THE NEW VALUE FRONTIER

KYOCERA

2020 KYOCERA Round Tools Digest Catalog



ROUND TOOLS

Automotive | Mold & Die | Aerospace | High Performance | General | Special Tools

ADVANCING PRODUCTIVITY

Solid Carbide End Mills Recommendations

Automotive

*Chip breaker

Anti Vibration		Z-Carb-AP P.1 (or **Z1M** P.10)		
High Performance	Finishing	T-Carb P.13	S-Carb P.45 (or **3AFK** P.57)	
	Roughing	Z-Carb-HPR P.21 *5RFH P.32		
General	Finishing Roughing	Series 1M P.38 (or **2FESM** P.41)		
	Material	P Steel	K Cast Iron	N Non Ferrous

Mold & Die

*Chip breaker

High Performance	Finishing	T-Carb P.13	HFS P.65 (or **Z-Carb MD** P.67)	
		Z-Carb Z1MB P.62 (or **Turbo-Carb 56MB** P.63)		
	Roughing	Z-Carb-HPR P.21 *5RFH P.32	Z-Carb-MD P.67	
General	Finishing Roughing	Series 1M P.38 (or **2FESM** P.41)		
	Material	P Steel	P Pre-Hardened Steel	H Hardened

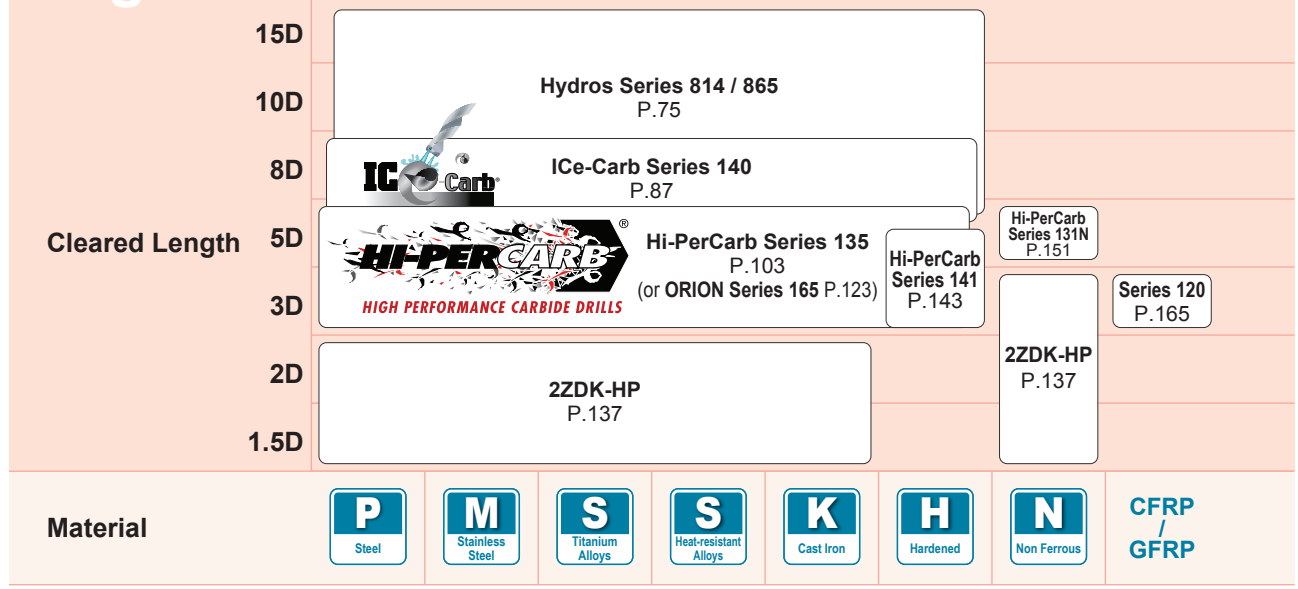
Aerospace

*Chip breaker

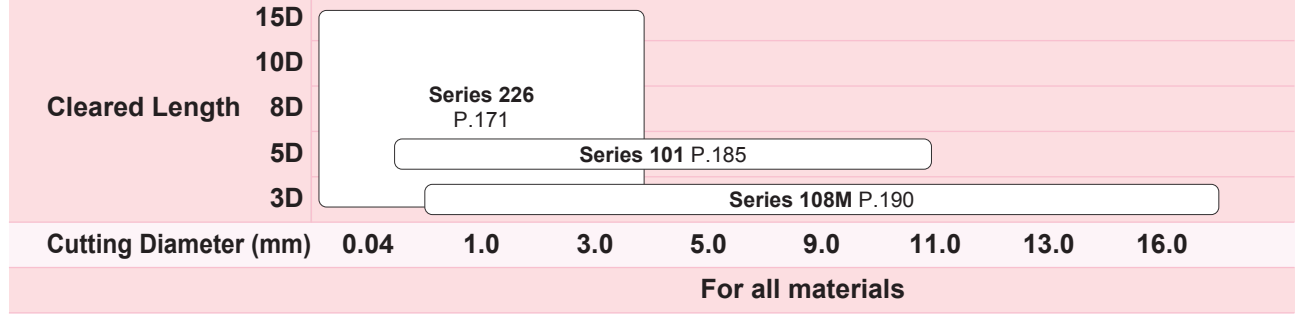
Anti Vibration		Z-Carb-AP P.1 (or **Z1M** P.10)			
High Performance	Finishing	T-Carb P.13	S-Carb P.45 (or **3AFK** P.57)	Series 25M P.69 (or **CCR Series 20** P.71)	
	Roughing	Z-Carb-HPR P.21 *5RFH P.32			
General	Finishing Roughing	Series 1M P.38 (or **2FESM** P.41)			
	Material	P Steel	M Stainless Steel	S Titanium Alloys	S Heat-resistant Alloys
		K Cast Iron	N Non Ferrous	CFRP / GFRP	

Solid Carbide Drills Recommendations

High Performance Drills



General Drills



2020 KYOCERA Round Tools Digest Catalog

Kyocera Asia Pacific lineup offers a wide range of cutting tools according to industry, material, size and process to meet various requirements worldwide. In this catalog, we selected some of the round tools from our three main catalogs.
Please use this catalog to select the most suitable tools for your application.
For other products not listed in this catalog, please contact Kyocera Sales representative.



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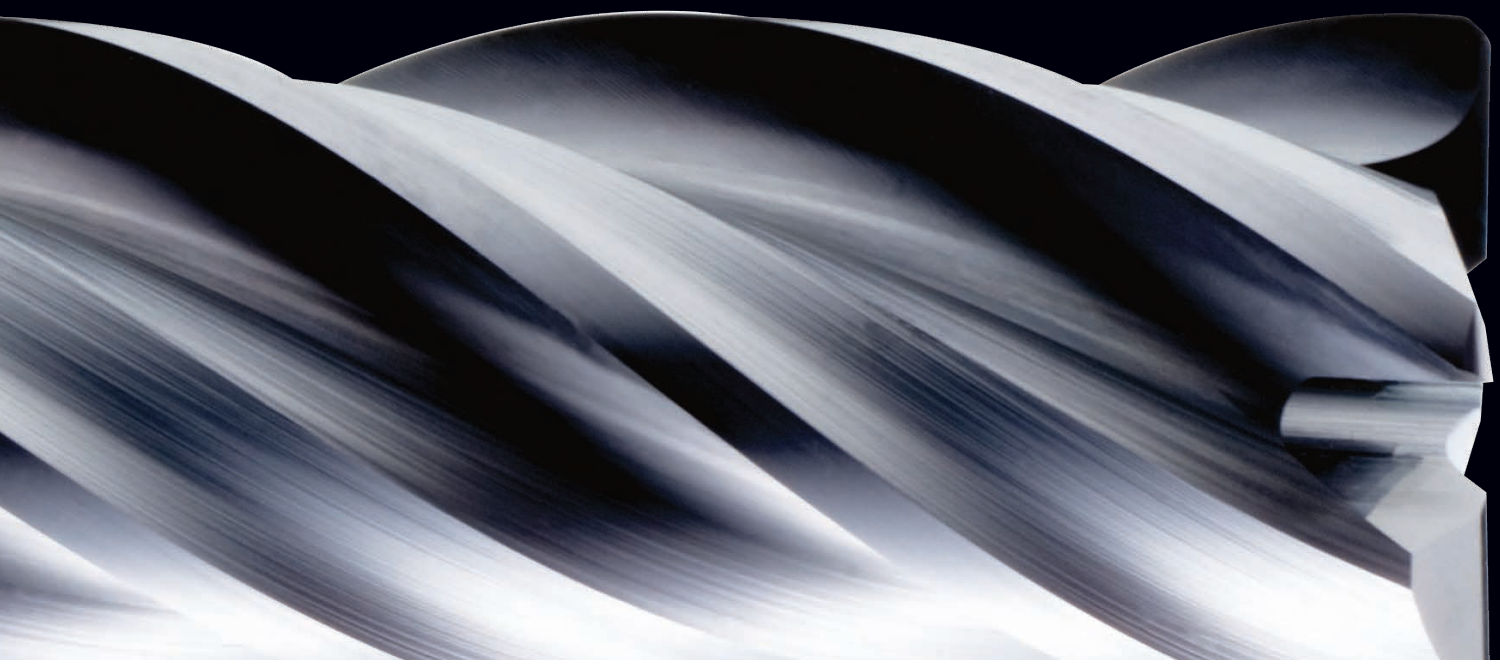
Z-CARB-AP

Patented Variable Rake End Mills

ADVANCED PATENTED DESIGN
DELIVERS ADVANCED PRODUCTIVITY

With conventional end mills, the cutting teeth entering and exiting the material creates a natural rhythm that results in damaging harmonics. Harmonics produce a frequency that resonates through the entire tool, resulting in one of the most damaging forms of cutter wear known as chatter. Chatter degrades the quality of your finish. It also creates tool pressure which has a negative effect on tool life. If you use conventional long reach tools, your chatter problem is further compounded by deflection, which limits your maximum speeds and cutting depths. Until now, your only choice was to adjust your operating parameters to account for the limitations of your conventional end mill.

WITH ITS PATENTED, ONE-OF-A-KIND GEOMETRY, THE Z-CARB-AP OFFERS THREE STAGES OF CHATTER SUPPRESSION, RESULTING IN THE QUIETEST, MOST STABLE MILLING EXPERIENCE AVAILABLE.



Z CARB-AP
Patented Variable Rake End Mills

ENHANCED CORNER GEOMETRY WITH TIGHT TOLERANCE CORNER RADIUS
- Improved accuracy
- Improved shearing capabilities
- Reduces tool pressure

UNEQUAL HELIX DESIGN
- Eliminates harmful harmonics unequal flute spacing
- Suppresses chatter

PATENTED VARIABLE RAKE ANGLE
- Controls cutting zone temperature
- Produces ideal chip shape and size

- New Expanded tools
- Now also available with HAIMER SAFE-LOCK option on select diameters



THREE STAGES OF CHATTER SUPPRESSION

1 Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge of typical end mills, which helps to suppress the development of damaging harmonics.

2 The patented unequal helix design aids in eliminating the damaging harmonics that occur during typical machining by changing the angle at which each cutting edge enters and exits the material during the milling process.

3 The rake angle is the main factor that determines the size and shape of the chip, as well as the pressure and temperature of the cutting zone. By incorporating the SGS Patented Variable Rake Geometry, the Z-Carb-AP can alter and control the cutting dynamic like no other tool available, which takes chatter suppression to a whole new level of advanced productivity.

LONG REACH DESIGNS
- Cut deeper and faster in long reach applications

www.sgstool.com

Ti-NAMITE-X®
ADVANCED TOOL COATING

	AlTiN	Ti-NAMITE-X	Ti-NAMITE-X Advantages over AlTiN
Hardness (HV)	2549 HV	3059 HV	Increased hardness offers better resistance to abrasion wear and improved coating strength.
Young's Modulus of Elasticity	460 GPa	368 Gpa	Increased toughness in the coating improves the performance in applications that encounter a high level of mechanical stress such as milling.
Adhesion	70 N	130 N	Good adhesion is critical to optimum performance; the level of measured adhesion has been proven to have a direct relationship to overall tool life. With a denser more uniform coating structure Ti-NAMITE-X improves the ability for the coating to perform at higher temperatures due to an increased oxidation stability.

TEST DATA PROVES:

- Ti-NAMITE-X reduces edge wear by up to:
  - » 58% in Inconel
  - » 64% in Tool Steel
  - » 66% in Alloy Steel
- Z-Carb-AP reduces chatter by up to 68% compared to conventional end mills
- Z-Carb-AP experiences up to 70% less tool wear compared to conventional end mills
- Z-Carb-AP produces up to 321% smoother surface finish than conventional end mills

EDGE WEAR Inconel 718 / 20 HRc

Ti-NAMITE-X



AlTiN

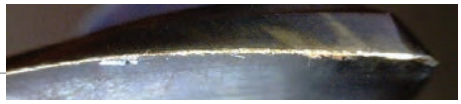


EDGE WEAR H13 / 49 HRc

Ti-NAMITE-X



AlTiN



www.sgstool.com

Z CARB-AP
Patented Variable Rake End Mills

Quotes and figures from end users using Z-Carb AP tools in their shops and *getting real results, with real savings.*

They've exceeded so well… I'm getting insane results here.

THEY HAVEN'T FAILED ME.

The Z-Carb AP tool saved an end user almost 74%, taking a cost per part from $1,073 to $281!

I know you needed results for the quarter, but I can't give you exact data until this thing dies.

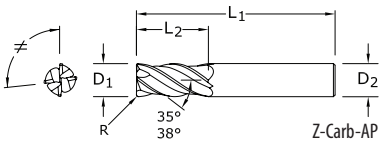
That is why I recommend you all around town.

It isn't getting any better… with straight endmilling.

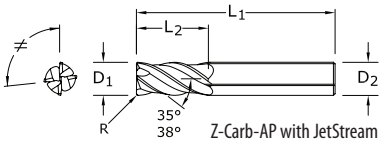
Anti Vibration End Mill

Z-Carb AP (4 flutes)

Patented Variable Rake End Mills



Z-Carb-AP



Z-Carb-AP with JetStream

TOLERANCES (mm)

DIAMETER	D_1	D_2
< 3	+0,012 / –0,012	h6
3 - 6	+0,000 / –0,030	h6
> 6 - 10	+0,000 / –0,040	h6
> 10 - 25	+0,000 / –0,050	h6

CORNER RADIUS TOLERANCES (mm)

< 3 = +0,000 / –0,025

≥ 3 = +0,000 / –0,050

New Expanded Tools

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Corner Radius R	Ti-Namite-X EDP No. w/o Flat	Ti-Namite-X EDP No. w/ Flat	JetStream EDP No.
1,0	3,0	57,0	6,0	0,1	46873	–	–
1,5	4,5	57,0	6,0	0,1	46849	–	–
2,0	6,0	57,0	6,0	0,2	46850	–	–
2,5	7,0	57,0	6,0	0,2	46874	–	–
3,0	8,0	57,0	6,0	0,3	46851	–	–
3,0	8,0	57,0	6,0	0,5	46880	–	–
4,0	11,0	57,0	6,0	0,3	46852	–	–
4,0	11,0	57,0	6,0	0,5	46881	–	–
5,0	6,0	57,0	13,0	0,3	46853	–	–
6,0	13,0	57,0	6,0	0,25	46882	–	–
6,0	13,0	57,0	6,0	0,5	46854	–	–
6,0	13,0	57,0	6,0	1,0	46855	–	–
6,0	13,0	57,0	6,0	1,5	46884	–	–
8,0	19,0	63,0	8,0	0,5	46856	–	–
8,0	19,0	63,0	8,0	1,0	46857	–	–
8,0	19,0	63,0	8,0	1,5	46886	–	–
8,0	19,0	63,0	8,0	2,0	46887	–	–
10,0	22,0	72,0	10,0	0,5	46858	–	–
10,0	22,0	72,0	10,0	1,0	46859	–	–
10,0	22,0	72,0	10,0	1,5	46889	–	–
10,0	22,0	72,0	10,0	2,0	46890	–	–
10,0	22,0	72,0	10,0	2,5	46891	–	–
12,0	26,0	83,0	12,0	0,5	46860	46909	–
12,0	26,0	83,0	12,0	0,75	46861	46910	–
12,0	26,0	83,0	12,0	1,0	46893	46911	–
12,0	26,0	83,0	12,0	1,5	46894	46912	–
12,0	26,0	83,0	12,0	2,0	46895	46913	–
12,0	26,0	83,0	12,0	2,5	46896	46914	–
12,0	26,0	83,0	12,0	3,0	42718	46915	–
14,0	14,0	83,0	26,0	1,0	46862	46916	46494
16,0	32,0	92,0	16,0	1,0	46863	46917	46495
16,0	32,0	92,0	16,0	1,5	46898	46918	–
16,0	32,0	92,0	16,0	2,0	46899	46919	–
16,0	32,0	92,0	16,0	2,5	46900	46920	–
16,0	32,0	92,0	16,0	3,0	46864	46921	–
20,0	38,0	104,0	20,0	1,0	46865	46922	46497
20,0	38,0	104,0	20,0	1,5	46903	46923	–
20,0	38,0	104,0	20,0	2,0	46904	46924	–
20,0	38,0	104,0	20,0	2,5	46905	46925	–
20,0	38,0	104,0	20,0	3,0	42722	46926	–
25,0	38,0	104,0	25,0	1,0	46866	46927	46498

Corner

Straight

Weldon Flat

HAIMER Safe-Lock

Regular

Variable Right Spiral

Flute Spacing Unequal

Variable Rake Angle

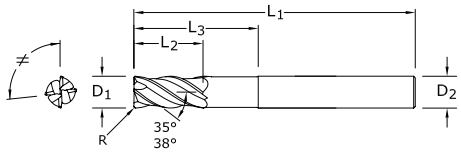
JetStream Coolant Slots

4 Flutes

Anti Vibration End Mill

Z-Carb AP (4 flutes)

Patented Variable Rake End Mills



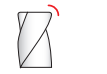
TOLERANCES (mm)

DIAMETER	D_1	D_2
6	+0,000 / –0,030	h6
> 6 - 10	+0,000 / –0,040	h6
> 10 - 20	+0,000 / –0,050	h6

CORNER RADIUS TOLERANCES (mm)

R = +0,000 / –0,050

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Reach L_3	Corner Radius R	Ti-Namite-X EDP No.
6,0	8,0	75,0	6,0	24,0	0,5	46821
8,0	10,0	75,0	8,0	32,0	1,0	46822
8,0	10,0	75,0	8,0	32,0	2,0	46823
10,0	12,0	100,0	10,0	40,0	1,0	46824
10,0	12,0	100,0	10,0	40,0	2,0	46825
12,0	15,0	100,0	12,0	48,0	1,0	46826
12,0	15,0	100,0	12,0	48,0	1,5	46827
12,0	15,0	100,0	12,0	48,0	2,0	46828
12,0	15,0	100,0	12,0	48,0	3,0	46829
16,0	20,0	115,0	16,0	65,0	1,0	46830
16,0	20,0	115,0	16,0	65,0	1,5	46831
16,0	20,0	115,0	16,0	65,0	2,0	46832
16,0	20,0	115,0	16,0	65,0	3,0	46833
16,0	20,0	115,0	16,0	65,0	4,0	46834
16,0	20,0	115,0	16,0	65,0	5,0	46835
20,0	24,0	140,0	20,0	80,0	1,0	46836
20,0	24,0	140,0	20,0	80,0	1,5	46837
20,0	24,0	140,0	20,0	80,0	2,0	46838
20,0	24,0	140,0	20,0	80,0	3,0	46839
20,0	24,0	140,0	20,0	80,0	4,0	46840
20,0	24,0	140,0	20,0	80,0	5,0	46841


Corner


Straight


HAIMER Safe-Lock


Long Reach Neck


Variable Right Spiral


Flute Spacing Unequal

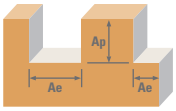

Variable Rake Angle

4
Flutes

Anti Vibration End Mill

Z-Carb AP (4 flutes)

CARB-AP
Patented Variable Rake End Mills



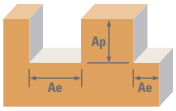
	Series Z1MPCR, Z1MPLC Metric	Hardness (Brinell)		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 1	3	6	8	10	12	16	20	25
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	169	RPM	53803	17934	8967	6725	5380	4484	3363	2690	2152
						(135-203)	Fz	0.0030	0.0109	0.029	0.049	0.061	0.074	0.087	0.099	0.108
							Feed (mm/min)	646	782	1040	1318	1313	1327	1170	1065	930
			Slot	1	≤ 1	134	RPM	42654	14218	7109	5332	4265	3555	2666	2133	1706
						(107-161)	Fz	0.0030	0.0109	0.029	0.049	0.061	0.074	0.087	0.099	0.108
							Feed (mm/min)	512	620	825	1045	1041	1052	928	845	737
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.5	≤ 1.5	96	RPM	30537	10179	5089	3817	3054	2545	1909	1527	1221
						(77-115)	Fz	0.0023	0.0081	0.022	0.036	0.045	0.055	0.067	0.075	0.080
							Feed (mm/min)	281	330	448	550	550	560	511	458	391
			Slot	1	≤ 1	76	RPM	24235	8078	4039	3029	2424	2020	1515	1212	969
						(61-91)	Fz	0.0023	0.0081	0.022	0.036	0.045	0.055	0.067	0.075	0.080
							Feed (mm/min)	223	262	355	436	436	444	406	364	310
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.5	≤ 1.5	56	RPM	17934	5978	2989	2242	1793	1495	1121	897	717
						(45-68)	Fz	0.0018	0.0066	0.017	0.030	0.037	0.043	0.051	0.059	0.065
							Feed (mm/min)	129	158	203	269	265	257	229	212	187
			Slot	1	≤ 1	44	RPM	14057	4686	2343	1757	1406	1171	879	703	562
						(35-53)	Fz	0.0018	0.0066	0.017	0.030	0.037	0.043	0.051	0.059	0.065
							Feed (mm/min)	101	124	159	211	208	201	179	166	146
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile	≤ 0.5	≤ 1.5	136	RPM	43139	14380	7190	5392	4314	3595	2696	2157	1726
						(109-163)	Fz	0.0028	0.0099	0.026	0.045	0.056	0.067	0.079	0.091	0.098
							Feed (mm/min)	483	569	748	971	966	963	852	785	676
			Slot	1	≤ 1	108	RPM	34414	11471	5736	4302	3441	2868	2151	1721	1377
						(87-130)	Fz	0.0028	0.0099	0.026	0.045	0.056	0.067	0.079	0.091	0.098
							Feed (mm/min)	385	454	597	774	771	769	680	626	540
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc	Profile	≤ 0.5	≤ 1.5	104	RPM	32960	10987	5493	4120	3296	2747	2060	1648	1318
						(83-124)	Fz	0.0020	0.0074	0.020	0.034	0.043	0.050	0.059	0.067	0.074
							Feed (mm/min)	264	325	439	560	567	549	486	442	390
			Slot	1	≤ 1	82	RPM	26174	8725	4362	3272	2617	2181	1636	1309	1047
						(66-99)	Fz	0.0020	0.0074	0.020	0.034	0.043	0.050	0.059	0.067	0.074
							Feed (mm/min)	209	258	349	445	450	436	386	351	310
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	149	RPM	47501	15834	7917	5938	4750	3958	2969	2375	1900
						(119-179)	Fz	0.0023	0.0081	0.022	0.036	0.045	0.055	0.067	0.075	0.080
							Feed (mm/min)	437	513	697	855	855	871	796	713	608
			Slot	1	≤ 1	119	RPM	37807	12602	6301	4726	3781	3151	2363	1890	1512
						(95-143)	Fz	0.0023	0.0081	0.022	0.036	0.045	0.055	0.067	0.075	0.080
							Feed (mm/min)	348	408	555	681	681	693	633	567	484
	STAINLESS STEELS (DIFFICULT) 304, 304L,316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	104	RPM	32960	10987	5493	4120	3296	2747	2060	1648	1318
						(83-124)	Fz	0.0018	0.0064	0.017	0.030	0.037	0.043	0.051	0.059	0.063
							Feed (mm/min)	237	281	374	494	488	472	420	389	332
			Slot	1	≤ 1	82	RPM	26174	8725	4362	3272	2617	2181	1636	1309	1047
						(66-99)	Fz	0.0018	0.0064	0.017	0.030	0.037	0.043	0.051	0.059	0.063
							Feed (mm/min)	188	223	297	393	387	375	334	309	264

continued on next page

Anti Vibration End Mill

Z-Carb AP (4 flutes)





	Series Z1MPCR, Z1MPLC Metric	Hardness (Brinell)		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 1	3	6	8	10	12	16	20	25
M	**STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450**	≤ 325 Bhn or ≤ 35 HRc	Profile	≤ 0.5	≤ 1.5	94	RPM	30052	10017	5009	3756	3005	2504	1878	1503	1202
						(76-113)	Fz	0.0018	0.0064	0.017	0.030	0.037	0.043	0.051	0.059	0.063
							Feed (mm/min)	216	256	341	451	445	431	383	355	303
			Slot	1	≤ 1	76	RPM	24235	8078	4039	3029	2424	2020	1515	1212	969
						(61-91)	Fz	0.0018	0.0064	0.017	0.030	0.037	0.043	0.051	0.059	0.063
							Feed (mm/min)	174	207	275	364	359	347	309	286	244
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400**	≤ 300 Bhn or ≤ 32 HRc	Profile	≤ 0.5	≤ 1.5	24	RPM	7755	2585	1293	969	776	646	485	388	310
						(20-29)	Fz	0.0018	0.0061	0.016	0.027	0.034	0.041	0.048	0.053	0.060
							Feed (mm/min)	56	63	83	105	105	106	93	82	74
			Slot	1	≤ 1	20	RPM	6301	2100	1050	788	630	525	394	315	252
						(16-24)	Fz	0.0018	0.0061	0.016	0.027	0.034	0.041	0.048	0.053	0.060
							Feed (mm/min)	45	51	67	85	86	86	76	67	60
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc	Profile	≤ 0.5	≤ 1.5	19	RPM	6010	2003	1002	751	601	501	376	301	240
						(15-23)	Fz	0.0013	0.0043	0.011	0.019	0.024	0.028	0.033	0.037	0.042
							Feed (mm/min)	31	34	44	57	58	56	50	44	40
			Slot	1	≤ 1	15	RPM	4847	1616	808	606	485	404	303	242	194
						(12-18)	Fz	0.0013	0.0043	0.011	0.019	0.024	0.028	0.033	0.037	0.042
							Feed (mm/min)	25	28	36	46	47	45	40	36	33
	TITANIUM ALLOYS Pure Ttanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	Profile	≤ 0.5	≤ 1.5	66	RPM	20842	6947	3474	2605	2084	1737	1303	1042	834
						(52-79)	Fz	0.0020	0.0071	0.019	0.032	0.040	0.048	0.056	0.064	0.070
							Feed (mm/min)	167	197	264	333	333	333	292	267	233
			Slot	1	≤ 1	52	RPM	16480	5493	2747	2060	1648	1373	1030	824	659
						(41-62)	Fz	0.0020	0.0071	0.019	0.032	0.040	0.048	0.056	0.064	0.070
							Feed (mm/min)	132	156	209	264	264	264	231	211	185
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	Profile	≤ 0.5	≤ 1.5	23	RPM	7271	2424	1212	909	727	606	454	364	291
						(18-27)	Fz	0.0020	0.0071	0.019	0.032	0.040	0.048	0.056	0.064	0.070
							Feed (mm/min)	58	69	92	116	116	116	102	93	81
			Slot	1	≤ 1	18	RPM	5816	1939	969	727	582	485	364	291	233
						(15-22)	Fz	0.0020	0.0071	0.019	0.032	0.040	0.048	0.056	0.064	0.070
							Feed (mm/min)	47	55	74	93	93	93	81	74	65

Bhn (Brinell) HRc (Rockwell C)
rpm = (Vc x 1000) / (D_1 x 3.14)
mm/min = Fz x 4 x rpm
maximum Slotting Ap for Z1PCR <3mm diameter and all Z1MPLC / Z1MPLB is .25 x D_1
maximum Profile Ae for Z1PCR <3mm diameter and all Z1MPLC / Z1MPLB is .20 x D_1
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the SGS Tool Wizard for complete technical information (www.sgstool.com)

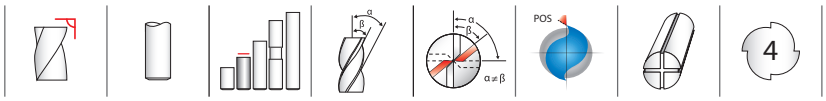


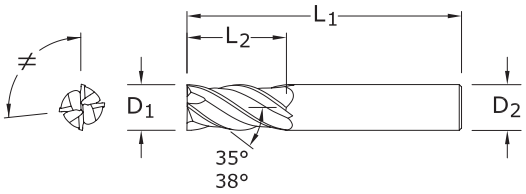
Tool Wizard
CALCULATE APPLICATION PARAMETERS
www.sgstool.com

Memo

METRIC

Z-Carb





Z1M

METRIC SERIES

- Unequal helix design aids in damaging harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

mm				EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	Ti-NAMITE-A (AlTiN)	JetStream
3,0	8,0	57,0	6,0	46357	–
4,0	11,0	57,0	6,0	46358	–
5,0	13,0	57,0	6,0	46359	–
6,0	13,0	57,0	6,0	46360	–
8,0	19,0	63,0	8,0	46362	–
10,0	22,0	72,0	10,0	46364	–
12,0	26,0	83,0	12,0	46366	–
14,0	26,0	83,0	14,0	46368	46506
16,0	32,0	92,0	16,0	46370	46507
18,0	32,0	92,0	18,0	46372	46508
20,0	38,0	104,0	20,0	46374	46509
25,0	38,0	104,0	25,0	46376	46510

TOLERANCES (mm)

3–6 DIAMETER
D_1 = +0,000/–0,030
D_2 = h_6

>6–10 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6

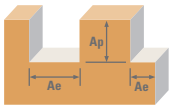
>10–25 DIAMETER
D_1 = +0,000/–0,050
D_2 = h_6

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com

METRIC

Z-Carb

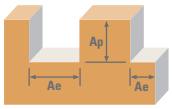


	Series Z1M, Z1MB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	16	20	25
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	169	RPM	17934	8967	6725	5380	4484	3363	2690	2152
						(135-203)	Fz	0.009	0.024	0.041	0.051	0.060	0.079	0.086	0.088
							Feed (mm/min)	654	861	1091	1090	1076	1067	927	753
			Slot	1	≤ 1	134	RPM	14218	7109	5332	4265	3555	2666	2133	1706
						(107-161)	Fz	0.009	0.024	0.041	0.051	0.060	0.079	0.086	0.088
							Feed (mm/min)	519	682	865	864	853	846	735	597
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.5	≤ 1.5	96	RPM	10179	5089	3817	3054	2545	1909	1527	1221
						(77-115)	Fz	0.007	0.019	0.030	0.037	0.046	0.061	0.067	0.068
							Feed (mm/min)	274	391	456	456	464	469	407	330
			Slot	1	≤ 1	76	RPM	8078	4039	3029	2424	2020	1515	1212	969
						(61-91)	Fz	0.007	0.019	0.030	0.037	0.046	0.061	0.067	0.068
							Feed (mm/min)	217	310	362	362	368	372	323	262
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.5	≤ 1.5	56	RPM	5978	2989	2242	1793	1495	1121	897	717
						(45-68)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
							Feed (mm/min)	115	143	191	191	186	184	163	129
			Slot	1	≤ 1	44	RPM	4686	2343	1757	1406	1171	879	703	562
						(35-53)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
							Feed (mm/min)	90	112	150	150	146	144	127	101
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile	≤ 0.5	≤ 1.5	136	RPM	14380	7190	5392	4314	3595	2696	2157	1726
						(109-163)	Fz	0.008	0.024	0.038	0.048	0.058	0.077	0.083	0.085
							Feed (mm/min)	483	690	828	828	828	828	713	587
			Slot	1	≤ 1	108	RPM	11471	5736	4302	3441	2868	2151	1721	1377
						(87-130)	Fz	0.008	0.024	0.038	0.048	0.058	0.077	0.083	0.085
							Feed (mm/min)	385	551	661	661	661	661	569	468
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc	Profile	≤ 0.5	≤ 1.5	104	RPM	10987	5493	4120	3296	2747	2060	1648	1318
						(83-124)	Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063
							Feed (mm/min)	316	369	492	492	475	485	422	330
			Slot	1	≤ 1	82	RPM	8725	4362	3272	2617	2181	1636	1309	1047
						(66-99)	Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063
							Feed (mm/min)	251	293	391	391	377	385	335	262
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	149	RPM	15834	7917	5938	4750	3958	2969	2375	1900
						(119-179)	Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063
							Feed (mm/min)	456	532	709	709	684	699	608	475
			Slot	1	≤ 1	119	RPM	12602	6301	4726	3781	3151	2363	1890	1512
						(95-143)	Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063
							Feed (mm/min)	363	423	565	565	544	557	484	378

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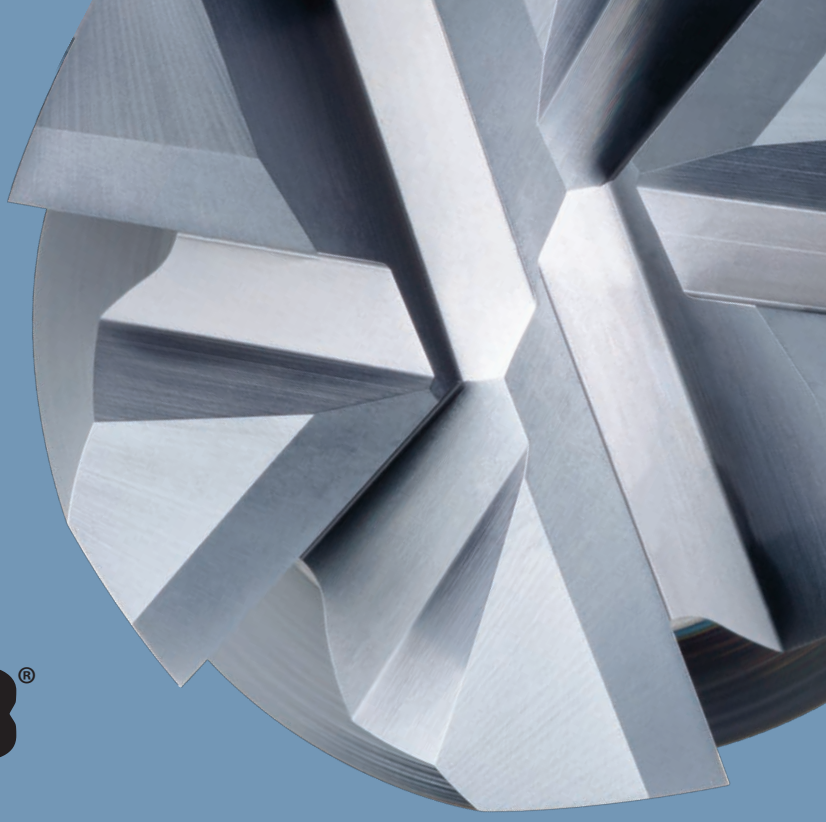
METRIC

Z-Carb



	Series Z1M, Z1MB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	16	20	25
M	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	104	RPM	10987	5493	4120	3296	2747	2060	1648	1318
						(83-124)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050
							Feed (mm/min)	211	316	387	387	369	380	334	264
			Slot	1	≤ 1	82	RPM	8725	4362	3272	2617	2181	1636	1309	1047
						(66-99)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050
							Feed (mm/min)	168	251	307	307	293	302	265	209
	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Profile	≤ 0.5	≤ 1.5	94	RPM	10017	5009	3756	3005	2504	1878	1503	1202
						(76-113)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050
							Feed (mm/min)	192	288	353	353	337	346	305	240
			Slot	1	≤ 1	76	RPM	8078	4039	3029	2424	2020	1515	1212	969
						(61-91)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050
							Feed (mm/min)	155	233	284	284	271	279	246	194
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc	Profile	≤ 0.5	≤ 1.5	24	RPM	2585	1293	969	776	646	485	388	310
						(20-29)	Fz	0.005	0.010	0.017	0.021	0.024	0.033	0.037	0.038
							Feed (mm/min)	55	50	66	53	62	65	58	47
			Slot	1	≤ 1	20	RPM	2100	1050	788	630	525	394	315	252
						(16-24)	Fz	0.005	0.010	0.017	0.021	0.024	0.033	0.037	0.038
							Feed (mm/min)	40	40	54	54	50	52	47	38
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc	Profile	≤ 0.5	≤ 1.5	19	RPM	2003	1002	751	601	501	376	301	240
						(15-23)	Fz	0.002	0.007	0.011	0.013	0.017	0.020	0.024	0.025
							Feed (mm/min)	19	29	32	32	34	31	29	24
			Slot	1	≤ 1	15	RPM	1583	792	594	475	396	297	238	190
						(12-18)	Fz	0.002	0.007	0.011	0.013	0.017	0.020	0.024	0.025
							Feed (mm/min)	15	23	25	25	27	24	23	19
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	Profile	≤ 0.5	≤ 1.5	66	RPM	6947	3474	2605	2084	1737	1303	1042	834
						(52-79)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
							Feed (mm/min)	133	167	222	222	217	213	189	150
			Slot	1	≤ 1	52	RPM	5493	2747	2060	1648	1373	1030	824	659
						(41-62)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
							Feed (mm/min)	105	132	176	176	171	169	149	119
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	Profile	≤ 0.5	≤ 1.5	23	RPM	2424	1212	909	727	606	454	364	291
						(18-27)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
							Feed (mm/min)	47	58	78	78	76	74	66	52
			Slot	1	≤ 1	18	RPM	1939	969	727	582	485	364	291	233
						(15-22)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
							Feed (mm/min)	37	47	62	62	60	60	53	42

Bhn (Brinell) HRc (Rockwell C)
rpm = (Vc x 1000) / (D_1 x 3.14)
ipm = Fz x 4 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



T-CARB®
Six Flute End Mills

T-Carb® 6-Flute High Performance End Mills are ideal for aggressive high speed machining using Trochoidal and Peel Milling techniques. The additional flutes allow higher feed rates at reduced tool loads, ultimately preventing breakage and failure. The variable pitch geometry allows the T-Carb® to excel in multiple operations calling for aggressive roughing and finishing, resulting in faster cycle times and lower costs. The series is offered in a variety of length, neck and corner radius options and is coated with Ti-NAMITE-X for ultimate thermal barrier protection.

Titanium

T-CARB® HIGH SPEED MACHINING END MILLS ARE **IDEAL FOR AGGRESSIVE MILLING APPLICATIONS** IN THESE TARGET MARKETS:

- Aerospace Structural and Titanium Components
- Medical Replacement Parts and Joints
- Automotive & Motorized Vehicles
- Energy and Power Generation



FEATURES & BENEFITS

- Incorporates unique 6-Flute design for High Speed Machining operations requiring high accuracy and less deflection
- Designed for aggressive ramping at high speeds where evacuation and load might be a factor
- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Exceptional performance with minimal deflection in difficult materials such as titanium alloys and stainless steels
- Eccentric relief provides superior strength and smoother surface finish
- Variable Flute Geometry maximizes productivity and tool life by reducing the harmful harmonics associated with aggressive milling
- Available in a variety of corner radius and reach options
- Exclusively coated with Ti-NAMITE-X for superior wear and increased tool life
- New Expanded tools



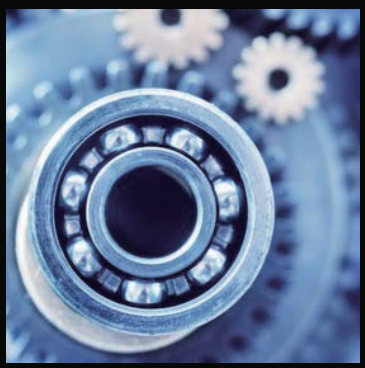
Ti-NAMITE-X ADVANCED TOOL COATING

Ti-NAMITE-X provides outstanding results in a diverse range of applications including medium-hard to very hard steels (40–65 HRC) and titanium alloys. The layered design of the coating, along with the nanocomposite grain structure provides the hardness necessary for extreme wear resistance with the toughness required to withstand interrupted cutting. Ti-NAMITE-X allows for a broad spectrum of high-performance machining from aggressive material removal rates to high speed machining and finishing.

Hardness (HV): 3600
Oxidation Temperature: 1150°C – 2100°F
Coefficient of Friction: 0.45
Thickness: 1 – 4 Microns (based on tool diameter)







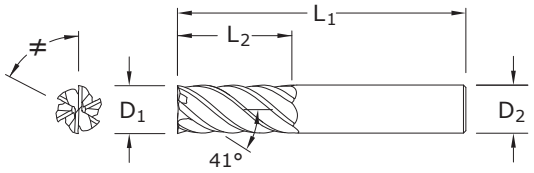
Finishing End Mill

T-Carb (6 flutes)

T-CARB® Six Flute End Mills

TOLERANCES (mm)

DIAMETER	D_1	D_2
6 - 20	+0,000 / -0,050	h6



Square

Straight

Right Spiral

Regular

Flute Spacing Unequal

Positive Rake Angle

External Coolant

6 Flutes

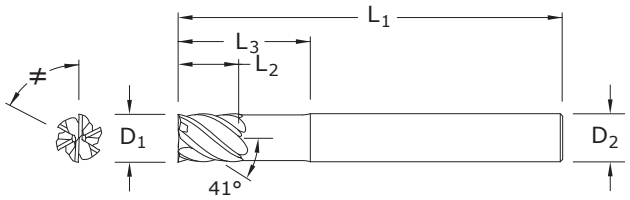
Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Ti-Namite-X (TX) EDP No.
6,0	19,0	63,0	6,0	45100
8,0	20,0	63,0	8,0	45101
10,0	22,0	75,0	10,0	45102
12,0	26,0	83,0	12,0	45103
16,0	32,0	92,0	16,0	45104
20,0	38,0	104,0	20,0	45105

Finishing End Mill

T-Carb (6 flutes)

T-CARB® Six Flute End Mills

TOLERANCES (mm)		
DIAMETER	D_1	D_2
6 - 20	+0,000 / -0,050	h6



Square

Straight

Right Spiral

Long Reach Neck

Flute Spacing Unequal

Positive Rake Angle

External Coolant

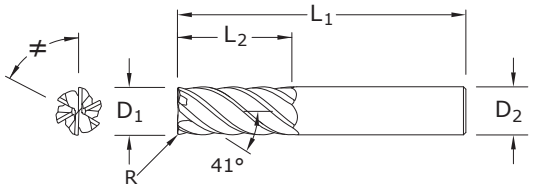
6 Flutes

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Reach L_3	Ti-Namite-X (TX) EDP No.
6,0	8,0	75,0	6,0	32,0	45106
8,0	10,0	75,0	8,0	32,0	45107
10,0	12,0	100,0	10,0	40,0	45108
12,0	15,0	100,0	12,0	48,0	45109
16,0	20,0	115,0	16,0	65,0	45110
20,0	24,0	150,0	20,0	80,0	45111

Finishing End Mill

T-Carb (6 flutes)

TOLERANCES (mm)			
DIAMETER	D_1	D_2	R
6 - 20	+0,000 / -0,050	h6	+0,000 / -0,050



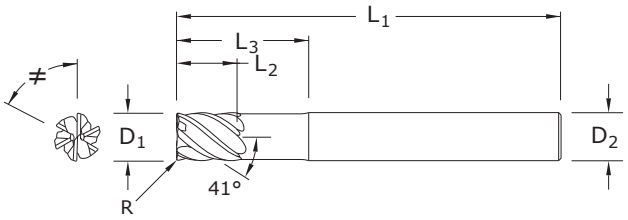
New Expanded Tools

Corner
Straight
Right Spiral
Regular
Flute Spacing Unequal
Positive Rake Angle
External Coolant
6 Flutes

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Corner Radius R	Ti-Namite-X (TX) EDP No.
6,0	19,0	63,0	6,0	0,5	45112
6,0	19,0	63,0	6,0	1,0	45170
6,0	19,0	63,0	6,0	1,5	45171
8,0	20,0	63,0	8,0	0,5	45113
8,0	20,0	63,0	8,0	1,0	45114
8,0	20,0	63,0	8,0	1,2	45150
8,0	20,0	63,0	8,0	1,5	45172
8,0	20,0	63,0	8,0	2,0	45173
10,0	22,0	75,0	10,0	0,5	45174
10,0	22,0	75,0	10,0	1,0	45115
10,0	22,0	75,0	10,0	1,5	45116
10,0	22,0	75,0	10,0	2,0	45117
10,0	22,0	75,0	10,0	2,5	45175
12,0	26,0	83,0	12,0	0,5	45176
12,0	26,0	83,0	12,0	0,76	45177
12,0	26,0	83,0	12,0	1,0	45118
12,0	26,0	83,0	12,0	1,5	45119
12,0	26,0	83,0	12,0	2,0	45120
12,0	26,0	83,0	12,0	2,5	45178
12,0	26,0	83,0	12,0	3,0	45179
16,0	32,0	92,0	16,0	1,0	45121
16,0	32,0	92,0	16,0	1,5	45122
16,0	32,0	92,0	16,0	2,0	45123
16,0	32,0	92,0	16,0	2,5	45180
16,0	32,0	92,0	16,0	3,0	45181
16,0	32,0	92,0	16,0	4,0	45182
20,0	38,0	104,0	20,0	1,0	45124
20,0	38,0	104,0	20,0	1,5	45125
20,0	38,0	104,0	20,0	2,0	45126
20,0	38,0	104,0	20,0	2,5	45183
20,0	38,0	104,0	20,0	3,0	45184
20,0	38,0	104,0	20,0	4,0	45185
20,0	38,0	104,0	20,0	5,0	45186

TCARB® Six Flute End Mills

TOLERANCES (mm)			
DIAMETER	D_1	D_2	R
6 - 20	+0,000 / -0,050	h6	+0,000 / -0,050



New Expanded Tools

Corner

Straight

Right Spiral

Long Reach Neck

Flute Spacing Unequal

Positive Rake Angle

External Coolant

6 Flutes

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Reach L_3	Corner Radius R	Ti-Namite-X (TX) EDP No.
6,0	8,0	75,0	6,0	32,0	0,5	45127
6,0	8,0	75,0	6,0	32,0	1,0	45187
6,0	8,0	75,0	6,0	32,0	1,5	45188
8,0	10,0	75,0	8,0	32,0	0,5	45128
8,0	10,0	75,0	8,0	32,0	1,0	45129
8,0	10,0	75,0	8,0	32,0	1,5	45189
8,0	10,0	75,0	8,0	32,0	2,0	45190
10,0	12,0	100,0	10,0	40,0	0,5	45191
10,0	12,0	100,0	10,0	40,0	1,0	45130
10,0	12,0	100,0	10,0	40,0	1,5	45131
10,0	12,0	100,0	10,0	40,0	2,0	45132
10,0	12,0	100,0	10,0	40,0	2,5	45192
12,0	15,0	100,0	12,0	48,0	0,5	45193
12,0	15,0	100,0	12,0	48,0	0,76	45194
12,0	15,0	100,0	12,0	48,0	1,0	45133
12,0	15,0	100,0	12,0	48,0	1,5	45134
12,0	15,0	100,0	12,0	48,0	2,0	45135
12,0	15,0	100,0	12,0	48,0	2,5	45195
12,0	15,0	100,0	12,0	48,0	3,0	45196
16,0	20,0	115,0	16,0	65,0	1,0	45136
16,0	20,0	115,0	16,0	65,0	1,5	45137
16,0	20,0	115,0	16,0	65,0	2,0	45138
16,0	20,0	115,0	16,0	65,0	2,5	45197
16,0	20,0	115,0	16,0	65,0	3,0	45198
16,0	20,0	115,0	16,0	65,0	4,0	45199
20,0	24,0	150,0	20,0	80,0	1,0	45139
20,0	24,0	150,0	20,0	80,0	1,5	45140
20,0	24,0	150,0	20,0	80,0	2,0	45141
20,0	24,0	150,0	20,0	80,0	2,5	45200
20,0	24,0	150,0	20,0	80,0	3,0	45201
20,0	24,0	150,0	20,0	80,0	4,0	45202
20,0	24,0	150,0	20,0	80,0	5,0	45203

Finishing End Mill

T-Carb (6 flutes)

T-CARB® Six Flute End Mills

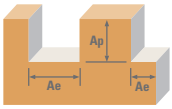
	Series 51M, 51MCR, 51ML, 51MLC Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.1	≤ 1	219	RPM	11633	8725	6980	5816	4362	3490
						(176-263)	Fz	0.048	0.081	0.101	0.121	0.142	0.158
							Feed (mm/min)	3350	4240	4230	4223	3717	3308
			HSM	≤ 0.05	≤ 2	279	RPM	14784	11088	8870	7392	5544	4435
						(223-335)	Fz	0.066	0.113	0.141	0.169	0.197	0.220
							Feed (mm/min)	5854	7517	7504	7495	6553	5854
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.1	≤ 1	149	RPM	7917	5938	4750	3958	2969	2375
						(119-179)	Fz	0.036	0.061	0.077	0.092	0.107	0.119
							Feed (mm/min)	1710	2173	2195	2185	1906	1696
			HSM	≤ 0.05	≤ 2	189	RPM	10017	7513	6010	5009	3756	3005
						(151-227)	Fz	0.049	0.083	0.104	0.125	0.146	0.163
							Feed (mm/min)	2945	3741	3750	3756	3291	2939
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.1	≤ 1	73	RPM	3878	2908	2327	1939	1454	1163
						(59-88)	Fz	0.029	0.049	0.061	0.073	0.086	0.096
							Feed (mm/min)	675	855	852	849	750	670
			HSM	≤ 0.05	≤ 2	93	RPM	4928	3696	2957	2464	1848	1478
						(74-112)	Fz	0.040	0.069	0.086	0.103	0.120	0.134
							Feed (mm/min)	1183	1530	1526	1523	1331	1189
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.1	≤ 1	155	RPM	8240	6180	4944	4120	3090	2472
						(140-171)	Fz	0.035	0.060	0.075	0.090	0.105	0.117
							Feed (mm/min)	1730	2225	2225	2225	1947	1735
			HSM	≤ 0.05	≤ 2	198	RPM	10502	7877	6301	5251	3938	3151
						(178-218)	Fz	0.048	0.082	0.102	0.122	0.143	0.159
							Feed (mm/min)	3025	3875	3856	3844	3379	3006
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.1	≤ 1	107	RPM	5655	4241	3393	2827	2121	1696
						(96-117)	Fz	0.029	0.049	0.061	0.073	0.086	0.096
							Feed (mm/min)	984	1247	1242	1238	1094	977
			HSM	≤ 0.05	≤ 2	137	RPM	7271	5453	4362	3635	2726	2181
						(123-151)	Fz	0.040	0.069	0.086	0.103	0.120	0.134
							Feed (mm/min)	1745	2258	2251	2247	1963	1754
	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Profile	≤ 0.1	≤ 1	99	RPM	5251	3938	3151	2626	1969	1575
						(89-109)	Fz	0.029	0.049	0.061	0.073	0.086	0.096
							Feed (mm/min)	914	1158	1153	1150	1016	907
			HSM	≤ 0.05	≤ 2	125	RPM	6624	4968	3975	3312	2484	1987
						(112-137)	Fz	0.040	0.069	0.086	0.103	0.120	0.134
							Feed (mm/min)	1590	2057	2051	2047	1789	1598

continued on next page

Finishing End Mill

T-Carb (6 flutes)

T-CARB® Six Flute End Mills



	Series 51M, 51MCR, 51ML, 51MLC Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc	Profile	≤ 0.1	≤ 1	32	RPM	1696	1272	1018	848	636	509
						(26-38)	Fz	0.034	0.057	0.071	0.085	0.100	0.110
							Feed (mm/min)	346	435	434	433	382	336
			HSM	≤ 0.05	≤ 2	40	RPM	2100	1575	1260	1050	788	630
						(32-48)	Fz	0.046	0.077	0.097	0.120	0.140	0.150
							Feed (mm/min)	580	728	733	756	662	567
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc	Profile	≤ 0.1	≤ 1	24	RPM	1293	969	776	646	485	388
						(20-29)	Fz	0.023	0.039	0.049	0.059	0.068	0.077
							Feed (mm/min)	178	227	228	229	198	179
			HSM	≤ 0.05	≤ 2	30	RPM	1616	1212	969	808	606	485
						(24-37)	Fz	0.032	0.054	0.068	0.081	0.095	0.110
							Feed (mm/min)	310	393	396	393	345	320
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	Profile	≤ 0.1	≤ 1	85	RPM	4524	3393	2714	2262	1696	1357
						(68-102)	Fz	0.023	0.039	0.049	0.059	0.068	0.077
							Feed (mm/min)	624	794	798	801	692	627
			HSM	≤ 0.05	≤ 2	108	RPM	5736	4302	3441	2868	2151	1721
						(87-130)	Fz	0.032	0.054	0.068	0.081	0.095	0.110
							Feed (mm/min)	1101	1394	1404	1394	1226	1136
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	Profile	≤ 0.1	≤ 1	47	RPM	2504	1878	1503	1252	939	751
						(38-57)	Fz	0.023	0.039	0.049	0.059	0.068	0.077
							Feed (mm/min)	346	440	442	443	383	347
			HSM	≤ 0.05	≤ 2	61	RPM	3231	2424	1939	1616	1212	969
						(49-73)	Fz	0.032	0.054	0.068	0.081	0.095	0.110
							Feed (mm/min)	620	785	791	785	691	640

Note:
- Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
- rpm = (Vc x 1000) / (D_1 x 3.14)
- mm/min = Fz x 6 x rpm
- reduce speed and feed for materials harder than listed
- reduce feed and Ae when finish milling (.02 x D_1 maximum)
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

TOOLWIZARD® 2.1
www.sgstoolwizard.com



Z-CARB-HPR

HIGH PERFORMANCE ROUGHER

INTRODUCING THE NEXT GENERATION Z-CARB

The Z-Carb HPR Five Flute Roughing End Mills are ideal for achieving high material removal rates (MRR) and superior finishes. The specialized five flute design is engineered for increased productivity over three and four flute end mills. The variable indexing geometry allows for improved chatter suppression over symmetrical designs. The series is offered in a variety of length, square, and corner radius options and is coated with Ti-NAMITE-M and Ti-NAMITE-A for superior performance in difficult to machine materials like Titanium and Stainless Steel.

THE Z-CARB HPR MATERIAL REMOVAL RATES (MRR) MAKE THIS TOOL IDEAL FOR THE FOLLOWING TARGET MARKETS:

- Aerospace Structural Components
- Medical Implants
- Automotive & Heavy Transportation
- Energy & Power Generation
- Castings & Forgings
- General Engineering

EXPANSIVE OFFERING

- Over 700 items in portfolio
- Available in stub and regular lengths
- Full complement of corner radii available
- Central coolant hole option available on select diameters
- Plain and Weldon Flat options available for diameters ½" and 12mm and above (other retention methods available upon request)
- Special tooling design attributes available upon request
- Available in Ti-NAMITE-A coating ideal for Stainless Steel applications
- Available coatings are suitable for dry machining in ferrous based materials such as cast irons and many carbon steels



Ti-NAMITE-M

Features of Ti-Namite-M include high wear resistance, reduced friction, and excellent prevention of cutting edge build up. This coating provides superior material removal rates and tool life when used in high performance operations in Cast Iron and Steel and with difficult to machine materials like Titanium.

Hardness (HV): 3600
Oxidation Temperature: 1150°C / 2100°F
Coefficient of Friction: 0.45
Thickness: 1 – 4 Microns (based on tool diameter)

Ti-NAMITE-A

The Z-Carb HPR is available with an abrasive resistant and hard coating, Aluminum Titanium Nitride (AlTiN) or Ti-NAMITE-A. The coating has a high hardness giving ultimate protection against abrasive wear and erosion. Ideal for high temperature alloys and stainless steel applications.

Hardness (HV): 3700
Oxidation Temperature: 1100°C / 2010°F
Coefficient of Friction: 0.30
Thickness: 1 – 4 Microns (based on tool diameter)









FEATURES

RADIAL RAKE

- Specially designed radial rake balances positive cutting action and edge strength
- End grind features include: (1) Positive axial rake for high performance shearing and lifting of material; and (2) Increased clearances to eliminate edge build-up during ramping





THROUGH COOLANT

- Central hole delivers coolant effectively to the cutting zone
- Enhances chip removal when pocketing or slotting
- Select fractional and metric diameters in stock

FLUTING & HELIX ANGLE

- Specialized five flute design is engineered for strength, chip evacuation, and increased productivity over three and four flute end mills by 20–40%
- The variable flute pattern provides excellent chatter suppression over a range of spindle speeds
- Open center design delivers efficiency during entry movements into the work-piece
- Helix angle engineered for balance between positive cutting action and reduced contact area to control tool pressure and spindle load

CAPABILITIES

RAMPING

- Typical ramp angles of 5 degrees are common; greater than 5 degree ramp angles are obtainable with reduced feed rates
- Entry feed rates can achieve 100% of the slotting value
- The open center provides an ideal exit for central coolant and chip flushing while maintaining the 5 degree ramp angle

ROUGHING

- One times diameter slotting capability is typical
- 50% radial by 150% axial heavy profiling capability is common

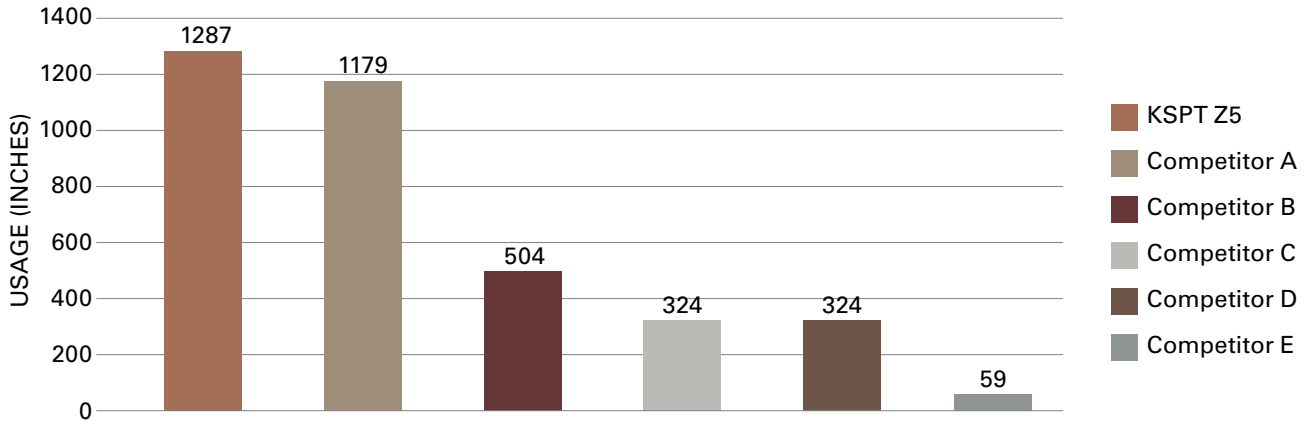
FINISHING

- Variable geometry contributes to exceptional finishing capabilities
- 10 µin. Ra possible

HIGH-SPEED MACHINING

- Variable geometry design and open fluting eliminate vibration to enable increased rates for High Speed Machining
- Exclusive Ti-NAMITE-M coating for higher heat resistance to enhance tool life in difficult to machine materials like Titanium
- Available with Ti-NAMITE-A coating for superior wear, edge build-up resistance and extended tool life in difficult to machine materials like Stainless Steel

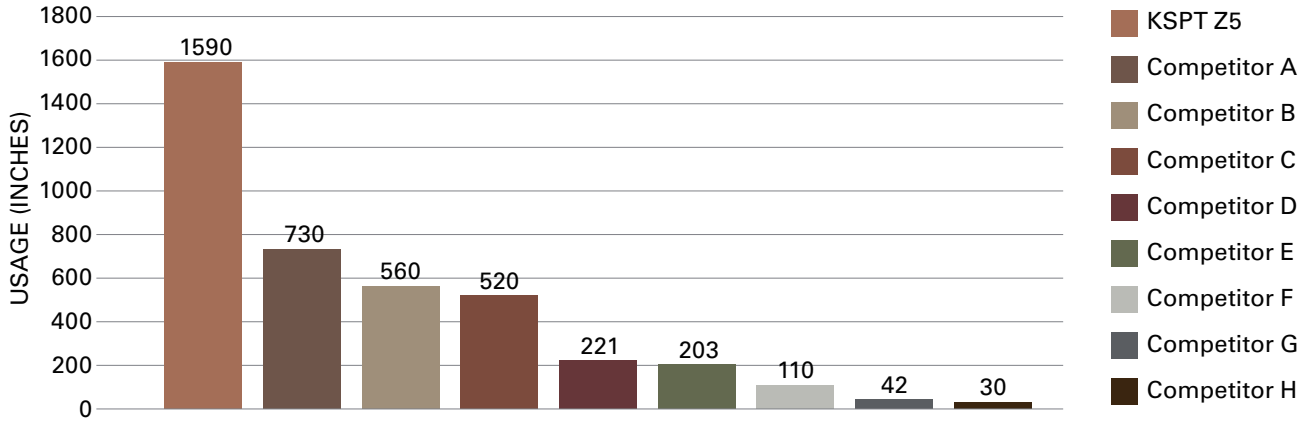
LAB TESTING RESULTS – HEAVY PROFILING IN TITANIUM



RESULTS IN TITANIUM 6AL4V @ 32HRC Z5CR 1/2" TESTED AT 1643 RPM X 16.4 IPM
.250" RADIAL WIDTH OF CUT X .750" AXIAL DEPTH OF CUT

Ti-NAMITE-M

LAB TESTING RESULTS – HEAVY PROFILING IN STAINLESS STEEL



RESULTS IN STAINLESS STEEL 316 @ 160HB Z5CR 1/2" TESTED AT 2540 RPM X 31.7 IPM
.250" RADIAL WIDTH OF CUT X .750" AXIAL DEPTH OF CUT

Ti-NAMITE-A

CASE STUDY

INDUSTRY
GENERAL ENGINEERING

MATERIAL
304LP Stainless Steel

PRODUCT
KSPT Z-CARB HPR

APPLICATION
MILLING

COMPETITOR
INSERT CUTTER

COOLANT
FLOOD

TOOL INFORMATION
.625 DIA / 1.25" LOC / 3.5" OAL

GOALS

The goals of this study were to significantly reduce job cost through increasing tool life, reducing cycle time and improving manufacturing efficiency.

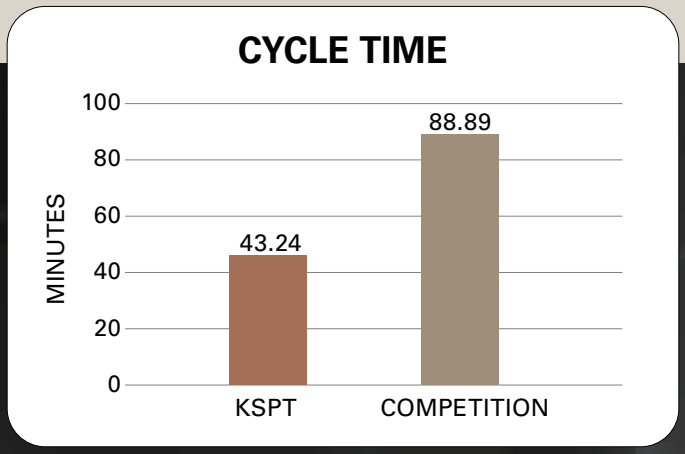
STRATEGY

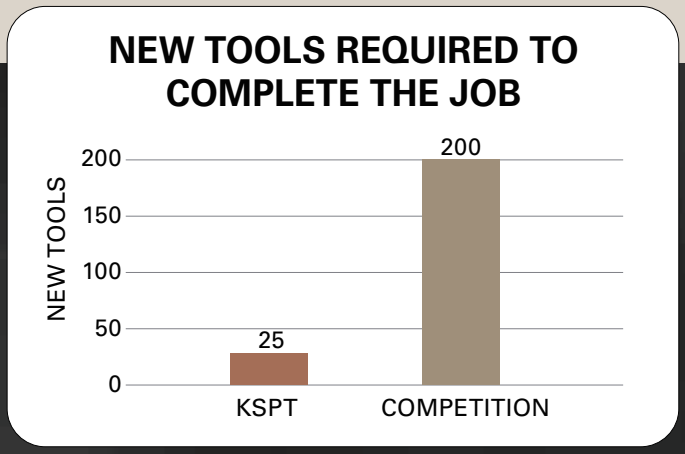
KSPT approached this job with a 5 flute Z-Carb high performance rougher (HPR) end mill. KSPT's Z-Carb HPR is ideal for achieving high metal removal rates, while at the same time achieving an optimal surface finish. The Ti-Namite M coating was selected for its outstanding performance in Titanium.

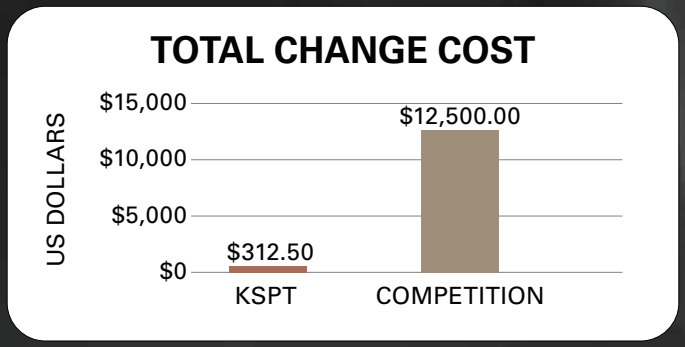
	KSPT	COMPETITOR
TOOL DIAMETER	.6250"	2" (INDEXABLE)
SPEED	1850 RPM	1200 RPM
FEED	18.5 IPM	9.0 IPM
RADIAL CUT (AE)	.1250"	.0500"
AXIAL CUT (AP)	1.4000"	.3000"
TOTAL MACHINING HOURS	72.07 HOURS	148.15 HOURS

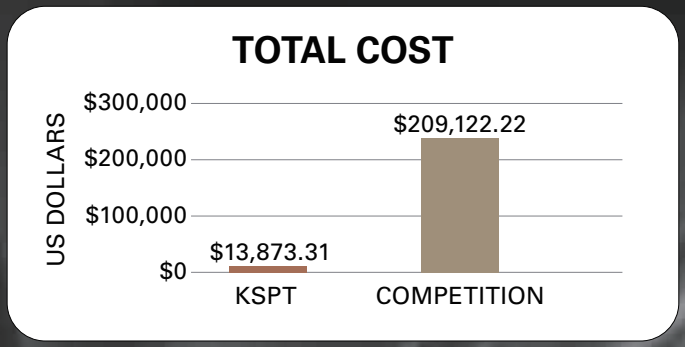
RESULTS

The overall findings of this study indicate that **KSPT's Z-Carb HPR outperformed the competition in every statistical category.** The HPR was able to be run more than **35% faster than the competition,** while maintaining a **feed rate that was double the competition.** Given those increased efficiencies, the HPR was able to **produce 8 times as many parts with 8 times less new tools.** With the limited number of new tools necessary to complete the job, the **tool change cost savings was over $12,000.** Additionally, the smaller number of new tools lead to a **total new tool cost more than $171,000 less than the competition.** The HPR outperformed the competition so impressively that the **total machining cost savings for the job was $11,411 and the total cost savings was $195,248.91!**







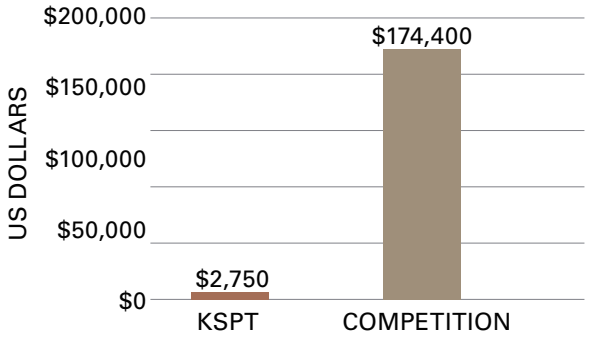




CARB-HPR

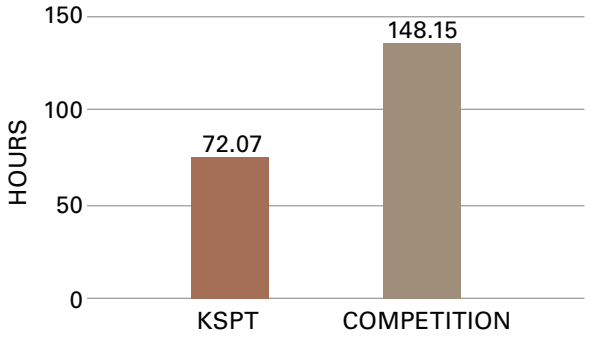
HIGH PERFORMANCE ROUGHER

TOTAL NEW TOOL COST



TOTAL MACHINING COST

TOTAL MACHINING HOURS



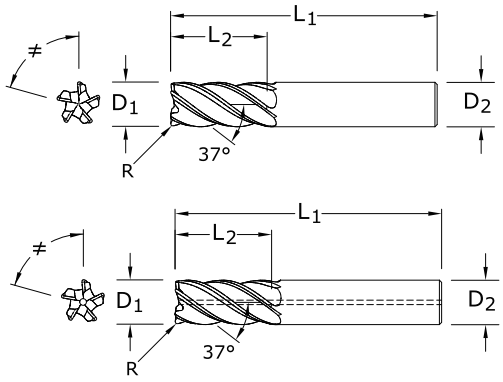
DESIGN AND ENGINEERING
ENSURE UNPARALLELED PERFORMANCE
IN A VARIETY OF DIFFICULT TO MACHINE MATERIALS.

KYOCERA SGS Precision Tools (KSPT) actively maintains a serious commitment to research and development. Our reputation for quality and ever increasing Value at the Spindle® pushes us to continually innovate and discover the next best thing in cutting tool technology. The Z-Carb HPR is a product of this passionate pursuit.

Field testing demonstrates the KSPT design achieved higher material removal rates while meeting or exceeding expected tool life. The specialized geometry allows for aggressive feed rates to increase productivity and enables exceptional finishes.



CARB-HPR
HIGH PERFORMANCE ROUGHER



TOLERANCES (mm)

DIAMETER	D_1	D_2
6	+0,000 / –0,030	h6
> 6 - 10	+0,000 / –0,040	h6
> 10 - 25	+0,000 / –0,050	h6

CORNER RADIUS TOLERANCES (mm)

R = +0,000 / –0,050

New Expanded Tools

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Corner Radius R	Ti-Namite-A (TA) EDP No.	Ti-Namite-A (TA) EDP No. w/Flat	Ti-Namite-A (TA) EDP No. w/Internal Coolant	Ti-Namite-M (TM) EDP No.	Ti-Namite-M (TM) EDP No. w/ Flat	Ti-Namite-M (TM) EDP No. w/Internal Coolant
6,0	9,0	54,0	6,0	0,5	48000	–	–	47000	–	–
6,0	13,0	57,0	6,0	0,3	48001	–	–	47001	–	–
6,0	13,0	57,0	6,0	0,5	47120	–	–	47002	–	–
6,0	13,0	57,0	6,0	1,0	48002	–	–	47003	–	–
6,0	13,0	57,0	6,0	1,5	48003	–	–	47004	–	–
8,0	11,0	58,0	8,0	0,5	48004	–	–	47005	–	–
8,0	18,0	63,0	8,0	0,5	47121	–	–	47006	–	–
8,0	18,0	63,0	8,0	1,0	47122	–	–	47007	–	–
8,0	18,0	63,0	8,0	1,5	48005	–	–	47008	–	–
8,0	18,0	63,0	8,0	2,0	48006	–	–	47009	–	–
10,0	13,0	66,0	10,0	1,0	48007	–	–	47010	–	–
10,0	22,0	72,0	10,0	0,5	47123	–	–	47011	–	–
10,0	22,0	72,0	10,0	1,0	47124	–	–	47012	–	–
10,0	22,0	72,0	10,0	1,5	48008	–	–	47013	–	–
10,0	22,0	72,0	10,0	2,0	48009	–	–	47014	–	–
10,0	22,0	72,0	10,0	2,5	48010	–	–	47015	–	–
12,0	15,0	73,0	12,0	1,0	48011	48029	–	47016	47024	–
12,0	26,0	83,0	12,0	0,5	47125	47128	47160	47017	47025	47161
12,0	26,0	83,0	12,0	0,76	47126	47129	47162	47018	47026	47163
12,0	26,0	83,0	12,0	1,0	47127	47130	47164	47019	47027	47165
12,0	26,0	83,0	12,0	1,5	48012	48030	47166	47020	47028	47167
12,0	26,0	83,0	12,0	2,0	48013	48031	47168	47021	47029	47169
12,0	26,0	83,0	12,0	2,5	48014	48032	47170	47022	47030	47171
12,0	26,0	83,0	12,0	3,0	48015	48033	47172	47023	47031	47173
16,0	19,0	82,0	16,0	1,0	48016	48034	48056	47032	47039	47046
16,0	19,0	82,0	16,0	1,5	48070	–	–	48071	–	–
16,0	35,0	92,0	16,0	1,0	47131	48035	47134	47033	47040	47047
16,0	35,0	92,0	16,0	1,5	48017	48036	48057	47034	47041	47048
16,0	35,0	92,0	16,0	2,0	47132	48037	47135	47035	47042	47049
16,0	35,0	92,0	16,0	2,5	48018	48038	48058	47036	47043	47050
16,0	35,0	92,0	16,0	3,0	47133	48039	47136	47037	47044	47051
16,0	35,0	92,0	16,0	4,0	48019	48040	48059	47038	47045	47052
20,0	23,0	92,0	20,0	1,0	48020	48041	48060	47053	47061	47069
20,0	43,0	104,0	20,0	1,0	47137	48042	47140	47054	47062	47070

(continued on next page)

Corner
Straight
Weldon Flat
Right Spiral
Stub and Regular
Flute Spacing Unequal
Positive Rake Angle
Internal Coolant
External Coolant
5 Flutes

Roughing End Mill

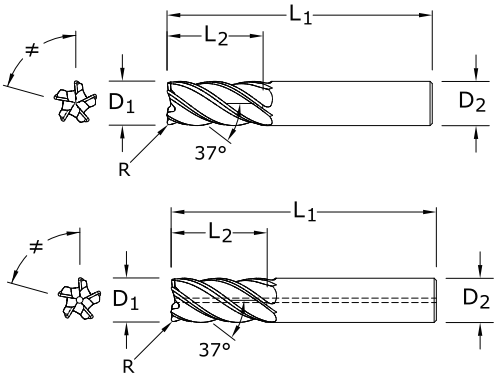
Z-Carb HPR

TOLERANCES (mm)

DIAMETER	D_1	D_2
6	+0,000 / –0,030	h6
> 6 - 10	+0,000 / –0,040	h6
> 10 - 25	+0,000 / –0,050	h6

CORNER RADIUS TOLERANCES (mm)

R = +0,000 / –0,050



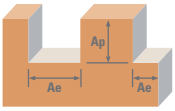
CARB-HPR
HIGH PERFORMANCE ROUGHER

New Expanded Tools

Corner
Straight
Weldon Flat
Right Spiral
Stub and Regular
Flute Spacing Unequal
Positive Rake Angle
Internal Coolant
External Coolant
5 Flutes

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Corner Radius R	Ti-Namite-A (TA) EDP No.	Ti-Namite-A (TA) EDP No. w/Flat	Ti-Namite-A (TA) EDP No. w/Internal Coolant	Ti-Namite-M (TM) EDP No.	Ti-Namite-M (TM) EDP No. w/ Flat	Ti-Namite-M (TM) EDP No. w/Internal Coolant
20,0	43,0	104,0	20,0	1,5	48021	48043	48061	47055	47063	47071
20,0	43,0	104,0	20,0	2,0	47138	48044	47141	47056	47064	47072
20,0	43,0	104,0	20,0	2,5	48022	48045	48062	47057	47065	47073
20,0	43,0	104,0	20,0	3,0	47139	48046	47142	47058	47066	47074
20,0	43,0	104,0	20,0	4,0	48023	48047	48063	47059	47067	47075
20,0	43,0	104,0	20,0	5,0	48024	48048	48064	47060	47068	47076
25,0	28,0	100,0	25,0	1,0	48025	48049	48065	47077	47084	47091
25,0	53,0	121,0	25,0	1,0	47143	48050	47146	47078	47085	47092
25,0	53,0	121,0	25,0	2,0	47144	48051	47147	47079	47086	47093
25,0	53,0	121,0	25,0	2,5	48026	48052	48066	47080	47087	47094
25,0	53,0	121,0	25,0	3,0	47145	48053	47148	47081	47088	47095
25,0	53,0	121,0	25,0	4,0	48027	48054	48067	47082	47089	47096
25,0	53,0	121,0	25,0	5,0	48028	48055	48068	47083	47090	47097

Z-CARB-HPR
HIGH PERFORMANCE ROUGHER



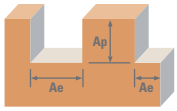
	Series Z5MCR Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20	25
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	169	RPM	8967	6725	5380	4484	3363	2690	2152
						(135-203)	Fz	0.029	0.049	0.061	0.074	0.087	0.099	0.108
							Feed (mm/min)	1291	1650	1650	1668	1463	1327	1157
			Slot	1	≤ 1	134	RPM	7109	5332	4265	3555	2666	2133	1706
						(107-161)	Fz	0.029	0.049	0.061	0.074	0.087	0.099	0.108
							Feed (mm/min)	1024	1308	1308	1322	1160	1052	917
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.5	≤ 1.5	96	RPM	5089	3817	3054	2545	1909	1527	1221
						(77-115)	Fz	0.022	0.036	0.045	0.055	0.067	0.075	0.080
							Feed (mm/min)	550	692	692	702	635	570	489
			Slot	1	≤ 1	76	RPM	4039	3029	2424	2020	1515	1212	969
						(61-91)	Fz	0.022	0.036	0.045	0.055	0.067	0.075	0.080
							Feed (mm/min)	436	549	549	557	504	452	388
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.5	≤ 1.5	56	RPM	2989	2242	1793	1495	1121	897	717
						(45-68)	Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.065
							Feed (mm/min)	251	335	335	323	287	263	233
			Slot	1	≤ 1	44	RPM	2343	1757	1406	1171	879	703	562
						(35-53)	Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.065
							Feed (mm/min)	197	262	262	253	225	206	183
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile	≤ 0.5	≤ 1.5	136	RPM	7190	5392	4314	3595	2696	2157	1726
						(109-163)	Fz	0.026	0.045	0.056	0.067	0.079	0.091	0.098
							Feed (mm/min)	949	1208	1208	1208	1070	978	841
			Slot	1	≤ 1	108	RPM	5736	4302	3441	2868	2151	1721	1377
						(87-130)	Fz	0.026	0.045	0.056	0.067	0.079	0.091	0.098
							Feed (mm/min)	757	964	964	964	853	780	671
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc	Profile	≤ 0.5	≤ 1.5	104	RPM	5493	4120	3296	2747	2060	1648	1318
						(83-124)	Fz	0.020	0.034	0.043	0.050	0.059	0.067	0.073
							Feed (mm/min)	554	703	703	692	606	549	478
			Slot	1	≤ 1	82	RPM	4362	3272	2617	2181	1636	1309	1047
						(66-99)	Fz	0.020	0.034	0.043	0.050	0.059	0.067	0.073
							Feed (mm/min)	440	558	558	550	482	436	380
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	149	RPM	7917	5938	4750	3958	2969	2375	1900
						(119-179)	Fz	0.022	0.036	0.045	0.055	0.067	0.075	0.080
							Feed (mm/min)	855	1077	1077	1092	988	887	760
			Slot	1	≤ 1	119	RPM	6301	4726	3781	3151	2363	1890	1512
						(95-143)	Fz	0.022	0.036	0.045	0.055	0.067	0.075	0.080
							Feed (mm/min)	680	857	857	869	786	706	605
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	104	RPM	5493	4120	3296	2747	2060	1648	1318
						(83-124)	Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.063
							Feed (mm/min)	461	615	615	593	527	483	412
			Slot	1	≤ 1	82	RPM	4362	3272	2617	2181	1636	1309	1047
						(66-99)	Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.063
							Feed (mm/min)	366	489	489	471	419	384	327
	STAINLESS STEELS (PH) 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	≤ 325 Bhn or ≤ 35 HRc	Profile	≤ 0.5	≤ 1.5	94	RPM	5009	3756	3005	2504	1878	1503	1202
						(76-113)	Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.063
							Feed (mm/min)	421	561	561	541	481	441	376
			Slot	1	≤ 1	76	RPM	4039	3029	2424	2020	1515	1212	969
						(61-91)	Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.063
							Feed (mm/min)	339	452	452	436	388	355	303

continued on next page

Roughing End Mill

Z-Carb HPR





	Series Z5MCR Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm)						
S	**SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400**	≤ 300 Bhn or ≤ 32 HRc	Profile	≤ 0.5	≤ 1.5	24	RPM	1293	969	776	646	485	388	310
						(20-29)	Fz	0.0160	0.0272	0.0340	0.0409	0.0478	0.0531	0.0599
							Feed (mm/min)	103	132	132	132	116	103	93
			Slot	1	≤ 1	20	RPM	1050	788	630	525	394	315	252
						(16-24)	Fz	0.0160	0.0272	0.0340	0.0409	0.0478	0.0531	0.0599
							Feed (mm/min)	84	107	107	107	94	84	75
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc	Profile	≤ 0.5	≤ 1.5	19	RPM	1002	751	601	501	376	301	240
						(15-23)	Fz	0.0112	0.0192	0.0239	0.0284	0.0333	0.0371	0.0420
							Feed (mm/min)	56	72	72	71	63	56	50
			Slot	1	≤ 1	15	RPM	808	606	485	404	303	242	194
						(12-18)	Fz	0.0112	0.0192	0.0239	0.0284	0.0333	0.0371	0.0420
							Feed (mm/min)	45	58	58	57	50	45	41
	TITANIUM ALLOYS Pure Ttanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	Profile	≤ 0.5	≤ 1.5	66	RPM	3474	2605	2084	1737	1303	1042	834
						(52-79)	Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.070
							Feed (mm/min)	333	417	417	417	367	333	292
			Slot	1	≤ 1	52	RPM	2747	2060	1648	1373	1030	824	659
						(41-62)	Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.070
							Feed (mm/min)	264	330	330	330	290	264	231
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	Profile	≤ 0.5	≤ 1.5	23	RPM	1212	909	727	606	454	364	291
						(18-27)	Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.071
							Feed (mm/min)	116	145	145	145	128	116	103
			Slot	1	≤ 1	18	RPM	969	727	582	485	364	291	233
						(15-22)	Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.071
							Feed (mm/min)	93	116	116	116	102	93	83

Note:

- Bhn (Brinell) HRc (Rockwell C)
- rpm = (Vc x 1000) / (D_1 x 3.14)
- mm/min = Fz x 5 x rpm
- ramp at 5 degrees or less, using slotting speed and feed rates (do not plunge)
- reduce speed and feed for materials harder than listed
- reduce feed and Ae when finish milling (.02 x D_1 maximum)
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



High Efficiency Roughing End Mill for Difficult-to-Cut Material

4/5/6RFH

High Efficiency and Stable Machining with Multi-edge Design and Coolant Hole Deep Slotting (ap = 2 X Dc) for Stainless Steel and Titanium Alloy

1 High Efficiency Machining with Multi-edge Design

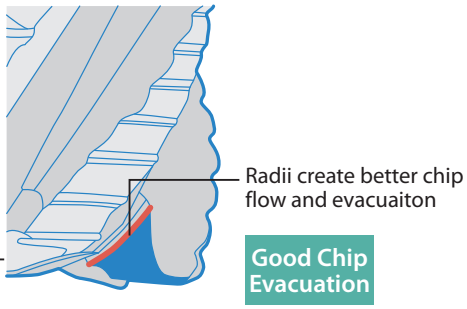
Multi-edge Design with Coolant Hole

Good Chip Evacuation with Serrated Edge

Multi-edge Design (ø16 - 6 flutes)



Original Serration Shape

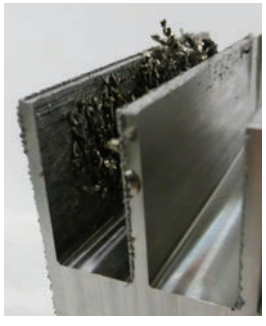


High Efficiency Slotting

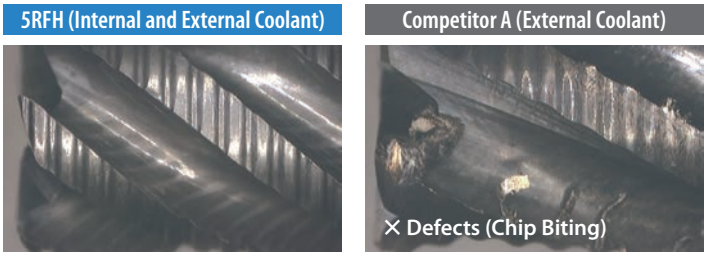
Deep Slotting (ap = 2 X Dc) for Stainless Steel and Titanium Alloy

Slotting Performance Comparison (Internal Evaluation)

After Machining 1 Pass



Competitor A | 5RFH



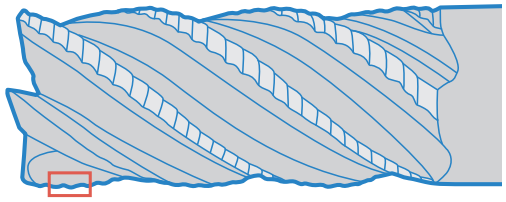
Cutting Conditions: n = 2,550 min^{-1}, Vf = 336 mm/min, ap = 20 mm
End Mill Dia. ø10, Wet, Slotting Workpiece: SUS304

No Defects when Deep Slotting

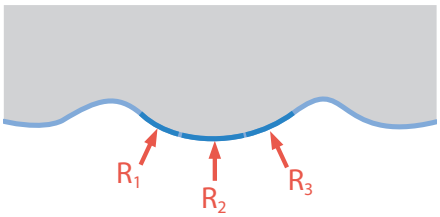
2 Defect Resistant

Reducess Cutting Pressure with Radial Serrated Edge

Stable Machining

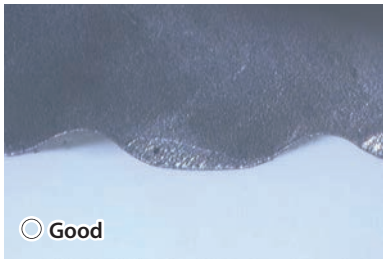


Special Curved Radius Serrated Edge

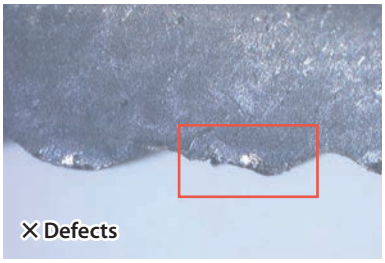


Serrated Curved Edge with Different Radii
(Compound Radius Shape)
Distributes cutting pressure and provides stress reduction

Blade Edge after Machining 12m (Internal Evaluation)



5RFH



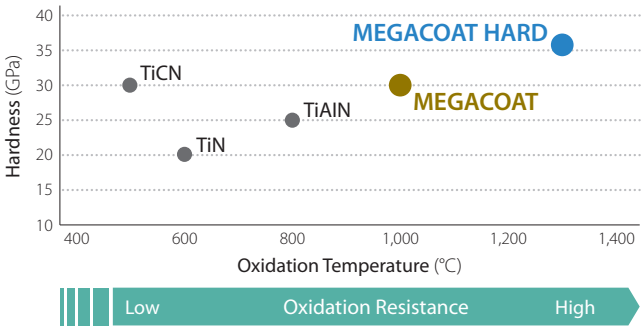
Competitor B

Cutting Conditions: n = 2,900 min^{-1}, Vf = 712 mm/min, ap X ae = 5 X 3 mm
End Mill Dia. ø10, Wet, Shouldering Workpiece: Ti-6Al-4V

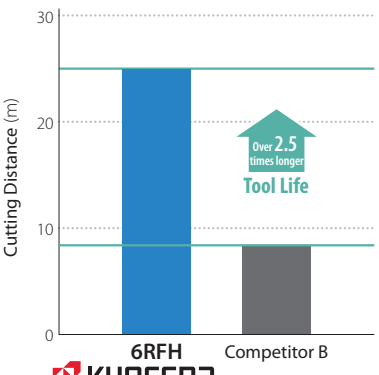
3 Achieves Long Tool Life and Stable Machining

The MEGACOAT HARD Coating Technology Delivers the Highest Hardness and Thermal Resistance of Kyocera's PVD Coating

Coating Properties



Tool Life Comparison (Internal Evaluation)



Blade Edge after Machining 8.4m



6RFH



Competitor B

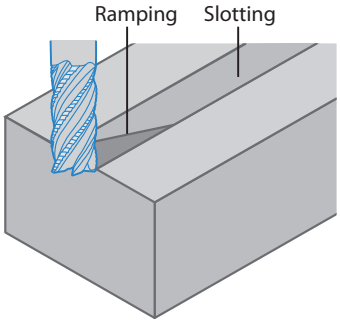
Cutting Conditions: n = 3,500 min^{-1}, Vf = 840 mm/min, ap X ae = 5 X 4.8 mm
End Mill Dia. ø16, Shouldering, Wet Workpiece: SUS304

Roughing End Mill

Machining Information

Corresponding to medium finishing from rough machining. Reach maximum tool integration

Case Studies



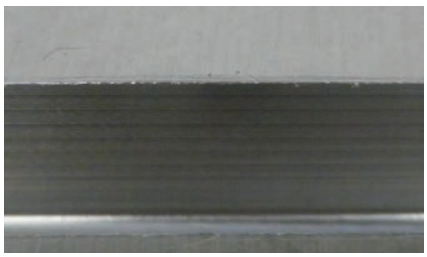
RFH is internal coolant support

RFH with multi-edge design produces excellent surface finish even at the same table feed of competitor B (By lowering the feed per tooth)

Side Surface Finish Comparison (Internal Evaluation)

5RFH (5 Flutes)

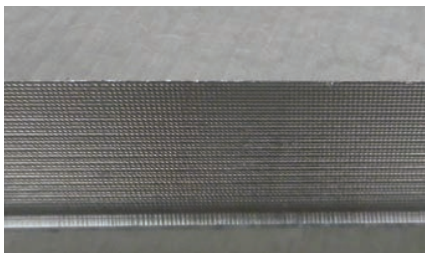
with Coolant Hole



Surface Finish: 0.20 µmRa

Competitor B (4 Flutes)

without Coolant Hole



Surface Finish: 1.66 µmRa

Cutting Conditions: n = 3,200 min^{-1}
Vf = 310 mm/min, ap = 10 mm
End Mill Dia. ø10, Wet
Ramping (Ramping Angle 5°) · Slotting
Workpiece: SUS304

Competitor B needed a semi-finishing tool because of bad surface finish
5RFH did not need a semi-finishing tool because of its excellent surface finish

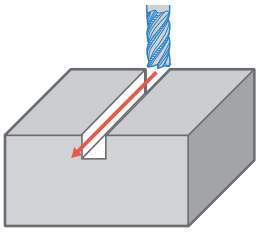
4/5/6RFH can be custom-made for NIKKEN's X-Treme chuck

Great for Difficult-to-cut Materials and Heavy Machining
For more information, please contact your Kyocera sales representative

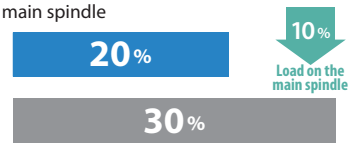
Case Studies

Test Piece SUS304

n = 1,800 min^{-1}
(Vc = 56 m/min)
Vf = 250 mm/min
(fz = 0.027 mm/t)
ap X ae = 3 X 10 mm (Slotting)
3 passes
Wet (Internal Coolant)
5RFH100-250



Load on the main spindle

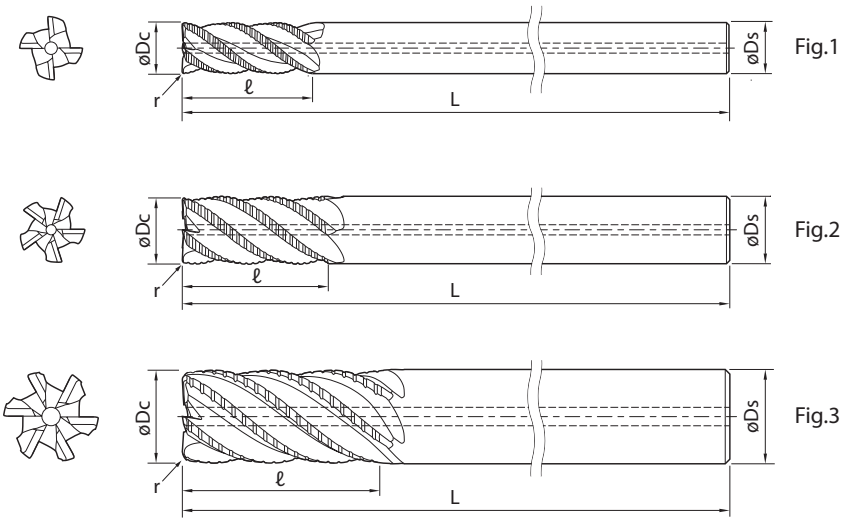


5RFH shows 10% reduced load compared to competitor C. Reduced vibration for quieter machining with excellent surface finish.

