	.5000	1/2"	12.70	1/2"	3"	1-1/4"	.030"	56.45	54.00	51.54	49.09
	84337	.5000	1/2"	12.70	1/2"	3"	1-1/4"	.060"	56.45	54.00	51.54	49.09
	84357	.5000	1/2"	12.70	1/2"	3"	1-1/4"	.120"	56.45	54.00	51.54	49.09
	84367	.5000	1/2"	12.70	1/2"	4"	2"	.030"	66.87	63.96	61.06	58.15
NEW	84377	.5000	1/2"	12.70	1/2"	4"	2"	.060"	66.87	63.96	61.06	58.15
	84397	.5000	1/2"	12.70	1/2"	4"	2"	.120"	66.87	63.96	61.06	58.15
	84467	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.015"	89.77	85.87	81.96	78.06
NEW	84487	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.030"	89.77	85.87	81.96	78.06
	84497	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.060"	89.77	85.87	81.96	78.06
	84507	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.120"	89.77	85.87	81.96	78.06
	84567	.6299		16.00	16.0	88	32	1.0	93.61	89.54	85.47	81.40
	84577	.6299		16.00	16.0	88	32	2.0	93.61	89.54	85.47	81.40
NEW	84587	.6299		16.00	16.0	150	65	1.0	139.79	133.71	127.63	121.56
	84597	.6299		16.00	16.0	150	65	2.0	139.79	133.71	127.63	121.56
	84667	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.015"	128.46	122.88	117.29	111.71
	84687	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.030"	128.46	122.88	117.29	111.71
	84697	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.060"	128.46	122.88	117.29	111.71
NEW	84700	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.120"	128.46	122.88	117.29	111.71
	84707	.7500	3/4"	19.05	3/4"	5"	2"	.030"	177.88	170.14	162.42	154.68
	84717	.7500	3/4"	19.05	3/4"	5"	2"	.060"	177.88	170.14	162.42	154.68
NEW	84747	.7500	3/4"	19.05	3/4"	5"	2"	.120"	177.88	170.14	162.42	154.68
	84757	.7500	3/4"	19.05	3/4"	5"	2"	.190"	177.88	170.14	162.42	154.68
	84767	.7874		20.00	20.0	100	38	1.0	181.80	173.90	165.99	158.09
NEW	84777	.7874		20.00	20.0	100	38	3.0	181.80	173.90	165.99	158.09
	84887	.9843		25.00	25.0	100	38	1.0	208.04	198.99	189.95	180.91
	84897	.9843		25.00	25.0	100	38	3.0	208.04	198.99	189.95	180.91
	84957	1.000	1"	25.40	1"	4"	1-1/2"	.015"	218.85	209.33	199.82	190.30
	84967	1.000	1"	25.40	1"	4"	1-1/2"	.030"	218.85	209.33	199.82	190.30
NEW	84970	1.000	1"	25.40	1"	4"	1-1/2"	.060"	218.85	209.33	199.82	190.30
	84977	1.000	1"	25.40	1"	4"	1-1/2"	.120"	218.85	209.33	199.82	190.30
	84980	1.000	1"	25.40	1"	4"	1-1/2"	.190"	218.85	209.33	199.82	190.30
NEW	84987	1.000	1"	25.40	1"	5"	2"	.030"	269.13	257.43	245.73	234.03
	84997	1.000	1"	25.40	1"	5"	2"	.120"	269.13	257.43	245.73	234.03
	85007	1.000	1"	25.40	1"	5"	2"	.190"	269.13	257.43	245.73	234.03

263M (863M metric) - 3 Flute - Uncoated
263MC - 3 Flute - TiCN Coated
263MA (863MA metric) - 3 Flute - Balinit® X.CEED Coated

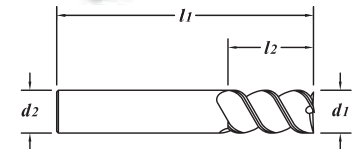
TOLERANCES

d_1	+.000" - .002" (+.000 - .050mm)	
d_2	3mm - 6mm	+.0000" - .0003" (+.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)

Technical information: page 193, 195



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



HIGH PERFORMANCE
END MILLS

UNCOATED EDP#	TiCN EDP#	X.CEED EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal	Metric							
23510	-	-	.2362	6.00	6.0	65	13	13.48	12.90	12.30	11.72
23010	-	-	.2500	6.35	1/4"	2-1/2"	3/4"	12.84	12.28	11.73	11.17
23020	-	-	.3125	7.94	5/16"	2-1/2"	7/8"	18.02	17.24	16.45	15.67
23520	-	-	.3150	8.00	8.0	65	19	18.92	18.10	17.27	16.45
23030	-	-	.3750	9.52	3/8"	2-1/2"	7/8"	22.43	21.46	20.48	19.51
23530	-	-	.3937	10.00	10.0	70	22	27.32	26.14	24.95	23.75
23040	-	-	.4375	11.11	7/16"	2-3/4"	1"	27.39	26.20	25.01	23.82
23540	-	-	.4724	12.00	12.0	75	26	37.74	36.10	34.46	32.82
23050	-	-	.5000	12.70	1/2"	3"	1"	35.94	34.38	32.81	31.25
23060	-	-	.6250	15.87	5/8"	3-1/2"	1-1/4"	69.31	66.29	63.27	60.27
23550	-	-	.6299	16.00	16.0	88	32	72.78	69.62	66.45	63.28
23070	-	-	.7500	19.05	3/4"	4"	1-1/2"	101.63	97.21	92.79	88.37
23560	-	-	.7874	20.00	20.0	100	38	135.68	129.78	123.88	117.98
23080	-	-	1.000	25.40	1"	4"	1-1/2"	152.03	145.41	138.81	132.19
-	23014	-	.2500	6.35	1/4"	2-1/2"	3/4"	16.68	15.95	15.24	14.51
-	23024	-	.3125	7.94	5/16"	2-1/2"	7/8"	23.14	22.13	21.13	20.12
-	23034	-	.3750	9.52	3/8"	2-1/2"	7/8"	27.57	26.37	25.17	23.97
-	23044	-	.4375	11.11	7/16"	2-3/4"	1"	33.55	32.09	30.63	29.17
-	23054	-	.5000	12.70	1/2"	3"	1"	42.09	40.26	38.43	36.60
-	23064	-	.6250	15.87	5/8"	3-1/2"	1-1/4"	78.88	75.45	72.02	68.60
-	23074	-	.7500	19.05	3/4"	4"	1-1/2"	112.59	107.69	102.80	97.91
-	23084	-	1.000	25.40	1"	4"	1-1/2"	168.50	161.18	153.85	146.53
-	-	23517	.2362	6.00	6.0	65	13	17.89	17.11	16.33	15.56
-	-	23017	.2500	6.35	1/4"	2-1/2"	3/4"	17.27	16.53	15.78	15.02
-	-	23027	.3125	7.94	5/16"	2-1/2"	7/8"	24.64	23.57	22.50	21.42
-	-	23527	.3150	8.00	8.0	65	19	25.52	24.41	23.31	22.19
-	-	23037	.3750	9.52	3/8"	2-1/2"	7/8"	29.07	27.80	26.54	25.27
-	-	23537	.3937	10.00	10.0	70	22	34.84	33.32	31.81	30.30
-	-	23047	.4375	11.11	7/16"	2-3/4"	1"	34.92	33.40	31.89	30.37
-	-	23547	.4724	12.00	12.0	75	26	45.27	43.31	41.33	39.36
-	-	23057	.5000	12.70	1/2"	3"	1"	43.46	41.57	39.69	37.79
-	-	23067	.6250	15.87	5/8"	3-1/2"	1-1/4"	80.19	76.71	73.22	69.73
-	-	23557	.6299	16.00	16.0	88	32	83.66	80.02	76.38	72.75
-	-	23077	.7500	19.05	3/4"	4"	1-1/2"	114.47	109.49	104.52	99.54
-	-	23567	.7874	20.00	20.0	100	38	154.66	147.93	141.21	134.48
-	-	23087	1.000	25.40	1"	4"	1-1/2"	171.01	163.57	156.14	148.70

246M (846M metric) - 6 Flute - Uncoated

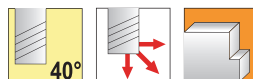
246MC - 6 Flute - TiCN Coated

246MA (846MA metric) - 6 Flute - *Balinit*® X.CEED Coated

TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$3\text{mm} - 6\text{mm} \quad +.0000" - .0003" (+.0000 - .0075\text{mm})$
	$1/4" - 1-1/4" \quad -.0001" - .0004" (-.0025 - .0100\text{mm})$

Technical information: page 193, 195

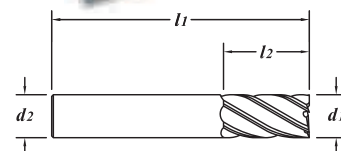


Solid submicron grain carbide end mill - center cutting

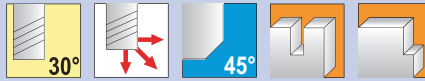
High performance finishing in a variety of steels

Rigid work holding, machine stability and part integrity are critical!

Excellent durability



UNCOATED EDP#	TiCN EDP#	X.CEED EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal		Metric							
51110	-	-	.1875	3/16"	4.76	3/16"	2"	5/8"	10.65	10.18	9.72	9.26
51510	-	-	.1969		5.00	5.0	50	16	11.82	11.32	10.80	10.29
51520	-	-	.2362		6.00	6.0	65	20	13.48	12.90	12.30	11.72
51150	-	-	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	12.84	12.28	11.73	11.17
51190	-	-	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	18.02	17.24	16.45	15.67
51530	-	-	.3150		8.00	8.0	65	22	18.92	18.10	17.27	16.45
51230	-	-	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	22.43	21.46	20.48	19.51
51540	-	-	.3937		10.00	10.0	70	25	27.32	26.14	24.95	23.75
51270	-	-	.4375	7/16"	11.11	7/16"	2-3/4"	1"	27.39	26.20	25.01	23.82
51550	-	-	.4724		12.00	12.0	75	25	37.74	36.10	34.46	32.82
51310	-	-	.5000	1/2"	12.70	1/2"	3"	1"	35.94	34.38	32.81	31.25
51330	-	-	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	69.31	66.29	63.27	60.27
51560	-	-	.6299		16.00	16.0	88	32	72.78	69.62	66.45	63.28
51350	-	-	.7500	3/4"	19.05	3/4"	4"	1-1/2"	101.63	97.21	92.79	88.37
51570	-	-	.7874		20.00	20.0	100	38	135.68	129.78	123.88	117.98
51580	-	-	.9843		25.00	25.0	100	38	157.62	150.77	143.92	137.06
51370	-	-	1.000	1"	25.40	1"	4"	1-1/2"	152.03	145.41	138.81	132.19
51400	-	-	1.250	1-1/4"	31.75	1-1/4"	4-1/2"	2"	443.82	424.52	405.23	385.93
51430	-	-	1.250	1-1/4"	31.75	1-1/4"	6"	3"	580.96	555.70	530.44	505.19
-	51114	-	.1875	3/16"	4.76	3/16"	2"	5/8"	12.53	11.99	11.44	10.90
-	51154	-	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	16.68	15.95	15.24	14.51
-	51194	-	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	23.14	22.13	21.13	20.12
-	51234	-	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	27.57	26.37	25.17	23.97
-	51274	-	.4375	7/16"	11.11	7/16"	2-3/4"	1"	33.55	32.09	30.63	29.17
-	51314	-	.5000	1/2"	12.70	1/2"	3"	1"	42.09	40.26	38.43	36.60
-	51334	-	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	78.88	75.45	72.02	68.60
-	51354	-	.7500	3/4"	19.05	3/4"	4"	1-1/2"	112.59	107.69	102.80	97.91
-	51374	-	1.000	1"	25.40	1"	4"	1-1/2"	168.48	161.16	153.83	146.50
-	51404	-	1.250	1-1/4"	31.75	1-1/4"	4-1/2"	2"	470.42	449.97	429.52	409.06
-	51434	-	1.250	1-1/4"	31.75	1-1/4"	6"	3"	611.05	584.48	557.92	531.36
-	-	51117	.1875	3/16"	4.76	3/16"	2"	5/8"	12.80	12.24	11.69	11.13
-	-	51517	.1969		5.00	5.0	50	16	15.16	14.51	13.84	13.19
-	-	51527	.2362		6.00	6.0	65	20	17.89	17.11	16.33	15.56
-	-	51157	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	17.27	16.53	15.78	15.02
-	-	51197	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	24.64	23.57	22.50	21.42
-	-	51537	.3150		8.00	8.0	65	22	25.52	24.41	23.31	22.19
-	-	51237	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	29.07	27.80	26.54	25.27
-	-	51547	.3937		10.00	10.0	70	25	34.84	33.32	31.81	30.30
-	-	51277	.4375	7/16"	11.11	7/16"	2-3/4"	1"	34.92	33.40	31.89	30.37
-	-	51557	.4724		12.00	12.0	75	25	45.27	43.31	41.33	39.36
-	-	51317	.5000	1/2"	12.70	1/2"	3"	1"	43.46	41.57	39.69	37.79
-	-	51337	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	80.19	76.71	73.22	69.73
-	-	51567	.6299		16.00	16.0	88	32	83.66	80.02	76.38	72.75
-	-	51357	.7500	3/4"	19.05	3/4"	4"	1-1/2"	114.47	109.49	104.52	99.54
-	-	51577	.7874		20.00	20.0	100	38	154.66	147.93	141.21	134.48
-	-	51587	.9843		25.00	25.0	100	38	176.60	168.93	161.24	153.57
-	-	51377	1.000	1"	25.40	1"	4"	1-1/2"	171.01	163.57	156.14	148.70
-	-	51407	1.250	1-1/4"	31.75	1-1/4"	4-1/2"	2"	474.95	454.29	433.65	413.00
-	-	51437	1.250	1-1/4"	31.75	1-1/4"	6"	3"	612.09	585.48	558.86	532.26



TOLERANCES		
d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)

HIGH PERFORMANCE
END MILLS

Balinit® X.CEED Coated

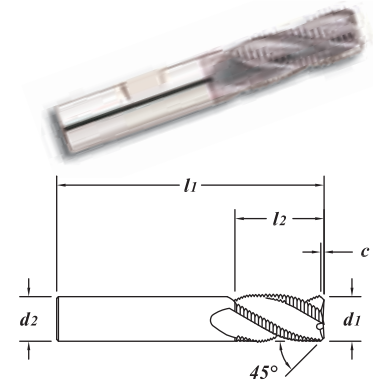
Solid submicron grain carbide end mill - center cutting

State-of-the-art rougher using VRX technology

Reduces tool pressure for more aggressive machining

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

Variable flute geometry



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	c Chamfer Length	1-11	12-24	25-49	50-100
	Decimal	Metric								
49490	.2362	6.00	6.0	50	12	0.5	29.90	28.60	27.30	26.00
49500	.2362	6.00	6.0	65	19	0.5	33.10	31.67	30.22	28.79
49520	.2500	6.35	1/4"	2"	3/8"	.020"	28.71	27.47	26.22	24.97
49540	.2500	6.35	1/4"	2-1/2"	3/4"	.020"	32.76	31.34	29.91	28.49
49550	.2756	7.00	8.0	50	12	0.5	40.67	38.91	37.14	35.37
49555	.2756	7.00	8.0	65	22	0.5	43.98	42.07	40.15	38.24
49570	.2812	7.14	5/16"	2"	7/16"	.020"	39.95	38.21	36.47	34.74
49575	.2812	7.14	5/16"	2-1/2"	13/16"	.020"	43.04	41.16	39.29	37.42
49580	.3125	7.94	5/16"	2"	7/16"	.020"	34.90	33.38	31.87	30.35
49600	.3125	7.94	5/16"	2-1/2"	13/16"	.020"	37.62	35.98	34.34	32.71
49610	.3150	8.00	8.0	50	12	0.5	35.64	34.09	32.54	30.99
49620	.3150	8.00	8.0	65	22	0.5	38.42	36.74	35.08	33.40
49625	.3438	8.73	3/8"	2"	1/2"	.025"	45.30	43.34	41.36	39.40
49630	.3438	8.73	3/8"	2-1/2"	7/8"	.025"	51.56	49.32	47.08	44.83
49635	.3543	9.00	10.0	50	14	0.5	55.57	53.15	50.73	48.32
49637	.3543	9.00	10.0	65	22	0.5	60.40	57.77	55.15	52.52
49640	.3750	9.52	3/8"	2"	1/2"	.025"	40.04	38.30	36.56	34.82
49660	.3750	9.52	3/8"	2-1/2"	7/8"	.025"	45.58	43.60	41.62	39.63
49670	.3937	10.00	10.0	50	16	0.5	49.11	46.98	44.83	42.70
49680	.3937	10.00	10.0	70	22	0.5	53.36	51.04	48.72	46.40
49690	.4375	11.11	7/16"	2-1/2"	5/8"	.025"	53.63	51.30	48.97	46.63
49700	.4375	11.11	7/16"	2-3/4"	1"	.025"	53.63	51.30	48.97	46.63
49710	.4724	12.00	12.0	65	19	0.8	57.57	55.07	52.57	50.07
49720	.4724	12.00	12.0	75	32	0.8	64.25	61.45	58.67	55.87
* 49740	.5000	12.70	1/2"	2-1/2"	5/8"	.030"	55.14	52.74	50.35	47.94
* 49760	.5000	12.70	1/2"	3"	1-1/4"	.030"	61.61	58.93	56.25	53.57
* 49765	.5512	14.00	14.0	75	19	0.8	91.14	87.17	83.21	79.25
* 49770	.5512	14.00	14.0	88	32	0.8	93.68	89.61	85.54	81.46
* 49780	.6250	15.87	5/8"	3"	3/4"	.035"	95.63	91.47	87.31	83.16
* 49800	.6250	15.87	5/8"	3-1/2"	1-1/4"	.035"	98.17	93.90	89.63	85.36
* 49820	.6250	15.87	5/8"	4"	1-5/8"	.035"	103.43	98.94	94.43	89.94
* 49830	.6299	16.00	16.0	75	19	1.0	99.85	95.51	91.17	86.83
* 49840	.6299	16.00	16.0	88	32	1.0	102.47	98.02	93.56	89.11
* 49845	.7087	18.00	18.0	75	22	1.0	144.07	137.81	131.54	125.28
* 49850	.7087	18.00	18.0	100	38	1.0	147.32	140.91	134.50	128.10
* 49860	.7500	19.05	3/4"	3"	7/8"	.040"	138.09	132.09	126.08	120.08
* 49880	.7500	19.05	3/4"	4"	1-5/8"	.040"	140.95	134.83	128.69	122.56
* 49890	.7874	20.00	20.0	75	22	1.0	195.19	186.70	178.21	169.73
* 49900	.7874	20.00	20.0	100	38	1.0	199.46	190.79	182.11	173.44
* 49905	.8661	22.00	22.0	100	22	1.0	219.24	209.71	200.18	190.64
* 49910	.8661	22.00	22.0	100	38	1.0	219.24	209.71	200.18	190.64
* 49915	.9843	25.00	25.0	100	25	1.0	228.75	218.81	208.85	198.91
* 49920	.9843	25.00	25.0	100	38	1.0	228.75	218.81	208.85	198.91
* 49925	1.000	25.40	1"	4"	1"	.040"	236.72	226.43	216.14	205.85
* 49930	1.000	25.40	1"	4"	1-1/2"	.040"	236.72	226.43	216.14	205.85
* 49940	1.000	25.40	1"	5"	2"	.040"	291.47	278.79	266.13	253.46

* - Tools with weldon flats

d_1	$+0.000" -0.002" (+.000 -0.050mm)$
d_2	$3mm - 6mm \quad +0.0000" -0.0003" (+.0000 -0.0075mm)$
	$1/4" - 1" \quad -0.0001" -0.0004" (-.0025 -0.0100mm)$

**NEW
SERIES****Square End - Balinit® X.CEED Coated**

Solid submicron grain carbide end mill - center cutting

State-of-the-art rougher/finisher

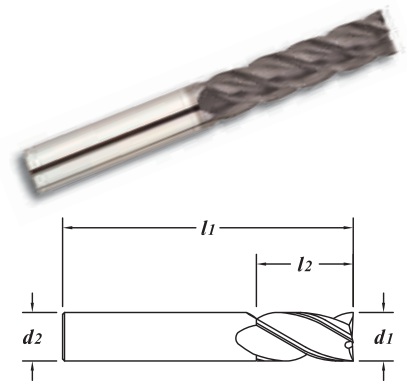
Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

Recommended for stainless steel, inconel, pH materials, titanium and tool steels

Variable flute geometry

VRX Corner Radius - page 103

VRX Ball End - page 107



EDP# (plain)	EDP# (weldon)	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Metric							
61877	-	.1181	3.00	3.0	38	8	10.15	9.71	9.27	8.83
61887	-	.1181	3.00	3.0	38	12	10.15	9.71	9.27	8.83
61917	-	.1250	1/8"	3.17	1/8"	1-1/2"	10.15	9.71	9.27	8.83
61927	-	.1250	1/8"	3.17	1/8"	1-1/2"	10.15	9.71	9.27	8.83
61977	-	.1575	4.00	6.0	50	12	19.05	18.22	17.40	16.57
62007	-	.1875	3/16"	4.76	3/16"	2"	12.80	12.24	11.69	11.13
62017	-	.1875	3/16"	4.76	3/16"	2"	12.80	12.24	11.69	11.13
62057	-	.1969	5.00	6.0	65	15	20.38	19.50	18.62	17.72
62077	-	.2362	6.00	6.0	50	12	15.87	15.18	14.49	13.80
62087	-	.2362	6.00	6.0	65	19	17.89	17.11	16.33	15.56
62137	-	.2500	1/4"	6.35	1/4"	2"	15.23	14.56	13.90	13.24
62147	-	.2500	1/4"	6.35	1/4"	2-1/2"	17.27	16.53	15.78	15.02
62207	-	.3125	5/16"	7.94	5/16"	2"	21.05	20.13	19.22	18.30
62217	-	.3125	5/16"	7.94	5/16"	2-1/2"	24.64	23.57	22.50	21.42
62257	-	.3150	8.00	8.0	50	12	21.91	20.96	20.01	19.05
62267	-	.3150	8.00	8.0	65	22	25.52	24.41	23.31	22.19
62317	-	.3750	3/8"	9.52	3/8"	2"	24.88	23.80	22.71	21.63
62327	-	.3750	3/8"	9.52	3/8"	2-1/2"	29.07	27.80	26.54	25.27
62397	-	.3937	10.00	10.0	70	22	34.84	33.32	31.81	30.30
62437	-	.4375	7/16"	11.11	7/16"	2-3/4"	34.92	33.40	31.89	30.37
62475	-	.4724	12.00	12.0	65	19	42.42	40.58	38.73	36.89
62485	-	.4724	12.00	12.0	75	32	45.27	43.31	41.33	39.36
62525	* 62527	.5000	1/2"	12.70	1/2"	2-1/2"	40.67	38.91	37.14	35.37
62535	* 62537	.5000	1/2"	12.70	1/2"	3"	43.46	41.57	39.69	37.79
62565	* 62567	.5000	1/2"	12.70	1/2"	4"	58.81	56.25	53.70	51.14
62625	* 62627	.5625	9/16"	14.29	9/16"	3-1/2"	72.26	69.12	65.98	62.84
62655	* 62657	.6250	5/8"	15.87	5/8"	3-1/2"	80.19	76.71	73.22	69.73
62675	* 62677	.6250	5/8"	15.87	5/8"	4"	85.64	81.92	78.20	74.47
62715	* 62717	.6299	16.00	16.0	88	32	83.66	80.02	76.38	72.75
62775	* 62777	.7500	3/4"	19.05	3/4"	4"	114.47	109.49	104.52	99.54
62785	* 62787	.7500	3/4"	19.05	3/4"	4"	114.47	109.49	104.52	99.54
62795	* 62797	.7500	3/4"	19.05	3/4"	5"	153.64	146.96	140.28	133.60
62805	* 62807	.7500	3/4"	19.05	3/4"	6"	179.81	171.98	164.17	156.35
62825	* 62827	.7874	20.00	20.0	100	38	154.66	147.93	141.21	134.48
62855	* 62857	.9843	25.00	25.0	100	38	176.60	168.93	161.24	153.57
62885	* 62887	1.000	1"	25.40	1"	4"	171.01	163.57	156.14	148.70
62895	* 62897	1.000	1"	25.40	1"	4"	171.01	163.57	156.14	148.70
62905	* 62907	1.000	1"	25.40	1"	5"	228.90	218.95	209.00	199.05
62915	* 62917	1.000	1"	25.40	1"	6"	298.18	285.21	272.25	259.28

* - Tools with weldon flats

VRX - 4 Flute

Technical information: page 197



.1181" - .3125"
(3.00mm - 7.94mm)

TOLERANCES		
d_1	+.000" - .002" (+.000 - .050mm)	
d_2	3mm - 6mm	+.0000" - .0003" (+.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)
r	+.001" - .001" (+.025 - .025mm)	

Corner Radius - Balinit® X.CEED Coated

Solid submicron grain carbide end mill - center cutting

State-of-the-art rougher/finisher

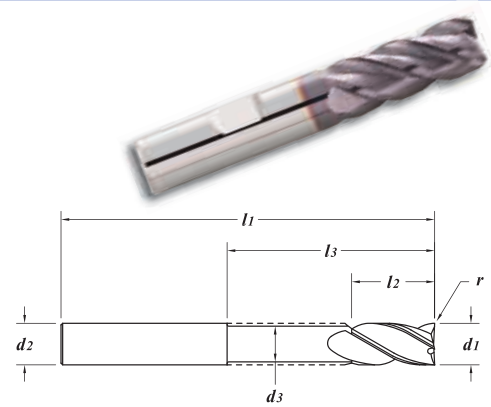
Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

Recommended for stainless steel, inconel, pH materials, titanium and tool steels

Variable flute geometry

VRX Square End - page 102

VRX Ball End - page 107



HIGH PERFORMANCE
END MILLS

EDP# (plain)	EDP# (weldon)	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
		Decimal	Metric										
27420	-	.1181	3.00	3.0	50	8	0.2	-	-	11.42	10.92	10.43	9.93
27430	-	.1181	3.00	3.0	50	12	0.2	-	-	11.42	10.92	10.43	9.93
27435	-	.1181	3.00	3.0	50	12	0.5	-	-	11.42	10.92	10.43	9.93
27440	-	.1250	1/8"	3.17	1/8"	1-1/2"	1/4"	.010"	-	11.42	10.92	10.43	9.93
27450	-	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	.010"	-	11.42	10.92	10.43	9.93
27455	-	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	.020"	-	11.42	10.92	10.43	9.93
27460	-	.1562	5/32"	3.97	3/16"	2"	5/16"	.010"	-	15.74	15.05	14.36	13.69
27470	-	.1562	5/32"	3.97	3/16"	2"	1/2"	.010"	-	15.74	15.05	14.36	13.69
27480	-	.1575	4.00	6.0	50	8	0.3	-	-	19.35	18.51	17.67	16.83
27490	-	.1575	4.00	6.0	50	12	0.3	-	-	19.35	18.51	17.67	16.83
27495	-	.1575	4.00	6.0	50	12	0.5	-	-	19.35	18.51	17.67	16.83
27500	-	.1875	3/16"	4.76	3/16"	2"	5/16"	.010"	-	14.34	13.72	13.09	12.47
27520	-	.1875	3/16"	4.76	3/16"	2"	9/16"	.010"	-	14.34	13.72	13.09	12.47
27521	-	.1875	3/16"	4.76	3/16"	2"	9/16"	.020"	-	14.34	13.72	13.09	12.47
63100	-	.1875	3/16"	4.76	3/16"	4"	5/16"	.010"	-	26.72	25.55	24.40	23.23
27522	-	.1969	5.00	6.0	50	10	0.3	-	-	18.97	18.15	17.32	16.49
27524	-	.1969	5.00	6.0	65	15	0.3	-	-	21.02	20.10	19.19	18.27
27526	-	.1969	5.00	6.0	65	15	0.5	-	-	21.02	20.10	19.19	18.27
63110	-	.1969	5.00	6.0	100	10	0.3	-	-	40.26	38.51	36.75	35.01
27525	-	.2188	7/32"	5.56	1/4"	2"	3/8"	.015"	-	18.24	17.45	16.65	15.86
27530	-	.2188	7/32"	5.56	1/4"	2-1/2"	3/4"	.015"	-	20.23	19.34	18.47	17.59
63120	-	.2188	7/32"	5.56	1/4"	4"	3/8"	.015"	-	38.89	37.19	35.51	33.81
27535	-	.2362	6.00	6.0	50	12	0.3	-	-	18.36	17.56	16.76	15.96
27540	-	.2362	6.00	6.0	65	19	0.3	-	-	20.34	19.46	18.57	17.69
27545	-	.2362	6.00	6.0	65	19	0.5	-	-	20.34	19.46	18.57	17.69
27547	-	.2362	6.00	6.0	65	19	1.0	-	-	20.34	19.46	18.57	17.69
27548	-	.2362	6.00	6.0	65	19	1.5	-	-	20.34	19.46	18.57	17.69
63130	-	.2362	6.00	6.0	100	12	0.3	32	5.70	39.25	37.54	35.84	34.13
27560	-	.2500	1/4"	6.35	1/4"	2"	3/8"	.015"	-	17.67	16.90	16.13	15.36
NEW 27570	-	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.010"	-	19.56	18.71	17.86	17.01
27580	-	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.015"	-	19.56	18.71	17.86	17.01
27581	-	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.030"	-	19.56	18.71	17.86	17.01
27583	-	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.060"	-	19.56	18.71	17.86	17.01
63140	-	.2500	1/4"	6.35	1/4"	4"	3/8"	.015"	1-1/4"	37.90	36.25	34.60	32.96
27585	-	.2756	7.00	8.0	50	12	0.3	-	-	28.63	27.38	26.15	24.90
27590	-	.2756	7.00	8.0	65	22	0.3	-	-	31.48	30.11	28.75	27.37
27595	-	.2812	9/32"	7.14	5/16"	2"	7/16"	.015"	-	27.60	26.41	25.20	24.00
27597	-	.2812	9/32"	7.14	5/16"	2-1/2"	13/16"	.015"	-	30.35	29.03	27.71	26.38
63150	-	.2812	9/32"	7.14	5/16"	4"	7/16"	.015"	-	52.42	50.14	47.86	45.58
27600	-	.3125	5/16"	7.94	5/16"	2"	7/16"	.020"	-	24.11	23.06	22.01	20.97
NEW 27610	-	.3125	5/16"	7.94	5/16"	2-1/2"	13/16"	.010"	-	26.50	25.34	24.19	23.05
27620	-	.3125	5/16"	7.94	5/16"	2-1/2"	13/16"	.020"	-	26.50	25.34	24.19	23.05
27622	-	.3125	5/16"	7.94	5/16"	2-1/2"	13/16"	.030"	-	26.50	25.34	24.19	23.05
27624	-	.3125	5/16"	7.94	5/16"	2-1/2"	13/16"	.060"	-	26.50	25.34	24.19	23.05
63160	-	.3125	5/16"	7.94	5/16"	4"	7/16"	.020"	1-7/8"	51.11	48.88	46.66	44.44

continued →

VRX - 4 Flute (continued)

.3150" - .5512"
(8.00mm - 14.00mm)

	EDP# (plain)	EDP# (weldon)	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
			Decimal	Metric										
NEW	27630	-	.3150	8.00	8.0	50	12	0.5	-	-	25.01	23.92	22.84	21.75
	27635	-	.3150	8.00	8.0	65	22	0.3	-	-	27.50	26.30	25.11	23.91
	27640	-	.3150	8.00	8.0	65	22	0.5	-	-	27.50	26.30	25.11	23.91
	27642	-	.3150	8.00	8.0	65	22	1.0	-	-	27.50	26.30	25.11	23.91
	27643	-	.3150	8.00	8.0	65	22	1.5	-	-	27.50	26.30	25.11	23.91
	63170	-	.3150	8.00	8.0	100	12	0.5	47	7.60	52.87	50.58	48.28	45.98
	27645	-	.3438 11/32"	8.73	3/8"	2"	1/2"	.020"	-	-	32.21	30.80	29.41	28.01
	27650	-	.3438 11/32"	8.73	3/8"	2-1/2"	7/8"	.020"	-	-	35.02	33.50	31.97	30.45
	63180	-	.3438 11/32"	8.73	3/8"	4"	1/2"	.020"	-	-	56.12	53.67	51.24	48.80
	27655	-	.3543	9.00	10.0	50	14	0.5	-	-	38.90	37.20	35.52	33.82
NEW	27657	-	.3543	9.00	10.0	65	22	0.5	-	-	42.28	40.44	38.60	36.76
	27658	-	.3750 3/8"	9.52	3/8"	2"	1/2"	.010"	-	-	28.48	27.24	26.00	24.76
	27660	-	.3750 3/8"	9.52	3/8"	2"	1/2"	.020"	-	-	28.48	27.24	26.00	24.76
	27662	-	.3750 3/8"	9.52	3/8"	2"	1/2"	.030"	-	-	28.48	27.24	26.00	24.76
	27670	-	.3750 3/8"	9.52	3/8"	2-1/2"	7/8"	.010"	-	-	30.95	29.61	28.26	26.92
	27680	-	.3750 3/8"	9.52	3/8"	2-1/2"	7/8"	.020"	-	-	30.95	29.61	28.26	26.92
	27682	-	.3750 3/8"	9.52	3/8"	2-1/2"	7/8"	.030"	-	-	30.95	29.61	28.26	26.92
	27684	-	.3750 3/8"	9.52	3/8"	2-1/2"	7/8"	.060"	-	-	30.95	29.61	28.26	26.92
	63190	-	.3750 3/8"	9.52	3/8"	4"	1/2"	.020"	1-7/8"	.360"	54.70	52.32	49.95	47.57
	27690	-	.3937	10.00	10.0	50	16	0.5	-	-	34.37	32.87	31.39	29.89
NEW	27698	-	.3937	10.00	10.0	70	22	0.3	-	-	37.38	35.76	34.12	32.50
	27700	-	.3937	10.00	10.0	70	22	0.5	-	-	37.38	35.76	34.12	32.50
	27702	-	.3937	10.00	10.0	70	22	1.0	-	-	37.38	35.76	34.12	32.50
	63200	-	.3937	10.00	10.0	100	14	0.5	47	9.50	66.90	63.99	61.09	58.18
	27705	-	.4375 7/16"	11.11	7/16"	2-1/2"	5/8"	.020"	-	-	37.45	35.82	34.20	32.56
	27708	-	.4375 7/16"	11.11	7/16"	2-3/4"	7/8"	.010"	-	-	37.45	35.82	34.20	32.56
	27710	-	.4375 7/16"	11.11	7/16"	2-3/4"	7/8"	.020"	-	-	37.45	35.82	34.20	32.56
	63210	-	.4375 7/16"	11.11	7/16"	6"	1"	.020"	-	-	80.69	77.19	73.67	70.17
	27712	-	.4724	12.00	12.0	65	19	0.3	-	-	49.34	47.20	45.04	42.90
	27715	-	.4724	12.00	12.0	65	19	0.5	-	-	49.34	47.20	45.04	42.90
NEW	27718	-	.4724	12.00	12.0	75	32	0.3	-	-	55.05	52.66	50.26	47.87
	27720	-	.4724	12.00	12.0	75	32	0.5	-	-	55.05	52.66	50.26	47.87
	27722	-	.4724	12.00	12.0	75	32	1.0	-	-	55.05	52.66	50.26	47.87
	27730	-	.4724	12.00	12.0	75	32	1.5	-	-	55.05	52.66	50.26	47.87
	27735	-	.4724	12.00	12.0	75	32	2.0	-	-	55.05	52.66	50.26	47.87
	63220	-	.4724	12.00	12.0	150	19	0.5	57	11.50	97.10	92.88	88.66	84.44
	27739	* 27738	.5000 1/2"	12.70	1/2"	2-1/2"	5/8"	.010"	-	-	47.31	45.25	43.19	41.14
	27741	* 27740	.5000 1/2"	12.70	1/2"	2-1/2"	5/8"	.020"	-	-	47.31	45.25	43.19	41.14
	27743	* 27742	.5000 1/2"	12.70	1/2"	2-1/2"	5/8"	.030"	-	-	47.31	45.25	43.19	41.14
	27751	* 27750	.5000 1/2"	12.70	1/2"	3"	1-1/4"	.010"	-	-	52.80	50.50	48.21	45.92
NEW	27761	* 27760	.5000 1/2"	12.70	1/2"	3"	1-1/4"	.020"	-	-	52.80	50.50	48.21	45.92
	27763	* 27762	.5000 1/2"	12.70	1/2"	3"	1-1/4"	.030"	-	-	52.80	50.50	48.21	45.92
	27767	* 27764	.5000 1/2"	12.70	1/2"	3"	1-1/4"	.060"	-	-	52.80	50.50	48.21	45.92
	27769	* 27768	.5000 1/2"	12.70	1/2"	3"	1-1/4"	.120"	-	-	52.80	50.50	48.21	45.92
	63231	* 63230	.5000 1/2"	12.70	1/2"	4"	5/8"	.020"	2-1/4"	.480"	71.25	68.15	65.05	61.95
	63401	* 63400	.5000 1/2"	12.70	1/2"	4"	1-1/2"	.010"	-	-	62.41	59.70	56.98	54.27
	63411	* 63410	.5000 1/2"	12.70	1/2"	4"	1-1/2"	.030"	-	-	62.41	59.70	56.98	54.27
	63421	* 63420	.5000 1/2"	12.70	1/2"	4"	1-1/2"	.060"	-	-	62.41	59.70	56.98	54.27
	63431	* 63430	.5000 1/2"	12.70	1/2"	4"	2"	.010"	-	-	62.41	59.70	56.98	54.27
	63441	* 63440	.5000 1/2"	12.70	1/2"	4"	2"	.030"	-	-	62.41	59.70	56.98	54.27
NEW	63451	* 63450	.5000 1/2"	12.70	1/2"	4"	2"	.060"	-	-	62.41	59.70	56.98	54.27
	63241	* 63240	.5000 1/2"	12.70	1/2"	6"	2"	.020"	-	-	88.26	84.43	80.59	76.75
	27766	* 27765	.5512	14.00	14.0	75	19	0.5	-	-	77.92	74.53	71.14	67.76
	27771	* 27770	.5512	14.00	14.0	88	32	0.5	-	-	80.08	76.60	73.11	69.64
	63251	* 63250	.5512	14.00	14.0	150	19	0.5	57	13.50	129.07	123.46	117.85	112.24
	63261	* 63260	.5512	14.00	14.0	150	50	0.5	-	-	120.22	114.99	109.77	104.54

* - Tools with weldon flats

VRX - 4 Flute (continued)

.6250" - .9843"
(15.87mm - 25.00mm)

HIGH PERFORMANCE
END MILLS

	EDP#	EDP#	d_1 †			d_2	l_1	l_2	r	l_3	d_3	1-11	12-24	25-49	50-100
	(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter				
NEW	63461	* 63460	.6250	5/8"	15.87	5/8"	3"	3/4"	.010"	-	-	81.80	78.24	74.68	71.13
	27781	* 27780	.6250	5/8"	15.87	5/8"	3"	3/4"	.025"	-	-	81.80	78.24	74.68	71.13
	27791	* 27790	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.010"	-	-	84.08	80.42	76.77	73.11
	27801	* 27800	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.025"	-	-	84.08	80.42	76.77	73.11
	27803	* 27802	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.060"	-	-	84.08	80.42	76.77	73.11
NEW	27805	* 27804	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.120"	-	-	84.08	80.42	76.77	73.11
NEW	63501	* 63500	.6250	5/8"	15.87	5/8"	4"	1-1/2"	.010"	-	-	91.38	87.41	83.44	79.47
NEW	63511	* 63510	.6250	5/8"	15.87	5/8"	4"	1-1/2"	.030"	-	-	91.38	87.41	83.44	79.47
NEW	63521	* 63520	.6250	5/8"	15.87	5/8"	4"	1-1/2"	.060"	-	-	91.38	87.41	83.44	79.47
NEW	63531	* 63530	.6250	5/8"	15.87	5/8"	4"	1-3/4"	.010"	-	-	91.38	87.41	83.44	79.47
NEW	63541	* 63540	.6250	5/8"	15.87	5/8"	4"	1-3/4"	.030"	-	-	91.38	87.41	83.44	79.47
NEW	63551	* 63550	.6250	5/8"	15.87	5/8"	4"	1-3/4"	.060"	-	-	91.38	87.41	83.44	79.47
NEW	63271	* 63270	.6250	5/8"	15.87	5/8"	6"	3/4"	.025"	3-1/4"	.600"	134.66	128.80	122.95	117.09
	63281	* 63280	.6250	5/8"	15.87	5/8"	6"	2"	.025"	-	-	125.81	120.34	114.87	109.40
	27809	* 27808	.6299		16.00	16.0	75	19	0.3	-	-	85.38	81.67	77.96	74.25
	27811	* 27810	.6299		16.00	16.0	75	19	0.5	-	-	85.38	81.67	77.96	74.25
	27819	* 27818	.6299		16.00	16.0	88	32	0.3	-	-	87.73	83.92	80.10	76.29
NEW	27821	* 27820	.6299		16.00	16.0	88	32	0.5	-	-	87.73	83.92	80.10	76.29
	27823	* 27822	.6299		16.00	16.0	88	32	1.0	-	-	87.73	83.92	80.10	76.29
	27825	* 27824	.6299		16.00	16.0	88	32	2.0	-	-	87.73	83.92	80.10	76.29
	63581	* 63580	.6299		16.00	16.0	100	38	0.3	-	-	93.29	89.23	85.18	81.12
	63291	* 63290	.6299		16.00	16.0	150	19	0.5	82	15.25	134.66	128.80	122.95	117.09
	27831	* 27830	.7087		18.00	18.0	75	22	0.8	-	-	123.18	117.82	112.47	107.11
	27836	* 27835	.7087		18.00	18.0	100	38	0.8	-	-	125.95	120.47	115.00	109.52
	63301	* 63300	.7087		18.00	18.0	150	25	0.8	82	17.25	196.29	187.75	179.22	170.68
	27841	* 27840	.7500	3/4"	19.05	3/4"	3"	7/8"	.030"	-	-	118.00	112.87	107.73	102.61
	27851	* 27850	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.015"	-	-	120.57	115.33	110.08	104.84
NEW	27861	* 27860	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.030"	-	-	120.57	115.33	110.08	104.84
	27865	* 27864	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.060"	-	-	120.57	115.33	110.08	104.84
	27867	* 27866	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.120"	-	-	120.57	115.33	110.08	104.84
	63601	* 63600	.7500	3/4"	19.05	3/4"	4"	1-3/4"	.015"	-	-	120.57	115.33	110.08	104.84
	27869	* 27868	.7500	3/4"	19.05	3/4"	4"	1-3/4"	.030"	-	-	120.57	115.33	110.08	104.84
NEW	63611	* 63610	.7500	3/4"	19.05	3/4"	4"	1-3/4"	.060"	-	-	120.57	115.33	110.08	104.84
NEW	63621	* 63620	.7500	3/4"	19.05	3/4"	4"	1-3/4"	.120"	-	-	120.57	115.33	110.08	104.84
NEW	63631	* 63630	.7500	3/4"	19.05	3/4"	5"	2"	.015"	-	-	167.25	159.98	152.71	145.43
NEW	63311	* 63310	.7500	3/4"	19.05	3/4"	5"	2"	.030"	-	-	167.25	159.98	152.71	145.43
	63641	* 63640	.7500	3/4"	19.05	3/4"	5"	2"	.060"	-	-	167.25	159.98	152.71	145.43
	63651	* 63650	.7500	3/4"	19.05	3/4"	6"	3"	.015"	-	-	198.67	190.03	181.40	172.75
	63661	* 63660	.7500	3/4"	19.05	3/4"	6"	3"	.030"	-	-	198.67	190.03	181.40	172.75
	63671	* 63670	.7500	3/4"	19.05	3/4"	6"	3"	.060"	-	-	198.67	190.03	181.40	172.75
NEW	63321	* 63320	.7500	3/4"	19.05	3/4"	6"	1"	.030"	3-1/4"	.730"	207.56	198.54	189.51	180.49
	27871	* 27870	.7874		20.00	20.0	75	22	1.0	-	-	166.88	159.62	152.37	145.11
	27879	* 27878	.7874		20.00	20.0	100	38	0.5	-	-	170.63	163.22	155.79	148.38
	27881	* 27880	.7874		20.00	20.0	100	38	1.0	-	-	170.63	163.22	155.79	148.38
	27891	* 27890	.7874		20.00	20.0	100	38	1.5	-	-	170.63	163.22	155.79	148.38
	63331	* 63330	.7874		20.00	20.0	150	25	1.0	82	19.30	218.61	209.10	199.60	190.09
	27911	* 27910	.8661		22.00	22.0	100	38	1.0	-	-	187.45	179.30	171.15	163.00
NEW	63341	* 63340	.8661		22.00	22.0	150	25	1.0	82	21.50	236.66	226.38	216.08	205.80
	27941	* 27940	.9843		25.00	25.0	100	38	1.0	-	-	195.57	187.06	178.57	170.06
	27951	* 27950	.9843		25.00	25.0	100	38	1.5	-	-	195.57	187.06	178.57	170.06
	63351	* 63350	.9843		25.00	25.0	125	50	1.0	-	-	244.15	233.53	222.92	212.31
	63361	* 63360	.9843		25.00	25.0	150	32	1.0	82	24.40	327.41	313.18	298.94	284.71

* - Tools with weldon flats

continued →

VRX - 4 Flute (continued)

1.000"
(25.40mm)

	EDP# (plain)	EDP# (weldon)	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100
			Decimal		Metric										
NEW	27959	* 27958	1.000	1"	25.40	1"	4"	1"	.015"	-	-	205.85	196.89	187.95	178.99
	27961	* 27960	1.000	1"	25.40	1"	4"	1"	.035"	-	-	205.85	196.89	187.95	178.99
NEW	27963	* 27962	1.000	1"	25.40	1"	4"	1"	.060"	-	-	205.85	196.89	187.95	178.99
NEW	27965	* 27964	1.000	1"	25.40	1"	4"	1"	.090"	-	-	205.85	196.89	187.95	178.99
NEW	27967	* 27966	1.000	1"	25.40	1"	4"	1-1/2"	.015"	-	-	205.85	196.89	187.95	178.99
	27971	* 27970	1.000	1"	25.40	1"	4"	1-1/2"	.035"	-	-	205.85	196.89	187.95	178.99
NEW	27981	* 27980	1.000	1"	25.40	1"	4"	1-1/2"	.060"	-	-	205.85	196.89	187.95	178.99
NEW	27991	* 27990	1.000	1"	25.40	1"	4"	1-1/2"	.090"	-	-	205.85	196.89	187.95	178.99
NEW	28001	* 28000	1.000	1"	25.40	1"	4"	1-3/4"	.015"	-	-	205.85	196.89	187.95	178.99
NEW	28011	* 28012	1.000	1"	25.40	1"	4"	1-3/4"	.060"	-	-	205.85	196.89	187.95	178.99
NEW	28021	* 28022	1.000	1"	25.40	1"	4"	1-3/4"	.090"	-	-	205.85	196.89	187.95	178.99
NEW	63369	* 63368	1.000	1"	25.40	1"	5"	2"	.015"	-	-	253.26	242.25	231.23	220.23
	63371	* 63370	1.000	1"	25.40	1"	5"	2"	.035"	-	-	253.26	242.25	231.23	220.23
NEW	63373	* 63372	1.000	1"	25.40	1"	5"	2"	.060"	-	-	253.26	242.25	231.23	220.23
NEW	63375	* 63374	1.000	1"	25.40	1"	5"	2"	.090"	-	-	253.26	242.25	231.23	220.23
	63381	* 63380	1.000	1"	25.40	1"	6"	1-1/4"	.035"	3-1/4"	.980"	342.11	327.24	312.35	297.49

* - Tools with weldon flats



TOLERANCES

d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
Ball radius	+.000" -.001" (+.000 -.025mm)	

Ball End - Balinit® X.CEED Coated

Solid submicron grain carbide end mill - center cutting

State-of-the-art rougher/finisher

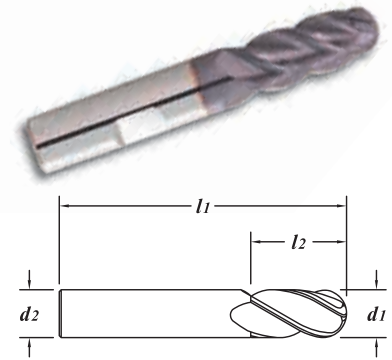
Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

Recommended for stainless steel, inconel, pH materials, titanium and tool steels

Variable flute geometry

VRX Square End - page 102

VRX Corner Radius - page 103



EDP# (plain)	EDP# (weldon)	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Metric							
28470	-	.1575	4.00	6.0	50	8	19.35	18.51	17.67	16.83
28480	-	.1575	4.00	6.0	50	12	19.35	18.51	17.67	16.83
28490	-	.1875	3/16"	4.76	3/16"	2"	14.34	13.72	13.09	12.47
28500	-	.1875	3/16"	4.76	3/16"	2"	14.34	13.72	13.09	12.47
28510	-	.1969	5.00	6.0	50	10	18.97	18.15	17.32	16.49
28520	-	.1969	5.00	6.0	65	15	21.02	20.10	19.19	18.27
28530	-	.2362	6.00	6.0	50	12	18.36	17.56	16.76	15.96
28540	-	.2362	6.00	6.0	65	19	20.34	19.46	18.57	17.69
28570	-	.2500	1/4"	6.35	1/4"	2"	17.67	16.90	16.13	15.36
28580	-	.2500	1/4"	6.35	1/4"	2-1/2"	19.56	18.71	17.86	17.01
28610	-	.3125	5/16"	7.94	5/16"	2"	24.11	23.06	22.01	20.97
28620	-	.3125	5/16"	7.94	5/16"	2-1/2"	26.50	25.34	24.19	23.05
28630	-	.3150	8.00	8.0	50	12	25.01	23.92	22.84	21.75
28640	-	.3150	8.00	8.0	65	22	27.50	26.30	25.11	23.91
28670	-	.3750	3/8"	9.52	3/8"	2"	28.48	27.24	26.00	24.76
28680	-	.3750	3/8"	9.52	3/8"	2-1/2"	30.95	29.61	28.26	26.92
28690	-	.3937	10.00	10.0	50	16	34.37	32.87	31.39	29.89
28700	-	.3937	10.00	10.0	70	22	37.38	35.76	34.12	32.50
28705	-	.4375	7/16"	11.11	7/16"	2-1/2"	37.45	35.82	34.20	32.56
28710	-	.4375	7/16"	11.11	7/16"	2-3/4"	37.45	35.82	34.20	32.56
28715	-	.4724	12.00	12.0	65	19	49.34	47.20	45.04	42.90
28720	-	.4724	12.00	12.0	75	32	55.05	52.66	50.26	47.87
28751	* 28750	.5000	1/2"	12.70	1/2"	2-1/2"	47.31	45.25	43.19	41.14
28761	* 28760	.5000	1/2"	12.70	1/2"	3"	52.80	50.50	48.21	45.92
28771	* 28770	.5000	1/2"	12.70	1/2"	4"	62.41	59.70	56.98	54.27
28781	* 28780	.5512	14.00	14.0	75	19	77.92	74.53	71.14	67.76
28786	* 28785	.5512	14.00	14.0	88	32	80.08	76.60	73.11	69.64
28796	* 28795	.6250	5/8"	15.87	5/8"	3"	81.80	78.24	74.68	71.13
28801	* 28800	.6250	5/8"	15.87	5/8"	3-1/2"	84.08	80.42	76.77	73.11
28806	* 28805	.6250	5/8"	15.87	5/8"	6"	125.81	120.34	114.87	109.40
28811	* 28810	.6299	16.00	16.0	75	19	85.38	81.67	77.96	74.25
28821	* 28820	.6299	16.00	16.0	88	32	87.73	83.92	80.10	76.29
28831	* 28830	.7087	18.00	18.0	75	22	123.18	117.82	112.47	107.11
28836	* 28835	.7087	18.00	18.0	100	38	125.95	120.47	115.00	109.52
28841	* 28840	.7500	3/4"	19.05	3/4"	3"	118.00	112.87	107.73	102.61
28861	* 28860	.7500	3/4"	19.05	3/4"	4"	120.57	115.33	110.08	104.84
28866	* 28865	.7500	3/4"	19.05	3/4"	5"	167.25	159.98	152.71	145.43
28871	* 28870	.7874	20.00	20.0	75	22	166.88	159.62	152.37	145.11
28881	* 28880	.7874	20.00	20.0	100	38	170.63	163.22	155.79	148.38
28901	* 28900	.9843	25.00	25.0	100	38	195.57	187.06	178.57	170.06
28911	* 28910	1.000	1"	25.40	1"	4"	205.85	196.89	187.95	178.99
28916	* 28915	1.000	1"	25.40	1"	4"	205.85	196.89	187.95	178.99
28931	* 28930	1.000	1"	25.40	1"	5"	253.26	242.25	231.23	220.23

* - Tools with weldon flats

d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)



