

THE NEW VALUE FRONTIER



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

Anti Vibration		 Z-Carb-AP P.1 (or Z1M P.10)	*Chip breaker		
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

High Performance		Finishing	 T-Carb P.13	HFS P.65 (or Z-Carb MD P.67)
		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

Anti Vibration		 Z-Carb-AP P.1 (or Z1M P.10)	*Chip breaker		
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	M Stainless Steel	S Titanium Alloys	S Heat-resistant Alloys
		K Cast Iron	N Non Ferrous	CFRP / GFRP	

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Solid Carbide Drills Recommendations

High Performance Drills								
Cleared Length	15D	Hydros Series 814 / 865 P.75						
	10D	ICe-Carb Series 140 P.87						
	8D	ICe-Carb Series 140 P.87						
	5D	Hi-PerCarb Series 135 P.103 (or ORION Series 165 P.123)						
	3D	Hi-PerCarb Series 141 P.143						
	2D	2ZDK-HP P.137						
	1.5D	2ZDK-HP P.137						
Material	P Steel	M Stainless Steel	S Titanium Alloys	S Heat-resistant Alloys	K Cast Iron	H Hardened	N Non Ferrous	
General Drills								
Cleared Length	15D	Series 226 P.171						
	10D	Series 101 P.185						
	8D	Series 108M P.190						
	5D	Series 108M P.190						
	3D	Series 108M P.190						
Cutting Diameter (mm)	0.04	1.0	3.0	5.0	9.0	11.0	13.0	16.0
For all materials								

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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Automotive
Mold & Die
Aerospace

High Performance
General

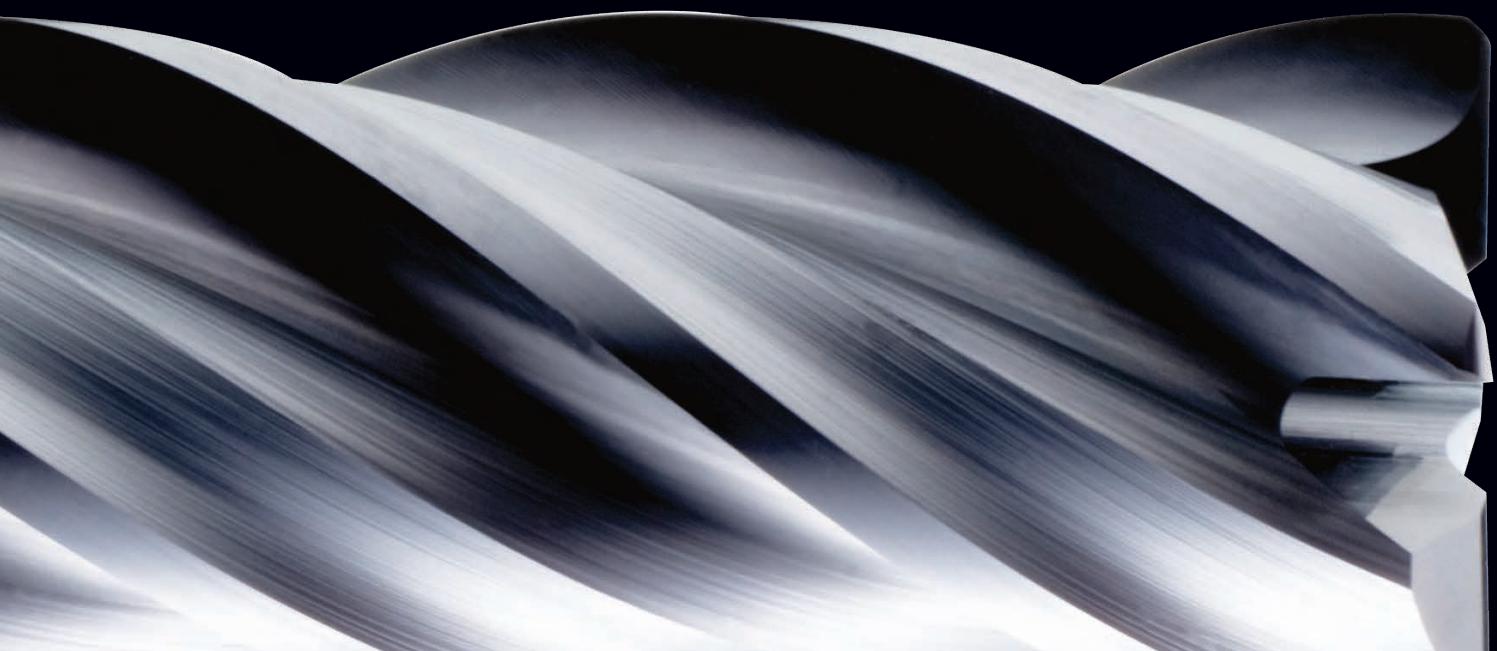
Special Tools



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.



**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



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.

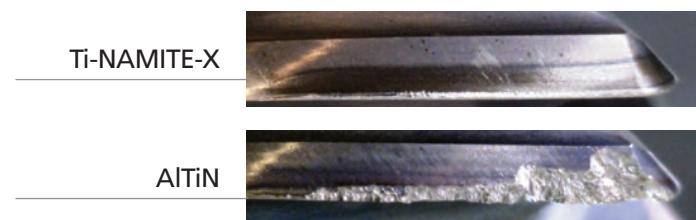
Young's Modulus of Elasticity 460 GPa 368 Gpa Increased toughness in the coating improves the performance in applications that encounter a high level of mechanical stress such as milling.

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



EDGE WEAR H13 / 49 HRc



www.sgstool.com



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

THEY HAVEN'T FAILED ME.

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

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

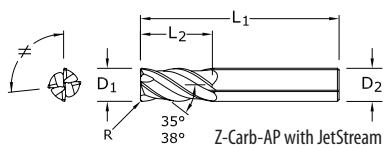
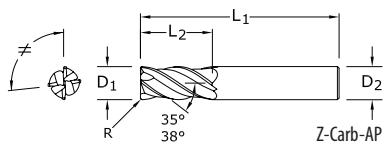
I know you needed results for the quarter, but I can't give you exact data until this thing dies.

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)



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

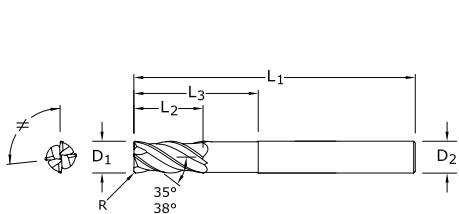
CORNER RADIUS TOLERANCES (mm)		
< 3	= +0,000 / -0,025	
≥ 3	= +0,000 / -0,050	

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.	Icon
1,0	3,0	57,0	6,0	0,1	46873	—	—	Corner
1,5	4,5	57,0	6,0	0,1	46849	—	—	Straight
2,0	6,0	57,0	6,0	0,2	46850	—	—	Weldon Flat
2,5	7,0	57,0	6,0	0,2	46874	—	—	HAIMER Safe-Lock
3,0	8,0	57,0	6,0	0,3	46851	—	—	Regular
3,0	8,0	57,0	6,0	0,5	46880	—	—	Variable Right Spiral
4,0	11,0	57,0	6,0	0,3	46852	—	—	Flute Spacing Unequal
4,0	11,0	57,0	6,0	0,5	46881	—	—	Variable Rake Angle
5,0	6,0	57,0	13,0	0,3	46853	—	—	JetStream Coolant Slots
6,0	13,0	57,0	6,0	0,25	46882	—	—	4 Flutes
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	

Anti Vibration End Mill

Z-Carb AP (4 flutes)



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

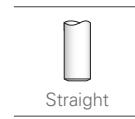
CORNER RADIUS TOLERANCES (mm)

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



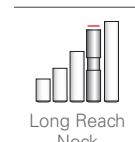
Corner



Straight



HAIMER Safe-Lock



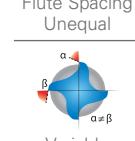
Long Reach Neck



Variable Right Spiral



Flute Spacing Unequal



Variable Rake Angle



4 Flutes

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Anti Vibration End Mill

Z-Carb AP (4 flutes)



Automotive

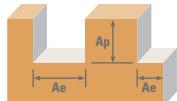
Mold & Die

Aerospace

High Performance

General

Special Tools



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		
CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	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
	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	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
ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	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
	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	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
TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	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
	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	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
CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	$\leq 220 \text{ Bhn}$ or $\leq 19 \text{ HRc}$	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
	$\leq 260 \text{ Bhn}$ or $\leq 26 \text{ HRc}$	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
CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	$\leq 260 \text{ Bhn}$ or $\leq 26 \text{ HRc}$	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
	$\leq 260 \text{ Bhn}$ or $\leq 26 \text{ HRc}$	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
STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	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
	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	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
STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	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
	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	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

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	$\leq 325 \text{ Bhn}$ or $\leq 35 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	94 (76-113)	RPM	30052	10017	5009	3756	3005	2504	1878	1503	1202
					Fz	0.0018	0.0064	0.017	0.030	0.037	0.043	0.051	0.059	0.063	
		Slot 	1	≤ 1	76 (61-91)	RPM	24235	8078	4039	3029	2424	2020	1515	1212	969
					Fz	0.0018	0.0064	0.017	0.030	0.037	0.043	0.051	0.059	0.063	
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	$\leq 300 \text{ Bhn}$ or $\leq 32 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	24 (20-29)	RPM	7755	2585	1293	969	776	646	485	388	310
					Fz	0.0018	0.0061	0.016	0.027	0.034	0.041	0.048	0.053	0.060	
		Slot 	1	≤ 1	20 (16-24)	RPM	6301	2100	1050	788	630	525	394	315	252
					Fz	0.0018	0.0061	0.016	0.027	0.034	0.041	0.048	0.053	0.060	
S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	$\leq 400 \text{ Bhn}$ or $\leq 43 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	19 (15-23)	RPM	6010	2003	1002	751	601	501	376	301	240
					Fz	0.0013	0.0043	0.011	0.019	0.024	0.028	0.033	0.037	0.042	
		Slot 	1	≤ 1	15 (12-18)	RPM	4847	1616	808	606	485	404	303	242	194
					Fz	0.0013	0.0043	0.011	0.019	0.024	0.028	0.033	0.037	0.042	
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	$\leq 350 \text{ Bhn}$ or $\leq 38 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	66 (52-79)	RPM	20842	6947	3474	2605	2084	1737	1303	1042	834
					Fz	0.0020	0.0071	0.019	0.032	0.040	0.048	0.056	0.064	0.070	
		Slot 	1	≤ 1	52 (41-62)	RPM	16480	5493	2747	2060	1648	1373	1030	824	659
					Fz	0.0020	0.0071	0.019	0.032	0.040	0.048	0.056	0.064	0.070	
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	$\leq 440 \text{ Bhn}$ or $\leq 47 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	23 (18-27)	RPM	7271	2424	1212	909	727	606	454	364	291
					Fz	0.0020	0.0071	0.019	0.032	0.040	0.048	0.056	0.064	0.070	
		Slot 	1	≤ 1	18 (15-22)	RPM	5816	1939	969	727	582	485	364	291	233
					Fz	0.0020	0.0071	0.019	0.032	0.040	0.048	0.056	0.064	0.070	

Bhn (Brinell) HRc (Rockwell C)

rpm = $(V_c \times 1000) / (D_1 \times 3.14)$

mm/min = $F_z \times 4 \times rpm$

maximum Slotted Ap for Z1PCR <3mm diameter and all Z1MPLC / Z1MPLB is .25 x D₁

maximum Profile Ae for Z1PCR <3mm diameter and all Z1MPLC / Z1MPLB is .20 x D₁

reduce speed and feed for materials harder than listed

reduce feed and Ae when finish milling (.02 x D₁ maximum)

refer to the SGS Tool Wizard for complete technical information (www.sgstool.com)



Tool Wizard
CALCULATE APPLICATION PARAMETERS

www.sgstool.com

Automotive

Mold & Die

Aerospace

High Performance

General

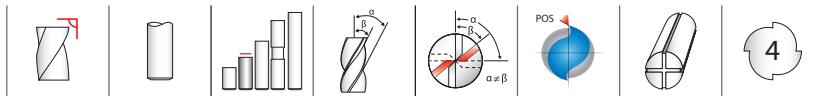
Special Tools

Memo

Anti Vibration End Mill

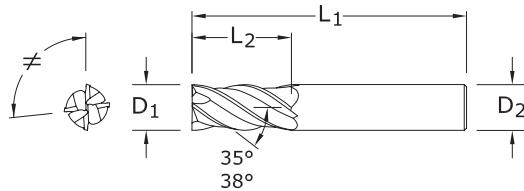
Z-Carb Z1M

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)



CUTTING DIAMETER D₁	LENGTH OF CUT L₂	OVERALL LENGTH L₁	SHANK DIAMETER D₂	EDP NO. 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

D₁ = +0,000/-0,030

D₂ = h₆

>6–10 DIAMETER

D₁ = +0,000/-0,040

D₂ = h₆

>10–25 DIAMETER

D₁ = +0,000/-0,050

D₂ = h₆

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

For patent information visit www.ksptpatents.com

Automotive

Mold & Die

Aerospace

High Performance

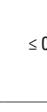
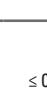
General

Special Tools

Anti Vibration End Mill

Z-Carb Z1M

METRIC Z-Carb

Series Z1M, Z1MB Metric		Hardness	Ae x D ₁	Ap x D ₁	V _c (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 (135-203)	RPM	17934	8967	6725	5380	4484	3363	2690	2152
						Fz	0.009	0.024	0.041	0.051	0.060	0.079	0.086	0.088	
		≤ 375 Bhn or ≤ 40 HRc	Slot 	1	≤ 1	134 (107-161)	RPM	14218	7109	5332	4265	3555	2666	2133	1706
						Fz	0.009	0.024	0.041	0.051	0.060	0.079	0.086	0.088	
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	Profile 	≤ 0.5	≤ 1.5	96 (77-115)	RPM	10179	5089	3817	3054	2545	1909	1527	1221
						Fz	0.007	0.019	0.030	0.037	0.046	0.061	0.067	0.068	
		≤ 375 Bhn or ≤ 40 HRc	Slot 	1	≤ 1	76 (61-91)	RPM	8078	4039	3029	2424	2020	1515	1212	969
						Fz	0.007	0.019	0.030	0.037	0.046	0.061	0.067	0.068	
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Profile 	≤ 0.5	≤ 1.5	56 (45-68)	RPM	5978	2989	2242	1793	1495	1121	897	717
						Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
		≤ 375 Bhn or ≤ 40 HRc	Slot 	1	≤ 1	44 (35-53)	RPM	4686	2343	1757	1406	1171	879	703	562
						Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile 	≤ 0.5	≤ 1.5	136 (109-163)	RPM	14380	7190	5392	4314	3595	2696	2157	1726
						Fz	0.008	0.024	0.038	0.048	0.058	0.077	0.083	0.085	
		≤ 260 Bhn or ≤ 26 HRc	Slot 	1	≤ 1	108 (87-130)	RPM	11471	5736	4302	3441	2868	2151	1721	1377
						Fz	0.008	0.024	0.038	0.048	0.058	0.077	0.083	0.085	
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc	Profile 	≤ 0.5	≤ 1.5	104 (83-124)	RPM	10987	5493	4120	3296	2747	2060	1648	1318
						Feed (mm/min)	316	369	492	492	475	485	422	330	
		≤ 260 Bhn or ≤ 26 HRc	Slot 	1	≤ 1	82 (66-99)	RPM	8725	4362	3272	2617	2181	1636	1309	1047
						Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063	
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile 	≤ 0.5	≤ 1.5	149 (119-179)	RPM	15834	7917	5938	4750	3958	2969	2375	1900
						Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063	
		≤ 275 Bhn or ≤ 28 HRc	Slot 	1	≤ 1	119 (95-143)	RPM	12602	6301	4726	3781	3151	2363	1890	1512
						Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063	

continued on next page

Anti Vibration End Mill

Z-Carb Z1M

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	$\leq 275 \text{ Bhn}$ $\leq 28 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	104 (83-124)	RPM	10987	5493	4120	3296	2747	2060	1648	1318
					Fz (66-99)	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050	
	$\leq 325 \text{ Bhn}$ $\leq 35 \text{ HRc}$	Slot 	1	≤ 1	82 (61-91)	RPM	8725	4362	3272	2617	2181	1636	1309	1047
					Fz (61-91)	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050	
 SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	$\leq 300 \text{ Bhn}$ $\leq 32 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	94 (76-113)	RPM	10017	5009	3756	3005	2504	1878	1503	1202
					Fz (76-113)	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050	
	$\leq 400 \text{ Bhn}$ $\leq 43 \text{ HRc}$	Slot 	1	≤ 1	76 (16-24)	RPM	8078	4039	3029	2424	2020	1515	1212	969
					Fz (16-24)	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050	
 SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	$\leq 400 \text{ Bhn}$ $\leq 43 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	24 (20-29)	RPM	2585	1293	969	776	646	485	388	310
					Fz (20-29)	0.005	0.010	0.017	0.021	0.024	0.033	0.037	0.038	
	$\leq 350 \text{ Bhn}$ $\leq 38 \text{ HRc}$	Slot 	1	≤ 1	20 (16-24)	RPM	2100	1050	788	630	525	394	315	252
					Fz (16-24)	0.005	0.010	0.017	0.021	0.024	0.033	0.037	0.038	
 TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	$\leq 350 \text{ Bhn}$ $\leq 38 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	19 (15-23)	RPM	2003	1002	751	601	501	376	301	240
					Fz (15-23)	0.002	0.007	0.011	0.013	0.017	0.020	0.024	0.025	
	$\leq 440 \text{ Bhn}$ $\leq 47 \text{ HRc}$	Slot 	1	≤ 1	15 (12-18)	RPM	1583	792	594	475	396	297	238	190
					Fz (12-18)	0.002	0.007	0.011	0.013	0.017	0.020	0.024	0.025	
 TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	$\leq 440 \text{ Bhn}$ $\leq 47 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	66 (52-79)	RPM	6947	3474	2605	2084	1737	1303	1042	834
					Fz (52-79)	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
	$\leq 440 \text{ Bhn}$ $\leq 47 \text{ HRc}$	Slot 	1	≤ 1	52 (41-62)	RPM	5493	2747	2060	1648	1373	1030	824	659
					Fz (41-62)	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
 TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	$\leq 440 \text{ Bhn}$ $\leq 47 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	23 (18-27)	RPM	2424	1212	909	727	606	454	364	291
					Fz (18-27)	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
	$\leq 440 \text{ Bhn}$ $\leq 47 \text{ HRc}$	Slot 	1	≤ 1	18 (15-22)	RPM	1939	969	727	582	485	364	291	233
					Fz (15-22)	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	

Bhn (Brinell) HRc (Rockwell C)

rpm = $(Vc \times 1000) / (D_1 \times 3.14)$

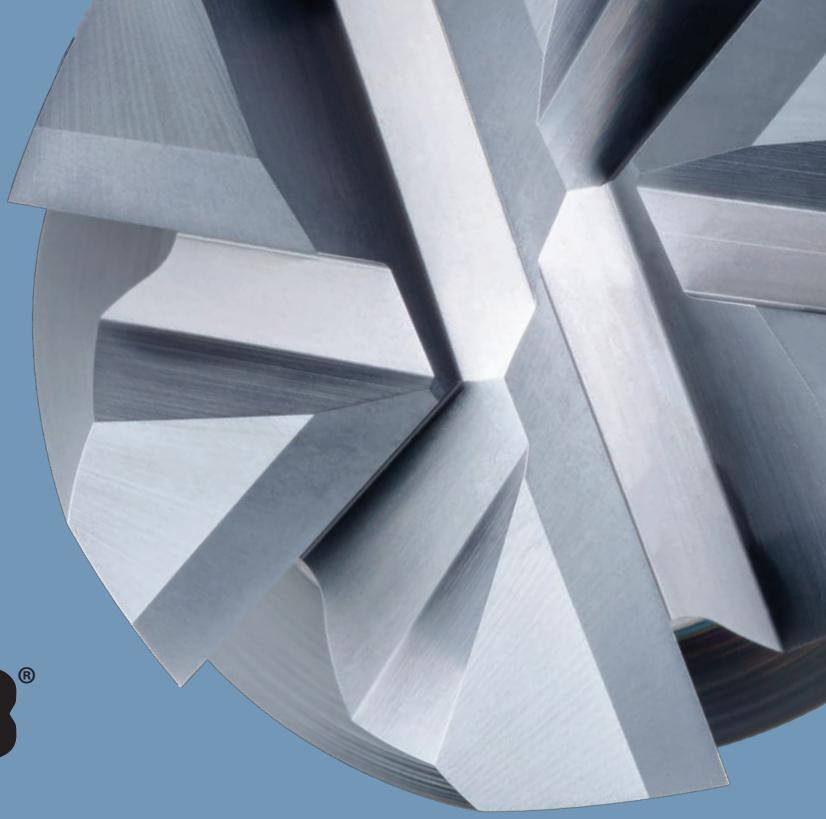
ipm = $Fz \times 4 \times rpm$

reduce speed and feed for materials harder than listed

reduce feed and Ae when finish milling (.02 x D₁ maximum)

refer to the KYOCERA SGS Tool Wizard™ for complete technical information (www.kyocera-sgstoold.com)

Automotive
Mold & Die
Aerospace
High Performance
General
Special Tools



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 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)



Automotive

Mold & Die

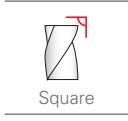
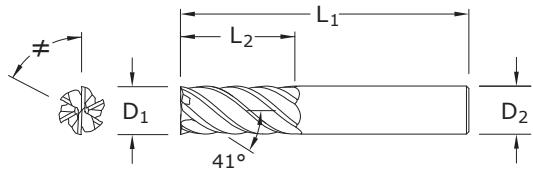
Aerospace

High Performance

General

Special Tools

TOLERANCES (mm)		
DIAMETER	D ₁	D ₂
6 - 20	+0,000 / -0,050	h6



Square



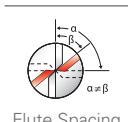
Straight



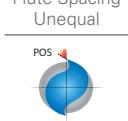
Right Spiral



Regular



Flute Spacing
Unequal



Positive
Rake Angle



External
Coolant



Flutes

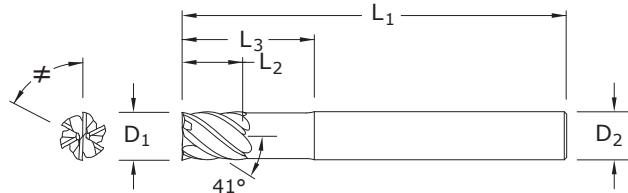
Cutting Diameter D ₁	Length of Cut L ₂	Overall Length L ₁	Shank Diameter D ₂	Ti-Namite-X (TX) EDP No.
6,0	19,0	63,0	6,0	45100
8,0	20,0	63,0	8,0	45101
10,0	22,0	75,0	10,0	45102
12,0	26,0	83,0	12,0	45103
16,0	32,0	92,0	16,0	45104
20,0	38,0	104,0	20,0	45105

Finishing End Mill

T-Carb (6 flutes)



DIAMETER	TOLERANCES (mm)	
	D ₁	D ₂
6 - 20	+0,000 / -0,050	h6



	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.
Square	6,0	8,0	75,0	6,0	32,0	45106
Straight	8,0	10,0	75,0	8,0	32,0	45107
Right Spiral	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
Long Reach Neck	20,0	24,0	150,0	20,0	80,0	45111
Flute Spacing Unequal						
Positive Rake Angle						
External Coolant						
Flutes						

Automotive

Mold & Die

Aerospace

High Performance

General

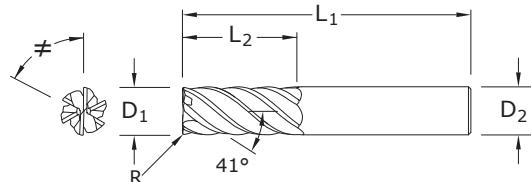
Special Tools

Finishing End Mill

T-Carb (6 flutes)



DIAMETER	TOLERANCES (mm)		
	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

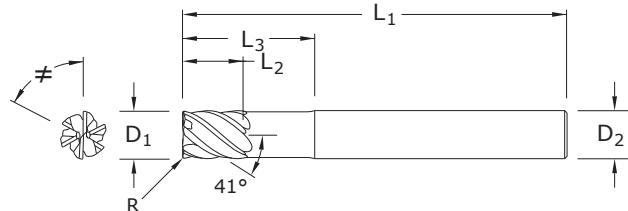
Cutting Diameter D ₁	Length of Cut L ₂	Overall Length L ₁	Shank Diameter D ₂	Corner Radius R	Ti-Namite-X (TX) EDP No.
6,0	19,0	63,0	6,0	0,5	45112
6,0	19,0	63,0	6,0	1,0	45170
6,0	19,0	63,0	6,0	1,5	45171
8,0	20,0	63,0	8,0	0,5	45113
8,0	20,0	63,0	8,0	1,0	45114
8,0	20,0	63,0	8,0	1,2	45150
8,0	20,0	63,0	8,0	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

Finishing End Mill

T-Carb (6 flutes)



DIAMETER	TOLERANCES (mm)		
	D ₁	D ₂	R
6 - 20	+0,000 / -0,050	h6	+0,000 / -0,050



New Expanded Tools



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
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20,0	24,0	150,0	20,0	80,0	2,0	45141
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Automotive

Mold & Die

Aerospace

High Performance

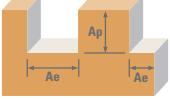
General

Special Tools

Finishing End Mill

T-Carb (6 flutes)



Series 51M, 51MCR, 51ML, 51MLC Metric		Hardness		Vc (m/min)	Diameter (D ₁) (mm)							
Ae x D ₁	Ap x D ₁				6	8	10	12	16	20		
CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	Profile 	≤ 0.1	≤ 1	219 (176-263)	RPM	11633	8725	6980	5816	4362	3490
		HSM 	≤ 0.05	≤ 2	279 (223-335)	RPM	14784	11088	8870	7392	5544	4435
	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Profile 	≤ 0.1	≤ 1	149 (119-179)	RPM	7917	5938	4750	3958	2969	2375
		HSM 	≤ 0.05	≤ 2	189 (151-227)	RPM	10017	7513	6010	5009	3756	3005
ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Profile 	≤ 0.1	≤ 1	73 (59-88)	RPM	3878	2908	2327	1939	1454	1163
		HSM 	≤ 0.05	≤ 2	93 (74-112)	RPM	4928	3696	2957	2464	1848	1478
	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Profile 	≤ 0.1	≤ 1	155 (140-171)	RPM	8240	6180	4944	4120	3090	2472
		HSM 	≤ 0.05	≤ 2	198 (178-218)	RPM	10502	7877	6301	5251	3938	3151
TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Profile 	≤ 0.1	≤ 1	107 (96-117)	RPM	5655	4241	3393	2827	2121	1696
		HSM 	≤ 0.05	≤ 2	137 (123-151)	RPM	7271	5453	4362	3635	2726	2181
	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	Profile 	≤ 0.1	≤ 1	99 (89-109)	RPM	5251	3938	3151	2626	1969	1575
		HSM 	≤ 0.05	≤ 2	125 (112-137)	RPM	6624	4968	3975	3312	2484	1987
STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	Profile 	≤ 0.1	≤ 1	914 (89-109)	Fz	0.029	0.049	0.061	0.073	0.086	0.096
		HSM 	≤ 0.05	≤ 2	1158 (112-137)	Feed (mm/min)	1158	1153	1150	1016	907	
	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	Profile 	≤ 0.1	≤ 1	1590 (112-137)	Fz	0.040	0.069	0.086	0.103	0.120	0.134
		HSM 	≤ 0.05	≤ 2	2057 (112-137)	Feed (mm/min)	2057	2051	2047	1789	1598	

continued on next page

Finishing End Mill

T-Carb (6 flutes)



Series 51M, 51MCR, 51ML, 51MLC Metric	Hardness			Vc (m/min)	Diameter (D ₁) (mm)							
		Ae x D ₁	Ap x D ₁		6	8	10	12	16	20		
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
		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
	≤ 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
		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
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 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
		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
	≤ 350 Bhn or ≤ 38 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
		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
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al18V6Cr4Zr4Mo, 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
		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

Note:

- Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
- rpm = $(V_c \times 1000) / (D_1 \times 3.14)$
- mm/min = $F_z \times 6 \times \text{rpm}$
- reduce speed and feed for materials harder than listed
- reduce feed and Ae when finish milling ($.02 \times D_1$ maximum)
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgsthool.com)

TOOLWIZARD® 2.1
www.sgsthoolwizard.com

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools



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 $\frac{1}{2}$ " 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

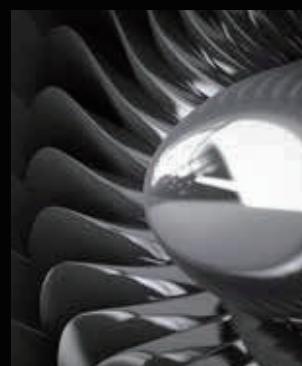
The Z-Carb HPR is available with an abrasive resistant and hard coating, Aluminum Titanium Nitride (AlTiN) or Ti-NAMITE-A. The coating has a high hardness giving ultimate protection against abrasive wear and erosion. Ideal for high temperature alloys and stainless steel applications.

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

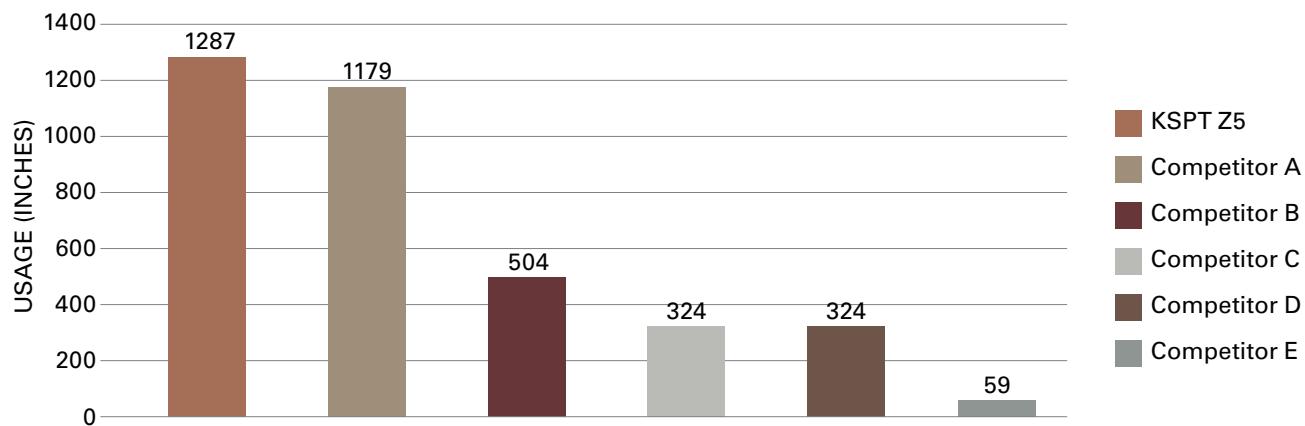
FINISHING

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

HIGH-SPEED MACHINING

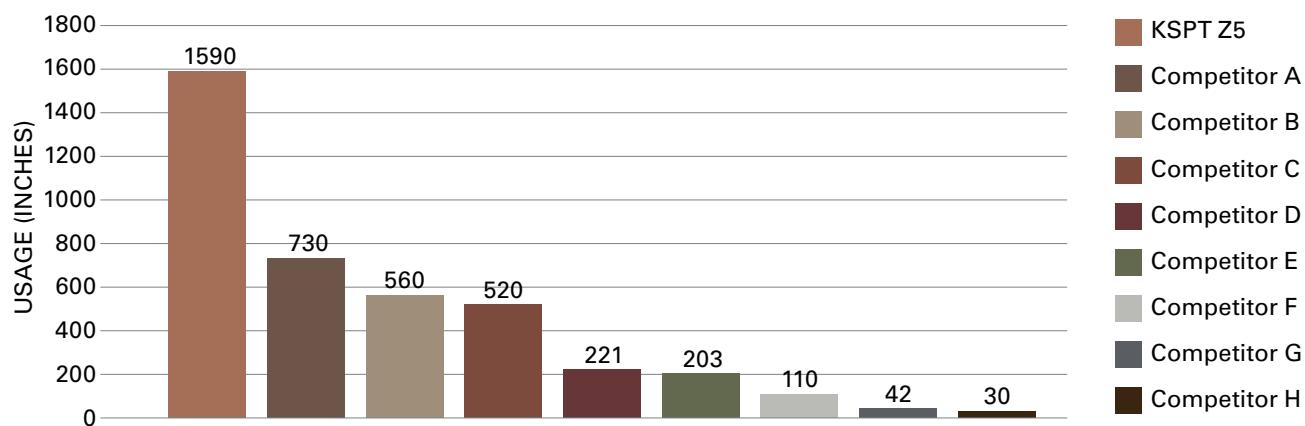
- Variable geometry design and open fluting eliminate vibration to enable increased rates for High Speed Machining
- Exclusive Ti-NAMITE-M coating for higher heat resistance to enhance tool life in difficult to machine materials like Titanium
- Available with Ti-NAMITE-A coating for superior wear, edge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

LAB TESTING RESULTS – HEAVY PROFILING IN TITANIUM



Ti-NAMITE-M

LAB TESTING RESULTS – HEAVY PROFILING IN STAINLESS STEEL



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

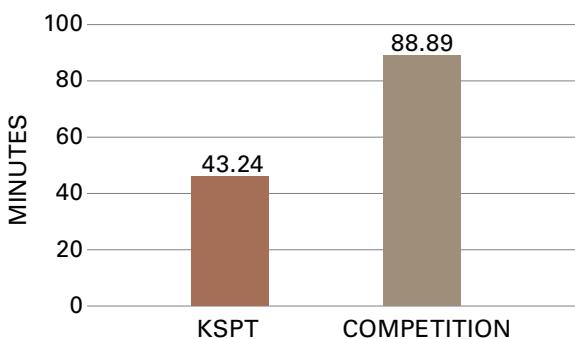
KSPT approached this job with a 5 flute Z-Carb high performance rougher (HPR) end mill. KSPT's Z-Carb HPR is ideal for achieving high metal removal rates, while at the same time achieving an optimal surface finish. The Ti-Namite M coating was selected for its outstanding performance in Titanium.

	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

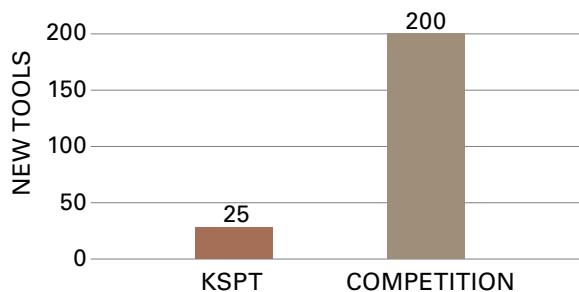
RESULTS

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!