(User Evaluation)

Roughing End Mill

Lineup (Medium Type / Long Type)



Helix Angle: 40°

4/5/6RFH (Medium Type)

(Unit: mm)

Description	Stock	Outside Dia. øDc	Mill Dia. Tolerance	* Corner-R r	Length of Cut ℓ	Shank Dia. øDs	Overall Length L	No. of Flutes Z	Shape
4RFH060-150	●	6.0	0 -0.050	0.3	15	6	60	4	Fig.1
4RFH080-200	●	8.0	0 -0.050	0.3	20	8	70	4	Fig.1
5RFH100-250	●	10.0	0 -0.050	0.5	25	10	80	5	Fig.2
5RFH120-260	●	12.0	0 -0.050	0.5	26	12	100	5	Fig.2
6RFH160-350	●	16.0	0 -0.060	0.5	35	16	110	6	Fig.3
6RFH200-450	●	20.0	0 -0.060	0.5	45	20	125	6	Fig.3

* Corner-R dimension is reference only

●: Stock Std.

4/5/6RFH (Long Type)

(Unit: mm)

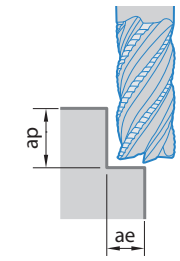
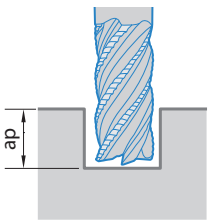
Description	Stock	Outside Dia. øDc	Mill Dia. Tolerance	* Corner-R r	Length of Cut ℓ	Shank Dia. øDs	Overall Length L	No. of Flutes Z	Shape
4RFH060-300	●	6.0	0 -0.050	0.3	30	6	80	4	Fig.1
4RFH080-400	●	8.0	0 -0.050	0.3	40	8	100	4	Fig.1
5RFH100-500	●	10.0	0 -0.050	0.5	50	10	110	5	Fig.2
5RFH120-600	●	12.0	0 -0.050	0.5	60	12	130	5	Fig.2
6RFH160-800	●	16.0	0 -0.060	0.5	80	16	160	6	Fig.3
6RFH200-1000	●	20.0	0 -0.060	0.5	100	20	180	6	Fig.3

* Corner-R dimension is reference only

●: Stock Std.

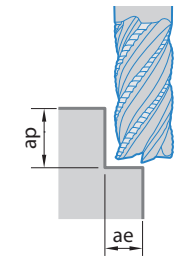
Cutting Conditions

4/5/6RFH (Medium Type)

Applications	Workpiece	Application	Depth of Cut ap X ae (mm)	Outside Dia. Dc (mm)	ø 6	ø 8	ø 10	ø 12	ø 16	ø 20
 Shouldering	Carbon Steel, Alloy Steel, Cast Iron S45C, SCM, SNCM FC	Shouldering	1.5Dc X 0.3Dc	Spindle Revolution (min-1)	6,400	4,800	3,800	3,200	2,400	1,900
				Feed Rate (mm/min)	1,040	1,050	1,100	1,000	980	920
		Slotting	1.0Dc	Spindle Revolution (min-1)	5,300	4,000	3,200	2,700	2,000	1,600
				Feed Rate (mm/min)	790	790	830	740	700	640
			2.0Dc	Spindle Revolution (min-1)	5,300	4,000	3,200	2,700	2,000	1,600
				Feed Rate (mm/min)	550	550	580	510	490	450
	Pre-hardened Steel (30~45HRC)	Shouldering	1.5Dc X 0.3Dc	Spindle Revolution (min-1)	4,200	3,200	2,500	2,100	1,600	1,300
				Feed Rate (mm/min)	490	620	580	540	490	460
		Slotting	1.0Dc	Spindle Revolution (min-1)	3,700	2,800	2,200	1,900	1,400	1,100
				Feed Rate (mm/min)	410	410	430	400	370	360
			2.0Dc	Spindle Revolution (min-1)	3,700	2,800	2,200	1,900	1,400	1,100
				Feed Rate (mm/min)	290	290	300	280	260	250
 Slotting	Stainless Steel SUS304	Shouldering	1.5Dc X 0.3Dc	Spindle Revolution (min-1)	6,400	4,800	3,800	3,200	2,400	1,900
				Feed Rate (mm/min)	410	410	410	400	380	380
		Slotting	1.0Dc	Spindle Revolution (min-1)	5,300	4,000	3,200	2,700	2,000	1,600
				Feed Rate (mm/min)	280	260	310	240	250	250
			2.0Dc	Spindle Revolution (min-1)	5,300	4,000	3,200	2,700	2,000	1,600
				Feed Rate (mm/min)	220	210	250	190	200	200
	Titanium Alloys	Shouldering	1.5Dc X 0.3Dc	Spindle Revolution (min-1)	4,200	3,200	2,500	2,100	1,600	1,300
				Feed Rate (mm/min)	330	420	410	390	380	370
		Slotting	1.0Dc	Spindle Revolution (min-1)	3,700	2,800	2,200	1,900	1,400	1,100
				Feed Rate (mm/min)	220	240	240	240	250	250
			2.0Dc	Spindle Revolution (min-1)	3,700	2,800	2,200	1,900	1,400	1,100
				Feed Rate (mm/min)	180	190	190	190	200	200
	Super Alloy	Shouldering	1.5Dc X 0.2Dc	Spindle Revolution (min-1)	800	600	480	400	300	240
				Feed Rate (mm/min)	60	60	60	60	60	60
		Slotting	1.0Dc	Spindle Revolution (min-1)	530	400	320	270	200	160
				Feed Rate (mm/min)	28	28	28	28	28	28
			2.0Dc	Spindle Revolution (min-1)	530	400	320	270	200	160
				Feed Rate (mm/min)	20	20	20	20	20	20

Water soluble coolant is recommended for stainless steel, titanium alloy, and super alloy.

4/5/6RFH (Long Type)

Applications	Workpiece	Application	Depth of Cut ap X ae (mm)	Outside Dia. Dc (mm)	ø 6	ø 8	ø 10	ø 12	ø 16	ø 20
 Shouldering	Carbon Steel, Alloy Steel, Cast Iron S45C, SCM, SNCM FC	Shouldering	ap: 4.0Dc ae: 0.1Dc (Dc≦ø12) ae: 1.2mm (Dc＞ø12)	Spindle Revolution (min-1)	5,100	3,800	3,100	2,500	1,900	1,500
				Feed Rate (mm/min)	620	630	660	600	590	550
	Pre-hardened Steel (30~45HRC)	Shouldering	ap: 4.0Dc ae: 0.1Dc (Dc≦ø12) ae: 1.2mm (Dc＞ø12)	Spindle Revolution (min-1)	3,400	2,500	2,000	1,700	1,300	1,000
				Feed Rate (mm/min)	340	430	410	380	340	320
	Stainless Steel SUS304	Shouldering	ap: 4.0Dc ae: 0.1Dc (Dc≦ø12) ae: 1.2mm (Dc＞ø12)	Spindle Revolution (min-1)	5,100	3,800	3,100	2,500	1,900	1,500
				Feed Rate (mm/min)	290	290	290	280	270	270
	Titanium Alloys	Shouldering	ap: 4.0Dc ae: 0.1Dc (Dc≦ø12) ae: 1.2mm (Dc＞ø12)	Spindle Revolution (min-1)	3,400	2,500	2,000	1,700	1,300	1,000
				Feed Rate (mm/min)	230	290	290	270	270	260
	Super Alloy	Shouldering	ap: 4.0 X Dc ae: 0.1Dc (Dc≦ø12) ae: 1.0mm (Dc＞ø12)	Spindle Revolution (min-1)	640	480	380	320	240	190
				Feed Rate (mm/min)	20	20	20	20	20	20

Water soluble coolant is recommended for stainless steel, titanium alloy, and super alloy.

KYOCERA

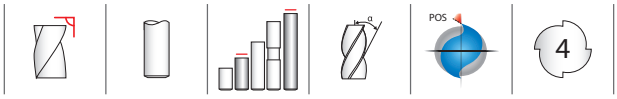
SGS Solid Carbide Tools

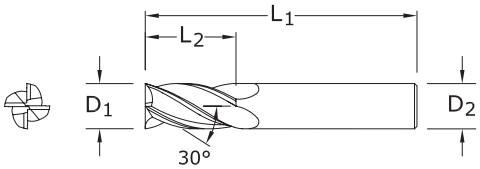
General Purpose End Mills



METRIC

4 Flute End Mills





TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6

1M • 1XLM
METRIC SERIES

mm				EDP NO.				SERIES
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	
1,0	4,0	38,0	3,0	40105	48500	48522	48543	1M
1,5	4,5	38,0	3,0	40109	48501	48523	48544	1M
2,0	6,3	38,0	3,0	40113	48502	48524	48545	1M
2,5	9,5	38,0	3,0	40117	48503	48525	48546	1M
3,0	12,0	38,0	3,0	40121	48504	48526	48547	1M
3,0	25,0	75,0	3,0	43101	49388	49401	49414	1XLM
3,5	12,0	50,0	4,0	40125	48505	48527	48548	1M
4,0	14,0	50,0	4,0	40129	48506	48528	48549	1M
4,0	25,0	75,0	4,0	43103	49389	49402	49415	1XLM
4,5	16,0	50,0	6,0	40133	48507	48529	48550	1M
5,0	16,0	50,0	6,0	40137	48508	48530	48551	1M
5,0	25,0	75,0	5,0	43107	49391	49404	49417	1XLM
6,0	19,0	50,0	6,0	40141	48509	48531	48552	1M
6,0	25,0	75,0	6,0	43105	49390	49403	49416	1XLM
7,0	19,0	63,0	8,0	40145	48510	48532	48553	1M
8,0	20,0	63,0	8,0	40149	48511	48533	48554	1M
8,0	25,0	75,0	8,0	43115	49392	49405	49418	1XLM
9,0	22,0	75,0	10,0	40153	48512	48534	48555	1M
10,0	22,0	75,0	10,0	40157	48513	48535	48556	1M
10,0	38,0	100,0	10,0	43125	49393	49406	49419	1XLM
11,0	25,0	75,0	12,0	40161	48514	48536	48557	1M
12,0	25,0	75,0	12,0	41665	48515	48537	48558	1M
12,0	50,0	100,0	12,0	43135	49394	49407	49420	1XLM
12,0	75,0	150,0	12,0	43145	49395	49408	49421	1XLM
14,0	32,0	89,0	14,0	40169	48516	48538	48559	1M
14,0	75,0	150,0	14,0	43155	49396	49409	49422	1XLM
16,0	32,0	89,0	16,0	40173	48517	48539	48560	1M
16,0	75,0	150,0	16,0	43165	49397	49410	49423	1XLM
18,0	38,0	100,0	18,0	40177	48518	48540	48561	1M
18,0	75,0	150,0	18,0	43175	49398	49411	49424	1XLM
20,0	38,0	100,0	20,0	40181	48519	48541	48562	1M
20,0	75,0	150,0	20,0	43185	49399	49412	49425	1XLM
25,0	38,0	100,0	25,0	40185	48520	48542	48563	1M
25,0	75,0	150,0	25,0	43195	49400	49413	49426	1XLM

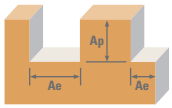
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Finishing & Roughing End Mill

METRIC

2 Flute: Square, Double, Stub, Long Reach, Ball
3 Flute: Square, Long Reach, Ball
4 Flute: Square, Double, Stub, Long Reach, Ball, Corner Radius

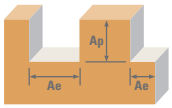


	Series 1M, 3M, 5M, 14M, 15M, 16M, 17M, 59M Metric	Hardness		Flutes	Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 0.4	0.75	1.5	3	6	10	12	20	25
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	Profile				140	RPM	111483	59458	29729	14864	7432	4459	3716	2230	1784
								Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	≤ 0.50	≤ 1.5	(112-168)	Feed (mm/min)	178	178	184	208	282	357	357	285	250
				3	≤ 0.25	≤ 1.5			268	268	276	312	424	535	535	428	375
				4	≤ 0.25	≤ 1.5			357	357	369	416	565	713	713	571	499
			Slot				102	RPM	81189	43301	21650	10825	5413	3248	2706	1624	1299
								Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	1	≤ 1	(82-123)	Feed (mm/min)	130	130	134	152	206	260	260	208	182
				3	1	≤ 0.5			195	195	201	227	309	390	390	312	273
				4	1	≤ 0.4			260	260	268	303	411	520	520	416	364
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	Profile				102	RPM	81189	43301	21650	10825	5413	3248	2706	1624	1299
								Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	≤ 0.50	≤ 1.5	(82-123)	Feed (mm/min)	81	104	95	130	152	188	195	156	135
				3	≤ 0.25	≤ 1.5			122	156	143	195	227	283	292	234	203
				4	≤ 0.25	≤ 1.5			162	208	191	260	303	377	390	312	270
			Slot				75	RPM	59377	31668	15834	7917	3958	2375	1979	1188	950
								Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	1	≤ 1	(60-90)	Feed (mm/min)	59	76	70	95	111	138	143	114	99
				3	1	≤ 0.5			119	152	139	190	222	276	285	228	198
				4	1	≤ 0.4			119	152	139	190	222	276	285	228	198
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc	Profile				96	RPM	76342	40715	20358	10179	5089	3054	2545	1527	1221
								Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	≤ 0.50	≤ 1.5	(77-115)	Feed (mm/min)	76	98	90	122	143	177	183	147	127
				3	≤ 0.25	≤ 1.5			115	147	134	183	214	266	275	220	191
				4	≤ 0.25	≤ 1.5			153	195	179	244	285	354	366	293	254
			Slot				70	RPM	55741	29729	14864	7432	3716	2230	1858	1115	892
								Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	1	≤ 1	(56-84)	Feed (mm/min)	56	71	65	89	104	129	134	107	93
				3	1	≤ 0.5			84	107	98	134	156	194	201	161	139
				4	1	≤ 0.4			111	143	131	178	208	259	268	214	186
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile				102	RPM	81189	43301	21650	10825	5413	3248	2706	1624	1299
								Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	≤ 0.50	≤ 1.5	(82-123)	Feed (mm/min)	130	130	134	152	206	260	260	208	182
				3	≤ 0.25	≤ 1.5			195	195	201	227	309	390	390	312	273
				4	≤ 0.25	≤ 1.5			260	260	268	303	411	520	520	416	364
			Slot				75	RPM	59377	31668	15834	7917	3958	2375	1979	1188	950
								Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	1	≤ 1	(60-90)	Feed (mm/min)	95	95	98	111	150	190	190	152	133
				3	1	≤ 0.5			143	143	147	166	226	285	285	228	200
				4	1	≤ 0.4			190	190	196	222	301	380	380	304	266
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 275 Bhn or ≤ 28 HRc	Profile				113	RPM	89671	47825	23912	11956	5978	3587	2989	1793	1435
								Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	≤ 0.50	≤ 1.5	(90-135)	Feed (mm/min)	90	115	105	143	167	208	215	172	149
				3	≤ 0.25	≤ 1.5			135	172	158	215	251	312	323	258	224
				4	≤ 0.25	≤ 1.5			179	230	210	287	335	416	430	344	298
			Slot				82	RPM	65436	34899	17449	8725	4362	2617	2181	1309	1047
								Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	1	≤ 1	(66-99)	Feed (mm/min)	65	84	77	105	122	152	157	126	109
				3	1	≤ 0.5			98	126	115	157	183	228	236	188	163
				4	1	≤ 0.4			131	168	154	209	244	304	314	251	218
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L, 17-4 PH, 15-5, 13-4, Custom 450	≤ 275 Bhn or ≤ 28 HRc	Profile				78	RPM	61800	32960	16480	8240	4120	2472	2060	1236	989
								Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042
				2	≤ 0.50	≤ 1.5	(62-93)	Feed (mm/min)	62	66	63	66	99	119	119	91	83
				3	≤ 0.25	≤ 1.5			93	99	94	99	148	178	179	137	125
				4	≤ 0.25	≤ 1.5			124	132	125	132	198	237	239	183	166
			Slot				56	RPM	44836	23912	11956	5978	2989	1793	1495	897	717
								Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042
				2	1	≤ 1	(45-68)	Feed (mm/min)	45	48	45	48	72	86	87	66	60
				3	1	≤ 0.5			67	72	68	72	108	129	130	100	90
				4	1	≤ 0.4			90	96	91	96	143	172	173	133	121

continued on next page

METRIC

2 Flute: Square, Double, Stub, Long Reach, Ball
3 Flute: Square, Long Reach, Ball
4 Flute: Square, Double, Stub, Long Reach, Ball, Corner Radius



	Series 1M, 3M, 5M, 14M, 15M, 16M, 17M, 59M Metric	Hardness		Flutes	Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 0.4	0.75	1.5	3	6	10	12	20	25
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, 718, Incoloy 800, Monel 400,Rene, Waspalloy	≤ 300 Bhn or ≤ 32 HRc	Profile				20	RPM	15753	8402	4201	2100	1050	630	525	315	252
								Fz	0.0005	0.0007	0.0014	0.004	0.010	0.021	0.024	0.032	0.035
				2	≤ 0.50	≤ 1.5	(16-24)	Feed (mm/min)	16	12	12	17	21	26	25	20	18
				3	≤ 0.25	≤ 1.5			24	18	18	25	32	40	38	30	26
				4	≤ 0.25	≤ 1.5			32	24	24	34	42	53	50	40	35
			Slot				14	RPM	10906	5816	2908	1454	727	436	364	218	174
								Fz	0.0005	0.0007	0.0014	0.004	0.010	0.021	0.024	0.032	0.035
				2	1	≤ 1	(11-16)	Feed (mm/min)	11	8	8	12	15	18	17	14	12
				3	1	≤ 0.5			16	12	12	17	22	27	26	21	18
				4	1	≤ 0.4			22	16	16	23	29	37	35	28	24
	TITANIUM ALLOYS Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti10Al2Fe3Al, Ti5Al53Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti152 Cr3Sn3Al	≤ 350 Bhn or ≤ 38 HRc	Profile				55	RPM	43624	23266	11633	5816	2908	1745	1454	872	698
								Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042
				2	≤ 0.50	≤ 1.5	(44-66)	Feed (mm/min)	44	47	44	47	70	84	84	65	59
				3	≤ 0.25	≤ 1.5			65	70	66	70	105	126	127	97	88
				4	≤ 0.25	≤ 1.5			87	93	88	93	140	168	169	129	117
			Slot				40	RPM	31506	16803	8402	4201	2100	1260	1050	630	504
								Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042
				2	1	≤ 1	(32-48)	Feed (mm/min)	32	34	32	34	50	60	61	47	42
				3	1	≤ 0.5			47	50	48	50	76	91	91	70	64
				4	1	≤ 0.4			63	67	64	67	101	121	122	93	85
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	Profile				268	RPM	213272	113745	56872	28436	14218	8531	7109	4265	3412
								Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140
				2	≤ 0.50	≤ 1.5	(215-322)	Feed (mm/min)	640	728	682	796	1081	1365	1365	1092	955
				3	≤ 0.25	≤ 1.5			960	1092	1024	1194	1621	2047	2047	1638	1433
			Slot				195	RPM	155107	82724	41362	20681	10340	6204	5170	3102	2482
								Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140
				2	1	≤ 1	(156-234)	Feed (mm/min)	465	529	496	579	786	993	993	794	695
				3	1	≤ 0.5			698	794	745	869	1179	1489	1489	1191	1042
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	Profile				148	RPM	117542	62689	31344	15672	7836	4702	3918	2351	1881
								Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	≤ 0.50	≤ 1.5	(118-177)	Feed (mm/min)	188	188	194	219	298	376	376	301	263
				3	≤ 0.25	≤ 1.5			282	282	292	329	447	564	564	451	395
				4	≤ 0.25	≤ 1.5			376	376	389	439	596	752	752	602	527
			Slot					RPM	84824	45239	22620	11310	5655	3393	2827	1696	1357
								Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	1	≤ 1		Feed (mm/min)	136	136	140	158	215	271	271	217	190
				3	1	≤ 0.5			204	204	210	238	322	407	407	326	285
				4	1	≤ 0.4			271	271	280	317	430	543	543	434	380
	PLASTICS Polycarbonate, PVC, Polypropylene		Profile				268	RPM	213272	113745	56872	28436	14218	8531	7109	4265	3412
								Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140
				2	≤ 0.50	≤ 1.5	(215-322)	Feed (mm/min)	640	728	682	796	1081	1365	1365	1092	955
				3	≤ 0.25	≤ 1.5			960	1092	1024	1194	1621	2047	2047	1638	1433
				4	≤ 0.25	≤ 1.5			1280	1456	1365	1592	2161	2730	2730	2184	1911
			Slot				195	RPM	155107	82724	41362	20681	10340	6204	5170	3102	2482
								Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140
				2	1	≤ 1	(156-234)	Feed (mm/min)	465	529	496	579	786	993	993	794	695
				3	1	≤ 0.5			698	794	745	869	1179	1489	1489	1191	1042
				4	1	≤ 0.4			931	1059	993	1158	1572	1985	1985	1588	1390
	GRAPHITE		Profile				201	RPM	159954	85309	42654	21327	10664	6398	5332	3199	2559
								Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140
				2	≤ 0.50	≤ 1.5	(161-241)	Feed (mm/min)	480	546	512	597	810	1024	1024	819	717
				3	≤ 0.25	≤ 1.5			720	819	768	896	1216	1536	1536	1228	1075
				4	≤ 0.25	≤ 1.5			960	1092	1024	1194	1621	2047	2047	1638	1433
			Slot				146	RPM	116330	62043	31021	15511	7755	4653	3878	2327	1861
								Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140
				2	1	≤ 1	(117-176)	Feed (mm/min)	349	397	372	434	589	745	745	596	521
				3	1	≤ 0.5			523	596	558	651	884	1117	1117	893	782
				4	1	≤ 0.4			698	794	745	869	1179	1489	1489	1191	1042

Bhn (Brinell) HRc (Rockwell C)
rpm = (Vc x 1000) / (D_1 x 3.14)
mm/min = Fz x number of flutes x rpm
reduce speed and feed for materials harder than listed

limit cut depths of long and extra long flute mills to .05 x D_1 when slotting or profiling
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

General End Mill

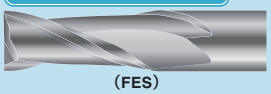
2FESM

Introduction

Surface finish oriented

F Series

MEGACOAT is applied



(FES)

MEGACOAT and sharp cutting edge enable high precision finishing owing to excellent wear and heat resistance
Overall lengths 35mm and 45mm are available for automatic lathes

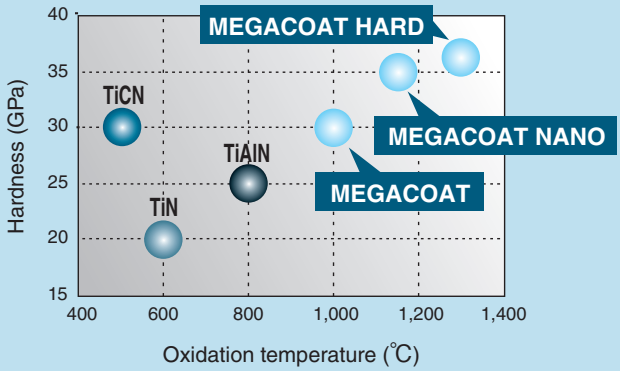
New PVD technology, MEGACOAT



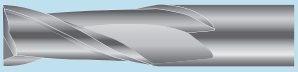
Superior wear and oxidation resistant MEGACOAT

MEGACOAT for Solid End Mill

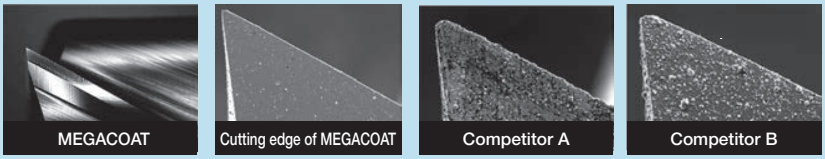
1. For General Milling
.....MEGACOAT
2. For High Efficiency Milling
.....MEGACOAT NANO
3. For Superalloy, Hard materials
.....MEGACOAT HARD



1. MEGACOAT for general milling



MEGACOAT extend tool life for roughing to finishing of various kinds of material with superior wear resistance and high oxidation resistance



(Internal evaluation)

General End Mill

No. of Flutes : 2

2FESS, 2FESM, 2FESL



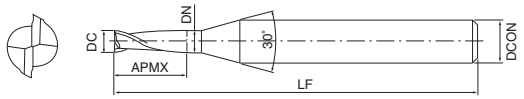
2

MEGACOAT is applied

Recommended Workpiece Materials ★ 1st Choice







2FESS (Short)

Shouldering Slotting

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of cut	Neck Dia.	Shank Dia.	Overall length	No. of Flutes
		DC		APMX	DN	DCON	LF	ZEFP
2FESS010-015-04	●	1.0	0 -0.015	1.5	1.1	4	45	2
2FESS015-023-04	●	1.5	0 -0.015	2.3	1.6	4	45	2
2FESS020-030-04	●	2.0	0 -0.015	3.0	2.1	4	45	2
2FESS025-037-04	●	2.5	0 -0.015	3.7	2.6	4	45	2
2FESS030-045-06	●	3.0	0 -0.015	4.5	3.2	6	50	2
2FESS035-052-06	●	3.5	0 -0.015	5.2	3.7	6	50	2
2FESS040-060-06	●	4.0	0 -0.015	6.0	4.2	6	50	2
2FESS045-067-06	●	4.5	0 -0.015	6.7	4.7	6	50	2
2FESS050-075-06	●	5.0	0 -0.015	7.5	5.2	6	50	2
2FESS055-082-06	●	5.5	0 -0.015	8.2	5.7	6	50	2
2FESS060-090-06	●	6.0	0 -0.020	9.0	-	6	50	2
2FESS070-105-08	●	7.0	0 -0.020	10.5	7.2	8	60	2
2FESS080-120-08	●	8.0	-0.005 -0.025	12.0	-	8	60	2
2FESS090-135-10	●	9.0	-0.005 -0.025	13.5	9.2	10	70	2
2FESS100-150-10	●	10.0	-0.005 -0.025	15.0	-	10	70	2
2FESS120-180-12	●	12.0	-0.010 -0.030	18.0	-	12	75	2
2FESS140-210-16	●	14.0	-0.010 -0.030	21.0	14.2	16	75	2
2FESS150-230-16	●	15.0	-0.010 -0.030	23.0	15.2	16	90	2
2FESS160-240-16	●	16.0	-0.010 -0.030	24.0	-	16	90	2

2FESM (Medium)

Shouldering Slotting

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of cut	Neck Dia.	Shank Dia.	Overall length	No. of Flutes
		DC		APMX	DN	DCON	LF	ZEFP
2FESM002-004-04	●	0.2	0 -0.015	0.4	0.22	4	45	2
2FESM003-006-04	●	0.3	0 -0.015	0.6	0.32	4	45	2
2FESM004-008-04	●	0.4	0 -0.015	0.8	0.42	4	45	2
2FESM005-010-04	●	0.5	0 -0.015	1.0	0.53	4	45	2
2FESM006-012-04	●	0.6	0 -0.015	1.2	0.63	4	45	2
2FESM007-014-04	●	0.7	0 -0.015	1.4	0.74	4	45	2
2FESM008-016-04	●	0.8	0 -0.015	1.6	0.84	4	45	2
2FESM009-020-04	●	0.9	0 -0.015	2.0	0.95	4	45	2
2FESM010-025-04	●	1.0	0 -0.015	2.5	1.1	4	45	2
2FESM011-025-04	●	1.1	0 -0.015	2.5	1.2	4	45	2
2FESM012-040-04	●	1.2	0 -0.015	4.0	1.3	4	45	2
2FESM013-040-04	●	1.3	0 -0.015	4.0	1.4	4	45	2
2FESM014-040-04	●	1.4	0 -0.015	4.0	1.5	4	45	2
2FESM015-040-04	●	1.5	0 -0.015	4.0	1.6	4	45	2
2FESM016-050-04	●	1.6	0 -0.015	5.0	1.7	4	45	2
2FESM017-050-04	●	1.7	0 -0.015	5.0	1.8	4	45	2
2FESM018-050-04	●	1.8	0 -0.015	5.0	1.9	4	45	2
2FESM019-050-04	●	1.9	0 -0.015	5.0	2.0	4	45	2
2FESM020-060-04	●	2.0	0 -0.015	6.0	2.1	4	45	2
2FESM021-060-04	●	2.1	0 -0.015	6.0	2.2	4	45	2
2FESM022-060-04	●	2.2	0 -0.015	6.0	2.3	4	45	2
2FESM023-060-04	●	2.3	0 -0.015	6.0	2.4	4	45	2
2FESM024-080-04	●	2.4	0 -0.015	8.0	2.5	4	45	2
2FESM025-080-04	●	2.5	0 -0.015	8.0	2.6	4	45	2
2FESM026-080-04	●	2.6	0 -0.015	8.0	2.7	4	45	2
2FESM027-080-04	●	2.7	0 -0.015	8.0	2.8	4	45	2
2FESM028-080-04	●	2.8	0 -0.015	8.0	2.9	4	45	2
2FESM029-080-04	●	2.9	0 -0.015	8.0	3.1	4	45	2
2FESM030-100-06	●	3.0	0 -0.015	10.0	3.2	6	50	2
2FESM031-100-06	●	3.1	0 -0.015	10.0	3.3	6	50	2
2FESM032-100-06	●	3.2	0 -0.015	10.0	3.4	6	50	2
2FESM033-100-06	●	3.3	0 -0.015	10.0	3.5	6	50	2

● : Std. Item

General End Mill

2FESM (Medium)

Shouldering | Slotting

(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Neck Dia. DN	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP
2FESM034-100-06	●	3.4	0 -0.015	10.0	3.6	6	50	2
2FESM035-100-06	●	3.5	0 -0.015	10.0	3.7	6	50	2
2FESM036-100-06	●	3.6	0 -0.015	10.0	3.8	6	50	2
2FESM037-100-06	●	3.7	0 -0.015	10.0	3.9	6	50	2
2FESM038-110-06	●	3.8	0 -0.015	11.0	4.0	6	50	2
2FESM039-110-06	●	3.9	0 -0.015	11.0	4.1	6	50	2
2FESM040-110-06	●	4.0	0 -0.015	11.0	4.2	6	50	2
2FESM041-110-06	●	4.1	0 -0.015	11.0	4.3	6	50	2
2FESM042-110-06	●	4.2	0 -0.015	11.0	4.4	6	50	2
2FESM043-110-06	●	4.3	0 -0.015	11.0	4.5	6	50	2
2FESM044-110-06	●	4.4	0 -0.015	11.0	4.6	6	50	2
2FESM045-110-06	●	4.5	0 -0.015	11.0	4.7	6	50	2
2FESM046-110-06	●	4.6	0 -0.015	11.0	4.8	6	50	2
2FESM047-110-06	●	4.7	0 -0.015	11.0	4.9	6	50	2
2FESM048-130-06	●	4.8	0 -0.015	13.0	5.0	6	50	2
2FESM049-130-06	●	4.9	0 -0.015	13.0	5.1	6	50	2
2FESM050-130-06	●	5.0	0 -0.015	13.0	5.2	6	50	2
2FESM051-130-06	●	5.1	0 -0.015	13.0	5.3	6	50	2
2FESM052-130-06	●	5.2	0 -0.015	13.0	5.4	6	50	2
2FESM053-130-06	●	5.3	0 -0.015	13.0	5.5	6	50	2
2FESM054-130-06	●	5.4	0 -0.015	13.0	5.6	6	50	2
2FESM055-130-06	●	5.5	0 -0.015	13.0	5.7	6	50	2
2FESM056-130-06	●	5.6	0 -0.015	13.0	5.8	6	50	2
2FESM057-130-06	●	5.7	0 -0.015	13.0	-	6	50	2
2FESM058-130-06	●	5.8	0 -0.015	13.0	-	6	50	2
2FESM059-130-06	●	5.9	0 -0.015	13.0	-	6	50	2
2FESM060-130-06	●	6.0	0 -0.020	13.0	-	6	50	2
2FESM060-150-06	●	6.0	0 -0.020	15.0	-	6	50	2
2FESM061-160-08	●	6.1	0 -0.020	16.0	6.3	8	60	2
2FESM062-160-08	●	6.2	0 -0.020	16.0	6.4	8	60	2
2FESM063-160-08	●	6.3	0 -0.020	16.0	6.5	8	60	2
2FESM064-160-08	●	6.4	0 -0.020	16.0	6.6	8	60	2
2FESM065-160-08	●	6.5	0 -0.020	16.0	6.7	8	60	2
2FESM066-160-08	●	6.6	0 -0.020	16.0	6.8	8	60	2
2FESM067-160-08	●	6.7	0 -0.020	16.0	6.9	8	60	2
2FESM068-160-08	●	6.8	0 -0.020	16.0	7.0	8	60	2
2FESM069-160-08	●	6.9	0 -0.020	16.0	7.1	8	60	2
2FESM070-160-08	●	7.0	0 -0.020	16.0	7.2	8	60	2
2FESM071-160-08	●	7.1	0 -0.020	16.0	7.3	8	60	2
2FESM072-160-08	●	7.2	0 -0.020	16.0	7.4	8	60	2
2FESM073-160-08	●	7.3	0 -0.020	16.0	7.5	8	60	2
2FESM074-160-08	●	7.4	0 -0.020	16.0	7.6	8	60	2
2FESM075-190-08	●	7.5	0 -0.020	19.0	7.7	8	60	2
2FESM076-190-08	●	7.6	0 -0.020	19.0	-	8	60	2
2FESM077-190-08	●	7.7	0 -0.020	19.0	-	8	60	2
2FESM078-190-08	●	7.8	0 -0.020	19.0	-	8	60	2
2FESM079-190-08	●	7.9	0 -0.020	19.0	-	8	60	2

(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Neck Dia. DN	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP
2FESM080-190-08	●	8.0	-0.005 -0.025	19.0	-	8	60	2
2FESM080-200-08	●	8.0	-0.005 -0.025	20.0	-	8	60	2
2FESM081-190-10	●	8.1	-0.005 -0.025	19.0	8.3	10	70	2
2FESM082-190-10	●	8.2	-0.005 -0.025	19.0	8.4	10	70	2
2FESM083-190-10	●	8.3	-0.005 -0.025	19.0	8.5	10	70	2
2FESM084-190-10	●	8.4	-0.005 -0.025	19.0	8.6	10	70	2
2FESM085-190-10	●	8.5	-0.005 -0.025	19.0	8.7	10	70	2
2FESM086-190-10	●	8.6	-0.005 -0.025	19.0	8.8	10	70	2
2FESM087-190-10	●	8.7	-0.005 -0.025	19.0	8.9	10	70	2
2FESM088-190-10	●	8.8	-0.005 -0.025	19.0	9.0	10	70	2
2FESM089-190-10	●	8.9	-0.005 -0.025	19.0	9.1	10	70	2
2FESM090-190-10	●	9.0	-0.005 -0.025	19.0	9.2	10	70	2
2FESM091-190-10	●	9.1	-0.005 -0.025	19.0	9.3	10	70	2
2FESM092-190-10	●	9.2	-0.005 -0.025	19.0	9.4	10	70	2
2FESM093-190-10	●	9.3	-0.005 -0.025	19.0	9.5	10	70	2
2FESM094-190-10	●	9.4	-0.005 -0.025	19.0	9.6	10	70	2
2FESM095-190-10	●	9.5	-0.005 -0.025	19.0	9.7	10	70	2
2FESM096-220-10	●	9.6	-0.005 -0.025	22.0	-	10	70	2
2FESM097-220-10	●	9.7	-0.005 -0.025	22.0	-	10	70	2
2FESM098-220-10	●	9.8	-0.005 -0.025	22.0	-	10	70	2
2FESM099-220-10	●	9.9	-0.005 -0.025	22.0	-	10	70	2
2FESM100-220-10	●	10.0	-0.005 -0.025	22.0	-	10	70	2
2FESM100-250-10	●	10.0	-0.005 -0.025	25.0	-	10	70	2
2FESM105-220-12	●	10.5	-0.005 -0.025	22.0	10.7	12	75	2
2FESM110-220-12	●	11.0	-0.005 -0.025	22.0	11.2	12	75	2
2FESM115-220-12	●	11.5	-0.005 -0.025	22.0	11.7	12	75	2
2FESM120-260-12	●	12.0	-0.010 -0.030	26.0	-	12	75	2
2FESM130-260-16	●	13.0	-0.010 -0.030	26.0	13.2	16	75	2
2FESM140-260-16	●	14.0	-0.010 -0.030	26.0	14.2	16	75	2
2FESM150-300-16	●	15.0	-0.010 -0.030	30.0	15.2	16	90	2
2FESM160-320-16	●	16.0	-0.010 -0.030	32.0	-	16	90	2

2FESL (Long)

Shouldering

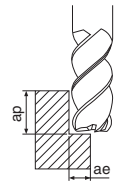
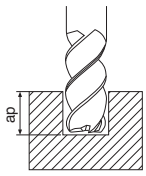
(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Neck Dia. DN	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP
2FESL010-040-04	●	1.0	0 -0.015	4.0	1.1	4	45	2
2FESL015-060-04	●	1.5	0 -0.015	6.0	1.6	4	45	2
2FESL020-090-04	●	2.0	0 -0.015	9.0	2.1	4	45	2
2FESL025-120-04	●	2.5	0 -0.015	12.0	2.6	4	45	2
2FESL030-140-06	●	3.0	0 -0.015	14.0	3.2	6	50	2
2FESL040-170-06	●	4.0	0 -0.015	17.0	4.2	6	50	2
2FESL050-200-06	●	5.0	0 -0.015	20.0	5.2	6	60	2
2FESL060-240-06	●	6.0	-0.005 -0.025	24.0	-	6	60	2
2FESL080-280-08	●	8.0	-0.005 -0.025	28.0	-	8	70	2
2FESL100-340-10	●	10.0	-0.005 -0.025	34.0	-	10	90	2
2FESL120-400-12	●	12.0	-0.010 -0.030	40.0	-	12	90	2
2FESL160-480-16	●	16.0	-0.010 -0.030	48.0	-	16	115	2

● : Std. Item

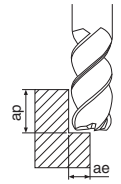
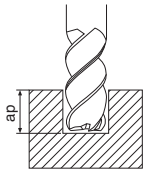
General End Mill

2FESS

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø1	ø2	ø4	ø6	ø8	ø12	ø16
 Shouldering **Depth of Cut (ap x ae) (mm)** 1.2DC x 0.05DC (DC＜ø3) 1.2DC x 0.1DC (DC≥ø3)  Slotting **Depth of Cut (ap) (mm)** 0.1DC (DC＜ø1) 0.3DC (ø1≤DC＜ø3) 0.5DC (DC≥ø3)	Carbon Steel, Cast Iron	Shouldering	Spindle Revolution (min^{-1})	25,500	13,200	6,600	4,400	3,300	2,200	1,700
			Feed Rate (mm/min)	225	230	375	415	420	310	240
		Slotting	Spindle Revolution (min^{-1})	19,000	11,000	6,000	4,000	3,000	2,000	1,500
			Feed Rate (mm/min)	135	140	225	250	250	245	245
	Alloy Steel	Shouldering	Spindle Revolution (min^{-1})	22,000	11,000	5,600	3,700	2,800	1,900	1,400
			Feed Rate (mm/min)	195	220	285	315	310	230	200
		Slotting	Spindle Revolution (min^{-1})	18,000	9,500	4,800	3,200	2,400	1,600	1,200
			Feed Rate (mm/min)	115	130	170	190	185	185	185
	Prehardened Steel	Shouldering	Spindle Revolution (min^{-1})	17,000	8,800	4,400	3,000	2,200	1,500	1,100
			Feed Rate (mm/min)	55	80	100	105	105	110	110
		Slotting	Spindle Revolution (min^{-1})	16,000	8,000	4,000	2,700	2,000	1,300	990
			Feed Rate (mm/min)	35	50	60	63	63	65	65
	Stainless Steel	Shouldering	Spindle Revolution (min^{-1})	22,000	11,000	5,600	3,700	2,800	1,900	1,400
			Feed Rate (mm/min)	95	95	110	115	115	115	115
		Slotting	Spindle Revolution (min^{-1})	16,000	8,000	4,000	2,700	2,000	1,300	990
			Feed Rate (mm/min)	60	60	65	70	70	70	70

* Machining with water soluble coolant is recommended for stainless steel.

2FESM

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø0.5	ø1	ø2	ø4	ø6	ø8	ø12	ø16
 Shouldering **Depth of Cut (ap x ae) (mm)** 1.5DC x 0.05DC (DC＜ø3) 1.5DC x 0.1DC (DC≥ø3)  Slotting **Depth of Cut (ap) (mm)** 0.1DC (DC＜ø1) 0.3DC (ø1≤DC＜ø3) 0.5DC (DC≥ø3)	Carbon Steel, Cast Iron	Shouldering	Spindle Revolution (min^{-1})	32,000	25,500	13,200	6,600	4,400	3,300	2,200	1,700
			Feed Rate (mm/min)	210	225	230	375	415	420	310	240
		Slotting	Spindle Revolution (min^{-1})	29,000	19,000	11,000	6,000	4,000	3,000	2,000	1,500
			Feed Rate (mm/min)	130	135	140	225	250	250	245	245
	Alloy Steel	Shouldering	Spindle Revolution (min^{-1})	27,000	22,000	11,000	5,600	3,700	2,800	1,900	1,400
			Feed Rate (mm/min)	180	195	220	285	315	310	230	200
		Slotting	Spindle Revolution (min^{-1})	27,000	18,000	9,500	4,800	3,200	2,400	1,600	1,200
			Feed Rate (mm/min)	105	115	130	170	190	185	185	185
	Prehardened Steel	Shouldering	Spindle Revolution (min^{-1})	25,000	17,000	8,800	4,400	3,000	2,200	1,500	1,100
			Feed Rate (mm/min)	50	55	80	100	105	105	110	110
		Slotting	Spindle Revolution (min^{-1})	25,000	16,000	8,000	4,000	2,700	2,000	1,300	990
			Feed Rate (mm/min)	30	35	50	60	63	63	65	65
	Stainless Steel	Shouldering	Spindle Revolution (min^{-1})	27,000	22,000	11,000	5,600	3,700	2,800	1,900	1,400
			Feed Rate (mm/min)	60	95	95	110	115	115	115	115
		Slotting	Spindle Revolution (min^{-1})	25,000	16,000	8,000	4,000	2,700	2,000	1,300	990
			Feed Rate (mm/min)	35	60	60	65	70	70	70	70

* Machining with water soluble coolant is recommended for stainless steel.

S-CARB® HIGH PERFORMANCE END MILLS

The original, symmetrical flute design features an engineered flute form that provides high performance results through a full range of machining conditions. These tools are designed for aggressive aluminum, non-ferrous, and non-metallic machining requiring a high level of material removal.



Engineered Flute Design

- Effective chip removal at high feed rates
- Lower cutting forces than comparable products
- Improved balance at high spindle speeds
- Improved workpiece finish through better balance
- More effective plunging vs. conventional designs

Circular Land

- Increased control at various speed and feed levels
- Reduced chatter

Various Reach, Neck and End Options Available

- Ball End design for complex workpieces
- Necked design with blended diameter transitions provide clearance to reach
- Short flutes for maximum rigidity
- Axial slotting up to 1xD

Series 43 Metric Expanded Tools Available with Polished Flutes

- Polished flutes maximize chip evacuation and enhance finish allowing for higher feed rates
- Less built up edge due to lower co-efficient of friction

CARB
Solid Carbide End Mills for Aluminum

Aluminum



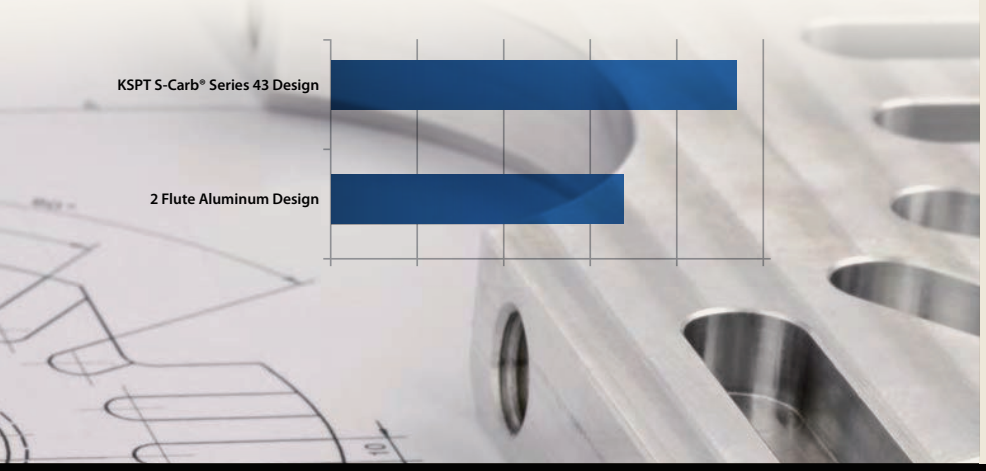
S-CARB® END MILLS FOR **ALUMINUM**, NON-FERROUS & NON-METALLIC MATERIALS

VALUE AT THE SPINDLE®

ENHANCED PRODUCTIVITY RESULTING FROM A SUPERIOR FLUTE DESIGN THAT MANAGES THE SIZE AND VOLUME OF CHIPS PRODUCED DURING AGGRESSIVE MACHINING.

Maximum RPM Capability

Results of Independent Lab Balance Analysis Testing per the ISO G2.5 Tolerance ½" Diameter Tools Equal Flute Lengths and Overall Lengths



Ti-NAMITE-B

Available with TiB_2 Coating (Titanium Diboride). This ceramic based coating ensures a smooth surface and a low affinity to cold welding or edge build-up, which makes it optimal for aluminum and copper applications. It has high toughness and high hardness.

Microhardness: 4000 HV
Oxidation Temperature: 850°C / 1562°F
Coefficient of Friction: 0.45
Thickness: 1 - 2 Microns (based on tool diameter)

S-CARB® **HIGH PERFORMANCE** END MILLS ARE IDEAL FOR **CYCLE TIME REDUCTION** IN TARGET APPLICATIONS SUCH AS:

Aerospace
- Structure components

Automotive/Motorbike
- Performance aluminum wheels
- Non-ferrous housings, transmissions, manifolds, electronic pumps

Mold & Die
- Non-ferrous mold cavities

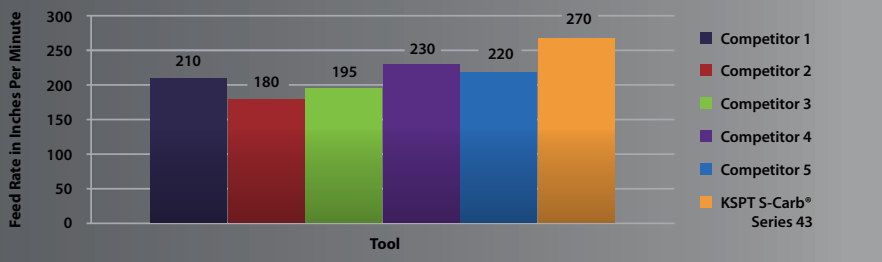
Firearms
- Aluminum components

Semiconductor
- Aluminum vacuum chambers

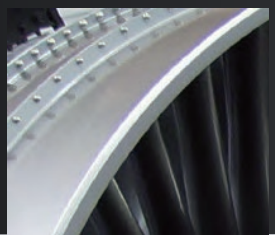


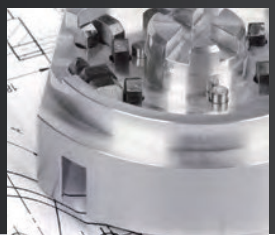


SLOTTING CAPABILITY: 3-FLUTE END MILLS MAXIMUM FEED RATE ACHIEVED AT 100% SPINDLE LOAD ON A 30 HP VERTICAL MILL IN 6061 ALUMINUM @ 10,000 RPM .500" DEEP SLOT .500" DIAMETER TOOL



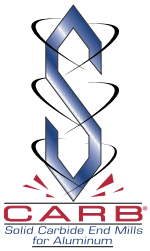


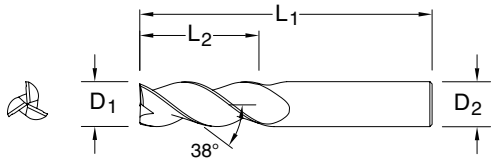




Aluminum Machining End Mill

S-Carb (3 flutes)

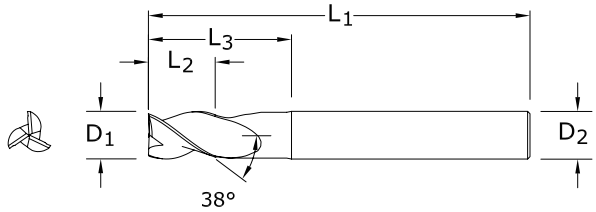




TOLERANCES (mm)		
DIAMETER	D_1	D_2
6	+0,000 / –0,008	h6
8 - 10	+0,000 / –0,009	h6
12 - 16	+0,000 / –0,011	h6
20	+0,000 / –0,013	h6

SERIES 43M

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Uncoated EDP No.	Ti-NAMITE-B (TiB_2) EDP No.
6,0	13,0	57,0	6,0	44701	44715
6,0	13,0	72,0	6,0	44702	44716
8,0	19,0	63,0	8,0	44703	44717
10,0	22,0	72,0	10,0	44705	44719
12,0	26,0	83,0	12,0	44708	44722
16,0	32,0	92,0	16,0	44711	44725
20,0	38,0	104,0	20,0	44714	44728
25,0	50,0	125,0	25,0	–	44731



SERIES 43ML

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Reach L_3	Ti-NAMITE-B (TiB_2) EDP No.
6,0	10,0	75,0	6,0	20,0	42706
8,0	12,0	75,0	8,0	25,0	42707
10,0	14,0	100,0	10,0	35,0	42708
12,0	16,0	100,0	12,0	40,0	42709
16,0	20,0	125,0	16,0	50,0	42710
20,0	25,0	150,0	20,0	65,0	42711


Square


Straight


Regular


Long Reach Neck


Right Spiral



Positive Rake


External Coolant



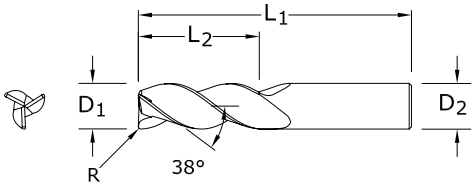
Flutes

Aluminum Machining End Mill

S-Carb (3 flutes)

TOLERANCES (mm)		
DIAMETER	D_1	D_2
6	+0,000 / –0,008	h6
8 - 10	+0,000 / –0,009	h6
12 - 16	+0,000 / –0,011	h6
20	+0,000 / –0,013	h6

CORNER RADIUS TOLERANCE (mm)
R = +0,00 / –0,05



S-CARB
Solid Carbide End Mills for Aluminum

Corner

Straight

Regular

Long Reach Neck

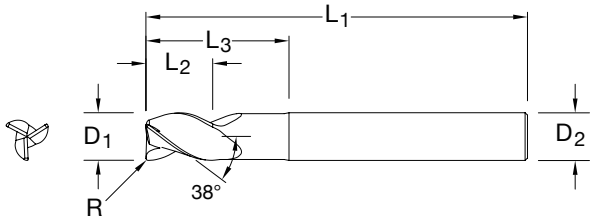
Positive Rake

External Coolant

3 Flutes

SERIES 43MCR

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Corner Radius R	Uncoated EDP No.	Ti-NAMITE-B (TiB_2) EDP No.
6,0	13,0	57,0	6,0	1,5	–	44732
12,0	26,0	83,0	12,0	1,5	44814	44733
12,0	26,0	83,0	12,0	2,0	44815	44826
12,0	26,0	83,0	12,0	2,5	44816	44827
12,0	26,0	83,0	12,0	3,0	44817	44734
16,0	32,0	92,0	16,0	1,5	44818	44735
16,0	32,0	92,0	16,0	2,0	44819	44828
16,0	32,0	92,0	16,0	2,5	44820	44829
16,0	32,0	92,0	16,0	3,0	44821	44736
20,0	38,0	104,0	20,0	2,0	44822	44830
20,0	38,0	104,0	20,0	2,5	44823	44831
20,0	38,0	104,0	20,0	3,0	44824	44737

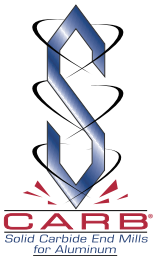


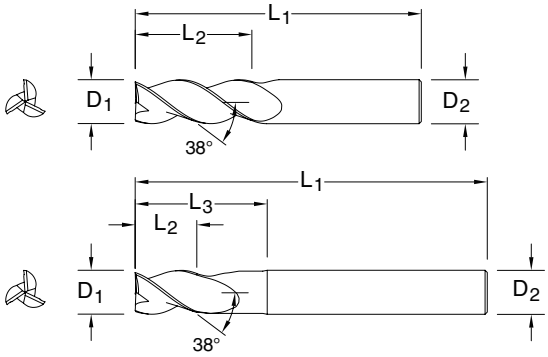
SERIES 43MLC

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Reach L_3	Corner Radius R	Uncoated EDP No.	Ti-NAMITE-B (TiB_2) EDP No.
6,0	10,0	63,0	6,0	20,0	0,5	44769	44789
6,0	10,0	63,0	6,0	20,0	1,0	44770	44790
6,0	13,0	72,0	6,0	30,0	0,5	44771	44791
6,0	13,0	72,0	6,0	30,0	1,0	44772	44792
8,0	12,0	75,0	8,0	25,0	0,3	44773	44793
8,0	12,0	75,0	8,0	25,0	0,5	44774	44794
8,0	12,0	75,0	8,0	25,0	1,0	44775	44795
8,0	12,0	75,0	8,0	25,0	1,5	44776	44796
10,0	14,0	100,0	10,0	35,0	0,3	44777	44797
10,0	14,0	100,0	10,0	35,0	0,5	44778	44798
10,0	14,0	100,0	10,0	35,0	1,0	44779	44799
10,0	14,0	100,0	10,0	35,0	1,5	44780	44800
12,0	16,0	100,0	12,0	40,0	0,5	44781	44801
12,0	16,0	100,0	12,0	40,0	1,0	44782	44802
12,0	16,0	100,0	12,0	40,0	1,5	44783	44803
12,0	16,0	100,0	12,0	40,0	2,0	44784	44804
12,0	16,0	100,0	12,0	40,0	2,5	44832	44839
12,0	16,0	100,0	12,0	40,0	3,0	44833	44738
12,0	16,0	100,0	12,0	40,0	4,0	44834	44741
16,0	20,0	125,0	16,0	50,0	2,0	44785	44805
16,0	20,0	125,0	16,0	50,0	2,5	44835	44840
16,0	20,0	125,0	16,0	50,0	3,0	44836	44739
16,0	20,0	125,0	16,0	50,0	4,0	44786	44806
20,0	25,0	150,0	20,0	65,0	2,0	44787	44807
20,0	25,0	150,0	20,0	65,0	2,5	44837	44841
20,0	25,0	150,0	20,0	65,0	3,0	44838	44740
20,0	25,0	150,0	20,0	65,0	4,0	44788	44808

Aluminum Machining End Mill

S-Carb (3 flutes)





TOLERANCES (mm)		
DIAMETER	D_1	D_2
3	+0,000 / –0,006	h6
4 - 6	+0,000 / –0,008	h6
8 - 10	+0,000 / –0,009	h6
12 - 16	+0,000 / –0,011	h6
20	+0,000 / –0,013	h6

SERIES 43M

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Reach L_3	Polished Flute	Ti-NAMITE-B (TiB_2) EDP No.
3,0	8,0	52,0	6,0	–	•	44890
4,0	11,0	55,0	6,0	–	•	44891
5,0	13,0	57,0	6,0	–	•	44892
6,0	24,0	75,0	6,0	–	•	44893
8,0	32,0	75,0	8,0	–	•	44895
10,0	40,0	100,0	10,0	–	•	44896
12,0	48,0	100,0	12,0	–	•	44897
14,0	30,0	89,0	14,0	–	•	44898
14,0	18,0	125,0	14,0	45,0	•	44899
16,0	64,0	125,0	16,0	–	•	44900
20,0	80,0	150,0	20,0	–	•	44901


Square


Common


Straight


Regular, Long Reach Neck


Right Spiral



Positive Rake


External Coolant



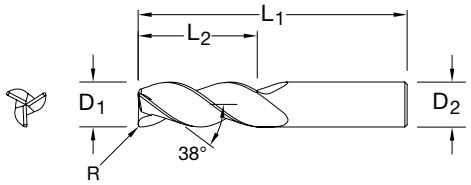
Flutes

Aluminum Machining End Mill

S-Carb (3 flutes)

TOLERANCES (mm)		
DIAMETER	D_1	D_2
6	+0,000 / –0,008	h6
8 - 10	+0,000 / –0,009	h6
12 - 16	+0,000 / –0,011	h6
20	+0,000 / –0,013	h6

CORNER RADIUS TOLERANCE (mm)
R = +0,00 / –0,05



CARB® Solid Carbide End Mills for Aluminum

Corner

Straight

Regular, Long

Right Spiral

Positive Rake

External Coolant

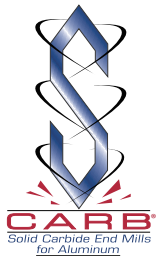
3 Flutes

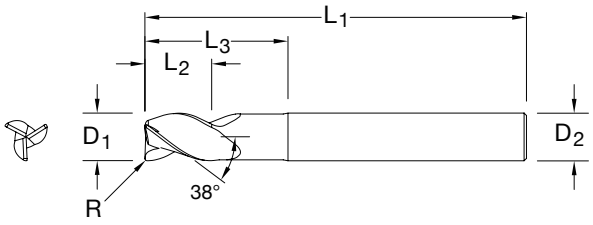
SERIES 43MCR

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Corner Radius R	Polished Flute	Ti-NAMITE-B (TiB_2) EDP No.
6,0	13,0	57,0	6,0	0,5	•	44902
6,0	13,0	57,0	6,0	1,0	•	44894
6,0	13,0	72,0	6,0	0,8	•	44842
6,0	13,0	72,0	6,0	1,2	•	44843
6,0	24,0	75,0	6,0	0,5	•	44844
6,0	24,0	75,0	6,0	1,0	•	44845
8,0	19,0	63,0	8,0	0,3	•	44846
8,0	19,0	63,0	8,0	0,5	•	44847
8,0	19,0	63,0	8,0	1,0	•	44848
8,0	19,0	63,0	8,0	1,5	•	44849
8,0	32,0	75,0	8,0	0,5	•	44850
8,0	32,0	75,0	8,0	1,0	•	44851
8,0	32,0	75,0	8,0	1,5	•	44852
8,0	32,0	75,0	8,0	2,0	•	44853
10,0	22,0	72,0	10,0	0,3	•	44854
10,0	22,0	72,0	10,0	0,5	•	44855
10,0	22,0	72,0	10,0	1,0	•	44856
10,0	22,0	72,0	10,0	1,5	•	44857
10,0	40,0	100,0	10,0	0,5	•	44858
10,0	40,0	100,0	10,0	1,0	•	44859
10,0	40,0	100,0	10,0	1,5	•	44860
10,0	40,0	100,0	10,0	2,0	•	44861
12,0	48,0	100,0	12,0	0,5	•	44862
12,0	48,0	100,0	12,0	1,0	•	44863
12,0	48,0	100,0	12,0	1,5	•	44864
12,0	48,0	100,0	12,0	2,0	•	44865
12,0	48,0	100,0	12,0	2,5	•	44866
12,0	48,0	100,0	12,0	3,0	•	44867
14,0	30,0	89,0	14,0	1,0	•	44868
14,0	30,0	89,0	14,0	2,0	•	44869
14,0	30,0	89,0	14,0	3,0	•	44870
16,0	32,0	92,0	16,0	4,0	•	44871
16,0	64,0	125,0	16,0	0,5	•	44872
16,0	64,0	125,0	16,0	1,0	•	44873
16,0	64,0	125,0	16,0	1,5	•	44874
16,0	64,0	125,0	16,0	2,0	•	44875
16,0	64,0	125,0	16,0	2,5	•	44876
16,0	64,0	125,0	16,0	3,0	•	44877
16,0	64,0	125,0	16,0	4,0	•	44878
20,0	38,0	104,0	20,0	4,0	•	44879
20,0	80,0	150,0	20,0	0,5	•	44880
20,0	80,0	150,0	20,0	1,0	•	44881
20,0	80,0	150,0	20,0	1,5	•	44882
20,0	80,0	150,0	20,0	2,0	•	44883
20,0	80,0	150,0	20,0	2,5	•	44884
20,0	80,0	150,0	20,0	3,0	•	44885
20,0	80,0	150,0	20,0	4,0	•	44886

Aluminum Machining End Mill

S-Carb (3 flutes)





TOLERANCES (mm)		
DIAMETER	D_1	D_2
8 - 10	+0,000 / –0,009	h6
12 - 16	+0,000 / –0,011	h6
20	+0,000 / –0,013	h6

CORNER RADIUS TOLERANCE (mm)
R = +0,00 / –0,05

SERIES 43MLC Aero Radius Range

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Reach L_3	Corner Radius R	Polished Flute	Ti-NAMITE-B (TiB_2) EDP No.
8,0	12,0	75,0	8,0	25,0	0,8	•	44950
8,0	12,0	75,0	8,0	25,0	1,2	•	44951
8,0	12,0	75,0	8,0	25,0	1,6	•	44952
10,0	14,0	100,0	10,0	35,0	0,8	•	44953
10,0	14,0	100,0	10,0	35,0	1,2	•	44954
10,0	14,0	100,0	10,0	35,0	1,6	•	44955
10,0	14,0	100,0	10,0	35,0	2,4	•	44956
12,0	16,0	100,0	12,0	40,0	0,8	•	44957
12,0	16,0	100,0	12,0	40,0	1,2	•	44958
12,0	16,0	100,0	12,0	40,0	1,6	•	44959
12,0	16,0	100,0	12,0	40,0	2,4	•	44960
14,0	18,0	125,0	14,0	45,0	1,0	•	44961
14,0	18,0	125,0	14,0	45,0	2,0	•	44962
14,0	18,0	125,0	14,0	45,0	3,0	•	44963
14,0	18,0	125,0	14,0	45,0	4,0	•	44964
16,0	20,0	125,0	16,0	50,0	0,8	•	44965
16,0	20,0	125,0	16,0	50,0	1,2	•	44966
16,0	20,0	125,0	16,0	50,0	1,6	•	44967
16,0	20,0	125,0	16,0	50,0	2,4	•	44968
16,0	20,0	125,0	16,0	50,0	3,2	•	44969
20,0	25,0	150,0	20,0	65,0	0,8	•	44970
20,0	25,0	150,0	20,0	65,0	1,2	•	44971
20,0	25,0	150,0	20,0	65,0	1,6	•	44972
20,0	25,0	150,0	20,0	65,0	2,4	•	44973
20,0	25,0	150,0	20,0	65,0	3,2	•	44974


Corner


Straight


Long Reach Neck


Right Spiral



Positive Rake


External Coolant

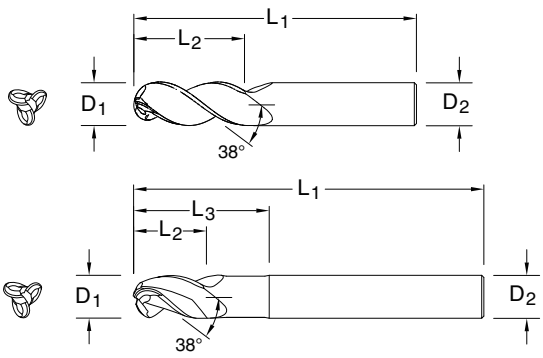


Flutes

Aluminum Machining End Mill

S-Carb (3 flutes)

DIAMETER	TOLERANCES (mm) D_1	D_2	BALL RADIUS
3	+0,000 / –0,006	h6	+0,0127 / -0,0127
4 - 6	+0,000 / –0,008	h6	+0,0127 / -0,0127
8 - 10	+0,000 / –0,009	h6	+0,0127 / -0,0127
12 - 16	+0,000 / –0,011	h6	+0,0127 / -0,0127
20 - 25	+0,000 / –0,013	h6	+0,0127 / -0,0127



CARB
Solid Carbide End Mills for Aluminum

Ball

Common

Straight

Stub, Regular, Long, Long Reach Neck

Right Spiral

Positive Rake

External Coolant

3 Flutes

SERIES 43MB

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Reach L_3	Polished Flute	Ti-NAMITE-B (TiB_2) EDP No.
3,0	4,5	57,0	6,0	–	•	44916
3,0	6,0	57,0	6,0	10,0	•	44917
3,0	9,0	57,0	6,0	16,0	•	44918
4,0	6,0	57,0	6,0	–	•	44919
4,0	8,0	57,0	6,0	13,0	•	44920
4,0	12,0	57,0	6,0	21,0	•	44921
5,0	7,5	57,0	6,0	–	•	44922
5,0	10,0	63,0	6,0	16,0	•	44923
5,0	15,0	63,0	6,0	26,0	•	44924
6,0	9,0	57,0	6,0	–	•	44925
6,0	12,0	63,0	6,0	19,0	•	44926
6,0	18,0	75,0	6,0	31,0	•	44927
8,0	12,0	63,0	8,0	–	•	44928
8,0	16,0	75,0	8,0	25,0	•	44929
8,0	24,0	83,0	8,0	41,0	•	44930
10,0	15,0	75,0	10,0	–	•	44931
10,0	20,0	83,0	10,0	31,0	•	44932
10,0	30,0	100,0	10,0	51,0	•	44933
12,0	18,0	83,0	12,0	–	•	44934
12,0	24,0	100,0	12,0	37,0	•	44935
12,0	36,0	130,0	12,0	61,0	•	44936
16,0	24,0	100,0	16,0	–	•	44937
16,0	32,0	130,0	16,0	49,0	•	44938
16,0	48,0	150,0	16,0	81,0	•	44939
20,0	30,0	108,0	20,0	–	•	44940
20,0	40,0	130,0	20,0	61,0	•	44941
20,0	60,0	150,0	20,0	101,0	•	44942
25,0	37,5	127,0	25,0	–	•	44943
25,0	50,0	152,0	25,0	76,0	•	44944
25,0	75,0	170,0	25,0	126,0	•	44945

Aluminum Machining End Mill

S-Carb (3 flutes)

Corner

Straight

Regular, Long Reach Neck

Right Spiral

Chip Breaker

External Coolant

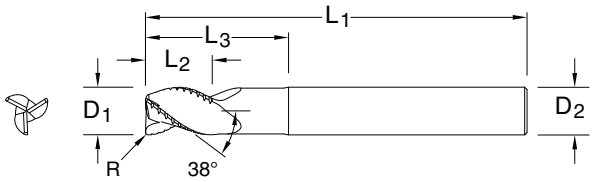
Positive Rake

3 Flutes

TOLERANCES (inch)		
DIAMETER	D_1	D_2
1/4 - 3/8	+0.00000 / –0.00035	h6
1/2 - 5/8	+0.00000 / –0.00043	h6
3/4 - 1	+0.00000 / –0.00051	h6

CORNER RADIUS TOLERANCE (inch)

R = +0.0000 / –0.0020



CARB Solid Carbide End Mills for Aluminum

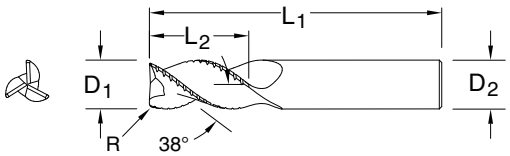
SERIES 43LCB

Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Reach L_3	Corner Radius R	Uncoated EDP No.	Ti-NAMITE-B (TiB_2) EDP No.
1/4	3/8	4	1/4	3/4	.020	33500	33540
1/4	3/8	4	1/4	1-1/8	.020	33501	33541
1/4	3/8	4	1/4	2-1/8	.020	33502	33542
5/16	7/16	4	5/16	1-1/8	.020	33503	33543
5/16	7/16	4	5/16	2-1/8	.020	33504	33544
3/8	1/2	4	3/8	1-1/8	.020	33507	33547
3/8	1/2	4	3/8	2-1/8	.020	33508	33548
1/2	5/8	4	1/2	1-3/8	.030	33511	33551
1/2	5/8	4	1/2	2-1/4	.030	33512	33552
1/2	5/8	6	1/2	3-3/8	.030	33513	33553
1/2	5/8	6	1/2	4-1/4	.030	33514	33554
5/8	3/4	4	5/8	1-5/8	.030	33515	33555
5/8	3/4	6	5/8	2-3/8	.030	33516	33556
5/8	3/4	6	5/8	3-3/8	.030	33517	33557
5/8	3/4	6	5/8	4-3/8	.030	33518	33558
3/4	1	4	3/4	2	.030	33519	33559
3/4	1	6	3/4	2-1/2	.030	33520	33560
3/4	1	6	3/4	3-3/8	.030	33521	33561
3/4	1	6	3/4	4-3/8	.030	33522	33562
1	1-1/4	6	1	2-5/8	.030	33523	33563
1	1-1/4	6	1	3-3/8	.030	33524	33564
1	1-1/4	7	1	4-3/8	.030	33525	33565

TOLERANCES (mm)		
DIAMETER	D_1	D_2
6 - 10	+0,000 / –0,009	h6
12 - 16	+0,000 / –0,011	h6
20	+0,000 / –0,013	h6

CORNER RADIUS TOLERANCE (mm)

R = +0,00 / –0,05



CARB Solid Carbide End Mills for Aluminum

SERIES 43MCB

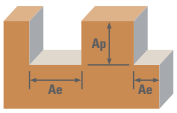
Cutting Diameter D_1	Length of Cut L_2	Overall Length L_1	Shank Diameter D_2	Corner Radius R	Uncoated EDP No.	Ti-NAMITE-B (TiB_2) EDP No.
6,0	19,0	63,0	6,0	0,3	–	44299
8,0	19,0	63,0	8,0	0,3	44300	44305
10,0	22,0	72,0	10,0	0,3	44301	44306
12,0	26,0	83,0	12,0	1,0	44302	44307
16,0	32,0	92,0	16,0	1,0	44303	44308
20,0	38,0	104,0	20,0	1,0	44304	44309

Aluminum Machining End Mill

S-Carb (3 flutes)