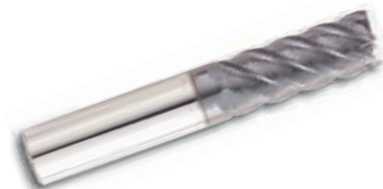
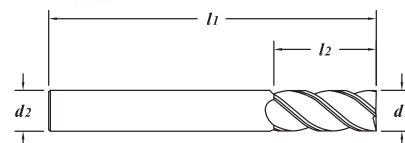
Square End - *Balinit*® X.CEED Coated

Solid submicron grain carbide end mill - center cutting
High performance tool for use in high Rockwell materials

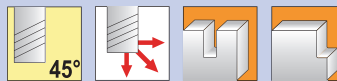
Recommended for hardened die mold, inconel and tool steels above 45 Rc

Corner Radius - page 109

Ball End - page 110



EDP#	d_1 †		d_2	l_1	l_2	Number of Flutes	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric								
21200	.1181	3.00	3.0	38	12	4	12.45	11.91	11.37	10.83
21230	.1250	1/8"	3.17	1/8"	1-1/2"	4	11.82	11.32	10.80	10.29
21260	.1575	4.00	6.0	50	12	4	20.11	19.24	18.37	17.49
21290	.1875	3/16"	4.76	3/16"	2"	4	14.86	14.22	13.57	12.93
21320	.1969	5.00	6.0	65	15	4	22.03	21.07	20.11	19.16
21350	.2362	6.00	6.0	65	19	4	21.36	20.44	19.50	18.57
21380	.2500	1/4"	6.35	1/4"	2-1/2"	4	20.58	19.69	18.79	17.90
21410	.2756	7.00	8.0	65	22	5	32.26	30.86	29.45	28.05
21440	.3125	5/16"	7.94	5/16"	2-1/2"	5	27.96	26.74	25.52	24.30
21470	.3150	8.00	8.0	65	22	5	29.39	28.11	26.83	25.55
21500	.3543	9.00	10.0	65	22	5	43.16	41.29	39.41	37.53
21530	.3750	3/8"	9.52	3/8"	2-1/2"	5	32.40	30.99	29.58	28.17
21560	.3937	10.00	10.0	70	22	5	39.09	37.40	35.69	34.00
21620	.4724	12.00	12.0	75	32	5	57.32	54.83	52.34	49.85
21660	.5000	1/2"	12.70	1/2"	3"	5	54.52	52.15	49.77	47.40
21710	.6250	5/8"	15.87	5/8"	3-1/2"	5	86.56	82.79	79.03	75.26
21740	.6299	16.00	16.0	88	32	5	91.04	87.08	83.13	79.16
21770	.7087	18.00	18.0	100	38	5	129.55	123.92	118.29	112.65
21800	.7500	3/4"	19.05	3/4"	4"	5	123.97	118.58	113.18	107.80
21830	.7874	20.00	20.0	100	38	5	175.26	167.64	160.02	152.40
21890	.9843	25.00	25.0	100	38	5	219.12	209.59	200.06	190.54
21920	1.000	1"	25.40	1"	4"	5	211.86	202.64	193.44	184.23



TOLERANCES

d_1	+.000" - .002" (+.000 - .050mm)	
d_2	3mm - 6mm	+.0000" - .0003" (+.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)
r	+.001" - .001" (+.025 - .025mm)	

Corner Radius - *Balinit*® X.CEED Coated

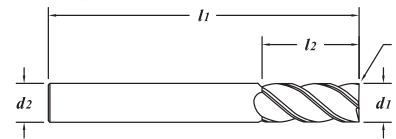
Solid submicron grain carbide end mill - center cutting

High performance tool for use in high Rockwell materials

Recommended for hardened die mold, inconel and tool steels above 45 Rc

Square End - page 108

Ball End - page 110



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	Number of Flutes	1-11	12-24	25-49	50-100
	Decimal	Metric									
21202	.1181	3.00	3.0	38	12	0.2	4	13.60	13.01	12.42	11.82
NEW 21212	.1181	3.00	3.0	38	12	0.5	4	13.60	13.01	12.42	11.82
21232	.1250	1/8"	3.17	1-1/2"	1/2"	.010"	4	12.92	12.36	11.79	11.23
NEW 21242	.1250	1/8"	3.17	1-1/2"	1/2"	.020"	4	12.92	12.36	11.79	11.23
21262	.1575	4.00	6.0	50	12	0.3	4	21.91	20.96	20.01	19.05
21292	.1875	3/16"	4.76	2"	9/16"	.010"	4	16.23	15.53	14.82	14.11
NEW 21302	.1875	3/16"	4.76	2"	9/16"	.020"	4	16.23	15.53	14.82	14.11
21322	.1969	5.00	6.0	65	15	0.3	4	23.90	22.86	21.82	20.78
NEW 21342	.2362	6.00	6.0	65	19	0.2	4	23.15	22.14	21.13	20.13
21352	.2362	6.00	6.0	65	19	0.5	4	23.15	22.14	21.13	20.13
NEW 21372	.2500	1/4"	6.35	2-1/2"	3/4"	.010"	4	22.30	21.33	20.36	19.39
21382	.2500	1/4"	6.35	2-1/2"	3/4"	.015"	4	22.30	21.33	20.36	19.39
NEW 21392	.2500	1/4"	6.35	2-1/2"	3/4"	.030"	4	22.30	21.33	20.36	19.39
21412	.2756	7.00	8.0	65	22	0.5	5	34.99	33.47	31.94	30.42
NEW 21432	.3125	5/16"	7.94	2-1/2"	13/16"	.010"	5	30.20	28.89	27.57	26.26
21442	.3125	5/16"	7.94	2-1/2"	13/16"	.015"	5	30.20	28.89	27.57	26.26
NEW 21452	.3125	5/16"	7.94	2-1/2"	13/16"	.030"	5	30.20	28.89	27.57	26.26
NEW 21462	.3150	8.00	8.0	65	22	0.2	5	31.79	30.41	29.03	27.64
21472	.3150	8.00	8.0	65	22	0.5	5	31.79	30.41	29.03	27.64
21502	.3543	9.00	10.0	65	22	0.5	5	46.98	44.94	42.89	40.85
NEW 21522	.3750	3/8"	9.52	2-1/2"	7/8"	.010"	5	35.14	33.61	32.08	30.56
21532	.3750	3/8"	9.52	2-1/2"	7/8"	.015"	5	35.14	33.61	32.08	30.56
NEW 21542	.3750	3/8"	9.52	2-1/2"	7/8"	.030"	5	35.14	33.61	32.08	30.56
NEW 21552	.3937	10.00	10.0	70	22	0.2	5	42.46	40.61	38.77	36.92
21562	.3937	10.00	10.0	70	22	0.5	5	42.46	40.61	38.77	36.92
NEW 21602	.4724	12.00	12.0	75	32	0.2	5	62.72	60.00	57.27	54.54
21612	.4724	12.00	12.0	75	32	0.5	5	62.72	60.00	57.27	54.54
21622	.4724	12.00	12.0	75	32	1.0	5	62.72	60.00	57.27	54.54
NEW 21642	.5000	1/2"	12.70	1/2"	3"	.010"	5	59.58	56.99	54.40	51.81
21652	.5000	1/2"	12.70	1/2"	3"	.015"	5	59.58	56.99	54.40	51.81
21662	.5000	1/2"	12.70	1/2"	3"	.030"	5	59.58	56.99	54.40	51.81
NEW 21672	.5000	1/2"	12.70	1/2"	3"	.060"	5	59.58	56.99	54.40	51.81
NEW 21692	.6250	5/8"	15.87	3-1/2"	1-1/4"	.010"	5	94.75	90.64	86.52	82.40
21702	.6250	5/8"	15.87	3-1/2"	1-1/4"	.015"	5	94.75	90.64	86.52	82.40
21712	.6250	5/8"	15.87	3-1/2"	1-1/4"	.030"	5	94.75	90.64	86.52	82.40
NEW 21722	.6250	5/8"	15.87	3-1/2"	1-1/4"	.060"	5	94.75	90.64	86.52	82.40
21732	.6299	16.00	16.0	88	32	0.5	5	99.75	95.41	91.07	86.74
21742	.6299	16.00	16.0	88	32	1.0	5	99.75	95.41	91.07	86.74
21772	.7087	18.00	18.0	100	38	0.5	5	142.36	136.17	129.98	123.79
21802	.7500	3/4"	19.05	4"	1-1/2"	.015"	5	136.23	130.30	124.38	118.46
NEW 21812	.7500	3/4"	19.05	4"	1-1/2"	.030"	5	136.23	130.30	124.38	118.46
NEW 21822	.7500	3/4"	19.05	4"	1-1/2"	.060"	5	136.23	130.30	124.38	118.46
21832	.7874	20.00	20.0	100	38	0.5	5	192.59	184.22	175.84	167.47
21892	.9843	25.00	25.0	100	38	0.5	5	240.79	230.32	219.86	209.38
21922	1.000	1"	25.40	4"	1-1/2"	.015"	5	232.81	222.70	212.57	202.45
NEW 21932	1.000	1"	25.40	4"	1-1/2"	.030"	5	232.81	222.70	212.57	202.45
NEW 21942	1.000	1"	25.40	4"	1-1/2"	.060"	5	232.81	222.70	212.57	202.45



TOLERANCES

d_1	+0.000" -0.002" (+0.000 -0.050mm)	
d_2	3mm - 6mm	+0.0000" -0.0003" (+0.0000 -0.0075mm)
	1/4" - 1"	-0.0001" -0.0004" (-0.0025 -0.0100mm)
Ball radius	+0.000" -0.001" (+0.000 -0.025mm)	

Ball End - *Balinit*® X.CEED Coated

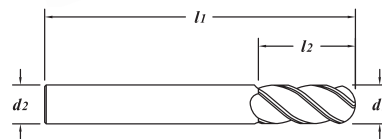
Solid submicron grain carbide end mill - center cutting

High performance tool for use in high Rockwell materials

Recommended for hardened die mold, inconel and tool steels above 45 Rc

Square End - page 108

Corner Radius - page 109



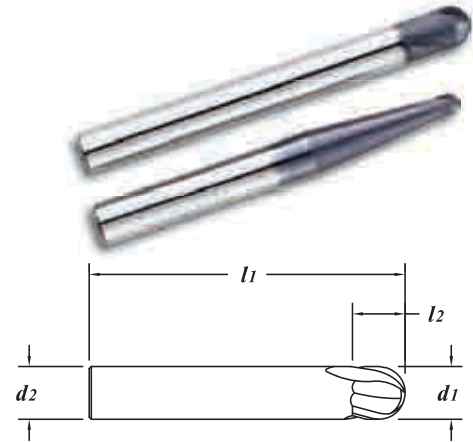
EDP#	d_1 †		d_2	l_1	l_2	Number of Flutes	1-11	12-24	25-49	50-100
	Decimal	Metric								
21204	.1181	3.00	3.0	38	12	4	13.60	13.01	12.42	11.82
21234	.1250	1/8"	3.17	1/8"	1-1/2"	4	12.92	12.36	11.79	11.23
21264	.1575	4.00	6.0	50	12	4	21.91	20.96	20.01	19.05
21294	.1875	3/16"	4.76	3/16"	2"	4	16.23	15.53	14.82	14.11
21324	.1969	5.00	6.0	65	15	4	23.90	22.86	21.82	20.78
21354	.2362	6.00	6.0	65	19	4	23.15	22.14	21.13	20.13
21384	.2500	1/4"	6.35	1/4"	2-1/2"	4	22.30	21.33	20.36	19.39
21414	.2756	7.00	8.0	65	22	5	34.99	33.47	31.94	30.42
21444	.3125	5/16"	7.94	5/16"	2-1/2"	5	30.20	28.89	27.57	26.26
21474	.3150	8.00	8.0	65	22	5	31.79	30.41	29.03	27.64
21504	.3543	9.00	10.0	65	22	5	46.98	44.94	42.89	40.85
21534	.3750	3/8"	9.52	3/8"	2-1/2"	5	35.14	33.61	32.08	30.56
21564	.3937	10.00	10.0	70	22	5	42.46	40.61	38.77	36.92
21624	.4724	12.00	12.0	75	32	5	62.72	60.00	57.27	54.54
21664	.5000	1/2"	12.70	1/2"	3"	5	59.58	56.99	54.40	51.81
21714	.6250	5/8"	15.87	5/8"	3-1/2"	5	94.75	90.64	86.52	82.40
21744	.6299	16.00	16.0	88	32	5	99.75	95.41	91.07	86.74
21774	.7087	18.00	18.0	100	38	5	142.36	136.17	129.98	123.79
21804	.7500	3/4"	19.05	3/4"	4"	5	136.23	130.30	124.38	118.46
21834	.7874	20.00	20.0	100	38	5	192.59	184.22	175.84	167.47
21894	.9843	25.00	25.0	100	38	5	240.79	230.32	219.86	209.38
21924	1.000	1"	25.40	1"	4"	5	232.81	222.70	212.57	202.45



TOLERANCES	
d_1	+0.000" -0.001" (+.000 - .025mm)
d_2	-.0001" -.0003" (-.0025 -.0075mm)
Ball radius	+0.0000" -.0005" (+.0000 -.0127mm)

Die Mold Cutters - *Balinit*® X.CEED Coated

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



EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
14210	.0312	1/32"	0.79	1/4"	3"	1/32"	48.07	45.98	43.89
15210	.0394		1.00	6.0	75	1	48.07	45.98	43.89
15220	.0591		1.50	6.0	75	1.5	48.07	45.98	43.89
14220	.0625	1/16"	1.59	1/4"	3"	1/16"	48.07	45.98	43.89
15230	.0787		2.00	6.0	75	2	48.07	45.98	43.89
14230	.0938	3/32"	2.38	1/4"	3"	3/32"	48.07	45.98	43.89
15240	.1181		3.00	6.0	75	3	46.97	44.93	42.88
14240	.1250	1/8"	3.17	1/4"	3"	1/8"	46.97	44.93	42.88
15250	.1575		4.00	6.0	75	4	46.29	44.27	42.27
14250	.1875	3/16"	4.76	1/4"	3"	3/16"	46.29	44.27	42.27
15260	.1969		5.00	6.0	75	5	46.29	44.27	42.27
15270	.2362		6.00	6.0	75	6	45.31	43.35	41.37
14260	.2500	1/4"	6.35	1/4"	3"	1/4"	45.31	43.35	41.37
14270	.3125	5/16"	7.94	5/16"	4"	5/16"	55.49	53.08	50.67
15280	.3150		8.00	8.0	100	8	55.49	53.08	50.67
14280	.3750	3/8"	9.52	3/8"	4"	3/8"	61.41	58.74	56.08
15290	.3937		10.00	10.0	100	10	66.44	63.54	60.65
15300	.4724		12.00	12.0	100	12	80.46	76.97	73.47
14290	.5000	1/2"	12.70	1/2"	4"	1/2"	89.61	85.71	81.82

d_1	$+0.000" -0.002" (+.000 -0.050\text{mm})$
d_2	$-0.0001" -0.0002" (-0.0025 -0.0050\text{mm})$



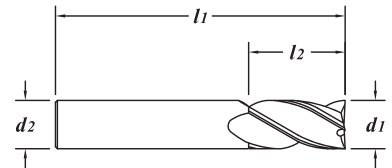
Square End - Diamond Coated

Solid grade C-2 carbide end mill - center cutting

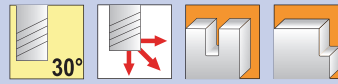
Crystalline diamond coating

Up to 17x tool life than uncoated

Recommended for graphite, fiber-reinforced plastics, carbon fiber and high silicon aluminum



EDP#	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100
	Decimal		Metric							
10018	.0312	1/32"	0.79	1/8"	1-1/2"	3/32"	58.33	55.80	53.26	50.72
46018	.0394		1.00	3.0	38	4	61.40	58.73	56.07	53.39
10028	.0469	3/64"	1.19	1/8"	1-1/2"	1/8"	58.33	55.80	53.26	50.72
46028	.0591		1.50	3.0	38	6	61.40	58.73	56.07	53.39
10038	.0625	1/16"	1.59	1/8"	1-1/2"	1/4"	56.47	54.02	51.56	49.11
46038	.0787		2.00	3.0	38	8	59.46	56.87	54.29	51.70
10058	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	55.47	53.06	50.65	48.24
46058	.1181		3.00	3.0	38	12	55.17	52.77	50.38	47.98
10078	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	52.41	50.13	47.85	45.57
46078	.1575		4.00	4.0	50	14	88.18	84.34	80.52	76.68
10118	.1875	3/16"	4.76	3/16"	2"	5/8"	83.77	80.13	76.49	72.84
46098	.1969		5.00	5.0	50	16	101.64	97.22	92.80	88.38
46108	.2362		6.00	6.0	65	20	103.66	99.15	94.64	90.14
10158	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	98.48	94.19	89.92	85.63
10198	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	117.81	112.68	107.57	102.44
46128	.3150		8.00	8.0	65	20	139.07	133.03	126.97	120.93
10238	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	132.02	126.28	120.54	114.80
46148	.3937		10.00	10.0	70	25	154.02	147.33	140.63	133.93
46168	.4724		12.00	12.0	75	25	168.85	161.51	154.17	146.83
10318	.5000	1/2"	12.70	1/2"	3"	1"	160.41	153.43	146.46	139.48
13338	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	231.82	221.74	211.66	201.58
46188	.6299		16.00	16.0	88	32	282.27	269.99	257.72	245.45
13358	.7500	3/4"	19.05	3/4"	4"	1-1/2"	438.59	419.52	400.45	381.39
46208	.7874		20.00	20.0	100	38	549.22	525.35	501.47	477.59
46228	.9843		25.00	25.0	100	38	694.40	664.21	634.02	603.82
13378	1.000	1"	25.40	1"	4"	1-1/2"	689.08	659.12	629.16	599.21



TOLERANCES

d_1	$+0.000^{\circ} - .002^{\circ} (+.000 - .050\text{mm})$
d_2	$-.0001^{\circ} - .0002^{\circ} (-.0025 - .0050\text{mm})$
r	$+0.001^{\circ} - .001^{\circ} (+.025 - .025\text{mm})$

Corner Radius - Diamond Coated

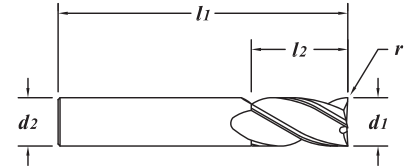
Solid grade C-2 carbide end mill - center cutting

Crystalline diamond coating

Up to 17x tool life than uncoated

For stronger corners and part radius

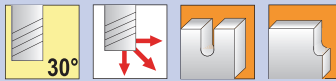
Recommended for graphite, fiber-reinforced plastics, carbon fiber and high silicon aluminum



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100	
	Decimal	Metric									
24108	.1181	3.00	3.0	38	12	0.3	76.45	73.12	69.80	66.48	
24118	.1181	3.00	3.0	38	12	0.5	76.45	73.12	69.80	66.48	
80018	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	.015"	72.62	69.46	66.31	63.15
80028	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	.020"	72.62	69.46	66.31	63.15
24148	.1575	4.00	4.0	50	14	0.3	110.48	105.67	100.87	96.06	
24158	.1575	4.00	4.0	50	14	0.5	110.48	105.67	100.87	96.06	
80058	.1875	3/16"	4.76	3/16"	2"	5/8"	.015"	104.95	100.38	95.82	91.26
80068	.1875	3/16"	4.76	3/16"	2"	5/8"	.020"	104.95	100.38	95.82	91.26
24178	.2362	6.00	6.0	65	20	0.5	117.87	112.75	107.62	102.50	
24208	.2362	6.00	6.0	65	20	1.5	117.87	112.75	107.62	102.50	
80108	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.015"	111.98	107.11	102.24	97.38
80118	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.020"	111.98	107.11	102.24	97.38
80128	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.030"	111.98	107.11	102.24	97.38
24228	.3150	8.00	8.0	65	20	0.5	147.84	141.41	134.98	128.55	
24248	.3150	8.00	8.0	65	20	1.0	147.84	141.41	134.98	128.55	
80248	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.020"	140.86	134.73	128.61	122.48
80258	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.030"	140.86	134.73	128.61	122.48
24298	.3937	10.00	10.0	70	25	0.5	164.20	157.06	149.92	142.78	
24318	.3937	10.00	10.0	70	25	1.0	164.20	157.06	149.92	142.78	
24378	.4724	12.00	12.0	75	25	0.5	180.56	172.71	164.86	157.01	
24398	.4724	12.00	12.0	75	25	1.0	180.56	172.71	164.86	157.01	
80328	.5000	1/2"	12.70	1/2"	3"	1"	.030"	171.53	164.07	156.61	149.16
80348	.5000	1/2"	12.70	1/2"	3"	1"	.060"	171.53	164.07	156.61	149.16

TOLERANCES

d_1	$+0.000" -0.002" (+0.000 -0.050\text{mm})$
d_2	$-0.0001" -0.0002" (-0.0025 -0.0050\text{mm})$
Ball radius	$+0.000" -0.001" (+0.000 -0.025\text{mm})$



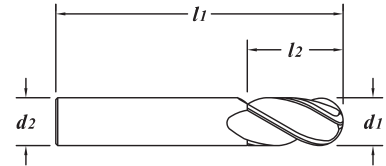
Ball End - Diamond Coated

Solid grade C-2 carbide end mill - center cutting

Crystalline diamond coating

Up to 17x tool life than uncoated

Recommended for graphite, fiber-reinforced plastics, carbon fiber and high silicon aluminum



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
15018	.0312	1/32"	0.79	1/8"	1-1/2"	3/32"	78.86	75.43	68.58
48018	.0394		1.00	3.0	38	4	83.01	79.40	72.19
15028	.0469	3/64"	1.19	1/8"	1-1/2"	1/8"	78.86	75.43	68.58
48028	.0591		1.50	3.0	38	6	83.01	79.40	72.19
15038	.0625	1/16"	1.59	1/8"	1-1/2"	1/4"	77.01	73.66	66.97
48038	.0787		2.00	3.0	38	8	81.07	77.54	70.49
15058	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	75.68	72.39	65.81
48058	.1181		3.00	3.0	38	12	76.45	73.12	66.48
15078	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	72.62	69.46	63.15
48078	.1575		4.00	4.0	50	14	110.48	105.67	96.06
15118	.1875	3/16"	4.76	3/16"	2"	5/8"	104.95	100.38	91.26
48098	.1969		5.00	5.0	50	16	115.43	110.41	100.37
48108	.2362		6.00	6.0	65	20	117.87	112.75	102.50
15158	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	111.98	107.11	97.38
15198	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	126.13	120.65	109.68
48128	.3150		8.00	8.0	65	20	147.84	141.41	128.55
15238	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	140.86	134.73	122.48
48148	.3937		10.00	10.0	70	25	164.20	157.06	142.78
48168	.4724		12.00	12.0	75	25	180.56	172.71	157.01
15318	.5000	1/2"	12.70	1/2"	3"	1"	171.53	164.07	149.16
18338	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	239.17	228.77	207.98
48188	.6299		16.00	16.0	88	32	289.98	277.38	252.16
18358	.7500	3/4"	19.05	3/4"	4"	1-1/2"	449.78	430.23	391.11
48208	.7874		20.00	20.0	100	38	571.99	547.12	497.38
48228	.9843		25.00	25.0	100	38	738.40	706.30	642.09
18378	1.000	1"	25.40	1"	4"	1-1/2"	731.50	699.70	667.89
									636.10

d_1	$+0.000" -0.002" (+0.000 -0.050\text{mm})$
d_2	$-0.0001" -0.0002" (-0.0025 -0.0050\text{mm})$



Extra Length - Square End - Diamond Coated

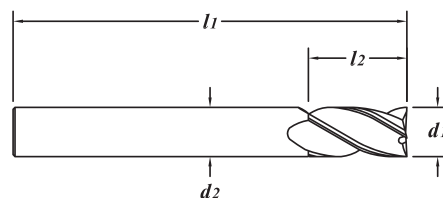
Solid grade C-2 carbide end mill - center cutting

Crystalline diamond coating

Up to 17x tool life than uncoated

Recommended for graphite, fiber-reinforced plastics, carbon fiber and high silicon aluminum

Can be modified with a neck in 48 hours



EDP#	d_1 †		d_2	l_1	l_2	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric							
94028	.1181		3.00	3.0	75	20	84.54	80.87	77.19
38038	.1250	1/8"	3.17	1/8"	3"	1"	80.32	76.82	73.33
94068	.1575		4.00	4.0	75	25	113.13	108.21	103.29
38048	.1875	3/16"	4.76	3/16"	4"	1"	107.47	102.80	98.12
94108	.2362		6.00	6.0	100	25	125.87	120.40	114.93
94128	.2362		6.00	6.0	150	38	144.06	137.80	131.53
38058	.2500	1/4"	6.35	1/4"	3"	1"	115.14	110.14	105.12
38068	.2500	1/4"	6.35	1/4"	4"	1"	119.58	114.38	109.18
38078	.2500	1/4"	6.35	1/4"	6"	1-1/2"	136.85	130.90	124.96
38098	.3125	5/16"	7.94	5/16"	4"	1"	140.18	134.09	127.99
94168	.3150		8.00	8.0	100	25	167.69	160.40	153.11
38128	.3750	3/8"	9.52	3/8"	4"	1"	156.11	149.32	142.54
38138	.3750	3/8"	9.52	3/8"	6"	1-1/2"	172.54	165.04	157.53
94208	.3937		10.00	10.0	100	25	187.21	179.07	170.93
94248	.4724		12.00	12.0	100	25	206.73	197.75	188.75
38168	.5000	1/2"	12.70	1/2"	4"	1"	196.39	187.86	179.32
38178	.5000	1/2"	12.70	1/2"	4"	2"	196.39	187.86	179.32

d_1	$+0.000" -0.002" (+0.000 -0.050\text{mm})$
d_2	$-0.0001" -0.0002" (-0.0025 -0.0050\text{mm})$
Ball radius	$+0.000" -0.001" (+0.000 -0.025\text{mm})$



Extra Length - Ball End - Diamond Coated

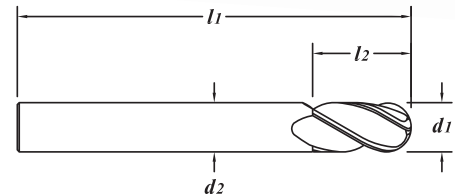
Solid grade C-2 carbide end mill - center cutting

Crystalline diamond coating

Up to 17x tool life than uncoated

Recommended for graphite, fiber-reinforced plastics, carbon fiber and high silicon aluminum

Can be modified with a neck in 48 hours



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
99028	.1181	3.00	3.0	75	20	103.27	98.78	94.29	89.80
40038	.1250	1/8"	3.17	1/8"	3"	98.10	93.84	89.58	85.31
99068	.1575	4.00	4.0	75	25	128.48	122.90	117.31	111.73
40048	.1875	3/16"	4.76	3/16"	4"	122.06	116.76	111.45	106.14
99108	.2362	6.00	6.0	100	25	141.22	135.09	128.94	122.80
99128	.2362	6.00	6.0	150	38	156.81	149.99	143.18	136.35
40058	.2500	1/4"	6.35	1/4"	3"	129.73	124.09	118.45	112.81
40068	.2500	1/4"	6.35	1/4"	4"	134.17	128.34	122.50	116.67
40078	.2500	1/4"	6.35	1/4"	6"	148.96	142.48	136.00	129.53
40098	.3125	5/16"	7.94	5/16"	4"	154.77	148.04	141.32	134.59
99168	.3150	8.00	8.0	100	25	180.41	172.57	164.73	156.87
40128	.3750	3/8"	9.52	3/8"	4"	170.71	163.28	155.86	148.44
40138	.3750	3/8"	9.52	3/8"	6"	180.62	172.76	164.91	157.06
99208	.3937	10.00	10.0	100	25	199.92	191.22	182.53	173.85
99248	.4724	12.00	12.0	100	25	219.48	209.93	200.40	190.85
40168	.5000	1/2"	12.70	1/2"	4"	208.50	199.43	190.37	181.30
40178	.5000	1/2"	12.70	1/2"	2"	208.50	199.43	190.37	181.30

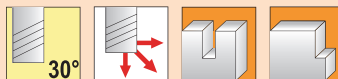


160M (860M metric) - 2 Flute

170M (870M metric) - 4 Flute

.0050" - .0787"
(0.13mm - 2.00mm)

Technical information:
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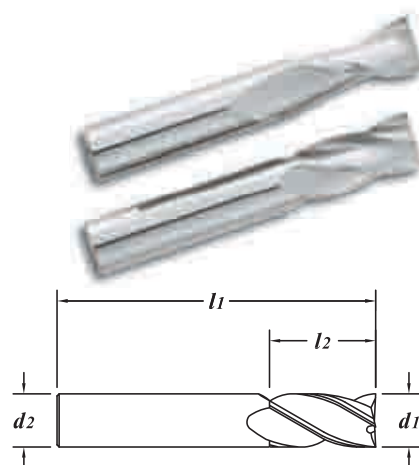


TOLERANCES

d_1	$\leq .030"$	$+0.004" - .0004" (+.0100 - .0100mm)$
	$\geq 1/32"$	$+0.000" - .002" (+.000 - .050mm)$
d_2	3mm - 6mm	$+0.000" - .0003" (-.0000 - .0075mm)$
	1/4" - 1"	$-0.001" - .0004" (-.0025 - .0100mm)$

Stub Length

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
TiAlN Coated - page 120



2 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric							
01200	-	.0050	.0050"	0.13	1/8"	1-1/2"	.008"	18.50	17.70	16.89	16.09
01210	-	.0060	.0060"	0.15	1/8"	1-1/2"	.009"	18.50	17.70	16.89	16.09
01220	-	.0070	.0070"	0.18	1/8"	1-1/2"	.011"	17.41	16.65	15.89	15.14
01230	-	.0080	.0080"	0.20	1/8"	1-1/2"	.012"	17.41	16.65	15.89	15.14
01240	-	.0090	.0090"	0.23	1/8"	1-1/2"	.014"	16.43	15.71	15.01	14.29
01250	-	.0100	.0100"	0.25	1/8"	1-1/2"	.015"	16.43	15.71	15.01	14.29
01260	-	.0110	.0110"	0.28	1/8"	1-1/2"	.017"	15.22	14.55	13.89	13.23
01270	-	.0120	.0120"	0.30	1/8"	1-1/2"	.018"	15.22	14.55	13.89	13.23
01280	-	.0130	.0130"	0.33	1/8"	1-1/2"	.020"	15.13	14.48	13.81	13.16
01290	-	.0140	.0140"	0.36	1/8"	1-1/2"	.021"	15.13	14.48	13.81	13.16
01300	-	.0150	.0150"	0.38	1/8"	1-1/2"	.023"	15.13	14.48	13.81	13.16
01310	-	.0160	.0160"	0.41	1/8"	1-1/2"	.024"	14.92	14.28	13.62	12.98
01320	-	.0170	.0170"	0.43	1/8"	1-1/2"	.026"	14.92	14.28	13.62	12.98
01330	-	.0180	.0180"	0.46	1/8"	1-1/2"	.027"	14.65	14.02	13.37	12.74
01340	-	.0190	.0190"	0.48	1/8"	1-1/2"	.029"	14.65	14.02	13.37	12.74
01350	-	.0200	.0200"	0.51	1/8"	1-1/2"	.030"	14.65	14.02	13.37	12.74
01360	-	.0210	.0210"	0.53	1/8"	1-1/2"	.032"	14.65	14.02	13.37	12.74
01370	-	.0220	.0220"	0.56	1/8"	1-1/2"	.033"	14.49	13.85	13.23	12.59
01380	-	.0230	.0230"	0.58	1/8"	1-1/2"	.035"	14.49	13.85	13.23	12.59
01390	-	.0240	.0240"	0.61	1/8"	1-1/2"	.036"	14.49	13.85	13.23	12.59
01400	-	.0250	.0250"	0.64	1/8"	1-1/2"	.038"	13.66	13.06	12.47	11.88
01410	-	.0260	.0260"	0.66	1/8"	1-1/2"	.039"	13.66	13.06	12.47	11.88
01420	-	.0270	.0270"	0.69	1/8"	1-1/2"	.041"	12.25	11.72	11.19	10.65
01430	-	.0280	.0280"	0.71	1/8"	1-1/2"	.042"	12.25	11.72	11.19	10.65
01440	-	.0290	.0290"	0.74	1/8"	1-1/2"	.044"	12.25	11.72	11.19	10.65
01450	-	.0300	.0300"	0.76	1/8"	1-1/2"	.045"	12.25	11.72	11.19	10.65
01010	02010	.0312	1/32"	0.79	1/8"	1-1/2"	1/16"	8.91	8.53	8.13	7.75
01510	02510	.0394		1.00	3.0	38	2	9.36	8.95	8.55	8.14
01020	02020	.0469	3/64"	1.19	1/8"	1-1/2"	3/32"	8.91	8.53	8.13	7.75
01520	02520	.0591		1.50	3.0	38	3	9.36	8.95	8.55	8.14
01030	02030	.0625	1/16"	1.59	1/8"	1-1/2"	1/8"	7.07	6.76	6.46	6.15
01530	02530	.0787		2.00	3.0	38	4	7.44	7.11	6.79	6.47

160M (860M metric) - 2 Flute (continued)
170M (870M metric) - 4 Flute (continued)

.0938" - 1.000"
(2.38mm - 25.40mm)

END MILLS

2 Flute EDP#	4 Flute EDP#	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric							
01040	02040	.0938	3/32"	2.38	1/8"	1-1/2"	3/16"	6.70	6.41	6.12	5.82
01540	02540	.0984		2.50	3.0	38	5	7.03	6.73	6.42	6.12
01550	02550	.1181		3.00	3.0	38	6	6.86	6.56	6.27	5.97
01050	02050	.1250	1/8"	3.17	1/8"	1-1/2"	1/4"	6.51	6.23	5.95	5.66
01560	02560	.1378		3.50	4.0	50	7	9.62	9.20	8.79	8.36
01060	02060	.1562	5/32"	3.97	3/16"	2"	5/16"	9.14	8.75	8.35	7.95
01570	02570	.1575		4.00	4.0	50	8	9.09	8.69	8.30	7.90
01580	02580	.1772		4.50	5.0	50	9.5	12.06	11.54	11.01	10.49
01070	02070	.1875	3/16"	4.76	3/16"	2"	3/8"	8.64	8.27	7.89	7.52
01590	02590	.1969		5.00	5.0	50	10	11.24	10.75	10.26	9.78
01080	02080	.2188	7/32"	5.56	1/4"	2"	7/16"	11.47	10.97	10.47	9.97
01600	02600	.2362		6.00	6.0	50	12	11.91	11.39	10.87	10.36
01090	02090	.2500	1/4"	6.35	1/4"	2"	1/2"	11.30	10.82	10.32	9.83
01610	02610	.2756		7.00	7.0	50	12	15.49	14.81	14.14	13.47
01100	02100	.3125	5/16"	7.94	5/16"	2"	1/2"	15.46	14.79	14.12	13.45
01620	02620	.3150		8.00	8.0	50	12	16.27	15.56	14.85	14.14
01630	02630	.3543		9.00	9.0	50	14	20.09	19.22	18.35	17.47
01110	02110	.3750	3/8"	9.52	3/8"	2"	5/8"	19.10	18.27	17.44	16.61
01640	02640	.3937		10.00	10.0	50	16	22.19	21.23	20.26	19.30
01650	02650	.4331		11.00	11.0	65	19	25.94	24.81	23.68	22.56
01120	02120	.4375	7/16"	11.11	7/16"	2-1/2"	5/8"	23.62	22.59	21.57	20.54
01660	02660	.4724		12.00	12.0	65	19	33.16	31.71	30.27	28.83
01130	02130	.5000	1/2"	12.70	1/2"	2-1/2"	5/8"	31.50	30.13	28.77	27.39
01140	02140	.6250	5/8"	15.87	5/8"	3"	3/4"	60.22	57.60	54.98	52.36
01670	02670	.6299		16.00	16.0	75	19	63.37	60.61	57.86	55.10
01150	02150	.7500	3/4"	19.05	3/4"	3"	1"	86.59	82.83	79.06	75.30
01680	02680	.7874		20.00	20.0	75	25	117.45	112.34	107.23	102.13
-	02690	.9843		25.00	25.0	75	25	133.47	127.67	121.87	116.06
-	02160	1.000	1"	25.40	1"	3"	1"	149.02	142.54	136.06	129.58

160MA (860MA metric) - 2 Flute 170MA (870MA metric) - 4 Flute

Technical information:
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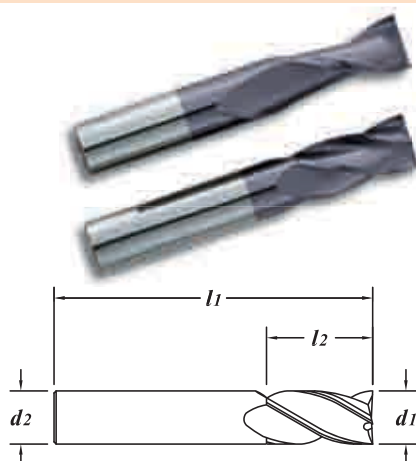


TOLERANCES

d_1	$+0.000" -0.002" (+0.000 -0.050\text{mm})$
d_2	$3\text{mm} - 6\text{mm} \quad +0.0000" -0.0003" (-0.0000 -0.0075\text{mm})$
	$1/4" - 1" \quad -0.0001" -0.0004" (-0.0025 -0.0100\text{mm})$

Stub Length - TiALN Coated

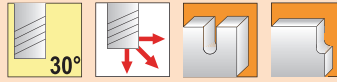
Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Dry or semi-dry machining
Up to 40% faster than uncoated
Extremely versatile
Uncoated - page 118



2 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric							
01017	02017	.0312	1/32"	0.79	1/8"	1-1/2"	1/16"	11.07	10.59	10.10	9.62
01517	02517	.0394		1.00	3.0	38	2	11.51	11.01	10.51	10.02
01027	02027	.0469	3/64"	1.19	1/8"	1-1/2"	3/32"	11.07	10.59	10.10	9.62
01527	02527	.0591		1.50	3.0	38	3	11.51	11.01	10.51	10.02
01037	02037	.0625	1/16"	1.59	1/8"	1-1/2"	1/8"	9.22	8.82	8.42	8.02
01537	02537	.0787		2.00	3.0	38	4	9.59	9.17	8.76	8.34
01047	02047	.0938	3/32"	2.38	1/8"	1-1/2"	3/16"	8.84	8.46	8.07	7.69
01547	02547	.0984		2.50	3.0	38	5	9.17	8.78	8.37	7.98
01557	02557	.1181		3.00	3.0	38	6	9.01	8.61	8.23	7.83
01057	02057	.1250	1/8"	3.17	1/8"	1-1/2"	1/4"	8.64	8.27	7.89	7.52
01567	02567	.1378		3.50	4.0	50	7	11.75	11.24	10.73	10.22
01067	02067	.1562	5/32"	3.97	3/16"	2"	5/16"	11.27	10.78	10.30	9.81
01577	02577	.1575		4.00	4.0	50	8	11.24	10.75	10.26	9.78
01587	02587	.1772		4.50	5.0	50	9.5	15.40	14.74	14.06	13.40
01077	02077	.1875	3/16"	4.76	3/16"	2"	3/8"	10.80	10.33	9.86	9.39
01597	02597	.1969		5.00	5.0	50	10	14.58	13.95	13.31	12.68
01087	02087	.2188	7/32"	5.56	1/4"	2"	7/16"	14.82	14.18	13.53	12.89
01607	02607	.2362		6.00	6.0	50	12	15.25	14.58	13.93	13.26
01097	02097	.2500	1/4"	6.35	1/4"	2"	1/2"	14.65	14.02	13.37	12.74
01617	02617	.2756		7.00	7.0	50	12	20.26	19.38	18.50	17.62
01107	02107	.3125	5/16"	7.94	5/16"	2"	1/2"	20.24	19.35	18.48	17.60
01627	02627	.3150		8.00	8.0	50	12	21.05	20.13	19.22	18.30
01637	02637	.3543		9.00	9.0	50	14	24.87	23.78	22.70	21.62
01117	02117	.3750	3/8"	9.52	3/8"	2"	5/8"	23.87	22.83	21.79	20.76
01647	02647	.3937		10.00	10.0	50	16	27.61	26.42	25.21	24.01
01657	02657	.4331		11.00	11.0	65	19	33.47	32.01	30.56	29.10
01127	02127	.4375	7/16"	11.11	7/16"	2-1/2"	5/8"	31.15	29.80	28.44	27.08
01667	02667	.4724		12.00	12.0	65	19	40.67	38.91	37.14	35.37
01137	02137	.5000	1/2"	12.70	1/2"	2-1/2"	5/8"	39.02	37.33	35.63	33.94
01147	02147	.6250	5/8"	15.87	5/8"	3"	3/4"	68.94	65.95	62.95	59.95
01677	02677	.6299		16.00	16.0	75	19	72.08	68.95	65.81	62.68
01157	02157	.7500	3/4"	19.05	3/4"	3"	1"	97.04	92.82	88.61	84.39
01687	02687	.7874		20.00	20.0	75	25	133.90	128.08	122.25	116.44
-	02697	.9843		25.00	25.0	75	25	149.93	143.41	136.88	130.37
-	02167	1.000	1"	25.40	1"	3"	1"	165.50	158.30	151.10	143.90

180M (980M metric) - 2 Flute
190M (990M metric) - 4 Flute

Technical information:
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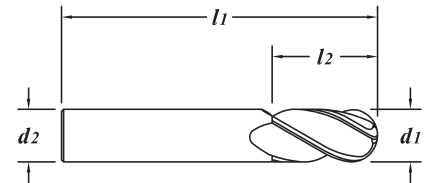


TOLERANCES

d_1	$\leq .030"$	$+0.004" - 0.004" (+.0100 - .0100\text{mm})$
	$\geq 1/32"$	$+0.000" - 0.002" (+.000 - .050\text{mm})$
d_2	3mm - 6mm	$+0.000" - 0.003" (-.0000 - .0075\text{mm})$
	1/4" - 1"	$-0.001" - 0.004" (-.0025 - .0100\text{mm})$
Ball radius		$+0.000" - 0.001" (+.000 - .025\text{mm})$

Stub Length - Ball End

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
TiAlN Coated - page 122



2 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric							
03250	-	.0100	.0100"	0.25	1/8"	1-1/2"	.015"	18.89	18.06	17.24	16.42
03300	-	.0150	.0150"	0.38	1/8"	1-1/2"	.023"	18.80	17.98	17.17	16.35
03350	-	.0200	.0200"	0.51	1/8"	1-1/2"	.030"	18.30	17.50	16.71	15.91
03400	-	.0250	.0250"	0.64	1/8"	1-1/2"	.038"	17.69	16.92	16.15	15.38
03450	-	.0300	.0300"	0.76	1/8"	1-1/2"	.045"	15.24	14.57	13.92	13.25
03010	04010	.0312	1/32"	0.79	1/8"	1-1/2"	1/16"	11.30	10.82	10.32	9.83
03510	04510	.0394		1.00	3.0	38	2	11.87	11.35	10.84	10.32
03020	04020	.0469	3/64"	1.19	1/8"	1-1/2"	3/32"	11.30	10.82	10.32	9.83
03520	04520	.0591		1.50	3.0	38	3	11.87	11.35	10.84	10.32
03030	04030	.0625	1/16"	1.59	1/8"	1-1/2"	1/8"	8.32	7.96	7.59	7.24
03530	04530	.0787		2.00	3.0	38	4	8.77	8.38	8.01	7.62
03040	04040	.0938	3/32"	2.38	1/8"	1-1/2"	3/16"	7.87	7.53	7.19	6.84
03540	04540	.0984		2.50	3.0	38	5	8.27	7.90	7.55	7.19
03550	04550	.1181		3.00	3.0	38	6	8.06	7.71	7.36	7.01
03050	04050	.1250	1/8"	3.17	1/8"	1-1/2"	1/4"	7.66	7.33	7.00	6.67
03560	04560	.1378		3.50	4.0	50	7	11.29	10.81	10.32	9.82
03060	04060	.1562	5/32"	3.97	3/16"	2"	5/16"	10.73	10.26	9.80	9.33
03570	04570	.1575		4.00	4.0	50	8	10.71	10.24	9.78	9.32
03580	04580	.1772		4.50	5.0	50	9.5	14.18	13.56	12.94	12.32
03070	04070	.1875	3/16"	4.76	3/16"	2"	3/8"	10.18	9.73	9.30	8.85
03590	04590	.1969		5.00	5.0	50	10	13.34	12.76	12.18	11.61
03080	04080	.2188	7/32"	5.56	1/4"	2"	7/16"	13.50	12.92	12.32	11.74
03600	04600	.2362		6.00	6.0	50	12	14.02	13.41	12.80	12.19
03090	04090	.2500	1/4"	6.35	1/4"	2"	1/2"	13.30	12.72	12.15	11.56
03610	04610	.2756		7.00	7.0	50	12	18.35	17.54	16.75	15.95
03100	04100	.3125	5/16"	7.94	5/16"	2"	1/2"	18.18	17.39	16.60	15.81
03620	04620	.3150		8.00	8.0	50	12	19.14	18.30	17.47	16.64
03630	04630	.3543		9.00	9.0	50	14	23.65	22.62	21.59	20.56
03110	04110	.3750	3/8"	9.52	3/8"	2"	5/8"	22.46	21.49	20.51	19.53
03640	04640	.3937		10.00	10.0	50	16	26.12	24.99	23.86	22.71
03650	04650	.4331		11.00	11.0	65	19	30.05	28.74	27.44	26.12
03120	04120	.4375	7/16"	11.11	7/16"	2-1/2"	5/8"	27.78	26.57	25.37	24.16
03660	04660	.4724		12.00	12.0	65	19	38.98	37.28	35.59	33.89
03130	04130	.5000	1/2"	12.70	1/2"	2-1/2"	5/8"	37.04	35.43	33.82	32.21
03140	04140	.6250	5/8"	15.87	5/8"	3"	3/4"	70.87	67.79	64.70	61.62
03670	04670	.6299		16.00	16.0	75	19	74.58	71.33	68.09	64.85
03150	04150	.7500	3/4"	19.05	3/4"	3"	1"	101.90	97.47	93.04	88.61
03680	04680	.7874		20.00	20.0	75	25	138.17	132.16	126.16	120.15
-	04690	.9843		25.00	25.0	75	25	157.04	150.21	143.38	136.56

180MA (980MA metric) - 2 Flute
190MA (990MA metric) - 4 Flute

Technical information:
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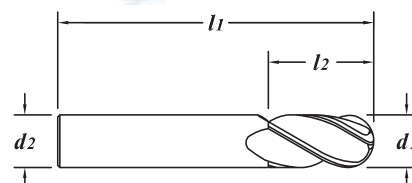


TOLERANCES

d_1	$\leq .030"$	$+0.004" - 0.004" (+0.100 - .0100mm)$
	$\geq 1/32"$	$+0.000" - 0.002" (+0.000 - .050mm)$
d_2	3mm - 6mm	$+0.0000" - 0.003" (-0.0000 - .0075mm)$
	1/4" - 1"	$-0.001" - 0.004" (-.0025 - .0100mm)$
Ball radius	$+0.000" - 0.001" (+0.000 - .025mm)$	

Stub Length - Ball End - TiAlN Coated

Solid submicron grain carbide end mill - center cutting
 Shorter flute length for rigidity
 Dry or semi-dry machining
 Up to 40% faster than uncoated
 Extremely versatile
 Uncoated - page 121



2 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric							
03017	04017	.0312	1/32"	0.79	1/8"	1-1/2"	1/16"	13.46	12.88	12.28	11.70
03517	04517	.0394		1.00	3.0	38	2	14.02	13.41	12.80	12.19
03027	04027	.0469	3/64"	1.19	1/8"	1-1/2"	3/32"	13.46	12.88	12.28	11.70
03527	04527	.0591		1.50	3.0	38	3	14.02	13.41	12.80	12.19
03037	04037	.0625	1/16"	1.59	1/8"	1-1/2"	1/8"	10.46	10.00	9.56	9.10
03537	04537	.0787		2.00	3.0	38	4	10.91	10.43	9.96	9.48
03047	04047	.0938	3/32"	2.38	1/8"	1-1/2"	3/16"	10.02	9.58	9.14	8.70
03547	04547	.0984		2.50	3.0	38	5	10.42	9.96	9.52	9.06
03557	04557	.1181		3.00	3.0	38	6	10.20	9.76	9.32	8.87
03057	04057	.1250	1/8"	3.17	1/8"	1-1/2"	1/4"	9.81	9.38	8.95	8.53
03567	04567	.1378		3.50	4.0	50	7	13.45	12.86	12.28	11.69
03067	04067	.1562	5/32"	3.97	3/16"	2"	5/16"	12.86	12.30	11.74	11.19
03577	04577	.1575		4.00	4.0	50	8	12.85	12.29	11.74	11.18
03587	04587	.1772		4.50	5.0	50	9.5	17.51	16.75	16.00	15.23
03077	04077	.1875	3/16"	4.76	3/16"	2"	3/8"	12.32	11.78	11.25	10.71
03597	04597	.1969		5.00	5.0	50	10	16.68	15.95	15.24	14.51
03087	04087	.2188	7/32"	5.56	1/4"	2"	7/16"	16.85	16.12	15.38	14.65
03607	04607	.2362		6.00	6.0	50	12	17.36	16.60	15.85	15.09
03097	04097	.2500	1/4"	6.35	1/4"	2"	1/2"	16.65	15.92	15.20	14.48
03617	04617	.2756		7.00	7.0	50	12	23.12	22.11	21.11	20.10
03107	04107	.3125	5/16"	7.94	5/16"	2"	1/2"	22.95	21.95	20.96	19.96
03627	04627	.3150		8.00	8.0	50	12	23.91	22.87	21.83	20.79
03637	04637	.3543		9.00	9.0	50	14	28.41	27.18	25.94	24.71
03117	04117	.3750	3/8"	9.52	3/8"	2"	5/8"	27.24	26.05	24.87	23.68
03647	04647	.3937		10.00	10.0	50	16	31.54	30.17	28.80	27.42
03657	04657	.4331		11.00	11.0	65	19	37.56	35.93	34.30	32.67
03127	04127	.4375	7/16"	11.11	7/16"	2-1/2"	5/8"	35.31	33.77	32.24	30.70
03667	04667	.4724		12.00	12.0	65	19	46.50	44.48	42.45	40.44
03137	04137	.5000	1/2"	12.70	1/2"	2-1/2"	5/8"	44.56	42.63	40.68	38.75
03147	04147	.6250	5/8"	15.87	5/8"	3"	3/4"	79.58	76.12	72.66	69.20
03677	04677	.6299		16.00	16.0	75	19	83.31	79.70	76.07	72.45
03157	04157	.7500	3/4"	19.05	3/4"	3"	1"	112.35	107.46	102.59	97.70
03687	04687	.7874		20.00	20.0	75	25	154.63	147.91	141.18	134.46
-	04697	.9843		25.00	25.0	75	25	173.49	165.95	158.40	150.86

165M (865M metric) - 2 Flute
175M (875M metric) - 4 Flute

Technical information:
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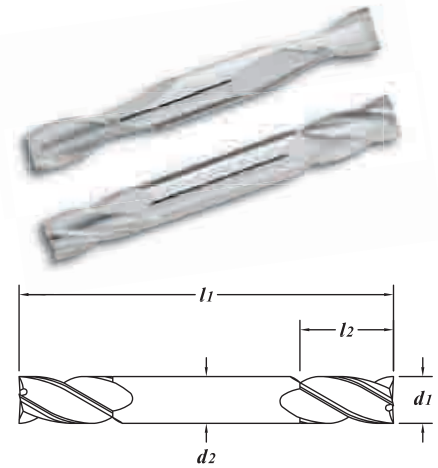


TOLERANCES

d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1/2"	-.0001" -.0004" (-.0025 -.0100mm)