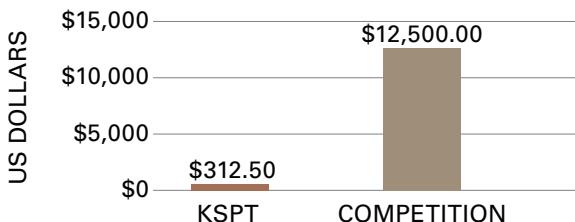
CYCLE TIME



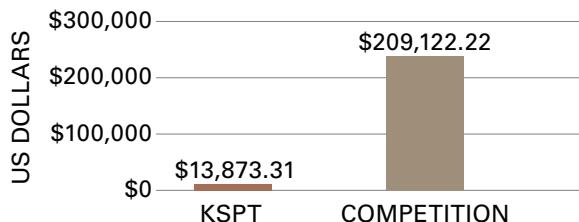
NEW TOOLS REQUIRED TO COMPLETE THE JOB



TOTAL CHANGE COST



TOTAL COST

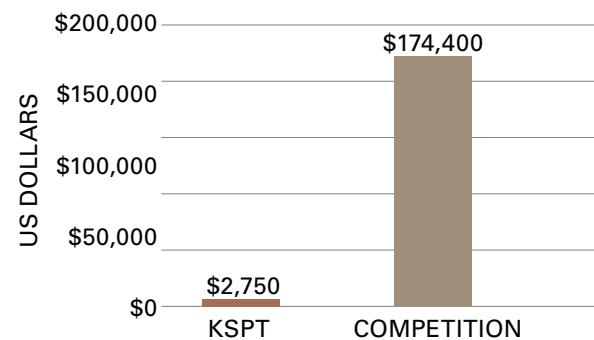




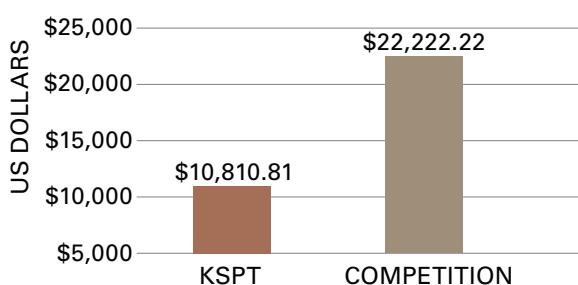
CARB-HPR

HIGH PERFORMANCE ROUGHER

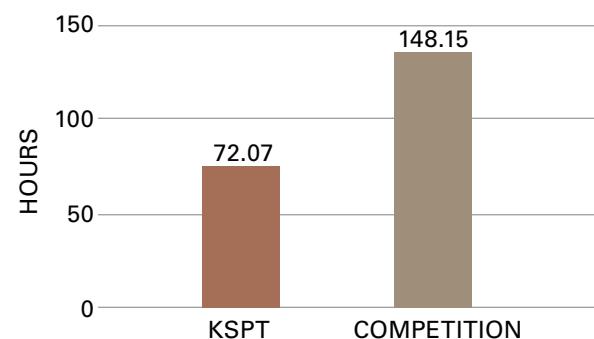
TOTAL NEW TOOL COST



TOTAL MACHINING COST



TOTAL MACHINING HOURS



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

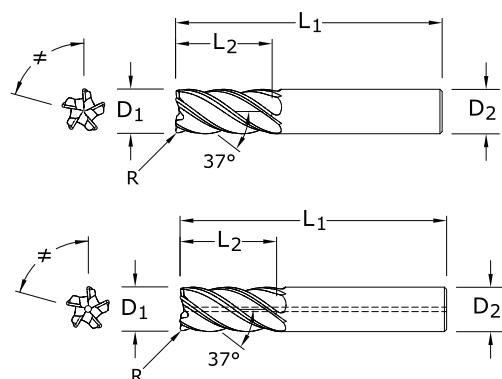
KYOCERA SGS Precision Tools (KSPT) actively maintains a serious commitment to research and development. Our reputation for quality and ever increasing Value at the Spindle® pushes us to continually innovate and discover the next best thing in cutting tool technology. The Z-Carb HPR is a product of this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



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

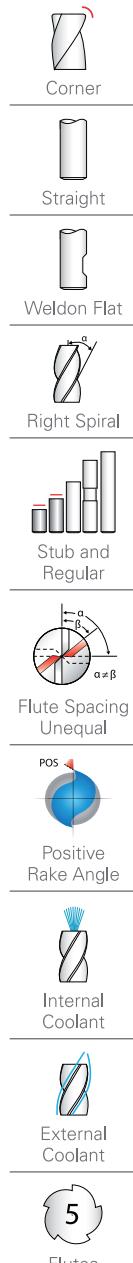
CORNER RADIUS TOLERANCES (mm)

R = +0,000 / -0,050

New Expanded Tools

Cutting Diameter D ₁	Length of Cut L ₂	Overall Length L ₁	Shank Diameter D ₂	Corner Radius R	Ti-Nomite-A (TA) EDP No.	Ti-Nomite-A (TA) EDP No. w/Flat	Ti-Nomite-A (TA) EDP No. w/Internal Coolant	Ti-Nomite-M (TM) EDP No.	Ti-Nomite-M (TM) EDP No. w/ Flat	Ti-Nomite-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)



Automotive
Mold & Die
Aerospace

High Performance
General
Special Tools

Roughing End Mill

Z-Carb HPR

Automotive

Mold & Die

Aerospace

High Performance

General

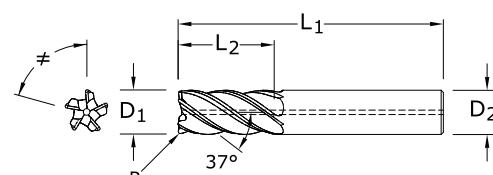
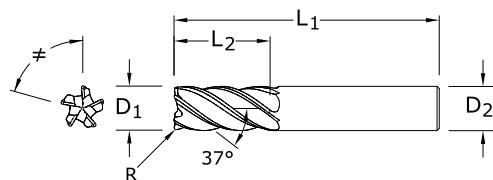
Special Tools

TOLERANCES (mm)

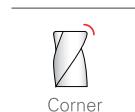
DIAMETER	D ₁	D ₂
6	+0,000 / -0,030	h6
> 6 - 10	+0,000 / -0,040	h6
> 10 - 25	+0,000 / -0,050	h6

CORNER RADIUS TOLERANCES (mm)

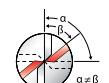
R = +0,000 / -0,050



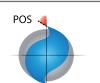
New Expanded Tools



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
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



Flute Spacing Unequal



Positive Rake Angle



Internal Coolant



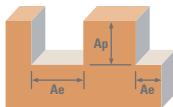
External Coolant



Flutes

Roughing End Mill

Z-Carb HPR



Series Z5MCR Metric	Hardness	$Ae \times D_1$	$Ap \times D_1$	V_c (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	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	169 (135-203)	RPM	8967	6725	5380	4484	3363	2690	2152
		Slot 	1	≤ 1	134 (107-161)	RPM	7109	5332	4265	3555	2666	2133	1706
	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	96 (77-115)	Fz	0.029	0.049	0.061	0.074	0.087	0.099	0.108
		Slot 	1	≤ 1	76 (61-91)	RPM	4039	3029	2424	2020	1515	1212	969
H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	56 (45-68)	RPM	2989	2242	1793	1495	1121	897	717
		Slot 	1	≤ 1	44 (35-53)	RPM	2343	1757	1406	1171	879	703	562
	$\leq 220 \text{ Bhn}$ or $\leq 19 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	136 (109-163)	Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.065
		Slot 	1	≤ 1	108 (87-130)	RPM	5736	4302	3441	2868	2151	1721	1377
K CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	$\leq 260 \text{ Bhn}$ or $\leq 26 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	104 (83-124)	Fz	0.020	0.034	0.043	0.050	0.059	0.067	0.073
		Slot 	1	≤ 1	82 (66-99)	RPM	4362	3272	2617	2181	1636	1309	1047
	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	149 (119-179)	Fz	0.022	0.036	0.045	0.055	0.067	0.075	0.080
		Slot 	1	≤ 1	119 (95-143)	RPM	6301	4726	3781	3151	2363	1890	1512
M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	104 (83-124)	Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.063
		Slot 	1	≤ 1	82 (66-99)	RPM	4362	3272	2617	2181	1636	1309	1047
	$\leq 325 \text{ Bhn}$ or $\leq 35 \text{ HRc}$	Profile 	≤ 0.5	≤ 1.5	94 (76-113)	Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.063
		Slot 	1	≤ 1	76 (61-91)	RPM	4039	3029	2424	2020	1515	1212	969

continued on next page

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Roughing End Mill

Z-Carb HPR



Automotive

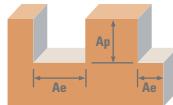
Mold & Die

Aerospace

High Performance

General

Special Tools



Diameter (D_1)
(mm)

Series Z5MCR Metric	Hardness	$A_e \times D_1$	$A_p \times D_1$	V_c (m/min)	Diameter (D_1) (mm)								
					24	RPM	1293	969	776	646	485	388	310
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	
	≤ 400 Bhn or ≤ 43 HRc	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	
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	
	≤ 350 Bhn or ≤ 38 HRc	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	
TITANIUM ALLOYS Pure Titanium, 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	
	≤ 440 Bhn or ≤ 47 HRc	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	
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	
	≤ 440 Bhn or ≤ 47 HRc	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	

Note:

- Bhn (Brinell) HRc (Rockwell C)
- rpm = $(V_c \times 1000) / (D_1 \times 3.14)$
- mm/min = $F_z \times 5 \times rpm$
- 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-sgsthool.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 ($ap = 2 \times D_c$) for Stainless Steel and Titanium Alloy

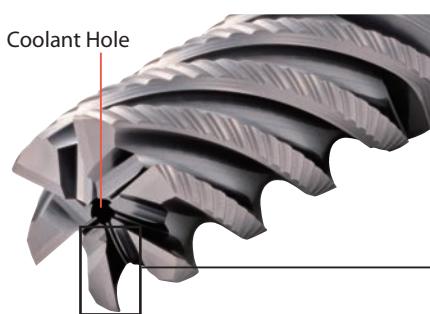
1

High Efficiency Machining with Multi-edge Design

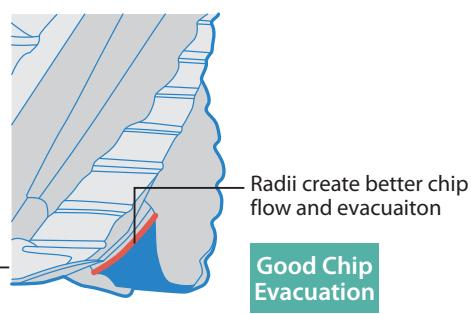
Multi-edge Design with Coolant Hole

Good Chip Evacuation with Serrated Edge

Multi-edge Design ($\varnothing 16$ - 6 flutes)



Original Serration Shape



High Efficiency Slotting

Deep Slotting ($ap = 2 \times D_c$) for Stainless Steel and Titanium Alloy

Slotting Performance Comparison (Internal Evaluation)

After Machining 1 Pass



Competitor A

5RFH

5RFH (Internal and External Coolant)



Competitor A (External Coolant)



✗ Defects (Chip Biting)

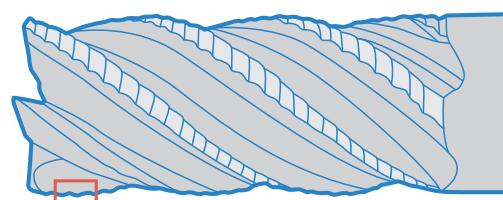
Cutting Conditions: $n = 2,550 \text{ min}^{-1}$, $V_f = 336 \text{ mm/min}$, $ap = 20 \text{ mm}$
End Mill Dia. $\varnothing 10$, Wet, Slotting Workpiece: SUS304

No Defects when
Deep Slotting

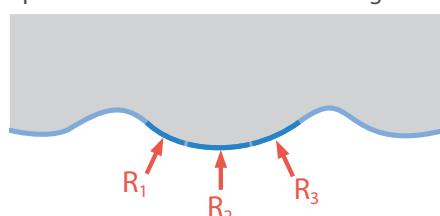
2 Defect Resistant

Reduces Cutting Pressure with Radial Serrated Edge

Stable Machining



Special Curved Radius Serrated Edge



Serrated Curved Edge with Different Radii
(Compound Radius Shape)

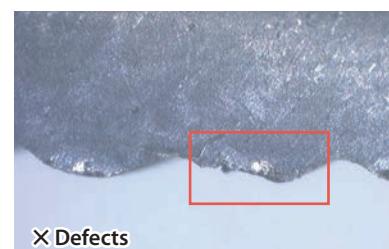
Distributes cutting pressure and provides stress reduction

Blade Edge after Machining 12m (Internal Evaluation)



○ Good

5RFH



✗ Defects

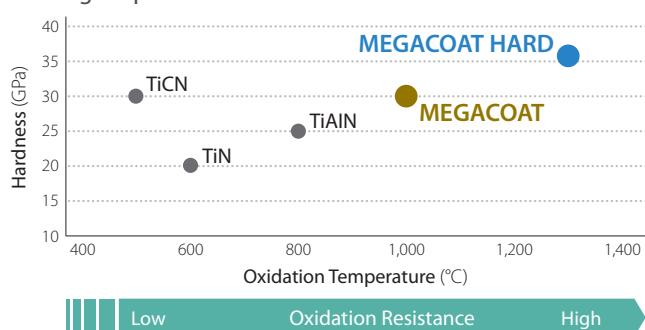
Competitor B

Cutting Conditions: $n = 2,900 \text{ min}^{-1}$, $V_f = 712 \text{ mm/min}$, $a_p \times a_e = 5 \times 3 \text{ mm}$
End Mill Dia. ø10, Wet, Shouldering Workpiece: Ti-6Al-4V

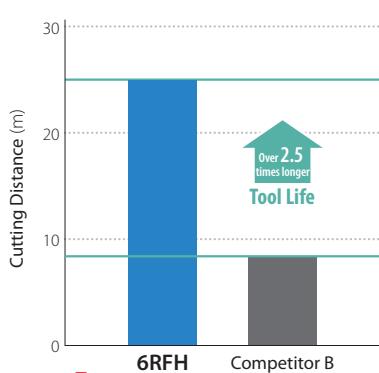
3 Achieves Long Tool Life and Stable Machining

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

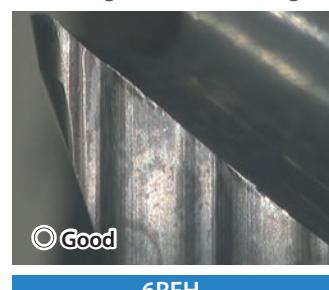
Coating Properties



Tool Life Comparison (Internal Evaluation)

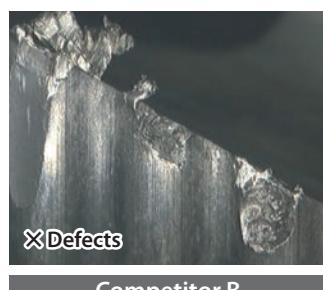


Blade Edge after Machining 8.4m



○ Good

6RFH



✗ Defects

Competitor B

Cutting Conditions: $n = 3,500 \text{ min}^{-1}$, $V_f = 840 \text{ mm/min}$, $a_p \times a_e = 5 \times 4.8 \text{ mm}$
End Mill Dia. ø16, Shouldering, Wet Workpiece: SUS304

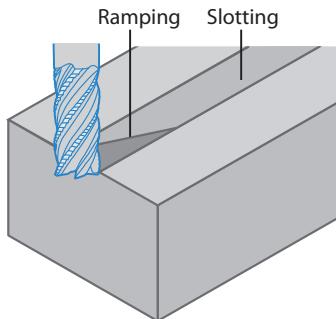
Roughing End Mill

5RFH

Machining Information

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

Case Studies



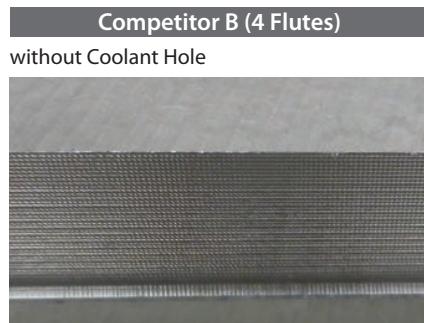
RFH is internal coolant support

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)



Surface Finish: 0.20 μmRa



Surface Finish: 1.66 μmRa

Cutting Conditions: $n = 3,200 \text{ min}^{-1}$
 $V_f = 310 \text{ mm/min}$, $a_p = 10 \text{ mm}$
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

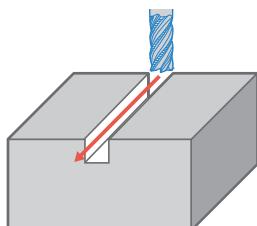
4/5/6RFH can be custom-made for NIKKEN's X-Treme chuck

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

Case Studies

Test Piece SUS304

$n = 1,800 \text{ min}^{-1}$
($V_c = 56 \text{ m/min}$)
 $V_f = 250 \text{ mm/min}$
($f_z = 0.027 \text{ mm/t}$)
 $a_p \times a_e = 3 \times 10 \text{ mm}$ (Slotting)
3 passes
Wet (Internal Coolant)
5RFH100-250



Load on the main spindle

5RFH
100-250

20 %

10 %
Load on the main spindle

Competitor C

30 %

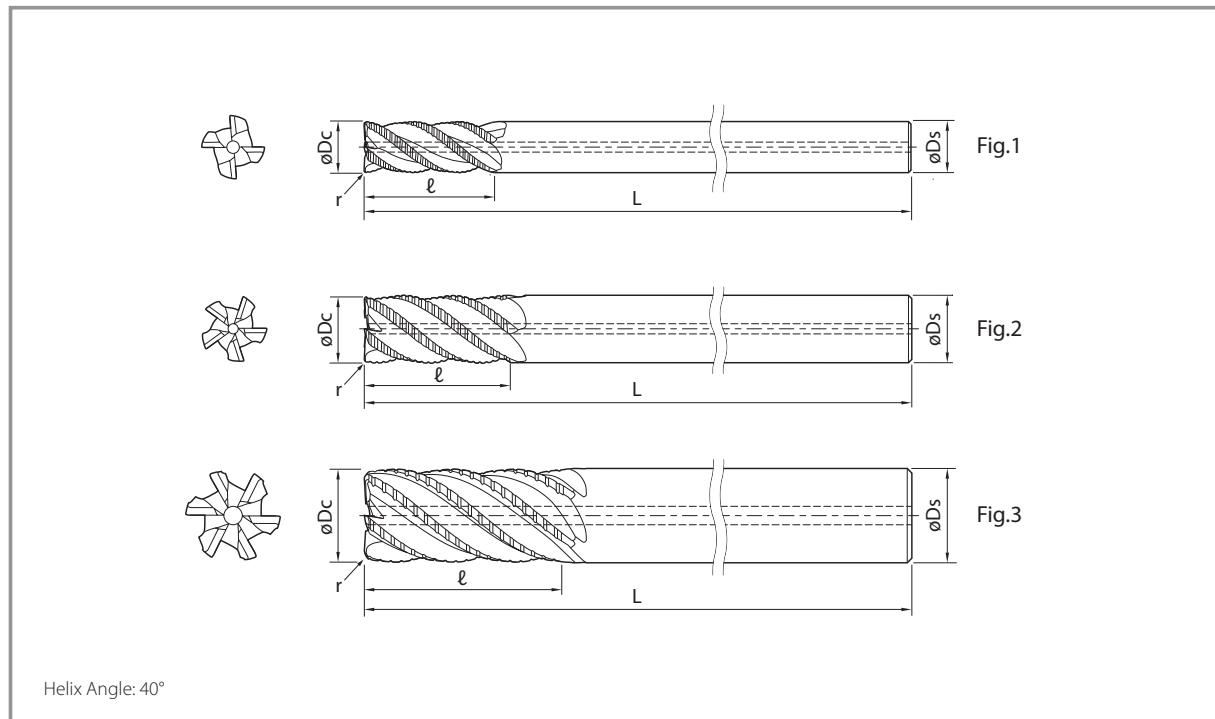
5RFH shows 10% reduced load compared to competitor C.
Reduced vibration for quieter machining with excellent surface finish.

(User Evaluation)

Roughing End Mill

5RFH

Lineup (Medium Type / Long Type)



4/5/6RFH (Medium Type)

(Unit: mm)

Description	Stock	Outside Dia.	Mill Dia. Tolerance	* Corner-R	Length of Cut	Shank Dia.	Overall Length	No. of Flutes	Shape
		øDc		r	ℓ	øDs	L	Z	
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.	Mill Dia. Tolerance	* Corner-R	Length of Cut	Shank Dia.	Overall Length	No. of Flutes	Shape
		øDc		r	ℓ	øDs	L	Z	
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.

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Roughing End Mill

5RFH

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
	Pre-hardened Steel (30~45HRC)	Shouldering	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
		Slotting	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
	Stainless Steel SUS304	Shouldering	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
		Slotting	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	Titanium Alloys	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
	Super Alloy	Shouldering	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
		Slotting	1.5Dc X 0.2Dc	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
	Super Alloy	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

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
		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
		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.

Automotive

Mold & Die

Aerospace

High Performance

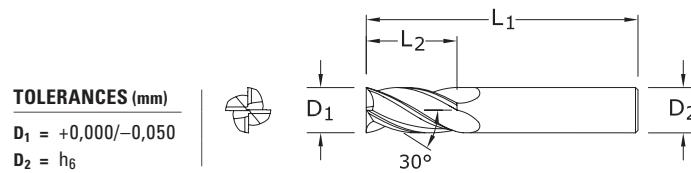
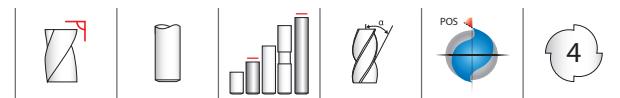
General

Special Tools

General Purpose End Mills



METRIC
4 Flute End Mills



1M • 1XLM
METRIC SERIES

CUTTING DIAMETER D ₁	LENGTH OF CUT L ₂	OVERALL LENGTH L ₁	SHANK DIAMETER D ₂	EDP NO.	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	SERIES
1,0	4,0	38,0	3,0	40105	48500	48522	48543	48544	1M
1,5	4,5	38,0	3,0	40109	48501	48523	48544	48545	1M
2,0	6,3	38,0	3,0	40113	48502	48524	48545	48546	1M
2,5	9,5	38,0	3,0	40117	48503	48525	48546	48547	1M
3,0	12,0	38,0	3,0	40121	48504	48526	48547	48548	1M
3,0	25,0	75,0	3,0	43101	49388	49401	49414	49415	1XLM
3,5	12,0	50,0	4,0	40125	48505	48527	48548	48549	1M
4,0	14,0	50,0	4,0	40129	48506	48528	48549	48550	1M
4,0	25,0	75,0	4,0	43103	49389	49402	49415	49416	1XLM
4,5	16,0	50,0	6,0	40133	48507	48529	48550	48551	1M
5,0	16,0	50,0	6,0	40137	48508	48530	48551	48552	1M
5,0	25,0	75,0	5,0	43107	49391	49404	49417	49418	1XLM
6,0	19,0	50,0	6,0	40141	48509	48531	48552	48553	1M
6,0	25,0	75,0	6,0	43105	49390	49403	49416	49417	1XLM
7,0	19,0	63,0	8,0	40145	48510	48532	48553	48554	1M
8,0	20,0	63,0	8,0	40149	48511	48533	48554	48555	1M
8,0	25,0	75,0	8,0	43115	49392	49405	49418	49419	1XLM
9,0	22,0	75,0	10,0	40153	48512	48534	48555	48556	1M
10,0	22,0	75,0	10,0	40157	48513	48535	48556	48557	1M
10,0	38,0	100,0	10,0	43125	49393	49406	49419	49420	1XLM
11,0	25,0	75,0	12,0	40161	48514	48536	48557	48558	1M
12,0	25,0	75,0	12,0	41665	48515	48537	48558	48559	1M
12,0	50,0	100,0	12,0	43135	49394	49407	49420	49421	1XLM
12,0	75,0	150,0	12,0	43145	49395	49408	49421	49422	1XLM
14,0	32,0	89,0	14,0	40169	48516	48538	48559	48560	1M
14,0	75,0	150,0	14,0	43155	49396	49409	49422	49423	1XLM
16,0	32,0	89,0	16,0	40173	48517	48539	48560	48561	1M
16,0	75,0	150,0	16,0	43165	49397	49410	49423	49424	1XLM
18,0	38,0	100,0	18,0	40177	48518	48540	48561	48562	1M
18,0	75,0	150,0	18,0	43175	49398	49411	49424	49425	1XLM
20,0	38,0	100,0	20,0	40181	48519	48541	48562	48563	1M
20,0	75,0	150,0	20,0	43185	49399	49412	49425	49426	1XLM
25,0	38,0	100,0	25,0	40185	48520	48542	48563	48564	1M
25,0	75,0	150,0	25,0	43195	49400	49413	49426	49427	1XLM



For patent information visit www.ksptpatents.com

Automotive
Mold & Die
Aerospace

High Performance
General

Special Tools

Finishing & Roughing End Mill

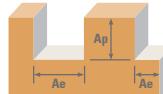
Series 1M

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



Metric	Hardness	Flutes	$A_e \times D_1$	$A_p \times D_1$	V_c (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 	2	≤ 0.50	≤ 1.5	(112-168)	140	RPM	111483	59458	29729	14864	7432	4459	3716	2230	1784
				3	≤ 0.25	≤ 1.5		Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070	
				4	≤ 0.25	≤ 1.5		Feed (mm/min)	268	268	276	312	424	535	535	428	375	
		≤ 275 Bhn or ≤ 28 HRc	Slot 	2	1	≤ 1	(82-123)	102	RPM	81189	43301	21650	10825	5413	3248	2706	1624	1299
				3	1	≤ 0.5		Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070	
				4	1	≤ 0.4		Feed (mm/min)	130	130	134	152	206	260	260	208	182	
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	Profile 	2	≤ 0.50	≤ 1.5	(82-123)	102	RPM	81189	43301	21650	10825	5413	3248	2706	1624	1299
				3	≤ 0.25	≤ 1.5		Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052	
				4	≤ 0.25	≤ 1.5		Feed (mm/min)	81	104	95	130	152	188	195	156	135	
		≤ 250 Bhn or ≤ 24 HRc	Slot 	2	1	≤ 1	(60-90)	75	RPM	59377	31668	15834	7917	3958	2375	1979	1188	950
				3	1	≤ 0.5		Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052	
				4	1	≤ 0.4		Feed (mm/min)	59	76	70	95	111	138	143	114	99	
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc	Profile 	2	≤ 0.50	≤ 1.5	(77-115)	96	RPM	76342	40715	20358	10179	5089	3054	2545	1527	1221
				3	≤ 0.25	≤ 1.5		Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052	
				4	≤ 0.25	≤ 1.5		Feed (mm/min)	76	98	90	122	143	177	183	147	127	
		≤ 250 Bhn or ≤ 24 HRc	Slot 	2	1	≤ 1	(56-84)	70	RPM	55741	29729	14864	7432	3716	2230	1858	1115	892
				3	1	≤ 0.5		Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052	
				4	1	≤ 0.4		Feed (mm/min)	56	71	65	89	104	129	134	107	93	
	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile 	2	≤ 0.50	≤ 1.5	(82-123)	102	RPM	81189	43301	21650	10825	5413	3248	2706	1624	1299
				3	≤ 0.25	≤ 1.5		Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070	
				4	≤ 0.25	≤ 1.5		Feed (mm/min)	130	130	134	152	206	260	260	208	182	
		≤ 220 Bhn or ≤ 19 HRc	Slot 	2	1	≤ 1	(60-90)	75	RPM	59377	31668	15834	7917	3958	2375	1979	1188	950
				3	1	≤ 0.5		Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070	
				4	1	≤ 0.4		Feed (mm/min)	95	95	98	111	150	190	190	152	133	
K	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 275 Bhn or ≤ 28 HRc	Profile 	2	≤ 0.50	≤ 1.5	(90-135)	102	RPM	81189	43301	21650	10825	5413	3248	2706	1624	1299
				3	≤ 0.25	≤ 1.5		Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070	
				4	≤ 0.25	≤ 1.5		Feed (mm/min)	130	130	134	152	206	260	260	208	182	
		≤ 275 Bhn or ≤ 28 HRc	Slot 	2	1	≤ 1	(66-99)	75	RPM	59377	31668	15834	7917	3958	2375	1979	1188	950
				3	1	≤ 0.5		Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052	
				4	1	≤ 0.4		Feed (mm/min)	65	84	77	105	122	157	157	126	109	
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L, 17-4 PH, 15-5, 13-4, Custom 450	≤ 275 Bhn or ≤ 28 HRc	Profile 	2	≤ 0.50	≤ 1.5	(62-93)	78	RPM	61800	32960	16480	8240	4120	2472	2060	1236	989
				3	≤ 0.25	≤ 1.5		Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042	
				4	≤ 0.25	≤ 1.5		Feed (mm/min)	62	66	63	66	99	119	119	91	83	
		≤ 275 Bhn or ≤ 28 HRc	Slot 	2	1	≤ 1	(45-68)	56	RPM	44836	23912	11956	5978	2989	1793	1495	897	717
				3	1	≤ 0.5		Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042	
				4	1	≤ 0.4		Feed (mm/min)	45	48	45	48	72	86	87	66	60	

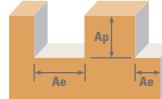
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METRIC

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	V _c (m/min)	Diameter (D ₁) (mm)										
						0.4	0.75	1.5	3	6	10	12	20	25		
S	≤ 300 Bhn or ≤ 32 HRc	Profile	2 ≤ 0.50 ≤ 1.5	Ap ≤ 1.5	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	
					(16-24)	Feed (mm/min)	16	12	12	17	21	26	25	20	18	
						24	18	18	25	32	40	38	30	26		
						32	24	24	34	42	53	50	40	35		
		Slot	2 1 ≤ 1	Ap ≤ 1.5	14	RPM	10906	5816	2908	1454	727	436	364	218	174	
					(11-16)	Fz	0.0005	0.0007	0.0014	0.004	0.010	0.021	0.024	0.032	0.035	
	≤ 350 Bhn or ≤ 38 HRc	Profile	2 ≤ 0.50 ≤ 1.5	Ap ≤ 1.5		55	RPM	43624	23266	11633	5816	2908	1745	1454	872	698
					(44-66)	Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042	
						44	47	44	47	70	84	84	65	59		
		Slot	3 ≤ 0.25 ≤ 1.5	Ap ≤ 1.5		65	70	66	70	105	126	127	97	88		
						87	93	88	93	140	168	169	129	117		
N	≤ 150 Bhn or ≤ 7 HRc	Profile	2 ≤ 0.50 ≤ 1.5	Ap ≤ 1.5	40	RPM	31506	16803	8402	4201	2100	1260	1050	630	504	
					(32-48)	Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042	
						32	34	32	34	50	60	61	47	42		
		Slot	3 ≤ 0.25 ≤ 0.5	Ap ≤ 1.5		47	50	48	50	76	91	91	70	64		
						63	67	64	67	101	121	122	93	85		
	≤ 140 Bhn or ≤ 3 HRc	Profile	2 ≤ 0.50 ≤ 1.5	Ap ≤ 1.5	268	RPM	213272	113745	56872	28436	14218	8531	7109	4265	3412	
					(215-322)	Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140	
						640	728	682	796	1081	1365	1365	1092	955		
		Slot	3 ≤ 0.25 ≤ 1.5	Ap ≤ 1.5		960	1092	1024	1194	1621	2047	2047	1638	1433		
						87	93	88	93	140	168	169	129	117		
PLASTICS	Alum Bronze, C110, Muntz Brass	Profile	2 1 ≤ 1	Ap ≤ 1.5	195	RPM	155107	82724	41362	20681	10340	6204	5170	3102	2482	
					(156-234)	Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140	
						465	529	496	579	786	993	993	794	695		
		Slot	3 1 ≤ 0.5	Ap ≤ 1.5		698	794	745	869	1179	1489	1489	1191	1042		
						271	271	280	317	430	543	543	434	380		
	Polycarbonate, PVC, Polypropylene	Profile	2 ≤ 0.50 ≤ 1.5	Ap ≤ 1.5	148	RPM	117542	62689	31344	15672	7836	4702	3918	2351	1881	
					(118-177)	Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070	
						188	188	194	219	298	376	376	301	263		
		Slot	3 ≤ 0.25 ≤ 1.5	Ap ≤ 1.5		282	282	292	329	447	564	564	451	395		
						376	376	389	439	596	752	752	602	527		
GRAPHITE	Copper Alloys	Profile	2 ≤ 0.25 ≤ 1.5	Ap ≤ 1.5	268	RPM	84824	45239	22620	11310	5655	3393	2827	1696	1357	
					(118-177)	Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070	
						188	188	194	219	298	376	376	301	263		
		Slot	3 ≤ 0.25 ≤ 1.5	Ap ≤ 1.5		282	282	292	329	447	564	564	451	395		
						376	376	389	439	596	752	752	602	527		
	General	Profile	2 1 ≤ 1	Ap ≤ 1.5	195	RPM	84824	45239	22620	11310	5655	3393	2827	1696	1357	
					(156-234)	Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140	
						465	529	496	579	786	993	993	794	695		
		Slot	3 1 ≤ 0.5	Ap ≤ 1.5		698	794	745	869	1179	1489	1489	1191	1042		
						931	1059	993	1158	1572	1985	1985	1588	1390		
Special Tools	High Performance	Profile	2 ≤ 0.50 ≤ 1.5	Ap ≤ 1.5	201	RPM	159954	85309	42654	21327	10664	6398	5332	3199	2559	
					(215-322)	Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140	
						640	728	682	796	1081	1365	1365	1092	955		
		Slot	3 ≤ 0.25 ≤ 1.5	Ap ≤ 1.5		960	1092	1024	1194	1621	2047	2047	1638	1433		
						1280	1456	1365	1592	2161	2730	2730	2184	1911		
	General	Profile	2 1 ≤ 1	Ap ≤ 1.5	195	RPM	155107	82724	41362	20681	10340	6204	5170	3102	2482	
					(156-234)	Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140	
						465	529	496	579	786	993	993	794	695		
		Slot	3 1 ≤ 0.5	Ap ≤ 1.5		698	794	745	869	1179	1489	1489	1191	1042		
						931	1059	993	1158	1572	1985	1985	1588	1390		
Automotive	General	Profile	2 ≤ 0.50 ≤ 1.5	Ap ≤ 1.5	201	RPM	159954	85309	42654	21327	10664	6398	5332	3199	2559	
					(161-241)	Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140	
						480	546	512	597	810	1024	1024	819	717		
		Slot	3 ≤ 0.25 ≤ 1.5	Ap ≤ 1.5		720	819	768	896	1216	1536	1536	1228	1075		
						960	1092	1024	1194	1621	2047	2047	1638	1433		
	Special Tools	Profile	2 1 ≤ 1	Ap ≤ 1.5	146	RPM	116330	62043	31021	15511	7755	4653	3878	2327	1861	
					(117-176)	Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140	
						349	397	372	434	589	745	745	596	521		
		Slot	3 1 ≤ 0.5	Ap ≤ 1.5		523	596	558	651	884	1117	1117	893	782		
						698	794	745	869	1179	1489	1489	1191	1042		

Bhn (Brinell) HRc (Rockwell C)
 rpm = $(V_c \times 1000) / (D_1 \times 3.14)$
 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 $.05 \times D_1$ when slotting or profiling
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstoold.com)

■ Introduction

Surface finish oriented



MEGACOAT is applied



(FES)

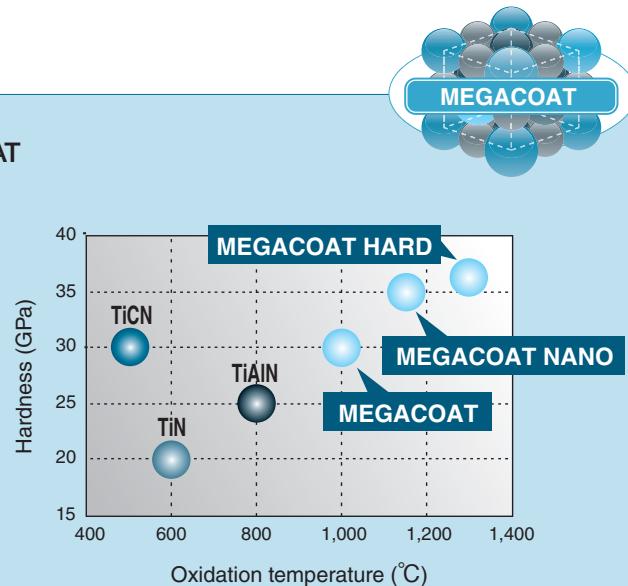
MEGACOAT and sharp cutting edge enable high precision finishing owing to excellent wear and heat resistance
Overall lengths 35mm and 45mm are available for automatic lathes

■ New PVD technology, MEGACOAT

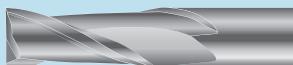
Superior wear and oxidation resistant MEGACOAT

MEGACOAT for Solid End Mill

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



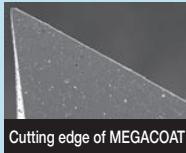
1. MEGACOAT for general milling



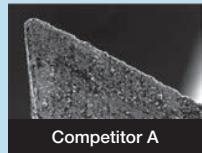
MEGACOAT extend tool life for roughing to finishing of various kinds of material with superior wear resistance and high oxidation resistance



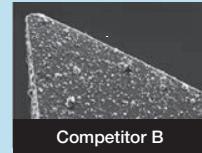
MEGACOAT



Cutting edge of MEGACOAT



Competitor A



Competitor B

(Internal evaluation)

General End Mill

2FESM

■ 2FESS, 2FESM, 2FESL

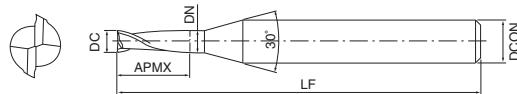


MEGACOAT is applied

No. of Flutes : 2

Recommended Workpiece Materials

★ 1st Choice



■ 2FESS (Short)

Shouldering Slotting

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
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. DC	Mill Dia. tolerance	Length of cut APMX	Neck Dia. DN	Shank Dia. DCON	Overall length LF	No. of Flutes 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

KYOCERA

General End Mill

2FESM

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

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
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						

● : Std. Item

(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
2FESM080-190-08	●	8.0	0 -0.025	19.0	-	8	60	2						
2FESM080-200-08	●	8.0	0 -0.025	20.0	-	8	60	2						
2FESM081-190-10	●	8.1	0 -0.025	19.0	8.3	10	70	2						
2FESM082-190-10	●	8.2	0 -0.025	19.0	8.4	10	70	2						
2FESM083-190-10	●	8.3	0 -0.025	19.0	8.5	10	70	2						
2FESM084-190-10	●	8.4	0 -0.025	19.0	8.6	10	70	2						
2FESM085-190-10	●	8.5	0 -0.025	19.0	8.7	10	70	2						
2FESM086-190-10	●	8.6	0 -0.025	19.0	8.8	10	70	2						
2FESM087-190-10	●	8.7	0 -0.025	19.0	8.9	10	70	2						
2FESM088-190-10	●	8.8	0 -0.025	19.0	9.0	10	70	2						
2FESM089-190-10	●	8.9	0 -0.025	19.0	9.1	10	70	2						
2FESM090-190-10	●	9.0	0 -0.025	19.0	9.2	10	70	2						
2FESM091-190-10	●	9.1	0 -0.025	19.0	9.3	10	70	2						
2FESM092-190-10	●	9.2	0 -0.025	19.0	9.4	10	70	2						
2FESM093-190-10	●	9.3	0 -0.025	19.0	9.5	10	70	2						
2FESM094-190-10	●	9.4	0 -0.025	19.0	9.6	10	70	2						
2FESM095-190-10	●	9.5	0 -0.025	19.0	9.7	10	70	2						
2FESM096-220-10	●	9.6	0 -0.025	22.0	-	10	70	2						
2FESM097-220-10	●	9.7	0 -0.025	22.0	-	10	70	2						
2FESM098-220-10	●	9.8	0 -0.025	22.0	-	10	70	2						
2FESM099-220-10	●	9.9	0 -0.025	22.0	-	10	70	2						
2FESM100-220-10	●	10.0	0 -0.025	22.0	-	10	70	2						
2FESM100-250-10	●	10.0	0 -0.025	25.0	-	10	70	2						
2FESM105-220-12	●	10.5	0 -0.025	22.0	10.7	12	75	2						
2FESM110-220-12	●	11.0	0 -0.025	22.0	11.2	12	75	2						
2FESM115-220-12	●	11.5	0 -0.025	22.0	11.7	12	75	2						
2FESM120-260-12	●	12.0	0 -0.030	26.0	-	12	75	2						
2FESM130-260-16	●	13.0	0 -0.030	26.0	13.2	16	75	2						
2FESM140-260-16	●	14.0	0 -0.030	26.0	14.2	16	75	2						
2FESM150-300-16	●	15.0	0 -0.030	30.0	15.2	16	90	2						
2FESM160-320-16	●	16.0	0 -0.030	32.0	-	16	90	2						

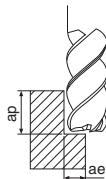
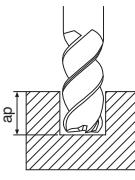
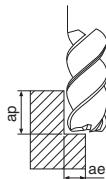
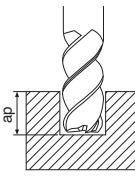
(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of cut	Neck Dia.	Shank Dia.	Overall length	No. of Flutes					
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General End Mill

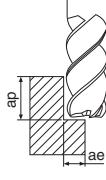
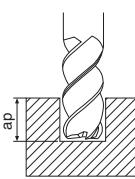
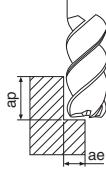
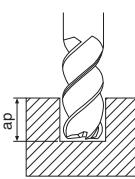
2FESM

2FESS

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø1	ø2	ø4	ø6	ø8	ø12	ø16
 Shouldering	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
 Slotting	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
 Shouldering	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
 Slotting	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	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
 Slotting	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
 Shouldering	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
 Slotting	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.