CARB Solid Carbide End Mills for Aluminum

SkiCarb

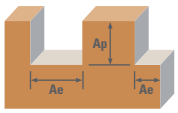


	Series 44M, 43MCR, 43MLC, 43MCB, 43M, 43MB, 47M, 43ML, 47ML, 47MB, 47MLB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	10	12	20	25
N	**ALLOYS 2024, 5052, 5086, 6061, 6073, 7075**	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	490	RPM	52022	26011	15607	13005	7803	6243
						(392-588)	Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed 2 flutes (mm/min)	2247	3121	3746	3745	2913	2653
							Feed 3 flutes (mm/min)	3371	4682	5618	5618	4370	3980
			Profile	≤ 0.5	≤ 1.5	610	RPM	64762	32381	19429	16190	9714	7771
						(488-732)	Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed 2 flutes (mm/min)	2797	3885	4663	4662	3627	3303
							Feed 3 flutes (mm/min)	4196	5828	6994	6994	5440	4955
			HSM	≤ 0.05	≤ 2	1005	RPM	106698	53349	32009	26674	16005	12804
						(804-1206)	Fz	0.050	0.132	0.280	0.336	0.440	0.488
							Feed 2 flutes (mm/min)	10754	14083	17925	17924	14084	12484
							Feed 3 flutes (mm/min)	16131	21124	26888	26885	21126	18726
N	**ALUMINUM DIE CAST ALLOYS (HIGH SILICON) A-390, A-392, B-390**	≤ 125 Bhn or ≤ 77 HRb	Slot	1	≤ 1	185	RPM	19641	9820	5892	4910	2946	2357
						(148-222)	Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed 2 flutes (mm/min)	848	1178	1414	1414	1100	1002
							Feed 3 flutes (mm/min)	1273	1768	2121	2121	1650	1503
			Profile	≤ 0.5	≤ 1.5	230	RPM	24418	12209	7326	6105	3663	2930
						(184-276)	Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed 2 flutes (mm/min)	1055	1465	1758	1758	1367	1245
							Feed 3 flutes (mm/min)	1582	2197	2637	2637	2051	1868
			HSM	≤ 0.05	≤ 2	380	RPM	40343	20172	12103	10086	6052	4841
						(304-456)	Fz	0.050	0.132	0.280	0.336	0.440	0.488
							Feed 2 flutes (mm/min)	4066	5325	6778	6777	5325	4720
							Feed 3 flutes (mm/min)	6099	7987	10166	10166	7988	7081
N	**COPPER ALLOYS Aluminum Bronze, Brass, Naval Brass, Red Brass**	≤ 140 Bhn or ≤ 3 HRc	Slot	1	≤ 1	265	RPM	28134	14067	8440	7034	4220	3376
						(212-318)	Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed 2 flutes (mm/min)	1080	1350	1801	1688	1350	1182
							Feed 3 flutes (mm/min)	1620	2025	2701	2532	2026	1773
			Profile	≤ 0.5	≤ 1.5	330	RPM	35035	17518	10511	8759	5255	4204
						(264-396)	Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed 2 flutes (mm/min)	1345	1682	2242	2102	1682	1472
							Feed 3 flutes (mm/min)	2018	2522	3363	3153	2523	2207
			HSM	≤ 0.05	≤ 2	545	RPM	57861	28930	17358	14465	8679	6943
						(436-654)	Fz	0.041	0.108	0.227	0.276	0.373	0.400
							Feed 2 flutes (mm/min)	4721	6248	7869	7984	6480	5555
							Feed 3 flutes (m/min)	7082	9373	11804	11976	9721	8332

continued on next page

Aluminum Machining End Mill

S-Carb (3 flutes)



Series 44M, 43MCR, 43MLC, 43MCB, 43M, 43MB, 47M, 43ML, 47ML, 47MB, 47MLB Metric			Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	10	12	20	25
N	**COPPER ALLOYS Beryllium Copper, C110, Maganese Bronze, Tin Bronze**	≤ 200 Bhn or ≤ 23 HRc	Slot	1	≤ 1	105	RPM	11148	5574	3344	2787	1672	1338
						(84-126)	Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed 2 flutes (mm/min)	428	535	713	669	535	468
							Feed 3 flutes (mm/min)	642	803	1070	1003	803	702
			Profile	≤ 0.5	≤ 1.5	130	RPM	13802	6901	4141	3450	2070	1656
						(104-156)	Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed 2 flutes (mm/min)	530	662	883	828	662	580
							Feed 3 flutes (mm/min)	795	994	1325	1242	994	870
			HSM	≤ 0.05	≤ 2	215	RPM	22826	11413	6848	5706	3424	2739
						(172-258)	Fz	0.041	0.108	0.227	0.276	0.373	0.400
							Feed 2 flutes (mm/min)	1862	2465	3104	3150	2556	2191
							Feed 3 flutes (mm/min)	2794	3697	4656	4725	3835	3287
N	**PLASTICS ABS, Polycarbonate, PVC, Polypropylene**		Slot	1	≤ 1	490	RPM	52022	26011	15607	13005	7803	6243
						(392-588)	Fz	0.036	0.096	0.200	0.240	0.320	0.350
							Feed 2 flutes (mm/min)	3745	4994	6243	6242	4994	4370
							Feed 3 flutes (mm/min)	5618	7490	9364	9363	7491	6555
			Profile	≤ 0.5	≤ 1.5	610	RPM	64762	32381	19429	16190	9714	7771
						(488-732)	Fz	0.036	0.096	0.200	0.240	0.320	0.350
							Feed 2 flutes (mm/min)	4662	6217	7771	7771	6217	5440
							Feed 3 flutes (mm/min)	6994	9325	11657	11656	9326	8160
			HSM	≤ 0.05	≤ 2	1005	RPM	106698	53349	32009	26674	16005	12804
						(804-1206)	Fz	0.082	0.216	0.453	0.552	0.733	0.800
							Feed 2 flutes (mm/min)	17412	23045	29022	29446	23473	20487
							Feed 3 flutes (mm/min)	26117	34567	43532	44169	35210	30730

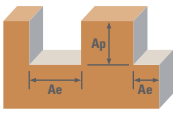
Note:

- Bhn (Brinell), HRc (Rockwell C), HRb (Rockwell B)
- rpm = (1000 x m/min) / (3.14 x D_1)
- mm / min = Fz x number of flutes x rpm
- reduce speed and feed for materials harder than listed
- reduce cut depth and feed by 50% for long flute or long reach tools
- reduce feed and Ae when finish milling (.02 x D_1 maximum)
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Aluminum Machining End Mill

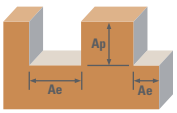
S-Carb (3 flutes)

CARB
Solid Carbide End Mills for Aluminum



	Series 43APR Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 3/4	1
N	ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	4920	RPM	25059	18794
						(3936-5904)	Fz	0.0060	0.0070
							Feed (in/min)	451	395
			Profile	≤ 0.5	≤ 1.5	6560	RPM	33412	25059
						(5248-7872)	Fz	0.0060	0.0070
							Feed (in/min)	601	526
	ALUMINUM ALLOYS (LITHIUM)* 2090, 2091, 2099, 2195, 2199, 2297, 8090	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	3940	RPM	20068	15051
						(3152-4728)	Fz	0.0045	0.0053
							Feed (in/min)	271	239
			Profile	≤ 0.5	≤ 1.5	4920	RPM	25059	18794
						(3936-5904)	Fz	0.0045	0.0053
							Feed (in/min)	338	299

Note:
- Bhn (Brinell) HRc (Rockwell C)
- surface speed is dependent on machine spindle and fixturing
- balancing is recommended at ultra high surface speeds
- *tool life may be reduced when machining Lithium Alloys
- rpm = Vc x 3.82 / D_1
- ipm = Fz x 3 x rpm
- maximum recommended depths shown
- reduce speed and feed for materials harder than listed
- ramp angle = 15˚ (feed rate = 50%)
- plunge depth = 1 x D_1 (feed rate = 30%)
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



	Series 43MAPR Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 12	16	20	25
N	ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	1500	RPM	39788	29841	23873	19098
						(1200-1800)	Fz	0.080	0.110	0.150	0.180
							Feed (mm/min)	9549	9848	10743	10313
			Profile	≤ 0.5	≤ 1.5	2000	RPM	53050	39788	31830	25464
						(1600-2400)	Fz	0.080	0.110	0.150	0.180
							Feed (mm/min)	12732	13130	14324	13751
	ALUMINUM ALLOYS (LITHIUM)* 2090, 2091, 2099, 2195, 2199, 2297, 8090	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	1200	RPM	31830	23873	19098	15278
						(960-1440)	Fz	0.060	0.083	0.110	0.140
							Feed (mm/min)	11459	5944	6302	6417
			Profile	≤ 0.5	≤ 1.5	1500	RPM	39788	29841	23873	19098
						(1200-1800)	Fz	0.060	0.083	0.110	0.140
							Feed (mm/min)	7162	7430	7878	8021

Note:
- Bhn (Brinell) HRc (Rockwell C)
- surface speed is dependent on machine spindle and fixturing
- balancing is recommended at ultra high surface speeds
- *tool life may be reduced when machining Lithium Alloys
- rpm = (Vc x 1000) / (D_1 x 3.14)
- mm/min = Fz x 3 x rpm
- maximum recommended depths shown
- reduce speed and feed for materials harder than listed
- ramp angle = 15˚ (feed rate = 50%)
- plunge depth = 1 x D_1 (feed rate = 30%)
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

For Aluminum Machining

3AFK

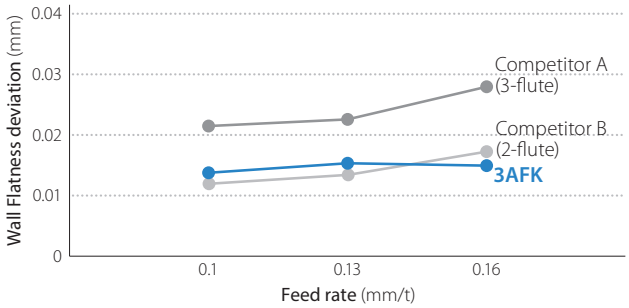
3-Flute End Mill for High Efficiency and Precision

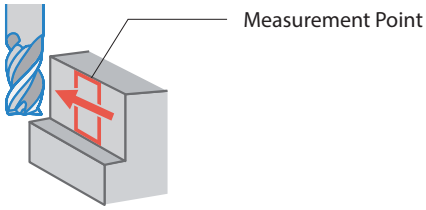
Sharp cutting edge and excellant Anti-Chattering Performance. Delivers High Stability in Diverse Machining Situations

1 High-performance and High-precision Machining

High Efficiency with 3-Flutes. Excellent Machining Precision

Comparison of wall flatness (In-house Evaluation)





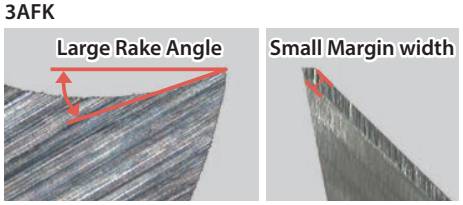
Cutting Conditions: n = 11,700 min^{-1}, Vf = 3,500 – 5,600 mm/min, ap × ae = 15 × 1 mm
Machining Diameter 10mm, Shouldering, Down Cut, Wet, HSK A63 Workpiece: A5052

2 Burr reduction

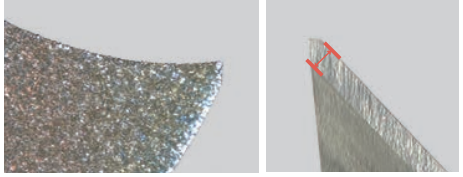
Excellent Sharpness with Large Rake Angle and small margin width

Comparison of the Rake Angle and Margin

3AFK

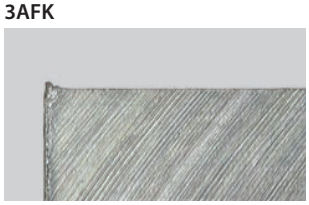


Competitor C

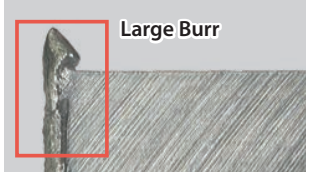


Burr Comparison after Machining (In-house Evaluation)

3AFK

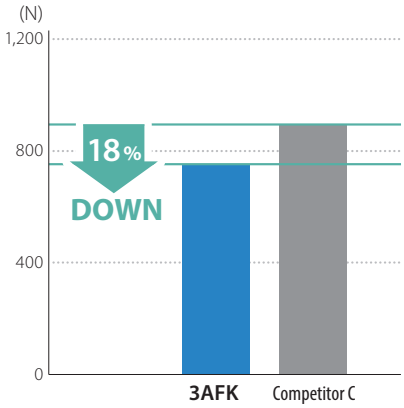


Competitor C



Burr Comparison after Machining Cutting Conditions: n = 11,700 min^{-1}, Vf = 4,600 mm/min, ap × ae = 10 × 1 mm
Machining Diameter ø10, Shouldering, Down Cut, Wet, HSK A63 Workpiece: A7075

Cutting Force Comparison (In-house Evaluation)

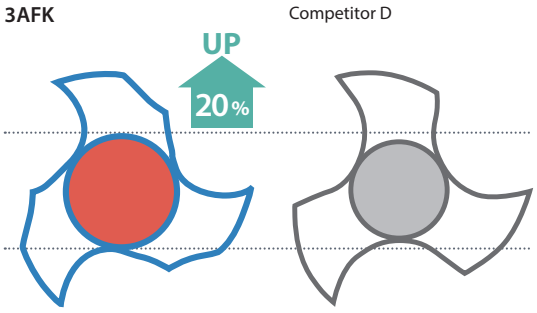


Cutting Conditions: n = 11,700 min^{-1}, Vf = 3,400 mm/min
ap × ae = 10 × 10 mm
Machining Diameter ø10, Slotting, Wet, BT50
Workpiece: A5052

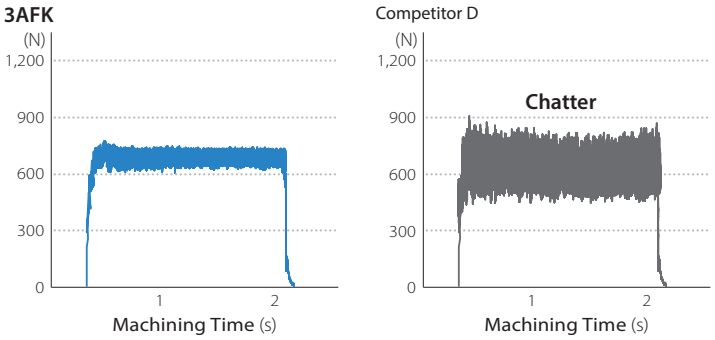
3 Chattering Resistance

Larger Core Thickness to Reduce Chattering

Core Thickness Comparison

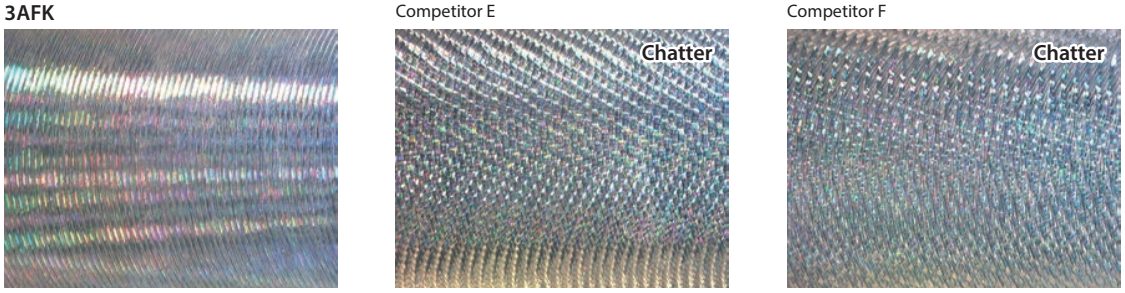


Cutting Force Comparison (In-house Evaluation)



Cutting Conditions: n = 11,700 min^{-1}, Vf = 3,400 mm/min, ap × ae = 10 × 10 mm, Machining Diameter ø10, Slotting, Wet, BT50 Workpiece: A5052

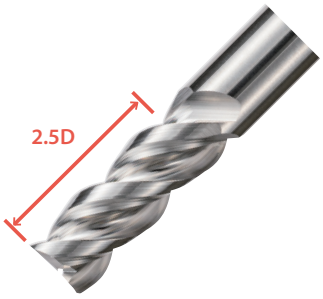
Slotting and Bottom Surface Comparison (In-house Evaluation)



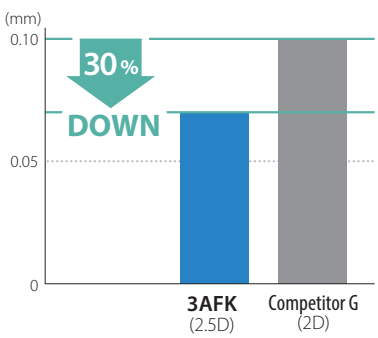
Cutting Conditions: n = 11,100 min^{-1}, Vf = 2,600 mm/min, ap = 10 mm, Wet Workpiece: A5052

4 Flute Length 2.5 D (medium type) Added to the Lineup

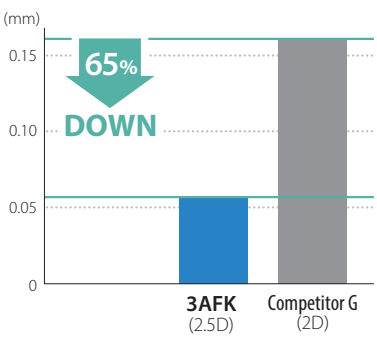
Stable Machining even while Deep Slotting



Comparison of wall flatness (In-house Evaluation)



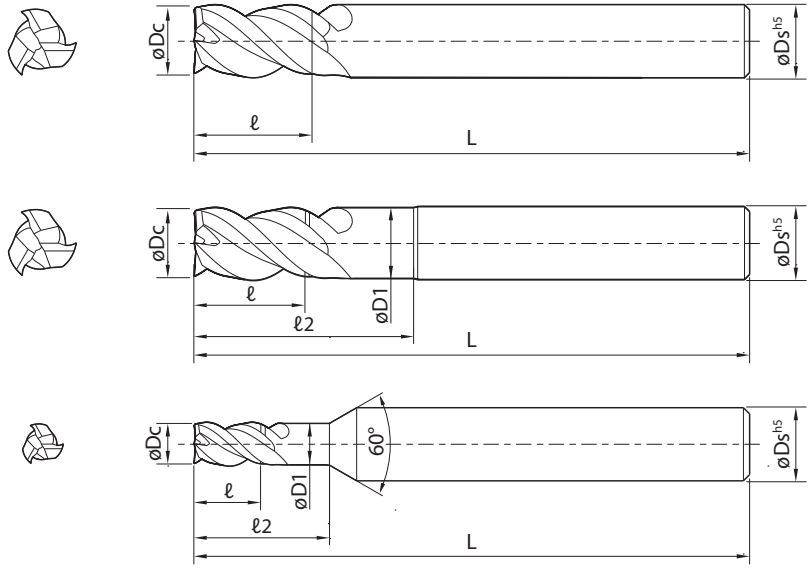
Burr Height Comparison (In-house Evaluation)



Cutting Conditions: n = 11,100 min^{-1}, Vf = 3,800 mm/min, ap × ae = 20 × 1 mm
Machining Diameter ø10, Shouldering, Down Cut, Wet, HSK A63 Workpiece: A7075

Aluminum Machining End Mill

Lineup (short type 1.5D)



Non-coated

(Unit: mm)

Description	Stock	Outer Diameter ø Dc	Outer Diameter Tolerance	Flute Length ℓ	Neck Diameter ø D1	Neck Length ℓ2	Shank Diameter ø Ds	Overall Length L	Number of Flutes	Shape
3AFK030-045-090	●	3.0	0 -0.015	4.5	2.7	9	6	70	3	Fig. 3
3AFK040-060-120	●	4.0	0 -0.015	6	3.7	12	6	70	3	Fig. 3
3AFK050-075-150	●	5.0	0 -0.015	7.5	4.7	15	6	70	3	Fig. 3
3AFK060-090	●	6.0	0 -0.005	9	—	—	6	70	3	Fig. 1
3AFK060-090-180	●	6.0	0 -0.005	9	5.7	18	6	70	3	Fig. 2
3AFK070-105-210	●	7.0	0 -0.015	10.5	6.7	21	8	80	3	Fig. 3
3AFK080-120	●	8.0	0 -0.006	12	—	—	8	80	3	Fig. 1
3AFK080-120-240	●	8.0	0 -0.006	12	7.7	24	8	80	3	Fig. 2
3AFK090-135-270	●	9.0	0 -0.015	13.5	8.7	27	10	90	3	Fig. 3
3AFK100-150	●	10.0	0 -0.006	15	—	—	10	90	3	Fig. 1
3AFK100-150-300	●	10.0	0 -0.006	15	9.7	30	10	90	3	Fig. 2
3AFK110-165-330	●	11.0	0 -0.015	16.5	10.7	33	12	110	3	Fig. 3
3AFK120-180	●	12.0	0 -0.008	18	—	—	12	110	3	Fig. 1
3AFK120-180-360	●	12.0	0 -0.008	18	11.7	36	12	110	3	Fig. 2
3AFK160-240	●	16.0	0 -0.008	24	—	—	16	120	3	Fig. 1
3AFK160-240-480	●	16.0	0 -0.008	24	15.7	48	16	120	3	Fig. 2

Aluminum Machining End Mill

3AFK

Lineup (medium type 2.5D)

(Unit: mm)

Description	Stock	Outer Diameter ø Dc	Outer Diameter Tolerance	Flute Length ℓ	Neck Diameter ø D1	Neck Length ℓ2	Shank Diameter ø Ds	Overall Length L	Number of Flutes	Shape
3AFK030-075-150	●	3.0	0 -0.015	7.5	2.7	15	6	70	3	Fig. 3
3AFK040-100-200	●	4.0	0 -0.015	10	3.7	20	6	70	3	Fig. 3
3AFK050-125-250	●	5.0	0 -0.015	12.5	4.7	25	6	70	3	Fig. 3
3AFK060-150	●	6.0	0 -0.005	15	—	—	6	70	3	Fig. 1
3AFK060-150-300	●	6.0	0 -0.005	15	5.7	30	6	70	3	Fig. 2
3AFK070-175-350	●	7.0	0 -0.015	17.5	6.7	35	8	80	3	Fig. 3
3AFK080-200	●	8.0	0 -0.006	20	—	—	8	80	3	Fig. 1
3AFK080-200-400	●	8.0	0 -0.006	20	7.7	40	8	80	3	Fig. 2
3AFK090-225-450	●	9.0	0 -0.015	22.5	8.7	45	10	90	3	Fig. 3
3AFK100-250	●	10.0	0 -0.006	25	—	—	10	90	3	Fig. 1
3AFK100-250-500	●	10.0	0 -0.006	25	9.7	50	10	90	3	Fig. 2
3AFK110-275-550	●	11.0	0 -0.015	27.5	10.7	55	12	110	3	Fig. 3
3AFK120-300	●	12.0	0 -0.008	30	—	—	12	110	3	Fig. 1
3AFK120-300-600	●	12.0	0 -0.008	30	11.7	60	12	110	3	Fig. 2
3AFK160-400	●	16.0	0 -0.008	40	—	—	16	120	3	Fig. 1
3AFK160-400-800	●	16.0	0 -0.008	40	15.7	80	16	120	3	Fig. 2

●: Standard Stock

Cutting Conditions

Short Type 1.5D

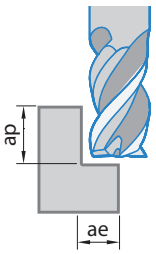
Workpiece	Application	Hole Depth (mm)	Outer Diameter Dc (mm)	ø3	ø4	ø5	ø6	ø7	ø8	ø9	ø10	ø11	ø12	ø16
			RPM (min^{-1})	20,000	20,000	20,000	19,500	16,800	14,700	13,000	11,700	10,700	9,800	7,300
Aluminum Alloy A5052 A7075	Shouldering	ap × ae = 1.5Dc × 0.3Dc	Feed Rate (mm/min)	2,400	2,800	3,500	4,200	4,300	4,400	4,500	4,600	4,700	4,700	3,500
	Slotting	1Dc		1,600	2,000	2,500	3,000	3,100	3,200	3,300	3,400	3,500	3,500	2,200
	Plunging	1Dc		350	350	350	350	350	350	350	350	350	350	350
Workpiece	Application	Hole Depth (mm)	Outer Diameter Dc (mm)	ø3	ø4	ø5	ø6	ø7	ø8	ø9	ø10	ø11	ø12	ø16
			RPM (min^{-1})	20,000	19,900	15,900	13,200	11,300	9,900	8,800	7,900	7,200	6,600	4,900
Aluminum Alloy Cast AC, ADC	Shouldering	ap × ae = 1.5Dc × 0.3Dc	Feed Rate (mm/min)	2,400	2,500	2,500	2,500	2,500	2,600	2,600	2,600	2,600	2,600	1,900
	Slotting	1Dc		1,300	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,800	1,300
	Plunging	1Dc		300	250	200	200	190	150	150	100	100	80	60

Medium Type 2.5D

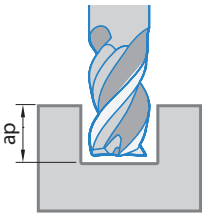
Workpiece	Application	Hole Depth (mm)	Outer Diameter Dc (mm)	ø3	ø4	ø5	ø6	ø7	ø8	ø9	ø10	ø11	ø12	ø16
			RPM (min^{-1})	20,000	20,000	19,000	16,000	13,500	12,000	10,500	9,500	8,500	8,000	6,000
Aluminum Alloy A5052 A7075	Shouldering	ap × ae = 2.5Dc × 0.3Dc	Feed Rate (mm/min)	2,300	2,600	3,200	3,600	3,600	3,600	3,700	3,900	4,000	4,000	2,800
	Slotting	0.5Dc		1,500	1,900	2,300	2,600	2,600	2,700	2,700	2,800	2,900	2,900	1,600
	Plunging	0.5Dc		300	300	300	300	300	300	300	300	300	300	300
Workpiece	Application	Hole Depth (mm)	Outer Diameter Dc (mm)	ø3	ø4	ø5	ø6	ø7	ø8	ø9	ø10	ø11	ø12	ø16
			RPM (min^{-1})	20,000	15,900	12,700	10,600	9,100	7,900	7,000	6,300	5,800	5,300	3,950
Aluminum Alloy Cast AC, ADC	Shouldering	ap × ae = 2.5Dc × 0.3Dc	Feed Rate (mm/min)	2,300	2,200	2,000	2,000	2,000	2,000	2,000	2,000	2,100	2,100	1,500
	Slotting	0.5Dc		1,300	1,300	1,300	1,400	1,400	1,400	1,400	1,400	1,400	1,500	1,100
	Plunging	0.5Dc		300	200	150	160	160	120	120	80	80	60	50

Caution
- Water-soluble cutting oil should be used
- The cutting conditions should be adjusted based on the overhang of the tool and the machine or workpiece rigidity
- RPM and feed rate should be adjusted by the same percentage
- Pecking may be necessary if chips become clogged while plunging

Application



Shouldering

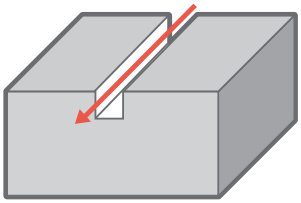


Slotting / Plunging

Case Study

Device Part A5052

n = 7,200 min^{-1} (Vc = 230 m/min)
Vf = 1,300 mm/min (fz = 0.06 mm/t)
ap × ae = 10 × 10 mm (Slotting)
Wet (Water-soluble)
3AFK100-250-500



Metal Removal

3AFK **130 cc/min**

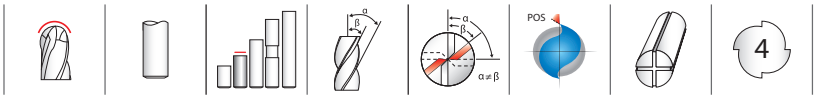
Competitor H **65 cc/min**

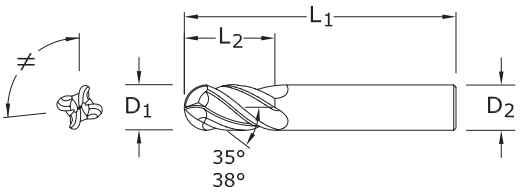
Doubled the Efficiency
2 Times

3AFK is capable of stable machining even with a slot depth of 10 mm and achieves twice the machining efficiency. Competitor H has high cutting forces with only a slot depth of 5 mm, and has machining difficulty.

(User Evaluation)

METRIC
Z-Carb





Z1MB
METRIC SERIES

mm				EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	Ti-NAMITE-X (TX)	JetStream
3,0	8,0	57,0	6,0	46354	–
4,0	11,0	57,0	6,0	46355	–
5,0	13,0	57,0	6,0	46356	–
6,0	13,0	57,0	6,0	46343	–
8,0	19,0	63,0	8,0	46344	–
10,0	22,0	72,0	10,0	46345	–
12,0	26,0	83,0	12,0	46346	–
14,0	26,0	83,0	14,0	46347	46518
16,0	32,0	92,0	16,0	46348	46519
18,0	32,0	92,0	18,0	46349	46520
20,0	38,0	104,0	20,0	46350	46521
25,0	38,0	104,0	25,0	46351	46522

- Unequal helix design aids in damaging harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

Note:
- Refer to P.11 and P.12 for Cutting Parameter.

TOLERANCES (mm)

3–6 DIAMETER
D_1 = +0,000/–0,030
D_2 = h_6
BALL RADIUS
+0,000/–0,015

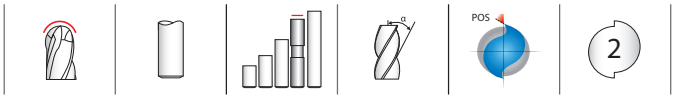
>6–10 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6
BALL RADIUS
+0,000/–0,020

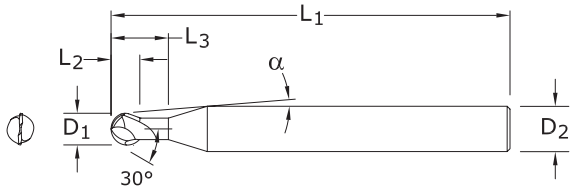
>10–25 DIAMETER
D_1 = +0,000/–0,050
D_2 = h_6
BALL RADIUS
+0,000/–0,025

STEELS
STAINLESS STEELS
CAST IRON
HIGH TEMP ALLOYS
TITANIUM
HARDENED STEELS

For patent information visit www.ksptpatents.com

METRIC
Turbo-Carb





56MB
METRIC SERIES

- Short flute length and rigid design to reduce deflection
- S-Gash Ball geometry minimizes load and heat produced during the cutting process, ultimately enhancing tool life
- Ideal for machining complex contoured shapes in hardened steels
- Recommended for materials 35 to 60 HRc (327 to 654 Bhn)

mm						EDP NO.
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	α	REACH L_3	Ti-NAMITE-X
1,0	1,0	76,0	6,0	8°10'	2,0	91349
1,5	1,5	76,0	6,0	7°45'	3,0	91350
2,0	2,0	76,0	6,0	7°10'	4,0	91351
2,5	2,5	76,0	6,0	6°35'	5,0	91352
3,0	3,0	76,0	6,0	6°	6,0	91353
4,0	4,0	76,0	6,0	4°30'	8,0	91354
5,0	5,0	89,0	6,0	2°30'	10,0	91355
6,0	6,0	89,0	6,0	–	12,0	91356
8,0	8,0	102,0	8,0	–	16,0	91357
10,0	10,0	102,0	10,0	–	20,0	91358
12,0	12,0	114,0	12,0	–	24,0	91359
16,0	16,0	140,0	16,0	–	32,0	91360
20,0	20,0	165,0	20,0	–	40,0	91361

Neck Option Available

TOLERANCES (mm)

1–2,5 DIAMETER
D_1 = +0,000/–0,025
D_2 = h_6
BALL RADIUS
+0.0000/–0.0013

>2,5–6 DIAMETER
D_1 = +0,000/–0,030
D_2 = h_6
BALL RADIUS
+0.0000/–0.0015

>6–10 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6
BALL RADIUS
+0.0000/–0.0020

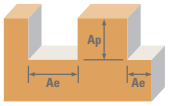
>10–20 DIAMETER
D_1 = +0,000/–0,050
D_2 = h_6
BALL RADIUS
+0.0000/–0.0025

HARDENED STEELS

For patent information visit www.ksptpatents.com

METRIC

Turbo-Carb



	Series 56MB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 1	1.5	3	5	6	10	12	20
H	TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Rough	≤ 0.4	≤ 0.1	191	RPM	60748	40498	20249	12150	10125	6075	5062	3037
						(153-229)	Fz	0.015	0.038	0.076	0.102	0.127	0.203	0.254	0.305
							Feed (mm/min)	1822	3078	3078	2479	2572	2466	2572	1853
			HSM	≤ 0.4	≤ 0.03	290	RPM	92235	61490	46117	18447	15372	9223	7686	4612
						(232-348)	Fz	0.018	0.043	0.084	0.112	0.117	0.224	0.279	0.330
							Feed (mm/min)	3320	5288	7748	4132	3597	4132	4289	3044
	TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 475 Bhn or ≤ 50 HRc	Rough	≤ 0.4	≤ 0.05	229	RPM	72833	48556	24278	14567	12139	7283	6069	3642
						(183-275)	Fz	0.013	0.028	0.058	0.076	0.097	0.152	0.191	0.216
							Feed (mm/min)	1894	2719	2816	2214	2355	2214	2319	1573
			HSM	≤ 0.4	≤ 0.02	351	RPM	111636	74424	37212	22327	18606	11164	9303	5582
						(281-421)	Fz	0.015	0.030	0.064	0.084	0.107	0.168	0.208	0.254
							Feed (mm/min)	3349	4465	4763	3751	3982	3751	3870	2836
	TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 655 Bhn or ≤ 60 HRc	Rough	≤ 0.4	≤ 0.04	152	RPM	48344	32229	16115	9669	8057	4834	4029	2417
						(122-182)	Fz	0.010	0.020	0.043	0.058	0.074	0.114	0.145	0.160
							Feed (mm/min)	967	1289	1386	1122	1192	1102	1168	773
			HSM	≤ 0.4	≤ 0.01	305	RPM	97005	64670	32335	19401	16168	9701	8084	4850
						(244-366)	Fz	0.013	0.023	0.048	0.064	0.081	0.127	0.160	0.180
							Feed (mm/min)	2522	2975	3104	2483	2619	2464	2587	1746

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
rpm = (Vc x 1000) / (D_1 x 3.14)
mm/min = Fz x 2 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Hardened Machining End Mill

HFS

4HFS, 5HFS, 6HFS, 7HFS, 8HFS

No. of Flutes : 4,5,6,7,8



4 5 6 7 8

HFSM

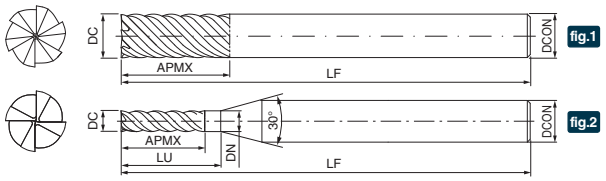
MEGACOAT HARD is applied

High Efficiency Machining

Recommended Workpiece Materials ★ 1st Choice

P ~30HRC	P 30~40HRC	H ~55HRC	H ~68HRC

MEGACOAT HARD | Land | h5 Shank Dia. | 45°

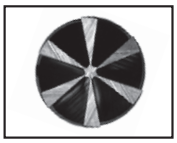


4HFSS, 5HFSS, 6HFSS, 7HFSS (Short)

Shouldering

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of cut	Neck Dia.	Under Neck Length	Shank Dia.	Overall length	No. of Flutes
		DC		APMX	DN	LU	DCON	LF	ZEFP
4HFSS010-040-06 fig.2	●	1	0 -0.015	4	1.05	4.8	6	60	4
4HFSS020-060-06 fig.2	●	2	0 -0.015	6	2.10	7.2	6	60	4
4HFSS030-080-06 fig.2	●	3	0 -0.015	8	3.15	9.6	6	60	4
4HFSS040-100-06 fig.2	●	4	0 -0.015	10	4.2	12.0	6	60	4
4HFSS050-120-06 fig.2	●	5	0 -0.015	12	5.2	14.4	6	60	4
5HFSS040-100-06 fig.2	●	4	0 -0.015	10	4.2	12.0	6	60	5
6HFSS060-140-06 fig.1	●	6	0 -0.020	14	-	-	6	60	6
6HFSS080-180-08 fig.1	●	8	-0.005 -0.025	18	-	-	8	70	6
6HFSS100-220-10 fig.1	●	10	-0.005 -0.025	22	-	-	10	80	6
6HFSS120-260-12 fig.1	●	12	-0.010 -0.030	26	-	-	12	90	6
7HFSS060-140-06 fig.1	●	6	0 -0.020	14	-	-	6	60	7
7HFSS080-180-08 fig.1	●	8	-0.005 -0.025	18	-	-	8	70	7
7HFSS100-220-10 fig.1	●	10	-0.005 -0.025	22	-	-	10	80	7
7HFSS120-260-12 fig.1	●	12	-0.010 -0.030	26	-	-	12	90	7



Bottom surface of 6HFSS cutting edge

4HFSM, 5HFSM, 6HFSM, 7HFSM, 8HFSM (Medium)

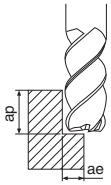
Shouldering

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of cut	Neck Dia.	Under Neck Length	Shank Dia.	Overall length	No. of Flutes
		DC		APMX	DN	LU	DCON	LF	ZEFP
4HFSM010-050-06 fig.2	●	1	0 -0.015	5	1.05	6	6	60	4
4HFSM020-090-06 fig.2	●	2	0 -0.015	9	2.10	10.8	6	60	4
4HFSM030-120-06 fig.2	●	3	0 -0.015	12	3.15	14.4	6	60	4
4HFSM040-140-06 fig.2	●	4	0 -0.015	14	4.2	16.8	6	60	4
4HFSM050-170-06 fig.2	●	5	0 -0.015	17	5.2	20.4	6	60	4
5HFSM040-140-06 fig.2	●	4	0 -0.015	14	4.2	16.8	6	60	5
6HFSM060-170-06 fig.1	●	6	0 -0.020	17	-	-	6	60	6
6HFSM070-200-08 fig.2	●	7	-0.005 -0.025	20	7.2	24.0	8	70	6
6HFSM080-230-08 fig.1	●	8	-0.005 -0.025	23	-	-	8	70	6
6HFSM100-280-10 fig.1	●	10	-0.005 -0.025	28	-	-	10	80	6
6HFSM120-330-12 fig.1	●	12	-0.010 -0.030	33	-	-	12	90	6
6HFSM140-370-16 fig.2	●	14	-0.010 -0.030	37	14.2	44.4	16	105	6
6HFSM150-420-16 fig.2	●	15	-0.010 -0.030	42	15.2	50.4	16	105	6
6HFSM160-420-16 fig.1	●	16	-0.010 -0.030	42	-	-	16	105	6
6HFSM200-480-20 fig.1	●	20	-0.010 -0.030	48	-	-	20	110	6
7HFSM060-170-06 fig.1	●	6	0 -0.020	17	-	-	6	60	7
7HFSM080-230-08 fig.1	●	8	-0.005 -0.025	23	-	-	8	70	7
7HFSM100-280-10 fig.1	●	10	-0.005 -0.025	28	-	-	10	80	7
7HFSM120-330-12 fig.1	●	12	-0.010 -0.030	33	-	-	12	90	7
7HFSM160-420-16 fig.1	●	16	-0.010 -0.030	42	-	-	16	105	7
8HFSM250-530-25 fig.1	●	25	-0.010 -0.030	53	-	-	25	125	8

- PVD coating "MEGACOAT HARD" for hard materials is applied.
  Achieves high rigidity by ensuring a large core diameter, longer tool life and stable machining.
  Also increases cutting edge strength and chip evacuation with a negative rake angle.

4HFSS, 5HFSS, 6HFSS, 7HFSS (Shouldering)
4HFSM, 5HFSM, 6HFSM, 7HFSM, 8HFSM (Shouldering)

Applications	Workpiece Material		Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø1	ø2	ø4	ø6	ø8	ø12
 Shouldering	Tool Steel (< 40HRC) Prehardened Steel		1.5DC x 0.05DC (DC < ø3) 1.5DC x 0.1DC (ø3 ≤ DC)	Spindle Revolution (min^{-1})	20,700	20,000	11,100	7,400	5,600	3,700
				Feed Rate (mm/min)	910	1,750	2,000	2,900	2,930	2,930
	Tool Steel, Heat Treated Steel (40 ~ 45HRC) Prehardened Steel			Spindle Revolution (min^{-1})	20,700	20,000	9,900	6,600	5,000	3,300
				Feed Rate (mm/min)	910	1,750	1,800	2,630	2,650	2,650
	Heat Treated Steel	45 ~ 55HRC	1.5DC x 0.05DC	Spindle Revolution (min^{-1})	20,700	16,000	8,000	5,300	4,000	2,700
				Feed Rate (mm/min)	910	1,400	1,400	2,100	2,100	2,100
		55 ~ 60HRC	1.5DC x 0.02DC	Spindle Revolution (min^{-1})	20,700	12,000	6,000	4,000	3,000	2,000
				Feed Rate (mm/min)	640	730	740	1,100	1,100	1,100
		60 ~ 65HRC		Spindle Revolution (min^{-1})	20,700	11,100	5,600	3,700	2,800	1,900
				Feed Rate (mm/min)	550	600	600	880	880	880
		65 ~ 70HRC		Spindle Revolution (min^{-1})	15,900	8,000	4,000	2,700	2,000	1,330
				Feed Rate (mm/min)	370	370	370	560	560	550

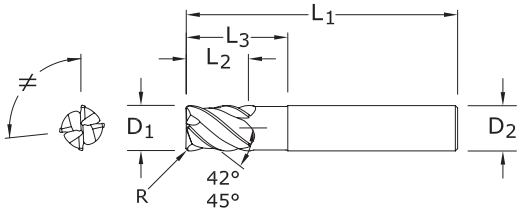
* Above is even number flute condition. In case of Odd number flute, please take standard with increasing feed rate 15 ~ 20% condition.

Slotting is not recommended.

METRIC

Z-Carb-MD





ZD1MCR

METRIC SERIES

TOLERANCES (mm)

3–6 DIAMETER
D_1 = +0,000/–0,030
D_2 = h_6
R = +0,000/–0,050

>6–10 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6
R = +0,000/–0,050

>10–20 DIAMETER
D_1 = +0,000/–0,050
D_2 = h_6
R = +0,000/–0,050

HARDENED STEELS

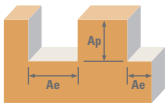
For patent information visit www.ksptpatents.com

mm						EDP NO.
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	REACH L_3	CORNER RADIUS R	Ti-NAMITE-X
3,0	4,0	57,0	6,0	15,0	0,2	46560
4,0	5,0	57,0	6,0	15,0	0,3	46561
5,0	6,0	57,0	6,0	15,0	0,5	46562
6,0	7,0	57,0	6,0	15,0	1,0	46563
8,0	10,0	63,0	8,0	25,0	1,0	46564
10,0	12,0	72,0	10,0	30,0	1,0	46565
12,0	15,0	83,0	12,0	35,0	1,0	46566
16,0	20,0	92,0	16,0	45,0	1,5	46567
20,0	24,0	104,0	20,0	55,0	2,0	46568

- The original Z-Carb design with negative rake, heavy core, and higher helix for strength and shearing of hard mold & die materials
- Unequal helix design aids in damaging harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials 35-60HRc (327 to 654 Bhn)

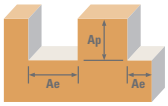
FRACTIONAL & METRIC

Z-Carb-MD



	Series ZD1CR Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/8	1/4	3/8	1/2	5/8	3/4
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.4	≤ 1	405	RPM	12377	6188	4126	3094	2475	2063
						(324-486)	Fz	0.0005	0.0012	0.0023	0.0030	0.0039	0.0042
							Feed (ipm)	24.8	29.7	38.0	37.1	38.6	34.7
			Slot	1	≤ 0.4	320	RPM	9779	4890	3260	2445	1956	1630
						(256-384)	Fz	0.0005	0.0012	0.0023	0.0030	0.0039	0.0042
							Feed (ipm)	19.6	23.5	30.0	29.3	30.5	27.4
	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 475 Bhn or ≤ 50 HRc	Profile	≤ 0.4	≤ 1	210	RPM	6418	3209	2139	1604	1284	1070
						(168-252)	Fz	0.0004	0.0010	0.0019	0.0025	0.0032	0.0035
							Feed (ipm)	10.3	12.8	16.3	16.0	16.4	15.0
			Slot	1	≤ 0.4	170	RPM	5195	2598	1732	1299	1039	866
						(136-204)	Fz	0.0004	0.0010	0.0019	0.0025	0.0032	0.0035
							Feed (ipm)	8.3	10.4	13.2	13.0	13.3	12.1
	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 655 Bhn or ≤ 60 HRc	Profile	≤ 0.4	≤ 1	90	RPM	2750	1375	917	688	550	458
						(72-108)	Fz	0.0002	0.0005	0.0010	0.0013	0.0017	0.0018
							Feed (ipm)	2.2	2.8	3.7	3.6	3.7	3.3
			Slot	1	≤ 0.4	70	RPM	2139	1070	713	535	428	357
						(56-84)	Fz	0.0002	0.0005	0.0010	0.0013	0.0017	0.0018
							Feed (ipm)	1.7	2.1	2.9	2.8	2.9	2.6

Bhn (Brinell) HRc (Rockwell C)
rpm = Vc x 3.82 / D_1
ipm = Fz x 4 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



	Series ZD1MCR Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	16	20
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.4	≤ 1	123	RPM	13087	6544	4908	3926	3272	2454	1963
						(99-148)	Fz	0.012	0.029	0.049	0.061	0.072	0.083	0.112
							Feed (mm/min)	628	754	963	963	942	817	879
			Slot	1	≤ 0.4	98	RPM	10340	5170	3878	3102	2585	1939	1551
						(78-117)	Fz	0.012	0.029	0.049	0.061	0.072	0.083	0.112
							Feed (mm/min)	496	596	761	761	744	645	695
	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 475 Bhn or ≤ 50 HRc	Profile	≤ 0.4	≤ 1	64	RPM	6786	3393	2545	2036	1696	1272	1018
						(51-77)	Fz	0.010	0.024	0.041	0.051	0.060	0.068	0.093
							Feed (mm/min)	261	326	413	413	407	347	380
			Slot	1	≤ 0.4	52	RPM	5493	2747	2060	1648	1373	1030	824
						(41-62)	Fz	0.010	0.024	0.041	0.051	0.060	0.068	0.093
							Feed (mm/min)	211	264	334	334	330	281	308
	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 655 Bhn or ≤ 60 HRc	Profile	≤ 0.4	≤ 1	27	RPM	2908	1454	1091	872	727	545	436
						(22-33)	Fz	0.005	0.012	0.021	0.027	0.031	0.036	0.048
							Feed (mm/min)	56	70	93	93	91	79	84
			Slot	1	≤ 0.4	21	RPM	2262	1131	848	679	565	424	339
						(17-26)	Fz	0.005	0.012	0.021	0.027	0.031	0.036	0.048
							Feed (mm/min)	43	54	72	72	71	62	65

Bhn (Brinell) HRc (Rockwell C)
rpm = (Vc x 1000) / (D_1 x 3.14)
ipm = Fz x 4 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

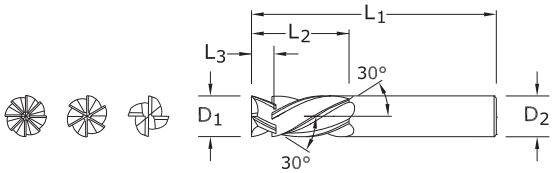
METRIC

Compression





25M
METRIC SERIES



- Compression-style helixes direct cutting forces inward, eliminating fiber breakout and delamination
- Primary/secondary relief grind for reduced friction and pressure
- Rigid, heavy core

mm						EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	INTERSECT LENGTH L_3	NO. OF FLUTES	UNCOATED	Di-NAMITE® (Diamond)
6,0	25,0	63,0	6,0	4,10	4	82990	82991
8,0	25,0	63,0	8,0	5,58	4	82992	82993
10,0	28,0	63,0	10,0	7,05	6	82994	82995
12,0	38,0	89,0	12,0	8,60	8	82996	82997

TOLERANCES (mm)

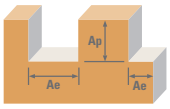
D_1 = +0,00/–0,08
D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

METRIC

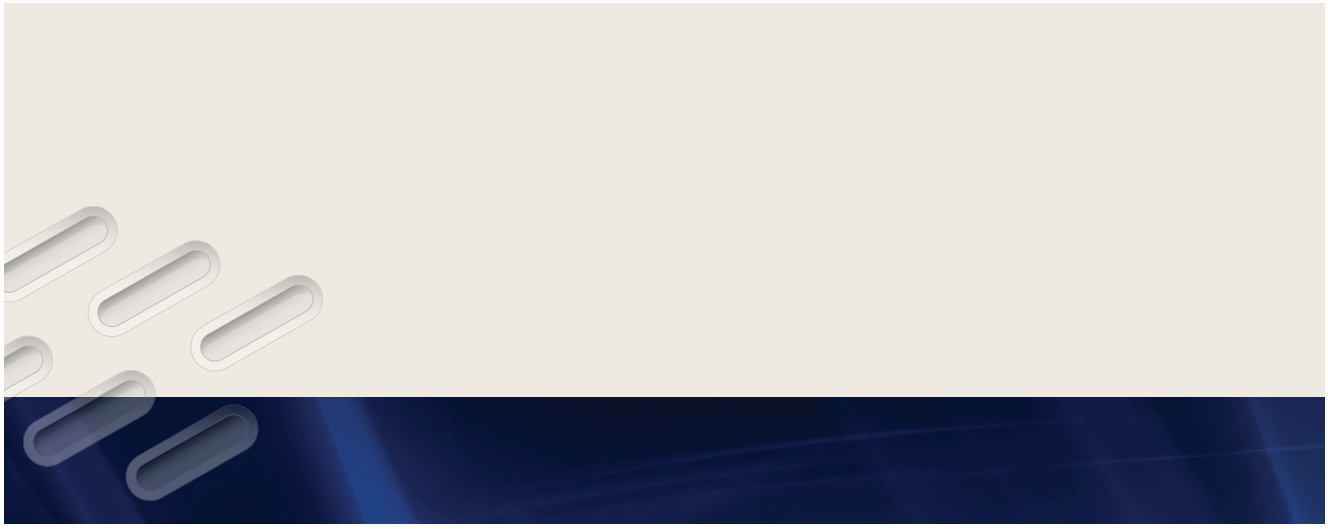
Compression



	Series 25M Metric		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12
N	CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Profile	≤ 0.5	≤ 1.5	150	RPM	7951	5963	4771	3976
					(96-164)	Fz	0.040	0.065	0.075	0.100
						Feed (mm/min)	1272	1550	2147	3181
		HSM	≤ 0.05	≤ 2	250	RPM	13252	9939	7951	6626
					(200-300)	Fz	0.095	0.145	0.175	0.235
						Feed (mm/min)	5036	5765	8349	12457
	GFRP (FIBERGLASS)	Profile	≤ 0.5	≤ 1.5	120	RPM	6361	4771	3817	3181
					(96-164)	Fz	0.040	0.065	0.075	0.100
						Feed (mm/min)	1018	1240	1717	2544
		HSM	≤ 0.05	≤ 2	200	RPM	10602	7951	6361	5301
					(160-240)	Fz	0.095	0.145	0.175	0.235
						Feed (mm/min)	4029	4612	6679	9966
	CARBON, GRAPHITE	Profile	≤ 0.5	≤ 1.5	185	RPM	9807	7355	5884	4903
					(148-222)	Fz	0.050	0.080	0.095	0.125
						Feed (mm/min)	1961	2354	3354	4903
		HSM	≤ 0.05	≤ 2	300	RPM	15903	11927	9542	7951
					(240-360)	Fz	0.115	0.185	0.220	0.290
						Feed (mm/min)	7315	8826	12595	18447
	PLASTICS	Profile	≤ 0.5	≤ 1.5	305	RPM	16168	12126	9701	8084
					(244-366)	Fz	0.050	0.080	0.095	0.125
						Feed (mm/min)	3234	3880	5529	8084
		HSM	≤ 0.05	≤ 2	505	RPM	26769	20077	16062	13385
					(404-606)	Fz	0.115	0.185	0.220	0.290
						Feed (mm/min)	12314	14857	21201	31052
	MACHINABLE CERAMICS MACHINABLE GLASS	Profile	≤ 0.5	≤ 1.5	15	RPM	795	596	477	398
					(12-18)	Fz	0.020	0.035	0.045	0.050
						Feed (mm/min)	64	83	129	159
		HSM	≤ 0.05	≤ 2	25	RPM	1325	994	795	663
					(20-30)	Fz	0.045	0.075	0.085	0.115
						Feed (mm/min)	239	298	406	610

HSM (high speed machining)
rpm = (Vc x 1000) / (D_1 x 3.14)
mm/min = Fz x number of flutes x rpm
adjust parameters based on resin type and fiber structure
reduce speed when overheating causes melting or damage to resin
reduce feed if delamination or fraying occur
finish cuts typically required reduced feed and cutting depths
rates shown are for use without coolant; rates may be increased with coolant
dust collection is vital when machining dry
diamond coating will increase tool life in graphite and composite materials
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

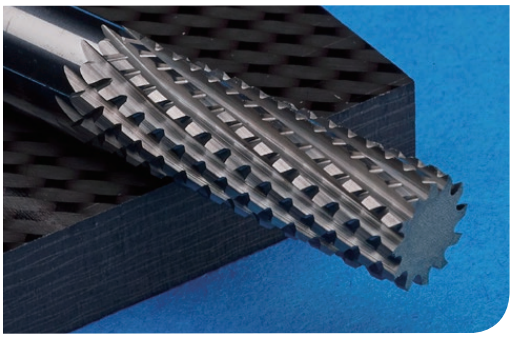
Carbon Composite Router



SERIES 20 CARBON COMPOSITE ROUTER

SGS Carbon Composite Routers were designed for maximum performance in CFRP materials. We partnered with a leading Aerospace company to launch the original Series 20, a design focused on trimming and finishing in demanding applications requiring minimal fiber breakout and delamination.

- The multi-flute design and positive geometry cleanly shear through the material with minimal pressure without delamination issues
- The unique clearance grind minimizes the contact between the tool diameter and workpiece, eliminating friction and pressure concerns
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Greater edge finish with longer tool life
- Available with and without end cut
- Now available with Di-NAMITE coating option



Performance by Design

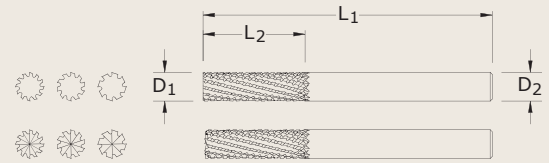
The Original CCR is now available in a diamond coated option for maximum abrasion resistance and increased tool life.

Tolerances (inch)

Diameter	D_1	D_2
All	+.000 / -.005	h6

Tolerances (mm)

Diameter	D_1	D_2
All	+0,00 / -0,13	h6

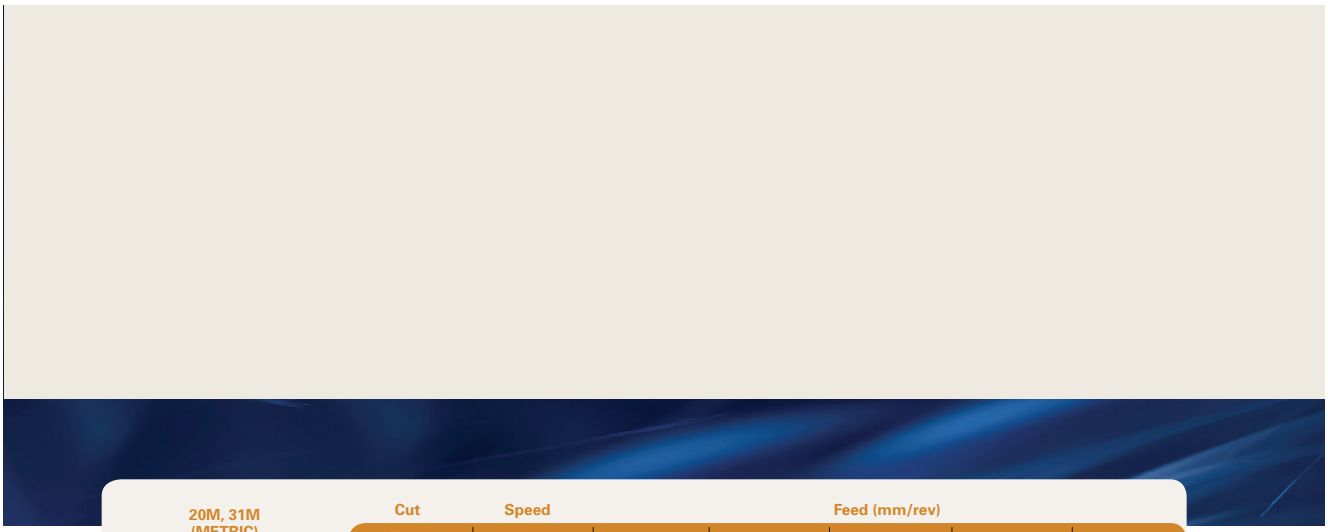


SERIES 20 CCR (FRACTIONAL)

Cutting Diameter D_1	Flute Length L_2	Overall Length L_1	Shank Diameter D_2	Number of Flutes	End Style	Uncoated EDP No.	Di-NAMITE (TD) EDP No.
1/4	1	2-1/2	1/4	8	No End Cutting	72930	73013
1/4	1	2-1/2	1/4	8	End Cutting	72947	73012
5/16	1	2-1/2	5/16	10	No End Cutting	72948	73026
5/16	1	2-1/2	5/16	10	End Cutting	72949	73014
3/8	1-1/8	2-1/2	3/8	12	No End Cutting	72950	73028
3/8	1-1/8	2-1/2	3/8	12	End Cutting	72951	73027
1/2	1-1/2	3-1/2	1/2	12	No End Cutting	72952	73041
1/2	1-1/2	3-1/2	1/2	12	End Cutting	72953	73029

SERIES 20-M CCR (METRIC)

Cutting Diameter D_1	Flute Length L_2	Overall Length L_1	Shank Diameter D_2	Number of Flutes	End Style	Uncoated EDP No.	Di-NAMITE (TD) EDP No.
6,0	25,0	63,0	6,0	8	No End Cutting	82966	83027
6,0	25,0	63,0	6,0	8	End Cutting	82967	83026
8,0	25,0	63,0	8,0	10	No End Cutting	82968	83029
8,0	25,0	63,0	8,0	10	End Cutting	82969	83028
10,0	28,0	63,0	10,0	12	No End Cutting	82970	83042
10,0	28,0	63,0	10,0	12	End Cutting	82971	83041
12,0	38,0	89,0	12,0	12	No End Cutting	82972	83044
12,0	38,0	89,0	12,0	12	End Cutting	82973	83043



20M, 31M (METRIC)	Cut	Speed	Feed (mm/rev)				
	Type	m/min	1.6	3	6	10	12
● CFRP, AFRP (Carbon Fiber, Aramid Fiber)	Slot	120	0.030	0.060	0.120	0.230	0.305
	Profile	150	0.030	0.060	0.120	0.230	0.305
	Light	250	0.070	0.140	0.280	0.525	0.700
● GFRP (Fiberglass)	Slot	100	0.030	0.060	0.120	0.230	0.305
	Profile	120	0.030	0.060	0.120	0.230	0.305
	Light	200	0.070	0.140	0.280	0.525	0.700
● CARBON, GRAPHITE	Slot	145	0.040	0.075	0.150	0.290	0.380
	Profile	185	0.040	0.075	0.150	0.290	0.380
	Light	300	0.090	0.175	0.350	0.655	0.875
● PLASTIC	Slot	245	0.040	0.075	0.150	0.290	0.380
	Profile	305	0.040	0.075	0.150	0.290	0.380
	Light	505	0.090	0.175	0.350	0.655	0.875
MACHINABLE CERAMIC, MACHINABLE GLASS	Slot	10	0.015	0.030	0.060	0.115	0.150
	Profile	15	0.015	0.030	0.060	0.115	0.150
	Light	25	0.035	0.070	0.135	0.260	0.350

Cut Type

Slot	Profile	Light
31M Rw = D_1 Ad = D_1	31M Rw = .5 x D_1 Ad = 1.5 x D_1	20M, 31M Rw = .05 x D_1 Ad = L_2



rpm = (1000 x m/min) / (3.14 x D_1)
mm/min = (mm/rev) x rpm

- maximum recommended depths shown
- adjust speed and feed based upon resin type and/or fiber structure
- reduce speed when overheating causes melting or damage to resin
- reduce feed if delamination or fraying occurs
- finish cuts typically require reduced feed and cutting depths
- rates shown are for use without coolant; rates may be increased with coolant use
- dust collection is vital when machining dry
- diamond coating will increase tool life in graphite and composite materials
- refer to the SGS Tool Wizard for more complete technical information (available at www.sgstool.com)

KYOCERA

SGS Solid Carbide Tools

High Performance Drills



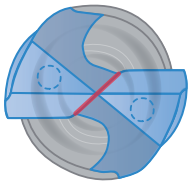
HYDROS Deep Drill

Excellent Hole Accuracy with a Low Cutting Force Design
Good for Difficult-to-Cut Materials

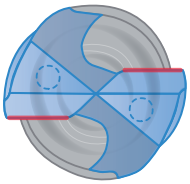
1 Optimized Cutting Edge for Increased Accuracy

The optimized cutting edge creates excellent drilling accuracy during the initial cut by consistently controlling the cutting force across the face of both cutting edges.

Cutting Edge



Centering Edge

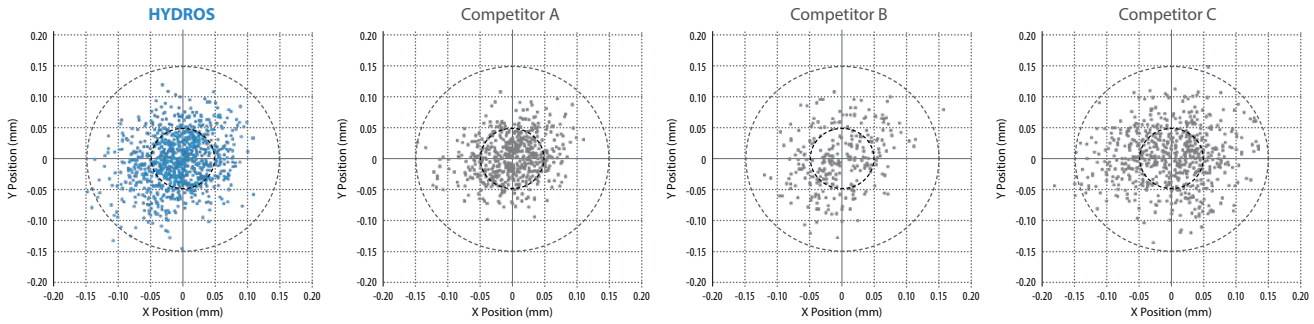


Primary Cutting Edge

Centering Edge



Drill Hole Positional Accuracy After 1400 Holes (In-house Evaluation)

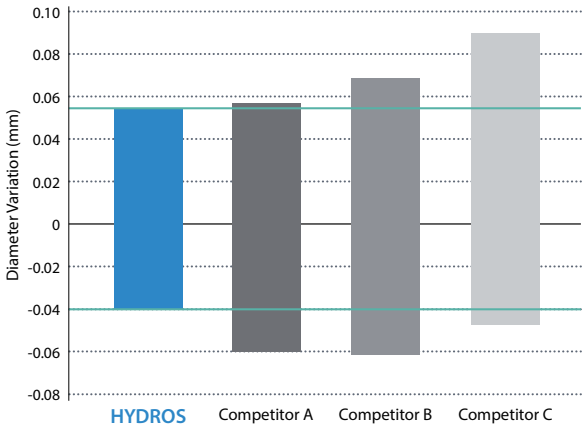


Excellent Hole Positional Accuracy

	HYDROS	Competitor A	Competitor B	Competitor C
Cp	1.92	1.97	1.70	1.50
CpK	1.34	1.35	1.03	0.86
Spec (+/-)	0.15mm	0.15mm	0.15mm	0.15mm

Cutting Conditions : N = 6468rpm, Vf = 575mm/min Drill Diameter Ø3mm Drilling Depth 25.4mm 17-4PH-900

Hole Diameter Variation (In-house Evaluation)



	No. of Holes	Diameter Variation (mm)
HYDROS	600	0.0937
Competitor A	600	0.1141
Competitor B	269 (Broken)	0.1281
Competitor C	600	0.1347

Cutting Conditions : N = 6468rpm, Vf = 575mm/min Drill Diameter Ø3mm Drilling Depth 25.4mm 17-4PH-900

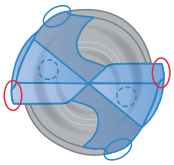
2 Double Margin for Smooth Hole Finish

Two margins create a cutting and wiping effect that create a smooth hole finish and smooth cutting performance along the hole wall.

Chip Comparison



Double Margins



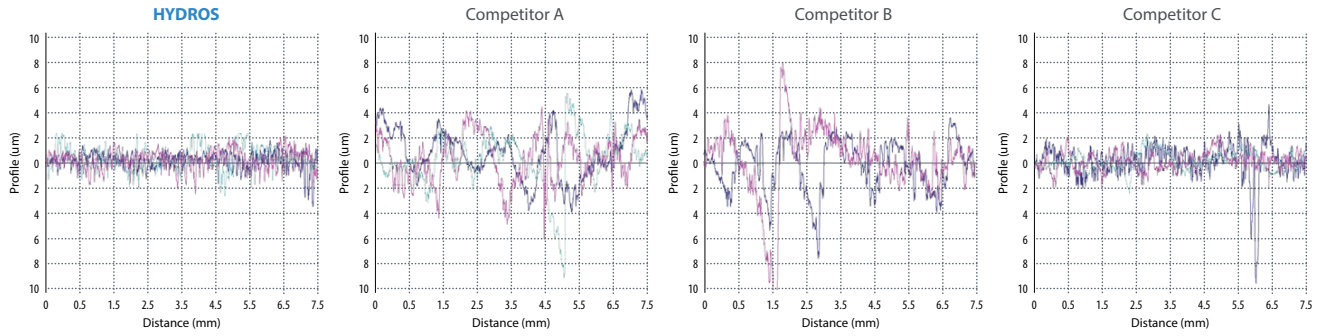


Cutting Edge

Wiping Edge

Optimized for smooth cutting performance with excellent chip evacuation

Hole Roughness (In-house Evaluation)



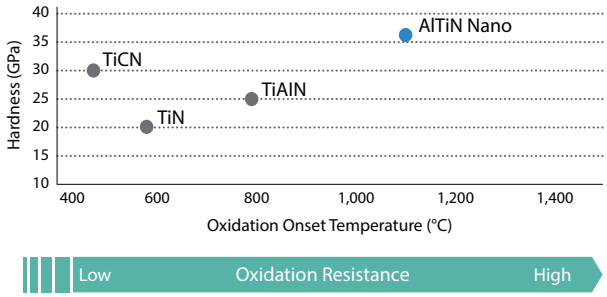
	HYDROS			Competitor A			Competitor B			Competitor C		
	Hole 1	Hole 300	Hole 600	Hole 1	Hole 300	Hole 600	Hole 1	Hole 300	Hole 600	Hole 1	Hole 300	Hole 600
R_a (µm)	0.421	0.539	0.676	1.705	1.540	1.572	1.638	1.977	Broken	0.893	0.559	0.562
R_q (µm)	0.554	0.677	0.869	2.123	1.832	2.113	1.979	2.581	Broken	1.249	0.712	0.687
R_z (µm)	3.282	3.478	4.406	8.076	8.480	10.077	8.847	10.973	Broken	7.178	3.845	3.206

Cutting Conditions : N = 6468rpm, Vf = 575mm/min Drill Diameter Ø3mm Drilling Depth 25.4mm 17-4PH-900

3 Nanocomposite Super-nitride AlTiN Coating Technology

Great for difficult-to-cut and hardened materials, the 2nd generation AlTiN supernitride with a nanocomposite coating structure has a hardness GPa of 36.3 and maximum application temperature (C°) of 1,100.

Coating Properties



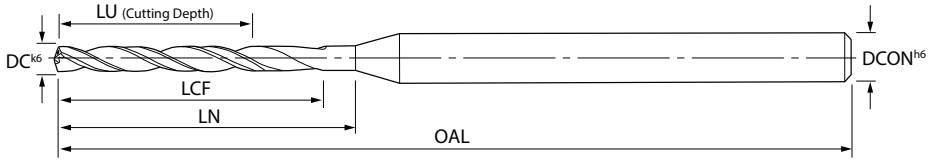


HYDROS Mini 8xD Deep Drills - Metric Sizes (Ø1.00mm - Ø4.00mm) NEW



Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance
1.00mm ~ 4.00mm	k6	h6

8D



*LU dimension refers to the Max. Length of Cut (8 x DC).

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)						Point Angle
		DCk6	DCONh6	OAL	*LU	LCF	LN	
814-0394L524	●	1.00	4.00	53.00	8.00	13.30	14.36	140°
814-0433L555	●	1.10	4.00	53.00	8.80	14.10	15.23	140°
814-0472L587	●	1.20	4.00	53.00	9.60	14.90	16.09	140°
814-0512L618	●	1.30	4.00	53.00	10.40	15.70	16.96	140°
814-0551L650	●	1.40	4.00	53.00	11.20	16.50	17.82	140°
814-0591L681	●	1.50	4.00	53.00	12.00	17.30	18.68	140°
814-0630L713	●	1.60	4.00	64.00	12.80	18.10	19.55	140°
814-0669L744	●	1.70	4.00	64.00	13.60	18.90	20.41	140°
814-0709L803	●	1.80	4.00	64.00	14.40	20.40	22.03	140°
814-0748L835	●	1.90	4.00	64.00	15.20	21.20	22.90	140°
814-0787L866	●	2.00	4.00	64.00	16.00	22.00	23.76	140°
814-0827L898	●	2.10	4.00	64.00	16.80	22.80	24.62	140°
814-0866L1012	●	2.20	4.00	64.00	17.60	25.70	27.76	140°
814-0906L1043	●	2.30	4.00	64.00	18.40	26.50	28.62	140°
814-0945L1075	●	2.40	4.00	64.00	19.20	27.30	29.48	140°
814-0984L1106	●	2.50	4.00	64.00	20.00	28.10	30.35	140°
814-1024L1138	●	2.60	4.00	76.00	20.80	28.90	31.21	140°
814-1063L1169	●	2.70	4.00	76.00	21.60	29.70	32.08	140°
814-1102L1201	●	2.80	4.00	76.00	22.40	30.50	32.94	140°
814-1142L1268	●	2.90	4.00	76.00	23.20	32.20	34.78	140°
814-1181L1299	●	3.00	4.00	76.00	24.00	33.00	35.64	140°
814-1220L1331	●	3.10	4.00	76.00	24.80	33.80	36.50	140°
814-1260L1362	●	3.20	4.00	76.00	25.60	34.60	37.37	140°
814-1299L1394	●	3.30	4.00	76.00	26.40	35.40	38.23	140°
814-1339L1500	●	3.40	4.00	76.00	27.20	38.10	41.15	140°
814-1378L1531	●	3.50	4.00	76.00	28.00	38.90	42.01	140°
814-1417L1563	●	3.60	4.00	76.00	28.80	39.70	42.88	140°
814-1457L1594	●	3.70	4.00	76.00	29.60	40.50	43.74	140°
814-1496L1626	●	3.80	4.00	76.00	30.40	41.30	44.60	140°
814-1535L1657	●	3.90	4.00	76.00	31.20	42.10	45.47	140°
814-1575L1689	●	4.00	4.00	76.00	32.00	42.90	46.33	140°

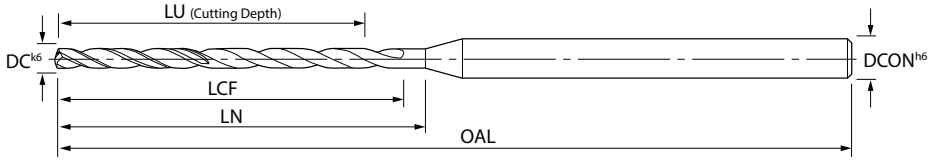
● : Standard Item

HYDROS Mini 15xD Deep Drills - Metric Sizes (Ø1.00mm - Ø4.00mm) NEW



Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance
1.00mm ~ 4.00mm	k6	h6

15D



*LU dimension refers to the Max. Length of Cut (15 x DC).

Metric Drill Dimensions

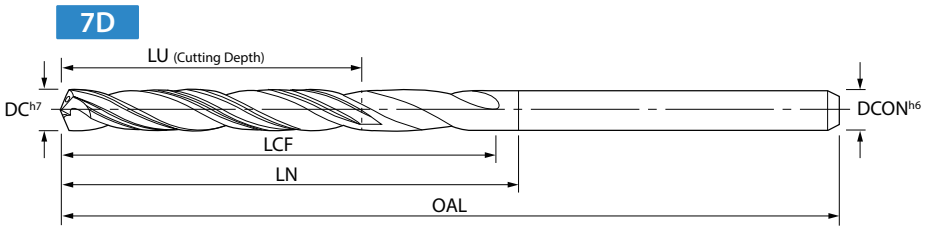
Part Number	Stock	Dimensions (mm)						Point Angle
		DC^{k6}	DCON^{h6}	OAL	*LU	LCF	LN	
814-0394L799	●	1.00	4.00	64.00	15.00	20.30	21.32	140°
814-0433L858	●	1.10	4.00	64.00	16.50	21.80	22.89	140°
814-0472L917	●	1.20	4.00	64.00	18.00	23.30	24.47	140°
814-0512L976	●	1.30	4.00	64.00	19.50	24.80	26.04	140°
814-0551L1035	●	1.40	4.00	64.00	21.00	26.30	27.62	140°
814-0591L1094	●	1.50	4.00	64.00	22.50	27.80	29.19	140°
814-0630L1154	●	1.60	4.00	81.00	24.00	29.30	30.77	140°
814-0669L1213	●	1.70	4.00	81.00	25.50	30.80	32.34	140°
814-0709L1299	●	1.80	4.00	81.00	27.00	33.00	34.65	140°
814-0748L1358	●	1.90	4.00	81.00	28.50	34.50	36.23	140°
814-0787L1417	●	2.00	4.00	81.00	30.00	36.00	37.80	140°
814-0827L1476	●	2.10	4.00	81.00	31.50	37.50	39.38	140°
814-0866L1618	●	2.20	4.00	81.00	33.00	41.10	43.16	140°
814-0906L1677	●	2.30	4.00	81.00	34.50	42.60	44.73	140°
814-0945L1736	●	2.40	4.00	81.00	36.00	44.10	46.31	140°
814-0984L1795	●	2.50	4.00	90.00	37.50	45.60	47.88	140°
814-1024L1854	●	2.60	4.00	90.00	39.00	47.10	49.46	140°
814-1063L1913	●	2.70	4.00	90.00	40.50	48.60	51.03	140°
814-1102L1972	●	2.80	4.00	90.00	42.00	50.10	52.61	140°
814-1142L2067	●	2.90	4.00	90.00	43.50	52.50	55.13	140°
814-1181L2126	●	3.00	4.00	90.00	45.00	54.00	56.70	140°
814-1220L2185	●	3.10	4.00	106.00	46.50	55.50	58.28	140°
814-1260L2244	●	3.20	4.00	106.00	48.00	57.00	59.85	140°
814-1299L2303	●	3.30	4.00	106.00	49.50	58.50	61.43	140°
814-1339L2437	●	3.40	4.00	106.00	51.00	61.90	65.00	140°
814-1378L2496	●	3.50	4.00	106.00	52.50	63.40	66.57	140°
814-1417L2555	●	3.60	4.00	106.00	54.00	64.90	68.15	140°
814-1457L2614	●	3.70	4.00	106.00	55.50	66.40	69.72	140°
814-1496L2673	●	3.80	4.00	106.00	57.00	67.90	71.30	140°
814-1535L2732	●	3.90	4.00	106.00	58.50	69.40	72.87	140°
814-1575L2791	●	4.00	4.00	106.00	60.00	70.90	74.45	140°

● : Standard Item

HYDROS 7xD Deep Drills - Metric Sizes (Ø3.00mm - Ø6.00mm) NEW



Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance
3.00mm ~ 6.00mm	h7	h6



*LU dimension refers to the Max. Length of Cut (7 x DC).
If a pilot drill is needed for your application please match with ORION High Performance Drills Series 165.

Metric Drill Dimensions

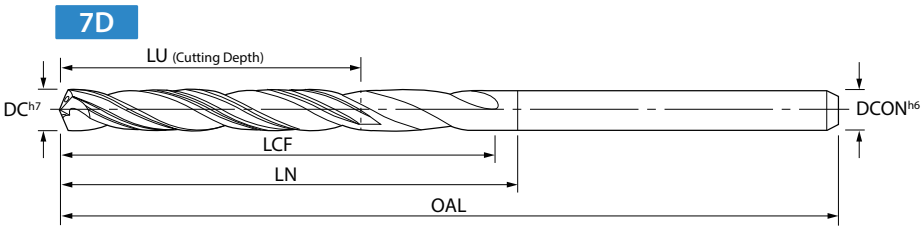
Part Number	Stock	Dimensions (mm)						Point Angle
		DC h7	DCON h6	OAL	*LU	LCF	LN	
865-1181AG1181	●	3.00	3.00	80.37	21.00	30.00	31.50	135°
865-1220AG1220	●	3.10	4.00	80.37	21.70	31.00	32.55	135°
865-1260AG1260	●	3.20	4.00	80.37	22.40	32.00	33.60	135°
865-1299AG1299	●	3.30	4.00	80.37	23.10	33.00	34.65	135°
865-1339AG1339	●	3.40	4.00	80.37	23.80	34.00	35.70	135°
865-1378AG1378	●	3.50	4.00	80.37	24.50	35.00	36.75	135°
865-1417AG1417	●	3.60	4.00	80.37	25.20	36.00	37.80	135°
865-1457AG1457	●	3.70	4.00	90.37	25.90	37.00	38.85	135°
865-1496AG1496	●	3.80	4.00	90.37	26.60	38.00	39.90	135°
865-1535AG1535	●	3.90	4.00	90.37	27.30	39.00	40.95	135°
865-1575AG1575	●	4.00	4.00	90.37	28.00	40.00	42.00	135°
865-1614AG1614	●	4.10	6.00	90.37	28.70	41.00	43.05	135°
865-1654AG1654	●	4.20	6.00	90.37	29.40	42.00	44.10	135°
865-1693AG1693	●	4.30	6.00	90.37	30.10	43.00	45.15	135°
865-1732AG1732	●	4.40	6.00	90.37	30.80	44.00	46.20	135°
865-1772AG1772	●	4.50	6.00	100.37	31.50	45.00	47.25	135°
865-1811AG1811	●	4.60	6.00	100.37	32.20	46.00	48.30	135°
865-1850AG1850	●	4.70	6.00	100.37	32.90	47.00	49.35	135°
865-1890AG1890	●	4.80	6.00	100.37	33.60	48.00	50.40	135°
865-1929AG1929	●	4.90	6.00	100.37	34.30	49.00	51.45	135°
865-1969AG1969	●	5.00	6.00	100.37	35.00	50.00	52.50	135°
865-2008AG2008	●	5.10	6.00	100.37	35.70	51.00	53.55	135°
865-2047AG2047	●	5.20	6.00	100.37	36.40	52.00	54.60	135°
865-2087AG2087	●	5.30	6.00	110.37	37.10	53.00	55.65	135°
865-2126AG2126	●	5.40	6.00	110.37	37.80	54.00	56.70	135°
865-2165AG2165	●	5.50	6.00	110.37	38.50	55.00	57.75	135°
865-2205AG2205	●	5.60	6.00	110.37	39.20	56.00	58.80	135°
865-2244AG2244	●	5.70	6.00	110.47	39.90	57.00	59.85	135°
865-2283AG2283	●	5.80	6.00	110.47	40.60	58.00	60.90	135°
865-2323AG2323	●	5.90	6.00	110.47	41.30	59.00	61.95	135°
865-2362AG2362	●	6.00	6.00	110.47	42.00	60.00	63.00	135°

● : Standard Item

HYDROS 7xD Deep Drills - Metric Sizes (Ø6.10mm - Ø9.10mm) NEW



Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance
6.10mm ~ 9.10mm	h7	h6



*LU dimension refers to the Max. Length of Cut (7 x DC).
If a pilot drill is needed for your application please match with ORION High Performance Drills Series 165.

Metric Drill Dimensions

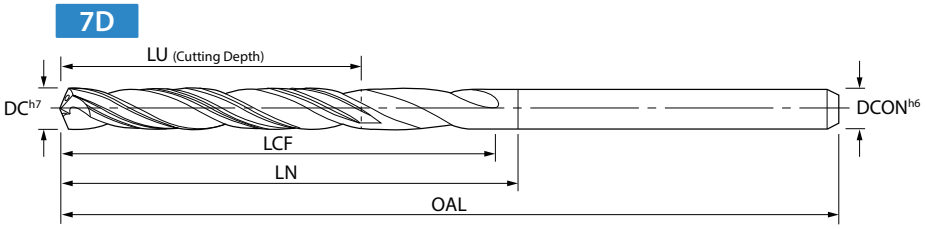
Part Number	Stock	Dimensions (mm)						Point Angle
		DC^{h7}	DCON^{h6}	OAL	*LU	LCF	LN	
865-2402AG2402	●	6.10	8.00	110.47	42.70	61.00	64.05	135°
865-2441AG2441	●	6.20	8.00	110.47	43.40	62.00	65.10	135°
865-2480AG2480	●	6.30	8.00	110.47	44.10	63.00	66.15	135°
865-2520AG2520	●	6.40	8.00	120.47	44.80	64.00	67.20	135°
865-2559AG2559	●	6.50	8.00	120.47	45.50	65.00	68.25	135°
865-2598AG2598	●	6.60	8.00	120.47	46.20	66.00	69.30	135°
865-2638AG2638	●	6.70	8.00	120.47	46.90	67.00	70.35	135°
865-2677AG2677	●	6.80	8.00	120.47	47.60	68.00	71.40	135°
865-2717AG2717	●	6.90	8.00	120.47	48.30	69.00	72.45	135°
865-2756AG2756	●	7.00	8.00	120.47	49.00	70.00	73.50	135°
865-2795AG2795	●	7.10	8.00	120.47	49.70	71.00	74.55	135°
865-2835AG2835	●	7.20	8.00	120.47	50.40	72.00	75.60	135°
865-2874AG2874	●	7.30	8.00	120.47	51.10	73.00	76.65	135°
865-2913AG2913	●	7.40	8.00	130.47	51.80	74.00	77.70	135°
865-2953AG2953	●	7.50	8.00	130.47	52.50	75.00	78.75	135°
865-2992AG2992	●	7.60	8.00	130.62	53.20	76.00	79.80	135°
865-3031AG3031	●	7.70	8.00	130.62	53.90	77.00	80.85	135°
865-3071AG3071	●	7.80	8.00	130.62	54.60	78.00	81.90	135°
865-3110AG3110	●	7.90	8.00	130.62	55.30	79.00	82.95	135°
865-3150AG3150	●	8.00	8.00	130.62	56.00	80.00	84.00	135°
865-3189AG3189	●	8.10	10.00	140.62	56.70	81.00	85.05	135°
865-3228AG3228	●	8.20	10.00	140.62	57.40	82.00	86.10	135°
865-3268AG3268	●	8.30	10.00	140.62	58.10	83.00	87.15	135°
865-3307AG3307	●	8.40	10.00	140.62	58.80	84.00	88.20	135°
865-3346AG3346	●	8.50	10.00	140.62	59.50	85.00	89.25	135°
865-3386AG3386	●	8.60	10.00	140.62	60.20	86.00	90.30	135°
865-3425AG3425	●	8.70	10.00	140.62	60.90	87.00	91.35	135°
865-3465AG3465	●	8.80	10.00	140.62	61.60	88.00	92.40	135°
865-3504AG3504	●	8.90	10.00	140.62	62.30	89.00	93.45	135°
865-3543AG3543	●	9.00	10.00	140.62	63.00	90.00	94.50	135°
865-3583AG3583	●	9.10	10.00	140.62	63.70	91.00	95.55	135°

● : Standard Item

HYDROS 7xD Deep Drills - Metric Sizes (Ø9.20mm - Ø12.00mm) NEW



Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance
9.20mm ~ 12.00mm	h7	h6



*LU dimension refers to the Max. Length of Cut (7 x DC).
If a pilot drill is needed for your application please match with ORION High Performance Drills Series 165.