Stub Length - Double End

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
TiAlN Coated - page 124



2 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric							
05010	06010	.0312	1/32"	0.79	1/8"	1-1/2"	1/16"	16.02	15.32	14.62	13.93
05510	06510	.0394		1.00	3.0	38	2	16.87	16.13	15.40	14.66
05020	06020	.0469	3/64"	1.19	1/8"	1-1/2"	3/32"	16.02	15.32	14.62	13.93
05520	06520	.0591		1.50	3.0	38	3	16.87	16.13	15.40	14.66
05030	06030	.0625	1/16"	1.59	1/8"	1-1/2"	1/8"	16.02	15.32	14.62	13.93
05530	06530	.0787		2.00	3.0	38	4	16.87	16.13	15.40	14.66
05040	06040	.0938	3/32"	2.38	1/8"	1-1/2"	3/16"	16.02	15.32	14.62	13.93
05540	06540	.0984		2.50	3.0	38	5	16.87	16.13	15.40	14.66
05550	06550	.1181		3.00	3.0	38	6	10.45	9.99	9.55	9.09
05050	06050	.1250	1/8"	3.17	1/8"	1-1/2"	1/4"	9.93	9.50	9.07	8.63
05560	06560	.1378		3.50	4.0	50	7	18.57	17.76	16.96	16.15
05060	06060	.1562	5/32"	3.97	3/16"	2"	5/16"	17.63	16.86	16.10	15.33
05570	06570	.1575		4.00	4.0	50	8	15.14	14.49	13.82	13.17
05580	06580	.1772		4.50	5.0	65	9.5	21.65	20.71	19.77	18.82
05070	06070	.1875	3/16"	4.76	3/16"	2"	3/8"	14.38	13.76	13.14	12.51
05590	06590	.1969		5.00	5.0	65	10	19.13	18.29	17.46	16.63
05080	06080	.2188	7/32"	5.56	1/4"	2-1/2"	1/2"	20.56	19.67	18.77	17.88
05600	06600	.2362		6.00	6.0	65	12	19.71	18.86	17.99	17.14
05090	06090	.2500	1/4"	6.35	1/4"	2-1/2"	1/2"	18.72	17.91	17.09	16.28
05610	06610	.2756		7.00	7.0	65	12	23.75	22.72	21.68	20.65
05100	06100	.3125	5/16"	7.94	5/16"	2-1/2"	1/2"	23.30	22.29	21.27	20.26
05620	06620	.3150		8.00	8.0	65	12	24.52	23.45	22.39	21.32
05630	06630	.3543		9.00	9.0	75	14	27.33	26.15	24.95	23.76
05110	06110	.3750	3/8"	9.52	3/8"	2-1/2"	1/2"	24.78	23.70	22.63	21.55
05640	06640	.3937		10.00	10.0	75	14	35.85	34.29	32.73	31.17
05650	06650	.4331		11.00	11.0	75	14	38.27	36.61	34.94	33.28
05120	06120	.4375	7/16"	11.11	7/16"	2-3/4"	9/16"	35.47	33.94	32.39	30.85
05660	06660	.4724		12.00	12.0	75	16	44.32	42.40	40.47	38.54
05130	06130	.5000	1/2"	12.70	1/2"	3"	5/8"	42.11	40.28	38.45	36.62

165MA (865MA metric) - 2 Flute
175MA (875MA metric) - 4 Flute

Technical information:
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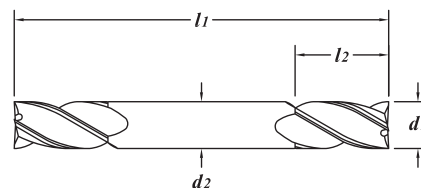


TOLERANCES

d_1	$+0.000'' - 0.002'' (+0.000 - 0.050\text{mm})$
d_2	$3\text{mm} - 6\text{mm} \quad +0.0000'' - 0.0003'' (-0.0000 - 0.0075\text{mm})$
	$1/4'' - 1/2'' \quad -0.0001'' - 0.0004'' (-0.0025 - 0.0100\text{mm})$

Stub Length - Double End - TiALN Coated

Solid submicron grain carbide end mill - center cutting
 Shorter flute length for rigidity
 Dry or semi-dry machining
 Up to 40% faster than uncoated
 Extremely versatile
 Uncoated - page 123



2 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric							
05017	06017	.0312	1/32"	0.79	1/8"	1-1/2"	1/16"	19.23	18.40	17.56	16.72
05517	06517	.0394		1.00	3.0	38	2	20.08	19.21	18.34	17.46
05027	06027	.0469	3/64"	1.19	1/8"	1-1/2"	3/32"	19.23	18.40	17.56	16.72
05527	06527	.0591		1.50	3.0	38	3	20.08	19.21	18.34	17.46
05037	06037	.0625	1/16"	1.59	1/8"	1-1/2"	1/8"	19.23	18.40	17.56	16.72
05537	06537	.0787		2.00	3.0	38	4	20.08	19.21	18.34	17.46
05047	06047	.0938	3/32"	2.38	1/8"	1-1/2"	3/16"	19.23	18.40	17.56	16.72
05547	06547	.0984		2.50	3.0	38	5	20.08	19.21	18.34	17.46
05557	06557	.1181		3.00	3.0	38	6	13.67	13.07	12.48	11.89
05057	06057	.1250	1/8"	3.17	1/8"	1-1/2"	1/4"	13.15	12.57	12.00	11.43
05567	06567	.1378		3.50	4.0	50	7	21.79	20.84	19.90	18.95
05067	06067	.1562	5/32"	3.97	3/16"	2"	5/16"	20.84	19.94	19.03	18.13
05577	06577	.1575		4.00	4.0	50	8	18.36	17.56	16.76	15.96
05587	06587	.1772		4.50	5.0	65	9.5	28.28	27.05	25.82	24.59
05077	06077	.1875	3/16"	4.76	3/16"	2"	3/8"	17.61	16.84	16.08	15.31
05597	06597	.1969		5.00	5.0	65	10	25.75	24.63	23.51	22.39
05087	06087	.2188	7/32"	5.56	1/4"	2-1/2"	1/2"	27.20	26.01	24.84	23.65
05607	06607	.2362		6.00	6.0	65	12	26.33	25.19	24.04	22.90
05097	06097	.2500	1/4"	6.35	1/4"	2-1/2"	1/2"	25.34	24.24	23.14	22.04
05617	06617	.2756		7.00	7.0	65	12	33.68	32.21	30.74	29.29
05107	06107	.3125	5/16"	7.94	5/16"	2-1/2"	1/2"	33.23	31.78	30.34	28.89
05627	06627	.3150		8.00	8.0	65	12	34.46	32.96	31.46	29.96
05637	06637	.3543		9.00	9.0	75	14	37.25	35.63	34.02	32.40
05117	06117	.3750	3/8"	9.52	3/8"	2-1/2"	1/2"	34.72	33.21	31.70	30.19
05647	06647	.3937		10.00	10.0	75	14	47.13	45.08	43.04	40.99
05657	06657	.4331		11.00	11.0	75	14	49.58	47.42	45.26	43.11
05127	06127	.4375	7/16"	11.11	7/16"	2-3/4"	9/16"	46.77	44.73	42.70	40.66
05667	06667	.4724		12.00	12.0	75	16	55.63	53.21	50.79	48.37
05137	06137	.5000	1/2"	12.70	1/2"	3"	5/8"	53.40	51.08	48.76	46.44

185M (985M metric) - 2 Flute
195M (995M metric) - 4 Flute

Technical information:
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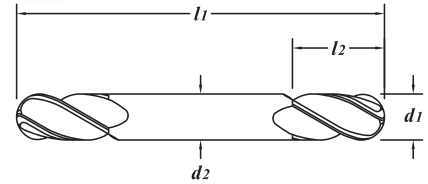


TOLERANCES

d_1	$\leq .030"$	$+0.004" - .0004" (+.0100 - .0100mm)$
	$\geq 1/32"$	$+0.000" - .002" (+.000 - .050mm)$
d_2	3mm - 6mm	$+0.0000" - .0003" (+.0000 - .0075mm)$
	1/4" - 1/2"	$-.0001" - .0004" (-.0025 - .0100mm)$
Ball radius		$+0.000" - .001" (+.000 - .025mm)$

Stub Length - Double End - Ball End

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
TiALN Coated - page 126



2 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric							
07010	08010	.0312	1/32"	0.79	1/8"	1-1/2"	1/16"	18.81	17.99	17.18	16.36
07510	08510	.0394		1.00	3.0	38	2	19.80	18.94	18.08	17.22
07020	08020	.0469	3/64"	1.19	1/8"	1-1/2"	3/32"	18.81	17.99	17.18	16.36
07520	08520	.0591		1.50	3.0	38	3	19.80	18.94	18.08	17.22
07030	08030	.0625	1/16"	1.59	1/8"	1-1/2"	1/8"	18.81	17.99	17.18	16.36
07530	08530	.0787		2.00	3.0	38	4	19.80	18.94	18.08	17.22
07040	08040	.0938	3/32"	2.38	1/8"	1-1/2"	3/16"	18.81	17.99	17.18	16.36
07540	08540	.0984		2.50	3.0	38	5	19.80	18.94	18.08	17.22
07550	08550	.1181		3.00	3.0	38	6	12.29	11.76	11.22	10.69
07050	08050	.1250	1/8"	3.17	1/8"	1-1/2"	1/4"	11.67	11.16	10.65	10.15
07560	08560	.1378		3.50	4.0	50	7	21.82	20.87	19.93	18.97
07060	08060	.1562	5/32"	3.97	3/16"	2"	5/16"	20.73	19.82	18.93	18.02
07570	08570	.1575		4.00	4.0	50	8	17.83	17.05	16.28	15.50
07580	08580	.1772		4.50	5.0	65	9.5	25.46	24.36	23.24	22.14
07070	08070	.1875	3/16"	4.76	3/16"	2"	3/8"	16.93	16.19	15.45	14.73
07590	08590	.1969		5.00	5.0	65	10	22.59	21.61	20.62	19.65
07080	08080	.2188	7/32"	5.56	1/4"	2-1/2"	1/2"	24.19	23.14	22.09	21.04
07600	08600	.2362		6.00	6.0	65	12	23.19	22.18	21.17	20.17
07090	08090	.2500	1/4"	6.35	1/4"	2-1/2"	1/2"	22.03	21.07	20.11	19.16
07610	08610	.2756		7.00	7.0	65	12	28.09	26.87	25.65	24.43
07100	08100	.3125	5/16"	7.94	5/16"	2-1/2"	1/2"	27.41	26.22	25.03	23.84
07620	08620	.3150		8.00	8.0	65	12	28.87	27.61	26.36	25.11
07630	08630	.3543		9.00	9.0	75	14	31.92	30.53	29.14	27.76
07110	08110	.3750	3/8"	9.52	3/8"	2-1/2"	1/2"	29.16	27.89	26.62	25.36
07640	08640	.3937		10.00	10.0	75	14	42.44	40.60	38.75	36.91
07650	08650	.4331		11.00	11.0	75	14	44.88	42.92	40.98	39.02
07120	08120	.4375	7/16"	11.11	7/16"	2-3/4"	9/16"	41.72	39.92	38.10	36.29
07660	08660	.4724		12.00	12.0	75	16	52.17	49.90	47.63	45.36
07130	08130	.5000	1/2"	12.70	1/2"	3"	5/8"	49.55	47.39	45.24	43.09

185MA (985MA metric) - 2 Flute
195MA (995MA metric) - 4 Flute

Technical information:
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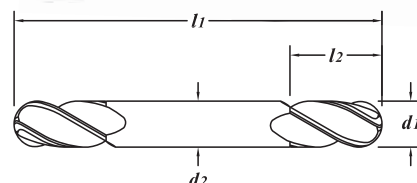


TOLERANCES

d_1	$\leq .030"$	$+0.004" - .0004" (+0.100 - .0100\text{mm})$
	$\geq 1/32"$	$+0.000" - .002" (+0.000 - .050\text{mm})$
d_2	3mm - 6mm	$+0.000" - .0003" (-0.000 - .0075\text{mm})$
	1/4" - 1/2"	$-.0001" - .0004" (-.0025 - .0100\text{mm})$
Ball radius	$+0.000" - .001" (+0.000 - .025\text{mm})$	

Stub Length - Double End - Ball End - TiAlN Coated

Solid submicron grain carbide end mill - center cutting
 Shorter flute length for rigidity
 Dry or semi-dry machining
 Up to 40% faster than uncoated
 Extremely versatile
 Uncoated - page 125



2 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric							
07017	08017	.0312	1/32"	0.79	1/8"	1-1/2"	1/16"	22.03	21.07	20.11	19.16
07517	08517	.0394		1.00	3.0	38	2	23.03	22.03	21.02	20.02
07027	08027	.0469	3/64"	1.19	1/8"	1-1/2"	3/32"	22.03	21.07	20.11	19.16
07527	08527	.0591		1.50	3.0	38	3	23.03	22.03	21.02	20.02
07037	08037	.0625	1/16"	1.59	1/8"	1-1/2"	1/8"	22.03	21.07	20.11	19.16
07537	08537	.0787		2.00	3.0	38	4	23.03	22.03	21.02	20.02
07047	08047	.0938	3/32"	2.38	1/8"	1-1/2"	3/16"	22.03	21.07	20.11	19.16
07547	08547	.0984		2.50	3.0	38	5	23.03	22.03	21.02	20.02
07557	08557	.1181		3.00	3.0	38	6	15.52	14.84	14.16	13.49
07057	08057	.1250	1/8"	3.17	1/8"	1-1/2"	1/4"	14.89	14.25	13.59	12.95
07567	08567	.1378		3.50	4.0	50	7	25.03	23.94	22.86	21.77
07067	08067	.1562	5/32"	3.97	3/16"	2"	5/16"	23.94	22.90	21.86	20.82
07577	08577	.1575		4.00	4.0	50	8	21.05	20.13	19.22	18.30
07587	08587	.1772		4.50	5.0	65	9.5	32.08	30.69	29.30	27.90
07077	08077	.1875	3/16"	4.76	3/16"	2"	3/8"	20.16	19.28	18.40	17.52
07597	08597	.1969		5.00	5.0	65	10	29.23	27.97	26.70	25.42
07087	08087	.2188	7/32"	5.56	1/4"	2-1/2"	1/2"	30.83	29.48	28.14	26.80
07607	08607	.2362		6.00	6.0	65	12	29.82	28.52	27.23	25.93
07097	08097	.2500	1/4"	6.35	1/4"	2-1/2"	1/2"	28.67	27.42	26.18	24.93
07617	08617	.2756		7.00	7.0	65	12	38.03	36.38	34.73	33.07
07107	08107	.3125	5/16"	7.94	5/16"	2-1/2"	1/2"	37.34	35.71	34.09	32.47
07627	08627	.3150		8.00	8.0	65	12	38.80	37.12	35.43	33.74
07637	08637	.3543		9.00	9.0	75	14	41.85	40.03	38.21	36.39
07117	08117	.3750	3/8"	9.52	3/8"	2-1/2"	1/2"	39.08	37.39	35.68	33.99
07647	08647	.3937		10.00	10.0	75	14	53.74	51.40	49.07	46.73
07657	08657	.4331		11.00	11.0	75	14	56.18	53.74	51.29	48.85
07127	08127	.4375	7/16"	11.11	7/16"	2-3/4"	9/16"	53.02	50.71	48.41	46.10
07667	08667	.4724		12.00	12.0	75	16	63.46	60.70	57.94	55.18
07137	08137	.5000	1/2"	12.70	1/2"	3"	5/8"	60.85	58.21	55.56	52.92

220M (820M metric) - 2 Flute
223M (823M metric) - 3 Flute
230M (830M metric) - 4 Flute
 .0050" - .0984"
 (0.13mm - 2.50mm)

Technical information:

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TOLERANCES

d_1	$\leq .030"$	$+0.004" - .0004" (+.0100 - .0100mm)$
	$\geq 1/32"$	$+0.000" - .002" (+.000 - .050mm)$
d_2	3mm - 6mm	$+0.000" - .0003" (-.0000 - .0075mm)$
	1/4" - 1-1/4"	$-.0001" - .0004" (-.0025 - .0100mm)$

Standard Length

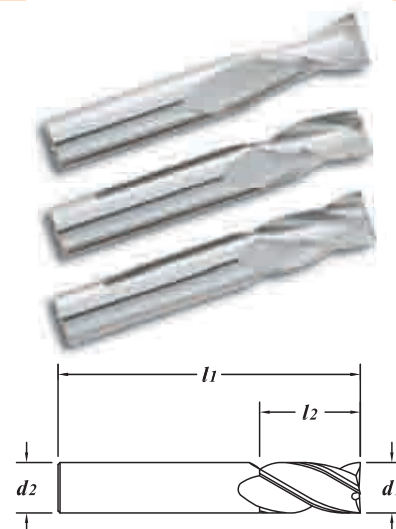
Solid submicron grain carbide end mill - center cutting

Extremely versatile

TiN Coated - page 129

TiCN Coated - page 130

TiAlN Coated - page 131



END MILLS

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal	Diameter	Metric							
11500	-	-	.0050	.0050"	0.13	1/8"	1-1/2"	.015"	18.50	17.70	16.89	16.09
11510	-	-	.0060	.0060"	0.15	1/8"	1-1/2"	.018"	18.50	17.70	16.89	16.09
11520	-	-	.0070	.0070"	0.18	1/8"	1-1/2"	.021"	17.41	16.65	15.89	15.14
11530	-	-	.0080	.0080"	0.20	1/8"	1-1/2"	.024"	17.41	16.65	15.89	15.14
11540	-	-	.0090	.0090"	0.23	1/8"	1-1/2"	.027"	16.43	15.71	15.01	14.29
11550	-	13550	.0100	.0100"	0.25	1/8"	1-1/2"	.030"	16.43	15.71	15.01	14.29
11560	-	-	.0110	.0110"	0.28	1/8"	1-1/2"	.033"	15.22	14.55	13.89	13.23
11570	-	-	.0120	.0120"	0.30	1/8"	1-1/2"	.036"	15.22	14.55	13.89	13.23
11580	-	-	.0130	.0130"	0.33	1/8"	1-1/2"	.039"	15.13	14.48	13.81	13.16
11590	-	-	.0140	.0140"	0.36	1/8"	1-1/2"	.042"	15.13	14.48	13.81	13.16
11600	-	13600	.0150	.0150"	0.38	1/8"	1-1/2"	.045"	15.13	14.48	13.81	13.16
11610	-	-	.0160	.0160"	0.41	1/8"	1-1/2"	.048"	14.92	14.28	13.62	12.98
11620	-	-	.0170	.0170"	0.43	1/8"	1-1/2"	.051"	14.92	14.28	13.62	12.98
11630	-	-	.0180	.0180"	0.46	1/8"	1-1/2"	.054"	14.65	14.02	13.37	12.74
11640	-	-	.0190	.0190"	0.48	1/8"	1-1/2"	.057"	14.65	14.02	13.37	12.74
11650	-	13650	.0200	.0200"	0.51	1/8"	1-1/2"	.060"	14.65	14.02	13.37	12.74
11660	-	-	.0210	.0210"	0.53	1/8"	1-1/2"	.063"	14.65	14.02	13.37	12.74
11670	-	-	.0220	.0220"	0.56	1/8"	1-1/2"	.066"	14.49	13.85	13.23	12.59
11680	-	-	.0230	.0230"	0.58	1/8"	1-1/2"	.069"	14.49	13.85	13.23	12.59
11690	-	-	.0240	.0240"	0.61	1/8"	1-1/2"	.072"	14.49	13.85	13.23	12.59
11700	-	13700	.0250	.0250"	0.64	1/8"	1-1/2"	.075"	13.66	13.06	12.47	11.88
11710	-	-	.0260	.0260"	0.66	1/8"	1-1/2"	.078"	13.66	13.06	12.47	11.88
11720	-	-	.0270	.0270"	0.69	1/8"	1-1/2"	.081"	12.25	11.72	11.19	10.65
11730	-	-	.0280	.0280"	0.71	1/8"	1-1/2"	.084"	12.25	11.72	11.19	10.65
11740	-	-	.0290	.0290"	0.74	1/8"	1-1/2"	.087"	12.25	11.72	11.19	10.65
11750	-	13750	.0300	.0300"	0.76	1/8"	1-1/2"	.090"	12.25	11.72	11.19	10.65
11010	12010	13010	.0312	1/32"	0.79	1/8"	1-1/2"	3/32"	8.91	8.53	8.13	7.75
45010	37010	46010	.0394		1.00	3.0	38	4	9.36	8.95	8.55	8.14
11020	12020	13020	.0469	3/64"	1.19	1/8"	1-1/2"	1/8"	8.91	8.53	8.13	7.75
45020	37020	46020	.0591		1.50	3.0	38	6	9.36	8.95	8.55	8.14
11030	12030	13030	.0625	1/16"	1.59	1/8"	1-1/2"	1/4"	8.27	7.90	7.55	7.19
11040	12040	13040	.0781	5/64"	1.98	1/8"	1-1/2"	1/4"	8.27	7.90	7.55	7.19
45030	37030	46030	.0787		2.00	3.0	38	8	8.68	8.31	7.92	7.55
11050	12050	13050	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	7.82	7.48	7.14	6.80
45040	37040	46040	.0984		2.50	3.0	38	12	8.22	7.86	7.50	7.14

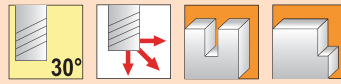
continued →

220M (820M metric) - 2 Flute (continued)**223M (823M metric) - 3 Flute (continued)****230M (830M metric) - 4 Flute (continued)**

.1094" - 1.250"

(2.78mm - 31.75mm)

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal		Metric							
11060	12060	13060	.1094	7/64"	2.78	1/8"	1-1/2"	3/8"	7.82	7.48	7.14	6.80
45050	37050	46050	.1181		3.00	3.0	38	12	7.58	7.25	6.93	6.59
11070	12070	13070	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	7.23	6.92	6.60	6.28
45060	37060	46060	.1378		3.50	4.0	50	12	11.22	10.73	10.24	9.76
11080	12080	13080	.1406	9/64"	3.57	3/16"	2"	9/16"	10.67	10.20	9.74	9.28
11090	12090	13090	.1562	5/32"	3.97	3/16"	2"	9/16"	10.67	10.20	9.74	9.28
45070	37070	46070	.1575		4.00	4.0	50	14	10.63	10.17	9.70	9.25
11100	12100	13100	.1719	11/64"	4.37	3/16"	2"	9/16"	10.67	10.20	9.74	9.28
45080	37080	46080	.1772		4.50	5.0	50	14	13.01	12.45	11.88	11.32
11110	12110	13110	.1875	3/16"	4.76	3/16"	2"	5/8"	10.12	9.68	9.24	8.80
45090	37090	46090	.1969		5.00	5.0	65	16	12.42	11.88	11.34	10.80
11120	12120	13120	.2031	13/64"	5.16	1/4"	2-1/2"	5/8"	13.41	12.82	12.24	11.66
11130	12130	13130	.2188	7/32"	5.56	1/4"	2-1/2"	5/8"	13.41	12.82	12.24	11.66
11140	12140	13140	.2344	15/64"	5.95	1/4"	2-1/2"	3/4"	13.41	12.82	12.24	11.66
45100	37100	46100	.2362		6.00	6.0	65	19	12.81	12.25	11.70	11.14
11150	12150	13150	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	12.20	11.67	11.14	10.61
11160	12160	13160	.2656	17/64"	6.75	5/16"	2-1/2"	7/8"	21.39	20.47	19.53	18.61
45110	37110	46110	.2756		7.00	7.0	65	22	17.60	16.83	16.07	15.30
11170	12170	13170	.2812	9/32"	7.14	5/16"	2-1/2"	7/8"	21.39	20.47	19.53	18.61
11180	12180	13180	.2969	19/64"	7.54	5/16"	2-1/2"	7/8"	21.39	20.47	19.53	18.61
11190	12190	13190	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	17.12	16.37	15.63	14.88
45120	37120	46120	.3150		8.00	8.0	65	22	17.97	17.19	16.41	15.63
11200	12200	13200	.3281	21/64"	8.33	3/8"	2-1/2"	7/8"	25.34	24.24	23.14	22.04
11210	12210	13210	.3438	11/32"	8.73	3/8"	2-1/2"	7/8"	25.34	24.24	23.14	22.04
45130	37130	46130	.3543		9.00	9.0	65	22	22.38	21.40	20.44	19.46
11220	12220	13220	.3594	23/64"	9.13	3/8"	2-1/2"	7/8"	25.34	24.24	23.14	22.04
11230	12230	13230	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	21.32	20.39	19.47	18.54
11240	12240	13240	.3906	25/64"	9.92	7/16"	2-3/4"	7/8"	30.32	29.00	27.68	26.36
45140	37140	46140	.3937		10.00	10.0	70	25	25.94	24.81	23.68	22.56
11250	12250	13250	.4062	13/32"	10.32	7/16"	2-3/4"	7/8"	30.32	29.00	27.68	26.36
11260	12260	13260	.4219	27/64"	10.72	7/16"	2-3/4"	7/8"	30.32	29.00	27.68	26.36
45150	37150	46150	.4331		11.00	11.0	75	25	27.32	26.14	24.95	23.75
11270	12270	13270	.4375	7/16"	11.11	7/16"	2-3/4"	1"	26.01	24.88	23.75	22.62
11280	12280	13280	.4531	29/64"	11.51	1/2"	3"	1"	40.82	39.04	37.27	35.50
11290	12290	13290	.4688	15/32"	11.91	1/2"	3"	1"	40.82	39.04	37.27	35.50
45160	37160	46160	.4724		12.00	12.0	75	25	35.86	34.30	32.74	31.18
11300	12300	13300	.4844	31/64"	12.30	1/2"	3"	1"	40.82	39.04	37.27	35.50
11310	12310	13310	.5000	1/2"	12.70	1/2"	3"	1"	34.14	32.66	31.18	29.69
45170	37170	46170	.5512		14.00	14.0	88	32	61.22	58.56	55.90	53.24
11320	12320	13320	.5625	9/16"	14.29	9/16"	3-1/2"	1-1/4"	58.31	55.78	53.24	50.71
11330	12330	13330	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	65.84	62.98	60.11	57.25
45180	37180	46180	.6299		16.00	16.0	88	38	69.14	66.13	63.13	60.12
11340	12340	13340	.6875	11/16"	17.46	3/4"	4"	1-1/2"	109.65	104.88	100.11	95.35
45190	37190	46190	.7087		18.00	18.0	100	38	101.37	96.96	92.55	88.15
11350	12350	13350	.7500	3/4"	19.05	3/4"	4"	1-1/2"	96.53	92.33	88.14	83.94
45200	37200	46200	.7874		20.00	20.0	100	38	128.90	123.29	117.69	112.08
45210	37210	46210	.8661		22.00	22.0	100	38	143.22	136.99	130.76	124.54
11360	12360	13360	.8750	7/8"	22.22	7/8"	4"	1-1/2"	138.91	132.87	126.83	120.80
45220	37220	46220	.9843		25.00	25.0	100	38	149.74	143.23	136.72	130.21
11370	12370	13370	1.000	1"	25.40	1"	4"	1-1/2"	144.41	138.13	131.85	125.58
-	-	13390	1.250	1-1/4"	31.75	1-1/4"	4-1/2"	2"	421.64	403.30	384.97	366.64

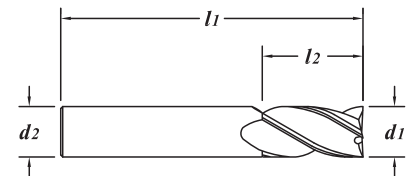


TOLERANCES

d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (-.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)

Standard Length - TiN Coated

Solid submicron grain carbide end mill - center cutting
 Improved lubricity - 10% faster than uncoated
 Extremely versatile
 Uncoated - page 127
 TiCN Coated - page 130
 TiALN Coated - page 131



2 Flute EDP#	4 Flute EDP#	$d1$ † Diameter			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric							
11073	13073	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	8.50	8.12	7.76	7.38
11113	13113	.1875	3/16"	4.76	3/16"	2"	5/8"	11.38	10.88	10.39	9.89
11153	13153	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	14.76	14.11	13.48	12.83
11193	13193	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	20.54	19.65	18.75	17.86
11233	13233	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	24.74	23.67	22.59	21.52
11273	13273	.4375	7/16"	11.11	7/16"	2-3/4"	1"	30.16	28.85	27.54	26.23
11313	13313	.5000	1/2"	12.70	1/2"	3"	1"	38.29	36.63	34.96	33.30
11333	13333	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	72.23	69.09	65.95	62.81
11353	13353	.7500	3/4"	19.05	3/4"	4"	1-1/2"	103.84	99.33	94.82	90.30
11373	13373	1.000	1"	25.04	1"	4"	1-1/2"	157.19	150.35	143.52	136.69

220MC - 2 Flute
223MC - 3 Flute
230MC - 4 Flute

Technical information:
 page 192, 194

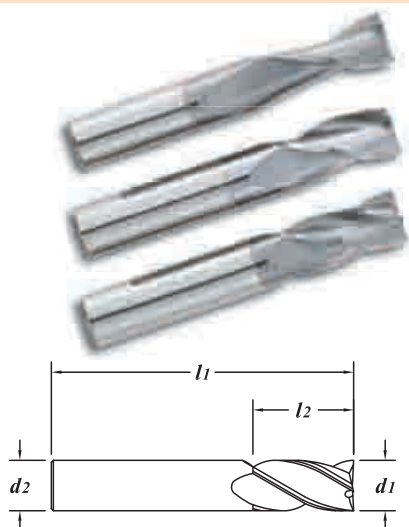


TOLERANCES

d_1	$+0.000'' - .002'' (+.000 - .050\text{mm})$
d_2	$3\text{mm} - 6\text{mm} \quad +.0000'' - .0003'' (-.0000 - .0075\text{mm})$
	$1/4'' - 1-1/4'' \quad -.0001'' - .0004'' (-.0025 - .0100\text{mm})$

Standard Length - TiCN Coated

Solid submicron grain carbide end mill - center cutting
 Improved abrasion resistance and lubricity
 Up to 25% faster than uncoated
 Extremely versatile
 Uncoated - page 127
 TiN Coated - page 129
 TiAlN Coated - page 131

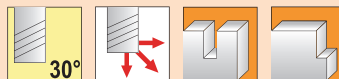


2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal		Metric							
11014	12014	13014	.0312	1/32"	0.79	1/8"	1-1/2"	3/32"	10.82	10.35	9.88	9.40
11024	12024	13024	.0469	3/64"	1.19	1/8"	1-1/2"	1/8"	10.82	10.35	9.88	9.40
11034	12034	13034	.0625	1/16"	1.59	1/8"	1-1/2"	1/4"	10.17	9.72	9.29	8.84
11044	12044	13044	.0781	5/64"	1.98	1/8"	1-1/2"	1/4"	10.17	9.72	9.29	8.84
11054	12054	13054	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	9.71	9.29	8.87	8.44
11064	12064	13064	.1094	7/64"	2.78	1/8"	1-1/2"	3/8"	9.71	9.29	8.87	8.44
11074	12074	13074	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	9.11	8.72	8.32	7.92
11084	12084	13084	.1406	9/64"	3.57	3/16"	2"	9/16"	12.56	12.01	11.47	10.92
11094	12094	13094	.1562	5/32"	3.97	3/16"	2"	9/16"	12.56	12.01	11.47	10.92
11104	12104	13104	.1719	11/64"	4.37	3/16"	2"	9/16"	12.56	12.01	11.47	10.92
11114	12114	13114	.1875	3/16"	4.76	3/16"	2"	5/8"	12.01	11.49	10.97	10.44
11124	12124	13124	.2031	13/64"	5.16	1/4"	2-1/2"	5/8"	17.24	16.49	15.75	15.00
11134	12134	13134	.2188	7/32"	5.56	1/4"	2-1/2"	5/8"	17.24	16.49	15.75	15.00
11144	12144	13144	.2344	15/64"	5.95	1/4"	2-1/2"	3/4"	17.24	16.49	15.75	15.00
11154	12154	13154	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	16.04	15.34	14.64	13.95
11164	12164	13164	.2656	17/64"	6.75	5/16"	2-1/2"	7/8"	26.53	25.38	24.22	23.07
11174	12174	13174	.2812	9/32"	7.14	5/16"	2-1/2"	7/8"	26.53	25.38	24.22	23.07
11184	12184	13184	.2969	19/64"	7.54	5/16"	2-1/2"	7/8"	26.53	25.38	24.22	23.07
11194	12194	13194	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	22.25	21.28	20.31	19.34
11204	12204	13204	.3281	21/64"	8.33	3/8"	2-1/2"	7/8"	30.47	29.15	27.82	26.50
11214	12214	13214	.3438	11/32"	8.73	3/8"	2-1/2"	7/8"	30.47	29.15	27.82	26.50
11224	12224	13224	.3594	23/64"	9.13	3/8"	2-1/2"	7/8"	30.47	29.15	27.82	26.50
11234	12234	13234	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	26.45	25.29	24.15	22.99
11244	12244	13244	.3906	25/64"	9.92	7/16"	2-1/2"	7/8"	36.46	34.88	33.29	31.71
11254	12254	13254	.4062	13/32"	10.32	7/16"	2-1/2"	7/8"	36.46	34.88	33.29	31.71
11264	12264	13264	.4219	27/64"	10.72	7/16"	2-1/2"	7/8"	36.46	34.88	33.29	31.71
11274	12274	13274	.4375	7/16"	11.11	7/16"	2-3/4"	1"	32.18	30.77	29.38	27.98
11284	12284	13284	.4531	29/64"	11.51	1/2"	3"	1"	46.98	44.94	42.89	40.85
11294	12294	13294	.4688	15/32"	11.91	1/2"	3"	1"	46.98	44.94	42.89	40.85
11304	12304	13304	.4844	31/64"	12.30	1/2"	3"	1"	46.98	44.94	42.89	40.85
11314	12314	13314	.5000	1/2"	12.70	1/2"	3"	1"	40.31	38.55	36.81	35.05
11324	12324	13324	.5625	9/16"	14.29	9/16"	3-1/2"	1-1/4"	67.91	64.96	62.00	59.05
11334	12334	13334	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	75.43	72.16	68.87	65.59
11344	12344	13344	.6875	11/16"	17.46	3/4"	4"	1-1/2"	120.61	115.37	110.13	104.87
11354	12354	13354	.7500	3/4"	19.05	3/4"	4"	1-1/2"	107.49	102.82	98.14	93.48
11364	12364	13364	.8750	7/8"	22.22	7/8"	4"	1-1/2"	155.39	148.63	141.88	135.12
11374	12374	13374	1.000	1"	25.40	1"	4"	1-1/2"	160.89	153.89	146.90	139.90
-	-	13394	1.250	1-1/4"	31.75	1-1/4"	4-1/2"	2"	448.26	428.77	409.28	389.79

220MA (820MA metric) - 2 Flute
223MA (823MA metric) - 3 Flute
230MA (830MA metric) - 4 Flute
 .0312" - .3594"
 (0.79mm - 9.13mm)

Technical information:

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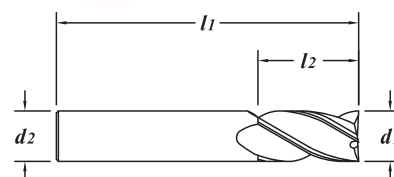


TOLERANCES

d_1	$+0.000^{\circ} - .002^{\circ} (+.000 - .050\text{mm})$
d_2	$3\text{mm} - 6\text{mm} \quad +.0000^{\circ} - .0003^{\circ} (-.0000 - .0075\text{mm})$
	$1/4" - 1-1/4" \quad -.0001^{\circ} - .0004^{\circ} (-.0025 - .0100\text{mm})$

Standard Length - TiALN Coated

Solid submicron grain carbide end mill - center cutting
 Dry or semi-dry machining
 Up to 40% faster than uncoated
 Extremely versatile
 Uncoated - page 127
 TiN Coated - page 129
 TiCN Coated - page 130



END MILLS

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal		Metric							
11017	12017	13017	.0312	1/32"	0.79	1/8"	1-1/2"	3/32"	11.07	10.59	10.10	9.62
45017	37017	46017	.0394		1.00	3.0	38	4	11.50	11.00	10.50	10.00
11027	12027	13027	.0469	3/64"	1.19	1/8"	1-1/2"	1/8"	11.07	10.59	10.10	9.62
45027	37027	46027	.0591		1.50	3.0	38	6	11.50	11.00	10.50	10.00
11037	12037	13037	.0625	1/16"	1.59	1/8"	1-1/2"	1/4"	10.42	9.96	9.52	9.06
11047	12047	13047	.0781	5/64"	1.98	1/8"	1-1/2"	1/4"	10.42	9.96	9.52	9.06
45037	37037	46037	.0787		2.00	3.0	38	8	10.83	10.36	9.88	9.41
11057	12057	13057	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	9.96	9.53	9.10	8.66
45047	37047	46047	.0984		2.50	3.0	38	12	10.36	9.91	9.45	9.01
11067	12067	13067	.1094	7/64"	2.78	1/8"	1-1/2"	3/8"	9.96	9.53	9.10	8.66
45057	37057	46057	.1181		3.00	3.0	38	12	9.72	9.30	8.88	8.46
11077	12077	13077	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	9.36	8.95	8.55	8.14
45067	37067	46067	.1378		3.50	4.0	50	12	13.36	12.78	12.20	11.62
11087	12087	13087	.1406	9/64"	3.57	3/16"	2"	9/16"	12.81	12.25	11.70	11.14
11097	12097	13097	.1562	5/32"	3.97	3/16"	2"	9/16"	12.81	12.25	11.70	11.14
45077	37077	46077	.1575		4.00	4.0	50	14	12.77	12.22	11.66	11.11
11107	12107	13107	.1719	11/64"	4.37	3/16"	2"	9/16"	12.81	12.25	11.70	11.14
45087	37087	46087	.1772		4.50	5.0	50	14	16.36	15.65	14.93	14.23
11117	12117	13117	.1875	3/16"	4.76	3/16"	2"	5/8"	12.26	11.73	11.19	10.66
45097	37097	46097	.1969		5.00	5.0	65	16	16.84	16.11	15.37	14.64
11127	12127	13127	.2031	13/64"	5.16	1/4"	2-1/2"	5/8"	17.85	17.07	16.30	15.52
11137	12137	13137	.2188	7/32"	5.56	1/4"	2-1/2"	5/8"	17.85	17.07	16.30	15.52
11147	12147	13147	.2344	15/64"	5.95	1/4"	2-1/2"	3/4"	17.85	17.07	16.30	15.52
45107	37107	46107	.2362		6.00	6.0	65	19	17.23	16.48	15.74	14.99
11157	12157	13157	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	16.63	15.90	15.18	14.46
11167	12167	13167	.2656	17/64"	6.75	5/16"	2-1/2"	7/8"	28.02	26.80	25.58	24.37
45117	37117	46117	.2756		7.00	7.0	65	22	24.21	23.16	22.11	21.05
11177	12177	13177	.2812	9/32"	7.14	5/16"	2-1/2"	7/8"	28.02	26.80	25.58	24.37
11187	12187	13187	.2969	19/64"	7.54	5/16"	2-1/2"	7/8"	28.02	26.80	25.58	24.37
11197	12197	13197	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	23.74	22.71	21.67	20.64
45127	37127	46127	.3150		8.00	8.0	65	22	24.61	23.54	22.46	21.39
11207	12207	13207	.3281	21/64"	8.33	3/8"	2-1/2"	7/8"	31.97	30.58	29.19	27.80
11217	12217	13217	.3438	11/32"	8.73	3/8"	2-1/2"	7/8"	31.97	30.58	29.19	27.80
45137	37137	46137	.3543		9.00	9.0	65	22	29.01	27.75	26.48	25.22
11227	12227	13227	.3594	23/64"	9.13	3/8"	2-1/2"	7/8"	31.97	30.58	29.19	27.80

continued →

220MA (820MA metric) - 2 Flute (continued)**223MA (823MA metric) - 3 Flute (continued)****230MA (830MA metric) - 4 Flute (continued)**

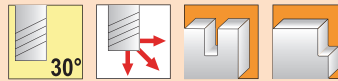
.3750" - 1.250"

(9.52mm - 31.75mm)

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal		Metric							
11237	12237	13237	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	27.93	26.72	25.50	24.29
11247	12247	13247	.3906	25/64"	9.92	7/16"	2-3/4"	7/8"	37.85	36.20	34.56	32.91
45147	37147	46147	.3937		10.00	10.0	70	25	33.47	32.01	30.56	29.10
11257	12257	13257	.4062	13/32"	10.32	7/16"	2-3/4"	7/8"	37.85	36.20	34.56	32.91
11267	12267	13267	.4219	27/64"	10.72	7/16"	2-3/4"	7/8"	37.85	36.20	34.56	32.91
45157	37157	46157	.4331		11.00	11.0	75	25	34.84	33.32	31.81	30.30
11277	12277	13277	.4375	7/16"	11.11	7/16"	2-3/4"	1"	33.55	32.09	30.63	29.17
11287	12287	13287	.4531	29/64"	11.51	1/2"	3"	1"	48.35	46.25	44.15	42.05
11297	12297	13297	.4688	15/32"	11.91	1/2"	3"	1"	48.35	46.25	44.15	42.05
45167	37167	46167	.4724		12.00	12.0	75	25	43.38	41.50	39.60	37.72
11307	12307	13307	.4844	31/64"	12.30	1/2"	3"	1"	48.35	46.25	44.15	42.05
11317	12317	13317	.5000	1/2"	12.70	1/2"	3"	1"	41.68	39.87	38.05	36.24
45177	37177	46177	.5512		14.00	14.0	88	32	72.10	68.97	65.83	62.70
11327	12327	13327	.5625	9/16"	14.29	9/16"	3-1/2"	1-1/4"	69.20	66.20	63.18	60.17
11337	12337	13337	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	76.73	73.39	70.05	66.73
45187	37187	46187	.6299		16.00	16.0	88	38	80.04	76.55	73.08	69.60
11347	12347	13347	.6875	11/16"	17.46	3/4"	4"	1-1/2"	122.49	117.17	111.84	106.52
45197	37197	46197	.7087		18.00	18.0	100	38	114.22	109.25	104.29	99.32
11357	12357	13357	.7500	3/4"	19.05	3/4"	4"	1-1/2"	109.39	104.63	99.87	95.12
45207	37207	46207	.7874		20.00	20.0	100	38	147.88	141.45	135.02	128.59
45217	37217	46217	.8661		22.00	22.0	100	38	162.20	155.15	148.10	141.04
11367	12367	13367	.8750	7/8"	22.22	7/8"	4"	1-1/2"	157.89	151.03	144.16	137.30
45227	37227	46227	.9843		25.00	25.0	100	38	168.72	161.39	154.04	146.71
11377	12377	13377	1.000	1"	25.40	1"	4"	1-1/2"	163.39	156.29	149.19	142.08
-	-	13397	1.250	1-1/4"	31.75	1-1/4"	4-1/2"	2"	449.14	429.61	410.08	390.56

220R - 2 Flute 230R - 4 Flute

Technical information: page 192, 194



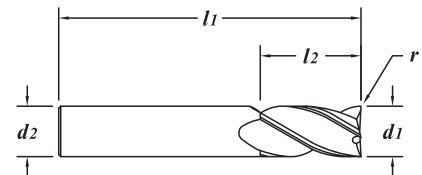
.0625" - .5000"
(1.59mm - 12.70mm)

TOLERANCES

d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (-.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
r	+.001" -.001" (+.025 -.025mm)	

Standard Length - Corner Radius

Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Extremely versatile
TiALN Coated - page 135



	2 Flute EDP#	4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100	
			Decimal	Metric									
NEW	79580	80580	.0625	1/16"	1.59	1/8"	1-1/2"	1/4"	.010"	10.67	10.20	9.74	9.28
	79590	80590	.0625	1/16"	1.59	1/8"	1-1/2"	1/4"	.015"	10.67	10.20	9.74	9.28
	79600	80600	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	.010"	10.20	9.76	9.32	8.87
	79610	80610	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	.015"	10.20	9.76	9.32	8.87
	79620	80620	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	.020"	10.20	9.76	9.32	8.87
	79000	80000	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	.010"	9.26	8.85	8.46	8.05
	79010	80010	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	.015"	9.26	8.85	8.46	8.05
	79020	80020	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	.020"	9.26	8.85	8.46	8.05
	79030	80030	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	.030"	9.26	8.85	8.46	8.05
	79040	80040	.1875	3/16"	4.76	3/16"	2"	5/8"	.010"	12.20	11.67	11.14	10.61
	79050	80050	.1875	3/16"	4.76	3/16"	2"	5/8"	.015"	12.20	11.67	11.14	10.61
	79060	80060	.1875	3/16"	4.76	3/16"	2"	5/8"	.020"	12.20	11.67	11.14	10.61
	79070	80070	.1875	3/16"	4.76	3/16"	2"	5/8"	.030"	12.20	11.67	11.14	10.61
	-	80090	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.010"	15.14	14.49	13.82	13.17
	79100	80100	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.015"	15.14	14.49	13.82	13.17
	79110	80110	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.020"	15.14	14.49	13.82	13.17
	79120	80120	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.030"	15.14	14.49	13.82	13.17
	79130	80130	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.045"	15.14	14.49	13.82	13.17
	79140	80140	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.060"	15.14	14.49	13.82	13.17
	79160	80160	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	.015"	19.87	19.01	18.15	17.28
79170	80170	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	.020"	19.87	19.01	18.15	17.28	
79180	80180	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	.030"	19.87	19.01	18.15	17.28	
79190	80190	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	.045"	19.87	19.01	18.15	17.28	
NEW	79200	80200	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	.060"	19.87	19.01	18.15	17.28
	-	80220	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.010"	24.32	23.25	22.20	21.14
	79230	80230	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.015"	24.32	23.25	22.20	21.14
	79240	80240	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.020"	24.32	23.25	22.20	21.14
	79250	80250	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.030"	24.32	23.25	22.20	21.14
	79260	80260	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.045"	24.32	23.25	22.20	21.14
NEW	79270	80270	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.060"	24.32	23.25	22.20	21.14
	-	80290	.5000	1/2"	12.70	1/2"	3"	1"	.010"	45.27	43.31	41.33	39.36
	79300	80300	.5000	1/2"	12.70	1/2"	3"	1"	.015"	45.27	43.31	41.33	39.36
	79310	80310	.5000	1/2"	12.70	1/2"	3"	1"	.020"	45.27	43.31	41.33	39.36
	79320	80320	.5000	1/2"	12.70	1/2"	3"	1"	.030"	45.27	43.31	41.33	39.36
	79330	80330	.5000	1/2"	12.70	1/2"	3"	1"	.045"	45.27	43.31	41.33	39.36
	79340	80340	.5000	1/2"	12.70	1/2"	3"	1"	.060"	45.27	43.31	41.33	39.36
	79350	80350	.5000	1/2"	12.70	1/2"	3"	1"	.090"	45.27	43.31	41.33	39.36
79360	80360	.5000	1/2"	12.70	1/2"	3"	1"	.125"	45.27	43.31	41.33	39.36	

continued →

220R - 2 Flute (continued)

230R - 4 Flute (continued)

.6250" - 1.000"
(15.87mm - 25.40mm)

2 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100	
		Decimal	Metric										
79370	80370	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.015"	73.20	70.01	66.83	63.65	
79380	80380	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.020"	73.20	70.01	66.83	63.65	
79390	80390	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.030"	73.20	70.01	66.83	63.65	
79400	80400	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.045"	73.20	70.01	66.83	63.65	
79410	80410	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.060"	73.20	70.01	66.83	63.65	
79420	80420	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.090"	73.20	70.01	66.83	63.65	
79440	80440	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.015"	107.72	103.04	98.35	93.67	
79450	80450	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.020"	107.72	103.04	98.35	93.67	
79460	80460	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.030"	107.72	103.04	98.35	93.67	
79470	80470	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.045"	107.72	103.04	98.35	93.67	
79480	80480	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.060"	107.72	103.04	98.35	93.67	
79490	80490	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.090"	107.72	103.04	98.35	93.67	
79500	80500	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.125"	107.72	103.04	98.35	93.67	
NEW	79630	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.250"	107.72	103.04	98.35	93.67	
	79510	80510	1.000	1"	25.40	1"	4"	1-1/2"	.015"	186.85	178.72	170.60	162.48
	79520	80520	1.000	1"	25.40	1"	4"	1-1/2"	.020"	186.85	178.72	170.60	162.48
	79530	80530	1.000	1"	25.40	1"	4"	1-1/2"	.030"	186.85	178.72	170.60	162.48
	79540	80540	1.000	1"	25.40	1"	4"	1-1/2"	.045"	186.85	178.72	170.60	162.48
	79550	80550	1.000	1"	25.40	1"	4"	1-1/2"	.060"	186.85	178.72	170.60	162.48
	79560	80560	1.000	1"	25.40	1"	4"	1-1/2"	.090"	186.85	178.72	170.60	162.48
	79570	80570	1.000	1"	25.40	1"	4"	1-1/2"	.125"	186.85	178.72	170.60	162.48
NEW	79640	80640	1.000	1"	25.40	1"	4"	1-1/2"	.250"	186.85	178.72	170.60	162.48

220RA - 2 Flute 230RA (830RA metric) - 4 Flute

.0625" - .3125"
(1.59mm - 7.94mm)

Technical information:
page 192, 194

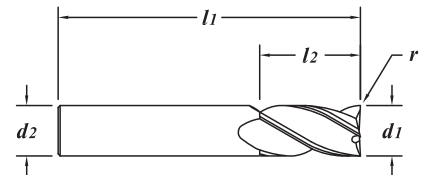


TOLERANCES

d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (-.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
r	+.001" -.001" (+.025 -.025mm)	

Standard Length - Corner Radius - TiALN Coated

Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Up to 40% faster than uncoated
For stronger corners and part radius
Extremely versatile
Uncoated - page 133



END MILLS

2 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100	
		Decimal		Metric									
79587	80587	.0625	1/16"	1.59	1/8"	1-1/2"	1/4"	.010"	12.81	12.25	11.70	11.14	
79597	80597	.0625	1/16"	1.59	1/8"	1-1/2"	1/4"	.015"	12.81	12.25	11.70	11.14	
79607	80607	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	.010"	12.34	11.80	11.27	10.73	
79617	80617	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	.015"	12.34	11.80	11.27	10.73	
79627	80627	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	.020"	12.34	11.80	11.27	10.73	
-	24077	.1181		3.00	3.0	38	12	0.2	11.42	10.92	10.43	9.93	
-	24087	.1181		3.00	3.0	38	12	0.5	11.42	10.92	10.43	9.93	
79007	80007	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	.010"	11.40	10.90	10.41	9.91	
79017	80017	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	.015"	11.40	10.90	10.41	9.91	
79027	80027	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	.020"	11.40	10.90	10.41	9.91	
79037	80037	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	.030"	11.40	10.90	10.41	9.91	
-	24097	.1575		4.00	4.0	50	14	0.3	14.96	14.30	13.66	13.00	
-	24107	.1575		4.00	4.0	50	14	0.5	14.96	14.30	13.66	13.00	
79047	80047	.1875	3/16"	4.76	3/16"	2"	5/8"	.010"	14.34	13.72	13.09	12.47	
79057	80057	.1875	3/16"	4.76	3/16"	2"	5/8"	.015"	14.34	13.72	13.09	12.47	
79067	80067	.1875	3/16"	4.76	3/16"	2"	5/8"	.020"	14.34	13.72	13.09	12.47	
79077	80077	.1875	3/16"	4.76	3/16"	2"	5/8"	.030"	14.34	13.72	13.09	12.47	
-	24117	.1969		5.00	5.0	50	16	0.3	19.95	19.08	18.21	17.35	
-	24127	.1969		5.00	5.0	65	16	0.5	19.95	19.08	18.21	17.35	
-	24177	.2362		6.00	6.0	65	19	0.5	20.34	19.46	18.57	17.69	
-	24187	.2362		6.00	6.0	65	19	0.8	20.34	19.46	18.57	17.69	
-	24197	.2362		6.00	6.0	65	19	1.0	20.34	19.46	18.57	17.69	
-	24207	.2362		6.00	6.0	65	19	1.5	20.34	19.46	18.57	17.69	
-	24217	.2362		6.00	6.0	65	19	2.0	20.34	19.46	18.57	17.69	
NEW	-	80097	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.010"	19.56	18.71	17.86	17.01
79107	80107	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.015"	19.56	18.71	17.86	17.01	
79117	80117	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.020"	19.56	18.71	17.86	17.01	
79127	80127	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.030"	19.56	18.71	17.86	17.01	
79137	80137	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.045"	19.56	18.71	17.86	17.01	
79147	80147	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	.060"	19.56	18.71	17.86	17.01	
79167	80167	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	.015"	26.50	25.34	24.19	23.05	
79177	80177	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	.020"	26.50	25.34	24.19	23.05	
79187	80187	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	.030"	26.50	25.34	24.19	23.05	
79197	80197	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	.045"	26.50	25.34	24.19	23.05	
79207	80207	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	.060"	26.50	25.34	24.19	23.05	

continued →

220RA - 2 Flute (continued)

230RA (830RA metric) - 4 Flute (continued)

.3150" - .7500"
(8.00mm - 19.05mm)

