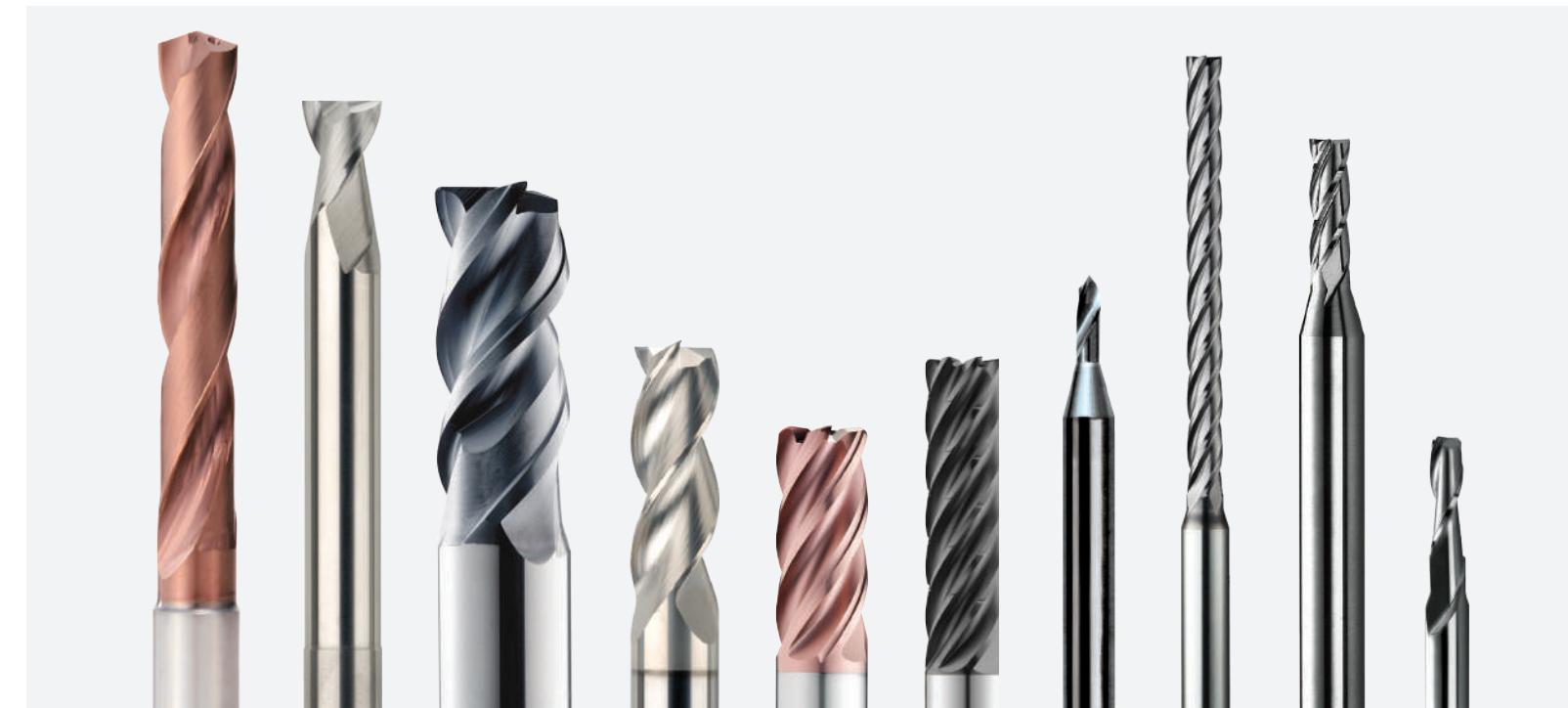




2020-2021  
**KYOCERA**  
Round Tools Catalog



**KYOCERA** 2020 - 2021 **KYOCERA** Round Tools Catalog



**KYOCERA**

KYOCERA Asia Pacific Pte. Ltd.  
<https://asia.kyocera.com/products/cuttingtools/>

IS09001 JMI-0036

EMS 635470 / ISO 14001

ADVANCING PRODUCTIVITY



# Index

2020-2021  
KYOCERA Round Tools Catalog

## ADVANCING PRODUCTIVITY

Advancing your productivity  
through efficient cutting tool products  
and advanced tooling solutions

Kyocera is the global and comprehensive cutting tool manufacturer who provides innovative materials and tool designs as well as proposes solutions for technological improvements.

Kyocera contributes to a world manufacturing by the innovative products and technology.

Kyocera's Management aims to be focused on the User's Perspective.

We promise to be a Comprehensive Value-Added Manufacturer.

### KYOCERA Solid Tools

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End Mills	L2~L44
Solid Tools for CFRP	L45~L47
Drills	L48~L62
Cutting Conditions	L63~L82

### SGS Solid Tools

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### SGS Micro Tools

Introduction	M2~9
Millings	M10~M88
Hole Making	M89~M117
Technical Information	M118~M131

See the front page of each section for details.

## Official Media Lineup

**Scan us!** For latest updates from KYOCERA

• **Web site**

**KYOCERA Asia Pacific Cutting Tools**

<https://asia.kyocera.com/products/cuttingtools/index.html>



• **Application**

**KYOCERA Cutting Tools**



### KYOCERA CUTTING TOOLS Social media available now!



**Facebook page**

KYOCERA Asia Pacific  
Cutting Tools



**YouTube Channel**

KYOCERA Asia Pacific  
Cutting Tools



**LINE account**

KYOCERA Tool Thai



**Highly Efficient and Cost Effective  
New Universal Solid Carbide Drill  
is Now Available!**

**High-Precision Design for a Wide Variety of  
Machining Solutions**



# Striking the Perfect Balance between Performance and Cost

High Efficiency Coated Solid Carbide Drill

## KDA

New K-series is Now Available for Excellent All-Around  
Drilling Performance

The perfect balance between performance and cost

Large lineup accommodates a wide variety of applications

Styles Available

---

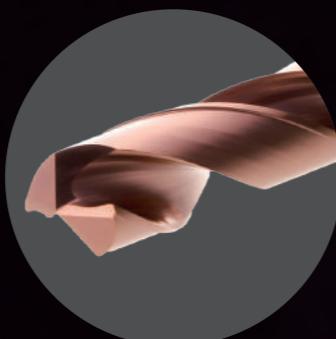
### Type N Normal type

Universal Design without Coolant Holes  
Economical Style for Machining with External  
Coolant

Diameter  
Range

3D      5D  
ø3~ø16

Cutting diameters available in 0.1 mm  
increments



---

### Type C with Coolant hole

Coolant-Through Design  
Provides Higher Efficiency and Stable  
Machining with Stainless Steel, etc.

Diameter  
Range

3D      5D  
ø3~ø16

Cutting diameters available in 0.1 mm  
increments





3D / 131 Items

5D / 131 Items



3D / 131 Items

5D / 131 Items

Features  
1

### Universal Design and Lineup Applicable to a Wide Range of Machining Applications

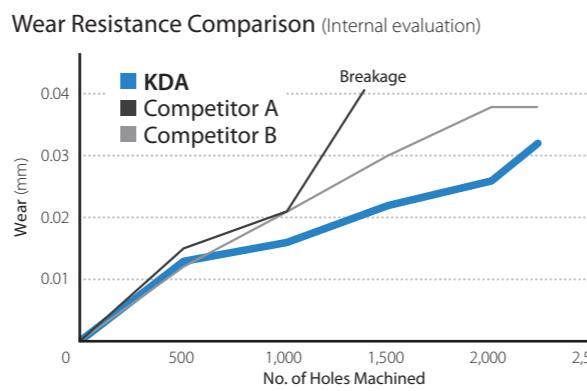
Type N: No Coolant Holes  
Type C: With Coolant Holes  
3D and 5D depths available



Features  
2

### High-Performance Coating Maintains Long tool life

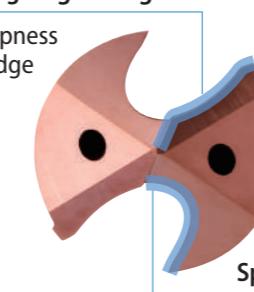
Excellent Wear and Heat Resistance  
Aluminum Chrome (AlCr) Coating



Features  
3

### Stable Machining with Unique Shape

Curved Cutting-edge Design and Special Flute Shape



Curved Cutting-edge Design  
Excellent sharpness and cutting edge strength

Special Flute Shape  
Excellent chip control and high rigidity



Chip Condition  
(Internal evaluation)

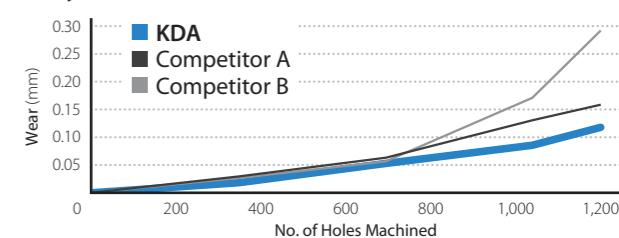
Cutting Conditions:  
 $V_c = 80 \text{ m/min}$ ,  $f = 0.14 \text{ mm/rev}$ ,  $H = 24 \text{ mm}$ , Wet (Internal coolant) BT 50 ø 6 (5D) Type C

Features  
4

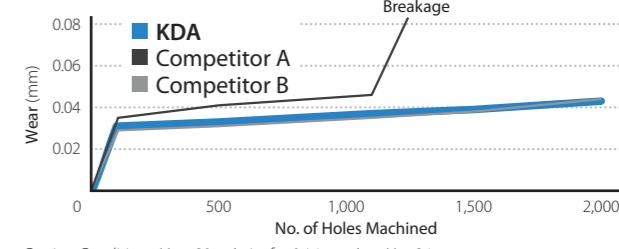
### Supports a Variety of Workpieces

Compatible not only with carbon steel, but also mold steel, stainless steel, cast iron machining, etc.

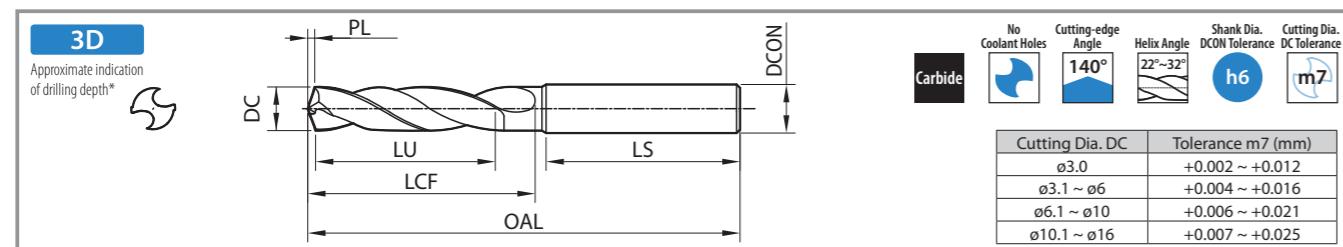
Alloy Steel SCM 440 (32 HRC) (Internal evaluation)



Stainless Steel SUS 304 (Internal evaluation)



## Type N No Coolant Holes 3D

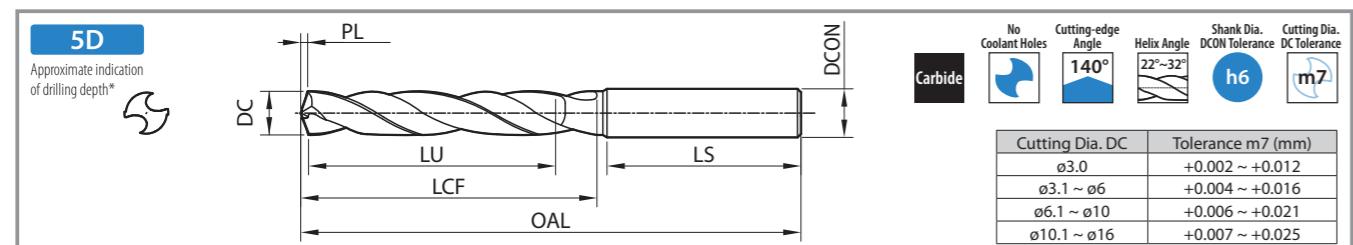


Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0300X03S060N	●	3	6	62	15.5	20	36	0.5
KDA0310X03S060N	●	3.1	6	62	15.3	20	36	0.5
KDA0320X03S060N	●	3.2	6	62	15.2	20	36	0.5
KDA0330X03S060N	●	3.3	6	62	15.0	20	36	0.6
KDA0340X03S060N	●	3.4	6	62	14.9	20	36	0.6
KDA0350X03S060N	●	3.5	6	62	14.7	20	36	0.6
KDA0360X03S060N	●	3.6	6	62	14.6	20	36	0.6
KDA0370X03S060N	●	3.7	6	62	14.4	20	36	0.6
KDA0380X03S060N	●	3.8	6	66	18.3	24	36	0.6
KDA0390X03S060N	●	3.9	6	66	18.1	24	36	0.7
KDA0400X03S060N	●	4	6	66	18.0	24	36	0.7
KDA0410X03S060N	●	4.1	6	66	17.8	24	36	0.7
KDA0420X03S060N	●	4.2	6	66	17.7	24	36	0.7
KDA0430X03S060N	●	4.3	6	66	17.5	24	36	0.7
KDA0440X03S060N	●	4.4	6	66	17.4	24	36	0.8
KDA0450X03S060N	●	4.5	6	66	17.2	24	36	0.8
KDA0460X03S060N	●	4.6	6	66	17.1	24	36	0.8
KDA0470X03S060N	●	4.7	6	66	16.9	24	36	0.8
KDA0480X03S060N	●	4.8	6	66	20.8	28	36	0.8
KDA0490X03S060N	●	4.9	6	66	20.6	28	36	0.8
KDA0500X03S060N	●	5	6	66	20.5	28	36	0.9
KDA0510X03S060N	●	5.1	6	66	20.3	28	36	0.9
KDA0520X03S060N	●	5.2	6	66	20.2	28	36	0.9
KDA0530X03S060N	●	5.3	6	66	20.0	28	36	0.9
KDA0540X03S060N	●	5.4	6	66	19.9	28	36	0.9
KDA0550X03S060N	●	5.5	6	66	19.7	28	36	1.0
KDA0560X03S060N	●	5.6	6	66	19.6	28	36	1.0
KDA0570X03S060N	●	5.7	6	66	19.4	28	36	1.0
KDA0580X03S060N	●	5.8	6	66	19.3	28	36	1.0
KDA0590X03S060N	●	5.9	6	66	19.1	28	36	1.0
KDA0600X03S060N	●	6	6	66	19.0	28	36	1.0
KDA0610X03S080N	●	6.1	8	79	24.8	34	36	1.1
KDA0620X03S080N	●	6.2	8	79	24.7	34	36	1.1

Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0960X03S100N	●	9.6	10	89	32.6	47	40	1.7
KDA0970X03S100N	●	9.7	10	89	32.4	47	40	1.7
KDA0980X03S100N	●	9.8	10	89	32.3	47	40	1.7
KDA0990X03S100N	●	9.9	10	89	32.1	47	40	1.8
KDA1000X03S100N	●	10	10	89	32.0	47	40	1.8
KDA1010X03S120N	●	10.1	12	102	39.8	55	45	1.8
KDA1020X03S120N	●	10.2	12	102	39.7	55	45	1.8
KDA1030X03S120N	●	10.3	12	102	39.5	55	45	1.8
KDA1040X03S120N	●	10.4	12	102	39.4	55	45	1.8
KDA1050X03S120N	●	10.5	12	102	39.2	55	45	1.9
KDA1060X03S120N	●	10.6	12	102	39.1	55	45	1.9
KDA1070X03S120N	●	10.7	12	102	38.9	55	45	1.9
KDA1080X03S120N	●	10.8	12	102	38.8	55	45	1.9
KDA1090X03S120N	●	10.9	12	102	38.6	55	45	1.9
KDA1100X03S120N	●	11	12	102	38.5	55	45	2.0
KDA1110X03S120N	●	11.1	12	102	38.3	55	45	2.0
KDA1120X03S120N	●	11.2	12	102	38.2	55	45	2.0
KDA1130X03S120N	●	11.3	12	102	38.0	55	45	2.0
KDA1140X03S120N	●	11.4	12	102	37.9	55	45	2.0
KDA1150X03S120N	●	11.5	12	102	37.7	55	45	2.0
KDA1160X03S120N	●	11.6	12	102	37.6	55	45	2.1
KDA1170X03S120N	●	11.7	12	102	37.4	55	45	2.1
KDA1180X03S120N	●	11.8	12	102	37.3	55	45	2.1
KDA1190X03S120N	●	11.9	12	102	37.1	55	45	2.1
KDA1200X03S120N	●	12	12	102	37.0	55	45	2.1
KDA1210X03S140N	●	12.1	14	107	41.8	60	45	2.2
KDA1220X03S140N	●	12.2	14	107	41.7	60	45	2.2
KDA1230X03S140N	●	12.3	14	107	41.5	60	45	2.2
KDA1240X03S140N	●	12.4	14	107	41.4	60	45	2.2
KDA1250X03S140N	●	12.5	14	107	41.2	60	45	2.2
KDA1260X03S140N	●	12.6	14	107	41.1	60	45	2.2
KDA1270X03S140N	●	12.7	14	107	40.9	60	45	2.3
KDA1280X03S140N	●	12.8	14	107	40.8	60	45	2.3

Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA1290X03S140N	●	12.9	14	107	40.6	60	45	2.3
KDA1300X03S140N	●	13	14	107	40.5	60	45	2.3
KDA1310X03S140N	●	13.1	14	107	40.3	60	45	2.3
KDA1320X03S140N	●	13.2	14	107	40.2	60	45	2.4
KDA1330X03S140N	●	13.3	14	107	40.0	60	45	2.4</td

## Type N No Coolant Holes 5D

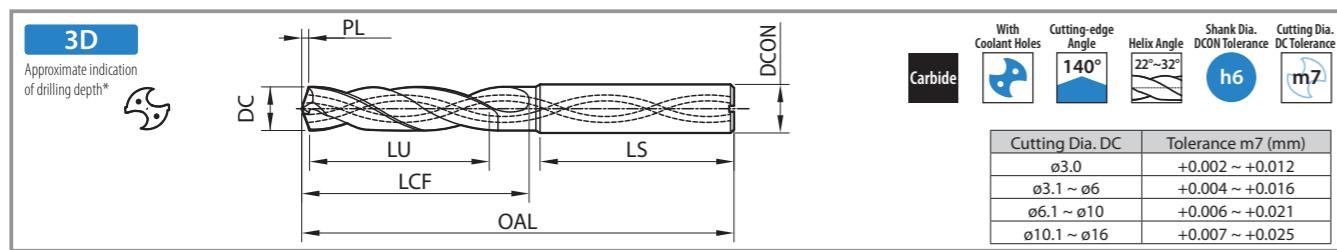


Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0300X05S060N	●	3	6	66	23.5	28	36	0.5
KDA0310X05S060N	●	3.1	6	66	23.3	28	36	0.5
KDA0320X05S060N	●	3.2	6	66	23.2	28	36	0.5
KDA0330X05S060N	●	3.3	6	66	23.0	28	36	0.6
KDA0340X05S060N	●	3.4	6	66	22.9	28	36	0.6
KDA0350X05S060N	●	3.5	6	66	22.7	28	36	0.6
KDA0360X05S060N	●	3.6	6	66	22.6	28	36	0.6
KDA0370X05S060N	●	3.7	6	66	22.4	28	36	0.6
KDA0380X05S060N	●	3.8	6	74	30.3	36	36	0.6
KDA0390X05S060N	●	3.9	6	74	30.1	36	36	0.7
KDA0400X05S060N	●	4	6	74	30.0	36	36	0.7
KDA0410X05S060N	●	4.1	6	74	29.8	36	36	0.7
KDA0420X05S060N	●	4.2	6	74	29.7	36	36	0.7
KDA0430X05S060N	●	4.3	6	74	29.5	36	36	0.7
KDA0440X05S060N	●	4.4	6	74	29.4	36	36	0.8
KDA0450X05S060N	●	4.5	6	74	29.2	36	36	0.8
KDA0460X05S060N	●	4.6	6	74	29.1	36	36	0.8
KDA0470X05S060N	●	4.7	6	74	28.9	36	36	0.8
KDA0480X05S060N	●	4.8	6	82	36.8	44	36	0.8
KDA0490X05S060N	●	4.9	6	82	36.6	44	36	0.8
KDA0500X05S060N	●	5	6	82	36.5	44	36	0.9
KDA0510X05S060N	●	5.1	6	82	36.3	44	36	0.9
KDA0520X05S060N	●	5.2	6	82	36.2	44	36	0.9
KDA0530X05S060N	●	5.3	6	82	36.0	44	36	0.9
KDA0540X05S060N	●	5.4	6	82	35.9	44	36	0.9
KDA0550X05S060N	●	5.5	6	82	35.7	44	36	1.0
KDA0560X05S060N	●	5.6	6	82	35.6	44	36	1.0
KDA0570X05S060N	●	5.7	6	82	35.4	44	36	1.0
KDA0580X05S060N	●	5.8	6	82	35.3	44	36	1.0
KDA0590X05S060N	●	5.9	6	82	35.1	44	36	1.0
KDA0600X05S060N	●	6	6	82	35.0	44	36	1.0
KDA0610X05S080N	●	6.1	8	91	43.8	53	36	1.1
KDA0620X05S080N	●	6.2	8	91	43.7	53	36	1.1

Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0630X05S080N	●	6.3	8	91	43.5	53	36	1.1
KDA0640X05S080N	●	6.4	8	91	43.4	53	36	1.1
KDA0650X05S080N	●	6.5	8	91	43.2	53	36	1.1
KDA0660X05S080N	●	6.6	8	91	43.1	53	36	1.2
KDA0670X05S080N	●	6.7	8	91	42.9	53	36	1.2
KDA0680X05S080N	●	6.8	8	91	42.8	53	36	1.2
KDA0690X05S080N	●	6.9	8	91	42.6	53	36	1.2
KDA0700X05S080N	●	7	8	91	42.5	53	36	1.2
KDA0710X05S080N	●	7.1	8	91	42.3	53	36	1.2
KDA0720X05S080N	●	7.2	8	91	42.2	53	36	1.3
KDA0730X05S080N	●	7.3	8	91	42.0	53	36	1.3
KDA0740X05S080N	●	7.4	8	91	41.9	53	36	1.3
KDA0750X05S080N	●	7.5	8	91	41.7	53	36	1.3
KDA0760X05S080N	●	7.6	8	91	41.6	53	36	1.3
KDA0770X05S080N	●	7.7	8	91	41.4	53	36	1.4
KDA0780X05S080N	●	7.8	8	91	41.3	53	36	1.4
KDA0790X05S080N	●	7.9	8	91	41.1	53	36	1.4
KDA0800X05S080N	●	8	8	91	41.0	53	36	1.4
KDA0810X05S100N	●	8.1	10	103	48.8	61	40	1.4
KDA0820X05S100N	●	8.2	10	103	48.7	61	40	1.4
KDA0830X05S100N	●	8.3	10	103	48.5	61	40	1.5
KDA0840X05S100N	●	8.4	10	103	48.4	61	40	1.5
KDA0850X05S100N	●	8.5	10	103	48.2	61	40	1.5
KDA0860X05S100N	●	8.6	10	103	48.1	61	40	1.5
KDA0870X05S100N	●	8.7	10	103	47.9	61	40	1.5
KDA0880X05S100N	●	8.8	10	103	47.8	61	40	1.6
KDA0890X05S100N	●	8.9	10	103	47.6	61	40	1.6
KDA0900X05S100N	●	9	10	103	47.5	61	40	1.6
KDA0910X05S100N	●	9.1	10	103	47.3	61	40	1.6
KDA0920X05S100N	●	9.2	10	103	47.2	61	40	1.6
KDA0930X05S100N	●	9.3	10	103	47.0	61	40	1.6
KDA0940X05S100N	●	9.4	10	103	46.9	61	40	1.7
KDA0950X05S100N	●	9.5	10	103	46.7	61	40	1.7

Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0960X05S100N	●	9.6	10	103	46.6	61	40	1.7
KDA0970X05S100N	●	9.7	10	103	46.4	61	40	1.7
KDA0980X05S100N	●	9.8	10	103	46.3	61	40	1.7
KDA0990X05S100N	●	9.9	10	103	46.1	61	40	1.8
KDA1000X05S100N	●	10	10	103	46.0	61	40	1.8
KDA1010X05S120N	●	10.1	12	118	55.8	71	45	1.8
KDA1020X05S120N	●	10.2	12	118	55.7	71	45	1.8
KDA1030X05S120N	●	10.3	12	118	55.5	71	45</td	

## Type C with Coolant Holes 3D

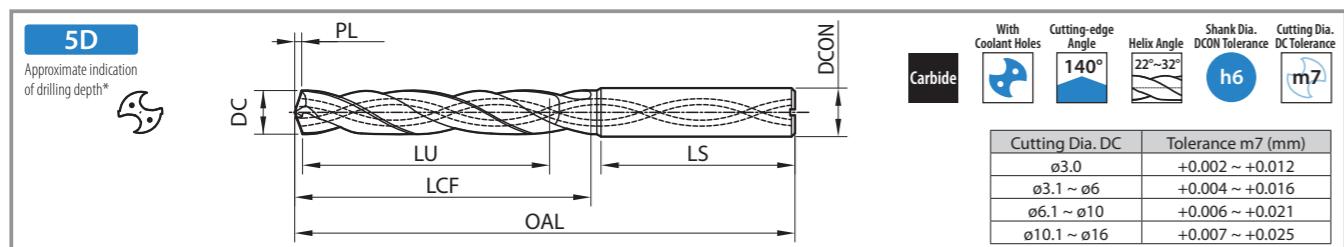


Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0300X03S060C	●	3	6	62	15.5	20	36	0.5
KDA0310X03S060C	●	3.1	6	62	15.3	20	36	0.5
KDA0320X03S060C	●	3.2	6	62	15.2	20	36	0.5
KDA0330X03S060C	●	3.3	6	62	15.0	20	36	0.6
KDA0340X03S060C	●	3.4	6	62	14.9	20	36	0.6
KDA0350X03S060C	●	3.5	6	62	14.7	20	36	0.6
KDA0360X03S060C	●	3.6	6	62	14.6	20	36	0.6
KDA0370X03S060C	●	3.7	6	62	14.4	20	36	0.6
KDA0380X03S060C	●	3.8	6	66	18.3	24	36	0.6
KDA0390X03S060C	●	3.9	6	66	18.1	24	36	0.7
KDA0400X03S060C	●	4	6	66	18.0	24	36	0.7
KDA0410X03S060C	●	4.1	6	66	17.8	24	36	0.7
KDA0420X03S060C	●	4.2	6	66	17.7	24	36	0.7
KDA0430X03S060C	●	4.3	6	66	17.5	24	36	0.7
KDA0440X03S060C	●	4.4	6	66	17.4	24	36	0.8
KDA0450X03S060C	●	4.5	6	66	17.2	24	36	0.8
KDA0460X03S060C	●	4.6	6	66	17.1	24	36	0.8
KDA0470X03S060C	●	4.7	6	66	16.9	24	36	0.8
KDA0480X03S060C	●	4.8	6	66	20.8	28	36	0.8
KDA0490X03S060C	●	4.9	6	66	20.6	28	36	0.8
KDA0500X03S060C	●	5	6	66	20.5	28	36	0.9
KDA0510X03S060C	●	5.1	6	66	20.3	28	36	0.9
KDA0520X03S060C	●	5.2	6	66	20.2	28	36	0.9
KDA0530X03S060C	●	5.3	6	66	20.0	28	36	0.9
KDA0540X03S060C	●	5.4	6	66	19.9	28	36	0.9
KDA0550X03S060C	●	5.5	6	66	19.7	28	36	1.0
KDA0560X03S060C	●	5.6	6	66	19.6	28	36	1.0
KDA0570X03S060C	●	5.7	6	66	19.4	28	36	1.0
KDA0580X03S060C	●	5.8	6	66	19.3	28	36	1.0
KDA0590X03S060C	●	5.9	6	66	19.1	28	36	1.0
KDA0600X03S060C	●	6	6	66	19.0	28	36	1.0
KDA0610X03S080C	●	6.1	8	79	24.8	34	36	1.1
KDA0620X03S080C	●	6.2	8	79	24.7	34	36	1.1

Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0630X03S080C	●	6.3	8	79	24.5	34	36	1.1
KDA0640X03S080C	●	6.4	8	79	24.4	34	36	1.1
KDA0650X03S080C	●	6.5	8	79	24.2	34	36	1.1
KDA0660X03S080C	●	6.6	8	79	24.1	34	36	1.2
KDA0670X03S080C	●	6.7	8	79	23.9	34	36	1.2
KDA0680X03S080C	●	6.8	8	79	23.8	34	36	1.2
KDA0690X03S080C	●	6.9	8	79	23.6	34	36	1.2
KDA0700X03S080C	●	7	8	79	23.5	34	36	1.2
KDA0710X03S080C	●	7.1	8	79	30.3	41	36	1.2
KDA0720X03S080C	●	7.2	8	79	30.2	41	36	1.3
KDA0730X03S080C	●	7.3	8	79	30.0	41	36	1.3
KDA0740X03S080C	●	7.4	8	79	29.9	41	36	1.3
KDA0750X03S080C	●	7.5	8	79	29.7	41	36	1.3
KDA0760X03S080C	●	7.6	8	79	29.6	41	36	1.3
KDA0770X03S080C	●	7.7	8	79	29.4	41	36	1.4
KDA0780X03S080C	●	7.8	8	79	29.3	41	36	1.4
KDA0790X03S080C	●	7.9	8	79	29.1	41	36	1.4
KDA0800X03S080C	●	8	8	79	29.0	41	36	1.4
KDA0810X03S100C	●	8.1	10	89	34.8	47	40	1.4
KDA0820X03S100C	●	8.2	10	89	34.7	47	40	1.4
KDA0830X03S100C	●	8.3	10	89	34.5	47	40	1.5
KDA0840X03S100C	●	8.4	10	89	34.4	47	40	1.5
KDA0850X03S100C	●	8.5	10	89	34.2	47	40	1.5
KDA0860X03S100C	●	8.6	10	89	34.1	47	40	1.5
KDA0870X03S100C	●	8.7	10	89	33.9	47	40	1.5
KDA0880X03S100C	●	8.8	10	89	33.8	47	40	1.6
KDA0890X03S100C	●	8.9	10	89	33.6	47	40	1.6
KDA0900X03S100C	●	9	10	89	33.5	47	40	1.6
KDA0910X03S100C	●	9.1	10	89	33.3	47	40	1.6
KDA0920X03S100C	●	9.2	10	89	33.2	47	40	1.6
KDA0930X03S100C	●	9.3	10	89	33.0	47	40	1.6
KDA0940X03S100C	●	9.4	10	89	32.9	47	40	1.7
KDA0950X03S100C	●	9.5	10	89	32.7	47	40	1.7

Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0960X03S100C	●	9.6	10	89	32.6	47	40	1.7
KDA0970X03S100C	●	9.7	10	89	32.4	47	40	1.7
KDA0980X03S100C	●	9.8	10	89	32.3	47	40	1.7
KDA0990X03S100C	●	9.9	10	89	32.1	47	40	1.8
KDA1000X03S100C	●	10	10	89	32.0	47	40	1.8
KDA1010X03S120C	●	10.1	12	102	39.8	55	45	1.8
KDA1020X03S120C	●	10.2	12	102	39.7	55	45	1.8
KDA1030X03S120C	●	10.3	12	102	39.5	55	45	1.8
KDA1040X03S12								

## Type C with Coolant Holes 5D



Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0300X05S060C	●	3	6	66	23.5	28	36	0.5
KDA0310X05S060C	●	3.1	6	66	23.3	28	36	0.5
KDA0320X05S060C	●	3.2	6	66	23.2	28	36	0.5
KDA0330X05S060C	●	3.3	6	66	23.0	28	36	0.6
KDA0340X05S060C	●	3.4	6	66	22.9	28	36	0.6
KDA0350X05S060C	●	3.5	6	66	22.7	28	36	0.6
KDA0360X05S060C	●	3.6	6	66	22.6	28	36	0.6
KDA0370X05S060C	●	3.7	6	66	22.4	28	36	0.6
KDA0380X05S060C	●	3.8	6	74	30.3	36	36	0.6
KDA0390X05S060C	●	3.9	6	74	30.1	36	36	0.7
KDA0400X05S060C	●	4	6	74	30.0	36	36	0.7
KDA0410X05S060C	●	4.1	6	74	29.8	36	36	0.7
KDA0420X05S060C	●	4.2	6	74	29.7	36	36	0.7
KDA0430X05S060C	●	4.3	6	74	29.5	36	36	0.7
KDA0440X05S060C	●	4.4	6	74	29.4	36	36	0.8
KDA0450X05S060C	●	4.5	6	74	29.2	36	36	0.8
KDA0460X05S060C	●	4.6	6	74	29.1	36	36	0.8
KDA0470X05S060C	●	4.7	6	74	28.9	36	36	0.8
KDA0480X05S060C	●	4.8	6	82	36.8	44	36	0.8
KDA0490X05S060C	●	4.9	6	82	36.6	44	36	0.8
KDA0500X05S060C	●	5	6	82	36.5	44	36	0.9
KDA0510X05S060C	●	5.1	6	82	36.3	44	36	0.9
KDA0520X05S060C	●	5.2	6	82	36.2	44	36	0.9
KDA0530X05S060C	●	5.3	6	82	36.0	44	36	0.9
KDA0540X05S060C	●	5.4	6	82	35.9	44	36	0.9
KDA0550X05S060C	●	5.5	6	82	35.7	44	36	1.0
KDA0560X05S060C	●	5.6	6	82	35.6	44	36	1.0
KDA0570X05S060C	●	5.7	6	82	35.4	44	36	1.0
KDA0580X05S060C	●	5.8	6	82	35.3	44	36	1.0
KDA0590X05S060C	●	5.9	6	82	35.1	44	36	1.0
KDA0600X05S060C	●	6	6	82	35.0	44	36	1.0
KDA0610X05S080C	●	6.1	8	91	43.8	53	36	1.1
KDA0620X05S080C	●	6.2	8	91	43.7	53	36	1.1

Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0630X05S080C	●	6.3	8	91	43.5	53	36	1.1
KDA0640X05S080C	●	6.4	8	91	43.4	53	36	1.1
KDA0650X05S080C	●	6.5	8	91	43.2	53	36	1.1
KDA0660X05S080C	●	6.6	8	91	43.1	53	36	1.2
KDA0670X05S080C	●	6.7	8	91	42.9	53	36	1.2
KDA0680X05S080C	●	6.8	8	91	42.8	53	36	1.2
KDA0690X05S080C	●	6.9	8	91	42.6	53	36	1.2
KDA0700X05S080C	●	7	8	91	42.5	53	36	1.2
KDA0710X05S080C	●	7.1	8	91	42.3	53	36	1.2
KDA0720X05S080C	●	7.2	8	91	42.2	53	36	1.3
KDA0730X05S080C	●	7.3	8	91	42.0	53	36	1.3
KDA0740X05S080C	●	7.4	8	91	41.9	53	36	1.3
KDA0750X05S080C	●	7.5	8	91	41.7	53	36	1.3
KDA0760X05S080C	●	7.6	8	91	41.6	53	36	1.3
KDA0770X05S080C	●	7.7	8	91	41.4	53	36	1.4
KDA0780X05S080C	●	7.8	8	91	41.3	53	36	1.4
KDA0790X05S080C	●	7.9	8	91	41.1	53	36	1.4
KDA0800X05S080C	●	8	8	91	41.0	53	36	1.4
KDA0810X05S100C	●	8.1	10	103	48.8	61	40	1.4
KDA0820X05S100C	●	8.2	10	103	48.7	61	40	1.4
KDA0830X05S100C	●	8.3	10	103	48.5	61	40	1.5
KDA0840X05S100C	●	8.4	10	103	48.4	61	40	1.5
KDA0850X05S100C	●	8.5	10	103	48.2	61	40	1.5
KDA0860X05S100C	●	8.6	10	103	48.1	61	40	1.5
KDA0870X05S100C	●	8.7	10	103	47.9	61	40	1.5
KDA0880X05S100C	●	8.8	10	103	47.8	61	40	1.6
KDA0890X05S100C	●	8.9	10	103	47.6	61	40	1.6
KDA0900X05S100C	●	9	10	103	47.5	61	40	1.6
KDA0910X05S100C	●	9.1	10	103	47.3	61	40	1.6
KDA0920X05S100C	●	9.2	10	103	47.2	61	40	1.6
KDA0930X05S100C	●	9.3	10	103	47.0	61	40	1.6
KDA0940X05S100C	●	9.4	10	103	46.9	61	40	1.7
KDA0950X05S100C	●	9.5	10	103	46.7	61	40	1.7

Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0960X05S100C	●	9.6	10	103	46.6	61	40	1.7
KDA0970X05S100C	●	9.7	10	103	46.4	61	40	1.7
KDA0980X05S100C	●	9.8	10	103	46.3	61	40	1.7
KDA0990X05S100C	●	9.9	10	103	46.1	61	40	1.8
KDA1000X05S100C	●	10	10	103	46.0	61	40	1.8
KDA1010X05S120C	●	10.1	12	118	55.8	71	45	1.8
KDA1020X05S120C	●	10.2	12	118	55.7	71	45	1.8
KDA1030X05S120C	●	10.3	12	118</				

## Reference Cutting Conditions Table

K-series **3D** **5D**

Workpiece	Vc (m/min)		f (mm/rev)							
	Type N	Type C	ø3	ø4	ø6	ø8	ø10	ø12	ø14	ø16
Mild Steel/Low Carbon Steel SS 400/S 10 C (< 125 HB)	50-100	60-140	0.09-0.16	0.11-0.19	0.14-0.23	0.19-0.31	0.23-0.38	0.24-0.41	0.28-0.45	0.30-0.50
Carbon Steel S 35C/S 50C (< 25 HRC)	45-90	60-120	0.09-0.16	0.11-0.19	0.14-0.23	0.19-0.31	0.23-0.38	0.24-0.41	0.28-0.45	0.30-0.50
Alloy Steel/Tool Steel SCM/SCr/SNCM (< 35 HRC)	45-90	50-110	0.09-0.16	0.11-0.19	0.14-0.23	0.19-0.31	0.23-0.38	0.24-0.41	0.28-0.45	0.30-0.50
Alloy Steel/Tool Steel SCM/SCr/SNCM (35-48 HRC)	40-80	40-90	0.09-0.14	0.10-0.17	0.13-0.22	0.17-0.29	0.21-0.35	0.22-0.37	0.26-0.41	0.28-0.44
Austenitic Stainless Steel SUS 304 (130-200 HB)	20-40	40-80	0.05-0.10	0.06-0.12	0.07-0.14	0.08-0.18	0.09-0.20	0.10-0.22	0.11-0.24	0.12-0.24
High Strength Austenitic Stainless Steel and Stainless Cast Steel (< 25 HRC)	20-40	40-80	0.03-0.08	0.04-0.10	0.05-0.10	0.06-0.12	0.07-0.14	0.08-0.16	0.09-0.18	0.10-0.18
Austenitic-ferritic Stainless Steel (< 30 HRC)	20-35	30-60	0.03-0.08	0.04-0.10	0.05-0.10	0.06-0.12	0.07-0.14	0.08-0.16	0.09-0.18	0.10-0.18
Gray Cast Iron FC 250 (< 32 HRC)	60-100	60-140	0.13-0.20	0.15-0.23	0.17-0.30	0.20-0.35	0.23-0.40	0.25-0.45	0.28-0.48	0.30-0.50
Alloy Cast Iron/Nodular Cast Iron FCD450 (< 28 HRC)	60-100	60-140	0.11-0.18	0.13-0.20	0.15-0.25	0.17-0.32	0.20-0.36	0.22-0.42	0.24-0.45	0.25-0.48
High Alloy Cast Iron and Nodular Cast Iron (< 45 HRC)	60-90	60-100	0.06-0.11	0.08-0.13	0.10-0.16	0.12-0.20	0.14-0.26	0.16-0.28	0.18-0.30	0.20-0.32

Precautions

1. Make sure the workpiece is fixed firmly to the machine.  
Use of precision holders, hydro chucks, and high-quality collet chucks is recommended.
2. Use a drill with a run-out of less than 0.02 mm when mounting.
3. Standard cutting conditions is when water-soluble coolant is applied.
4. If the tool diameter you want to use is not listed in the table, please refer to the closest tool diameter value in the table.  
Adjust the cutting parameters according to your working environment in Machining.

## Description's view

KDA0950X03S100C

<b>KDA</b>	<b>0950</b>	<b>X</b>	<b>03</b>	<b>S100</b>	<b>C</b>
Product Name High Efficiency Coated Solid Carbide Drill	Cutting Dia. DC ø9.5	Drilling Depth* (L/D) 03 : 3D 05 : 5D	Shank Dia. DCON ø10.0	Type N: No Coolant Holes C: With Coolant Holes	

\* Drilling depth is an approximate indication of L/D and depends on the size.  
Depending on the size, the size may be smaller than the L/D indicated. Check the dimension table.

## Case Studies

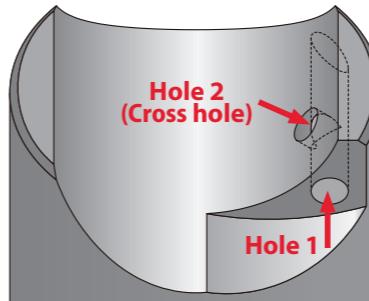
(User evaluation)

The KDA extends 20% longer than the current set life.

The condition of the cutting edge was good, and the wear of the shoulder was less than competitor.

### Body SCM 440

ø6.9, Drilling



Type C  
KDA0690X055080C

Tool life

**KDA** **2,400 pcs or more/1KDA**

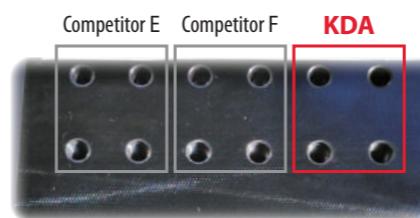
Competitor C  
Competitor D **2,000 pcs/1KDA**

Cutting Conditions:  
Hole 1: Vc = 50 m/min, f = 0.1 mm/rev, H = 25 mm  
Hole 2: Vc = 40 m/min, f = 0.1 mm/rev, H = 15 mm  
Wet (Internal coolant) Combined cutting machine

KDA showed less variation in hole diameter compared to competitor and achieved high efficiency machining. Machining sound was quiet and chip condition was good.

### Mold Part Cold Tool Steel

ø5.1, Drilling



Type N  
KDA0510X03S060N

Hole diameter variation (H = 7.5 mm)

**KDA** **0.022 mm**

Competitor E **0.042 mm**

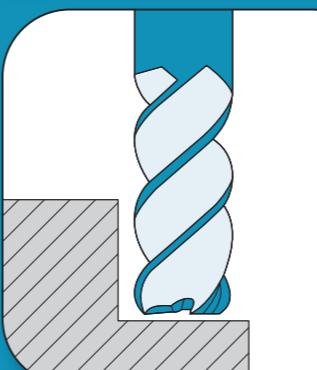
Cutting Conditions:  
Vc = 80 m/min, f = 0.15 mm/rev, H = 15 mm  
Wet (External coolant) BT 50



# Solid Tools

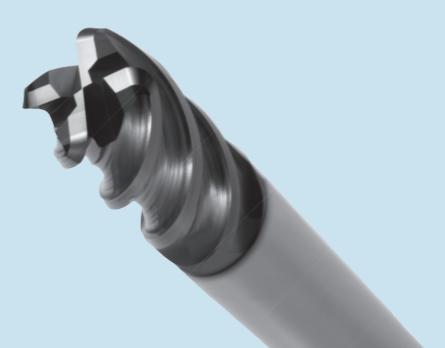
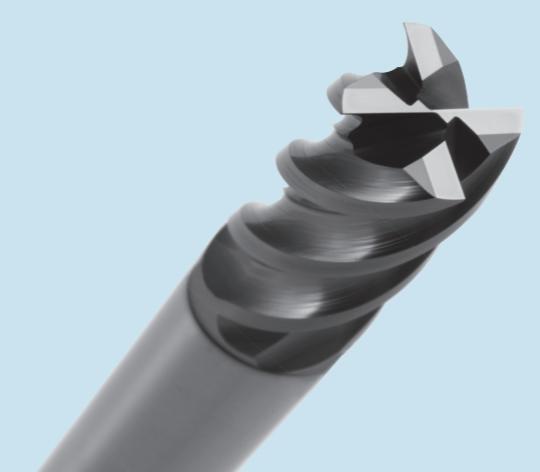
Carbide Substrate

L1~L82



## End Mills

Tool Selection Guide	L2~L9
Application and selection	L2
Solid End Mill Identification System / Icon Glossary	L4
Surface finish oriented	L10~L15
Square / For Automatic Lathes (Overall length 35mm / 45mm) F Series	L10
High efficiency chip evacuation	L16~L24
High feed rate, High efficiency	L16
Difficult-to-cut materials, High efficiency	L20
Multi-functional, High efficiency	L22
Multi-purpose	L25
High efficiency, High feed rate with multi-edge	L26~L27
Superalloy	4JER
Roughings	L28~L29
Special serrated edge, Difficult-to-cut materials	L30
Serrated edge, Notched edge	L32
Ball-nose End Mills	L34~L36
Ball-noses	2SEB
Hard Materials	H Series
Special corner-R shaped (For High Feed Rate)	L38~L39
Aluminum & Non-ferrous Metals	L40~L44
High efficiency, High precision	L40
Square (Varied interval flute design with wiper edge)	N Series
Solid Tools for CFRP	L45~L47



## Drills

Flat Bottom Drill	2ZDK-HP
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Recommended Cutting Conditions	L63~L82
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## Tool Selection Guide

Carbide Substrate

Substrate of all solid end mills  
is carbide.