Metric Drill Dimensions

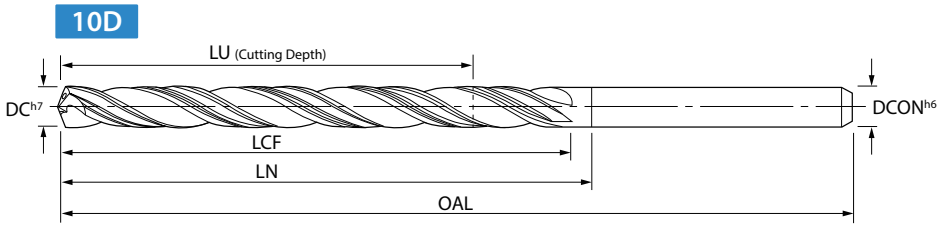
Part Number	Stock	Dimensions (mm)						Point Angle
		DC^{h7}	DCON^{h6}	OAL	*LU	LCF	LN	
865-3622AG3622	●	9.20	10.00	140.62	64.40	92.00	96.60	135°
865-3661AG3661	●	9.30	10.00	140.62	65.10	93.00	97.65	135°
865-3701AG3701	●	9.40	10.00	150.62	65.80	94.00	98.70	135°
865-3740AG3740	●	9.50	10.00	150.62	66.50	95.00	99.75	135°
865-3780AG3780	●	9.60	10.00	150.62	67.20	96.00	100.80	135°
865-3819AG3819	●	9.70	10.00	150.62	67.90	97.00	101.85	135°
865-3858AG3858	●	9.80	10.00	150.62	68.60	98.00	102.90	135°
865-3898AG3898	●	9.90	10.00	150.62	69.30	99.00	103.95	135°
865-3937AG3937	●	10.00	10.00	150.62	70.00	100.00	105.00	135°
865-3976AG3976	●	10.10	12.00	150.62	70.70	101.00	106.05	135°
865-4016AG4016	●	10.20	12.00	160.62	71.40	102.00	107.10	135°
865-4055AG4055	●	10.30	12.00	160.62	72.10	103.00	108.15	135°
865-4094AG4094	●	10.40	12.00	160.62	72.80	104.00	109.20	135°
865-4134AG4134	●	10.50	12.00	160.62	73.50	105.00	110.25	135°
865-4173AG4173	●	10.60	12.00	160.62	74.20	106.00	111.30	135°
865-4213AG4213	●	10.70	12.00	160.62	74.90	107.00	112.35	135°
865-4252AG4252	●	10.80	12.00	160.62	75.60	108.00	113.40	135°
865-4291AG4291	●	10.90	12.00	160.62	76.30	109.00	114.45	135°
865-4331AG4331	●	11.00	12.00	160.62	77.00	110.00	115.50	135°
865-4370AG4370	●	11.10	12.00	160.62	77.70	111.00	116.55	135°
865-4409AG4409	●	11.20	12.00	170.62	78.40	112.00	117.60	135°
865-4449AG4449	●	11.30	12.00	170.77	79.10	113.00	118.65	135°
865-4488AG4488	●	11.40	12.00	170.77	79.80	114.00	119.70	135°
865-4528AG4528	●	11.50	12.00	170.77	80.50	115.00	120.75	135°
865-4567AG4567	●	11.60	12.00	170.77	81.20	116.00	121.80	135°
865-4606AG4606	●	11.70	12.00	170.77	81.90	117.00	122.85	135°
865-4646AG4646	●	11.80	12.00	170.77	82.60	118.00	123.90	135°
865-4685AG4685	●	11.90	12.00	170.77	83.30	119.00	124.95	135°
865-4724AG4724	●	12.00	12.00	170.77	84.00	120.00	126.00	135°

● : Standard Item

HYDROS 10xD Deep Drills - Metric Sizes (Ø3.00mm - Ø6.00mm)



Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance
3.00mm ~ 6.00mm	h7	h6



*LU dimension refers to the Max. Length of Cut (10 x DC).
If a pilot drill is needed for your application please match with ORION High Performance Drills Series 165.

Metric Drill Dimensions

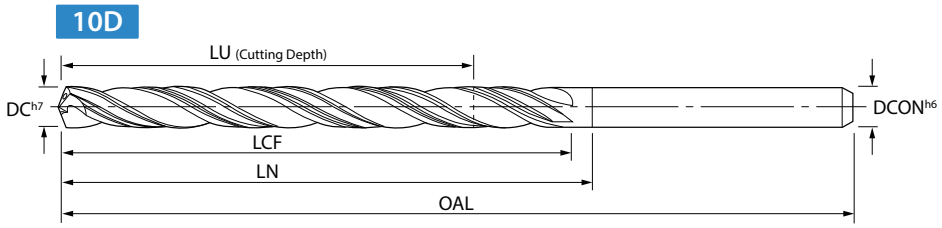
Part Number	Stock	Dimensions (mm)						Point Angle
		DC h7	DCON h6	OAL	*LU	LCF	LN	
865-1181AG1535	●	3.00	3.00	90.00	30.00	39.00	40.50	135°
865-1220AG1587	●	3.10	4.00	90.00	31.00	40.30	41.85	135°
865-1260AG1638	●	3.20	4.00	90.00	32.00	41.60	43.20	135°
865-1299AG1689	●	3.30	4.00	90.00	33.00	42.90	44.55	135°
865-1339AG1740	●	3.40	4.00	90.00	34.00	44.20	45.90	135°
865-1378AG1791	●	3.50	4.00	90.00	35.00	45.50	47.25	135°
865-1417AG1843	●	3.60	4.00	90.00	36.00	46.80	48.60	135°
865-1457AG1894	●	3.70	4.00	100.00	37.00	48.10	49.95	135°
865-1496AG1945	●	3.80	4.00	100.00	38.00	49.40	51.30	135°
865-1535AG1996	●	3.90	4.00	100.00	39.00	50.70	52.65	135°
865-1575AG2047	●	4.00	4.00	100.00	40.00	52.00	54.00	135°
865-1614AG2098	●	4.10	6.00	100.00	41.00	53.30	55.35	135°
865-1654AG2150	●	4.20	6.00	110.00	42.00	54.60	56.70	135°
865-1693AG2201	●	4.30	6.00	110.00	43.00	55.90	58.05	135°
865-1732AG2252	●	4.40	6.00	110.00	44.00	57.20	59.40	135°
865-1772AG2303	●	4.50	6.00	110.00	45.00	58.50	60.75	135°
865-1811AG2354	●	4.60	6.00	110.00	46.00	59.80	62.10	135°
865-1850AG2406	●	4.70	6.00	110.00	47.00	61.10	63.45	135°
865-1890AG2457	●	4.80	6.00	110.00	48.00	62.40	64.80	135°
865-1929AG2508	●	4.90	6.00	110.00	49.00	63.70	66.15	135°
865-1969AG2559	●	5.00	6.00	110.00	50.00	65.00	67.50	135°
865-2008AG2610	●	5.10	6.00	120.00	51.00	66.30	68.85	135°
865-2047AG2661	●	5.20	6.00	120.00	52.00	67.60	70.20	135°
865-2087AG2713	●	5.30	6.00	120.00	53.00	68.90	71.55	135°
865-2126AG2764	●	5.40	6.00	120.00	54.00	70.20	72.90	135°
865-2165AG2815	●	5.50	6.00	120.00	55.00	71.50	74.25	135°
865-2205AG2866	●	5.60	6.00	120.00	56.00	72.80	75.60	135°
865-2244AG2917	●	5.70	6.00	120.00	57.00	74.10	76.95	135°
865-2283AG2969	●	5.80	6.00	120.00	58.00	75.40	78.30	135°
865-2323AG3020	●	5.90	6.00	120.00	59.00	76.70	79.65	135°
865-2362AG3071	●	6.00	6.00	130.00	60.00	78.00	81.00	135°

● : Standard Item

HYDROS 10xD Deep Drills - Metric Sizes (Ø6.10mm - Ø9.10mm)



Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance
6.10mm ~ 9.10mm	h7	h6



*LU dimension refers to the Max. Length of Cut (10 x DC).
If a pilot drill is needed for your application please match with ORION High Performance Drills Series 165.

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)						Point Angle
		DC h7	DCON h6	OAL	*LU	LCF	LN	
865-2402AG3122	●	6.10	8.00	130.00	61.00	79.30	82.35	135°
865-2441AG3173	●	6.20	8.00	130.00	62.00	80.60	83.70	135°
865-2480AG3224	●	6.30	8.00	130.00	63.00	81.90	85.05	135°
865-2520AG3276	●	6.40	8.00	130.00	64.00	83.20	86.40	135°
865-2559AG3327	●	6.50	8.00	140.00	65.00	84.50	87.75	135°
865-2598AG3378	●	6.60	8.00	140.00	66.00	85.80	89.10	135°
865-2638AG3429	●	6.70	8.00	140.00	67.00	87.10	90.45	135°
865-2677AG3480	●	6.80	8.00	140.00	68.00	88.40	91.80	135°
865-2717AG3531	●	6.90	8.00	140.00	69.00	89.70	93.15	135°
865-2756AG3583	●	7.00	8.00	140.00	70.00	91.00	94.50	135°
865-2795AG3634	●	7.10	8.00	140.00	71.00	92.30	95.85	135°
865-2835AG3685	●	7.20	8.00	140.00	72.00	93.60	97.20	135°
865-2874AG3736	●	7.30	8.00	140.00	73.00	94.90	98.55	135°
865-2913AG3787	●	7.40	8.00	150.00	74.00	96.20	99.90	135°
865-2953AG3839	●	7.50	8.00	150.00	75.00	97.50	101.25	135°
865-2992AG3890	●	7.60	8.00	150.00	76.00	98.80	102.60	135°
865-3031AG3941	●	7.70	8.00	150.00	77.00	100.10	103.95	135°
865-3071AG3992	●	7.80	8.00	150.00	78.00	101.40	105.30	135°
865-3110AG4043	●	7.90	8.00	150.00	79.00	102.70	106.65	135°
865-3150AG4094	●	8.00	8.00	150.00	80.00	104.00	108.00	135°
865-3189AG4146	●	8.10	10.00	160.00	81.00	105.30	109.35	135°
865-3228AG4197	●	8.20	10.00	160.00	82.00	106.60	110.70	135°
865-3268AG4248	●	8.30	10.00	160.00	83.00	107.90	112.05	135°
865-3307AG4299	●	8.40	10.00	160.00	84.00	109.20	113.40	135°
865-3346AG4350	●	8.50	10.00	160.00	85.00	110.50	114.75	135°
865-3386AG4402	●	8.60	10.00	160.00	86.00	111.80	116.10	135°
865-3425AG4453	●	8.70	10.00	160.00	87.00	113.10	117.45	135°
865-3465AG4504	●	8.80	10.00	170.00	88.00	114.40	118.80	135°
865-3504AG4555	●	8.90	10.00	170.00	89.00	115.70	120.15	135°
865-3543AG4606	●	9.00	10.00	170.00	90.00	117.00	121.50	135°
865-3583AG4657	●	9.10	10.00	170.00	91.00	118.30	122.85	135°

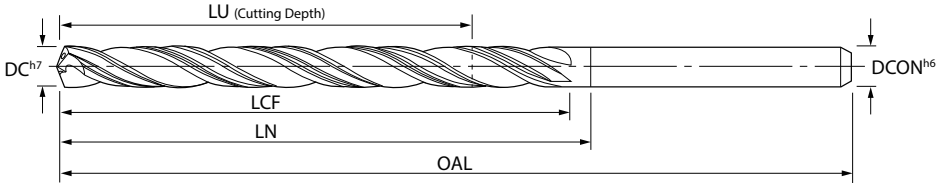
● : Standard Item

HYDROS 10xD Deep Drills - Metric Sizes (Ø9.20mm - Ø12.00mm)



Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance
9.20mm ~ 12.00mm	h7	h6

10D



*LU dimension refers to the Max. Length of Cut (10 x DC).
If a pilot drill is needed for your application please match with ORION High Performance Drills Series 165.

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)						Point Angle
		DC^{h7}	DCON^{h6}	OAL	*LU	LCF	LN	
865-3622AG4709	●	9.20	10.00	170.00	92.00	119.60	124.20	135°
865-3661AG4760	●	9.30	10.00	170.00	93.00	120.90	125.55	135°
865-3701AG4811	●	9.40	10.00	170.00	94.00	122.20	126.90	135°
865-3740AG4862	●	9.50	10.00	170.00	95.00	123.50	128.25	135°
865-3780AG4913	●	9.60	10.00	180.00	96.00	124.80	129.60	135°
865-3819AG4965	●	9.70	10.00	180.00	97.00	126.10	130.95	135°
865-3858AG5016	●	9.80	10.00	180.00	98.00	127.40	132.30	135°
865-3898AG5067	●	9.90	10.00	180.00	99.00	128.70	133.65	135°
865-3937AG5118	●	10.00	10.00	180.00	100.00	130.00	135.00	135°
865-3976AG5169	●	10.10	12.00	180.00	101.00	131.30	136.35	135°
865-4016AG5220	●	10.20	12.00	190.00	102.00	132.60	137.70	135°
865-4055AG5272	●	10.30	12.00	190.00	103.00	133.90	139.05	135°
865-4094AG5323	●	10.40	12.00	190.00	104.00	135.20	140.40	135°
865-4134AG5374	●	10.50	12.00	190.00	105.00	136.50	141.75	135°
865-4173AG5425	●	10.60	12.00	190.00	106.00	137.80	143.10	135°
865-4213AG5476	●	10.70	12.00	190.00	107.00	139.10	144.45	135°
865-4252AG5528	●	10.80	12.00	190.00	108.00	140.40	145.80	135°
865-4291AG5579	●	10.90	12.00	190.00	109.00	141.70	147.15	135°
865-4331AG5630	●	11.00	12.00	200.00	110.00	143.00	148.50	135°
865-4370AG5681	●	11.10	12.00	200.00	111.00	144.30	149.85	135°
865-4409AG5732	●	11.20	12.00	200.00	112.00	145.60	151.20	135°
865-4449AG5783	●	11.30	12.00	200.00	113.00	146.90	152.55	135°
865-4488AG5835	●	11.40	12.00	200.00	114.00	148.20	153.90	135°
865-4528AG5886	●	11.50	12.00	200.00	115.00	149.50	155.25	135°
865-4567AG5937	●	11.60	12.00	200.00	116.00	150.80	156.60	135°
865-4606AG5988	●	11.70	12.00	200.00	117.00	152.10	157.95	135°
865-4646AG6039	●	11.80	12.00	200.00	118.00	153.40	159.30	135°
865-4685AG6091	●	11.90	12.00	210.00	119.00	154.70	160.65	135°
865-4724AG6142	●	12.00	12.00	210.00	120.00	156.00	162.00	135°

● : Standard Item

Recommended Cutting Conditions

Workpiece Material	Material Hardness/Types	Recommended Cutting Speed (sfm)	Cutting Dia. DC (in)	Cutting Dia. DC (mm)	Drill Length (Cutting Depth) Feed Rate (ipr)			
					7xD HYDROS	8xD Mini	10xD HYDROS	15xD Mini
Low Carbon Steel	12L14 A36	400 - **450** - 500	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0010 - 0.0020	-	0.0006 - 0.0012
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0020 - 0.0040	0.0016 - 0.0032	0.0012 - 0.0024
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0040 - 0.0060	-	0.0032 - 0.0048	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0060 - 0.0080	-	0.0048 - 0.0064	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0080 - 0.0100	-	0.0064 - 0.0080	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0100 - 0.0120	-	0.0080 - 0.0095	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0120 - 0.0140	-	0.0095 - 0.0110	-
Mild Carbon Steel	1018 1028 1050	360 - **410** - 460	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0009 - 0.0018	-	0.0006 - 0.0012
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0018 - 0.0036	0.0015 - 0.0030	0.0012 - 0.0024
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0038 - 0.0056	-	0.0030 - 0.0045	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0056 - 0.0075	-	0.0045 - 0.0060	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0075 - 0.0095	-	0.0060 - 0.0075	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0095 - 0.0110	-	0.0075 - 0.0090	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0110 - 0.0122	-	0.0090 - 0.0105	-
Alloy Steel	4130 4140 4150 8620	260 - **310** - 360	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0008 - 0.0016	-	0.0005 - 0.0011
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0016 - 0.0034	0.0014 - 0.0027	0.0011 - 0.0022
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0035 - 0.0050	-	0.0027 - 0.0044	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0050 - 0.0070	-	0.0044 - 0.0056	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0070 - 0.0088	-	0.0056 - 0.0070	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0088 - 0.0105	-	0.0070 - 0.0084	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0105 - 0.0113	-	0.0084 - 0.0090	-
Preharden Tool Steel	4140PH A2 D2 H13 P20	190 - **240** - 290	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0005 - 0.0010	-	0.0003 - 0.0007
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0010 - 0.0020	0.0008 - 0.0016	0.0007 - 0.0014
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0020 - 0.0030	-	0.0016 - 0.0024	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0030 - 0.0040	-	0.0024 - 0.0032	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0040 - 0.0050	-	0.0032 - 0.0040	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0050 - 0.0060	-	0.0040 - 0.0048	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0060 - 0.0070	-	0.0048 - 0.0052	-
Harden Tool Steel	>48 HRc	125 - **150** - 175	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0004 - 0.0009	-	0.0003 - 0.0006
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0009 - 0.0016	0.0007 - 0.0014	0.0006 - 0.0011
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0017 - 0.0026	-	0.0014 - 0.0020	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0026 - 0.0035	-	0.0020 - 0.0028	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0035 - 0.0044	-	0.0028 - 0.0035	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0044 - 0.0053	-	0.0035 - 0.0042	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0053 - 0.0058	-	0.0042 - 0.0046	-
Stainless Steel	303 304 316 321	130 - **180** - 230	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0007 - 0.0014	-	0.0005 - 0.0010
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0014 - 0.0028	0.0012 - 0.0023	0.0010 - 0.0019
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0028 - 0.0043	-	0.0023 - 0.0035	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0043 - 0.0058	-	0.0035 - 0.0047	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0058 - 0.0073'	-	0.0047 - 0.0059	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0073 - 0.0088	-	0.0059 - 0.0070	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0088 - 0.0095	-	0.0070 - 0.0075	-
Stainless Steel	15-5PH 17-4PH 13-8 400 Series	100 - **125** - 150	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0006 - 0.0011	-	0.0004 - 0.0008
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0011 - 0.0022	0.0009 - 0.0018	0.0008 - 0.0015
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0022 - 0.0034	-	0.0018 - 0.0027	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0034 - 0.0046	-	0.0027 - 0.0037	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0046 - 0.0058	-	0.0037 - 0.0047	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0058 - 0.0070	-	0.0047 - 0.0057	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0070 - 0.0075	-	0.0057 - 0.0061	-
Gray Cast Iron	-	375 - **425** - 475	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0013 - 0.0025	-	0.0009 - 0.0018
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0025 - 0.0050	0.0020 - 0.0040	0.0018 - 0.0034
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0050 - 0.0075	-	0.0040 - 0.0063	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0075 - 0.0100	-	0.0063 - 0.0084	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0100 - 0.0120	-	0.0084 - 0.0105	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0120 - 0.0140	-	0.0105 - 0.0126	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0140 - 0.015	-	0.0126 - 0.0135	-
Nodular Cast Iron	-	310 - **360** - 410	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0010 - 0.0020	-	0.0006 - 0.0012
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0020 - 0.0030	0.0016 - 0.0032	0.0012 - 0.0024
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0040 - 0.0060	-	0.0032 - 0.0048	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0060 - 0.0080	-	0.0048 - 0.0064	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0080 - 0.0100	-	0.0064 - 0.0080	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0100 - 0.0120	-	0.0080 - 0.0095	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0120 - 0.0140	-	0.0095 - 0.0110	-

** Above recommendations are suggested starting parameters. Cutting speeds and feeds may vary according to machining application, setup, and tool runout.

PECK CYCLE: Depending on material, coolant pressure/ location, and depth of hole pecking may be needed. If needed the recommended peck depth is 1.0xDia to 3.0xDia per peck.

Recommended Cutting Conditions

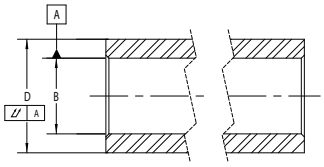
Workpiece Material	Material Hardness/Types	Recommended Cutting Speed (sfm)	Cutting Dia. DC (in)	Cutting Dia. DC (mm)	Drill Length (Cutting Depth) Feed Rate (ipr)			
					7xD HYDROS	8xD Mini	10xD HYDROS	15xD Mini
Aluminum	-	ALLOY 375 - **425** - 475 CAST 490 - **540** - 590	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0016 - 0.0032	-	0.0010 - 0.0023
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0032 - 0.0062	0.0025 - 0.0050	0.0023 - 0.0045
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0062 - 0.0090	-	0.0050 - 0.0075	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0090 - 0.0125	-	0.0075 - 0.0100	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0125 - 0.0150	-	0.0100 - 0.0125	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0150 - 0.0175	-	0.0125 - 0.0150	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0175 - 0.019	-	0.0150 - 0.0160	-
Copper Alloys	-	275 - **325** - 375	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0016 - 0.0032	-	0.0010 - 0.0023
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0032 - 0.0062	0.0025 - 0.0050	0.0023 - 0.0045
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0062 - 0.0090	-	0.0050 - 0.0075	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0090 - 0.0125	-	0.0075 - 0.0100	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0125 - 0.0150	-	0.0100 - 0.0125	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0150 - 0.0175	-	0.0125 - 0.0150	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0175 - 0.019	-	0.0150 - 0.0160	-
Heat Resistant Alloy	Hastelloy Inconel Monel Waspaloy Promet	75 - **90** - 105	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0004 - 0.0007	-	0.0002 - 0.0005
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0007 - 0.0015	0.0006 - 0.0011	0.0005 - 0.0010
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0015 - 0.0022	-	0.0011 - 0.0017	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0022 - 0.0030	-	0.0017 - 0.0023	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0030 - 0.0037	-	0.0023 - 0.0029	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0037 - 0.0044	-	0.0029 - 0.0035	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0044 - 0.0049	-	0.0035 - 0.0040	-
Titanium Alloy	-	125 - **150** - 175	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	-	0.0004 - 0.0009	-	0.0003 - 0.0006
			Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	-	0.0009 - 0.0016	0.0007 - 0.0014	0.0006 - 0.0011
			Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0017 - 0.0026	-	0.0014 - 0.0020	-
			Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0026 - 0.0035	-	0.0020 - 0.0028	-
			Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0035 - 0.0044	-	0.0028 - 0.0035	-
			Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0044 - 0.0053	-	0.0035 - 0.0042	-
			Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0053 - 0.0058	-	0.0042 - 0.0046	-

** Above recommendations are suggested starting parameters. Cutting speeds and feeds may vary according to machining application, setup, and tool runout.
PECK CYCLE: Depending on material, coolant pressure/ location, and depth of hole pecking may be needed. If needed the recommended peck depth is 1.0xDia to 3.0xDia per peck.

Case Studies

Adapter - Aerospace
17-4PH1150

Vc = 67sfm (n = 1,050rpm)
Vf = 4.2ipm
D.O.C. = 2.000"
Wet (Internal Coolant)
Ø0.244"
865-2441AG3173



Tool LIfe

HYDROS Ø0.244" — **130** pcs / tool — Tool Life 1.6x

Competitor A Ø0.244" — **80** pcs / tool

The HYDROS drill showed 1.6 times the tool life of Competitor A.

(User Evaluation)

Implant Device - Medical
17-4

Vc = 125sfm (n = 3,970rpm)
Vf = 4.76ipm
D.O.C. = 1.000"
Wet (Internal Coolant)
Ø0.118"
865-1181AG1535



Tool Life

HYDROS Ø0.118" — **180** pcs / tool — Tool Life 1.1x

Competitor B Ø0.118" — **165** pcs / tool

The HYDROS showed better wear and tool life was 1.1 times that of Competitor B.

(User Evaluation)



ICe-Carb®

High Performance Internal Coolant Drills

The design of the ICe-Carb® Series 140 was created to bring to the end user the ability to achieve high performance results with high production demands. The internal coolant design allows for better control of machining temperatures during these types of applications, while the geometry features provide effective and efficient chip creation and removal. The results of the ICe-Carb® Series 140 design are reduced cutting loads, increased operating parameters and enhanced tool life.

SERIES 140

A COOLANT THROUGH DESIGN

- promotes controlled and consistent operating temperatures
- improves coolant flow to the cut while maintaining strength
- increases tool life at increased operating parameters

B HIGH PERFORMANCE FLUTE DESIGN

- optimized open fluting
- improved surface finish through effective chip evacuation

C POLISHED Ti-NAMITE A COATING

- reduces friction between the chip and tool preventing the impediment of chip flow
- decreased machine loads associated with chip clogging
- reduced friction reduces heat and abrasion wear

D HIGH PENETRATION 140° POINT GEOMETRY

- split point geometry for improved drill penetration and accuracy
- cam relief drill point
- self centering design with high penetration capabilities

E ENGINEERED CUTTING EDGES

- precisely ground with a curvature that allows efficient chip creation and control
- controlled edge honing for longevity
- negative corner position strengthens and protects

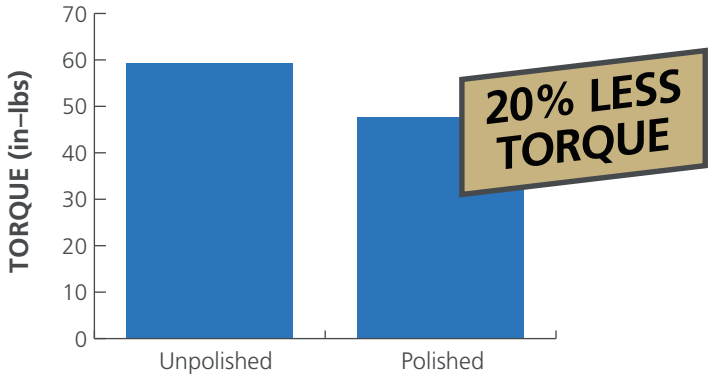
PERFORMANCE. PRECISION. PASSION.

ICe-CARB® SERIES 140 INTERNAL COOLANT DRILLS

PERFORMANCE.

The cutting edges of the ICe-Carb® Series 140 are designed to allow the tool to achieve high penetration rates, while the highly polished Ti-NAMITE A tool coating allows the chips to move smoothly along the flute and out of the cut. This helps to avoid chip clogging often associated with elevated penetration rates. Through efficient chip creation and movement, the drill operates at lower loads under identical conditions.

TORQUE COMPARISON
8620 Carbon Steel @ 175 BHN
3/8" Diameter 1.125" Deep
350 sfm / 29 ipm



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PRECISION.

The more efficient a drill can function, the more precise the results it can produce. The symmetrical grind of the cam relieved point ensures balanced pressure during cutting, while the split point design ensures fast and accurate engagement into the material. Precision must be maintained throughout the life of the drill, so the ICe-Carb® Series 140 specialized hone, strong margin design and negative corner position help to delay the wear that often causes a drill to lose precision in the cut and prematurely end tool life.

ICe-CARB® SERIES 140 VS. 2 COMPETITORS

DRILL SIZE	3/8" (.3750)
DEPTH OF HOLE	1.875"
MATERIAL	316 STAINLESS STEEL @ 140 BHN
SPEED	1430 RPM (140 sfm)
FEED	8.5 IPM (.0059 ipr)
COOLANT	8% WATER SOLUBLE @ 700 psi
MACHINE	HAAS VF-3 VMC
TYPE OF HOLE	BLIND

PASSION.

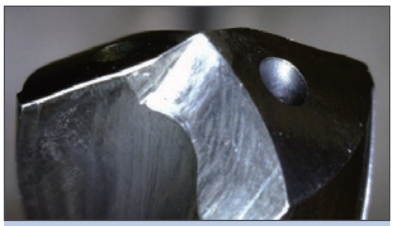
Controlling temperatures during the cutting process certainly helps to improve the operating parameters and tool life a tool is capable of achieving. All of the high performance features of the ICe-Carb® Series 140 are engineered to work together to create the most efficient total cutting performance beyond what simply having coolant through the tool can offer. The flute profile compliments the coolant through design of the ICe-Carb® Series 140 to create a strong cutting tool that effectively transports the chips being created, while the cutting edges offer a balance of strength and shear.

ACTUAL CUSTOMER TEST IN 17-4 PH STAINLESS STEEL @ 36 HRc
ICe-CARB® SERIES 140 8xD VS. COMPETITOR 1

SPEED (RPM)	1600
FEED (IPM)	9.6
HOLE DIAMETER	9.1mm (.3583)
HOLE DEPTH	3.3"
COOLANT PRESSURE	60 psi (BELOW RECOMMENDATIONS)
TYPE OF COOLANT	WATER SOLUBLE
TYPE OF MACHINE	CNC LATHE – LIVE PART

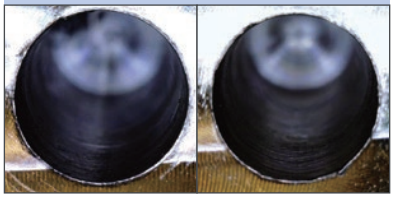
CONDITION OF DRILLS AFTER 175 HOLES

ICe-CARB® SERIES 140

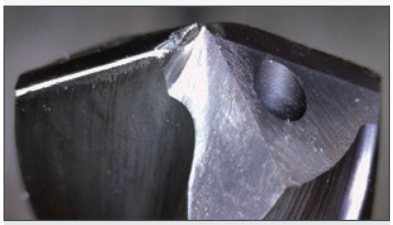


No damage found, good condition to continue using; .375" Ø throughout depth with good finish

FIRST HOLE LAST HOLE

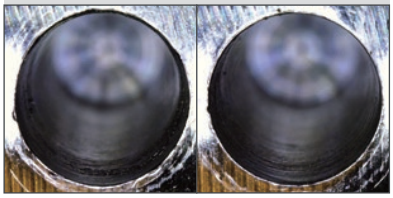


COMPETITOR 1

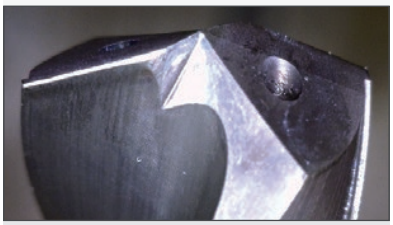


Point severely chipped with wear on margins; Coating loss below cutting lips; .375" Ø held but surface finish deteriorating

FIRST HOLE LAST HOLE

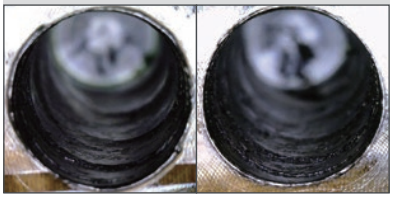


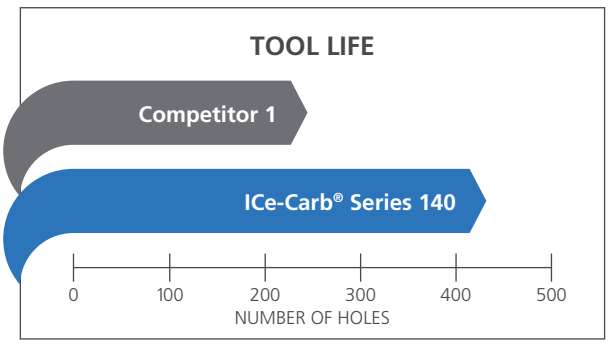
COMPETITOR 2

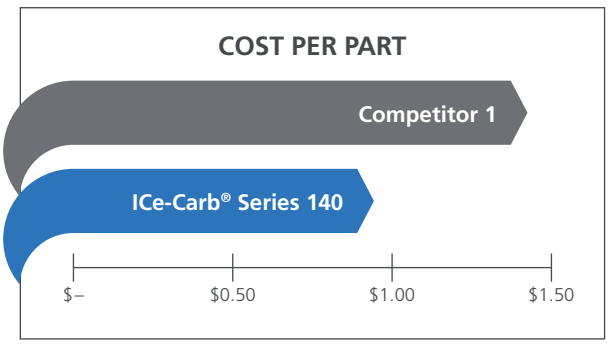


Better condition than Competitor 1 but unacceptable holes; Holes out of round, oversized to .385" Ø and tapered to .392" Ø with heavy swirl marks

FIRST HOLE LAST HOLE





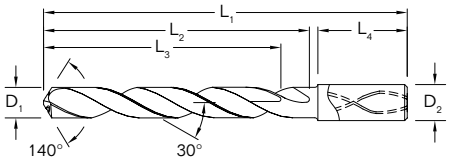


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Internal Coolant Drill

ICe-Carb | Series 140





TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
3,0 mm	0.1181			6,0	66,0	28,0	23,0	36,0	63901
3,1 mm	0.1220			6,0	66,0	28,0	23,0	36,0	63902
1/8	0.1250	3.18		6,0	66,0	28,0	23,0	36,0	51901
3,2 mm	0.1260		M3,5 X 0,35	6,0	66,0	28,0	23,0	36,0	63903
3,3 mm	0.1299		M4 X 0,7	6,0	66,0	28,0	23,0	36,0	63904
3,4 mm	0.1339			6,0	66,0	28,0	23,0	36,0	63905
#29	0.1360	3.45	8-32,8-36	6,0	66,0	28,0	23,0	36,0	51902
3,5 mm	0.1378		M4 X 0,5	6,0	66,0	28,0	23,0	36,0	63906
9/64	0.1406	3.57		6,0	66,0	28,0	23,0	36,0	51903
3,6 mm	0.1417		M4 X 0,35	6,0	66,0	28,0	23,0	36,0	63907
3,7 mm	0.1457		M4,5 X 0,75	6,0	66,0	28,0	23,0	36,0	63908
3,8 mm	0.1496		10-24	6,0	74,0	36,0	29,0	36,0	51904
3,9 mm	0.1535			6,0	74,0	36,0	29,0	36,0	63909
5/32	0.1562	3.97		6,0	74,0	36,0	29,0	36,0	51905
4,0 mm	0.1575		M4,5 X 0,5	6,0	74,0	36,0	29,0	36,0	63910
#21	0.1590	4.04	10-32	6,0	74,0	36,0	29,0	36,0	51906
4,1 mm	0.1614			6,0	74,0	36,0	29,0	36,0	63911
4,2 mm	0.1654		M5 / M5 x 0,75	6,0	74,0	36,0	29,0	36,0	63912
4,3 mm	0.1693			6,0	74,0	36,0	29,0	36,0	63913
11/64	0.1719	4.37		6,0	74,0	36,0	29,0	36,0	51907
4,4 mm	0.1732		12-24	6,0	74,0	36,0	29,0	36,0	63914
4,5 mm	0.1772		M5 X 0,5	6,0	74,0	36,0	29,0	36,0	63915
4,6 mm	0.1811		12-28	6,0	74,0	36,0	29,0	36,0	63916
4,7 mm	0.1850		12-32	6,0	74,0	36,0	29,0	36,0	63917
3/16	0.1875	4.76		6,0	82,0	44,0	35,0	36,0	51908
4,8 mm	0.1890		7/32-32	6,0	82,0	44,0	35,0	36,0	63918
4,9 mm	0.1929			6,0	82,0	44,0	35,0	36,0	63919
5,0 mm	0.1969		M6 X 1	6,0	82,0	44,0	35,0	36,0	63920
5,1 mm	0.2008		1/4-20	6,0	82,0	44,0	35,0	36,0	63900
13/64	0.2031	5.16		6,0	82,0	44,0	35,0	36,0	51910
5,2 mm	0.2047		M6 X 0,75	6,0	82,0	44,0	35,0	36,0	63921
5,3 mm	0.2087			6,0	82,0	44,0	35,0	36,0	63922
5,4 mm	0.2126			6,0	82,0	44,0	35,0	36,0	63998
5,5 mm	0.2165		M6 X 0,5	6,0	82,0	44,0	35,0	36,0	63923
7/32	0.2188	5.56	1/4-32	6,0	82,0	44,0	35,0	36,0	51912
5,6 mm	0.2205			6,0	82,0	44,0	35,0	36,0	63924
5,7 mm	0.2244			6,0	82,0	44,0	35,0	36,0	63925
5,8 mm	0.2283			6,0	82,0	44,0	35,0	36,0	63926
5,9 mm	0.2323			6,0	82,0	44,0	35,0	36,0	63927
15/64	0.2344	5.95		6,0	82,0	44,0	35,0	36,0	51913

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Common

5xD Reach

Right Spiral

Internal Coolant

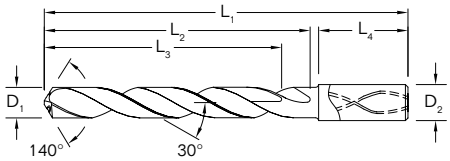
2 Flutes

TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6



Common

5xD
Reach

Right Spiral

Internal Coolant

2
Flutes

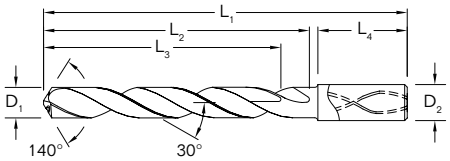
Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
6,0 mm	0.2362		M7 X 1	6,0	82,0	44,0	35,0	36,0	63928
6,1 mm	0.2402			8,0	91,0	53,0	43,0	36,0	63929
6,2 mm	0.2441		M7 X 0,75	8,0	91,0	53,0	43,0	36,0	63930
6,3 mm	0.2480			8,0	91,0	53,0	43,0	36,0	63931
1/4	0.2500	6.35		8,0	91,0	53,0	43,0	36,0	51914
6,4 mm	0.2520			8,0	91,0	53,0	43,0	36,0	63932
6,5 mm	0.2559			8,0	91,0	53,0	43,0	36,0	63933
F	0.2570	6.53	5/16-18	8,0	91,0	53,0	43,0	36,0	51915
6,6 mm	0.2598			8,0	91,0	53,0	43,0	36,0	63934
6,7 mm	0.2638			8,0	91,0	53,0	43,0	36,0	63935
17/64	0.2656	6.75	5/16-20	8,0	91,0	53,0	43,0	36,0	51916
6,8 mm	0.2677		M8 X 1,25	8,0	91,0	53,0	43,0	36,0	63936
6,9 mm	0.2717		5/16-24	8,0	91,0	53,0	43,0	36,0	63999
7,0 mm	0.2756		M8 X 1	8,0	91,0	53,0	43,0	36,0	63937
7,1 mm	0.2795			8,0	91,0	53,0	43,0	36,0	63938
9/32	0.2812	7.14	5/16-32	8,0	91,0	53,0	43,0	36,0	51918
7,2 mm	0.2835		M8 X 0,75	8,0	91,0	53,0	43,0	36,0	63939
7,3 mm	0.2874			8,0	91,0	53,0	43,0	36,0	63940
7,4 mm	0.2913			8,0	91,0	53,0	43,0	36,0	63941
7,5 mm	0.2953		M8 X 0,5	8,0	91,0	53,0	43,0	36,0	63942
19/64	0.2969	7.54		8,0	91,0	53,0	43,0	36,0	51919
7,6 mm	0.2992			8,0	91,0	53,0	43,0	36,0	63943
7,7 mm	0.3031			8,0	91,0	53,0	43,0	36,0	63944
7,8 mm	0.3071		M9 X 1,25	8,0	91,0	53,0	43,0	36,0	63945
7,9 mm	0.3110			8,0	91,0	53,0	43,0	36,0	63946
5/16	0.3125	7.94	3/8-16	8,0	91,0	53,0	43,0	36,0	51920
8,0 mm	0.3150		M9 X 1	8,0	91,0	53,0	43,0	36,0	63947
8,1 mm	0.3189			10,0	103,0	61,0	49,0	40,0	63948
8,2 mm	0.3228			10,0	103,0	61,0	49,0	40,0	63949
8,3 mm	0.3268			10,0	103,0	61,0	49,0	40,0	63950
21/64	0.3281	8.33	3/8-20	10,0	103,0	61,0	49,0	40,0	51921
8,4 mm	0.3307			10,0	103,0	61,0	49,0	40,0	63951
Q	0.3320	8.43	3/8-24	10,0	103,0	61,0	49,0	40,0	51922
8,5 mm	0.3346		M10 X 1,5	10,0	103,0	61,0	49,0	40,0	63952
8,6 mm	0.3386			10,0	103,0	61,0	49,0	40,0	63953
8,7 mm	0.3425			10,0	103,0	61,0	49,0	40,0	63954
11/32	0.3438	8.73	3/8-32	10,0	103,0	61,0	49,0	40,0	51923
8,8 mm	0.3465		M10 X 1,25	10,0	103,0	61,0	49,0	40,0	63955
8,9 mm	0.3504			10,0	103,0	61,0	49,0	40,0	63956
9,0 mm	0.3543		M10 X 1	10,0	103,0	61,0	49,0	40,0	63957

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Internal Coolant Drill

ICe-Carb | Series 140





TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
9,1 mm	0.3583			10,0	103,0	61,0	49,0	40,0	63958
23/64	0.3594	9.13		10,0	103,0	61,0	49,0	40,0	51924
9,2 mm	0.3622		M10 X 0,75	10,0	103,0	61,0	49,0	40,0	63959
9,3 mm	0.3661			10,0	103,0	61,0	49,0	40,0	63960
U	0.3680	9.35	7/16-14	10,0	103,0	61,0	49,0	40,0	51925
9,4 mm	0.3701			10,0	103,0	61,0	49,0	40,0	63961
9,5 mm	0.3740		M11 / M10 X 0,5	10,0	103,0	61,0	49,0	40,0	63962
3/8	0.3750	9.53		10,0	103,0	61,0	49,0	40,0	51926
9,6 mm	0.3780			10,0	103,0	61,0	49,0	40,0	63963
9,7 mm	0.3819			10,0	103,0	61,0	49,0	40,0	63964
9,8 mm	0.3858			10,0	103,0	61,0	49,0	40,0	63965
9,9 mm	0.3898			10,0	103,0	61,0	49,0	40,0	63966
25/64	0.3906	9.92	7/16-20	10,0	103,0	61,0	49,0	40,0	51927
10,0 mm	0.3937			10,0	103,0	61,0	49,0	40,0	63967
10,1 mm	0.3976			12,0	118,0	71,0	56,0	45,0	63968
10,2 mm	0.4016		M12 X 1,75	12,0	118,0	71,0	56,0	45,0	63969
10,3 mm	0.4055			12,0	118,0	71,0	56,0	45,0	63970
13/32	0.4062	10.32		12,0	118,0	71,0	56,0	45,0	51928
10,4 mm	0.4094			12,0	118,0	71,0	56,0	45,0	63971
10,5 mm	0.4134		M12 X 1,5	12,0	118,0	71,0	56,0	45,0	63972
10,6 mm	0.4173			12,0	118,0	71,0	56,0	45,0	63973
10,7 mm	0.4213			12,0	118,0	71,0	56,0	45,0	63974
27/64	0.4219	10.72	1/2-13	12,0	118,0	71,0	56,0	45,0	51929
10,8 mm	0.4252		M12 X 1,25	12,0	118,0	71,0	56,0	45,0	63975
10,9 mm	0.4291			12,0	118,0	71,0	56,0	45,0	63976
11,0 mm	0.4331		M12 X 1	12,0	118,0	71,0	56,0	45,0	63977
11,1 mm	0.4370			12,0	118,0	71,0	56,0	45,0	63978
7/16	0.4375	11.11	1/4-18NPT	12,0	118,0	71,0	56,0	45,0	51930
11,2 mm	0.4409			12,0	118,0	71,0	56,0	45,0	63979
11,3 mm	0.4449			12,0	118,0	71,0	56,0	45,0	63980
11,4 mm	0.4488			12,0	118,0	71,0	56,0	45,0	63981
11,5 mm	0.4528		M12 X 0,5	12,0	118,0	71,0	56,0	45,0	64000
11,6 mm	0.4567			12,0	118,0	71,0	56,0	45,0	63982
11,7 mm	0.4606			12,0	118,0	71,0	56,0	45,0	63983
11,8 mm	0.4646			12,0	118,0	71,0	56,0	45,0	63984
11,9 mm	0.4685			12,0	118,0	71,0	56,0	45,0	63985
15/32	0.4688	11.91	1/2-28	12,0	118,0	71,0	56,0	45,0	51932
12,0 mm	0.4724		M14 X 2	12,0	118,0	71,0	56,0	45,0	63986
31/64	0.4844	12.30	9/16-12	14,0	124,0	77,0	60,0	45,0	51933
12,5 mm	0.4921		M14 X 1,5	14,0	124,0	77,0	60,0	45,0	63987

Common
5xD Reach
Right Spiral
Internal Coolant
2 Flutes

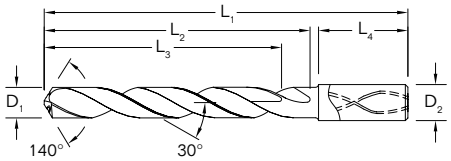
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TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6



Common

5xD
Reach

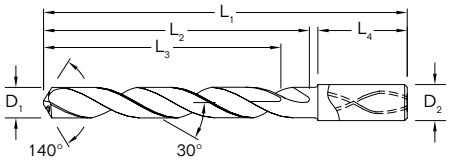
Right Spiral

Internal Coolant

2
Flutes

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
1/2	0.5000	12.70		14,0	124,0	77,0	60,0	45,0	51934
12,8 mm	0.5039		M14 X 1,25	14,0	124,0	77,0	60,0	45,0	63988
13,0 mm	0.5118		M14 X 1	14,0	124,0	77,0	60,0	45,0	63989
33/64	0.5156	13.10	9/16-18	14,0	124,0	77,0	60,0	45,0	51935
13,5 mm	0.5315		5/8-11	14,0	124,0	77,0	60,0	45,0	64001
13,8 mm	0.5433			14,0	124,0	77,0	60,0	45,0	63990
14,0 mm	0.5512		M16 X 2	14,0	124,0	77,0	60,0	45,0	63991
9/16	0.5625	14.29		16,0	133,0	83,0	63,0	48,0	51937
14,5 mm	0.5709		M16 X 1,5	16,0	133,0	83,0	63,0	48,0	63992
37/64	0.5781	14.68	5/8-18	16,0	133,0	83,0	63,0	48,0	51938
14,8 mm	0.5827			16,0	133,0	83,0	63,0	48,0	63993
15,0 mm	0.5906		M16 X 1	16,0	133,0	83,0	63,0	48,0	63994
15,5 mm	0.6102		M18 X 2,5	16,0	133,0	83,0	63,0	48,0	63995
15,8 mm	0.6220			16,0	133,0	83,0	63,0	48,0	63996
5/8	0.6250	15.88	11/16-16	16,0	133,0	83,0	63,0	48,0	51939
16,0 mm	0.6299			16,0	133,0	83,0	63,0	48,0	63997
21/32	0.6562	16.67	3/4-10	18,0	143,0	93,0	71,0	48,0	51940
11/16	0.6875	17.46	3/4-16	18,0	143,0	93,0	71,0	48,0	51941
3/4	0.7500	19.05	13/16-16	20,0	153,0	101,0	77,0	50,0	51942





TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
3,0 mm	0.1181			6,0	72,0	34,0	29,0	36,0	63575
3,1 mm	0.1220			6,0	72,0	34,0	29,0	36,0	63576
1/8	0.1250	3.18		6,0	72,0	34,0	29,0	36,0	51801
3,2 mm	0.1260		M3,5 X 0,35	6,0	72,0	34,0	29,0	36,0	63577
3,3 mm	0.1299		M4 X 0,7	6,0	72,0	34,0	29,0	36,0	63578
3,4 mm	0.1339			6,0	72,0	34,0	29,0	36,0	63579
#29	0.1360	3.45	8-32,8-36	6,0	72,0	34,0	29,0	36,0	51802
3,5 mm	0.1378		M4 X 0,5	6,0	72,0	34,0	29,0	36,0	63580
9/64	0.1406	3.57		6,0	72,0	34,0	29,0	36,0	51803
3,6 mm	0.1417		M4 X 0,35	6,0	72,0	34,0	29,0	36,0	63581
3,7 mm	0.1457		M4,5 X 0,75	6,0	72,0	34,0	29,0	36,0	63582
3,8 mm	0.1496		10-24	6,0	81,0	43,0	36,0	36,0	63583
3,9 mm	0.1535			6,0	81,0	43,0	36,0	36,0	63584
5/32	0.1562	3.97		6,0	81,0	43,0	36,0	36,0	51804
4,0 mm	0.1575		M4,5 X 0,5	6,0	81,0	43,0	36,0	36,0	63585
#21	0.1590	4.04	10-32	6,0	81,0	43,0	36,0	36,0	51805
4,1 mm	0.1614			6,0	81,0	43,0	36,0	36,0	63586
4,2 mm	0.1654		M5 / M5 X 0,75	6,0	81,0	43,0	36,0	36,0	63587
4,3 mm	0.1693			6,0	81,0	43,0	36,0	36,0	63588
11/64	0.1719	4.37		6,0	81,0	43,0	36,0	36,0	51806
4,4 mm	0.1732		12-24	6,0	81,0	43,0	36,0	36,0	63589
4,5 mm	0.1772		M5 X 0,5	6,0	81,0	43,0	36,0	36,0	63590
4,6 mm	0.1811		12-28	6,0	81,0	43,0	36,0	36,0	63591
4,7 mm	0.1850		12-32	6,0	81,0	43,0	36,0	36,0	63592
3/16	0.1875	4.76		6,0	95,0	57,0	48,0	36,0	51807
4,8 mm	0.1890		7/32-32	6,0	95,0	57,0	48,0	36,0	63593
4,9 mm	0.1929			6,0	95,0	57,0	48,0	36,0	63594
5,0 mm	0.1969		M6 X 1	6,0	95,0	57,0	48,0	36,0	63595
5,1 mm	0.2008		1/4-20	6,0	95,0	57,0	48,0	36,0	63596
13/64	0.2031	5.16		6,0	95,0	57,0	48,0	36,0	51808
5,2 mm	0.2047		M6 X 0,75	6,0	95,0	57,0	48,0	36,0	63597
5,3 mm	0.2087			6,0	95,0	57,0	48,0	36,0	63598
5,4 mm	0.2126			6,0	95,0	57,0	48,0	36,0	63599
5,5 mm	0.2165		M6 X 0,5	6,0	95,0	57,0	48,0	36,0	63600
7/32	0.2188	5.56	1/4-32	6,0	95,0	57,0	48,0	36,0	51809
5,6 mm	0.2205			6,0	95,0	57,0	48,0	36,0	63601
5,7 mm	0.2244			6,0	95,0	57,0	48,0	36,0	63602
5,8 mm	0.2283			6,0	95,0	57,0	48,0	36,0	63603
5,9 mm	0.2323			6,0	95,0	57,0	48,0	36,0	63604
15/64	0.2344	5.95		6,0	95,0	57,0	48,0	36,0	51810

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Common

8xD Reach

Right Spiral

Internal Coolant

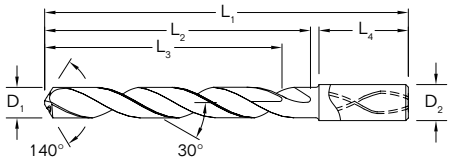
2 Flutes

TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6



Common

8xD
Reach

Right Spiral

Internal Coolant

2
Flutes

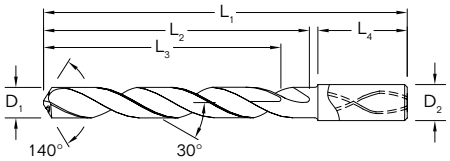
Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
6,0 mm	0.2362		M7 X 1	6,0	95,0	57,0	48,0	36,0	63605
6,1 mm	0.2402			8,0	114,0	76,0	64,0	36,0	63606
6,2 mm	0.2441		M7 X 0,75	8,0	114,0	76,0	64,0	36,0	63607
6,3 mm	0.2480			8,0	114,0	76,0	64,0	36,0	63608
1/4	0.2500	6.35		8,0	114,0	76,0	64,0	36,0	51811
6,4 mm	0.2520			8,0	114,0	76,0	64,0	36,0	63609
6,5 mm	0.2559			8,0	114,0	76,0	64,0	36,0	63610
F	0.2570	6.53	5/16-18	8,0	114,0	76,0	64,0	36,0	51812
6,6 mm	0.2598			8,0	114,0	76,0	64,0	36,0	63611
6,7 mm	0.2638			8,0	114,0	76,0	64,0	36,0	63612
17/64	0.2656	6.75	5/16-20	8,0	114,0	76,0	64,0	36,0	51813
6,8 mm	0.2677		M8 X 1,25	8,0	114,0	76,0	64,0	36,0	63613
6,9 mm	0.2717			8,0	114,0	76,0	64,0	36,0	63614
7,0 mm	0.2756		M8 X 1	8,0	114,0	76,0	64,0	36,0	63615
7,1 mm	0.2795			8,0	114,0	76,0	64,0	36,0	63616
9/32	0.2812	7.14	5/16-32	8,0	114,0	76,0	64,0	36,0	51814
7,2 mm	0.2835		M8 X 0,75	8,0	114,0	76,0	64,0	36,0	63617
7,3 mm	0.2874			8,0	114,0	76,0	64,0	36,0	63618
7,4 mm	0.2913			8,0	114,0	76,0	64,0	36,0	63619
7,5 mm	0.2953		M8 X 0,5	8,0	114,0	76,0	64,0	36,0	63620
19/64	0.2969	7.54		8,0	114,0	76,0	64,0	36,0	51815
7,6 mm	0.2992			8,0	114,0	76,0	64,0	36,0	63621
7,7 mm	0.3031			8,0	114,0	76,0	64,0	36,0	63622
7,8 mm	0.3071		M9 X 1,25	8,0	114,0	76,0	64,0	36,0	63623
7,9 mm	0.3110			8,0	114,0	76,0	64,0	36,0	63624
5/16	0.3125	7.94	3/8-16	8,0	114,0	76,0	64,0	36,0	51816
8,0 mm	0.3150		M9 X 1	8,0	114,0	76,0	64,0	36,0	63625
8,1 mm	0.3189			10,0	142,0	95,0	80,0	40,0	63626
8,2 mm	0.3228			10,0	142,0	95,0	80,0	40,0	63627
8,3 mm	0.3268			10,0	142,0	95,0	80,0	40,0	63628
21/64	0.3281	8.33	3/8-20	10,0	142,0	95,0	80,0	40,0	51817
8,4 mm	0.3307			10,0	142,0	95,0	80,0	40,0	63629
Q	0.3320	8.43	3/8-24	10,0	142,0	95,0	80,0	40,0	51818
8,5 mm	0.3346		M10 X 1,5	10,0	142,0	95,0	80,0	40,0	63630
8,6 mm	0.3386			10,0	142,0	95,0	80,0	40,0	63631
8,7 mm	0.3425			10,0	142,0	95,0	80,0	40,0	63632
11/32	0.3438	8.73	3/8-32	10,0	142,0	95,0	80,0	40,0	51819
8,8 mm	0.3465		M10 X 1,25	10,0	142,0	95,0	80,0	40,0	63633
8,9 mm	0.3504			10,0	142,0	95,0	80,0	40,0	63634
9,0 mm	0.3543		M10 X 1	10,0	142,0	95,0	80,0	40,0	63635

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Internal Coolant Drill

ICe-Carb | Series 140





TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
9,1 mm	0.3583			10,0	142,0	95,0	80,0	40,0	63636
23/64	0.3594	9.13		10,0	142,0	95,0	80,0	40,0	51820
9,2 mm	0.3622		M10 X 0,75	10,0	142,0	95,0	80,0	40,0	63637
9,3 mm	0.3661			10,0	142,0	95,0	80,0	40,0	63638
U	0.3680	9.35	7/16-14	10,0	142,0	95,0	80,0	40,0	51821
9,4 mm	0.3701			10,0	142,0	95,0	80,0	40,0	63639
9,5 mm	0.3740		M11 / M10 X 0,5	10,0	142,0	95,0	80,0	40,0	63640
3/8	0.3750	9.53		10,0	142,0	95,0	80,0	40,0	51822
9,6 mm	0.3780			10,0	142,0	95,0	80,0	40,0	63641
9,7 mm	0.3819			10,0	142,0	95,0	80,0	40,0	63642
9,8 mm	0.3858			10,0	142,0	95,0	80,0	40,0	63643
9,9 mm	0.3898			10,0	142,0	95,0	80,0	40,0	63644
25/64	0.3906	9.92	7/16-20	10,0	142,0	95,0	80,0	40,0	51823
10,0 mm	0.3937			10,0	142,0	95,0	80,0	40,0	63645
10,1 mm	0.3976			12,0	162,0	114,0	96,0	45,0	63646
10,2 mm	0.4016		M12 X 1,75	12,0	162,0	114,0	96,0	45,0	63647
10,3 mm	0.4055			12,0	162,0	114,0	96,0	45,0	63648
13/32	0.4062	10.32		12,0	162,0	114,0	96,0	45,0	51824
10,4 mm	0.4094			12,0	162,0	114,0	96,0	45,0	63649
10,5 mm	0.4134		M12 X 1,5	12,0	162,0	114,0	96,0	45,0	63650
10,6 mm	0.4173			12,0	162,0	114,0	96,0	45,0	63651
10,7 mm	0.4213			12,0	162,0	114,0	96,0	45,0	63652
27/64	0.4219	10.72	1/2-13	12,0	162,0	114,0	96,0	45,0	51825
10,8 mm	0.4252		M12 X 1,25	12,0	162,0	114,0	96,0	45,0	63653
10,9 mm	0.4291			12,0	162,0	114,0	96,0	45,0	63654
11,0 mm	0.4331		M12 X 1	12,0	162,0	114,0	96,0	45,0	63655
11,1 mm	0.4370			12,0	162,0	114,0	96,0	45,0	63656
7/16	0.4375	11.11	1/4-18NPT	12,0	162,0	114,0	96,0	45,0	51826
11,2 mm	0.4409			12,0	162,0	114,0	96,0	45,0	63657
11,3 mm	0.4449			12,0	162,0	114,0	96,0	45,0	63658
11,4 mm	0.4488			12,0	162,0	114,0	96,0	45,0	63659
11,5 mm	0.4528		M12 X 0,5	12,0	162,0	114,0	96,0	45,0	63660
11,6 mm	0.4567			12,0	162,0	114,0	96,0	45,0	63661
11,7 mm	0.4606			12,0	162,0	114,0	96,0	45,0	63662
11,8 mm	0.4646			12,0	162,0	114,0	96,0	45,0	63663
11,9 mm	0.4685			12,0	162,0	114,0	96,0	45,0	63664
15/32	0.4688	11.91	1/2-28	12,0	162,0	114,0	96,0	45,0	51827
12,0 mm	0.4724		M14 X 2	12,0	162,0	114,0	96,0	45,0	63665
31/64	0.4844	12.30	9/16-12	14,0	178,0	133,0	112,0	45,0	51828
12,5 mm	0.4921		M14 X 1,5	14,0	178,0	133,0	112,0	45,0	63666

Common

8xD
Reach

Right Spiral

Internal Coolant

2
Flutes

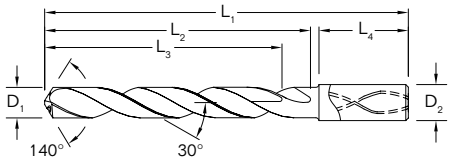
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TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6



Common

8xD
Reach

Right Spiral

Internal Coolant

2
Flutes

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
1/2	0.5000	12.70		14,0	178,0	133,0	112,0	45,0	51829
12,8 mm	0.5039		M14 X 1,25	14,0	178,0	133,0	112,0	45,0	63667
13,0 mm	0.5118		M14 X 1	14,0	178,0	133,0	112,0	45,0	63668
33/64	0.5156	13.10	9/16-18	14,0	178,0	133,0	112,0	45,0	51830
13,5 mm	0.5315		5/8-11	14,0	178,0	133,0	112,0	45,0	63669
13,8 mm	0.5433			14,0	178,0	133,0	112,0	45,0	63670
14,0 mm	0.5512		M16 X 2	14,0	178,0	133,0	112,0	45,0	63671
9/16	0.5625	14.29		16,0	203,0	152,0	128,0	48,0	51831
14,5 mm	0.5709		M16 X 1,5	16,0	203,0	152,0	128,0	48,0	63672
37/64	0.5781	14.68	5/8-18	16,0	203,0	152,0	128,0	48,0	51832
14,8 mm	0.5827			16,0	203,0	152,0	128,0	48,0	63673
15,0 mm	0.5906		M16 X 1	16,0	203,0	152,0	128,0	48,0	63674
15,5 mm	0.6102		M18 X 2,5	16,0	203,0	152,0	128,0	48,0	63675
15,8 mm	0.6220			16,0	203,0	152,0	128,0	48,0	63676
5/8	0.6250	15.88	11/16-16	16,0	203,0	152,0	128,0	48,0	51833
16,0 mm	0.6299			16,0	203,0	152,0	128,0	48,0	63677
21/32	0.6562	16.67	3/4-10	18,0	222,0	171,0	144,0	48,0	51834
11/16	0.6875	17.46	3/4-16	18,0	222,0	171,0	144,0	48,0	51835
3/4	0.7500	19.05	13/16-16	20,0	243,0	190,0	160,0	50,0	51836



	Series 140M 5D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	14	16
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	130	RPM	13733	6867	5150	4120	3433	2943	2575
			(104-155)	Fr	0.095	0.189	0.252	0.316	0.379	0.442	0.505
				Feed (mm/min)	1300	1300	1300	1300	1300	1300	1300
		≤ 275 Bhn or ≤ 28 HRc	116	RPM	12279	6140	4605	3684	3070	2631	2302
			(93-139)	Fr	0.086	0.171	0.228	0.285	0.342	0.399	0.456
				Feed (mm/min)	1050	1050	1050	1050	1050	1050	1050
		≤ 425 Bhn or ≤ 45 HRc	67	RPM	7109	3555	2666	2133	1777	1523	1333
			(54-80)	Fr	0.071	0.142	0.189	0.237	0.284	0.332	0.379
				Feed (mm/min)	505	505	505	505	505	505	505
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	101	RPM	10664	5332	3999	3199	2666	2285	1999
			(80-121)	Fr	0.071	0.143	0.190	0.238	0.285	0.333	0.380
				Feed (mm/min)	760	760	760	760	760	760	760
		≤ 375 Bhn or ≤ 40 HRc	61	RPM	6463	3231	2424	1939	1616	1385	1212
			(49-73)	Fr	0.062	0.124	0.165	0.206	0.248	0.289	0.330
				Feed (mm/min)	400	400	400	400	400	400	400
		≤ 450 Bhn or ≤ 48 HRc	43	RPM	4524	2262	1696	1357	1131	969	848
			(34-51)	Fr	0.043	0.086	0.115	0.144	0.172	0.201	0.230
				Feed (mm/min)	195	195	195	195	195	195	195
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 200 Bhn or ≤ 13 HRc	44	RPM	4686	2343	1757	1406	1171	1004	879
			(35-53)	Fr	0.061	0.122	0.162	0.203	0.243	0.284	0.324
				Feed (mm/min)	285	285	285	285	285	285	285
		≤ 375 Bhn or ≤ 40 HRc	29	RPM	3070	1535	1151	921	767	658	576
			(23-35)	Fr	0.029	0.059	0.078	0.098	0.117	0.137	0.156
				Feed (mm/min)	90	90	90	90	90	90	90
		≤ 475 Bhn or ≤ 50 HRc	26	RPM	2747	1373	1030	824	687	589	515
			(21-31)	Fr	0.018	0.036	0.049	0.061	0.073	0.085	0.097
				Feed (mm/min)	50	50	50	50	50	50	50
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	110	RPM	11633	5816	4362	3490	2908	2493	2181
			(88-132)	Fr	0.109	0.218	0.291	0.364	0.437	0.509	0.582
				Feed (mm/min)	1270	1270	1270	1270	1270	1270	1270
		≤ 260 Bhn or ≤ 26 HRc	102	RPM	10825	5413	4059	3248	2706	2320	2030
			(82-123)	Fr	0.109	0.218	0.291	0.363	0.436	0.509	0.581
				Feed (mm/min)	1180	1180	1180	1180	1180	1180	1180
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 185 Bhn or ≤ 9 HRc	93	RPM	9856	4928	3696	2957	2464	2112	1848
			(74-112)	Fr	0.061	0.123	0.164	0.205	0.246	0.286	0.327
				Feed (mm/min)	605	605	605	605	605	605	605
		≤ 275 Bhn or ≤ 28 HRc	59	RPM	6301	3151	2363	1890	1575	1350	1181
			(48-71)	Fr	0.048	0.095	0.127	0.159	0.190	0.222	0.254
				Feed (mm/min)	300	300	300	300	300	300	300
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc	46	RPM	4847	2424	1818	1454	1212	1039	909
			(37-55)	Fr	0.047	0.095	0.127	0.158	0.190	0.221	0.253
				Feed (mm/min)	230	230	230	230	230	230	230
		≤ 375 Bhn or ≤ 40 HRc	34	RPM	3555	1777	1333	1066	889	762	666
			(27-40)	Fr	0.042	0.084	0.113	0.141	0.169	0.197	0.225
				Feed (mm/min)	150	150	150	150	150	150	150

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	Series 140M 5D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	14	16
S	**SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy**	≤ 300 Bhn or ≤ 32 HRc	29	RPM	3070	1535	1151	921	767	658	576
			(23-35)	Fr	0.020	0.039	0.052	0.065	0.078	0.091	0.104
				Feed (mm/min)	60	60	60	60	60	60	60
		≤ 400 Bhn or ≤ 43 HRc	15	RPM	1616	808	606	485	404	346	303
			(12-18)	Fr	0.015	0.031	0.041	0.052	0.062	0.072	0.083
				Feed (mm/min)	25	25	25	25	25	25	25
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	66	RPM	6947	3474	2605	2084	1737	1489	1303
			(52-79)	Fr	0.040	0.079	0.106	0.132	0.158	0.185	0.211
				Feed (mm/min)	275	275	275	275	275	275	275
		≤ 350 Bhn or ≤ 38 HRc	49	RPM	5170	2585	1939	1551	1293	1108	969
			(39-59)	Fr	0.039	0.077	0.103	0.129	0.155	0.181	0.206
				Feed (mm/min)	200	200	200	200	200	200	200
		≤ 440 Bhn or ≤ 47 HRc	26	RPM	2747	1373	1030	824	687	589	515
			(21-31)	Fr	0.029	0.058	0.078	0.097	0.117	0.136	0.155
				Feed (mm/min)	80	80	80	80	80	80	80
N	**ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075**	≤ 80 Bhn or ≤ 47 HRb	235	RPM	24882	12441	9331	7465	6220	5332	4665
			(188-282)	Fr	0.118	0.237	0.316	0.395	0.473	0.552	0.631
				Feed (mm/min)	2945	2945	2945	2945	2945	2945	2945
		≤ 150 Bhn or ≤ 7 HRc	201	RPM	21327	10664	7998	6398	5332	4570	3999
			(161-241)	Fr	0.119	0.238	0.318	0.397	0.476	0.556	0.635
				Feed (mm/min)	2540	2540	2540	2540	2540	2540	2540
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	168	RPM	17773	8886	6665	5332	4443	3808	3332
			(134-201)	Fr	0.048	0.096	0.128	0.159	0.191	0.223	0.255
				Feed (mm/min)	850	850	850	850	850	850	850
		≤ 200 Bhn or ≤ 23 HRc	134	RPM	14218	7109	5332	4265	3555	3047	2666
			(107-161)	Fr	0.048	0.096	0.128	0.161	0.193	0.225	0.257
				Feed (mm/min)	685	685	685	685	685	685	685

Note:

- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (Vc x 1000) / (D_1 x 3.14)
- mm/min = Fr x RPM
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



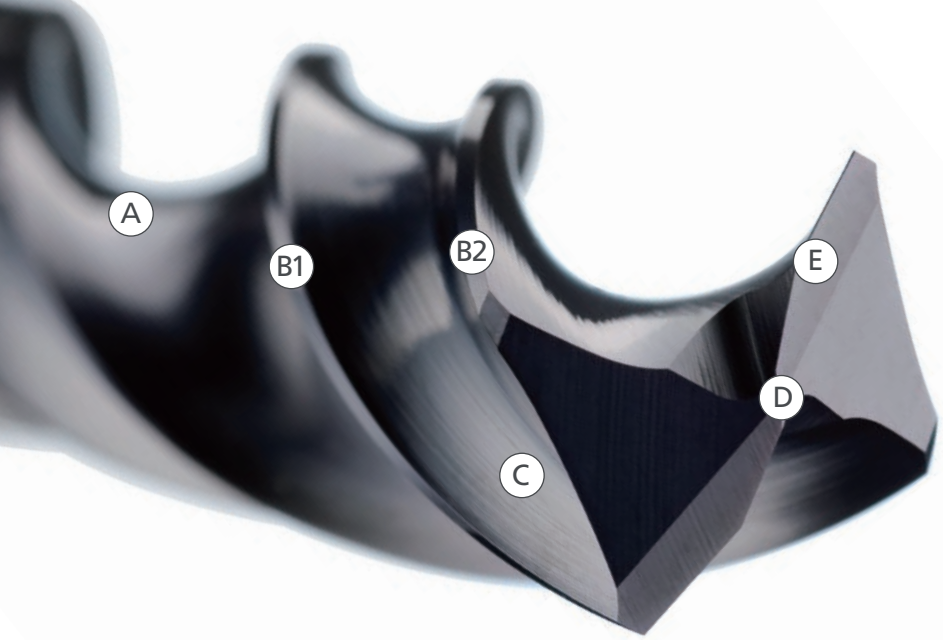
	Series 140M 8D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	14	16
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	123	RPM	13087	6544	4908	3926	3272	2804	2454
			(100-170)	Fr	0.085	0.171	0.228	0.285	0.342	0.399	0.455
				Feed (mm/min)	1118	1118	1118	1118	1118	1118	1118
		≤ 275 Bhn or ≤ 28 HRc	113	RPM	11956	5978	4484	3587	2989	2562	2242
			(90-135)	Fr	0.072	0.144	0.193	0.241	0.289	0.337	0.385
				Feed (mm/min)	864	864	864	864	864	864	864
		≤ 425 Bhn or ≤ 45 HRc	64	RPM	6786	3393	2545	2036	1696	1454	1272
			(51-77)	Fr	0.062	0.124	0.165	0.206	0.247	0.288	0.329
				Feed (mm/min)	419	419	419	419	419	419	419
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	98	RPM	10340	5170	3878	3102	2585	2216	1939
			(78-117)	Fr	0.061	0.123	0.164	0.205	0.246	0.287	0.328
				Feed (mm/min)	635	635	635	635	635	635	635
		≤ 375 Bhn or ≤ 40 HRc	58	RPM	6140	3070	2302	1842	1535	1316	1151
			(46-69)	Fr	0.048	0.095	0.127	0.159	0.190	0.222	0.254
				Feed (mm/min)	292	292	292	292	292	292	292
		≤ 450 Bhn or ≤ 48 HRc	41	RPM	4362	2181	1636	1309	1091	935	818
			(33-49)	Fr	0.038	0.076	0.101	0.126	0.151	0.177	0.202
				Feed (mm/min)	165	165	165	165	165	165	165
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 200 Bhn or ≤ 13 HRc	43	RPM	4524	2262	1696	1357	1131	969	848
			(34-51)	Fr	0.048	0.095	0.127	0.159	0.191	0.223	0.255
				Feed (mm/min)	216	216	216	216	216	216	216
		≤ 375 Bhn or ≤ 40 HRc	27	RPM	2908	1454	1091	872	727	623	545
			(22-33)	Fr	0.026	0.052	0.070	0.087	0.105	0.122	0.140
				Feed (mm/min)	76	76	76	76	76	76	76
		≤ 475 Bhn or ≤ 50 HRc	24	RPM	2585	1293	969	776	646	554	485
			(20-29)	Fr	0.015	0.029	0.039	0.049	0.059	0.069	0.079
				Feed (mm/min)	38	38	38	38	38	38	38
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	107	RPM	11310	5655	4241	3393	2827	2424	2121
			(85-128)	Fr	0.090	0.180	0.240	0.299	0.359	0.419	0.479
				Feed (mm/min)	1016	1016	1016	1016	1016	1016	1016
		≤ 260 Bhn or ≤ 26 HRc	94	RPM	10017	5009	3756	3005	2504	2147	1878
			(76-113)	Fr	0.094	0.188	0.250	0.313	0.375	0.438	0.500
				Feed (mm/min)	940	940	940	940	940	940	940
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 185 Bhn or ≤ 9 HRc	88	RPM	9371	4686	3514	2811	2343	2008	1757
			(71-106)	Fr	0.047	0.095	0.126	0.158	0.190	0.221	0.253
				Feed (mm/min)	445	445	445	445	445	445	445
		≤ 275 Bhn or ≤ 28 HRc	55	RPM	5816	2908	2181	1745	1454	1246	1091
			(44-66)	Fr	0.044	0.087	0.116	0.146	0.175	0.204	0.233
				Feed (mm/min)	254	254	254	254	254	254	254
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc	40	RPM	4201	2100	1575	1260	1050	900	788
			(32-48)	Fr	0.042	0.085	0.113	0.141	0.169	0.198	0.226
				Feed (mm/min)	178	178	178	178	178	178	178
		≤ 375 Bhn or ≤ 40 HRc	29	RPM	3070	1535	1151	921	767	658	576
			(23-35)	Fr	0.037	0.074	0.099	0.124	0.149	0.174	0.199
				Feed (mm/min)	114	114	114	114	114	114	114

(continued on next page)



	Series 140M 8D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	14	16
S	**SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy**	≤ 300 Bhn or ≤ 32 HRc	20	RPM	2100	1050	788	630	525	450	394
			(16-24)	Fr	0.021	0.041	0.055	0.069	0.082	0.096	0.110
				Feed (mm/min)	43	43	43	43	43	43	43
		≤ 400 Bhn or ≤ 43 HRc	11	RPM	1131	565	424	339	283	242	212
			(9-13)	Fr	0.013	0.027	0.036	0.045	0.054	0.063	0.072
				Feed (mm/min)	15	15	15	15	15	15	15
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	56	RPM	5978	2989	2242	1793	1495	1281	1121
			(45-68)	Fr	0.038	0.076	0.102	0.127	0.153	0.178	0.204
				Feed (mm/min)	229	229	229	229	229	229	229
		≤ 350 Bhn or ≤ 38 HRc	43	RPM	4524	2262	1696	1357	1131	969	848
			(34-51)	Fr	0.028	0.056	0.075	0.094	0.112	0.131	0.150
				Feed (mm/min)	127	127	127	127	127	127	127
		≤ 440 Bhn or ≤ 47 HRc	23	RPM	2424	1212	909	727	606	519	454
			(18-27)	Fr	0.024	0.048	0.064	0.080	0.096	0.112	0.129
				Feed (mm/min)	58	58	58	58	58	58	58
N	**ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075**	≤ 80 Bhn or ≤ 47 HRb	223	RPM	23589	11795	8846	7077	5897	5055	4423
			(178-267)	Fr	0.108	0.215	0.287	0.359	0.431	0.502	0.574
				Feed (mm/min)	2540	2540	2540	2540	2540	2540	2540
		≤ 150 Bhn or ≤ 7 HRc	194	RPM	20519	10260	7695	6156	5130	4397	3847
			(155-232)	Fr	0.111	0.223	0.297	0.371	0.446	0.520	0.594
				Feed (mm/min)	2286	2286	2286	2286	2286	2286	2286
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	78	RPM	8240	4120	3090	2472	2060	1766	1545
			(62-93)	Fr	0.043	0.086	0.115	0.144	0.173	0.201	0.230
				Feed (mm/min)	356	356	356	356	356	356	356
		≤ 200 Bhn or ≤ 23 HRc	72	RPM	7594	3797	2848	2278	1898	1627	1424
			(57-86)	Fr	0.043	0.087	0.116	0.145	0.174	0.203	0.232
				Feed (mm/min)	330	330	330	330	330	330	330

Note:
- Bhn (BrineII) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (Vc x 1000) / (D_1 x 3.14)
- mm/min = Fr x RPM
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



SERIES 135

HIGH PERFORMANCE CARBIDE DRILLS

The key features designed into the Hi-PerCarb Series 135 Drill allow the product to offer application benefits not only beyond that of standard carbide drills, but also other High Performance drills. Each feature of the Hi-PerCarb Series 135 Drill was uniquely engineered as a solution towards addressing the issues commonly encountered during high production drilling.

(A) HIGH PERFORMANCE FLUTE DESIGN
- efficiently transports chips
- increases strength for aggressive drilling

Ti-NAMITE A COATING
- improves resistance to heat and wear
- enhances tool life

(B1) (B2) DOUBLE MARGIN DESIGN
- improves accuracy and surface finish
- increases stability and rigidity

(C) SECONDARY FLUTE
- improves coolant flow to point
- reduces friction along drill body
- assists in fine swarf evacuation

(D) SPECIALIZED 145° NOTCHED POINT
- self centering eliminates need for spot drill
- improves chip control
- decreases drill thrust and deflection

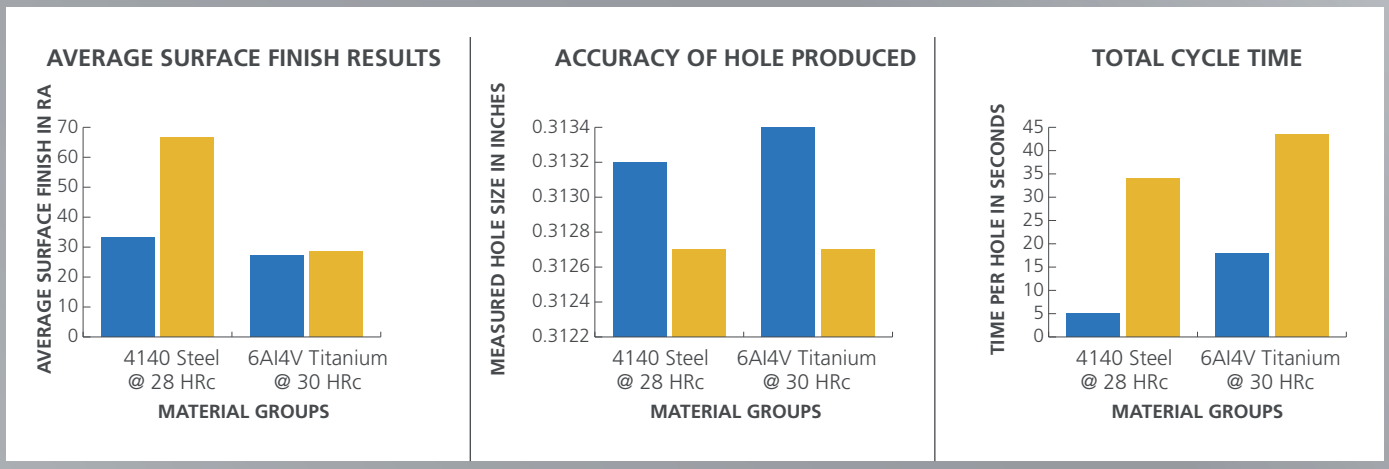
(E) ENGINEERED EDGE PROTECTION
- improves edge strength
- reduces edge fatigue
- allows increased feed rates

PERFORMANCE. PRECISION. PASSION.

HI-PER CARB SERIES 135 DRILLS

PERFORMANCE.

MACHINING ENVIRONMENT:
Haas VM-3 with 9% Water Soluble Oil Flood Coolant
5/16" (.3125) diameter hole:
4140 application – .650" deep
6Al-4V application – 1.125" deep



HI-PERCARB SERIES 135 SOLID CARBIDE DRILL AND REAMER

The second margin gives the Hi-PerCarb Series 135 Drill a burnishing effect and the flute form effectively controls and transports chips allowing the drill to offer superior surface finishes and hole size in high production environments saving cycle time by often avoiding the need for reaming in many applications.

www.kyocera-sgstool.com

PRECISION.

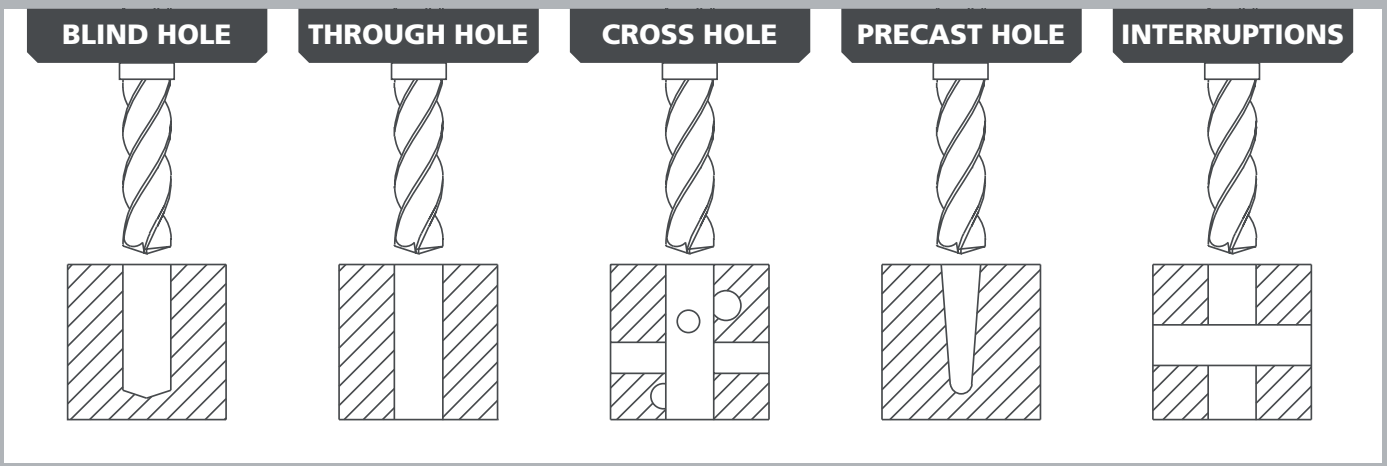
The stability of the double margin design and penetration capability of the point geometry allow the Hi-PerCarb Series 135 Drill to address demanding applications that would normally require reduced operating parameters or a two step process.