	2 Flute EDP#	4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100	
			Decimal	Metric									
NEW	-	24227	.3150	8.00	8.0	65	22	0.5	27.50	26.30	25.11	23.91	
	-	24237	.3150	8.00	8.0	65	22	0.8	27.50	26.30	25.11	23.91	
	-	24247	.3150	8.00	8.0	65	22	1.0	27.50	26.30	25.11	23.91	
	-	24257	.3150	8.00	8.0	65	22	1.5	27.50	26.30	25.11	23.91	
	-	24267	.3150	8.00	8.0	65	22	2.0	27.50	26.30	25.11	23.91	
	-	24277	.3150	8.00	8.0	65	22	2.5	27.50	26.30	25.11	23.91	
	-	24287	.3150	8.00	8.0	65	22	3.0	27.50	26.30	25.11	23.91	
	-	80227	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.010"	30.95	29.61	28.26	26.92
	79237	80237	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.015"	30.95	29.61	28.26	26.92
	79247	80247	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.020"	30.95	29.61	28.26	26.92
	79257	80257	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.030"	30.95	29.61	28.26	26.92
	79267	80267	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.045"	30.95	29.61	28.26	26.92
	79277	80277	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	.060"	30.95	29.61	28.26	26.92
	-	24297	.3937	10.00	10.0	70	25	0.5	37.38	35.76	34.12	32.50	
	-	24307	.3937	10.00	10.0	70	25	0.8	37.38	35.76	34.12	32.50	
	-	24317	.3937	10.00	10.0	70	25	1.0	37.38	35.76	34.12	32.50	
	-	24327	.3937	10.00	10.0	70	25	1.5	37.38	35.76	34.12	32.50	
	-	24337	.3937	10.00	10.0	70	25	2.0	37.38	35.76	34.12	32.50	
	-	24347	.3937	10.00	10.0	70	25	2.5	37.38	35.76	34.12	32.50	
	NEW	-	24357	.3937	10.00	10.0	70	25	3.0	37.38	35.76	34.12	32.50
-		24367	.3937	10.00	10.0	70	25	3.2	37.38	35.76	34.12	32.50	
-		24377	.4724	12.00	12.0	75	25	0.5	55.05	52.66	50.26	47.87	
-		24387	.4724	12.00	12.0	75	25	0.8	55.05	52.66	50.26	47.87	
-		24397	.4724	12.00	12.0	75	25	1.0	55.05	52.66	50.26	47.87	
-		24407	.4724	12.00	12.0	75	25	1.5	55.05	52.66	50.26	47.87	
-		24417	.4724	12.00	12.0	75	25	2.0	55.05	52.66	50.26	47.87	
-		24427	.4724	12.00	12.0	75	25	2.5	55.05	52.66	50.26	47.87	
-		24437	.4724	12.00	12.0	75	25	3.0	55.05	52.66	50.26	47.87	
-		24447	.4724	12.00	12.0	75	25	3.2	55.05	52.66	50.26	47.87	
-		80297	.5000	1/2"	12.70	1/2"	3"	1"	.010"	52.80	50.50	48.21	45.92
79307		80307	.5000	1/2"	12.70	1/2"	3"	1"	.015"	52.80	50.50	48.21	45.92
79317		80317	.5000	1/2"	12.70	1/2"	3"	1"	.020"	52.80	50.50	48.21	45.92
79327		80327	.5000	1/2"	12.70	1/2"	3"	1"	.030"	52.80	50.50	48.21	45.92
79337		80337	.5000	1/2"	12.70	1/2"	3"	1"	.045"	52.80	50.50	48.21	45.92
79347		80347	.5000	1/2"	12.70	1/2"	3"	1"	.060"	52.80	50.50	48.21	45.92
79357		80357	.5000	1/2"	12.70	1/2"	3"	1"	.090"	52.80	50.50	48.21	45.92
79367		80367	.5000	1/2"	12.70	1/2"	3"	1"	.125"	52.80	50.50	48.21	45.92
79377		80377	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.015"	84.08	80.42	76.77	73.11
79387		80387	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.020"	84.08	80.42	76.77	73.11
79397	80397	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.030"	84.08	80.42	76.77	73.11	
79407	80407	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.045"	84.08	80.42	76.77	73.11	
79417	80417	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.060"	84.08	80.42	76.77	73.11	
79427	80427	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	.090"	84.08	80.42	76.77	73.11	
-	24457	.6299	16.00	16.0	88	38	0.5	87.73	83.92	80.10	76.29		
-	24467	.6299	16.00	16.0	88	38	1.0	87.73	83.92	80.10	76.29		
-	24477	.6299	16.00	16.0	88	38	2.0	87.73	83.92	80.10	76.29		
-	24487	.6299	16.00	16.0	88	38	2.5	87.73	83.92	80.10	76.29		
-	24497	.6299	16.00	16.0	88	38	3.0	87.73	83.92	80.10	76.29		
-	24507	.6299	16.00	16.0	88	38	4.0	87.73	83.92	80.10	76.29		
-	24517	.6299	16.00	16.0	88	38	5.0	87.73	83.92	80.10	76.29		
79447	80447	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.015"	120.57	115.33	110.08	104.84	
79457	80457	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.020"	120.57	115.33	110.08	104.84	
79467	80467	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.030"	120.57	115.33	110.08	104.84	
79477	80477	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.045"	120.57	115.33	110.08	104.84	
79487	80487	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.060"	120.57	115.33	110.08	104.84	
79497	80497	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.090"	120.57	115.33	110.08	104.84	
79507	80507	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.125"	120.57	115.33	110.08	104.84	
NEW	79637	80637	.7500	3/4"	19.05	3/4"	4"	1-1/2"	.250"	120.57	115.33	110.08	104.84

220RA - 2 Flute (continued) 230RA (830RA metric) - 4 Flute (continued)

.7874" - 1.000"
(20.00mm - 25.40mm)

END MILLS

2 Flute EDP#	4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
		Decimal	Metric								
-	24527	.7874	20.00	20.0	100	38	0.5	170.63	163.22	155.79	148.38
-	24537	.7874	20.00	20.0	100	38	1.0	170.63	163.22	155.79	148.38
-	24547	.7874	20.00	20.0	100	38	2.0	170.63	163.22	155.79	148.38
-	24557	.7874	20.00	20.0	100	38	3.0	170.63	163.22	155.79	148.38
-	24567	.7874	20.00	20.0	100	38	5.0	170.63	163.22	155.79	148.38
79517	80517	1.000	1"	25.40	1"	4"	1-1/2"	205.85	196.89	187.95	178.99
79527	80527	1.000	1"	25.40	1"	4"	1-1/2"	205.85	196.89	187.95	178.99
79537	80537	1.000	1"	25.40	1"	4"	1-1/2"	205.85	196.89	187.95	178.99
79547	80547	1.000	1"	25.40	1"	4"	1-1/2"	205.85	196.89	187.95	178.99
79557	80557	1.000	1"	25.40	1"	4"	1-1/2"	205.85	196.89	187.95	178.99
79567	80567	1.000	1"	25.40	1"	4"	1-1/2"	205.85	196.89	187.95	178.99
79577	80577	1.000	1"	25.40	1"	4"	1-1/2"	205.85	196.89	187.95	178.99
NEW 79647	80647	1.000	1"	25.40	1"	4"	1-1/2"	205.85	196.89	187.95	178.99



320M (920M metric) - 2 Flute
323M (923M metric) - 3 Flute
330M (930M metric) - 4 Flute
 .0100" - .2656"
 (0.25mm - 6.75mm)

Technical information:
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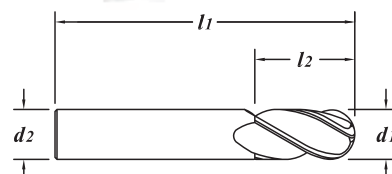


TOLERANCES

d_1	$\leq .030"$	$+0.004" - .0004" (+0.100 - .0100\text{mm})$
	$\geq 1/32"$	$+0.000" - .002" (+0.000 - .050\text{mm})$
d_2	3mm - 6mm	$+0.000" - .0003" (+0.000 - .0075\text{mm})$
	1/4" - 1"	$-0.001" - .0004" (-.0025 - .0100\text{mm})$
Ball radius	$+0.000" - .001" (+0.000 - .025\text{mm})$	

Standard Length - Ball End

Solid submicron grain carbide end mill - center cutting
 Extremely versatile
 TiN Coated - page 140
 TiCN Coated - page 141
 TiALN Coated - page 142



2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal		Metric							
16550	-	-	.0100	.0100"	0.25	1/8"	1-1/2"	.030"	18.89	18.06	17.24	16.42
16600	-	-	.0150	.0150"	0.38	1/8"	1-1/2"	.045"	18.80	17.98	17.17	16.35
16650	-	-	.0200	.0200"	0.51	1/8"	1-1/2"	.060"	18.30	17.50	16.71	15.91
16700	-	-	.0250	.0250"	0.64	1/8"	1-1/2"	.075"	17.69	16.92	16.15	15.38
16750	-	-	.0300	.0300"	0.76	1/8"	1-1/2"	.090"	15.24	14.57	13.92	13.25
16010	17010	18010	.0312	1/32"	0.79	1/8"	1-1/2"	3/32"	11.30	10.82	10.32	9.83
47010	38010	48010	.0394		1.00	3.0	38	4	11.87	11.35	10.84	10.32
16020	17020	18020	.0469	3/64"	1.19	1/8"	1-1/2"	1/8"	11.30	10.82	10.32	9.83
47020	38020	48020	.0591		1.50	3.0	38	6	11.87	11.35	10.84	10.32
16030	17030	18030	.0625	1/16"	1.59	1/8"	1-1/2"	1/4"	10.67	10.20	9.74	9.28
16040	17040	18040	.0781	5/64"	1.98	1/8"	1-1/2"	1/4"	10.67	10.20	9.74	9.28
47030	38030	48030	.0787		2.00	3.0	38	8	11.19	10.70	10.21	9.73
16050	17050	18050	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	10.20	9.76	9.32	8.87
47040	38040	48040	.0984		2.50	3.0	38	12	10.71	10.24	9.78	9.32
16060	17060	18060	.1094	7/64"	2.78	1/8"	1-1/2"	3/8"	10.20	9.76	9.32	8.87
47050	38050	48050	.1181		3.00	3.0	38	12	9.72	9.30	8.88	8.46
16070	17070	18070	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	9.26	8.85	8.46	8.05
47060	38060	48060	.1378		3.50	4.0	50	12	14.29	13.67	13.05	12.43
16080	17080	18080	.1406	9/64"	3.57	3/16"	2"	9/16"	13.58	12.99	12.40	11.81
16090	17090	18090	.1562	5/32"	3.97	3/16"	2"	9/16"	13.58	12.99	12.40	11.81
47070	38070	48070	.1575		4.00	4.0	50	14	12.81	12.25	11.70	11.14
16100	17100	18100	.1719	11/64"	4.37	3/16"	2"	9/16"	13.58	12.99	12.40	11.81
47080	38080	48080	.1772		4.50	5.0	50	14	16.12	15.42	14.72	14.02
16110	17110	18110	.1875	3/16"	4.76	3/16"	2"	5/8"	12.20	11.67	11.14	10.61
47090	38090	48090	.1969		5.00	5.0	65	16	15.53	14.85	14.18	13.50
16120	17120	18120	.2031	13/64"	5.16	1/4"	2-1/2"	5/8"	15.80	15.11	14.42	13.74
16130	17130	18130	.2188	7/32"	5.56	1/4"	2-1/2"	5/8"	15.80	15.11	14.42	13.74
16140	17140	18140	.2344	15/64"	5.95	1/4"	2-1/2"	3/4"	15.80	15.11	14.42	13.74
47100	38100	48100	.2362		6.00	6.0	65	19	15.92	15.23	14.54	13.84
16150	17150	18150	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	15.14	14.49	13.82	13.17
16160	17160	18160	.2656	17/64"	6.75	5/16"	2-1/2"	7/8"	23.71	22.68	21.65	20.62

320M (920M metric) - 2 Flute (continued)
323M (923M metric) - 3 Flute (continued)
330M (930M metric) - 4 Flute (continued)
.2756" - 1.000"
(7.00mm - 25.40mm)

END MILLS

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal	Diameter Metric							
47110	38110	48110	.2756	7.00	7.0	65	22	20.44	19.55	18.66	17.77
16170	17170	18170	.2812	9/32"	7.14	5/16"	2-1/2"	7/8"	23.71	22.68	21.65
16180	17180	18180	.2969	19/64"	7.54	5/16"	2-1/2"	7/8"	23.71	22.68	21.65
16190	17190	18190	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	19.87	19.01	18.15
47120	38120	48120	.3150	8.00	8.0	65	22	20.89	19.99	19.07	18.17
16200	17200	18200	.3281	21/64"	8.33	3/8"	2-1/2"	7/8"	28.39	27.15	25.93
16210	17210	18210	.3438	11/32"	8.73	3/8"	2-1/2"	7/8"	28.39	27.15	25.93
47130	38130	48130	.3543	9.00	9.0	65	22	25.54	24.43	23.32	22.21
16220	17220	18220	.3594	23/64"	9.13	3/8"	2-1/2"	7/8"	28.39	27.15	25.93
16230	17230	18230	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	24.32	23.25	22.20
16240	17240	18240	.3906	25/64"	9.92	7/16"	2-3/4"	7/8"	34.92	33.40	31.89
47140	38140	48140	.3937	10.00	10.0	70	25	29.85	28.55	27.25	25.96
16250	17250	18250	.4062	13/32"	10.32	7/16"	2-3/4"	7/8"	34.92	33.40	31.89
16260	17260	18260	.4219	27/64"	10.72	7/16"	2-3/4"	7/8"	34.92	33.40	31.89
47150	38150	48150	.4331	11.00	11.0	75	25	31.42	30.06	28.68	27.32
16270	17270	18270	.4375	7/16"	11.11	7/16"	2-3/4"	1"	29.92	28.62	27.32
16280	17280	18280	.4531	29/64"	11.51	1/2"	3"	1"	50.04	47.87	45.70
16290	17290	18290	.4688	15/32"	11.91	1/2"	3"	1"	50.04	47.87	45.70
47160	38160	48160	.4724	12.00	12.0	75	25	47.53	45.46	43.40	41.33
16300	17300	18300	.4844	31/64"	12.30	1/2"	3"	1"	50.04	47.87	45.70
16310	17310	18310	.5000	1/2"	12.70	1/2"	3"	1"	45.27	43.31	41.33
47170	38170	48170	.5512	14.00	14.0	88	32	69.20	66.20	63.18	60.17
16320	17320	18320	.5625	9/16"	14.29	9/16"	3-1/2"	1-1/4"	65.92	63.04	60.18
16330	17330	18330	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	73.20	70.01	66.83
47180	38180	48180	.6299	16.00	16.0	88	38	76.85	73.51	70.16	66.82
16340	17340	18340	.6875	11/16"	17.46	3/4"	4"	1-1/2"	121.85	116.55	111.25
47190	38190	48190	.7087	18.00	18.0	100	38	113.09	108.17	103.25	98.34
16350	17350	18350	.7500	3/4"	19.05	3/4"	4"	1-1/2"	107.72	103.04	98.35
47200	38200	48200	.7874	20.00	20.0	100	38	151.65	145.06	138.47	131.87
47210	38210	48210	.8661	22.00	22.0	100	38	168.47	161.15	153.82	146.49
16360	17360	18360	.8750	7/8"	22.22	7/8"	4"	1-1/2"	172.57	165.07	157.56
47220	38220	48220	.9843	25.00	25.0	100	38	176.59	168.92	161.23	153.56
16370	17370	18370	1.000	1"	25.40	1"	4"	1-1/2"	186.85	178.72	170.60

320MT - 2 Flute

330MT - 4 Flute

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TOLERANCES

d_1	+.000" - .002" (+.000 - .050mm)	
d_2	1/8" - 3/16"	+.0000" - .0003" (-.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)
Ball radius	+.000" - .001" (+.000 - .025mm)	

Standard Length - Ball End - TiN Coated

Solid submicron grain carbide end mill - center cutting

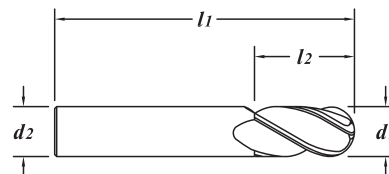
Improved lubricity - 10% faster than uncoated

Extremely versatile

Uncoated - page 138

TiCN Coated - page 141

TiALN Coated - page 142



2 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric							
16073	18073	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	10.51	10.06	9.60	9.14
16113	18113	.1875	3/16"	4.76	3/16"	2"	5/8"	13.47	12.89	12.29	11.71
16153	18153	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	17.70	16.93	16.16	15.39
16193	18193	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	23.30	22.29	21.27	20.26
16233	18233	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	27.75	26.54	25.33	24.13
16273	18273	.4375	7/16"	11.11	7/16"	2-3/4"	1"	34.07	32.59	31.11	29.63
16313	18313	.5000	1/2"	12.70	1/2"	3"	1"	49.42	47.27	45.13	42.97
16333	18333	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	79.58	76.12	72.66	69.20
16353	18353	.7500	3/4"	19.05	3/4"	4"	1-1/2"	115.02	110.02	105.02	100.02
16373	18373	1.000	1"	25.40	1"	4"	1-1/2"	199.63	190.94	182.27	173.59

320MC - 2 Flute
323MC - 3 Flute
330MC - 4 Flute

Technical information: page 192, 194

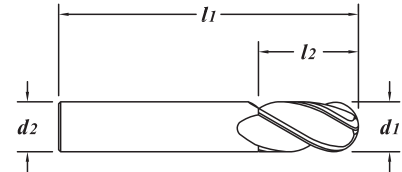


TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$1/8" - 3/16" \quad +.0000" - .0003" (-.0000 - .0075\text{mm})$
	$1/4" - 1" \quad -.0001" - .0004" (-.0025 - .0100\text{mm})$
Ball radius	$+0.000" - .001" (+.000 - .025\text{mm})$

Standard Length - Ball End - TiCN Coated

Solid submicron grain carbide end mill - center cutting
 Improved abrasion resistance and lubricity
 Up to 25% faster than uncoated
 Extremely versatile
 Uncoated - page 138
 TiN Coated - page 140
 TiAlN Coated - page 142



END MILLS

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal		Metric							
16014	17014	18014	.0312	1/32"	0.79	1/8"	1-1/2"	3/32"	13.19	12.62	12.04	11.47
16024	17024	18024	.0469	3/64"	1.19	1/8"	1-1/2"	1/8"	13.19	12.62	12.04	11.47
16034	17034	18034	.0625	1/16"	1.59	1/8"	1-1/2"	1/4"	12.56	12.01	11.47	10.92
16044	17044	18044	.0781	5/64"	1.98	1/8"	1-1/2"	1/4"	12.56	12.01	11.47	10.92
16054	17054	18054	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	12.10	11.56	11.04	10.51
16064	17064	18064	.1094	7/64"	2.78	1/8"	1-1/2"	3/8"	12.10	11.56	11.04	10.51
16074	17074	18074	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	11.15	10.66	10.18	9.69
16084	17084	18084	.1406	9/64"	3.57	3/16"	2"	9/16"	15.49	14.81	14.14	13.47
16094	17094	18094	.1562	5/32"	3.97	3/16"	2"	9/16"	15.49	14.81	14.14	13.47
16104	17104	18104	.1719	11/64"	4.37	3/16"	2"	9/16"	15.49	14.81	14.14	13.47
16114	17114	18114	.1875	3/16"	4.76	3/16"	2"	5/8"	14.09	13.48	12.86	12.25
16124	17124	18124	.2031	13/64"	5.16	1/4"	2-1/2"	5/8"	19.62	18.77	17.92	17.07
16134	17134	18134	.2188	7/32"	5.56	1/4"	2-1/2"	5/8"	19.62	18.77	17.92	17.07
16144	17144	18144	.2344	15/64"	5.95	1/4"	2-1/2"	3/4"	19.62	18.77	17.92	17.07
16154	17154	18154	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	18.98	18.16	17.33	16.50
16164	17164	18164	.2656	17/64"	6.75	5/16"	2-1/2"	7/8"	28.85	27.59	26.34	25.08
16174	17174	18174	.2812	9/32"	7.14	5/16"	2-1/2"	7/8"	28.85	27.59	26.34	25.08
16184	17184	18184	.2969	19/64"	7.54	5/16"	2-1/2"	7/8"	28.85	27.59	26.34	25.08
16194	17194	18194	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	25.02	23.93	22.85	21.76
16204	17204	18204	.3281	21/64"	8.33	3/8"	2-1/2"	7/8"	33.52	32.06	30.61	29.15
16214	17214	18214	.3438	11/32"	8.73	3/8"	2-1/2"	7/8"	33.52	32.06	30.61	29.15
16224	17224	18224	.3594	23/64"	9.13	3/8"	2-1/2"	7/8"	33.52	32.06	30.61	29.15
16234	17234	18234	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	29.44	28.16	26.88	25.60
16244	17244	18244	.3906	25/64"	9.92	7/16"	2-3/4"	7/8"	41.07	39.28	37.50	35.71
16254	17254	18254	.4062	13/32"	10.32	7/16"	2-3/4"	7/8"	41.07	39.28	37.50	35.71
16264	17264	18264	.4219	27/64"	10.72	7/16"	2-3/4"	7/8"	41.07	39.28	37.50	35.71
16274	17274	18274	.4375	7/16"	11.11	7/16"	2-3/4"	1"	36.07	34.50	32.93	31.37
16284	17284	18284	.4531	29/64"	11.51	1/2"	3"	1"	56.20	53.76	51.31	48.87
16294	17294	18294	.4688	15/32"	11.91	1/2"	3"	1"	56.20	53.76	51.31	48.87
16304	17304	18304	.4844	31/64"	12.30	1/2"	3"	1"	56.20	53.76	51.31	48.87
16314	17314	18314	.5000	1/2"	12.70	1/2"	3"	1"	51.43	49.19	46.96	44.72
16324	17324	18324	.5625	9/16"	14.29	9/16"	3-1/2"	1-1/4"	75.49	72.21	68.93	65.64
16334	17334	18334	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	82.78	79.19	75.59	71.99
16344	17344	18344	.6875	11/16"	17.46	3/4"	4"	1-1/2"	132.81	127.04	121.26	115.48
16354	17354	18354	.7500	3/4"	19.05	3/4"	4"	1-1/2"	118.67	113.52	108.36	103.20
16364	17364	18364	.8750	7/8"	22.22	7/8"	4"	1-1/2"	189.04	180.82	172.60	164.38
16374	17374	18374	1.000	1"	25.40	1"	4"	1-1/2"	203.32	194.48	185.64	176.80

320MA (920MA metric) - 2 Flute
323MA (923MA metric) - 3 Flute
330MA (930MA metric) - 4 Flute
 .0312" - .3150"
 (0.79mm - 8.00mm)

Technical information:
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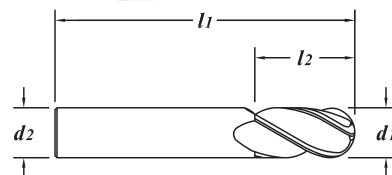


TOLERANCES

d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (-.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
Ball radius	+.000" -.001" (+.000 -.025mm)	

Standard Length - Ball End - TiALN Coated

Solid submicron grain carbide end mill - center cutting
 Dry or semi-dry machining
 Up to 40% faster than uncoated
 Extremely versatile
 Uncoated - page 138
 TiN Coated - page 140
 TiCN Coated - page 141



2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal	Diameter	Metric							
16017	17017	18017	.0312	1/32"	0.79	1/8"	1-1/2"	3/32"	13.45	12.86	12.28	11.69
47017	38017	48017	.0394		1.00	3.0	38	4	14.01	13.40	12.79	12.18
16027	17027	18027	.0469	3/64"	1.19	1/8"	1-1/2"	1/8"	13.45	12.86	12.28	11.69
47027	38027	48027	.0591		1.50	3.0	38	6	14.01	13.40	12.79	12.18
16037	17037	18037	.0625	1/16"	1.59	1/8"	1-1/2"	1/4"	12.81	12.25	11.70	11.14
16047	17047	18047	.0781	5/64"	1.98	1/8"	1-1/2"	1/4"	12.81	12.25	11.70	11.14
47037	38037	48037	.0787		2.00	3.0	38	8	13.33	12.75	12.18	11.60
16057	17057	18057	.0938	3/32"	2.38	1/8"	1-1/2"	3/8"	12.34	11.80	11.27	10.73
47047	38047	48047	.0984		2.50	3.0	38	12	12.85	12.29	11.74	11.18
16067	17067	18067	.1094	7/64"	2.78	1/8"	1-1/2"	3/8"	12.34	11.80	11.27	10.73
47057	38057	48057	.1181		3.00	3.0	38	12	11.87	11.35	10.84	10.32
16077	17077	18077	.1250	1/8"	3.17	1/8"	1-1/2"	1/2"	11.40	10.90	10.41	9.91
47067	38067	48067	.1378		3.50	4.0	50	12	16.42	15.70	15.00	14.28
16087	17087	18087	.1406	9/64"	3.57	3/16"	2"	9/16"	15.74	15.05	14.36	13.69
16097	17097	18097	.1562	5/32"	3.97	3/16"	2"	9/16"	15.74	15.05	14.36	13.69
47077	38077	48077	.1575		4.00	4.0	50	14	14.96	14.30	13.66	13.00
16107	17107	18107	.1719	11/64"	4.37	3/16"	2"	9/16"	15.74	15.05	14.36	13.69
47087	38087	48087	.1772		4.50	5.0	50	14	19.47	18.63	17.77	16.93
16117	17117	18117	.1875	3/16"	4.76	3/16"	2"	5/8"	14.34	13.72	13.09	12.47
47097	38097	48097	.1969		5.00	5.0	65	16	19.95	19.08	18.21	17.35
16127	17127	18127	.2031	13/64"	5.16	1/4"	2-1/2"	5/8"	20.23	19.34	18.47	17.59
16137	17137	18137	.2188	7/32"	5.56	1/4"	2-1/2"	5/8"	20.23	19.34	18.47	17.59
16147	17147	18147	.2344	15/64"	5.95	1/4"	2-1/2"	3/4"	20.23	19.34	18.47	17.59
47107	38107	48107	.2362		6.00	6.0	65	19	20.34	19.46	18.57	17.69
16157	17157	18157	.2500	1/4"	6.35	1/4"	2-1/2"	3/4"	19.56	18.71	17.86	17.01
16167	17167	18167	.2656	17/64"	6.75	5/16"	2-1/2"	7/8"	30.35	29.03	27.71	26.38
47117	38117	48117	.2756		7.00	7.0	65	22	27.04	25.86	24.69	23.51
16177	17177	18177	.2812	9/32"	7.14	5/16"	2-1/2"	7/8"	30.35	29.03	27.71	26.38
16187	17187	18187	.2969	19/64"	7.54	5/16"	2-1/2"	7/8"	30.35	29.03	27.71	26.38
16197	17197	18197	.3125	5/16"	7.94	5/16"	2-1/2"	7/8"	26.50	25.34	24.19	23.05
47127	38127	48127	.3150		8.00	8.0	65	22	27.50	26.30	25.11	23.91

320MA (920MA metric) - 2 Flute (continued)
323MA (923MA metric) - 3 Flute (continued)
330MA (930MA metric) - 4 Flute (continued)
.3281" - 1.000"
(8.33mm - 25.40mm)

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal	Diameter	Metric							
16207	17207	18207	.3281	21/64"	8.33	3/8"	2-1/2"	7/8"	35.02	33.50	31.97	30.45
16217	17217	18217	.3438	11/32"	8.73	3/8"	2-1/2"	7/8"	35.02	33.50	31.97	30.45
47137	38137	48137	.3543		9.00	9.0	65	22	32.15	30.75	29.35	27.96
16227	17227	18227	.3594	23/64"	9.13	3/8"	2-1/2"	7/8"	35.02	33.50	31.97	30.45
16237	17237	18237	.3750	3/8"	9.52	3/8"	2-1/2"	7/8"	30.95	29.61	28.26	26.92
16247	17247	18247	.3906	25/64"	9.92	7/16"	2-3/4"	7/8"	42.44	40.60	38.75	36.91
47147	38147	48147	.3937		10.00	10.0	70	25	37.38	35.76	34.12	32.50
16257	17257	18257	.4062	13/32"	10.32	7/16"	2-3/4"	7/8"	42.44	40.60	38.75	36.91
16267	17267	18267	.4219	27/64"	10.72	7/16"	2-3/4"	7/8"	42.44	40.60	38.75	36.91
47157	38157	48157	.4331		11.00	11.0	75	25	38.94	37.24	35.55	33.86
16277	17277	18277	.4375	7/16"	11.11	7/16"	2-3/4"	1"	37.45	35.82	34.20	32.56
16287	17287	18287	.4531	29/64"	11.51	1/2"	3"	1"	57.57	55.07	52.57	50.07
16297	17297	18297	.4688	15/32"	11.91	1/2"	3"	1"	57.57	55.07	52.57	50.07
47167	38167	48167	.4724		12.00	12.0	75	25	55.05	52.66	50.26	47.87
16307	17307	18307	.4844	31/64"	12.30	1/2"	3"	1"	57.57	55.07	52.57	50.07
16317	17317	18317	.5000	1/2"	12.70	1/2"	3"	1"	52.80	50.50	48.21	45.92
47177	38177	48177	.5512		14.00	14.0	88	32	80.08	76.60	73.11	69.64
16327	17327	18327	.5625	9/16"	14.29	9/16"	3-1/2"	1-1/4"	76.78	73.44	70.11	66.77
16337	17337	18337	.6250	5/8"	15.87	5/8"	3-1/2"	1-1/4"	84.08	80.42	76.77	73.11
47187	38187	48187	.6299		16.00	16.0	88	38	87.73	83.92	80.10	76.29
16347	17347	18347	.6875	11/16"	17.46	3/4"	4"	1-1/2"	134.69	128.84	122.98	117.12
47197	38197	48197	.7087		18.00	18.0	100	38	125.95	120.47	115.00	109.52
16357	17357	18357	.7500	3/4"	19.05	3/4"	4"	1-1/2"	120.57	115.33	110.08	104.84
47207	38207	48207	.7874		20.00	20.0	100	38	170.63	163.22	155.79	148.38
47217	38217	48217	.8661		22.00	22.0	100	38	187.45	179.30	171.15	163.00
16367	17367	18367	.8750	7/8"	22.22	7/8"	4"	1-1/2"	191.55	183.22	174.89	166.57
47227	38227	48227	.9843		25.00	25.0	100	38	195.57	187.06	178.57	170.06
16377	17377	18377	1.000	1"	25.40	1"	4"	1-1/2"	205.85	196.89	187.95	178.99

222M - 2 Flute - Square End
234M - 4 Flute - Square End
322M - 2 Flute - Ball End
334M - 4 Flute - Ball End

Technical information:
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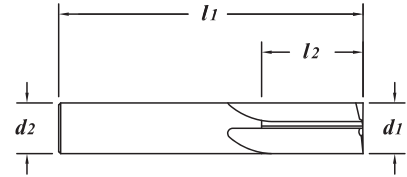


TOLERANCES

d_1	+0.000" -0.002" (+0.000 -0.050mm)	
d_2	1/8" - 3/16"	+0.0000" -0.0003" (-0.0000 -0.0075mm)
	1/4" - 1"	-0.0001" -0.0004" (-0.0025 -0.0100mm)
Ball radius	+0.000" -0.001" (+0.000 -0.025mm)	

Standard Length - Straight Flute

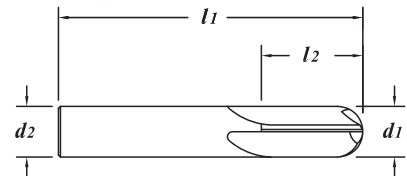
Solid submicron grain carbide end mill - center cutting
For cutting high Rc materials
Helps to hold perpendicularity



222M EDP#	234M EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter Metric							
81070	82070	.1250	1/8"	3.17	1/8"	1-1/2"	8.02	7.66	7.32	6.97
81110	82110	.1875	3/16"	4.76	3/16"	2"	11.24	10.75	10.26	9.78
81150	82150	.2500	1/4"	6.35	1/4"	2-1/2"	13.56	12.97	12.39	11.79
81190	82190	.3125	5/16"	7.94	5/16"	2-1/2"	19.00	18.18	17.35	16.53
81230	82230	.3750	3/8"	9.52	3/8"	2-1/2"	23.69	22.66	21.63	20.60
81270	82270	.4375	7/16"	11.11	7/16"	2-3/4"	28.89	27.63	26.37	25.13
81310	82310	.5000	1/2"	12.70	1/2"	3"	37.90	36.25	34.60	32.96
81330	82330	.6250	5/8"	15.87	5/8"	3-1/2"	73.16	69.98	66.80	63.62
81350	82350	.7500	3/4"	19.05	3/4"	4"	107.26	102.60	97.93	93.27
81370	82370	1.000	1"	25.04	1"	4"	176.48	168.80	161.13	153.46

Standard Length - Straight Flute - Ball End

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



322M EDP#	334M EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter Metric							
83070	84070	.1250	1/8"	3.17	1/8"	1-1/2"	10.28	9.83	9.38	8.93
83110	84110	.1875	3/16"	4.76	3/16"	2"	13.56	12.97	12.39	11.79
83150	84150	.2500	1/4"	6.35	1/4"	2-1/2"	16.82	16.09	15.35	14.62
83190	84190	.3125	5/16"	7.94	5/16"	2-1/2"	22.08	21.12	20.16	19.20
83230	84230	.3750	3/8"	9.52	3/8"	2-1/2"	27.02	25.84	24.67	23.49
83270	84270	.4375	7/16"	11.11	7/16"	2-3/4"	33.26	31.81	30.37	28.92
83310	84310	.5000	1/2"	12.70	1/2"	3"	50.30	48.12	45.93	43.74
83330	84330	.6250	5/8"	15.87	5/8"	3-1/2"	81.34	77.80	74.27	70.73
83350	84350	.7500	3/4"	19.05	3/4"	4"	119.69	114.49	109.28	104.08
83370	84370	1.000	1"	25.04	1"	4"	207.60	198.58	189.55	180.52

273M - 3 Flute - Square end 373M - 3 Flute - Ball end

Technical information:
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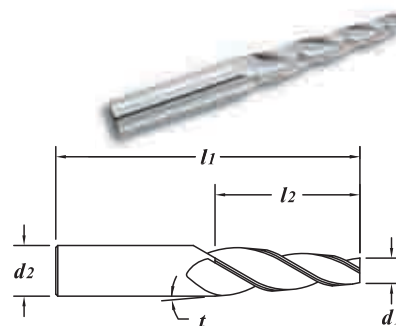


TOLERANCES

d_1	$+0.003" -0.000" (+0.075 -0.000\text{mm})$
d_2	$-0.001" -0.004" (-0.025 -0.100\text{mm})$
r	$+0.003" -0.000" (+0.075 -0.000\text{mm})$

Standard Length - Tapered

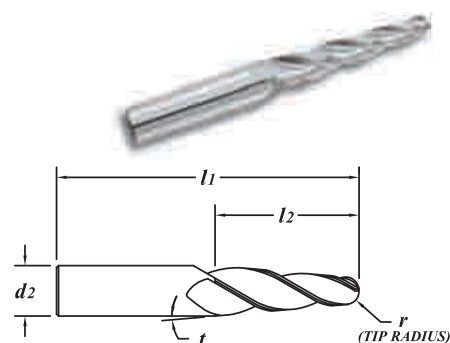
Solid submicron grain carbide end mill - center cutting
Excellent for holding draft angles in mold and die applications



273M EDP#	d_2 Shank Diameter	t Taper Per Side	d_1 † Tip Diameter		l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
			Decimal	Metric							
49010	1/4"	1°	.1250	1/8"	3.17	3"	1-1/2"	26.29	25.15	24.00	22.86
49020	1/4"	1° 30'	.1250	1/8"	3.17	3"	1-1/2"	26.29	25.15	24.00	22.86
49030	1/4"	2°	.1250	1/8"	3.17	3"	1"	26.29	25.15	24.00	22.86
49040	1/4"	3°	.1250	1/8"	3.17	3"	1"	26.29	25.15	24.00	22.86
49050	1/4"	5°	.1250	1/8"	3.17	3"	3/4"	26.29	25.15	24.00	22.86
49060	1/4"	7°	.1250	1/8"	3.17	3"	1/2"	26.29	25.15	24.00	22.86
49070	3/8"	1°	.1875	3/16"	4.76	3-1/2"	1-3/4"	39.48	37.76	36.05	34.33
49080	3/8"	1° 30'	.1875	3/16"	4.76	3-1/2"	1-3/4"	39.48	37.76	36.05	34.33
49090	3/8"	2°	.1875	3/16"	4.76	3-1/2"	1-3/4"	39.48	37.76	36.05	34.33
49100	3/8"	3°	.1562	5/32"	3.97	3-1/2"	1-3/4"	39.48	37.76	36.05	34.33
49110	3/8"	5°	.1250	1/8"	3.17	3-1/2"	1-1/2"	39.48	37.76	36.05	34.33
49120	3/8"	7°	.1562	5/32"	3.97	3-1/2"	3/4"	39.48	37.76	36.05	34.33
49130	1/2"	3°	.2500	1/4"	6.35	4"	2"	54.38	52.02	49.65	47.29
49140	1/2"	5°	.2500	1/4"	6.35	4"	1-1/4"	54.38	52.02	49.65	47.29
49150	1/2"	7°	.1875	3/16"	4.76	4"	1-1/4"	54.38	52.02	49.65	47.29

Standard Length - Tapered - Ball End

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



373M EDP#	d_2 Shank Diameter	t Taper Per Side	$r^\dagger$ Tip Radius			l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal		Metric						
50010	1/4"	1°	.0620	.062"	1.57	3"	1-1/2"	29.16	27.89	26.62	25.36
50020	1/4"	1° 30'	.0620	.062"	1.57	3"	1-1/2"	29.16	27.89	26.62	25.36
50030	1/4"	2°	.0620	.062"	1.57	3"	1"	29.16	27.89	26.62	25.36
50040	1/4"	3°	.0620	.062"	1.57	3"	1"	29.16	27.89	26.62	25.36
50050	1/4"	5°	.0620	.062"	1.57	3"	3/4"	29.16	27.89	26.62	25.36
50060	1/4"	7°	.0620	.062"	1.57	3"	1/2"	29.16	27.89	26.62	25.36
50070	3/8"	1°	.0930	.093"	2.36	3-1/2"	1-3/4"	43.84	41.93	40.02	38.12
50080	3/8"	1° 30'	.0930	.093"	2.36	3-1/2"	1-3/4"	43.84	41.93	40.02	38.12
50090	3/8"	2°	.0930	.093"	2.36	3-1/2"	1-3/4"	43.84	41.93	40.02	38.12
50100	3/8"	3°	.0780	.078"	1.98	3-1/2"	1-3/4"	43.84	41.93	40.02	38.12
50110	3/8"	5°	.0620	.062"	1.57	3-1/2"	1-1/2"	43.84	41.93	40.02	38.12
50120	3/8"	7°	.0780	.078"	1.98	3-1/2"	3/4"	43.84	41.93	40.02	38.12
50130	1/2"	3°	.1250	.125"	3.18	4"	2"	62.50	59.79	57.06	54.35
50140	1/2"	5°	.1250	.125"	3.18	4"	1-1/4"	62.50	59.79	57.06	54.35
50150	1/2"	7°	.0930	.093"	2.36	4"	1-1/4"	62.50	59.79	57.06	54.35

280M - 2 Flute - Square End
290M - 4 Flute - Square End
380M - 2 Flute - Ball End
390M - 4 Flute - Ball End

Technical information:
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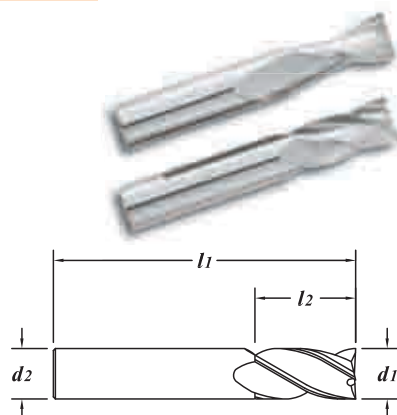


TOLERANCES

d_1	+.001" -.000" (+.025 -.000mm)	
d_2	1/8" - 3/16"	+.0000" -.0003" (-.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
Ball radius	+.000" -.001" (+.000 -.025mm)	

Standard Length - N/C Tolerance

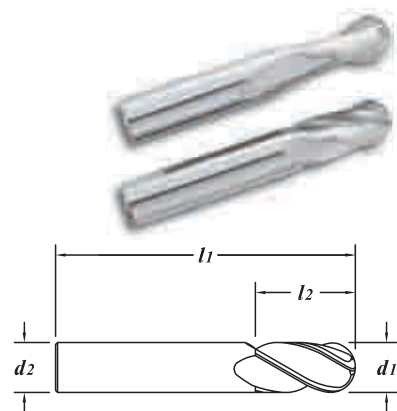
Solid submicron grain carbide end mill - center cutting
 Excellent for keyways
 Tight tolerance for precision machining
 For use when matching tools are necessary



280M EDP#	290M EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter Metric							
25010	26010	.0625	1/16"	1.59	1/8"	1-1/2"	11.74	11.23	10.72	10.21
25020	26020	.0938	3/32"	2.38	1/8"	1-1/2"	11.13	10.64	10.16	9.67
25030	26030	.1250	1/8"	3.17	1/8"	1-1/2"	10.80	10.33	9.86	9.39
25040	26040	.1875	3/16"	4.76	3/16"	2"	14.36	13.74	13.11	12.49
25050	26050	.2500	1/4"	6.35	1/4"	2-1/2"	16.52	15.80	15.08	14.36
25060	26060	.3125	5/16"	7.94	5/16"	2-1/2"	23.65	22.62	21.59	20.56
25070	26070	.3750	* 3/8"	9.53	3/8"	2-1/2"	30.35	29.03	27.71	26.38
25080	26080	.4375	* 7/16"	11.11	7/16"	2-3/4"	37.01	35.40	33.80	32.19
25090	26090	.5000	* 1/2"	12.70	1/2"	3"	48.59	46.48	44.37	42.26
25100	26100	.6250	* 5/8"	15.87	5/8"	3-1/2"	86.52	82.75	79.00	75.23
25110	26110	.7500	* 3/4"	19.05	3/4"	4"	129.38	123.75	118.12	112.50
25120	26120	1.000	* 1"	25.40	1"	4"	219.72	210.16	200.62	191.06

Standard Length - N/C Tolerance - Ball End

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



380M EDP#	390M EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter Metric							
27010	28010	.0625	1/16"	1.59	1/8"	1-1/2"	13.52	12.93	12.34	11.75
27020	28020	.0938	3/32"	2.38	1/8"	1-1/2"	12.81	12.25	11.70	11.14
27030	28030	.1250	1/8"	3.17	1/8"	1-1/2"	12.42	11.88	11.34	10.80
27040	28040	.1875	3/16"	4.76	3/16"	2"	16.52	15.80	15.08	14.36
27050	28050	.2500	1/4"	6.35	1/4"	2-1/2"	19.00	18.18	17.35	16.53
27060	28060	.3125	5/16"	7.94	5/16"	2-1/2"	27.18	25.99	24.81	23.63
27070	28070	.3750	* 3/8"	9.53	3/8"	2-1/2"	34.90	33.38	31.87	30.35
27080	28080	.4375	* 7/16"	11.11	7/16"	2-3/4"	42.56	40.71	38.85	37.00
27090	28090	.5000	* 1/2"	12.70	1/2"	3"	55.90	53.47	51.04	48.61
27100	28100	.6250	* 5/8"	15.87	5/8"	3-1/2"	99.52	95.19	90.86	86.54
27110	28110	.7500	* 3/4"	19.05	3/4"	4"	148.78	142.31	135.84	129.38
27120	28120	1.000	* 1"	25.40	1"	4"	252.68	241.70	230.70	219.72

* - Tools with weldon flats

425M - 2 Flute
435M - 4 Flute
425MA - 2 Flute
435MA - 4 Flute

Technical information:
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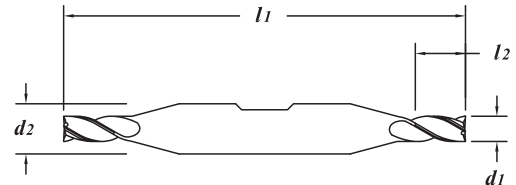


TOLERANCES

d_1	$+0.000" - .002" (+.000 - .050\text{mm})$
d_2	$-.0001" - .0004" (-.0025 - .0100\text{mm})$

Standard Length - Double End - 3/8" Shank

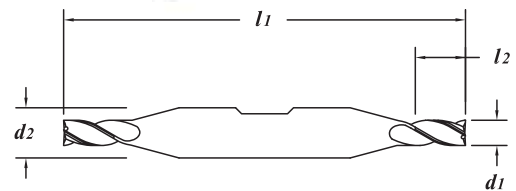
Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel



425M EDP#	435M EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
		Decimal	Metric								
33010	34010	.1250	1/8"	3.17	3/8"	3"	3/8"	31.42	30.06	28.68	27.32
33020	34020	.1562	5/32"	3.97	3/8"	3"	7/16"	31.42	30.06	28.68	27.32
33030	34030	.1875	3/16"	4.76	3/8"	3"	1/2"	31.42	30.06	28.68	27.32
33040	34040	.2188	7/32"	5.56	3/8"	3"	9/16"	31.42	30.06	28.68	27.32
33050	34050	.2500	1/4"	6.35	3/8"	3"	5/8"	31.42	30.06	28.68	27.32
33060	34060	.2812	9/32"	7.14	3/8"	4"	11/16"	36.10	34.53	32.96	31.39
33070	34070	.3125	5/16"	7.94	3/8"	4"	3/4"	36.10	34.53	32.96	31.39
33080	34080	.3438	11/32"	8.73	3/8"	4"	3/4"	36.10	34.53	32.96	31.39
33090	34090	.3750	3/8"	9.52	3/8"	4"	3/4"	36.10	34.53	32.96	31.39

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

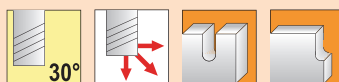
Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel
Dry or semi-dry machining
Up to 40% faster than uncoated



425MA EDP#	435MA EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric							
33017	34017	.1250	1/8"	3.17	3/8"	3"	3/8"	41.36	39.56	37.76	35.96
33027	34027	.1562	5/32"	3.97	3/8"	3"	7/16"	41.36	39.56	37.76	35.96
33037	34037	.1875	3/16"	4.76	3/8"	3"	1/2"	41.36	39.56	37.76	35.96
33047	34047	.2188	7/32"	5.56	3/8"	3"	9/16"	41.36	39.56	37.76	35.96
33057	34057	.2500	1/4"	6.35	3/8"	3"	5/8"	41.36	39.56	37.76	35.96
33067	34067	.2812	9/32"	7.14	3/8"	4"	11/16"	48.70	46.58	44.47	42.35
33077	34077	.3125	5/16"	7.94	3/8"	4"	3/4"	48.70	46.58	44.47	42.35
33087	34087	.3438	11/32"	8.73	3/8"	4"	3/4"	48.70	46.58	44.47	42.35
33097	34097	.3750	3/8"	9.52	3/8"	4"	3/4"	48.70	46.58	44.47	42.35

525M - 2 Flute
535M - 4 Flute
525MA - 2 Flute
535MA - 4 Flute

Technical information: page 192, 194

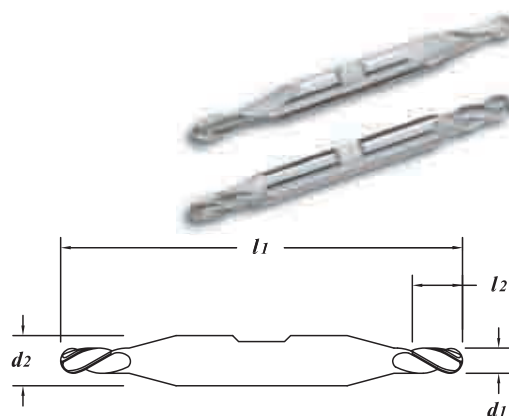


TOLERANCES

d_1	+0.000" -0.002" (+0.000 -0.050mm)
d_2	-0.0001" -0.0004" (-0.0025 -0.0100mm)
Ball radius	+0.000" -0.001" (+0.000 -0.025mm)

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

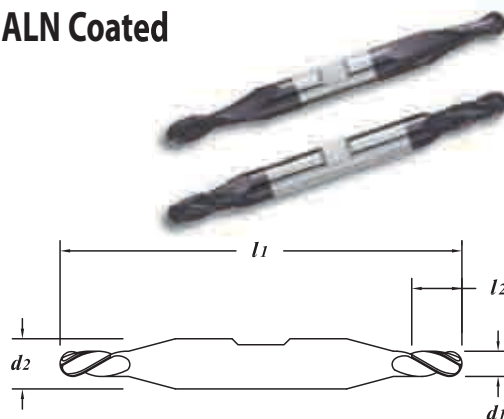
Solid submicron grain carbide end mill - center cutting
 Common 3/8" diameter shank with weldon flat
 For strength and adaptability when converting from high speed steel



525M EDP#	535M EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
		Decimal	Metric								
35010	36010	.1250	1/8"	3.17	3/8"	3"	3/8"	36.96	35.35	33.75	32.14
35020	36020	.1562	5/32"	3.97	3/8"	3"	7/16"	36.96	35.35	33.75	32.14
35030	36030	.1875	3/16"	4.76	3/8"	3"	1/2"	36.96	35.35	33.75	32.14
35040	36040	.2188	7/32"	5.56	3/8"	3"	9/16"	36.96	35.35	33.75	32.14
35050	36050	.2500	1/4"	6.35	3/8"	3"	5/8"	36.96	35.35	33.75	32.14
35060	36060	.2812	9/32"	7.14	3/8"	4"	11/16"	42.46	40.61	38.77	36.92
35070	36070	.3125	5/16"	7.94	3/8"	4"	3/4"	42.46	40.61	38.77	36.92
35080	36080	.3438	11/32"	8.73	3/8"	4"	3/4"	42.46	40.61	38.77	36.92
35090	36090	.3750	3/8"	9.52	3/8"	4"	3/4"	42.46	40.61	38.77	36.92

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

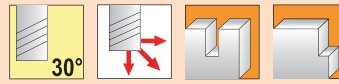
Solid submicron grain carbide end mill - center cutting
 Common 3/8" diameter shank with weldon flat
 For strength and adaptability when converting from high speed steel
 Dry or semi-dry machining
 Up to 40% faster than uncoated



525MA EDP#	535MA EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
		Decimal	Metric								
35017	36017	.1250	1/8"	3.17	3/8"	3"	3/8"	46.88	44.84	42.81	40.77
35027	36027	.1562	5/32"	3.97	3/8"	3"	7/16"	46.88	44.84	42.81	40.77
35037	36037	.1875	3/16"	4.76	3/8"	3"	1/2"	46.88	44.84	42.81	40.77
35047	36047	.2188	7/32"	5.56	3/8"	3"	9/16"	46.88	44.84	42.81	40.77
35057	36057	.2500	1/4"	6.35	3/8"	3"	5/8"	46.88	44.84	42.81	40.77
35067	36067	.2812	9/32"	7.14	3/8"	4"	11/16"	55.08	52.69	50.28	47.89
35077	36077	.3125	5/16"	7.94	3/8"	4"	3/4"	55.08	52.69	50.28	47.89
35087	36087	.3438	11/32"	8.73	3/8"	4"	3/4"	55.08	52.69	50.28	47.89
35097	36097	.3750	3/8"	9.52	3/8"	4"	3/4"	55.08	52.69	50.28	47.89

420M - 2 Flute
430M (450M metric) - 4 Flute

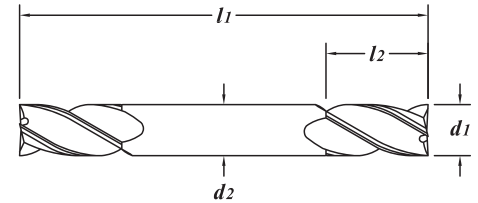
Technical information: page 192, 194



TOLERANCES		
d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (-.0000 -.0075mm)
	1/4" - 1/2"	-.0001" -.0004" (-.0025 -.0100mm)

Standard Length - Double End

Solid submicron grain carbide end mill - center cutting
 Extremely versatile
 TiALN Coated - page 150



2 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric							
29010	30010	.0312	1/32"	0.79	1/8"	2"	3/32"	19.02	18.19	17.37	16.54
-	30510	.0394		1.00	3.0	50	4	20.02	19.15	18.28	17.41
29020	30020	.0469	3/64"	1.19	1/8"	2"	1/8"	19.02	18.19	17.37	16.54
-	30520	.0591		1.50	3.0	50	5	20.02	19.15	18.28	17.41
29030	30030	.0625	1/16"	1.59	1/8"	2"	3/16"	19.02	18.19	17.37	16.54
-	30530	.0787		2.00	3.0	50	6	20.02	19.15	18.28	17.41
29040	30040	.0938	3/32"	2.38	1/8"	2"	1/4"	19.02	18.19	17.37	16.54
-	30540	.0984		2.50	3.0	50	7	20.02	19.15	18.28	17.41
-	30550	.1181		3.00	3.0	50	8	14.46	13.83	13.20	12.57
29050	30050	.1250	1/8"	3.17	1/8"	2"	3/8"	13.74	13.15	12.54	11.95
-	30560	.1378		3.50	4.0	65	9.5	20.66	19.77	18.87	17.97
29060	30060	.1562	5/32"	3.97	3/16"	2-1/2"	7/16"	19.64	18.78	17.93	17.08
-	30570	.1575		4.00	4.0	65	10	17.30	16.55	15.79	15.04
-	30580	.1772		4.50	5.0	65	12	23.03	22.03	21.02	20.02
29070	30070	.1875	3/16"	4.76	3/16"	2-1/2"	1/2"	16.43	15.71	15.01	14.29
-	30590	.1969		5.00	5.0	65	12	20.07	19.20	18.32	17.45
29080	30080	.2188	7/32"	5.56	1/4"	2-1/2"	9/16"	21.87	20.92	19.97	19.02
-	30600	.2362		6.00	6.0	65	16	20.97	20.05	19.15	18.23
29090	30090	.2500	1/4"	6.35	1/4"	2-1/2"	5/8"	19.92	19.05	18.18	17.32
-	30610	.2756		7.00	7.0	88	19	26.34	25.20	24.06	22.91
29100	30100	.3125	5/16"	7.94	5/16"	3-1/2"	3/4"	26.01	24.88	23.75	22.62
-	30620	.3150		8.00	8.0	88	19	27.37	26.19	24.99	23.81
-	30630	.3543		9.00	9.0	88	19	35.37	33.83	32.29	30.75
29110	30110	.3750	3/8"	9.52	3/8"	3-1/2"	3/4"	33.59	32.14	30.67	29.21
-	30640	.3937		10.00	10.0	88	19	47.01	44.96	42.92	40.87
-	30650	.4331		11.00	11.0	100	22	50.24	48.06	45.87	43.69
29120	30120	.4375	7/16"	11.11	7/16"	4"	7/8"	47.74	45.66	43.59	41.51
-	30660	.4724		12.00	12.0	100	25	56.47	54.02	51.56	49.11
29130	30130	.5000	1/2"	12.70	1/2"	4"	1"	53.64	51.31	48.97	46.64