## Application and selection

See Page	Applications	Description	Identify System	Features	Shape	Coating	No. of Flutes	Helix Angle	Outside Dia. DC (mm)		Workpiece Material										Description	See Page			
											Steel		Heat Treated Steel		Stainless Steel <b>M</b> Stainless steel	Titanium Alloys <b>S</b> Titanium Alloy	Heat-resistant Alloys <b>S</b> Heat-resistant Alloy	Cast Iron <b>K</b> Cast Iron	Aluminum & Non-ferrous Metals <b>N</b> Aluminum & Non Ferrous Material						
<b>P</b> ~30HRC 30~40HRC		<b>H</b> ~55HRC ~68HRC																							
L10-L11	Surface finish oriented	2FES S/M/L	①	2 flutes, Sharp corner edge		MEGACOAT	2	30°	ø0.2~ø16 ø3~ø16 ø1~ø16 ø3~ø16 ø3~ø13											2FES S/M/L L10-L11					
L12		2FEK S/M		2 flutes, Tough corner edge																					
L13		4FESM		4 flutes, Sharp corner edge																					
		4FEKM		4 flutes, Tough corner edge																					
L14-L15		2/3/4 FESW		For Automatic Lathes (Overall length 35mm / 45mm)																					
L16-L19	High efficiency chip evacuation	4MFK	②	4 flutes High feed rate, High efficiency		MEGACOAT NANO	4	Variable Lead 42°, 44°	ø3~ø16											4MFK L16-L19					
L20-L21		4MFR		4 flutes Difficult-to-cut materials, High efficiency																					
L22-L23		4TFK	②	4 flutes Difficult-to-cut materials, High efficiency		MEGACOAT NANO	4	Variable Lead 42°, 44°	ø3~ø20											4TFK L20-L21					
L24		4TFR		Multi-functional, High efficiency																					
L25	Multi-purpose	3UFSM	①	3 flutes, Multi-purpose		TiAIN	3	45°	ø1~ø20												3UFSM L25				
L26-L27	High efficiency, High feed rate with Multi-edge	6PFK	②	6/8 flutes, High efficiency, High feed rate, Finishing (Shouldering)		MEGACOAT NANO	6	Variable Lead 42°, 44°	ø6~ø25											6PFK L26-L27					
L28-L29	Superalloy	4JER	②	4 flutes High efficiency, Stable machining		MEGACOAT HARD	4	Variable Lead 32°, 35°	ø6~ø20											4JER L28-L29					
L30-L31	Roughing	4RFH	②	Special serrated edge, Difficult-to-cut materials with Coolant hole		MEGACOAT HARD	4	40°	ø6~ø20											4RFH L30-L31					
L32		5RFH																							
L33		6RFH																							
L34-L35	Ball-nose	3/4/5 RDSM	①	Serrated edge		TiAIN	3/4/5	20°	ø4~ø25											3/4/5 RDSM L32					
L35		3/4/5 RDSL																							
L36		4/6 RFMS	①	Notched edge			4/6	45°	ø6~ø25												4/6 RFMS L33				
L37	Hard materials	4/5/6/7 HFSS	①	Multi-edge type Negative rake angle Hard Materials Finishing		MEGACOAT HARD	4/5/6/7	45°	ø1~ø12											4/5/6/7 HFSS L37					
L38-L39	Special corner-R shaped	6PDRS		6 flutes, High feed rate																					

● : 1st Choice ○ : 2nd Choice

# Tool Selection Guide

## Application and selection

See Page	Applications	Description	Features	Shape	Coating	No. of Flutes	Helix Angle	Outside Dia. DC (mm)	Workpiece Material										Description	See Page
									Steel		Heat Treated Steel		Stainless Steel	Titanium Alloys	Heat-resistant Alloys	Cast Iron	Aluminum & Non-ferrous Metals			
L40-L43	Aluminum & Non-ferrous metals	3AFK [2]	High efficiency, High precision		-	3	45°	ø3~ø16	P ~30HRC	P 30~40HRC	H ~55HRC	H ~68HRC	M Stainless steel	S Titanium Alloy	S Heat-resistant Alloy	K Cast Iron	N Aluminum & Non Ferrous Material	● 3AFK L40-L43		
L44		3NESM [1]	Varied interval flute design with wiper edge		-	3	38°	ø3~ø20										● 3NESM L44		
L47	CFRP	4FCX-KCD [2]	NEW For CFRP Diamond Coating		Diamond	4	10°	ø8~ø12										● 4FCX-KCD L47		

Substrate of all solid end mills is carbide.

## Carbide Substrate

## Solid End Mill Identification System

1	<b>2 F E S M 020 - 060 - 04 XXXXXXXX</b>								
(1) No. of Flutes	(2) Applications	(3) Helix Angle	(4) Series	(5) Length of cut	(6) Outside Dia.	(7) Length of cut	(8) Shank Dia.	(9) Others	
2 F : Surface finish oriented 3 U : Multi-purpose 4 Z : Multi-functional, High efficiency 5 Y/D : High efficiency (Difficult-to-cut materials) 6 R : Roughing 7 H : Hard materials 8 N : Aluminum & Non-ferrous metals	D: 20-29° E: 30-39° F: 40-49° G: 50-59°	B : Ball-nose R : Radius S,K : Square C : With corner chamfering	S : Short M: Medium L : Long W: For Automatic Lathes	020 ↓ 2.0mm	060 ↓ 6.0mm	04 ↓ 4.0mm	Corner-R, C width etc. ....		

2	<b>4 T F R 030 - 080 - R02</b>							
(1) No. of Flutes	(2) Applications	(3) Helix Angle	(4) Series	(5) Outside Dia.	(6) Length of cut	(7) Others		
3 M : High feed rate, High efficiency 4 P : Shouldering, High feed rate, Finishing 5 T : High efficiency (Difficult-to-cut materials) 6 J : Superalloy 7 A : Aluminum & Non-ferrous metals 8 R : Roughing F : For CFRP	C: 10-19° E: 30-39° F: 40-49°	K : Tough corner edge R : Radius H : Radius (with Coolant Hole) X : Special	030 ↓ 3.0mm	080 ↓ 8.0mm	R02: Corner-R 0.2mm 090: Under Neck Length 9mm KCD: Diamond Coating			
(1) No. of Flutes (2) Applications (3) Helix Angle (4) Series (5) Outside Dia. (6) Length of cut (7) Radius of Ball-nose								
2 S : High efficiency	E : 30-39°	B : Ball-nose	020 ↓ 2.0mm	050 ↓ 5.0mm	R10 ↓ R1.0mm			

## Icon Glossary

<b>Coating</b>	MEGACOAT NANO	MEGACOAT HARD	MEGACOAT	TiAlN Coating	AlTiN Coating
CVD Diamond Coating	Uncoated				
<b>Shank Dia. Tolerance</b>					
Shank Dia. Tolerance is h5.					
Shank Dia. Tolerance is h6.					
<b>Corner Form</b>					
Radius	Sharp corner edge	Land	With corner land	C With corner chamfering	Honed
Corner Radius Tolerance					
Ball-nose radius Tolerance					
Corner Radius Tolerance is 0~0.02mm.					
<b>No. of Flutes</b>					
3 flutes design	Helix Angle 30°				
<b>Cutting edge shape</b>					
Roughing					

# Tool Selection Guide

## Introduction

### Surface finish oriented



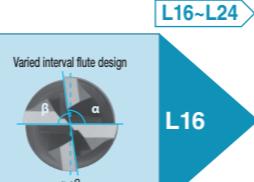
MEGACOAT and sharp cutting edge enable high precision finishing owing to excellent wear and heat resistance  
Overall lengths 35mm and 45mm are available for automatic lathes

L10~L15  
L10~L15

### High efficiency, Excellent chip evacuation



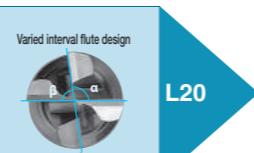
Superior chattering resistance with Kyocera's unique varied interval flute design and variable lead  
Achieves high rigidity and stable chip evacuation with new special flute design  
Achieves high feed rate, high efficiency machining



L16~L24  
L16



High efficiency end mill for difficult-to-cut materials (stainless steel, titanium alloys and heat-resistant alloys )  
Varied interval flute design / Variable Lead



L20



Multi-functional, high efficiency end mill  
Applicable to plunge milling, slotting and finishing with one end mill.  
Smooth chip evacuation because sub-groove on gash breaks chips during plunge milling.

L22  
L24



Varied interval flute design with 5 flutes  
For high efficiency slotting and shoulder cutting  
Applicable to difficult-to-cut materials like stainless steel and heat resistant steel

### High efficiency , High feed rate



High feed rate and high efficiency shoulder cutting with multi-edge design (6 flutes /8 flutes)  
Varied interval flute design and variable lead to minimize chattering

L26~L27  
L26

### Superalloy



High efficiency and stable machining for Heat Resistant Alloys such as Inconel®  
Long tool life machining with MEGACOAT HARD for excellent heat resistance

L28~L29  
L28

## Roughing



High efficiency machining of Difficult-to-cut material with multi-edge design and coolant hole  
Deep slotting ( $ap = 2 \times DC$ ) for Stainless Steel and Titanium Alloy Lineup of RDS with serrated edge and RFS with notched edge

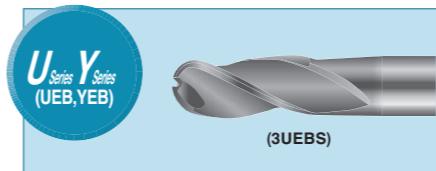
L30~L33  
L30

## Ball-nose End Mill



High efficiency ball-nose end mill with 2 flutes  
Sharp cutting with special nose geometry  
Close tolerance edge diameter ( $R \pm 0.005\text{mm}$ ,  $\phi 16$  excluded)  
Stable chip evacuation by a large chip pocket design

L34~L36  
L34



Bull-nose end mill with 3/4 flutes



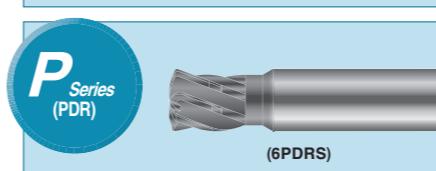
L36

## Hard Materials



PVD coating "MEGACOAT HARD" for hard materials is applied  
Large core diameter and negative rake angle improves edge strength  
Helix angle is 45°.High efficiency machining and long tool life with wide range of 4, 5, 6, 7 and 8 flutes types

L37~L39  
L37



High efficiency radius. Enables large cutting volume and high efficiency machining with special corner-R shaped  
Ramping and arc cutting are possible

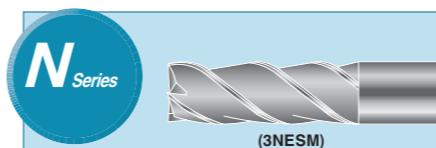
L38

## Aluminum & Non-ferrous Metals



High-efficiency and High-precision 3 flutes end mill  
Sharp cutting edge and excellent anti-chattering performance  
Delivers high stability in diverse machining situations

L40~L44  
L40



Good bottom surface finish with wiper edge on the end edge  
Varied interval flute design prevents chattering and improves machining efficiency and surface finish quality of side wall of workpiece.

L44

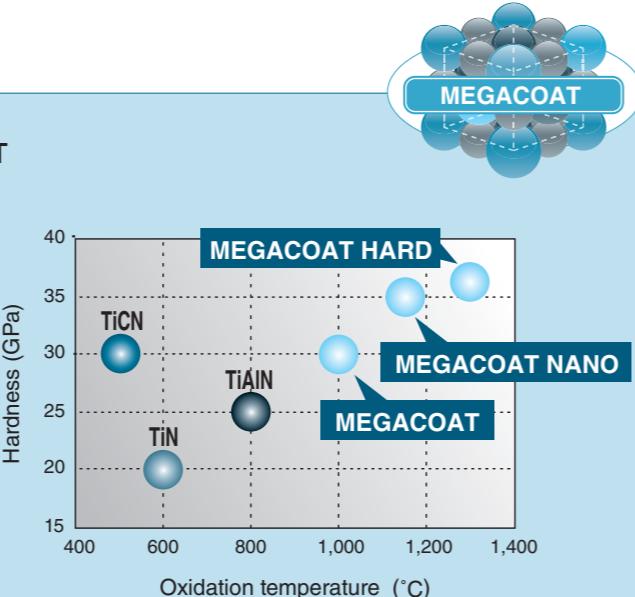
# Solid End Mill Series

## New PVD technology, MEGACOAT

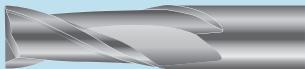
Superior wear and oxidation resistant MEGACOAT

MEGACOAT for Solid End Mill

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

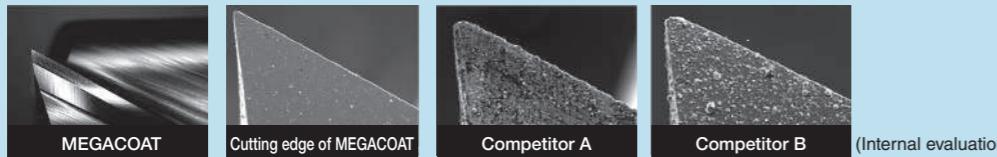


### 1. MEGACOAT for general milling



F Series  
L10~L15

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

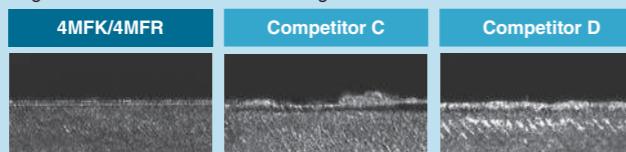


### 2. MEGACOAT NANO with special multilayer nano coating for high efficiency machining



Long Tool Life with "MEGACOAT NANO"  
Doubled Wear Resistance compared to the Competitor's!

Edge Conditions after 140m Machining

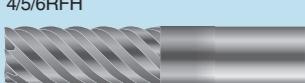


4MFK / 4MFR  
L16

4TFK / 4TFR  
L20

The special Multilayer Nano Coating realizes superior wear resistance due to high hardness and anti-chipping performance. Suitable for high feed rate machining

### 3. MEGACOAT HARD for machining of superalloy and hard materials



4JER  
L28

4/5/6RFH  
L30

H Series  
L37

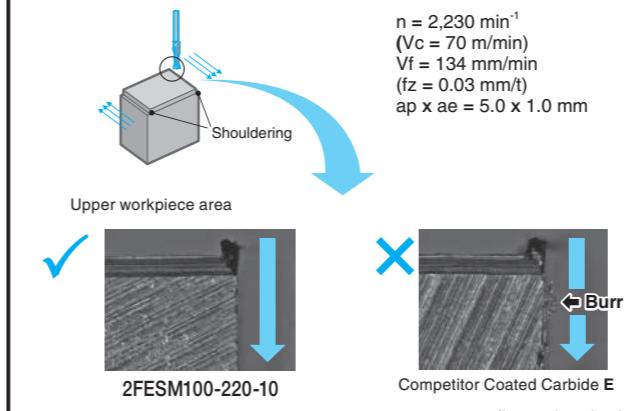
The special multilayer coating provides high hardness and excellent oxidation resistance

Longer tool life and stability at machining of superalloys and hard materials

## Case Studies

### Block SUS304

Sharp Cutting Edge Reduced Burrs



### Machine parts SCM440

n = 2,400 min<sup>-1</sup>  
(Vc = 150 m/min)  
Vf = 1,710 mm/min  
(fz = 0.12 mm/t)  
ap x ae = 18 x 1.0 mm  
Shouldering

Cycle time for a set of workpiece (setup time included)

6PFK 200-450      159 sec  
Conventional G      336 sec

52%  
Cutting Time  
Cycle time greatly reduced compared with conventional End Mill G  
No heavy wear after machining 100 workpieces and still possible to continue machining  
(User Evaluation)

### Plate SUS304

n = 1,590 min<sup>-1</sup>  
(Vc = 50 m/min)  
Vf = 220 mm/min  
(fz = 0.035 mm/t)  
ap x ae = 4 ~ 10 x 10 mm, Wet

Number of workpiece

4TFK100-250      2 pcs

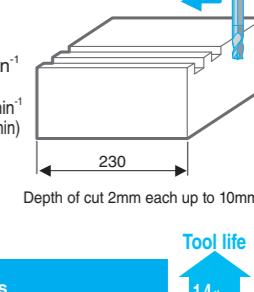
Competitor I (4 flutes)      1.5 pcs

4TFK showed 1.3 times longer tool life than Competitor I  
(User Evaluation)

### Mold Heat Treated Steel (60HRC)

n=1,194 min<sup>-1</sup>  
(Vc=60m/min)  
Vf=400 mm/min  
(fz=0.056mm/t)  
ap x ae=40 x 0.3mm  
6HFSM160-420-16  
(ø16, 6 flutes)

Tool life : 10pcs  
Competitor Coated Carbide J      Amount of chip evacuation 4.8cc/min  
The cutting speed and table feed rate is doubled compared to competitor's coated carbide J. The cutting edge conditions was good and the tool life was also doubled.  
(User Evaluation)



### Slotting of Titanium Alloy

Outside Dia. ø10 mm  
Workpiece Material Ti-6Al-4V  
Spindle Revolution 3ZFK: n = 1,700 min<sup>-1</sup>  
(Vc = 54 m/min)  
Spindle Revolution Competitor F: n = 1,300 min<sup>-1</sup>  
(Vc = 40 m/min)  
Feed Rate Vf = 460 mm/min  
(fz = 0.09 mm/t)  
ap x ae = 2 x 10 mm  
Wet  
Depth of cut 2mm each up to 10mm

3ZFK	52 slots	Tool life 1.4 times
Competitor F	35 slots	

Better surface finish and longer tool life with 3ZFK  
Compared to competitor's coated product, the 3ZFK has a 1.4 times longer tool life  
3ZFK prevents burr formation due to sharp cutting edge (Internal evaluation)

# Surface finish oriented, 2 flutes, Sharp corner edge

## 2FESS, 2FESM, 2FESL



2

MEGACOAT is applied

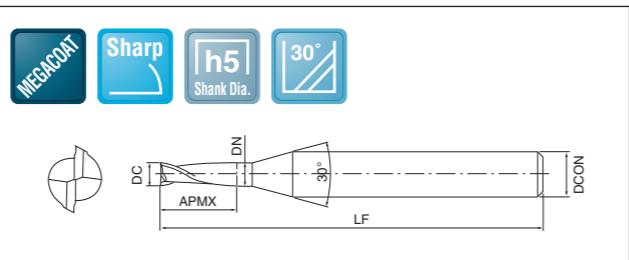
## 2FESS (Short)

Shouldering Slitting

(Unit : mm)

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

Recommended Workpiece Materials											
★ 1st Choice											
P ~30HRC	P 30~40HRC	H ~55HRC	M Stainless steel	K Cast Iron	N Aluminum & Non Ferrous Material						



No. of Flutes : 2

## 2FESM (Medium)

Shouldering Slotting

(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut				Neck Dia.	Shank Dia.	Overall length	No. of Flutes
				APMX	DN	DCON	LF				
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</						

## Surface finish oriented, 2 flutes, Tough corner edge

### 2FEKS, 2FEKM

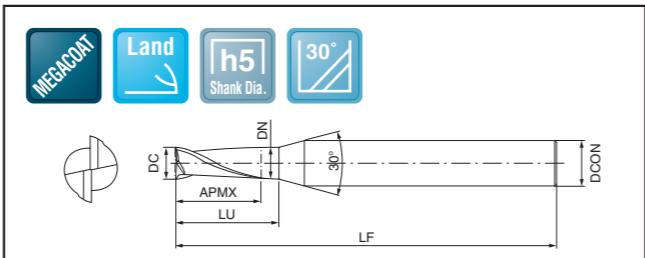
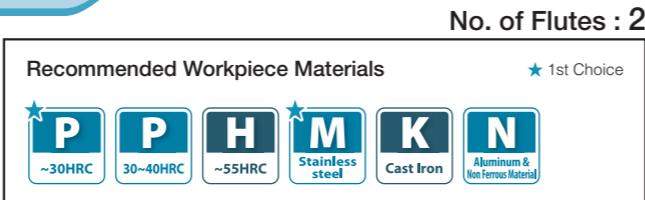


2

MEGACOAT is applied

### 2FEKS (Short)

Description	Stock	Shouldering		Slotting		No. of Flutes			
		Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Neck Dia. DN	Under Neck Length LU	Shank Dia. DCON	Overall length LF	ZEFP
2FEKS030-045-06	●	3.0	0 -0.015	4.5	3.15	6.5	6	50	2
2FEKS035-052-06	●	3.5	0 -0.015	5.2	3.68	7.2	6	50	2
2FEKS040-060-06	●	4.0	0 -0.015	6.0	4.2	8.2	6	50	2
2FEKS045-067-06	●	4.5	0 -0.015	6.7	4.7	8.9	6	50	2
2FEKS050-075-06	●	5.0	0 -0.015	7.5	5.2	10.1	6	50	2
2FEKS055-082-06	●	5.5	0 -0.015	8.2	5.7	10.8	6	50	2
2FEKS060-090-06	●	6.0	0 -0.020	9.0	-	-	6	50	2
2FEKS080-120-08	●	8.0	-0.005 -0.025	12.0	-	-	8	60	2
2FEKS100-150-10	●	10.0	-0.005 -0.025	15.0	-	-	10	70	2
2FEKS120-180-12	●	12.0	-0.010 -0.030	18.0	-	-	12	75	2
2FEKS140-210-16	●	14.0	-0.010 -0.030	21.0	14.2	31.4	16	75	2
2FEKS150-230-16	●	15.0	-0.010 -0.030	23.0	15.2	35	16	90	2
2FEKS160-240-16	●	16.0	-0.010 -0.030	24.0	-	-	16	90	2



### 2FEKM (Medium)

Description	Stock	Shouldering		Slotting		No. of Flutes			
		Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Neck Dia. DN	Under Neck Length LU	Shank Dia. DCON	Overall length LF	ZEFP
2FEKM030-100-06	●	3.0	0 -0.015	10.0	3.15	12.0	6	50	2
2FEKM035-100-06	●	3.5	0 -0.015	10.0	3.68	12.0	6	50	2
2FEKM040-110-06	●	4.0	0 -0.015	11.0	4.2	13.2	6	50	2
2FEKM045-110-06	●	4.5	0 -0.015	11.0	4.7	13.2	6	50	2
2FEKM050-130-06	●	5.0	0 -0.015	13.0	5.2	15.6	6	50	2
2FEKM055-130-06	●	5.5	0 -0.015	13.0	5.7	15.6	6	50	2
2FEKM060-130-06	●	6.0	0 -0.020	13.0	-	-	6	50	2
2FEKM065-160-08	●	6.5	0 -0.020	16.0	6.7	22.4	8	60	2
2FEKM070-160-08	●	7.0	0 -0.020	16.0	7.2	22.4	8	60	2
2FEKM075-190-08	●	7.5	0 -0.020	19.0	7.7	26.6	8	60	2
2FEKM080-190-08	●	8.0	0 -0.025	19.0	-	-	8	60	2
2FEKM085-190-10	●	8.5	0 -0.025	19.0	8.7	26.6	10	70	2
2FEKM090-190-10	●	9.0	0 -0.025	19.0	9.2	26.6	10	70	2
2FEKM095-190-10	●	9.5	0 -0.025	19.0	9.7	26.6	10	70	2
2FEKM100-220-10	●	10.0	0 -0.025	22.0	-	-	10	70	2
2FEKM110-220-12	●	11.0	0 -0.025	22.0	11.2	30.8	12	75	2
2FEKM120-260-12	●	12.0	0 -0.030	26.0	-	-	12	75	2
2FEKM130-260-16	●	13.0	0 -0.030	26.0	13.2	36.4	16	75	2
2FEKM140-260-16	●	14.0	0 -0.030	26.0	14.2	36.4	16	75	2
2FEKM150-300-16	●	15.0	0 -0.030	30.0	15.2	42.0	16	90	2
2FEKM160-320-16	●	16.0	0 -0.030	32.0	-	-	16	90	2

● MEGACOAT and sharp cutting edge enable high precision finishing owing to excellent wear and heat resistance.