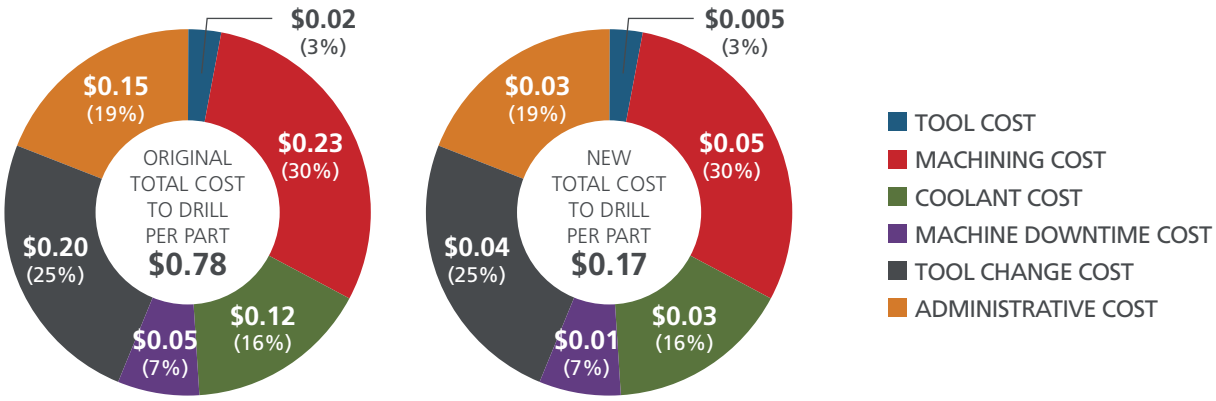
PASSION.

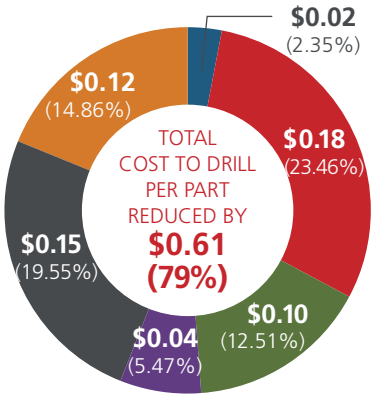
The secondary flute provides a channel for cooling capabilities normally not found in external coolant drills, this combined with the Ti-NAMITE A tool coating and the high strength edge design results in increased operating parameters with additional tool life.

ACTUAL CUSTOMER APPLICATION USING A 6MM DRILL IN 17-4 PH STAINLESS STEEL

	COMPETITOR	HI-PERCARB SERIES 135
NUMBER OF PARTS TO PRODUCE	50000	50000
SURFACE FEET PER MINUTE (SFM)	74	124
SPEED IN REVOLUTIONS PER MINUTE (RPM)	1200	2000
FEED IN INCHES PER MINUTE (IPM)	3.6	10
NUMBER OF PARTS PRODUCED PER TOOL	140	500
DEPTH OF HOLE	0.6800	0.6800
NUMBER OF NEW TOOLS REQUIRED TO COMPLETE JOB	358	100
TOTAL HOURS OF MACHINING TIME	157	57
TOTAL MACHINING COST	$10,231.48	$3,683.33
TOOL CHANGE COST	$1,939.17	$541.67
TOTAL COST	$39,017.07	$8,460.00
COST PER PART	$0.78	$0.17
MATERIAL REMOVAL RATE (IN^3 / MIN) – DRILLING	0.16	0.44
CUTTING TIME PER PART – MINUTES	0.19	0.07
SAVINGS PER PART – DOLLARS	0	$0.61
TOTAL COST SAVINGS / JOB – PERCENTAGE	0	78.32%
TOTAL COST SAVINGS / JOB – DOLLARS	0	$30,557.07







TOOL COST REDUCED BY

MACHINING COST REDUCED BY

COOLANT COST REDUCED BY

MACHINE DOWNTIME COST REDUCED BY

TOOL CHANGE COST REDUCED BY

ADMINISTRATIVE COST REDUCED BY

Using 100 tools per job compared to 358 means less inventory and fewer purchase orders to issue resulting in improved administrative cost and reduced tooling cost per job.

Increasing the feed by 278% has decreased the total hours of machine time by 100 hours gaining manufacturing capacity; this factored with the hourly shop rate has resulted in the largest portion of the savings.

With a tool life of 500 parts compared to 140 parts or a 357% improvement in tool life equates to less time dedicated to changing tools to keep the job running.

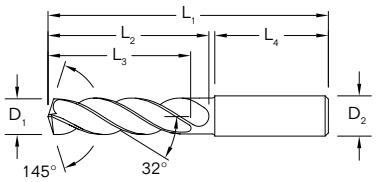
Increasing the material removal rate by .28 cubic inches or 275% requires less time in the cut and a reduced use of coolant.

www.kyocera-sgstool.com

Hi Performance Drill

Hi-PerCarb | Series 135

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS



TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6
> 18 - 30	+0,008/+0,029	h6

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
1/64	0.0156	0.40		1/8	1-1/2	1/8	5/64	1	51752*
1/32	0.0312	0.79		1/8	1-1/2	1/4	3/16	1	51269*
3/64	0.0469	1.19	1/16-64	1/8	1-1/2	3/8	5/16	1	51270*
1,25 mm	0.0492			3,0	38,0	9,5	8,0	25,0	64500*
1,45 mm	0.0571			3,0	38,0	9,5	8,0	25,0	64501*
#53	0.0595	1.51		1/8	1-1/2	3/8	5/16	1	64502*
1/16	0.0625	1.59	5/64-60	1/8	2	7/16	3/8	1-1/4	51271*
1,6 mm	0.0630			3,0	50,0	11,0	9,0	32,0	64503*
1,75 mm	0.0689			3,0	50,0	11,0	9,0	32,0	64504*
#50	0.0700	1.78		1/8	2	7/16	3/8	1-1/4	64505*
5/64	0.0781	1.98		1/8	2	1/2	7/16	1-1/4	51272*
#47	0.0785	1.99		1/8	2	1/2	7/16	1-1/4	64506*
2,05 mm	0.0807			3,0	50,0	12,0	11,0	32,0	64507*
#46	0.0810	2.06		1/8	2	1/2	7/16	1-1/4	64508*
#43	0.0890	2.26		1/8	2	1/2	7/16	1-1/4	64509*
#42	0.0935	2.37		1/8	2	1/2	7/16	1-1/4	64510*
3/32	0.0938	2.38	1/8-32	1/8	2	1/2	7/16	1-1/4	51273
#40	0.0980	2.49		1/8	2	9/16	1/2	1-1/4	51274
2,5 mm	0.0984			3,0	50,0	14,0	12,0	32,0	64511
#39	0.0995	2.53		1/8	2	9/16	1/2	1-1/4	51753
#38	0.1015	2.58	5-40	1/8	2	9/16	1/2	1-1/4	51754
#37	0.1040	2.64	5-44	1/8	2	9/16	1/2	1-1/4	51755
#36	0.1065	2.71	6-32	1/8	2	9/16	1/2	1-1/4	51756
7/64	0.1094	2.78		1/8	2	5/8	9/16	1-1/4	51275
#35	0.1100	2.79		1/8	2	5/8	9/16	1-1/4	51276
#34	0.1110	2.82		1/8	2	5/8	9/16	1-1/4	51277
#33	0.1130	2.87	6-40	1/8	2	5/8	9/16	1-1/4	51757
2,9 mm	0.1142			3,0	50,0	16,0	14,0	32,0	64512
#32	0.1160	2.95		1/8	2	5/8	9/16	1-1/4	51758
3,0 mm	0.1181			6,0	62,0	20,0	17,0	36,0	63155
#31	0.1200	3.05		1/8	2	5/8	9/16	1-1/4	51759
3,1 mm	0.1220			6,0	62,0	20,0	17,0	36,0	63741
1/8	0.1250	3.18		1/4	2-1/2	3/4	21/32	1-7/16	51330
3,2 mm	0.1260		M3,5 X 0,35	6,0	62,0	20,0	17,0	36,0	63156
#30	0.1285	3.26		1/4	2-1/2	3/4	21/32	1-7/16	51278
3,3 mm	0.1299		M4 X 0,7	6,0	62,0	20,0	17,0	36,0	63157
3,4 mm	0.1339			6,0	62,0	20,0	17,0	36,0	63158
#29	0.1360	3.45	8-32,8-36	1/4	2-1/2	3/4	21/32	1-7/16	51331
3,5 mm	0.1378		M4 X 0,5	6,0	62,0	20,0	17,0	36,0	63159
#28	0.1405	3.57	8-40	1/4	2-1/2	3/4	21/32	1-7/16	51760
9/64	0.1406	3.57		1/4	2-1/2	3/4	21/32	1-7/16	51332
3,6 mm	0.1417		M4 X 0,35	6,0	62,0	20,0	17,0	36,0	63160

*Single Margin

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Common
3xD Reach
Right Spiral
External Coolant
2 Flutes

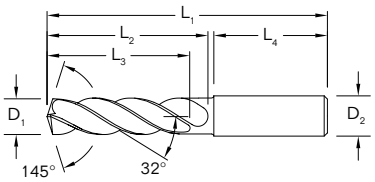
HI-PER CARB®
HIGH PERFORMANCE CARBIDE DRILLS

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Common

3xD Reach

Right Spiral

External Coolant

2 Flutes

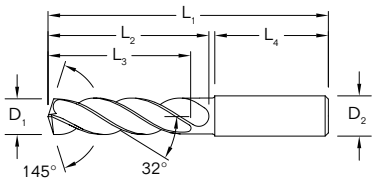
Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
#27	0.1440	3.66		1/4	2-1/2	3/4	21/32	1-7/16	51761
3,7 mm	0.1457		M4.5 X 0,75	6,0	62,0	20,0	17,0	36,0	63161
#26	0.1470	3.73	3/16-24	1/4	2-1/2	3/4	21/32	1-7/16	51762
#25	0.1495	3.80	10-24	1/4	2-5/8	7/8	23/32	1-7/16	51333
3,8 mm	0.1496			6,0	66,0	24,0	21,0	36,0	63742
#24	0.1520	3.86	10-28	1/4	2-5/8	7/8	23/32	1-7/16	51763
3,9 mm	0.1535			6,0	66,0	24,0	21,0	36,0	63743
#23	0.1540	3.91		1/4	2-5/8	7/8	23/32	1-7/16	51764
5/32	0.1562	3.97		1/4	2-5/8	7/8	23/32	1-7/16	51334
#22	0.1570	3.99	10-30	1/4	2-5/8	7/8	23/32	1-7/16	51765
4,0 mm	0.1575		M4,5 X 0,5	6,0	66,0	24,0	21,0	36,0	63162
#21	0.1590	4.04	10-32	1/4	2-5/8	7/8	23/32	1-7/16	51335
#20	0.1610	4.09	13/64-24	1/4	2-5/8	7/8	23/32	1-7/16	51279
4,1 mm	0.1614			6,0	66,0	24,0	21,0	36,0	63744
4,2 mm	0.1654		M5 / M5 X 0,75	6,0	66,0	24,0	21,0	36,0	63163
#19	0.1660	4.22		1/4	2-5/8	7/8	23/32	1-7/16	51766
4,3 mm	0.1693			6,0	66,0	24,0	21,0	36,0	63164
#18	0.1695	4.31		1/4	2-5/8	7/8	23/32	1-7/16	51767
11/64	0.1719	4.37		1/4	2-5/8	7/8	23/32	1-7/16	51336
#17	0.1730	4.39		1/4	2-5/8	7/8	23/32	1-7/16	51768
4,4 mm	0.1732			6,0	66,0	24,0	21,0	36,0	63745
#16	0.1770	4.50	12-24	1/4	2-5/8	7/8	23/32	1-7/16	51769
4,5 mm	0.1772		M5 X 0,5	6,0	66,0	24,0	21,0	36,0	63165
#15	0.1800	4.57		1/4	2-5/8	7/8	23/32	1-7/16	51770
4,6 mm	0.1811		12-28	6,0	66,0	24,0	21,0	36,0	63166
#14	0.1820	4.62		1/4	2-5/8	7/8	23/32	1-7/16	51771
#13	0.1850	4.70	12-32	1/4	2-5/8	7/8	23/32	1-7/16	51772
4,7 mm	0.1850			6,0	66,0	24,0	21,0	36,0	63746
3/16	0.1875	4.76		1/4	2-5/8	1	53/64	1-7/16	51337
#12	0.1890	4.80	7/32-32	1/4	2-5/8	1	53/64	1-7/16	51773
4,8 mm	0.1890			6,0	66,0	28,0	24,0	36,0	63167
#11	0.1910	4.85		1/4	2-5/8	1	53/64	1-7/16	51774
4,9 mm	0.1929			6,0	66,0	28,0	24,0	36,0	63747
#10	0.1935	4.91	14-20	1/4	2-5/8	1	53/64	1-7/16	51775
#9	0.1960	4.98		1/4	2-5/8	1	53/64	1-7/16	51776
5,0 mm	0.1969		M6 X 1	6,0	66,0	28,0	24,0	36,0	63168
#8	0.1990	5.05		1/4	2-5/8	1	53/64	1-7/16	51777
5,1 mm	0.2008			6,0	66,0	28,0	24,0	36,0	63748
#7	0.2010	5.11	1/4-20	1/4	2-5/8	1	53/64	1-7/16	51338
13/64	0.2031	5.16		1/4	2-5/8	1	53/64	1-7/16	51339
#6	0.2040	5.18		1/4	2-5/8	1	53/64	1-7/16	51778
5,2 mm	0.2047		M6 X 0,75	6,0	66,0	28,0	24,0	36,0	63749

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Hi Performance Drill

Hi-PerCarb | Series 135

HIGH PERFORMANCE CARBIDE DRILLS



TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
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Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
#5	0.2055	5.22		1/4	2-5/8	1	53/64	1-7/16	51779
5,25 mm	0.2067			6,0	66,0	28,0	24,0	36,0	63169
5,3 mm	0.2087			6,0	66,0	28,0	24,0	36,0	63170
#4	0.2090	5.31	1/4-24	1/4	2-5/8	1	53/64	1-7/16	51780
5,4 mm	0.2126			6,0	66,0	28,0	24,0	36,0	63750
#3	0.2130	5.41	1/4-28	1/4	2-5/8	1	53/64	1-7/16	51340
5,5 mm	0.2165		M6 X 0,5	6,0	66,0	28,0	24,0	36,0	63171
7/32	0.2188	5.56	1/4-32	1/4	2-5/8	1	53/64	1-7/16	51341
5,6 mm	0.2205			6,0	66,0	28,0	24,0	36,0	63751
#2	0.2210	5.61		1/4	2-5/8	1	53/64	1-7/16	51781
5,7 mm	0.2244			6,0	66,0	28,0	24,0	36,0	63752
#1	0.2280	5.79		1/4	2-5/8	1	53/64	1-7/16	51782
5,8 mm	0.2283			6,0	66,0	28,0	24,0	36,0	63172
5,9 mm	0.2323			6,0	66,0	28,0	24,0	36,0	63753
A	0.2340	5.94		1/4	2-5/8	1	53/64	1-7/16	51601
15/64	0.2344	5.95		1/4	2-5/8	1	53/64	1-7/16	51342
6,0	0.2362	6.00	M7 X 1	6,0	66,0	28,0	24,0	36,0	63173
B	0.2380	6.05		1/4	3-1/8	1-5/16	1-3/64	1-7/16	51602
6,1 mm	0.2402			8,0	79,0	34,0	28,0	36,0	63754
C	0.2420	6.15		1/4	3-1/8	1-5/16	1-3/64	1-7/16	51603
6,2 mm	0.2441			8,0	79,0	34,0	28,0	36,0	63755
D	0.2460	6.25		1/4	3-1/8	1-5/16	1-3/64	1-7/16	51604
6,25 mm	0.2461		M7 X 0,75	8,0	79,0	34,0	28,0	36,0	63174
6,3 mm	0.2480			8,0	79,0	34,0	28,0	36,0	63756
1/4	0.2500	6.35		1/4	3-1/8	1-5/16	1-3/64	1-7/16	51343
E	0.2500	6.35		1/4	3-1/8	1-5/16	1-3/64	1-7/16	51605
6,4 mm	0.2520			8,0	79,0	34,0	28,0	36,0	63175
6,5 mm	0.2559			8,0	79,0	34,0	28,0	36,0	63213
F	0.2570	6.53	5/16-18	5/16	3-1/8	1-5/16	1-3/64	1-7/16	51344
6,6 mm	0.2598			8,0	79,0	34,0	28,0	36,0	63757
G	0.2610	6.63		5/16	3-1/8	1-5/16	1-3/64	1-7/16	51606
6,7 mm	0.2638			8,0	79,0	34,0	28,0	36,0	63758
17/64	0.2656	6.75	5/16-20	5/16	3-1/8	1-5/16	1-3/64	1-7/16	51345
H	0.2660	6.76		5/16	3-1/8	1-5/16	1-3/64	1-7/16	51607
6,8 mm	0.2677		M8 X 1,25	8,0	79,0	34,0	28,0	36,0	63176
6,9 mm	0.2717			8,0	79,0	34,0	28,0	36,0	63759
I	0.2720	6.91	5/16-24	5/16	3-1/8	1-5/16	1-3/64	1-7/16	51346
7,0 mm	0.2756		M8 X 1	8,0	79,0	34,0	28,0	36,0	63177
J	0.2770	7.04		5/16	3-1/8	1-5/16	1-3/64	1-7/16	51608
7,1 mm	0.2795			8,0	79,0	41,0	34,0	36,0	63760
K	0.2810	7.14		5/16	3-1/8	1-9/16	1-3/16	1-7/16	51609
9/32	0.2812	7.14	5/16-32	5/16	3-1/8	1-9/16	1-3/16	1-7/16	51347

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Common

3xD Reach

Right Spiral

External Coolant

2 Flutes

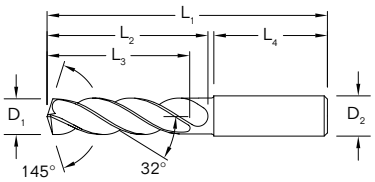
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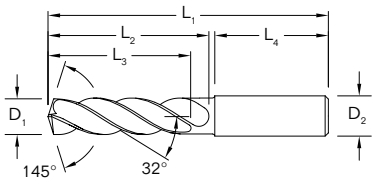
External Coolant

2 Flutes

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
7,2 mm	0.2835			8,0	79,0	41,0	34,0	36,0	63761
7,25 mm	0.2854		M8 X 0,75	8,0	79,0	41,0	34,0	36,0	63178
7,3 mm	0.2874			8,0	79,0	41,0	34,0	36,0	63762
L	0.2900	7.37		5/16	3-1/8	1-9/16	1-3/16	1-7/16	51610
7,4 mm	0.2913			8,0	79,0	41,0	34,0	36,0	63763
M	0.2950	7.49		5/16	3-1/8	1-9/16	1-3/16	1-7/16	51611
7,5 mm	0.2953		M8 X 0,5	8,0	79,0	41,0	34,0	36,0	63179
19/64	0.2969	7.54		5/16	3-1/8	1-9/16	1-3/16	1-7/16	51348
7,6 mm	0.2992			8,0	79,0	41,0	34,0	36,0	63764
N	0.3020	7.67		5/16	3-1/8	1-9/16	1-3/16	1-7/16	51612
7,7 mm	0.3031			8,0	79,0	41,0	34,0	36,0	63765
7,8 mm	0.3071		M9 X 1,25	8,0	79,0	41,0	34,0	36,0	63180
7,9 mm	0.3110			8,0	79,0	41,0	34,0	36,0	63766
5/16	0.3125	7.94	3/8-16	5/16	3-1/8	1-9/16	1-3/16	1-7/16	51349
8,0 mm	0.3150		M9 x 1	8,0	79,0	41,0	34,0	36,0	63181
O	0.3160	8.03		3/8	3-1/2	1-27/32	1-37/64	1-9/16	51613
8,1 mm	0.3189			10,0	89,0	47,0	40,0	40,0	63767
8,2 mm	0.3228			10,0	89,0	47,0	40,0	40,0	63768
P	0.3230	8.20		3/8	3-1/2	1-27/32	1-37/64	1-9/16	51614
8,3 mm	0.3268			10,0	89,0	47,0	40,0	40,0	63769
21/64	0.3281	8.33	3/8-20	3/8	3-1/2	1-27/32	1-37/64	1-9/16	51350
8,4 mm	0.3307			10,0	89,0	47,0	40,0	40,0	63182
Q	0.3320	8.43	3/8-24	3/8	3-1/2	1-27/32	1-37/64	1-9/16	51351
8,5 mm	0.3346		M10 X 1,5	10,0	89,0	47,0	40,0	40,0	63183
8,6 mm	0.3386			10,0	89,0	47,0	40,0	40,0	63770
R	0.3390	8.61		3/8	3-1/2	1-27/32	1-37/64	1-9/16	51615
8,7 mm	0.3425			10,0	89,0	47,0	40,0	40,0	63771
11/32	0.3438	8.73	3/8-32	3/8	3-1/2	1-27/32	1-37/64	1-9/16	51352
8,8 mm	0.3465		M10 X 1,25	10,0	89,0	47,0	40,0	40,0	63184
S	0.3480	8.84		3/8	3-1/2	1-27/32	1-37/64	1-9/16	51616
8,9 mm	0.3504			10,0	89,0	47,0	40,0	40,0	63772
9,0 mm	0.3543		M10 X 1	10,0	89,0	47,0	40,0	40,0	63185
T	0.3580	9.09		3/8	3-1/2	1-27/32	1-37/64	1-9/16	51617
9,1 mm	0.3583			10,0	89,0	47,0	40,0	40,0	63773
23/64	0.3594	9.13		3/8	3-1/2	1-27/32	1-37/64	1-9/16	51353
9,2 mm	0.3622		M10 X 0,75	10,0	89,0	47,0	40,0	40,0	63774
9,25 mm	0.3642	9.25		10,0	89,0	47,0	40,0	40,0	63186
9,3 mm	0.3661			10,0	89,0	47,0	40,0	40,0	63775
U	0.3680	9.35	7/16-14	3/8	3-1/2	1-27/32	1-37/64	1-9/16	51354
9,4 mm	0.3701			10,0	89,0	47,0	40,0	40,0	63776
9,5 mm	0.3740		M10 X 0,5	10,0	89,0	47,0	40,0	40,0	63187
3/8	0.3750	9.53		3/8	3-1/2	1-27/32	1-37/64	1-9/16	51355

(continued on next page)

HIGH PERFORMANCE CARBIDE DRILLS



TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6
> 18 - 30	+0,008/+0,029	h6

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
V	0.3770	9.58		1/2	3-1/2	1-27/32	1-37/64	1-9/16	51618
9,6 mm	0.3780			10,0	89,0	47,0	40,0	40,0	63777
9,7 mm	0.3819			10,0	89,0	47,0	40,0	40,0	63778
9,8 mm	0.3858			10,0	89,0	47,0	40,0	40,0	63779
W	0.3860			1/2	3-1/2	1-27/32	1-37/64	1-9/16	51619
9,9 mm	0.3898			10,0	89,0	47,0	40,0	40,0	63780
25/64	0.3906	9.92	7/16-20	1/2	3-1/2	1-27/32	1-37/64	1-9/16	51356
10,0 mm	0.3937			10,0	89,0	47,0	40,0	40,0	63188
X	0.3970	10.08	7/16-24	1/2	4-1/16	2-3/16	1-51/64	1-49/64	51620
10,1 mm	0.3976			12,0	102,0	55,0	45,0	45,0	63781
10,2 mm	0.4016		M12 X 1,75	12,0	102,0	55,0	45,0	45,0	63189
Y	0.4040	10.26	7/16-28	1/2	4-1/16	2-3/16	1-51/64	1-49/64	51621
10,3 mm	0.4055			12,0	102,0	55,0	45,0	45,0	63782
13/32	0.4062	10.32		1/2	4-1/16	2-3/16	1-51/64	1-49/64	51357
10,4 mm	0.4094			12,0	102,0	55,0	45,0	45,0	63783
Z	0.4130	10.49		1/2	4-1/16	2-3/16	1-51/64	1-49/64	51622
10,5 mm	0.4134		M12 X 1,5	12,0	102,0	55,0	45,0	45,0	63190
10,6 mm	0.4173			12,0	102,0	55,0	45,0	45,0	63784
10,7 mm	0.4213			12,0	102,0	55,0	45,0	45,0	63785
27/64	0.4219	10.72	1/2-13	1/2	4-1/16	2-3/16	1-51/64	1-49/64	51358
10,8 mm	0.4252		M12 X 1,25	12,0	102,0	55,0	45,0	45,0	63191
10,9 mm	0.4291			12,0	102,0	55,0	45,0	45,0	63786
11,0 mm	0.4331		M12 X 1	12,0	102,0	55,0	45,0	45,0	63192
11,1 mm	0.4370			12,0	102,0	55,0	45,0	45,0	63787
7/16	0.4375	11.11	1/4-18 NPT	1/2	4-1/16	2-3/16	1-51/64	1-49/64	51359
11,2 mm	0.4409			12,0	102,0	55,0	45,0	45,0	63788
11,25 mm	0.4429			12,0	102,0	55,0	45,0	45,0	63193
11,3 mm	0.4449			12,0	102,0	55,0	45,0	45,0	63789
11,4 mm	0.4488			12,0	102,0	55,0	45,0	45,0	63790
11,5 mm	0.4528		M12 X 0,5	12,0	102,0	55,0	45,0	45,0	63194
29/64	0.4531	11.51	1/2-20	1/2	4-1/16	2-3/16	1-51/64	1-49/64	51360
11,6 mm	0.4567			12,0	102,0	55,0	45,0	45,0	63791
11,7 mm	0.4606			12,0	102,0	55,0	45,0	45,0	63792
11,8 mm	0.4646			12,0	102,0	55,0	45,0	45,0	63793
11,9 mm	0.4685			12,0	102,0	55,0	45,0	45,0	63794
15/32	0.4688	11.91	1/2-28	1/2	4-1/16	2-3/16	1-51/64	1-49/64	51361
12,0 mm	0.4724		M14 X 2	12,0	102,0	55,0	45,0	45,0	63195
31/64	0.4844	12.30	9/16-12	1/2	4-1/4	2-5/16	1-7/8	1-49/64	51362
12,5 mm	0.4921		M14 X 1,5	14,0	107,0	60,0	49,0	45,0	63196
1/2	0.5000	12.70		1/2	4-1/4	2-5/16	1-7/8	1-49/64	51363
12,8 mm	0.5039		M14 X 1,25	14,0	107,0	60,0	49,0	45,0	63197
13,0 mm	0.5118		M14 X 1	14,0	107,0	60,0	49,0	45,0	63198

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Common

3xD Reach

Right Spiral

External Coolant

2 Flutes

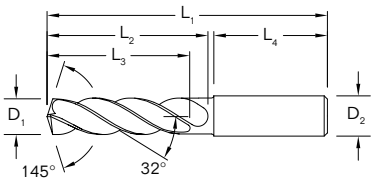
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6
> 18 - 30	+0,008/+0,029	h6




Common

3xD
Reach

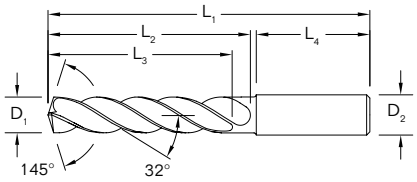

Right Spiral


External Coolant

2
Flutes

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
33/64	0.5156	13.10	9/16-18	5/8	4-1/4	2-5/16	1-7/8	1-49/64	51364
17/32	0.5312	13.49	5/8-11	5/8	4-1/4	2-5/16	1-7/8	1-49/64	51365
13,5 mm	0.5315			14,0	107,0	60,0	49,0	45,0	63199
35/64	0.5469	13.89	5/8-12	5/8	4-1/4	2-5/16	1-7/8	1-49/64	51783
14,0 mm	0.5512		M16 X 2	14,0	107,0	60,0	49,0	45,0	63200
9/16	0.5625	14.29		5/8	4-9/16	2-1/2	2	1-57/64	51366
14,5 mm	0.5709		M16 X 1,5	16,0	115,0	65,0	51,0	48,0	63201
37/64	0.5781	14.68	5/8-18	5/8	4-9/16	2-1/2	2	1-57/64	51367
15,0 mm	0.5906		M16 X 1	16,0	115,0	65,0	51,0	48,0	63202
19/32	0.5938	15.08	11/16-11	5/8	4-9/16	2-1/2	2	1-57/64	51784
39/64	0.6094	15.48	11/16-12	5/8	4-9/16	2-1/2	2	1-57/64	51785
15,5 mm	0.6102		M18 X 2,5	16,0	115,0	65,0	51,0	48,0	63203
5/8	0.6250	15.88	11/16-16	5/8	4-9/16	2-1/2	2	1-57/64	51368
16,0 mm	0.6299			16,0	115,0	65,0	51,0	48,0	63204
41/64	0.6406	16.27	11/16-24	3/4	4-7/8	2-3/4	2-5/16	1-57/64	51786
16,5 mm	0.6496		M18 X 1,5	18,0	123,0	73,0	58,0	48,0	63205
21/32	0.6562	16.67	3/4-10	3/4	4-7/8	2-3/4	2-5/16	1-57/64	51369
17,0 mm	0.6693			18,0	123,0	73,0	58,0	48,0	63206
43/64	0.6719	17.07	3/4-12	3/4	4-7/8	2-3/4	2-5/16	1-57/64	51787
11/16	0.6875	17.46	3/4-16	3/4	4-7/8	2-3/4	2-5/16	1-57/64	51370
17,5 mm	0.6890		M20 X 2,5	18,0	123,0	73,0	58,0	48,0	63207
45/64	0.7031	17.86	3/4-20, 1/2-14 NPT	3/4	4-7/8	2-3/4	2-5/16	1-57/64	51788
18,0 mm	0.7087			18,0	123,0	73,0	58,0	48,0	63208
23/32	0.7188	18.26		3/4	4-7/8	2-3/4	2-5/16	1-57/64	51789
18,5 mm	0.7283		M20 X 1,5	20,0	131,0	79,0	63,0	50,0	63209
47/64	0.7344	18.65	13/16-12	3/4	4-7/8	2-3/4	2-5/16	1-57/64	51790
19,0 mm	0.7480			20,0	131,0	79,0	63,0	50,0	63210
3/4	0.7500	19.05	13/16-16	3/4	5-1/4	3-1/16	2-7/16	1-31/32	51371
49/64	0.7656	19.45	7/8-9	7/8	5-1/4	3-1/16	2-7/16	1-31/32	51372
19,5 mm	0.7677		M22 X 2,5	20,0	131,0	79,0	63,0	50,0	63211
25/32	0.7812	19.84		7/8	6	3-11/16	2-11/16	2-1/8	51791
20,0 mm	0.7874			20,0	131,0	79,0	63,0	50,0	63212
51/64	0.7969	20.24	7/8-12	7/8	6	3-11/16	2-11/16	2-1/8	51792
20,5 mm	0.8071			22,0	150,0	93,0	73,0	53,0	64513
13/16	0.8125	20.64	7/8-14	7/8	6	3-11/16	2-11/16	2-1/8	51373
21,0 mm	0.8268			22,0	150,0	93,0	73,0	53,0	64514
22,0 mm	0.8661			22,0	150,0	93,0	73,0	53,0	64515
7/8	0.8750	22.23	15/16-16, 1-8	7/8	6	3-11/16	2-11/16	2-1/8	51374
59/64	0.9219	23.42	1-12	1	6	3-11/16	2-11/16	2-1/8	51375

HIGH PERFORMANCE CARBIDE DRILLS



TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
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> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6
> 18 - 30	+0,008/+0,029	h6

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
1/64	0.0156	0.40		1/8	1 1/2	5/32	7/64	1	52300*
1/32	0.0312	0.79		1/8	1 1/2	5/16	7/32	1	52301*
3/64	0.0469	1.19	1/16-64	1/8	1 1/2	25/64	19/64	1	52302*
1,25 mm	0.0492			3,0	38,0	10,0	7,5	25,0	64520*
1,45 mm	0.0571			3,0	38,0	10,0	7,5	25,0	64521*
#53	0.0595	1.51		1/8	1-1/2	25/64	19/64	1	64522*
1/16	0.0625	1.59	5/64-60	1/8	2	15/32	23/64	1-1/4	52303*
1,6 mm	0.0630			3,0	50,0	12,0	9,0	32,0	64523*
1,75 mm	0.0689			3,0	50,0	12,0	9,0	32,0	64524*
#50	0.0700	1.78		1/8	2	15/32	23/64	1-1/4	64525*
5/64	0.0781	1.98		1/8	2	35/64	27/64	1-1/4	52304*
#47	0.0785	1.99		1/8	2	35/64	27/64	1-1/4	64526*
2,05 mm	0.0807			3,0	50,0	14,0	11,0	32,0	64527*
#46	0.0810	2.06		1/8	2	35/64	27/64	1-1/4	64528*
#43	0.0890	2.26		1/8	2	19/32	15/32	1-1/4	64529*
#42	0.0935	2.37		1/8	2	5/8	1/2	1-1/4	64530*
3/32	0.0938	2.38	1/8-32	1/8	2	5/8	1/2	1-1/4	52305
#40	0.0980	2.49		1/8	2	43/64	17/32	1-1/4	52306
2,5 mm	0.0984			3,0	50,0	17,0	13,0	32,0	64531
#39	0.0995	2.53		1/8	2	43/64	17/32	1-1/4	52307
#38	0.1015	2.58	5-40	1/8	2	43/64	17/32	1-1/4	52308
#37	0.1040	2.64	5-44	1/8	2	45/64	9/16	1-1/4	52309
#36	0.1065	2.71	6-32	1/8	2	45/64	9/16	1-1/4	52310
7/64	0.1094	2.78		1/8	2	3/4	19/32	1-1/4	52311
#35	0.1100	2.79		1/8	2	3/4	19/32	1-1/4	52312
#34	0.1110	2.82		1/8	2	3/4	19/32	1-1/4	52313
#33	0.1130	2.87	6-40	1/8	2	3/4	19/32	1-1/4	52314
2,9 mm	0.1142			3,0	50,0	19,0	15,0	32,0	64532
#32	0.1160	2.95		1/8	2	3/4	39/64	1-1/4	52315
3,0 mm	0.1181			6,0	66,0	28,0	23,0	36,0	64100
#31	0.1200	3.05		1/8	2	3/4	39/64	1-1/4	52316
3,1 mm	0.1220			6,0	66,0	28,0	23,0	36,0	64101
1/8	0.1250	3.18		1/4	3	1	53/64	1-7/16	51580
3,2 mm	0.1260		M3,5 X 0,35	6,0	66,0	28,0	23,0	36,0	64102
#30	0.1285	3.26		1/4	3	1	53/64	1-7/16	51581
3,3 mm	0.1299		M4 X 0,7	6,0	66,0	28,0	23,0	36,0	64103
3,4 mm	0.1339		8-32,8-36	6,0	66,0	28,0	23,0	36,0	64104
#29	0.1360	3.45		1/4	3	1	53/64	1-7/16	51582
3,5 mm	0.1378			6,0	66,0	28,0	23,0	36,0	64105
#28	0.1405	3.57	8-40	1/4	3	1	53/64	1- 7/16	52317
9/64	0.1406	3.57		1/4	3	1	53/64	1-7/16	51583
3,6 mm	0.1417		M4 X 0,35	6,0	66,0	28,0	23,0	36,0	64106

*Single Margin

(continued on next page)

Common
5xD Reach
Right Spiral
External Coolant
2 Flutes

Hi Performance Drill

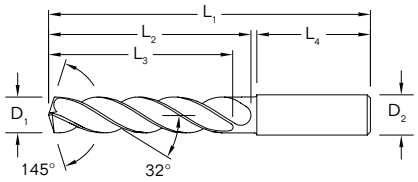
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
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>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
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> 18 - 30	+0,008/+0,029	h6



Common

5xD
Reach

Right Spiral

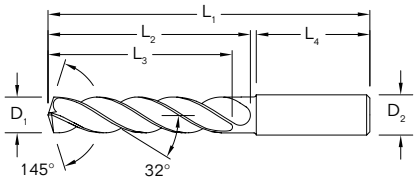
External Coolant

2
Flutes

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
#27	0.1440	3.66		1/4	3	1	53/64	1-7/16	52318
3,7 mm	0.1457		M4.5 X 0,75	6,0	66,0	28,0	23,0	36,0	64107
#26	0.1470	3.73	3/16-24	1/4	3	1	53/64	1-7/16	52319
#25	0.1495	3.80	10-24	1/4	3-1/4	1-1/4	1-5/64	1-7/16	51584
3,8 mm	0.1496			6,0	74,0	36,0	29,0	36,0	64108
#24	0.1520	3.86	10-28	1/4	3-1/4	1-1/4	1-5/64	1-7/16	52321
3,9 mm	0.1535			6,0	74,0	36,0	29,0	36,0	64109
#23	0.1540	3.91		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52322
5/32	0.1562	3.97		1/4	3-1/4	1-1/4	1-5/64	1-7/16	51585
#22	0.1570	3.99	10-30	1/4	3-1/4	1-1/4	1-5/64	1-7/16	52323
4,0 mm	0.1575		M4,5 X 0,5	6,0	74,0	36,0	29,0	36,0	64110
#21	0.1590	4.04	10-32	1/4	3-1/4	1-1/4	1-5/64	1-7/16	51586
#20	0.1610	4.09	13/64-24	1/4	3-1/4	1-1/4	1-5/64	1-7/16	51587
4,1 mm	0.1614			6,0	74,0	36,0	29,0	36,0	64111
4,2 mm	0.1654		M5 / M5 X 0,75	6,0	74,0	36,0	29,0	36,0	64112
#19	0.1660	4.22		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52324
4,3 mm	0.1693			6,0	74,0	36,0	29,0	36,0	64113
#18	0.1695	4.31		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52325
11/64	0.1719	4.37		1/4	3-1/4	1-1/4	1-5/64	1-7/16	51588
#17	0.1730	4.39		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52326
4,4 mm	0.1732			6,0	74,0	36,0	29,0	36,0	64114
4,5 mm	0.1772		M5 X 0,5	6,0	74,0	36,0	29,0	36,0	64115
#15	0.1800	4.57		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52327
4,6 mm	0.1811		12-28	6,0	74,0	36,0	29,0	36,0	64116
#14	0.1820	4.62		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52328
#13	0.1850	4.70	12-32	1/4	3-1/4	1-1/4	1-5/64	1-7/16	52329
4,7 mm	0.1850			6,0	74,0	36,0	29,0	36,0	64117
3/16	0.1875	4.76		1/4	3-1/4	1-3/4	1-37/64	1-7/16	51589
#12	0.1890	4.80	7/32-32	1/4	3-1/4	1-3/4	1-37/64	1-7/16	52330
4,8 mm	0.1890			6,0	82,0	44,0	35,0	36,0	64118
4,9 mm	0.1929			6,0	82,0	44,0	35,0	36,0	64119
#10	0.1935	4.91	14-20	1/4	3-1/4	1-3/4	1-37/64	1-7/16	52331
#9	0.1960	4.98		1/4	3-1/4	1-3/4	1-37/64	1-7/16	52332
5,0 mm	0.1969		M6 X 1	6,0	82,0	44,0	35,0	36,0	64120
#8	0.1990	5.05		1/4	3-1/4	1-3/4	1-37/64	1-7/16	52333
5,1 mm	0.2008			6,0	82,0	44,0	35,0	36,0	64121
#7	0.2010	5.11	1/4-20	1/4	3-1/4	1-3/4	1-37/64	1-7/16	51506
13/64	0.2031	5.16		1/4	3-1/4	1-3/4	1-37/64	1-7/16	51507
#6	0.2040	5.18		1/4	3 1/4	1 3/4	1 37/64	1 7/16	52334
5,2 mm	0.2047		M6 X 0,75	6,0	82,0	44,0	35,0	36,0	64122
#5	0.2055	5.22		1/4	3-1/4	1-3/4	1-37/64	1-7/16	51590
5,25 mm	0.2067			6,0	82,0	44,0	35,0	36,0	64123

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HIGH PERFORMANCE CARBIDE DRILLS



TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6
> 18 - 30	+0,008/+0,029	h6

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
5,3 mm	0.2087			6,0	82,0	44,0	35,0	36,0	64124
#4	0.2090	5.31	1/4-24	1/4	3-1/4	1-3/4	1-37/64	1-7/16	51508
5,4 mm	0.2126			6,0	82,0	44,0	35,0	36,0	64125
#3	0.2130	5.41	1/4-28	1/4	3-1/4	1-3/4	1-37/64	1-7/16	51509
5,5 mm	0.2165		M6 X 0,5	6,0	82,0	44,0	35,0	36,0	64126
7/32	0.2188	5.56	1/4-32	1/4	3-1/4	1-3/4	1-37/64	1-7/16	51510
5,6 mm	0.2205			6,0	82,0	44,0	35,0	36,0	64127
#2	0.2210	5.61		1/4	3-1/4	1-3/4	1-37/64	1-7/16	52335
5,7 mm	0.2244			6,0	82,0	44,0	35,0	36,0	64128
#1	0.2280	5.79		1/4	3-1/4	1-3/4	1-37/64	1-7/16	52336
5,8 mm	0.2283			6,0	82,0	44,0	35,0	36,0	64129
5,9 mm	0.2323			6,0	82,0	44,0	35,0	36,0	64130
A	0.2340	5.94		1/4	3-1/4	1-3/4	1-37/64	1-7/16	52337
15/64	0.2344	5.95		1/4	3-1/4	1-3/4	1-37/64	1-7/16	51591
6,0 mm	0.2362		M7 X 1	6,0	82,0	44,0	35,0	36,0	64131
B	0.2380	6.05		1/4	3 5/8	2-5/64	1-51/64	1-7/16	52338
6,1 mm	0.2402			8,0	91,0	53,0	43,0	36,0	64132
C	0.2420	6.15		1/4	3 5/8	2-5/64	1-51/64	1-7/16	52339
6,2 mm	0.2441			8,0	91,0	53,0	43,0	36,0	64133
D	0.2460	6.25		1/4	3 5/8	2-5/64	1-51/64	1-7/16	52340
6,25 mm	0.2461		M7 X 0,75	8,0	91,0	53,0	43,0	36,0	64134
6,3 mm	0.2480			8,0	91,0	53,0	43,0	36,0	64135
1/4	0.2500	6.35		1/4	3-5/8	2-5/64	1-51/64	1-7/16	51511
6,4 mm	0.2520			8,0	91,0	53,0	43,0	36,0	64136
6,5 mm	0.2559			8,0	91,0	53,0	43,0	36,0	64137
F	0.2570	6.53	5/16-18	5/16	3-5/8	2-5/64	1-51/64	1-7/16	51512
6,6 mm	0.2598			8,0	91,0	53,0	43,0	36,0	64138
G	0.2610	6.63		5/16	3 5/8	2 5/64	1 51/64	1 7/16	52341
6,7 mm	0.2638			8,0	91,0	53,0	43,0	36,0	64139
17/64	0.2656	6.75	5/16-20	5/16	3-5/8	2-5/64	1-51/64	1-7/16	51513
H	0.2660	6.76		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52342
6,8 mm	0.2677		M8 X 1,25	8,0	91,0	53,0	43,0	36,0	64140
6,9 mm	0.2717			8,0	91,0	53,0	43,0	36,0	64141
I	0.2720	6.91	5/16-24	5/16	3-5/8	2-5/64	1-51/64	1-7/16	51514
7,0 mm	0.2756		M8 X 1	8,0	91,0	53,0	43,0	36,0	64142
J	0.2770	7.04		5/16	3 5/8	2-5/64	1-51/64	1-7/16	52343
7,1 mm	0.2795			8,0	91,0	53,0	43,0	36,0	64143
K	0.2810	7.14		5/16	3 5/8	2-5/64	1-51/64	1-7/16	52344
9/32	0.2812	7.14	5/16-32	5/16	3-5/8	2-5/64	1-51/64	1-7/16	51515
7,2 mm	0.2835			8,0	91,0	53,0	43,0	36,0	64144
7,25 mm	0.2854		M8 X 0,75	8,0	91,0	53,0	43,0	36,0	64145
7,3 mm	0.2874			8,0	91,0	53,0	43,0	36,0	64146

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Common
5xD Reach
Right Spiral
External Coolant
2 Flutes

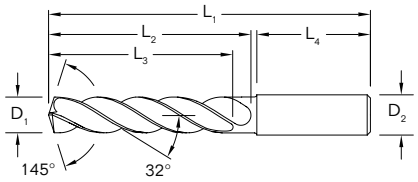
HIGH PERFORMANCE CARBIDE DRILLS

TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6
> 18 - 30	+0,008/+0,029	h6



Common

5xD Reach

Right Spiral

External Coolant

2 Flutes

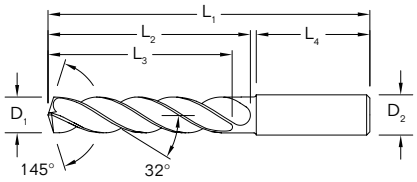
Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
L	0.2900	7.37		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52345
7,4 mm	0.2913			8,0	91,0	53,0	43,0	36,0	64147
M	0.2950	7.49		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52346
7,5 mm	0.2953		M8 X 0,5	8,0	91,0	53,0	43,0	36,0	64148
19/64	0.2969	7.54		5/16	3-5/8	2-5/64	1-51/64	1-7/16	51516
7,6 mm	0.2992			8,0	91,0	53,0	43,0	36,0	64149
N	0.3020	7.67		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52347
7,7 mm	0.3031			8,0	91,0	53,0	43,0	36,0	64150
7,8 mm	0.3071		M9 X 1,25	8,0	91,0	53,0	43,0	36,0	64151
7,9 mm	0.3110			8,0	91,0	53,0	43,0	36,0	64152
5/16	0.3125	7.94	3/8-16	5/16	3-5/8	2-5/64	1-51/64	1-7/16	51517
8,0 mm	0.3150		M9 X 1	8,0	91,0	53,0	43,0	36,0	64153
O	0.3160	8.03		3/8	4	2-13/32	2-1/8	1-9/16	52348
8,1 mm	0.3189			10,0	103,0	61,0	49,0	40,0	64154
8,2 mm	0.3228			10,0	103,0	61,0	49,0	40,0	64155
P	0.3230	8.20		3/8	4	2-13/32	2-1/8	1-9/16	51518
8,3 mm	0.3268			10,0	103,0	61,0	49,0	40,0	64156
21/64	0.3281	8.33	3/8-20	3/8	4	2-13/32	2-1/8	1-9/16	51519
8,4 mm	0.3307			10,0	103,0	61,0	49,0	40,0	64157
Q	0.3320	8.43	3/8-24	3/8	4	2-13/32	2-1/8	1-9/16	51520
8,5 mm	0.3346		M10 X 1,5	10,0	103,0	61,0	49,0	40,0	64158
8,6 mm	0.3386			10,0	103,0	61,0	49,0	40,0	64159
R	0.3390	8.61	3/8-32	3/8	4	2-13/32	2-1/8	1-9/16	52349
8,7 mm	0.3425		M10 X 1,25	10,0	103,0	61,0	49,0	40,0	64160
11/32	0.3438	8.73		3/8	4	2-13/32	2-1/8	1-9/16	51521
8,8 mm	0.3465			10,0	103,0	61,0	49,0	40,0	64161
S	0.3480	8.84		3/8	4	2-13/32	2-1/8	1-9/16	51522
8,9 mm	0.3504			10,0	103,0	61,0	49,0	40,0	64162
9,0 mm	0.3543		M10 X 1	10,0	103,0	61,0	49,0	40,0	64163
T	0.3580	9.09		3/8	4	2 13/32	2 1/8	1 9/16	52350
9,1 mm	0.3583			10,0	103,0	61,0	49,0	40,0	64164
23/64	0.3594	9.13		3/8	4	2-13/32	2-1/8	1-9/16	51523
9,2 mm	0.3622		M10 X 0,75	10,0	103,0	61,0	49,0	40,0	64165
9,25 mm	0.3642			10,0	103,0	61,0	49,0	40,0	64166
9,3 mm	0.3661			10,0	103,0	61,0	49,0	40,0	64167
U	0.3680	9.35	7/16-14	3/8	4	2-13/32	2-1/8	1-9/16	51524
9,4 mm	0.3701			10,0	103,0	61,0	49,0	40,0	64168
9,5 mm	0.3740		M10 X 0,5	10,0	103,0	61,0	49,0	40,0	64169
3/8	0.3750	9.53		3/8	4	2-13/32	2-1/8	1-9/16	51525
V	0.3770	9.58		1/2	4	2-13/32	2-1/8	1-9/16	52351
9,6 mm	0.3780			10,0	103,0	61,0	49,0	40,0	64170
9,7 mm	0.3819			10,0	103,0	61,0	49,0	40,0	64171

(continued on next page)

Hi Performance Drill

Hi-PerCarb | Series 135

HIGH PERFORMANCE CARBIDE DRILLS



TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6
> 18 - 30	+0,008/+0,029	h6

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
9,8 mm	0.3858			10,0	103,0	61,0	49,0	40,0	64172
W	0.3860	9.80		1/2	4	2-13/32	2-1/8	1-9/16	51526
9,9 mm	0.3898			10,0	103,0	61,0	49,0	40,0	64173
25/64	0.3906	9.92	7/16-20	1/2	4	2-13/32	2-1/8	1-9/16	51527
10,0 mm	0.3937			10,0	103,0	61,0	49,0	40,0	64174
X	0.3970	10.08	7/16-24	1/2	4-11/16	2-3/4	2-23/64	1-49/64	52352
10,1 mm	0.3976			12,0	118,0	71,0	56,0	45,0	64175
10,2 mm	0.4016			12,0	118,0	71,0	56,0	45,0	64176
Y	0.4040	10.26	7/16-28	1/2	4-11/16	2-3/4	2-23/64	1-49/64	52353
10,3 mm	0.4055			12,0	118,0	71,0	56,0	45,0	64177
13/32	0.4062	10.32		1/2	4-11/16	2-3/4	2-23/64	1-49/64	51528
10,4 mm	0.4095			12,0	118,0	71,0	56,0	45,0	64178
Z	0.4130	10.49		1/2	4-11/16	2-3/4	2-23/64	1-49/64	52354
10,5 mm	0.4134		M12 X 1,5	12,0	118,0	71,0	56,0	45,0	64179
10,6 mm	0.4173			12,0	118,0	71,0	56,0	45,0	64180
10,7 mm	0.4213			12,0	118,0	71,0	56,0	45,0	64181
27/64	0.4219	10.72	1/2-13	1/2	4-11/16	2-3/4	2-23/64	1-49/64	51529
10,8 mm	0.4252		M12 X 1,25	12,0	118,0	71,0	56,0	45,0	64182
10,9 mm	0.4291			12,0	118,0	71,0	56,0	45,0	64183
11,0 mm	0.4331			12,0	118,0	71,0	56,0	45,0	64184
11,1 mm	0.4370		M12 X 1	12,0	118,0	71,0	56,0	45,0	64185
7/16	0.4375	11.11	1/4-18 NPT	1/2	4-11/16	2-3/4	2-23/64	1-49/64	51530
11,2 mm	0.4409			12,0	118,0	71,0	56,0	45,0	64186
11,25 mm	0.4429			12,0	118,0	71,0	56,0	45,0	64187
11,3 mm	0.4449			12,0	118,0	71,0	56,0	45,0	64188
11,4 mm	0.4488			12,0	118,0	71,0	56,0	45,0	64189
11,5 mm	0.4528		M12 X 0,5	12,0	118,0	71,0	56,0	45,0	64190
29/64	0.4531	11.51	1/2-20	1/2	4-11/16	2-3/4	2-23/64	1-49/64	51531
11,6 mm	0.4567			12,0	118,0	71,0	56,0	45,0	64191
11,7 mm	0.4606			12,0	118,0	71,0	56,0	45,0	64192
11,8 mm	0.4646			12,0	118,0	71,0	56,0	45,0	64193
11,9 mm	0.4685			12,0	118,0	71,0	56,0	45,0	64194
15/32	0.4688	11.91	1/2-28	1/2	4-11/16	2-3/4	2-23/64	1-49/64	51532
12,0 mm	0.4724		M14 X 2	12,0	118,0	71,0	56,0	45,0	64195
31/64	0.4844	12.30	9/16-12	1/2	4-7/8	3-1/32	2-19/32	1-49/64	51533
12,5 mm	0.4921		M14 X 1,5	14,0	124,0	77,0	60,0	45,0	64196
1/2	0.5000	12.70		1/2	4-7/8	3-1/32	2-19/32	1-49/64	51534
12,8 mm	0.5039		M14 X 1,25	14,0	124,0	77,0	60,0	45,0	64197
13,0 mm	0.5118		M14 X 1	14,0	124,0	77,0	60,0	45,0	64198
33/64	0.5156	13.10	9/16-18	5/8	4-7/8	3-1/32	2-19/32	1-49/64	51535
17/32	0.5312	13.49	5/8-11	5/8	4-7/8	3-1/32	2-19/32	1-49/64	51536
13,5 mm	0.5315			14,0	124,0	77,0	60,0	45,0	64199

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Common

5xD
Reach

Right Spiral

External Coolant

2
Flutes

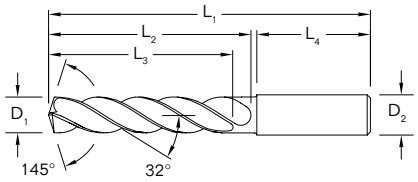
HI-PER CARB®
HIGH PERFORMANCE CARBIDE DRILLS

TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6
> 18 - 30	+0,008/+0,029	h6




Common

5xD
Reach


Right Spiral


External Coolant

2
Flutes

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-A (AlTiN) EDP No.
35/64	0.5469	13.89	5/8-12	5/8	4-7/8	3-1/32	2-19/32	1-49/64	51537
14,0 mm	0.5512		M16 X 2	14,0	124,0	77,0	60,0	45,0	64200
9/16	0.5625	14.29		5/8	5-1/4	3-1/4	2-3/4	1-57/64	51538
14,5 mm	0.5709		M16 X 1,5	16,0	133,0	83,0	63,0	48,0	64201
37/64	0.5781	14.68	5/8-18	5/8	5-1/4	3-1/4	2-3/4	1-57/64	51539
15,0 mm	0.5906		M16 X 1	16,0	133,0	83,0	63,0	48,0	64202
19/32	0.5938	15.08	11/16-11	5/8	5-1/4	3-1/4	2-3/4	1-57/64	51592
39/64	0.6094	15.48	11/16-12	5/8	5-1/4	3-1/4	2-3/4	1-57/64	51593
15,5 mm	0.6102		M18 X 2,5	16,0	133,0	83,0	63,0	48,0	64203
5/8	0.6250	15.88	11/16-16	5/8	5-1/4	3-1/4	2-3/4	1-57/64	51540
16,0 mm	0.6299			16,0	133,0	83,0	63,0	48,0	64204
41/64	0.6406	16.27	11/16-24	3/4	5-5/8	3-5/8	3-3/16	1-57/64	51594
16,5 mm	0.6496		M18 X 1,5	18,0	143,0	93,0	71,0	48,0	64205
21/32	0.6562	16.67	3/4-10	3/4	5-5/8	3-5/8	3-3/16	1-57/64	51541
17,0 mm	0.6693			18,0	143,0	93,0	71,0	48,0	64206
43/64	0.6719	17.07	3/4-12	3/4	5-5/8	3-5/8	3-3/16	1-57/64	51595
11/16	0.6875	17.46	3/4-16	3/4	5-5/8	3-5/8	3-3/16	1-57/64	51542
17,5 mm	0.6890		M20 X 2,5	18,0	143,0	93,0	71,0	48,0	64207
45/64	0.7031	17.86	3/4-20, 1/2-14 NPT	3/4	5-5/8	3-5/8	3-3/16	1-57/64	51543
18,0 mm	0.7087			18,0	143,0	93,0	71,0	48,0	64208
23/32	0.7188	18.26		3/4	6	4	3-3/8	1-31/32	51596
18,5 mm	0.7283		M20 X 1,5	20,0	153,0	101,0	77,0	50,0	64209
47/64	0.7344	18.65	13/16-12	3/4	6	4	3-3/8	1-31/32	51544
19,0 mm	0.7480			20,0	153,0	101,0	77,0	50,0	64210
3/4	0.7500	19.05	13/16-16	3/4	6	4	3-3/8	1-31/32	51545
49/64	0.7656	19.45	7/8-9	7/8	6	4	3-3/8	1-31/32	52355
19,5 mm	0.7677		M22 X 2,5	20,0	153,0	101,0	77,0	50,0	64211
25/32	0.7812	19.84		7/8	6	4	3-3/8	1-31/32	52356
20,0 mm	0.7874			20,0	153,0	101,0	77,0	50,0	64212
51/64	0.7969	20.24	7/8-12	7/8	6	4	3-3/8	1-31/32	52357
20,5 mm	0.8071			22,0	153,0	101,0	77,0	50,0	64533
13/16	0.8125	20.64	7/8-14	7/8	6-1/2	4-1/2	3-7/8	1-31/32	52358
21,0 mm	0.8268			22,0	153,0	101,0	77,0	50,0	64534
22,0 mm	0.8661			22,0	178,0	127,0	108,0	50,0	64535
7/8	0.8750	22.23	15/16-16, 1-8	7/8	6-1/2	4-1/2	3-7/8	1-31/32	52359
59/64	0.9219	23.42	1-12	1	7	5	4-3/8	2-1/8	52360

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

	Series 135 3D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 1.5	3	6	8	10	12	16	20
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	117	RPM	24882	12441	6220	4665	3732	3110	2333	1866
			(94-141)	Fr	0.047	0.094	0.189	0.252	0.315	0.378	0.504	0.630
				Feed (mm/min)	1175	1175	1175	1175	1175	1175	1175	1175
		≤ 275 Bhn or ≤ 28 HRc	107	RPM	22620	11310	5655	4241	3393	2827	2121	1696
			(85-128)	Fr	0.043	0.086	0.172	0.229	0.286	0.343	0.457	0.572
				Feed (mm/min)	970	970	970	970	970	970	970	970
		≤ 475 Bhn or ≤ 45 HRc	61	RPM	12926	6463	3231	2424	1939	1616	1212	969
			(49-73)	Fr	0.036	0.071	0.142	0.190	0.237	0.285	0.380	0.475
				Feed (mm/min)	460	460	460	460	460	460	460	460
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	91	RPM	19388	9694	4847	3635	2908	2424	1818	1454
			(73-110)	Fr	0.036	0.071	0.142	0.190	0.237	0.285	0.380	0.475
				Feed (mm/min)	690	690	690	690	690	690	690	690
		≤ 375 Bhn or ≤ 40 HRc	56	RPM	11956	5978	2989	2242	1793	1495	1121	897
			(45-68)	Fr	0.031	0.061	0.122	0.163	0.204	0.244	0.326	0.407
				Feed (mm/min)	365	365	365	365	365	365	365	365
		≤ 450 Bhn or ≤ 48 HRc	40	RPM	8402	4201	2100	1575	1260	1050	788	630
			(32-48)	Fr	0.021	0.042	0.083	0.111	0.139	0.167	0.222	0.278
				Feed (mm/min)	175	175	175	175	175	175	175	175
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 200 Bhn or ≤ 13 HRc	40	RPM	8402	4201	2100	1575	1260	1050	788	630
			(32-48)	Fr	0.032	0.063	0.126	0.168	0.210	0.252	0.336	0.421
				Feed (mm/min)	265	265	265	265	265	265	265	265
		≤ 375 Bhn or ≤ 40 HRc	27	RPM	5816	2908	1454	1091	872	727	545	436
			(22-33)	Fr	0.014	0.028	0.055	0.073	0.092	0.110	0.147	0.183
				Feed (mm/min)	80	80	80	80	80	80	80	80
		≤ 475 Bhn or ≤ 50 HRc	23	RPM	4847	2424	1212	909	727	606	454	364
			(18-27)	Fr	0.009	0.019	0.037	0.050	0.062	0.074	0.099	0.124
				Feed (mm/min)	45	45	45	45	45	45	45	45
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	98	RPM	20681	10340	5170	3878	3102	2585	1939	1551
			(78-117)	Fr	0.055	0.110	0.220	0.293	0.366	0.439	0.585	0.732
				Feed (mm/min)	1135	1135	1135	1135	1135	1135	1135	1135
		≤ 260 Bhn or ≤ 26 HRc	87	RPM	18419	9209	4605	3454	2763	2302	1727	1381
			(69-104)	Fr	0.055	0.110	0.219	0.292	0.366	0.439	0.585	0.731
				Feed (mm/min)	1010	1010	1010	1010	1010	1010	1010	1010
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 185 Bhn or ≤ 9 HRc	84	RPM	17773	8886	4443	3332	2666	2222	1666	1333
			(67-101)	Fr	0.031	0.061	0.123	0.164	0.204	0.245	0.327	0.409
				Feed (mm/min)	545	545	545	545	545	545	545	545
		≤ 275 Bhn or ≤ 28 HRc	52	RPM	10987	5493	2747	2060	1648	1373	1030	824
			(41-62)	Fr	0.024	0.047	0.095	0.126	0.158	0.189	0.252	0.316
				Feed (mm/min)	260	260	260	260	260	260	260	260
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc	27	RPM	5816	2908	1454	1091	872	727	545	436
			(22-33)	Fr	0.023	0.046	0.093	0.124	0.155	0.186	0.248	0.309
				Feed (mm/min)	135	135	135	135	135	135	135	135
		≤ 375 Bhn or ≤ 40 HRc	20	RPM	4201	2100	1050	788	630	525	394	315
			(16-24)	Fr	0.020	0.040	0.081	0.108	0.135	0.162	0.216	0.270
				Feed (mm/min)	85	85	85	85	85	85	85	85

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HIGH PERFORMANCE CARBIDE DRILLS

	Series 135 3D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 1.5	3	6	8	10	12	16	20
S	SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy	≤ 300 Bhn or ≤ 32 HRc	17	RPM	3555	1777	889	666	533	444	333	267
			(13-20)	Fr	0.010	0.020	0.039	0.053	0.066	0.079	0.105	0.131
				Feed (mm/min)	35	35	35	35	35	35	35	35
		≤ 400 Bhn or ≤ 43 HRc	9	RPM	1939	969	485	364	291	242	182	145
			(7-11)	Fr	0.008	0.015	0.031	0.041	0.052	0.062	0.083	0.103
				Feed (mm/min)	15	15	15	15	15	15	15	15
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	41	RPM	8725	4362	2181	1636	1309	1091	818	654
			(33-49)	Fr	0.021	0.042	0.085	0.113	0.141	0.170	0.226	0.283
				Feed (mm/min)	185	185	185	185	185	185	185	185
		≤ 350 Bhn or ≤ 38 HRc	30	RPM	6463	3231	1616	1212	969	808	606	485
			(24-37)	Fr	0.019	0.039	0.077	0.103	0.129	0.155	0.206	0.258
				Feed (mm/min)	125	125	125	125	125	125	125	125
		≤ 440 Bhn or ≤ 47 HRc	17	RPM	3555	1777	889	666	533	444	333	267
			(13-20)	Fr	0.014	0.028	0.056	0.075	0.094	0.113	0.150	0.188
				Feed (mm/min)	50	50	50	50	50	50	50	50
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	213	RPM	45239	22620	11310	8482	6786	5655	4241	3393
			(171-256)	Fr	0.059	0.119	0.238	0.317	0.396	0.476	0.634	0.793
				Feed (mm/min)	2690	2690	2690	2690	2690	2690	2690	2690
		≤ 150 Bhn or ≤ 7 HRc	183	RPM	38777	19388	9694	7271	5816	4847	3635	2908
			(146-219)	Fr	0.060	0.120	0.240	0.320	0.400	0.480	0.640	0.799
				Feed (mm/min)	2325	2325	2325	2325	2325	2325	2325	2325
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	152	RPM	32314	16157	8078	6059	4847	4039	3029	2424
			(122-183)	Fr	0.024	0.048	0.096	0.128	0.160	0.192	0.256	0.320
				Feed (mm/min)	776	776	776	776	776	776	776	776
		≤ 200 Bhn or ≤ 23 HRc	122	RPM	25851	12926	6463	4847	3878	3231	2424	1939
			(98-146)	Fr	0.024	0.049	0.097	0.130	0.162	0.195	0.260	0.325
				Feed (mm/min)	630	630	630	630	630	630	630	630

Note:

- Bhn (BrineII) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (Vc x 1000) / (D_1 x 3.14)
- mm/min = Fr x RPM
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

	Series 135M 5D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 1.5	3	6	8	10	12	16	20
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	105	RPM	22297	11148	5574	4181	3344	2787	2090	1672
			(84-126)	Fr	0.048	0.095	0.190	0.254	0.317	0.380	0.507	0.634
				Feed (mm/min)	1060	1060	1060	1060	1060	1060	1060	1060
		≤ 275 Bhn or ≤ 28 HRc	94	RPM	20035	10017	5009	3756	3005	2504	1878	1503
			(76-113)	Fr	0.043	0.085	0.171	0.228	0.285	0.341	0.455	0.569
				Feed (mm/min)	855	855	855	855	855	855	855	855
		≤ 425 Bhn or ≤ 45 HRc	55	RPM	11633	5816	2908	2181	1745	1454	1091	872
			(44-66)	Fr	0.036	0.071	0.143	0.190	0.238	0.285	0.381	0.476
				Feed (mm/min)	415	415	415	415	415	415	415	415
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	82	RPM	17449	8725	4362	3272	2617	2181	1636	1309
			(66-99)	Fr	0.036	0.072	0.143	0.191	0.239	0.287	0.382	0.478
				Feed (mm/min)	625	625	625	625	625	625	625	625
		≤ 375 Bhn or ≤ 40 HRc	50	RPM	10664	5332	2666	1999	1600	1333	1000	800
			(40-60)	Fr	0.031	0.062	0.124	0.165	0.206	0.248	0.330	0.413
				Feed (mm/min)	330	330	330	330	330	330	330	330
		≤ 450 Bhn or ≤ 48 HRc	35	RPM	7432	3716	1858	1394	1115	929	697	557
			(28-42)	Fr	0.022	0.043	0.086	0.115	0.144	0.172	0.230	0.287
				Feed (mm/min)	160	160	160	160	160	160	160	160
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 200 Bhn or ≤ 13 HRc	37	RPM	7755	3878	1939	1454	1163	969	727	582
			(29-44)	Fr	0.031	0.062	0.124	0.165	0.206	0.248	0.330	0.413
				Feed (mm/min)	240	240	240	240	240	240	240	240
		≤ 375 Bhn or ≤ 40 HRc	24	RPM	5170	2585	1293	969	776	646	485	388
			(20-29)	Fr	0.015	0.029	0.058	0.077	0.097	0.116	0.155	0.193
				Feed (mm/min)	75	75	75	75	75	75	75	75
		≤ 475 Bhn or ≤ 50 HRc	21	RPM	4524	2262	1131	848	679	565	424	339
			(17-26)	Fr	0.010	0.020	0.040	0.053	0.066	0.080	0.106	0.133
				Feed (mm/min)	45	45	45	45	45	45	45	45
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	91	RPM	19388	9694	4847	3635	2908	2424	1818	1454
			(73-110)	Fr	0.054	0.108	0.217	0.289	0.361	0.433	0.578	0.722
				Feed (mm/min)	1050	1050	1050	1050	1050	1050	1050	1050
		≤ 260 Bhn or ≤ 26 HRc	81	RPM	17126	8563	4282	3211	2569	2141	1606	1284
			(65-97)	Fr	0.055	0.109	0.218	0.291	0.364	0.437	0.582	0.728
				Feed (mm/min)	935	935	935	935	935	935	935	935
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 185 Bhn or ≤ 9 HRc	76	RPM	16157	8078	4039	3029	2424	2020	1515	1212
			(61-91)	Fr	0.031	0.061	0.123	0.163	0.204	0.245	0.327	0.408
				Feed (mm/min)	495	495	495	495	495	495	495	495
		≤ 275 Bhn or ≤ 28 HRc	46	RPM	9694	4847	2424	1818	1454	1212	909	727
			(37-55)	Fr	0.024	0.047	0.095	0.127	0.158	0.190	0.253	0.316
				Feed (mm/min)	230	230	230	230	230	230	230	230
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc	24	RPM	5170	2585	1293	969	776	646	485	388
			(20-29)	Fr	0.023	0.046	0.093	0.124	0.155	0.186	0.248	0.309
				Feed (mm/min)	120	120	120	120	120	120	120	120
		≤ 375 Bhn or ≤ 40 HRc	17	RPM	3555	1777	889	666	533	444	333	267
			(13-20)	Fr	0.021	0.042	0.084	0.113	0.141	0.169	0.225	0.281
				Feed (mm/min)	75	75	75	75	75	75	75	75

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HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

	Series 135M 5D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 1.5	3	6	8	10	12	16	20
S	**SUPER ALLOYS (Nickel , Cobalt, Iron Base) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy**	≤ 300 Bhn or ≤ 32 HRc	12	RPM	2585	1293	646	485	388	323	242	194
			(10-15)	Fr	0.010	0.019	0.039	0.052	0.064	0.077	0.103	0.129
				Feed (mm/min)	25	25	25	25	25	25	25	25
		≤ 400 Bhn or ≤ 43 HRc	6	RPM	1293	646	323	242	194	162	121	97
			(5-7)	Fr	0.007	0.014	0.028	0.037	0.046	0.056	0.074	0.093
				Feed (mm/min)	9	9	9	9	9	9	9	9
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	32	RPM	6786	3393	1696	1272	1018	848	636	509
			(26-38)	Fr	0.021	0.043	0.085	0.114	0.142	0.171	0.228	0.285
				Feed (mm/min)	145	145	145	145	145	145	145	145
		≤ 350 Bhn or ≤ 38 HRc	24	RPM	5170	2585	1293	969	776	646	485	388
			(20-29)	Fr	0.019	0.039	0.077	0.103	0.129	0.155	0.206	0.258
				Feed (mm/min)	100	100	100	100	100	100	100	100
		≤ 440 Bhn or ≤ 47 HRc	13	RPM	2714	1357	679	509	407	339	254	204
			(10-15)	Fr	0.015	0.029	0.059	0.079	0.098	0.118	0.157	0.196
				Feed (mm/min)	40	40	40	40	40	40	40	40
N	**ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075**	≤ 80 Bhn or ≤ 47 HRb	194	RPM	41039	20519	10260	7695	6156	5130	3847	3078
			(155-232)	Fr	0.059	0.118	0.237	0.316	0.395	0.474	0.632	0.790
				Feed (mm/min)	2430	2430	2430	2430	2430	2430	2430	2430
		≤ 150 Bhn or ≤ 7 HRc	165	RPM	34899	17449	8725	6544	5235	4362	3272	2617
			(132-198)	Fr	0.059	0.118	0.237	0.316	0.394	0.473	0.631	0.789
				Feed (mm/min)	2065	2065	2065	2065	2065	2065	2065	2065
	Copper Alloys Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	137	RPM	29082	14541	7271	5453	4362	3635	2726	2181
			(110-165)	Fr	0.027	0.053	0.107	0.142	0.178	0.213	0.284	0.355
				Feed (mm/min)	775	775	775	775	775	775	775	775
		≤ 200 Bhn or ≤ 23 HRc	110	RPM	23266	11633	5816	4362	3490	2908	2181	1745
			(88-132)	Fr	0.027	0.054	0.108	0.144	0.181	0.217	0.289	0.361
				Feed (mm/min)	630	630	630	630	630	630	630	630

Note:
- Bhn (BrineII) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (Vc x 1000) / (D_1 x 3.14)
- mm/min = Fr x RPM
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

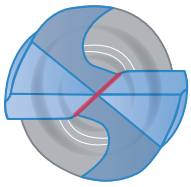
ORION High Performance Drill

Excellent Hole Accuracy with a Low Cutting Force Design
Good for Difficult-to-Cut Materials

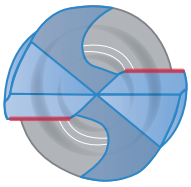
1 Optimized Cutting Edge for Increased Accuracy

The optimized cutting edge creates excellent drilling accuracy during the initial cut by consistently controlling the cutting force across the face of both cutting edges.

Cutting Edge



Centering Edge

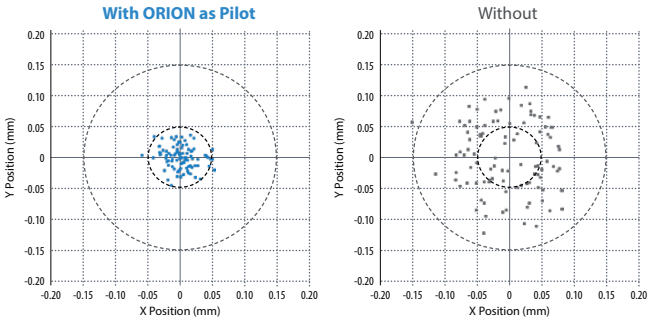


Primary Cutting Edge

Centering Edge



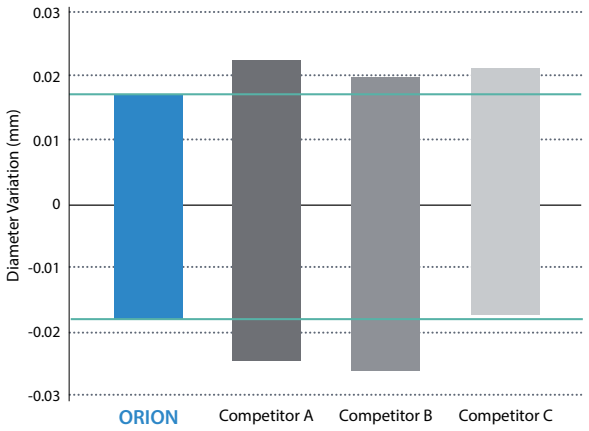
3mm Coolant Fed Drill Hole Positional Accuracy
(After using the ORION as a pilot drill)



	With ORION	Without
Cp	3.80	1.98
CpK	3.17	1.06
Spec (+/-)	0.15	0.15

Cutting Conditions : N = 2588rpm, Vf = 196mm/min Drill Diameter Ø3mm Drilling Depth 9mm 17-4PH-900

Hole Diameter Variation (In-house Evaluation)



Drill	No. of Holes	Diameter Variation (mm)
ORION	600	0.0071
Competitor A	600	0.0113
Competitor B	600	0.0109
Competitor C	600	0.0087

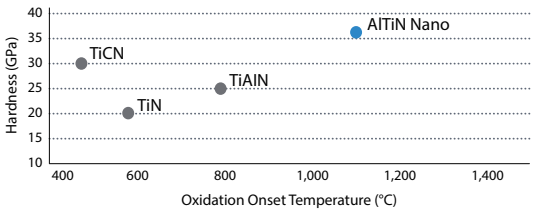
Cutting Conditions : N = 2588rpm, Vf = 196mm/min Drill Diameter Ø3mm Drilling Depth 9mm 17-4PH-900



2 Nanocomposite Super-nitride AlTiN Coating Technology

Great for difficult-to-cut and hardened materials, the 2nd generation AlTiN supernitride with a nanocomposite coating structure has a hardness GPa of 36.3 and maximum application temperature (C°) of 1,100.

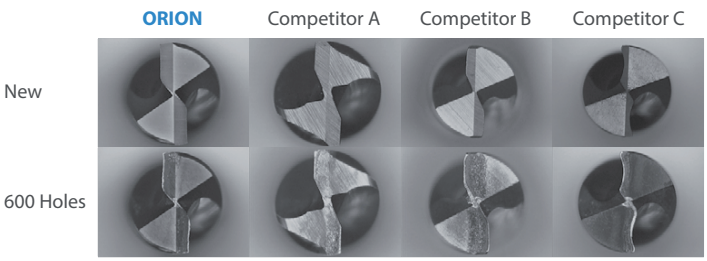
Coating Properties







Wear Resistance Comparison (In-house Evaluation)



The ORION performed with good overall wear while still maintaining good tool finish

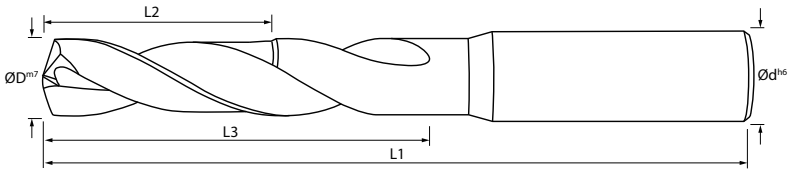
Drill	Total Holes	At 300 Holes	At 600 Holes
		Wear (mm)	Wear (mm)
ORION	600	0.032	0.068
Competitor A	600	0.031	0.057
Competitor B	600	0.044	0.073
Competitor C	600	0.044	0.071

Cutting Conditions : N = 2588rpm, Vf = 196mm/min Drill Diameter Ø3mm Drilling Depth 9mm 17-4PH-900

3xD ORION Drills - Metric Sizes (Ø1.00mm - Ø3.70mm)



3D



Cutting Dia. (ØD)	Cutting Dia. Tolerance	Shank Tolerance
1.00mm ~ 3.70mm	m7	h6

*L2 dimension refers to the Max. Length of Cut (3 x ØD).
There is an additional 2 x ØD length beyond the Length of Cut for chip exhaust only.

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)					Point Angle
		ØD^{m7}	Ød^{h6}	L1	*L2	L3	
NEW 165-0394AG197	●	1.00	3.00	50.00	3.00	5.00	142°
NEW 165-0433AG217	●	1.10	3.00	50.00	3.30	5.50	142°
NEW 165-0472AG236	●	1.20	3.00	50.00	3.60	6.00	142°
NEW 165-0512AG256	●	1.30	3.00	50.00	3.90	6.50	142°
NEW 165-0551AG276	●	1.40	3.00	50.00	4.20	7.00	142°
NEW 165-0591AG295	●	1.50	3.00	50.00	4.50	7.50	142°
NEW 165-0630AG315	●	1.60	3.00	50.00	4.80	8.00	142°
NEW 165-0669AG335	●	1.70	3.00	50.00	5.10	8.50	142°
NEW 165-0709AG354	●	1.80	3.00	50.00	5.40	9.00	142°
NEW 165-0748AG374	●	1.90	3.00	50.00	5.70	9.50	142°
NEW 165-0787AG394	●	2.00	3.00	50.00	6.00	10.00	142°
165-0827AG413	●	2.10	3.00	50.00	6.30	10.50	142°
165-0866AG433	●	2.20	3.00	50.00	6.60	11.00	142°
165-0906AG453	●	2.30	3.00	50.00	6.90	11.50	142°
165-0945AG472	●	2.40	3.00	50.00	7.20	12.00	142°
165-0984AG492	●	2.50	3.00	50.00	7.50	12.50	142°
165-1024AG512	●	2.60	3.00	50.00	7.80	13.00	142°
165-1063AG531	●	2.70	3.00	50.00	8.10	13.50	142°
165-1102AG551	●	2.80	3.00	50.00	8.40	14.00	142°
165-1142AG571	●	2.90	3.00	50.00	8.70	14.50	142°
165-1181AG591	●	3.00	4.00	60.00	9.00	15.00	142°
165-1220AG610	●	3.10	4.00	60.00	9.30	15.50	142°
165-1260AG630	●	3.20	4.00	60.00	9.60	16.00	142°
165-1299AG650	●	3.30	4.00	60.00	9.90	16.50	142°
165-1339AG669	●	3.40	4.00	60.00	10.20	17.00	142°
165-1378AG689	●	3.50	4.00	60.00	10.50	17.50	142°
165-1417AG709	●	3.60	4.00	60.00	10.80	18.00	142°
165-1457AG728	●	3.70	4.00	60.00	11.10	18.50	142°

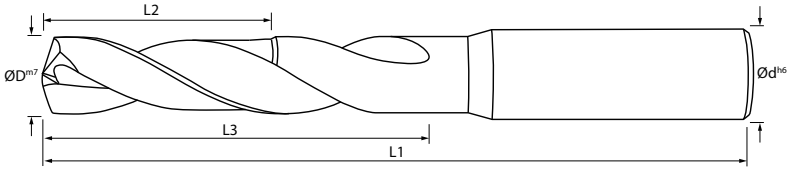
● : U.S. Stock

3xD ORION Drills - Metric Sizes (Ø3.80mm - Ø6.50mm)

Cutting Dia. (ØD)	Cutting Dia. Tolerance	Shank Tolerance
3.80mm ~ 6.50mm	m7	h6



3D



*L2 dimension refers to the Max. Length of Cut (3 x ØD).
There is an additional 2 x ØD length beyond the Length of Cut for chip exhaust only.