Automotive

Mold & Die

High Performance

General

Special Tools

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



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
 $\frac{1}{2}$ " Diameter Tools Equal Flute Lengths and Overall Lengths

KSPT S-Carb® Series 43 Design

2 Flute Aluminum Design

Ti-NAMITE-B

Available with TiB₂ 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

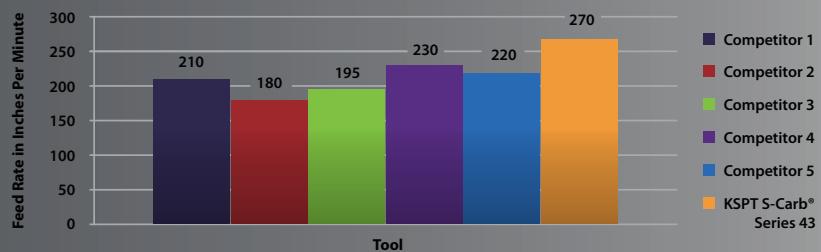
Semiconductor

- Aluminum vacuum chambers



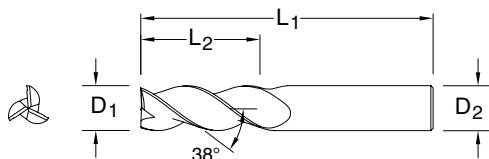
SLOTTING CAPABILITY: 3-FLUTE END MILLS

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

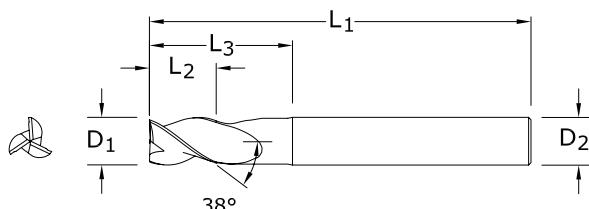
S-Carb (3 flutes)



DIAMETER	TOLERANCES (mm)	
	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

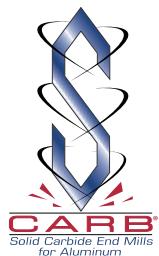
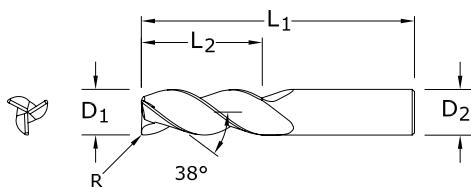
Cutting Diameter D ₁	Length of Cut L ₂	Overall Length L ₁	Shank Diameter D ₂	Reach L ₃	Ti-NAMITE-B (TiB ₂) EDP No.
6,0	10,0	75,0	6,0	20,0	42706
8,0	12,0	75,0	8,0	25,0	42707
10,0	14,0	100,0	10,0	35,0	42708
12,0	16,0	100,0	12,0	40,0	42709
16,0	20,0	125,0	16,0	50,0	42710
20,0	25,0	150,0	20,0	65,0	42711

Aluminum Machining End Mill

S-Carb (3 flutes)

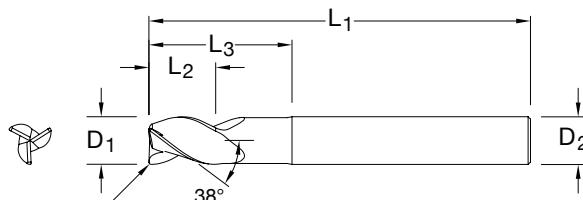
TOLERANCES (mm)		
DIAMETER	D ₁	D ₂
6	+0,000 / -0,008	h6
8 - 10	+0,000 / -0,009	h6
12 - 16	+0,000 / -0,011	h6
20	+0,000 / -0,013	h6

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



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.
Corner	6,0	13,0	57,0	6,0	1,5	—	44732
Straight	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
	16,0	32,0	92,0	16,0	1,5	44818	44735
Regular	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
Long Reach Neck	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
Positive Rake							



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.
External Coolant	6,0	10,0	63,0	6,0	20,0	0,5	44769	44789
Flutes	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

Automotive
Mold & Die

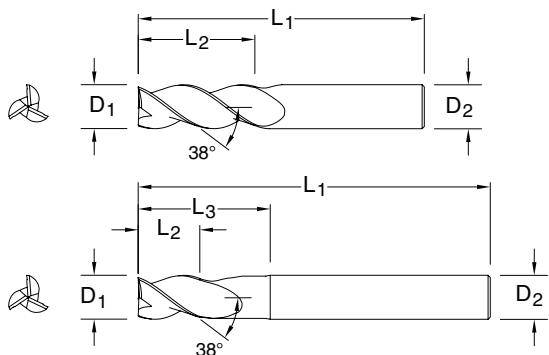
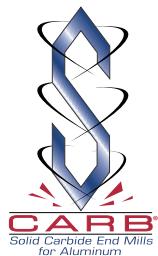
Aerospace

High Performance
General

Special Tools

Aluminum Machining End Mill

S-Carb (3 flutes)



DIAMETER	TOLERANCES (mm)	
	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



Automotive

Mold & Die

Aerospace

High Performance

General

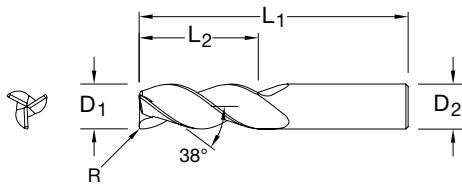
Special Tools

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)		
$R = +0,00 / -0,05$		



SERIES 43MCR						
	Cutting Diameter D ₁	Length of Cut L ₂	Overall Length L ₁	Shank Diameter D ₂	Corner Radius R	Ti-NAMITE-B (TiB ₂) EDP No.
Corner	6,0	13,0	57,0	6,0	0,5	• 44902
Straight	6,0	13,0	57,0	6,0	1,0	• 44894
Regular, Long	6,0	13,0	72,0	6,0	0,8	• 44842
Right Spiral	6,0	13,0	72,0	6,0	1,2	• 44843
Positive Rake	6,0	24,0	75,0	6,0	0,5	• 44844
External Coolant	6,0	24,0	75,0	6,0	1,0	• 44845
Flutes	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

Automotive

Mold & Die

Aerospace

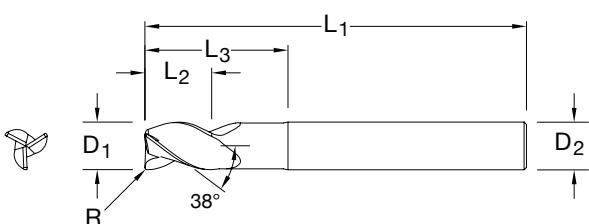
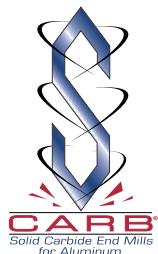
High Performance

General

Special Tools

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



Automotive

Mold & Die

Aerospace

High Performance

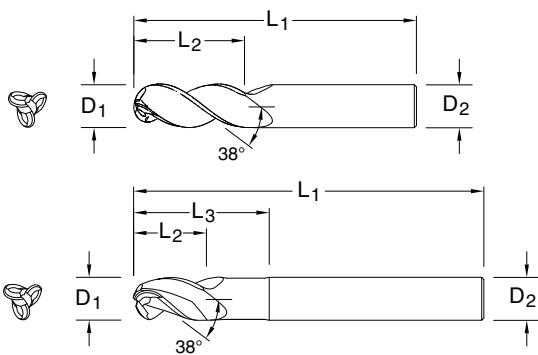
General

Special Tools

Aluminum Machining End Mill

S-Carb (3 flutes)

DIAMETER	TOLERANCES (mm)		BALL RADIUS
	D ₁	D ₂	
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



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.
Ball	3,0	4,5	57,0	6,0	—	•	44916
Common	3,0	6,0	57,0	6,0	10,0	•	44917
Straight	3,0	9,0	57,0	6,0	16,0	•	44918
Stub, Regular, Long, Long Reach Neck	4,0	6,0	57,0	6,0	—	•	44919
	4,0	8,0	57,0	6,0	13,0	•	44920
Right Spiral	4,0	12,0	57,0	6,0	21,0	•	44921
Positive Rake	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
External Coolant	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
Flutes	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

Automotive

Mold & Die

Aerospace

High Performance

General

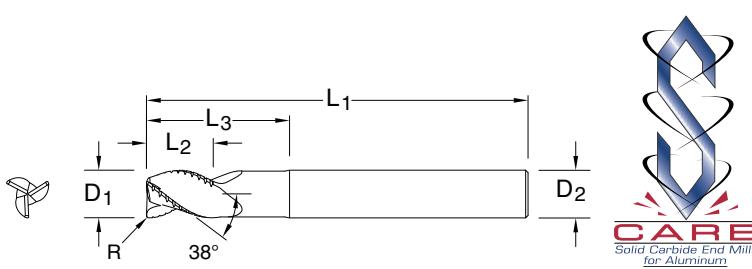
Special Tools

Aluminum Machining End Mill

S-Carb (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		



SERIES 43LCB

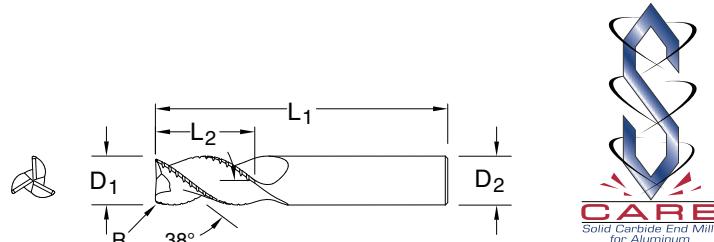


Cutting Diameter D ₁	Length of Cut L ₂	Overall Length L ₁	Shank Diameter D ₂	Reach L ₃	Corner Radius R	Uncoated EDP No.	Ti-NAMITE-B (TiB ₂) EDP No.
1/4	3/8	4	1/4	3/4	.020	33500	33540
1/4	3/8	4	1/4	1-1/8	.020	33501	33541
1/4	3/8	4	1/4	2-1/8	.020	33502	33542
5/16	7/16	4	5/16	1-1/8	.020	33503	33543
5/16	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		



SERIES 43MBC

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)



SkiCarb

Series
44M, 43MCR, 43MLC,
43MCB, 43M, 43MB,
47M, 43ML, 47ML,
47MB, 47MLB

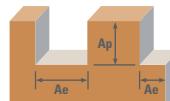
Metric

N

N

N

N



Vc (m/min)

Diameter (D₁) (mm)

	Hardness	Ae x D ₁	Ap x D ₁	Vc (m/min)	Diameter (D ₁) (mm)						
					3	6	10	12	20	25	
ALLOYS 2024, 5052, 5086, 6061, 6073, 7075	$\leq 150 \text{ Bhn}$ or $\leq 7 \text{ HRc}$	Slot 	1 ≤ 1 (392-588)	490	RPM	52022	26011	15607	13005	7803	6243
				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 (488-732)	610	RPM	64762	32381	19429	16190	9714	7771
				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 (804-1206)	1005	RPM	106698	53349	32009	26674	16005	12804
				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	
ALUMINUM DIE CAST ALLOYS (HIGH SILICON) A-390, A-392, B-390	$\leq 125 \text{ Bhn}$ or $\leq 77 \text{ HRb}$	Slot 	1 ≤ 1 (148-222)	185	RPM	19641	9820	5892	4910	2946	2357
				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 (184-276)	230	RPM	24418	12209	7326	6105	3663	2930
				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 (304-456)	380	RPM	40343	20172	12103	10086	6052	4841
				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	
COPPER ALLOYS Aluminum Bronze, Brass, Naval Brass, Red Brass	$\leq 140 \text{ Bhn}$ or $\leq 3 \text{ HRc}$	Slot 	1 ≤ 1 (212-318)	265	RPM	28134	14067	8440	7034	4220	3376
				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 (264-396)	330	RPM	35035	17518	10511	8759	5255	4204
				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 (436-654)	545	RPM	57861	28930	17358	14465	8679	6943
				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 (mm/min)	7082	9373	11804	11976	9721	8332	

continued on next page

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General

Special Tools

KYOCERA

Aluminum Machining End Mill

S-Carb (3 flutes)

Automotive

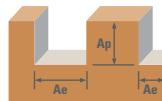
Mold & Die

Aerospace

High Performance

General

Special Tools



SkiCarb



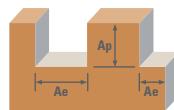
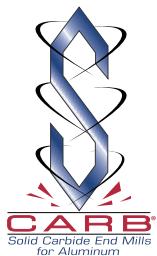
Series 44M, 43MCR, 43MLC, 43MCB, 43M, 43MB, 47M, 43ML, 47ML, 47MB, 47MLB		Metric	Hardness	Ae x D ₁	Ap x D ₁	V _c (m/min)	Diameter (D ₁) (mm)								
3	6	10	12	20	25										
N COPPER ALLOYS Beryllium Copper, C110, Manganese Bronze, Tin Bronze	N PLASTICS ABS, Polycarbonate, PVC, Polypropylene	Slot 	≤ 200 Bhn or ≤ 23 HRc	1	≤ 1 $(84-126)$	105	RPM	11148	5574	3344	2787	1672	1338		
						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			
						130	RPM	13802	6901	4141	3450	2070	1656		
		Profile 		≤ 0.5 $(104-156)$		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			
						215	RPM	22826	11413	6848	5706	3424	2739		
						Fz	0.041	0.108	0.227	0.276	0.373	0.400			
		HSM 		≤ 0.05 $(172-258)$		Feed 2 flutes (mm/min)	1862	2465	3104	3150	2556	2191			
						Feed 3 flutes (mm/min)	2794	3697	4656	4725	3835	3287			
						490	RPM	52022	26011	15607	13005	7803	6243		
						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			
						610	RPM	64762	32381	19429	16190	9714	7771		
		Profile 		≤ 0.5 $(488-732)$		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			
						1005	RPM	106698	53349	32009	26674	16005	12804		
						Fz	0.082	0.216	0.453	0.552	0.733	0.800			
		HSM 		≤ 0.05 $(804-1206)$		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 = $(1000 \times m/min) / (3.14 \times D_1)$
- 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 D₁ maximum)
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgsthool.com)

Aluminum Machining End Mill

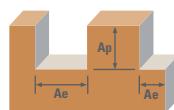
S-Carb (3 flutes)



Series 43APR Fractional	Hardness	$Ae \times D_1$	$Ap \times D_1$	V_c (sfm)	Diameter (D_1) (inch)			
					3/4	1		
N	ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075	≤ 150 Bhn or ≤ 7 HRc	Slot	1	4920 (3936-5904)	RPM	25059	18794
			Profile	≤ 0.5	6560 (5248-7872)	RPM	33412	25059
	ALUMINUM ALLOYS (LITHIUM)* 2090, 2091, 2099, 2195, 2199, 2297, 8090	≤ 150 Bhn or ≤ 7 HRc	Slot	1	3940 (3152-4728)	RPM	20068	15051
			Profile	≤ 0.5	4920 (3936-5904)	RPM	25059	18794

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 = $V_c \times 3.82 / D_1$
- ipm = $F_z \times 3 \times rpm$
- 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-sgstoold.com)



Series 43MAPR Metric	Hardness	$Ae \times D_1$	$Ap \times D_1$	V_c (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	1500 (1200-1800)	RPM	39788	29841	23873	19098
			Profile	≤ 0.5	2000 (1600-2400)	RPM	53050	39788	31830	25464
	ALUMINUM ALLOYS (LITHIUM)* 2090, 2091, 2099, 2195, 2199, 2297, 8090	≤ 150 Bhn or ≤ 7 HRc	Slot	1	1200 (960-1440)	RPM	31830	23873	19098	15278
			Profile	≤ 0.5	1500 (1200-1800)	RPM	39788	29841	23873	19098

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 = $(V_c \times 1000) / (D_1 \times 3.14)$
- mm/min = $F_z \times 3 \times rpm$
- 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-sgstoold.com)

Automotive

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For Aluminum Machining

3AFK

3-Flute End Mill for High Efficiency and Precision

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

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High Performance

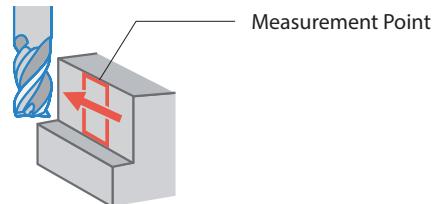
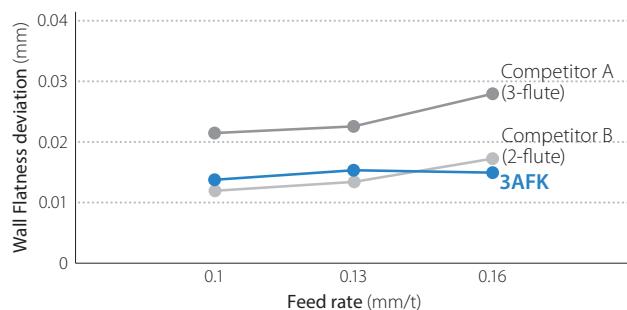
General

Special Tools

1 High-performance and High-precision Machining

High Efficiency with 3-Flutes. Excellent Machining Precision

Comparison of wall flatness (In-house Evaluation)

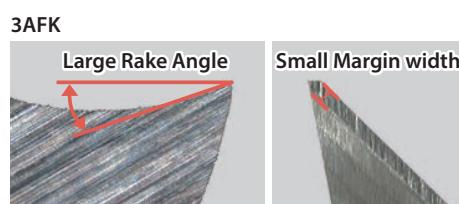


Cutting Conditions: $n = 11,700 \text{ min}^{-1}$, $V_f = 3,500 - 5,600 \text{ mm/min}$, $a_p \times a_e = 15 \times 1 \text{ mm}$
Machining Diameter 10mm, Shouldering, Down Cut, Wet, HSK A63 Workpiece: A5052

2 Burr reduction

Excellent Sharpness with Large Rake Angle and small margin width

Comparison of the Rake Angle and Margin



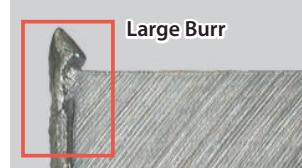
Competitor C



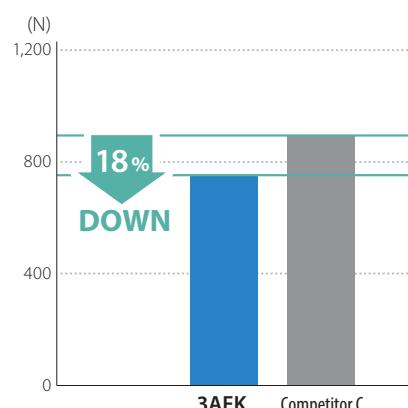
Burr Comparison after Machining (In-house Evaluation)



Competitor C



Cutting Force Comparison (In-house Evaluation)



Cutting Conditions: $n = 11,700 \text{ min}^{-1}$, $V_f = 3,400 \text{ mm/min}$, $a_p \times a_e = 10 \times 10 \text{ mm}$
Machining Diameter $\varnothing 10$, Shouldering, Down Cut, Wet, HSK A63 Workpiece: A5052

Burr Comparison after Machining Cutting Conditions: $n = 11,700 \text{ min}^{-1}$, $V_f = 4,600 \text{ mm/min}$, $a_p \times a_e = 10 \times 1 \text{ mm}$
Machining Diameter $\varnothing 10$, Shouldering, Down Cut, Wet, HSK A63 Workpiece: A7075

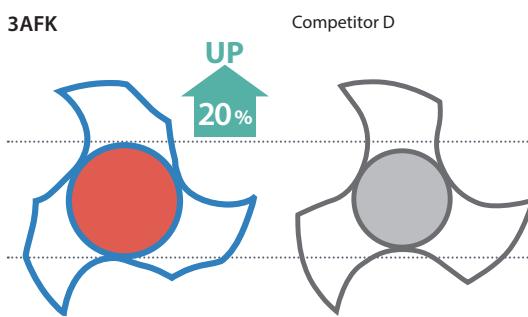
Aluminum Machining End Mill

3AFK

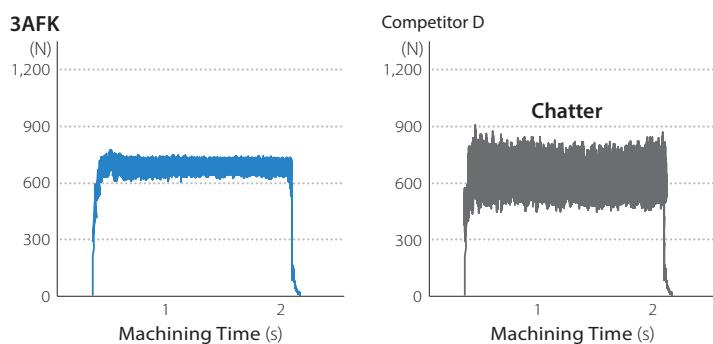
3 Chattering Resistance

Larger Core Thickness to Reduce Chattering

Core Thickness Comparison

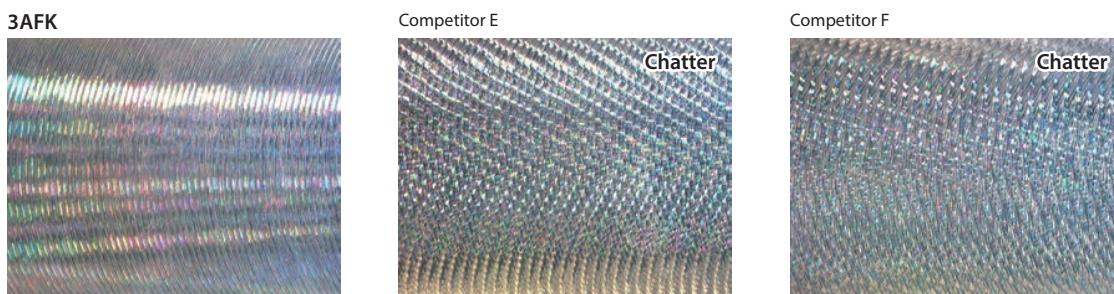


Cutting Force Comparison (In-house Evaluation)



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

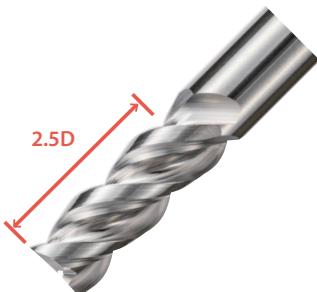
Slotting and Bottom Surface Comparison (In-house Evaluation)



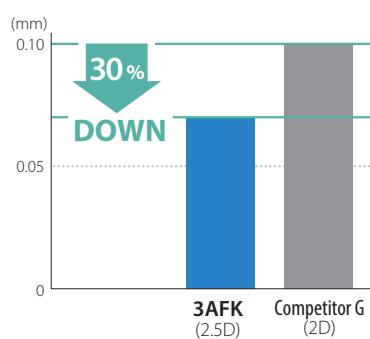
Cutting Conditions: $n = 11,100 \text{ min}^{-1}$, $V_f = 2,600 \text{ mm/min}$, $a_p = 10 \text{ mm}$, Wet Workpiece: A5052

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

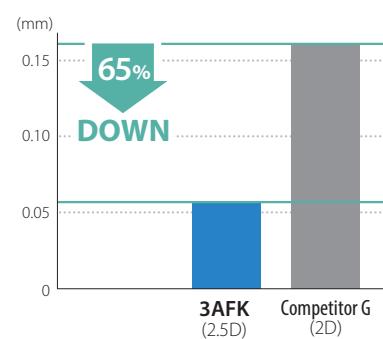
Stable Machining even while Deep Slotting



Comparison of wall flatness (In-house Evaluation)



Burr Height Comparison (In-house Evaluation)

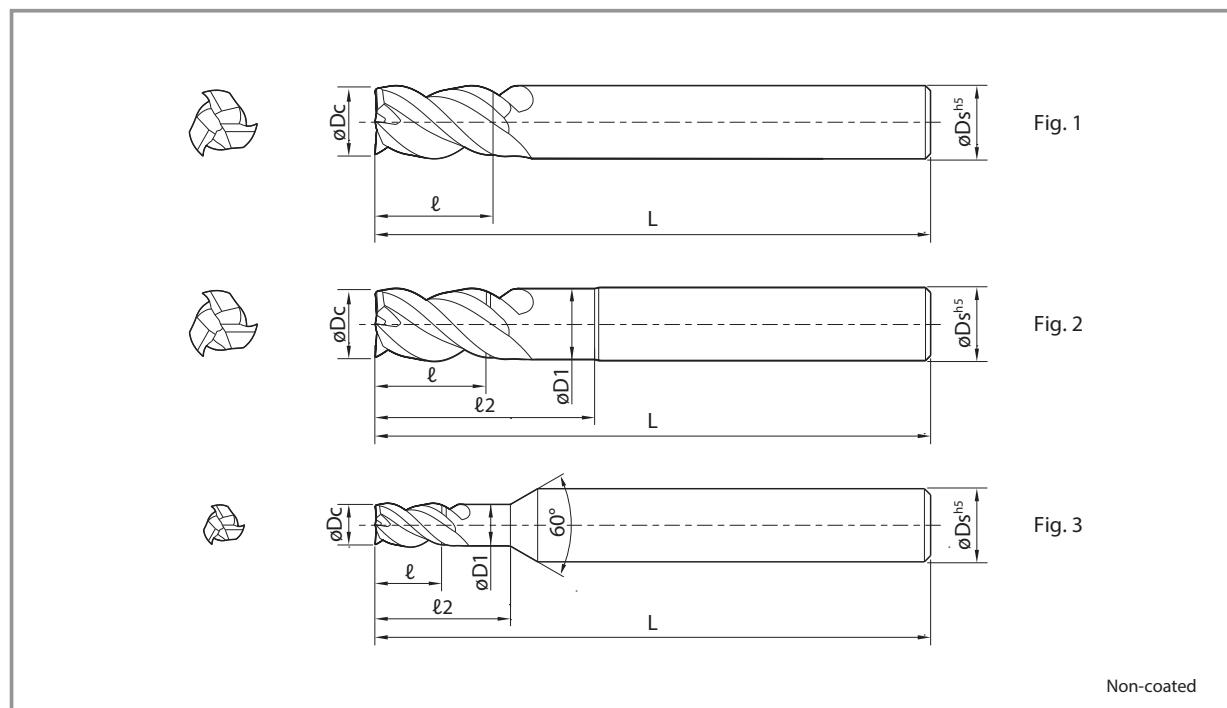


Cutting Conditions: $n = 11,100 \text{ min}^{-1}$, $V_f = 3,800 \text{ mm/min}$, $a_p \times a_e = 20 \times 1 \text{ mm}$
 Machining Diameter ø10, Shouldering, Down Cut, Wet, HSK A63 Workpiece: A7075

Aluminum Machining End Mill

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Lineup (short type 1.5D)



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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	(Unit: mm)	
									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)

Description	Stock	Outer Diameter	Outer Diameter Tolerance	Flute Length	Neck Diameter	Neck Length	Shank Diameter	Overall Length	Number of Flutes	Shape
		Ø Dc								
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

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Aluminum Machining End Mill

3AFK

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
	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

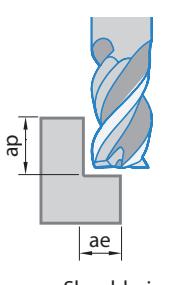
Medium Type 2.5D

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
	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

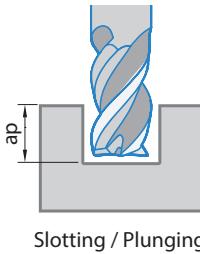
Caution

- 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

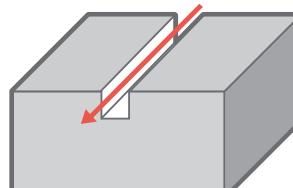


Slotting / Plunging

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

Doubled the Efficiency
2 Times

Competitor H

65 cc/min

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)

Automotive

Aerospace

High Performance

General

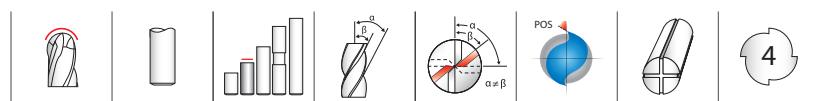
Special Tools

Hi Performance Carbide End Mill

Z-Carb Z1MB



METRIC
Z-Carb



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

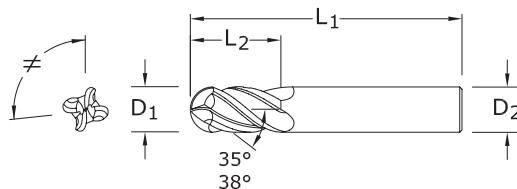
CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

For patent information visit
www.ksptpatents.com



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

Note:

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

Z1MB
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
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

Automotive

Mold & Die

Aerospace

High Performance

General

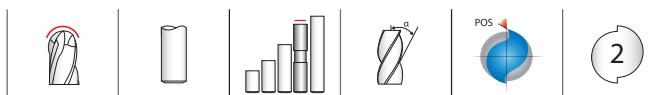
Special Tools

Hi Performance Carbide End Mill

Turbo-Carb 56MB

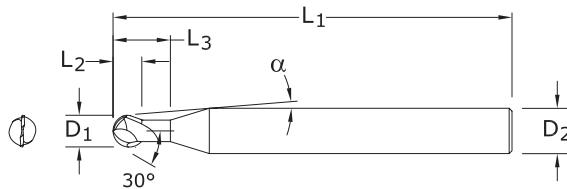
METRIC

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)



CUTTING DIAMETER D₁	LENGTH OF CUT L₂	OVERALL LENGTH L₁	SHANK DIAMETER D₂	α	REACH L₃	EDP NO.
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

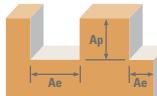
HARDENED STEELS

For patent information visit www.ksptpatents.com

Hi Performance Carbide End Mill

Turbo-Carb 56MB

METRIC
Turbo-Carb



Series 56MB Metric	Hardness	Ae x D ₁	Ap x D ₁	V _c (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	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Rough	≤ 0.4	≤ 0.1	191 (153-229)	RPM	60748	40498	20249	12150	10125	6075	5062	3037
		HSM	≤ 0.4	≤ 0.03	290 (232-348)	RPM	92235	61490	46117	18447	15372	9223	7686	4612
	$\leq 475 \text{ Bhn}$ or $\leq 50 \text{ HRc}$	Rough	≤ 0.4	≤ 0.05	229 (183-275)	Fz	0.015	0.038	0.076	0.102	0.127	0.203	0.254	0.305
		HSM	≤ 0.4	≤ 0.02	351 (281-421)	Feed (mm/min)	1822	3078	3078	2479	2572	2466	2572	1853
TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	$\leq 655 \text{ Bhn}$ or $\leq 60 \text{ HRc}$	Rough	≤ 0.4	≤ 0.04	152 (122-182)	RPM	72833	48556	24278	14567	12139	7283	6069	3642
		HSM	≤ 0.4	≤ 0.01	305 (244-366)	Fz	0.013	0.028	0.058	0.076	0.097	0.152	0.191	0.216
	$\leq 655 \text{ Bhn}$ or $\leq 60 \text{ HRc}$	Rough	≤ 0.4	≤ 0.04	152 (122-182)	Feed (mm/min)	1894	2719	2816	2214	2355	2214	2319	1573
		HSM	≤ 0.4	≤ 0.01	305 (244-366)	Feed (mm/min)	3349	4465	4763	3751	3982	3751	3870	2836

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)

rpm = $(V_c \times 1000) / (D_1 \times 3.14)$

mm/min = $F_z \times 2 \times \text{rpm}$

reduce speed and feed for materials harder than listed

reduce feed and Ae when finish milling (.02 x D₁ maximum)

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgsthool.com)

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Hardened Machining End Mill

HFS

■ 4HFS, 5HFS, 6HFS, 7HFS, 8HFS



MEGACOAT HARD is applied

High Efficiency Machining

■ 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	ZEFF
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

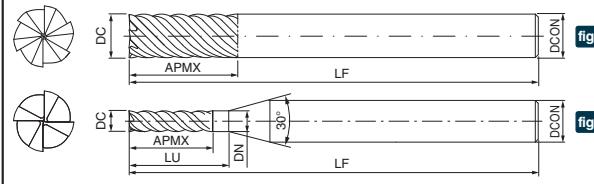


Bottom surface of
6HFSS cutting edge

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

Recommended Workpiece Materials

★ 1st Choice



■ 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	ZEFF
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.

Automotive

Mold & Die

Aerospace

High Performance

General
Special Tools

Hardened Machining End Mill

HFS

■ 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	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	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	1.5DC x 0.05DC	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	
		1.5DC x 0.02DC	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.