Recommended Cutting Conditions L64

● : Std. Item

## Surface finish oriented 4 flutes

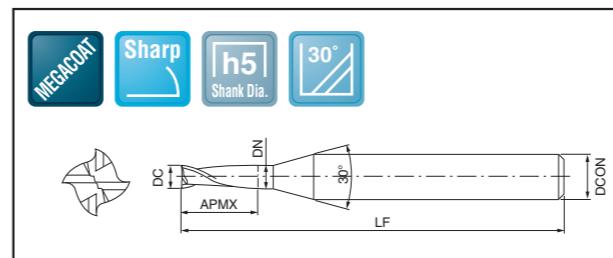
### Sharp corner edge

#### 4FESM



4

MEGACOAT is applied



#### 4FESM

Shouldering (Unit : mm)

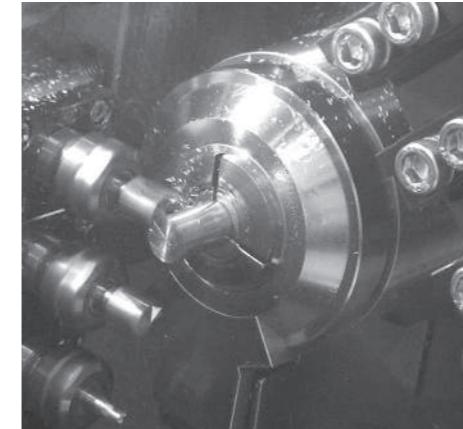
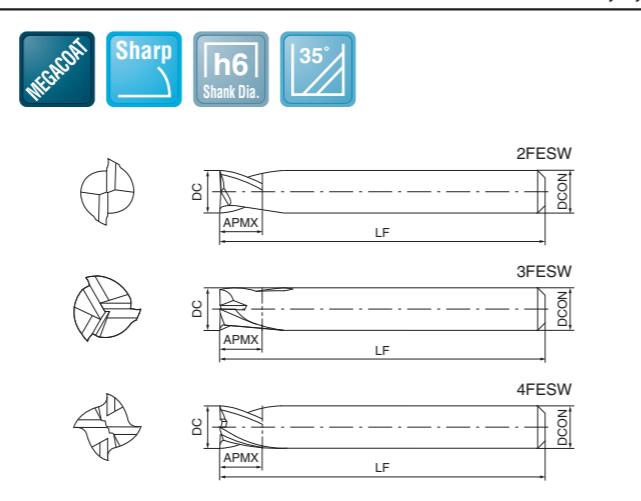
Description	Stock	Shouldering		Slotting		No. of Flutes		
		Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Neck Dia. DN	Shank Dia. DCON	Overall length LF	ZEFP
4FESM010-025-04	●	1.0	0 -0.015	2.5	1.1	4	45	4
4FESM015-040-04	●	1.5	0 -0.015	4.0	1.6	4	45	4
4FESM020-060-04	●	2.0	0 -0.015	6.0	2.1	4	45	4
4FESM025-080-04	●	2.5	0 -0.015	8.0	2.6	4	45	4
4FESM030-100-06	●	3.0	0 -0.015	10.0	3.2	6	50	4
4FESM035-100-06	●	3.5	0 -0.015	10.0	3.7	6	50	4
4FESM040-110-06	●	4.0	0 -0.015	11.0	4.2	6	50	4
4FESM045-110-06	●	4.5	0 -0.015	11.0	4.7	6	50	4
4FESM050-130-06	●	5.0	0 -0.015	13.0	5.2	6	50	4
4FESM055-130-06	●	5.5	0 -0.015	13.0	5.7	6	50	4
4FESM060-130-06	●	6.0	0 -0.020	13.0	-	6	50	4
4FESM060-150-06	●	6.0	0 -0.020	15.0	-	6	50	4
4FESM070-160-08	●	7.0	0 -0.020	16.0	7.2	8	60	4
4FESM080-190-08	●	8.0	0 -0.025	19.0	-	8	60	4
4FESM080-200-08	●	8.0	0 -0.025	20.0	-	8	60	4
4FESM090-190-10	●	9.0	0 -0.025	19.0	9.2	10	70	4
4FESM100-220-10	●	10.0	0 -0.025	22.0	-	10	70	4
4FESM100-250-10	●	10.0	0 -0.025	25.0	-	10	70	4
4FESM120-260-12	●	12.0	0 -0.030	26.0	-	12	75	4
4FESM140-260								

# Surface finish oriented, for Automatic Lathes

## 2FESW, 3FESW, 4FESW (Overall length 35mm / 45mm)



Recommended Workpiece Materials					
<b>P</b> ~30HRC					★ 1st Choice
<b>P</b> 30~40HRC	<b>H</b> ~55HRC	<b>M</b> Stainless steel	<b>K</b> Cast Iron	<b>N</b> Aluminum & Non Ferrous Material	



Workpiece Material: Ni-Co alloy		
2FES (ø3, 2flutes) Excellent surface finish		Facing of machine parts
Competitor A (ø3, 2flutes) X Large burrs		n=2,150min⁻¹ (Vc=20m/min) Vf=100mm/min (fz=0.023mm/t)

(Internal evaluation)

Comparison with competitor's end mill after 600 passes



MEGACOAT is applied

## 2FESW

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP	Shouldering		Slotting	
								(Unit : mm)		(Unit : mm)	
2FESW050-050-05A	●	5	0 -0.020	5	5	35	2				
2FESW060-060-05A	●	6	0 -0.020	6	5	35	2				
2FESW030-030-04	●	3	0 -0.020	3	4	45	2				
2FESW035-035-04	●	3.5	0 -0.020	3.5	4	45	2				
2FESW040-040-04	●	4	0 -0.020	4	4	45	2				
2FESW050-050-06	●	5	0 -0.020	5	6	45	2				
2FESW060-060-06	●	6	0 -0.020	6	6	45	2				
2FESW070-070-07	●	7	0 -0.025	7	7	45	2				
2FESW080-080-07	●	8	0 -0.025	8	7	45	2				
2FESW080-080-08	●	8	0 -0.025	8	8	45	2				
2FESW100-080-07	●	10	0 -0.025	8	7	45	2				
2FESW100-080-10	●	10	0 -0.025	8	10	45	2				
2FESW120-080-10	●	12	0 -0.025	8	10	45	2				
2FESW120-080-12	●	12	0 -0.030	8	12	45	2				
2FESW130-080-13	●	13	0 -0.030	8	13	45	2				

## 3FESW

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP	Shouldering		Slotting	
								(Unit : mm)		(Unit : mm)	
3FESW050-050-05A	●	5	0 -0.020	5	5	35	3				
3FESW060-060-05A	●	6	0 -0.020	6	5	35	3				
3FESW030-030-04	●	3	0 -0.020	3	4	45	3				
3FESW035-035-04	●	3.5	0 -0.020	3.5	4	45	3				
3FESW040-040-04	●	4	0 -0.020	4	4	45	3				
3FESW050-050-06	●	5	0 -0.020	5	6	45	3				
3FESW060-060-06	●	6	0 -0.020	6	6	45	3				
3FESW070-070-07	●	7	0 -0.025	7	7	45	3				
3FESW080-080-07	●	8	0 -0.025	8	7	45	3				
3FESW080-080-08	●	8	0 -0.025	8	8	45	3				
3FESW100-080-07	●	10	0 -0.025	8	7	45	3				
3FESW100-080-10	●	10	0 -0.025	8	10	45	3				
3FESW120-080-10	●	12	0 -0.025	8	10	45	3				
3FESW120-080-12	●	12	0 -0.030	8	12	45	3				
3FESW130-080-13	●	13	0 -0.030	8	13	45	3				

## 4FESW

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP	Shouldering		Slotting	
								(Unit : mm)		(Unit : mm)	
4FESW030-030-04	●	3	0 -0.020	3	4	45	4				
4FESW035-035-04	●	3.5	0 -0.020	3.5	4	45	4				
4FESW040-040-04	●	4	0 -0.020	4	4	45	4				
4FESW050-050-06	●	5	0 -0.020	5	6	45	4				
4FESW060-060-06	●	6	0 -0.020	6	6	45	4				
4FESW070-070-07	●	7	0 -0.025	7	7	45	4				
4FESW080-080-07	●	8	0 -0.025	8	7	45	4				
4FESW080-080-08	●	8	0 -0.025	8	8	45	3				

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP	Shouldering		Slotting	
								(Unit : mm)		(Unit : mm)	
4FESW080-080-08	●	8	0 -0.025	8	8	45					

## 4MFK / 4MFR

MEGACOAT NANO is applied

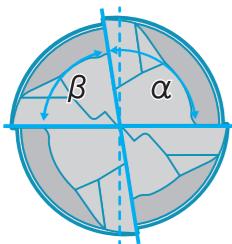
New standard of steel machining

Applicable for high feed machining by anti-chattering structure

### 1 Chattering control by varied interval flute and variable lead design

Excellent Surface Finish with Reduced Chattering

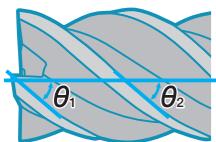
Varied interval flute design



Cutting force distribution varies due to variable flute width, which prevents periodical vibration during machining

$$\alpha \neq \beta$$

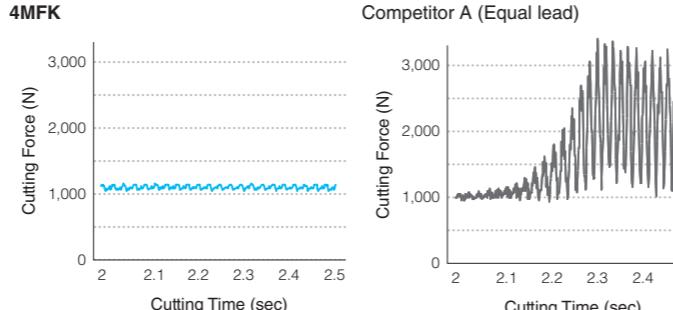
Variable lead



Each flute contains optimized helix angle (lead angle  $\theta$ ), which prevents vibration and achieves a clean surface finish  
Chattering control, good surface finish

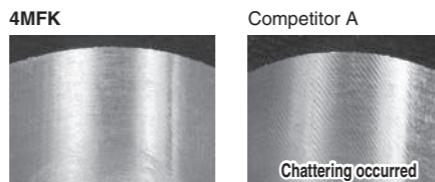
$$\theta_1 \neq \theta_2$$

Cutting Force Comparison (Internal evaluation) **Drastically Reduced Vibration for Stable Machining**



Cutting Conditions: n = 2,650 min⁻¹, Vf = 300 mm/min, ap × ae = 10 × 8 mm, End Mill Dia. ø8, Slotted Wet Workpiece Material: SCM440

Surface Comparison (Internal evaluation)

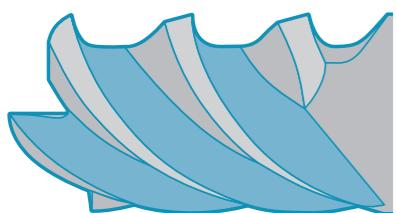


Cutting Conditions: n = 6,000 min⁻¹, Vf = 1,500 mm/min, ap × ae = 8 × 2 mm, End Mill Dia. ø8, Shouldering Wet Workpiece Material: S45C

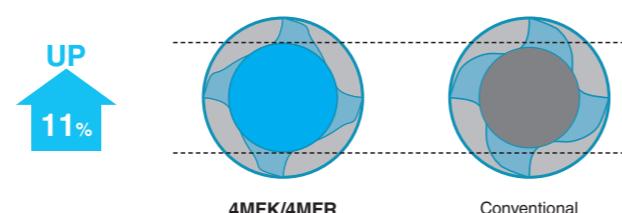
### 2 Good Chip Evacuation

Unique Flute Design for Smooth Chip Evacuation Even in Slotting and High Feed Machining Applications

Large Chip Pocket



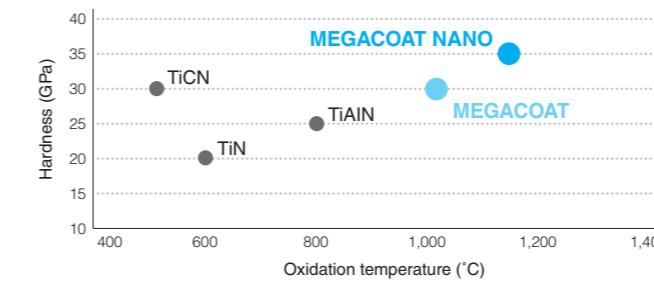
Core diameter comparison (Internal evaluation)



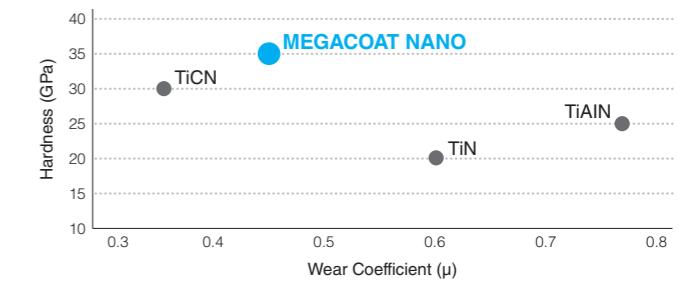
### 3 Achieves Long Tool Life and Stable Machining

Special Nano-layer Coating MEGACOAT NANO controls wear progress and improves chipping resistance

Properties of PVD Coating (Abrasion Resistance)

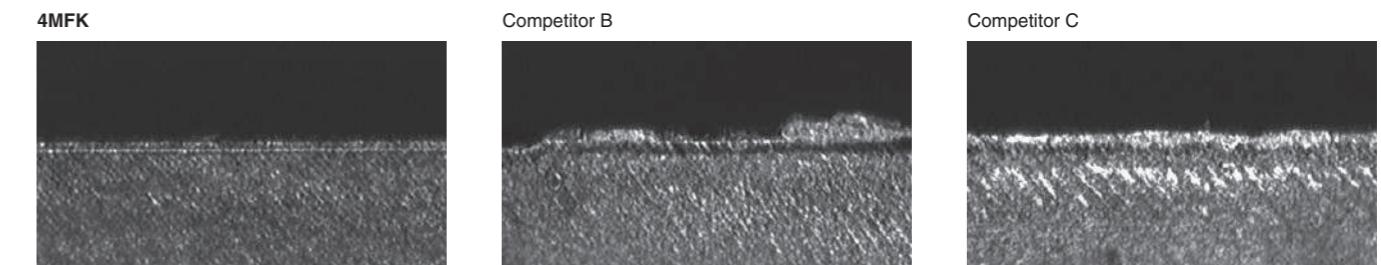


Properties of PVD Coating (Adhesion Resistance)



Achieve long tool life with the combination of a tough substrate and a special Nano coating layer

Abrasion Resistance Comparison (Internal evaluation)



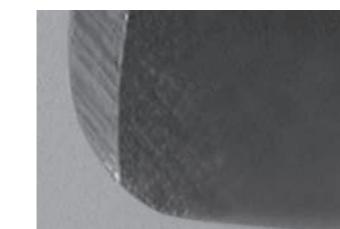
Edge Conditions after 140m Cutting

Cutting Conditions: n = 6,000 min⁻¹, Vf = 1,100 mm/min, ap × ae = 5.0 × 0.8 mm, End Mill Dia. ø8, Shouldering, Wet Workpiece Material: SCM440

### 4 High Quality Sharp Edge

High Quality Sharp Edge with Advanced Grinding Technology  
Enables Excellent Surface Finish

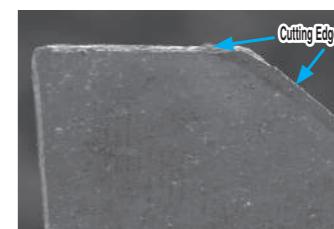
4MFR Corner Radius Type



Smooth and Sharp Cutting Edge Up to the Tip **Preventing Burrs**



4MFK



Competitor D

# High feed rate, High efficiency

## 4MFK



MEGACOAT NANO is applied

No. of Flutes : 4

Recommended Workpiece Materials						
★ 1st Choice						
P ~30HRC	P 30~40HRC	H ~55HRC	M Stainless steel	S Titanium Alloy	K Cast Iron	N Aluminum & Non Ferrous Material

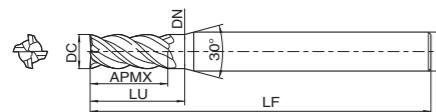


Fig.1

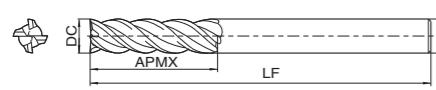


Fig.2

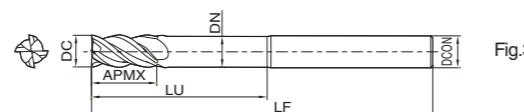


Fig.3

## 4MFK (With corner land)

Description	Stock	Outside Dia. DC	Mill Dia. APMX	Length of cut -0.015	* Cutting edge length DN	Neck Dia. LU	Interflute Length DCON	Shank Dia. LF	Overall length ZFP	No. of Flutes Shape	(Unit : mm)																
											DC	Mill Dia. APMX	Length of cut -0.015	* Cutting edge length DN	Neck Dia. LU	Interflute Length DCON	Shank Dia. LF	Overall length ZFP	No. of Flutes Shape	DC	Mill Dia. APMX	Length of cut -0.015	* Cutting edge length DN	Neck Dia. LU	Interflute Length DCON	Shank Dia. LF	Overall length ZFP
4MFK030-045	●	3.0	0 -0.015	4.5 S	5.4	6	60	4																			
4MFK030-080	●			8 M	3.15	9.6																					
4MFK030-120	●			12 L		14.4																					
4MFK035-050	●			5 S		6.0																					
4MFK035-095	●	3.5	0 -0.015	9.5 M	3.7	11.4	6	60	4																		
4MFK035-140	●			14 L		16.8																					
4MFK040-060	●			6 S		7.2																					
4MFK040-110	●			11 M		13.2	6	60	4																		
4MFK040-120	●			12 M (3D)	4.2																						
4MFK040-160	●			16 L		19.2																					
4MFK045-065	●			6.5 S		7.8																					
4MFK045-120	●	4.0	0 -0.015	12 M	4.7	14.4	6	60	4																		
4MFK045-180	●			18 L		21.6																					
4MFK050-075	●			7.5 S		9.0																					
4MFK050-130	●	5.0	0 -0.015	13 M	5.2	15.6	6	60	4																		
4MFK050-200	●			20 L		24.0																					
4MFK055-080	●			8 S		9.6																					
4MFK055-130	●			13 M	5.7	15.6	6	60	4																		
4MFK055-210	●			21 L		25.2																					
4MFK060-090	●			S -																							
4MFK060-090-180	●			9 S'		18.0																					
4MFK060-090-300	●			5.8 S'		30.0	6	70	4																		
4MFK060-130	●			13 M																							
4MFK060-150	●			15 M (2.5D)	-	-																					
4MFK060-220	●			22 L																							
4MFK065-160	●	6.5	0 -0.020	16 M	6.7	19.2	8	70	4																		
4MFK070-105	●			10.5 S		12.6																					
4MFK070-160	●			16 M	7.2	19.2	8	70	4																		
4MFK070-250	●			25 L		30.0																					

Recommended Cutting Conditions L67

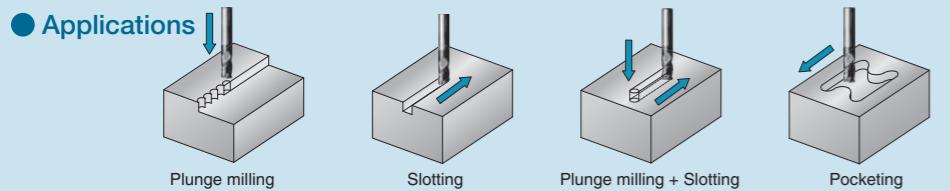
Description	Stock	Outside Dia. DC	Mill Dia. APMX	Length of cut -0.015	* Cutting edge length DN	Neck Dia. LU	Interflute Length DCON	Shank Dia. LF	Overall length ZFP	No. of Flutes Shape	(Unit : mm)											
											DC	Mill Dia. APMX	Length of cut -0.015	* Cutting edge length DN	Neck Dia. LU	Interflute Length DCON	Shank Dia. LF	Overall length ZFP	No. of Flutes Shape	DC	Mill Dia. APMX	Length of cut -0.015
4MFK030-045	●	3.0	0 -0.015	4.5 S	5.4	6	60</															



# 3ZFK

## Triple functions

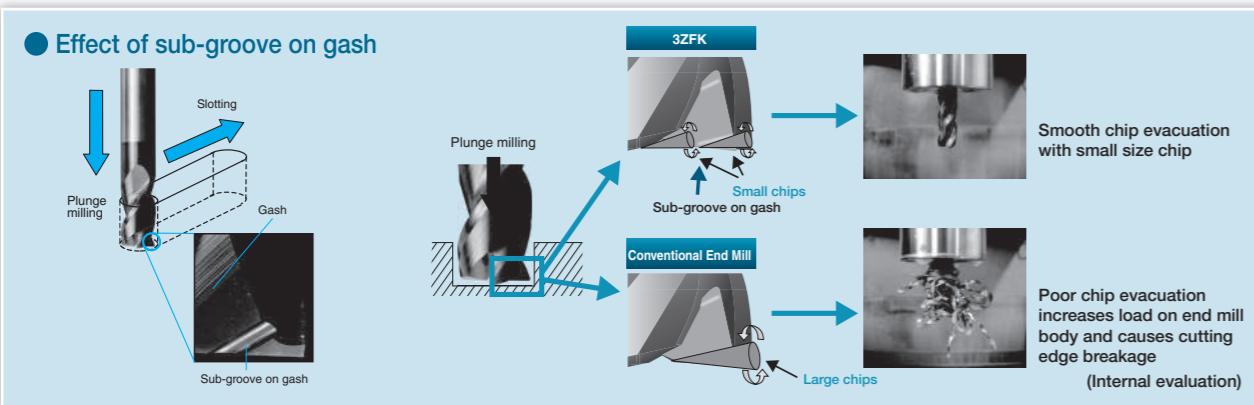
Applicable for plunge milling, slotting and finishing with one end mill



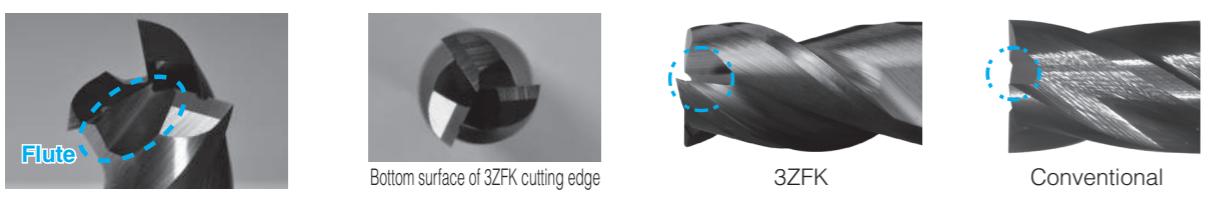
## Triple Performances

### 1. High efficiency machining with new design

- Smooth chip evacuation because sub-groove on gash breaks chips during plunge milling