420MA - 2 Flute 430MA (450MA metric) - 4 Flute

Technical information:
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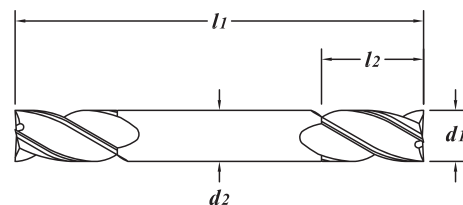


TOLERANCES

d_1	$+0.000^{\circ} - 0.002^{\circ}$ (+.000 -.050mm)
d_2	$+0.000^{\circ} - 0.003^{\circ}$ (+.0000 -.0075mm)
	$-0.001^{\circ} - 0.004^{\circ}$ (-.0025 -.0100mm)

Standard Length - Double End - TiALN Coated

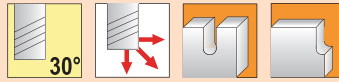
Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Up to 40% faster than uncoated
Extremely versatile
Uncoated - page 149



2 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric							
29017	30017	.0312	1/32"	0.79	1/8"	2"	3/32"	22.25	21.28	20.31	19.34
-	30517	.0394		1.00	3.0	50	4	23.25	22.25	21.24	20.22
29027	30027	.0469	3/64"	1.19	1/8"	2"	1/8"	22.25	21.28	20.31	19.34
-	30527	.0591		1.50	3.0	50	5	23.25	22.25	21.24	20.22
29037	30037	.0625	1/16"	1.59	1/8"	2"	3/16"	22.25	21.28	20.31	19.34
-	30537	.0787		2.00	3.0	50	6	23.25	22.25	21.24	20.22
29047	30047	.0938	3/32"	2.38	1/8"	2"	1/4"	22.25	21.28	20.31	19.34
-	30547	.0984		2.50	3.0	50	7	23.25	22.25	21.24	20.22
-	30557	.1181		3.00	3.0	50	8	17.68	16.91	16.14	15.37
29057	30057	.1250	1/8"	3.17	1/8"	2"	3/8"	16.96	16.22	15.49	14.75
-	30567	.1378		3.50	4.0	65	9.5	25.68	24.56	23.44	22.33
29067	30067	.1562	5/32"	3.97	3/16"	2-1/2"	7/16"	24.65	23.58	22.51	21.43
-	30577	.1575		4.00	4.0	65	10	22.30	21.33	20.36	19.39
-	30587	.1772		4.50	5.0	65	12	29.65	28.36	27.07	25.78
29077	30077	.1875	3/16"	4.76	3/16"	2-1/2"	1/2"	21.44	20.51	19.58	18.65
-	30597	.1969		5.00	5.0	65	12	26.70	25.53	24.38	23.21
29087	30087	.2188	7/32"	5.56	1/4"	2-1/2"	9/16"	28.50	27.26	26.02	24.78
-	30607	.2362		6.00	6.0	65	16	27.59	26.40	25.19	23.99
29097	30097	.2500	1/4"	6.35	1/4"	2-1/2"	5/8"	26.56	25.41	24.25	23.10
-	30617	.2756		7.00	7.0	88	19	38.97	37.27	35.58	33.88
29107	30107	.3125	5/16"	7.94	5/16"	3-1/2"	3/4"	38.62	36.94	35.26	33.58
-	30627	.3150		8.00	8.0	88	19	39.98	38.24	36.50	34.77
-	30637	.3543		9.00	9.0	88	19	47.98	45.88	43.80	41.71
29117	30117	.3750	3/8"	9.52	3/8"	3-1/2"	3/4"	46.22	44.21	42.20	40.19
-	30647	.3937		10.00	10.0	88	19	61.62	58.94	56.26	53.58
-	30657	.4331		11.00	11.0	100	22	64.85	62.04	59.22	56.40
29127	30127	.4375	7/16"	11.11	7/16"	4"	7/8"	62.35	59.63	56.93	54.22
-	30667	.4724		12.00	12.0	100	25	71.09	68.01	64.92	61.82
29137	30137	.5000	1/2"	12.70	1/2"	4"	1"	68.26	65.29	62.32	59.35

520M - 2 Flute
530M - 4 Flute

Technical information:
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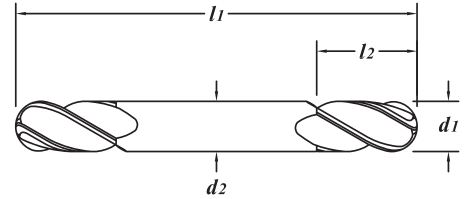


TOLERANCES

d_1	+.000" -.002" (+.000 -.050mm)	
d_2	1/8" - 3/16"	+.0000" -.0003" (-.0000 -.0075mm)
	1/4" - 1/2"	-.0001" -.0004" (-.0025 -.0100mm)
Ball radius	+.000" -.001" (+.000 -.025mm)	

Standard Length - Double End - Ball End

Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiALN Coated - page 152



2 Flute EDP#	4 Flute EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
		Decimal	Metric								
31010	32010	.0312	1/32"	0.79	1/8"	2"	3/32"	21.89	20.94	19.99	19.03
31020	32020	.0469	3/64"	1.19	1/8"	2"	1/8"	21.89	20.94	19.99	19.03
31030	32030	.0625	1/16"	1.59	1/8"	2"	3/16"	21.89	20.94	19.99	19.03
31040	32040	.0938	3/32"	2.38	1/8"	2"	1/4"	21.89	20.94	19.99	19.03
31050	32050	.1250	1/8"	3.17	1/8"	2"	3/8"	15.79	15.10	14.41	13.73
31060	32060	.1562	5/32"	3.97	3/16"	2-1/2"	7/16"	22.58	21.60	20.61	19.64
31070	32070	.1875	3/16"	4.76	3/16"	2-1/2"	1/2"	19.34	18.50	17.66	16.82
31080	32080	.2188	7/32"	5.56	1/4"	2-1/2"	9/16"	25.15	24.06	22.96	21.87
31090	32090	.2500	1/4"	6.35	1/4"	2-1/2"	5/8"	22.95	21.95	20.96	19.96
31100	32100	.3125	5/16"	7.94	5/16"	3-1/2"	3/4"	29.91	28.61	27.31	26.01
31110	32110	.3750	3/8"	9.52	3/8"	3-1/2"	3/4"	38.67	36.98	35.31	33.62
31120	32120	.4375	7/16"	11.11	7/16"	4"	7/8"	54.90	52.51	50.13	47.74
31130	32130	.5000	1/2"	12.70	1/2"	4"	1"	61.69	59.01	56.33	53.64

520MA - 2 Flute
530MA - 4 Flute

Technical information: page 192, 194

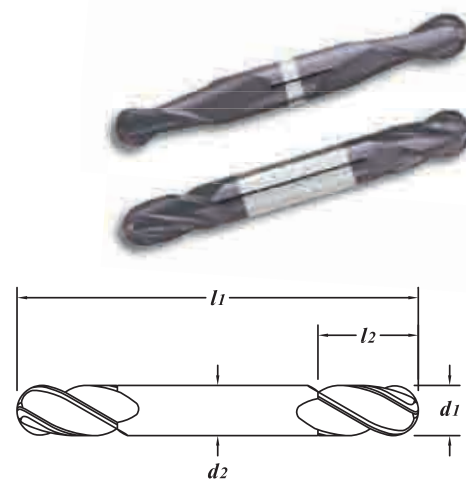


TOLERANCES

d_1	$+0.000'' -0.002'' (+0.000 -0.050\text{mm})$
d_2	$+0.0000'' -0.0003'' (-0.0000 -0.0075\text{mm})$
d_2	$+0.0001'' -0.0004'' (-0.0025 -0.0100\text{mm})$
Ball radius	$+0.000'' -0.001'' (+0.000 -0.025\text{mm})$

Standard Length - Double End - Ball End - TiALN Coated

Solid submicron grain carbide end mill - center cutting
 Dry or semi-dry machining
 Up to 40% faster than uncoated
 Extremely versatile
 Uncoated - page 151



2 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric							
31017	32017	.0312	1/32"	0.79	1/8"	2"	3/32"	25.11	24.01	22.92	21.83
31027	32027	.0469	3/64"	1.19	1/8"	2"	1/8"	25.11	24.01	22.92	21.83
31037	32037	.0625	1/16"	1.59	1/8"	2"	3/16"	25.11	24.01	22.92	21.83
31047	32047	.0938	3/32"	2.38	1/8"	2"	1/4"	25.11	24.01	22.92	21.83
31057	32057	.1250	1/8"	3.17	1/8"	2"	3/8"	19.00	18.18	17.35	16.53
31067	32067	.1562	5/32"	3.97	3/16"	2-1/2"	7/16"	27.59	26.40	25.19	23.99
31077	32077	.1875	3/16"	4.76	3/16"	2-1/2"	1/2"	24.35	23.29	22.22	21.17
31087	32087	.2188	7/32"	5.56	1/4"	2-1/2"	9/16"	31.79	30.41	29.03	27.64
31097	32097	.2500	1/4"	6.35	1/4"	2-1/2"	5/8"	29.59	28.30	27.02	25.73
31107	32107	.3125	5/16"	7.94	5/16"	3-1/2"	3/4"	42.53	40.67	38.82	36.98
31117	32117	.3750	3/8"	9.52	3/8"	3-1/2"	3/4"	51.27	49.05	46.81	44.58
31127	32127	.4375	7/16"	11.11	7/16"	4"	7/8"	69.51	66.49	63.47	60.44
31137	32137	.5000	1/2"	12.70	1/2"	4"	1"	76.30	72.99	69.67	66.35

620M (640M metric) - 2 Flute
623M (643M metric) - 3 Flute
630M (650M metric) - 4 Flute
 .1181" - .3150"
 (3.00mm - 8.00mm)

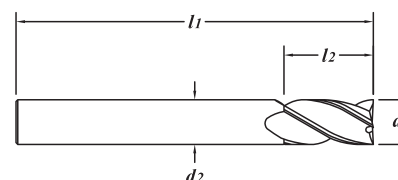
Technical information: page 192, 194



TOLERANCES		
d_1	+.000" - .002" (+.000 - .050mm)	
d_2	3mm - 6mm	+.0000" - .0003" (-.0000 - .0075mm)
	1/4" - 1-1/4"	-.0001" - .0004" (-.0025 - .0100mm)

Extra Length

Solid submicron grain carbide end mill - center cutting
 Extended reach
 Can be modified with a neck within 48 hours
 Extremely versatile
 TiCN Coated - page 155
 TiAlN Coated - page 156



END MILLS

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal	Diameter Metric							
92010	93010	94010	.1181	3.00	3.0	50	16	10.12	9.68	9.24	8.80
92020	93020	94020	.1181	3.00	3.0	75	20	17.20	16.45	15.70	14.96
92030	93030	94030	.1181	3.00	3.0	75	25	17.20	16.45	15.70	14.96
41010	54510	42010	.1250	1/8"	3.17	1/8"	2"	10.60	10.14	9.67	9.21
41020	54520	42020	.1250	1/8"	3.17	1/8"	3"	16.34	15.63	14.91	14.21
41030	54530	42030	.1250	1/8"	3.17	1/8"	1"	16.34	15.63	14.91	14.21
92040	93040	94040	.1575	4.00	4.0	50	16	10.63	10.17	9.70	9.25
92050	93050	94050	.1575	4.00	4.0	75	20	17.60	16.83	16.07	15.30
92060	93060	94060	.1575	4.00	4.0	75	25	17.60	16.83	16.07	15.30
41040	54540	42040	.1875	3/16"	4.76	3/16"	3"	18.03	17.25	16.46	15.68
41050	54550	42050	.1875	3/16"	4.76	3/16"	1-1/8"	18.03	17.25	16.46	15.68
41060	54560	42060	.1875	3/16"	4.76	3/16"	4"	19.91	19.04	18.18	17.31
92070	93070	94070	.1969	5.00	5.0	50	16	12.50	11.96	11.41	10.87
92080	93080	94080	.1969	5.00	5.0	75	20	18.98	18.16	17.33	16.50
92090	93090	94090	.1969	5.00	5.0	75	25	18.98	18.16	17.33	16.50
92100	93100	94100	.2362	6.00	6.0	75	25	22.00	21.04	20.08	19.13
92110	93110	94110	.2362	6.00	6.0	100	25	23.20	22.19	21.18	20.18
92120	93120	94120	.2362	6.00	6.0	100	32	23.20	22.19	21.18	20.18
92130	93130	94130	.2362	6.00	6.0	150	38	31.40	30.04	28.66	27.30
41070	54570	42070	.2500	1/4"	6.35	1/4"	3"	20.88	19.98	19.06	18.16
41080	54580	42080	.2500	1/4"	6.35	1/4"	4"	22.04	21.08	20.12	19.17
41090	54590	42090	.2500	1/4"	6.35	1/4"	1-1/2"	22.04	21.08	20.12	19.17
41100	54600	42100	.2500	1/4"	6.35	1/4"	6"	29.82	28.52	27.23	25.93
41110	54610	42110	.3125	5/16"	7.94	5/16"	3"	25.77	24.65	23.54	22.41
41120	54620	42120	.3125	5/16"	7.94	5/16"	4"	28.78	27.53	26.27	25.02
41130	54630	42130	.3125	5/16"	7.94	5/16"	1-5/8"	28.78	27.53	26.27	25.02
41140	54640	42140	.3125	5/16"	7.94	5/16"	6"	42.66	40.81	38.95	37.10
92140	93140	94140	.3150	8.00	8.0	75	25	27.13	25.96	24.77	23.60
92150	93150	94150	.3150	8.00	8.0	100	25	30.27	28.95	27.64	26.32
92160	93160	94160	.3150	8.00	8.0	100	41	30.27	28.95	27.64	26.32
92170	93170	94170	.3150	8.00	8.0	150	50	43.75	41.85	39.95	38.04

continued →

620M (640M metric) - 2 Flute (continued)**623M (643M metric) - 3 Flute (continued)****630M (650M metric) - 4 Flute (continued)**

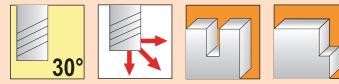
.3750" - 1.250"

(9.52mm - 31.75mm)

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal	Diameter	Metric							
41150	54650	42150	.3750	3/8"	9.52	3/8"	3"	1"	29.00	27.74	26.48	25.21
41160	54660	42160	.3750	3/8"	9.52	3/8"	4"	1"	31.83	30.45	29.07	27.68
41170	54670	42170	.3750	3/8"	9.52	3/8"	4"	2"	31.83	30.45	29.07	27.68
41180	54680	42180	.3750	3/8"	9.52	3/8"	6"	1-1/2"	46.39	44.38	42.36	40.34
41190	54690	42190	.3750	3/8"	9.52	3/8"	6"	3"	46.39	44.38	42.36	40.34
92180	93180	94180	.3937		10.00	10.0	75	25	31.48	30.11	28.75	27.37
92190	93190	94190	.3937		10.00	10.0	100	25	40.58	38.81	37.06	35.29
92200	93200	94200	.3937		10.00	10.0	100	50	40.58	38.81	37.06	35.29
92210	93210	94210	.3937		10.00	10.0	150	38	53.37	51.05	48.73	46.42
92220	93220	94220	.3937		10.00	10.0	150	75	53.37	51.05	48.73	46.42
41200	54700	42200	.4375	7/16"	11.11	7/16"	4"	1"	43.80	41.90	40.00	38.10
41210	54710	42210	.4375	7/16"	11.11	7/16"	4"	2"	43.80	41.90	40.00	38.10
41220	54720	42220	.4375	7/16"	11.11	7/16"	6"	1-1/2"	58.25	55.71	53.19	50.65
41230	54730	42230	.4375	7/16"	11.11	7/16"	6"	3"	58.25	55.71	53.19	50.65
92230	93230	94230	.4724		12.00	12.0	100	25	49.42	47.27	45.13	42.97
92240	93240	94240	.4724		12.00	12.0	100	50	49.42	47.27	45.13	42.97
92250	93250	94250	.4724		12.00	12.0	150	50	67.39	64.46	61.53	58.60
92260	93260	94260	.4724		12.00	12.0	150	75	67.39	64.46	61.53	58.60
41240	54740	42240	.5000	1/2"	12.70	1/2"	4"	1"	46.61	44.58	42.56	40.53
41250	54750	42250	.5000	1/2"	12.70	1/2"	4"	2"	46.61	44.58	42.56	40.53
41260	54760	42260	.5000	1/2"	12.70	1/2"	6"	1-1/2"	67.39	64.46	61.53	58.60
41270	54770	42270	.5000	1/2"	12.70	1/2"	6"	3"	67.39	64.46	61.53	58.60
92270	93270	94270	.5512		14.00	14.0	100	25	67.85	64.90	61.95	59.00
92280	93280	94280	.5512		14.00	14.0	100	50	67.85	64.90	61.95	59.00
92290	93290	94290	.5512		14.00	14.0	150	50	88.45	84.60	80.76	76.92
92300	93300	94300	.5512		14.00	14.0	150	75	88.45	84.60	80.76	76.92
41280	54780	42280	.5625	9/16"	14.29	9/16"	6"	2"	88.47	84.62	80.78	76.93
41290	54790	42290	.5625	9/16"	14.29	9/16"	6"	3"	88.47	84.62	80.78	76.93
41300	54800	42300	.6250	5/8"	15.87	5/8"	6"	2"	96.06	91.88	87.71	83.53
41310	54810	42310	.6250	5/8"	15.87	5/8"	6"	3"	96.06	91.88	87.71	83.53
92310	93310	94310	.6299		16.00	16.0	150	50	96.06	91.88	87.71	83.53
92320	93320	94320	.6299		16.00	16.0	150	75	96.06	91.88	87.71	83.53
92330	93330	94330	.7087		18.00	18.0	150	50	144.41	138.13	131.85	125.58
92340	93340	94340	.7087		18.00	18.0	150	75	144.41	138.13	131.85	125.58
41320	54820	42320	.7500	3/4"	19.05	3/4"	6"	2"	153.02	146.36	139.71	133.06
41330	54830	42330	.7500	3/4"	19.05	3/4"	6"	3"	153.02	146.36	139.71	133.06
92350	93350	94350	.7874		20.00	20.0	150	50	161.20	154.19	147.18	140.17
92360	93360	94360	.7874		20.00	20.0	150	75	161.20	154.19	147.18	140.17
92370	93370	94370	.9843		25.00	25.0	150	50	248.39	237.60	226.79	216.00
92380	93380	94380	.9843		25.00	25.0	150	75	248.39	237.60	226.79	216.00
41340	54840	42340	1.000	1"	25.40	1"	6"	2"	260.15	248.83	237.53	226.21
41350	54850	42350	1.000	1"	25.40	1"	6"	3"	260.15	248.83	237.53	226.21
-	-	42360	1.000	1"	25.40	1"	6"	4"	273.82	261.91	250.01	238.11
-	-	42390	1.250	1-1/4"	31.75	1-1/4"	6"	3"	551.92	527.92	503.92	479.93

620MC - 2 Flute
623MC - 3 Flute
630MC - 4 Flute

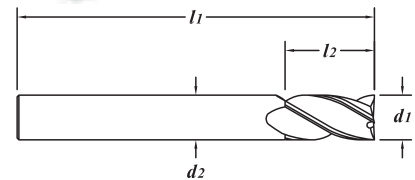
Technical information: page 192, 194



TOLERANCES		
d_1	+.000" -.002" (+.000 -.050mm)	
d_2	1/8" - 3/16"	+.0000" -.0003" (-.0000 -.0075mm)
	1/4" - 1-1/4"	-.0001" -.0004" (-.0025 -.0100mm)

Extra Length - TiCN Coated

Solid submicron grain carbide end mill - center cutting
 Extended reach
 Improved abrasion resistance and lubricity
 Up to 25% faster than uncoated
 Can be modified with a neck within 48 hours
 Extremely versatile
 Uncoated - page 153
 TiAlN Coated - page 156



END MILLS

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal		Metric							
41014	54514	42014	.1250	1/8"	3.17	1/8"	2"	5/8"	12.47	11.93	11.39	10.85
41024	54524	42024	.1250	1/8"	3.17	1/8"	3"	3/4"	18.65	17.84	17.02	16.21
41034	54534	42034	.1250	1/8"	3.17	1/8"	3"	1"	18.65	17.84	17.02	16.21
41044	54544	42044	.1875	3/16"	4.76	3/16"	3"	1"	20.70	19.79	18.90	17.99
41054	54554	42054	.1875	3/16"	4.76	3/16"	3"	1-1/8"	20.70	19.79	18.90	17.99
41064	54564	42064	.1875	3/16"	4.76	3/16"	4"	1"	22.97	21.98	20.98	19.98
41074	54574	42074	.2500	1/4"	6.35	1/4"	3"	1"	24.72	23.65	22.57	21.50
41084	54584	42084	.2500	1/4"	6.35	1/4"	4"	1"	26.20	25.05	23.92	22.78
41094	54594	42094	.2500	1/4"	6.35	1/4"	4"	1-1/2"	26.20	25.05	23.92	22.78
41104	54604	42104	.2500	1/4"	6.35	1/4"	6"	1-1/2"	37.00	35.39	33.79	32.18
41114	54614	42114	.3125	5/16"	7.94	5/16"	3"	1"	30.91	29.57	28.23	26.87
41124	54624	42124	.3125	5/16"	7.94	5/16"	4"	1"	35.13	33.60	32.07	30.54
41134	54634	42134	.3125	5/16"	7.94	5/16"	4"	1-5/8"	35.13	33.60	32.07	30.54
41144	54644	42144	.3125	5/16"	7.94	5/16"	6"	1-1/2"	51.26	49.04	46.80	44.57
41154	54654	42154	.3750	3/8"	9.52	3/8"	3"	1"	34.12	32.64	31.16	29.67
41164	54664	42164	.3750	3/8"	9.52	3/8"	4"	1"	38.22	36.56	34.89	33.24
41174	54674	42174	.3750	3/8"	9.52	3/8"	4"	2"	38.22	36.56	34.89	33.24
41184	54684	42184	.3750	3/8"	9.52	3/8"	6"	1-1/2"	55.01	52.61	50.22	47.83
41194	54694	42194	.3750	3/8"	9.52	3/8"	6"	3"	55.01	52.61	50.22	47.83
41204	54704	42204	.4375	7/16"	11.11	7/16"	4"	1"	51.50	49.26	47.02	44.78
41214	54714	42214	.4375	7/16"	11.11	7/16"	4"	2"	51.50	49.26	47.02	44.78
41224	54724	42224	.4375	7/16"	11.11	7/16"	6"	1-1/2"	69.14	66.13	63.13	60.12
41234	54734	42234	.4375	7/16"	11.11	7/16"	6"	3"	69.14	66.13	63.13	60.12
41244	54744	42244	.5000	1/2"	12.70	1/2"	4"	1"	54.29	51.93	49.57	47.21
41254	54754	42254	.5000	1/2"	12.70	1/2"	4"	2"	54.29	51.93	49.57	47.21
41264	54764	42264	.5000	1/2"	12.70	1/2"	6"	1-1/2"	78.28	74.88	71.47	68.07
41274	54774	42274	.5000	1/2"	12.70	1/2"	6"	3"	78.28	74.88	71.47	68.07
41284	54784	42284	.5625	9/16"	14.29	9/16"	6"	2"	101.90	97.47	93.04	88.61
41294	54794	42294	.5625	9/16"	14.29	9/16"	6"	3"	101.90	97.47	93.04	88.61
41304	54804	42304	.6250	5/8"	15.87	5/8"	6"	2"	109.49	104.73	99.96	95.21
41314	54814	42314	.6250	5/8"	15.87	5/8"	6"	3"	109.49	104.73	99.96	95.21
41324	54824	42324	.7500	3/4"	19.05	3/4"	6"	2"	168.37	161.04	153.72	146.40
41334	54834	42334	.7500	3/4"	19.05	3/4"	6"	3"	168.37	161.04	153.72	146.40
41344	54844	42344	1.000	1"	25.40	1"	6"	2"	281.86	269.61	257.35	245.10
41354	54854	42354	1.000	1"	25.40	1"	6"	3"	281.86	269.61	257.35	245.10
-	-	42364	1.000	1"	25.40	1"	6"	4"	295.54	282.68	269.84	256.99
-	-	42394	1.250	1-1/4"	31.75	1-1/4"	6"	3"	582.00	556.70	531.40	506.10

620MA (640MA metric) - 2 Flute
623MA (643MA metric) - 3 Flute
630MA (650MA metric) - 4 Flute
 .1181" - .3150"
 (3.00mm - 8.00mm)

Technical information:
 page 192, 194

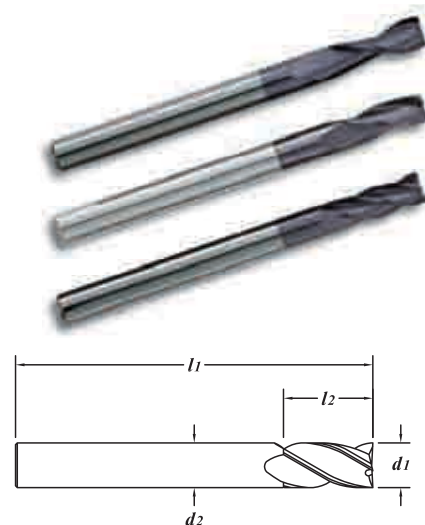


TOLERANCES

d_1	$+0.000^{\circ} - .002^{\circ} (+.000 - .050\text{mm})$
d_2	$3\text{mm} - 6\text{mm} \quad +.0000^{\circ} - .0003^{\circ} (-.0000 - .0075\text{mm})$
	$1/4^{\circ} - 1-1/4^{\circ} \quad -.0001^{\circ} - .0004^{\circ} (-.0025 - .0100\text{mm})$

Extra Length - TiALN Coated

Solid submicron grain carbide end mill - center cutting
 Extended reach
 Dry or semi-dry machining
 Up to 40% faster than uncoated
 Can be modified with a neck within 48 hours
 Extremely versatile
 Uncoated - page 153
 TiCN Coated - page 155



2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal	Diameter Metric							
92017	93017	94017	.1181	3.00	3.0	50	16	11.81	11.30	10.78	10.28
92027	93027	94027	.1181	3.00	3.0	75	20	19.34	18.50	17.66	16.82
92037	93037	94037	.1181	3.00	3.0	75	25	19.34	18.50	17.66	16.82
41017	54517	42017	.1250	1/8"	3.17	1/8"	2"	12.74	12.19	11.63	11.08
41027	54527	42027	.1250	1/8"	3.17	1/8"	3"	18.97	18.15	17.32	16.49
41037	54537	42037	.1250	1/8"	3.17	1/8"	1"	18.97	18.15	17.32	16.49
92047	93047	94047	.1575	4.00	4.0	50	16	12.77	12.22	11.66	11.11
92057	93057	94057	.1575	4.00	4.0	75	20	20.91	20.01	19.09	18.19
92067	93067	94067	.1575	4.00	4.0	75	25	20.91	20.01	19.09	18.19
41047	54547	42047	.1875	3/16"	4.76	3/16"	3"	21.37	20.45	19.51	18.58
41057	54557	42057	.1875	3/16"	4.76	3/16"	1-1/8"	21.37	20.45	19.51	18.58
41067	54567	42067	.1875	3/16"	4.76	3/16"	4"	23.81	22.77	21.74	20.70
92077	93077	94077	.1969	5.00	5.0	50	16	15.84	15.15	14.47	13.77
92087	93087	94087	.1969	5.00	5.0	75	20	23.39	22.37	21.35	20.34
92097	93097	94097	.1969	5.00	5.0	75	25	23.39	22.37	21.35	20.34
92107	93107	94107	.2362	6.00	6.0	75	25	26.41	25.26	24.11	22.96
92117	93117	94117	.2362	6.00	6.0	100	25	28.39	27.15	25.93	24.69
92127	93127	94127	.2362	6.00	6.0	100	32	28.39	27.15	25.93	24.69
92137	93137	94137	.2362	6.00	6.0	150	38	38.70	37.01	35.33	33.65
41077	54577	42077	.2500	1/4"	6.35	1/4"	3"	25.30	24.20	23.10	22.01
41087	54587	42087	.2500	1/4"	6.35	1/4"	4"	27.24	26.05	24.87	23.68
41097	54597	42097	.2500	1/4"	6.35	1/4"	1-1/2"	27.24	26.05	24.87	23.68
41107	54607	42107	.2500	1/4"	6.35	1/4"	6"	37.14	35.53	33.90	32.29
41117	54617	42117	.3125	5/16"	7.94	5/16"	3"	32.40	30.99	29.58	28.17
41127	54627	42127	.3125	5/16"	7.94	5/16"	4"	37.17	35.56	33.94	32.32
41137	54637	42137	.3125	5/16"	7.94	5/16"	1-5/8"	37.17	35.56	33.94	32.32
41147	54647	42147	.3125	5/16"	7.94	5/16"	6"	54.18	51.82	49.47	47.11
92147	93147	94147	.3150	8.00	8.0	75	25	33.74	32.27	30.80	29.34
92157	93157	94157	.3150	8.00	8.0	100	25	38.69	37.00	35.33	33.64
92167	93167	94167	.3150	8.00	8.0	100	41	38.69	37.00	35.33	33.64
92177	93177	94177	.3150	8.00	8.0	150	50	55.28	52.87	50.47	48.07

620MA (640MA metric) - 2 Flute (continued)**623MA (643MA metric) - 3 Flute (continued)****630MA (650MA metric) - 4 Flute (continued)**

.3750" - 1.250"

(9.52mm - 31.75mm)

END MILLS

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal	Diameter	Metric							
41157	54657	42157	.3750	3/8"	9.52	3/8"	3"	1"	35.63	34.08	32.53	30.98
41167	54667	42167	.3750	3/8"	9.52	3/8"	4"	1"	40.26	38.51	36.75	35.01
41177	54677	42177	.3750	3/8"	9.52	3/8"	4"	2"	40.26	38.51	36.75	35.01
41187	54687	42187	.3750	3/8"	9.52	3/8"	6"	1-1/2"	57.91	55.39	52.87	50.36
41197	54697	42197	.3750	3/8"	9.52	3/8"	6"	3"	57.91	55.39	52.87	50.36
92187	93187	94187	.3937		10.00	10.0	75	25	39.00	37.30	35.61	33.91
92197	93197	94197	.3937		10.00	10.0	100	25	50.33	48.14	45.95	43.76
92207	93207	94207	.3937		10.00	10.0	100	50	50.33	48.14	45.95	43.76
92217	93217	94217	.3937		10.00	10.0	150	38	67.08	64.17	61.25	58.33
92227	93227	94227	.3937		10.00	10.0	150	75	67.08	64.17	61.25	58.33
41207	54707	42207	.4375	7/16"	11.11	7/16"	4"	1"	53.56	51.23	48.90	46.57
41217	54717	42217	.4375	7/16"	11.11	7/16"	4"	2"	53.56	51.23	48.90	46.57
41227	54727	42227	.4375	7/16"	11.11	7/16"	6"	1-1/2"	71.95	68.82	65.69	62.57
41237	54737	42237	.4375	7/16"	11.11	7/16"	6"	3"	71.95	68.82	65.69	62.57
92237	93237	94237	.4724		12.00	12.0	100	25	59.16	56.59	54.01	51.44
92247	93247	94247	.4724		12.00	12.0	100	50	59.16	56.59	54.01	51.44
92257	93257	94257	.4724		12.00	12.0	150	50	81.09	77.56	74.04	70.51
92267	93267	94267	.4724		12.00	12.0	150	75	81.09	77.56	74.04	70.51
41247	54747	42247	.5000	1/2"	12.70	1/2"	4"	1"	56.36	53.90	51.46	49.00
41257	54757	42257	.5000	1/2"	12.70	1/2"	4"	2"	56.36	53.90	51.46	49.00
41267	54767	42267	.5000	1/2"	12.70	1/2"	6"	1-1/2"	81.09	77.56	74.04	70.51
41277	54777	42277	.5000	1/2"	12.70	1/2"	6"	3"	81.09	77.56	74.04	70.51
92277	93277	94277	.5512		14.00	14.0	100	25	78.73	75.31	71.88	68.46
92287	93287	94287	.5512		14.00	14.0	100	50	78.73	75.31	71.88	68.46
92297	93297	94297	.5512		14.00	14.0	150	50	104.62	100.08	95.52	90.98
92307	93307	94307	.5512		14.00	14.0	150	75	104.62	100.08	95.52	90.98
41287	54787	42287	.5625	9/16"	14.29	9/16"	6"	2"	104.62	100.08	95.52	90.98
41297	54797	42297	.5625	9/16"	14.29	9/16"	6"	3"	104.62	100.08	95.52	90.98
41307	54807	42307	.6250	5/8"	15.87	5/8"	6"	2"	112.24	107.36	102.48	97.59
41317	54817	42317	.6250	5/8"	15.87	5/8"	6"	3"	112.24	107.36	102.48	97.59
92317	93317	94317	.6299		16.00	16.0	150	50	112.24	107.36	102.48	97.59
92327	93327	94327	.6299		16.00	16.0	150	75	112.24	107.36	102.48	97.59
92337	93337	94337	.7087		18.00	18.0	150	50	163.13	156.04	148.95	141.86
92347	93347	94347	.7087		18.00	18.0	150	75	163.13	156.04	148.95	141.86
41327	54827	42327	.7500	3/4"	19.05	3/4"	6"	2"	171.75	164.28	156.81	149.34
41337	54837	42337	.7500	3/4"	19.05	3/4"	6"	3"	171.75	164.28	156.81	149.34
92357	93357	94357	.7874		20.00	20.0	150	50	185.50	177.43	169.37	161.31
92367	93367	94367	.7874		20.00	20.0	150	75	185.50	177.43	169.37	161.31
92377	93377	94377	.9843		25.00	25.0	150	50	272.70	260.84	248.99	237.13
92387	93387	94387	.9843		25.00	25.0	150	75	272.70	260.84	248.99	237.13
41347	54847	42347	1.000	1"	25.40	1"	6"	2"	284.44	272.07	259.71	247.34
41357	54857	42357	1.000	1"	25.40	1"	6"	3"	284.44	272.07	259.71	247.34
-	-	42367	1.000	1"	25.40	1"	6"	4"	298.13	285.17	272.20	259.24
-	-	42397	1.250	1-1/4"	31.75	1-1/4"	6"	3"	583.07	557.71	532.37	507.02

630R - 4 Flute

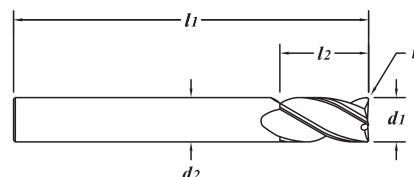
Technical information: page 192, 194

.1250" - .3125"
(3.17mm - 7.94mm)**TOLERANCES**

d_1	+.000" - .002" (+.000 - .050mm)	
d_2	1/8" - 3/16"	+.0000" - .0003" (-.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)
r	+.001" - .001" (+.025 - .025mm)	

Extra Length - Corner Radius

Solid submicron grain carbide end mill - center cutting
 Extended reach
 For stronger corners and part radius
 Can be modified with a neck within 48 hours
 Extremely versatile
 TiAlN Coated - page 161



EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
	Decimal	Diameter	Metric								
20100	.1250	1/8"	3.17	1/8"	3"	1"	.010"	19.23	18.40	17.56	16.72
20110	.1250	1/8"	3.17	1/8"	3"	1"	.015"	19.23	18.40	17.56	16.72
20120	.1250	1/8"	3.17	1/8"	3"	1"	.020"	19.23	18.40	17.56	16.72
20130	.1250	1/8"	3.17	1/8"	3"	1"	.030"	19.23	18.40	17.56	16.72
20140	.1250	1/8"	3.17	1/8"	3"	1"	.045"	19.23	18.40	17.56	16.72
20150	.1875	3/16"	4.76	3/16"	3"	1"	.010"	21.21	20.28	19.36	18.44
20160	.1875	3/16"	4.76	3/16"	3"	1"	.015"	21.21	20.28	19.36	18.44
20170	.1875	3/16"	4.76	3/16"	3"	1"	.020"	21.21	20.28	19.36	18.44
20180	.1875	3/16"	4.76	3/16"	3"	1"	.030"	21.21	20.28	19.36	18.44
20190	.1875	3/16"	4.76	3/16"	3"	1"	.045"	21.21	20.28	19.36	18.44
20200	.1875	3/16"	4.76	3/16"	3"	1"	.060"	21.21	20.28	19.36	18.44
20210	.1875	3/16"	4.76	3/16"	4"	1"	.010"	22.83	21.84	20.84	19.85
20220	.1875	3/16"	4.76	3/16"	4"	1"	.015"	22.83	21.84	20.84	19.85
20230	.1875	3/16"	4.76	3/16"	4"	1"	.020"	22.83	21.84	20.84	19.85
20240	.1875	3/16"	4.76	3/16"	4"	1"	.030"	22.83	21.84	20.84	19.85
20250	.1875	3/16"	4.76	3/16"	4"	1"	.045"	22.83	21.84	20.84	19.85
20260	.1875	3/16"	4.76	3/16"	4"	1"	.060"	22.83	21.84	20.84	19.85
20270	.2500	1/4"	6.35	1/4"	3"	1"	.010"	24.55	23.48	22.42	21.35
20280	.2500	1/4"	6.35	1/4"	3"	1"	.020"	24.55	23.48	22.42	21.35
20290	.2500	1/4"	6.35	1/4"	3"	1"	.030"	24.55	23.48	22.42	21.35
20300	.2500	1/4"	6.35	1/4"	3"	1"	.045"	24.55	23.48	22.42	21.35
20310	.2500	1/4"	6.35	1/4"	3"	1"	.060"	24.55	23.48	22.42	21.35
20320	.2500	1/4"	6.35	1/4"	4"	1"	.010"	25.83	24.71	23.59	22.46
20330	.2500	1/4"	6.35	1/4"	4"	1"	.020"	25.83	24.71	23.59	22.46
20340	.2500	1/4"	6.35	1/4"	4"	1"	.030"	25.83	24.71	23.59	22.46
20350	.2500	1/4"	6.35	1/4"	4"	1"	.045"	25.83	24.71	23.59	22.46
20360	.2500	1/4"	6.35	1/4"	4"	1"	.060"	25.83	24.71	23.59	22.46
20370	.2500	1/4"	6.35	1/4"	6"	1-1/2"	.010"	33.58	32.13	30.66	29.20
20380	.2500	1/4"	6.35	1/4"	6"	1-1/2"	.020"	33.58	32.13	30.66	29.20
20390	.2500	1/4"	6.35	1/4"	6"	1-1/2"	.030"	33.58	32.13	30.66	29.20
20400	.2500	1/4"	6.35	1/4"	6"	1-1/2"	.045"	33.58	32.13	30.66	29.20
20410	.2500	1/4"	6.35	1/4"	6"	1-1/2"	.060"	33.58	32.13	30.66	29.20
20420	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.010"	33.85	32.38	30.91	29.43
20430	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.020"	33.85	32.38	30.91	29.43
20440	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.030"	33.85	32.38	30.91	29.43
20450	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.045"	33.85	32.38	30.91	29.43
20460	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.060"	33.85	32.38	30.91	29.43
20470	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.090"	33.85	32.38	30.91	29.43
20480	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.125"	33.85	32.38	30.91	29.43

630R - 4 Flute (continued)

.3750" - .7500"
(9.52mm - 19.05mm)

END MILLS

EDP#	d_1 † Diameter		Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
	Decimal										
20490	.3750	3/8"	9.52	3/8"	4"	1"	.010"	37.45	35.82	34.20	32.56
20500	.3750	3/8"	9.52	3/8"	4"	1"	.020"	37.45	35.82	34.20	32.56
20510	.3750	3/8"	9.52	3/8"	4"	1"	.030"	37.45	35.82	34.20	32.56
20520	.3750	3/8"	9.52	3/8"	4"	1"	.045"	37.45	35.82	34.20	32.56
20530	.3750	3/8"	9.52	3/8"	4"	1"	.060"	37.45	35.82	34.20	32.56
20540	.3750	3/8"	9.52	3/8"	4"	1"	.090"	37.45	35.82	34.20	32.56
20550	.3750	3/8"	9.52	3/8"	4"	1"	.125"	37.45	35.82	34.20	32.56
20560	.3750	3/8"	9.52	3/8"	4"	2"	.010"	37.45	35.82	34.20	32.56
20570	.3750	3/8"	9.52	3/8"	4"	2"	.020"	37.45	35.82	34.20	32.56
20580	.3750	3/8"	9.52	3/8"	4"	2"	.030"	37.45	35.82	34.20	32.56
20590	.3750	3/8"	9.52	3/8"	4"	2"	.045"	37.45	35.82	34.20	32.56
20600	.3750	3/8"	9.52	3/8"	4"	2"	.060"	37.45	35.82	34.20	32.56
20610	.3750	3/8"	9.52	3/8"	4"	2"	.090"	37.45	35.82	34.20	32.56
20620	.3750	3/8"	9.52	3/8"	4"	2"	.125"	37.45	35.82	34.20	32.56
20630	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.010"	51.42	49.18	46.95	44.71
20640	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.020"	51.42	49.18	46.95	44.71
20650	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.030"	51.42	49.18	46.95	44.71
20660	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.045"	51.42	49.18	46.95	44.71
20670	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.060"	51.42	49.18	46.95	44.71
20680	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.090"	51.42	49.18	46.95	44.71
20690	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.125"	51.42	49.18	46.95	44.71
20700	.5000	1/2"	12.70	1/2"	4"	1"	.015"	52.64	50.36	48.07	45.78
20710	.5000	1/2"	12.70	1/2"	4"	1"	.020"	52.64	50.36	48.07	45.78
20720	.5000	1/2"	12.70	1/2"	4"	1"	.030"	52.64	50.36	48.07	45.78
20730	.5000	1/2"	12.70	1/2"	4"	1"	.045"	52.64	50.36	48.07	45.78
20740	.5000	1/2"	12.70	1/2"	4"	1"	.060"	52.64	50.36	48.07	45.78
20750	.5000	1/2"	12.70	1/2"	4"	1"	.090"	52.64	50.36	48.07	45.78
20760	.5000	1/2"	12.70	1/2"	4"	1"	.125"	52.64	50.36	48.07	45.78
20770	.5000	1/2"	12.70	1/2"	4"	2"	.015"	52.64	50.36	48.07	45.78
20780	.5000	1/2"	12.70	1/2"	4"	2"	.020"	52.64	50.36	48.07	45.78
20790	.5000	1/2"	12.70	1/2"	4"	2"	.030"	52.64	50.36	48.07	45.78
20800	.5000	1/2"	12.70	1/2"	4"	2"	.045"	52.64	50.36	48.07	45.78
20810	.5000	1/2"	12.70	1/2"	4"	2"	.060"	52.64	50.36	48.07	45.78
20820	.5000	1/2"	12.70	1/2"	4"	2"	.090"	52.64	50.36	48.07	45.78
20830	.5000	1/2"	12.70	1/2"	4"	2"	.125"	52.64	50.36	48.07	45.78
20840	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.015"	74.57	71.32	68.08	64.84
20850	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.020"	74.57	71.32	68.08	64.84
20860	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.030"	74.57	71.32	68.08	64.84
20870	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.045"	74.57	71.32	68.08	64.84
20880	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.060"	74.57	71.32	68.08	64.84
20890	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.090"	74.57	71.32	68.08	64.84
20900	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.125"	74.57	71.32	68.08	64.84
20910	.6250	5/8"	15.87	5/8"	6"	2"	.010"	109.65	104.88	100.11	95.35
20920	.6250	5/8"	15.87	5/8"	6"	2"	.015"	109.65	104.88	100.11	95.35
20930	.6250	5/8"	15.87	5/8"	6"	2"	.020"	109.65	104.88	100.11	95.35
20940	.6250	5/8"	15.87	5/8"	6"	2"	.030"	109.65	104.88	100.11	95.35
20950	.6250	5/8"	15.87	5/8"	6"	2"	.045"	109.65	104.88	100.11	95.35
20960	.6250	5/8"	15.87	5/8"	6"	2"	.060"	109.65	104.88	100.11	95.35
20970	.6250	5/8"	15.87	5/8"	6"	2"	.090"	109.65	104.88	100.11	95.35
20980	.6250	5/8"	15.87	5/8"	6"	2"	.125"	109.65	104.88	100.11	95.35
20990	.7500	3/4"	19.05	3/4"	6"	3"	.015"	179.94	172.12	164.29	156.47
21000	.7500	3/4"	19.05	3/4"	6"	3"	.020"	179.94	172.12	164.29	156.47
21010	.7500	3/4"	19.05	3/4"	6"	3"	.030"	179.94	172.12	164.29	156.47
21020	.7500	3/4"	19.05	3/4"	6"	3"	.045"	179.94	172.12	164.29	156.47
21030	.7500	3/4"	19.05	3/4"	6"	3"	.060"	179.94	172.12	164.29	156.47
21040	.7500	3/4"	19.05	3/4"	6"	3"	.090"	179.94	172.12	164.29	156.47
21050	.7500	3/4"	19.05	3/4"	6"	3"	.125"	179.94	172.12	164.29	156.47
NEW 21140	.7500	3/4"	19.05	3/4"	6"	3"	.250"	179.94	172.12	164.29	156.47

continued →

630R - 4 Flute (continued)

1.000"
(25.40mm)

END MILLS

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100	
	Decimal	Metric									
21060	1.000	1"	25.40	1"	6"	3"	.015"	306.00	292.70	279.39	266.08
21070	1.000	1"	25.40	1"	6"	3"	.020"	306.00	292.70	279.39	266.08
21080	1.000	1"	25.40	1"	6"	3"	.030"	306.00	292.70	279.39	266.08
21090	1.000	1"	25.40	1"	6"	3"	.045"	306.00	292.70	279.39	266.08
21100	1.000	1"	25.40	1"	6"	3"	.060"	306.00	292.70	279.39	266.08
21110	1.000	1"	25.40	1"	6"	3"	.090"	306.00	292.70	279.39	266.08
21120	1.000	1"	25.40	1"	6"	3"	.125"	306.00	292.70	279.39	266.08
NEW 21130	1.000	1"	25.40	1"	6"	3"	.250"	306.00	292.70	279.39	266.08



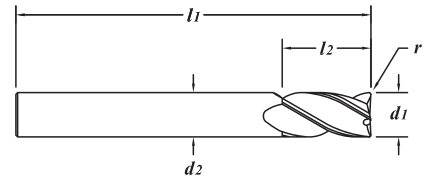
.1250" - .3125"
(3.17mm - 7.94mm)

TOLERANCES

d_1	+.000" - .002" (+.000 - .050mm)	
d_2	1/8" - 3/16"	+.0000" - .0003" (-.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)
r	+.001" - .001" (+.025 - .025mm)	

Extra Length - Corner Radius - TiALN Coated

Solid submicron grain carbide end mill - center cutting
Extended reach
For stronger corners and part radius
Dry or semi-dry machining
Up to 40% faster than uncoated
Can be modified with a neck within 48 hours
Extremely versatile
Uncoated - page 158



EDP#	d_1 †			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
	Decimal	Diameter	Metric								
20107	.1250	1/8"	3.17	1/8"	3"	1"	.010"	21.85	20.90	19.95	19.00
20117	.1250	1/8"	3.17	1/8"	3"	1"	.015"	21.85	20.90	19.95	19.00
20127	.1250	1/8"	3.17	1/8"	3"	1"	.020"	21.85	20.90	19.95	19.00
20137	.1250	1/8"	3.17	1/8"	3"	1"	.030"	21.85	20.90	19.95	19.00
20147	.1250	1/8"	3.17	1/8"	3"	1"	.045"	21.85	20.90	19.95	19.00
20157	.1875	3/16"	4.76	3/16"	3"	1"	.010"	24.54	23.47	22.41	21.34
20167	.1875	3/16"	4.76	3/16"	3"	1"	.015"	24.54	23.47	22.41	21.34
20177	.1875	3/16"	4.76	3/16"	3"	1"	.020"	24.54	23.47	22.41	21.34
20187	.1875	3/16"	4.76	3/16"	3"	1"	.030"	24.54	23.47	22.41	21.34
20197	.1875	3/16"	4.76	3/16"	3"	1"	.045"	24.54	23.47	22.41	21.34
20207	.1875	3/16"	4.76	3/16"	3"	1"	.060"	24.54	23.47	22.41	21.34
20217	.1875	3/16"	4.76	3/16"	4"	1"	.010"	26.72	25.55	24.40	23.23
20227	.1875	3/16"	4.76	3/16"	4"	1"	.015"	26.72	25.55	24.40	23.23
20237	.1875	3/16"	4.76	3/16"	4"	1"	.020"	26.72	25.55	24.40	23.23
20247	.1875	3/16"	4.76	3/16"	4"	1"	.030"	26.72	25.55	24.40	23.23
20257	.1875	3/16"	4.76	3/16"	4"	1"	.045"	26.72	25.55	24.40	23.23
20267	.1875	3/16"	4.76	3/16"	4"	1"	.060"	26.72	25.55	24.40	23.23
20277	.2500	1/4"	6.35	1/4"	3"	1"	.010"	28.97	27.72	26.46	25.20
20287	.2500	1/4"	6.35	1/4"	3"	1"	.020"	28.97	27.72	26.46	25.20
20297	.2500	1/4"	6.35	1/4"	3"	1"	.030"	28.97	27.72	26.46	25.20
20307	.2500	1/4"	6.35	1/4"	3"	1"	.045"	28.97	27.72	26.46	25.20
20317	.2500	1/4"	6.35	1/4"	3"	1"	.060"	28.97	27.72	26.46	25.20
20327	.2500	1/4"	6.35	1/4"	4"	1"	.010"	31.02	29.67	28.33	26.98
20337	.2500	1/4"	6.35	1/4"	4"	1"	.020"	31.02	29.67	28.33	26.98
20347	.2500	1/4"	6.35	1/4"	4"	1"	.030"	31.02	29.67	28.33	26.98
20357	.2500	1/4"	6.35	1/4"	4"	1"	.045"	31.02	29.67	28.33	26.98
20367	.2500	1/4"	6.35	1/4"	4"	1"	.060"	31.02	29.67	28.33	26.98
20377	.2500	1/4"	6.35	1/4"	6"	1-1/2"	.010"	40.89	39.11	37.34	35.56
20387	.2500	1/4"	6.35	1/4"	6"	1-1/2"	.020"	40.89	39.11	37.34	35.56
20397	.2500	1/4"	6.35	1/4"	6"	1-1/2"	.030"	40.89	39.11	37.34	35.56
20407	.2500	1/4"	6.35	1/4"	6"	1-1/2"	.045"	40.89	39.11	37.34	35.56
20417	.2500	1/4"	6.35	1/4"	6"	1-1/2"	.060"	40.89	39.11	37.34	35.56
20427	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.010"	42.27	40.42	38.59	36.75
20437	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.020"	42.27	40.42	38.59	36.75
20447	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.030"	42.27	40.42	38.59	36.75
20457	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.045"	42.27	40.42	38.59	36.75
20467	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.060"	42.27	40.42	38.59	36.75
20477	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.090"	42.27	40.42	38.59	36.75
20487	.3125	5/16"	7.94	5/16"	4"	1-5/8"	.125"	42.27	40.42	38.59	36.75

continued →

630RA - 4 Flute (continued)

.3750" - .7500"
(9.52mm - 19.05mm)