Metric Drill Dimensions

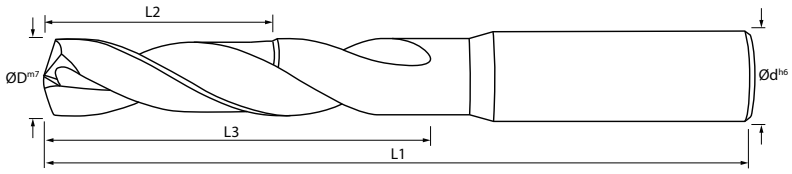
Part Number	Stock	Dimensions (mm)					Point Angle
		ØD^{m7}	Ød^{h6}	L1	*L2	L3	
165-1496AG748	●	3.80	4.00	60.00	11.40	19.00	142°
165-1535AG768	●	3.90	4.00	60.00	11.70	19.50	142°
165-1575AG787	●	4.00	6.00	70.00	12.00	20.00	142°
165-1614AG807	●	4.10	6.00	70.00	12.30	20.50	142°
165-1654AG827	●	4.20	6.00	70.00	12.60	21.00	142°
165-1693AG846	●	4.30	6.00	70.00	12.90	21.50	142°
165-1732AG866	●	4.40	6.00	70.00	13.20	22.00	142°
165-1772AG886	●	4.50	6.00	70.00	13.50	22.50	142°
165-1811AG906	●	4.60	6.00	70.00	13.80	23.00	142°
165-1850AG925	●	4.70	6.00	70.00	14.10	23.50	142°
165-1890AG945	●	4.80	6.00	70.00	14.40	24.00	142°
165-1929AG965	●	4.90	6.00	70.00	14.70	24.50	142°
165-1969AG984	●	5.00	6.00	70.00	15.00	25.00	142°
165-2008AG1004	●	5.10	6.00	70.00	15.30	25.50	142°
165-2047AG1024	●	5.20	6.00	70.00	15.60	26.00	142°
165-2087AG1043	●	5.30	6.00	70.00	15.90	26.50	142°
165-2126AG1063	●	5.40	6.00	70.00	16.20	27.00	142°
165-2165AG1083	●	5.50	6.00	70.00	16.50	27.50	142°
165-2205AG1102	●	5.60	6.00	70.00	16.80	28.00	142°
165-2244AG1122	●	5.70	6.00	70.00	17.10	28.50	142°
165-2283AG1142	●	5.80	6.00	70.00	17.40	29.00	142°
165-2323AG1161	●	5.90	6.00	70.00	17.70	29.50	142°
165-2362AG1181	●	6.00	8.00	80.00	18.00	30.00	142°
165-2402AG1201	●	6.10	8.00	80.00	18.30	30.50	142°
165-2441AG1220	●	6.20	8.00	80.00	18.60	31.00	142°
165-2480AG1240	●	6.30	8.00	80.00	18.90	31.50	142°
165-2520AG1260	●	6.40	8.00	80.00	19.20	32.00	142°
165-2559AG1280	●	6.50	8.00	80.00	19.50	32.50	142°

● : U.S. Stock

3xD ORION Drills - Metric Sizes (Ø6.60mm - Ø9.30mm)



3D



Cutting Dia. (ØD)	Cutting Dia. Tolerance	Shank Tolerance
6.60mm ~ 9.30mm	m7	h6

*L2 dimension refers to the Max. Length of Cut (3 x ØD).
There is an additional 2 x ØD length beyond the Length of Cut for chip exhaust only.

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)					Point Angle
		ØD^{m7}	Ød^{h6}	L1	*L2	L3	
165-2598AG1299	●	6.60	8.00	80.00	19.80	33.00	142°
165-2638AG1319	●	6.70	8.00	80.00	20.10	33.50	142°
165-2677AG1339	●	6.80	8.00	80.00	20.40	34.00	142°
165-2717AG1358	●	6.90	8.00	80.00	20.70	34.50	142°
165-2756AG1378	●	7.00	8.00	80.00	21.00	35.00	142°
165-2795AG1398	●	7.10	8.00	80.00	21.30	35.50	142°
165-2835AG1417	●	7.20	8.00	80.00	21.60	36.00	142°
165-2874AG1437	●	7.30	8.00	80.00	21.90	36.50	142°
165-2913AG1457	●	7.40	8.00	80.00	22.20	37.00	142°
165-2953AG1476	●	7.50	8.00	80.00	22.50	37.50	142°
165-2992AG1496	●	7.60	8.00	80.00	22.80	38.00	142°
165-3031AG1516	●	7.70	8.00	80.00	23.10	38.50	142°
165-3071AG1535	●	7.80	8.00	80.00	23.40	39.00	142°
165-3110AG1555	●	7.90	8.00	80.00	23.70	39.50	142°
165-3150AG1575	●	8.00	10.00	100.00	24.00	40.00	142°
165-3189AG1594	●	8.10	10.00	100.00	24.30	40.50	142°
165-3228AG1614	●	8.20	10.00	100.00	24.60	41.00	142°
165-3268AG1634	●	8.30	10.00	100.00	24.90	41.50	142°
165-3307AG1654	●	8.40	10.00	100.00	25.20	42.00	142°
165-3346AG1673	●	8.50	10.00	100.00	25.50	42.50	142°
165-3386AG1693	●	8.60	10.00	100.00	25.80	43.00	142°
165-3425AG1713	●	8.70	10.00	100.00	26.10	43.50	142°
165-3465AG1732	●	8.80	10.00	100.00	26.40	44.00	142°
165-3504AG1752	●	8.90	10.00	100.00	26.70	44.50	142°
165-3543AG1772	●	9.00	10.00	100.00	27.00	45.00	142°
165-3583AG1791	●	9.10	10.00	100.00	27.30	45.50	142°
165-3622AG1811	●	9.20	10.00	100.00	27.60	46.00	142°
165-3661AG1831	●	9.30	10.00	100.00	27.90	46.50	142°

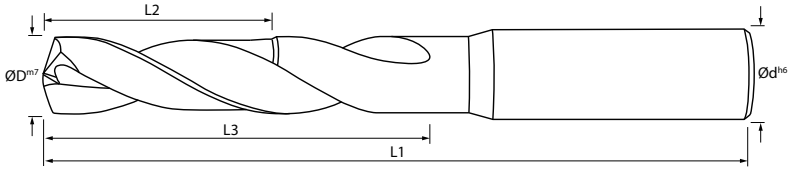
● : U.S. Stock

3xD ORION Drills - Metric Sizes (Ø9.40mm - Ø12.00mm)

Cutting Dia. (ØD)	Cutting Dia. Tolerance	Shank Tolerance
9.40mm ~ 12.00mm	m7	h6



3D



*L2 dimension refers to the Max. Length of Cut (3 x ØD).
There is an additional 2 x ØD length beyond the Length of Cut for chip exhaust only.

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)					Point Angle
		ØD^{m7}	Ød^{h6}	L1	*L2	L3	
165-3701AG1850	●	9.40	10.00	100.00	28.20	47.00	142°
165-3740AG1870	●	9.50	10.00	100.00	28.50	47.50	142°
165-3780AG1890	●	9.60	10.00	100.00	28.80	48.00	142°
165-3819AG1909	●	9.70	10.00	100.00	29.10	48.50	142°
165-3858AG1929	●	9.80	10.00	100.00	29.40	49.00	142°
165-3898AG1949	●	9.90	10.00	100.00	29.70	49.50	142°
165-3937AG1969	●	10.00	12.00	110.00	30.00	50.00	142°
165-3976AG1988	●	10.10	12.00	110.00	30.30	50.50	142°
165-4016AG2008	●	10.20	12.00	110.00	30.60	51.00	142°
165-4055AG2028	●	10.30	12.00	110.00	30.90	51.50	142°
165-4094AG2047	●	10.40	12.00	110.00	31.20	52.00	142°
165-4134AG2067	●	10.50	12.00	110.00	31.50	52.50	142°
165-4173AG2087	●	10.60	12.00	110.00	31.80	53.00	142°
165-4213AG2106	●	10.70	12.00	110.00	32.10	53.50	142°
165-4252AG2126	●	10.80	12.00	110.00	32.40	54.00	142°
165-4291AG2146	●	10.90	12.00	110.00	32.70	54.50	142°
165-4331AG2165	●	11.00	12.00	110.00	33.00	55.00	142°
165-4370AG2185	●	11.10	12.00	110.00	33.30	55.50	142°
165-4409AG2205	●	11.20	12.00	110.00	33.60	56.00	142°
165-4449AG2224	●	11.30	12.00	110.00	33.90	56.50	142°
165-4488AG2244	●	11.40	12.00	110.00	34.20	57.00	142°
165-4528AG2264	●	11.50	12.00	110.00	34.50	57.50	142°
165-4567AG2283	●	11.60	12.00	110.00	34.80	58.00	142°
165-4606AG2303	●	11.70	12.00	110.00	35.10	58.50	142°
165-4646AG2323	●	11.80	12.00	110.00	35.40	59.00	142°
165-4685AG2343	●	11.90	12.00	110.00	35.70	59.50	142°
165-4724AG2362	●	12.00	14.00	110.00	36.00	60.00	142°

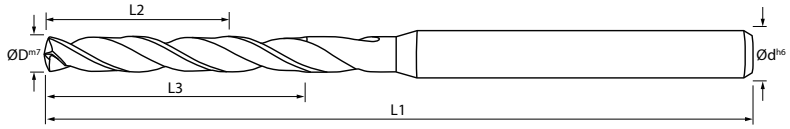
● : U.S. Stock

5xD ORION Drills - Metric Sizes (Ø1.00mm - Ø3.70mm) NEW

Cutting Dia. (ØD)	Cutting Dia. Tolerance	Shank Tolerance
1.00mm ~ 3.70mm	m7	h6



5D



*L2 dimension refers to the Max. Length of Cut (5 x ØD).
There is an additional 2 x ØD length beyond the Length of Cut for chip exhaust only.

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)					Point Angle
		ØD^{m7}	Ød^{h6}	L1	*L2	L3	
165-0394AG276	●	1.00	3.00	60.00	5.00	0.276	142°
165-0433AG303	●	1.10	3.00	60.00	5.50	0.303	142°
165-0472AG331	●	1.20	3.00	60.00	6.00	0.331	142°
165-0512AG358	●	1.30	3.00	60.00	6.50	0.358	142°
165-0551AG386	●	1.40	3.00	60.00	7.00	0.386	142°
165-0591AG413	●	1.50	3.00	60.00	7.50	10.50	142°
165-0630AG441	●	1.60	3.00	60.00	8.00	11.20	142°
165-0669AG469	●	1.70	3.00	60.00	8.50	11.90	142°
165-0709AG496	●	1.80	3.00	60.00	9.00	12.60	142°
165-0748AG524	●	1.90	3.00	60.00	9.50	13.30	142°
165-0787AG551	●	2.00	3.00	60.00	10.00	14.00	142°
165-0827AG579	●	2.10	3.00	60.00	10.50	14.70	142°
165-0866AG606	●	2.20	3.00	60.00	11.00	15.40	142°
165-0906AG634	●	2.30	3.00	60.00	11.50	16.10	142°
165-0945AG661	●	2.40	3.00	60.00	12.00	16.80	142°
165-0984AG689	●	2.50	3.00	60.00	12.50	17.50	142°
165-1024AG717	●	2.60	3.00	60.00	13.00	18.20	142°
165-1063AG744	●	2.70	3.00	60.00	13.50	18.90	142°
165-1102AG772	●	2.80	3.00	60.00	14.00	19.60	142°
165-1142AG799	●	2.90	3.00	60.00	14.50	20.30	142°
165-1181AG827	●	3.00	4.00	70.00	15.00	21.00	142°
165-1220AG854	●	3.10	4.00	70.00	15.50	21.70	142°
165-1260AG882	●	3.20	4.00	70.00	16.00	22.40	142°
165-1299AG909	●	3.30	4.00	70.00	16.50	23.10	142°
165-1339AG937	●	3.40	4.00	70.00	17.00	23.80	142°
165-1378AG965	●	3.50	4.00	70.00	17.50	24.50	142°
165-1417AG992	●	3.60	4.00	70.00	18.00	25.20	142°
165-1457AG1020	●	3.70	4.00	70.00	18.50	25.90	142°

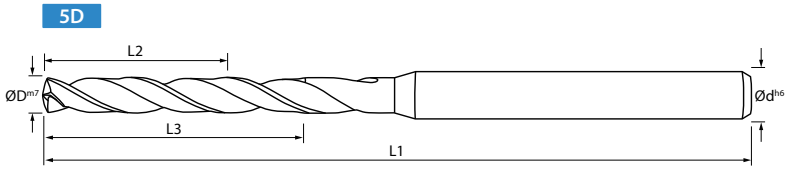
● : U.S. Stock

Hi Performance Drill

5xD ORION Drills - Metric Sizes (Ø3.80mm - Ø6.50mm) NEW

Cutting Dia. (ØD)	Cutting Dia. Tolerance	Shank Tolerance
3.80mm ~ 6.50mm	m7	h6





*L2 dimension refers to the Max. Length of Cut (5 x ØD).
There is an additional 2 x ØD length beyond the Length of Cut for chip exhaust only.

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)					Point Angle
		ØD^{m7}	Ød^{h6}	L1	*L2	L3	
165-1496AG1047	●	3.80	4.00	70.00	19.00	26.60	142°
165-1535AG1075	●	3.90	4.00	70.00	19.50	27.30	142°
165-1575AG1102	●	4.00	6.00	90.00	20.00	28.00	142°
165-1614AG1130	●	4.10	6.00	90.00	20.50	28.70	142°
165-1654AG1157	●	4.20	6.00	90.00	21.00	29.40	142°
165-1693AG1185	●	4.30	6.00	90.00	21.50	30.10	142°
165-1732AG1213	●	4.40	6.00	90.00	22.00	30.80	142°
165-1772AG1240	●	4.50	6.00	90.00	22.50	31.50	142°
165-1811AG1268	●	4.60	6.00	90.00	23.00	32.20	142°
165-1850AG1295	●	4.70	6.00	90.00	23.50	32.90	142°
165-1890AG1323	●	4.80	6.00	90.00	24.00	33.60	142°
165-1929AG1350	●	4.90	6.00	90.00	24.50	34.30	142°
165-1969AG1378	●	5.00	6.00	90.00	25.00	35.00	142°
165-2008AG1406	●	5.10	6.00	90.00	25.50	35.70	142°
165-2047AG1433	●	5.20	6.00	90.00	26.00	36.40	142°
165-2087AG1461	●	5.30	6.00	90.00	26.50	37.10	142°
165-2126AG1488	●	5.40	6.00	90.00	27.00	37.80	142°
165-2165AG1516	●	5.50	6.00	90.00	27.50	38.50	142°
165-2205AG1543	●	5.60	6.00	90.00	28.00	39.20	142°
165-2244AG1571	●	5.70	6.00	90.00	28.50	39.90	142°
165-2283AG1598	●	5.80	6.00	90.00	29.00	40.60	142°
165-2323AG1626	●	5.90	6.00	90.00	29.50	41.30	142°
165-2362AG1654	●	6.00	8.00	100.00	30.00	42.00	142°
165-2402AG1681	●	6.10	8.00	100.00	30.50	42.70	142°
165-2441AG1709	●	6.20	8.00	100.00	31.00	43.40	142°
165-2480AG1736	●	6.30	8.00	100.00	31.50	44.10	142°
165-2520AG1764	●	6.40	8.00	100.00	32.00	44.80	142°
165-2559AG1791	●	6.50	8.00	100.00	32.50	45.50	142°

● : U.S. Stock

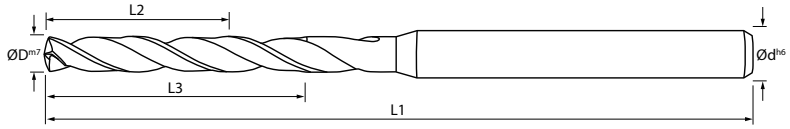
Hi Performance Drill

5xD ORION Drills - Metric Sizes (Ø6.60mm - Ø9.30mm) NEW

Cutting Dia. (ØD)	Cutting Dia. Tolerance	Shank Tolerance
6.60mm ~ 9.30mm	m7	h6



5D



*L2 dimension refers to the Max. Length of Cut (5 x ØD).
There is an additional 2 x ØD length beyond the Length of Cut for chip exhaust only.

Metric Drill Dimensions

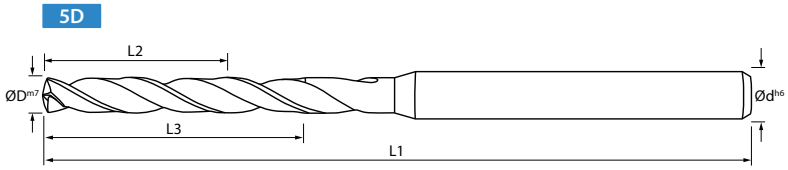
Part Number	Stock	Dimensions (mm)					Point Angle
		ØD^{m7}	Ød^{h6}	L1	*L2	L3	
165-2598AG1819	●	6.60	8.00	100.00	33.00	46.20	142°
165-2638AG1846	●	6.70	8.00	100.00	33.50	46.90	142°
165-2677AG1874	●	6.80	8.00	100.00	34.00	47.60	142°
165-2717AG1902	●	6.90	8.00	100.00	34.50	48.30	142°
165-2756AG1929	●	7.00	8.00	100.00	35.00	49.00	142°
165-2795AG1957	●	7.10	8.00	100.00	35.50	49.70	142°
165-2835AG1984	●	7.20	8.00	100.00	36.00	50.40	142°
165-2874AG2012	●	7.30	8.00	100.00	36.50	51.10	142°
165-2913AG2039	●	7.40	8.00	100.00	37.00	51.80	142°
165-2953AG2067	●	7.50	8.00	100.00	37.50	52.50	142°
165-2992AG2094	●	7.60	8.00	100.00	38.00	53.20	142°
165-3031AG2122	●	7.70	8.00	100.00	38.50	53.90	142°
165-3071AG2150	●	7.80	8.00	100.00	39.00	54.60	142°
165-3110AG2177	●	7.90	8.00	100.00	39.50	55.30	142°
165-3150AG2205	●	8.00	10.00	120.00	40.00	56.00	142°
165-3189AG2232	●	8.10	10.00	120.00	40.50	56.70	142°
165-3228AG2260	●	8.20	10.00	120.00	41.00	57.40	142°
165-3268AG2287	●	8.30	10.00	120.00	41.50	58.10	142°
165-3307AG2315	●	8.40	10.00	120.00	42.00	58.80	142°
165-3346AG2343	●	8.50	10.00	120.00	42.50	59.50	142°
165-3386AG2370	●	8.60	10.00	120.00	43.00	60.20	142°
165-3425AG2398	●	8.70	10.00	120.00	43.50	60.90	142°
165-3465AG2425	●	8.80	10.00	120.00	44.00	61.60	142°
165-3504AG2453	●	8.90	10.00	120.00	44.50	62.30	142°
165-3543AG2480	●	9.00	10.00	120.00	45.00	63.00	142°
165-3583AG2508	●	9.10	10.00	120.00	45.50	63.70	142°
165-3622AG2535	●	9.20	10.00	120.00	46.00	64.40	142°
165-3661AG2563	●	9.30	10.00	120.00	46.50	65.10	142°

● : U.S. Stock

5xD ORION Drills - Metric Sizes (Ø9.40mm - Ø12.00mm) NEW

Cutting Dia. (ØD)	Cutting Dia. Tolerance	Shank Tolerance
9.40mm ~ 12.00mm	m7	h6





*L2 dimension refers to the Max. Length of Cut (5 x ØD).
There is an additional 2 x ØD length beyond the Length of Cut for chip exhaust only.

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)					Point Angle
		ØD^{m7}	Ød^{h6}	L1	*L2	L3	
165-3701AG2591	●	9.40	10.00	120.00	47.00	65.80	142°
165-3740AG2618	●	9.50	10.00	120.00	47.50	66.50	142°
165-3780AG2646	●	9.60	10.00	120.00	48.00	67.20	142°
165-3819AG2673	●	9.70	10.00	120.00	48.50	67.90	142°
165-3858AG2701	●	9.80	10.00	120.00	49.00	68.60	142°
165-3898AG2728	●	9.90	10.00	120.00	49.50	69.30	142°
165-3937AG2756	●	10.00	12.00	140.00	50.00	70.00	142°
165-3976AG2783	●	10.10	12.00	140.00	50.50	70.70	142°
165-4016AG2811	●	10.20	12.00	140.00	51.00	71.40	142°
165-4055AG2839	●	10.30	12.00	140.00	51.50	72.10	142°
165-4094AG2866	●	10.40	12.00	140.00	52.00	72.80	142°
165-4134AG2894	●	10.50	12.00	140.00	52.50	73.50	142°
165-4173AG2921	●	10.60	12.00	140.00	53.00	74.20	142°
165-4213AG2949	●	10.70	12.00	140.00	53.50	74.90	142°
165-4252AG2976	●	10.80	12.00	140.00	54.00	75.60	142°
165-4291AG3004	●	10.90	12.00	140.00	54.50	76.30	142°
165-4331AG3031	●	11.00	12.00	140.00	55.00	77.00	142°
165-4370AG3059	●	11.10	12.00	140.00	55.50	77.70	142°
165-4409AG3087	●	11.20	12.00	140.00	56.00	78.40	142°
165-4449AG3114	●	11.30	12.00	140.00	56.50	79.10	142°
165-4488AG3142	●	11.40	12.00	140.00	57.00	79.80	142°
165-4528AG3169	●	11.50	12.00	140.00	57.50	80.50	142°
165-4567AG3197	●	11.60	12.00	140.00	58.00	81.20	142°
165-4606AG3224	●	11.70	12.00	140.00	58.50	81.90	142°
165-4646AG3252	●	11.80	12.00	140.00	59.00	82.60	142°
165-4685AG3280	●	11.90	12.00	140.00	59.50	83.30	142°
165-4724AG3307	●	12.00	14.00	140.00	60.00	84.00	142°

● : U.S. Stock

RECOMMENDED CUTTING CONDITIONS

Workpiece Material	Material Hardness/ Types	Recommended Cutting Speed		Cutting Dia. DC (in)	Cutting Dia. DC (mm)	Feed Rate Drill Length to Dia Ratio	
						3xD & 5xD	
		sfm	m/min			(ipr)	(mm/rev)
Low Carbon Steel	**12L14 A36**	270 - **300** - 330	80 - **90** - 100	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0015 - 0.0030	0.04 - 0.08
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0030 - 0.0060	0.08 - 0.15
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0060 - 0.0090	0.15 - 0.23
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0090 - 0.0120	0.23 - 0.30
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0120 - 0.0150	0.30 - 0.38
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0120 - 0.0150	0.30 - 0.38
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0120 - 0.0150	0.30 - 0.38
Mild Carbon Steel	**1018 1028 1050**	250 - **275** - 300	75 - **85** - 90	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0015 - 0.0030	0.04 - 0.08
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0030 - 0.0060	0.08 - 0.15
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0060 - 0.0090	0.15 - 0.23
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0090 - 0.0120	0.23 - 0.30
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0120 - 0.0150	0.30 - 0.38
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0120 - 0.0150	0.30 - 0.38
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0120 - 0.0150	0.30 - 0.38
Alloy Steel	**4130 4140 4150 8620**	225 - **250** - 275	70 - **75** - 85	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0010 - 0.0020	0.03 - 0.05
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0020 - 0.0045	0.05 - 0.11
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0045 - 0.0070	0.11 - 0.18
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0070 - 0.0090	0.18 - 0.23
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0090 - 0.0115	0.23 - 0.29
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0090 - 0.0115	0.23 - 0.29
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0090 - 0.0115	0.23 - 0.29
Prehardened Tool Steel	**4140PH A2 D2 H13 P20**	150 - **200** - 250	45 - **60** - 75	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0010 - 0.0020	0.03 - 0.05
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0020 - 0.0040	0.05 - 0.10
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0040 - 0.0060	0.10 - 0.15
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0060 - 0.0080	0.15 - 0.20
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0060 - 0.0080	0.15 - 0.20
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0060 - 0.0080	0.15 - 0.20
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0060 - 0.0080	0.15 - 0.20
Hardened Tool Steel	**>48 HRc**	75 - **100** - 125	20 - **30** - 40	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0005 - 0.0010	0.01 - 0.03
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0010 - 0.0020	0.03 - 0.05
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0020 - 0.0030	0.05 - 0.08
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0030 - 0.0040	0.08 - 0.10
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0040 - 0.0050	0.10 - 0.13
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0040 - 0.0050	0.10 - 0.13
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0040 - 0.0050	0.10 - 0.13
Stainless Steel	**303 304 316 321**	115 - **130** - 145	35 - **40** - 45	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0010 - 0.0020	0.03 - 0.05
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0020 - 0.0045	0.05 - 0.11
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0045 - 0.0070	0.11 - 0.18
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0070 - 0.0090	0.18 - 0.23
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0090 - 0.0115	0.23 - 0.29
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0110 - 0.0125	0.28 - 0.32
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.00120 - 0.0135	0.03 - 0.34
Stainless Steel	**15-5PH 17-4PH 13-8 400 Series**	90 - **100** - 110	25 - **30** - 35	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0010 - 0.0020	0.03 - 0.05
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0020 - 0.0040	0.05 - 0.10
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0040 - 0.0060	0.10 - 0.15
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0050 - 0.0070	0.13 - 0.18
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0060 - 0.0080	0.15 - 0.20
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0070 - 0.0090	0.18 - 0.23
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0090 - 0.0110	0.23 - 0.28

Recommended starting parameters based on good setup, minimum tool runout & good tooling

- Above recommendations are suggested starting parameters. Cutting speeds and feed rates may vary according to machining application and setup.

RECOMMENDED CUTTING CONDITIONS

Workpiece Material	Material Hardness/ Types	Recommended Cutting Speed		Cutting Dia. DC (in)	Cutting Dia. DC (mm)	Feed Rate Drill Length to Dia Ratio	
						3xD & 5xD	
		sfm	m/min			(ipr)	(mm/rev)
Gray Cast Iron	-	295 - **325** - 355	90 - **100** - 110	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0015 - 0.0030	0.04 - 0.08
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0030 - 0.0060	0.08 - 0.15
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0060 - 0.0090	0.15 - 0.23
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0090 - 0.0120	0.23 - 0.30
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0120 - 0.0150	0.30 - 0.38
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0150 - 0.0170	0.38 - 0.43
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0170 - 0.0190	0.43 - 0.48
Nodular Cast Iron	-	235 - **260** - 285	70 - **80** - 85	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0010 - 0.0025	0.03 - 0.06
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0025 - 0.0050	0.06 - 0.13
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0055 - 0.0080	0.14 - 0.20
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0080 - 0.0110	0.20 - 0.28
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0110 - 0.0130	0.28 - 0.33
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0130 - 0.0150	0.33 - 0.38
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0150 - 0.0170	0.38 - 0.43
Aluminum	-	**ALLOY** 320 - **350** - 380 **CAST** 400 - **450** - 500	**ALLOY** 100 - **105** - 115 **CAST** 120 - **135** - 150	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0015 - 0.0030	0.04 - 0.08
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0030 - 0.0070	0.08 - 0.18
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0070 - 0.0095	0.18 - 0.24
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0095 - 0.0125	0.24 - 0.32
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0125 - 0.0140	0.32 - 0.36
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0140 - 0.0155	0.36 - 0.39
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0155 - 0.0170	0.39 - 0.43
Copper Alloys	-	280 - **325** - 360	85 - **100** - 110	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0015 - 0.0030	0.04 - 0.08
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0030 - 0.0070	0.08 - 0.18
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0070 - 0.0095	0.18 - 0.24
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0095 - 0.0125	0.24 - 0.32
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0125 - 0.0140	0.32 - 0.36
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0140 - 0.0155	0.36 - 0.39
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0155 - 0.0170	0.39 - 0.43
Heat Resistant Alloy	**Hastelloy Inconel Monel Waspaloy Promet**	60 - **75** - 85	20 - **22** - 25	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0005 - 0.0010	0.01 - 0.03
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0010 - 0.0020	0.03 - 0.05
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0020 - 0.0030	0.05 - 0.08
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0030 - 0.0040	0.08 - 0.10
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0040 - 0.0050	0.10 - 0.13
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0050 - 0.0060	0.13 - 0.15
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0060 - 0.0070	0.15 - 0.18
Titanium Alloy	-	90 - **100** - 110	27 - **30** - 33	Ø0.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0005 - 0.0010	0.01 - 0.03
				Ø0.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0010 - 0.0020	0.03 - 0.05
				Ø0.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0020 - 0.0030	0.05 - 0.08
				Ø0.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0030 - 0.0040	0.08 - 0.10
				Ø0.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0040 - 0.0050	0.10 - 0.13
				Ø0.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0040 - 0.0050	0.10 - 0.13
				Ø0.4685 - Ø0.5000	Ø11.90 - Ø12.70	0.0040 - 0.0050	0.10 - 0.13

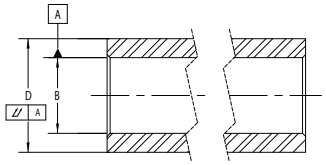
Recommended starting parameters based on good setup, minimum tool runout & good tooling

- Above recommendations are suggested starting parameters. Cutting speeds and feed rates may vary according to machining application and setup.

Case Studies

Bushing
17-4PH Stainless Steel

Vc = 147.3 sfm (n = 1,800 rpm)
Vf = 4.32 ipm
D.O.C. = 0.500"
Ø0.3125"
160-3125AG1563



Tool LIfe

ORION Ø0.3125" **659** pcs / tool — Tool Life 3.3x

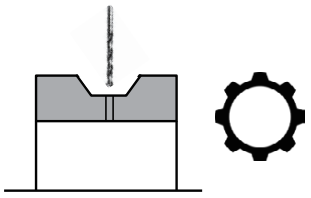
Competitor A
Ø0.3125" **200** pcs / tool

The ORION drill showed 3.3 times the tool life of Competitor A.

(User Evaluation)

Gear
1045 Steel

Vc = 165 sfm (n = 7,583 rpm)
Vf = 0.005 ipt
D.O.C. = 0.276"
Ø2.1mm
165-0827AG413 (Special)
Number of Holes: 4



Tool Life

ORION Ø2.1mm **1,000** Parts (4,000 Holes) — Tool Life 1.7x

Competitor B
Ø2.1mm **600** Parts (2,400 Holes)

The ORION drill showed 1.7 times the tool life of Competitor B.
There is also a 10% better cost performance.

(User Evaluation)

KYOCERA

SGS Solid Carbide Tools

High Performance Drills

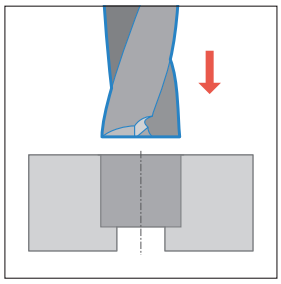


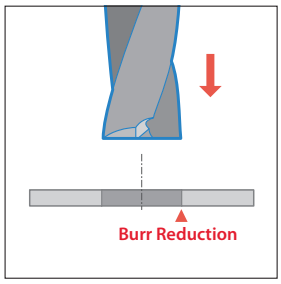
Flat Bottom Drill

2ZDK-HP

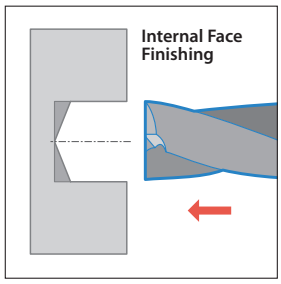
New Generation Flat Bottom Drill. Stable Machining in a Wide Range of Applications Including Counterboring and Drilling in Cylinder Surfaces. Low Cutting Force Corner Edge Prevents Burr Formation

1 Flat Bottom Used in a Wide Range of Machining Applications

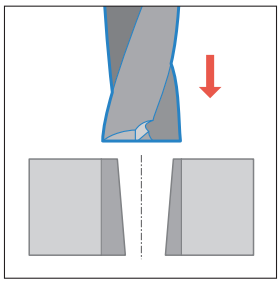

Hole Counterboring

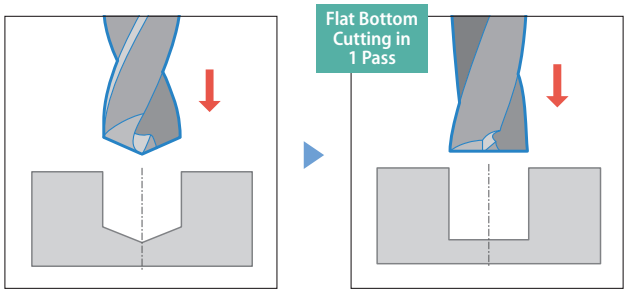


Plunging on Thin Plate

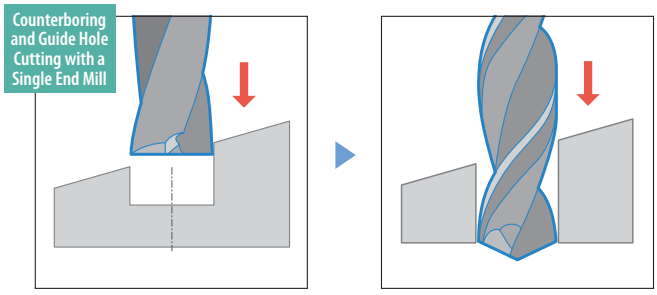


Turning in Automatic Lathes

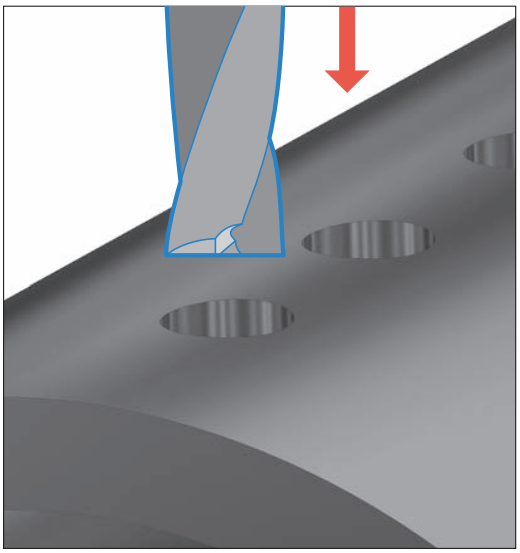

Hole Expanding



Flat Bottom Finishing after Drilling



Counterboring on Slant Surface/Spotting for Secondary Process



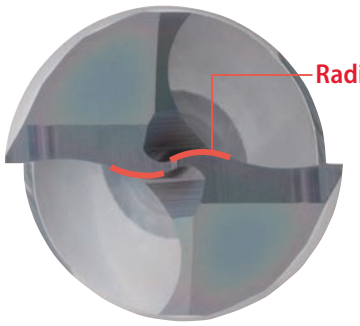
Achieves Stable Machining even in Difficult Drilling Situations

Drilling in Cylinder and Curved Surfaces

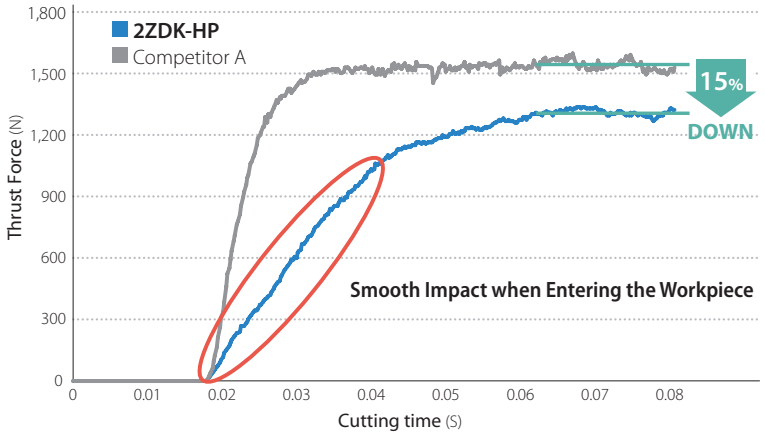
2 High Precision Machining

Chisel Edge with S-curve Provides Lower Cutting Forces
Reduced Impact Forces when Entering the Workpiece and Provides Excellent Vibration Control for High Precision Drilling

Special Thinning Shape

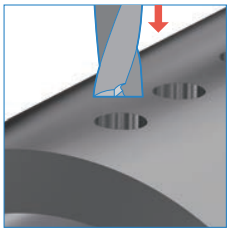


Cutting Force Comparison (In-house Evaluation)



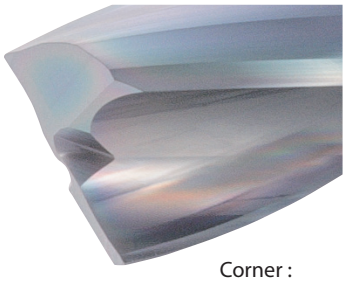
Cutting Conditions: n = 1,800 min^{-1}, Vf = 400 mm/min, Drilling Depth 10 mm, Dry Drilling Dia. ø12 mm (3D Type)
Workpiece: S50C

3 Minimizes Burrs



Low Cutting Force with Flat Bottom and Sharp Cutting Edge Minimizes Burrs

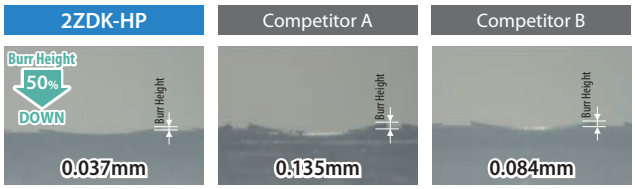
Low Cutting Force Corner Edge Design



Corner :
Positive Rake Angle

Burr Comparison (In-house Evaluation)

Drilling in Cylinder Surface

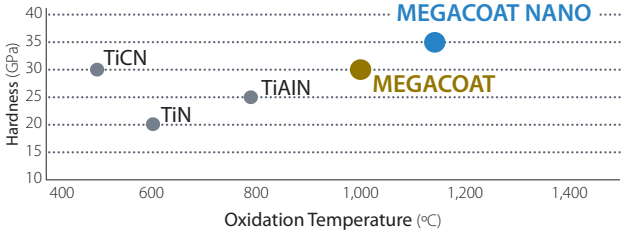


Cutting Conditions: n = 7,000 min^{-1}, Vf = 420 mm/min, Wet Drilling Dia. ø3.5 mm (3D Type)
Workpiece: Carbon Steel Pipe ø17.3 mm (Thickness 3.2 mm)

4 Long Tool Life with MEGACOAT NANO Coating Technology

The special Multilayer Nano Coating prevents wear and chipping with high hardness (35GPa) and superior oxidation resistance (oxidation temperature: 1,150 °C)

Coating Property



Flat Bottom Drill

2ZDK-HP

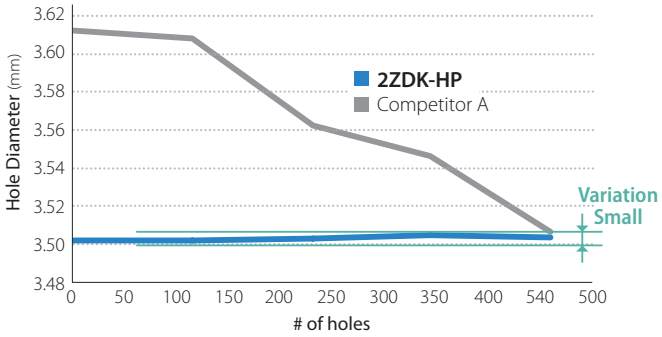
Drilling in Flat Surface

Cutting Performance Comparison (In-house Evaluation)

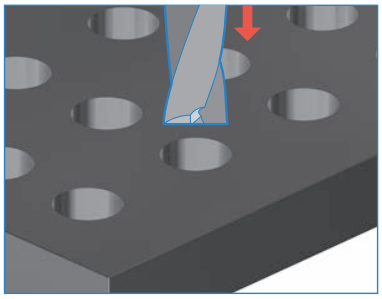
Drilling Dia. : ø3.5mm

Stable and High Precision Machining with Less Variation in Hole Diameter
Excellent Cutting Edge Condition

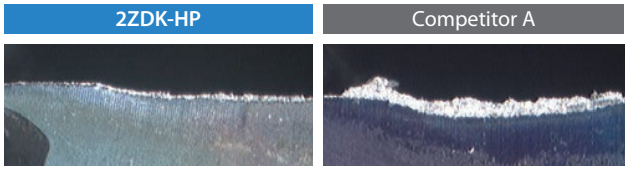
Hole Diameter



Cutting Conditions: n = 6,000 min^{-1}, Vf = 360 mm/min, Drilling Depth 5 mm, Wet
Drilling Dia. ø3.5 mm (3D Type) Workpiece: SCM440



Cutting Edge after Machining 500 holes



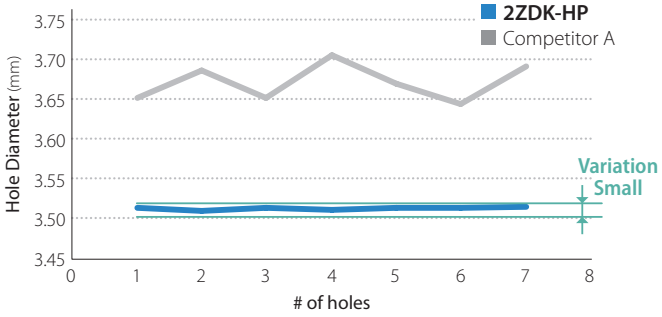
Drilling in Cylinder Surface

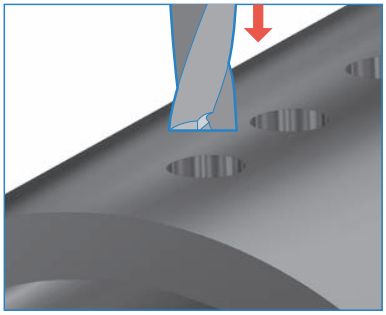
Cutting Performance Comparison (In-house Evaluation)

Drilling Dia. : ø3.5mm

Stable and High Precision Machining with Less Variation in Hole Diameter

Hole Diameter (ø3.5mm)





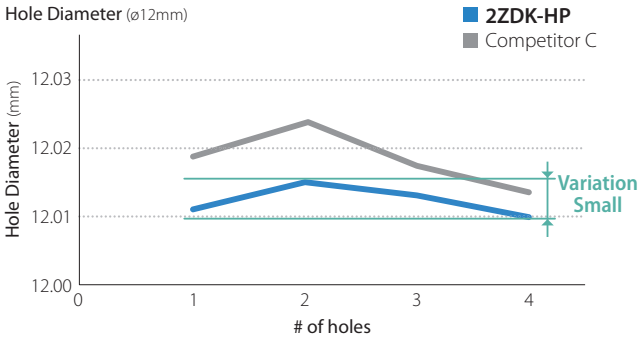
Cutting Conditions: n = 7,000 min^{-1}, Vf = 420 mm/min, Wet Drilling Dia. ø3.5 mm (3D Type)
Workpiece: Carbon Steel Pipe ø17.3 mm (Thickness 3.2 mm)

Cutting Performance Comparison (In-house Evaluation)

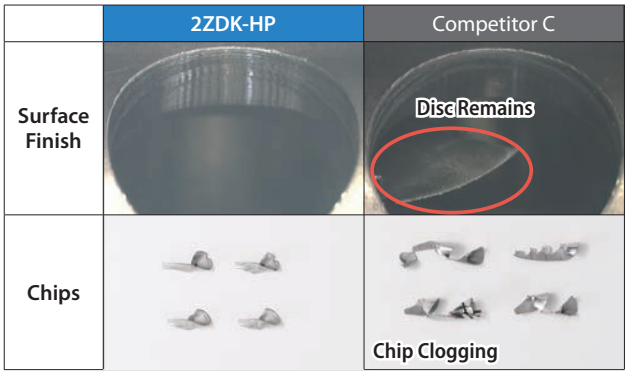
Drilling Dia. : ø12mm

Minimizes Hole Diameter Variation even at Feed Rates as High as 0.3mm/rev. Stable Machining without Chip Clogging

Hole Diameter (ø12mm)



Surface Finish and Chips



Cutting Conditions: n = 1,800 min^{-1}, Vf = 540 mm/min, Wet Drilling Dia. ø12 mm (3D Type)
Workpiece: Carbon Steel Pipe ø25 mm (Thickness 4 mm)

Flat Bottom Drill

Stock Items (1.5D Type)

1.5D

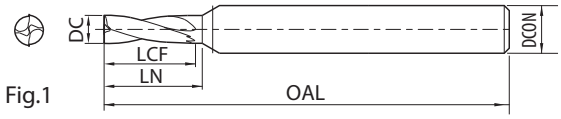


Fig.1

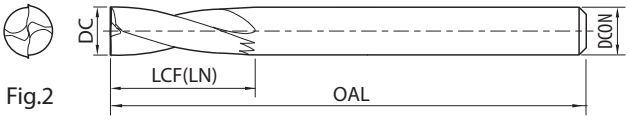


Fig.2

Number of Flutes (Z) = 2 Helix Angle: 20°

Description	Stock	Dimensions (mm)						Drawing
		DC	Outside Dia. Tolerance	LCF	LN	DCON	OAL	
2ZDK030HP-1.5D	●	3.0	0 -0.010	9	10	6	60	Fig.1
2ZDK031HP-1.5D	●	3.1	0 -0.012	10	11	6	60	Fig.1
2ZDK032HP-1.5D	●	3.2						
2ZDK033HP-1.5D	●	3.3						
2ZDK034HP-1.5D	●	3.4	0 -0.012	11	12	6	60	Fig.1
2ZDK035HP-1.5D	●	3.5						
2ZDK036HP-1.5D	●	3.6						
2ZDK037HP-1.5D	●	3.7	0 -0.012	12	13	6	60	Fig.1
2ZDK038HP-1.5D	●	3.8						
2ZDK039HP-1.5D	●	3.9						
2ZDK040HP-1.5D	●	4.0						
2ZDK041HP-1.5D	●	4.1	0 -0.012	13	14	6	60	Fig.1
2ZDK042HP-1.5D	●	4.2						
2ZDK043HP-1.5D	●	4.3						
2ZDK044HP-1.5D	●	4.4	0 -0.012	14	15	6	60	Fig.1
2ZDK045HP-1.5D	●	4.5						
2ZDK046HP-1.5D	●	4.6						
2ZDK047HP-1.5D	●	4.7	0 -0.012	15	16	6	60	Fig.1
2ZDK048HP-1.5D	●	4.8						
2ZDK049HP-1.5D	●	4.9						
2ZDK050HP-1.5D	●	5.0	0 -0.012	16	17	6	60	Fig.1
2ZDK051HP-1.5D	●	5.1						
2ZDK052HP-1.5D	●	5.2						
2ZDK053HP-1.5D	●	5.3						
2ZDK054HP-1.5D	●	5.4	0 -0.012	17	18	6	60	Fig.1
2ZDK055HP-1.5D	●	5.5						
2ZDK056HP-1.5D	●	5.6						
2ZDK057HP-1.5D	●	5.7	0 -0.012	18	19	6	60	Fig.1
2ZDK058HP-1.5D	●	5.8						
2ZDK059HP-1.5D	●	5.9						
2ZDK060HP-1.5D	●	6.0	0 -0.012	19	(21)	6	60	Fig.2
2ZDK061HP-1.5D	●	6.1	0 -0.015	19	21	8	70	Fig.1
2ZDK062HP-1.5D	●	6.2						
2ZDK063HP-1.5D	●	6.3	0 -0.015	20	22	8	70	Fig.1
2ZDK064HP-1.5D	●	6.4						
2ZDK065HP-1.5D	●	6.5						
2ZDK066HP-1.5D	●	6.6						
2ZDK067HP-1.5D	●	6.7	0 -0.015	21	23	8	70	Fig.1
2ZDK068HP-1.5D	●	6.8						
2ZDK069HP-1.5D	●	6.9						
2ZDK070HP-1.5D	●	7.0	0 -0.015	22	24	8	70	Fig.1
2ZDK071HP-1.5D	●	7.1						
2ZDK072HP-1.5D	●	7.2						
2ZDK073HP-1.5D	●	7.3	0 -0.015	23	25	8	70	Fig.1
2ZDK074HP-1.5D	●	7.4						
2ZDK075HP-1.5D	●	7.5						

Description	Stock	Dimensions (mm)						Drawing
		DC	Outside Dia. Tolerance	LCF	LN	DCON	OAL	
2ZDK076HP-1.5D	●	7.6	0 -0.015	24	25	8	70	Fig.1
2ZDK077HP-1.5D	●	7.7						
2ZDK078HP-1.5D	●	7.8						
2ZDK079HP-1.5D	●	7.9						
2ZDK080HP-1.5D	●	8.0	0 -0.015	25	(27)	8	70	Fig.2
2ZDK081HP-1.5D	●	8.1	0 -0.015	25	27	10	80	Fig.1
2ZDK082HP-1.5D	●	8.2						
2ZDK083HP-1.5D	●	8.3	0 -0.015	26	28	10	80	Fig.1
2ZDK084HP-1.5D	●	8.4						
2ZDK085HP-1.5D	●	8.5						
2ZDK086HP-1.5D	●	8.6	0 -0.015	27	29	10	80	Fig.1
2ZDK087HP-1.5D	●	8.7						
2ZDK088HP-1.5D	●	8.8						
2ZDK089HP-1.5D	●	8.9	0 -0.015	28	30	10	80	Fig.1
2ZDK090HP-1.5D	●	9.0						
2ZDK091HP-1.5D	●	9.1						
2ZDK092HP-1.5D	●	9.2	0 -0.015	29	31	10	80	Fig.1
2ZDK093HP-1.5D	●	9.3						
2ZDK094HP-1.5D	●	9.4						
2ZDK095HP-1.5D	●	9.5						
2ZDK096HP-1.5D	●	9.6	0 -0.015	30	32	10	80	Fig.1
2ZDK097HP-1.5D	●	9.7						
2ZDK098HP-1.5D	●	9.8						
2ZDK099HP-1.5D	●	9.9	0 -0.015	31	33	10	80	Fig.1
2ZDK100HP-1.5D	●	10.0	0 -0.015	31	(33)	10	80	Fig.2
2ZDK101HP-1.5D	●	10.1	0 -0.018	31	33	12	100	Fig.1
2ZDK102HP-1.5D	●	10.2	0 -0.018	32	34	12	100	Fig.1
2ZDK103HP-1.5D	●	10.3						
2ZDK104HP-1.5D	●	10.4						
2ZDK105HP-1.5D	●	10.5	0 -0.018	33	35	12	100	Fig.1
2ZDK106HP-1.5D	●	10.6						
2ZDK107HP-1.5D	●	10.7						
2ZDK108HP-1.5D	●	10.8						
2ZDK109HP-1.5D	●	10.9	0 -0.018	34	36	12	100	Fig.1
2ZDK110HP-1.5D	●	11.0						
2ZDK111HP-1.5D	●	11.1						
2ZDK112HP-1.5D	●	11.2	0 -0.018	35	37	12	100	Fig.1
2ZDK113HP-1.5D	●	11.3						
2ZDK114HP-1.5D	●	11.4						
2ZDK115HP-1.5D	●	11.5	0 -0.018	36	38	12	100	Fig.1
2ZDK116HP-1.5D	●	11.6						
2ZDK117HP-1.5D	●	11.7						
2ZDK118HP-1.5D	●	11.8						
2ZDK119HP-1.5D	●	11.9						
2ZDK120HP-1.5D	●	12.0	0 -0.018	37	(39)	12	100	Fig.2

● : Standard Stock

Flat Bottom Drill

2ZDK-HP

Stock Items (3D Type)

3D

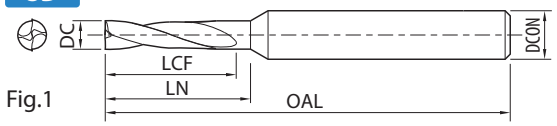


Fig.1

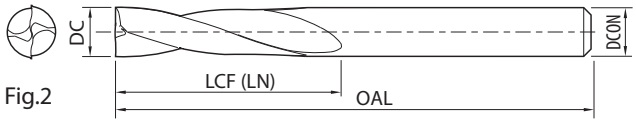


Fig.2

Number of Flutes (Z) = 2 Helix Angle: 20°

• Pecking is recommended when drilling depth is 2D or over

Description	Stock	Dimensions (mm)						Drawing
		DC	Outside Dia. Tolerance	LCF	LN	DCON	OAL	
2ZDK030HP-3D	●	3.0	0 -0.010	14	15	6	60	Fig.1
2ZDK031HP-3D	●	3.1	0 -0.012	14	15	6	60	Fig.1
2ZDK032HP-3D	●	3.2						
2ZDK033HP-3D	●	3.3	0 -0.012	15	16	6	60	Fig.1
2ZDK034HP-3D	●	3.4						
2ZDK035HP-3D	●	3.5	0 -0.012	17	18	6	60	Fig.1
2ZDK036HP-3D	●	3.6						
2ZDK037HP-3D	●	3.7						
2ZDK038HP-3D	●	3.8						
2ZDK039HP-3D	●	3.9						
2ZDK040HP-3D	●	4.0	0 -0.012	19	20	6	60	Fig.1
2ZDK041HP-3D	●	4.1						
2ZDK042HP-3D	●	4.2	0 -0.012	20	21	6	60	Fig.1
2ZDK043HP-3D	●	4.3						
2ZDK044HP-3D	●	4.4						
2ZDK045HP-3D	●	4.5	0 -0.012	21	22	6	60	Fig.1
2ZDK046HP-3D	●	4.6						
2ZDK047HP-3D	●	4.7						
2ZDK048HP-3D	●	4.8						
2ZDK049HP-3D	●	4.9						
2ZDK050HP-3D	●	5.0	0 -0.012	23	24	6	60	Fig.1
2ZDK051HP-3D	●	5.1						
2ZDK052HP-3D	●	5.2						
2ZDK053HP-3D	●	5.3	0 -0.012	24	25	6	60	Fig.1
2ZDK054HP-3D	●	5.4						
2ZDK055HP-3D	●	5.5	0 -0.012	25	26	6	60	Fig.1
2ZDK056HP-3D	●	5.6	0 -0.012	26	27	6	60	Fig.1
2ZDK057HP-3D	●	5.7						
2ZDK058HP-3D	●	5.8						
2ZDK059HP-3D	●	5.9						
2ZDK060HP-3D	●	6.0	0 -0.012	28	(28)	6	60	Fig.2
2ZDK061HP-3D	●	6.1	0 -0.015	28	29	8	70	Fig.1
2ZDK062HP-3D	●	6.2						
2ZDK063HP-3D	●	6.3						
2ZDK064HP-3D	●	6.4						
2ZDK065HP-3D	●	6.5	0 -0.015	30	31	8	70	Fig.1
2ZDK066HP-3D	●	6.6						
2ZDK067HP-3D	●	6.7						
2ZDK068HP-3D	●	6.8	0 -0.015	31	32	8	70	Fig.1
2ZDK069HP-3D	●	6.9						
2ZDK070HP-3D	●	7.0	0 -0.015	32	33	8	70	Fig.1
2ZDK071HP-3D	●	7.1						
2ZDK072HP-3D	●	7.2						
2ZDK073HP-3D	●	7.3						
2ZDK074HP-3D	●	7.4						
2ZDK075HP-3D	●	7.5	0 -0.015	34	35	8	70	Fig.1

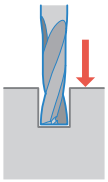
Description	Stock	Dimensions (mm)						Drawing
		DC	Outside Dia. Tolerance	LCF	LN	DCON	OAL	
2ZDK076HP-3D	●	7.6	0 -0.015	34	35	8	70	Fig.1
2ZDK077HP-3D	●	7.7						
2ZDK078HP-3D	●	7.8						
2ZDK079HP-3D	●	7.9						
2ZDK080HP-3D	●	8.0	0 -0.015	36	(36)	8	70	Fig.2
2ZDK081HP-3D	●	8.1	0 -0.015	36	37	10	80	Fig.1
2ZDK082HP-3D	●	8.2						
2ZDK083HP-3D	●	8.3						
2ZDK084HP-3D	●	8.4						
2ZDK085HP-3D	●	8.5	0 -0.015	38	39	10	80	Fig.1
2ZDK086HP-3D	●	8.6						
2ZDK087HP-3D	●	8.7						
2ZDK088HP-3D	●	8.8	0 -0.015	39	40	10	80	Fig.1
2ZDK089HP-3D	●	8.9						
2ZDK090HP-3D	●	9.0	0 -0.015	40	41	10	80	Fig.1
2ZDK091HP-3D	●	9.1						
2ZDK092HP-3D	●	9.2						
2ZDK093HP-3D	●	9.3						
2ZDK094HP-3D	●	9.4						
2ZDK095HP-3D	●	9.5	0 -0.015	42	43	10	80	Fig.1
2ZDK096HP-3D	●	9.6						
2ZDK097HP-3D	●	9.7						
2ZDK098HP-3D	●	9.8						
2ZDK099HP-3D	●	9.9						
2ZDK100HP-3D	●	10.0	0 -0.015	45	(45)	10	80	Fig.2
2ZDK101HP-3D	●	10.1	0 -0.018	45	46	12	100	Fig.1
2ZDK102HP-3D	●	10.2						
2ZDK103HP-3D	●	10.3	0 -0.018	46	47	12	100	Fig.1
2ZDK104HP-3D	●	10.4						
2ZDK105HP-3D	●	10.5	0 -0.018	47	48	12	100	Fig.1
2ZDK106HP-3D	●	10.6						
2ZDK107HP-3D	●	10.7						
2ZDK108HP-3D	●	10.8						
2ZDK109HP-3D	●	10.9						
2ZDK110HP-3D	●	11.0	0 -0.018	51	52	12	100	Fig.1
2ZDK111HP-3D	●	11.1						
2ZDK112HP-3D	●	11.2						
2ZDK113HP-3D	●	11.3						
2ZDK114HP-3D	●	11.4						
2ZDK115HP-3D	●	11.5	0 -0.018	53	54	12	100	Fig.1
2ZDK116HP-3D	●	11.6						
2ZDK117HP-3D	●	11.7						
2ZDK118HP-3D	●	11.8						
2ZDK119HP-3D	●	11.9						
2ZDK120HP-3D	●	12.0	0 -0.018	54	(54)	12	100	Fig.2

●: Standard Stock

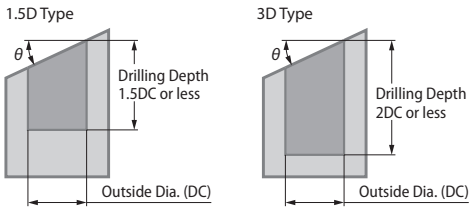
Flat Bottom Drill

2ZDK-HP

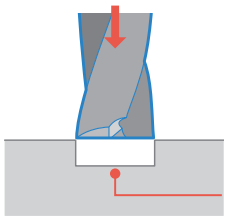
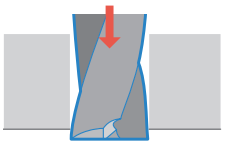
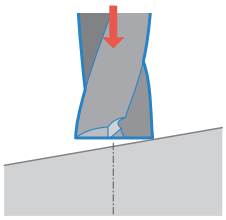
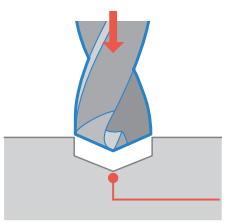
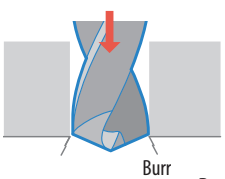
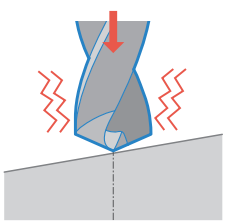
Cutting Conditions

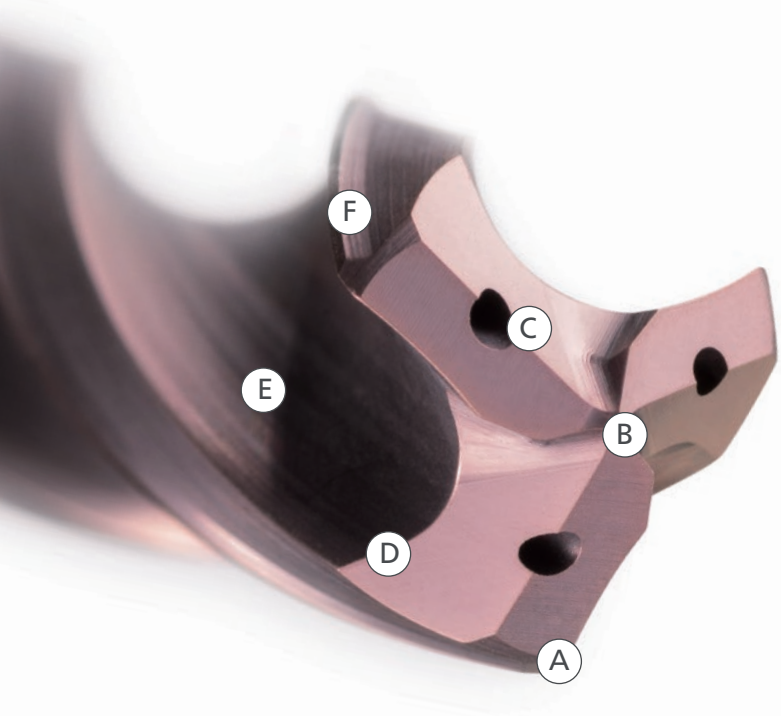
Workpiece	Application	Drilling Depth (mm)	Outside Dia. DC (mm)	3	3.5	4	4.5	5	6	8	10	12
Structural Steel Carbon Steel SS400, S45C	 Plunge Milling	1.5D Type: ap≦1.5DC 3D Type: ap≦2DC	Spindle Revolution (min^{-1})	9,100	7,800	6,800	6,100	5,500	4,600	3,500	2,800	2,300
			Feed Rate (mm/min)	520	520	520	520	520	520	520	520	520
Alloy Steel SCM, SNCM		1.5D Type: ap≦1.5DC 3D Type: ap≦2DC	Spindle Revolution (min^{-1})	7,200	6,200	5,400	4,800	4,400	3,600	2,700	2,200	1,800
			Feed Rate (mm/min)	450	450	450	450	450	450	450	450	450
Pre-hardened Steel (30 ~ 45HRC)		1.5D Type: ap≦1.5DC 3D Type: ap≦2DC	Spindle Revolution (min^{-1})	3,900	3,400	2,900	2,600	2,300	1,900	1,500	1,200	1,000
			Feed Rate (mm/min)	210	210	210	210	210	210	210	210	210
Nodular Cast Iron FCD400		1.5D Type: ap≦1.5DC 3D Type: ap≦2DC	Spindle Revolution (min^{-1})	7,200	6,200	5,400	4,800	4,400	3,600	2,700	2,200	1,800
			Feed Rate (mm/min)	390	390	390	390	390	390	390	390	390
Aluminum Alloy A7075		1.5D Type: ap≦1.5DC 3D Type: ap≦2DC	Spindle Revolution (min^{-1})	17,800	15,200	13,100	11,800	10,500	8,900	6,700	5,400	4,500
			Feed Rate (mm/min)	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270
Aluminum Alloy Casting AC, ADC		1.5D Type: ap≦1.5DC 3D Type: ap≦2DC	Spindle Revolution (min^{-1})	13,100	11,500	10,000	8,800	8,000	6,700	5,000	4,000	3,400
			Feed Rate (mm/min)	820	820	820	820	820	820	820	820	820

- **This tool is specially designed for plunging and NOT recommended for traversing**
- Coolant is recommended
- Adjust ap to suit machine rigidity and overhang length
- Use chuck and machine with the highest rigidity possible
- Pecking is recommended when drilling depth is 2D or over
- Stainless steel cutting (SUS304/SUS316) is NOT recommended
- Cutting condition modifications may be needed when cutting a slant surface, depending on the slant angle (Right Figure)
  When workpiece slant is 30° or less, reduce the feed rate by 50%
  When workpiece slant is 30° or more, reduce the revolution by 70% and the feed rate by 30%



Comparison with Standard Drill

	Bottom Shape	Burr	Drilling in Slant Surface
2ZDK-HP	 Almost even	 Minimizes Burrs	 Stable Machining (Lowered the Feed)
Standard Drill	 Same as Bottom Shape	 Burr Burr Build-up	 Unstable Machining



SERIES 141K

HI-PERCARB®

HIGH PERFORMANCE CARBIDE DRILLS

The key features designed into the Hi-PerCarb Series 141K Drill allow the product to offer application benefits not only beyond that of standard carbide drills, but also other High Performance drills. Each feature of the Hi-PerCarb Series 141K Drill was uniquely engineered as a solution towards addressing the issues commonly encountered during high production drilling.

(A) TRI-MARGIN DESIGN

- improved hole stability over two-flute designs
- superior surface finish, roundness, and hole cylindricity
- unsurpassed hole size control

(B) SELF-STABILIZING POINT AND OPEN FLUTE STRUCTURE

- pyramid design stabilizes the drill on contact with the workpiece
- engineered flute shape efficiently transports chip volume without sacrificing strength

(C) COOLANT THROUGH TOOLING

- puts coolant as close to cut as possible for consistent chip flushing, maximum cooling, and highest productivity

(D) EDGE AND CORNER PROTECTION

- corner chamfers provide strength and reduce breakout when drilling through holes in cast iron
- automated edge treatment process extends tool life by eliminating microscopic imperfections in the cutting edges

(E) APPLICATION SPECIFIC COATING AND PREMIUM CARBIDE

- Ti-Namite M is a state-of-the-art nano-composite surface coating that maximizes wear resistance in abrasive cast irons
- 141K drills are manufactured from premium certified carbide to further ensure the highest level of quality, performance, and longevity

(F) MINIMAL MARGIN DESIGN

- a narrow margin reduces frictional heat generated by excessive contact with the workpiece, and the parallel design helps to maintain a consistent contact width as the margins wear

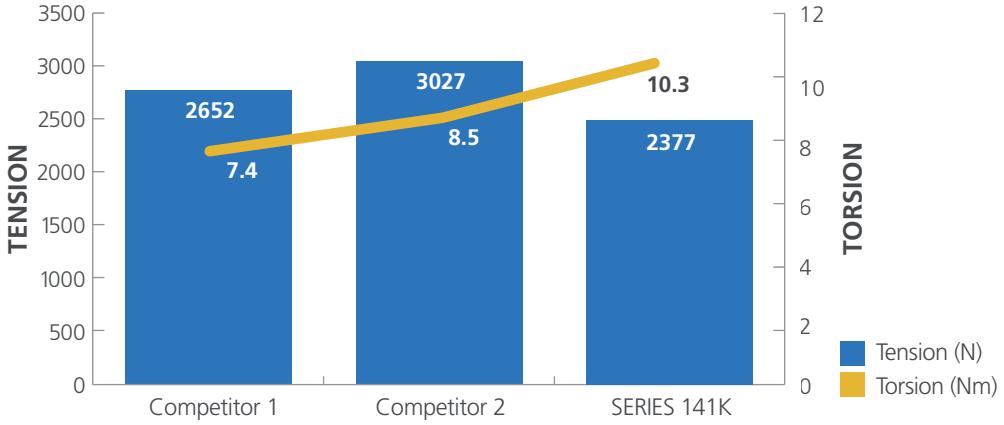
PERFORMANCE. PRECISION. PASSION.

HI-PERCARB SERIES 141K CAST IRON DRILLS

PERFORMANCE.

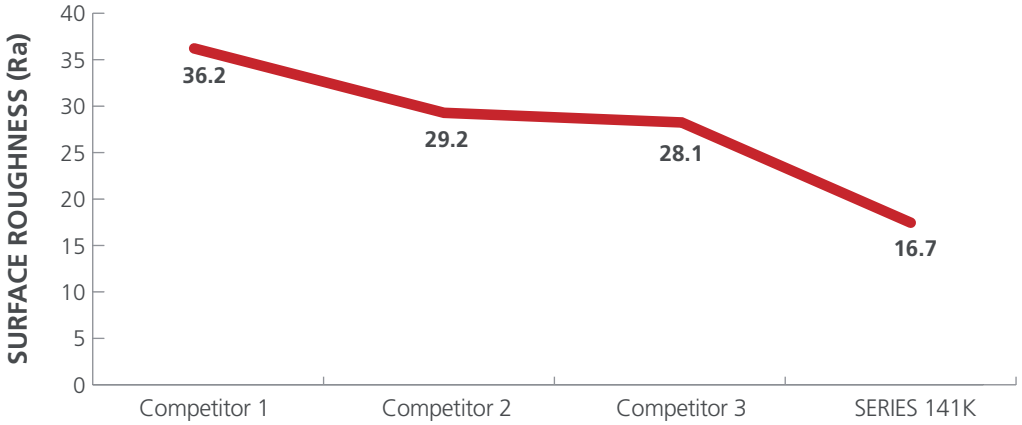
FORCE COMPARISON

Series 141K drills with 20% less force than the top competitors



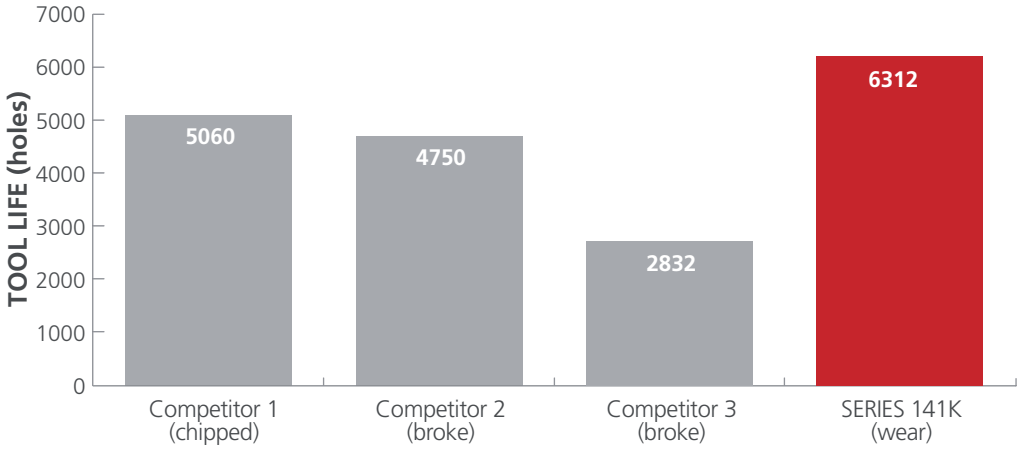
SURFACE FINISH COMPARISON

Series 141K drill results in improvement of hole finishes 40-50% over leading competitors



USAGE & WEAR COMPARISONS

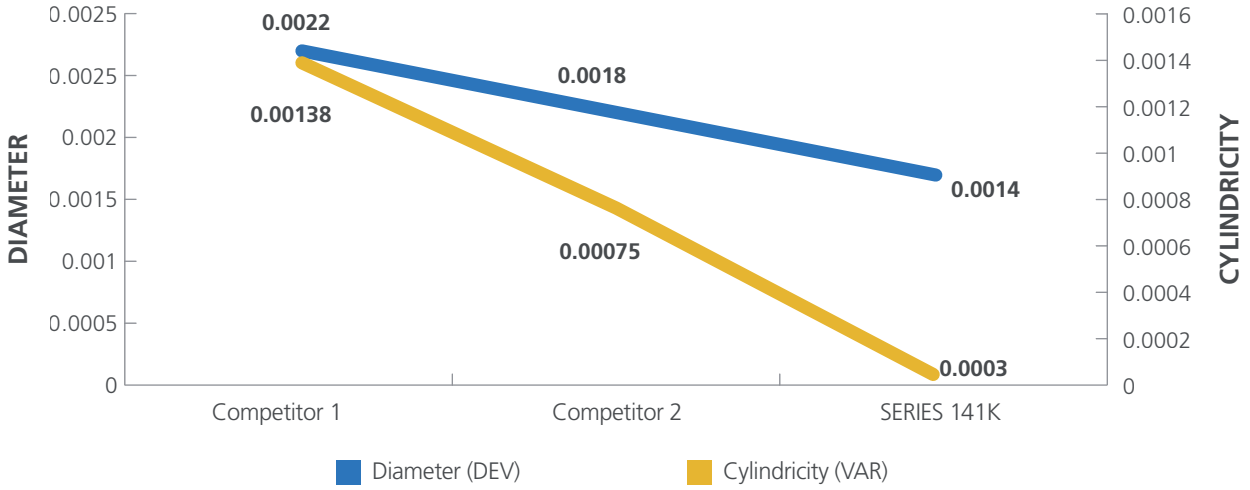
Series 141K drill results in 50% tool life improvement over a range of leading competitors



www.kyocera-sgstool.com

PRECISION.

SERIES 141K Hole Size Comparison vs. Competition in Class 40 Cast Iron



PASSION.

Lab Results Indicate the Hi-PerCarb Series 141K Drill outperforms the competition in measured hole quality at a variety of speed and feed rates.

Ti-NAMITE-M

Features of Ti-Namite-M include high wear resistance, reduced friction, and excellent prevention of cutting edge build up. This coating allows superior material removal rates and tool life when used in high performance operations in Cast Iron and Steel and with difficult to machine materials like Titanium.

Hardness (HV): 3600

Oxidation Temperature: 1150°C / 2100°F

Coefficient of Friction: 0.45

Thickness: 1-4 Microns (based on tool diameter)



www.kyocera-sgstool.com

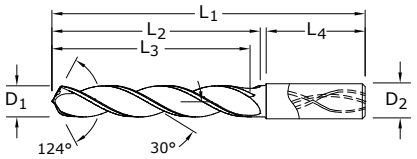
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6



Common

5xD
Reach

Right Spiral

Internal Coolant

3
Flutes

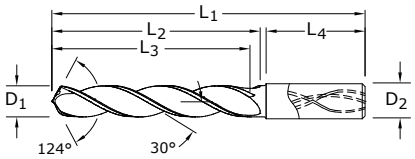
Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-M (TM) EDP No.
3,0 mm	0.1181			6,0	66,0	28,0	23,0	36,0	65160
3,1 mm	0.1220			6,0	66,0	28,0	23,0	36,0	65161
1/8	0.1250	3.18		6,0	66,0	28,0	23,0	36,0	55160
3,2 mm	0.1260		M3,5 X 0,35	6,0	66,0	28,0	23,0	36,0	65162
3,3 mm	0.1299		M4 X 0,7	6,0	66,0	28,0	23,0	36,0	65163
3,4 mm	0.1339			6,0	66,0	28,0	23,0	36,0	65164
#29	0.1360	3.45	8-32,8-36	6,0	66,0	28,0	23,0	36,0	55161
3,5 mm	0.1378		M4 X 0,5	6,0	66,0	28,0	23,0	36,0	65165
9/64	0.1406	3.57		6,0	66,0	28,0	23,0	36,0	55162
3,6 mm	0.1417		M4 X 0,35	6,0	66,0	28,0	23,0	36,0	65166
3,7 mm	0.1457		M4,5 X 0,75	6,0	66,0	28,0	23,0	36,0	65167
3,8 mm	0.1496		10-24	6,0	74,0	36,0	29,0	36,0	65168
3,9 mm	0.1535			6,0	74,0	36,0	29,0	36,0	65169
5/32	0.1562	3.97		6,0	74,0	36,0	29,0	36,0	55163
4,0 mm	0.1575		M4,5 X 0,5	6,0	74,0	36,0	29,0	36,0	65170
#21	0.1590	4.04	10-32	6,0	74,0	36,0	29,0	36,0	55164
4,1 mm	0.1614			6,0	74,0	36,0	29,0	36,0	65171
4,2 mm	0.1654		M5 / M5 x 0,75	6,0	74,0	36,0	29,0	36,0	65172
4,3 mm	0.1693			6,0	74,0	36,0	29,0	36,0	65173
11/64	0.1719	4.37		6,0	74,0	36,0	29,0	36,0	55165
4,4 mm	0.1732		12-24	6,0	74,0	36,0	29,0	36,0	65174
4,5 mm	0.1772		M5 X 0,5	6,0	74,0	36,0	29,0	36,0	65175
4,6 mm	0.1811		12-28	6,0	74,0	36,0	29,0	36,0	65176
4,7 mm	0.1850		12-32	6,0	74,0	36,0	29,0	36,0	65177
3/16	0.1875	4.76		6,0	82,0	44,0	35,0	36,0	55166
4,8 mm	0.1890		7/32-32	6,0	82,0	44,0	35,0	36,0	65178
4,9 mm	0.1929			6,0	82,0	44,0	35,0	36,0	65179
5,0 mm	0.1969		M6 X 1	6,0	82,0	44,0	35,0	36,0	65180
5,1 mm	0.2008		1/4-20	6,0	82,0	44,0	35,0	36,0	65181
13/64	0.2031	5.16		6,0	82,0	44,0	35,0	36,0	55167
5,2 mm	0.2047		M6 X 0,75	6,0	82,0	44,0	35,0	36,0	65182
5,3 mm	0.2087			6,0	82,0	44,0	35,0	36,0	65183
5,4 mm	0.2126			6,0	82,0	44,0	35,0	36,0	65184
5,5 mm	0.2165		M6 X 0,5	6,0	82,0	44,0	35,0	36,0	65185
7/32	0.2188	5.56	1/4-32	6,0	82,0	44,0	35,0	36,0	55168
5,6 mm	0.2205			6,0	82,0	44,0	35,0	36,0	65186
5,7 mm	0.2244			6,0	82,0	44,0	35,0	36,0	65187
5,8 mm	0.2283			6,0	82,0	44,0	35,0	36,0	65188
5,9 mm	0.2323			6,0	82,0	44,0	35,0	36,0	65189
15/64	0.2344	5.95		6,0	82,0	44,0	35,0	36,0	55169

(continued on next page)

Hi Performance Drill

Hi-PerCarb | Series 141K

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS



TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-M (TM) EDP No.
6,0 mm	0.2362		M7 X 1	6,0	82,0	44,0	35,0	36,0	65190
6,1 mm	0.2402			8,0	91,0	53,0	43,0	36,0	65191
6,2 mm	0.2441		M7 X 0,75	8,0	91,0	53,0	43,0	36,0	65192
6,3 mm	0.2480			8,0	91,0	53,0	43,0	36,0	65193
1/4	0.2500	6.35		8,0	91,0	53,0	43,0	36,0	55170
6,4 mm	0.2520			8,0	91,0	53,0	43,0	36,0	65194
6,5 mm	0.2559			8,0	91,0	53,0	43,0	36,0	65195
F	0.2570	6.53	5/16-18	8,0	91,0	53,0	43,0	36,0	55171
6,6 mm	0.2598			8,0	91,0	53,0	43,0	36,0	65196
6,7 mm	0.2638			8,0	91,0	53,0	43,0	36,0	65197
17/64	0.2656	6.75	5/16-20	8,0	91,0	53,0	43,0	36,0	55172
6,8 mm	0.2677		M8 X 1,25	8,0	91,0	53,0	43,0	36,0	65198
6,9 mm	0.2717		5/16-24	8,0	91,0	53,0	43,0	36,0	65199
7,0 mm	0.2756		M8 X 1	8,0	91,0	53,0	43,0	36,0	65200
7,1 mm	0.2795			8,0	91,0	53,0	43,0	36,0	65201
9/32	0.2812	7.14	5/16-32	8,0	91,0	53,0	43,0	36,0	55173
7,2 mm	0.2835		M8 X 0,75	8,0	91,0	53,0	43,0	36,0	65202
7,3 mm	0.2874			8,0	91,0	53,0	43,0	36,0	65203
7,4 mm	0.2913			8,0	91,0	53,0	43,0	36,0	65204
7,5 mm	0.2953		M8 X 0,5	8,0	91,0	53,0	43,0	36,0	65205
19/64	0.2969	7.54		8,0	91,0	53,0	43,0	36,0	55174
7,6 mm	0.2992			8,0	91,0	53,0	43,0	36,0	65206
7,7 mm	0.3031			8,0	91,0	53,0	43,0	36,0	65207
7,8 mm	0.3071		M9 X 1,25	8,0	91,0	53,0	43,0	36,0	65208
7,9 mm	0.3110			8,0	91,0	53,0	43,0	36,0	65209
5/16	0.3125	7.94	3/8-16	8,0	91,0	53,0	43,0	36,0	55175
8,0 mm	0.3150		M9 X 1	8,0	91,0	53,0	43,0	36,0	65210
8,1 mm	0.3189			10,0	103,0	61,0	49,0	40,0	65211
8,2 mm	0.3228			10,0	103,0	61,0	49,0	40,0	65212
8,3 mm	0.3268			10,0	103,0	61,0	49,0	40,0	65213
21/64	0.3281	8.33	3/8-20	10,0	103,0	61,0	49,0	40,0	55176
8,4 mm	0.3307			10,0	103,0	61,0	49,0	40,0	65214
Q	0.3320	8.43	3/8-24	10,0	103,0	61,0	49,0	40,0	55177
8,5 mm	0.3346		M10 X 1,5	10,0	103,0	61,0	49,0	40,0	65215
8,6 mm	0.3386			10,0	103,0	61,0	49,0	40,0	65216
8,7 mm	0.3425			10,0	103,0	61,0	49,0	40,0	65217
11/32	0.3438	8.73	3/8-32	10,0	103,0	61,0	49,0	40,0	55178
8,8 mm	0.3465		M10 X 1,25	10,0	103,0	61,0	49,0	40,0	65218
8,9 mm	0.3504			10,0	103,0	61,0	49,0	40,0	65219
9,0 mm	0.3543		M10 X 1	10,0	103,0	61,0	49,0	40,0	65220

(continued on next page)

Common
5xD Reach
Right Spiral
Internal Coolant
3 Flutes

Hi Performance Drill

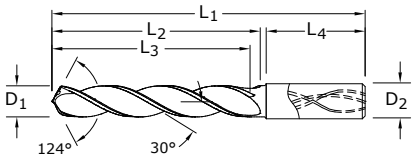
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6



Common

5xD
Reach

Right Spiral

Internal Coolant

3
Flutes

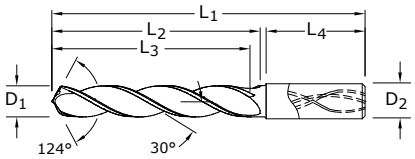
Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-M (TM) EDP No.
9,1 mm	0.3583			10,0	103,0	61,0	49,0	40,0	65221
23/64	0.3594	9.13		10,0	103,0	61,0	49,0	40,0	55179
9,2 mm	0.3622		M10 X 0,75	10,0	103,0	61,0	49,0	40,0	65222
9,3 mm	0.3661			10,0	103,0	61,0	49,0	40,0	65223
U	0.3680	9.35	7/16-14	10,0	103,0	61,0	49,0	40,0	55180
9,4 mm	0.3701			10,0	103,0	61,0	49,0	40,0	65224
9,5 mm	0.3740		M11 / M10 X 0,5	10,0	103,0	61,0	49,0	40,0	65225
3/8	0.3750	9.53		10,0	103,0	61,0	49,0	40,0	55181
9,6 mm	0.3780			10,0	103,0	61,0	49,0	40,0	65226
9,7 mm	0.3819			10,0	103,0	61,0	49,0	40,0	65227
9,8 mm	0.3858			10,0	103,0	61,0	49,0	40,0	65228
9,9 mm	0.3898			10,0	103,0	61,0	49,0	40,0	65229
25/64	0.3906	9.92	7/16-20	10,0	103,0	61,0	49,0	40,0	55182
10,0 mm	0.3937			10,0	103,0	61,0	49,0	40,0	65230
10,1 mm	0.3976			12,0	118,0	71,0	56,0	45,0	65231
10,2 mm	0.4016		M12 X 1,75	12,0	118,0	71,0	56,0	45,0	65232
10,3 mm	0.4055			12,0	118,0	71,0	56,0	45,0	65233
13/32	0.4062	10.32		12,0	118,0	71,0	56,0	45,0	55183
10,4 mm	0.4094			12,0	118,0	71,0	56,0	45,0	65234
10,5 mm	0.4134		M12 X 1,5	12,0	118,0	71,0	56,0	45,0	65235
10,6 mm	0.4173			12,0	118,0	71,0	56,0	45,0	65236
10,7 mm	0.4213			12,0	118,0	71,0	56,0	45,0	65237
27/64	0.4219	10.72	1/2-13	12,0	118,0	71,0	56,0	45,0	55184
10,8 mm	0.4252		M12 X 1,25	12,0	118,0	71,0	56,0	45,0	65238
10,9 mm	0.4291			12,0	118,0	71,0	56,0	45,0	65239
11,0 mm	0.4331		M12 X 1	12,0	118,0	71,0	56,0	45,0	65240
11,1 mm	0.4370			12,0	118,0	71,0	56,0	45,0	65241
7/16	0.4375	11.11	1/4-18NPT	12,0	118,0	71,0	56,0	45,0	55185
11,2 mm	0.4409			12,0	118,0	71,0	56,0	45,0	65242
11,3 mm	0.4449			12,0	118,0	71,0	56,0	45,0	65243
11,4 mm	0.4488			12,0	118,0	71,0	56,0	45,0	65244
11,5 mm	0.4528		M12 X 0,5	12,0	118,0	71,0	56,0	45,0	65245
11,6 mm	0.4567			12,0	118,0	71,0	56,0	45,0	65246
11,7 mm	0.4606			12,0	118,0	71,0	56,0	45,0	65247
11,8 mm	0.4646			12,0	118,0	71,0	56,0	45,0	65248
11,9 mm	0.4685			12,0	118,0	71,0	56,0	45,0	65249
15/32	0.4688	11.91	1/2-28	12,0	118,0	71,0	56,0	45,0	55186
12,0 mm	0.4724		M14 X 2	12,0	118,0	71,0	56,0	45,0	65250
31/64	0.4844	12.30	9/16-12	14,0	124,0	77,0	60,0	45,0	55187
12,5 mm	0.4921		M14 X 1,5	14,0	124,0	77,0	60,0	45,0	65251

(continued on next page)

Hi Performance Drill

Hi-PerCarb | Series 141K

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS



TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6

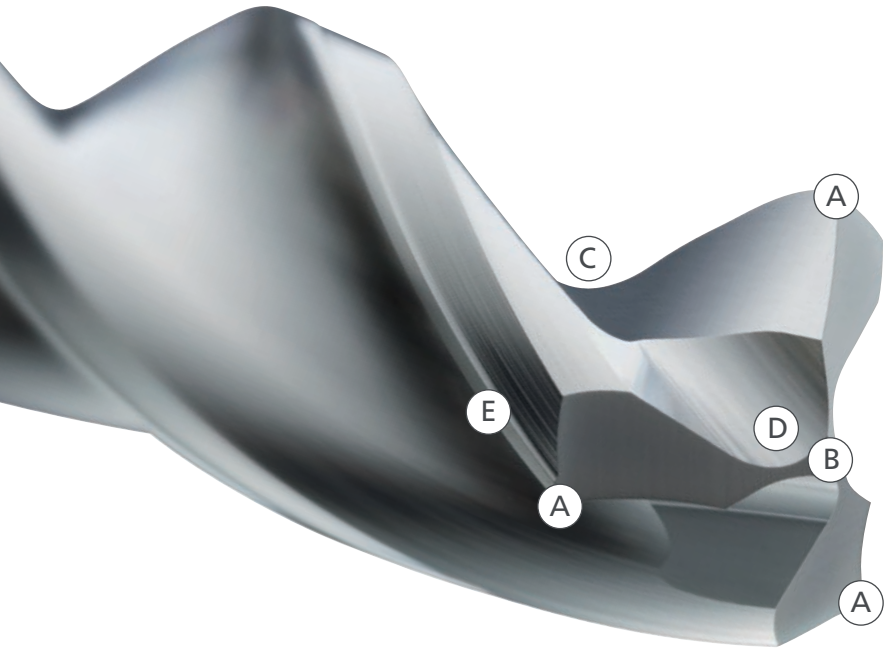
Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Ti-NAMITE-M (TM) EDP No.
1/2	0.5000	12.70		14,0	124,0	77,0	60,0	45,0	55188
12,8 mm	0.5039		M14 X 1,25	14,0	124,0	77,0	60,0	45,0	65252
13,0 mm	0.5118		M14 X 1	14,0	124,0	77,0	60,0	45,0	65253
33/64	0.5156	13.10	9/16-18	14,0	124,0	77,0	60,0	45,0	55189
13,5 mm	0.5315		5/8-11	14,0	124,0	77,0	60,0	45,0	65254
13,8 mm	0.5433			14,0	124,0	77,0	60,0	45,0	65255
14,0 mm	0.5512		M16 X 2	14,0	124,0	77,0	60,0	45,0	65256
9/16	0.5625	14.29		16,0	133,0	83,0	63,0	48,0	55190
14,5 mm	0.5709		M16 X 1,5	16,0	133,0	83,0	63,0	48,0	65257
37/64	0.5781	14.68	5/8-18	16,0	133,0	83,0	63,0	48,0	55191
14,8 mm	0.5827			16,0	133,0	83,0	63,0	48,0	65258
15,0 mm	0.5906		M16 X 1	16,0	133,0	83,0	63,0	48,0	65259
15,5 mm	0.6102		M18 X 2,5	16,0	133,0	83,0	63,0	48,0	65260
15,8 mm	0.6220			16,0	133,0	83,0	63,0	48,0	65261
5/8	0.6250	15.88	11/16-16	16,0	133,0	83,0	63,0	48,0	55192
16,0 mm	0.6299			16,0	133,0	83,0	63,0	48,0	65262
21/32	0.6562	16.67	3/4-10	18,0	143,0	93,0	71,0	48,0	55193
11/16	0.6875	17.46	3/4-16	18,0	143,0	93,0	71,0	48,0	55194
3/4	0.7500	19.05	13/16-16	20,0	153,0	101,0	77,0	50,0	55195

Common
5xD Reach
Right Spiral
Internal Coolant
3 Flutes

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

	Series 141K 5D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	14	16
K	**GRAY CAST IRON FERRITIC ASTM A48: CLASS 20 SAE J431C: GRADE 1800**	≤ 150 Bhn or ≤ 80 HRb	137	RPM	14541	7271	5453	4362	3635	3116	2726
			(110-165)	Fr	0.119	0.237	0.316	0.395	0.475	0.554	0.633
				Feed (mm/min)	1725	1725	1725	1725	1725	1725	1725
	GRAY CAST IRON PEARLITIC ASTM A48: CLASS 30, 35, 40 SAE J431C: GRADE 3000	≤ 220 Bhn or ≤ 19 HRc	114	RPM	12118	6059	4544	3635	3029	2597	2272
			(91-137)	Fr	0.094	0.189	0.252	0.315	0.378	0.441	0.504
				Feed (mm/min)	1145	1145	1145	1145	1145	1145	1145
	COMPACTED GRAPHITE IRON	≤ 250 Bhn or ≤ 25 HRc	99	RPM	10502	5251	3938	3151	2626	2250	1969
			(79-119)	Fr	0.094	0.189	0.251	0.314	0.377	0.440	0.503
				Feed (mm/min)	990	990	990	990	990	990	990
	MALLEABLE CAST IRON FERRITIC ASTM A220: GRADE 40010 SAE J158: GRADE M4504	≤ 160 Bhn or ≤ 3 HRc	137	RPM	14541	7271	5453	4362	3635	3116	2726
			(110-165)	Fr	0.119	0.237	0.316	0.395	0.475	0.554	0.633
				Feed (mm/min)	1725	1725	1725	1725	1725	1725	1725
	MALLEABLE CAST IRON MARTENSITE ASTM A220: GRADE 90001 SAE J158: GRADE M8501	≤ 320 Bhn or ≤ 34 HRc	76	RPM	8078	4039	3029	2424	2020	1731	1515
			(61-91)	Fr	0.076	0.151	0.201	0.252	0.302	0.352	0.403
				Feed (mm/min)	610	610	610	610	610	610	610

Note:
- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (Vc x 1000) / (D_1 x 3.14)
- mm/min = Fr x rpm
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



SERIES 131N

HIGH PERFORMANCE CARBIDE DRILLS

The key features designed into the Hi-PerCarb Series 131N Drill allow the product to offer application benefits not only beyond that of standard carbide drills, but also other High Performance drills. Each feature of the Hi-PerCarb Series 131N Drill was uniquely engineered as a solution towards addressing the issues commonly encountered during high production drilling.