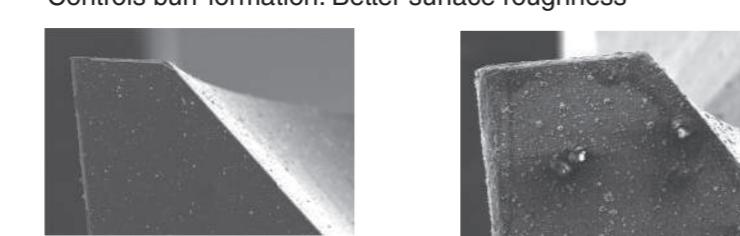
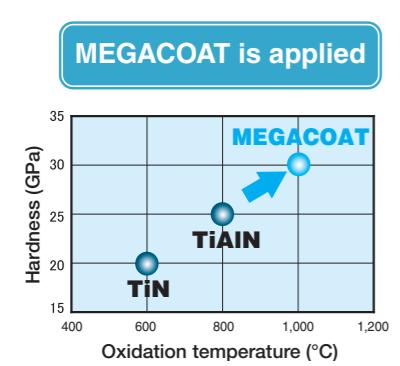


- Prevents chip clogging owing to deep flute and gash design



### 2. Longer tool life with MEGACOAT

- Excellent wear resistance and heat resistance



Smooth and sharp to the tip of the cutting edge  
Longer tool life and improved surface finish  
**(Internal evaluation)**

Rough coating surface and round  
blunt cutting edge  
**(Internal evaluation)**

## 3ZFKS, 3ZFKM



3

MEGACOAT is applied

## 3ZFKS (Short)

Shouldering Slotting Plunge milling

## 3ZFKM (Medium)

Shouldering Slotting Plunge milling

(Unit : mm)

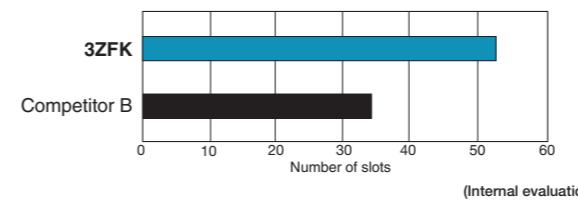
Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut				Shank Dia.	Overall length	No. of Flutes	Shape
				APMX	DN	LU	DCON				
3ZFKS060-090-06	●	6.0	0 -0.020	9.0	-	-	6	50	3	Fig.1	
3ZFKS070-105-08	●	7.0	0 -0.020	10.5	7.2	11.3	8	60	3	Fig.2	
3ZFKS080-120-08	●	8.0	-0.005 -0.025	12.0	-	-	8	60	3	Fig.1	
3ZFKS100-150-10	●	10.0	-0.005 -0.025	15.0	-	-	10	70	3	Fig.1	
3ZFKS120-180-12	●	12.0	-0.010 -0.030	18.0	-	-	12	75	3	Fig.1	

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut				Shank Dia.	Overall length	No. of Flutes	Shape
				APMX	DN	LU	DCON				
3ZFKM030-060-06	●	3.0	0 -0.015	6.0	3.2	6.5	6	50	3	Fig.2	
3ZFKM030-080-06	●	3.0	0 -0.015	8.0	3.2	8.6	6	50	3	Fig.2	
3ZFKM040-080-06	●	4.0	0 -0.015	8.0	4.2	8.6	6	50	3	Fig.2	
3ZFKM040-120-06	●	4.0	0 -0.015	12.0	4.2	13.0	6	50	3	Fig.2	
3ZFKM050-100-06	●	5.0	0 -0.015	10.0	5.2	10.8	6	50	3	Fig.1	
3ZFKM050-130-06	●	5.0	0 -0.015	13.0	5.2	14.0	6	50	3	Fig.1	
3ZFKM060-130-06	●	6.0	0 -0.020	13.0	-	-	6	50	3	Fig.1	
3ZFKM070-160-08	●	7.0	0 -0.020	16.0	7.2	17.3	8	60	3	Fig.2	
3ZFKM080-190-08	●	8.0	0 -0.025	19.0	-	-	8	60	3	Fig.1	
3ZFKM100-220-10	●	10.0	-0.005 -0.025	22.0	-	-	10	70	3	Fig.1	
3ZFKM120-260-12	●	12.0	-0.010 -0.030	26.0	-	-	12	75	3	Fig.1	
3ZFKM160-350-16	●	16.0	-0.010 -0.030	35.0	-	-	16	90	3	Fig.1	

## Case Studies

### Slotting of Titanium Alloy

Outside Dia.	ø10
Workpiece Material	Ti-6Al-4V
Spindle Revolution	3ZFK : n=1,700min <sup>-1</sup> Competitor B: n=1,300min <sup>-1</sup>
Feed Rate	Vf = 460mm/min
Depth of Cut	ap x ae=2 x 10mm (Wet)

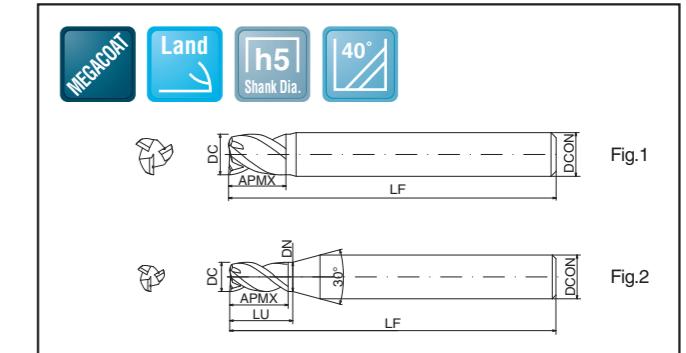


Better surface finish and longer tool life with 3ZFK.
Compared to competitor's coated product, the 3ZFK has a 1.4 times longer tool life.
3ZFK prevents burr formation due to sharp cutting edge.
◆ Cutting edge after 35 passes

(Internal evaluation)

Recommended Cutting Conditions L69

Recommended Workpiece Materials		No. of Flutes : 3
P ~30HRC	M 30~40HRC	1st Choice



## For Steel and Difficult-to-cut materials, Varied interval flute design

### 5DERM



5

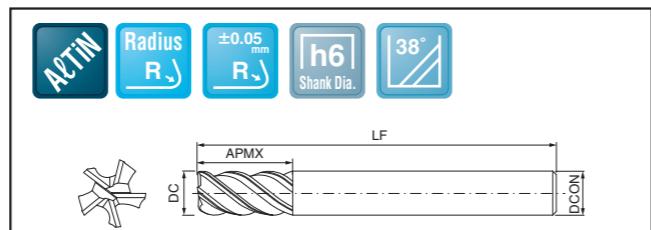
#### 5DERM (Radius)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of cut	Shank Dia.	Overall length	Spec of Corners	No. of Flutes
								ZEFP
5DERM040-120-06-R025	▲	4	-0.020 -0.038	12	6	55	R0.25	5
5DERM050-130-06-R025	▲	5	-0.020 -0.038	13	6	57	R0.25	5
5DERM060-130-06-R040	▲	6	-0.020 -0.038	13	6	57	R0.4	5
5DERM080-160-08-R050	▲	8	-0.025 -0.047	16	8	63	R0.5	5
5DERM090-190-10-R050	▲	9	-0.025 -0.047	19	10	72	R0.5	5
5DERM100-220-10-R050	▲	10	-0.025 -0.047	22	10	72	R0.5	5
5DERM120-260-12-R075	▲	12	-0.032 -0.059	26	12	83	R0.75	5

● 5 flutes design enables high feed rate machining. Varied intervals prevent vibration.

Maximum groove width is 0.8DC.

No. of Flutes : 5



Shouldering      Slotting  
(Unit : mm)

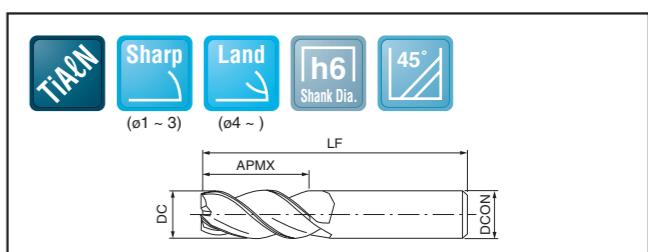
## 3 flutes, Multi-purpose

### 3UFSM



3

### 3UFSM



Shouldering      Slotting  
(Unit : mm)

Recommended Cutting Conditions L70

▲ : To be replaced by a new product

Recommended Cutting Conditions L71

▲ : To be replaced by a new product

# 6PFK/8PFK

High efficiency machining and superior surface finish with new special flute design

● Varied interval flute design / Variable lead

Superior chattering resistance performance with Kyocera's unique varied interval flute design / variable lead

Varied interval flute design



Cutting force varies due to varied interval flute, which prevents periodical vibration during machining

Variable Lead



Every flute has its optimum helix angle (lead angle $\theta$ ), which enables excellent and anti vibration effect and good surface finish

Surface finish comparison (side surface)

End Mill Dia. ø12 (Internal evaluation)

Workpiece Material	SCM440	SUS304	Ti-6Al-4V
Cutting Conditions	n=3,300min <sup>-1</sup> (Vc=124m/min) Vf=2,000mm/min(fz=0.1mm/t) apxae=30x1.5mm	n=2,500min <sup>-1</sup> (Vc=94m/min) Vf=1,130mm/min (fz=0.08mm/t) apxae=30x0.6mm	n=2,500min <sup>-1</sup> (Vc=94m/min) Vf=1,130mm/min (fz=0.08mm/t) apxae=30x0.6mm
Results	6PFK	6PFK	6PFK
	Chattering occurred	Chattering occurred	Dull surface due to poor approach

High feed rate and high efficiency shouldering with Multi-edge design (6 flutes /8 flutes)

Varied interval flute design and variable lead to minimize chattering

Good surface finish

● Special Flute Design

## New Special Flute Design Enables Stable Chip Evacuation



Good chip evacuation with wide chip pocket  
Good performance at high feed rate machining

## 6PFK, 8PFK



MEGACOAT NANO is applied

## 6PFK, 8PFK (Medium)

Shouldering  
(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP	Shape
6PFK060-150	●	6.0	0 -0.020	15	6	60	6	Fig.1
6PFK080-200	●	8.0	-0.005 -0.025	20	8	70	6	
6PFK100-250	●	10.0	-0.005 -0.025	25	10	80	6	
6PFK120-300	●	12.0	-0.010 -0.030	30	12	100	6	
6PFK160-400	●	16.0	-0.010 -0.030	40	16	110	6	
6PFK200-450	●	20.0	-0.010 -0.030	45	20	125	6	
8PFK250-500	●	25.0	-0.010 -0.030	50	25	140	8	Fig.2

## 6PFK, 8PFK (Long)

Shouldering  
(Unit : mm)

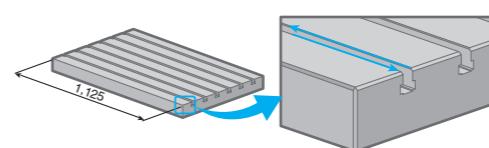
Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP	Shape
6PFK060-250	●	6.0	0 -0.020	25	6	70	6	Fig.1
6PFK080-350	●	8.0	-0.005 -0.025	35	8	90	6	
6PFK100-450	●	10.0	-0.005 -0.025	45	10	100	6	
6PFK120-550	●	12.0	-0.010 -0.030	55	12	120	6	
6PFK160-650	●	16.0	-0.010 -0.030	65	16	135	6	
6PFK200-750	●	20.0	-0.010 -0.030	75	20	155	6	
6PFK200-1000	●	20.0	-0.010 -0.030	100	20	180	6	
8PFK250-1000	●	25.0	-0.010 -0.030	100	25	180	8	Fig.2

Recommended Cutting Conditions L72

## Case Studies

### Machine table FC250

6PFK200-450  
Finishing (1 pass)  
n = 2,500 min<sup>-1</sup>  
(Vc = 157 m/min)  
Vf = 3,500 mm/min  
(fz = 0.23 mm/t)  
ap x ae = 35 x 1.2 mm



Cutting Time (1,125mm x 24 slots)

6PFK 200-450

10 min

1/8  
Cutting Time

Competitor Coated Carbide B

80 min

Competitor machined the workpiece with 2 passes due to chattering.  
6PFK machined the workpiece with 1 pass without chattering.  
Productivity has greatly improved by increasing cutting conditions.

(User Evaluation)

Competitor Coated Carbide B (2 passes)  
Semi finishing n = 2,500 min<sup>-1</sup> (Vc = 157 m/min)  
Vf = 1,500 mm/min (fz = 0.1 mm/t)  
ap x ae = 35 x 1.0 mm  
Finishing n = 2,000 min<sup>-1</sup> (Vc = 125 m/min)  
Vf = 1,000 mm/min (fz = 0.1 mm/t)  
ap x ae = 35 x 0.2 mm

# 4JER

High Efficiency and Stable Machining for Superalloy such as Inconel®

Long Tool Life Machining with MEGACOAT HARD for Excellent Heat Resistance

## 1 Resistant to Breakage

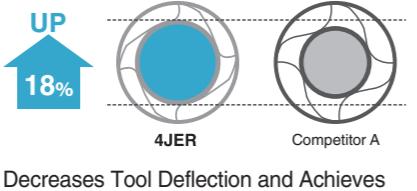
Stable Slotting and Trochoid Machining with Chip Pocket Grooves and Large Core Thickness

- Chip Pocket for Smooth Chip Evacuation During Slotting Applications



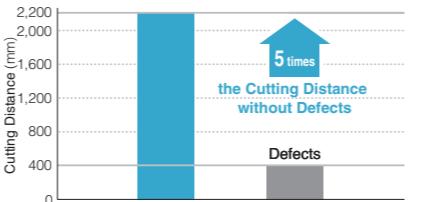
Excellent Chip Evacuation

2 times  
Amount of chip evacuation



Decreases Tool Deflection and Achieves Excellent Machining Precision

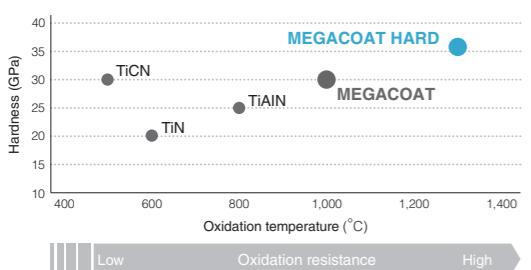
- Slotting Performance Comparison (Internal evaluation)



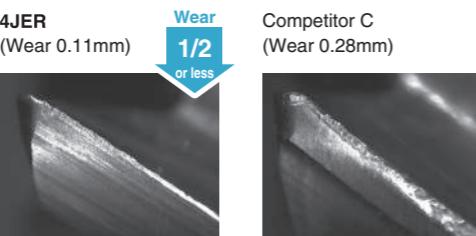
## 2 Achieves Long Tool Life and Stable Machining

The MEGACOAT HARD coating technology delivers the highest hardness and heat resistance in Kyocera's PVD coating

- Properties of Coating



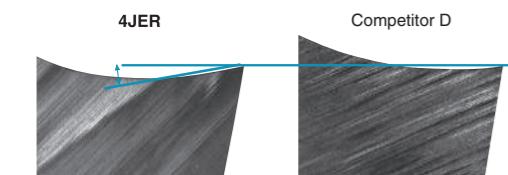
- Wear resistance comparison (Cutting distance 975mm)



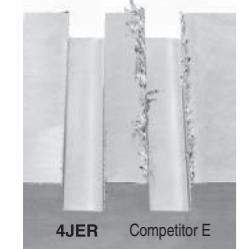
Cutting Conditions : n = 1,200 min<sup>-1</sup>, Vf = 140 mm/min, ap = 4 mm  
End Mill Dia. ø8 mm, Slotting, Wet  
Workpiece Material : Inconel®718 (Aging treatment, 40HRC)

## 3 Decreased burr

High Sharpness with a Large Rake Angle



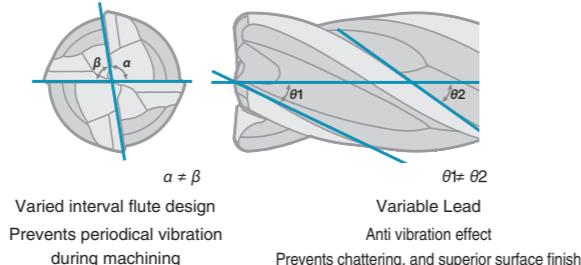
Burring During Slotting (Inconel® 718)



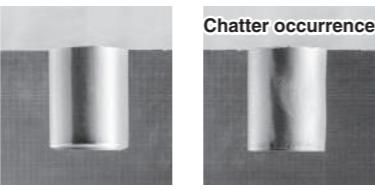
Cutting Conditions : n = 1,200 min<sup>-1</sup>, Vf = 140 mm/min, ap = 4 mm  
End Mill Dia. ø8 mm, Wet

## 4 Resistance to chattering

Improved Chatter Resistance with Varied interval flute and Variable Lead



Slotting Surface in Trochoidal Machining (Inconel® 718)



Cutting Conditions : n = 1,200 min<sup>-1</sup>, Vf = 300 mm/min, ap = 20 mm  
End Mill Dia. ø16 mm, Width 20mm, Wet

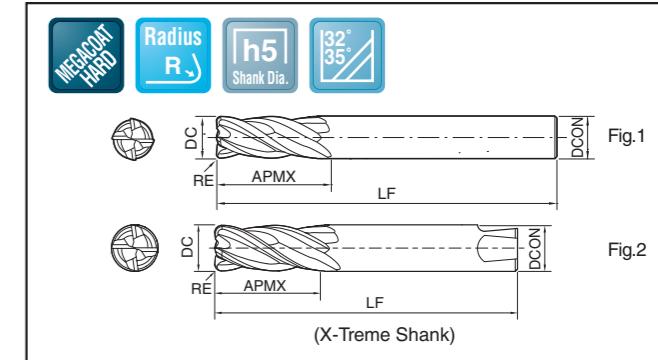
## 4JER



MEGACOAT HARD is applied

Recommended Workpiece Materials				
P ~30HRC	P 30~40HRC	M Stainless steel	S Titanium Alloy	S Heat-resistant Alloy

★ 1st Choice



## 4JER (Short)

Shouldering Slotting (Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Corner-R RE	Length of cut APMX	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP	Shape							
4JER060-090-R03	●	6.0	0 -0.020	0.3	9	6	60	4								
4JER060-090-R05	●			0.5												
4JER060-090-R10	●			1.0												
4JER080-120-R03	●	8.0	-0.005 -0.025	0.3	12	8	70	4								
4JER080-120-R05	●			0.5												
4JER080-120-R10	●			1.0												
4JER080-120-R15	●			1.5												
4JER100-150-R03	●			10.0						-0.005 -0.025	0.3	15	10	80	4	
4JER100-150-R05	●	0.5														
4JER100-150-R10	●	1.0														
4JER100-150-R15	●	1.5														
4JER100-150-R20	●	2.0														
4JER100-150-R30	●	3.0														
4JER120-180-R05	●	12.0	-0.010 -0.030		0.5	18	12	100	4							
4JER120-180-R10	●			1.0												
4JER120-180-R15	●			1.5												
4JER120-180-R20	●			2.0												
4JER120-180-R30	●			3.0												
4JER160-240-R10	●			16.0	-0.010 -0.030					1.0		24	16	110	4	
4JER160-240-R20	●	2.0														
4JER160-240-R30	●	3.0														
4JER200-300-R10	●	20.0	-0.010 -0.030			1.0	30	20	125	4						
4JER200-300-R20	●					2.0										
4JER200-300-R30	●					3.0										

Fig.1

## 4JER (Medium)

Shouldering Slotting (Unit : mm)

Fig.1

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Corner-R RE	Length of cut APMX	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP	Shape							
4JER060-150-R03	●	6.0	0 -0.020	0.3	15	6	60	4								
4JER060-150-R05	●			0.5												
4JER060-150-R10	●			1.0												
4JER080-200-R03	●	8.0	-0.005 -0.025	0.3	20	8	70	4								
4JER080-200-R05	●			0.5												
4JER080-200-R10	●			1.0												
4JER080-200-R15	●			1.5												
4JER100-250-R03	●			10.0						-0.005 -0.025	0.3	25	10	80	4	
4JER100-250-R05	●	0.5														
4JER100-250-R10	●	1.0														
4JER100-250-R15	●	1.5														
4JER100-250-R20	●	2.0														
4JER100-250-R30	●	3.0														
4JER120-260-R05	●	12.0	-0.010 -0.030		0.5	26	12	100	4							
4JER120-260-R10	●			1.0												
4JER120-260-R15	●			1.5												
4JER120-260-R20	●			2.0												
4JER120-260-R30	●			3.0												
4JER160-350-R10	●			16.0	-0.010 -0.030					1.0		35	16	110	4	
4JER160-350-R20	●	2.0														
4JER160-350-R30	●	3.0														
4JER200-450-R10	●	20.0	-0.010 -0.030			1.0	45	20	125	4						
4JER200-450-R20	●					2.0										
4JER200-450-R30	●					3.0										
4JER120-260-R10-XT	●			12.0	-0.010 -0.030	1.0						26	12	94	4	
4JER120-260-R20-XT	●					2.0										
4JER120-260-R30-XT	●					3.0										
4JER160-350-R10-XT	●	16.0	-0.010 -0.030	1.0	35	16	116	4								
4JER160-350-R20-XT	●			2.0												
4JER160-350-R30-XT	●			3.0												
4JER200-450-R10-XT	●	20.0	-0.010 -0.030	1.0	45	20	130	4								
4JER200-450-R20-XT	●			2.0												
4JER200-450-R30-XT	●			3.0												

Fig.2

Applicable chuck for 4JER...XT M90

Recommended Cutting Conditions L73

● : Std. Item

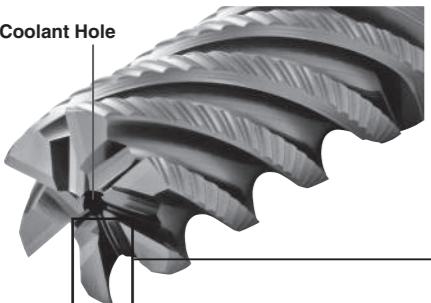
# 4 / 5 / 6RFH

**High Efficiency and Stable Machining with Multi-edge Design and Coolant Hole  
Deep Slotting for Stainless Steel and Titanium Alloy**

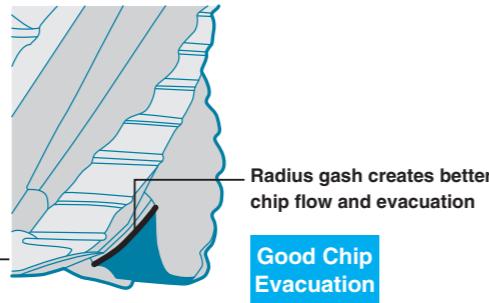
## 1 High Efficiency Machining with Multi-edge Design

Multi-edge Design with Coolant Hole. Good Chip Evacuation with Original Gash Shape

● Multi-edge Design ( $\phi 16$  - 6 flutes)



● Original Gash Shape



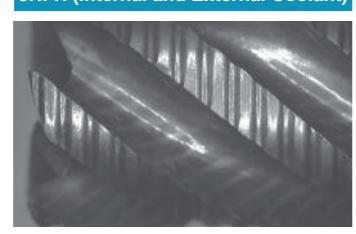
Deep Slotting ( $ap = 2 \times DC$ ) for Stainless Steel and Titanium Alloy

● Slitting Performance Comparison (Internal Evaluation)

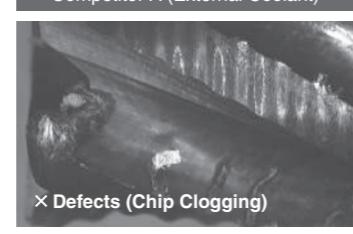
After Machining 1 Pass



5RFH (Internal and External Coolant)