END MILLS

EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
	Decimal		Metric								
20497	.3750	3/8"	9.52	3/8"	4"	1"	.010"	45.85	43.86	41.87	39.87
20507	.3750	3/8"	9.52	3/8"	4"	1"	.020"	45.85	43.86	41.87	39.87
20517	.3750	3/8"	9.52	3/8"	4"	1"	.030"	45.85	43.86	41.87	39.87
20527	.3750	3/8"	9.52	3/8"	4"	1"	.045"	45.85	43.86	41.87	39.87
20537	.3750	3/8"	9.52	3/8"	4"	1"	.060"	45.85	43.86	41.87	39.87
20547	.3750	3/8"	9.52	3/8"	4"	1"	.090"	45.85	43.86	41.87	39.87
20557	.3750	3/8"	9.52	3/8"	4"	1"	.125"	45.85	43.86	41.87	39.87
20567	.3750	3/8"	9.52	3/8"	4"	2"	.010"	45.85	43.86	41.87	39.87
20577	.3750	3/8"	9.52	3/8"	4"	2"	.020"	45.85	43.86	41.87	39.87
20587	.3750	3/8"	9.52	3/8"	4"	2"	.030"	45.85	43.86	41.87	39.87
20597	.3750	3/8"	9.52	3/8"	4"	2"	.045"	45.85	43.86	41.87	39.87
20607	.3750	3/8"	9.52	3/8"	4"	2"	.060"	45.85	43.86	41.87	39.87
20617	.3750	3/8"	9.52	3/8"	4"	2"	.090"	45.85	43.86	41.87	39.87
20627	.3750	3/8"	9.52	3/8"	4"	2"	.125"	45.85	43.86	41.87	39.87
20637	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.010"	63.48	60.73	57.96	55.20
20647	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.020"	63.48	60.73	57.96	55.20
20657	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.030"	63.48	60.73	57.96	55.20
20667	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.045"	63.48	60.73	57.96	55.20
20677	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.060"	63.48	60.73	57.96	55.20
20687	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.090"	63.48	60.73	57.96	55.20
20697	.3750	3/8"	9.52	3/8"	6"	1-1/2"	.125"	63.48	60.73	57.96	55.20
20707	.5000	1/2"	12.70	1/2"	4"	1"	.015"	62.41	59.70	56.98	54.27
20717	.5000	1/2"	12.70	1/2"	4"	1"	.020"	62.41	59.70	56.98	54.27
20727	.5000	1/2"	12.70	1/2"	4"	1"	.030"	62.41	59.70	56.98	54.27
20737	.5000	1/2"	12.70	1/2"	4"	1"	.045"	62.41	59.70	56.98	54.27
20747	.5000	1/2"	12.70	1/2"	4"	1"	.060"	62.41	59.70	56.98	54.27
20757	.5000	1/2"	12.70	1/2"	4"	1"	.090"	62.41	59.70	56.98	54.27
20767	.5000	1/2"	12.70	1/2"	4"	1"	.125"	62.41	59.70	56.98	54.27
20777	.5000	1/2"	12.70	1/2"	4"	2"	.015"	62.41	59.70	56.98	54.27
20787	.5000	1/2"	12.70	1/2"	4"	2"	.020"	62.41	59.70	56.98	54.27
20797	.5000	1/2"	12.70	1/2"	4"	2"	.030"	62.41	59.70	56.98	54.27
20807	.5000	1/2"	12.70	1/2"	4"	2"	.045"	62.41	59.70	56.98	54.27
20817	.5000	1/2"	12.70	1/2"	4"	2"	.060"	62.41	59.70	56.98	54.27
20827	.5000	1/2"	12.70	1/2"	4"	2"	.090"	62.41	59.70	56.98	54.27
20837	.5000	1/2"	12.70	1/2"	4"	2"	.125"	62.41	59.70	56.98	54.27
20847	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.015"	88.26	84.43	80.59	76.75
20857	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.020"	88.26	84.43	80.59	76.75
20867	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.030"	88.26	84.43	80.59	76.75
20877	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.045"	88.26	84.43	80.59	76.75
20887	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.060"	88.26	84.43	80.59	76.75
20897	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.090"	88.26	84.43	80.59	76.75
20907	.5000	1/2"	12.70	1/2"	6"	1-1/2"	.125"	88.26	84.43	80.59	76.75
20917	.6250	5/8"	15.87	5/8"	6"	2"	.010"	125.81	120.34	114.87	109.40
20927	.6250	5/8"	15.87	5/8"	6"	2"	.015"	125.81	120.34	114.87	109.40
20937	.6250	5/8"	15.87	5/8"	6"	2"	.020"	125.81	120.34	114.87	109.40
20947	.6250	5/8"	15.87	5/8"	6"	2"	.030"	125.81	120.34	114.87	109.40
20957	.6250	5/8"	15.87	5/8"	6"	2"	.045"	125.81	120.34	114.87	109.40
20967	.6250	5/8"	15.87	5/8"	6"	2"	.060"	125.81	120.34	114.87	109.40
20977	.6250	5/8"	15.87	5/8"	6"	2"	.090"	125.81	120.34	114.87	109.40
20987	.6250	5/8"	15.87	5/8"	6"	2"	.125"	125.81	120.34	114.87	109.40
20997	.7500	3/4"	19.05	3/4"	6"	3"	.015"	198.67	190.03	181.40	172.75
21007	.7500	3/4"	19.05	3/4"	6"	3"	.020"	198.67	190.03	181.40	172.75
21017	.7500	3/4"	19.05	3/4"	6"	3"	.030"	198.67	190.03	181.40	172.75
21027	.7500	3/4"	19.05	3/4"	6"	3"	.045"	198.67	190.03	181.40	172.75
21037	.7500	3/4"	19.05	3/4"	6"	3"	.060"	198.67	190.03	181.40	172.75
21047	.7500	3/4"	19.05	3/4"	6"	3"	.090"	198.67	190.03	181.40	172.75
21057	.7500	3/4"	19.05	3/4"	6"	3"	.125"	198.67	190.03	181.40	172.75
NEW 21147	.7500	3/4"	19.05	3/4"	6"	3"	.250"	198.67	190.03	181.40	172.75

630RA - 4 Flute (continued)

1.000"
(25.40mm)

END MILLS

EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
	Decimal		Metric								
21067	1.000	1"	25.40	1"	6"	3"	.015"	330.31	315.95	301.59	287.23
21077	1.000	1"	25.40	1"	6"	3"	.020"	330.31	315.95	301.59	287.23
21087	1.000	1"	25.40	1"	6"	3"	.030"	330.31	315.95	301.59	287.23
21097	1.000	1"	25.40	1"	6"	3"	.045"	330.31	315.95	301.59	287.23
21107	1.000	1"	25.40	1"	6"	3"	.060"	330.31	315.95	301.59	287.23
21117	1.000	1"	25.40	1"	6"	3"	.090"	330.31	315.95	301.59	287.23
21127	1.000	1"	25.40	1"	6"	3"	.125"	330.31	315.95	301.59	287.23
NEW 21137	1.000	1"	25.40	1"	6"	3"	.250"	330.31	315.95	301.59	287.23



720M (740M metric) - 2 Flute
723M (743M metric) - 3 Flute
730M (750M metric) - 4 Flute
 .1181" - .3150"
 (3.00mm - 8.00mm)

Technical information:
 page 192, 194

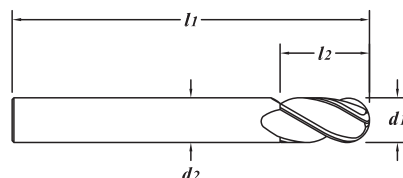


TOLERANCES

d_1	+.000" - .002" (+.000 - .050mm)	
d_2	3mm - 6mm	+.0000" - .0003" (-.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)
Ball radius	+.000" - .001" (+.000 - .025mm)	

Extra Length - Ball End

Solid submicron grain carbide end mill - center cutting
 Extended reach
 Can be modified with a neck within 48 hours
 Extremely versatile
 TiCN Coated - page 166
 TiAlN Coated - page 167



2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal	Diameter Metric							
97010	98010	99010	.1181	3.00	3.0	50	16	12.29	11.76	11.22	10.69
97020	98020	99020	.1181	3.00	3.0	75	20	20.24	19.35	18.48	17.60
97030	98030	99030	.1181	3.00	3.0	75	25	20.24	19.35	18.48	17.60
43010	55510	44010	.1250	1/8"	3.17	1/8"	2"	12.46	11.92	11.38	10.84
43020	55520	44020	.1250	1/8"	3.17	1/8"	3"	19.23	18.40	17.56	16.72
43030	55530	44030	.1250	1/8"	3.17	1/8"	1"	19.23	18.40	17.56	16.72
97040	98040	99040	.1575	4.00	4.0	50	16	12.81	12.25	11.70	11.14
97050	98050	99050	.1575	4.00	4.0	75	20	20.66	19.77	18.87	17.97
97060	98060	99060	.1575	4.00	4.0	75	25	20.66	19.77	18.87	17.97
43040	55540	44040	.1875	3/16"	4.76	3/16"	3"	21.21	20.28	19.36	18.44
43050	55550	44050	.1875	3/16"	4.76	3/16"	3"	21.21	20.28	19.36	18.44
43060	55560	44060	.1875	3/16"	4.76	3/16"	4"	22.83	21.84	20.84	19.85
97070	98070	99070	.1969	5.00	5.0	50	16	14.82	14.18	13.53	12.89
97080	98080	99080	.1969	5.00	5.0	75	20	22.32	21.35	20.37	19.41
97090	98090	99090	.1969	5.00	5.0	75	25	22.32	21.35	20.37	19.41
97100	98100	99100	.2362	6.00	6.0	75	25	25.84	24.72	23.60	22.47
97110	98110	99110	.2362	6.00	6.0	100	25	27.20	26.01	24.84	23.65
97120	98120	99120	.2362	6.00	6.0	100	32	27.20	26.01	24.84	23.65
97130	98130	99130	.2362	6.00	6.0	150	38	35.35	33.81	32.27	30.74
43070	55570	44070	.2500	1/4"	6.35	1/4"	3"	24.55	23.48	22.42	21.35
43080	55580	44080	.2500	1/4"	6.35	1/4"	4"	25.83	24.71	23.59	22.46
43090	55590	44090	.2500	1/4"	6.35	1/4"	4"	25.83	24.71	23.59	22.46
43100	55600	44100	.2500	1/4"	6.35	1/4"	6"	33.58	32.13	30.66	29.20
43110	55610	44110	.3125	5/16"	7.94	5/16"	3"	30.33	29.01	27.68	26.37
43120	55620	44120	.3125	5/16"	7.94	5/16"	4"	33.85	32.38	30.91	29.43
43130	55630	44130	.3125	5/16"	7.94	5/16"	4"	33.85	32.38	30.91	29.43
43140	55640	44140	.3125	5/16"	7.94	5/16"	6"	50.21	48.03	45.84	43.66
97140	98140	99140	.3150	8.00	8.0	75	25	31.92	30.53	29.14	27.76
97150	98150	99150	.3150	8.00	8.0	100	25	35.63	34.08	32.53	30.98
97160	98160	99160	.3150	8.00	8.0	100	41	35.63	34.08	32.53	30.98
97170	98170	99170	.3150	8.00	8.0	150	50	51.52	49.29	47.04	44.80

720M (740M metric) - 2 Flute (continued)
723M (743M metric) - 3 Flute (continued)
730M (750M metric) - 4 Flute (continued)

.3750" - 1.000"
(9.52mm - 25.40mm)

END MILLS

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	$d1$ †			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100
			Decimal	Diameter	Metric							
43150	55650	44150	.3750	3/8"	9.52	3/8"	3"	1"	34.12	32.64	31.16	29.67
43160	55660	44160	.3750	3/8"	9.52	3/8"	4"	1"	37.45	35.82	34.20	32.56
43170	55670	44170	.3750	3/8"	9.52	3/8"	4"	2"	37.45	35.82	34.20	32.56
43180	55680	44180	.3750	3/8"	9.52	3/8"	6"	1-1/2"	51.97	49.71	47.44	45.19
43190	55690	44190	.3750	3/8"	9.52	3/8"	6"	3"	51.97	49.71	47.44	45.19
97180	98180	99180	.3937		10.00	10.0	75	25	36.87	35.27	33.66	32.06
97190	98190	99190	.3937		10.00	10.0	100	25	48.32	46.22	44.12	42.02
97200	98200	99200	.3937		10.00	10.0	100	50	48.32	46.22	44.12	42.02
97210	98210	99210	.3937		10.00	10.0	150	38	62.16	59.46	56.75	54.05
97220	98220	99220	.3937		10.00	10.0	150	75	62.16	59.46	56.75	54.05
43200	55700	44200	.4375	7/16"	11.11	7/16"	4"	1"	51.55	49.31	47.07	44.82
43210	55710	44210	.4375	7/16"	11.11	7/16"	4"	2"	51.55	49.31	47.07	44.82
43220	55720	44220	.4375	7/16"	11.11	7/16"	6"	1-1/2"	67.00	64.08	61.17	58.26
43230	55730	44230	.4375	7/16"	11.11	7/16"	6"	3"	67.00	64.08	61.17	58.26
97230	98230	99230	.4724		12.00	12.0	100	25	55.47	53.06	50.65	48.24
97240	98240	99240	.4724		12.00	12.0	100	50	55.47	53.06	50.65	48.24
97250	98250	99250	.4724		12.00	12.0	150	50	74.56	71.31	68.08	64.83
97260	98260	99260	.4724		12.00	12.0	150	75	74.56	71.31	68.08	64.83
43240	55740	44240	.5000	1/2"	12.70	1/2"	4"	1"	52.64	50.36	48.07	45.78
43250	55750	44250	.5000	1/2"	12.70	1/2"	4"	2"	52.64	50.36	48.07	45.78
43260	55760	44260	.5000	1/2"	12.70	1/2"	6"	1-1/2"	74.57	71.32	68.08	64.84
43270	55770	44270	.5000	1/2"	12.70	1/2"	6"	3"	74.57	71.32	68.08	64.84
97270	98270	99270	.5512		14.00	14.0	100	25	76.67	73.33	70.00	66.66
97280	98280	99280	.5512		14.00	14.0	100	50	76.67	73.33	70.00	66.66
97290	98290	99290	.5512		14.00	14.0	150	50	104.06	99.54	95.01	90.49
97300	98300	99300	.5512		14.00	14.0	150	75	104.06	99.54	95.01	90.49
43280	55780	44280	.5625	9/16"	14.29	9/16"	6"	2"	104.05	99.53	95.00	90.48
43290	55790	44290	.5625	9/16"	14.29	9/16"	6"	3"	104.05	99.53	95.00	90.48
43300	55800	44300	.6250	5/8"	15.87	5/8"	6"	2"	109.65	104.88	100.11	95.35
43310	55810	44310	.6250	5/8"	15.87	5/8"	6"	3"	109.65	104.88	100.11	95.35
97310	98310	99310	.6299		16.00	16.0	150	50	109.64	104.87	100.10	95.34
97320	98320	99320	.6299		16.00	16.0	150	75	109.64	104.87	100.10	95.34
97330	98330	99330	.7087		18.00	18.0	150	50	168.66	161.32	153.99	146.66
97340	98340	99340	.7087		18.00	18.0	150	75	168.66	161.32	153.99	146.66
43320	55820	44320	.7500	3/4"	19.05	3/4"	6"	2"	179.94	172.12	164.29	156.47
43330	55830	44330	.7500	3/4"	19.05	3/4"	6"	3"	179.94	172.12	164.29	156.47
97350	98350	99350	.7874		20.00	20.0	150	50	185.44	177.38	169.31	161.25
97360	98360	99360	.7874		20.00	20.0	150	75	185.44	177.38	169.31	161.25
97370	98370	99370	.9843		25.00	25.0	150	50	294.25	281.46	268.66	255.87
97380	98380	99380	.9843		25.00	25.0	150	75	294.25	281.46	268.66	255.87
43340	55840	44340	1.000	1"	25.40	1"	6"	2"	306.00	292.70	279.39	266.08
43350	55850	44350	1.000	1"	25.40	1"	6"	3"	306.00	292.70	279.39	266.08

720MC - 2 Flute
723MC - 3 Flute
730MC - 4 Flute

Technical information:
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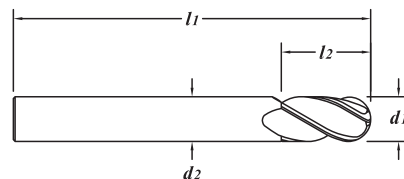


TOLERANCES

d_1	+.000" - .002" (+.000 - .050mm)	
d_2	1/8" - 3/16"	+.0000" - .0003" (-.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)
Ball radius	+.000" - .001" (+.000 - .025mm)	

Extra Length - Ball End - TiCN Coated

Solid submicron grain carbide end mill - center cutting
 Extended reach
 Improved abrasion resistance and lubricity
 Up to 25% faster than uncoated
 Can be modified with a neck within 48 hours
 Extremely versatile
 Uncoated - page 164
 TiALN Coated - page 167



2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 † Diameter			d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal		Metric							
43014	55514	44014	.1250	1/8"	3.17	1/8"	2"	5/8"	14.34	13.72	13.09	12.47
43024	55524	44024	.1250	1/8"	3.17	1/8"	3"	3/4"	21.54	20.60	19.67	18.73
43034	55534	44034	.1250	1/8"	3.17	1/8"	3"	1"	21.54	20.60	19.67	18.73
43044	55544	44044	.1875	3/16"	4.76	3/16"	3"	1"	23.85	22.81	21.78	20.74
43054	55554	44054	.1875	3/16"	4.76	3/16"	3"	1-1/8"	23.85	22.81	21.78	20.74
43064	55564	44064	.1875	3/16"	4.76	3/16"	4"	1"	25.90	24.77	23.64	22.52
43074	55574	44074	.2500	1/4"	6.35	1/4"	3"	1"	28.39	27.15	25.93	24.69
43084	55584	44084	.2500	1/4"	6.35	1/4"	4"	1"	29.98	28.68	27.37	26.07
43094	55594	44094	.2500	1/4"	6.35	1/4"	4"	1-1/2"	29.98	28.68	27.37	26.07
43104	55604	44104	.2500	1/4"	6.35	1/4"	6"	1-1/2"	40.75	38.98	37.20	35.43
43114	55614	44114	.3125	5/16"	7.94	5/16"	3"	1"	35.47	33.94	32.39	30.85
43124	55624	44124	.3125	5/16"	7.94	5/16"	4"	1"	40.22	38.47	36.72	34.98
43134	55634	44134	.3125	5/16"	7.94	5/16"	4"	1-5/8"	40.22	38.47	36.72	34.98
43144	55644	44144	.3125	5/16"	7.94	5/16"	6"	1-1/2"	58.81	56.25	53.70	51.14
43154	55654	44154	.3750	3/8"	9.52	3/8"	3"	1"	39.25	37.54	35.84	34.13
43164	55664	44164	.3750	3/8"	9.52	3/8"	4"	1"	43.83	41.92	40.02	38.11
43174	55674	44174	.3750	3/8"	9.52	3/8"	4"	2"	43.83	41.92	40.02	38.11
43184	55684	44184	.3750	3/8"	9.52	3/8"	6"	1-1/2"	60.58	57.95	55.31	52.68
43194	55694	44194	.3750	3/8"	9.52	3/8"	6"	3"	60.58	57.95	55.31	52.68
43204	55704	44204	.4375	7/16"	11.11	7/16"	4"	1"	59.24	56.66	54.09	51.51
43214	55714	44214	.4375	7/16"	11.11	7/16"	4"	2"	59.24	56.66	54.09	51.51
43224	55724	44224	.4375	7/16"	11.11	7/16"	6"	1-1/2"	77.89	74.50	71.12	67.72
43234	55734	44234	.4375	7/16"	11.11	7/16"	6"	3"	77.89	74.50	71.12	67.72
43244	55744	44244	.5000	1/2"	12.70	1/2"	4"	1"	60.34	57.72	55.09	52.47
43254	55754	44254	.5000	1/2"	12.70	1/2"	4"	2"	60.34	57.72	55.09	52.47
43264	55764	44264	.5000	1/2"	12.70	1/2"	6"	1-1/2"	85.46	81.74	78.02	74.31
43274	55774	44274	.5000	1/2"	12.70	1/2"	6"	3"	85.46	81.74	78.02	74.31
43284	55784	44284	.5625	9/16"	14.29	9/16"	6"	2"	117.50	112.39	107.29	102.17
43294	55794	44294	.5625	9/16"	14.29	9/16"	6"	3"	117.50	112.39	107.29	102.17
43304	55804	44304	.6250	5/8"	15.87	5/8"	6"	2"	123.08	117.73	112.38	107.03
43314	55814	44314	.6250	5/8"	15.87	5/8"	6"	3"	123.08	117.73	112.38	107.03
43324	55824	44324	.7500	3/4"	19.05	3/4"	6"	2"	195.29	186.80	178.31	169.82
43334	55834	44334	.7500	3/4"	19.05	3/4"	6"	3"	195.29	186.80	178.31	169.82
43344	55844	44344	1.000	1"	25.40	1"	6"	2"	327.71	313.47	299.22	284.97
43354	55854	44354	1.000	1"	25.40	1"	6"	3"	327.71	313.47	299.22	284.97

720MA (740MA metric) - 2 Flute
723MA (743MA metric) - 3 Flute
730MA (750MA metric) - 4 Flute
 .1181" - .3150"
 (3.00mm - 8.00mm)

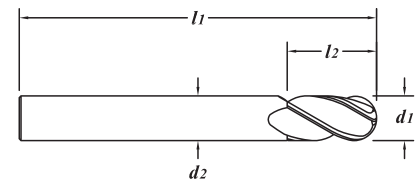
Technical information:
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TOLERANCES		
d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (-.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
Ball radius	+.000" -.001" (+.000 -.025mm)	

Extra Length - Ball End - TiALN Coated

Solid submicron grain carbide end mill - center cutting
 Extended reach
 Dry or semi-dry machining
 Up to 40% faster than uncoated
 Can be modified with a neck within 48 hours
 Extremely versatile
 Uncoated - page 164
 TiCN Coated - page 166



END MILLS

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
			Decimal	Diameter Metric							
97017	98017	99017	.1181	3.00	3.0	50	16	14.00	13.38	12.78	12.17
97027	98027	99027	.1181	3.00	3.0	75	20	22.38	21.40	20.44	19.46
97037	98037	99037	.1181	3.00	3.0	75	25	22.38	21.40	20.44	19.46
43017	55517	44017	.1250	1/8"	3.17	1/8"	2"	14.59	13.96	13.32	12.69
43027	55527	44027	.1250	1/8"	3.17	1/8"	3"	21.85	20.90	19.95	19.00
43037	55537	44037	.1250	1/8"	3.17	1/8"	1"	21.85	20.90	19.95	19.00
97047	98047	99047	.1575	4.00	4.0	50	16	14.96	14.30	13.66	13.00
97057	98057	99057	.1575	4.00	4.0	75	20	24.01	22.97	21.92	20.88
97067	98067	99067	.1575	4.00	4.0	75	25	24.01	22.97	21.92	20.88
43047	55547	44047	.1875	3/16"	4.76	3/16"	1"	24.54	23.47	22.41	21.34
43057	55557	44057	.1875	3/16"	4.76	3/16"	1-1/8"	24.54	23.47	22.41	21.34
43067	55567	44067	.1875	3/16"	4.76	3/16"	4"	26.72	25.55	24.40	23.23
97077	98077	99077	.1969	5.00	5.0	50	16	18.16	17.37	16.58	15.79
97087	98087	99087	.1969	5.00	5.0	75	20	26.74	25.57	24.41	23.25
97097	98097	99097	.1969	5.00	5.0	75	25	26.74	25.57	24.41	23.25
97107	98107	99107	.2362	6.00	6.0	75	25	30.26	28.94	27.63	26.31
97117	98117	99117	.2362	6.00	6.0	100	25	32.38	30.97	29.56	28.15
97127	98127	99127	.2362	6.00	6.0	100	32	32.38	30.97	29.56	28.15
97137	98137	99137	.2362	6.00	6.0	150	38	42.65	40.80	38.94	37.09
43077	55577	44077	.2500	1/4"	6.35	1/4"	1"	28.97	27.72	26.46	25.20
43087	55587	44087	.2500	1/4"	6.35	1/4"	4"	31.02	29.67	28.33	26.98
43097	55597	44097	.2500	1/4"	6.35	1/4"	1-1/2"	31.02	29.67	28.33	26.98
43107	55607	44107	.2500	1/4"	6.35	1/4"	6"	40.89	39.11	37.34	35.56
43117	55617	44117	.3125	5/16"	7.94	5/16"	1"	36.96	35.35	33.75	32.14
43127	55627	44127	.3125	5/16"	7.94	5/16"	4"	42.27	40.42	38.59	36.75
43137	55637	44137	.3125	5/16"	7.94	5/16"	1-5/8"	42.27	40.42	38.59	36.75
43147	55647	44147	.3125	5/16"	7.94	5/16"	1-1/2"	61.71	59.03	56.35	53.66
97147	98147	99147	.3150	8.00	8.0	75	25	38.52	36.85	35.17	33.50
97157	98157	99157	.3150	8.00	8.0	100	25	44.02	42.11	40.20	38.28
97167	98167	99167	.3150	8.00	8.0	100	41	44.02	42.11	40.20	38.28
97177	98177	99177	.3150	8.00	8.0	150	50	63.03	60.29	57.55	54.81

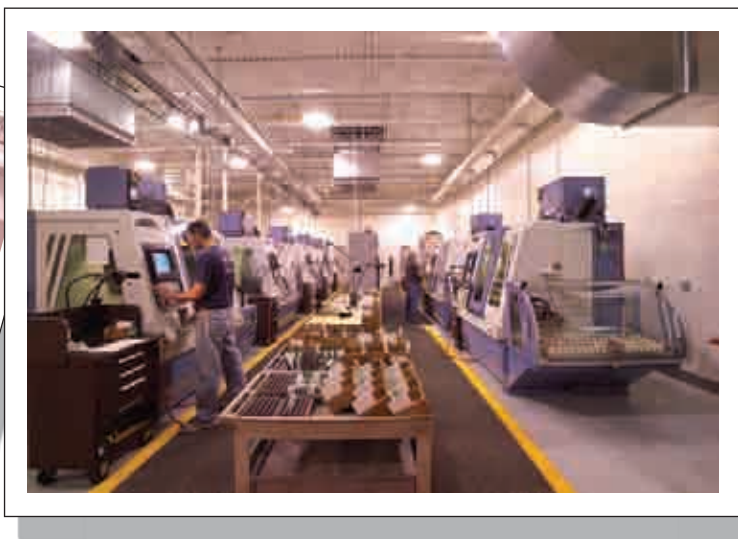
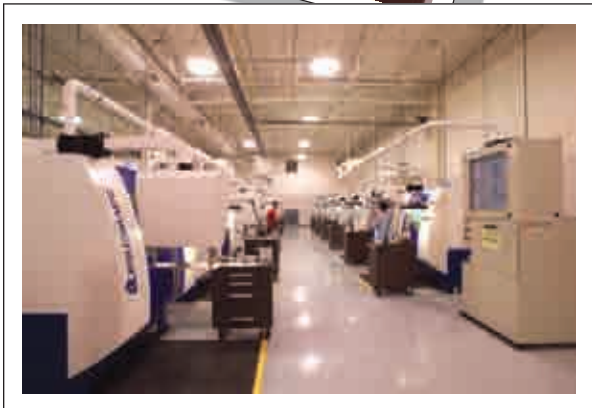
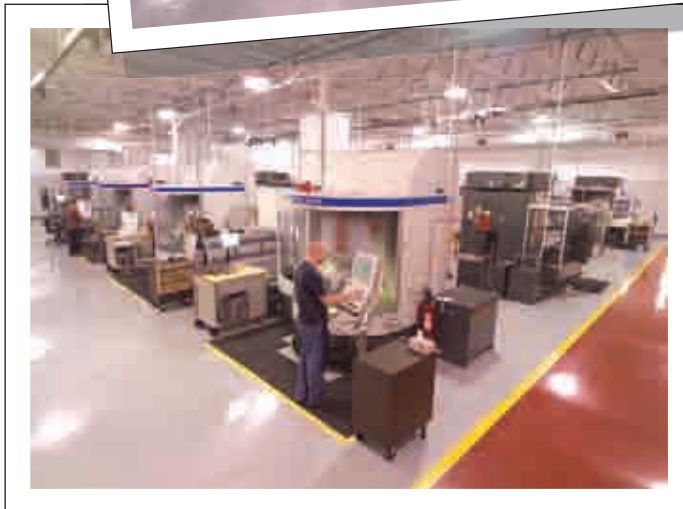
continued →

720MA (740MA metric) - 2 Flute (continued)**723MA (743MA metric) - 3 Flute (continued)****730MA (750MA metric) - 4 Flute (continued)**

.3750" - 1.000"

(9.52mm - 25.40mm)

2 Flute EDP#	3 Flute EDP#	4 Flute EDP#	$d1$ †			$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100
			Decimal	Diameter	Metric							
43157	55657	44157	.3750	3/8"	9.52	3/8"	3"	1"	40.75	38.98	37.20	35.43
43167	55667	44167	.3750	3/8"	9.52	3/8"	4"	1"	45.85	43.86	41.87	39.87
43177	55677	44177	.3750	3/8"	9.52	3/8"	4"	2"	45.85	43.86	41.87	39.87
43187	55687	44187	.3750	3/8"	9.52	3/8"	6"	1-1/2"	63.48	60.73	57.96	55.20
43197	55697	44197	.3750	3/8"	9.52	3/8"	6"	3"	63.48	60.73	57.96	55.20
97187	98187	99187	.3937		10.00	10.0	76	25	44.41	42.47	40.55	38.62
97197	98197	99197	.3937		10.00	10.0	100	25	58.05	55.53	53.01	50.48
97207	98207	99207	.3937		10.00	10.0	100	50	58.05	55.53	53.01	50.48
97217	98217	99217	.3937		10.00	10.0	150	38	75.84	72.54	69.24	65.95
97227	98227	99227	.3937		10.00	10.0	150	75	75.84	72.54	69.24	65.95
43207	55707	44207	.4375	7/16"	11.11	7/16"	4"	1"	61.31	58.65	55.97	53.31
43217	55717	44217	.4375	7/16"	11.11	7/16"	4"	2"	61.31	58.65	55.97	53.31
43227	55727	44227	.4375	7/16"	11.11	7/16"	6"	1-1/2"	80.69	77.19	73.67	70.17
43237	55737	44237	.4375	7/16"	11.11	7/16"	6"	3"	80.69	77.19	73.67	70.17
97237	98237	99237	.4724		12.00	12.0	100	25	65.21	62.37	59.54	56.70
97247	98247	99247	.4724		12.00	12.0	100	50	65.21	62.37	59.54	56.70
97257	98257	99257	.4724		12.00	12.0	150	50	88.26	84.43	80.59	76.75
97267	98267	99267	.4724		12.00	12.0	150	75	88.26	84.43	80.59	76.75
43247	55747	44247	.5000	1/2"	12.70	1/2"	4"	1"	62.41	59.70	56.98	54.27
43257	55757	44257	.5000	1/2"	12.70	1/2"	4"	2"	62.41	59.70	56.98	54.27
43267	55767	44267	.5000	1/2"	12.70	1/2"	6"	1-1/2"	88.26	84.43	80.59	76.75
43277	55777	44277	.5000	1/2"	12.70	1/2"	6"	3"	88.26	84.43	80.59	76.75
97277	98277	99277	.5512		14.00	14.0	100	25	87.56	83.75	79.94	76.14
97287	98287	99287	.5512		14.00	14.0	100	50	87.56	83.75	79.94	76.14
97297	98297	99297	.5512		14.00	14.0	150	50	120.22	114.99	109.77	104.54
97307	98307	99307	.5512		14.00	14.0	150	75	120.22	114.99	109.77	104.54
43287	55787	44287	.5625	9/16"	14.29	9/16"	6"	2"	120.22	114.99	109.77	104.54
43297	55797	44297	.5625	9/16"	14.29	9/16"	6"	3"	120.22	114.99	109.77	104.54
43307	55807	44307	.6250	5/8"	15.87	5/8"	6"	2"	125.81	120.34	114.87	109.40
43317	55817	44317	.6250	5/8"	15.87	5/8"	6"	3"	125.81	120.34	114.87	109.40
97317	98317	99317	.6299		16.00	16.0	150	50	125.81	120.34	114.87	109.40
97327	98327	99327	.6299		16.00	16.0	150	75	125.81	120.34	114.87	109.40
97337	98337	99337	.7087		18.00	18.0	150	50	187.39	179.24	171.09	162.95
97347	98347	99347	.7087		18.00	18.0	150	75	187.39	179.24	171.09	162.95
43327	55827	44327	.7500	3/4"	19.05	3/4"	6"	2"	198.67	190.03	181.40	172.75
43337	55837	44337	.7500	3/4"	19.05	3/4"	6"	3"	198.67	190.03	181.40	172.75
97357	98357	99357	.7874		20.00	20.0	150	50	209.77	200.65	191.53	182.41
97367	98367	99367	.7874		20.00	20.0	150	75	209.77	200.65	191.53	182.41
97377	98377	99377	.9843		25.00	25.0	150	50	318.55	304.70	290.85	277.00
97387	98387	99387	.9843		25.00	25.0	150	75	318.55	304.70	290.85	277.00
43347	55847	44347	1.000	1"	25.40	1"	6"	2"	330.31	315.95	301.59	287.23
43357	55857	44357	1.000	1"	25.40	1"	6"	3"	330.31	315.95	301.59	287.23



SA (1/4" Steel Shank)

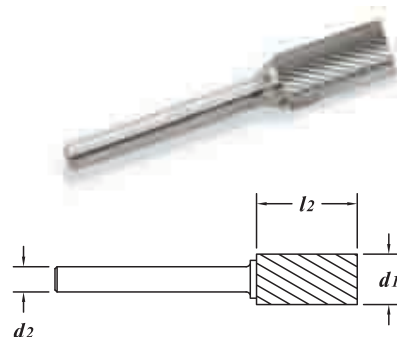
Carbide Rotary Files - Cylindrical Shape

Submicron Grain Carbide

A - Aluminum Cut

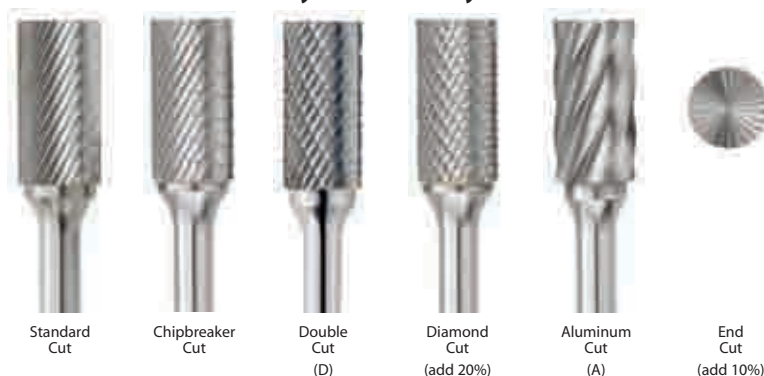
D - Double Cut

* - Solid Carbide



EDP#	TOOL #	d_1 † Diameter			d_2 Shank Diameter	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric						
60010	* SA-14	.1875	3/16"	4.76	1/4"	5/8"	7.91	7.57	7.23	6.88
60012	* SA-14D	.1875	3/16"	4.76	1/4"	5/8"	7.91	7.57	7.23	6.88
60020	* SA-1	.2500	1/4"	6.35	1/4"	5/8"	7.03	6.73	6.42	6.12
60021	* SA-1A	.2500	1/4"	6.35	1/4"	5/8"	8.84	8.46	8.07	7.69
60022	* SA-1D	.2500	1/4"	6.35	1/4"	5/8"	7.03	6.73	6.42	6.12
60030	SA-2	.3125	5/16"	7.94	1/4"	3/4"	9.84	9.41	8.99	8.56
60032	SA-2D	.3125	5/16"	7.94	1/4"	3/4"	9.84	9.41	8.99	8.56
60040	SA-3	.3750	3/8"	9.52	1/4"	3/4"	10.61	10.15	9.68	9.22
60041	SA-3A	.3750	3/8"	9.52	1/4"	3/4"	14.27	13.64	13.03	12.41
60042	SA-3D	.3750	3/8"	9.52	1/4"	3/4"	10.61	10.15	9.68	9.22
60050	SA-4	.4375	7/16"	11.11	1/4"	1"	14.64	14.01	13.37	12.73
60052	SA-4D	.4375	7/16"	11.11	1/4"	1"	14.64	14.01	13.37	12.73
60060	SA-5	.5000	1/2"	12.70	1/4"	1"	15.62	14.94	14.26	13.58
60061	SA-5A	.5000	1/2"	12.70	1/4"	1"	20.24	19.35	18.48	17.60
60062	SA-5D	.5000	1/2"	12.70	1/4"	1"	15.62	14.94	14.26	13.58
60070	SA-6	.6250	5/8"	15.87	1/4"	1"	18.92	18.10	17.27	16.45
60071	SA-6A	.6250	5/8"	15.87	1/4"	1"	31.71	30.33	28.95	27.57
60072	SA-6D	.6250	5/8"	15.87	1/4"	1"	18.92	18.10	17.27	16.45
60080	SA-7	.7500	3/4"	19.05	1/4"	1"	29.95	28.65	27.35	26.04
60081	SA-7A	.7500	3/4"	19.05	1/4"	1"	35.93	34.37	32.81	31.24
60082	SA-7D	.7500	3/4"	19.05	1/4"	1"	29.95	28.65	27.35	26.04
60090	SA-9	1.000	1"	25.40	1/4"	1"	40.85	39.07	37.29	35.53
60091	SA-9A	1.000	1"	25.40	1/4"	1"	49.00	46.87	44.74	42.61
60092	SA-9D	1.000	1"	25.40	1/4"	1"	40.85	39.07	37.29	35.53

Basic Rotary File Cut Styles Available



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

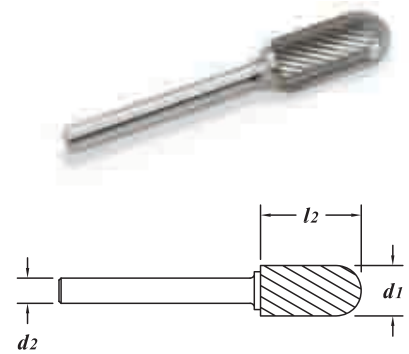
Carbide Rotary Files - Cylindrical-Radius Shape

Submicron Grain Carbide

A - Aluminum Cut

D - Double Cut

* - Solid Carbide



EDP#	TOOL #	$d1$ † Diameter			$d2$ Shank Diameter	$l2$ Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric						
61010	* SC-14	.1875	3/16"	4.76	1/4"	5/8"	8.94	8.56	8.16	7.78
61012	* SC-14D	.1875	3/16"	4.76	1/4"	5/8"	8.94	8.56	8.16	7.78
61020	* SC-1	.2500	1/4"	6.35	1/4"	5/8"	8.43	8.07	7.70	7.33
61021	* SC-1A	.2500	1/4"	6.35	1/4"	5/8"	11.13	10.64	10.16	9.67
61022	* SC-1D	.2500	1/4"	6.35	1/4"	5/8"	8.43	8.07	7.70	7.33
61030	SC-2	.3125	5/16"	7.94	1/4"	3/4"	9.84	9.41	8.99	8.56
61032	SC-2D	.3125	5/16"	7.94	1/4"	3/4"	9.84	9.41	8.99	8.56
61040	SC-3	.3750	3/8"	9.52	1/4"	3/4"	11.49	10.99	10.49	9.99
61041	SC-3A	.3750	3/8"	9.52	1/4"	3/4"	19.88	19.02	18.16	17.30
61042	SC-3D	.3750	3/8"	9.52	1/4"	3/4"	11.49	10.99	10.49	9.99
61050	SC-4	.4375	7/16"	11.11	1/4"	1"	16.60	15.88	15.15	14.44
61052	SC-4D	.4375	7/16"	11.11	1/4"	1"	16.60	15.88	15.15	14.44
61060	SC-5	.5000	1/2"	12.70	1/4"	1"	17.21	16.46	15.71	14.97
61061	SC-5A	.5000	1/2"	12.70	1/4"	1"	26.17	25.03	23.89	22.76
61062	SC-5D	.5000	1/2"	12.70	1/4"	1"	17.21	16.46	15.71	14.97
61070	SC-6	.6250	5/8"	15.87	1/4"	1"	22.98	21.99	20.99	19.99
61071	SC-6A	.6250	5/8"	15.87	1/4"	1"	35.85	34.29	32.73	31.17
61072	SC-6D	.6250	5/8"	15.87	1/4"	1"	22.98	21.99	20.99	19.99
61080	SC-7	.7500	3/4"	19.05	1/4"	1"	33.85	32.38	30.91	29.43
61081	SC-7A	.7500	3/4"	19.05	1/4"	1"	49.77	47.61	45.45	43.28
61082	SC-7D	.7500	3/4"	19.05	1/4"	1"	33.85	32.38	30.91	29.43

SD (1/4" Steel Shank)

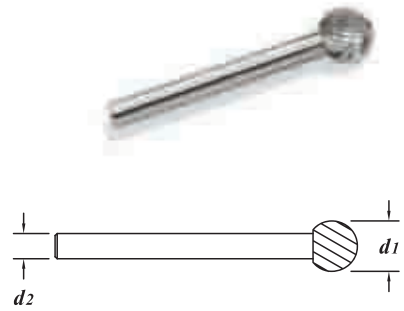
Carbide Rotary Files - Ball Shape

Submicron Grain Carbide

A - Aluminum Cut

D - Double Cut

* - Solid Carbide



EDP#	TOOL #	$d1$ †		$d2$ Shank Diameter	$l2$ Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter						
62010	* SD-14	.1875	3/16"	4.76	1/4"	-	8.94	8.56	7.78
62012	* SD-14D	.1875	3/16"	4.76	1/4"	-	8.94	8.56	7.78
62020	* SD-1	.2500	1/4"	6.35	1/4"	-	8.94	8.56	7.78
62021	* SD-1A	.2500	1/4"	6.35	1/4"	-	14.20	13.58	12.96
62022	* SD-1D	.2500	1/4"	6.35	1/4"	-	8.94	8.56	7.78
62030	SD-2	.3125	5/16"	7.94	1/4"	-	8.43	8.07	7.70
62032	SD-2D	.3125	5/16"	7.94	1/4"	-	8.43	8.07	7.70
62040	SD-3	.3750	3/8"	9.52	1/4"	-	9.14	8.75	8.35
62041	SD-3A	.3750	3/8"	9.52	1/4"	-	14.80	14.15	13.51
62042	SD-3D	.3750	3/8"	9.52	1/4"	-	9.14	8.75	8.35
62050	SD-4	.4375	7/16"	11.11	1/4"	-	13.29	12.71	12.14
62052	SD-4D	.4375	7/16"	11.11	1/4"	-	13.29	12.71	12.14
62060	SD-5	.5000	1/2"	12.70	1/4"	-	13.70	13.10	12.50
62061	SD-5A	.5000	1/2"	12.70	1/4"	-	18.32	17.52	16.73
62062	SD-5D	.5000	1/2"	12.70	1/4"	-	13.70	13.10	12.50
62070	SD-6	.6250	5/8"	15.87	1/4"	-	15.32	14.65	13.99
62071	SD-6A	.6250	5/8"	15.87	1/4"	-	31.71	30.33	28.95
62072	SD-6D	.6250	5/8"	15.87	1/4"	-	15.32	14.65	13.99
62080	SD-7	.7500	3/4"	19.05	1/4"	-	21.82	20.87	19.93
62082	SD-7D	.7500	3/4"	19.05	1/4"	-	21.82	20.87	19.93
62090	SD-9	1.000	1"	25.40	1/4"	-	40.48	38.72	36.96
62092	SD-9D	1.000	1"	25.40	1/4"	-	40.48	38.72	36.96

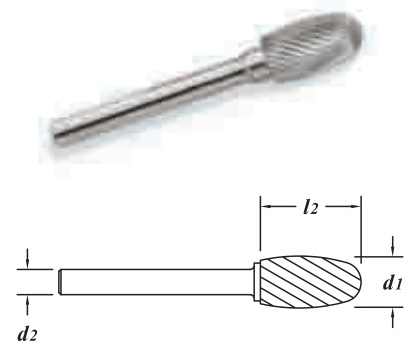
Carbide Rotary Files - Egg Shape

Submicron Grain Carbide

A - Aluminum Cut

D - Double Cut

* - Solid Carbide



EDP#	TOOL #	d_1 † Diameter			d_2 Shank Diameter	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric						
63010	* SE-1	.2500	1/4"	6.35	1/4"	3/8"	9.19	8.80	8.39	8.00
63012	* SE-1D	.2500	1/4"	6.35	1/4"	3/8"	9.19	8.80	8.39	8.00
63020	SE-3	.3750	3/8"	9.52	1/4"	5/8"	12.77	12.22	11.66	11.11
63021	SE-3A	.3750	3/8"	9.52	1/4"	5/8"	18.51	17.71	16.90	16.10
63022	SE-3D	.3750	3/8"	9.52	1/4"	5/8"	12.77	12.22	11.66	11.11
63030	SE-5	.5000	1/2"	12.70	1/4"	7/8"	16.35	15.64	14.92	14.22
63031	SE-5A	.5000	1/2"	12.70	1/4"	7/8"	26.58	25.43	24.27	23.12
63032	SE-5D	.5000	1/2"	12.70	1/4"	7/8"	16.35	15.64	14.92	14.22
63040	SE-6	.6250	5/8"	15.87	1/4"	1"	24.02	22.98	21.93	20.89
63041	SE-6A	.6250	5/8"	15.87	1/4"	1"	39.46	37.74	36.03	34.31
63042	SE-6D	.6250	5/8"	15.87	1/4"	1"	24.02	22.98	21.93	20.89
63050	SE-7	.7500	3/4"	19.05	1/4"	1"	33.09	31.66	30.21	28.78
63052	SE-7D	.7500	3/4"	19.05	1/4"	1"	33.09	31.66	30.21	28.78

SF (1/4" Steel Shank)

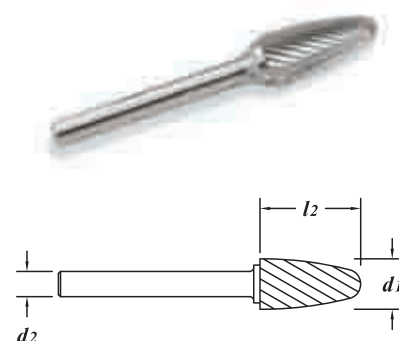
Carbide Rotary Files - Tree-Radius Shape

Submicron Grain Carbide

A - Aluminum Cut

D - Double Cut

* - Solid Carbide



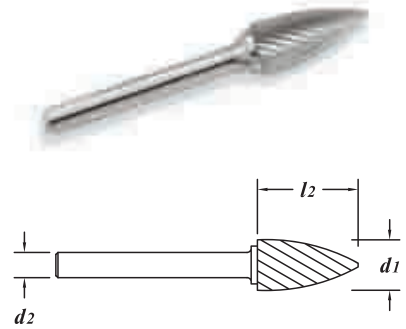
EDP#	TOOL #	$d1$ †			$d2$ Shank Diameter	$l2$ Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric						
64010	* SF-1	.2500	1/4"	6.35	1/4"	5/8"	9.19	8.80	8.39	8.00
64011	* SF-1A	.2500	1/4"	6.35	1/4"	5/8"	14.20	13.58	12.96	12.34
64012	* SF-1D	.2500	1/4"	6.35	1/4"	5/8"	9.19	8.80	8.39	8.00
64020	SF-3	.3750	3/8"	9.52	1/4"	3/4"	11.09	10.61	10.12	9.64
64021	SF-3A	.3750	3/8"	9.52	1/4"	3/4"	17.89	17.11	16.33	15.56
64022	SF-3D	.3750	3/8"	9.52	1/4"	3/4"	11.09	10.61	10.12	9.64
64030	SF-5	.5000	1/2"	12.70	1/4"	1"	16.60	15.88	15.15	14.44
64031	SF-5A	.5000	1/2"	12.70	1/4"	1"	25.30	24.20	23.10	22.01
64032	SF-5D	.5000	1/2"	12.70	1/4"	1"	16.60	15.88	15.15	14.44
64040	SF-6	.6250	5/8"	15.87	1/4"	1"	22.98	21.99	20.99	19.99
64041	SF-6A	.6250	5/8"	15.87	1/4"	1"	35.18	33.65	32.13	30.60
64042	SF-6D	.6250	5/8"	15.87	1/4"	1"	22.98	21.99	20.99	19.99
64050	SF-14	.7500	3/4"	19.05	1/4"	1-1/4"	35.42	33.88	32.34	30.80
64052	SF-14D	.7500	3/4"	19.05	1/4"	1-1/4"	35.42	33.88	32.34	30.80

Carbide Rotary Files - Tree-Pointed Shape

Submicron Grain Carbide

D - Double Cut

* - Solid Carbide

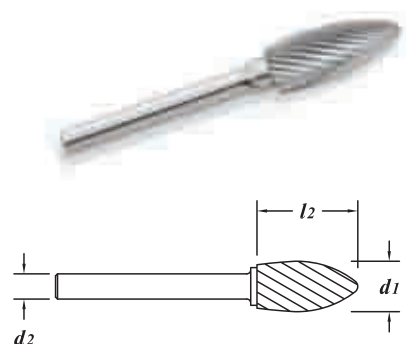


EDP#	TOOL #	d_1 † Diameter			d_2 Shank Diameter	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric						
65010	* SG-1	.2500	1/4"	6.35	1/4"	5/8"	9.19	8.80	8.39	8.00
65012	* SG-1D	.2500	1/4"	6.35	1/4"	5/8"	9.19	8.80	8.39	8.00
65020	SG-3	.3750	3/8"	9.52	1/4"	3/4"	11.82	11.32	10.80	10.29
65022	SG-3D	.3750	3/8"	9.52	1/4"	3/4"	11.82	11.32	10.80	10.29
65030	SG-13	.5000	1/2"	12.70	1/4"	3/4"	15.84	15.15	14.47	13.77
65032	SG-13D	.5000	1/2"	12.70	1/4"	3/4"	15.84	15.15	14.47	13.77
65040	SG-5	.5000	1/2"	12.70	1/4"	1"	16.37	15.66	14.94	14.24
65042	SG-5D	.5000	1/2"	12.70	1/4"	1"	16.37	15.66	14.94	14.24
65050	SG-6	.6250	5/8"	15.87	1/4"	1"	22.98	21.99	20.99	19.99
65052	SG-6D	.6250	5/8"	15.87	1/4"	1"	22.98	21.99	20.99	19.99
65060	SG-7	.7500	3/4"	19.05	1/4"	1"	30.40	29.08	27.76	26.44
65062	SG-7D	.7500	3/4"	19.05	1/4"	1"	30.40	29.08	27.76	26.44

SH (1/4" Steel Shank)

Carbide Rotary Files - Flame Shape

Submicron Grain Carbide
D - Double Cut



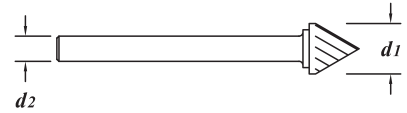
EDP#	TOOL #	d_1 †			d_2 Shank Diameter	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric						
66010	SH-2	.3125	5/16"	7.94	1/4"	3/4"	11.24	10.75	10.26	9.78
66012	SH-2D	.3125	5/16"	7.94	1/4"	3/4"	11.24	10.75	10.26	9.78
66020	SH-5	.5000	1/2"	12.70	1/4"	1-1/4"	22.98	21.99	20.99	19.99
66022	SH-5D	.5000	1/2"	12.70	1/4"	1-1/4"	22.98	21.99	20.99	19.99
66030	SH-6	.6250	5/8"	15.87	1/4"	1-7/16"	30.14	28.83	27.52	26.21
66032	SH-6D	.6250	5/8"	15.87	1/4"	1-7/16"	30.14	28.83	27.52	26.21
66040	SH-7	.7500	3/4"	19.05	1/4"	1-5/8"	37.04	35.43	33.82	32.21
66042	SH-7D	.7500	3/4"	19.05	1/4"	1-5/8"	37.04	35.43	33.82	32.21

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

Submicron Grain Carbide

D - Double Cut

** - Solid Carbide/Double End



EDP#	TOOL #	$d1$ † Diameter		$d2$ Shank Diameter	1-11	12-24	25-49	50-100
		Decimal	Metric					
67010	** SJ-1	.2500	1/4"	6.35	1/4"	11.56	11.07	10.56
67012	** SJ-1D	.2500	1/4"	6.35	1/4"	11.56	11.07	10.56
67020	SJ-3	.3750	3/8"	9.52	1/4"	9.71	9.29	8.87
67022	SJ-3D	.3750	3/8"	9.52	1/4"	9.71	9.29	8.87
67030	SJ-5	.5000	1/2"	12.70	1/4"	11.98	11.46	10.94
67032	SJ-5D	.5000	1/2"	12.70	1/4"	11.98	11.46	10.94
67040	SJ-6	.6250	5/8"	15.87	1/4"	15.96	15.27	14.58
67042	SJ-6D	.6250	5/8"	15.87	1/4"	15.96	15.27	14.58
67050	SJ-7	.7500	3/4"	19.05	1/4"	20.95	20.03	19.13
67052	SJ-7D	.7500	3/4"	19.05	1/4"	20.95	20.03	19.13
67060	SJ-8	.8750	7/8"	22.22	1/4"	31.70	30.32	28.94
67062	SJ-8D	.8750	7/8"	22.22	1/4"	31.70	30.32	28.94
67070	SJ-9	1.000	1"	25.40	1/4"	33.59	32.14	30.67
67072	SJ-9D	1.000	1"	25.40	1/4"	33.59	32.14	30.67

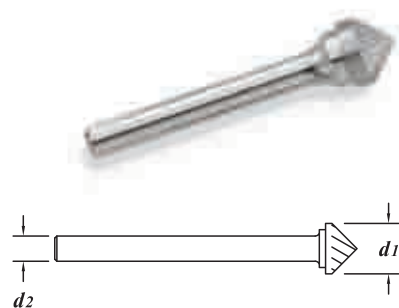
SK (1/4" Steel Shank)