Automotive

Mold & Die

Aerospace

High Performance

General

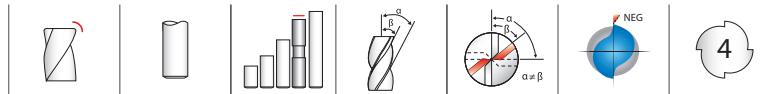
Special Tools

Hardened Machining End Mill

Z-Carb MD



METRIC
Z-Carb-MD



Automotive

Mold & Die

Aerospace

High Performance

General
Special Tools

TOLERANCES (mm)

3–6 DIAMETER

$D_1 = +0,000/-0,030$
 $D_2 = h_6$
 $R = +0,000/-0,050$

>6–10 DIAMETER

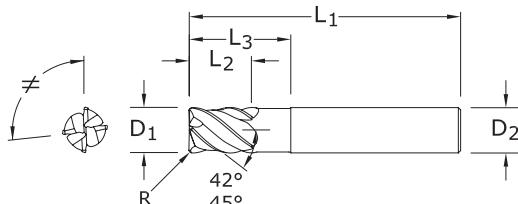
$D_1 = +0,000/-0,040$
 $D_2 = h_6$
 $R = +0,000/-0,050$

>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



CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	REACH L_3	CORNER RADIUS R	EDP NO. 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

ZD1MCR
METRIC SERIES

- 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)

Hardened Machining End Mill

Z-Carb MD

FRACTIONAL & METRIC Z-Carb-MD

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

Bhn (Brinell) HRc (Rockwell C)

rpm = $V_c \times 3.82 / D_1$

ipm = $F_z \times 4 \times rpm$

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-sgsthool.com)

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

Bhn (Brinell) HRc (Rockwell C)

rpm = $(V_c \times 1000) / (D_1 \times 3.14)$

ipm = $F_z \times 4 \times rpm$

reduce speed and feed for materials harder than listed

reduce feed and Ae when finish milling (.02 x D_1 maximum)

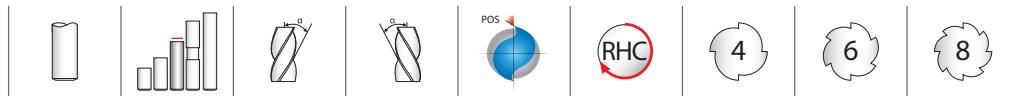
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgsthool.com)

Compression

Series 25M

METRIC

Compression



Automotive

Mold & Die

Aerospace

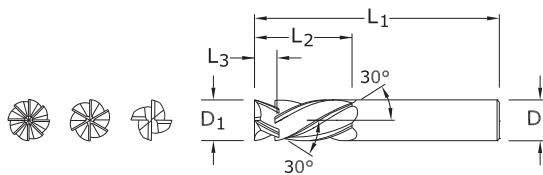
High Performance

General

Special Tools

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



CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	INTERSECT LENGTH L_3	NO. OF FLUTES	EDP NO.	
						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

Compression

Series 25M

METRIC Compression

Series 25M Metric	Ae x D ₁	Ap x D ₁	V _c (m/min)	Diameter (D ₁) (mm)				
				6	8	10	12	
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Profile 	≤ 0.5	≤ 1.5	150 (96-164)	RPM Fz Feed (mm/min)	7951 0.040 1272	5963 0.065 1550	4771 0.075 2147
		≤ 0.05	≤ 2	250 (200-300)	RPM Fz Feed (mm/min)	13252 0.095 5036	9939 0.145 5765	7951 0.175 8349
	HSM 	≤ 0.5	≤ 1.5	120 (96-164)	RPM Fz Feed (mm/min)	6361 0.040 1018	4771 0.065 1240	3817 0.075 1717
		≤ 0.05	≤ 2	200 (160-240)	RPM Fz Feed (mm/min)	10602 0.095 4029	7951 0.145 4612	6361 0.175 6679
GFRP (FIBERGLASS)	Profile 	≤ 0.5	≤ 1.5	120 (96-164)	RPM Fz Feed (mm/min)	6361 0.040 1018	4771 0.065 1240	3817 0.075 1717
		≤ 0.05	≤ 2	200 (160-240)	RPM Fz Feed (mm/min)	10602 0.095 4029	7951 0.145 4612	6361 0.175 6679
	HSM 	≤ 0.5	≤ 1.5	185 (148-222)	RPM Fz Feed (mm/min)	9807 0.050 1961	7355 0.080 2354	5884 0.095 3354
		≤ 0.05	≤ 2	300 (240-360)	RPM Fz Feed (mm/min)	15903 0.115 7315	11927 0.185 8826	7951 0.220 12595
N CARBON, GRAPHITE	Profile 	≤ 0.5	≤ 1.5	185 (148-222)	RPM Fz Feed (mm/min)	9807 0.050 1961	7355 0.080 2354	4903 0.095 3354
		≤ 0.05	≤ 2	300 (240-360)	RPM Fz Feed (mm/min)	15903 0.115 7315	11927 0.185 8826	7951 0.220 12595
	HSM 	≤ 0.5	≤ 1.5	305 (244-366)	RPM Fz Feed (mm/min)	16168 0.050 3234	12126 0.080 3880	9701 0.095 5529
		≤ 0.05	≤ 2	505 (404-606)	RPM Fz Feed (mm/min)	26769 0.115 12314	20077 0.185 14857	13385 0.220 21201
PLASTICS	Profile 	≤ 0.5	≤ 1.5	305 (244-366)	RPM Fz Feed (mm/min)	16168 0.050 3234	12126 0.080 3880	8084 0.095 5529
		≤ 0.05	≤ 2	505 (404-606)	RPM Fz Feed (mm/min)	26769 0.115 12314	20077 0.185 14857	13385 0.220 21201
	HSM 	≤ 0.5	≤ 1.5	15 (12-18)	RPM Fz Feed (mm/min)	795 0.020 64	596 0.035 83	477 0.045 129
		≤ 0.05	≤ 2	25 (20-30)	RPM Fz Feed (mm/min)	1325 0.045 239	994 0.075 298	398 0.050 610
MACHINABLE CERAMICS MACHINABLE GLASS	Profile 	≤ 0.5	≤ 1.5	15 (12-18)	RPM Fz Feed (mm/min)	795 0.020 64	596 0.035 83	477 0.045 129
		≤ 0.05	≤ 2	25 (20-30)	RPM Fz Feed (mm/min)	1325 0.045 239	994 0.075 298	398 0.050 610

HSM (high speed machining)

rpm = $(V_c \times 1000) / (D_1 \times 3.14)$

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

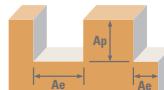
rates shown are for use without coolant; rates may be increased with coolant

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-sgsthool.com)



Automotive

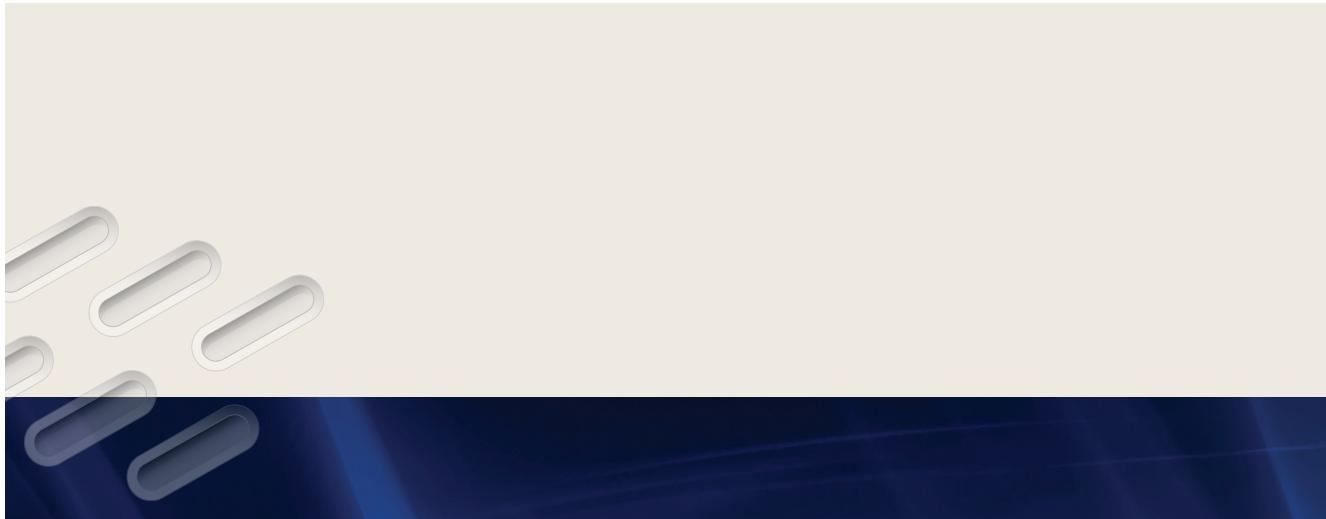
Mold & Die

Aerospace

High Performance

General

Special Tools

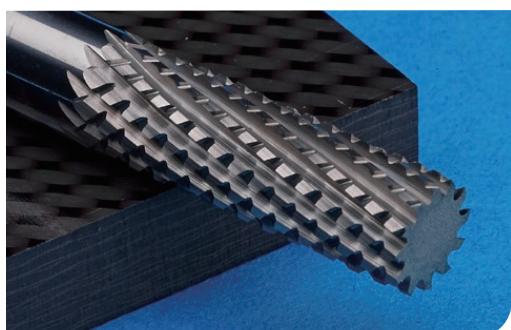


SERIES 20 CARBON COMPOSITE ROUTER

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.

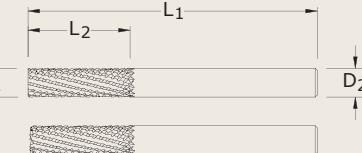
Carbon Composite Router

CCR | Series 20

Tolerances (inch)

Diameter D_1
All $+0.000 / -0.005$

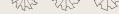
D_2
h6



Tolerances (mm)

Diameter D_1
All $+0,00 / -0,13$

D_2
h6



	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.
SERIES 20 CCR (FRACTIONAL)	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

	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.
SERIES 20-M CCR (METRIC)	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

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Carbon Composite Router

CCR / Series 20

Automotive

Mold & Die

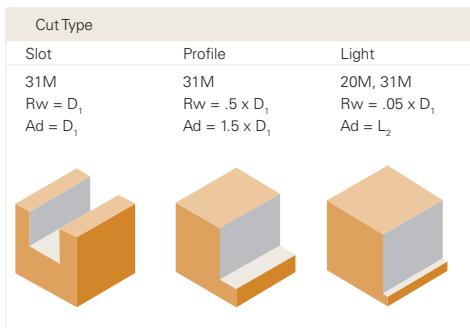
Aerospace

High Performance

General

Special Tools

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



$$\text{rpm} = (1000 \times \text{m/min}) / (3.14 \times D_1)$$

$$\text{mm/min} = (\text{mm/rev}) \times \text{rpm}$$

- 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)

High Performance Drills



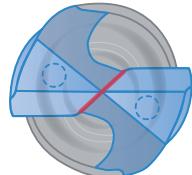
HYDROS Deep Drill

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

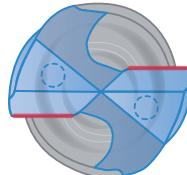
1 Optimized Cutting Edge for Increased Accuracy

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

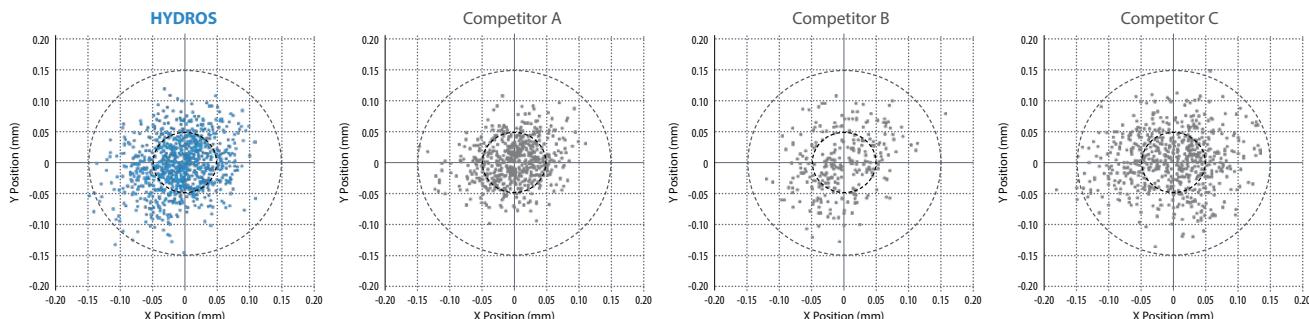


Primary Cutting Edge

Centering Edge



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

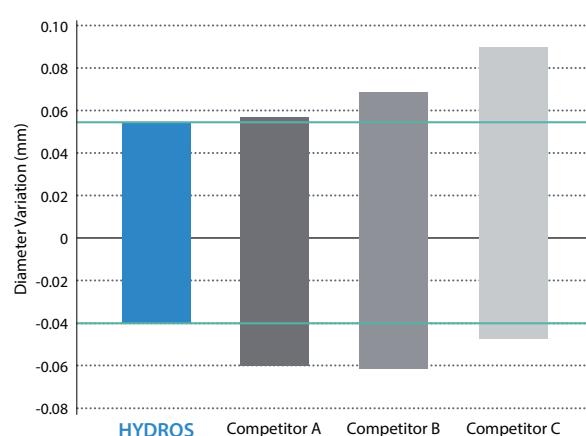


Excellent Hole Positional Accuracy

	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)



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

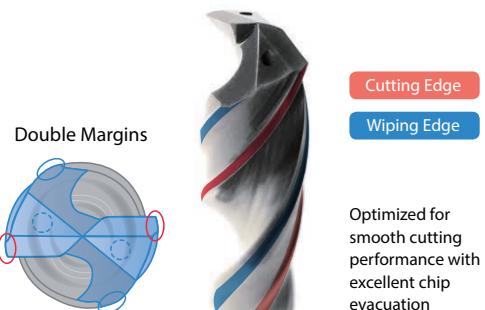
	No. of Holes	Diameter Variation (mm)
HYDROS	600	0.0937
Competitor A	600	0.1141
Competitor B	269 (Broken)	0.1281
Competitor C	600	0.1347

2

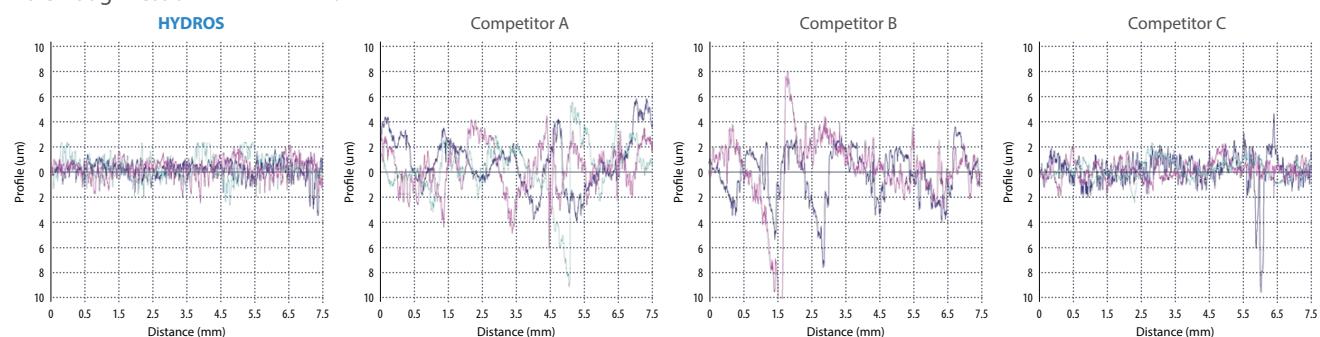
Double Margin for Smooth Hole Finish

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

Chip Comparison



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

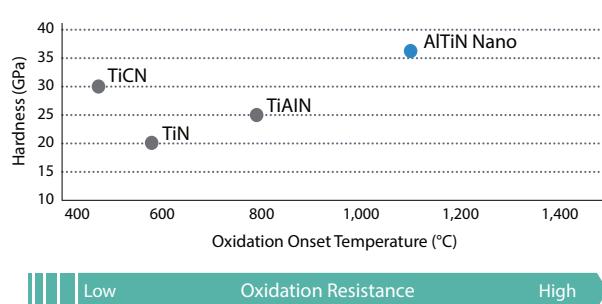
Cutting Conditions : N = 6468rpm, Vf = 575mm/min Drill Diameter Ø3mm Drilling Depth 25.4mm 17-4PH-900

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



Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Deep Drill

Hydros I Series 814 / 865

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
		DC ^{k6}	DCON ^{h6}	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°

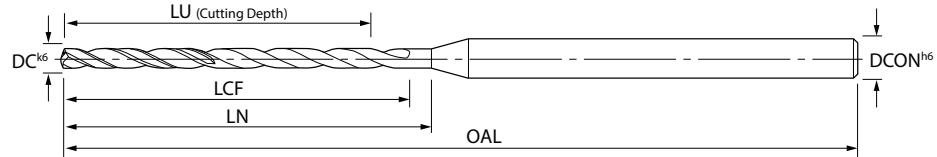
● : Standard Item

Deep Drill

Hydros I Series 814 / 865

HYDROS Mini 15xD Deep Drills - Metric Sizes ($\varnothing 1.00\text{mm} - \varnothing 4.00\text{mm}$)

NEW

 15D 	<table border="1"> <thead> <tr> <th>Cutting Dia. (DC)</th><th>Cutting Dia. Tolerance</th><th>Shank Tolerance</th></tr> </thead> <tbody> <tr> <td>1.00mm ~ 4.00mm</td><td>k6</td><td>h6</td></tr> </tbody> </table>	Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance	1.00mm ~ 4.00mm	k6	h6
Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance					
1.00mm ~ 4.00mm	k6	h6					
*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

Automotive

Mold & Die

Aerospace

High Performance

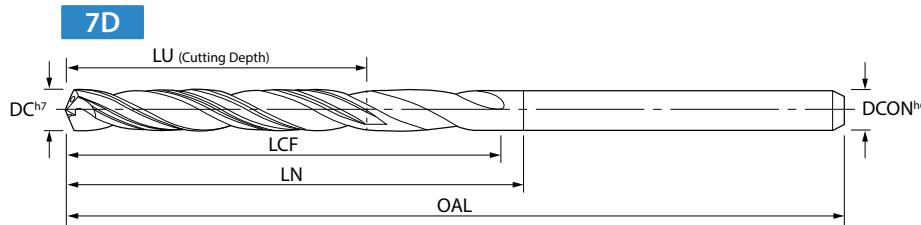
General

Special Tools

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



7D

LU (Cutting Depth)

DC^{h7}

LCF

LN

OAL

DCON^{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°

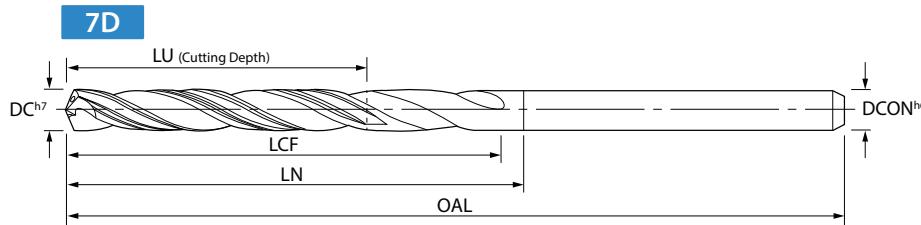
● : Standard Item

Deep Drill

Hydros I Series 814 / 865

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

NEW

	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Cutting Dia. (DC)</th><th>Cutting Dia. Tolerance</th><th>Shank Tolerance</th></tr> </thead> <tbody> <tr> <td>6.10mm ~ 9.10mm</td><td>h7</td><td>h6</td></tr> </tbody> </table>	Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance	6.10mm ~ 9.10mm	h7	h6
Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance					
6.10mm ~ 9.10mm	h7	h6					
 <p>*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.</p>							

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

Automotive

Mold & Die

Aerospace

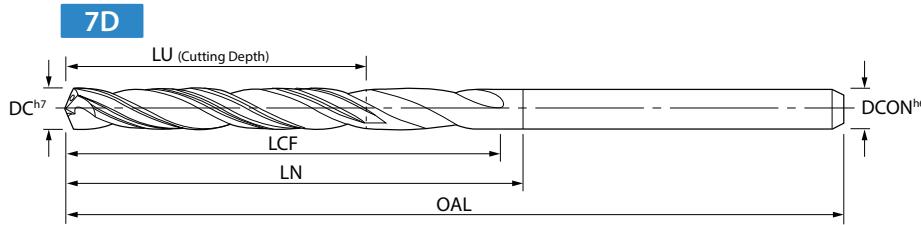
High Performance

General

Special Tools

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

NEW

	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Cutting Dia. (DC)</th><th>Cutting Dia. Tolerance</th><th>Shank Tolerance</th></tr> </thead> <tbody> <tr> <td>9.20mm ~ 12.00mm</td><td>h7</td><td>h6</td></tr> </tbody> </table>	Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance	9.20mm ~ 12.00mm	h7	h6
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

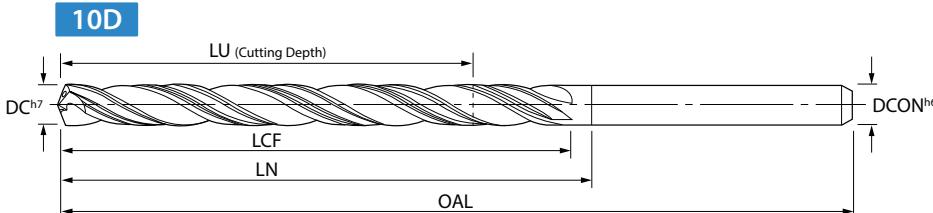
Part Number	Stock	Dimensions (mm)						Point Angle
		DC ^{h7}	DCON ^{h6}	OAL	*LU	LCF	LN	
865-3622AG3622	●	9.20	10.00	140.62	64.40	92.00	96.60	135°
865-3661AG3661	●	9.30	10.00	140.62	65.10	93.00	97.65	135°
865-3701AG3701	●	9.40	10.00	150.62	65.80	94.00	98.70	135°
865-3740AG3740	●	9.50	10.00	150.62	66.50	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

Deep Drill

Hydros I Series 814 / 865

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

	<table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <th>Cutting Dia. (DC)</th><th>Cutting Dia. Tolerance</th><th>Shank Tolerance</th></tr> <tr> <td>3.00mm ~ 6.00mm</td><td>h7</td><td>h6</td></tr> </table>	Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance	3.00mm ~ 6.00mm	h7	h6
Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance					
3.00mm ~ 6.00mm	h7	h6					
 <p>*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.</p>							

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

Automotive

Mold & Die

Aerospace

High Performance

General

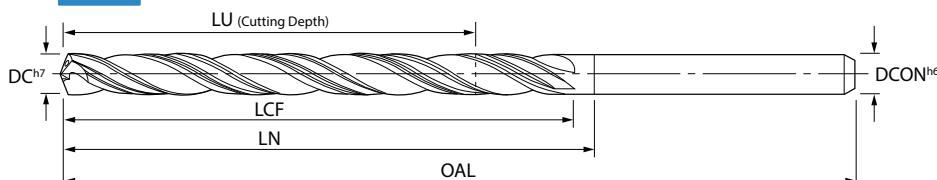
Special Tools

HYDROS 10xD Deep Drills - Metric Sizes ($\varnothing 6.10\text{mm} - \varnothing 9.10\text{mm}$)



Cutting Dia. (DC)	Cutting Dia. Tolerance	Shank Tolerance
6.10mm ~ 9.10mm	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	
865-2402AG3122	●	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

Deep Drill

Hydros I Series 814 / 865

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 (Cutting Depth)

DC^{h7}

LCF

LN

OAL

DCON^{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	
865-3622AG4709	●	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

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

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	00.0394 - 00.0787	01.00 - 02.00	-	0.0010 - 0.0020	-	0.0006 - 0.0012
			00.0787 - 00.1535	02.00 - 03.90	-	0.0020 - 0.0040	0.0016 - 0.0032	0.0012 - 0.0024
			00.1575 - 00.2320	04.00 - 05.90	0.0040 - 0.0060	-	0.0032 - 0.0048	-
			00.2360 - 00.3110	06.00 - 07.90	0.0060 - 0.0080	-	0.0048 - 0.0064	-
			00.3150 - 00.3898	08.00 - 09.90	0.0080 - 0.0100	-	0.0064 - 0.0080	-
			00.3937 - 00.4685	010.00 - 011.90	0.0100 - 0.0120	-	0.0080 - 0.0095	-
			00.4685 - 00.5000	011.90 - 012.70	0.0120 - 0.0140	-	0.0095 - 0.0110	-
Mild Carbon Steel	1018 1028 1050	360 - 410 - 460	00.0394 - 00.0787	01.00 - 02.00	-	0.0009 - 0.0018	-	0.0006 - 0.0012
			00.0787 - 00.1535	02.00 - 03.90	-	0.0018 - 0.0036	0.0015 - 0.0030	0.0012 - 0.0024
			00.1575 - 00.2320	04.00 - 05.90	0.0038 - 0.0056	-	0.0030 - 0.0045	-
			00.2360 - 00.3110	06.00 - 07.90	0.0056 - 0.0075	-	0.0045 - 0.0060	-
			00.3150 - 00.3898	08.00 - 09.90	0.0075 - 0.0095	-	0.0060 - 0.0075	-
			00.3937 - 00.4685	010.00 - 011.90	0.0095 - 0.0110	-	0.0075 - 0.0090	-
			00.4685 - 00.5000	011.90 - 012.70	0.0110 - 0.0122	-	0.0090 - 0.0105	-
Alloy Steel	4130 4140 4150 8620	260 - 310 - 360	00.0394 - 00.0787	01.00 - 02.00	-	0.0008 - 0.0016	-	0.0005 - 0.0011
			00.0787 - 00.1535	02.00 - 03.90	-	0.0016 - 0.0034	0.0014 - 0.0027	0.0011 - 0.0022
			00.1575 - 00.2320	04.00 - 05.90	0.0035 - 0.0050	-	0.0027 - 0.0044	-
			00.2360 - 00.3110	06.00 - 07.90	0.0050 - 0.0070	-	0.0044 - 0.0056	-
			00.3150 - 00.3898	08.00 - 09.90	0.0070 - 0.0088	-	0.0056 - 0.0070	-
			00.3937 - 00.4685	010.00 - 011.90	0.0088 - 0.0105	-	0.0070 - 0.0084	-
			00.4685 - 00.5000	011.90 - 012.70	0.0105 - 0.0113	-	0.0084 - 0.0090	-
Preharden Tool Steel	4140PH A2 D2 H13 P20	190 - 240 - 290	00.0394 - 00.0787	01.00 - 02.00	-	0.0005 - 0.0010	-	0.0003 - 0.0007
			00.0787 - 00.1535	02.00 - 03.90	-	0.0010 - 0.0020	0.0008 - 0.0016	0.0007 - 0.0014
			00.1575 - 00.2320	04.00 - 05.90	0.0020 - 0.0030	-	0.0016 - 0.0024	-
			00.2360 - 00.3110	06.00 - 07.90	0.0030 - 0.0040	-	0.0024 - 0.0032	-
			00.3150 - 00.3898	08.00 - 09.90	0.0040 - 0.0050	-	0.0032 - 0.0040	-
			00.3937 - 00.4685	010.00 - 011.90	0.0050 - 0.0060	-	0.0040 - 0.0048	-
			00.4685 - 00.5000	011.90 - 012.70	0.0060 - 0.0070	-	0.0048 - 0.0052	-
Harden Tool Steel	>48 HRc	125 - 150 - 175	00.0394 - 00.0787	01.00 - 02.00	-	0.0004 - 0.0009	-	0.0003 - 0.0006
			00.0787 - 00.1535	02.00 - 03.90	-	0.0009 - 0.0016	0.0007 - 0.0014	0.0006 - 0.0011
			00.1575 - 00.2320	04.00 - 05.90	0.0017 - 0.0026	-	0.0014 - 0.0020	-
			00.2360 - 00.3110	06.00 - 07.90	0.0026 - 0.0035	-	0.0020 - 0.0028	-
			00.3150 - 00.3898	08.00 - 09.90	0.0035 - 0.0044	-	0.0028 - 0.0035	-
			00.3937 - 00.4685	010.00 - 011.90	0.0044 - 0.0053	-	0.0035 - 0.0042	-
			00.4685 - 00.5000	011.90 - 012.70	0.0053 - 0.0058	-	0.0042 - 0.0046	-
Stainless Steel	303 304 316 321	130 - 180 - 230	00.0394 - 00.0787	01.00 - 02.00	-	0.0007 - 0.0014	-	0.0005 - 0.0010
			00.0787 - 00.1535	02.00 - 03.90	-	0.0014 - 0.0028	0.0012 - 0.0023	0.0010 - 0.0019
			00.1575 - 00.2320	04.00 - 05.90	0.0028 - 0.0043	-	0.0023 - 0.0035	-
			00.2360 - 00.3110	06.00 - 07.90	0.0043 - 0.0058	-	0.0035 - 0.0047	-
			00.3150 - 00.3898	08.00 - 09.90	0.0058 - 0.0073'	-	0.0047 - 0.0059	-
			00.3937 - 00.4685	010.00 - 011.90	0.0073 - 0.0088	-	0.0059 - 0.0070	-
			00.4685 - 00.5000	011.90 - 012.70	0.0088 - 0.0095	-	0.0070 - 0.0075	-
Stainless Steel	15-5PH 17-4PH 13-8 400 Series	100 - 125 - 150	00.0394 - 00.0787	01.00 - 02.00	-	0.0006 - 0.0011	-	0.0004 - 0.0008
			00.0787 - 00.1535	02.00 - 03.90	-	0.0011 - 0.0022	0.0009 - 0.0018	0.0008 - 0.0015
			00.1575 - 00.2320	04.00 - 05.90	0.0022 - 0.0034	-	0.0018 - 0.0027	-
			00.2360 - 00.3110	06.00 - 07.90	0.0034 - 0.0046	-	0.0027 - 0.0037	-
			00.3150 - 00.3898	08.00 - 09.90	0.0046 - 0.0058	-	0.0037 - 0.0047	-
			00.3937 - 00.4685	010.00 - 011.90	0.0058 - 0.0070	-	0.0047 - 0.0057	-
			00.4685 - 00.5000	011.90 - 012.70	0.0070 - 0.0075	-	0.0057 - 0.0061	-
Gray Cast Iron	-	375 - 425 - 475	00.0394 - 00.0787	01.00 - 02.00	-	0.0013 - 0.0025	-	0.0009 - 0.0018
			00.0787 - 00.1535	02.00 - 03.90	-	0.0025 - 0.0050	0.0020 - 0.0040	0.0018 - 0.0034
			00.1575 - 00.2320	04.00 - 05.90	0.0050 - 0.0075	-	0.0040 - 0.0063	-
			00.2360 - 00.3110	06.00 - 07.90	0.0075 - 0.0100	-	0.0063 - 0.0084	-
			00.3150 - 00.3898	08.00 - 09.90	0.0100 - 0.0120	-	0.0084 - 0.0105	-
			00.3937 - 00.4685	010.00 - 011.90	0.0120 - 0.0140	-	0.0105 - 0.0126	-
			00.4685 - 00.5000	011.90 - 012.70	0.0140 - 0.015	-	0.0126 - 0.0135	-
Nodular Cast Iron	-	310 - 360 - 410	00.0394 - 00.0787	01.00 - 02.00	-	0.0010 - 0.0020	-	0.0006 - 0.0012
			00.0787 - 00.1535	02.00 - 03.90	-	0.0020 - 0.0030	0.0016 - 0.0032	0.0012 - 0.0024
			00.1575 - 00.2320	04.00 - 05.90	0.0040 - 0.0060	-	0.0032 - 0.0048	-
			00.2360 - 00.3110	06.00 - 07.90	0.0060 - 0.0080	-	0.0048 - 0.0064	-
			00.3150 - 00.3898	08.00 - 09.90	0.0080 - 0.0100	-	0.0064 - 0.0080	-
			00.3937 - 00.4685	010.00 - 011.90	0.0100 - 0.0120	-	0.0080 - 0.0095	-
			00.4685 - 00.5000	011.90 - 012.70	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	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	-
		CAST 490 - 540 - 590	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	-
		75 - 90 - 105	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	-
		125 - 150 - 175	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	-
		125 - 150 - 175	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)

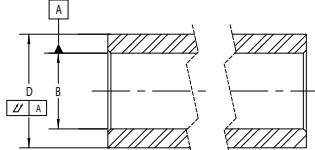
Vf = 4.2ipm

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.

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

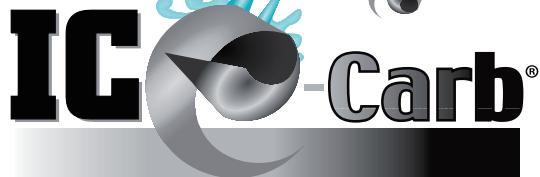
Competitor B
Ø0.118"

165 pcs / tool

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

(User Evaluation)

(User Evaluation)



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

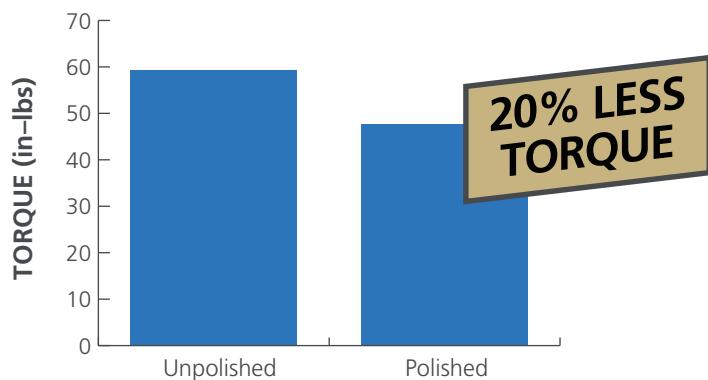
- precisely ground with a curvature that allows efficient chip creation and control
- controlled edge honing for longevity
- negative corner position strengthens and protects

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



www.kyocera-sgstool.com

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.

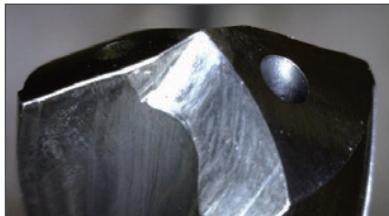
Controlling temperatures during the cutting process certainly helps to improve the operating parameters and tool life a tool is capable of achieving. All of the high performance features of the ICe-Carb® Series 140 are engineered to work together to create the most efficient total cutting performance beyond what simply having coolant through the tool can offer. The flute profile complements 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

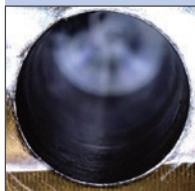
CONDITION OF DRILLS AFTER 175 HOLES

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

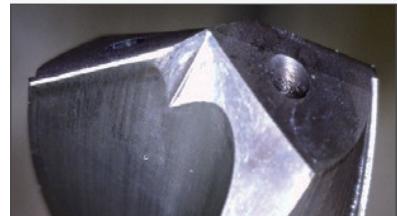
FIRST HOLE



LAST HOLE

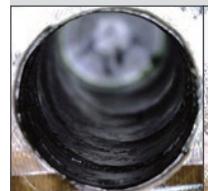


COMPETITOR 2



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



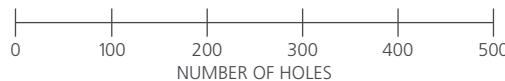
LAST HOLE



TOOL LIFE

Competitor 1

ICe-Carb® Series 140



COST PER PART

Competitor 1

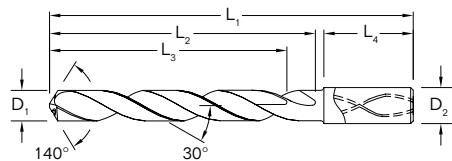
ICe-Carb® Series 140



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Internal Coolant Drill

ICe-Carb | Series 140



TOLERANCES (inch)

DIAMETER	D ₁	D ₂
≤ .1181	.+0.0008/+0.0047	h6
> .1181-.2362	.+0.0016/+0.0063	h6
> .2362-.3937	.+0.00024/+0.0083	h6
> .3937-.7087	.+0.00028/+0.0098	h6
> .7087-1.1811	.+.00031/+0.00114	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

Automotive

Mold & Die

Aerospace

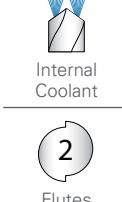
High Performance

General

Special Tools

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 (AITIN) 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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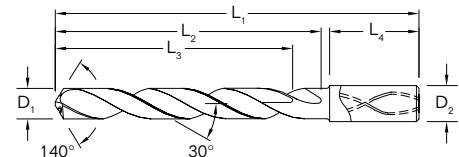
Internal Coolant Drill

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 (AITiN) EDP No.
Common	6,0 mm	0.2362		M7 X 1	6,0	82,0	44,0	35,0	36,0	63928
5xD Reach	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
Right Spiral	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
Internal Coolant	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
2 Flutes	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

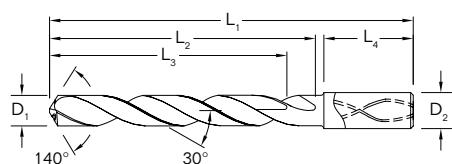
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Automotive
Mold & Die
Aerospace

High Performance
General
Special Tools

Internal Coolant Drill

ICe-Carb | Series 140



TOLERANCES (inch)

DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+0.00047	h6
>.1181-.2362	.+.00016/+0.00063	h6
>.2362-.3937	.+.00024/+0.00083	h6
>.3937-.7087	.+.00028/+0.00098	h6
>.7087-1.1811	.+.00031/+0.00114	h6

TOLERANCES (mm)

DIAMETER	D ₁	D ₂
≤ 3	.+.0002/+0.012	h6
> 3 - 6	.+.0004/+0.016	h6
> 6 - 10	.+.0006/+0.021	h6
> 10 - 18	.+.0007/+0.025	h6

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

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 (AITIN) 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

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Common



5xD



Right Spiral



Internal Coolant



2

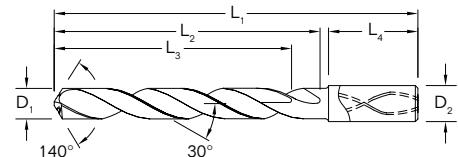
Internal Coolant Drill

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 (AITiN) EDP No.
Common	1/2	0.5000	12.70		14,0	124,0	77,0	60,0	45,0	51934
5xD Reach	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
Right Spiral	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
Internal Coolant	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
2 Flutes	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

Automotive

Mold & Die

Aerospace

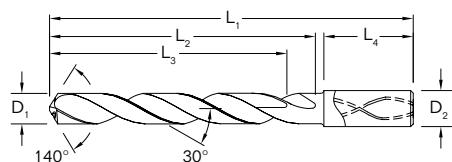
High Performance

General

Special Tools

Internal Coolant Drill

ICe-Carb | Series 140



TOLERANCES (inch)

DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+0.00047	h6
>.1181-.2362	.+.00016/+0.00063	h6
>.2362-.3937	.+.00024/+0.00083	h6
>.3937-.7087	.+.00028/+0.00098	h6
>.7087-1.1811	.+.00031/+0.00114	h6

TOLERANCES (mm)

DIAMETER	D ₁	D ₂
≤ 3	.+.0002/+0.012	h6
> 3 - 6	.+.0004/+0.016	h6
> 6 - 10	.+.0006/+0.021	h6
> 10 - 18	.+.0007/+0.025	h6

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

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 (AITIN) 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

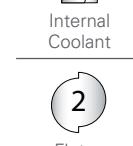
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Common
Reach



Right Spiral



Internal Coolant
2 Flutes

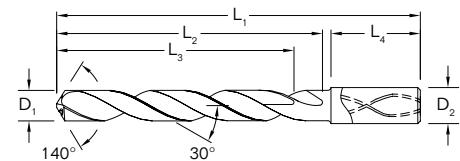
Internal Coolant Drill

ICe-Carb / Series 140



TOLERANCES (inch)		
DIAMETER	D ₁	D ₂
≤.1181	+0.0008/+0.00047	h6
>.1181-.2362	+0.0016/+0.00063	h6
>.2362-.3937	+0.00024/+0.00083	h6
>.3937-.7087	+0.00028/+0.00098	h6
>.7087-1.1811	+0.00031/+0.00114	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

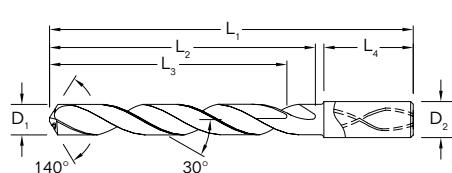


	Cutting Diameter D ₁	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D ₂	Overall Length L ₁	Flute Length L ₂	Min. Cleared Length L ₃	Shank Length L ₄	Ti-NAMITE (AITiN) EDP No.
Common	6,0 mm	0.2362		M7 X 1	6,0	95,0	57,0	48,0	36,0	63605
8xD Reach	6,1 mm	0.2402			8,0	114,0	76,0	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
Right Spiral	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
Internal Coolant	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
2 Flutes	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/+0.00047	h6
>.1181-.2362	.+.00016/+0.00063	h6
>.2362-.3937	.+.00024/+0.00083	h6
>.3937-.7087	.+.00028/+0.00098	h6
>.7087-1.1811	.+.00031/+0.00114	h6

TOLERANCES (mm)