Competitor A (External Coolant)



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

Competitor A

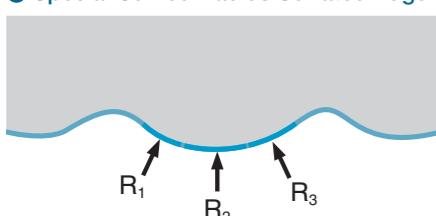
5RFH

No Defects when Deep Slotting

## 2 Defect Resistant

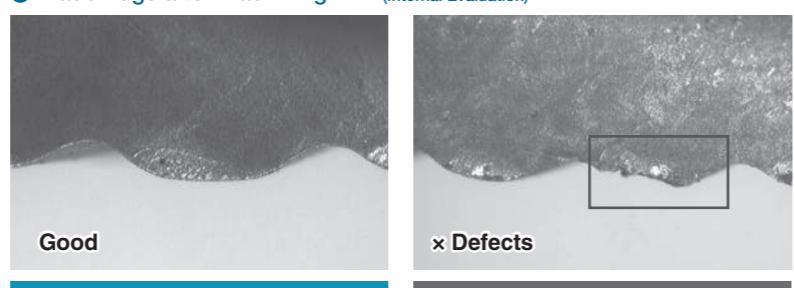
Reduces Cutting Pressure and Defect with Special Curved Radius Serrated Edge. Enables Stable Machining

● Special Curved Radius Serrated Edge



Serrated Curved Edge with Different Radii (Compound Radius Shape)  
Distributes cutting pressure and increase defect resistance

● Blade Edge after Machining 12m (Internal Evaluation)



5RFH

Competitor B

## 3 Achieves Long Tool Life and Stable Machining

The MEGACOAT HARD coating technology delivers the highest hardness and heat resistance in Kyocera's PVD coating

## 4 / 5 / 6RFH

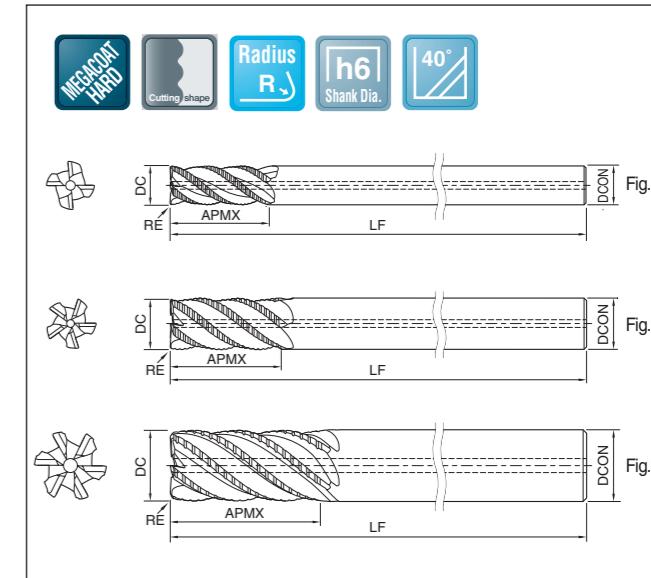


MEGACOAT HARD is applied



Recommended Workpiece Materials					
P ~30HRC	P 30~40HRC	M Stainless steel	S Titanium Alloy	S Heat-resistant Alloy	K Cast Iron

\* 1st Choice



## 4 / 5 / 6RFH (Medium)

Shouldering Slotted  
(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	* Corner-R				Length of cut	Shank Dia.	Overall length	No. of Flutes	Shape
				RE	APMX	DCON	LF					
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

## 4 / 5 / 6RFH (Long)

Shouldering Slotted  
(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	* Corner-R				Length of cut	Shank Dia.	Overall length	No. of Flutes	Shape
				RE	APMX	DCON	LF					
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

● Std. Item

No. of Flutes : 4, 5, 6

## Roughing Serrated edge

### 3RDS, 4RDS, 5RDS



No. of Flutes : 3,4,5

Recommended Workpiece Materials ★ 1st Choice

P ~30HRC	P 30~40HRC	M Stainless steel	K Cast Iron
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TiAlN Cutting Shape C h6 Shank Dia. 20°

Diagram showing dimensions: APMX, DC, LF, CHW, Non, and a cross-section of the tool with a 20° helix angle.

### 3RDSTM, 4RDSTM, 5RDSTM

(Medium)

Shouldering Slitting

Description	Stock	(Unit : mm)							
		Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Shank Dia. DCON	Overall length LF	Spec. of Corners CHW	No. of Flutes ZEFP	
3RDSM040-110-06	● 4	-0.030 -0.105	11	6	55	0.3	3		
3RDSM050-130-06	● 5	-0.030 -0.105	13	6	57	0.3	3		
3RDSM060-130-06	● 6	-0.030 -0.105	13	6	57	0.3	3		
3RDSM080-160-08	● 8	-0.040 -0.130	16	8	63	0.3	3		
4RDSM100-220-10	● 10	-0.040 -0.130	22	10	72	0.5	4		
4RDSM120-260-12	● 12	-0.050 -0.160	26	12	83	0.5	4		
4RDSM160-320-16	● 16	-0.050 -0.160	32	16	92	0.5	4		
4RDSM200-380-20	● 20	-0.065 -0.195	38	20	104	0.5	4		
5RDSM250-450-25	● 25	-0.065 -0.195	45	25	121	0.5	5		

● Three, four and five flutes types are available for roughing. Their edge design with sine-curve pattern reduce cutting force.

## Roughing Notched edge

### 4RFSM, 6RFSM



No. of Flutes : 4,6

Recommended Workpiece Materials ★ 1st Choice

P ~30HRC	P 30~40HRC	H ~55HRC	H ~68HRC	M Stainless steel	S Titanium Alloy	S Heat-resistant Alloy	K Cast Iron
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TiAlN Cutting Shape C h6 Shank Dia. 45°

Diagram showing dimensions: APMX, DC, LF, CHW, Non, and a cross-section of the tool with a 45° helix angle.

### 4RFSM

Shouldering Slitting

Description	Stock	(Unit : mm)							
		Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Shank Dia. DCON	Overall length LF	Spec. of Corners CHW	No. of Flutes ZEFP	
4RFSM060-130-06	● 6	-0.030 -0.105	13	6	57	0.3	4		
4RFSM080-160-08	● 8	-0.040 -0.130	16	8	63	0.4	4		
4RFSM100-220-10	● 10	-0.040 -0.130	22	10	72	0.5	4		
4RFSM120-260-12	● 12	-0.050 -0.160	26	12	83	0.6	4		
4RFSM160-320-16	● 16	-0.050 -0.160	32	16	92	0.6	4		
4RFSM200-380-20	● 20	-0.065 -0.195	38	20	104	1.0	4		

### 6RFSM

Shouldering Slitting

Description	Stock	(Unit : mm)							
		Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Shank Dia. DCON	Overall length LF	Spec. of Corners CHW	No. of Flutes ZEFP	
6RFSM160-320-16	● 16	-0.050 -0.160	32	16	92	0.6	6		
6RFSM200-380-20	● 20	-0.065 -0.195	38	20	104	1.0	6		
6RFSM250-450-25	● 25	-0.065 -0.195	45	25	121	1.1	6		

Recommended Cutting Conditions L76

● RFS has notched surface edge of 45° helix angle. It is applicable for hard materials and titanium alloys due to strong cutting edge.

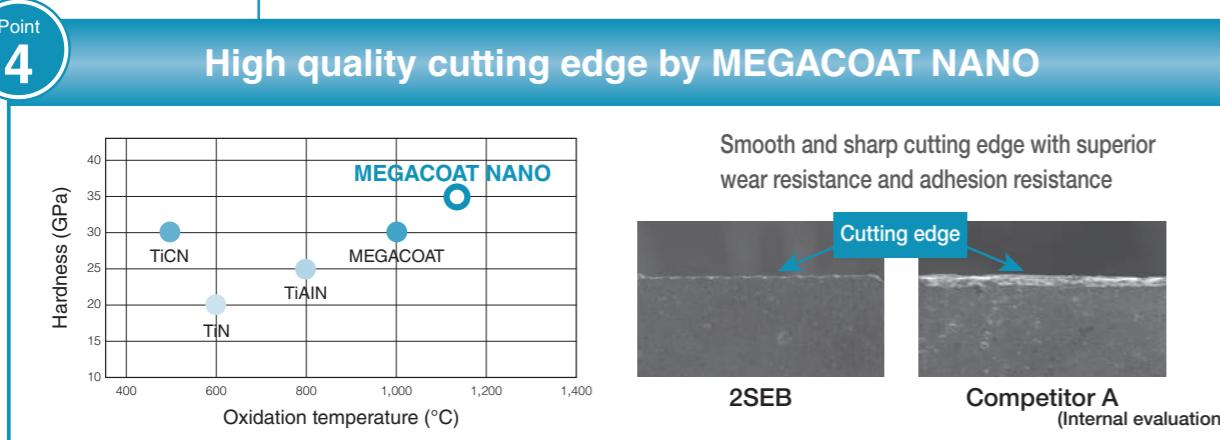
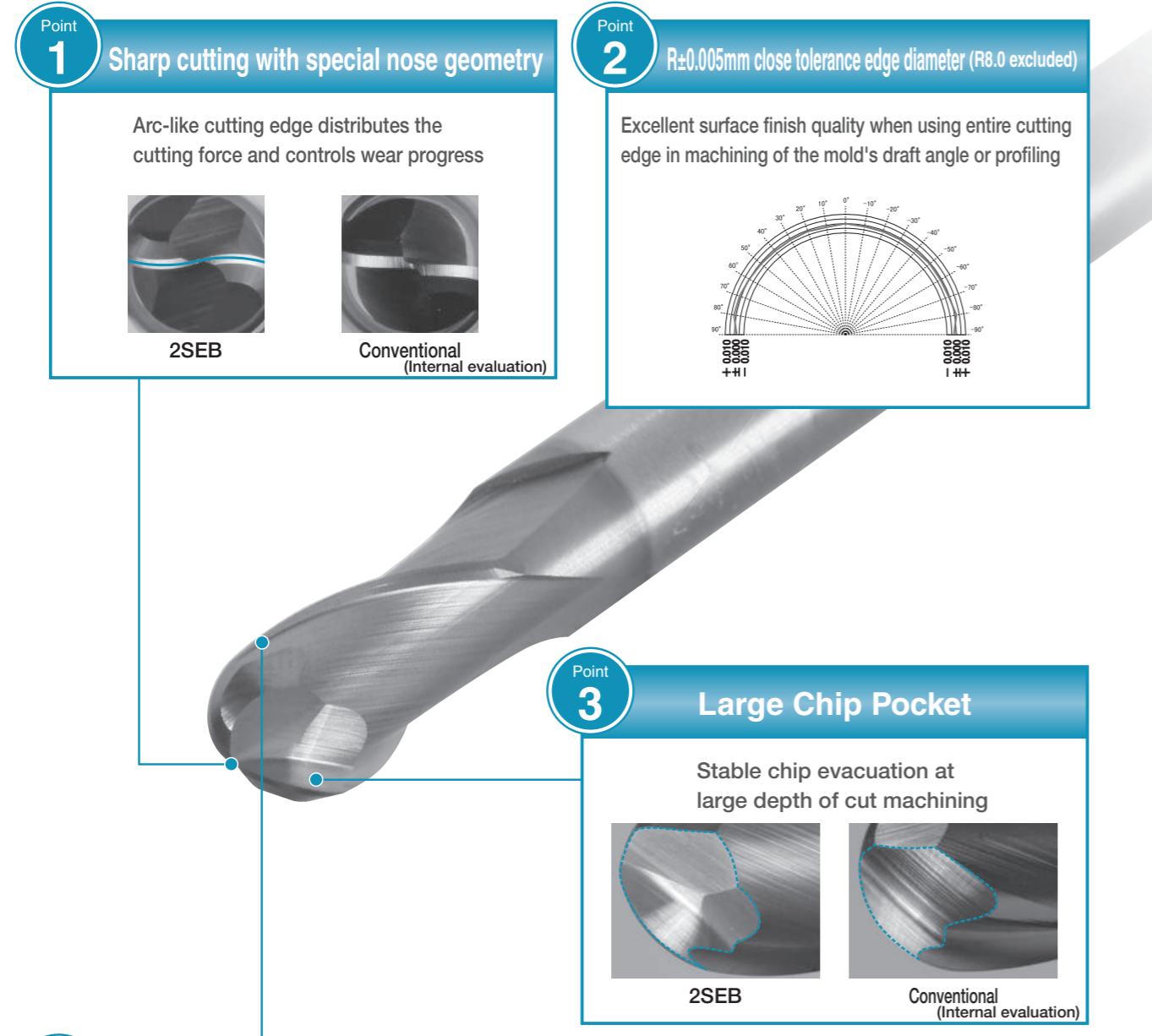
Recommended Cutting Conditions L75

● : Std. Item

● : Std. Item

# 2SEB

Special cutting edge concept and nano layer coating  
realized high precision and long tool life machining



## 2SEB

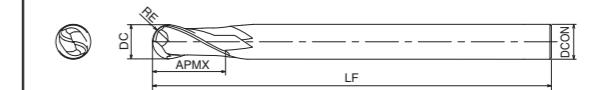
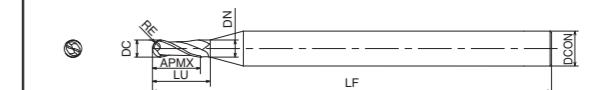


2

MEGACOAT NANO is applied

Recommended Workpiece Materials					
P	P	H	H	M	K
~30HRC	30~40HRC	~55HRC	~68HRC	Stainless steel	Cast Iron
★ 1st Choice					

MEGACOAT NANO	±0.005 mm R	±0.010 mm R	h5 Shank Dia.	30°
R8.0				



No. of Flutes : 2

## 2SEB (Ball-nose End Mill with 2 Flutes)

Description	Stock	Radius of Ball-nose RE	Radius of Ball-nose Tolerance	Outside Dia.	Length of cut	Neck Dia.	Under Neck Length	Shank Dia.	Overall length	No. of Flutes	Shape
				DC	APMX	DN	LU	DCON	LF	ZEFP	
2SEB020-050-R10	●	1.0	±0.005	2.0	5	2.10	6.6	6	50	2	Fig.1
2SEB030-080-R15	●	1.5	±0.005	3.0	8	3.15	9.8	6	70	2	
2SEB040-080-R20	●	2.0	±0.005	4.0	8	4.2	10.0	6	70	2	Fig.2
2SEB050-100-R25	●	2.5	±0.005	5.0	10	5.2	12.4	6	80	2	
2SEB060-120-R30	●	3.0	±0.005	6.0	12	-	-	6	90	2	Fig.1
2SEB080-140-R40	●	4.0	±0.005	8.0	14	-	-	8	100	2	
2SEB100-180-R50	●	5.0	±0.005	10.0	18	-	-	10	100	2	Fig.2
2SEB120-220-R60	●	6.0	±0.005	12.0	22	-	-	12	110	2	
2SEB160-300-R80	●	8.0	±0.010	16.0	30	-	-	16	140	2	

Copying  
(Unit : mm)

## Solid End Mill Identification System

2 S E B 0 2 0 - 0 5 0 - R 1 0

(1) No. of Flutes	(2) Applications	(3) Helix Angle	(4) Series	(5) Outside Dia.	(6) Length of cut	(7) Radius of Ball-nose
2	S : High efficiency	E : 30-39°	B : Ball-nose End Mill	020 ↓ 2.0mm	050 ↓ 5.0mm	R10 ↓ R1.0mm

Recommended Cutting Conditions L77

● : Std. Item

## 3-4 flutes Ball-nose End Mill

### 3UEBS (Ball-nose End Mill with 3 Flutes)



3

### 3UEBS (Ball-nose End Mill with 3 Flutes)

Description	Stock	* Radius of Ball-nose	Outside Dia.	Length of cut	Shank Dia.	Overall length
		RE	DC	APMX	DCON	LF
3UEBS030-070-06	▲	R1.5	3	7	6	57
3UEBS040-080-06	▲	R2	4	8	6	57
3UEBS050-100-06	▲	R2.5	5	10	6	57
3UEBS060-100-06	▲	R3	6	10	6	57
3UEBS080-160-08	▲	R4	8	16	8	63
3UEBS100-190-10	▲	R5	10	19	10	72
3UEBS120-220-12	▲	R6	12	22	12	83

● Ball-nose end mill with three flutes for machining of difficult-to-cut materials.

Recommended Cutting Conditions L77

### 4YEBM



4

### 4YEBM (Ball-nose End Mill with 4 Flutes)

Description	Stock	* Radius of Ball-nose	Outside Dia.	Length of cut	Neck Dia.	Under Neck Length	Shank Dia.	Overall length
		RE	DC	APMX	DN	LU	DCON	LF
4YEBM050-090-06	▲	R2.5	5	9	4.5	15	6	57
4YEBM060-100-06	▲	R3	6	10	5.5	15	6	57
4YEBM080-120-08	▲	R4	8	12	7.4	20	8	63
4YEBM100-140-10	▲	R5	10	14	9.2	25	10	72
4YEBM120-160-12	▲	R6	12	16	11	30	12	83
4YEBM160-220-16	▲	R8	16	22	15	38	16	92
4YEBM200-260-20	▲	R10	20	26	19	50	20	104

● Ball-nose end mill for semi-finishing of difficult-to-cut materials.

Recommended Cutting Conditions L78

\* Actual ball-nose radius will be half of actual measurement of outside diameter.

## Hard materials, Multi-edge, Negative rake angle, Finishing

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



High Efficiency Machining

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

Shouldering (Unit : mm)

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



Bottom surface of 6HFSS cutting edge

● 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.

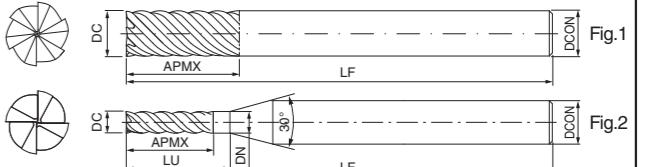
No. of Flutes : 4,5,6,7,8

### Recommended Workpiece Materials

★ 1st Choice

P	~30HRC	P	30~40HRC	M	Stainless steel	S	Titanium Alloy	K	Cast Iron	N	Aluminum & Non Ferrous Material
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TiCN	±0.01 mm R	h6	Shank Dia.	30°
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### 4HFSM, 5HFSM, 6HFSM, 7HFSM, 8HFSM (Medium)

Shouldering (Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut	Neck Dia.	Under Neck Length	Shank Dia.	Overall length	No. of Flutes	Shape
				APMX	DN	LU	DCON	LF	ZEFF	
4HFSM010-050-06	●	1	0 -0.015	5	1.05	6	6	60	4	Fig.2
4HFSM020-090-06	●	2	0 -0.015	9	2.10	10.8	6	60	4	
4HFSM030-120-06	●	3	0 -0.015	12	3.15	14.4	6	60	4	
4HFSM040-140-06	●	4	0 -0.015	14	4.2	16.8	6	60	4	
4HFSM050-170-06	●	5	0 -0.015	17	5.2	20.4	6	60	4	
5HFSM040-140-06	●	4	0 -0.015	14	4.2	16.8	6	60	5	
6HFSM060-170-06	●	6	0 -0.020	17	-	-	6	60	6	
6HFSM070-200-08	●	7	-0.005 -0.025	20	7.2	24.0	8	70	6	
6HFSM080-230-08	●	8	-0.005 -0.025	23	-	-	8	70	6	
6HFSM100-280-10	●	10	-0.005 -0.025	28	-	-	10	80	6	
6HFSM120-330-12	●	12	-0.010 -0.030	33	-	-	12	90		

## Special corner-R shaped, 6 flutes, High feed rate

### 6PDRS

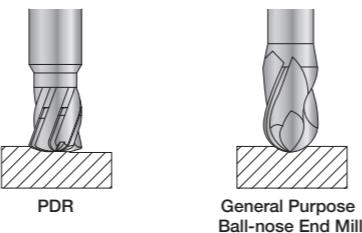


6

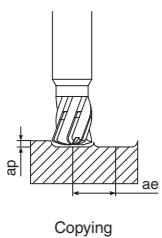
### 6PDRS

Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of cut	Under Neck Length	Shank Dia.	Overall length	No. of Flutes
		DC		APMX	LU	DCON	LF	ZEFP
6PDRS060-045-06	●	6	-0.020 -0.038	4.5	9	6	57	6
6PDRS080-060-08	●	8	-0.025 -0.047	6	12	8	63	6
6PDRS100-075-10	●	10	-0.025 -0.047	7.5	15	10	72	6
6PDRS120-090-12	●	12	-0.032 -0.059	9	18	12	83	6

- Increased rigidity with large core diameter. 6 flutes design enables high feed rate machining.
- Achieves large cutting allowance and high efficiency machining with special corner-R shaped.
- Ramping and arc cutting are possible.

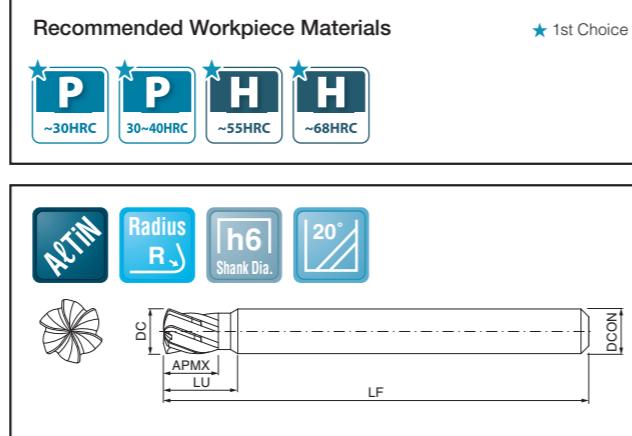


### Recommended Cutting Conditions



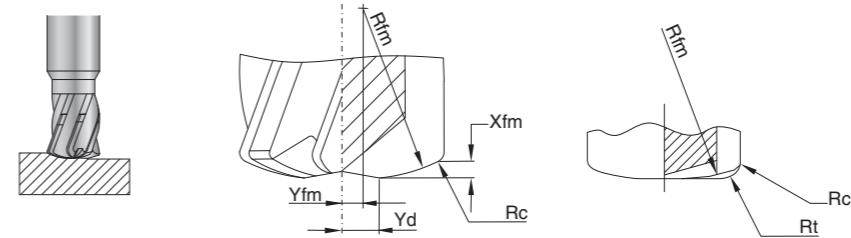
Workpiece Material	Depth of Cut (ap x ae) (mm)	Outside Dia.DC (mm)	ø6	ø8	ø10	ø12	
Prehardened Steel	52HRC	ø6 : 0.32 x 3.3mm (0.32 x 0.55DC)	Spindle Revolution (min <sup>-1</sup> )	6,400	4,800	3,800	3,200
		ø8 : 0.42 x 4.4mm (0.42 x 0.55DC)	Feed Rate (mm/min)	7,600	7,200	6,900	7,600
Carbon Steel / Alloy Steel	< 45HRC	ø10: 0.53 x 5.5mm (0.53 x 0.55DC)	Spindle Revolution (min <sup>-1</sup> )	8,500	6,400	5,100	4,200
		ø12: 0.63 x 6.6mm (0.63 x 0.55DC)	Feed Rate (mm/min)	15,300	15,300	15,300	12,700

No. of Flutes : 6



## 6PDRS Ramping / Arc cutting

### Details of 6PDRS cutting edge shape



Xfm : Maximum Depth of Cut  
Yfm : Distance between the center line of tool and the center of Rfm  
Yd : Distance between the center line of tool and the start position of cutting edge  
Rfm : Radius of tool tip  
Rc : Corner-R  
Rt : Virtual radius in program

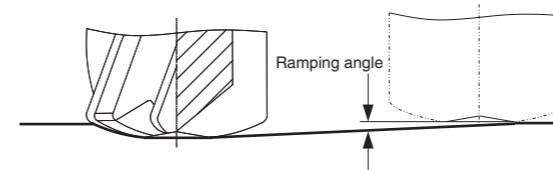
(Unit : mm)

Description	Outside Dia.	Maximum Depth of Cut	Radius of tool tip	Corner-R	Distance between the center line of tool and the center of Rfm	Distance between the center line of tool and the start position of cutting edge	Virtual radius in program
	DC	Xfm	Rfm	Rc	Yfm	Yd	Rt
6PDRS060-045-06	6	0.32	6	0.62	0.75	1.32	0.62
6PDRS080-060-08	8	0.42	8	0.83	1.00	1.76	0.83
6PDRS100-075-10	10	0.53	10	1.04	1.25	2.20	1.04
6PDRS120-090-12	12	0.63	12	1.24	1.50	2.64	1.24

- Cutting with cut amount exceeding the Xfm value is not recommended.