A TRI-MARGIN DESIGN
- improved hole stability over two-flute designs
- superior surface finish, roundness and hole cylindricity
- unsurpassed hole size control

B SELF-STABILIZING POINT
- pyramid design stabilizes the drill on contact with the workpiece

C OPEN FLUTE STRUCTURE
- efficiently transports chips while maintaining strength at high feed rates

D SCULPTED GASH
- allows chips to easily flow away from the drill center
- reduced cutting forces over competitive three-flute designs

E MINIMAL MARGIN DESIGN
- reduces frictional heat generated by excessive margin contact with the workpiece
- parallel design maintains contact width as margin wears for performance consistency

Now available with 3XD and 5XD Coated and Uncoated Options!

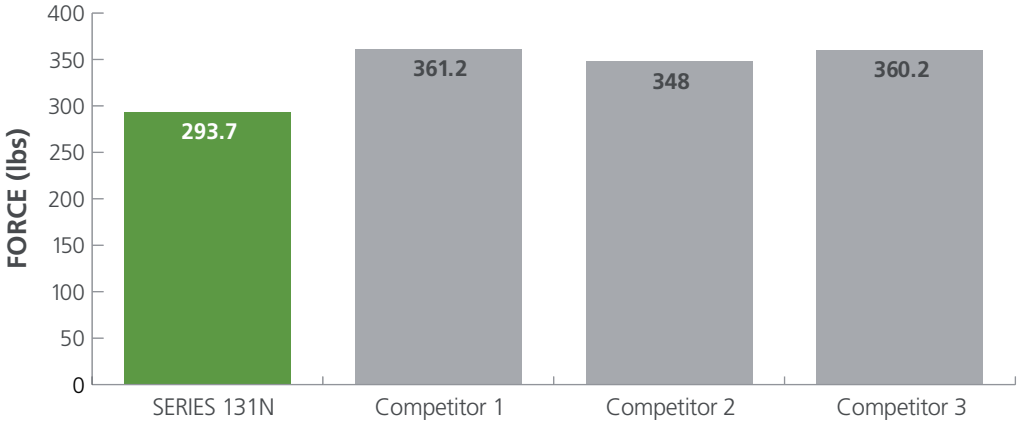
PERFORMANCE. PRECISION. PASSION.

HI-PERCARB SERIES 131N ALUMINUM DRILLS

PERFORMANCE.

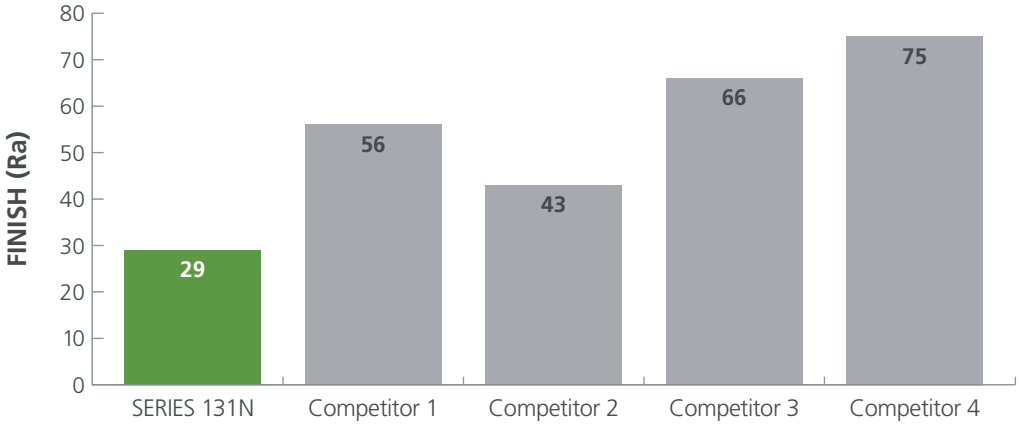
FORCE COMPARISON

Series 131N drills with 15-20% less force than the top competitors



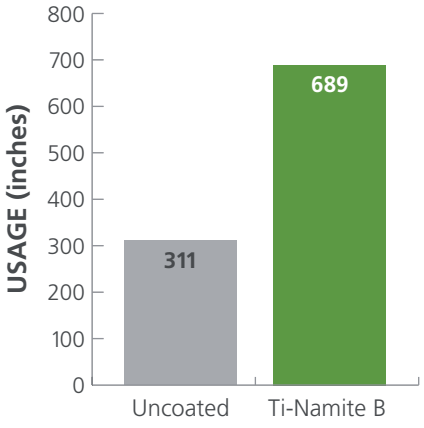
SURFACE FINISH COMPARISON

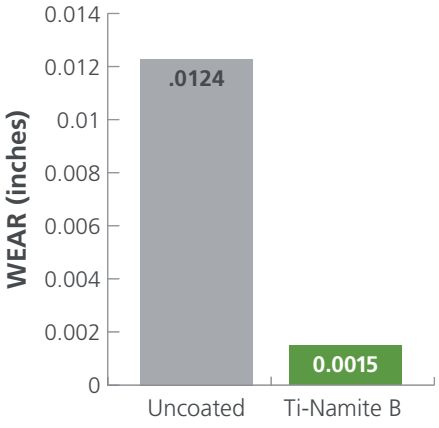
Series 131N drill results in improvement of hole finishes 30-60% over leading competitors



USAGE & WEAR COMPARISONS

Ti-NAMITE B coating significantly improves wear resistance, which is particularly beneficial when drilling high silicon aluminum alloys

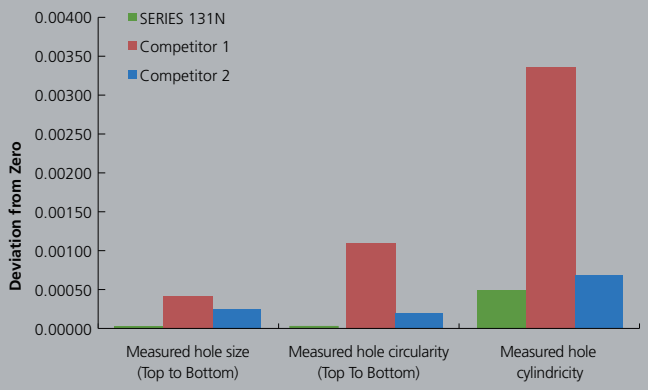




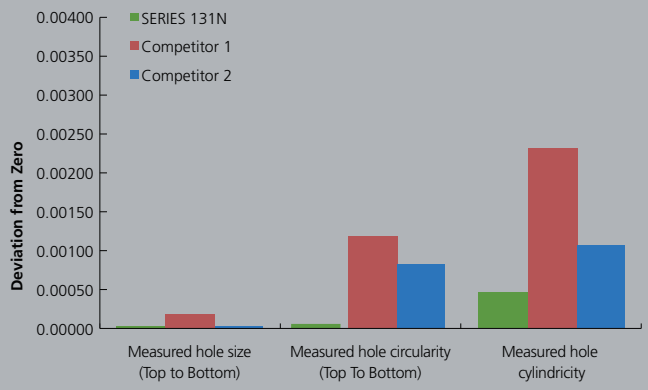
PRECISION.

SERIES 131N 3 Flute Drill vs. Competition 2 Flute Drill in 2024 Aluminum

4847 RPM
65 INCHES PER MINUTE



6786 RPM
100 INCHES PER MINUTE

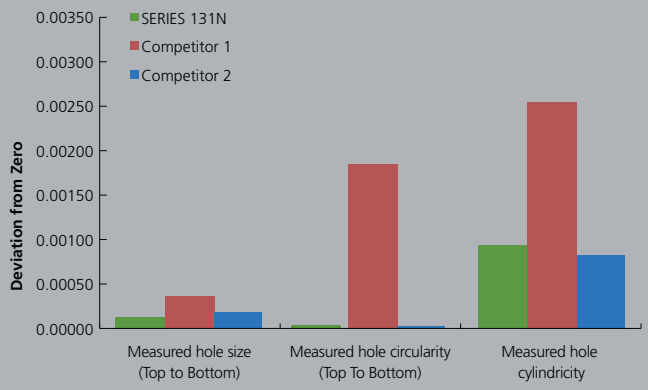


PASSION.

Lab Results Indicate the Hi-PerCarb Series 131N Drill outperforms the competition in measured hole quality at a variety of speed and feed rates.



9530 RPM
200 INCHES PER MINUTE



Now also available uncoated!

Ti-NAMITE-B

This ceramic based coating ensures a smooth surface and a low affinity to cold welding or edge build-up, which makes it optimal for aluminum and copper applications. It has high toughness and high hardness.

Microhardness: 4000 HV

Oxidation Temperature: 850°C / 1562°F

Coefficient of Friction: 0.45

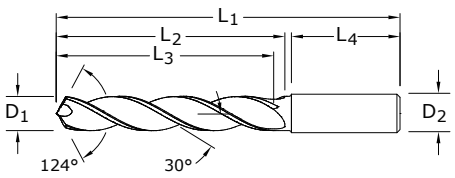
Thickness: 1-2 Microns (based on tool diameter)

www.kyocera-sgstool.com

Hi Performance Drill

Hi-PerCarb | Series 131N

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS



TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6

New Expanded Tools

Cutting Diameter D_1	Decimal Equiv.	Metric Equiv.	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min, Cleared Length L_3	Shank Length L_4	Uncoated EDP No.	Ti-NAMITE-B (TB) EDP No.
3,0 mm	0.1181			6,0	62,0	20,0	14,0	36,0	64600	67600
3,1 mm	0.1220			6,0	62,0	20,0	14,0	36,0	64601	67601
1/8	0.1250	3.18		6,0	62,0	20,0	14,0	36,0	54600	54700
3,2 mm	0.1260		M3,5 X 0,35	6,0	62,0	20,0	14,0	36,0	64602	67602
3,3 mm	0.1299		M4 X 0,7	6,0	62,0	20,0	14,0	36,0	64603	67603
3,4 mm	0.1339			6,0	62,0	20,0	14,0	36,0	64604	67604
#29	0.1360	3.45	8-32,8-36	6,0	62,0	20,0	14,0	36,0	54601	54701
3,5 mm	0.1378		M4 X 0,5	6,0	62,0	20,0	14,0	36,0	64605	67605
9/64	0.1406	3.57		6,0	62,0	20,0	14,0	36,0	54602	54702
3,6 mm	0.1417		M4 X 0,35	6,0	62,0	20,0	14,0	36,0	64606	67606
3,7 mm	0.1457		M4,5 X 0,75	6,0	62,0	20,0	14,0	36,0	64607	67607
3,8 mm	0.1496		10-24	6,0	66,0	24,0	17,0	36,0	64608	67608
3,9 mm	0.1535			6,0	66,0	24,0	17,0	36,0	64609	67609
5/32	0.1562	3.97		6,0	66,0	24,0	17,0	36,0	54603	54703
4,0 mm	0.1575		M4,5 X 0,5	6,0	66,0	24,0	17,0	36,0	64610	67610
#21	0.1590	4.04	10-32	6,0	66,0	24,0	17,0	36,0	54604	54704
4,1 mm	0.1614			6,0	66,0	24,0	17,0	36,0	64611	67611
4,2 mm	0.1654		M5 / M5 x 0,75	6,0	66,0	24,0	17,0	36,0	64612	67612
4,3 mm	0.1693			6,0	66,0	24,0	17,0	36,0	64613	67613
11/64	0.1719	4.37		6,0	66,0	24,0	17,0	36,0	54605	54705
4,4 mm	0.1732		12-24	6,0	66,0	24,0	17,0	36,0	64614	67614
4,5 mm	0.1772		M5 X 0,5	6,0	66,0	24,0	17,0	36,0	64615	67615
4,6 mm	0.1811		12-28	6,0	66,0	24,0	17,0	36,0	64616	67616
4,7 mm	0.1850		12-32	6,0	66,0	24,0	17,0	36,0	64617	67617
3/16	0.1875	4.76		6,0	66,0	28,0	20,0	36,0	54606	54706
4,8 mm	0.1890		7/32-32	6,0	66,0	28,0	20,0	36,0	64618	67618
4,9 mm	0.1929			6,0	66,0	28,0	20,0	36,0	64619	67619
5,0 mm	0.1969		M6 X 1	6,0	66,0	28,0	20,0	36,0	64620	67620
5,1 mm	0.2008		1/4-20	6,0	66,0	28,0	20,0	36,0	64621	67621
13/64	0.2031	5.16		6,0	66,0	28,0	20,0	36,0	54607	54707
5,2 mm	0.2047		M6 X 0,75	6,0	66,0	28,0	20,0	36,0	64622	67622
5,3 mm	0.2087			6,0	66,0	28,0	20,0	36,0	64623	67623
5,4 mm	0.2126			6,0	66,0	28,0	20,0	36,0	64624	67624
5,5 mm	0.2165		M6 X 0,5	6,0	66,0	28,0	20,0	36,0	64625	67625
7/32	0.2188	5.56	1/4-32	6,0	66,0	28,0	20,0	36,0	54608	54708
5,6 mm	0.2205			6,0	66,0	28,0	20,0	36,0	64626	67626
5,7 mm	0.2244			6,0	66,0	28,0	20,0	36,0	64627	67627
5,8 mm	0.2283			6,0	66,0	28,0	20,0	36,0	64628	67628
5,9 mm	0.2323			6,0	66,0	28,0	20,0	36,0	64629	67629
15/64	0.2344	5.95		6,0	66,0	28,0	20,0	36,0	54609	54709

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Common
3xD Reach
Right Spiral
External Coolant
3 Flutes

Hi Performance Drill

Hi-PerCarb | Series 131N

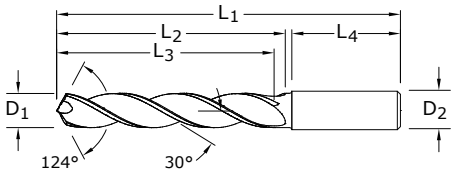
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6



New Expanded Tools

Common
3xD Reach
Right Spiral
External Coolant
3 Flutes

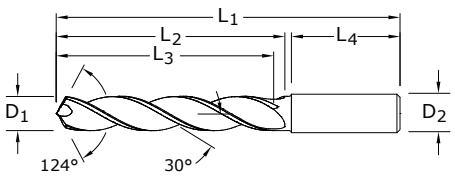
Cutting Diameter D_1	Decimal Equiv.	Metric Equiv.	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Uncoated EDP No.	Ti-NAMITE-B (TB) EDP No.
6,0 mm	0.2362		M7 X 1	6,0	66,0	28,0	20,0	36,0	64630	67630
6,1 mm	0.2402			8,0	79,0	34,0	24,0	36,0	64631	67631
6,2 mm	0.2441		M7 X 0,75	8,0	79,0	34,0	24,0	36,0	64632	67632
6,3 mm	0.2480			8,0	79,0	34,0	24,0	36,0	64633	67633
1/4	0.2500	6.35		8,0	79,0	34,0	24,0	36,0	54610	54710
6,4 mm	0.2520			8,0	79,0	34,0	24,0	36,0	64634	67634
6,5 mm	0.2559			8,0	79,0	34,0	24,0	36,0	64635	67635
F	0.2570	6.53	5/16-18	8,0	79,0	34,0	24,0	36,0	54611	54711
6,6 mm	0.2598			8,0	79,0	34,0	24,0	36,0	64636	67636
6,7 mm	0.2638			8,0	79,0	34,0	24,0	36,0	64637	67637
17/64	0.2656	6.75	5/16-20	8,0	79,0	34,0	24,0	36,0	54612	54712
6,8 mm	0.2677		M8 X 1,25	8,0	79,0	34,0	24,0	36,0	64638	67638
6,9 mm	0.2717		5/16-24	8,0	79,0	34,0	24,0	36,0	64639	67639
7,0 mm	0.2756		M8 X 1	8,0	79,0	34,0	24,0	36,0	64640	67640
7,1 mm	0.2795			8,0	79,0	41,0	29,0	36,0	64641	67641
9/32	0.2812	7.14	5/16-32	8,0	79,0	41,0	29,0	36,0	54613	54713
7,2 mm	0.2835		M8 X 0,75	8,0	79,0	41,0	29,0	36,0	64642	67642
7,3 mm	0.2874			8,0	79,0	41,0	29,0	36,0	64643	67643
7,4 mm	0.2913			8,0	79,0	41,0	29,0	36,0	64644	67644
7,5 mm	0.2953		M8 X 0,5	8,0	79,0	41,0	29,0	36,0	64645	67645
19/64	0.2969	7.54		8,0	79,0	41,0	29,0	36,0	54614	54714
7,6 mm	0.2992			8,0	79,0	41,0	29,0	36,0	64646	67646
7,7 mm	0.3031			8,0	79,0	41,0	29,0	36,0	64647	67647
7,8 mm	0.3071		M9 X 1,25	8,0	79,0	41,0	29,0	36,0	64648	67648
7,9 mm	0.3110			8,0	79,0	41,0	29,0	36,0	64649	67649
5/16	0.3125	7.94	3/8-16	8,0	79,0	41,0	29,0	36,0	54615	54715
8,0 mm	0.3150		M9 X 1	8,0	79,0	41,0	29,0	36,0	64650	67650
8,1 mm	0.3189			10,0	89,0	47,0	35,0	40,0	64651	67651
8,2 mm	0.3228			10,0	89,0	47,0	35,0	40,0	64652	67652
8,3 mm	0.3268			10,0	89,0	47,0	35,0	40,0	64653	67653
21/64	0.3281	8.33	3/8-20	10,0	89,0	47,0	35,0	40,0	54616	54716
8,4 mm	0.3307			10,0	89,0	47,0	35,0	40,0	64654	67654
Q	0.3320	8.43	3/8-24	10,0	89,0	47,0	35,0	40,0	54617	54717
8,5 mm	0.3346		M10 X 1,5	10,0	89,0	47,0	35,0	40,0	64655	67655
8,6 mm	0.3386			10,0	89,0	47,0	35,0	40,0	64656	67656
8,7 mm	0.3425			10,0	89,0	47,0	35,0	40,0	64657	67657
11/32	0.3438	8.73	3/8-32	10,0	89,0	47,0	35,0	40,0	54618	54718
8,8 mm	0.3465		M10 X 1,25	10,0	89,0	47,0	35,0	40,0	64658	67658
8,9 mm	0.3504			10,0	89,0	47,0	35,0	40,0	64659	67659
9,0 mm	0.3543		M10 X 1	10,0	89,0	47,0	35,0	40,0	64660	67660

(continued on next page)

Hi Performance Drill

Hi-PerCarb | Series 131N

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS



TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6

New Expanded Tools

Cutting Diameter D_1	Decimal Equiv.	Metric Equiv.	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min, Cleared Length L_3	Shank Length L_4	Uncoated EDP No.	Ti-NAMITE-B (TB) EDP No.
9,1 mm	0.3583			10,0	89,0	47,0	35,0	40,0	64661	67661
23/64	0.3594	9.13		10,0	89,0	47,0	35,0	40,0	54619	54719
9,2 mm	0.3622		M10 X 0,75	10,0	89,0	47,0	35,0	40,0	64662	67662
9,3 mm	0.3661			10,0	89,0	47,0	35,0	40,0	64663	67663
U	0.3680	9.35	7/16-14	10,0	89,0	47,0	35,0	40,0	54620	54720
9,4 mm	0.3701			10,0	89,0	47,0	35,0	40,0	64664	67664
9,5 mm	0.3740		M11 / M10 X 0,5	10,0	89,0	47,0	35,0	40,0	64665	67665
3/8	0.3750	9.53		10,0	89,0	47,0	35,0	40,0	54621	54721
9,6 mm	0.3780			10,0	89,0	47,0	35,0	40,0	64666	67666
9,7 mm	0.3819			10,0	89,0	47,0	35,0	40,0	64667	67667
9,8 mm	0.3858			10,0	89,0	47,0	35,0	40,0	64668	67668
9,9 mm	0.3898			10,0	89,0	47,0	35,0	40,0	64669	67669
25/64	0.3906	9.92	7/16-20	10,0	89,0	47,0	35,0	40,0	54622	54722
10,0 mm	0.3937			10,0	89,0	47,0	35,0	40,0	64670	67670
10,1 mm	0.3976			12,0	102,0	55,0	40,0	45,0	64671	67671
10,2 mm	0.4016		M12 X 1,75	12,0	102,0	55,0	40,0	45,0	64672	67672
10,3 mm	0.4055			12,0	102,0	55,0	40,0	45,0	64673	67673
13/32	0.4062	10.32		12,0	102,0	55,0	40,0	45,0	54623	54723
10,4 mm	0.4094			12,0	102,0	55,0	40,0	45,0	64674	67674
10,5 mm	0.4134		M12 X 1,5	12,0	102,0	55,0	40,0	45,0	64675	67675
10,6 mm	0.4173			12,0	102,0	55,0	40,0	45,0	64676	67676
10,7 mm	0.4213			12,0	102,0	55,0	40,0	45,0	64677	67677
27/64	0.4219	10.72	1/2-13	12,0	102,0	55,0	40,0	45,0	54624	54724
10,8 mm	0.4252		M12 X 1,25	12,0	102,0	55,0	40,0	45,0	64678	67678
10,9 mm	0.4291			12,0	102,0	55,0	40,0	45,0	64679	67679
11,0 mm	0.4331		M12 X 1	12,0	102,0	55,0	40,0	45,0	64680	67680
11,1 mm	0.4370			12,0	102,0	55,0	40,0	45,0	64681	67681
7/16	0.4375	11.11	1/4-18NPT	12,0	102,0	55,0	40,0	45,0	54625	54725
11,2 mm	0.4409			12,0	102,0	55,0	40,0	45,0	64682	67682
11,3 mm	0.4449			12,0	102,0	55,0	40,0	45,0	64683	67683
11,4 mm	0.4488			12,0	102,0	55,0	40,0	45,0	64684	67684
11,5 mm	0.4528		M12 X 0,5	12,0	102,0	55,0	40,0	45,0	64685	67685
11,6 mm	0.4567			12,0	102,0	55,0	40,0	45,0	64686	67686
11,7 mm	0.4606			12,0	102,0	55,0	40,0	45,0	64687	67687
11,8 mm	0.4646			12,0	102,0	55,0	40,0	45,0	64688	67688
11,9 mm	0.4685			12,0	102,0	55,0	40,0	45,0	64689	67689
15/32	0.4688	11.91	1/2-28	12,0	102,0	55,0	40,0	45,0	54626	54726
12,0 mm	0.4724		M14 X 2	12,0	102,0	55,0	40,0	45,0	64690	67690
31/64	0.4844	12.30	9/16-12	14,0	107,0	60,0	43,0	45,0	54627	54727
12,5 mm	0.4921		M14 X 1,5	14,0	107,0	60,0	43,0	45,0	64691	67691

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Common
3xD Reach
Right Spiral
External Coolant
3 Flutes

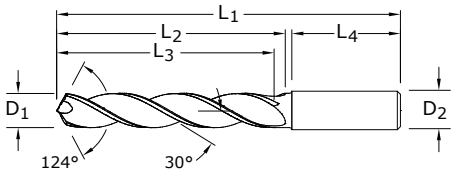
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
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TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6



New Expanded Tools

Common

3xD Reach

Right Spiral

External Coolant

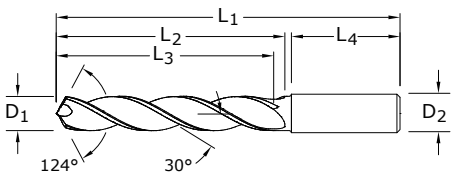
3 Flutes

Cutting Diameter D_1	Decimal Equiv.	Metric Equiv.	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min, Cleared Length L_3	Shank Length L_4	Uncoated EDP No.	Ti-NAMITE-B (TB) EDP No.
1/2	0.5000	12.70		14,0	107,0	60,0	43,0	45,0	54628	54728
12,8 mm	0.5039		M14 X 1,25	14,0	107,0	60,0	43,0	45,0	64692	67692
13,0 mm	0.5118		M14 X 1	14,0	107,0	60,0	43,0	45,0	64693	67693
33/64	0.5156	13.10	9/16-18	14,0	107,0	60,0	43,0	45,0	54629	54729
13,5 mm	0.5315		5/8-11	14,0	107,0	60,0	43,0	45,0	64694	67694
13,8 mm	0.5433			14,0	107,0	60,0	43,0	45,0	64695	67695
14,0 mm	0.5512		M16 X 2	14,0	107,0	60,0	43,0	45,0	64696	67696
9/16	0.5625	14.29		16,0	115,0	65,0	45,0	48,0	54630	54730
14,5 mm	0.5709		M16 X 1,5	16,0	115,0	65,0	45,0	48,0	64697	67697
37/64	0.5781	14.68	5/8-18	16,0	115,0	65,0	45,0	48,0	54631	54731
14,8 mm	0.5827			16,0	115,0	65,0	45,0	48,0	64698	67698
15,0 mm	0.5906		M16 X 1	16,0	115,0	65,0	45,0	48,0	64699	67699
15,5 mm	0.6102		M18 X 2,5	16,0	115,0	65,0	45,0	48,0	64700	67700
15,8 mm	0.6220			16,0	115,0	65,0	45,0	48,0	64701	67701
5/8	0.6250	15.88	11/16-16	16,0	115,0	65,0	45,0	48,0	54632	54732
16,0 mm	0.6299			16,0	115,0	65,0	45,0	48,0	64702	67702
21/32	0.6562	16.67	3/4-10	18,0	123,0	73,0	51,0	48,0	54633	54733
11/16	0.6875	17.46	3/4-16	18,0	123,0	73,0	51,0	48,0	54634	54734
3/4	0.7500	19.05	13/16-16	20,0	131,0	79,0	55,0	50,0	54635	54735

Hi Performance Drill

Hi-PerCarb | Series 131N

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS



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≤.1181	+.00008/+.00047	h6
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>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6

New Expanded Tools

Cutting Diameter D_1	Decimal Equiv.	Metric Equiv.	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Uncoated EDP No.	Ti-NAMITE-B (TB) EDP No.
3,0 mm	0.1181			6,0	66,0	28,0	23,0	36,0	65000	64800
3,1 mm	0.1220			6,0	66,0	28,0	23,0	36,0	65001	64801
1/8	0.1250	3.18		6,0	66,0	28,0	23,0	36,0	55000	54800
3,2 mm	0.1260		M3,5 X 0,35	6,0	66,0	28,0	23,0	36,0	65002	64802
3,3 mm	0.1299		M4 X 0,7	6,0	66,0	28,0	23,0	36,0	65003	64803
3,4 mm	0.1339			6,0	66,0	28,0	23,0	36,0	65004	64804
#29	0.1360	3.45	8-32,8-36	6,0	66,0	28,0	23,0	36,0	55001	54801
3,5 mm	0.1378		M4 X 0,5	6,0	66,0	28,0	23,0	36,0	65005	64805
9/64	0.1406	3.57		6,0	66,0	28,0	23,0	36,0	55002	54802
3,6 mm	0.1417		M4 X 0,35	6,0	66,0	28,0	23,0	36,0	65006	64806
3,7 mm	0.1457		M4,5 X 0,75	6,0	66,0	28,0	23,0	36,0	65007	64807
3,8 mm	0.1496		10-24	6,0	74,0	36,0	29,0	36,0	65008	64808
3,9 mm	0.1535			6,0	74,0	36,0	29,0	36,0	65009	64809
5/32	0.1562	3.97		6,0	74,0	36,0	29,0	36,0	55003	54803
4,0 mm	0.1575		M4,5 X 0,5	6,0	74,0	36,0	29,0	36,0	65010	64810
#21	0.1590	4.04	10-32	6,0	74,0	36,0	29,0	36,0	55004	54804
4,1 mm	0.1614			6,0	74,0	36,0	29,0	36,0	65011	64811
4,2 mm	0.1654		M5 / M5 x 0,75	6,0	74,0	36,0	29,0	36,0	65012	64812
4,3 mm	0.1693			6,0	74,0	36,0	29,0	36,0	65013	64813
11/64	0.1719	4.37		6,0	74,0	36,0	29,0	36,0	55005	54805
4,4 mm	0.1732		12-24	6,0	74,0	36,0	29,0	36,0	65014	64814
4,5 mm	0.1772		M5 X 0,5	6,0	74,0	36,0	29,0	36,0	65015	64815
4,6 mm	0.1811		12-28	6,0	74,0	36,0	29,0	36,0	65016	64816
4,7 mm	0.1850		12-32	6,0	74,0	36,0	29,0	36,0	65017	64817
3/16	0.1875	4.76		6,0	82,0	44,0	35,0	36,0	55006	54806
4,8 mm	0.1890		7/32-32	6,0	82,0	44,0	35,0	36,0	65018	64818
4,9 mm	0.1929			6,0	82,0	44,0	35,0	36,0	65019	64819
5,0 mm	0.1969		M6 X 1	6,0	82,0	44,0	35,0	36,0	65020	64820
5,1 mm	0.2008		1/4-20	6,0	82,0	44,0	35,0	36,0	65021	64821
13/64	0.2031	5.16		6,0	82,0	44,0	35,0	36,0	55007	54807
5,2 mm	0.2047		M6 X 0,75	6,0	82,0	44,0	35,0	36,0	65022	64822
5,3 mm	0.2087			6,0	82,0	44,0	35,0	36,0	65023	64823
5,4 mm	0.2126			6,0	82,0	44,0	35,0	36,0	65024	64824
5,5 mm	0.2165		M6 X 0,5	6,0	82,0	44,0	35,0	36,0	65025	64825
7/32	0.2188	5.56	1/4-32	6,0	82,0	44,0	35,0	36,0	55008	54808
5,6 mm	0.2205			6,0	82,0	44,0	35,0	36,0	65026	64826
5,7 mm	0.2244			6,0	82,0	44,0	35,0	36,0	65027	64827
5,8 mm	0.2283			6,0	82,0	44,0	35,0	36,0	65028	64828
5,9 mm	0.2323			6,0	82,0	44,0	35,0	36,0	65029	64829
15/64	0.2344	5.95		6,0	82,0	44,0	35,0	36,0	55009	54809

(continued on next page)

Common
5xD Reach
Right Spiral
External Coolant
3 Flutes

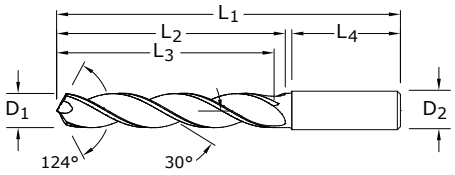
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6



New Expanded Tools

Common
5xD Reach
Right Spiral
External Coolant
3 Flutes

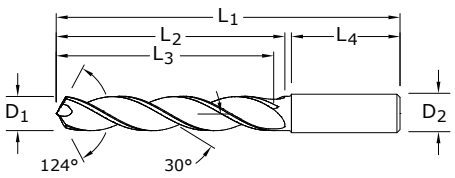
Cutting Diameter D_1	Decimal Equiv.	Metric Equiv.	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Uncoated EDP No.	Ti-NAMITE-B (TB) EDP No.
6,0 mm	0.2362		M7 X 1	6,0	82,0	44,0	35,0	36,0	65030	64830
6,1 mm	0.2402			8,0	91,0	53,0	43,0	36,0	65031	64831
6,2 mm	0.2441		M7 X 0,75	8,0	91,0	53,0	43,0	36,0	65032	64832
6,3 mm	0.2480			8,0	91,0	53,0	43,0	36,0	65033	64833
1/4	0.2500	6.35		8,0	91,0	53,0	43,0	36,0	55010	54810
6,4 mm	0.2520			8,0	91,0	53,0	43,0	36,0	65034	64834
6,5 mm	0.2559			8,0	91,0	53,0	43,0	36,0	65035	64835
F	0.2570	6.53	5/16-18	8,0	91,0	53,0	43,0	36,0	55011	54811
6,6 mm	0.2598			8,0	91,0	53,0	43,0	36,0	65036	64836
6,7 mm	0.2638			8,0	91,0	53,0	43,0	36,0	65037	64837
17/64	0.2656	6.75	5/16-20	8,0	91,0	53,0	43,0	36,0	55012	54812
6,8 mm	0.2677		M8 X 1,25	8,0	91,0	53,0	43,0	36,0	65038	64838
6,9 mm	0.2717		5/16-24	8,0	91,0	53,0	43,0	36,0	65039	64839
7,0 mm	0.2756		M8 X 1	8,0	91,0	53,0	43,0	36,0	65040	64840
7,1 mm	0.2795			8,0	91,0	53,0	43,0	36,0	65041	64841
9/32	0.2812	7.14	5/16-32	8,0	91,0	53,0	43,0	36,0	55013	54813
7,2 mm	0.2835		M8 X 0,75	8,0	91,0	53,0	43,0	36,0	65042	64842
7,3 mm	0.2874			8,0	91,0	53,0	43,0	36,0	65043	64843
7,4 mm	0.2913			8,0	91,0	53,0	43,0	36,0	65044	64844
7,5 mm	0.2953		M8 X 0,5	8,0	91,0	53,0	43,0	36,0	65045	64845
19/64	0.2969	7.54		8,0	91,0	53,0	43,0	36,0	55014	54814
7,6 mm	0.2992			8,0	91,0	53,0	43,0	36,0	65046	64846
7,7 mm	0.3031			8,0	91,0	53,0	43,0	36,0	65047	64847
7,8 mm	0.3071		M9 X 1,25	8,0	91,0	53,0	43,0	36,0	65048	64848
7,9 mm	0.3110			8,0	91,0	53,0	43,0	36,0	65049	64849
5/16	0.3125	7.94	3/8-16	8,0	91,0	53,0	43,0	36,0	55015	54815
8,0 mm	0.3150		M9 X 1	8,0	91,0	53,0	43,0	36,0	65050	64850
8,1 mm	0.3189			10,0	103,0	61,0	49,0	40,0	65051	64851
8,2 mm	0.3228			10,0	103,0	61,0	49,0	40,0	65052	64852
8,3 mm	0.3268			10,0	103,0	61,0	49,0	40,0	65053	64853
21/64	0.3281	8.33	3/8-20	10,0	103,0	61,0	49,0	40,0	55016	54816
8,4 mm	0.3307			10,0	103,0	61,0	49,0	40,0	65054	64854
Q	0.3320	8.43	3/8-24	10,0	103,0	61,0	49,0	40,0	55017	54817
8,5 mm	0.3346		M10 X 1,5	10,0	103,0	61,0	49,0	40,0	65055	64855
8,6 mm	0.3386			10,0	103,0	61,0	49,0	40,0	65056	64856
8,7 mm	0.3425			10,0	103,0	61,0	49,0	40,0	65057	64857
11/32	0.3438	8.73	3/8-32	10,0	103,0	61,0	49,0	40,0	55018	54818
8,8 mm	0.3465		M10 X 1,25	10,0	103,0	61,0	49,0	40,0	65058	64858
8,9 mm	0.3504			10,0	103,0	61,0	49,0	40,0	65059	64859
9,0 mm	0.3543		M10 X 1	10,0	103,0	61,0	49,0	40,0	65060	64860

(continued on next page)

Hi Performance Drill

Hi-PerCarb | Series 131N

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS



TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6

New Expanded Tools

Cutting Diameter D_1	Decimal Equiv.	Metric Equiv.	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Uncoated EDP No.	Ti-NAMITE-B (TB) EDP No.
9,1 mm	0.3583			10,0	103,0	61,0	49,0	40,0	65061	64861
23/64	0.3594	9.13		10,0	103,0	61,0	49,0	40,0	55019	54819
9,2 mm	0.3622		M10 X 0,75	10,0	103,0	61,0	49,0	40,0	65062	64862
9,3 mm	0.3661			10,0	103,0	61,0	49,0	40,0	65063	64863
U	0.3680	9.35	7/16-14	10,0	103,0	61,0	49,0	40,0	55020	54820
9,4 mm	0.3701			10,0	103,0	61,0	49,0	40,0	65064	64864
9,5 mm	0.3740		M11 / M10 X 0,5	10,0	103,0	61,0	49,0	40,0	65065	64865
3/8	0.3750	9.53		10,0	103,0	61,0	49,0	40,0	55021	54821
9,6 mm	0.3780			10,0	103,0	61,0	49,0	40,0	65066	64866
9,7 mm	0.3819			10,0	103,0	61,0	49,0	40,0	65067	64867
9,8 mm	0.3858			10,0	103,0	61,0	49,0	40,0	65068	64868
9,9 mm	0.3898			10,0	103,0	61,0	49,0	40,0	65069	64869
25/64	0.3906	9.92	7/16-20	10,0	103,0	61,0	49,0	40,0	55022	54822
10,0 mm	0.3937			10,0	103,0	61,0	49,0	40,0	65070	64870
10,1 mm	0.3976			12,0	118,0	71,0	56,0	45,0	65071	64871
10,2 mm	0.4016		M12 X 1,75	12,0	118,0	71,0	56,0	45,0	65072	64872
10,3 mm	0.4055			12,0	118,0	71,0	56,0	45,0	65073	64873
13/32	0.4062	10.32		12,0	118,0	71,0	56,0	45,0	55023	54823
10,4 mm	0.4094			12,0	118,0	71,0	56,0	45,0	65074	64874
10,5 mm	0.4134		M12 X 1,5	12,0	118,0	71,0	56,0	45,0	65075	64875
10,6 mm	0.4173			12,0	118,0	71,0	56,0	45,0	65076	64876
10,7 mm	0.4213			12,0	118,0	71,0	56,0	45,0	65077	64877
27/64	0.4219	10.72	1/2-13	12,0	118,0	71,0	56,0	45,0	55024	54824
10,8 mm	0.4252		M12 X 1,25	12,0	118,0	71,0	56,0	45,0	65078	64878
10,9 mm	0.4291			12,0	118,0	71,0	56,0	45,0	65079	64879
11,0 mm	0.4331		M12 X 1	12,0	118,0	71,0	56,0	45,0	65080	64880
11,1 mm	0.4370			12,0	118,0	71,0	56,0	45,0	65081	64881
7/16	0.4375	11.11	1/4-18NPT	12,0	118,0	71,0	56,0	45,0	55025	54825
11,2 mm	0.4409			12,0	118,0	71,0	56,0	45,0	65082	64882
11,3 mm	0.4449			12,0	118,0	71,0	56,0	45,0	65083	64883
11,4 mm	0.4488			12,0	118,0	71,0	56,0	45,0	65084	64884
11,5 mm	0.4528		M12 X 0,5	12,0	118,0	71,0	56,0	45,0	65085	64885
11,6 mm	0.4567			12,0	118,0	71,0	56,0	45,0	65086	64886
11,7 mm	0.4606			12,0	118,0	71,0	56,0	45,0	65087	64887
11,8 mm	0.4646			12,0	118,0	71,0	56,0	45,0	65088	64888
11,9 mm	0.4685			12,0	118,0	71,0	56,0	45,0	65089	64889
15/32	0.4688	11.91	1/2-28	12,0	118,0	71,0	56,0	45,0	55026	54826
12,0 mm	0.4724		M14 X 2	12,0	118,0	71,0	56,0	45,0	65090	64890
31/64	0.4844	12.30	9/16-12	14,0	124,0	77,0	60,0	45,0	55027	54827
12,5 mm	0.4921		M14 X 1,5	14,0	124,0	77,0	60,0	45,0	65091	64891

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Common
5xD Reach
Right Spiral
External Coolant
3 Flutes

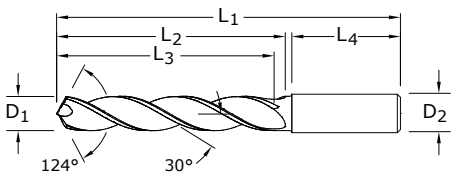
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

TOLERANCES (inch)

DIAMETER	D_1	D_2
≤.1181	+.00008/+.00047	h6
>.1181–.2362	+.00016/+.00063	h6
>.2362–.3937	+.00024/+.00083	h6
>.3937–.7087	+.00028/+.00098	h6
>.7087–1.1811	+.00031/+.00114	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
≤ 3	+0,002/+0,012	h6
> 3 - 6	+0,004/+0,016	h6
> 6 - 10	+0,006/+0,021	h6
> 10 - 18	+0,007/+0,025	h6



New Expanded Tools

Common

5xD Reach

Right Spiral

External Coolant

3 Flutes

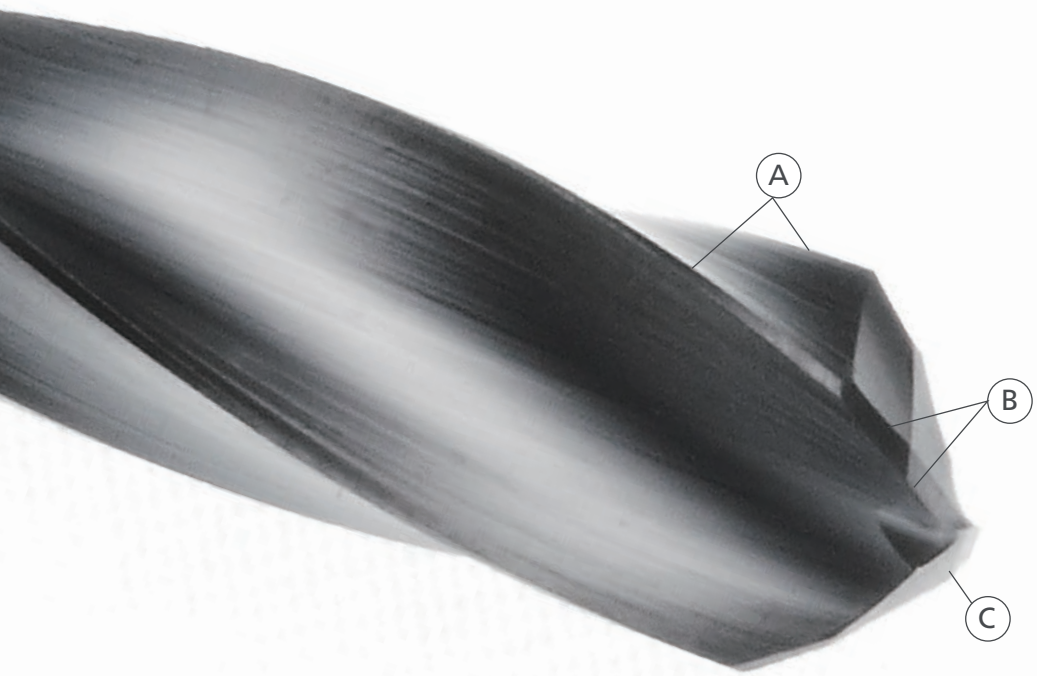
Cutting Diameter D_1	Decimal Equiv.	Metric Equiv.	Tap Size Reference Only	Shank Diameter D_2	Overall Length L_1	Flute Length L_2	Min. Cleared Length L_3	Shank Length L_4	Uncoated EDP No.	Ti-NAMITE-B (TB) EDP No.
1/2	0.5000	12.70		14,0	124,0	77,0	60,0	45,0	55028	54828
12,8 mm	0.5039		M14 X 1,25	14,0	124,0	77,0	60,0	45,0	65092	64892
13,0 mm	0.5118		M14 X 1	14,0	124,0	77,0	60,0	45,0	65093	64893
33/64	0.5156	13.10	9/16-18	14,0	124,0	77,0	60,0	45,0	55029	54829
13,5 mm	0.5315		5/8-11	14,0	124,0	77,0	60,0	45,0	65094	64894
13,8 mm	0.5433			14,0	124,0	77,0	60,0	45,0	65095	64895
14,0 mm	0.5512		M16 X 2	14,0	124,0	77,0	60,0	45,0	65096	64896
9/16	0.5625	14.29		16,0	133,0	83,0	63,0	48,0	55030	54830
14,5 mm	0.5709		M16 X 1,5	16,0	133,0	83,0	63,0	48,0	65097	64897
37/64	0.5781	14.68	5/8-18	16,0	133,0	83,0	63,0	48,0	55031	54831
14,8 mm	0.5827			16,0	133,0	83,0	63,0	48,0	65098	64898
15,0 mm	0.5906		M16 X 1	16,0	133,0	83,0	63,0	48,0	65099	64899
15,5 mm	0.6102		M18 X 2,5	16,0	133,0	83,0	63,0	48,0	65100	64900
15,8 mm	0.6220			16,0	133,0	83,0	63,0	48,0	65101	64901
5/8	0.6250	15.88	11/16-16	16,0	133,0	83,0	63,0	48,0	55032	54832
16,0 mm	0.6299			16,0	133,0	83,0	63,0	48,0	65102	64902
21/32	0.6562	16.67	3/4-10	18,0	143,0	93,0	71,0	48,0	55033	54833
11/16	0.6875	17.46	3/4-16	18,0	143,0	93,0	71,0	48,0	55034	54834
3/4	0.7500	19.05	13/16-16	20,0	153,0	101,0	77,0	50,0	55035	54835

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

	Series 131N 3D& 5D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	14	16
N	**ALUMINUM ALLOYS < 12% SI 6061, 2024, 7075**	≤ 150 Bhn or ≤ 7 HRc	244	RPM	25851	12926	9694	7755	6463	5540	4847
			(195-293)	Fr	0.133	0.265	0.354	0.442	0.531	0.619	0.708
				Feed (mm/min)	3430	3430	3430	3430	3430	3430	3430
	ALUMINUM ALLOYS > 12% SI A356.0, 390.0, 319.0	≤ 125 Bhn or ≤ 77 HRb	183	RPM	19388	9694	7271	5816	4847	4155	3635
			(146-219)	Fr	0.131	0.262	0.349	0.437	0.524	0.611	0.699
				Feed (mm/min)	2540	2540	2540	2540	2540	2540	2540
	COPPER ALLOYS Alum Bronze, Muntz Brass, Navel Brass	≤ 175 Bhn or ≤ 16 HRc	168	RPM	17773	8886	6665	5332	4443	3808	3332
			(134-201)	Fr	0.049	0.097	0.130	0.162	0.194	0.227	0.259
				Feed (mm/min)	864	864	864	864	864	864	864
	PLASTICS Acrylic, PVC, Polypropylene		137	RPM	14541	7271	5453	4362	3635	3116	2726
			(110-165)	Fr	0.059	0.119	0.158	0.198	0.238	0.277	0.317
				Feed (mm/min)	864	864	864	864	864	864	864

Note:
- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (Vc x 1000) / (D_1 x 3.14)
- mm/min = Fr x RPM
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Memo



SERIES 120

KYOCERA SGS Solid Carbide Tools

SERIES 120 COMPOSITE DRILL

The key features of the 8 Facet Double Angle Series 120 drill design offers application benefits beyond that of other high performance drills in its category. Each feature of this 8 facet design was engineered as a solution towards addressing the issues commonly encountered during Composite drilling. This unique High Performance design successfully creates an accurate hole without splintering or delamination.

A DOUBLE MARGIN CONSTRUCTION

- improves drill stability for better hole finish and size control
- allows coolant to reach the point for improved hole quality and extended tool life

B DOUBLE ANGLE POINT

- minimizes workpiece delamination on drill entry and exit
- redistributes loads along multiple cutting edges for improved performance

C NOTCHED POINT

- reduces cutting forces at the drill center for enhanced performance and tool life
- manufactured exclusively with Di-NAMITE® coating for even wear, extended tool life, and improved finishes.

PERFORMANCE. PRECISION. PASSION.

SERIES 120 COMPOSITE DRILL

PERFORMANCE.

- Double margin design stabilized the drill for greater hole accuracy and improved surface finish in final hole.
- Minimized delamination at hole entry/exit.
- Manufactured exclusively with Di-NAMITE® coating for even wear, extended tool life and improved finishes.

PRECISION.

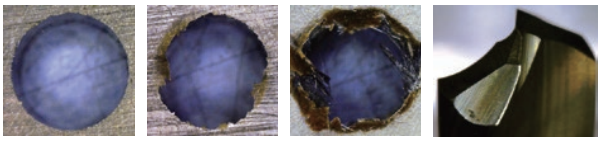
A test was conducted of our CFRP drill to determine the necessity of coating when drilling Carbon Fiber material. Fifty holes were drilled using a special size .190" CFRP drill. The tool's design produces acceptable quality holes; but as shown in the photos, early edge wear on the uncoated drill resulted in holes with frayed edges. The diamond coated drill produced all 50 holes with little to no fraying and edge wear was 38% less than the uncoated drills.
The geometry of the 8 Facet drill with the Di-NAMITE® coating is a necessity for additional tool life and productivity when manufacturing Carbon Fiber material.

SPEED	FEED	DIAMETER	HOLE DEPTH	WORKPIECE	MACHINE TYPE	COOLANT
5,000 rpm	5.0 ipm	.190"	.240"	CFRP	Vertical Machining Center	none

TOOL NO.	TYPE DESCRIPTION	TIR IN MACHINE	USAGE
1	.190" CFRP drill uncoated	.0001"	50 holes

INSPECTION NOTES: Good hole quality for 1st 3 holes. fraying starting by 3rd hole, .0021" wear

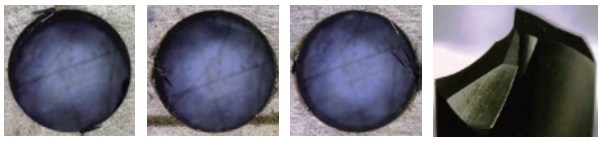
1ST HOLE | 3RD HOLE | 50TH HOLE | AFTER 50 HOLES



TOOL NO.	TYPE DESCRIPTION	TIR IN MACHINE	USAGE
2	.190" CFRP drill diamond	.0002"	50 holes

INSPECTION NOTES: Good hole quality all 50 holes slight fraying, .0013" wear

1ST HOLE | 25TH HOLE | 50TH HOLE | AFTER 50 HOLES

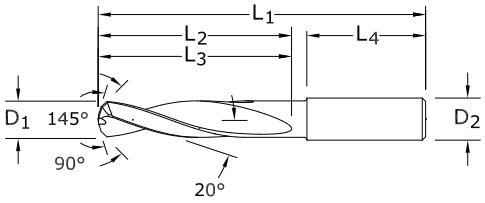


Di-NAMITE® CRYSTALLINE DIAMOND COATING

PASSION.

- The compound angle creates 4 cutting edges along the drill point.
- Distinct double angle prevents abrasiveness of the Composite from localizing along the point and diminishing tool life.

www.kyocera-sgstool.com



TOLERANCES (inch)

DIAMETER	D_1	D_2
#40-1/2	+0.0000 / –0.0005	h6

TOLERANCES (mm)

DIAMETER	D_1	D_2
2,7-12	+0,000 / –0,013	h6

Cutting Diameter D_1	Decimal Equivalent	Metric Equivalent	Shank Diameter D_2	Overall Length L_1	Flute Length L_2 / L_3	Shank Length L_4	Di-NAMITE® (Diamond) EDP No.
#40	0.0980	2.49	1/8	2	9/16	1-1/4	50000
2,7 mm	0.1063		6,0	63,0	20,0	32,0	50001
3,0 mm	0.1181		6,0	63,0	20,0	36,0	50002
1/8	0.1250	3.18	1/4	2-1/2	3/4	1-7/16	50003
3,2 mm	0.1260		6,0	63,0	20,0	36,0	50004
#30	0.1285	3.26	1/4	2-1/2	3/4	1-7/16	50005
#28	0.1405	3.57	1/4	2-1/2	3/4	1-7/16	50006
#22	0.1570	3.99	1/4	2-5/8	7/8	1-7/16	50007
#21	0.1590	4.04	1/4	2-5/8	7/8	1-7/16	50008
4,1 mm	0.1614		6,0	66,0	24,0	36,0	50009
#19	0.1660	4.22	1/4	2-5/8	7/8	1-7/16	50010
11/64	0.1719	4.37	1/4	2-5/8	7/8	1-7/16	50011
3/16	0.1875	4.76	1/4	2-5/8	1	1-7/16	50012
#11	0.1910	4.85	1/4	2-5/8	1	1-7/16	50013
#8	0.1990	5.05	1/4	2-5/8	1	1-7/16	50014
#7	0.2010	5.11	1/4	2-5/8	1	1-7/16	50015
#2	0.2210	5.61	1/4	2-5/8	1	1-7/16	50016
6,0 mm	0.2362		6,0	66,0	28,0	36,0	50017
1/4	0.2500	6.35	1/4	3-1/8	1-5/16	1-7/16	50018
.2510	0.2510	6.38	5/16	3-1/8	1-5/16	1-7/16	50019
F	0.2570	6.53	5/16	3-1/8	1-5/16	1-7/16	50020
I	0.2720	6.91	5/16	3-1/8	1-5/16	1-7/16	50021
J	0.2770	7.04	5/16	3-1/8	1-5/16	1-7/16	50022
K	0.2810	7.14	5/16	3-1/8	1-9/16	1-7/16	50023
5/16	0.3125	7.94	5/16	3-1/8	1-9/16	1-7/16	50024
8,0 mm	0.3150		8,0	79,0	41,0	36,0	50025
3/8	0.3750	9.53	3/8	3-1/2	1-27/32	1-9/16	50026
V	0.3770	9.58	1/2	3-1/2	1-27/32	1-9/16	50027
10,0 mm	0.3937		10,0	89,0	47,0	40,0	50028
7/16	0.4375	11.11	1/2	4-1/16	2-3/16	1-9/16	50029
12,0 mm	0.4724		12,0	102,0	55,0	45,0	50030
1/2	0.5000	12.70	1/2	4-1/4	2-5/16	1-3/4	50031


Common



Reach


Right Spiral


External Coolant



Flutes

Composite Drill

	Series 120 Metric	Vc (m/min)		Diameter (D_1) (mm) 2.5	3	4	6	8	10	12
N	CFRP, AFRP (Carbon Fiber, Aramid Fiber)	100	RPM	12722	10602	7951	5301	3976	3181	2650
		(80-120)	Fr	0.012	0.014	0.019	0.028	0.038	0.047	0.057
			Feed (mm/min)	150	150	150	150	150	150	150
	GFRP (Fiberglass)	75	RPM	9542	7951	5963	3976	2982	2385	1988
		(65-90)	Fr	0.012	0.014	0.019	0.029	0.039	0.048	0.058
			Feed (mm/min)	115	115	115	115	115	115	115
	CARBON, GRAPHITE	120	RPM	15266	12722	9542	6361	4771	3817	3181
		(96-144)	Fr	0.015	0.018	0.025	0.037	0.049	0.062	0.074
			Feed (mm/min)	235	235	235	235	235	235	235

Note:
- rpm = (Vc x 1000) / (D_1 x 3.14)
- mm/min = Fr x RPM
- adjust speed and / or feed based on resin type and / or fiber structure
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Memo

KYOCERA

SGS Solid Carbide Tools

General Purpose Drills



3.00mm SHANK

MICRO DRILLS

0.04mm - 0.34mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide



4 Facet Point Geometry

MICRO GRAIN | 118° POINT | R | 2

STANDARD Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC $^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	
226-0016.020	●	-	-	0.04	3.00	38.00	0.50	118°
NEW 226-0018.025	●	-	-	0.045	3.00	38.00	0.65	118°
226-0020.030	●	-	-	0.05	3.00	38.00	0.80	118°
226-0024.030	●	-	-	0.06	3.00	38.00	0.80	118°
226-0028.050	●	-	-	0.07	3.00	38.00	1.30	118°
226-0031.050	●	-	-	0.08	3.00	38.00	1.30	118°
226-0035.050	●	-	-	0.09	3.00	38.00	1.30	118°
226-0039.040	●	-	-	0.10	3.00	38.00	1.00	118°
226-0043.040	●	-	-	0.11	3.00	38.00	1.00	118°
226-0047.040	●	-	-	0.12	3.00	38.00	1.00	118°
226-0051.040	●	-	-	0.13	3.00	38.00	1.00	118°
226-0055.040	●	-	-	0.14	3.00	38.00	1.00	118°
226-0059.080	●	-	-	0.15	3.00	38.00	2.00	118°
226-0063.080	●	-	-	0.16	3.00	38.00	2.00	118°
226-0067.080	●	-	-	0.17	3.00	38.00	2.00	118°
226-0071.100	●	-	-	0.18	3.00	38.00	2.50	118°
226-0075.100	●	-	-	0.19	3.00	38.00	2.50	118°
226-0079.100	●	-	-	0.20	3.00	38.00	2.50	118°
226-0083.100	●	-	-	0.21	3.00	38.00	2.50	118°
226-0087.100	●	-	-	0.22	3.00	38.00	2.50	118°
226-0091.150	●	-	-	0.23	3.00	38.00	3.80	118°
226-0094.150	●	-	-	0.24	3.00	38.00	3.80	118°
226-0098.150	●	NEW 226-0098L150	-	0.25	3.00	38.00	3.80	118°
226-0102.150	●	NEW 226-0102L150	-	0.26	3.00	38.00	3.80	118°
226-0106.150	●	NEW 226-0106L150	-	0.27	3.00	38.00	3.80	118°
226-0110.150	●	NEW 226-0110L150	-	0.28	3.00	38.00	3.80	118°
226-0114.150	●	NEW 226-0114L150	-	0.29	3.00	38.00	3.80	118°
226-0118.225	●	226-0118L225	●	0.30	3.00	38.00	5.70	118°
226-0122.225	●	226-0122L225	●	0.31	3.00	38.00	5.70	118°
226-0126.225	●	226-0126L225	●	0.32	3.00	38.00	5.70	118°
226-0130.225	●	226-0130L225	●	0.33	3.00	38.00	5.70	118°
226-0134.225	●	226-0134L225	●	0.34	3.00	38.00	5.70	118°

SERIES 226 **WORKPIECE MATERIAL**

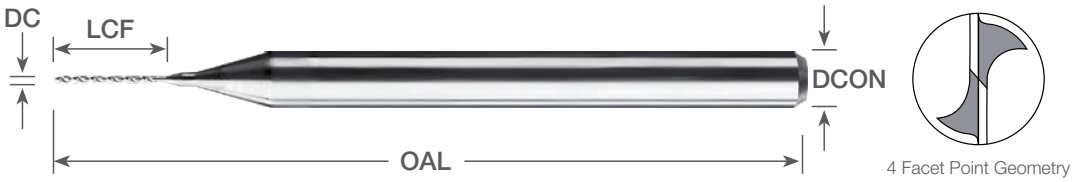
Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

★ : *Priority* ☆ : *Applicable Materials*

3.00mm SHANK

MICRO DRILLS

0.35mm - 0.54mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide



4 Facet Point Geometry

MICRO GRAIN | 130° POINT | R | 2

STANDARD Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC $^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	
226-0138.225	●	226-0138L225	●	0.35	3.00	38.00	5.70	130°
226-0142.225	●	226-0142L225	●	0.36	3.00	38.00	5.70	130°
226-0146.225	●	226-0146L225	●	0.37	3.00	38.00	5.70	130°
226-0150.250	●	226-0150L250	●	0.38	3.00	38.00	6.40	130°
226-0154.250	●	226-0154L250	●	0.39	3.00	38.00	6.40	130°
226-0157.250	●	226-0157L250	●	0.40	3.00	38.00	6.40	130°
226-0161.250	●	226-0161L250	●	0.41	3.00	38.00	6.40	130°
226-0165.250	●	226-0165L250	●	0.42	3.00	38.00	6.40	130°
226-0169.250	●	226-0169L250	●	0.43	3.00	38.00	6.40	130°
226-0173.250	●	226-0173L250	●	0.44	3.00	38.00	6.40	130°
226-0177.250	●	226-0177L250	●	0.45	3.00	38.00	6.40	130°
226-0181.250	●	226-0181L250	●	0.46	3.00	38.00	6.40	130°
226-0185.250	●	226-0185L250	●	0.47	3.00	38.00	6.40	130°
226-0189.260	●	226-0189L260	●	0.48	3.00	38.00	6.60	130°
226-0193.260	●	226-0193L260	●	0.49	3.00	38.00	6.60	130°
226-0197.260	●	226-0197L260	●	0.50	3.00	38.00	6.60	130°
226-0201.260	●	226-0201L260	●	0.51	3.00	38.00	6.60	130°
226-0205.260	●	226-0205L260	●	0.52	3.00	38.00	6.60	130°
226-0209.260	●	226-0209L260	●	0.53	3.00	38.00	6.60	130°
226-0213.260	●	226-0213L260	●	0.54	3.00	38.00	6.60	130°

SERIES 226 **WORKPIECE MATERIAL**

Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

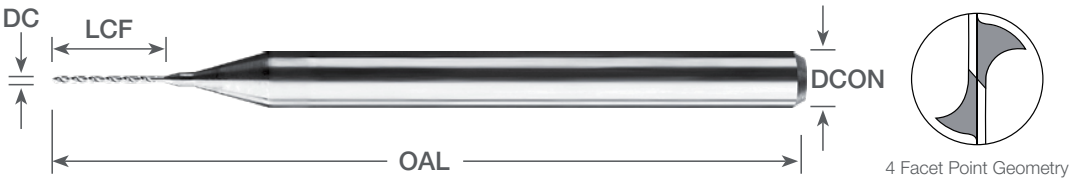
★ : *Priority* ☆ : *Applicable Materials*

● : U.S. Stock Standard
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3.00mm SHANK
MICRO DRILLS

0.55mm - 0.84mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide



4 Facet Point Geometry

MICRO GRAIN | 130° POINT | R | 2

STANDARD Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC $^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	
226-0217.340	●	226-0217L340	●	0.55	3.00	38.00	8.60	130°
226-0220.340	●	226-0220L340	●	0.56	3.00	38.00	8.60	130°
226-0224.340	●	226-0224L340	●	0.57	3.00	38.00	8.60	130°
226-0228.340	●	226-0228L340	●	0.58	3.00	38.00	8.60	130°
226-0232.340	●	226-0232L340	●	0.59	3.00	38.00	8.60	130°
226-0236.340	●	226-0236L340	●	0.60	3.00	38.00	8.60	130°
226-0240.340	●	226-0240L340	●	0.61	3.00	38.00	8.60	130°
226-0244.340	●	226-0244L340	●	0.62	3.00	38.00	8.60	130°
226-0248.340	●	226-0248L340	●	0.63	3.00	38.00	8.60	130°
226-0252.340	●	226-0252L340	●	0.64	3.00	38.00	8.60	130°
226-0256.340	●	226-0256L340	●	0.65	3.00	38.00	8.60	130°
226-0260.340	●	226-0260L340	●	0.66	3.00	38.00	8.60	130°
226-0264.340	●	226-0264L340	●	0.67	3.00	38.00	8.60	130°
226-0268.340	●	226-0268L340	●	0.68	3.00	38.00	8.60	130°
226-0272.340	●	226-0272L340	●	0.69	3.00	38.00	8.60	130°
226-0276.400	●	226-0276L400	●	0.70	3.00	38.00	10.20	130°
226-0280.400	●	226-0280L400	●	0.71	3.00	38.00	10.20	130°
226-0283.400	●	226-0283L400	●	0.72	3.00	38.00	10.20	130°
226-0287.400	●	226-0287L400	●	0.73	3.00	38.00	10.20	130°
226-0291.400	●	226-0291L400	●	0.74	3.00	38.00	10.20	130°
226-0295.400	●	226-0295L400	●	0.75	3.00	38.00	10.20	130°
226-0299.400	●	226-0299L400	●	0.76	3.00	38.00	10.20	130°
226-0303.400	●	226-0303L400	●	0.77	3.00	38.00	10.20	130°
226-0307.400	●	226-0307L400	●	0.78	3.00	38.00	10.20	130°
226-0311.400	●	226-0311L400	●	0.79	3.00	38.00	10.20	130°
226-0315.400	●	226-0315L400	●	0.80	3.00	38.00	10.20	130°
226-0319.400	●	226-0319L400	●	0.81	3.00	38.00	10.20	130°
226-0323.400	●	226-0323L400	●	0.82	3.00	38.00	10.20	130°
226-0327.400	●	226-0327L400	●	0.83	3.00	38.00	10.20	130°
226-0331.400	●	226-0331L400	●	0.84	3.00	38.00	10.20	130°

SERIES 226 WORKPIECE MATERIAL

Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

★ : *Priority* ☆ : *Applicable Materials*

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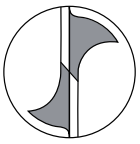
U.S. Stock Standard : ●
NOT STOCKED - Call for Delivery : ■

3.00mm SHANK

MICRO DRILLS

0.85mm - 1.14mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide





4 Facet Point Geometry

MICRO GRAIN | 130° POINT | R | 2

STANDARD Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC$^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	
226-0335.400	●	226-0335L400	●	0.85	3.00	38.00	10.20	130°
226-0339.400	●	226-0339L400	●	0.86	3.00	38.00	10.20	130°
226-0343.400	●	226-0343L400	●	0.87	3.00	38.00	10.20	130°
226-0346.400	●	226-0346L400	●	0.88	3.00	38.00	10.20	130°
226-0350.400	●	226-0350L400	●	0.89	3.00	38.00	10.20	130°
226-0354.400	●	226-0354L400	●	0.90	3.00	38.00	10.20	130°
226-0358.400	●	226-0358L400	●	0.91	3.00	38.00	10.20	130°
226-0362.400	●	226-0362L400	●	0.92	3.00	38.00	10.20	130°
226-0366.400	●	226-0366L400	●	0.93	3.00	38.00	10.20	130°
226-0370.400	●	226-0370L400	●	0.94	3.00	38.00	10.20	130°
226-0374.400	●	226-0374L400	●	0.95	3.00	38.00	10.20	130°
226-0378.400	●	226-0378L400	●	0.96	3.00	38.00	10.20	130°
226-0382.400	●	226-0382L400	●	0.97	3.00	38.00	10.20	130°
226-0386.400	●	226-0386L400	●	0.98	3.00	38.00	10.20	130°
226-0390.400	●	226-0390L400	●	0.99	3.00	38.00	10.20	130°
226-0394.400	●	226-0394L400	●	1.00	3.00	38.00	10.20	130°
226-0398.400	●	226-0398L400	●	1.01	3.00	38.00	10.20	130°
226-0402.400	●	226-0402L400	●	1.02	3.00	38.00	10.20	130°
226-0406.400	●	226-0406L400	●	1.03	3.00	38.00	10.20	130°
226-0409.400	●	226-0409L400	●	1.04	3.00	38.00	10.20	130°
226-0413.400	●	226-0413L400	●	1.05	3.00	38.00	10.20	130°
226-0417.400	●	226-0417L400	●	1.06	3.00	38.00	10.20	130°
226-0421.400	●	226-0421L400	●	1.07	3.00	38.00	10.20	130°
226-0425.400	●	226-0425L400	●	1.08	3.00	38.00	10.20	130°
226-0429.400	●	226-0429L400	●	1.09	3.00	38.00	10.20	130°
226-0433.400	●	226-0433L400	●	1.10	3.00	38.00	10.20	130°
226-0437.400	●	226-0437L400	●	1.11	3.00	38.00	10.20	130°
226-0441.400	●	226-0441L400	●	1.12	3.00	38.00	10.20	130°
226-0445.400	●	226-0445L400	●	1.13	3.00	38.00	10.20	130°
226-0449.400	●	226-0449L400	●	1.14	3.00	38.00	10.20	130°

SERIES 226 **WORKPIECE MATERIAL**

Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

★ : *Priority* ☆ : *Applicable Materials*

● : U.S. Stock Standard
■ : NOT STOCKED - Call for Delivery

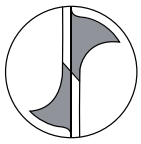
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3.00mm SHANK

MICRO DRILLS

1.15mm - 1.44mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide





4 Facet Point Geometry

MICRO GRAIN | 130° POINT | R | 2

STANDARD Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC $^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	
226-0453.400	●	226-0453L400	●	1.15	3.00	38.00	10.20	130°
226-0457.400	●	226-0457L400	●	1.16	3.00	38.00	10.20	130°
226-0461.400	●	226-0461L400	●	1.17	3.00	38.00	10.20	130°
226-0465.400	●	226-0465L400	●	1.18	3.00	38.00	10.20	130°
226-0469.400	●	226-0469L400	●	1.19	3.00	38.00	10.20	130°
226-0472.400	●	226-0472L400	●	1.20	3.00	38.00	10.20	130°
226-0476.400	●	226-0476L400	●	1.21	3.00	38.00	10.20	130°
226-0480.400	●	226-0480L400	●	1.22	3.00	38.00	10.20	130°
226-0484.400	●	226-0484L400	●	1.23	3.00	38.00	10.20	130°
226-0488.400	●	226-0488L400	●	1.24	3.00	38.00	10.20	130°
226-0492.400	●	226-0492L400	●	1.25	3.00	38.00	10.20	130°
226-0496.400	●	226-0496L400	●	1.26	3.00	38.00	10.20	130°
226-0500.400	●	226-0500L400	●	1.27	3.00	38.00	10.20	130°
226-0504.400	●	226-0504L400	●	1.28	3.00	38.00	10.20	130°
226-0508.400	●	226-0508L400	●	1.29	3.00	38.00	10.20	130°
226-0512.400	●	226-0512L400	●	1.30	3.00	38.00	10.20	130°
226-0516.400	●	226-0516L400	●	1.31	3.00	38.00	10.20	130°
226-0520.400	●	226-0520L400	●	1.32	3.00	38.00	10.20	130°
226-0524.400	●	226-0524L400	●	1.33	3.00	38.00	10.20	130°
226-0528.400	●	226-0528L400	●	1.34	3.00	38.00	10.20	130°
226-0531.400	●	226-0531L400	●	1.35	3.00	38.00	10.20	130°
226-0535.400	●	226-0535L400	●	1.36	3.00	38.00	10.20	130°
226-0539.400	●	226-0539L400	●	1.37	3.00	38.00	10.20	130°
226-0543.400	●	226-0543L400	●	1.38	3.00	38.00	10.20	130°
226-0547.400	●	226-0547L400	●	1.39	3.00	38.00	10.20	130°
226-0551.400	●	226-0551L400	●	1.40	3.00	38.00	10.20	130°
226-0555.400	●	226-0555L400	●	1.41	3.00	38.00	10.20	130°
226-0559.400	●	226-0559L400	●	1.42	3.00	38.00	10.20	130°
226-0563.400	●	226-0563L400	●	1.43	3.00	38.00	10.20	130°
226-0567.400	●	226-0567L400	●	1.44	3.00	38.00	10.20	130°

SERIES 226 **WORKPIECE MATERIAL**

Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

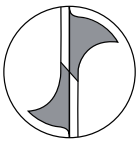
★ : *Priority* ☆ : *Applicable Materials*

3.00mm SHANK

MICRO DRILLS

1.45mm - 1.74mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide





4 Facet Point Geometry

MICRO GRAIN | 130° POINT | R | 2

STANDARD Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC$^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	
226-0571.400	●	226-0571L400	●	1.45	3.00	38.00	10.20	130°
226-0575.400	●	226-0575L400	●	1.46	3.00	38.00	10.20	130°
226-0579.400	●	226-0579L400	●	1.47	3.00	38.00	10.20	130°
226-0583.400	●	226-0583L400	●	1.48	3.00	38.00	10.20	130°
226-0587.400	●	226-0587L400	●	1.49	3.00	38.00	10.20	130°
226-0591.400	●	226-0591L400	●	1.50	3.00	38.00	10.20	130°
226-0594.400	●	226-0594L400	●	1.51	3.00	38.00	10.20	130°
226-0598.400	●	226-0598L400	●	1.52	3.00	38.00	10.20	130°
226-0602.400	●	226-0602L400	●	1.53	3.00	38.00	10.20	130°
226-0606.400	●	226-0606L400	●	1.54	3.00	38.00	10.20	130°
226-0610.400	●	226-0610L400	●	1.55	3.00	38.00	10.20	130°
226-0614.400	●	226-0614L400	●	1.56	3.00	38.00	10.20	130°
226-0618.400	●	226-0618L400	●	1.57	3.00	38.00	10.20	130°
226-0622.400	●	226-0622L400	●	1.58	3.00	38.00	10.20	130°
226-0626.400	●	226-0626L400	●	1.59	3.00	38.00	10.20	130°
226-0630.400	●	226-0630L400	●	1.60	3.00	38.00	10.20	130°
226-0634.400	●	226-0634L400	●	1.61	3.00	38.00	10.20	130°
226-0638.400	●	226-0638L400	●	1.62	3.00	38.00	10.20	130°
226-0642.400	●	226-0642L400	●	1.63	3.00	38.00	10.20	130°
226-0646.400	●	226-0646L400	●	1.64	3.00	38.00	10.20	130°
226-0650.400	●	226-0650L400	●	1.65	3.00	38.00	10.20	130°
226-0654.400	●	226-0654L400	●	1.66	3.00	38.00	10.20	130°
226-0657.400	●	226-0657L400	●	1.67	3.00	38.00	10.20	130°
226-0661.400	●	226-0661L400	●	1.68	3.00	38.00	10.20	130°
226-0665.400	●	226-0665L400	●	1.69	3.00	38.00	10.20	130°
226-0669.400	●	226-0669L400	●	1.70	3.00	38.00	10.20	130°
226-0673.400	●	226-0673L400	●	1.71	3.00	38.00	10.20	130°
226-0677.400	●	226-0677L400	●	1.72	3.00	38.00	10.20	130°
226-0681.400	●	226-0681L400	●	1.73	3.00	38.00	10.20	130°
226-0685.400	●	226-0685L400	●	1.74	3.00	38.00	10.20	130°

SERIES 226 **WORKPIECE MATERIAL**

Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

★ : *Priority* ☆ : *Applicable Materials*

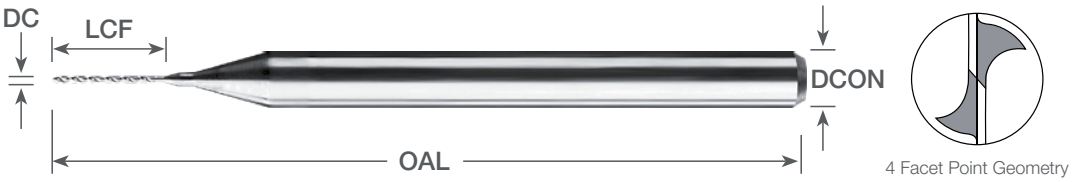
● : U.S. Stock Standard
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3.00mm SHANK