DIAMETER	D ₁	D ₂
≤ 3	.+.0002/+0.012	h6
> 3 - 6	.+.0004/+0.016	h6
> 6 - 10	.+.0006/+0.021	h6
> 10 - 18	.+.0007/+0.025	h6

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

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 (AITIN) 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

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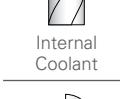
Common



Reach



Right Spiral



Internal Coolant



2 Flutes

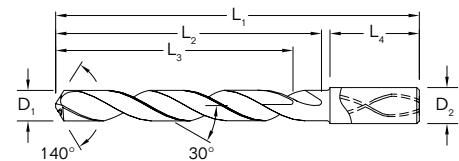
Internal Coolant Drill

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 (AITiN) EDP No.
Common	1/2	0.5000	12.70		14,0	178,0	133,0	112,0	45,0	51829
8xD Reach	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
Right Spiral	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
Internal Coolant	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
2 Flutes	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

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Internal Coolant Drill

ICe-Carb | Series 140



Automotive

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High Performance

General

Special Tools

Series 140M 5D Metric		Hardness	V_c (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 (104-155)	130	RPM	13733	6867	5150	4120	3433	2943	2575
		≤ 275 Bhn or ≤ 28 HRc (93-139)	116	RPM	12279	6140	4605	3684	3070	2631	2302
		≤ 425 Bhn or ≤ 45 HRc (54-80)	67	RPM	7109	3555	2666	2133	1777	1523	1333
		≤ 275 Bhn or ≤ 28 HRc (80-121)	101	RPM	10664	5332	3999	3199	2666	2285	1999
		≤ 375 Bhn or ≤ 40 HRc (49-73)	61	RPM	6463	3231	2424	1939	1616	1385	1212
		≤ 450 Bhn or ≤ 48 HRc (34-51)	43	RPM	4524	2262	1696	1357	1131	969	848
		≤ 200 Bhn or ≤ 13 HRc (35-53)	44	RPM	4686	2343	1757	1406	1171	1004	879
		≤ 375 Bhn or ≤ 40 HRc (23-35)	29	RPM	3070	1535	1151	921	767	658	576
		≤ 475 Bhn or ≤ 50 HRc (21-31)	26	RPM	2747	1373	1030	824	687	589	515
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 220 Bhn or ≤ 19 HRc (88-132)	110	RPM	11633	5816	4362	3490	2908	2493	2181
		≤ 260 Bhn or ≤ 26 HRc (82-123)	102	RPM	10825	5413	4059	3248	2706	2320	2030
		≤ 185 Bhn or ≤ 9 HRc (74-112)	93	RPM	9856	4928	3696	2957	2464	2112	1848
		≤ 275 Bhn or ≤ 28 HRc (48-71)	59	RPM	6301	3151	2363	1890	1575	1350	1181
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc (37-55)	46	RPM	4847	2424	1818	1454	1212	1039	909
		≤ 375 Bhn or ≤ 40 HRc (27-40)	34	RPM	3555	1777	1333	1066	889	762	666
		≤ 275 Bhn or ≤ 28 HRc (37-55)	Fr	0.047	0.095	0.127	0.158	0.190	0.221	0.253	
		≤ 375 Bhn or ≤ 40 HRc (27-40)	Fr	0.042	0.084	0.113	0.141	0.169	0.197	0.225	
<i>continued on next page</i>											

Internal Coolant Drill

ICe-Carb / Series 140



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 (23-35)	RPM Fr Feed (mm/min)	3070 0.020 60	1535 0.039 60	1151 0.052 60	921 0.065 60	767 0.078 60	658 0.091 60	576 0.104 60
	≤ 400 Bhn or ≤ 43 HRc	15 (12-18)	RPM Fr Feed (mm/min)	1616 0.015 25	808 0.031 25	606 0.041 25	485 0.052 25	404 0.062 25	346 0.072 25	303 0.083 25
	≤ 275 Bhn or ≤ 28 HRc	66 (52-79)	RPM Fr Feed (mm/min)	6947 0.040 275	3474 0.079 275	2605 0.106 275	2084 0.132 275	1737 0.158 275	1489 0.185 275	1303 0.211 275
	≤ 350 Bhn or ≤ 38 HRc	49 (39-59)	RPM Fr Feed (mm/min)	5170 0.039 200	2585 0.077 200	1939 0.103 200	1551 0.129 200	1293 0.155 200	1108 0.181 200	969 0.206 200
	≤ 440 Bhn or ≤ 47 HRc	26 (21-31)	RPM Fr Feed (mm/min)	2747 0.029 80	1373 0.058 80	1030 0.078 80	824 0.097 80	687 0.117 80	589 0.136 80	515 0.155 80
	≤ 80 Bhn or ≤ 47 HRb	235 (188-282)	RPM Fr Feed (mm/min)	24882 0.118 2945	12441 0.237 2945	9331 0.316 2945	7465 0.395 2945	6220 0.473 2945	5332 0.552 2945	4665 0.631 2945
N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	201 (161-241)	RPM Fr Feed (mm/min)	21327 0.119 2540	10664 0.238 2540	7998 0.318 2540	6398 0.397 2540	5332 0.476 2540	4570 0.556 2540	3999 0.635 2540
	≤ 140 Bhn or ≤ 3 HRc	168 (134-201)	RPM Fr Feed (mm/min)	17773 0.048 850	8886 0.096 850	6665 0.128 850	5332 0.159 850	4443 0.191 850	3808 0.223 850	3332 0.255 850
	≤ 200 Bhn or ≤ 23 HRc	134 (107-161)	RPM Fr Feed (mm/min)	14218 0.048 685	7109 0.096 685	5332 0.128 685	4265 0.161 685	3555 0.193 685	3047 0.225 685	2666 0.257 685

Note:

- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = $(V_c \times 1000) / (D_1 \times 3.14)$
- 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)

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Internal Coolant Drill

ICe-Carb | Series 140



Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

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 (100-170)	RPM	13087	6544	4908	3926	3272	2804	2454
				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 (90-135)	RPM	11956	5978	4484	3587	2989	2562	2242
				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 (51-77)	RPM	6786	3393	2545	2036	1696	1454	1272
				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
H	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	98 (78-117)	RPM	10340	5170	3878	3102	2585	2216	1939
				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 (46-69)	RPM	6140	3070	2302	1842	1535	1316	1151
				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 (33-49)	RPM	4362	2181	1636	1309	1091	935	818
				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
K	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 200 Bhn or ≤ 13 HRc	43 (34-51)	RPM	4524	2262	1696	1357	1131	969	848
				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 (22-33)	RPM	2908	1454	1091	872	727	623	545
				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 (20-29)	RPM	2585	1293	969	776	646	554	485
				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
M	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	107 (85-128)	RPM	11310	5655	4241	3393	2827	2424	2121
				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 (76-113)	RPM	10017	5009	3756	3005	2504	2147	1878
				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
		≤ 185 Bhn or ≤ 9 HRc	88 (71-106)	RPM	9371	4686	3514	2811	2343	2008	1757
				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
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	55 (44-66)	RPM	5816	2908	2181	1745	1454	1246	1091
				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
		≤ 275 Bhn or ≤ 28 HRc	40 (32-48)	RPM	4201	2100	1575	1260	1050	900	788
				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 (23-35)	RPM	3070	1535	1151	921	767	658	576
				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)

Internal Coolant Drill

ICe-Carb / Series 140



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 (16-24)	RPM	2100	1050	788	630	525	450	394
				Fr	0.021	0.041	0.055	0.069	0.082	0.096	0.110
		≤ 400 Bhn or ≤ 43 HRc	11 (9-13)	RPM	1131	565	424	339	283	242	212
				Fr	0.013	0.027	0.036	0.045	0.054	0.063	0.072
				Feed (mm/min)	43	43	43	43	43	43	43
				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 (45-60)	RPM	5978	2989	2242	1793	1495	1281	1121
				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 (34-51)	RPM	4524	2262	1696	1357	1131	969	848
				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
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 440 Bhn or ≤ 47 HRc	23 (18-27)	RPM	2424	1212	909	727	606	519	454
				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
		≤ 80 Bhn or ≤ 47 HRb	223 (178-267)	RPM	23589	11795	8846	7077	5897	5055	4423
				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
COPPER ALLOYS Alum Bronze, C110, Muntz Brass		≤ 150 Bhn or ≤ 7 HRc	194 (155-232)	RPM	20519	10260	7695	6156	5130	4397	3847
				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
		≤ 140 Bhn or ≤ 3 HRc	78 (62-93)	RPM	8240	4120	3090	2472	2060	1766	1545
				Fr	0.043	0.086	0.115	0.144	0.173	0.201	0.230
		≤ 200 Bhn or ≤ 23 HRc	72 (57-86)	RPM	7594	3797	2848	2278	1898	1627	1424
				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 (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = $(V_c \times 1000) / (D_1 \times 3.14)$
- 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)

Automotive

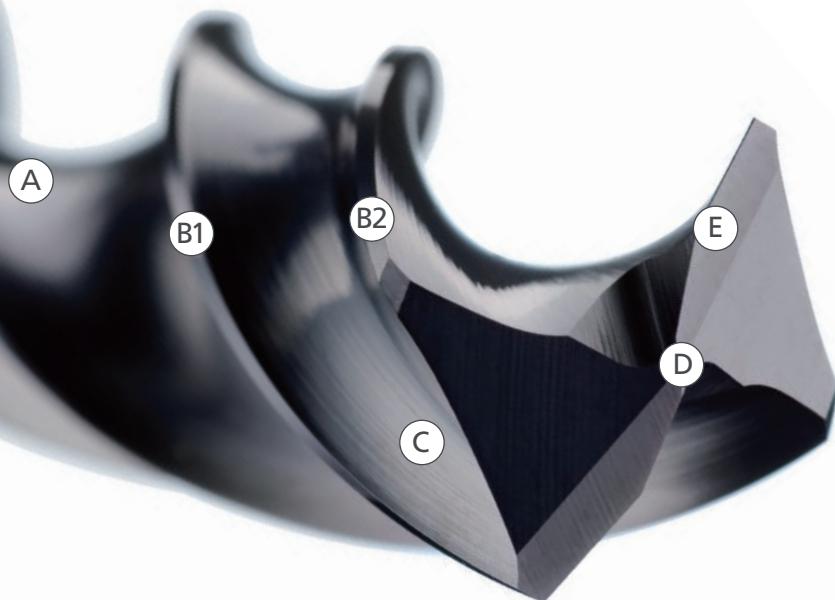
Mold & Die

Aerospace

High Performance

General

Special Tools



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 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.

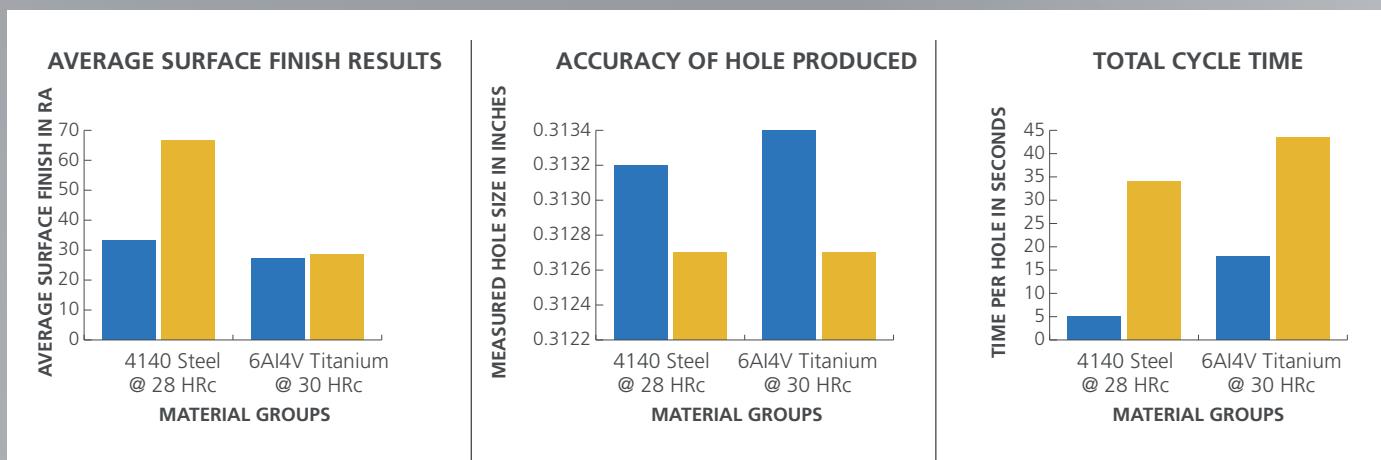
MACHINING ENVIRONMENT:

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.

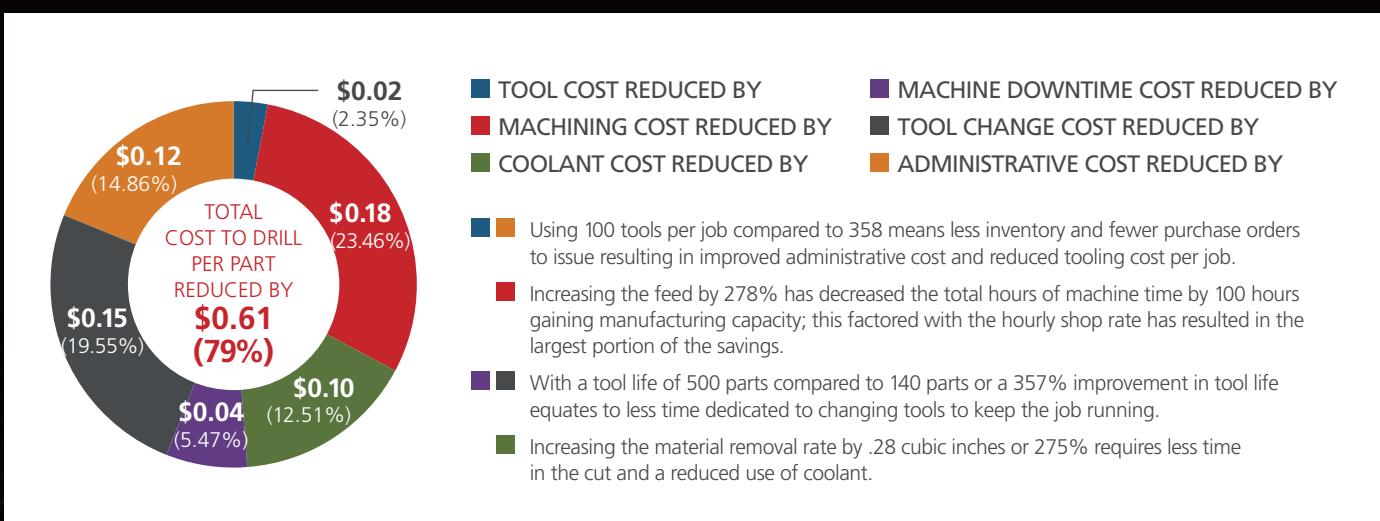
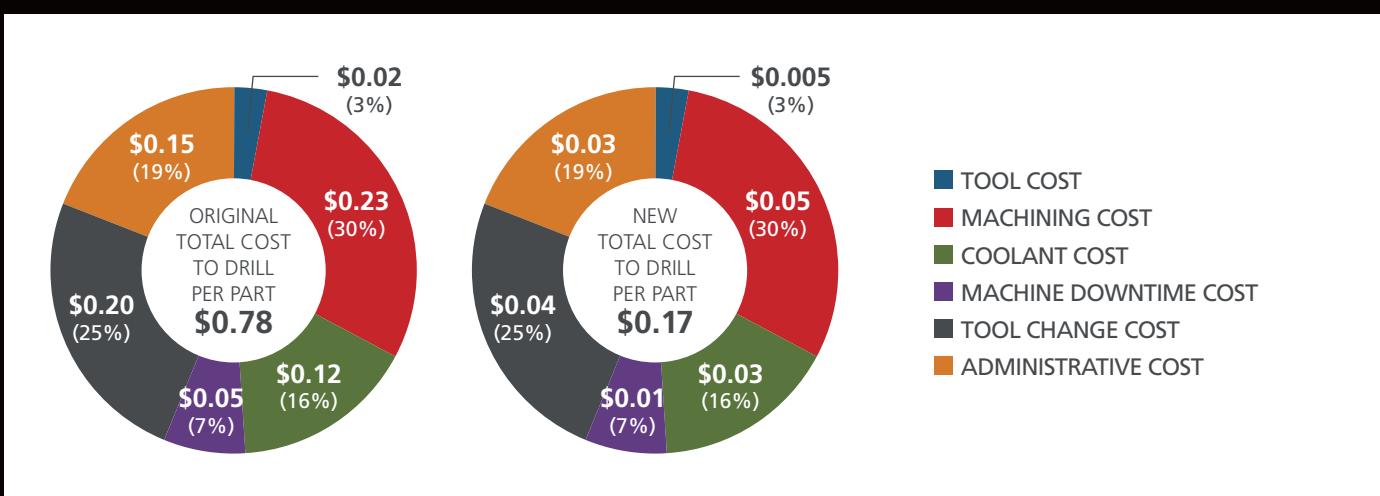
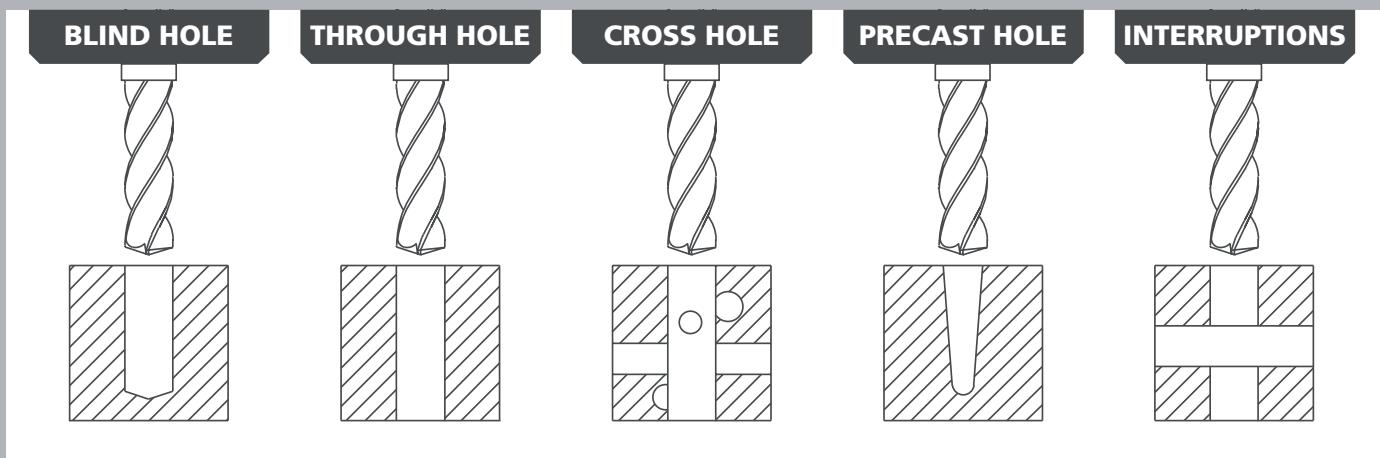
The stability of the double margin design and penetration capability of the point geometry allow the Hi-PerCarb Series 135 Drill to address demanding applications that would normally require reduced operating parameters or a two step process.

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

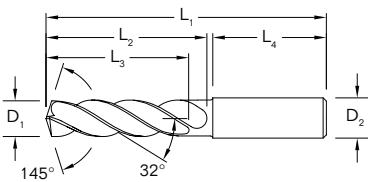
	COMPETITOR	HI-PERCARB SERIES 135
NUMBER OF PARTS TO PRODUCE	50000	50000
SURFACE FEET PER MINUTE (SFM)	74	124
SPEED IN REVOLUTIONS PER MINUTE (RPM)	1200	2000
FEED IN INCHES PER MINUTE (IPM)	3.6	10
NUMBER OF PARTS PRODUCED PER TOOL	140	500
DEPTH OF HOLE	0.6800	0.6800
NUMBER OF NEW TOOLS REQUIRED TO COMPLETE 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



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Hi Performance Drill

Hi-PerCarb / Series 135



TOLERANCES (inch)			TOLERANCES (mm)		
DIAMETER	D ₁	D ₂	DIAMETER	D ₁	D ₂
≤.1181	+ .00008/+ .00047	h6	≤ 3	+0,002/+0,012	h6
>.1181-.2362	+ .00016/+ .00063	h6	> 3 - 6	+0,004/+0,016	h6
>.2362-.3937	+ .00024/+ .00083	h6	> 6 - 10	+0,006/+0,021	h6
>.3937-.7087	+ .00028/+ .00098	h6	> 10 - 18	+0,007/+0,025	h6
>.7087-1.1811	+ .00031/+ .00114	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

(continued on next page)



Automotive

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Aerospace

General

Special Tools

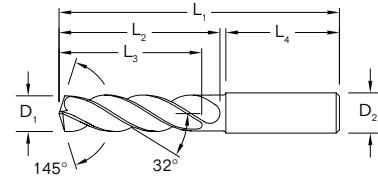
High Performance

Hi Performance Drill

Hi-PerCarb I Series 135



TOLERANCES (inch)			TOLERANCES (mm)		
DIAMETER	D ₁	D ₂	DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+0.00047	h6	≤ 3	+0.002/+0.012	h6
>.1181-.2362	.+.00016/+0.00063	h6	> 3 - 6	+0.004/+0.016	h6
>.2362-.3937	.+.00024/+0.00083	h6	> 6 - 10	+0.006/+0.021	h6
>.3937-.7087	.+.00028/+0.00098	h6	> 10 - 18	+0.007/+0.025	h6
>.7087-1.1811	.+.00031/+0.00114	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.
Common	#27	0.1440	3.66		1/4	2-1/2	3/4	21/32	1-7/16	51761
3xD Reach	3,7 mm	0.1457	M4.5 X 0,75	6,0	62,0	20,0	17,0	36,0	36,0	63161
Right Spiral	#26	0.1470	3.73	3/16-24	1/4	2-1/2	3/4	21/32	1-7/16	51762
External Coolant	#25	0.1495	3.80	10-24	1/4	2-5/8	7/8	23/32	1-7/16	51333
2 Flutes	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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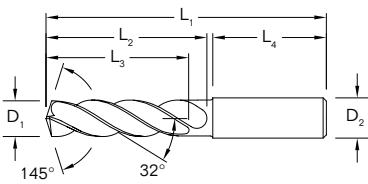
Automotive
Mold & Die

Aerospace
High Performance

General
Special Tools

Hi Performance Drill

Hi-PerCarb | Series 135



TOLERANCES (inch)			TOLERANCES (mm)		
DIAMETER	D ₁	D ₂	DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+0.00047	h6	≤ 3	+0.002/+0.012	h6
>.1181-.2362	.+.00016/+0.00063	h6	> 3 - 6	+0.004/+0.016	h6
>.2362-.3937	.+.00024/+0.00083	h6	> 6 - 10	+0.006/+0.021	h6
>.3937-.7087	.+.00028/+0.00098	h6	> 10 - 18	+0.007/+0.025	h6
>.7087-1.1811	.+.00031/+0.00114	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	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

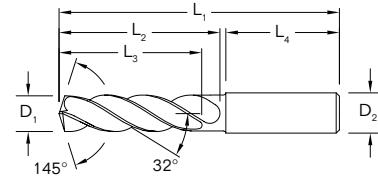
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TOLERANCES (inch)		
DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+0.00047	h6
>.1181-.2362	.+.00016/+0.00063	h6
>.2362-.3937	.+.00024/+0.00083	h6
>.3937-.7087	.+.00028/+0.00098	h6
>.7087-1.1811	.+.00031/+0.00114	h6

TOLERANCES (mm)		
DIAMETER	D ₁	D ₂
≤ 3	.+.0002/+0.012	h6
> 3 - 6	.+.0004/+0.016	h6
> 6 - 10	.+.0006/+0.021	h6
> 10 - 18	.+.0007/+0.025	h6
> 18 - 30	.+.0008/+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.
Common	7,2 mm	0.2835			8,0	79,0	41,0	34,0	36,0	63761
3xD Reach	7,25 mm	0.2854		M8 X 0,75	8,0	79,0	41,0	34,0	36,0	63178
Right Spiral	7,3 mm	0.2874			8,0	79,0	41,0	34,0	36,0	63762
L	7,4 mm	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	7,5 mm	0.2953		M8 X 0,5	5/16	3-1/8	1-9/16	1-3/16	1-7/16	51611
	19/64	0.2969	7.54		5/16	3-1/8	1-9/16	1-3/16	1-7/16	51348
External Coolant	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
2 Flutes	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

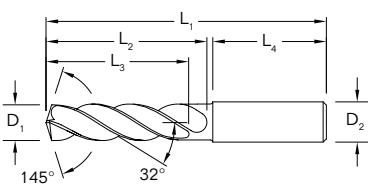
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Automotive
Mold & Die
Aerospace

High Performance
General
Special Tools

Hi Performance Drill

Hi-PerCarb | Series 135



TOLERANCES (inch)			TOLERANCES (mm)		
DIAMETER	D ₁	D ₂	DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+,.00047	h6	≤ 3	+0,002/+0,012	h6
>.1181-.2362	.+.00016/+,.00063	h6	> 3 - 6	+0,004/+0,016	h6
>.2362-.3937	.+.00024/+,.00083	h6	> 6 - 10	+0,006/+0,021	h6
>.3937-.7087	.+.00028/+,.00098	h6	> 10 - 18	+0,007/+0,025	h6
>.7087-1.1811	.+.00031/+,.00114	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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Automotive

Mold & Die

Aerospace

General

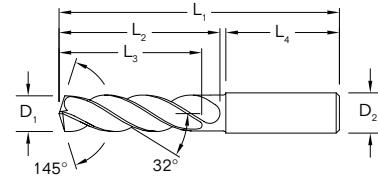
Special Tools

Hi Performance Drill

Hi-PerCarb I Series 135



TOLERANCES (inch)			TOLERANCES (mm)		
DIAMETER	D ₁	D ₂	DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+0.00047	h6	≤ 3	+0,002/+0,012	h6
>.1181-.2362	.+.00016/+0.00063	h6	> 3 - 6	+0,004/+0,016	h6
>.2362-.3937	.+.00024/+0.00083	h6	> 6 - 10	+0,006/+0,021	h6
>.3937-.7087	.+.00028/+0.00098	h6	> 10 - 18	+0,007/+0,025	h6
>.7087-.1.1811	.+.00031/+0.00114	h6	> 18 - 30	+0,008/+0,029	h6



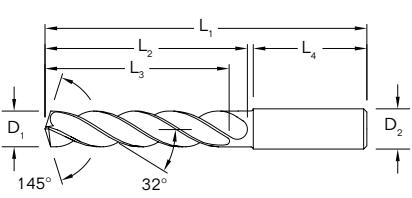
	Cutting Diameter D ₁	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D ₂	Overall Length L ₁	Flute Length L ₂	Min. Cleared Length L ₃	Shank Length L ₄	Ti-NAMITE-A (AITIN) EDP No.
Common	33/64	0.5156	13.10	9/16-18	5/8	4-1/4	2-5/16	1-7/8	1-49/64	51364
3xD Reach	17/32	0.5312	13.49	5/8-11	5/8	4-1/4	2-5/16	1-7/8	1-49/64	51365
Right Spiral	13,5 mm	0.5315			14,0	107,0	60,0	49,0	45,0	63199
External Coolant	35/64	0.5469	13.89	5/8-12	5/8	4-1/4	2-5/16	1-7/8	1-49/64	51783
2 Flutes	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

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Hi-PerCarb I Series 135



TOLERANCES (inch)

DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+0.00047	h6
>.1181-.2362	.+.00016/+0.00063	h6
>.2362-.3937	.+.00024/+0.00083	h6
>.3937-.7087	.+.00028/+0.00098	h6
>.7087-1.1811	.+.00031/+0.00114	h6

TOLERANCES (mm)

DIAMETER	D ₁	D ₂
≤ 3	.+.0002/+0.012	h6
> 3 - 6	.+.0004/+0.016	h6
> 6 - 10	.+.0006/+0.021	h6
> 10 - 18	.+.0007/+0.025	h6
> 18 - 30	.+.0008/+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

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Common



Reach



Right Spiral



External Coolant



Flutes

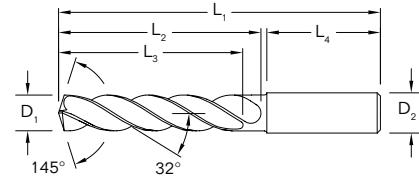
Hi Performance Drill

Hi-PerCarb I Series 135



TOLERANCES (inch)		
DIAMETER	D ₁	D ₂
≤.1181	+0.00008/+0.00047	h6
>.1181-.2362	+0.00016/+0.00063	h6
>.2362-.3937	+0.00024/+0.00083	h6
>.3937-.7087	+0.00028/+0.00098	h6
>.7087-1.1811	+0.00031/+0.00114	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 (AITIN) EDP No.
Common	#27	0.1440	3.66		1/4	3	1	53/64	1-7/16	52318
5xD Reach	3,7 mm	0.1457		M4.5 X 0,75	6,0	66,0	28,0	23,0	36,0	64107
Right Spiral	#26	0.1470	3.73	3/16-24	1/4	3	1	53/64	1-7/16	52319
External Coolant	#25	0.1495	3.80	10-24	1/4	3-1/4	1-1/4	1-5/64	1-7/16	51584
2 Flutes	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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Hi-PerCarb | Series 135



Automotive

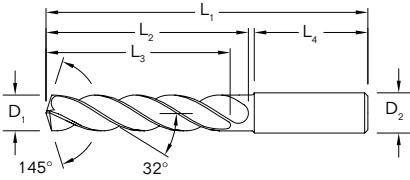
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Cutting Diameter D ₁	Decimal Equivalent	Metric Equivalent	Tap Size Reference Only	Shank Diameter D ₂	Overall Length L ₁	Flute Length L ₂	Min. Cleared Length L ₃	Shank Length L ₄	TOLERANCES (inch)			TOLERANCES (mm)		
									Diameter	D ₁	D ₂	Diameter	D ₁	D ₂
5,3 mm	0.2087			6,0	82,0	44,0	35,0	36,0	≤ .1181	+.00008/+0.00047	h6	≤ 3	+0,002/+0,012	h6
#4	0.2090	5.31	1/4-24	1/4	3-1/4	1-3/4	1-37/64	1-7/16	>.1181-.2362	+.00016/+0.00063	h6	> 3 - 6	+0,004/+0,016	h6
5,4 mm	0.2126			6,0	82,0	44,0	35,0	36,0	>.2362-.3937	+.00024/+0.00083	h6	> 6 - 10	+0,006/+0,021	h6
#3	0.2130	5.41	1/4-28	1/4	3-1/4	1-3/4	1-37/64	1-7/16	>.3937-.7087	+.00028/+0.00098	h6	> 10 - 18	+0,007/+0,025	h6
5,5 mm	0.2165		M6 X 0,5	6,0	82,0	44,0	35,0	36,0	>.7087-1.1811	+.00031/+0.00114	h6	> 18 - 30	+0,008/+0,029	h6
7/32	0.2188	5.56	1/4-32	1/4	3-1/4	1-3/4	1-37/64	1-7/16						
5,6 mm	0.2205			6,0	82,0	44,0	35,0	36,0						
#2	0.2210	5.61		1/4	3-1/4	1-3/4	1-37/64	1-7/16						
5,7 mm	0.2244			6,0	82,0	44,0	35,0	36,0						
#1	0.2280	5.79		1/4	3-1/4	1-3/4	1-37/64	1-7/16						
5,8 mm	0.2283			6,0	82,0	44,0	35,0	36,0						
5,9 mm	0.2323			6,0	82,0	44,0	35,0	36,0						
A	0.2340	5.94		1/4	3-1/4	1-3/4	1-37/64	1-7/16						
15/64	0.2344	5.95		1/4	3-1/4	1-3/4	1-37/64	1-7/16						
6,0 mm	0.2362		M7 X 1	6,0	82,0	44,0	35,0	36,0						
B	0.2380	6.05		1/4	3 5/8	2-5/64	1-51/64	1-7/16						
6,1 mm	0.2402			8,0	91,0	53,0	43,0	36,0						
C	0.2420	6.15		1/4	3 5/8	2-5/64	1-51/64	1-7/16						
6,2 mm	0.2441			8,0	91,0	53,0	43,0	36,0						
D	0.2460	6.25		1/4	3 5/8	2-5/64	1-51/64	1-7/16						
6,25 mm	0.2461		M7 X 0,75	8,0	91,0	53,0	43,0	36,0						
6,3 mm	0.2480			8,0	91,0	53,0	43,0	36,0						
1/4	0.2500	6.35		1/4	3-5/8	2-5/64	1-51/64	1-7/16						
6,4 mm	0.2520			8,0	91,0	53,0	43,0	36,0						
6,5 mm	0.2559			8,0	91,0	53,0	43,0	36,0						
F	0.2570	6.53	5/16-18	5/16	3-5/8	2-5/64	1-51/64	1-7/16						
6,6 mm	0.2598			8,0	91,0	53,0	43,0	36,0						
G	0.2610	6.63		5/16	3 5/8	2 5/64	1 51/64	1 7/16						
6,7 mm	0.2638			8,0	91,0	53,0	43,0	36,0						
17/64	0.2656	6.75	5/16-20	5/16	3-5/8	2-5/64	1-51/64	1-7/16						
H	0.2660	6.76		5/16	3-5/8	2-5/64	1-51/64	1-7/16						
6,8 mm	0.2677		M8 X 1,25	8,0	91,0	53,0	43,0	36,0						
6,9 mm	0.2717			8,0	91,0	53,0	43,0	36,0						
I	0.2720	6.91	5/16-24	5/16	3-5/8	2-5/64	1-51/64	1-7/16						
7,0 mm	0.2756		M8 X 1	8,0	91,0	53,0	43,0	36,0						
J	0.2770	7.04		5/16	3 5/8	2-5/64	1-51/64	1-7/16						
7,1 mm	0.2795			8,0	91,0	53,0	43,0	36,0						
K	0.2810	7.14		5/16	3 5/8	2-5/64	1-51/64	1-7/16						
9/32	0.2812	7.14	5/16-32	5/16	3-5/8	2-5/64	1-51/64	1-7/16						
7,2 mm	0.2835			8,0	91,0	53,0	43,0	36,0						
7,25 mm	0.2854		M8 X 0,75	8,0	91,0	53,0	43,0	36,0						
7,3 mm	0.2874			8,0	91,0	53,0	43,0	36,0						

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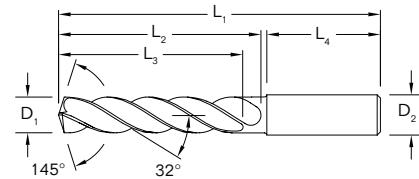
Hi Performance Drill

Hi-PerCarb I Series 135



TOLERANCES (inch)		
DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+0.00047	h6
>.1181-.2362	.+.00016/+0.00063	h6
>.2362-.3937	.+.00024/+0.00083	h6
>.3937-.7087	.+.00028/+0.00098	h6
>.7087-1.1811	.+.00031/+0.00114	h6

TOLERANCES (mm)		
DIAMETER	D ₁	D ₂
≤ 3	.+.0022/+0.012	h6
> 3 - 6	.+.004/+0.016	h6
> 6 - 10	.+.006/+0.021	h6
> 10 - 18	.+.007/+0.025	h6
> 18 - 30	.+.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.
Common	L	0.2900	7.37		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52345
5xD Reach	7,4 mm	0.2913			8,0	91,0	53,0	43,0	36,0	64147
Right Spiral	M	0.2950	7.49		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52346
External Coolant	7,5 mm	0.2953		M8 X 0,5	8,0	91,0	53,0	43,0	36,0	64148
2 Flutes	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
	0	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

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Hi Performance Drill

Hi-PerCarb | Series 135



Automotive

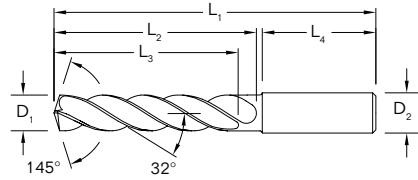
Mold & Die

Aerospace

High Performance

General

Special Tools



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	.+.002/+,.012	h6
> 3 - 6	.+.004/+,.016	h6
> 6 - 10	.+.006/+,.021	h6
> 10 - 18	.+.007/+,.025	h6
> 18 - 30	.+.008/+,.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



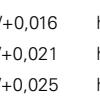
Flutes



Right Spiral



Reach



Common

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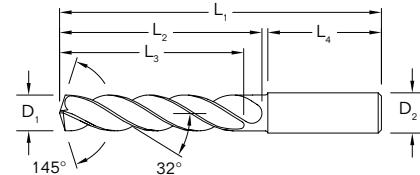
Hi Performance Drill

Hi-PerCarb I Series 135



TOLERANCES (inch)		
DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+0.00047	h6
>.1181-.2362	.+.00016/+0.00063	h6
>.2362-.3937	.+.00024/+0.00083	h6
>.3937-.7087	.+.00028/+0.00098	h6
>.7087-1.1811	.+.00031/+0.00114	h6

TOLERANCES (mm)		
DIAMETER	D ₁	D ₂
≤ 3	.+.0022/+0.012	h6
> 3 - 6	.+.004/+0.016	h6
> 6 - 10	.+.006/+0.021	h6
> 10 - 18	.+.007/+0.025	h6
> 18 - 30	.+.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.
Common	35/64	0.5469	13.89	5/8-12	5/8	4-7/8	3-1/32	2-19/32	1-49/64	51537
5xD Reach	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
Right Spiral	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
External Coolant	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
2 Flutes	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