### Ramping

During ramping, lower the feed rate to the ratio in the chart on the right.

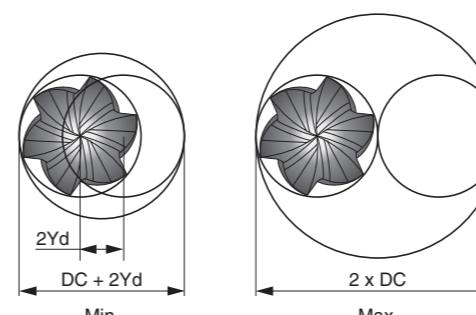


Ramping angle	1°	2°	3°	4°	5°
Ratio of feed rate	100%	70%	50%	30%	10%

- During pocket machining, set the ramping angle at 0.5°.
- Plunge milling is not recommended.

### Arc cutting

For arc cutting, hole diameter of each machining should be within the range in the chart on the right.



Description	Min.	Max.
6PDRS060-045-06	8.64	12.00
6PDRS080-060-08	11.52	16.00
6PDRS100-075-10	14.40	20.00
6PDRS120-090-12	17.28	24.00

# 3AFK

**High Efficiency and Excellent Precision Machining with 3 Flutes**

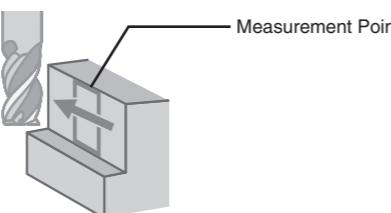
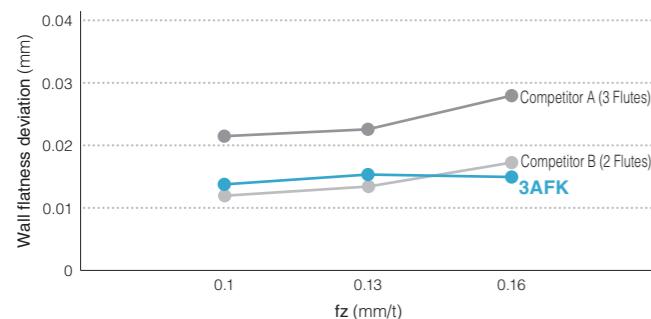
**Stable Machining with Sharp Edge for Anti-chattering Performance**

**Wide Range of Applications including Slotting, Shouldering, Ramping, and Plunge milling**

## 1 High-efficiency and High-precision Machining

**High Efficiency with 3 Flutes. Excellent Machining Precision**

**Comparison of wall flatness (Internal evaluation)**

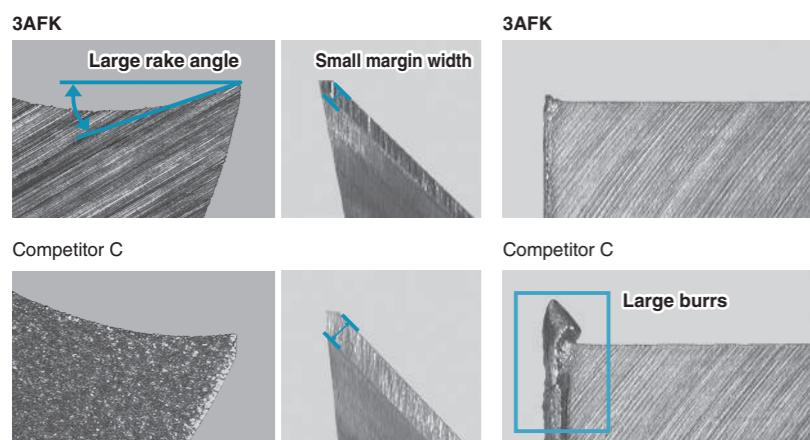


Cutting Conditions : n = 11,700 min<sup>-1</sup>, Vf = 3,500 - 5,600 mm/min, ap x ae = 15 x 1 mm  
End Mill Dia. ø10, Shouldering, Down-cut, Wet, HSK A63 Workpiece Material : A5052

## 2 Decreased burr

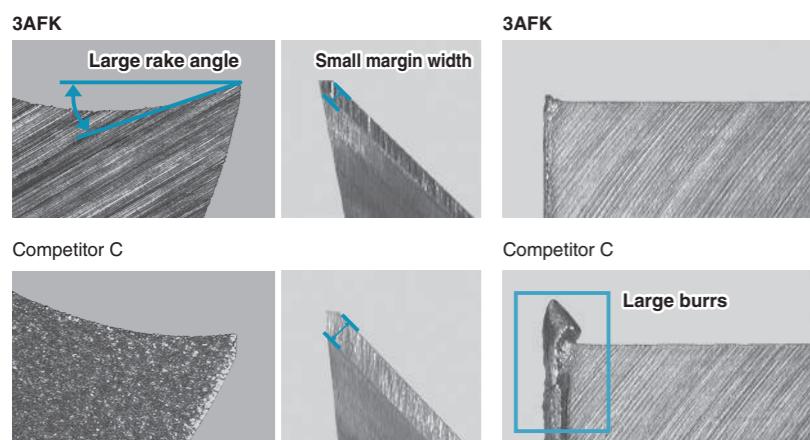
**Excellent Sharpness with Large Rake Angle and Small Margin Width**

**Comparison of the Rake Angle and Margin Width (Internal evaluation)**



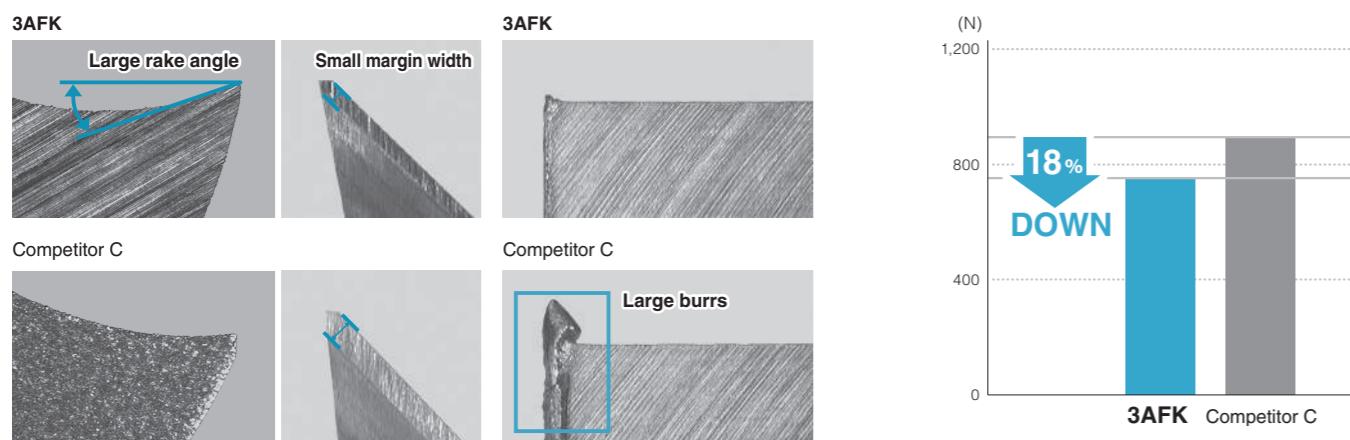
Burr Comparison after Machining Cutting Conditions : n = 11,700 min<sup>-1</sup>, Vf = 4,600 mm/min, ap x ae = 10 x 1 mm  
End Mill Dia. ø10, Shouldering, Down-cut, Wet, HSK A63 Workpiece Material : A7075

**Burr Comparison after Machining (Internal evaluation)**



Burr Comparison after Machining Cutting Conditions : n = 11,700 min<sup>-1</sup>, Vf = 4,600 mm/min, ap x ae = 10 x 1 mm  
End Mill Dia. ø10, Shouldering, Down-cut, Wet, HSK A63 Workpiece Material : A7075

**Cutting Force Comparison (Internal evaluation)**

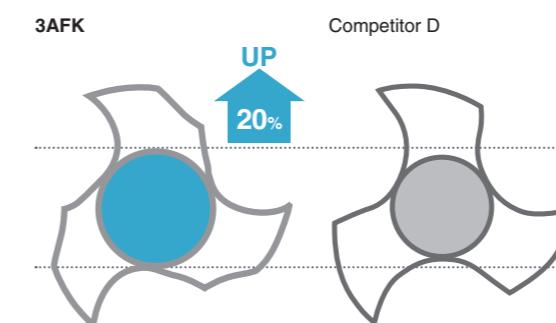


Cutting Conditions : n = 11,700 min<sup>-1</sup>, Vf = 3,400 mm/min  
ap x ae = 10 x 10 mm  
End Mill Dia. ø10, Slotting, Wet, BT50 Workpiece Material : A5052

## 3 Resistance to chattering

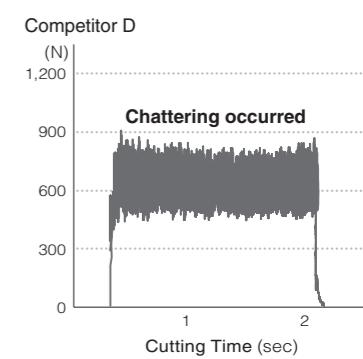
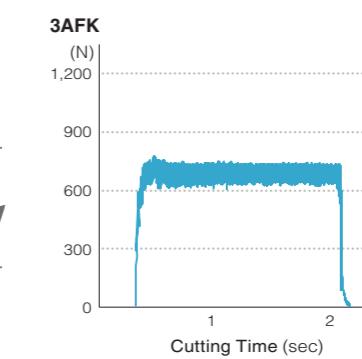
**Larger Core Thickness to Reduce Chattering**

**Core Thickness Comparison (Internal evaluation)**



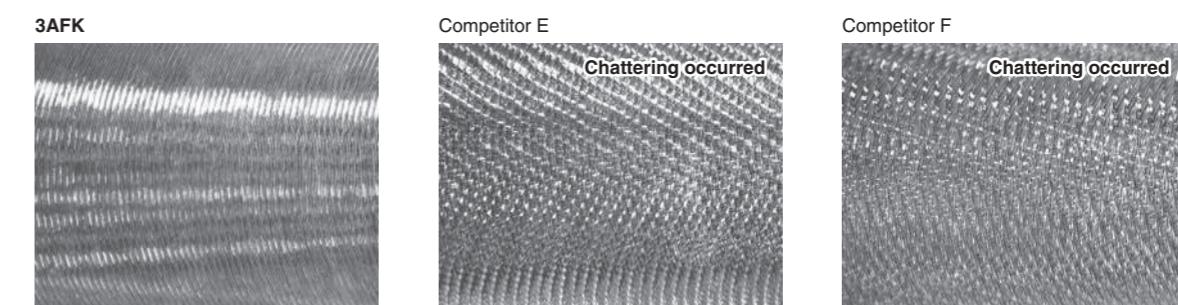
Cutting Conditions : n = 11,700 min<sup>-1</sup>, Vf = 3,400 mm/min, ap x ae = 10 x 10 mm, End Mill Dia. ø10, Slotting, Wet, BT50 Workpiece Material : A5052

**Cutting Force Comparison (Internal evaluation)**



Chattering occurred

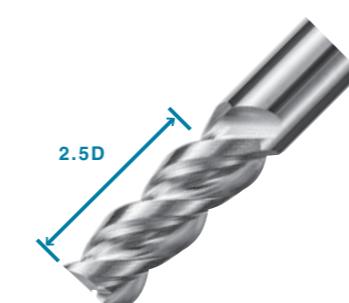
**Comparison of Bottom Surface at Slotting (Internal evaluation)**



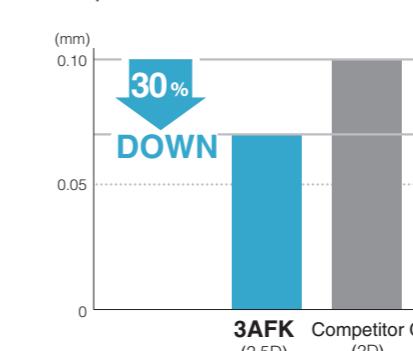
Cutting Conditions : n = 11,100 min<sup>-1</sup>, Vf = 2,600 mm/min, ap = 10 mm, Wet Workpiece Material : A5052

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

**Stable Machining even while Deep Slotting**

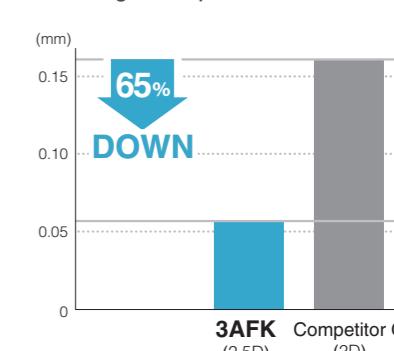


**Comparison of wall flatness (Internal evaluation)**



Cutting Conditions : n = 11,100 min<sup>-1</sup>, Vf = 3,800 mm/min, ap x ae = 20 x 1 mm  
End Mill Dia. ø10, Shouldering, Down-cut, Wet, HSK A63 Workpiece Material : A7075

**Burr Height Comparison (Internal evaluation)**

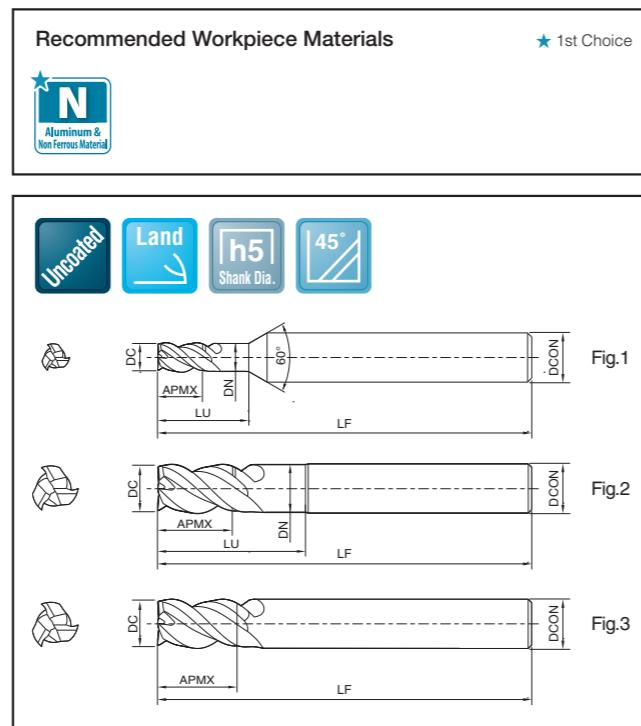


Chattering occurred

## 3AFK



3



## 3AFK (Short : 1.5D)

Shouldering Slitting Plunge milling

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of cut	Neck Dia.	Under Neck Length	Shank Dia.	Overall length	No. of Flutes	Shape
		DC		APMX	DN	LU	DCON	LF	ZEFP	
3AFK030-045-090	●	3.0	0 -0.015	4.5	2.7	9	6	70	3	Fig.1
3AFK040-060-120	●	4.0	0 -0.015	6	3.7	12	6	70	3	
3AFK050-075-150	●	5.0	0 -0.015	7.5	4.7	15	6	70	3	
3AFK060-090	●	6.0	0 -0.005	9	-	-	6	70	3	
3AFK060-090-180	●	6.0	0 -0.005	9	5.7	18	6	70	3	
3AFK070-105-210	●	7.0	0 -0.015	10.5	6.7	21	8	80	3	
3AFK080-120	●	8.0	0 -0.006	12	-	-	8	80	3	
3AFK080-120-240	●	8.0	0 -0.006	12	7.7	24	8	80	3	
3AFK090-135-270	●	9.0	0 -0.015	13.5	8.7	27	10	90	3	
3AFK100-150	●	10.0	0 -0.006	15	-	-	10	90	3	
3AFK100-150-300	●	10.0	0 -0.006	15	9.7	30	10	90	3	
3AFK110-165-330	●	11.0	0 -0.015	16.5	10.7	33	12	110	3	
3AFK120-180	●	12.0	0 -0.008	18	-	-	12	110	3	
3AFK120-180-360	●	12.0	0 -0.008	18	11.7	36	12	110	3	
3AFK160-240	●	16.0	0 -0.008	24	-	-	16	120	3	
3AFK160-240-480	●	16.0	0 -0.008	24	15.7	48	16	120	3	



## 3AFK (Medium : 2.5D)

Shouldering Slitting Plunge milling

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of cut	Neck Dia.	Under Neck Length	Shank Dia.	Overall length	No. of Flutes	Shape
		DC		APMX	DN	LU	DCON	LF	ZEFP	
3AFK030-075-150	●	3.0	0 -0.015	7.5	2.7	15	6	70	3	Fig.1
3AFK040-100-200	●	4.0	0 -0.015	10	3.7	20	6	70	3	
3AFK050-125-250	●	5.0	0 -0.015	12.5	4.7	25	6	70	3	
3AFK060-150	●	6.0	0 -0.005	15	-	-	6	70	3	
3AFK060-150-300	●	6.0	0 -0.005	15	5.7	30	6	70	3	
3AFK070-175-350	●	7.0	0 -0.015	17.5	6.7	35	8	80	3	
3AFK080-200	●	8.0	0 -0.006	20	-	-	8	80	3	
3AFK080-200-400	●	8.0	0 -0.006	20	7.7	40	8	80	3	
3AFK090-225-450	●	9.0	0 -0.015	22.5	8.7	45	10	90	3	
3AFK100-250	●	10.0	0 -0.006	25	-	-	10	90	3	
3AFK100-250-500	●	10.0	0 -0.006	25	9.7	50	10	90	3	
3AFK110-275-550	●	11.0	0 -0.015	27.5	10.7	55	12	110	3	
3AFK120-300	●	12.0	0 -0.008	30	-	-	12	110	3	
3AFK120-300-600	●	12.0	0 -0.008	30	11.7	60	12	110	3	
3AFK160-400	●	16.0	0 -0.008	40	-	-	16	120	3	
3AFK160-400-800	●	16.0	0 -0.008	40	15.7	80	16	120	3	

Recommended Cutting Conditions L79

● : Std. Item

Recommended Cutting Conditions L79

● : Std. Item

## 3NESM



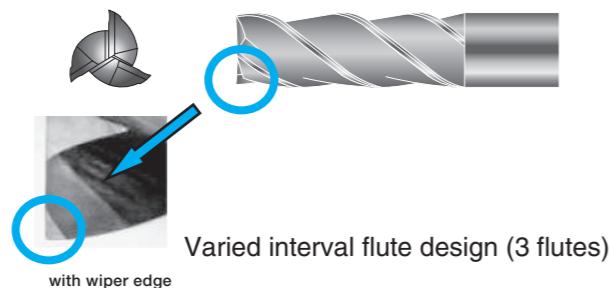
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3

## 3NESM

Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of cut	Shank Dia.	Overall length	No. of Flutes
		DC					
3NESM030-120-06	●	3	-0.014 -0.028	12	6	50	3
3NESM040-120-06	●	4	-0.020 -0.038	12	6	50	3
3NESM050-140-06	●	5	-0.020 -0.038	14	6	50	3
3NESM060-160-06	●	6	0 -0.008	16	6	50	3
3NESM080-200-08	●	8	0 -0.009	20	8	63	3
3NESM100-220-10	●	10	0 -0.009	22	10	76	3
3NESM120-250-12	●	12	0 -0.011	25	12	76	3
3NESM160-320-16	●	16	0 -0.011	32	16	89	3
3NESM200-380-20	●	20	0 -0.013	38	20	104	3

\* Cutting edge of over 6mm øDC has margin.

- A wiper is attached at the lower edge for improving the bottom surface finish.  
Chattering is controlled with cutting edge slots at varied intervals, and finishing of lateral surfaces is improved.