MICRO DRILLS

1.75mm - 2.02mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide



4 Facet Point Geometry



STANDARD Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC $^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	
226-0689.400	●	226-0689L400	●	1.75	3.00	38.00	10.20	130°
226-0693.400	●	226-0693L400	●	1.76	3.00	38.00	10.20	130°
226-0697.400	●	226-0697L400	●	1.77	3.00	38.00	10.20	130°
226-0701.400	●	226-0701L400	●	1.78	3.00	38.00	10.20	130°
226-0705.400	●	226-0705L400	●	1.79	3.00	38.00	10.20	130°
226-0709.400	●	226-0709L400	●	1.80	3.00	38.00	10.20	130°
226-0713.400	●	226-0713L400	●	1.81	3.00	38.00	10.20	130°
226-0717.400	●	226-0717L400	●	1.82	3.00	38.00	10.20	130°
226-0720.400	●	226-0720L400	●	1.83	3.00	38.00	10.20	130°
226-0724.400	●	226-0724L400	●	1.84	3.00	38.00	10.20	130°
226-0728.400	●	226-0728L400	●	1.85	3.00	38.00	10.20	130°
226-0732.400	●	226-0732L400	●	1.86	3.00	38.00	10.20	130°
226-0736.400	●	226-0736L400	●	1.87	3.00	38.00	10.20	130°
226-0740.400	●	226-0740L400	●	1.88	3.00	38.00	10.20	130°
226-0744.400	●	226-0744L400	●	1.89	3.00	38.00	10.20	130°
226-0748.400	●	226-0748L400	●	1.90	3.00	38.00	10.20	130°
226-0752.400	●	226-0752L400	●	1.91	3.00	38.00	10.20	130°
226-0756.400	●	226-0756L400	●	1.92	3.00	38.00	10.20	130°
226-0760.400	●	226-0760L400	●	1.93	3.00	38.00	10.20	130°
226-0764.400	●	226-0764L400	●	1.94	3.00	38.00	10.20	130°
226-0768.400	●	226-0768L400	●	1.95	3.00	38.00	10.20	130°
226-0772.400	●	226-0772L400	●	1.96	3.00	38.00	10.20	130°
226-0776.400	●	226-0776L400	●	1.97	3.00	38.00	10.20	130°
226-0780.400	●	226-0780L400	●	1.98	3.00	38.00	10.20	130°
226-0783.400	●	226-0783L400	●	1.99	3.00	38.00	10.20	130°
226-0787.400	●	226-0787L400	●	2.00	3.00	38.00	10.20	130°
226-0791.400	●	226-0791L400	●	2.01	3.00	38.00	10.20	130°
226-0795.400	●	226-0795L400	●	2.02	3.00	38.00	10.20	130°

SERIES 226 **WORKPIECE MATERIAL**

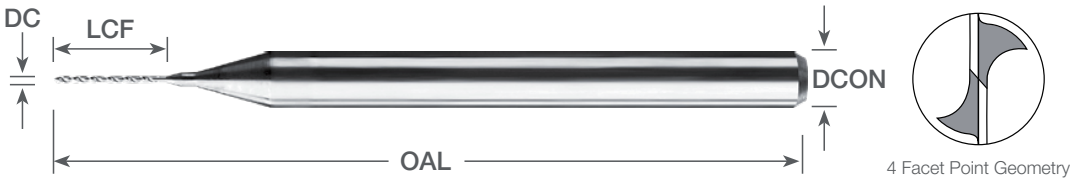
Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

★ : *Priority* ☆ : *Applicable Materials*

3.00mm SHANK

MICRO DRILLS

2.03mm - 2.30mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide



4 Facet Point Geometry



STANDARD Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC $^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	
226-0799.400	●	226-0799L400	●	2.03	3.00	38.00	10.20	130°
226-0803.400	●	226-0803L400	●	2.04	3.00	38.00	10.20	130°
226-0807.400	●	226-0807L400	●	2.05	3.00	38.00	10.20	130°
226-0811.400	●	226-0811L400	●	2.06	3.00	38.00	10.20	130°
226-0815.400	●	226-0815L400	●	2.07	3.00	38.00	10.20	130°
226-0819.400	●	226-0819L400	●	2.08	3.00	38.00	10.20	130°
226-0823.400	●	226-0823L400	●	2.09	3.00	38.00	10.20	130°
226-0827.400	●	226-0827L400	●	2.10	3.00	38.00	10.20	130°
226-0831.400	●	226-0831L400	●	2.11	3.00	38.00	10.20	130°
226-0835.400	●	226-0835L400	●	2.12	3.00	38.00	10.20	130°
226-0839.400	●	226-0839L400	●	2.13	3.00	38.00	10.20	130°
226-0843.400	●	226-0843L400	●	2.14	3.00	38.00	10.20	130°
226-0846.400	●	226-0846L400	●	2.15	3.00	38.00	10.20	130°
226-0850.400	●	226-0850L400	●	2.16	3.00	38.00	10.20	130°
226-0854.400	●	226-0854L400	●	2.17	3.00	38.00	10.20	130°
226-0858.400	●	226-0858L400	●	2.18	3.00	38.00	10.20	130°
226-0862.400	●	226-0862L400	●	2.19	3.00	38.00	10.20	130°
226-0866.400	●	226-0866L400	●	2.20	3.00	38.00	10.20	130°
226-0870.400	●	226-0870L400	●	2.21	3.00	38.00	10.20	130°
226-0874.400	●	226-0874L400	●	2.22	3.00	38.00	10.20	130°
226-0878.400	●	226-0878L400	●	2.23	3.00	38.00	10.20	130°
226-0882.400	●	226-0882L400	●	2.24	3.00	38.00	10.20	130°
226-0886.400	●	226-0886L400	●	2.25	3.00	38.00	10.20	130°
226-0890.400	●	226-0890L400	●	2.26	3.00	38.00	10.20	130°
226-0894.400	●	226-0894L400	●	2.27	3.00	38.00	10.20	130°
226-0898.400	●	226-0898L400	●	2.28	3.00	38.00	10.20	130°
226-0902.400	●	226-0902L400	●	2.29	3.00	38.00	10.20	130°
226-0906.400	●	226-0906L400	●	2.30	3.00	38.00	10.20	130°

SERIES 226 **WORKPIECE MATERIAL**

Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

★ : *Priority* ☆ : *Applicable Materials*

● : U.S. Stock Standard
■ : NOT STOCKED - Call for Delivery

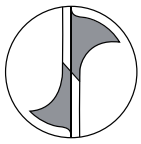
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3.00mm SHANK

MICRO DRILLS

2.31mm - 2.60mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide





4 Facet Point Geometry

MICRO GRAIN | 130° POINT | R | 2

STANDARD Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC $^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	
226-0909.400	●	226-0909L400	●	2.31	3.00	38.00	10.20	130°
226-0913.400	●	226-0913L400	●	2.32	3.00	38.00	10.20	130°
226-0917.400	●	226-0917L400	●	2.33	3.00	38.00	10.20	130°
226-0921.400	●	226-0921L400	●	2.34	3.00	38.00	10.20	130°
226-0925.400	●	226-0925L400	●	2.35	3.00	38.00	10.20	130°
226-0929.400	●	226-0929L400	●	2.36	3.00	38.00	10.20	130°
226-0933.400	●	226-0933L400	●	2.37	3.00	38.00	10.20	130°
226-0937.400	●	226-0937L400	●	2.38	3.00	38.00	10.20	130°
226-0941.400	●	226-0941L400	●	2.39	3.00	38.00	10.20	130°
226-0945.400	●	226-0945L400	●	2.40	3.00	38.00	10.20	130°
226-0949.400	●	226-0949L400	●	2.41	3.00	38.00	10.20	130°
226-0953.400	●	226-0953L400	●	2.42	3.00	38.00	10.20	130°
226-0957.400	●	226-0957L400	●	2.43	3.00	38.00	10.20	130°
226-0961.400	●	226-0961L400	●	2.44	3.00	38.00	10.20	130°
226-0965.400	●	226-0965L400	●	2.45	3.00	38.00	10.20	130°
226-0969.400	●	226-0969L400	●	2.46	3.00	38.00	10.20	130°
226-0972.400	●	226-0972L400	●	2.47	3.00	38.00	10.20	130°
226-0976.400	●	226-0976L400	●	2.48	3.00	38.00	10.20	130°
226-0980.400	●	226-0980L400	●	2.49	3.00	38.00	10.20	130°
226-0984.400	●	226-0984L400	●	2.50	3.00	38.00	10.20	130°
226-0988.400	●	226-0988L400	●	2.51	3.00	38.00	10.20	130°
226-0992.400	●	226-0992L400	●	2.52	3.00	38.00	10.20	130°
226-0996.400	●	226-0996L400	●	2.53	3.00	38.00	10.20	130°
226-1000.400	●	226-1000L400	●	2.54	3.00	38.00	10.20	130°
226-1004.400	●	226-1004L400	●	2.55	3.00	38.00	10.20	130°
226-1008.400	●	226-1008L400	●	2.56	3.00	38.00	10.20	130°
226-1012.400	●	226-1012L400	●	2.57	3.00	38.00	10.20	130°
226-1016.400	●	226-1016L400	●	2.58	3.00	38.00	10.20	130°
226-1020.400	●	226-1020L400	●	2.59	3.00	38.00	10.20	130°
226-1024.400	●	226-1024L400	●	2.60	3.00	38.00	10.20	130°

SERIES 226 **WORKPIECE MATERIAL**

Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

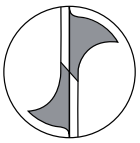
★ : *Priority* ☆ : *Applicable Materials*

3.00mm SHANK

MICRO DRILLS

2.61mm - 2.90mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide





4 Facet Point Geometry

MICRO GRAIN | 130° POINT | R | 2

STANDARD Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				
Part Number	Stock	Part Number	Stock	DC$^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	Point Angle
226-1028.400	●	226-1028L400	●	2.61	3.00	38.00	10.20	130°
226-1031.400	●	226-1031L400	●	2.62	3.00	38.00	10.20	130°
226-1035.400	●	226-1035L400	●	2.63	3.00	38.00	10.20	130°
226-1039.400	●	226-1039L400	●	2.64	3.00	38.00	10.20	130°
226-1043.400	●	226-1043L400	●	2.65	3.00	38.00	10.20	130°
226-1047.400	●	226-1047L400	●	2.66	3.00	38.00	10.20	130°
226-1051.400	●	226-1051L400	●	2.67	3.00	38.00	10.20	130°
226-1055.400	●	226-1055L400	●	2.68	3.00	38.00	10.20	130°
226-1059.400	●	226-1059L400	●	2.69	3.00	38.00	10.20	130°
226-1063.400	●	226-1063L400	●	2.70	3.00	38.00	10.20	130°
226-1067.400	●	226-1067L400	●	2.71	3.00	38.00	10.20	130°
226-1071.400	●	226-1071L400	●	2.72	3.00	38.00	10.20	130°
226-1075.400	●	226-1075L400	●	2.73	3.00	38.00	10.20	130°
226-1079.400	●	226-1079L400	●	2.74	3.00	38.00	10.20	130°
226-1083.400	●	226-1083L400	●	2.75	3.00	38.00	10.20	130°
226-1087.400	●	226-1087L400	●	2.76	3.00	38.00	10.20	130°
226-1091.400	●	226-1091L400	●	2.77	3.00	38.00	10.20	130°
226-1094.400	●	226-1094L400	●	2.78	3.00	38.00	10.20	130°
226-1098.400	●	226-1098L400	●	2.79	3.00	38.00	10.20	130°
226-1102.400	●	226-1102L400	●	2.80	3.00	38.00	10.20	130°
226-1106.400	●	226-1106L400	●	2.81	3.00	38.00	10.20	130°
226-1110.400	●	226-1110L400	●	2.82	3.00	38.00	10.20	130°
226-1114.400	●	226-1114L400	●	2.83	3.00	38.00	10.20	130°
226-1118.400	●	226-1118L400	●	2.84	3.00	38.00	10.20	130°
226-1122.400	●	226-1122L400	●	2.85	3.00	38.00	10.20	130°
226-1126.400	●	226-1126L400	●	2.86	3.00	38.00	10.20	130°
226-1130.400	●	226-1130L400	●	2.87	3.00	38.00	10.20	130°
226-1134.400	●	226-1134L400	●	2.88	3.00	38.00	10.20	130°
226-1138.400	●	226-1138L400	●	2.89	3.00	38.00	10.20	130°
226-1142.400	●	226-1142L400	●	2.90	3.00	38.00	10.20	130°

SERIES 226 **WORKPIECE MATERIAL**

Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

★ : *Priority* ☆ : *Applicable Materials*

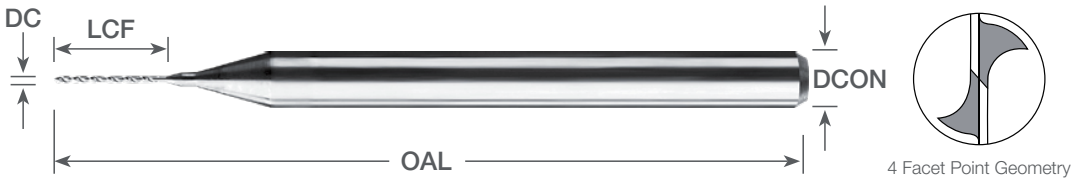
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3.00mm SHANK

MICRO DRILLS

2.91mm - 3.00mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide



4 Facet Point Geometry



STANDARD Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC $^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	
226-1146.400	●	**226-1146L400**	●	2.91	3.00	38.00	10.20	130°
226-1150.400	●	**226-1150L400**	●	2.92	3.00	38.00	10.20	130°
226-1154.400	●	**226-1154L400**	●	2.93	3.00	38.00	10.20	130°
226-1157.400	●	**226-1157L400**	●	2.94	3.00	38.00	10.20	130°
226-1161.400	●	**226-1161L400**	●	2.95	3.00	38.00	10.20	130°
226-1165.400	●	**226-1165L400**	●	2.96	3.00	38.00	10.20	130°
226-1169.400	●	**226-1169L400**	●	2.97	3.00	38.00	10.20	130°
226-1173.400	●	**226-1173L400**	●	2.98	3.00	38.00	10.20	130°
226-1177.400	●	**226-1177L400**	●	2.99	3.00	38.00	10.20	130°
226-1181.400	●	**226-1181L400**	●	3.00	3.00	38.00	10.20	130°

SERIES 226 **WORKPIECE MATERIAL**

Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

★ : *Priority* ☆ : *Applicable Materials*

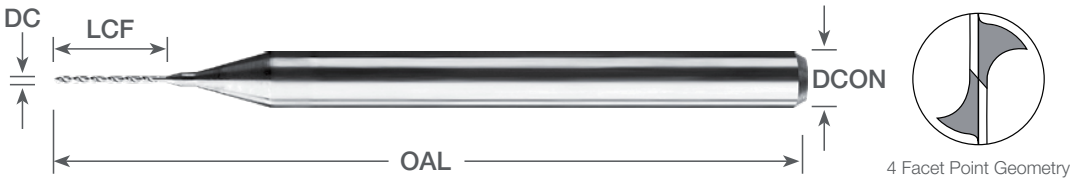
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3.00mm SHANK

MICRO DRILLS

0.75mm - 1.80mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide



4 Facet Point Geometry



EXTENDED Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC $^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	
226-0295.433	●	226-0295L433	●	0.75	3.00	50.00	11.00	130°
226-0315.433	●	226-0315L433	●	0.80	3.00	50.00	11.00	130°
226-0335.512	●	226-0335L512	●	0.85	3.00	50.00	13.00	130°
226-0354.512	●	226-0354L512	●	0.90	3.00	50.00	13.00	130°
226-0374.591	●	226-0374L591	●	0.95	3.00	50.00	15.00	130°
226-0394.591	●	226-0394L591	●	1.00	3.00	50.00	15.00	130°
226-0413.670	●	226-0413L670	●	1.05	3.00	50.00	17.00	130°
226-0433.670	●	226-0433L670	●	1.10	3.00	50.00	17.00	130°
226-0453.670	●	226-0453L670	●	1.15	3.00	50.00	17.00	130°
226-0472.670	●	226-0472L670	●	1.20	3.00	50.00	17.00	130°
226-0492.749	●	226-0492L749	●	1.25	3.00	50.00	19.00	130°
226-0512.749	●	226-0512L749	●	1.30	3.00	50.00	19.00	130°
226-0531.749	●	226-0531L749	●	1.35	3.00	50.00	19.00	130°
226-0551.749	●	226-0551L749	●	1.40	3.00	50.00	19.00	130°
226-0571.788	●	226-0571L788	●	1.45	3.00	50.00	20.00	130°
226-0591.788	●	226-0591L788	●	1.50	3.00	50.00	20.00	130°
226-0610.788	●	226-0610L788	●	1.55	3.00	50.00	20.00	130°
226-0630.788	●	226-0630L788	●	1.60	3.00	50.00	20.00	130°
226-0650.788	●	226-0650L788	●	1.65	3.00	50.00	20.00	130°
226-0669.788	●	226-0669L788	●	1.70	3.00	50.00	20.00	130°
226-0689.788	●	226-0689L788	●	1.75	3.00	50.00	20.00	130°
226-0709.788	●	226-0709L788	●	1.80	3.00	50.00	20.00	130°

SERIES 226 **WORKPIECE MATERIAL**

Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

★ : *Priority* ☆ : *Applicable Materials*

● : U.S. Stock Standard
■ : NOT STOCKED - Call for Delivery

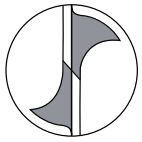
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3.00mm SHANK

MICRO DRILLS

1.85mm - 3.00mm DIAMETER
Mirror Surface Finishes
Sub Micron Grain Carbide





4 Facet Point Geometry

MICRO GRAIN | 130° POINT | R | 2

EXTENDED Flute Length

Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC $^{+0.000mm}_{-0.008mm}$	DCON	OAL	LCF	
226-0728.898	●	226-0728L898	●	1.85	3.00	60.00	22.80	130°
226-0748.898	●	226-0748L898	●	1.90	3.00	60.00	22.80	130°
226-0768.945	●	226-0768L945	●	1.95	3.00	60.00	24.00	130°
226-0787.945	●	226-0787L945	●	2.00	3.00	60.00	24.00	130°
226-0807.992	●	226-0807L992	●	2.05	3.00	60.00	25.20	130°
226-0827.992	●	226-0827L992	●	2.10	3.00	60.00	25.20	130°
226-0846.1039	●	226-0846L1039	●	2.15	3.00	60.00	26.40	130°
226-0866.1039	●	226-0866L1039	●	2.20	3.00	60.00	26.40	130°
226-0886.1087	●	226-0886L1087	●	2.25	3.00	60.00	27.60	130°
226-0906.1087	●	226-0906L1087	●	2.30	3.00	60.00	27.60	130°
226-0925.1134	●	226-0925L1134	●	2.35	3.00	60.00	28.80	130°
226-0945.1134	●	226-0945L1134	●	2.40	3.00	60.00	28.80	130°
226-0965.1181	●	226-0965L1181	●	2.45	3.00	60.00	30.00	130°
226-0984.1181	●	226-0984L1181	●	2.50	3.00	60.00	30.00	130°
226-1004.1228	●	226-1004L1228	●	2.55	3.00	60.00	31.20	130°
226-1024.1228	●	226-1024L1228	●	2.60	3.00	60.00	31.20	130°
226-1043.1276	●	226-1043L1276	●	2.65	3.00	60.00	32.40	130°
226-1063.1276	●	226-1063L1276	●	2.70	3.00	60.00	32.40	130°
226-1083.1323	●	226-1083L1323	●	2.75	3.00	60.00	33.60	130°
226-1102.1323	●	226-1102L1323	●	2.80	3.00	60.00	33.60	130°
226-1122.1370	●	226-1122L1370	●	2.85	3.00	60.00	34.80	130°
226-1142.1370	●	226-1142L1370	●	2.90	3.00	60.00	34.80	130°
226-1161.1417	●	226-1161L1417	●	2.95	3.00	60.00	36.00	130°
226-1181.1417	●	226-1181L1417	●	3.00	3.00	60.00	36.00	130°

SERIES 226 **WORKPIECE MATERIAL**

Coating	P Steel ~30HRC	P Steel 30~40HRC	H Hardened Steel ~55HRC	H Hardened Steel ~68HRC	M Stainless Steel	K Cast Iron	N Aluminum	N Graphite	N Copper Alloy	N Brass	N CFRP	N Plastic	N Thermoset Plastic	N High Density Plastic	S Nickel / Cobalt	S Titanium Alloy
AlTiN	★	★	★	★	★	☆		☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated							☆	☆	★	★	☆	★	★	★		☆

★ : *Priority* ☆ : *Applicable Materials*

Solid Carbide Micro Drills

Series 105 / 226 / 226L / 390 / 392

Workpiece Material	Material Hardness/Types	Uncoated Recommended Cutting Speed		AlTiN Coated Recommended Cutting Speed		Cutting Dia. DC (in)	Cutting Dia. DC (mm)	Feed Per Rev	
		(sfm)	(m/min)	(sfm)	(m/min)			(ipr)	(mm/rev)
Low Carbon Steel	**12L14 A36**	130 - 165	40 - 50	165 - 195	50 - 60	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00015 - 0.00030	0.0040 - 0.0075
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00030 - 0.00045	0.0075 - 0.0115
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00045 - 0.00060	0.0115 - 0.0150
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00060 - 0.00120	0.0150 - 0.0300
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00120 - 0.00240	0.0300 - 0.0600
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00240 - 0.00360	0.0600 - 0.0900
Mild Carbon Steel	**1018 1028 1050**	98 - 150	30 - 45	130 - 180	40 - 54	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00014 - 0.00028	0.0035 - 0.0070
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00028 - 0.00042	0.0070 - 0.0106
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00042 - 0.00056	0.0106 - 0.0140
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00056 - 0.00115	0.0140 - 0.0280
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00115 - 0.00226	0.0280 - 0.0560
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00226 - 0.00353	0.0560 - 0.0896
Alloy Steel	**4130 4140 8620**	180 - 245	55 - 75	195 - 260	60 - 80	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00013 - 0.00026	0.0033 - 0.0066
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00026 - 0.00039	0.0066 - 0.0099
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00039 - 0.00052	0.0099 - 0.0132
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00052 - 0.00104	0.0132 - 0.0264
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00104 - 0.00208	0.0264 - 0.0528
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00208 - 0.00326	0.0528 - 0.0828
Preharden Tool Steel	**P20 4140PH A2 D2 H13**	100 - 165	30 - 50	130 - 195	40 - 60	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00008 - 0.00015	0.0020 - 0.0038
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00015 - 0.00023	0.0038 - 0.0058
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00023 - 0.00030	0.0038 - 0.0076
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00030 - 0.00060	0.0076 - 0.0152
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00060 - 0.00120	0.0152 - 0.0304
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00120 - 0.00190	0.0304 - 0.0483
Harden Tool Steel	**>48 HRc/ <55HRc**	60 - 100	18 - 30	80 - 140	25 - 42	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00006 - 0.00013	0.0015 - 0.0033
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00013 - 0.00019	0.0033 - 0.0048
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00019 - 0.00026	0.0048 - 0.0066
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00026 - 0.00052	0.0066 - 0.0132
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00052 - 0.00105	0.0132 - 0.0264
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00105 - 0.00163	0.0264 - 0.0414
Stainless Steel	**303 304 316 321**	50 - 80	15 - 24	65 - 100	20 - 30	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00011 - 0.00022	0.0028 - 0.0056
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00022 - 0.00033	0.0056 - 0.0084
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00033 - 0.00044	0.0084 - 0.0110
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00044 - 0.00087	0.0110 - 0.0220
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00087 - 0.00174	0.0220 - 0.0442
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00174 - 0.00272	0.0442 - 0.0690
Stainless Steel	**15-5PH 17-4PH 13-8 400 Series**	30 - 50	10 - 15	40 - 70	12 - 21	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00009 - 0.00017	0.0023 - 0.0043
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00017 - 0.00026	0.0043 - 0.0066
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00026 - 0.00035	0.0066 - 0.0089
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00035 - 0.00070	0.0089 - 0.0178
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00070 - 0.00139	0.0178 - 0.0353
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00139 - 0.00218	0.0353 - 0.0553

Recommended starting parameters are for standard flute length if using extended flute length drill reduce feed per rev by 25%

Recommended starting parameters based on good setup, minimum tool runout & good tooling

Note: These tools can also be used in PLASTICS, when doing so use the parameters for aluminum listed above

- Above recommendations are suggested starting parameters. Cutting speeds and feed rates may vary according to machining application and setup.

Solid Carbide Micro Drills

Series 105 / 226 / 226L / 390 / 392

Workpiece Material	Material Hardness/Types	Uncoated Recommended Cutting Speed (sfm)	Uncoated Recommended Cutting Speed (m/min)	AlTiN Coated Recommended Cutting Speed (sfm)	AlTiN Coated Recommended Cutting Speed (m/min)	Cutting Dia. DC (in)	Cutting Dia. DC (mm)	Feed Per Rev (ipr)	Feed Per Rev (mm/rev)
Gray Cast Iron	-	130 - 165	40 - 50	165 - 190	50 - 57	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00020 - 0.00039	0.0051 - 0.0099
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00039 - 0.00059	0.0099 - 0.0149
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00059 - 0.00078	0.0149 - 0.0198
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00078 - 0.00157	0.0198 - 0.0398
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00157 - 0.00313	0.0398 - 0.0795
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00313 - 0.00489	0.0795 - 0.1242
Nodular Cast Iron	-	95 - 150	28 - 45	115 - 150	35 - 45	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00015 - 0.00030	0.0040 - 0.0075
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00030 - 0.00045	0.0075 - 0.0115
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00045 - 0.00060	0.0115 - 0.0150
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00060 - 0.00120	0.0150 - 0.0300
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00120 - 0.00240	0.0300 - 0.0600
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00240 - 0.00360	0.0600 - 0.0900
Aluminum	-	165 - 295	50 - 90	245 - 325	74 - 98	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00025 - 0.00049	0.0063 - 0.0124
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00049 - 0.00074	0.0124 - 0.0188
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00074 - 0.00099	0.0188 - 0.0250
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00099 - 0.00197	0.0250 - 0.0500
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00197 - 0.00394	0.0500 - 0.1000
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00394 - 0.00616	0.1000 - 0.1565
Copper Alloys	-	140 - 190	42 - 58	180 - 230	55 - 70	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00025 - 0.00049	0.0063 - 0.0124
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00049 - 0.00074	0.0124 - 0.0188
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00074 - 0.00099	0.0188 - 0.0250
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00099 - 0.00197	0.0250 - 0.0500
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00197 - 0.00394	0.0500 - 0.1000
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00394 - 0.00616	0.1000 - 0.1565
Heat Resistant Alloy	**Waspaloy Hastelloy Inconel Monel**	40 - 55	12 - 16	50 - 65	15 - 19	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00005 - 0.00011	0.0014 - 0.0028
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00011 - 0.00016	0.0028 - 0.0041
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00016 - 0.00022	0.0041 - 0.0055
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00022 - 0.00044	0.0055 - 0.0110
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00044 - 0.00087	0.0110 - 0.0220
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00087 - 0.00136	0.0220 - 0.0345
Titanium Alloy	-	40 - 55	12 - 16	50 - 65	15 - 19	Ø0.005 - Ø0.010	Ø0.13 - Ø0.25	0.00006 - 0.00013	0.0015 - 0.0033
						Ø0.010 - Ø0.015	Ø0.25 - Ø0.38	0.00013 - 0.00019	0.0033 - 0.0048
						Ø0.015 - Ø0.020	Ø0.38 - Ø0.50	0.00019 - 0.00026	0.0048 - 0.0066
						Ø0.020 - Ø0.040	Ø0.50 - Ø1.00	0.00026 - 0.00052	0.0066 - 0.0132
						Ø0.040 - Ø0.080	Ø1.00 - Ø2.00	0.00052 - 0.00105	0.0132 - 0.0264
						Ø0.080 - Ø0.125	Ø2.00 - Ø3.00	0.00105 - 0.00163	0.0264 - 0.0414

Recommended starting parameters are for standard flute length if using extended flute length drill reduce feed per rev by 25%

Recommended starting parameters based on good setup, minimum tool runout & good tooling

Note: These tools can also be used in PLASTICS, when doing so use the parameters for aluminum listed above

- Above recommendations are suggested starting parameters. Cutting speeds and feed rates may vary according to machining application and setup.

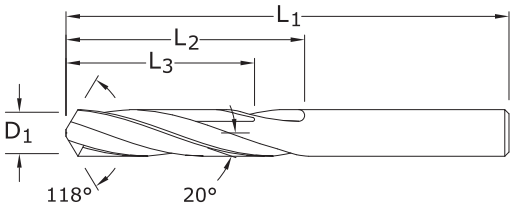
FRACTIONAL & METRIC

2 Flute Drills • Metric: DIN 338





Pictured:
Series 101 Drill Set



101
FRACTIONAL & METRIC SERIES

CUTTING DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	EDP NO. UNCOATED	EDP NO. Ti-NAMITE-A (AlTiN)
#80	0.0135	0.34	3/4	3/16	–	51080	57076
#79	0.0145	0.37	3/4	3/16	–	51079	57077
1/64	0.0156	0.40	3/4	3/16	–	51101	57078
#78	0.0160	0.41	3/4	3/16	–	51078	57079
#77	0.0180	0.46	3/4	3/16	–	51077	57080
#76	0.0200	0.51	7/8	1/4	–	51076	57081
#75	0.0210	0.53	7/8	1/4	–	51075	57082
#74	0.0225	0.57	7/8	1/4	–	51074	57083
#73	0.0240	0.61	7/8	1/4	–	51073	57084
#72	0.0250	0.64	1	5/16	–	51072	57085
#71	0.0260	0.66	1	5/16	–	51071	57086
0,7 mm	0.0276		28,0	9,0	–	61001	68268
#70	0.0280	0.71	1-1/4	1/2	–	51070	57087
#69	0.0292	0.74	1-1/4	1/2	–	51069	57088
#68	0.0310	0.79	1-1/4	1/2	–	51068	57089
1/32	0.0312	0.79	1-1/4	1/2	–	51102	57090
0,8 mm	0.0315		30,0	10,0	–	61003	68269
#67	0.0320	0.81	1-1/4	1/2	–	51067	57091
#66	0.0330	0.84	1-1/4	1/2	–	51066	57092
#65	0.0350	0.89	1-3/8	5/8	1/2	51065	57093
0,9 mm	0.0354		32,0	11,0	8,0	61005	68270
#64	0.0360	0.91	1-3/8	5/8	1/2	51064	57094
#63	0.0370	0.94	1-3/8	5/8	1/2	51063	57095
#62	0.0380	0.97	1-3/8	5/8	1/2	51062	57096
#61	0.0390	0.99	1-3/8	5/8	1/2	51061	57097
1,0 mm	0.0394		34,0	12,0	9,0	61007	68271
#60	0.0400	1.02	1-1/2	3/4	39/64	51060	57098
#59	0.0410	1.04	1-1/2	3/4	39/64	51059	57099
#58	0.0420	1.07	1-1/2	3/4	39/64	51058	57100
#57	0.0430	1.09	1-1/2	3/4	39/64	51057	57101
1,1 mm	0.0433		36,0	14,0	11,0	61052	68294
#56	0.0465	1.18	1-1/2	3/4	39/64	51056	57102
3/64	0.0469	1.19	1-1/2	3/4	39/64	51103	57103
1,2 mm	0.0472		38,0	16,0	12,0	61053	68295
1,3 mm	0.0512		38,0	16,0	12,0	61054	68296
#55	0.0520	1.32	1-1/2	3/4	39/64	51055	57104
#54	0.0550	1.40	1-1/2	3/4	39/64	51054	57105
1,4 mm	0.0551		40,0	18,0	14,0	61055	68297
1,5 mm	0.0591		40,0	18,0	14,0	61009	68272
#53	0.0595	1.51	1-1/2	3/4	39/64	51053	57106
*1/16	0.0625	1.59	1-1/2	3/4	39/64	51104	57107
1,6 mm	0.0630		43,0	20,0	16,0	61056	68298
#52	0.0635	1.61	1-1/2	3/4	39/64	51052	57108
1,7 mm	0.0669		43,0	20,0	17,0	61057	68299
#51	0.0670	1.70	1-1/2	3/4	39/64	51051	57109

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TOLERANCES (inch)

D_1 = +.0000/–.0005

TOLERANCES (mm)

D_1 = +0,0000/–0,0127

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

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FRACTIONAL & METRIC

2 Flute Drills • Metric: DIN 338

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FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	EDP NO. UNCOATED	EDP NO. Ti-NAMITE-A (AlTiN)
#50	0.0700	1.78	1-3/4	7/8	45/64	51050	57110
1,8 mm	0.0709		46,0	22,0	17,0	61058	68300
#49	0.0730	1.85	1-3/4	7/8	45/64	51049	57111
1,9 mm	0.0748		46,0	22,0	17,0	61059	68301
#48	0.0760	1.93	1-3/4	7/8	45/64	51048	57112
5/64	0.0781	1.98	1-3/4	7/8	45/64	51105	57113
#47	0.0785	1.99	1-3/4	7/8	45/64	51047	57114
2,0 mm	0.0787		49,0	24,0	19,0	61011	68273
#46	0.0810	2.06	1-3/4	7/8	45/64	51046	57115
#45	0.0820	2.08	1-3/4	7/8	45/64	51045	57116
2,1 mm	0.0827		49,0	24,0	19,0	61060	68302
#44	0.0860	2.18	2	1	51/64	51044	57117
2,2 mm	0.0866		53,0	27,0	21,0	61061	68303
#43	0.0890	2.26	2	1	51/64	51043	57118
2,3 mm	0.0906		53,0	27,0	21,0	61062	68304
#42	0.0935	2.37	2	1	51/64	51042	57119
3/32	0.0938	2.38	2	1	51/64	51106	57120
2,4 mm	0.0945		57,0	30,0	24,0	61063	68305
#41	0.0960	2.44	2	1	51/64	51041	57121
#40	0.0980	2.49	2	1	51/64	51040	57122
2,5 mm	0.0984		57,0	30,0	24,0	61013	68274
#39	0.0995	2.53	2-1/4	1-1/4	1	51039	57123
#38	0.1015	2.58	2-1/4	1-1/4	1	51038	57124
2,6 mm	0.1024		57,0	30,0	24,0	61064	68306
#37	0.1040	2.64	2-1/4	1-1/4	1	51037	57125
2,7 mm	0.1063		61,0	33,0	26,0	61065	68307
#36	0.1065	2.71	2-1/4	1-1/4	1	51036	57126
7/64	0.1094	2.78	2-1/4	1-1/4	1	51107	57127
#35	0.1100	2.79	2-1/4	1-1/4	1	51035	57128
2,8 mm	0.1102		61,0	33,0	26,0	61066	68308
#34	0.1110	2.82	2-1/4	1-1/4	1	51034	57129
#33	0.1130	2.87	2-1/4	1-1/4	1	51033	57130
2,9 mm	0.1142		61,0	33,0	26,0	61067	68309
#32	0.1160	2.95	2-1/4	1-1/4	1	51032	57131
3,0 mm	0.1181		61,0	33,0	26,0	61015	68275
#31	0.1200	3.05	2-1/4	1-1/4	1	51031	57132
3,1 mm	0.1220		65,0	36,0	28,0	61068	68310
*1/8	0.1250	3.18	2-1/4	1-1/4	1	51108	57133
3,2 mm	0.1260		65,0	36,0	28,0	61069	68311
#30	0.1285	3.26	2-1/4	1-1/4	1	51030	57134
3,3 mm	0.1299		65,0	36,0	28,0	61070	68312
3,4 mm	0.1339		70,0	39,0	31,0	61071	68313
#29	0.1360	3.45	2-1/2	1-3/8	1-7/64	51029	57135
3,5 mm	0.1378		70,0	39,0	31,0	61017	68276
#28	0.1405	3.57	2-1/2	1-3/8	1-7/64	51028	57136
9/64	0.1406	3.57	2-1/2	1-3/8	1-7/64	51109	57137
3,6 mm	0.1417		70,0	39,0	31,0	61072	68314
#27	0.1440	3.66	2-1/2	1-3/8	1-7/64	51027	57138
3,7 mm	0.1457		70,0	39,0	31,0	61073	68315
#26	0.1470	3.73	2-1/2	1-3/8	1-7/64	51026	57139
#25	0.1495	3.80	2-1/2	1-3/8	1-7/64	51025	57140
3,8 mm	0.1496		75,0	43,0	34,0	61074	68316
#24	0.1520	3.86	2-1/2	1-3/8	1-7/64	51024	57141
3,9 mm	0.1535		75,0	43,0	34,0	61075	68317

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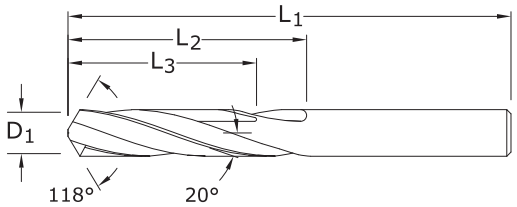
FRACTIONAL & METRIC

2 Flute Drills • Metric: DIN 338





Pictured:
Series 101 Drill Set



101

FRACTIONAL & METRIC SERIES

CUTTING DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	EDP NO. UNCOATED	EDP NO. Ti-NAMITE-A (AlTiN)
#23	0.1540	3.91	2-1/2	1-3/8	1-7/64	51023	57142
5/32	0.1562	3.97	2-1/2	1-3/8	1-7/64	51110	57143
#22	0.1570	3.99	2-1/2	1-3/8	1-7/64	51022	57144
4,0 mm	0.1575		75,0	43,0	34,0	61019	68277
#21	0.1590	4.04	2-1/2	1-3/8	1-7/64	51021	57145
#20	0.1610	4.09	2-1/2	1-3/8	1-7/64	51020	57146
4,1 mm	0.1614		75,0	43,0	34,0	61076	68318
4,2 mm	0.1654		75,0	43,0	34,0	61077	68319
#19	0.1660	4.22	2-1/2	1-5/8	1-19/64	51019	57147
4,3 mm	0.1693		80,0	47,0	37,0	61078	68320
#18	0.1695	4.31	2-3/4	1-5/8	1-19/64	51018	57148
11/64	0.1719	4.37	2-3/4	1-5/8	1-19/64	51111	57149
#17	0.1730	4.39	2-3/4	1-5/8	1-19/64	51017	57150
4,4 mm	0.1732		80,0	47,0	37,0	61079	68321
#16	0.1770	4.50	2-3/4	1-5/8	1-19/64	51016	57151
4,5 mm	0.1772		80,0	47,0	37,0	61021	68278
#15	0.1800	4.57	2-3/4	1-5/8	1-19/64	51015	57152
4,6 mm	0.1811		80,0	47,0	37,0	61080	68322
#14	0.1820	4.62	2-3/4	1-5/8	1-19/64	51014	57153
4,7 mm	0.1850		80,0	47,0	37,0	61081	68323
#13	0.1850	4.70	2-3/4	1-5/8	1-19/64	51013	57154
*3/16	0.1875	4.76	2-3/4	1-5/8	1-19/64	51112	57155
4,8 mm	0.1890		86,0	52,0	41,0	61082	68324
#12	0.1890	4.80	2-3/4	1-5/8	1-19/64	51012	57156
#11	0.1910	4.85	2-3/4	1-5/8	1-19/64	51011	57157
4,9 mm	0.1929		86,0	52,0	41,0	61083	68325
#10	0.1935	4.91	2-3/4	1-5/8	1-19/64	51010	57158
#9	0.1960	4.98	3	1-3/4	1-13/32	51009	57159
5,0 mm	0.1969		86,0	52,0	41,0	61023	68279
#8	0.1990	5.05	3	1-3/4	1-13/32	51008	57160
5,1 mm	0.2008		86,0	52,0	41,0	61084	68326
#7	0.2010	5.11	3	1-3/4	1-13/32	51007	57161
13/64	0.2031	5.16	3	1-3/4	1-13/32	51113	57162
#6	0.2040	5.18	3	1-3/4	1-13/32	51006	57163
5,2 mm	0.2047		86,0	52,0	41,0	61085	68327
#5	0.2055	5.22	3	1-3/4	1-13/32	51005	57164
5,3 mm	0.2087		86,0	52,0	41,0	61086	68328
#4	0.2090	5.31	3	1-3/4	1-13/32	51004	57165
5,4 mm	0.2126		93,0	57,0	45,0	61087	68329
#3	0.2130	5.41	3	1-3/4	1-13/32	51003	57166
5,5 mm	0.2165		93,0	57,0	1-13/32	61025	68280
7/32	0.2188	5.56	3	1-3/4	1-13/32	51114	57167
5,6 mm	0.2205		93,0	57,0	45,0	61088	68330
#2	0.2210	5.61	3	1-3/4	1-13/32	51002	57168

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TOLERANCES (inch)

D_1 = +.0000/–.0005

TOLERANCES (mm)

D_1 = +0,0000/–0,0127

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FRACTIONAL & METRIC

2 Flute Drills • Metric: DIN 338

101
FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	EDP NO. UNCOATED	EDP NO. Ti-NAMITE-A (AlTiN)
5,7 mm	0.2244		93,0	57,0	45,0	61089	68331
#1	0.2280	5.79	3	1-3/4	1-13/32	51001	57169
5,8 mm	0.2283		93,0	57,0	45,0	61090	68332
5,9 mm	0.2323		93,0	57,0	45,0	61091	68333
A	0.2340	5.94	3-1/4	2	1-39/64	51201	57170
15/64	0.2344	5.95	3-1/4	2	1-39/64	51115	57171
6,0 mm	0.2362		93,0	57,0	45,0	61027	68281
B	0.2380	6.05	3-1/4	2	1-39/64	51202	57172
6,1 mm	0.2402		101,0	63,0	50,0	61092	68334
C	0.2420	6.15	3-1/4	2	1-39/64	51203	57173
6,2 mm	0.2441		101,0	63,0	50,0	61093	68335
D	0.2460	6.25	3-1/4	2	1-39/64	51204	57174
6,3 mm	0.2480		101,0	63,0	50,0	61094	68336
*1/4	0.2500	6.35	3-1/4	2	1-39/64	51116	57176
6,4 mm	0.2520		101,0	63,0	50,0	61095	68337
6,5 mm	0.2559		101,0	63,0	50,0	61029	68282
F	0.2570	6.53	3-1/4	2	1-39/64	51206	57177
6,6 mm	0.2598		101,0	63,0	50,0	61096	68338
G	0.2610	6.63	3-1/2	2-1/8	1-45/64	51207	57178
6,7 mm	0.2638		101,0	63,0	50,0	61097	68339
17/64	0.2656	6.75	3-1/2	2-1/8	1-45/64	51117	57179
H	0.2660	6.76	3-1/2	2-1/8	1-45/64	51208	57180
6,8 mm	0.2677		109,0	69,0	55,0	61098	68340
6,9 mm	0.2717		109,0	69,0	55,0	61099	68341
I	0.2720	6.91	3-1/2	2-1/8	1-45/64	51209	57181
7,0 mm	0.2756		109,0	69,0	55,0	61031	68283
J	0.2770	7.04	3-1/2	2-1/8	1-45/64	51210	57182
7,1 mm	0.2795		109,0	69,0	55,0	61100	68342
K	0.2810	7.14	3-1/2	2-1/8	1-45/64	51211	57183
9/32	0.2812	7.14	3-1/2	2-1/8	1-45/64	51118	57184
7,2 mm	0.2835		109,0	69,0	55,0	61101	68343
7,3 mm	0.2874		109,0	69,0	55,0	61102	68344
L	0.2900	7.37	3-1/2	2-1/8	1-45/64	51212	57185
7,4 mm	0.2913		109,0	69,0	55,0	61103	68345
M	0.2950	7.49	3-3/4	2-3/8	1-29/32	51213	57186
7,5 mm	0.2953		109,0	69,0	55,0	61033	68284
19/64	0.2969	7.54	3-3/4	2-3/8	1-29/32	51119	57187
7,6 mm	0.2992		117,0	75,0	60,0	61104	68346
N	0.3020	7.67	3-3/4	2-3/8	1-29/32	51214	57188
7,7 mm	0.3031		117,0	75,0	60,0	61105	68347
7,8 mm	0.3071		117,0	75,0	60,0	61106	68348
7,9 mm	0.3110		117,0	75,0	60,0	61107	68349
*5/16	0.3125	7.94	3-3/4	2-3/8	1-29/32	51120	57189
8,0 mm	0.3150		117,0	75,0	60,0	61035	68285
O	0.3160	8.03	3-3/4	2-3/8	1-29/32	51215	57190
8,1 mm	0.3189		117,0	75,0	60,0	61108	68350
8,2 mm	0.3228		117,0	75,0	60,0	61109	68351
P	0.3230	8.20	3-3/4	2-3/8	1-29/32	51216	57191
8,3 mm	0.3268		117,0	75,0	60,0	61110	68352
21/64	0.3281	8.33	4	2-1/2	2	51121	57192
8,4 mm	0.3307		117,0	75,0	60,0	61111	68353
Q	0.3320	8.43	4	2-1/2	2	51217	57193
8,5 mm	0.3346		117,0	75,0	60,0	61037	68286
8,6 mm	0.3386		125,0	81,0	64,0	61112	68354

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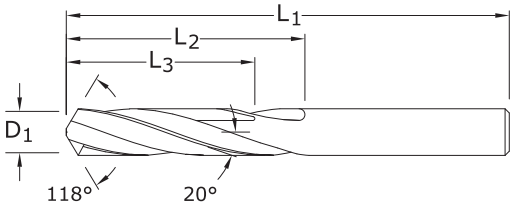
FRACTIONAL & METRIC

2 Flute Drills • Metric: DIN 338





Pictured:
Series 101 Drill Set



101

FRACTIONAL & METRIC SERIES

CUTTING DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	EDP NO. UNCOATED	EDP NO. Ti-NAMITE-A (AlTiN)
R	0.3390	8.61	4	2-1/2	2	51218	57194
8,7 mm	0.3425		125,0	81,0	64,0	61113	68355
11/32	0.3438	8.73	4	2-1/2	2	51122	57195
8,8 mm	0.3465		125,0	81,0	64,0	61114	68356
S	0.3480	8.84	4	2-1/2	2	51219	57196
8,9 mm	0.3504		125,0	81,0	64,0	61115	68357
9,0 mm	0.3543		125,0	81,0	64,0	61039	68287
T	0.3580	9.09	4-1/4	2-3/4	2-13/64	51220	57197
9,1 mm	0.3583		125,0	81,0	64,0	61116	68358
23/64	0.3594	9.13	4-1/4	2-3/4	2-13/64	51123	57198
9,2 mm	0.3622		125,0	81,0	64,0	61117	68359
9,3 mm	0.3661		125,0	81,0	64,0	61118	68360
U	0.3680	9.35	4-1/4	2-3/4	2-13/64	51221	57199
9,4 mm	0.3701		125,0	81,0	64,0	61119	68361
9,5 mm	0.3740		125,0	81,0	64,0	61041	68288
*3/8	0.3750	9.53	4-1/4	2-3/4	2-13/64	51124	57200
V	0.3770	9.58	4-1/4	2-3/4	2-13/64	51222	57201
9,6 mm	0.3780		133,0	87,0	69,0	61120	68362
9,7 mm	0.3819		133,0	87,0	69,0	61121	68363
9,8 mm	0.3858		133,0	87,0	69,0	61122	68364
W	0.3860	9.80	4-1/2	2-7/8	2-19/64	51223	57202
9,9 mm	0.3898		133,0	87,0	69,0	61123	68365
25/64	0.3906	9.92	4-1/2	2-7/8	2-19/64	51125	57203
10,0 mm	0.3937		133,0	87,0	69,0	61043	68289
X	0.3970	10.08	4-1/2	2-7/8	2-19/64	51224	57204
10,2 mm	0.4016		133,0	87,0	69,0	61124	68366
Y	0.4040	10.26	4-1/2	2-7/8	2-19/64	51225	57205
13/32	0.4062	10.32	4-1/2	2-7/8	2-19/64	51126	57206
Z	0.4130	10.49	4-1/2	2-7/8	2-19/64	51226	57207
10,5 mm	0.4134		133,0	87,0	69,0	61045	68290
27/64	0.4219	10.72	4-1/2	2-7/8	2-19/64	51127	57208
11,0 mm	0.4331		142,0	94,0	75,0	61047	68291
7/16	0.4375	11.11	4-1/2	2-7/8	2-19/64	51128	57209
11,5 mm	0.4528		142,0	94,0	75,0	61049	68292
29/64	0.4531	11.51	4-3/4	3	2-13/32	51129	57210
15/32	0.4688	11.91	4-3/4	3	2-13/32	51130	57211
12,0 mm	0.4724		151,0	101,0	80,0	61051	68293
31/64	0.4844	12.30	4-3/4	3	2-13/32	51131	57212
1/2	0.5000	12.70	4-3/4	3	2-13/32	51132	57213
*Series 101 Set						61175	57351

TOLERANCES (inch)

D_1 = +.0000/–.0005

TOLERANCES (mm)

D_1 = +0,0000/–0,0127

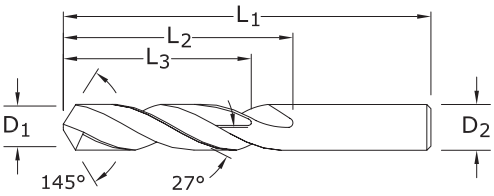
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

METRIC

Short Length Self Centering Drills • DIN 6539





108M Plus
METRIC SERIES

TOLERANCES (mm)

≤3 DIAMETER
D_1 = +0,000/–0,010
D_2 = h_6

>3–6 DIAMETER
D_1 = +0,000/–0,012
D_2 = h_6

>6–10 DIAMETER
D_1 = +0,000/–0,015
D_2 = h_6

>10–18 DIAMETER
D_1 = +0,000/–0,018
D_2 = h_6

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

mm				EDP NO,	
CUTTING DIAMETER D_1/D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	UNCOATED	Ti-NAMITE-A (AlTiN)
0,5	20,0	3,0	–	62001	68643
0,55	21,0	3,5	–	62003	68644
0,6	21,0	3,5	–	62005	68645
0,65	22,0	4,0	–	62007	68646
0,7	23,0	4,5	–	62009	68647
0,75	23,0	4,5	–	62011	68648
0,8	24,0	5,0	–	62013	68649
0,85	24,0	5,0	–	62015	68650
0,9	25,0	5,5	4,0	62017	68651
0,95	25,0	5,5	4,0	62019	68652
1,0	26,0	6,0	4,7	62021	68653
1,05	26,0	6,0	4,7	62023	68654
1,1	28,0	7,0	5,4	62025	68655
1,15	28,0	7,0	5,4	62027	68656
1,2	30,0	8,0	6,0	62029	68657
1,25	30,0	8,0	6,0	62031	68658
1,3	30,0	8,0	6,0	62033	68659
1,35	32,0	9,0	7,0	62035	68660
1,4	32,0	9,0	7,0	62037	68661
1,45	32,0	9,0	7,0	62039	68662
1,5	32,0	9,0	7,0	62041	68663
1,6	34,0	10,0	7,0	62043	68664
1,7	34,0	10,0	7,0	62045	68665
1,8	36,0	11,0	8,0	62047	68666
1,9	36,0	11,0	8,0	62049	68667
2,0	38,0	12,0	9,0	62051	68668
2,1	38,0	12,0	9,0	62053	68669
2,2	40,0	13,0	10,0	62055	68670
2,3	40,0	13,0	10,0	62057	68671
2,4	43,0	14,0	11,0	62059	68672
2,5	43,0	14,0	11,0	62061	68673
2,6	43,0	14,0	11,0	62063	68674
2,7	46,0	16,0	12,0	62065	68675
2,8	46,0	16,0	12,0	62067	68676

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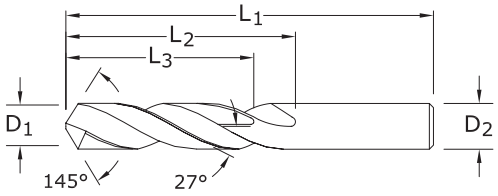
METRIC

Short Length Self Centering Drills • DIN 6539



108M Plus

METRIC SERIES



mm				EDP NO,	
CUTTING DIAMETER D_1 / D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	UNCOATED	Ti-NAMITE-A (AlTiN)
2,9	46,0	16,0	12,0	62069	68677
3,0	46,0	16,0	12,0	62071	68678
3,1	49,0	18,0	14,0	62073	68679
3,2	49,0	18,0	14,0	62075	68680
3,3	49,0	18,0	14,0	62077	68681
3,4	52,0	20,0	15,0	62079	68682
3,5	52,0	20,0	15,0	62081	68683
3,6	52,0	20,0	15,0	62083	68684
3,7	52,0	20,0	15,0	62085	68685
3,8	55,0	22,0	17,0	62087	68686
3,9	55,0	22,0	17,0	62089	68687
4,0	55,0	22,0	17,0	62091	68688
4,1	55,0	22,0	17,0	62093	68689
4,2	55,0	22,0	17,0	62095	68690
4,3	58,0	24,0	18,0	62097	68691
4,4	58,0	24,0	18,0	62099	68692
4,5	58,0	24,0	18,0	62101	68693
4,6	58,0	24,0	18,0	62103	68694
4,7	58,0	24,0	18,0	62105	68695
4,8	62,0	26,0	20,0	62107	68696
4,9	62,0	26,0	20,0	62109	68697
5,0	62,0	26,0	20,0	62111	68698
5,1	62,0	26,0	20,0	62113	68699
5,2	62,0	26,0	20,0	62115	68700
5,3	62,0	26,0	20,0	62117	68701
5,4	66,0	28,0	21,0	62119	68702
5,5	66,0	28,0	21,0	62121	68703
5,6	66,0	28,0	21,0	62123	68704
5,7	66,0	28,0	21,0	62125	68705
5,8	66,0	28,0	21,0	62127	68706
5,9	66,0	28,0	21,0	62129	68707
6,0	66,0	28,0	21,0	62131	68708

continued on next page

TOLERANCES (mm)

≤3 DIAMETER
D_1 = +0,000/–0,010
D_2 = h_6

>3–6 DIAMETER
D_1 = +0,000/–0,012
D_2 = h_6

>6–10 DIAMETER
D_1 = +0,000/–0,015
D_2 = h_6

>10–16 DIAMETER
D_1 = +0,000/–0,018
D_2 = h_6

STEELS
STAINLESS STEELS
CAST IRON
HIGH TEMP ALLOYS
TITANIUM
HARDENED STEELS
NON-FERROUS
PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

METRIC

Short Length Self Centering Drills • DIN 6539

108M Plus

METRIC SERIES

mm				EDP NO,	
CUTTING DIAMETER D_1/D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	UNCOATED	Ti-NAMITE-A (AlTiN)
6,1	70,0	31,0	23,0	62133	68709
6,2	70,0	31,0	23,0	62135	68710
6,3	70,0	31,0	23,0	62137	68711
6,4	70,0	31,0	23,0	62139	68712
6,5	70,0	31,0	23,0	62141	68713
6,8	70,0	31,0	23,0	62142	68603
7,0	74,0	34,0	25,0	62143	68718
7,5	74,0	34,0	25,0	62145	68723
7,8	79,0	37,0	27,0	62146	68604
8,0	79,0	37,0	27,0	62147	68728
8,5	79,0	37,0	27,0	62149	68733
9,0	84,0	40,0	29,0	62151	68738
9,5	84,0	40,0	29,0	62153	68743
9,8	89,0	43,0	31,0	62154	68606
10,0	89,0	43,0	31,0	62155	68748
10,2	89,0	43,0	31,0	62156	68607
10,5	89,0	43,0	31,0	62066	68753
11,0	95,0	47,0	33,0	62157	68758
11,5	95,0	47,0	33,0	62084	68763
11,8	102,0	51,0	35,0	62158	68608
12,0	102,0	51,0	35,0	62159	68768
12,5	102,0	51,0	35,0	62102	68773
13,0	102,0	51,0	35,0	62112	68778
13,8	107,0	54,0	37,0	62164	68609
14,0	107,0	54,0	37,0	62116	68780
14,5	111,0	56,0	38,0	62166	68611
14,8	111,0	56,0	38,0	62167	68612
15,0	111,0	56,0	38,0	62168	68613
15,8	115,0	58,0	38,0	62170	68614
16,0	115,0	58,0	38,0	62171	68616

CONTINUED

METRIC

2 Flute Drills
Short Length Self Centering Drills • DIN 6539

	Series 101M, 108M Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 1	3	6	8	10	12	16
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	81	RPM	25690	8563	4282	3211	2569	2141	1606
			(65-97)	Fr	0.014	0.041	0.082	0.109	0.136	0.163	0.218
				Feed (mm/min)	350	350	350	350	350	350	350
		≤ 300 Bhn or ≤ 32 HRc	38	RPM	12118	4039	2020	1515	1212	1010	757
			(30-46)	Fr	0.012	0.036	0.072	0.096	0.120	0.144	0.191
				Feed (mm/min)	145	145	145	145	145	145	145
		≤ 425 Bhn or ≤ 45 HRc	26	RPM	8240	2747	1373	1030	824	687	515
			(21-31)	Fr	0.007	0.020	0.040	0.053	0.067	0.080	0.107
				Feed (mm/min)	55	55	55	55	55	55	55
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	70	RPM	22297	7432	3716	2787	2230	1858	1394
			(56-84)	Fr	0.012	0.036	0.073	0.097	0.121	0.145	0.194
				Feed (mm/min)	270	270	270	270	270	270	270
		≤ 375 Bhn or ≤ 40 HRc	44	RPM	14057	4686	2343	1757	1406	1171	879
			(35-53)	Fr	0.012	0.036	0.073	0.097	0.121	0.145	0.194
				Feed (mm/min)	170	170	170	170	170	170	170
		≤ 450 Bhn or ≤ 48 HRc	18	RPM	5816	1939	969	727	582	485	364
			(15-22)	Fr	0.005	0.015	0.030	0.040	0.050	0.060	0.080
				Feed (mm/min)	29	29	29	29	29	29	29
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc	26	RPM	8240	2747	1373	1030	824	687	515
			(21-31)	Fr	0.007	0.020	0.040	0.053	0.067	0.080	0.107
				Feed (mm/min)	55	55	55	55	55	55	55
		≤ 375 Bhn or ≤ 40 HRc	17	RPM	5332	1777	889	666	533	444	333
			(13-20)	Fr	0.003	0.010	0.020	0.027	0.034	0.041	0.054
				Feed (mm/min)	18	18	18	18	18	18	18
		≤ 475 Bhn or ≤ 50 HRc	12	RPM	3878	1293	646	485	388	323	242
			(10-15)	Fr	0.003	0.009	0.019	0.025	0.031	0.037	0.050
				Feed (mm/min)	12	12	12	12	12	12	12
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	85	RPM	27144	9048	4524	3393	2714	2262	1696
			(68-102)	Fr	0.016	0.049	0.097	0.130	0.162	0.195	0.259
				Feed (mm/min)	440	440	440	440	440	440	440
		≤ 330 Bhn or ≤ 36 HRc	76	RPM	24235	8078	4039	3029	2424	2020	1515
			(61-91)	Fr	0.017	0.050	0.099	0.132	0.165	0.198	0.264
				Feed (mm/min)	400	400	400	400	400	400	400
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 250 Bhn or ≤ 24 HRc	64	RPM	20358	6786	3393	2545	2036	1696	1272
			(51-77)	Fr	0.010	0.029	0.059	0.079	0.098	0.118	0.157
				Feed (mm/min)	200	200	200	200	200	200	200
		≤ 330 Bhn or ≤ 36 HRc	34	RPM	10664	3555	1777	1333	1066	889	666
			(27-40)	Fr	0.006	0.017	0.034	0.045	0.056	0.068	0.090
				Feed (mm/min)	60	60	60	60	60	60	60
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc	20	RPM	6301	2100	1050	788	630	525	394
			(16-24)	Fr	0.007	0.021	0.043	0.057	0.071	0.086	0.114
				Feed (mm/min)	45	45	45	45	45	45	45
		≤ 375 Bhn or ≤ 40 HRc	17	RPM	5332	1777	889	666	533	444	333
			(13-20)	Fr	0.007	0.020	0.039	0.053	0.066	0.079	0.105
				Feed (mm/min)	35	35	35	35	35	35	35

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METRIC

2 Flute Drills
Short Length Self Centering Drills • DIN 6539

	Series 101M, 108M Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 1	3	6	8	10	12	16
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 220 Bhn or ≤ 19 HRc	12	RPM	3878	1293	646	485	388	323	242
			(10-15)	Fr	0.006	0.019	0.039	0.052	0.064	0.077	0.103
				Feed (mm/min)	25	25	25	25	25	25	25
		≤ 320 Bhn or ≤ 34 HRc	8	RPM	2424	808	404	303	242	202	151
			(6-9)	Fr	0.006	0.019	0.037	0.050	0.062	0.074	0.099
				Feed (mm/min)	15	15	15	15	15	15	15
		≤ 425 Bhn or ≤ 45 HRc	6	RPM	1939	646	323	242	194	162	121
			(5-7)	Fr	0.005	0.015	0.031	0.041	0.052	0.062	0.083
				Feed (mm/min)	10	10	10	10	10	10	10
S	TITANIUM ALLOYS (DIFFICULT) Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	26	RPM	8240	2747	1373	1030	824	687	515
			(21-31)	Fr	0.013	0.040	0.080	0.107	0.133	0.160	0.214
				Feed (mm/min)	110	110	110	110	110	110	110
		≤ 350 Bhn or ≤ 38 HRc	20	RPM	6301	2100	1050	788	630	525	394
			(16-24)	Fr	0.007	0.021	0.043	0.057	0.071	0.086	0.114
				Feed (mm/min)	45	45	45	45	45	45	45
		≤ 440 Bhn or ≤ 47 HRc	17	RPM	5332	1777	889	666	533	444	333
			(13-20)	Fr	0.007	0.020	0.039	0.053	0.066	0.079	0.105
				Feed (mm/min)	35	35	35	35	35	35	35
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	165	RPM	52348	17449	8725	6544	5235	4362	3272
			(132-198)	Fr	0.020	0.060	0.120	0.160	0.200	0.240	0.319
				Feed (mm/min)	1045	1045	1045	1045	1045	1045	1045
		≤ 150 Bhn or ≤ 7 HRc	139	RPM	44108	14703	7351	5514	4411	3676	2757
			(111-166)	Fr	0.020	0.060	0.120	0.160	0.200	0.239	0.319
				Feed (mm/min)	880	880	880	880	880	880	880
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	58	RPM	18419	6140	3070	2302	1842	1535	1151
			(46-69)	Fr	0.010	0.030	0.060	0.080	0.100	0.121	0.161
				Feed (mm/min)	185	185	185	185	185	185	185
		≤ 200 Bhn or ≤ 23 HRc	53	RPM	16965	5655	2827	2121	1696	1414	1060
			(43-64)	Fr	0.010	0.030	0.060	0.080	0.100	0.120	0.160
				Feed (mm/min)	170	170	170	170	170	170	170
	PLASTICS Polycarbonate, PVC		152	RPM	48471	16157	8078	6059	4847	4039	3029
			(122-183)	Fr	0.020	0.060	0.120	0.160	0.200	0.240	0.320
				Feed (mm/min)	970	970	970	970	970	970	970

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
rpm = (Vc x 1000) / (D_1 x 3.14)
mm/min = Fr x rpm
reduce speed and feed 30 percent when using uncoated drills
reduce speed and feed for materials harder than listed
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

PCD Tools

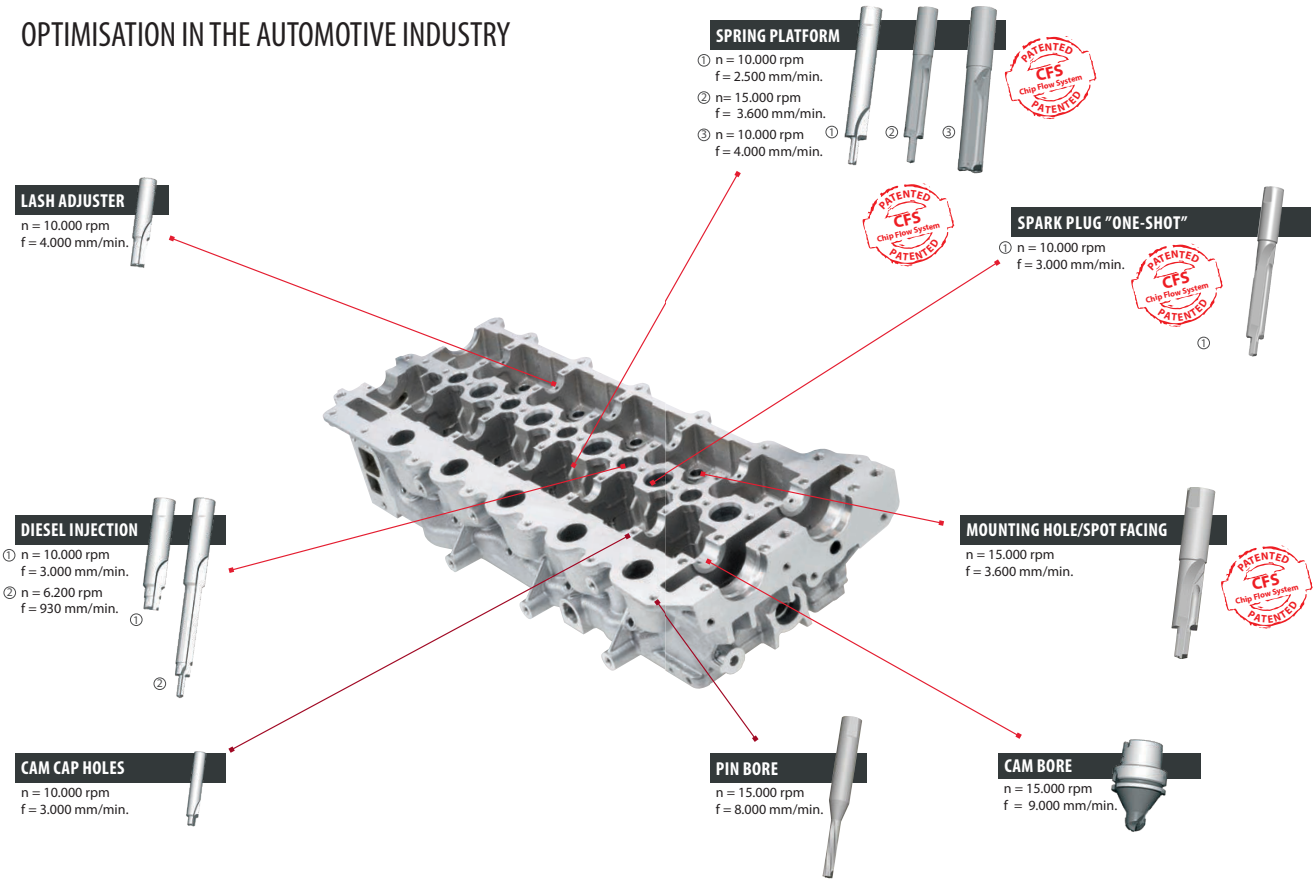


UM DANDIA™ tooling solutions for the automotive industry

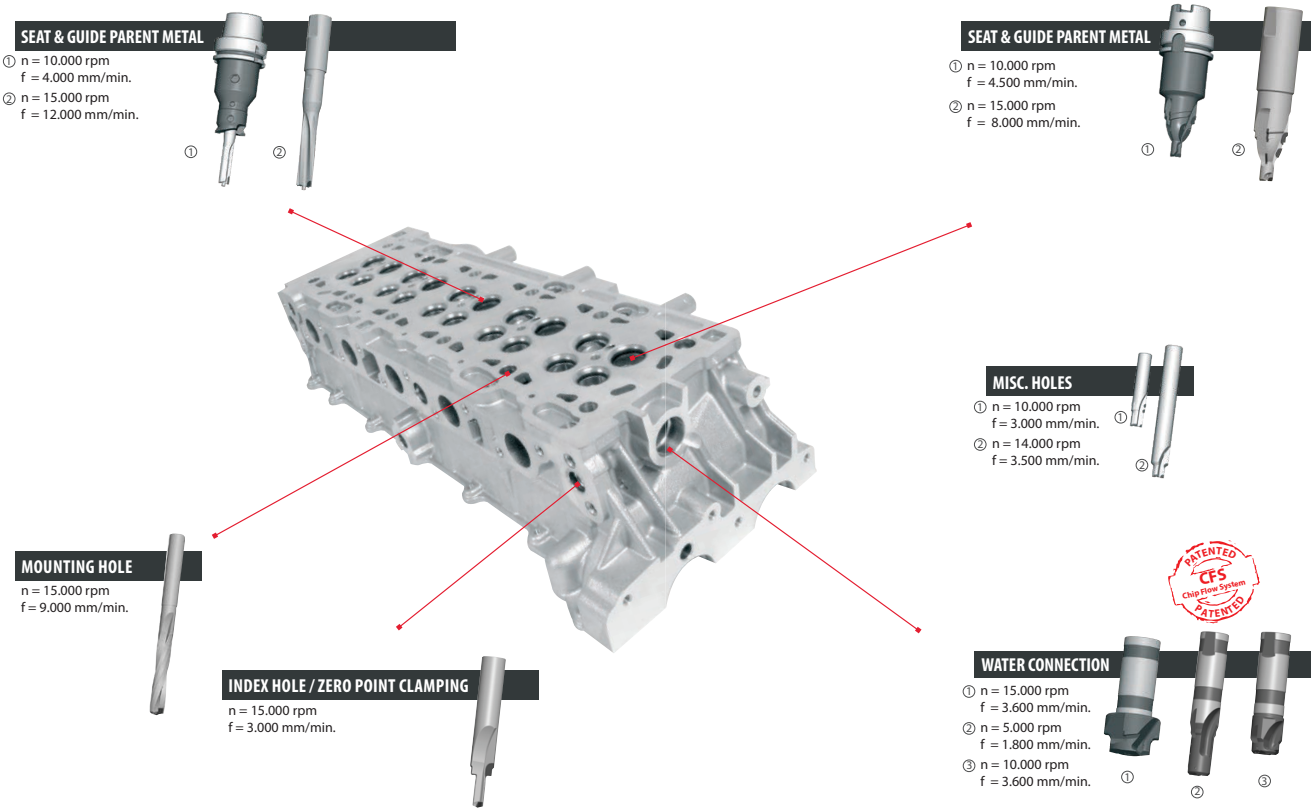


PCD Drill

OPTIMISATION IN THE AUTOMOTIVE INDUSTRY

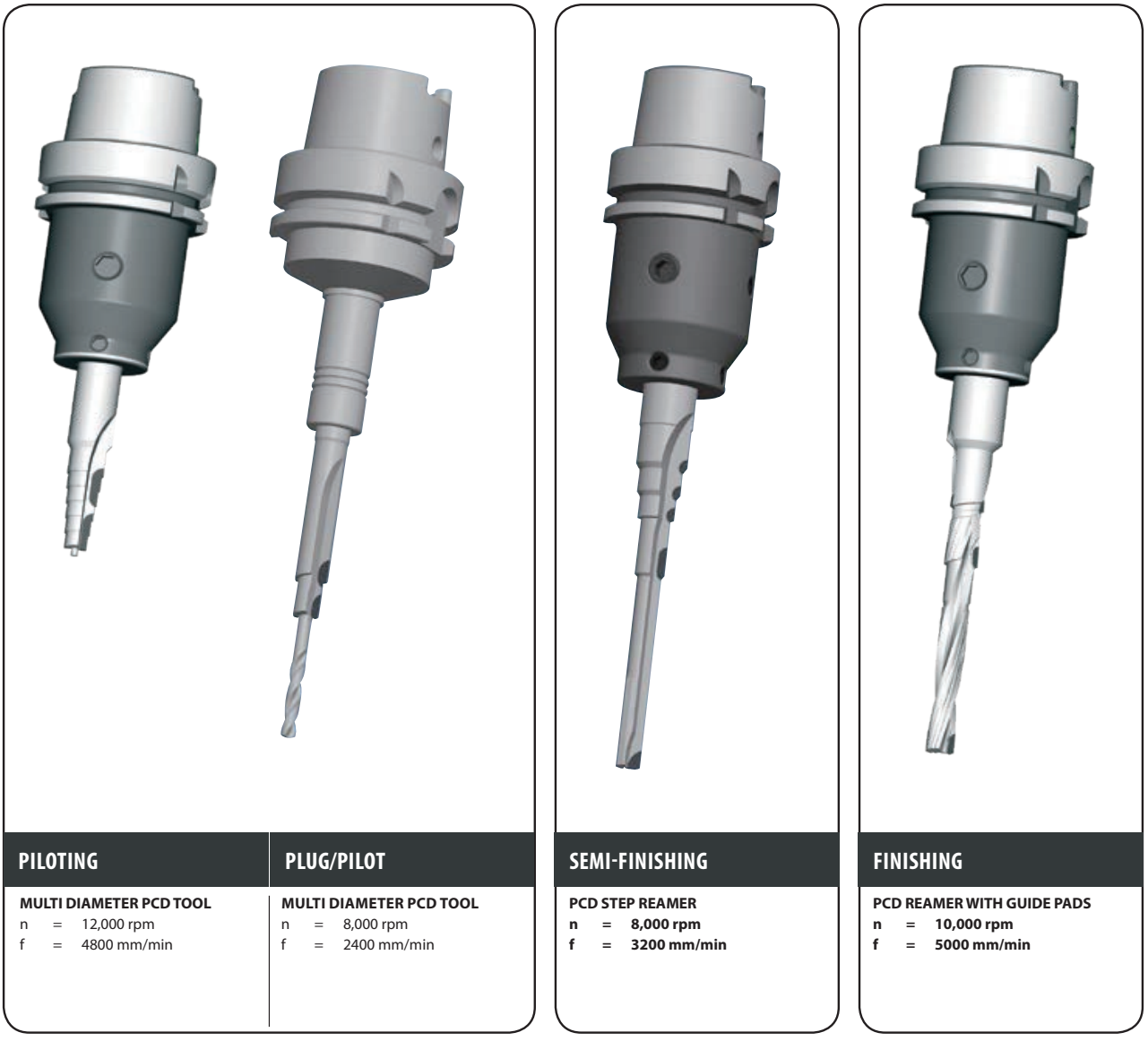


UM DANDIA™ – OPTIMUM SOLUTIONS



OPTIMISATION IN THE AUTOMOTIVE INDUSTRY

SPOOL BORE MACHINING



PILOTING	PLUG/PILOT	SEMI-FINISHING	FINISHING
MULTI DIAMETER PCD TOOL n = 12,000 rpm f = 4800 mm/min	**MULTI DIAMETER PCD TOOL** n = 8,000 rpm f = 2400 mm/min	**PCD STEP REAMER** **n = 8,000 rpm** **f = 3200 mm/min**	**PCD REAMER WITH GUIDE PADS** **n = 10,000 rpm** **f = 5000 mm/min**

3 PASS PROCESS STRATEGY

2 PASS PROCESS STRATEGY

1 PASS PROCESS STRATEGY

SPOOL BORE PROCESS STRATEGY

Out-of-the-box solution

KYOCERA UNIMERCO has customers who refer to UNIMERCO spool bore tooling solutions as "out-of-the-box performance". In short, this means that in cases where the machine spindles are in good order, the toolholder assembly can be taken right out of the box and placed on the machine spindle, and the first part produced will be a good part. We supply the toolholder assembly pre-balanced, gauge length preset and with assembly set runout within 0.002mm.

Adjustable holder system

The UNIMERCO adjustable holder provides an effective user-friendly method of dialing in tools. Dialing in tools on a machine spindle becomes necessary when the machine spindle is worn or when the part tolerance is very narrow. The UNIMERCO adjustable holder can be set within a matter of minutes, maintaining 0.002mm or better runout. In the long-term, this will improve tool life and robustness, resulting in consistent part quality.

Life-long traceability of a tool

The UNIMERCO tools/assemblies are delivered in protective wooden boxes with foam surrounding the tools/holders. Additionally, the box contains a measuring report that provides valuable information for the end-user as well as KYOCERA UNIMERCO. We use this information to track tools for quality and rework purposes. For you it provides traceability, thus assuring repeatable performance from the new and renewed tool.

› The padded wooden box provides superb protection against transport and stocking damages and gives immediate access to measuring data and RE•NEW® records.



› Drawing on top of the box ensures quick identification of the tool.



PCD Drill

PKD HELI-DRILL



ONE SHOT!

› FEATURES

The unique UM DANDIA™ sandwich drill point combined with helical guide pads and flute.
The drill is designed as a one-shot solution and the point geometry can be designed to enter in machined surfaces as well as pre-casted bores. Internal coolant channel design for improved chip evacuation.

› BENEFIT

A high performance one-shot solution, reduced overall cycle time, less tool changes, fewer tools in operation. Maintaining IT9 tolerances up to 10 x d.

› CUTTING DATA EXAMPLE

n = 10000 RPM, fn = 0.4-0.5 mm/rev.

PCD STEP DRILL



› FEATURES

Step drill with the unique point geometry called "Twin Point". Drills in full material with interrupted cuts. Specially designed internal coolant channels ensure optimum chip flow.

› BENEFIT

Lowest possible machining time due to one-shot process. Very good tool life and process reliability.

› CUTTING DATA EXAMPLE

n = 6000 RPM, fn = 0.35 mm/rev.

PCD Reamer

PCD HELI-REAMER



MQL

› FEATURES
A newly developed reamer design with a unique helical guidepad system, designed for high precision reaming applications. May be used for both wet and MQL machining, operates within extreme roundness, straightness, Ra and Rz values. Furthermore, CP and CPK values from 3.16 to as high as 6.7 have been reached.

› BENEFIT
Reduced overall cycle time due to fast cutting parameters and several steps built into "one" tool, extended tool life, less scrapped parts, high consistent part quality, fewer tools necessary.

› CUTTING DATA EXAMPLE
n = 12000 RPM, fn = 0.35-0.50 mm/rev.

PCD VALVE GUIDE REAMER



FERROUS APPLICATIONS

› FEATURES
PCD reamer developed for powdered metal valve guides Guidepad design allows for extended tool life and size control providing the customer with a very tight diameter range and high Cpk.

› BENEFIT
Unlike designs for bushed transfer lines and maching center applications. Extremely long tool life in addition to excellent size control. Very good seat to guide runout and great throughput. In transfer line applications, tool life is measured in weeks rather than number of parts.

› CUTTING DATA EXAMPLE
n = 2400 RPM, fn = 0.2-0.3 mm/rev.

PCD Reamer

PCD STEP REAMER



› FEATURES
Multi-diameter tool allowing for excellent hole size and concentricity between diameters.

› BENEFIT
Unique guidepad geometry allows for excellent roundness and straightness, even in an interrupted cut condition.

› CUTTING DATA EXAMPLE
n = 6000-10000 RPM, fn = 0.25-0.40 mm/rev.

PCD STEP REAMER



› FEATURES
Special design for injection bore. The fluting and coolant geometry layout is specifically designed for this application. The tool enables high precision cutting with extremely fast cutting parameters (in several cases double-up in comparison to the "normal" market features).

› BENEFIT
Extreme cutting parameters shorten cycle time, thus reducing overall costs. Also, the long tool life that comes from UM DANDIA PCD tooling coupled with the possibility of RE•NEW® further reduces total tooling costs.

› CUTTING DATA EXAMPLE
n = 10000 RPM, fn = 0.3 mm/rev.

PCD Reamer

PCD STEP REAMER



› FEATURES
Monoblock reamer with uneven number of inserts allowing for excellent hole size and surface quality. The integrated spindle adapter and multiple step diameters ensure good concentricity between diameters. Internal coolant channel design for improved chip evacuation.

› BENEFIT
Reduced overall costs, due to reduction in cycle time provided by the very high cutting parameters. The very long tool life means that fewer tools are needed – also due to the possibility to RE•NEW® the tools.

› CUTTING DATA EXAMPLE
n = 5000-7000 RPM, fn = 0.3-0.5 mm/.

PCD STEP/PROFILE REAMER



› FEATURES
Combining reamer and profile geometry on the PCD inserts, this multi-purpose PCD tool is able to cut three different difficult features in.

Fluting and cutting geometries developed specifically for this application.

› BENEFIT
This combination reamer enables reduced overall cycle time due to fewer operations and increased cutting parameters.

› CUTTING DATA EXAMPLE
n = 8000-15000 RPM, fn = 0.3-0.5 mm/rev.

PCD Combination Tool

PCD STEP REAMER/MILL



› FEATURES
A specially designed PCD insert and flute geometry combining several operations in one tool. Ensures a vibration -free finishing of all valve bore diameters in one pass, creates different surface roughness values within a specified range and a T-groove geometry.

› BENEFIT
Reduced overall cycle time with the multi tasking tool design due to reduction of tool changes and number of tools necessary.

› CUTTING DATA EXAMPLE
n = 3000 RPM, fn = 0.2-0.3 mm/rev.

PCD STEP DRILL/REAMER



› FEATURES
A special 2-fluted tool design for the shrink fit holder system. First step is drilling in solid material and the remaining steps are reaming pre-casted material. Internal coolant channel design for improved chip evacuation.

› BENEFIT
One-shot solution, reduced overall cycle time, less tool changes, fewer tools in operation.

› CUTTING DATA EXAMPLE
n = 6500 RPM, fn = 0.3-0.4 mm/rev.

PCD Combination Tool

PCD REAMER/COUNTERSINK TOOL

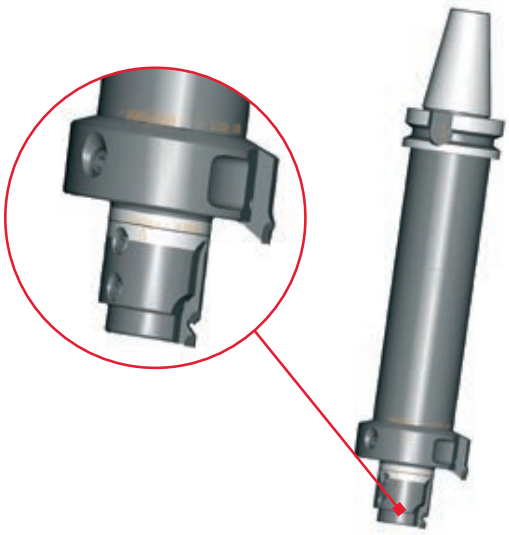


› FEATURES
Special PCD tool design in the flute opening, coolant placement and guidepad geometry. This tool is available as either a combination tool, with solid carbide tool body for the PCD reamer and steel body for the PCD bushing, or as a one -piece construction.

› BENEFIT
High cutting parameters yield reduced overall costs due to reduction in cycle time. Furthermore, fewer tools are required because of the long tool life coupled with our RE•NEW™ process.

› CUTTING DATA EXAMPLE
n = 8000 - 15000 RPM, fn = 0.25 - 08 mm/rev.

OUT-BORE PCD REAMER, ADJUSTABLE



› FEATURES
Single flute, out-bore, multi diameter PCD tool. The different diameters can be adjusted separately fast and easy due to the unique UM DANDIA™ design. The toolholder / spindle adapter allows for customized design.

› BENEFIT
Very accurate hole quality and production reliability. Extremely easy to run in and reduced overall cycle time due to the separate diameter adjustability.

› CUTTING DATA EXAMPLE
n = 2000 - 4000 RPM, fn = 0.1-0.2 mm/rev.

2020 KYOCERA Round Tools Digest Catalog

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