Automotive
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Aerospace

High Performance
General
Special Tools

Hi Performance Drill

Hi-PerCarb | Series 135



HIGH PERFORMANCE CARBIDE DRILLS

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High Performance

General

Special Tools

Series 135 3D Metric	Hardness	Vc (m/min)	Diameter (D _t) (mm)								
			1.5	3	6	8	10	12	16	20	
CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	117 (94-141)	RPM Fr Feed (mm/min)	24882 0.047 1175	12441 0.094 1175	6220 0.189 1175	4665 0.252 1175	3732 0.315 1175	3110 0.378 1175	2333 0.504 1175	1866 0.630 1175
	≤ 275 Bhn or ≤ 28 HRc	107 (85-128)	RPM Fr Feed (mm/min)	22620 0.043 970	11310 0.086 970	5655 0.172 970	4241 0.229 970	3393 0.286 970	2827 0.343 970	2121 0.457 970	1696 0.572 970
	≤ 475 Bhn or ≤ 45 HRc	61 (49-73)	RPM Fr Feed (mm/min)	12926 0.036 460	6463 0.071 460	3231 0.142 460	2424 0.190 460	1939 0.237 460	1616 0.285 460	1212 0.380 460	969 0.475 460
	≤ 275 Bhn or ≤ 28 HRc	91 (73-110)	RPM Fr Feed (mm/min)	19388 0.036 690	9694 0.071 690	4847 0.142 690	3635 0.190 690	2908 0.237 690	2424 0.285 690	1818 0.380 690	1454 0.475 690
	≤ 375 Bhn or ≤ 40 HRc	56 (45-68)	RPM Fr Feed (mm/min)	11956 0.031 365	5978 0.061 365	2989 0.122 365	2242 0.163 365	1793 0.204 365	1495 0.244 365	1121 0.326 365	897 0.407 365
	≤ 450 Bhn or ≤ 48 HRc	40 (32-48)	RPM Fr Feed (mm/min)	8402 0.021 175	4201 0.042 175	2100 0.083 175	1575 0.111 175	1260 0.139 175	1050 0.167 175	788 0.222 175	630 0.278 175
	≤ 200 Bhn or ≤ 13 HRc	40 (32-48)	RPM Fr Feed (mm/min)	8402 0.032 265	4201 0.063 265	2100 0.126 265	1575 0.168 265	1260 0.210 265	1050 0.252 265	788 0.336 265	630 0.421 265
	≤ 375 Bhn or ≤ 40 HRc	27 (22-33)	RPM Fr Feed (mm/min)	5816 0.014 80	2908 0.028 80	1454 0.055 80	1091 0.073 80	872 0.092 80	727 0.110 80	545 0.147 80	436 0.183 80
	≤ 475 Bhn or ≤ 50 HRc	23 (18-27)	RPM Fr Feed (mm/min)	4847 0.009 45	2424 0.019 45	1212 0.037 45	909 0.050 45	727 0.062 45	606 0.074 45	454 0.099 45	364 0.124 45
TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 220 Bhn or ≤ 19 HRc	98 (78-117)	RPM Fr Feed (mm/min)	20681 0.055 1135	10340 0.110 1135	5170 0.220 1135	3878 0.293 1135	3102 0.366 1135	2585 0.439 1135	1939 0.585 1135	1551 0.732 1135
	≤ 260 Bhn or ≤ 26 HRc	87 (69-104)	RPM Fr Feed (mm/min)	18419 0.055 1010	9209 0.110 1010	4605 0.219 1010	3454 0.292 1010	2763 0.366 1010	2302 0.439 1010	1727 0.585 1010	1381 0.731 1010
	≤ 185 Bhn or ≤ 9 HRc	84 (67-101)	RPM Fr Feed (mm/min)	17773 0.031 545	8886 0.061 545	4443 0.123 545	3332 0.164 545	2666 0.204 545	2222 0.245 545	1666 0.327 545	1333 0.409 545
	≤ 275 Bhn or ≤ 28 HRc	52 (41-62)	RPM Fr Feed (mm/min)	10987 0.024 260	5493 0.047 260	2747 0.095 260	2080 0.126 260	1648 0.158 260	1373 0.189 260	1030 0.252 260	824 0.316 260
STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	27 (22-33)	RPM Fr Feed (mm/min)	5816 0.023 135	2908 0.046 135	1454 0.093 135	1091 0.124 135	872 0.155 135	727 0.186 135	545 0.248 135	436 0.309 135
	≤ 375 Bhn or ≤ 40 HRc	20 (16-24)	RPM Fr Feed (mm/min)	4201 0.020 85	2100 0.040 85	1050 0.081 85	788 0.108 85	630 0.135 85	525 0.162 85	394 0.216 85	315 0.270 85
	≤ 220 Bhn or ≤ 19 HRc	98 (78-117)	RPM Fr Feed (mm/min)	20681 0.055 1135	10340 0.110 1135	5170 0.220 1135	3878 0.293 1135	3102 0.366 1135	2585 0.439 1135	1939 0.585 1135	1551 0.732 1135
	≤ 260 Bhn or ≤ 26 HRc	87 (69-104)	RPM Fr Feed (mm/min)	18419 0.055 1010	9209 0.110 1010	4605 0.219 1010	3454 0.292 1010	2763 0.366 1010	2302 0.439 1010	1727 0.585 1010	1381 0.731 1010
STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 185 Bhn or ≤ 9 HRc	84 (67-101)	RPM Fr Feed (mm/min)	17773 0.031 545	8886 0.061 545	4443 0.123 545	3332 0.164 545	2666 0.204 545	2222 0.245 545	1666 0.327 545	1333 0.409 545
	≤ 275 Bhn or ≤ 28 HRc	52 (41-62)	RPM Fr Feed (mm/min)	10987 0.024 260	5493 0.047 260	2747 0.095 260	2080 0.126 260	1648 0.158 260	1373 0.189 260	1030 0.252 260	824 0.316 260
	≤ 375 Bhn or ≤ 40 HRc	20 (16-24)	RPM Fr Feed (mm/min)	4201 0.020 85	2100 0.040 85	1050 0.081 85	788 0.108 85	630 0.135 85	525 0.162 85	394 0.216 85	315 0.270 85
	≤ 220 Bhn or ≤ 19 HRc	98 (78-117)	RPM Fr Feed (mm/min)	20681 0.055 1135	10340 0.110 1135	5170 0.220 1135	3878 0.293 1135	3102 0.366 1135	2585 0.439 1135	1939 0.585 1135	1551 0.732 1135

(continued on next page)

Hi Performance Drill

Hi-PerCarb I Series 135



Series 135 3D Metric	Hardness	Vc (m/min)	Diameter (D ₁) (mm)								
			1.5	3	6	8	10	12	16	20	
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy	≤ 300 Bhn or ≤ 32 HRc	17 (13-20)	RPM	3555	1777	889	666	533	444	333	267
			Fr	0.010	0.020	0.039	0.053	0.066	0.079	0.105	0.131
	≤ 400 Bhn or ≤ 43 HRc	9 (7-11)	RPM	1939	969	485	364	291	242	182	145
			Fr	0.008	0.015	0.031	0.041	0.052	0.062	0.083	0.103
			Feed (mm/min)	35	35	35	35	35	35	35	35
			15	15	15	15	15	15	15	15	15
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	41 (33-49)	RPM	8725	4362	2181	1636	1309	1091	818	654
			Fr	0.021	0.042	0.085	0.113	0.141	0.170	0.226	0.283
	≤ 350 Bhn or ≤ 38 HRc	30 (24-37)	RPM	6463	3231	1616	1212	969	808	606	485
			Fr	0.019	0.039	0.077	0.103	0.129	0.155	0.206	0.258
	≤ 440 Bhn or ≤ 47 HRc	17 (13-20)	RPM	3555	1777	889	666	533	444	333	267
			Fr	0.014	0.028	0.056	0.075	0.094	0.113	0.150	0.188
ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	213 (171-256)	RPM	45239	22620	11310	8482	6786	5655	4241	3393
			Fr	0.059	0.119	0.238	0.317	0.396	0.476	0.634	0.793
	≤ 150 Bhn or ≤ 7 HRc	183 (146-219)	RPM	38777	19388	9694	7271	5816	4847	3635	2908
			Fr	0.060	0.120	0.240	0.320	0.400	0.480	0.640	0.799
			Feed (mm/min)	2690	2690	2690	2690	2690	2690	2690	2690
			2325	2325	2325	2325	2325	2325	2325	2325	2325
COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	152 (122-183)	RPM	32314	16157	8078	6059	4847	4039	3029	2424
			Fr	0.024	0.048	0.096	0.128	0.160	0.192	0.256	0.320
	≤ 200 Bhn or ≤ 23 HRc	122 (98-146)	RPM	25851	12926	6463	4847	3878	3231	2424	1939
			Fr	0.024	0.049	0.097	0.130	0.162	0.195	0.260	0.325
			Feed (mm/min)	776	776	776	776	776	776	776	776

Note:

- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (Vc x 1000) / (D₁ 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)

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Hi Performance Drill

Hi-PerCarb | Series 135



Automotive

Mold & Die

Aerospace

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General

Special Tools

Diameter (D_1) (mm)

Series 135M 5D Metric		Hardness	V_c (m/min)	1.5	3	6	8	10	12	16	20	
				RPM	Fr	Feed (mm/min)	RPM	Fr	Feed (mm/min)	RPM	Fr	
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	105 (84-126)	22297	11148	5574	4181	3344	2787	2090	1672	
				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 (76-113)	20035	10017	5009	3756	3005	2504	1878	1503	
				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 (44-66)	11633	5816	2908	2181	1745	1454	1091	872	
				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
H	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	82 (66-99)	17449	8725	4362	3272	2617	2181	1636	1309	
				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 (40-60)	10664	5332	2666	1999	1600	1333	1000	800	
				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 (28-42)	7432	3716	1858	1394	1115	929	697	557	
				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
K	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 200 Bhn or ≤ 13 HRc	37 (29-44)	7755	3878	1939	1454	1163	969	727	582	
				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 (20-29)	5170	2585	1293	969	776	646	485	388	
				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 (17-26)	4524	2262	1131	848	679	565	424	339	
				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
M	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	91 (73-110)	19388	9694	4847	3635	2908	2424	1818	1454	
				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 (65-97)	17126	8563	4282	3211	2569	2141	1606	1284	
				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
		≤ 185 Bhn or ≤ 9 HRc	76 (61-91)	16157	8078	4039	3029	2424	2020	1515	1212	
				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
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	46 (37-55)	9694	4847	2424	1818	1454	1212	909	727	
				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
		≤ 275 Bhn or ≤ 28 HRc	24 (20-29)	5170	2585	1293	969	776	646	485	388	
				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 (13-20)	3555	1777	889	666	533	444	333	267	
				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

continued on next page



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 (10-15)	RPM	2585	1293	646	485	388	323	242	194
		≤ 400 Bhn or ≤ 43 HRc	6 (5-7)	Fr	0.010	0.019	0.039	0.052	0.064	0.077	0.103	0.129
		≤ 275 Bhn or ≤ 28 HRc	32 (26-38)	RPM	1293	646	323	242	194	162	121	97
		≤ 350 Bhn or ≤ 38 HRc	24 (20-29)	Fr	0.007	0.014	0.028	0.037	0.046	0.056	0.074	0.093
		≤ 440 Bhn or ≤ 47 HRc	13 (10-15)	Feed (mm/min)	9	9	9	9	9	9	9	9
		≤ 80 Bhn or ≤ 47 HRb	194 (155-232)	Feed (mm/min)	145	145	145	145	145	145	145	145
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	165 (132-198)	RPM	41039	20519	10260	7695	6156	5130	3847	3078
		≤ 140 Bhn or ≤ 3 HRc	137 (110-165)	Fr	0.059	0.118	0.237	0.316	0.395	0.474	0.632	0.790
		≤ 200 Bhn or ≤ 23 HRc	110 (88-132)	Feed (mm/min)	2430	2430	2430	2430	2430	2430	2430	2430
		≤ 150 Bhn or ≤ 7 HRc	165 (132-198)	Fr	0.059	0.118	0.237	0.316	0.394	0.473	0.631	0.789
		≤ 140 Bhn or ≤ 3 HRc	137 (110-165)	Feed (mm/min)	2065	2065	2065	2065	2065	2065	2065	2065
		≤ 200 Bhn or ≤ 23 HRc	110 (88-132)	RPM	29082	14541	7271	5453	4362	3635	2726	2181
Copper Alloys	Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	137 (110-165)	Fr	0.027	0.053	0.107	0.142	0.178	0.213	0.284	0.355
		≤ 200 Bhn or ≤ 23 HRc	110 (88-132)	Feed (mm/min)	775	775	775	775	775	775	775	775
		≤ 140 Bhn or ≤ 3 HRc	137 (110-165)	RPM	23266	11633	5816	4362	3490	2908	2181	1745
		≤ 200 Bhn or ≤ 23 HRc	110 (88-132)	Fr	0.027	0.054	0.108	0.144	0.181	0.217	0.289	0.361
		≤ 140 Bhn or ≤ 3 HRc	137 (110-165)	Feed (mm/min)	630	630	630	630	630	630	630	630
		≤ 200 Bhn or ≤ 23 HRc	110 (88-132)	RPM	630	630	630	630	630	630	630	630

Note:

- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (Vc x 1000) / (D₁ 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)

Automotive

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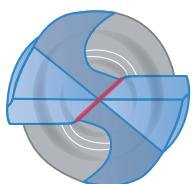
ORION High Performance Drill

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

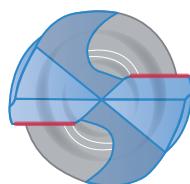
1 Optimized Cutting Edge for Increased Accuracy

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



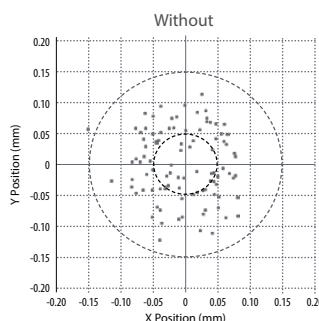
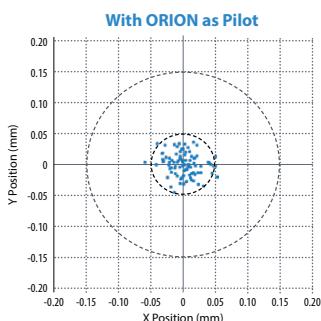
Primary Cutting Edge

Centering Edge



3mm Coolant Fed Drill Hole Positional Accuracy

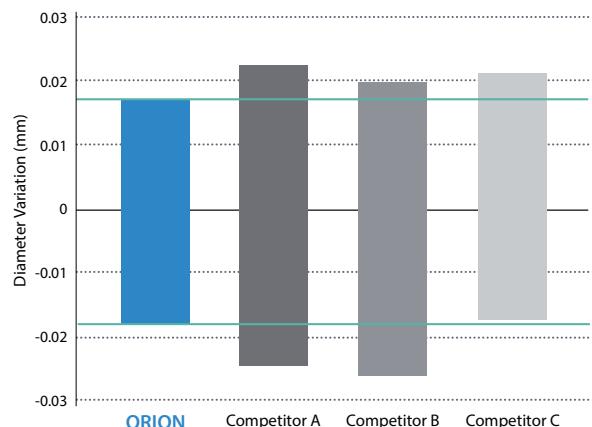
(After using the ORION as a pilot drill)



	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

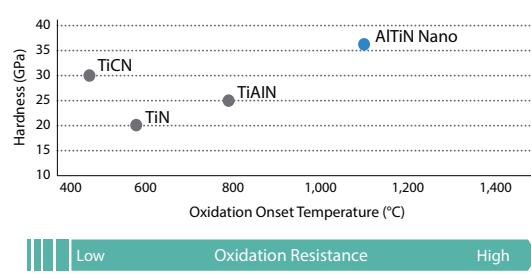


2

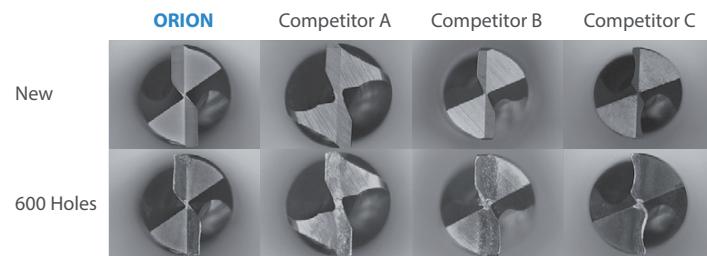
Nanocomposite Super-nitride AlTiN Coating Technology

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

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Hi Performance Drill

ORION | Series 165

3xD ORION Drills - Metric Sizes ($\varnothing 1.00\text{mm} - \varnothing 3.70\text{mm}$)

Cutting Dia. ($\varnothing D$)	Cutting Dia. Tolerance	Shank Tolerance
1.00mm ~ 3.70mm	m7	h6

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)					Point Angle
		$\varnothing D^{m7}$	$\varnothing d^{h6}$	L1	*L2	L3	
165-0394AG197	●	1.00	3.00	50.00	3.00	5.00	142°
165-0433AG217	●	1.10	3.00	50.00	3.30	5.50	142°
165-0472AG236	●	1.20	3.00	50.00	3.60	6.00	142°
165-0512AG256	●	1.30	3.00	50.00	3.90	6.50	142°
165-0551AG276	●	1.40	3.00	50.00	4.20	7.00	142°
165-0591AG295	●	1.50	3.00	50.00	4.50	7.50	142°
165-0630AG315	●	1.60	3.00	50.00	4.80	8.00	142°
165-0669AG335	●	1.70	3.00	50.00	5.10	8.50	142°
165-0709AG354	●	1.80	3.00	50.00	5.40	9.00	142°
165-0748AG374	●	1.90	3.00	50.00	5.70	9.50	142°
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

Hi Performance Drill

ORION I Series 165

3xD ORION Drills - Metric Sizes ($\varnothing 3.80\text{mm} - \varnothing 6.50\text{mm}$)

Cutting Dia. ($\varnothing D$)	Cutting Dia. Tolerance	Shank Tolerance
$3.80\text{mm} \sim 6.50\text{mm}$	m7	h6

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)					Point Angle
		$\varnothing D^{m7}$	$\varnothing d^{h6}$	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

Automotive

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Aerospace

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Special Tools

Hi Performance Drill

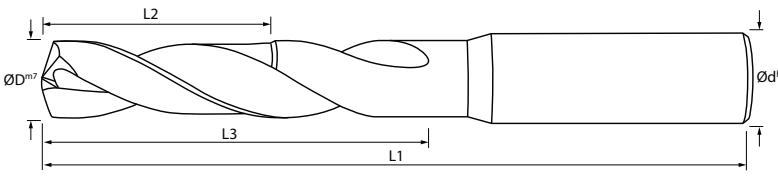
ORION | Series 165

3xD ORION Drills - Metric Sizes ($\varnothing 6.60\text{mm} - \varnothing 9.30\text{mm}$)



Cutting Dia. ($\varnothing D$)	Cutting Dia. Tolerance	Shank Tolerance
6.60mm ~ 9.30mm	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
		$\varnothing D^m7$	$\varnothing d^h6$	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

Hi Performance Drill

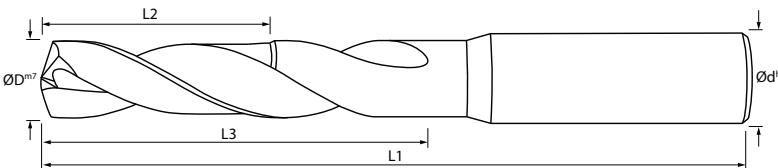
ORION I Series 165

3xD ORION Drills - Metric Sizes ($\varnothing 9.40\text{mm}$ - $\varnothing 12.00\text{mm}$)



Cutting Dia. ($\varnothing D$)	Cutting Dia. Tolerance	Shank Tolerance
$9.40\text{mm} \sim 12.00\text{mm}$	m7	h6

3D



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

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)					Point Angle
		$\varnothing D^m7$	$\varnothing d^h6$	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

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

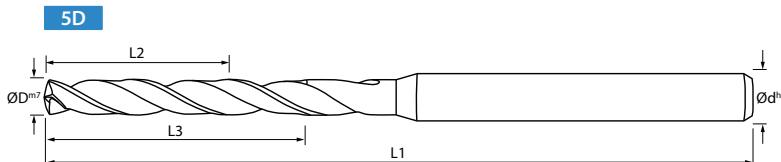
Hi Performance Drill

ORION | Series 165

5xD ORION Drills - Metric Sizes ($\varnothing 1.00\text{mm} - \varnothing 3.70\text{mm}$)

NEW

Cutting Dia. ($\varnothing D$)	Cutting Dia. Tolerance	Shank Tolerance
1.00mm ~ 3.70mm	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
		$\varnothing D^{m7}$	$\varnothing d^{h6}$	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

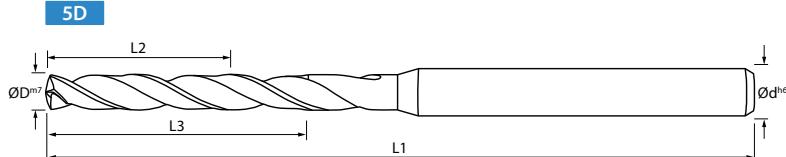
Hi Performance Drill

ORION I Series 165

5xD ORION Drills - Metric Sizes ($\varnothing 3.80\text{mm} - \varnothing 6.50\text{mm}$) 

			Cutting Dia. ($\varnothing D$)	Cutting Dia. Tolerance	Shank Tolerance
			3.80mm ~ 6.50mm	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
		$\varnothing D^{m7}$	$\varnothing d^{h6}$	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

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

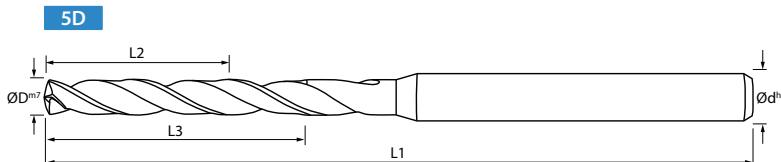
Hi Performance Drill

ORION | Series 165

5xD ORION Drills - Metric Sizes ($\varnothing 6.60\text{mm} - \varnothing 9.30\text{mm}$)

NEW

Cutting Dia. ($\varnothing D$)	Cutting Dia. Tolerance	Shank Tolerance
6.60mm ~ 9.30mm	m7	h6



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

Metric Drill Dimensions

Part Number	Stock	Dimensions (mm)					Point Angle
		$\varnothing D^{m7}$	$\varnothing d^{h6}$	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

Hi Performance Drill

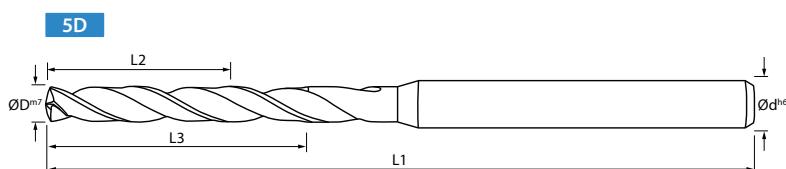
ORION I Series 165

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

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Hi Performance Drill

ORION I Series 165

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			
		sfm	m/min			3xD & 5xD			
						(ipr)	(mm/rev)		
Low Carbon Steel	12L14 A36	270 - 300 - 330	80 - 90 - 100	00.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0015 - 0.0030	0.04 - 0.08		
				00.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0030 - 0.0060	0.08 - 0.15		
				00.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0060 - 0.0090	0.15 - 0.23		
				00.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0090 - 0.0120	0.23 - 0.30		
				00.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0120 - 0.0150	0.30 - 0.38		
				00.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0120 - 0.0150	0.30 - 0.38		
				00.4685 - 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	00.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0015 - 0.0030	0.04 - 0.08		
				00.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0030 - 0.0060	0.08 - 0.15		
				00.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0060 - 0.0090	0.15 - 0.23		
				00.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0090 - 0.0120	0.23 - 0.30		
				00.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0120 - 0.0150	0.30 - 0.38		
				00.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0120 - 0.0150	0.30 - 0.38		
				00.4685 - 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	00.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0010 - 0.0020	0.03 - 0.05		
				00.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0020 - 0.0045	0.05 - 0.11		
				00.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0045 - 0.0070	0.11 - 0.18		
				00.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0070 - 0.0090	0.18 - 0.23		
				00.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0090 - 0.0115	0.23 - 0.29		
				00.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0090 - 0.0115	0.23 - 0.29		
				00.4685 - 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	00.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0010 - 0.0020	0.03 - 0.05		
				00.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0020 - 0.0040	0.05 - 0.10		
				00.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0040 - 0.0060	0.10 - 0.15		
				00.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0060 - 0.0080	0.15 - 0.20		
				00.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0060 - 0.0080	0.15 - 0.20		
				00.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0060 - 0.0080	0.15 - 0.20		
				00.4685 - 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	00.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0005 - 0.0010	0.01 - 0.03		
				00.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0010 - 0.0020	0.03 - 0.05		
				00.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0020 - 0.0030	0.05 - 0.08		
				00.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0030 - 0.0040	0.08 - 0.10		
				00.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0040 - 0.0050	0.10 - 0.13		
				00.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0040 - 0.0050	0.10 - 0.13		
				00.4685 - 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	00.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0010 - 0.0020	0.03 - 0.05		
				00.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0020 - 0.0045	0.05 - 0.11		
				00.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0045 - 0.0070	0.11 - 0.18		
				00.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0070 - 0.0090	0.18 - 0.23		
				00.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0090 - 0.0115	0.23 - 0.29		
				00.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0110 - 0.0125	0.28 - 0.32		
				00.4685 - 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	00.0394 - Ø0.0787	Ø1.00 - Ø2.00	0.0010 - 0.0020	0.03 - 0.05		
				00.0787 - Ø0.1535	Ø2.00 - Ø3.90	0.0020 - 0.0040	0.05 - 0.10		
				00.1575 - Ø0.2320	Ø4.00 - Ø5.90	0.0040 - 0.0060	0.10 - 0.15		
				00.2360 - Ø0.3110	Ø6.00 - Ø7.90	0.0050 - 0.0070	0.13 - 0.18		
				00.3150 - Ø0.3898	Ø8.00 - Ø9.90	0.0060 - 0.0080	0.15 - 0.20		
				00.3937 - Ø0.4685	Ø10.00 - Ø11.90	0.0070 - 0.0090	0.18 - 0.23		
				00.4685 - 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.

Automotive

Mold & Die

Aerospace

General

Special Tools

High Performance

Hi Performance Drill

ORION I Series 165

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			
		sfn	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.

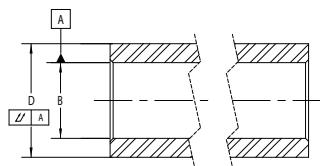
Automotive
Mold & Die
Aerospace
High Performance

General
Special Tools

Case Studies

Bushing 17-4PH Stainless Steel

$V_c = 147.3 \text{ sfm}$ ($n = 1,800 \text{ rpm}$)
 $V_f = 4.32 \text{ ipm}$
 $D.O.C. = 0.500"$
 $\varnothing 0.3125"$
 160-3125AG1563



Tool Life

ORION $\varnothing 0.3125"$

659 pcs / tool

Tool Life

3.3x

Competitor A
 $\varnothing 0.3125"$

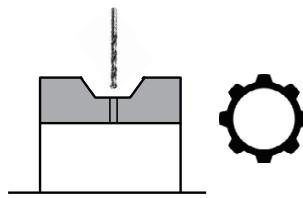
200 pcs / tool

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

(User Evaluation)

Gear 1045 Steel

$V_c = 165 \text{ sfm}$ ($n = 7,583 \text{ rpm}$)
 $V_f = 0.005 \text{ ipt}$
 $D.O.C. = 0.276"$
 $\varnothing 2.1 \text{ mm}$
 165-0827AG413 (Special)
 Number of Holes: 4



Tool Life

ORION $\varnothing 2.1 \text{ mm}$

1,000 Parts (4,000 Holes)

Tool Life

1.7x

Competitor B
 $\varnothing 2.1 \text{ mm}$

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)

Automotive

Mold & Die

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High Performance

General

Special 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

Automotive

Mold & Die

Aerospace

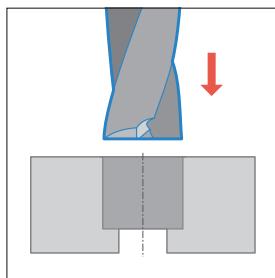
High Performance

General

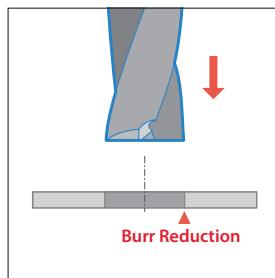
Special Tools

1

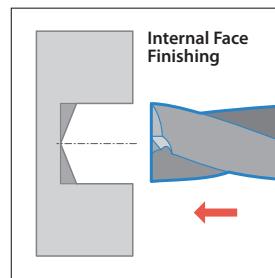
Flat Bottom Used in a Wide Range of Machining Applications



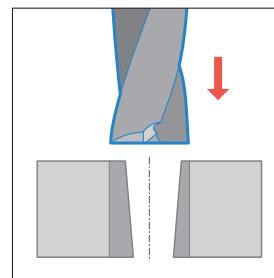
Hole Counterboring



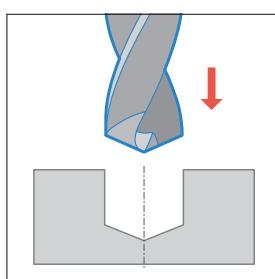
Plunging on Thin Plate



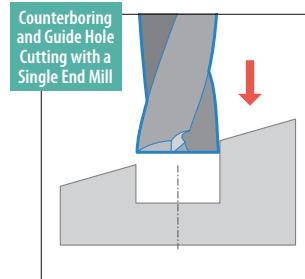
Internal Face Finishing



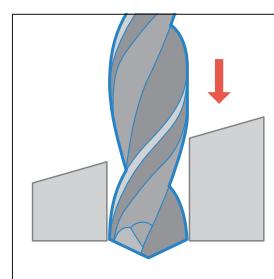
Hole Expanding



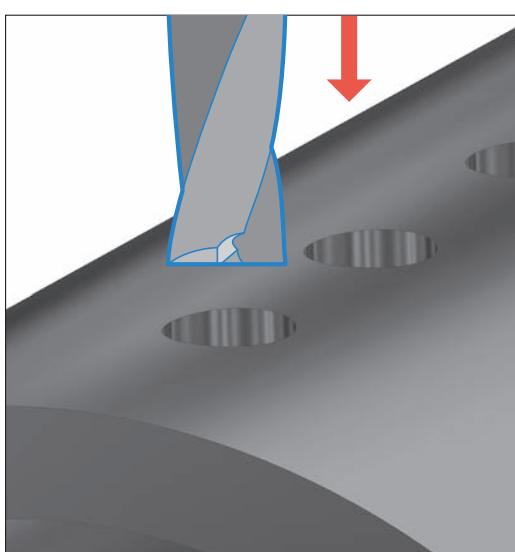
Flat Bottom Finishing after Drilling



Counterboring and Guide Hole Cutting with a Single End Mill



Counterboring on Slant Surface/Spotting for Secondary Process



Achieves Stable Machining
even in Difficult Drilling Situations

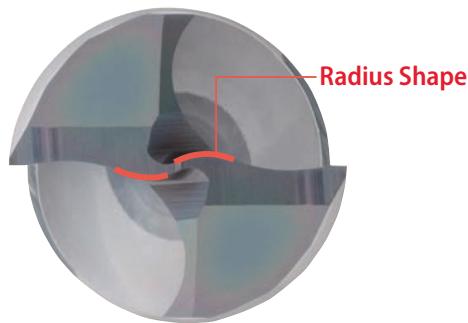
Drilling in Cylinder and Curved Surfaces

2 High Precision Machining

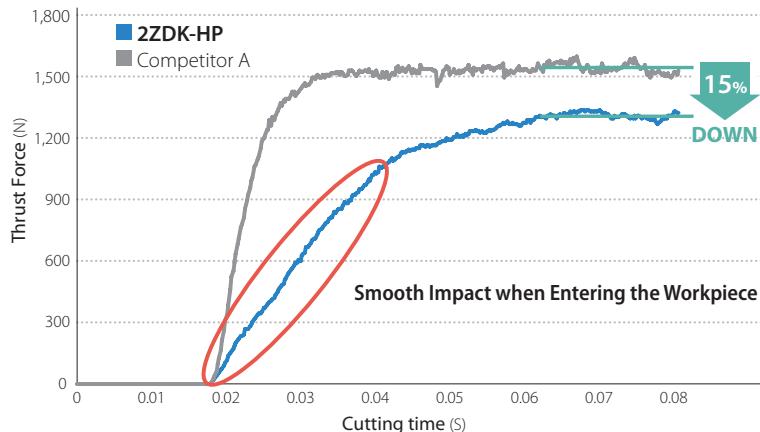
Chisel Edge with S-curve Provides Lower Cutting Forces

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)

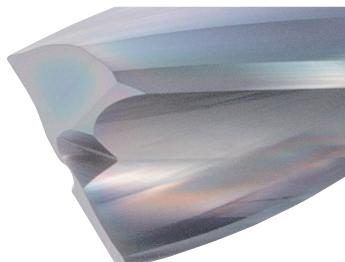


Cutting Conditions: $n = 1,800 \text{ min}^{-1}$, $V_f = 400 \text{ mm/min}$, Drilling Depth 10 mm, Dry Drilling Dia. $\varnothing 12 \text{ mm}$ (3D Type)
Workpiece: SSOC

3 Minimizes Burrs

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

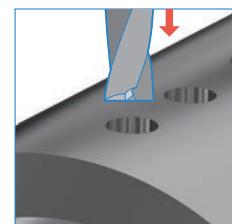
Low Cutting Force Corner Edge Design



Corner :
Positive Rake Angle

Burr Comparison (In-house Evaluation)

Drilling in Cylinder Surface

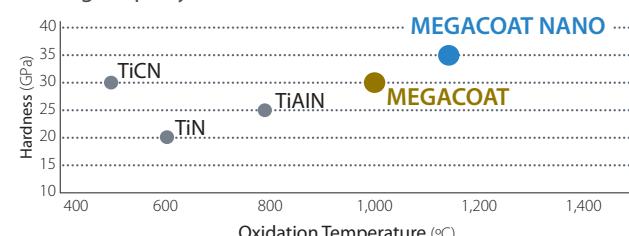


Cutting Conditions: $n = 7,000 \text{ min}^{-1}$, $V_f = 420 \text{ mm/min}$, Wet Drilling Dia. $\varnothing 3.5 \text{ mm}$ (3D Type)
Workpiece: Carbon Steel Pipe $\varnothing 17.3 \text{ mm}$ (Thickness 3.2 mm)

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

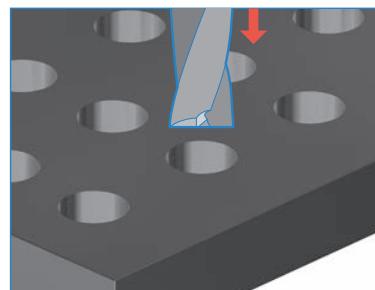
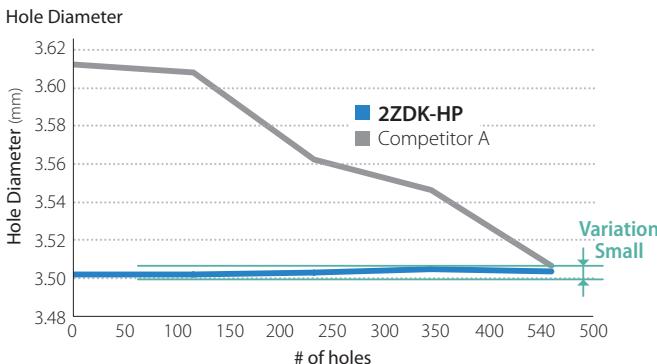
2ZDK-HP

Drilling in Flat Surface

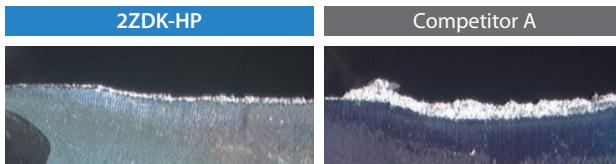
Cutting Performance Comparison (In-house Evaluation)

Drilling Dia. : ø3.5mm

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



Cutting Edge after Machining 500 holes



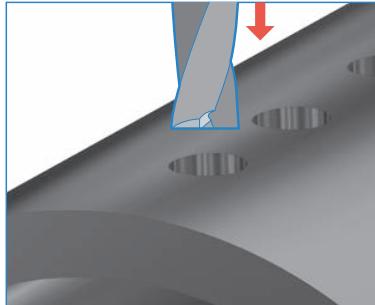
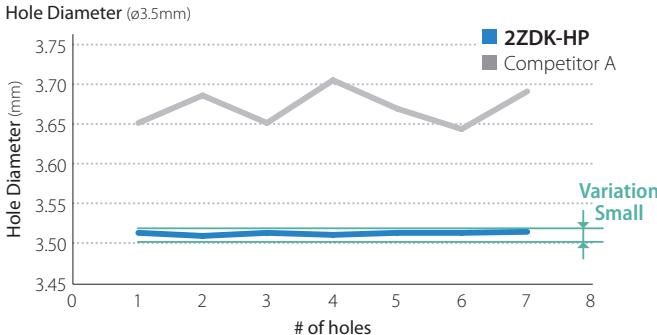
Cutting Conditions: $n = 6,000 \text{ min}^{-1}$, $V_f = 360 \text{ mm/min}$, Drilling Depth 5 mm, Wet
Drilling Dia. ø3.5 mm (3D Type) Workpiece: SCM440