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

Submicron Grain Carbide

D - Double Cut

** - Solid Carbide/Double End



EDP#	TOOL #	d_1 †		d_2 Shank Diameter	1-11	12-24	25-49	50-100
		Decimal	Diameter Metric					
68010	** SK-1	.2500	1/4"	6.35	1/4"	11.56	11.07	10.56
68012	** SK-1D	.2500	1/4"	6.35	1/4"	11.56	11.07	10.56
68020	SK-3	.3750	3/8"	9.52	1/4"	9.71	9.29	8.87
68022	SK-3D	.3750	3/8"	9.52	1/4"	9.71	9.29	8.87
68030	SK-5	.5000	1/2"	12.70	1/4"	11.98	11.46	10.94
68032	SK-5D	.5000	1/2"	12.70	1/4"	11.98	11.46	10.94
68040	SK-6	.6250	5/8"	15.87	1/4"	15.96	15.27	14.58
68042	SK-6D	.6250	5/8"	15.87	1/4"	15.96	15.27	14.58
68050	SK-7	.7500	3/4"	19.05	1/4"	20.95	20.03	19.13
68052	SK-7D	.7500	3/4"	19.05	1/4"	20.95	20.03	19.13
68060	SK-8	.8750	7/8"	22.22	1/4"	31.70	30.32	28.94
68062	SK-8D	.8750	7/8"	22.22	1/4"	31.70	30.32	28.94
68070	SK-9	1.000	1"	25.40	1/4"	33.59	32.14	30.67
68072	SK-9D	1.000	1"	25.40	1/4"	33.59	32.14	30.67

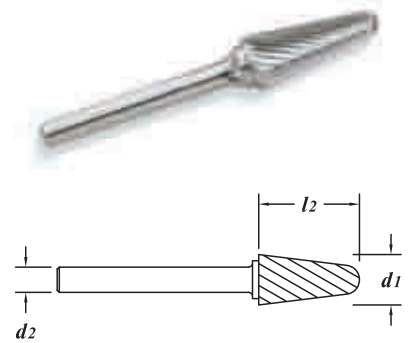
Carbide Rotary Files - Cone-Radius Shape (14° included angle)

Submicron Grain Carbide

A - Aluminum Cut

D - Double Cut

* - Solid Carbide



EDP#	TOOL #	$d1$ †			$d2$ Shank Diameter	$l2$ Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric						
69010	* SL-1	.2500	1/4"	6.35	1/4"	5/8"	9.19	8.80	8.39	8.00
69012	* SL-1D	.2500	1/4"	6.35	1/4"	5/8"	9.19	8.80	8.39	8.00
69020	SL-2	.3125	5/16"	7.94	1/4"	7/8"	10.99	10.51	10.04	9.56
69022	SL-2D	.3125	5/16"	7.94	1/4"	7/8"	10.99	10.51	10.04	9.56
69030	SL-3	.3750	3/8"	9.52	1/4"	1-1/16"	13.02	12.46	11.89	11.33
69031	SL-3A	.3750	3/8"	9.52	1/4"	1-1/16"	21.70	20.76	19.82	18.88
69032	SL-3D	.3750	3/8"	9.52	1/4"	1-1/16"	13.02	12.46	11.89	11.33
69040	SL-4	.5000	1/2"	12.70	1/4"	1-1/8"	15.84	15.15	14.47	13.77
69041	SL-4A	.5000	1/2"	12.70	1/4"	1-1/8"	26.89	25.73	24.55	23.39
69042	SL-4D	.5000	1/2"	12.70	1/4"	1-1/8"	15.84	15.15	14.47	13.77
69050	SL-5	.6250	5/8"	15.87	1/4"	1-3/16"	31.17	29.82	28.45	27.10
69051	SL-5A	.6250	5/8"	15.87	1/4"	1-3/16"	42.44	40.60	38.75	36.91
69052	SL-5D	.6250	5/8"	15.87	1/4"	1-3/16"	31.17	29.82	28.45	27.10
69060	SL-7	.7500	3/4"	19.05	1/4"	1-1/2"	41.13	39.34	37.55	35.77
69062	SL-7D	.7500	3/4"	19.05	1/4"	1-1/2"	41.13	39.34	37.55	35.77

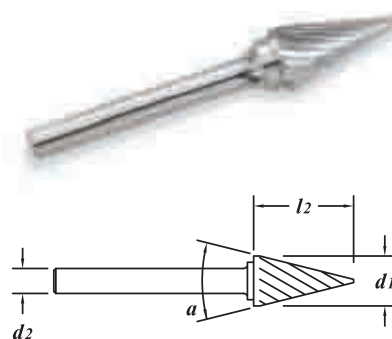
SM (1/4" Steel Shank)

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

Submicron Grain Carbide

D - Double Cut

* - Solid Carbide



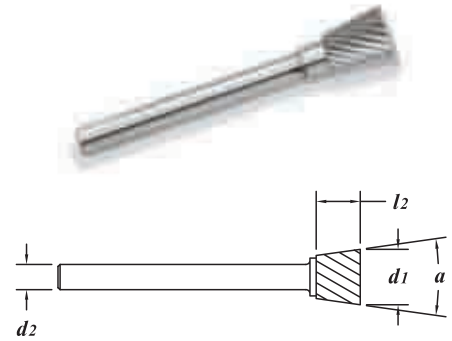
EDP#	TOOL #	$d1$ †			$d2$ Shank Diameter	a Included Angle	$l2$ Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric							
70010	* SM-1	.2500	1/4"	6.35	1/4"	22°	1/2"	9.19	8.80	8.39	8.00
70012	* SM-1D	.2500	1/4"	6.35	1/4"	22°	1/2"	9.19	8.80	8.39	8.00
70020	SM-4	.3750	3/8"	9.52	1/4"	28°	5/8"	13.02	12.46	11.89	11.33
70022	SM-4D	.3750	3/8"	9.52	1/4"	28°	5/8"	13.02	12.46	11.89	11.33
70030	SM-5	.5000	1/2"	12.70	1/4"	28°	7/8"	16.35	15.64	14.92	14.22
70032	SM-5D	.5000	1/2"	12.70	1/4"	28°	7/8"	16.35	15.64	14.92	14.22
70040	SM-6	.6250	5/8"	15.87	1/4"	31°	1"	21.72	20.77	19.82	18.89
70042	SM-6D	.6250	5/8"	15.87	1/4"	31°	1"	21.72	20.77	19.82	18.89

Carbide Rotary Files - Inverted Cone Shape

Submicron Grain Carbide

D - Double Cut

* - Solid Carbide



EDP#	TOOL #	$d1$ †			$d2$ Shank Diameter	a Included Angle	$l2$ Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric							
71010	* SN-1	.2500	1/4"	6.35	1/4"	10°	5/16"	9.19	8.80	8.39	8.00
71012	* SN-1D	.2500	1/4"	6.35	1/4"	10°	5/16"	9.19	8.80	8.39	8.00
71020	SN-2	.3750	3/8"	9.52	1/4"	13°	3/8"	11.49	10.99	10.49	9.99
71022	SN-2D	.3750	3/8"	9.52	1/4"	13°	3/8"	11.49	10.99	10.49	9.99
71030	SN-3	.5000	1/2"	12.70	1/4"	16°	1/2"	15.84	15.15	14.47	13.77
71032	SN-3D	.5000	1/2"	12.70	1/4"	16°	1/2"	15.84	15.15	14.47	13.77
71040	SN-5	.6250	5/8"	15.87	1/4"	19°	5/8"	21.72	20.77	19.82	18.89
71042	SN-5D	.6250	5/8"	15.87	1/4"	19°	5/8"	21.72	20.77	19.82	18.89

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

Solid Carbide Rotary Files

Submicron Grain Carbide
D - Double Cut



EDP#	TOOL #	d_1 †			l_1 Overall Length	α Included Angle	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric							
72010	SA-81	.1875	3/16"	4.76	2"	-	5/8"	10.07	9.63	9.19	8.76
72012	SA-81D	.1875	3/16"	4.76	2"	-	5/8"	10.07	9.63	9.19	8.76
72020	SC-81	.1875	3/16"	4.76	2"	-	5/8"	10.07	9.63	9.19	8.76
72022	SC-81D	.1875	3/16"	4.76	2"	-	5/8"	10.07	9.63	9.19	8.76
72030	SD-81	.1875	3/16"	4.76	2"	-	-	10.07	9.63	9.19	8.76
72032	SD-81D	.1875	3/16"	4.76	2"	-	-	10.07	9.63	9.19	8.76
72040	SE-81	.1875	3/16"	4.76	2"	-	9/32"	10.07	9.63	9.19	8.76
72042	SE-81D	.1875	3/16"	4.76	2"	-	9/32"	10.07	9.63	9.19	8.76
72050	SF-81	.1875	3/16"	4.76	2"	-	1/2"	10.07	9.63	9.19	8.76
72052	SF-81D	.1875	3/16"	4.76	2"	-	1/2"	10.07	9.63	9.19	8.76
72060	SG-81	.1875	3/16"	4.76	2"	-	1/2"	10.07	9.63	9.19	8.76
72062	SG-81D	.1875	3/16"	4.76	2"	-	1/2"	10.07	9.63	9.19	8.76
72070	SJ-81	.1875	3/16"	4.76	2"	60°	-	10.07	9.63	9.19	8.76
72072	SJ-81D	.1875	3/16"	4.76	2"	60°	-	10.07	9.63	9.19	8.76
72080	SK-81	.1875	3/16"	4.76	2"	90°	-	10.07	9.63	9.19	8.76
72082	SK-81D	.1875	3/16"	4.76	2"	90°	-	10.07	9.63	9.19	8.76
72090	SL-81	.1875	3/16"	4.76	2"	14°	1/2"	10.07	9.63	9.19	8.76
72092	SL-81D	.1875	3/16"	4.76	2"	14°	1/2"	10.07	9.63	9.19	8.76
72100	SM-81	.1875	3/16"	4.76	2"	12°	5/8"	10.07	9.63	9.19	8.76
72102	SM-81D	.1875	3/16"	4.76	2"	12°	5/8"	10.07	9.63	9.19	8.76
72110	SN-81	.1875	3/16"	4.76	2"	10°	1/4"	10.07	9.63	9.19	8.76
72112	SN-81D	.1875	3/16"	4.76	2"	10°	1/4"	10.07	9.63	9.19	8.76

Carbide Rotary Files

Submicron Grain Carbide
D - Double Cut



SA-51

SB-51

SC-51

SD-51

SE-51



SF-51

SG-51

SM-51

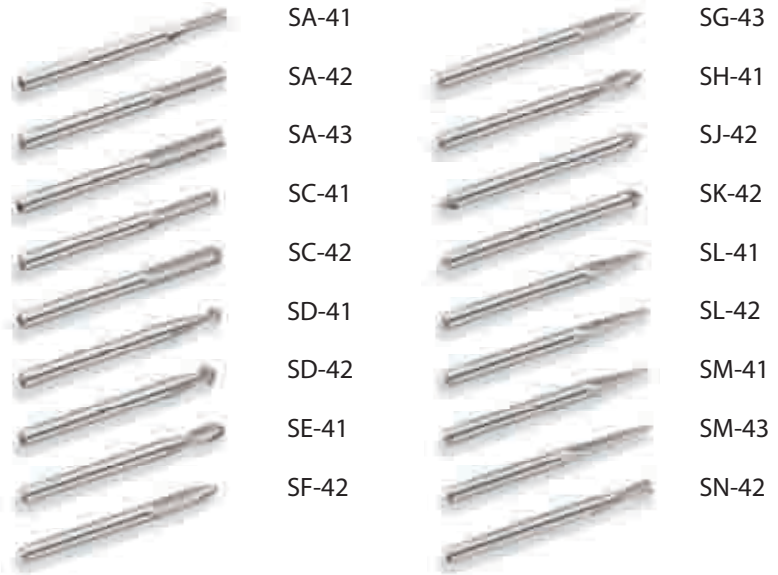
SN-51

EDP#	TOOL #	d_1 † Diameter			a Included Angle	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal		Metric						
73010	SA-51	.2500	1/4"	6.35	-	1/2"	9.62	9.20	8.79	8.36
73012	SA-51D	.2500	1/4"	6.35	-	1/2"	9.62	9.20	8.79	8.36
73020	SB-51	.2500	1/4"	6.35	-	3/16"	9.62	9.20	8.79	8.36
73022	SB-51D	.2500	1/4"	6.35	-	3/16"	9.62	9.20	8.79	8.36
73030	SC-51	.2500	1/4"	6.35	-	1/2"	9.62	9.20	8.79	8.36
73032	SC-51D	.2500	1/4"	6.35	-	1/2"	9.62	9.20	8.79	8.36
73040	SD-51	.2500	1/4"	6.35	-	-	9.62	9.20	8.79	8.36
73042	SD-51D	.2500	1/4"	6.35	-	-	9.62	9.20	8.79	8.36
73050	SE-51	.2500	1/4"	6.35	-	3/8"	9.62	9.20	8.79	8.36
73052	SE-51D	.2500	1/4"	6.35	-	3/8"	9.62	9.20	8.79	8.36
73060	SF-51	.2500	1/4"	6.35	-	1/2"	9.62	9.20	8.79	8.36
73062	SF-51D	.2500	1/4"	6.35	-	1/2"	9.62	9.20	8.79	8.36
73070	SG-51	.2500	1/4"	6.35	-	1/2"	9.62	9.20	8.79	8.36
73072	SG-51D	.2500	1/4"	6.35	-	1/2"	9.62	9.20	8.79	8.36
73080	SM-51	.2500	1/4"	6.35	22°	1/2"	9.62	9.20	8.79	8.36
73082	SM-51D	.2500	1/4"	6.35	22°	1/2"	9.62	9.20	8.79	8.36
73090	SN-51	.2500	1/4"	6.35	10°	1/4"	9.62	9.20	8.79	8.36
73092	SN-51D	.2500	1/4"	6.35	10°	1/4"	9.62	9.20	8.79	8.36

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

Solid Carbide Rotary Files

Submicron Grain Carbide
D - Double Cut



EDP#	TOOL #	d_1 †			l_1 Overall Length	α Included Angle	l_2 Flute Length	1-11	12-24	25-49	50-100
		Decimal	Diameter	Metric							
74010	SA-41	.0625	1/16"	1.59	1-1/2"	-	1/4"	5.69	5.44	5.19	4.95
74012	SA-41D	.0625	1/16"	1.59	1-1/2"	-	1/4"	5.69	5.44	5.19	4.95
74020	SA-42	.0938	3/32"	2.38	1-1/2"	-	7/16"	5.69	5.44	5.19	4.95
74022	SA-42D	.0938	3/32"	2.38	1-1/2"	-	7/16"	5.69	5.44	5.19	4.95
74030	SA-43	.1250	1/8"	3.17	1-1/2"	-	9/16"	5.69	5.44	5.19	4.95
74032	SA-43D	.1250	1/8"	3.17	1-1/2"	-	9/16"	5.69	5.44	5.19	4.95
74040	SC-41	.0938	3/32"	2.38	1-1/2"	-	7/16"	5.69	5.44	5.19	4.95
74042	SC-41D	.0938	3/32"	2.38	1-1/2"	-	7/16"	5.69	5.44	5.19	4.95
74050	SC-42	.1250	1/8"	3.17	1-1/2"	-	9/16"	5.69	5.44	5.19	4.95
74052	SC-42D	.1250	1/8"	3.17	1-1/2"	-	9/16"	5.69	5.44	5.19	4.95
74060	SD-41	.0938	3/32"	2.38	1-1/2"	-	-	5.69	5.44	5.19	4.95
74062	SD-41D	.0938	3/32"	2.38	1-1/2"	-	-	5.69	5.44	5.19	4.95
74070	SD-42	.1250	1/8"	3.17	1-1/2"	-	-	5.69	5.44	5.19	4.95
74072	SD-42D	.1250	1/8"	3.17	1-1/2"	-	-	5.69	5.44	5.19	4.95
74080	SE-41	.1250	1/8"	3.17	1-1/2"	-	7/32"	5.69	5.44	5.19	4.95
74082	SE-41D	.1250	1/8"	3.17	1-1/2"	-	7/32"	5.69	5.44	5.19	4.95
74090	SF-42	.1250	1/8"	3.17	1-1/2"	-	1/2"	5.69	5.44	5.19	4.95
74092	SF-42D	.1250	1/8"	3.17	1-1/2"	-	1/2"	5.69	5.44	5.19	4.95
74100	SG-43	.1250	1/8"	3.17	1-1/2"	-	3/8"	5.69	5.44	5.19	4.95
74102	SG-43D	.1250	1/8"	3.17	1-1/2"	-	3/8"	5.69	5.44	5.19	4.95
74110	SH-41	.1250	1/8"	3.17	1-1/2"	-	1/4"	5.69	5.44	5.19	4.95
74112	SH-41D	.1250	1/8"	3.17	1-1/2"	-	1/4"	5.69	5.44	5.19	4.95
74120	SJ-42	.1250	1/8"	3.17	1-1/2"	60°	-	5.69	5.44	5.19	4.95
74122	SJ-42D	.1250	1/8"	3.17	1-1/2"	60°	-	5.69	5.44	5.19	4.95
74130	SK-42	.1250	1/8"	3.17	1-1/2"	90°	-	5.69	5.44	5.19	4.95
74132	SK-42D	.1250	1/8"	3.17	1-1/2"	90°	-	5.69	5.44	5.19	4.95
74140	SL-41	.1250	1/8"	3.17	1-1/2"	8°	3/8"	5.69	5.44	5.19	4.95
74142	SL-41D	.1250	1/8"	3.17	1-1/2"	8°	3/8"	5.69	5.44	5.19	4.95
74150	SL-42	.1250	1/8"	3.17	1-1/2"	8°	1/2"	5.69	5.44	5.19	4.95
74152	SL-42D	.1250	1/8"	3.17	1-1/2"	8°	1/2"	5.69	5.44	5.19	4.95
74160	SM-41	.1250	1/8"	3.17	1-1/2"	12°	3/8"	5.69	5.44	5.19	4.95
74162	SM-41D	.1250	1/8"	3.17	1-1/2"	12°	3/8"	5.69	5.44	5.19	4.95
74170	SM-43	.1250	1/8"	3.17	1-1/2"	7°	5/8"	5.69	5.44	5.19	4.95
74172	SM-43D	.1250	1/8"	3.17	1-1/2"	7°	5/8"	5.69	5.44	5.19	4.95
74180	SN-42	.1250	1/8"	3.17	1-1/2"	10°	3/16"	5.69	5.44	5.19	4.95
74182	SN-42D	.1250	1/8"	3.17	1-1/2"	10°	3/16"	5.69	5.44	5.19	4.95



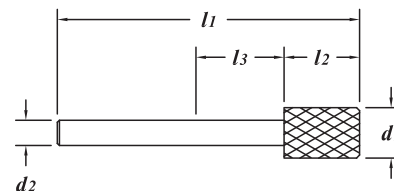
Solid Carbide Grinding Burrs

Submicron Grain Carbide

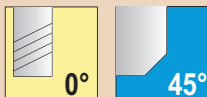
Standard 45° lead chamfer

Head diameter tolerance $+0.002" -0.002"$ ($+0.051\text{mm} -0.051\text{mm}$)

* - Carbide shank brazed to carbide head



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Neck Length	1-11	12-24	25-49	50-100
	Decimal	Metric								
76010	.0480	1.22	1/8"	1-1/2"	1/8"	1/2"	13.57	12.98	12.40	11.80
75010	.0625	1/16"	1/8"	1-1/2"	1/8"	3/8"	13.57	12.98	12.40	11.80
76020	.0790	2.01	1/8"	1-1/2"	1/8"	1/2"	13.57	12.98	12.40	11.80
75020	.0938	3/32"	1/8"	1-1/2"	5/32"	3/8"	13.57	12.98	12.40	11.80
76030	.1100	2.79	1/8"	1-1/2"	5/32"	5/8"	13.57	12.98	12.40	11.80
75030	.1250	1/8"	1/8"	1-1/2"	3/16"	5/8"	12.90	12.33	11.77	11.21
76040	.1410	3.58	3/16"	2"	3/16"	3/4"	19.10	18.27	17.44	16.61
75040	.1562	5/32"	3/16"	2"	1/4"	3/4"	19.10	18.27	17.44	16.61
76050	.1720	4.37	3/16"	2"	7/32"	3/4"	19.10	18.27	17.44	16.61
75050	.1875	3/16"	3/16"	2"	1/4"	3/4"	17.20	16.45	15.70	14.96
76060	.2030	5.16	1/4"	2"	1/4"	3/4"	19.71	18.86	17.99	17.14
75060	.2188	7/32"	1/4"	2"	1/4"	3/4"	19.71	18.86	17.99	17.14
76070	.2350	5.97	1/4"	2"	5/16"	3/4"	19.71	18.86	17.99	17.14
75070	.2500	1/4"	1/4"	2"	5/16"	3/4"	17.89	17.11	16.33	15.56
76080	* .3000	7.62	1/4"	2-1/2"	3/8"	-	28.88	27.62	26.37	25.12
75080	.3125	* 5/16"	1/4"	2-1/2"	3/8"	-	28.88	27.62	26.37	25.12
76090	* .3600	9.14	1/4"	2-1/2"	1/2"	-	30.83	29.48	28.14	26.80
75090	.3750	* 3/8"	1/4"	2-1/2"	1/2"	-	30.83	29.48	28.14	26.80
76100	* .4230	10.74	1/4"	2-1/2"	1/2"	-	33.55	32.09	30.63	29.17
75100	.4375	* 7/16"	1/4"	2-1/2"	1/2"	-	33.55	32.09	30.63	29.17
76110	* .4850	12.32	1/4"	2-1/2"	1/2"	-	34.54	33.04	31.53	30.04



TOLERANCES

d	.0625" - .2500"	+ .0002" - .0000" (+.0050 - .0000mm)
	.2501" - .5000"	+ .0003" - .0000" (+.0075 - .0000mm)

Standard Reamers

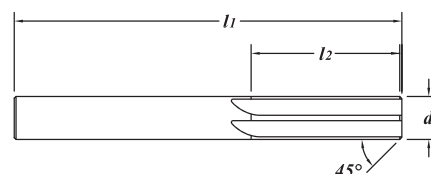
Solid Carbide Submicron Grain

Straight - RHC Flutes

Standard 45° Lead Chamfer

Shank diameter is .003"-.005" smaller than fluted diameter except where indicated by (*)

(*) - No plunge on shank



EDP#	$d^{\dagger}$ Diameter			l_1 Overall Length	l_2 Flute Length	No. of Flutes	1-11	12-24	25-49	50-100
	Decimal		Metric							
96000	.0625	* 1/16"	1.59	1-1/2"	3/8"	4	10.82	10.35	9.88	9.40
96020	.0781	* 5/64"	1.98	1-3/4"	1/2"	4	10.82	10.35	9.88	9.40
96040	.0938	3/32"	2.38	2"	1/2"	4	11.79	11.28	10.76	10.25
96060	.1094	7/64"	2.78	2-1/4"	5/8"	4	13.26	12.69	12.11	11.53
96080	.1250	1/8"	3.17	2-1/4"	5/8"	4	13.36	12.78	12.20	11.62
96100	.1406	9/64"	3.57	2-1/2"	3/4"	4	15.43	14.76	14.09	13.42
96120	.1562	5/32"	3.97	2-1/2"	3/4"	4	16.69	15.96	15.24	14.52
96140	.1719	11/64"	4.37	2-3/4"	7/8"	4	18.57	17.76	16.96	16.15
96160	.1875	3/16"	4.76	2-3/4"	7/8"	4	19.31	18.47	17.64	16.80
96180	.2031	13/64"	5.16	3"	1"	4	22.31	21.34	20.36	19.40
96200	.2188	7/32"	5.56	3"	1"	4	22.31	21.34	20.36	19.40
96220	.2344	15/64"	5.95	3"	1"	4	26.04	24.91	23.77	22.64
96240	.2500	1/4"	6.35	3"	1"	4	27.02	25.84	24.67	23.49
96280	.2812	9/32"	7.14	3-1/4"	1-1/8"	6	31.44	30.08	28.70	27.34
96320	.3125	5/16"	7.94	3-1/4"	1-1/8"	6	34.29	32.80	31.30	29.82
96400	.3750	3/8"	9.52	3-1/2"	1-1/4"	6	46.08	44.08	42.08	40.07
96480	.4375	7/16"	11.11	3-3/4"	1-3/8"	6	57.91	55.39	52.87	50.36
96560	.5000	1/2"	12.70	4"	1-1/2"	6	65.33	62.49	59.65	56.82

Straight - RHC
RHS - RHC
LHS - RHC

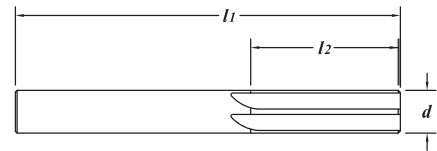
Special Reamers - Solid Carbide - 2 Week Delivery

Solid Carbide Submicron Grain

All reamers furnished with a standard 45° Lead Chamfer

Shank diameter is .003"-.005" smaller than fluted diameter except where indicated by (*)

(*) - No plunge on shank



d_1 † Diameter		l_1 Overall Length	l_2 Flute Length	No. of Flutes
Decimal	Metric			
*.0625" - .0850"	1.59 - 2.16	1-3/4"	1/2"	4
.0851" - .1000"	2.16 - 2.54	2"	5/8"	4
.1001" - .1150"	2.54 - 2.92	2-1/4"	5/8"	4
.1151" - .1300"	2.92 - 3.30	2-1/4"	5/8"	4
.1301" - .1450"	3.30 - 3.68	2-1/2"	3/4"	4
.1451" - .1600"	3.68 - 4.06	2-1/2"	3/4"	4
.1601" - .1750"	4.06 - 4.45	2-3/4"	7/8"	4
.1751" - .1950"	4.45 - 4.95	2-3/4"	7/8"	4
.1951" - .2250"	4.95 - 5.72	3"	1"	4
.2251" - .2550"	5.72 - 6.48	3"	1"	4
.2551" - .2850"	6.48 - 7.24	3-1/4"	1-1/8"	6
.2851" - .3200"	7.24 - 8.13	3-1/4"	1-1/8"	6
.3201" - .3500"	8.13 - 8.89	3-1/2"	1-1/4"	6
.3501" - .3850"	8.89 - 9.78	3-1/2"	1-1/4"	6
.3851" - .4450"	9.78 - 11.30	4"	1-1/2"	6
.4451" - .5000"	11.30 - 12.70	4"	1-1/2"	6

TOLERANCES

<i>d</i>	3mm - 6mm	+0.000" - 0.003" (+0.000 - 0.075mm)
	1/4" - 1"	-0.001" - 0.004" (-0.025 - 0.100mm)

Centerless Ground

Solid Carbide Submicron Grain



EDP#	<i>d</i> †		<i>l</i> Overall Length	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric					
95010	.1181	3.00	38	1.68	1.61	1.54	1.47
53010	.1250	1/8"	3.17	1-1/2"	1.62	1.55	1.48
53020	.1250	1/8"	3.17	2"	2.84	2.71	2.59
53030	.1250	1/8"	3.17	3"	3.17	3.04	2.89
53040	.1250	1/8"	3.17	4"	5.43	5.19	4.96
53050	.1250	1/8"	3.17	6"	8.53	8.15	7.79
53060	.1250	1/8"	3.17	12"	19.19	18.36	17.52
95070	.1575	4.00	50	4.16	3.98	3.80	3.62
53070	.1875	3/16"	4.76	2"	3.59	3.43	3.28
53080	.1875	3/16"	4.76	2-1/2"	5.04	4.83	4.61
53090	.1875	3/16"	4.76	3"	7.04	6.74	6.43
53100	.1875	3/16"	4.76	4"	8.59	8.22	7.84
53110	.1875	3/16"	4.76	6"	12.82	12.26	11.71
53120	.1875	3/16"	4.76	12"	21.87	20.92	19.97
95130	.1969	5.00	65	5.39	5.15	4.92	4.68
95190	.2362	6.00	65	5.77	5.52	5.27	5.02
53130	.2500	1/4"	6.35	2"	4.75	4.54	4.34
53140	.2500	1/4"	6.35	2-1/2"	5.50	5.26	5.02
53150	.2500	1/4"	6.35	3"	8.64	8.27	7.89
53160	.2500	1/4"	6.35	4"	13.66	13.06	12.47
53170	.2500	1/4"	6.35	6"	18.34	17.53	16.74
53180	.2500	1/4"	6.35	12"	34.83	33.31	31.80
53190	.3125	5/16"	7.94	2-1/2"	8.86	8.48	8.09
53200	.3125	5/16"	7.94	3"	14.51	13.87	13.25
53210	.3125	5/16"	7.94	4"	16.58	15.86	15.13
53220	.3125	5/16"	7.94	6"	27.02	25.84	24.67
53230	.3125	5/16"	7.94	12"	45.58	43.60	41.62
95250	.3150	8.00	65	8.86	8.48	8.09	7.71
53240	.3750	3/8"	9.52	2-1/2"	11.95	11.43	10.91
53250	.3750	3/8"	9.52	3"	16.04	15.34	14.64
53260	.3750	3/8"	9.52	3-1/2"	17.12	16.37	15.63
53270	.3750	3/8"	9.52	4"	18.78	17.96	17.15
53280	.3750	3/8"	9.52	6"	31.94	30.54	29.16
53290	.3750	3/8"	9.52	12"	52.97	50.67	48.36
95320	.3937	10.00	70	13.10	12.53	11.96	11.40
53300	.4375	7/16"	11.11	2-1/2"	14.61	13.98	13.34
53310	.4375	7/16"	11.11	3"	19.15	18.31	17.48
53320	.4375	7/16"	11.11	4"	26.33	25.19	24.04
53330	.4375	7/16"	11.11	6"	38.20	36.54	34.88
53340	.4375	7/16"	11.11	12"	78.67	75.24	71.82
95380	.4724	12.00	75	20.87	19.97	19.05	18.15
53350	.5000	1/2"	12.70	3"	19.56	18.71	17.86
53360	.5000	1/2"	12.70	4"	26.98	25.80	24.63
53370	.5000	1/2"	12.70	6"	45.48	43.50	41.53
53380	.5000	1/2"	12.70	12"	101.13	96.73	92.33
53390	.6250	5/8"	15.87	3-1/2"	37.80	36.16	34.52
53400	.6250	5/8"	15.87	4"	52.48	50.20	47.91
53410	.6250	5/8"	15.87	6"	83.03	79.42	75.82
53420	.6250	5/8"	15.87	12"	176.58	168.91	161.23
95440	.6299	16.00	88	37.80	36.16	34.52	32.87
53430	.7500	3/4"	19.05	4"	56.10	53.65	51.22
53440	.7500	3/4"	19.05	6"	110.65	105.83	101.03
53450	.7500	3/4"	19.05	12"	211.70	202.50	193.29
95490	.7874	20.00	100	70.62	67.55	64.48	61.40
95530	.9843	25.00	100	88.11	84.28	80.44	76.62
53460	1.000	1"	25.40	4"	85.95	82.21	78.47
53470	1.000	1"	25.40	6"	192.07	183.72	175.36
53480	1.000	1"	25.40	12"	338.42	323.70	308.98

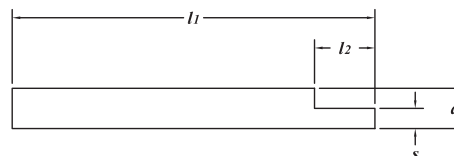
<i>d</i>	1/8" - 3/16"	+0.000" -0.003" (-0.000 -0.075mm)
	1/4" - 1/2"	-0.001" -0.004" (-0.025 -0.100mm)
<i>s</i>	+0.001" -0.000" (+0.025 -0.000mm) from centerline	

Centerless Ground Engraving - Split Single End

Solid Carbide Submicron Grain

For use in engraving or single flute milling

Ready to be finished - blank is non-cutting



EDP#	<i>d</i> †		<i>l</i> ₁ Overall Length	<i>l</i> ₂ Split Length	<i>s</i> Split Depth	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric							
54010	.1250	1/8"	3.17	1-1/2"	3/8"	1/16"	2.96	2.84	2.70
54020	.1250	1/8"	3.17	2"	3/8"	1/16"	4.19	4.00	3.83
54030	.1250	1/8"	3.17	3"	3/8"	1/16"	4.67	4.46	4.26
54040	.1250	1/8"	3.17	4"	3/8"	1/16"	6.79	6.50	6.20
54050	.1250	1/8"	3.17	6"	3/8"	1/16"	9.91	9.48	9.05
54060	.1875	3/16"	4.76	2"	1/2"	3/32"	5.67	5.42	5.18
54070	.1875	3/16"	4.76	2-1/2"	1/2"	3/32"	7.12	6.81	6.50
54080	.1875	3/16"	4.76	3"	1/2"	3/32"	9.14	8.75	8.35
54090	.1875	3/16"	4.76	4"	1/2"	3/32"	10.67	10.20	9.74
54100	.1875	3/16"	4.76	6"	1/2"	3/32"	14.89	14.25	13.59
54110	.2500	1/4"	6.35	2"	1/2"	1/8"	7.98	7.63	7.28
54120	.2500	1/4"	6.35	2-1/2"	1/2"	1/8"	8.72	8.34	7.96
54130	.2500	1/4"	6.35	3"	1/2"	1/8"	11.89	11.37	10.86
54140	.2500	1/4"	6.35	4"	1/2"	1/8"	16.90	16.16	15.43
54150	.2500	1/4"	6.35	6"	1/2"	1/8"	21.58	20.64	19.71
54160	.3125	5/16"	7.94	2-1/2"	1/2"	5/32"	12.30	11.77	11.23
54170	.3125	5/16"	7.94	3"	1/2"	5/32"	17.96	17.18	16.40
54180	.3125	5/16"	7.94	4"	1/2"	5/32"	20.01	19.14	18.27
54190	.3125	5/16"	7.94	6"	1/2"	5/32"	30.45	29.13	27.80
54200	.3750	3/8"	9.52	2-1/2"	1/2"	3/16"	16.66	15.93	15.22
54210	.3750	3/8"	9.52	3"	1/2"	3/16"	20.73	19.82	18.93
54220	.3750	3/8"	9.52	4"	1/2"	3/16"	23.47	22.45	21.43
54230	.3750	3/8"	9.52	6"	1/2"	3/16"	36.65	35.06	33.47
54240	.4375	7/16"	11.11	2-1/2"	5/8"	7/32"	19.83	18.97	18.11
54250	.4375	7/16"	11.11	3"	5/8"	7/32"	24.35	23.29	22.22
54260	.4375	7/16"	11.11	4"	5/8"	7/32"	31.55	30.18	28.81
54270	.4375	7/16"	11.11	6"	5/8"	7/32"	43.40	41.52	39.62
54280	.5000	1/2"	12.70	3"	5/8"	1/4"	26.53	25.38	24.22
54290	.5000	1/2"	12.70	4"	5/8"	1/4"	33.96	32.48	31.00
54300	.5000	1/2"	12.70	6"	5/8"	1/4"	52.46	50.18	47.89

TOLERANCES

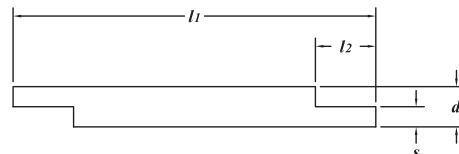
d	1/8" - 3/16"	+0.0000" - .0003" (-.0000 - .0075mm)
	1/4" - 1/2"	-.0001" - .0004" (-.0025 - .0100mm)
s	+.001" - .000" (+.025 - .000mm) from centerline	

Centerless Ground Engraving - Split Double End

Solid Carbide Submicron Grain

For use in engraving or single flute milling

Ready to be finished - blank is non-cutting



EDP#	d1 †		l1	l2	S	1-11	12-24	25-49	50-100
	Decimal	Diameter Metric							
55010	.1250	1/8"	3.17	1-1/2"	3/8"	1/16"	4.34	4.15	3.96
55020	.1250	1/8"	3.17	2"	3/8"	1/16"	5.53	5.29	5.05
55030	.1250	1/8"	3.17	3"	3/8"	1/16"	6.03	5.77	5.51
55040	.1250	1/8"	3.17	4"	3/8"	1/16"	8.16	7.81	7.46
55050	.1250	1/8"	3.17	6"	3/8"	1/16"	11.22	10.73	10.24
55060	.1875	3/16"	4.76	2"	1/2"	3/32"	7.76	7.43	7.08
55070	.1875	3/16"	4.76	2-1/2"	1/2"	3/32"	9.19	8.80	8.39
55080	.1875	3/16"	4.76	3"	1/2"	3/32"	11.21	10.72	10.23
55090	.1875	3/16"	4.76	4"	1/2"	3/32"	12.76	12.21	11.65
55100	.1875	3/16"	4.76	6"	1/2"	3/32"	16.98	16.24	15.51
55110	.2500	1/4"	6.35	2"	1/2"	1/8"	11.21	10.72	10.23
55120	.2500	1/4"	6.35	2-1/2"	1/2"	1/8"	11.95	11.43	10.91
55130	.2500	1/4"	6.35	3"	1/2"	1/8"	15.10	14.45	13.79
55140	.2500	1/4"	6.35	4"	1/2"	1/8"	20.11	19.24	18.37
55150	.2500	1/4"	6.35	6"	1/2"	1/8"	24.79	23.71	22.64
55160	.3125	5/16"	7.94	2-1/2"	1/2"	5/32"	15.76	15.07	14.38
55170	.3125	5/16"	7.94	3"	1/2"	5/32"	21.38	20.46	19.52
55180	.3125	5/16"	7.94	4"	1/2"	5/32"	23.46	22.44	21.42
55190	.3125	5/16"	7.94	6"	1/2"	5/32"	33.87	32.40	30.93
55200	.3750	3/8"	9.52	2-1/2"	1/2"	3/16"	21.34	20.42	19.49
55210	.3750	3/8"	9.52	3"	1/2"	3/16"	25.42	24.32	23.20
55220	.3750	3/8"	9.52	4"	1/2"	3/16"	28.15	26.93	25.71
55230	.3750	3/8"	9.52	6"	1/2"	3/16"	41.32	39.52	37.73
55240	.4375	7/16"	11.11	2-1/2"	5/8"	7/32"	25.03	23.94	22.86
55250	.4375	7/16"	11.11	3"	5/8"	7/32"	29.58	28.29	27.01
55260	.4375	7/16"	11.11	4"	5/8"	7/32"	36.75	35.15	33.56
55270	.4375	7/16"	11.11	6"	5/8"	7/32"	48.61	46.50	44.39
55280	.5000	1/2"	12.70	3"	5/8"	1/4"	33.52	32.06	30.61
55290	.5000	1/2"	12.70	4"	5/8"	1/4"	40.91	39.14	37.36
55300	.5000	1/2"	12.70	6"	5/8"	1/4"	59.45	56.86	54.28



TiN
(Titanium Nitride)

General purpose coating - low heat resistance. Good lubricity.



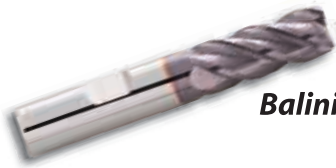
TiCN
(Titanium Carbonitride)

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



TiAlN - Balinit® FUTURA
(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.



Balinit® X.CEED

A single-layer coating whose hardness, oxidation resistance and thermal stability were optimized for material hardness above 52 HRC and high-speed machining of materials that are difficult to work (titanium alloys, Inconel). Competes with ALTiN.



Balinit® 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.



Balinit® HELICA

G6 Generation coating. 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.



ALUMASTAR®
(Titanium Diboride - TiB₂)

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

Improved productivity in composites and non-ferrous metals. Excellent choice for cutting graphite, fiberglass, and silicon-based aluminum. Can be added to a special for milling or drilling applications.

General Solid Carbide Milling Guide

Fractional

Type	Rc Hardness	MILLING SFM (Vc)					CHIPLOAD PER FLUTE (Fz)				
		2 flute stub / std.	2 flute extra length	3 & 4 flute stub / std.	3 & 4 flute extra length	Diamond Coated	1/32" - 1/8"	1/8" - 1/4"	1/4" - 1/2"	1/2" - 1"	1" - 1-1/4"
COBALT BASE ALLOYS											
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35	-	-	175 - 225	150 - 200	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	125 - 175	100 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
NICKEL BASE ALLOYS											
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	-	-	125 - 175	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	70 - 115	70 - 100	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
IRON BASE ALLOYS											
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	-	-	175 - 225	150 - 200	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	125 - 175	100 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
MONEL											
Monel - 65% Nickel		175 - 300	125 - 175	175 - 300	125 - 175	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"	.0040" - .0060"
TITANIUM ALLOYS											
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		200 - 300	125 - 250	200 - 300	125 - 250	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"	.0040" - .0060"
5553 / Beta Titanium		-	-	175 - 225	150 - 200	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
STAINLESS STEELS											
13/8, 15/5, 17-4, pH Types	< 35	-	-	150 - 250	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	125 - 175	80 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
Inox, 200 Series, 300 Series	< 35	-	-	200 - 250	125 - 175	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	150 - 200	100 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
304L, 316L, Nitronic 50, Inox	< 35	-	-	90 - 125	80 - 120	-	.0005" - .0008"	.0008" - .0015"	.0010" - .0020"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	75 - 110	60 - 90	-	.0003" - .0005"	.0005" - .0010"	.0010" - .0015"	.0010" - .0030"	.0020" - .0040"
400 Series	< 35	-	-	150 - 250	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	125 - 175	80 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
HIGH STRENGTH TOOL STEELS											
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30	-	-	150 - 225	125 - 175	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	30 - 38	-	-	90 - 125	80 - 120	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 38	-	-	60 - 90	50 - 80	-	.0002" - .0004"	.0003" - .0007"	.0008" - .0015"	.0010" - .0025"	.0015" - .0035"
MEDIUM ALLOY TOOL STEELS											
200, 250, 300, 8620	< 35	-	-	175 - 250	150 - 200	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"	.0040" - .0060"
	> 35	-	-	100 - 175	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
CARBON STEELS											
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	-	-	175 - 250	150 - 200	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"	.0040" - .0060"
	> 35	-	-	100 - 175	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
CAST MATERIAL											
Steel		225 - 325	175 - 250	250 - 350	175 - 250	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
Ductile Iron		200 - 300	125 - 200	200 - 300	125 - 200	-	.0005" - .0015"	.0010" - .0030"	.0015" - .0040"	.0020" - .0060"	.0030" - .0080"
Gray Iron		225 - 325	175 - 250	250 - 350	175 - 250	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
Aluminum		250 - 350	250 - 350	250 - 350	250 - 350	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
ALUMINUM											
Aircraft Grade (6061, 7075)	Standard Speed	300 - 500	300 - 500	300 - 500	300 - 500	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0150"
	High Speed	(SEE HIGH SPEED ALUMINUM CHART - PAGE 196)									
MAGNESIUM											
		300 - 500	300 - 500	300 - 500	300 - 500	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
COPPER											
Copper Alloys		300 - 400	250 - 350	300 - 450	250 - 350	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0035"	.0020" - .0080"	.0040" - .0100"
BRASS, BRONZE											
Brass, Aluminum/Bronze, Low Silicon Bronze		300 - 400	200 - 300	275 - 375	200 - 300	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0035"	.0020" - .0080"	.0040" - .0100"
COMPOSITE MATERIAL											
Glass Epoxy, Fiberglass, Plastics		200 - 400	200 - 400	200 - 400	200 - 400	200 - 500	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
Graphite, G10		(SEE GRAPHITE CHART - PAGE 202)				300 - 1000	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"

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

High Performance Solid Carbide Milling Guide

Fractional

Type	Rc Hardness	MILLING SFM (Vc)				CHIPLOAD PER FLUTE (Fz)		
		Aluminum Series		All Other High Performance Series		1/8" - 1/4"	1/4" - 1/2"	1/2" - 1"
		Uncoated	Coated	Uncoated	X.Ceed Coated			
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35	-	-	200 - 275	275 - 400	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 35	-	-	125 - 175	175 - 250	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	-	-	150 - 200	200 - 300	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 35	-	-	90 - 125	125 - 200	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
IRON BASE ALLOYS								
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	-	-	200 - 300	250 - 350	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 35	-	-	150 - 200	200 - 250	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
MONEL								
Monel - 65% Nickel		-	-	200 - 300	275 - 400	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"
TITANIUM ALLOYS								
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		200 - 400	400 - 600	250 - 350	300 - 500	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"
5553 / Beta Titanium		-	-	225 - 275	250 - 300	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
STAINLESS STEELS								
13/8, 15/5, 17-4, pH Types	< 35	-	-	200 - 350	250 - 300	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 35	-	-	150 - 250	200 - 250	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
Inox, 200 Series, 300 Series	< 35	-	-	250 - 350	300 - 400	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 35	-	-	175 - 275	225 - 300	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
304L, 316L, Nitronic 50, Inox	< 35	-	-	125 - 200	250 - 300	.0008" - .0015"	.0010" - .0020"	.0020" - .0040"
	> 35	-	-	90 - 125	200 - 250	.0005" - .0010"	.0010" - .0015"	.0010" - .0030"
400 Series	< 35	-	-	200 - 350	250 - 300	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 35	-	-	150 - 250	200 - 250	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30	-	-	225 - 300	250 - 350	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
	30 - 38	-	-	125 - 200	150 - 250	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"
	> 38	(SEE HIGH ROCKWELL CHART - PAGE 198)						
MEDIUM ALLOY TOOL STEELS								
200, 250, 300, 8620	< 35	-	-	250 - 350	250 - 400	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"
	> 35	-	-	150 - 200	150 - 300	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
CARBON STEELS								
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	-	-	250 - 350	300 - 500	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"
	> 35	-	-	150 - 200	250 - 400	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"
CAST MATERIAL								
Steel		-	-	175 - 250	250 - 400	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"
Ductile Iron		-	-	200 - 300	350 - 500	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"
Gray Iron		-	-	175 - 250	300 - 500	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"
Aluminum		300 - 400	350 - 500	300 - 400	-	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"
ALUMINUM								
Aircraft Grade (6061, 7075)	Standard Speed	300 - 500	400 - 700	300 - 500	400 - 600	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"
	High Speed	(SEE HIGH SPEED ALUMINUM CHART - PAGE 196)						
MAGNESIUM								
		300 - 400	300 - 600	300 - 400	350 - 600	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"
COPPER								
Copper Alloys		300 - 400	400 - 600	200 - 400	350 - 600	.0010" - .0025"	.0015" - .0035"	.0020" - .0080"
BRASS, BRONZE								
Brass, Aluminum/Bronze, Low Silicon Bronze		300 - 400	400 - 600	200 - 400	300 - 500	.0010" - .0025"	.0015" - .0035"	.0020" - .0080"

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

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

General Solid Carbide Milling Guide

Metric

Type	Rc Hardness	MILLING M/Min. (Vc)					CHIPLOAD PER FLUTE (Fz)				
		2 flute stub / std.	2 flute extra length	3 & 4 flute stub / std.	3 & 4 flute extra length	DIAMOND COATED	1.0 - 3.0	3.0 - 6.0	6.0 - 12.0	12.0 - 25.0	25.0 - 32.0
COBALT BASE ALLOYS											
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35 > 35	- -	- -	50 - 70 35 - 50	45 - 60 30 - 45	- -	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075	.075 - .125 .050 - .100
NICKEL BASE ALLOYS											
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35 > 35	- -	- -	35 - 50 20 - 35	30 - 45 15 - 25	- -	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075	.075 - .125 .050 - .100
IRON BASE ALLOYS											
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35 > 35	- -	- -	50 - 70 35 - 50	45 - 60 30 - 45	- -	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075	.075 - .125 .050 - .100
MONEL											
Monel - 65% Nickel		50 - 90	35 - 50	50 - 90	35 - 50	-	.015 - .035	.025 - .065	.035 - .100	.075 - .125	.100 - .150
TITANIUM ALLOYS											
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		60 - 90	35 - 75	60 - 90	35 - 75	-	.015 - .035	.025 - .065	.035 - .100	.075 - .125	.100 - .150
5553 / Beta Titanium		-	-	50 - 65	45 - 60	-	.010 - .025	.020 - .050	.025 - .075	.050 - .100	.075 - .125
STAINLESS STEELS											
13/8, 15/5, 17-4, pH Types	< 35 > 35	- -	- -	45 - 75 35 - 50	30 - 45 25 - 45	- -	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075	.075 - .125 .050 - .100
Inox, 200 Series, 300 Series	< 35 > 35	- -	- -	60 - 80 45 - 60	40 - 55 30 - 45	- -	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075	.075 - .125 .050 - .100
304L, 316L, Nitronic 50, Inox	< 35 > 35	- -	- -	25 - 40 20 - 35	25 - 35 15 - 25	- -	.010 - .020 .005 - .015	.020 - .035 .010 - .025	.025 - .050 .025 - .035	.035 - .075 .025 - .050	.050 - .100 .035 - .075
400 Series	< 35 > 35	- -	- -	45 - 75 35 - 50	30 - 45 25 - 40	- -	.010 - .025 .005 - .015	.020 - .050 .010 - .035	.025 - .075 .025 - .050	.050 - .100 .025 - .075	.075 - .125 .050 - .100
HIGH STRENGTH TOOL STEELS											
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30	-	-	45 - 60	35 - 50	-	.010 - .025	.020 - .050	.025 - .075	.050 - .100	.075 - .125
	30 - 38	-	-	30 - 45	25 - 35	-	.005 - .015	.010 - .035	.025 - .050	.025 - .075	.050 - .100
	> 38	-	-	15 - 30	10 - 25	-	.003 - .008	.005 - .020	.015 - .040	.020 - .065	.035 - .090
MEDIUM ALLOY TOOL STEELS											
200, 250, 300, 8620	< 35 > 35	- -	- -	55 - 75 35 - 55	45 - 60 30 - 45	- -	.015 - .035 .010 - .025	.025 - .065 .020 - .050	.035 - .100 .025 - .075	.075 - .125 .050 - .100	.100 - .150 .075 - .125
CARBON STEELS											
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35 > 35	- -	- -	55 - 75 35 - 55	45 - 60 30 - 45	- -	.015 - .035 .010 - .025	.025 - .065 .020 - .050	.035 - .100 .025 - .075	.075 - .125 .050 - .100	.100 - .150 .075 - .125
CAST MATERIAL											
Steel		70 - 100	50 - 75	75 - 105	50 - 75	-	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .250
Ductile Iron		60 - 90	35 - 60	60 - 90	35 - 60	-	.015 - .035	.025 - .075	.035 - .100	.050 - .150	.075 - .200
Gray Iron		70 - 100	50 - 75	75 - 105	50 - 75	-	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .250
Aluminum		75 - 105	75 - 105	75 - 105	75 - 105	-	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .250
ALUMINUM											
Aircraft Grade (6061, 7075)	Standard Speed	90 - 150	90 - 150	90 - 150	90 - 150	-	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .300
	High Speed	(SEE HIGH SPEED ALUMINUM CHART - PAGE 196)									
MAGNESIUM											
		90 - 150	90 - 150	90 - 150	90 - 150	-	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .250
COPPER											
Copper Alloys		120 - 150	75 - 105	90 - 135	75 - 105	-	.020 - .040	.025 - .065	.040 - .090	.050 - .200	.075 - .250
BRASS, BRONZE											
Brass, Aluminum/Bronze, Low Silicon Bronze		90 - 120	60 - 90	75 - 115	60 - 90	-	.020 - .040	.025 - .065	.040 - .090	.050 - .200	.075 - .250
COMPOSITE MATERIAL											
Glass Epoxy, Fiberglass, Plastics		60 - 120	60 - 120	60 - 120	60 - 120	60 - 150	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .250
Graphite, G10		(SEE GRAPHITE CHART - PAGE 202)				90 - 300	.025 - .050	.035 - .100	.050 - .150	.075 - .250	.125 - .250