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

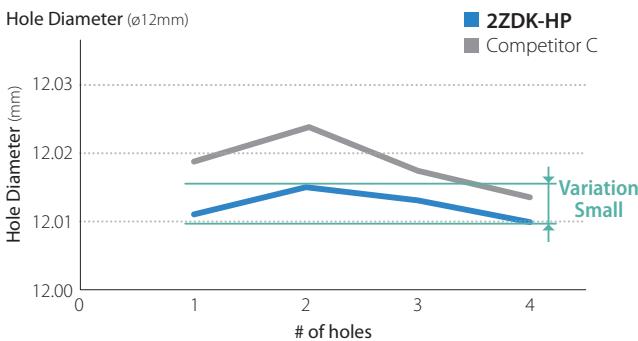


Cutting Conditions: $n = 7,000 \text{ min}^{-1}$, $V_f = 420 \text{ mm/min}$, Wet Drilling Dia. ø3.5 mm (3D Type)
Workpiece: Carbon Steel Pipe ø17.3 mm (Thickness 3.2 mm)

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



Surface Finish and Chips

	2ZDK-HP	Competitor C
Surface Finish		Disc Remains
Chips		Chip Clogging

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

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Flat Bottom Drill

2ZDK-HP

Stock Items (1.5D Type)

1.5D

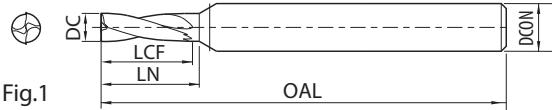


Fig.1

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

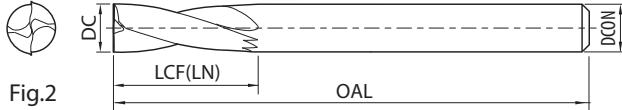


Fig.2

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	0 -0.012	11	12	6	60	Fig.1
2ZDK033HP-1.5D	●	3.3						
2ZDK034HP-1.5D	●	3.4						
2ZDK035HP-1.5D	●	3.5	0 -0.012	12	13	6	60	Fig.1
2ZDK036HP-1.5D	●	3.6						
2ZDK037HP-1.5D	●	3.7						
2ZDK038HP-1.5D	●	3.8	0 -0.012	13	14	6	60	Fig.1
2ZDK039HP-1.5D	●	3.9						
2ZDK040HP-1.5D	●	4.0						
2ZDK041HP-1.5D	●	4.1						
2ZDK042HP-1.5D	●	4.2	0 -0.012	14	15	6	60	Fig.1
2ZDK043HP-1.5D	●	4.3						
2ZDK044HP-1.5D	●	4.4						
2ZDK045HP-1.5D	●	4.5	0 -0.012	15	16	6	60	Fig.1
2ZDK046HP-1.5D	●	4.6						
2ZDK047HP-1.5D	●	4.7						
2ZDK048HP-1.5D	●	4.8	0 -0.012	16	17	6	60	Fig.1
2ZDK049HP-1.5D	●	4.9						
2ZDK050HP-1.5D	●	5.0						
2ZDK051HP-1.5D	●	5.1	0 -0.012	17	18	6	60	Fig.1
2ZDK052HP-1.5D	●	5.2						
2ZDK053HP-1.5D	●	5.3						
2ZDK054HP-1.5D	●	5.4						
2ZDK055HP-1.5D	●	5.5	0 -0.012	18	19	6	60	Fig.1
2ZDK056HP-1.5D	●	5.6						
2ZDK057HP-1.5D	●	5.7						
2ZDK058HP-1.5D	●	5.8	0 -0.012	19	20	6	60	Fig.1
2ZDK059HP-1.5D	●	5.9						
2ZDK060HP-1.5D	●	6.0	0 -0.012	20	21	8	70	Fig.1
2ZDK061HP-1.5D	●	6.1	0 -0.015	21	22	8	70	Fig.1
2ZDK062HP-1.5D	●	6.2						
2ZDK063HP-1.5D	●	6.3						
2ZDK064HP-1.5D	●	6.4	0 -0.015	22	23	8	70	Fig.1
2ZDK065HP-1.5D	●	6.5						
2ZDK066HP-1.5D	●	6.6						
2ZDK067HP-1.5D	●	6.7						
2ZDK068HP-1.5D	●	6.8	0 -0.015	23	24	8	70	Fig.1
2ZDK069HP-1.5D	●	6.9						
2ZDK070HP-1.5D	●	7.0						
2ZDK071HP-1.5D	●	7.1	0 -0.015	24	25	8	70	Fig.1
2ZDK072HP-1.5D	●	7.2						
2ZDK073HP-1.5D	●	7.3						
2ZDK074HP-1.5D	●	7.4	0 -0.015	25	26	8	70	Fig.1
2ZDK075HP-1.5D	●	7.5						

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

● : Standard Stock

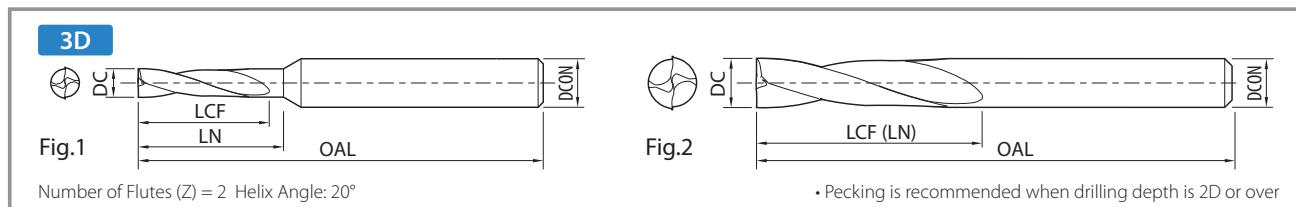
Automotive
Mold & Die
Aerospace

High Performance
General
Special Tools

Flat Bottom Drill

2ZDK-HP

Stock Items (3D Type)



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						
2ZDK036HP-3D	●	3.6						
2ZDK037HP-3D	●	3.7	0 -0.012	17	18	6	60	Fig.1
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						
2ZDK043HP-3D	●	4.3	0 -0.012	20	21	6	60	Fig.1
2ZDK044HP-3D	●	4.4						
2ZDK045HP-3D	●	4.5						
2ZDK046HP-3D	●	4.6						
2ZDK047HP-3D	●	4.7	0 -0.012	21	22	6	60	Fig.1
2ZDK048HP-3D	●	4.8						
2ZDK049HP-3D	●	4.9						
2ZDK050HP-3D	●	5.0						
2ZDK051HP-3D	●	5.1	0 -0.012	23	24	6	60	Fig.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						
2ZDK057HP-3D	●	5.7	0 -0.012	26	27	6	60	Fig.1
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						
2ZDK062HP-3D	●	6.2	0 -0.015	28	29	8	70	Fig.1
2ZDK063HP-3D	●	6.3						
2ZDK064HP-3D	●	6.4						
2ZDK065HP-3D	●	6.5						
2ZDK066HP-3D	●	6.6	0 -0.015	30	31	8	70	Fig.1
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						
2ZDK071HP-3D	●	7.1	0 -0.015	32	33	8	70	Fig.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						
2ZDK077HP-3D	●	7.7	0 -0.015					
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						
2ZDK082HP-3D	●	8.2	0 -0.015	36	37	10	80	Fig.1
2ZDK083HP-3D	●	8.3						
2ZDK084HP-3D	●	8.4						
2ZDK085HP-3D	●	8.5						
2ZDK086HP-3D	●	8.6	0 -0.015	38	39	10	80	Fig.1
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						
2ZDK091HP-3D	●	9.1						
2ZDK092HP-3D	●	9.2	0 -0.015	40	41	10	80	Fig.1
2ZDK093HP-3D	●	9.3						
2ZDK094HP-3D	●	9.4						
2ZDK095HP-3D	●	9.5						
2ZDK096HP-3D	●	9.6						
2ZDK097HP-3D	●	9.7	0 -0.015	42	43	10	80	Fig.1
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						
2ZDK106HP-3D	●	10.6						
2ZDK107HP-3D	●	10.7	0 -0.018	47	48	12	100	Fig.1
2ZDK108HP-3D	●	10.8						
2ZDK109HP-3D	●	10.9						
2ZDK110HP-3D	●	11.0						
2ZDK111HP-3D	●	11.1						
2ZDK112HP-3D	●	11.2	0 -0.018	51	52	12	100	Fig.1
2ZDK113HP-3D	●	11.3						
2ZDK114HP-3D	●	11.4						
2ZDK115HP-3D	●	11.5						
2ZDK116HP-3D	●	11.6						
2ZDK117HP-3D	●	11.7	0 -0.018	53	54	12	100	Fig.1
2ZDK118HP-3D	●	11.8						
2ZDK119HP-3D	●	11.9						
2ZDK120HP-3D	●	12.0	0 -0.018	54	(54)	12	100	Fig.2

● : Standard Stock

Automotive

Mold & Die

General

Special Tools

Cutting Conditions

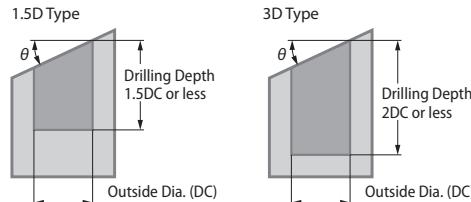
Workpiece	Application	Drilling Depth (mm)	Outside Dia. DC (mm)	3	3.5	4	4.5	5	6	8	10	12
Structural Steel Carbon Steel SS400, S45C	Plunge Milling	1.5D Type: $ap \leq 1.5DC$	Spindle Revolution (min ⁻¹)	9,100	7,800	6,800	6,100	5,500	4,600	3,500	2,800	2,300
		3D Type: $ap \leq 2DC$	Feed Rate (mm/min)	520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

Automotive

Mold & Die

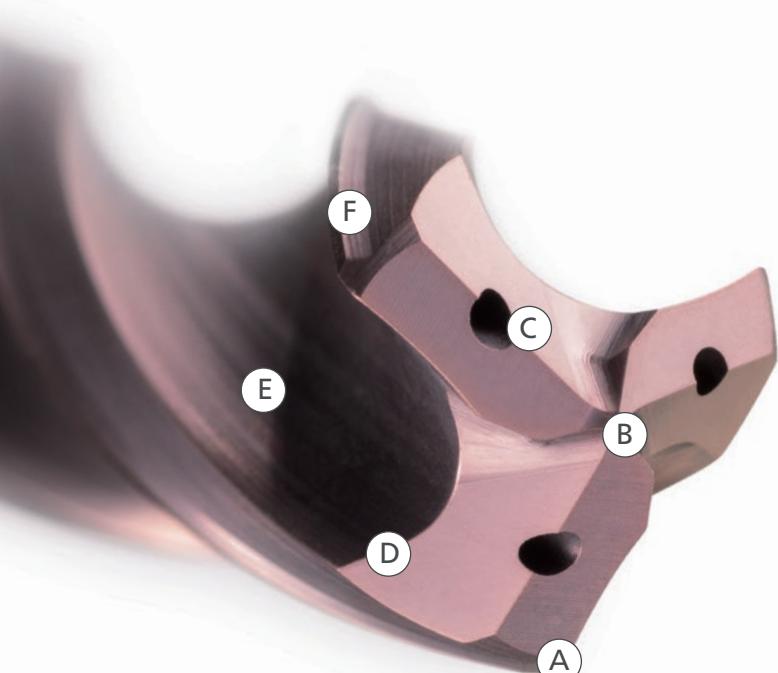
Aerospace

High Performance

General

Special Tools

SERIES 141K



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



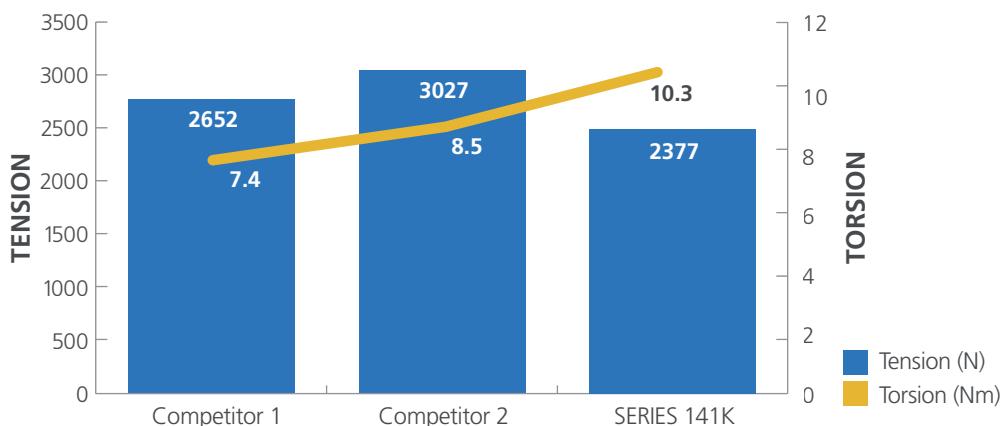
KYOCERA

SGS®
Solid Carbide Tools

PERFORMANCE.

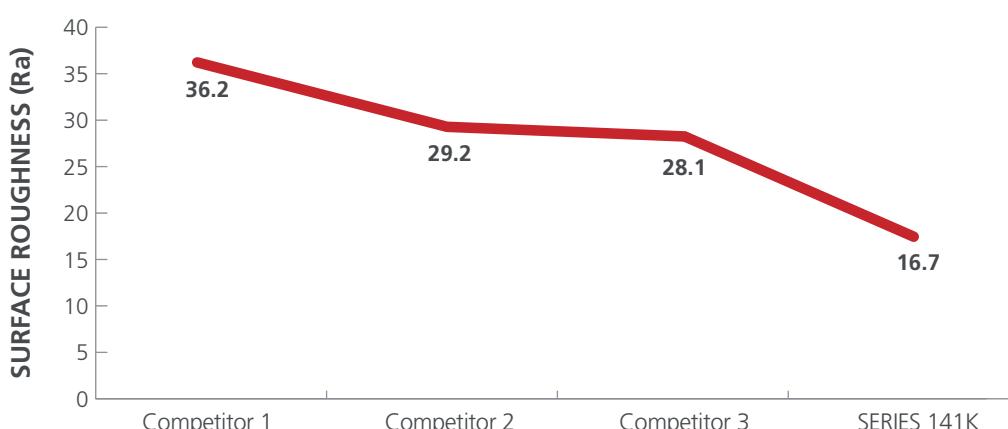
FORCE COMPARISON

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



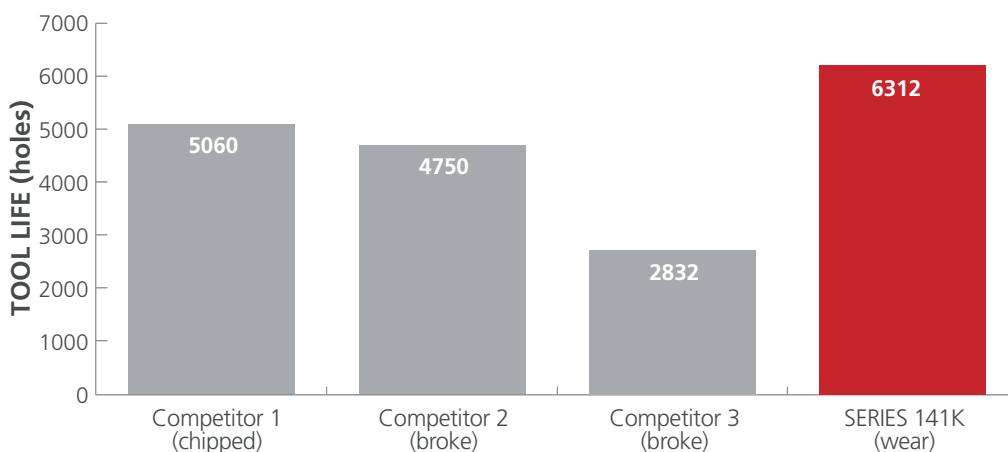
SURFACE FINISH COMPARISON

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



USAGE & WEAR COMPARISONS

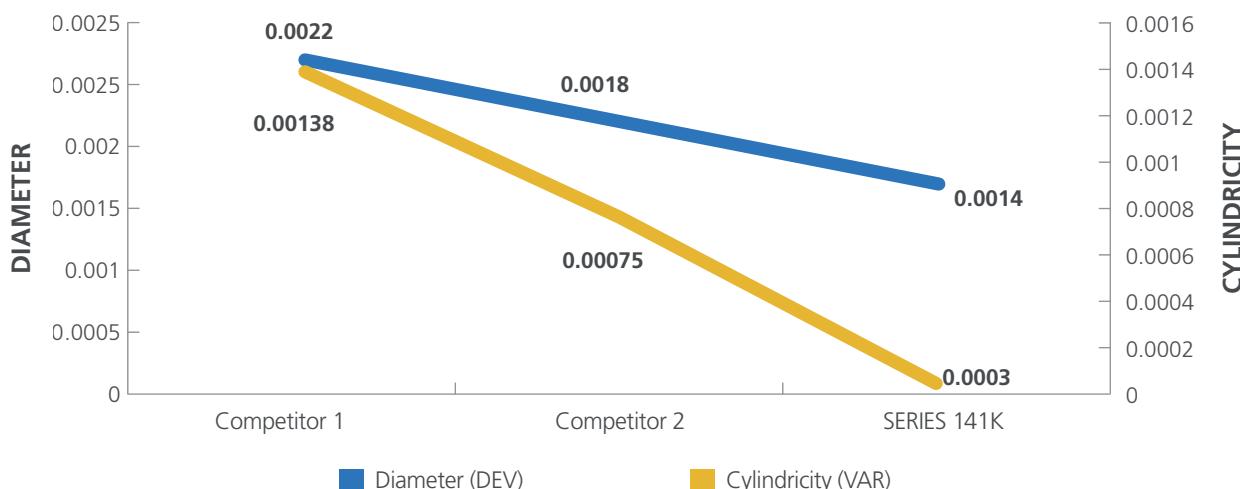
Series 141K drill results in 50% tool life improvement over a range of leading competitors



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)



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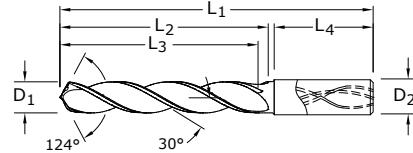
Hi Performance Drill

Hi-PerCarb I Series 141K



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 (TM) EDP No.
Common	3,0 mm	0.1181			6,0	66,0	28,0	23,0	36,0	65160
5xD Reach	3,1 mm	0.1220			6,0	66,0	28,0	23,0	36,0	65161
Right Spiral	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
Internal Coolant	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
Flutes	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

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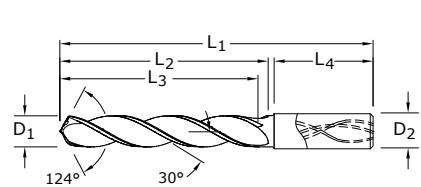
Automotive
Mold & Die

Aerospace
High Performance

General
Special Tools

Hi Performance Drill

Hi-PerCarb I Series 141K



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	.+.0002/+,.0012	h6
> 3 - 6	.+.0004/+,.0016	h6
> 6 - 10	.+.0006/+,.0021	h6
> 10 - 18	.+.0007/+,.0025	h6

Automotive

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Special Tools

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

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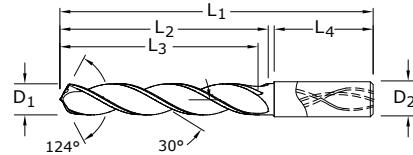
Hi Performance Drill

Hi-PerCarb I Series 141K



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™ 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

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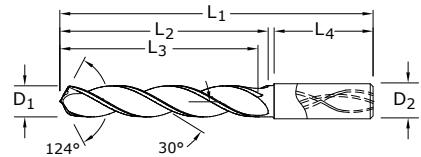
Automotive
Mold & Die

Aerospace
High Performance

General
Special Tools

Hi Performance Drill

Hi-PerCarb I Series 141K



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	.+.002/+,.012	h6
> 3 - 6	.+.004/+,.016	h6
> 6 - 10	.+.006/+,.021	h6
> 10 - 18	.+.007/+,.025	h6

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

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



Hi Performance Drill

Hi-PerCarb I Series 141K



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 (110-165)	RPM Fr Feed (mm/min)	14541 0.119 1725	7271 0.237 1725	5453 0.316 1725	4362 0.395 1725	3635 0.475 1725	3116 0.554 1725
	GRAY CAST IRON PEARLITIC ASTM A48: CLASS 30, 35, 40 SAE J431C: GRADE 3000	≤ 220 Bhn or ≤ 19 HRc	114 (91-137)	RPM Fr Feed (mm/min)	12118 0.094 1145	6059 0.189 1145	4544 0.252 1145	3635 0.315 1145	3029 0.378 1145	2597 0.441 1145
	COMPACTED GRAPHITE IRON	≤ 250 Bhn or ≤ 25 HRc	99 (79-119)	RPM Fr Feed (mm/min)	10502 0.094 990	5251 0.189 990	3938 0.251 990	3151 0.314 990	2626 0.377 990	2250 0.440 990
	MALLEABLE CAST IRON FERRITIC ASTM A220: GRADE 40010 SAE J158: GRADE M4504	≤ 160 Bhn or ≤ 3 HRc	137 (110-165)	RPM Fr Feed (mm/min)	14541 0.119 1725	7271 0.237 1725	5453 0.316 1725	4362 0.395 1725	3635 0.475 1725	3116 0.554 1725
	MALLEABLE CAST IRON MARTENSITE ASTM A220: GRADE 90001 SAE J158: GRADE M8501	≤ 320 Bhn or ≤ 34 HRc	76 (61-91)	RPM Fr Feed (mm/min)	8078 0.076 610	4039 0.151 610	3029 0.201 610	2424 0.252 610	2020 0.302 610	1731 0.352 610
										1515 0.403 610

Note:

- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (Vc x 1000) / (D₁ 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)

Automotive

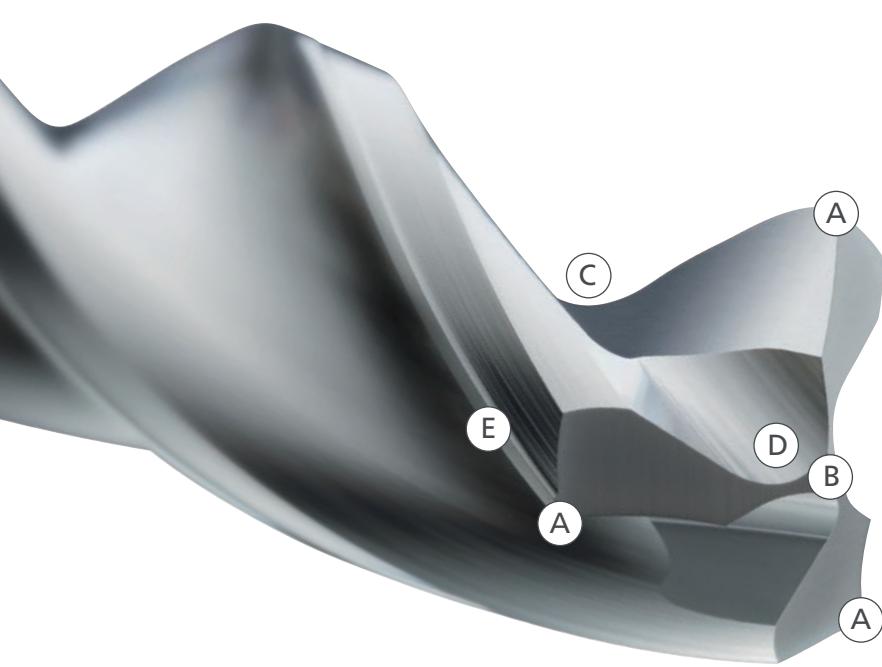
Mold & Die

Aerospace

High Performance

General

Special Tools



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

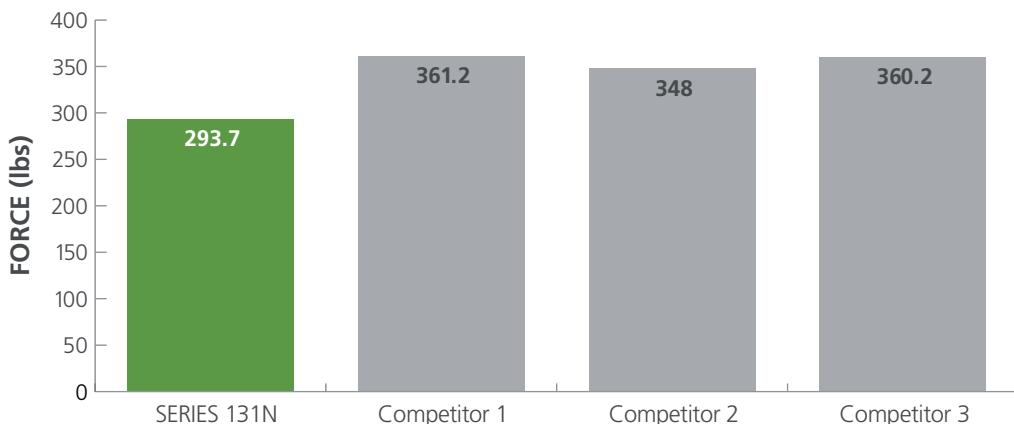
Now available with 3XD and 5XD Coated and Uncoated Options!

PERFORMANCE. PRECISION. PASSION.
HI-PERCARB SERIES 131N ALUMINUM DRILLS

PERFORMANCE.

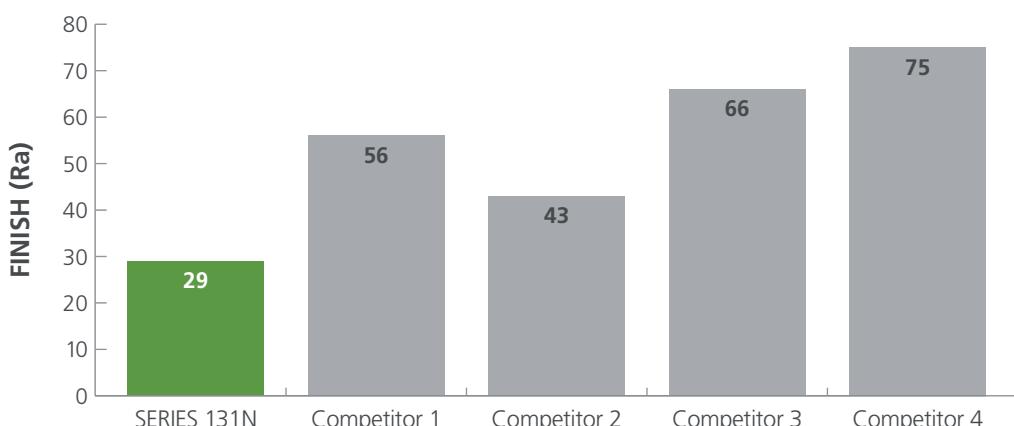
FORCE COMPARISON

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



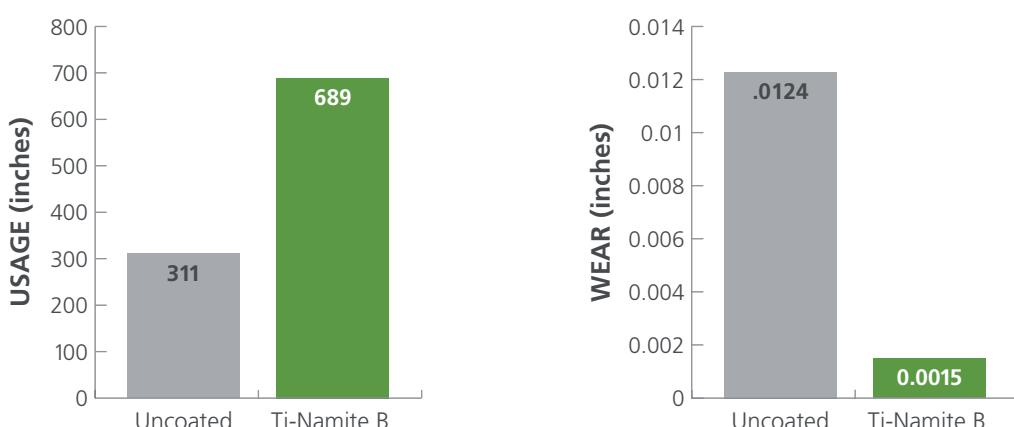
SURFACE FINISH COMPARISON

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



USAGE & WEAR COMPARISONS

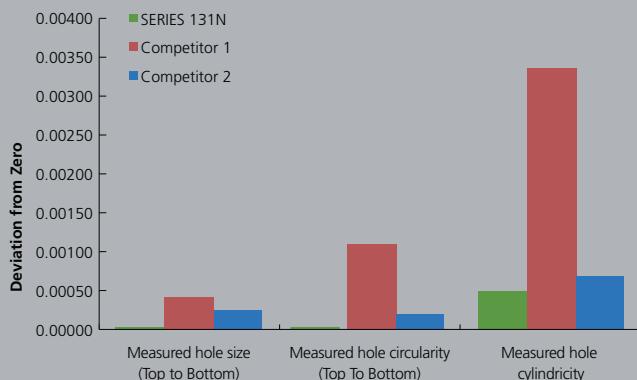
Ti-NAMITE B coating significantly improves wear resistance, which is particularly beneficial when drilling high silicon aluminum alloys



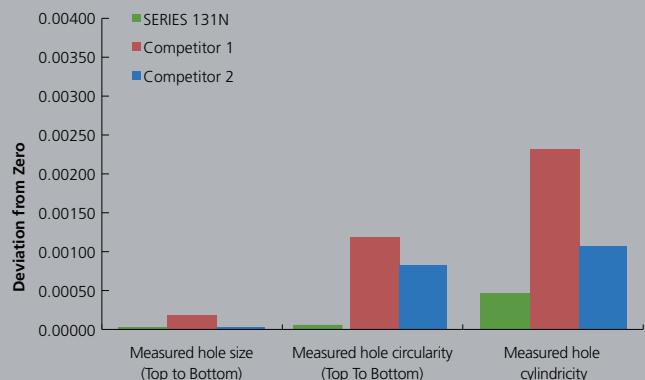
PRECISION.

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**

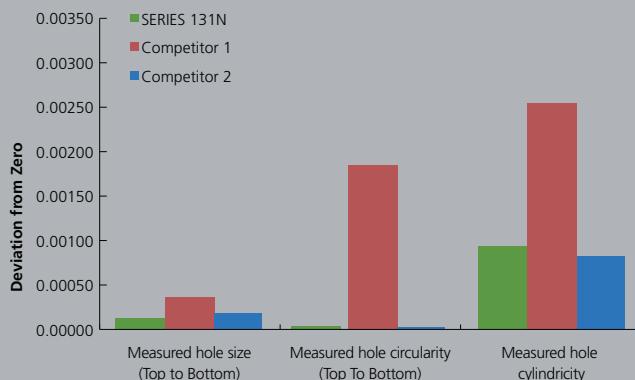


PASSION.

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

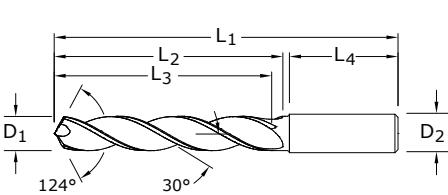
Coefficient of Friction: 0.45

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

www.kyocera-sgstool.com

Hi Performance Drill

Hi-PerCarb / Series 131N

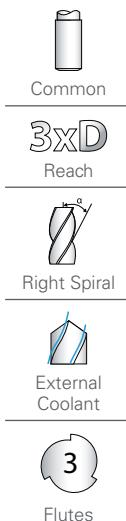


TOLERANCES (inch)			TOLERANCES (mm)		
DIAMETER	D ₁	D ₂	DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+0.00047	h6	≤ 3	+0.002/+0.012	h6
>.1181-.2362	.+.00016/+0.00063	h6	> 3 - 6	+0.004/+0.016	h6
>.2362-.3937	.+.00024/+0.00083	h6	> 6 - 10	+0.006/+0.021	h6
>.3937-.7087	.+.00028/+0.00098	h6	> 10 - 18	+0.007/+0.025	h6
>.7087-1.1811	.+.00031/+0.00114	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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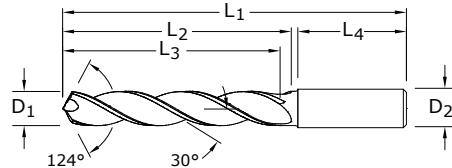
Hi Performance Drill

Hi-PerCarb I Series 131N



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.
Common	6,0 mm	0.2362		M7 X 1	6,0	66,0	28,0	20,0	36,0	64630	67630
3xD Reach	6,1 mm	0.2402			8,0	79,0	34,0	24,0	36,0	64631	67631
Right Spiral	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
External Coolant	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
3 Flutes	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

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Hi Performance Drill

Hi-PerCarb / Series 131N



Automotive

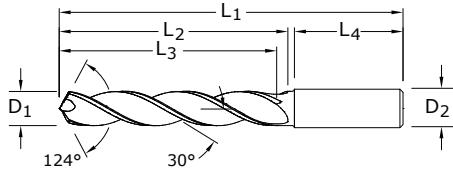
Mold & Die

Aerospace

High Performance

General

Special Tools



TOLERANCES (inch)			TOLERANCES (mm)		
DIAMETER	D ₁	D ₂	DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+0.00047	h6	≤ 3	+0.002/+0.012	h6
>.1181-.2362	.+.00016/+0.00063	h6	> 3 - 6	+0.004/+0.016	h6
>.2362-.3937	.+.00024/+0.00083	h6	> 6 - 10	+0.006/+0.021	h6
>.3937-.7087	.+.00028/+0.00098	h6	> 10 - 18	+0.007/+0.025	h6
>.7087-1.1811	.+.00031/+0.00114	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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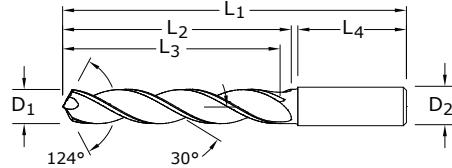
Hi Performance Drill

Hi-PerCarb | Series 131N



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.
Common	1/2	0.5000	12.70		14,0	107,0	60,0	43,0	45,0	54628	54728
3xD Reach	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

Automotive

Mold & Die

Aerospace

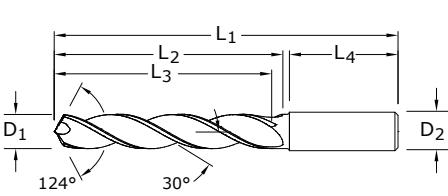
High Performance

General

Special Tools

Hi Performance Drill

Hi-PerCarb I Series 131N

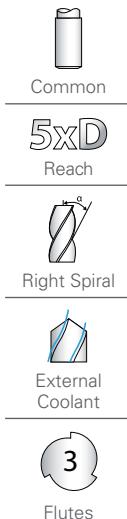


TOLERANCES (inch)			TOLERANCES (mm)		
DIAMETER	D ₁	D ₂	DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+0.00047	h6	≤ 3	.+.0002/+0.012	h6
>.1181-.2362	.+.00016/+0.00063	h6	> 3 - 6	.+.0004/+0.016	h6
>.2362-.3937	.+.00024/+0.00083	h6	> 6 - 10	.+.0006/+0.021	h6
>.3937-.7087	.+.00028/+0.00098	h6	> 10 - 18	.+.0007/+0.025	h6
>.7087-1.1811	.+.00031/+0.00114	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

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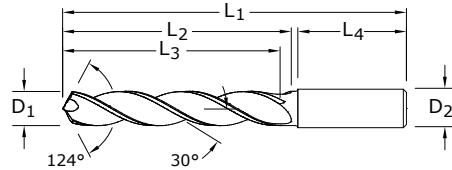
Hi Performance Drill

Hi-PerCarb I Series 131N



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
	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

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Hi Performance Drill

Hi-PerCarb I Series 131N



Automotive

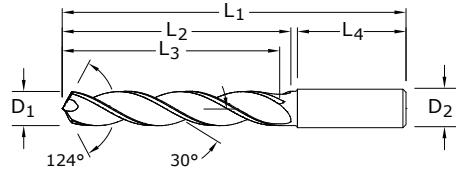
Mold & Die

Aerospace

High Performance

General

Special Tools



TOLERANCES (inch)			TOLERANCES (mm)		
DIAMETER	D ₁	D ₂	DIAMETER	D ₁	D ₂
≤.1181	.+.00008/+,.00047	h6	≤ 3	.+.002/+,.012	h6
>.1181-.2362	.+.00016/+,.00063	h6	> 3 - 6	.+.004/+,.016	h6
>.2362-.3937	.+.00024/+,.00083	h6	> 6 - 10	.+.006/+,.021	h6
>.3937-.7087	.+.00028/+,.00098	h6	> 10 - 18	.+.007/+,.025	h6
>.7087-1.1811	.+.00031/+,.00114	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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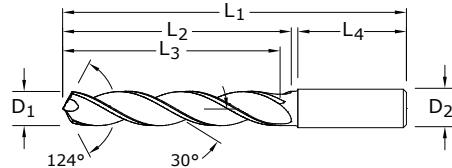
Hi Performance Drill

Hi-PerCarb | Series 131N



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.
Common	1/2	0.5000	12.70		14,0	124,0	77,0	60,0	45,0	55028	54828
5xD Reach	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
Right Spiral	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
External Coolant	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
3 Flutes	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

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Hi Performance Drill

Hi-PerCarb I Series 131N



Series 131N 3D& 5D Metric	Hardness	Vc (m/min)	Diameter (D ₁) (mm)							
			3	6	8	10	12	14	16	
ALUMINUM ALLOYS < 12% Si 6061, 2024, 7075	$\leq 150 \text{ Bhn}$ or $\leq 7 \text{ HRc}$	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	$\leq 125 \text{ Bhn}$ or $\leq 77 \text{ HRb}$	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	$\leq 175 \text{ Bhn}$ or $\leq 16 \text{ HRc}$	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 = $(V_c \times 1000) / (D_1 \times 3.14)$
- 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)

Automotive

Mold & Die

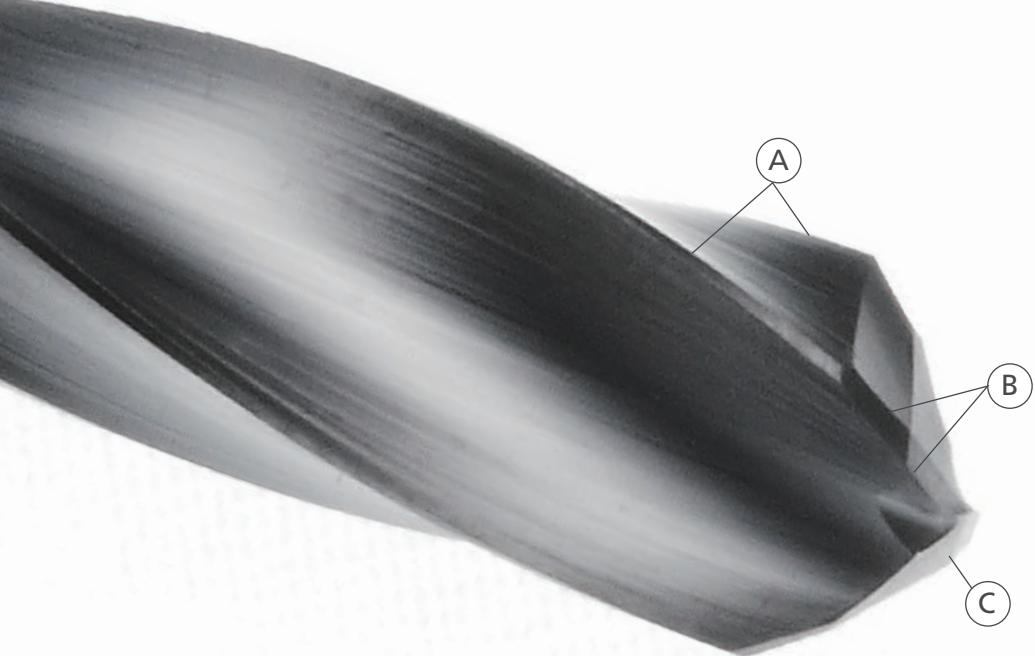
Aerospace

High Performance

General

Special Tools

Memo



SERIES 120



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

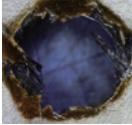
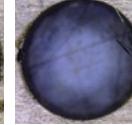
PERFORMANCE.

- 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 5,000 rpm	FEED 5.0 ipm	DIAMETER .190"	HOLE DEPTH .240"	WORKPIECE CFRP	MACHINE TYPE Vertical Machining Center	COOLANT none
TOOL NO.	TYPE DESCRIPTION	TIR IN MACHINE	USAGE	TOOL NO.	TYPE DESCRIPTION	TIR IN MACHINE
1	.190" CFRP drill uncoated	.0001"	50 holes	2	.190" CFRP drill diamond	.0002"
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	1ST HOLE	25TH HOLE	50TH HOLE
						
						AFTER 50 HOLES
						

Di-NAMITE®
CRYSTALLINE DIAMOND COATING

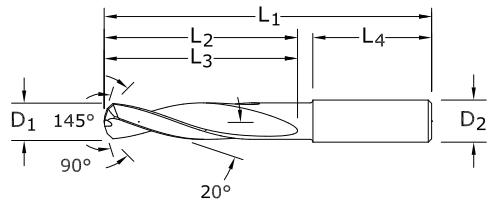
PASSION.

- 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

Composite Drill

Series 120



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



Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Composite Drill

Series 120



Series 120 Metric	Vc (m/min)	Diameter (D ₁) (mm)							
		2.5	3	4	6	8	10	12	
N	100 (80-120)	RPM	12722	10602	7951	5301	3976	3181	2650
		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 (65-90)	RPM	9542	7951	5963	3976	2982	2385	1988
		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 (96-144)	RPM	15266	12722	9542	6361	4771	3817	3181
		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) / (D₁ 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)

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

Memo

General Purpose Drills



3.00mm SHANK

MICRO DRILLS

0.04mm - 0.34mm DIAMETER

Mirror Surface Finishes

Sub Micron Grain Carbide



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
AITIN	★	★	★	★	★	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated						☆	☆	★	★	☆	☆	★	★	★	★	☆

★ : Priority ☆ : Applicable Materials

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3.00mm SHANK

MICRO DRILLS

0.35mm - 0.54mm DIAMETER

Mirror Surface Finishes

Sub Micron Grain Carbide



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						☆	☆	★	★	☆	★	★	★	☆	☆	

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0.55mm - 0.84mm DIAMETER

Mirror Surface Finishes

Sub Micron Grain Carbide



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
AITIN	★	★	★	★	★	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated						☆	☆	★	★	☆	☆	★	★	★	☆	☆

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3.00mm SHANK

MICRO DRILLS

0.85mm - 1.14mm DIAMETER

Mirror Surface Finishes

Sub Micron Grain Carbide



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						☆	☆	★	★	☆	☆	★	★	☆	☆	

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MICRO DRILLS

1.15mm - 1.44mm DIAMETER

Mirror Surface Finishes

Sub Micron Grain Carbide



STANDARD Flute Length



Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC ^{+0.000mm} DC ^{-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
AITIN	★	★	★	★	★	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	
Uncoated						☆	☆	★	★	☆	☆	★	★	★	☆	

★ : Priority ☆ : Applicable Materials

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3.00mm SHANK

MICRO DRILLS

1.45mm - 1.74mm DIAMETER

Mirror Surface Finishes

Sub Micron Grain Carbide



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

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3.00mm SHANK

MICRO DRILLS

1.75mm - 2.02mm DIAMETER

Mirror Surface Finishes

Sub Micron Grain Carbide



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
AITIN	★	★	★	★	★	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated						☆	☆	★	★	☆	☆	★	★	★	★	☆

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3.00mm SHANK

MICRO DRILLS

2.03mm - 2.30mm DIAMETER

Mirror Surface Finishes

Sub Micron Grain Carbide



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						☆	☆	★	★	☆	★	★	★	★	☆	

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3.00mm SHANK

MICRO DRILLS

2.31mm - 2.60mm DIAMETER

Mirror Surface Finishes

Sub Micron Grain Carbide



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
AITIN	★	★	★	★	★	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated						☆	☆	★	★	☆	☆	★	★	★	☆	☆

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3.00mm SHANK

MICRO DRILLS

2.61mm - 2.90mm DIAMETER

Mirror Surface Finishes

Sub Micron Grain Carbide



STANDARD Flute Length



Uncoated		AlTiN Coating		Dimensions (mm)				Point Angle
Part Number	Stock	Part Number	Stock	DC +0.000mm -0.008mm	DCON	OAL	LCF	
226-1028.400	●	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



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
AITIN	★	★	★	★	★	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	
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



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
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3.00mm SHANK

MICRO DRILLS

1.85mm - 3.00mm DIAMETER

Mirror Surface Finishes

Sub Micron Grain Carbide



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
AITIN	★	★	★	★	★	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
Uncoated						☆	☆	★	★	☆	☆	★	★	★	★	☆

★ : Priority ☆ : Applicable Materials

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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	00.005 - 00.010	00.13 - 00.25	0.00015 - 0.00030	0.0040 - 0.0075
						00.010 - 00.015	00.25 - 00.38	0.00030 - 0.00045	0.0075 - 0.0115
						00.015 - 00.020	00.38 - 00.50	0.00045 - 0.00060	0.0115 - 0.0150
						00.020 - 00.040	00.50 - 01.00	0.00060 - 0.00120	0.0150 - 0.0300
						00.040 - 00.080	01.00 - 02.00	0.00120 - 0.00240	0.0300 - 0.0600
						00.080 - 00.125	02.00 - 03.00	0.00240 - 0.00360	0.0600 - 0.0900
Mild Carbon Steel	1018 1028 1050	98 - 150	30 - 45	130 - 180	40 - 54	00.005 - 00.010	00.13 - 00.25	0.00014 - 0.00028	0.0035 - 0.0070
						00.010 - 00.015	00.25 - 00.38	0.00028 - 0.00042	0.0070 - 0.0106
						00.015 - 00.020	00.38 - 00.50	0.00042 - 0.00056	0.0106 - 0.0140
						00.020 - 00.040	00.50 - 01.00	0.00056 - 0.00115	0.0140 - 0.0280
						00.040 - 00.080	01.00 - 02.00	0.00115 - 0.00226	0.0280 - 0.0560
						00.080 - 00.125	02.00 - 03.00	0.00226 - 0.00353	0.0560 - 0.0896
Alloy Steel	4130 4140 8620	180 - 245	55 - 75	195 - 260	60 - 80	00.005 - 00.010	00.13 - 00.25	0.00013 - 0.00026	0.0033 - 0.0066
						00.010 - 00.015	00.25 - 00.38	0.00026 - 0.00039	0.0066 - 0.0099
						00.015 - 00.020	00.38 - 00.50	0.00039 - 0.00052	0.0099 - 0.0132
						00.020 - 00.040	00.50 - 01.00	0.00052 - 0.00104	0.0132 - 0.0264
						00.040 - 00.080	01.00 - 02.00	0.00104 - 0.00208	0.0264 - 0.0528
						00.080 - 00.125	02.00 - 03.00	0.00208 - 0.00326	0.0528 - 0.0828
Preharden Tool Steel	P20 4140PH A2 D2 H13	100 - 165	30 - 50	130 - 195	40 - 60	00.005 - 00.010	00.13 - 00.25	0.00008 - 0.00015	0.0020 - 0.0038
						00.010 - 00.015	00.25 - 00.38	0.00015 - 0.00023	0.0038 - 0.0058
						00.015 - 00.020	00.38 - 00.50	0.00023 - 0.00030	0.0038 - 0.0076
						00.020 - 00.040	00.50 - 01.00	0.00030 - 0.00060	0.0076 - 0.0152
						00.040 - 00.080	01.00 - 02.00	0.00060 - 0.00120	0.0152 - 0.0304
						00.080 - 00.125	02.00 - 03.00	0.00120 - 0.00190	0.0304 - 0.0483
Harden Tool Steel	>48 HRc/ <55HRc	60 - 100	18 - 30	80 - 140	25 - 42	00.005 - 00.010	00.13 - 00.25	0.00006 - 0.00013	0.0015 - 0.0033
						00.010 - 00.015	00.25 - 00.38	0.00013 - 0.00019	0.0033 - 0.0048
						00.015 - 00.020	00.38 - 00.50	0.00019 - 0.00026	0.0048 - 0.0066
						00.020 - 00.040	00.50 - 01.00	0.00026 - 0.00052	0.0066 - 0.0132
						00.040 - 00.080	01.00 - 02.00	0.00052 - 0.00105	0.0132 - 0.0264
						00.080 - 00.125	02.00 - 03.00	0.00105 - 0.00163	0.0264 - 0.0414
Stainless Steel	303 304 316 321	50 - 80	15 - 24	65 - 100	20 - 30	00.005 - 00.010	00.13 - 00.25	0.00011 - 0.00022	0.0028 - 0.0056
						00.010 - 00.015	00.25 - 00.38	0.00022 - 0.00033	0.0056 - 0.0084
						00.015 - 00.020	00.38 - 00.50	0.00033 - 0.00044	0.0084 - 0.0110
						00.020 - 00.040	00.50 - 01.00	0.00044 - 0.00087	0.0110 - 0.0220
						00.040 - 00.080	01.00 - 02.00	0.00087 - 0.00174	0.0220 - 0.0442
						00.080 - 00.125	02.00 - 03.00	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	00.005 - 00.010	00.13 - 00.25	0.00009 - 0.00017	0.0023 - 0.0043
						00.010 - 00.015	00.25 - 00.38	0.00017 - 0.00026	0.0043 - 0.0066
						00.015 - 00.020	00.38 - 00.50	0.00026 - 0.00035	0.0066 - 0.0089
						00.020 - 00.040	00.50 - 01.00	0.00035 - 0.00070	0.0089 - 0.0178
						00.040 - 00.080	01.00 - 02.00	0.00070 - 0.00139	0.0178 - 0.0353
						00.080 - 00.125	02.00 - 03.00	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.

Automotive
Mold & Die
Aerospace

General
High Performance

Special Tools

Solid Carbide Micro Drills

◆ Series 105 / 226 / 226L / 390 / 392

Workpiece Material	Material Hardness/Types	Uncoated		AlTiN Coated		Cutting Dia. DC (in)	Cutting Dia. DC (mm)	Feed Per Rev	
		Recommended Cutting Speed (sfm)	(m/min)	Recommended Cutting Speed (sfm)	(m/min)			(ipr)	(mm/rev)
Gray Cast Iron	-	130 - 165	40 - 50	165 - 190	50 - 57	00.005 - 00.010	00.13 - 00.25	0.00020 - 0.00039	0.0051 - 0.0099
						00.010 - 00.015	00.25 - 00.38	0.00039 - 0.00059	0.0099 - 0.0149
						00.015 - 00.020	00.38 - 00.50	0.00059 - 0.00078	0.0149 - 0.0198
						00.020 - 00.040	00.50 - 01.00	0.00078 - 0.00157	0.0198 - 0.0398
						00.040 - 00.080	01.00 - 02.00	0.00157 - 0.00313	0.0398 - 0.0795
						00.080 - 00.125	02.00 - 03.00	0.00313 - 0.00489	0.0795 - 0.1242
Nodular Cast Iron	-	95 - 150	28 - 45	115 - 150	35 - 45	00.005 - 00.010	00.13 - 00.25	0.00015 - 0.00030	0.0040 - 0.0075
						00.010 - 00.015	00.25 - 00.38	0.00030 - 0.00045	0.0075 - 0.0115
						00.015 - 00.020	00.38 - 00.50	0.00045 - 0.00060	0.0115 - 0.0150
						00.020 - 00.040	00.50 - 01.00	0.00060 - 0.00120	0.0150 - 0.0300
						00.040 - 00.080	01.00 - 02.00	0.00120 - 0.00240	0.0300 - 0.0600
						00.080 - 00.125	02.00 - 03.00	0.00240 - 0.00360	0.0600 - 0.0900
Aluminum	-	165 - 295	50 - 90	245 - 325	74 - 98	00.005 - 00.010	00.13 - 00.25	0.00025 - 0.00049	0.0063 - 0.0124
						00.010 - 00.015	00.25 - 00.38	0.00049 - 0.00074	0.0124 - 0.0188
						00.015 - 00.020	00.38 - 00.50	0.00074 - 0.00099	0.0188 - 0.0250
						00.020 - 00.040	00.50 - 01.00	0.00099 - 0.00197	0.0250 - 0.0500
						00.040 - 00.080	01.00 - 02.00	0.00197 - 0.00394	0.0500 - 0.1000
						00.080 - 00.125	02.00 - 03.00	0.00394 - 0.00616	0.1000 - 0.1565
Copper Alloys	-	140 - 190	42 - 58	180 - 230	55 - 70	00.005 - 00.010	00.13 - 00.25	0.00025 - 0.00049	0.0063 - 0.0124
						00.010 - 00.015	00.25 - 00.38	0.00049 - 0.00074	0.0124 - 0.0188
						00.015 - 00.020	00.38 - 00.50	0.00074 - 0.00099	0.0188 - 0.0250
						00.020 - 00.040	00.50 - 01.00	0.00099 - 0.00197	0.0250 - 0.0500
						00.040 - 00.080	01.00 - 02.00	0.00197 - 0.00394	0.0500 - 0.1000
						00.080 - 00.125	02.00 - 03.00	0.00394 - 0.00616	0.1000 - 0.1565
Heat Resistant Alloy	Waspaloy Hastelloy Inconel Monel	40 - 55	12 - 16	50 - 65	15 - 19	00.005 - 00.010	00.13 - 00.25	0.00005 - 0.00011	0.0014 - 0.0028
						00.010 - 00.015	00.25 - 00.38	0.00011 - 0.00016	0.0028 - 0.0041
						00.015 - 00.020	00.38 - 00.50	0.00016 - 0.00022	0.0041 - 0.0055
						00.020 - 00.040	00.50 - 01.00	0.00022 - 0.00044	0.0055 - 0.0110
						00.040 - 00.080	01.00 - 02.00	0.00044 - 0.00087	0.0110 - 0.0220
						00.080 - 00.125	02.00 - 03.00	0.00087 - 0.00136	0.0220 - 0.0345
Titanium Alloy	-	40 - 55	12 - 16	50 - 65	15 - 19	00.005 - 00.010	00.13 - 00.25	0.00006 - 0.00013	0.0015 - 0.0033
						00.010 - 00.015	00.25 - 00.38	0.00013 - 0.00019	0.0033 - 0.0048
						00.015 - 00.020	00.38 - 00.50	0.00019 - 0.00026	0.0048 - 0.0066
						00.020 - 00.040	00.50 - 01.00	0.00026 - 0.00052	0.0066 - 0.0132
						00.040 - 00.080	01.00 - 02.00	0.00052 - 0.00105	0.0132 - 0.0264
						00.080 - 00.125	02.00 - 03.00	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



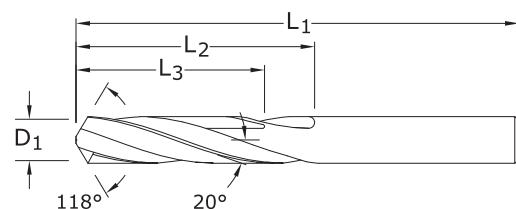
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2

101

FRACTIONAL & METRIC SERIES



Pictured:
Series 101 Drill Set

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

CUTTING DIAMETER <i>D₁</i>	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH <i>L₁</i>	FLUTE LENGTH <i>L₂</i>	CLEARED LENGTH <i>L₃</i>	EDP NO.	
						UNCOATED	Ti-NAMITE-A (AITIN)
#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)

D₁ = +.0000/-0.0127

TOLERANCES (mm)

D₁ = +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

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	Ti-NAMITE-A (AITIN)
#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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Automotive

Mold & Die
Aerospace

General

High Performance
Special Tools

FRACTIONAL & METRIC

2 Flute Drills • Metric: DIN 338



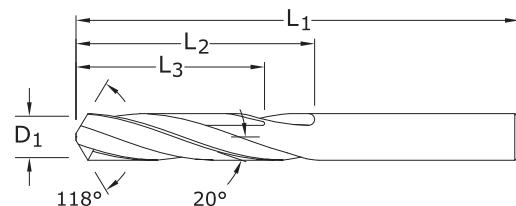
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2

101

FRACTIONAL & METRIC SERIES



Pictured:
Series 101 Drill Set

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

CUTTING DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	EDP NO.	
						UNCOATED	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)

$D_1 = +.0000/-0.0127$

TOLERANCES (mm)

$D_1 = +0,0000/-0,0127$

STEELS

STAINLESS STEELS

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FRACTIONAL & METRIC
2 Flute Drills • Metric: DIN 338

101

FRACTIONAL & METRIC SERIES

CUTTING DIAMETER <i>D₁</i>	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH <i>L₁</i>	FLUTE LENGTH <i>L₂</i>	CLEARED LENGTH <i>L₃</i>	EDP NO.		CONTINUED
						UNCOATED	Ti-NAMITE-A (AITiN)	
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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Automotive

Mold & Die
AerospaceGeneral
High Performance
Special Tools

FRACTIONAL & METRIC

2 Flute Drills • Metric: DIN 338



5xD

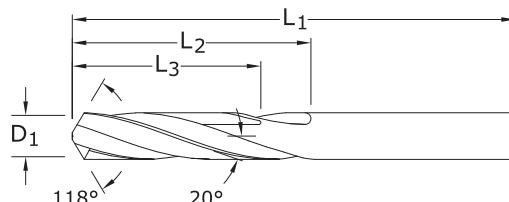


2

Pictured:
Series 101 Drill Set

101

FRACTIONAL & METRIC SERIES



TOLERANCES (inch)

D₁ = +.0000/-0.0005

TOLERANCES (mm)

D₁ = +0,0000/-0,0127

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

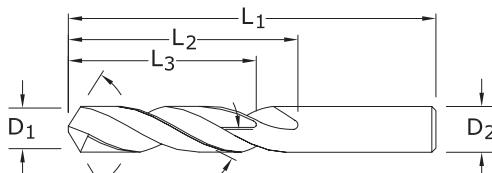
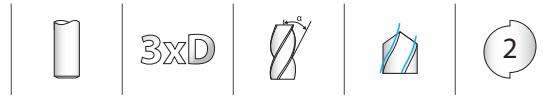
NON-FERROUS

PLASTICS/COMPOSITES

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CUTTING DIAMETER	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH	FLUTE LENGTH	CLEARED LENGTH	EDP NO.	
						UNCOATED	Ti-NAMITE-A (AITiN)
D ₁	0.3390	8.61	4	2-1/2	2	51218	57194
R	0.3425	8.73	125,0	81,0	64,0	61113	68355
8,7 mm	0.3425	8.73	4	2-1/2	2	51122	57195
11/32	0.3438	8.73	125,0	81,0	64,0	61114	68356
8,8 mm	0.3465	8.84	4	2-1/2	2	51219	57196
S	0.3480	8.84	125,0	81,0	64,0	61115	68357
8,9 mm	0.3504	8.84	4	2-1/2	2	61039	68287
9,0 mm	0.3543	8.84	125,0	81,0	64,0	51220	57197
T	0.3580	9.09	4-1/4	2-3/4	2-13/64	61116	68358
9,1 mm	0.3583	9.09	125,0	81,0	64,0	51123	57198
23/64	0.3594	9.13	4-1/4	2-3/4	2-13/64	61117	68359
9,2 mm	0.3622	9.13	125,0	81,0	64,0	61118	68360
9,3 mm	0.3661	9.13	125,0	81,0	64,0	51221	57199
U	0.3680	9.35	4-1/4	2-3/4	2-13/64	61119	68361
9,4 mm	0.3701	9.35	125,0	81,0	64,0	61041	68288
9,5 mm	0.3740	9.35	125,0	81,0	64,0	51124	57200
*3/8	0.3750	9.53	4-1/4	2-3/4	2-13/64	51222	57201
V	0.3770	9.58	4-1/4	2-3/4	2-13/64	61120	68362
9,6 mm	0.3780	9.58	133,0	87,0	69,0	61121	68363
9,7 mm	0.3819	9.58	133,0	87,0	69,0	61122	68364
9,8 mm	0.3858	9.58	133,0	87,0	69,0	51223	57202
W	0.3860	9.80	4-1/2	2-7/8	2-19/64	61123	68365
9,9 mm	0.3898	9.80	133,0	87,0	69,0	51125	57203
25/64	0.3906	9.92	4-1/2	2-7/8	2-19/64	61043	68289
10,0 mm	0.3937	9.92	133,0	87,0	69,0	51224	57204
X	0.3970	10.08	4-1/2	2-7/8	2-19/64	61124	68366
10,2 mm	0.4016	10.26	133,0	87,0	69,0	51225	57205
Y	0.4040	10.26	4-1/2	2-7/8	2-19/64	51126	57206
13/32	0.4062	10.32	4-1/2	2-7/8	2-19/64	51226	57207
Z	0.4130	10.49	4-1/2	2-7/8	2-19/64	61045	68290
10,5 mm	0.4134	10.49	133,0	87,0	69,0	27/64	57208
27/64	0.4219	10.72	4-1/2	2-7/8	2-19/64	51127	57208
11,0 mm	0.4331	10.72	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	11.11	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	11.91	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

METRIC Short Length Self Centering Drills • DIN 6539



108M Plus
METRIC SERIES

TOLERANCES (mm)

≤3 DIAMETER

D₁ = +0,000/-0,010

D₂ = h₆

>3–6 DIAMETER

D₁ = +0,000/-0,012

D₂ = h₆

>6–10 DIAMETER

D₁ = +0,000/-0,015

D₂ = h₆

>10–18 DIAMETER

D₁ = +0,000/-0,018

D₂ = h₆

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit
www.ksptpatents.com

CUTTING DIAMETER D ₁ /D ₂	OVERALL LENGTH L ₁	FLUTE LENGTH L ₂	CLEARED LENGTH L ₃	EDP NO.	
				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

continued on next page

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

METRIC

Short Length Self Centering Drills • DIN 6539



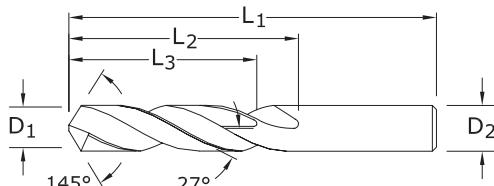
3xD



2

108M Plus

METRIC SERIES



CUTTING DIAMETER D_1/D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	EDP NO. UNCOATED	EDP NO. 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

CUTTING DIAMETER D_1/D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	EDP NO.	
				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

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

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 (65-97)	81	RPM	25690	8563	4282	3211	2569	2141	1606
				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
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 300 Bhn or ≤ 32 HRc (30-46)	38	RPM	12118	4039	2020	1515	1212	1010	757
				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
	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 425 Bhn or ≤ 45 HRc (21-31)	26	RPM	8240	2747	1373	1030	824	687	515
				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
H	CAST IRONS Gray, Malleable, Ductile	≤ 275 Bhn or ≤ 28 HRc (56-84)	70	RPM	22297	7432	3716	2787	2230	1858	1394
				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
	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 375 Bhn or ≤ 40 HRc (35-53)	44	RPM	14057	4686	2343	1757	1406	1171	879
				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
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 450 Bhn or ≤ 48 HRc (15-22)	18	RPM	5816	1939	969	727	582	485	364
				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
K	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc (21-31)	26	RPM	8240	2747	1373	1030	824	687	515
				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
	CAST IRONS Gray, Malleable, Ductile	≤ 375 Bhn or ≤ 40 HRc (13-20)	17	RPM	5332	1777	889	666	533	444	333
				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
	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 475 Bhn or ≤ 50 HRc (10-15)	12	RPM	3878	1293	646	485	388	323	242
				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
M	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc (68-102)	85	RPM	27144	9048	4524	3393	2714	2262	1696
				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
	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 330 Bhn or ≤ 36 HRc (61-91)	76	RPM	24235	8078	4039	3029	2424	2020	1515
				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
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 250 Bhn or ≤ 24 HRc (51-77)	64	RPM	20358	6786	3393	2545	2036	1696	1272
				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
L	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 330 Bhn or ≤ 36 HRc (27-40)	34	RPM	10664	3555	1777	1333	1066	889	666
				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 (16-24)	20	RPM	6301	2100	1050	788	630	525	394
				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
N	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 375 Bhn or ≤ 40 HRc (13-20)	17	RPM	5332	1777	889	666	533	444	333
				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

continued on next page

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 (10-15)	12	RPM	3878	1293	646	485	388	323	242
			Fr	0.006	0.019	0.039	0.052	0.064	0.077	0.103
	≤ 320 Bhn or ≤ 34 HRc (6-9)	8	RPM	2424	808	404	303	242	202	151
			Fr	0.006	0.019	0.037	0.050	0.062	0.074	0.099
	≤ 425 Bhn or ≤ 45 HRc (5-7)	6	RPM	1939	646	323	242	194	162	121
			Fr	0.005	0.015	0.031	0.041	0.052	0.062	0.083
			Feed (mm/min)	15	15	15	15	15	15	15
			Feed (mm/min)	10	10	10	10	10	10	10
	≤ 275 Bhn or ≤ 28 HRc (21-31)	26	RPM	8240	2747	1373	1030	824	687	515
			Fr	0.013	0.040	0.080	0.107	0.133	0.160	0.214
S TITANIUM ALLOYS (DIFFICULT) Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 350 Bhn or ≤ 38 HRc (16-24)	20	RPM	6301	2100	1050	788	630	525	394
			Fr	0.007	0.021	0.043	0.057	0.071	0.086	0.114
	≤ 440 Bhn or ≤ 47 HRc (13-20)	17	RPM	5332	1777	889	666	533	444	333
			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
	≤ 80 Bhn or ≤ 47 HRb (132-198)	165	RPM	52348	17449	8725	6544	5235	4362	3272
			Fr	0.020	0.060	0.120	0.160	0.200	0.240	0.319
	≤ 150 Bhn or ≤ 7 HRc (111-166)	139	RPM	44108	14703	7351	5514	4411	3676	2757
			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
N COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc (46-69)	58	RPM	18419	6140	3070	2302	1842	1535	1151
			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 (43-64)	53	RPM	16965	5655	2827	2121	1696	1414	1060
			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
			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) / (D₁ 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)

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

THE NEW VALUE FRONTIER



PCD Tools

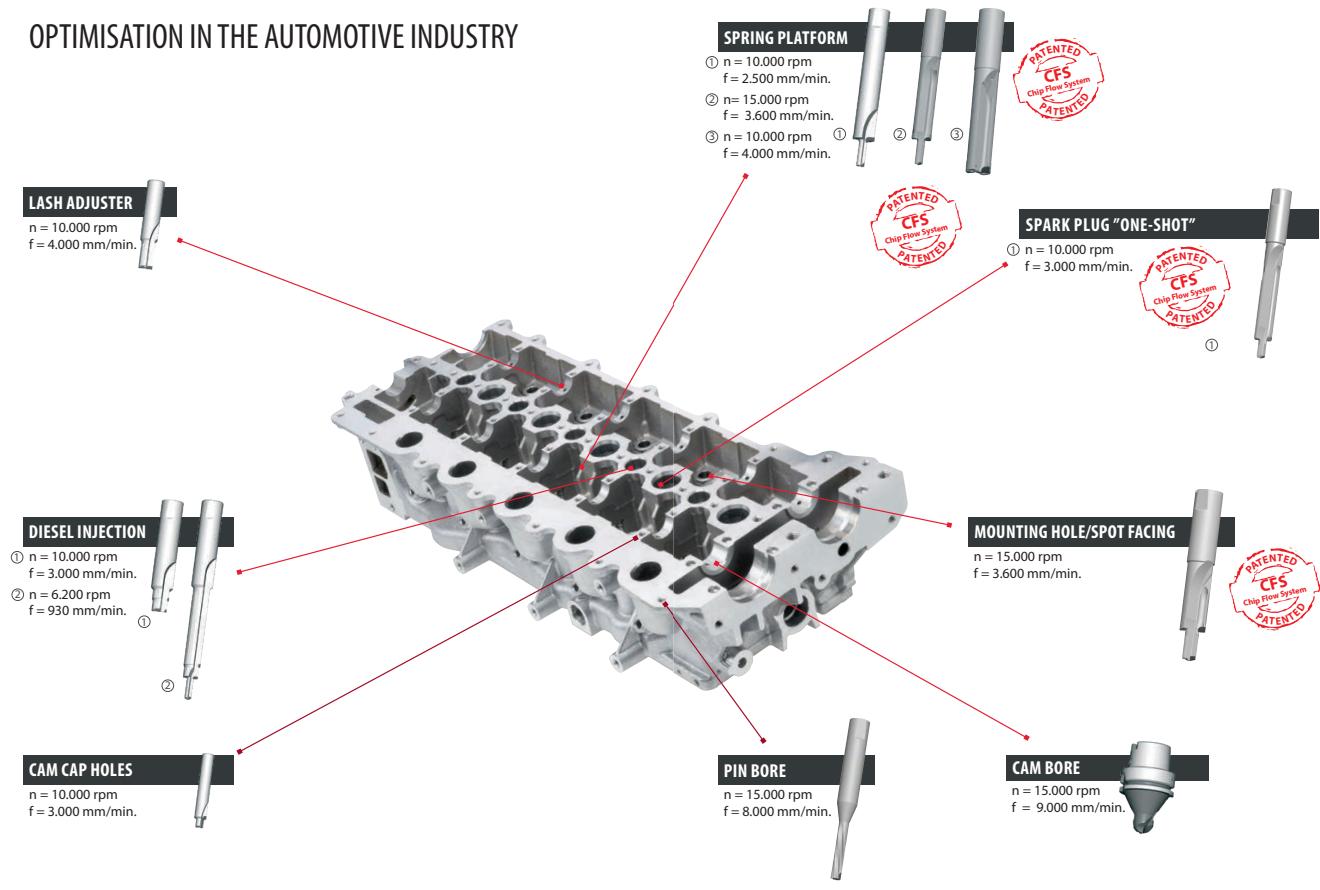


UM DANDIA™ tooling solutions for the automotive industry

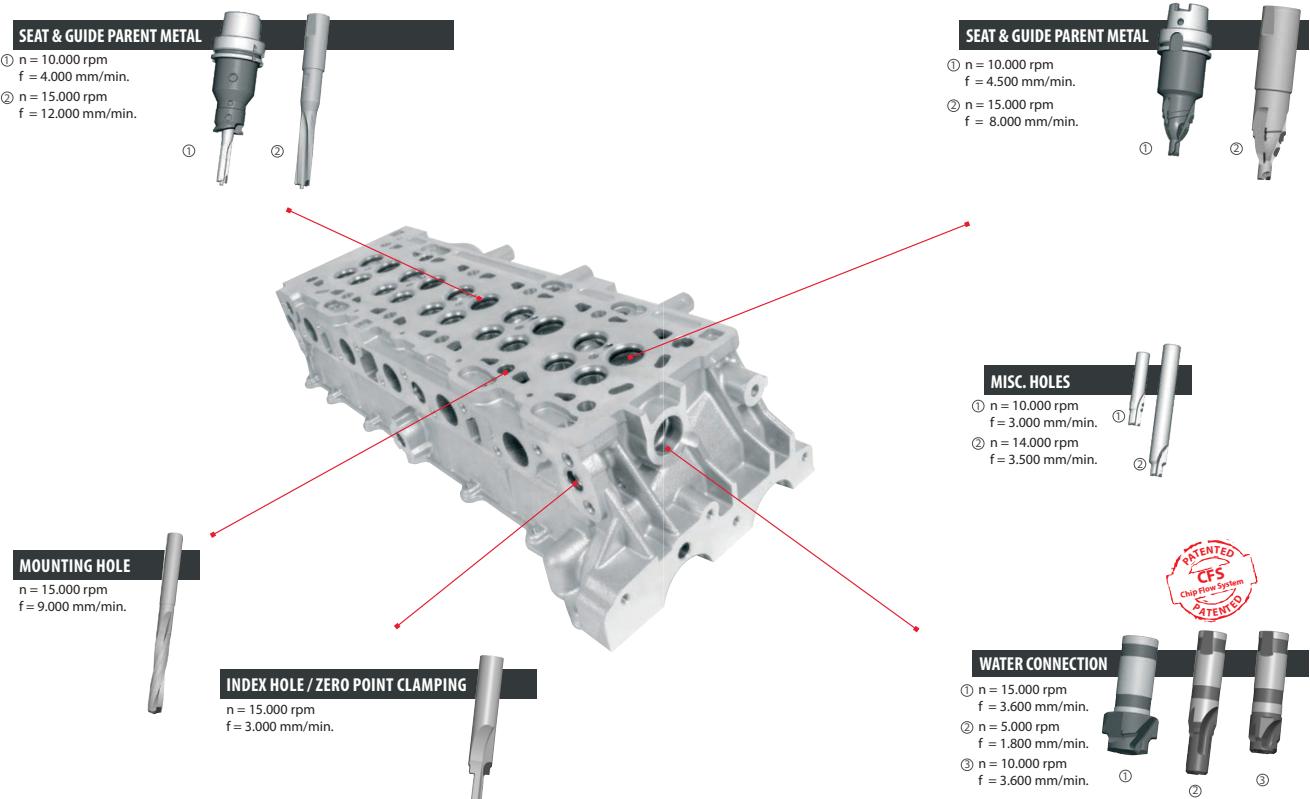


PCD Drill

OPTIMISATION IN THE AUTOMOTIVE INDUSTRY



UM DANDIA™ – OPTIMUM SOLUTIONS



Automotive

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High Performance

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PCD Drill

OPTIMISATION IN THE AUTOMOTIVE INDUSTRY

SPOOL BORE MACHINING

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools



PILOTING

MULTI DIAMETER PCD TOOL

n = 12,000 rpm
f = 4800 mm/min

PLUG/PILOT

MULTI DIAMETER PCD TOOL

n = 8,000 rpm
f = 2400 mm/min

SEMI-FINISHING

PCD STEP REAMER

n = 8,000 rpm
f = 3200 mm/min

FINISHING

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

PCD Drill

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.



Automotive

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Aerospace

High Performance

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Special Tools

PCD Drill

PKD HELI-DRILL



ONE SHOT!

PCD STEP DRILL



► 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.

► 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



PCD VALVE GUIDE REAMER



► 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.

► 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 machining 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.

Automotive

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Aerospace

High Performance

General

Special Tools

PCD Reamer

PCD STEP REAMER



PCD STEP REAMER



► FEATURES

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

► 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

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

► 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 = 6000-10000 RPM, fn = 0.25-0.40 mm/rev.

► 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.

Automotive

Mold & Die

Aerospace

High Performance

General

Special Tools

PCD Combination Tool

PCD STEP REAMER/MILL



PCD STEP DRILL/REAMER



Automotive

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Aerospace

High Performance

General

Special Tools

► 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.

► 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

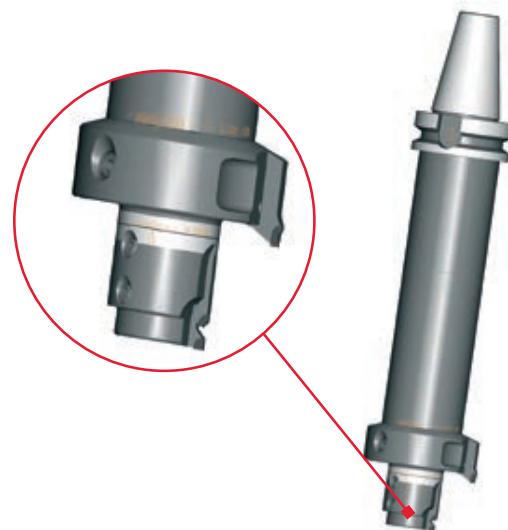
n = 6500 RPM, fn = 0.3-0.4 mm/rev.

PCD Combination Tool

PCD REAMER/COUNTERSINK TOOL



OUT-BORE PCD REAMER, ADJUSTABLE



► 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.

► 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.

Automotive

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