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

High Performance Solid Carbide Milling Guide

Metric

Type	Rc Hardness	MILLING M/Min. (Vc)				CHIPLOAD PER FLUTE (Fz)		
		Aluminum Series		All Other High Performance Series		3.0 - 6.0	6.0 - 12.0	12.0 - 25.0
		Uncoated	Coated	Uncoated	X.Ceed Coated			
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-4, L-605	< 35	-	-	60 - 80	80 - 120	.020 - .050	.025 - .075	.050 - .100
	> 35	-	-	40 - 50	50 - 75	.010 - .035	.025 - .050	.025 - .075
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	-	-	45 - 60	60 - 90	.020 - .050	.025 - .075	.050 - .100
	> 35	-	-	25 - 40	40 - 60	.010 - .035	.025 - .050	.025 - .075
IRON BASE ALLOYS								
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	-	-	60 - 90	75 - 105	.020 - .050	.025 - .075	.050 - .100
	> 35	-	-	45 - 60	60 - 75	.010 - .035	.025 - .050	.025 - .075
MONEL								
Monel - 65% Nickel		-	-	60 - 90	80 - 120	.025 - .065	.035 - .100	.075 - .125
TITANIUM ALLOYS								
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		60 - 120	120 - 180	75 - 105	90 - 150	.025 - .065	.035 - .100	.075 - .125
5553 / Beta Titanium		-	-	65 - 80	75 - 90	.020 - .050	.025 - .075	.050 - .100
STAINLESS STEELS								
13/8, 15/5, 17-4, pH Types	< 35	-	-	60 - 105	75 - 90	.020 - .050	.025 - .075	.050 - .100
	> 35	-	-	45 - 75	60 - 75	.010 - .035	.025 - .050	.025 - .075
Inox, 200 Series, 300 Series	< 35	-	-	75 - 105	90 - 120	.020 - .050	.025 - .075	.050 - .100
	> 35	-	-	50 - 80	65 - 90	.010 - .035	.025 - .050	.025 - .075
304L, 316L, Nitronic 50, Inox	< 35	-	-	40 - 60	75 - 90	.020 - .035	.025 - .050	.035 - .075
	> 35	-	-	25 - 40	60 - 75	.010 - .025	.025 - .035	.025 - .050
400 Series	< 35	-	-	60 - 105	75 - 90	.020 - .050	.025 - .075	.050 - .100
	> 35	-	-	45 - 75	60 - 75	.010 - .035	.025 - .050	.025 - .075
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30	-	-	65 - 90	75 - 105	.020 - .050	.025 - .075	.050 - .100
	30 - 38	-	-	40 - 60	45 - 75	.010 - .035	.025 - .050	.025 - .075
	> 38	(SEE HIGH ROCKWELL CHART - PAGE 199)						
MEDIUM ALLOY TOOL STEELS								
200, 250, 300, 8620	< 35	-	-	75 - 105	75 - 120	.025 - .065	.035 - .100	.075 - .125
	> 35	-	-	45 - 60	45 - 90	.020 - .050	.025 - .075	.050 - .100
CARBON STEELS								
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	-	-	75 - 105	90 - 150	.025 - .065	.035 - .100	.075 - .125
	> 35	-	-	45 - 60	75 - 120	.020 - .050	.025 - .075	.050 - .100
CAST MATERIAL								
Steel		-	-	50 - 75	75 - 120	.035 - .100	.050 - .150	.075 - .250
Ductile Iron		-	-	60 - 90	105 - 150	.035 - .100	.050 - .150	.075 - .250
Gray Iron		-	-	50 - 75	90 - 150	.035 - .100	.050 - .150	.075 - .250
Aluminum		90 - 120	90 - 150	90 - 120	-	.035 - .100	.050 - .150	.075 - .250
ALUMINUM								
Aircraft Grade (6061, 7075)	Standard Speed	90 - 150	120 - 210	90 - 150	120 - 180	.035 - .100	.050 - .150	.075 - .250
	High Speed	(SEE HIGH SPEED ALUMINUM CHART - PAGE 196)						
MAGNESIUM								
		90 - 120	90 - 180	90 - 120	105 - 180	.035 - .100	.050 - .150	.075 - .250
COPPER								
Copper Alloys		90 - 120	120 - 180	60 - 120	105 - 180	.025 - .065	.040 - .090	.050 - .200
BRASS, BRONZE								
Brass, Aluminum/Bronze, Low Silicon Bronze		90 - 120	120 - 180	60 - 120	90 - 150	.025 - .065	.040 - .090	.050 - .200

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

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

GARR TOOL End Mill Application Guide for Aircraft Grade Aluminum

Fractional

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

Metric

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

CPT = Chipload per flute (Fz)

END MILL NOTES: Climb milling recommended for best finish
 Figures shown are based on 6061 / 7075
 CAT 50 Taper holders are recommended for 3/4" and 1" diameter end mills
 In controlled slotting tests, 4000 SFM, 1% diameter Chipload Per Flute, and 50% of Dia. axial depth were obtained
 In cases for tools with slower SFM (M/Min.), reference Series 242M/842M, page 62

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

GARR TOOL VRX/VHM Series End Mills

Application Guide

Fractional

Material	Rc	SFM (Vc)	CHIPLOAD PER FLUTE Recommendations (Fz)									*Profiling	Slotting
			1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	Radial	Axial
Stainless Steel: 303		290-375	.0004"-.0008"	.0008"-.0010"	.0010"-.0015"	.0013"-.0020"	.0015"-.0020"	.0020"-.0030"	.0025"-.0035"	.0030"-.0040"	.0035"-.0045"	1 x D	1 x D
Stainless Steel: 304, 316, 400 Series, Kovar, Invar		250-300	.0003"-.0006"	.0006"-.0010"	.0008"-.0015"	.0010"-.0020"	.0012"-.0020"	.0015"-.0020"	.0020"-.0025"	.0025"-.0030"	.0025"-.0035"	1 x D	1 x D
Stainless Steel: 304L, 316L, 17/4, 15/5, 13/8, PH Materials	<35	250-300	.0003"-.0006"	.0006"-.0008"	.0007"-.0010"	.0010"-.0015"	.0015"-.0020"	.0015"-.0025"	.0020"-.0030"	.0025"-.0035"	.0030"-.0040"	1 x D	1 x D
	>35	200-250	.0003"-.0006"	.0006"-.0008"	.0007"-.0010"	.0008"-.0010"	.0010"-.0015"	.0010"-.0020"	.0015"-.0025"	.0020"-.0030"	.0020"-.0030"	0.5 x D	0.5 x D
High Temperature Alloys: Inconel 625/718, A286	<35	125-175	.0004"-.0008"	.0008"-.0010"	.0010"-.0015"	.0012"-.0020"	.0020"-.0025"	.0025"-.0030"	.0030"-.0035"	.0030"-.0035"	.0030"-.0040"	0.5 x D	0.3 x D
	>35	80-100	.0003"-.0006"	.0007"-.0010"	.0008"-.0010"	.0010"-.0015"	.0010"-.0015"	.0010"-.0015"	.0012"-.0020"	.0015"-.0025"	.0015"-.0025"	0.2 x D	0.2 x D
Titanium: 6AL4V, CP		150-200	.0004"-.0008"	.0008"-.0010"	.0010"-.0015"	.0010"-.0020"	.0015"-.0020"	.0020"-.0030"	.0025"-.0030"	.0030"-.0035"	.0030"-.0040"	1 x D	1 x D
Carbon Steels: 1000 Series	<35	400-600	.0004"-.0008"	.0008"-.0010"	.0010"-.0015"	.0010"-.0020"	.0015"-.0020"	.0020"-.0030"	.0025"-.0035"	.0030"-.0040"	.0035"-.0045"	0.3 x D	0.5 x D
	>35	275-425	.0003"-.0006"	.0006"-.0008"	.0008"-.0012"	.0010"-.0015"	.0010"-.0020"	.0015"-.0025"	.0020"-.0025"	.0020"-.0030"	.0025"-.0035"	0.3 x D	0.5 x D
High Strength Tool Steel: 4130, 4140, A2, D2, P20, H13	<30	250-350	.0003"-.0006"	.0006"-.0010"	.0008"-.0015"	.0010"-.0020"	.0012"-.0020"	.0015"-.0022"	.0020"-.0025"	.0025"-.0030"	.0025"-.0035"	0.5 x D	1 x D
	30-38	150-200	.0003"-.0006"	.0006"-.0008"	.0007"-.0010"	.0008"-.0010"	.0010"-.0015"	.0010"-.0020"	.0015"-.0025"	.0020"-.0030"	.0020"-.0030"	0.3 x D	1 x D
	>38	(SEE HIGH ROCKWELL CHART - PAGE 198)											
Gray Cast Iron		400-500	.0005"-.0010"	.0010"-.0020"	.0010"-.0020"	.0015"-.0020"	.0015"-.0025"	.0020"-.0035"	.0025"-.0035"	.0030"-.0040"	.0040"-.0050"	1 x D	1 x D

Metric

Material	Rc	M/Min. (Vc)	CHIPLOAD PER FLUTE - Metric Recommendations (Fz)									*Profiling	Slotting
			3.0	5.0	6.0	8.0	10.0	12.0	16.0	20.0	25.0	Radial	Axial
Stainless Steel: 303		90-115	.010-.020	.020-.025	.025-.038	.033-.050	.038-.050	.050-.076	.063-.089	.076-.102	.089-.114	1 x D	1 x D
Stainless Steel: 304, 316, 400 Series, Kovar, Invar		75-90	.008-.015	.015-.025	.020-.038	.025-.050	.030-.050	.038-.050	.050-.063	.063-.076	.063-.089	1 x D	1 x D
Stainless Steel: 304L, 316L, 17/4, 15/5, 13/8, PH Materials	<35	75-85	.008-.015	.015-.020	.018-.025	.025-.038	.038-.050	.038-.063	.050-.076	.063-.089	.076-.102	1 x D	1 x D
	>35	60-75	.008-.015	.015-.020	.018-.025	.020-.025	.025-.038	.025-.050	.038-.063	.050-.076	.050-.076	.5 x D	.5 x D
High Temperature Alloys: Inconel 625/718, A286	<35	40-55	.010-.020	.020-.025	.025-.038	.030-.050	.050-.063	.063-.076	.076-.089	.076-.089	.076-.102	.5 x D	.3 x D
	>35	25-30	.008-.015	.018-.025	.020-.025	.025-.038	.025-.038	.025-.038	.030-.050	.038-.063	.038-.063	.2 x D	.2 x D
Titanium: 6AL4V, CP		45-60	.010-.020	.020-.025	.025-.038	.025-.050	.038-.050	.050-.076	.063-.076	.076-.089	.076-.102	1 x D	1 x D
Carbon Steels: 1000 Series	<35	125-185	.010-.020	.020-.025	.025-.038	.025-.050	.038-.050	.050-.076	.063-.089	.076-.102	.089-.114	.3 x D	.5 x D
	>35	85-130	.008-.015	.015-.020	.020-.030	.025-.038	.025-.050	.038-.063	.050-.063	.050-.076	.063-.089	.3 x D	.5 x D
High Strength Tool Steel: 4130, 4140, A2, D2, P20, H13	<30	75-110	.008-.015	.015-.025	.020-.038	.025-.050	.030-.050	.038-.056	.050-.063	.063-.076	.063-.089	.5 x D	1 x D
	30-38	45-60	.006-.015	.015-.020	.018-.025	.020-.025	.025-.038	.025-.050	.038-.063	.050-.076	.050-.076	.3 x D	1 x D
	>38	(SEE HIGH ROCKWELL CHART - PAGE 199)											
Gray Cast Iron		125-150	.013-.025	.025-.050	.025-.050	.038-.050	.038-.063	.050-.089	.063-.089	.076-.102	.102-.127	1 x D	1 x D

* For profiling, axial = 1xD

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

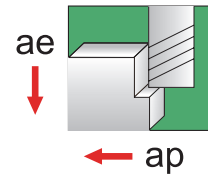
GARR TOOL Milling Guide for High Rc Finishers in Hardened Steel (*Fractional*)

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

	38 - 45 HRc		45 - 50 HRc		50 - 55 HRc		55 - 60 HRc		60 - 65 HRc		65 - 70 HRc	
	SFM = 450		SFM = 250		SFM = 175		SFM = 125		SFM = 75		SFM = 60	
DIAMETER	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)
1/8"	13750	.0009"	7650	.0008"	5350	.0006"	3820	.0005"	2300	.0004"	1850	.0003"
3/16"	9200	.0012"	5100	.0010"	3570	.0008"	2550	.0007"	1530	.0006"	1225	.0004"
1/4"	6900	.0015"	3850	.0012"	2675	.0010"	1910	.0008"	1150	.0007"	925	.0006"
3/8"	4600	.0018"	2550	.0015"	1800	.0012"	1275	.0010"	765	.0009"	615	.0008"
1/2"	3450	.0022"	1950	.0018"	1350	.0014"	955	.0012"	575	.0012"	460	.0010"
5/8"	2750	.0027"	1550	.0022"	1100	.0020"	765	.0018"	460	.0015"	370	.0013"
3/4"	2300	.0030"	1275	.0027"	900	.0025"	640	.0022"	390	.0017"	310	.0017"
1"	1720	.0033"	960	.0030"	675	.0027"	480	.0025"	290	.0023"	230	.0019"

	Profiling / Side Cutting
Axial (ae)	1xD
Radial (ap)	5% of Dia.

	Slotting / Pocket Milling
Axial (ae)	5% of Dia.
Radial (ap)	1xD



High Speed Machining

	38 - 45 HRc		45 - 50 HRc		50 - 55 HRc		55 - 60 HRc		60 - 65 HRc		65 - 70 HRc	
	SFM = 1200		SFM = 1000		SFM = 800		SFM = 600		SFM = 450		SFM = 375	
DIAMETER	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)
1/8"	36670	.0006"	30600	.0005"	24500	.0004"	18340	.0004"	13750	.0003"	11460	.0002"
3/16"	24450	.0009"	20400	.0008"	16300	.0006"	12230	.0005"	9200	.0004"	7650	.0003"
1/4"	18340	.0012"	15300	.0010"	12230	.0008"	9200	.0007"	6900	.0005"	5750	.0004"
3/8"	12225	.0015"	10200	.0012"	8150	.0010"	6100	.0008"	4600	.0007"	3850	.0006"
1/2"	9170	.0018"	7650	.0015"	6100	.0012"	4600	.0010"	3450	.0009"	2870	.0008"
5/8"	7335	.0022"	6100	.0018"	4900	.0014"	3700	.0012"	2750	.0011"	2300	.0010"
3/4"	6115	.0027"	5100	.0022"	4100	.0020"	3100	.0018"	2300	.0014"	1900	.0013"
1"	4585	.0030"	3820	.0027"	3100	.0025"	2300	.0022"	1720	.0019"	1450	.0017"

	Profiling / Side Cutting
Axial (ae)	1xD
Radial (ap)	2% of Dia.

	Slotting / Pocket Milling
Axial (ae)	2% of Dia.
Radial (ap)	1xD

D = Tool Diameter

Example: 2% of Dia., when D = 1/2" (.02 x .500") = .010" per pass

Preferable method is to run tools with air blast to keep chips away from the cutting edge.
If air is not available, either coolant spray or dry machining is acceptable.

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

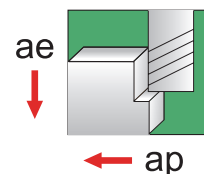
GARR TOOL Milling Guide for High Rc Finishers in Hardened Steel (*Metric*)

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

	38 - 45 HRC		45 - 50 HRC		50 - 55 HRC		55 - 60 HRC		60 - 65 HRC		65 - 70 HRC	
	M/Min. = 135		M/Min. = 75		M/Min. = 50		M/Min. = 40		M/Min. = 25		M/Min. = 20	
DIAMETER	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)
3.0	14500	.025	8100	.020	5650	.015	4050	.010	2400	.008	1950	.007
4.0	10900	.030	6100	.025	4200	.020	3000	.015	1800	.010	1450	.008
6.0	7300	.035	4050	.030	2800	.025	2000	.020	1200	.015	970	.010
8.0	5450	.040	3000	.035	2100	.030	1500	.025	900	.020	725	.015
12.0	3650	.055	2000	.045	1400	.035	1000	.030	600	.025	480	.020
16.0	2700	.065	1500	.055	1050	.050	750	.045	450	.030	360	.025
18.0	2400	.075	1350	.065	950	.060	675	.055	400	.045	320	.030
20.0	2150	.078	1200	.070	850	.065	600	.058	360	.050	290	.040
25.0	1750	.080	1000	.075	700	.070	500	.060	300	.055	250	.045

	Profiling / Side Cutting
Axial (ae)	1xD
Radial (ap)	5% of Dia.

	Slotting / Pocket Milling
Axial (ae)	5% of Dia.
Radial (ap)	1xD



High Speed Machining

	38 - 45 HRC		45 - 50 HRC		50 - 55 HRC		55 - 60 HRC		60 - 65 HRC		65 - 70 HRC	
	M/Min. = 365		M/Min. = 305		M/Min. = 240		M/Min. = 180		M/Min. = 135		M/Min. = 115	
DIAMETER	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)	RPM	CPT (Fz)
3.0	38800	.020	32300	.015	25800	.008	19400	.008	14500	.007	12100	.005
4.0	29100	.025	24200	.020	19400	.015	14500	.010	10900	.008	9100	.007
6.0	19400	.030	16100	.025	12900	.020	9700	.015	7300	.010	6050	.008
8.0	14500	.035	12100	.030	9700	.025	7250	.020	5450	.015	4500	.010
12.0	9700	.045	8075	.035	6450	.030	4850	.025	3650	.020	3000	.015
16.0	7250	.055	6050	.045	4850	.035	3600	.030	2700	.025	2300	.020
18.0	6450	.065	5400	.055	4300	.050	3200	.045	2400	.030	2000	.025
20.0	5800	.070	4850	.060	3850	.055	2900	.050	2150	.040	1800	.028
25.0	4650	.075	3870	.065	3100	.060	2300	.055	1750	.045	1450	.030

	Profiling / Side Cutting
Axial (ae)	1xD
Radial (ap)	2% of Dia.

	Slotting / Pocket Milling
Axial (ae)	2% of Dia.
Radial (ap)	1xD

D = Tool Diameter

Example: 2% of Dia., when D = 12mm (.02 x 12mm) = .24mm per pass

Preferable method is to run tools with air blast to keep chips away from the cutting edge.
If air is not available, either coolant spray or dry machining is acceptable.

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

Speed and Feed Recommendations for Cutting Die Molds (*Fractional*)

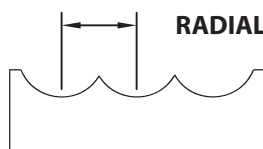
Roughing

(Reference series: VRX, 350MX)

DIAMETER	RPM		CHIPLOAD PER FLUTE (Fz)	
	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

DIAMETER	RPM		CHIPLOAD PER FLUTE (Fz)	
	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 (ap)

AXIAL DEPTH OF CUT (ae)



Roughing	
Axial (ae)	15% - 25% of Dia.
Radial (ap)	20% - 30% of Dia.

Semi-Finishing	
Axial (ae)	5% - 8% of Dia.
Radial (ap)	2% - 5% of Dia.

Finishing	
Axial (ae)	1% - 3% of Dia.
Radial (ap)	.5% - 1% of Dia.

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

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

Speed and Feed Recommendations for Cutting Die Molds (Metric)

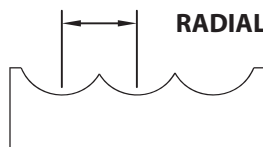
Roughing

(Reference series: VRX, 950MX)

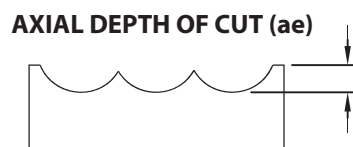
DIAMETER	RPM		CHIPLOAD PER FLUTE (Fz)	
	40 - 50 HRc	50 - 60 HRc	40 - 50 HRc	50 - 60 HRc
1.0	20,000 - 40,000	20,000 - 40,000	.013 - .018	.010 - .013
1.5	20,000 - 40,000	20,000 - 40,000	.025 - .038	.020 - .025
2.0	20,000 - 32,000	20,000 - 30,000	.038 - .050	.025 - .038
3.0	18,000 - 24,000	15,000 - 20,000	.050 - .065	.038 - .050
4.0	12,000 - 16,000	10,000 - 14,000	.075 - .100	.050 - .075
6.0	9,000 - 12,000	7,500 - 10,000	.100 - .125	.065 - .100
8.0	7,000 - 10,000	6,000 - 8,500	.125 - .165	.088 - .125
10.0	6,000 - 8,000	5,000 - 7,000	.150 - .190	.110 - .150
12.0	4,500 - 6,000	4,000 - 5,500	.200 - .250	.140 - .200
16.0	3,500 - 5,000	3,000 - 4,500	.225 - .275	.165 - .225
20.0	3,000 - 4,000	2,500 - 3,500	.250 - .300	.190 - .250
25.0	2,300 - 3,000	2,000 - 2,500	.275 - .325	.215 - .275

Semi-Finishing and Finishing

DIAMETER	RPM		CHIPLOAD PER FLUTE (Fz)	
	40 - 50 HRc	50 - 60 HRc	40 - 50 HRc	50 - 60 HRc
1.0	20,000 - 40,000	20,000 - 40,000	.010 - .013	.008 - .010
1.5	20,000 - 40,000	20,000 - 40,000	.020 - .025	.013 - .020
2.0	20,000 - 40,000	20,000 - 40,000	.025 - .038	.020 - .030
3.0	20,000 - 40,000	20,000 - 36,000	.038 - .050	.025 - .038
4.0	20,000 - 32,000	20,000 - 25,000	.050 - .075	.038 - .050
6.0	18,000 - 25,000	15,000 - 18,000	.065 - .100	.050 - .075
8.0	14,000 - 19,000	12,000 - 14,000	.088 - .125	.065 - .100
10.0	12,000 - 16,000	10,000 - 12,000	.110 - .150	.075 - .110
12.0	9,000 - 12,000	7,500 - 9,000	.140 - .200	.100 - .150
16.0	6,500 - 9,000	5,000 - 7,000	.165 - .225	.125 - .175
20.0	5,500 - 7,500	4,000 - 6,000	.190 - .250	.150 - .200
25.0	4,000 - 6,000	3,500 - 5,500	.215 - .275	.175 - .225



RADIAL STEP OVER (ap)



AXIAL DEPTH OF CUT (ae)

Roughing	
Axial (ae)	15% - 25% of Dia.
Radial (ap)	20% - 30% of Dia.

Semi-Finishing	
Axial (ae)	5% - 8% of Dia.
Radial (ap)	2% - 5% of Dia.

Finishing	
Axial (ae)	1% - 3% of Dia.
Radial (ap)	.5% - 1% of Dia.

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

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

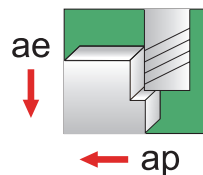
Speed and Feed Recommendations for Diamond Coated End Mills in Graphite

Fractional

DIAMETER	RPM	CHIPLOAD PER FLUTE (Fz)
1/32" - 1/16"	15,000 - 35,000	.0005" - .0010"
1/16" - 1/8"	8000 - 31,000	.0008" - .0015"
1/8" - 3/16"	8000 - 31,000	.0010" - .0020"
3/16" - 1/4"	8000 - 25,000	.0010" - .0020"
1/4" - 5/16"	6000 - 23,000	.0020" - .0040"
5/16" - 3/8"	6000 - 20,000	.0020" - .0040"
3/8" - 1/2"	6000 - 20,000	.0030" - .0050"
1/2" - 5/8"	4500 - 15,000	.0050" - .0060"
5/8" - 3/4"	4500 - 12,000	.0060" - .0070"
3/4" - 1"	4500 - 12,000	.0070" - .0080"

Generally, tools will run at maximum RPM in relation to the corresponding parameters below:

	SLOTING	PROFILING
Axial (ae)	5% of Dia.	1xD
Radial (ap)	1xD	10% of Dia.



Metric

DIAMETER	RPM	CHIPLOAD PER FLUTE (Fz)
1.0 - 3.0	15,000 - 35,000	.015 - .030
3.0 - 6.0	8000 - 31,000	.030 - .050
6.0 - 10.0	6000 - 31,000	.050 - .100
10.0 - 12.0	6000 - 25,000	.080 - .130
16.0 - 20.0	4500 - 15,000	.130 - .150
20.0 - 25.0	4500 - 12,000	.150 - .200

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.

SFM (M/Min.) / RPM Conversion Charts

Fractional

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

Metric

M/Min.	DIAMETER														
	.0394"	.0787"	.1181"	.1575"	.1969"	.2362"	.3150"	.3937"	.4724"	.5512"	.6299"	.7087"	.7874"	.8661"	.9843"
	1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	25.0
	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 Drill Selector Guide

Fractional

Type	Rc Hardness	RECOMMENDED SFM BY SERIES						
		1100, 1120	4000	1200, 1205, 1520, 1600, 1400	1500, 1510, 1300	1700	1700K	1800H
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35 > 35	80 - 120 -	80 - 120 -	100 - 150 80 - 110	100 - 150 80 - 110	- -	- -	- -
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35 > 35	100 - 125 -	100 - 125 -	125 - 150 100 - 125	125 - 175 100 - 125	- -	- -	- -
IRON BASE ALLOYS								
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35 > 35	150 - 175 -	150 - 175 -	150 - 200 150 - 175	175 - 200 150 - 200	- -	- -	- -
MONEL								
Monel - 65% Nickel		-	-	100 - 150	100 - 150	-	-	-
TITANIUM ALLOYS								
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		125 - 175	125 - 175	150 - 200	150 - 200	-	-	-
STAINLESS STEELS								
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35 > 35	- -	125 - 150 -	125 - 175 80 - 125	150 - 200 100 - 150	- -	- -	- -
(Austenitic) Inox, 200 Series, 300 Series	< 35 > 35	- -	125 - 150 -	100 - 175 100 - 125	150 - 200 125 - 150	- -	- -	- -
(Austenitic) 304L, 316L, Nitronic 50, Inox	< 35 > 35	- -	100 - 125 -	80 - 100 60 - 90	90 - 125 80 - 100	- -	- -	- -
(Martensitic) 400 Series	< 35 > 35	- -	125 - 150 -	100 - 150 80 - 125	125 - 175 100 - 140	- -	- -	- -
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35 > 35	- -	125 - 150 -	100 - 175 80 - 130	125 - 175 80 - 130	- -	- -	- -
MEDIUM ALLOY TOOL STEELS								
200, 250, 300, 8620	< 35 > 35	- -	125 - 150 -	125 - 175 100 - 150	125 - 175 100 - 150	- -	- -	- -
CARBON STEELS								
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35 > 35	- -	125 - 150 -	125 - 175 100 - 125	150 - 200 100 - 175	- -	- -	- -
CAST MATERIAL								
Steel		150 - 200	150 - 200	125 - 175	-	150 - 250	175 - 300	-
Ductile Iron		200 - 400	200 - 400	125 - 200	150 - 250	175 - 300	200 - 400	-
Gray Iron		175 - 300	175 - 300	100 - 200	150 - 250	175 - 300	200 - 400	-
Aluminum		200 - 400	200 - 400	150 - 300	-	250 - 400	300 - 450	500 - 700
ALUMINUM								
Aircraft Grade (6061, 7075)		-	300	250 - 500	-	-	-	500 - 700
MAGNESIUM								
		-	300	200 - 500	-	-	-	200 - 400
COPPER								
Copper Alloys		-	300	150 - 300	-	-	-	-
BRASS, BRONZE								
Brass, Aluminum/Bronze, Low Silicon Bronze		- -	- -	150 - 300 125 - 200	- -	- -	- -	200 - 400 200 - 400
COMPOSITE MATERIAL								
Glass Epoxy, Fiberglass, Plastics, Graphite, G10		200	200	150 - 300	150 - 300	-	-	-

INCREASE SFM 20%-40% FOR HARDLUBE COATING

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

GARR TOOL Drilling Guide

Fractional

Type	Rc Hardness	CHIPLOAD PER FLUTE (Fz)				
		1/16" - 1/8"	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 5/8"
COBALT BASE ALLOYS						
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35	.0004" - .0010"	.0008" - .0020"	.0015" - .0025"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0005" - .0010"	.0010" - .0015"	.0010" - .0020"	.0015" - .0030"
NICKEL BASE ALLOYS						
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	.0005" - .0015"	.0010" - .0015"	.0015" - .0025"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
IRON BASE ALLOYS						
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	.0010" - .0015"	.0010" - .0020"	.0015" - .0035"	.0020" - .0050"	.0030" - .0060"
	> 35	.0008" - .0015"	.0010" - .0020"	.0015" - .0025"	.0020" - .0040"	.0025" - .0050"
MONEL						
Monel - 65% Nickel		.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
TITANIUM ALLOYS						
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		.0008" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0025" - .0050"
STAINLESS STEELS						
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35	.0005" - .0015"	.0010" - .0020"	.0015" - .0035"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
(Austenitic) Inox, 200 Series, 300 Series	< 35	.0005" - .0015"	.0010" - .0020"	.0015" - .0035"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
(Austenitic) 304L, 316L, Nitronic 50, Inox	< 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
	> 35	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0010" - .0020"	.0015" - .0030"
(Martensitic) 400 Series	< 35	.0005" - .0015"	.0010" - .0020"	.0015" - .0035"	.0020" - .0040"	.0025" - .0050"
	> 35	.0004" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0030"	.0020" - .0040"
HIGH STRENGTH TOOL STEELS						
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35	.0005" - .0015"	.0010" - .0020"	.0015" - .0025"	.0015" - .0030"	.0020" - .0040"
	> 35	.0004" - .0010"	.0010" - .0020"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"
MEDIUM ALLOY TOOL STEELS						
200, 250, 300, 8620	< 35	.0010" - .0015"	.0015" - .0025"	.0020" - .0030"	.0020" - .0040"	.0025" - .0050"
	> 35	.0005" - .0010"	.0010" - .0020"	.0010" - .0025"	.0015" - .0030"	.0020" - .0040"
CARBON STEELS						
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	.0010" - .0015"	.0015" - .0025"	.0020" - .0030"	.0020" - .0040"	.0025" - .0050"
	> 35	.0005" - .0010"	.0010" - .0020"	.0010" - .0025"	.0015" - .0035"	.0020" - .0040"
CAST MATERIAL						
Steel		.0008" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0025" - .0050"
Ductile Iron		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
Gray Iron		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
Aluminum		.0010" - .0020"	.0015" - .0040"	.0020" - .0050"	.0030" - .0060"	.0035" - .0070"
ALUMINUM						
Aircraft Grade (6061, 7075)		.0010" - .0020"	.0015" - .0040"	.0020" - .0050"	.0030" - .0060"	.0035" - .0070"
MAGNESIUM						
		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
COPPER						
Copper Alloys		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
BRASS, BRONZE						
Brass, Aluminum/Bronze, Low Silicon Bronze		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"
		.0008" - .0015"	.0010" - .0020"	.0015" - .0030"	.0020" - .0040"	.0025" - .0050"
COMPOSITE MATERIAL						
Glass Epoxy, Fiberglass, Plastics, Granhite G10		.0010" - .0020"	.0010" - .0030"	.0015" - .0035"	.0025" - .0040"	.0030" - .0050"

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

GARR TOOL Drill Selector Guide

Metric

Type	Rc Hardness	RECOMMENDED M/Min. BY SERIES						
		1100, 1120	4000	1200, 1205, 1520, 1600, 1400	1500, 1510, 1300	1700	1700K	1800H
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35 > 35	25 - 40 -	25 - 40 -	30 - 45 25 - 35	30 - 45 25 - 35	- -	- -	- -
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35 > 35	30 - 40 -	30 - 40 -	40 - 45 30 - 40	40 - 50 30 - 40	- -	- -	- -
IRON BASE ALLOYS								
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35 > 35	45 - 55 -	45 - 55 -	45 - 60 40 - 50	50 - 60 45 - 60	- -	- -	- -
MONEL								
Monel - 65% Nickel		-	-	30 - 45	30 - 45	-	-	-
TITANIUM ALLOYS								
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		-	40 - 50	45 - 60	45 - 60	-	-	-
STAINLESS STEELS								
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35 > 35	-	40 - 45 -	40 - 50 25 - 40	45 - 60 30 - 45	- -	- -	- -
(Austenitic) Inox, 200 Series, 300 Series	< 35 > 35	-	40 - 45 -	30 - 50 30 - 40	45 - 60 40 - 45	- -	- -	- -
(Austenitic) 304L, 316L, Nitronic 50, Inox	< 35 > 35	-	30 - 40 -	25 - 30 20 - 30	30 - 40 25 - 30	- -	- -	- -
(Martensitic) 400 Series	< 35 > 35	-	40 - 45 -	30 - 45 25 - 40	40 - 55 30 - 45	- -	- -	- -
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35 > 35	-	40 - 45 -	30 - 55 25 - 40	40 - 55 25 - 40	- -	- -	- -
MEDIUM ALLOY TOOL STEELS								
200, 250, 300, 8620	< 35 > 35	-	40 - 45 -	40 - 55 30 - 45	40 - 55 30 - 45	- -	- -	- -
CARBON STEELS								
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35 > 35	-	40 - 45 -	40 - 55 30 - 40	45 - 60 30 - 55	- -	- -	- -
CAST MATERIAL								
Ductile Iron		60 - 120	60 - 120	40 - 60	45 - 75	50 - 90	60 - 120	-
Gray Iron		50 - 90	50 - 90	30 - 60	45 - 75	50 - 90	60 - 120	-
Aluminum		60 - 120	60 - 120	45 - 90	-	75 - 120	90 - 135	150 - 210
Steel		45 - 60	45 - 60	40 - 55	-	45 - 75	50 - 90	-
ALUMINUM								
Aircraft Grade (6061, 7075)		-	90	75 - 150	-	-	-	150 - 210
MAGNESIUM								
		-	90	60 - 150	-	-	-	60 - 120
COPPER								
Copper Alloys		-	90	45 - 90	-	-	-	-
BRASS, BRONZE								
Brass, Aluminum/Bronze, Low Silicon Bronze		- -	- -	45 - 90 40 - 60	- -	- -	- -	60 - 120 60 - 120
COMPOSITE MATERIAL								
Glass Epoxy, Fiberglass, Plastics, Graphite, G10		60	60	45 - 90	45 - 90	-	-	-

INCREASE M/Min. 20%-40% FOR HARDLUBE COATING

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

GARR TOOL Drilling Guide

Metric

Type	Rc Hardness	CHIPLOAD PER FLUTE (Fz)				
		2.0 - 3.0	3.0 - 6.0	6.0 - 10.0	10.0 - 13.0	13.0 - 16.0
COBALT BASE ALLOYS						
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-4, L-605	< 35	.010 - .025	.020 - .050	.040 - .065	.050 - .100	.065 - .125
	> 35	.010 - .025	.013 - .025	.025 - .040	.025 - .050	.040 - .075
NICKEL BASE ALLOYS						
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	.013 - .040	.025 - .040	.040 - .065	.050 - .100	.065 - .125
	> 35	.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
IRON BASE ALLOYS						
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	.025 - .040	.025 - .050	.040 - .090	.050 - .100	.075 - .150
	> 35	.020 - .040	.025 - .050	.040 - .065	.040 - .075	.065 - .125
MONEL						
Monel - 65% Nickel		.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
TITANIUM ALLOYS						
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		.020 - .040	.025 - .050	.040 - .075	.050 - .100	.065 - .125
STAINLESS STEELS						
(Precipitation) 13/8, 15/5, 17-4, pH Types	< 35	.013 - .040	.025 - .050	.040 - .090	.050 - .100	.065 - .125
	> 35	.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
(Austenitic) Inox, 200 Series, 300 Series	< 35	.013 - .040	.025 - .050	.040 - .090	.050 - .100	.065 - .125
	> 35	.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
(Austenitic) 304L, 316L, Nitronic 50, Inox	< 35	.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
	> 35	.008 - .020	.013 - .025	.025 - .040	.025 - .050	.040 - .075
(Martensitic) 400 Series	< 35	.013 - .040	.025 - .050	.040 - .090	.050 - .100	.065 - .125
	> 35	.010 - .025	.020 - .040	.025 - .040	.040 - .075	.050 - .100
HIGH STRENGTH TOOL STEELS						
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35	.013 - .040	.025 - .050	.040 - .065	.050 - .100	.075 - .125
	> 35	.010 - .025	.025 - .050	.025 - .050	.040 - .075	.050 - .100
MEDIUM ALLOY TOOL STEELS						
200, 250, 300, 8620	< 35	.025 - .040	.040 - .065	.050 - .075	.050 - .100	.065 - .125
	> 35	.013 - .040	.025 - .050	.025 - .065	.040 - .075	.050 - .100
CARBON STEELS						
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	.025 - .040	.040 - .065	.050 - .075	.050 - .100	.065 - .125
	> 35	.013 - .040	.025 - .050	.025 - .065	.040 - .090	.050 - .100
CAST MATERIAL						
Steel		.020 - .040	.025 - .050	.040 - .075	.050 - .100	.065 - .125
Ductile Iron		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
Gray Iron		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
Aluminum		.025 - .050	.025 - .100	.050 - .125	.075 - .150	.090 - .180
ALUMINUM						
Aircraft Grade (6061, 7075)		.025 - .050	.025 - .100	.050 - .125	.075 - .150	.090 - .180
MAGNESIUM						
		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
COPPER						
Copper Alloys		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
BRASS, BRONZE						
Brass, Aluminum/Bronze, Low Silicon Bronze		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125
		.020 - .040	.025 - .050	.040 - .075	.050 - .100	.065 - .125
COMPOSITE MATERIAL						
Glass Epoxy, Fiberglass, Plastics, Graphite, G10		.025 - .050	.025 - .075	.040 - .090	.065 - .100	.075 - .125

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

GARR TOOL High Performance Drilling Guide

Fractional

Type	Rc Hardness	Recommended SFM		CHIPLOAD PER FLUTE (Fz)				
		NON-COOLANT	COOLANT FED	1/8" - 1/4"	1/4" - 3/8"	3/8" - 1/2"	1/2" - 5/8"	5/8" - 3/4"
		1580H 1280H 1580HD	1580KH 1280KH 1880KH 1580KD 1280KD					
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35	225	300	.0015" - .0025"	.0025" - .0035"	.0030" - .0040"	.0035" - .0045"	.0040" - .0060"
	> 35	180	240	.0010" - .0020"	.0020" - .0030"	.0025" - .0035"	.0030" - .0040"	.0035" - .0050"
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	225	300	.0015" - .0025"	.0025" - .0035"	.0030" - .0040"	.0035" - .0050"	.0040" - .0060"
	> 35	180	240	.0010" - .0020"	.0020" - .0030"	.0025" - .0035"	.0030" - .0040"	.0035" - .0050"
IRON BASE ALLOYS								
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	300	375	.0020" - .0030"	.0030" - .0035"	.0030" - .0040"	.0040" - .0050"	.0040" - .0060"
	> 35	240	300	.0010" - .0020"	.0020" - .0030"	.0030" - .0035"	.0035" - .0040"	.0035" - .0050"
MONEL								
Monel - 65% Nickel		225	300	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0030" - .0040"	.0040" - .0060"
TITANIUM ALLOYS								
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		350	425	.0015" - .0025"	.0025" - .0035"	.0030" - .0040"	.0035" - .0045"	.0040" - .0060"
STAINLESS STEELS								
(Precipitation)	< 35	300	375	.0020" - .0030"	.0030" - .0035"	.0035" - .0040"	.0040" - .0050"	.0045" - .0060"
13/8, 15/5, 17-4, pH Types	> 35	240	300	.0010" - .0020"	.0020" - .0030"	.0030" - .0035"	.0035" - .0040"	.0040" - .0050"
(Austenitic)	< 35	300	375	.0020" - .0030"	.0030" - .0035"	.0035" - .0040"	.0040" - .0050"	.0045" - .0060"
Inox, 200 Series, 300 Series	> 35	225	300	.0015" - .0020"	.0020" - .0025"	.0025" - .0030"	.0030" - .0040"	.0040" - .0050"
(Austenitic)	< 35	175	225	.0015" - .0020"	.0020" - .0025"	.0025" - .0035"	.0035" - .0045"	.0035" - .0050"
304L, 316L, Nitronic 50, Inox	> 35	100	150	.0008" - .0015"	.0015" - .0020"	.0020" - .0030"	.0030" - .0040"	.0030" - .0050"
(Martensitic)	< 35	300	375	.0020" - .0030"	.0030" - .0035"	.0035" - .0040"	.0040" - .0050"	.0045" - .0060"
400 Series	> 35	240	300	.0010" - .0020"	.0020" - .0030"	.0030" - .0035"	.0035" - .0040"	.0040" - .0050"
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35	300	375	.0020" - .0030"	.0030" - .0035"	.0035" - .0040"	.0040" - .0050"	.0050" - .0060"
	> 35	240	300	.0010" - .0020"	.0020" - .0030"	.0030" - .0035"	.0035" - .0040"	.0040" - .0050"
MEDIUM ALLOY TOOL STEELS								
200, 250, 300, 8620	< 35	300	375	.0020" - .0030"	.0030" - .0035"	.0035" - .0040"	.0040" - .0050"	.0050" - .0070"
	> 35	240	300	.0010" - .0020"	.0020" - .0030"	.0030" - .0035"	.0035" - .0040"	.0040" - .0050"
CARBON STEELS								
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	300	375	.0020" - .0030"	.0030" - .0035"	.0035" - .0040"	.0040" - .0050"	.0050" - .0070"
	> 35	240	300	.0010" - .0020"	.0020" - .0030"	.0030" - .0035"	.0035" - .0040"	.0040" - .0050"
CAST MATERIAL								
Steel		300	450	.0040" - .0050"	.0040" - .0050"	.0050" - .0060"	.0070" - .0080"	.0080" - .0120"
Ductile Iron		600	700	.0040" - .0050"	.0040" - .0050"	.0050" - .0060"	.0070" - .0080"	.0080" - .0120"
Gray Iron		625	750	.0040" - .0050"	.0040" - .0050"	.0050" - .0060"	.0070" - .0080"	.0080" - .0120"
ALUMINUM								
2014, 2024, 6061-(T1-T6), 7075		700	850	.0050" - .0060"	.0070" - .0080"	.0090" - .0100"	.0090" - .0100"	.0090" - .0120"
Die Cast, Extruded		500	650	.0040" - .0050"	.0060" - .0070"	.0080" - .0090"	.0080" - .0090"	.0080" - .0100"
MAGNESIUM								
		600	725	.0050" - .0060"	.0070" - .0080"	.0090" - .0100"	.0090" - .0100"	.0090" - .0120"
COPPER								
Copper Alloys		600	725	.0040" - .0050"	.0040" - .0050"	.0050" - .0060"	.0070" - .0080"	.0080" - .0100"
BRASS								
Short Chips		600	725	.0050" - .0060"	.0070" - .0080"	.0090" - .0100"	.0090" - .0100"	.0100" - .0120"
Long Chips		475	600	.0040" - .0050"	.0060" - .0070"	.0080" - .0090"	.0080" - .0090"	.0080" - .0100"
BRONZE								
Short Chips		400	525	.0040" - .0050"	.0040" - .0050"	.0060" - .0070"	.0080" - .0090"	.0080" - .0120"
Long Chips		275	325	.0030" - .0040"	.0030" - .0040"	.0050" - .0060"	.0070" - .0080"	.0080" - .0100"

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

GARR TOOL High Performance Drilling Guide

Metric

Type	Rc Hardness	Recommended M/Min.		CHIPLOAD PER FLUTE (Fz)				
		NON-COOLANT	COOLANT FED	3.0 - 6.0	6.0 - 10.0	10.0 - 13.0	13.0 - 16.0	16.0 - 20.0
		1580H 1280H 1580HD	1580KH 1280KH 1880KH 1580KD 1280KD					
COBALT BASE ALLOYS								
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35	70	90	.035 - .060	.060 - .085	.075 - .100	.085 - .110	.095 - .130
	> 35	55	70	.025 - .050	.050 - .075	.060 - .085	.075 - .100	.095 - .110
NICKEL BASE ALLOYS								
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	70	90	.035 - .060	.060 - .085	.075 - .100	.085 - .125	.085 - .110
	> 35	55	70	.025 - .050	.050 - .075	.060 - .085	.075 - .100	.085 - .100
IRON BASE ALLOYS								
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	90	115	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.110 - .140
	> 35	70	90	.025 - .050	.050 - .075	.075 - .085	.085 - .100	.095 - .110
MONEL								
Monel - 65% Nickel		70	90	.035 - .060	.050 - .075	.060 - .085	.075 - .100	.085 - .120
TITANIUM ALLOYS								
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		105	130	.035 - .060	.060 - .085	.075 - .100	.085 - .110	.095 - .130
STAINLESS STEELS								
(Precipitation)	< 35	90	115	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.100 - .140
13/8, 15/5, 17-4, pH Types	> 35	70	90	.025 - .050	.050 - .075	.075 - .085	.085 - .100	.085 - .110
(Austenitic)	< 35	90	115	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.100 - .140
Inox, 200 Series, 300 Series	> 35	70	90	.035 - .050	.050 - .060	.060 - .075	.075 - .100	.075 - .110
(Austenitic)	< 35	55	70	.035 - .050	.050 - .060	.060 - .085	.085 - .110	.075 - .110
304L, 316L, Nitronic 50, Inox	> 35	30	45	.025 - .035	.035 - .050	.050 - .075	.075 - .100	.075 - .110
(Martensitic)	< 35	90	115	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.100 - .130
400 Series	> 35	70	90	.025 - .050	.050 - .075	.075 - .085	.085 - .100	.085 - .110
HIGH STRENGTH TOOL STEELS								
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 35	90	115	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.100 - .130
	> 35	70	90	.025 - .050	.050 - .075	.075 - .085	.085 - .100	.085 - .100
MEDIUM ALLOY TOOL STEELS								
200, 250, 300, 8620	< 35	90	115	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.100 - .140
	> 35	70	90	.025 - .050	.050 - .075	.075 - .085	.085 - .100	.085 - .110
CARBON STEELS								
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	90	115	.050 - .075	.075 - .085	.085 - .100	.100 - .125	.100 - .140
	> 35	70	90	.025 - .050	.050 - .075	.075 - .085	.085 - .100	.085 - .120
CAST MATERIAL								
Steel		90	135	.100 - .125	.100 - .125	.125 - .150	.175 - .200	.200 - .300
Ductile Iron		90	215	.100 - .125	.100 - .125	.125 - .150	.175 - .200	.200 - .300
Gray Iron		190	225	.100 - .125	.100 - .125	.125 - .150	.175 - .200	.200 - .300
ALUMINUM								
2014, 2024, 6061-(T1-T6), 7075		215	260	.125 - .150	.175 - .200	.225 - .250	.225 - .250	.230 - .280
Die Cast, Extruded		150	200	.100 - .120	.150 - .175	.200 - .225	.200 - .225	.200 - .250
MAGNESIUM								
		185	220	.125 - .150	.175 - .200	.225 - .250	.225 - .250	.230 - .280
COPPER								
Copper Alloys		185	220	.100 - .125	.100 - .125	.125 - .150	.175 - .200	.200 - .250
BRASS								
Short Chips		185	220	.125 - .150	.175 - .200	.225 - .250	.225 - .250	.250 - .280
Long Chips		145	180	.100 - .125	.150 - .175	.200 - .225	.200 - .225	.220 - .250
BRONZE								
Short Chips		120	160	.100 - .125	.100 - .125	.150 - .175	.200 - .225	.230 - .280
Lona Chips		85	100	.060 - .085	.075 - .100	.125 - .150	.175 - .200	.200 - .220

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

GARR TOOL Aluminum Series Drill Application Guide

Fractional

CHIPLOAD PER FLUTE (Fz)								
Material	Type	SFM	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"
Aluminum Alloy	6061	600 - 800	.002" - .004"	.004" - .005"	.004" - .006"	.005" - .007"	.006" - .008"	.007" - .010"
Cast Aluminum	380	450 - 600	.002" - .004"	.004" - .005"	.004" - .006"	.005" - .007"	.006" - .008"	.007" - .010"
Magnesium		400 - 600	.002" - .004"	.004" - .005"	.004" - .006"	.005" - .007"	.006" - .008"	.007" - .010"
Copper & Brass		400 - 600	.001" - .002"	.002" - .003"	.002" - .003"	.002" - .004"	.003" - .005"	.003" - .006"
Titanium	6Al-4V	100 - 300	.001" - .002"	.002" - .003"	.002" - .003"	.002" - .004"	.003" - .005"	.003" - .006"

Metric

CHIPLOAD PER FLUTE (Fz)								
Material	Type	M/Min.	4.0	6.0	8.0	10.0	12.0	16.0
Aluminum Alloy	6061	180 - 240	.050 - .100	.100 - .125	.100 - .150	.125 - .175	.150 - .200	.175 - .250
Cast Aluminum	380	135 - 180	.050 - .100	.100 - .125	.100 - .150	.125 - .175	.150 - .200	.175 - .250
Magnesium		120 - 180	.050 - .100	.100 - .125	.100 - .150	.125 - .175	.150 - .200	.175 - .250
Copper & Brass		120 - 180	.025 - .050	.050 - .075	.050 - .075	.050 - .100	.075 - .125	.075 - .150
Titanium	6Al-4V	30 - 90	.025 - .050	.050 - .075	.050 - .075	.050 - .100	.075 - .125	.075 - .150

PHYSICAL PROPERTIES AND CHARACTERISTICS OF ALUMASTAR COATING	
Property/Characteristic	Description
Nomenclature	TiB ₂
Color	Silver
Hardness	4000 Hv
Coating Thickness	1-2 µm
Thermal Stability	850° C (1562° F)
Deposition Temperature	450° C (842° F)
Applications	Aluminum, AlSi Alloys (<12% Si), Magnesium, Copper, Titanium Alloys, Non-ferrous

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

EDP Number / Series Number

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01**7	160MA / 860MA	120	28	390M	146	55	723M	164
02	170M / 870M	118	28	VRX (Ball End)	107	55**4	723MC	166
02**7	170MA / 870MA	120	28**5	1580KD	20	55**7	723MA	167
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03**7	180MA / 980MA	122	29**5	1580KD	20	56**1/6	1200H	57
04	190M / 990M	121	29**7	420MA	150	57	1300	79
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17**7	323MA	142	42	143M	82	80	230R	133
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18**4	330MC	141	42**7	630MA	156	81	222M	144
18**7	330MA	142	43	142B	81	82	234M	144
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23**7	263MA / 863MA	99	50	373M	145	94**7	650MA	156
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26**1/6	1880KH	33	53	2200M	188	98**7	743MA	167
26**5	1580HD	17	54	2220M	189	99	750M	164
26**5/7	1280KD	30	54	623M	153	99**7	750MA	167
27	380M	146	54**4	623MC	155	99**8	710D	116
27	VRX (Corner Radius)	103	54**7	623MA	156			

Standards

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

Each of our styles of end mills are center cutting.

Altered Standards - 48 Hour Delivery

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

Garr Tool cannot be responsible for tools altered by other parties.

Solid Carbide Specials - 2 Week Delivery

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

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

Let Garr Tool Company 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 Garr Tool 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.

GARR TOOL®

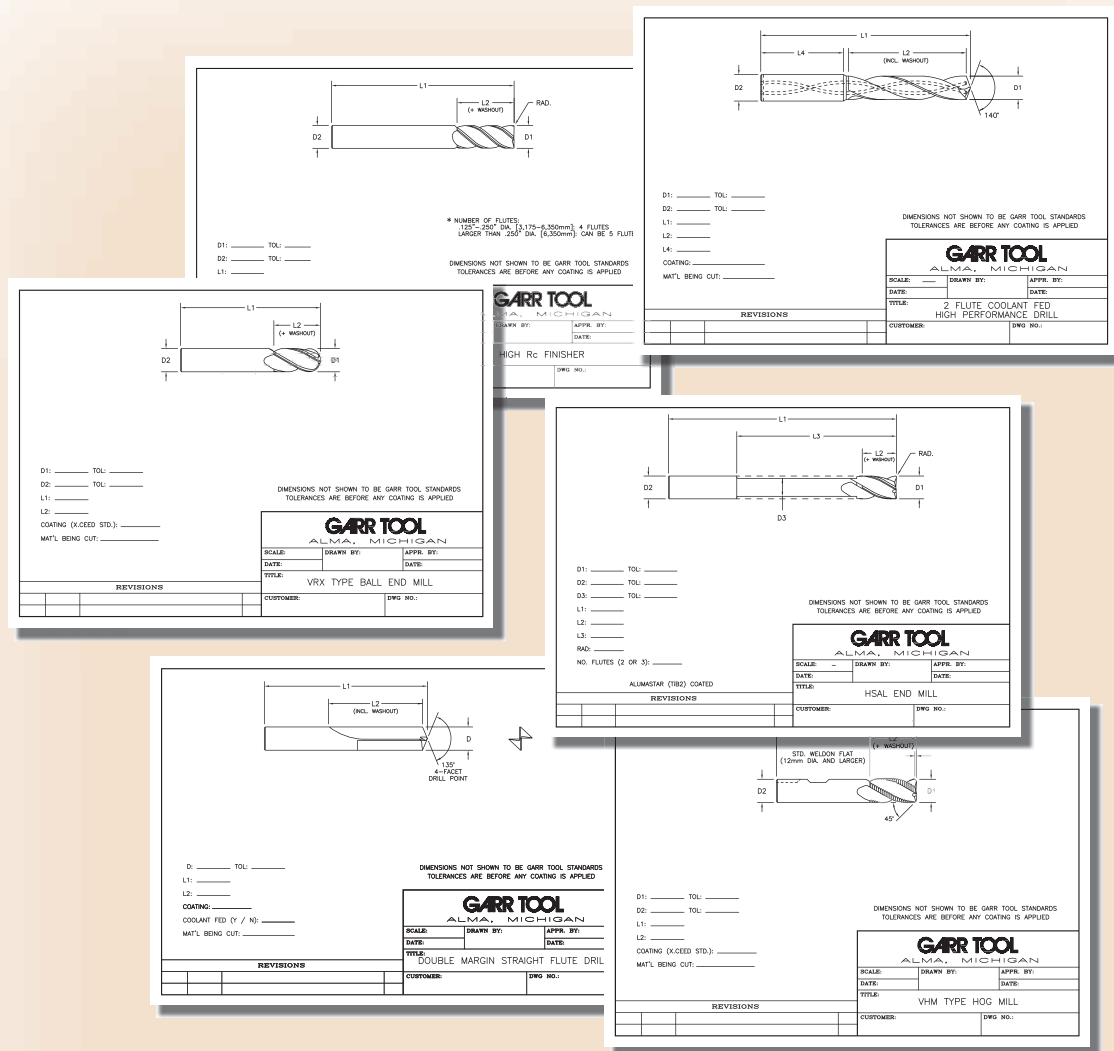
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www.garrtool.com

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"

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