Recommended Cutting Conditions L79

● : Std. Item

## Solid Tools for CFRP

End Mill 4FCX-KCD · Drill 2ZDF-KCD

NEW

# Diamond Coated Solid Tools

Newly Developed High Performance Diamond Coating

Long Tool Life and High Precision Machining of CFRP

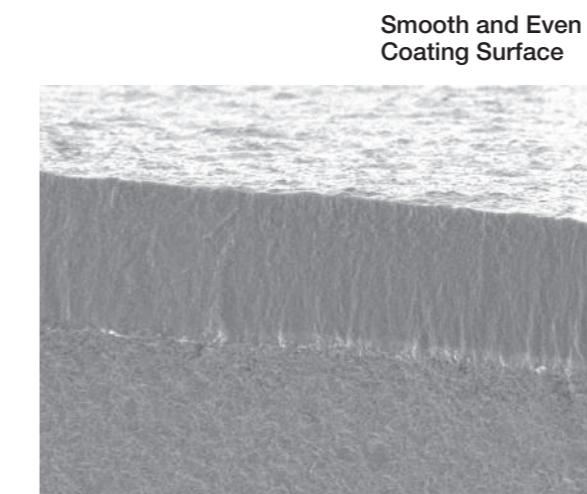
End Mill 4FCX-KCD

Drill 2ZDF-KCD

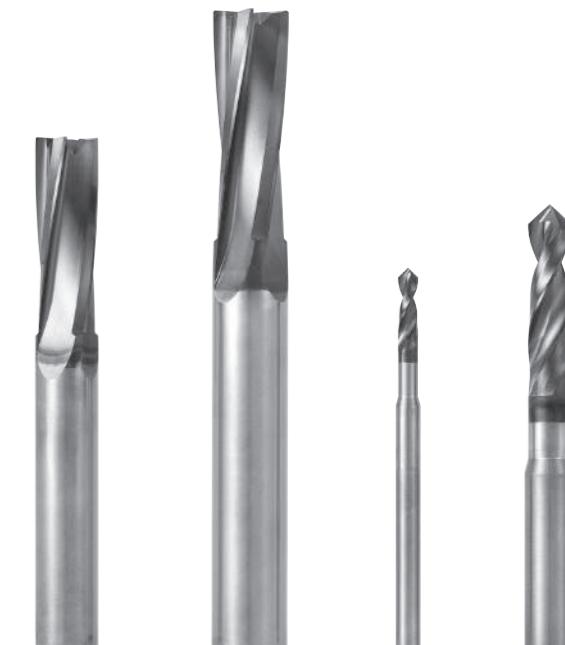
Special Order Items \* Special order items such as routers are also available

- 1 Diamond Coating with Superior Wear Resistance and Fracture Resistance  
High Degree of Crystallinity, Adhesion and Toughness Improve Tool Durability

Unique Preprocessing Technology and Special Carbide Material  
Superior Adhesion Ensures Stable Machining



Cross-section of Diamond Coating



# Solid Tools for CFRP

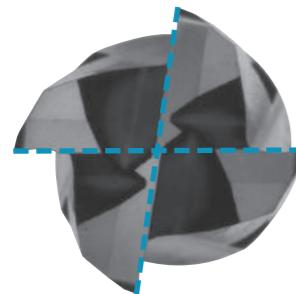
2

## Special Tool Geometry Coated with a Smooth Diamond Coating Reduces Cutting Force Long Tool Life, High Precision and High Quality Machining of CFRP

End Mill

Variable Flute Design Prevents Chattering and Stable Machining Provides High-quality Surface finishes  
Sharp Cutting Edges Cut Off Strong Carbon Fibers. Reduces Delamination and Burr Build Up

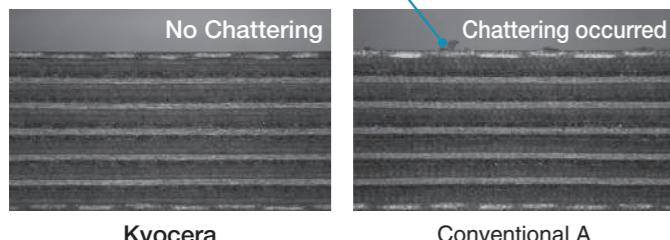
New Geometry (Variable Flute Design)



Variable flute design prevents chattering

Surface Finish Comparison (Internal evaluation)

Excellent surface finish (Side wall) Burr (Uncut fiber)



Cutting edge with excellent sharpness

Cutting Conditions :  $V_c = 280 \text{ m/min}$ ,  $f = 0.1 \text{ mm/rev}$   
Outside Dia.  $\varnothing 10 \text{ mm}$ ,  $a_e = 10 \text{ mm}$  (Slotting), Dry Workpiece Material : CFRP 4.6 mm (Thickness)

■ 4FCX-KCD NEW



4

Recommended Workpiece Materials



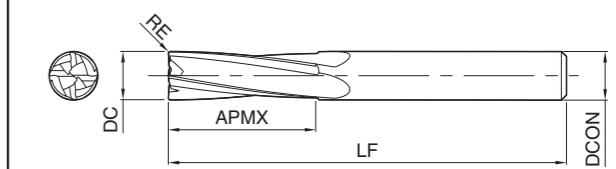
No. of Flutes : 4

\* 1st Choice



h5

Shank Dia.



Shouldering  
(Unit : mm)

Description	Stock	Outside Dia.	Corner-R	Length of cut	Shank Dia.	Overall length	No. of Flutes
		DC	RE				
4FCX080-250-KCD	●	8	0.4	25	8	80	4
4FCX100-300-KCD	●	10	0.4	30	10	80	4
4FCX120-300-KCD	●	12	0.4	30	12	100	4

\* Special order items such as routers are also available

■ 2ZDF-KCD NEW



Recommended Workpiece Materials

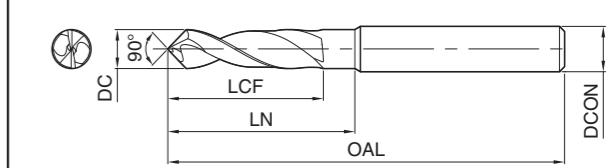


\* 1st Choice



h6

Shank Dia.



(Unit : mm)

Description	Stock	Outside Dia.		Flute length	Under Neck Length	Overall length	Shank Dia.
		DC (mm)	DC (inch)				
2ZDF04763-KCD	●	4.763	3/16	35	40	70	6
2ZDF06350-KCD	●	6.350	1/4	40	45	90	8
2ZDF07938-KCD	●	7.938	5/16	50	55	90	8

\* Special ordering is available

■ Solid Drill Identification System

2ZDF-04763-KCD

(1) (2) (3)

(1) Series (2) Outside Dia. (3) Others

2ZDF : Drill for CFRP 04763 ↓ 4.763mm KCD : Diamond Coating

● : Std. Item

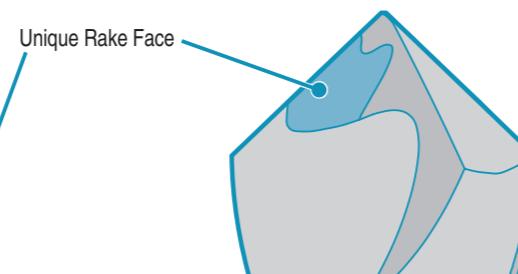
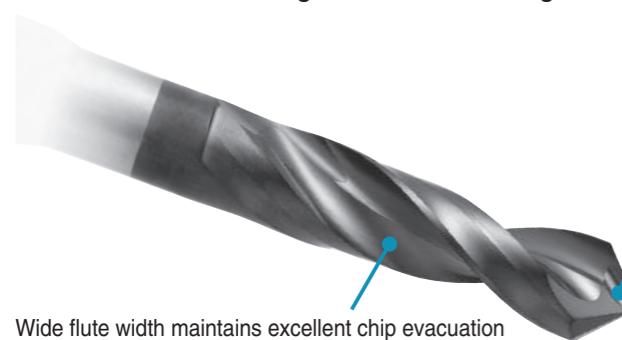
Recommended Cutting Conditions L79

3

## Unique Rake Face Delivers Sharpness at the top of Drill Low Cutting Force Provides Long Tool Life

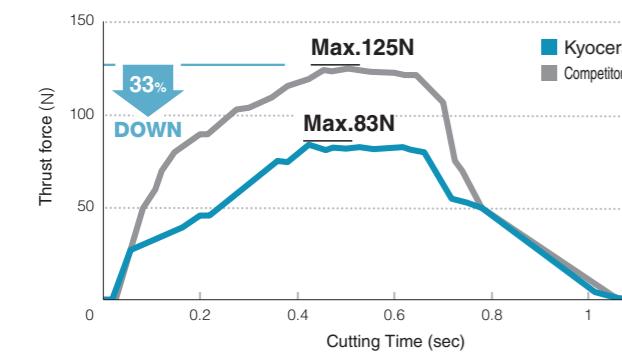
Drill

Unique Rake Face Delivers Sharpness at the top of Drill  
Low Cutting Force Provides Long Tool Life



Wide flute width maintains excellent chip evacuation

Cutting Force Comparison (Internal evaluation)



No. of Cutting Holes Comparison (Internal evaluation)

Kyocera 1,200 holes or more  
Competitor C 600 holes  
Tool life ↑ x2

Surface finish



Provides high quality surface finish and long tool life

Cutting Conditions :  $V_c = 100 \text{ m/min}$ ,  $f = 0.08 \text{ mm/rev}$

Outside Dia.  $\varnothing 6 \text{ mm}$  (Special order item), Dry Workpiece Material : CFRP 4.6 mm (Thickness)

# Flat Bottom Drill (Counterboring)

## 2ZDK-HP NEW

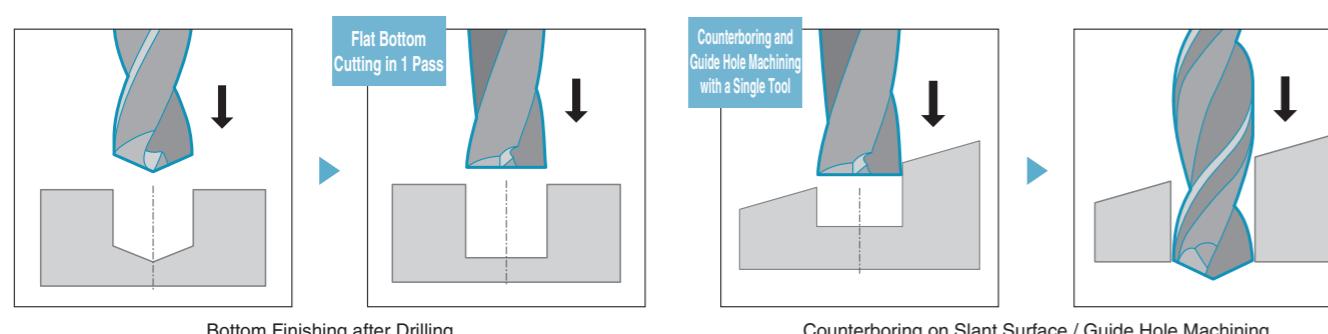
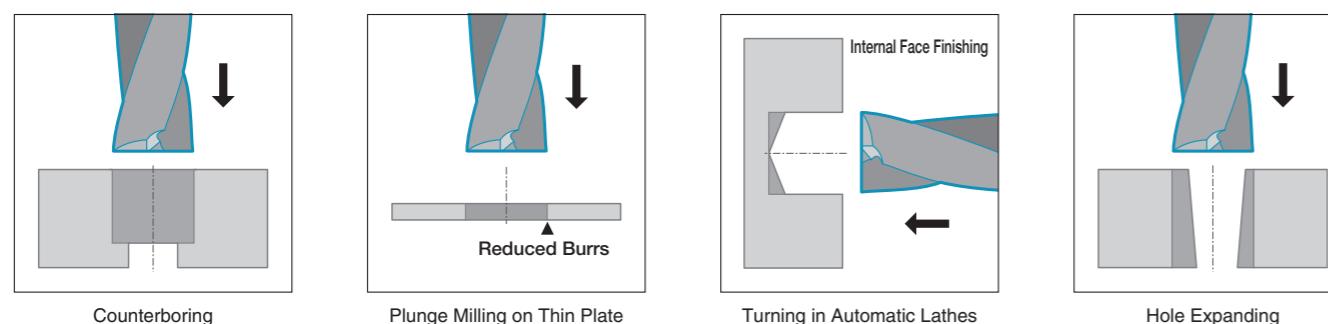
New Generation Flat Bottom Drill

Stable Machining in a Wide Range of Applications Including

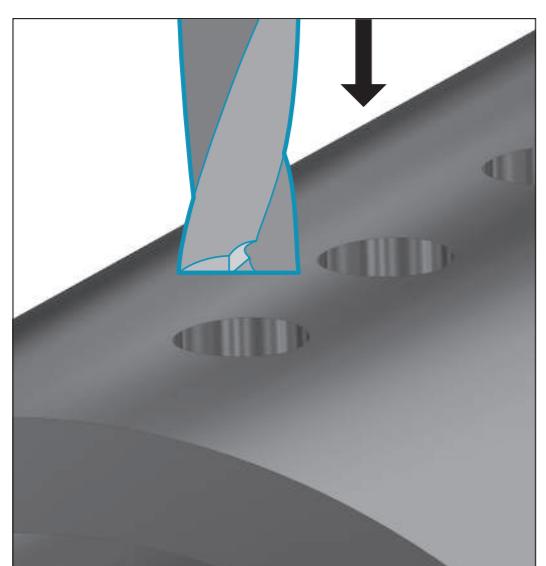
Counterboring and Drilling in Cylinder Surfaces

Low Cutting Force Corner Edge Prevents Burr Formation

### 1 Flat Bottom Used in a Wide Range of Machining Applications



Achieves Stable Machining even in Difficult Drilling Situations



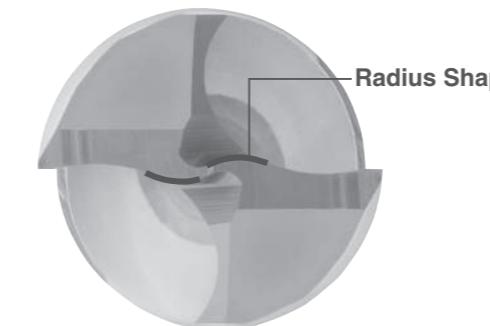
Drilling in Cylinder and Curved Surfaces

### 2 High-Precision Machining

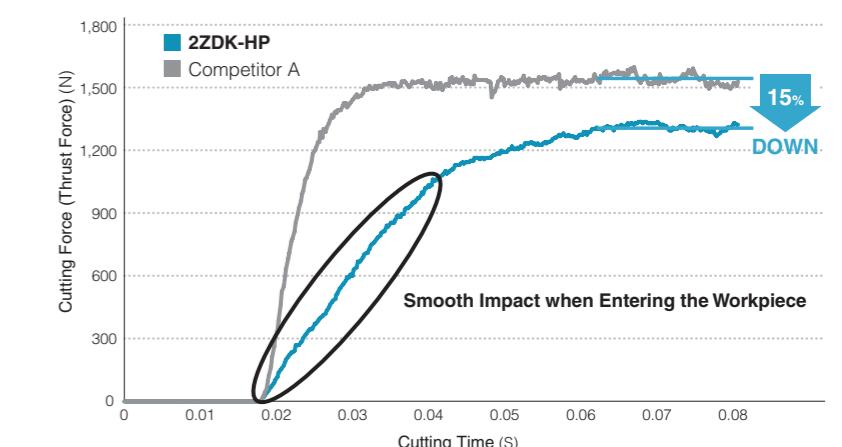
Chisel Edge with S-curve Provides Lower Cutting Forces

Reduced Impact Forces when Entering the Workpiece and Provides Excellent Vibration Control for High Precision Drilling

#### Special Thinning Shape



#### Cutting Force Comparison (Internal evaluation)

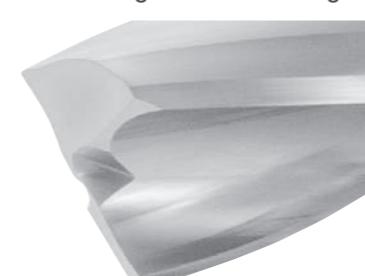


### 3 Decreased burr

Low Cutting Force with Flat Bottom and Sharp Cutting Edge

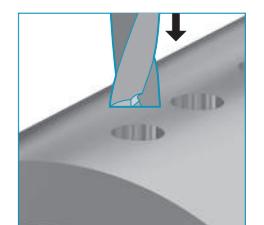
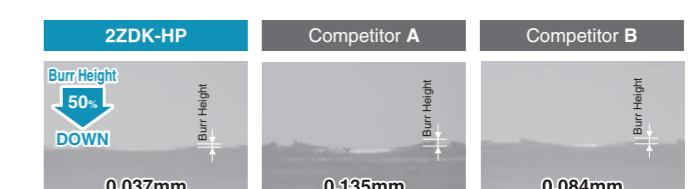
Decreased burr

Low Cutting Force Corner Edge Design



#### Burr Comparison (Internal evaluation)

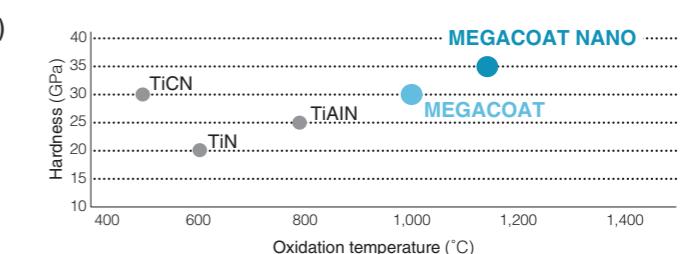
Drilling in Cylinder Surface



### 4 Extended Tool Life by MEGACOAT NANO Technology

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

#### Properties of Coating



# Flat Bottom Drill (Counterboring)

## 2ZDK-HP (Drilling Depth Short type) NEW



MEGACOAT NANO is applied

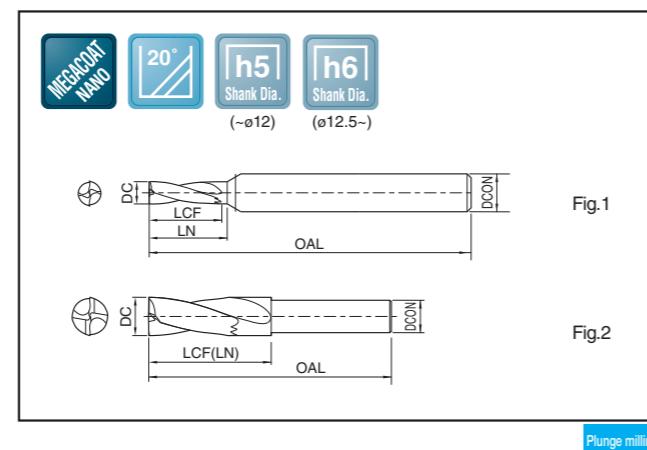
## 2ZDK-HP (Drilling Depth Short type)

Description	Stock	Outside Dia.		Mill Dia. tolerance	Flute length	Under Neck Length	Shank Dia.	Overall length	Shape
		DC	LCF						
2ZDK010HP-1.5D	●	1.0			3.5	4.3			
2ZDK011HP-1.5D	●	1.1			3.9	4.7			
2ZDK012HP-1.5D	●	1.2			4.3	5.1			
2ZDK013HP-1.5D	●	1.3			4.7	5.5			
2ZDK014HP-1.5D	●	1.4			5.1	5.9			
2ZDK015HP-1.5D	●	1.5			5.5	6.3			
2ZDK016HP-1.5D	●	1.6			5.7	6.5			
2ZDK017HP-1.5D	●	1.7			5.9	6.7			
2ZDK018HP-1.5D	●	1.8			6.1	6.9			
2ZDK019HP-1.5D	●	1.9			6.3	7.1			
2ZDK020HP-1.5D	●	2.0			6.5	7.3			
2ZDK021HP-1.5D	●	2.1			6.9	7.7			
2ZDK022HP-1.5D	●	2.2			7.3	8.1			
2ZDK023HP-1.5D	●	2.3			7.7	8.5			
2ZDK024HP-1.5D	●	2.4			8.1	8.9			
2ZDK025HP-1.5D	●	2.5			8.5	9.3			
2ZDK026HP-1.5D	●	2.6			8.8	9.5			
2ZDK027HP-1.5D	●	2.7			9.1	9.8			
2ZDK028HP-1.5D	●	2.8			9.3	10.0			
2ZDK029HP-1.5D	●	2.9			9.5	10.3			
2ZDK030HP-1.5D	●	3.0			9	10			
2ZDK031HP-1.5D	●	3.1			10	11			
2ZDK032HP-1.5D	●	3.2							
2ZDK033HP-1.5D	●	3.3							
2ZDK034HP-1.5D	●	3.4							

\* This tool is specially designed for plunge milling and NOT recommended for slotting.

. The drilling depth should be less than 1.5D(1.5 x DC).

Recommended Workpiece Materials			
P	P	K	N
~30HRC	30~40HRC	Cast Iron	Aluminum & Non Ferrous Material



No. of Flutes : 2

## 2ZDK-HP (Drilling Depth Short type)

Description	Stock	Outside Dia.		Mill Dia. tolerance	Flute length	Under Neck Length	Shank Dia.	Overall length	Shape
		DC	LCF						
2ZDK060HP-1.5D	●	6.0		0 -0.012	19	21	6	60	
2ZDK061HP-1.5D	●	6.1			19	21			
2ZDK062HP-1.5D	●	6.2			20	22			
2ZDK063HP-1.5D	●	6.3			21	23			
2ZDK064HP-1.5D	●	6.4			22	24			
2ZDK065HP-1.5D	●	6.5			23	25			
2ZDK066HP-1.5D	●	6.6			24	25			
2ZDK067HP-1.5D	●	6.7			25	27			
2ZDK068HP-1.5D	●	6.8			26	28			
2ZDK069HP-1.5D	●	6.9			27	29			
2ZDK070HP-1.5D	●	7.0			28	30			
2ZDK071HP-1.5D	●	7.1			29	31			
2ZDK072HP-1.5D	●	7.2			30	32			
2ZDK073HP-1.5D	●	7.3							
2ZDK074HP-1.5D	●	7.4							
2ZDK075HP-1.5D	●	7.5							
2ZDK076HP-1.5D	●	7.6							
2ZDK077HP-1.5D	●	7.7							
2ZDK078HP-1.5D	●	7.8							
2ZDK079HP-1.5D	●	7.9							
2ZDK080HP-1.5D	●	8.0							
2ZDK081HP-1.5D	●	8.1							
2ZDK082HP-1.5D	●	8.2							
2ZDK083HP-1.5D	●	8.3							
2ZDK084HP-1.5D	●	8.4							
2ZDK085HP-1.5D	●	8.5							
2ZDK086HP-1.5D	●	8.6							
2ZDK087HP-1.5D	●	8.7							
2ZDK088HP-1.5D	●	8.8							
2ZDK089HP-1.5D	●	8.9							
2ZDK090HP-1.5D	●	9.0							
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							
2ZDK098HP-1.5D	●	9.8							

Description	Stock	Outside Dia.		Mill Dia. tolerance	Flute length	Under Neck Length	Shank Dia.	Overall length	Shape
		DC	LCF						
2ZDK099HP-1.5D	●	9.9		0 -0.015	31	33	10	80	
2ZDK100HP-1.5D	●	10.0			31	33			
2ZDK101HP-1.5D	●	10.1			31	33			
2ZDK102HP-1.5D	●	10.2			32	34			
2ZDK103HP-1.5D	●	10.3			32	34			
2ZDK104HP-1.5D	●	10.4			32	34			
2ZDK105HP-1.5D	●	10.5			32	34			
2ZDK106HP-1.5D	●</td								

# Flat Bottom Drill (Counterboring)

2ZDK-HP (Drilling Depth Short type Long shank) **NEW**



2

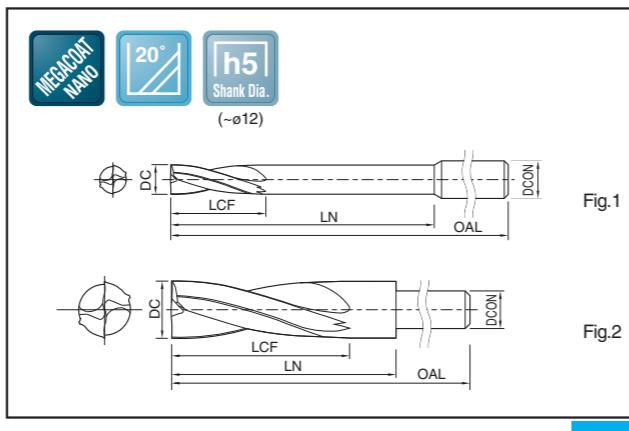
MEGACOAT NANO is applied

2ZDK-HP (Drilling Depth Short type Long shank)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	(Unit : mm)				
				Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL	Shape
2ZDK030HP-1.5D-LS	●	3.0	-0.010	9.0	30.0	6	100	Fig.1
2ZDK031HP-1.5D-LS	MTO	3.1		31.0				
2ZDK032HP-1.5D-LS	MTO	3.2		10.0	32.0			
2ZDK033HP-1.5D-LS	MTO	3.3		33.0				
2ZDK034HP-1.5D-LS	MTO	3.4		34.0				
2ZDK035HP-1.5D-LS	●	3.5		11.0	35.0			
2ZDK036HP-1.5D-LS	MTO	3.6		36.0				
2ZDK037HP-1.5D-LS	MTO	3.7		37.0				
2ZDK038HP-1.5D-LS	MTO	3.8		38.0				
2ZDK039HP-1.5D-LS	MTO	3.9		39.0				
2ZDK040HP-1.5D-LS	●	4.0	-0.012	40.0				
2ZDK041HP-1.5D-LS	MTO	4.1		41.0				
2ZDK042HP-1.5D-LS	MTO	4.2		42.0				
2ZDK043HP-1.5D-LS	MTO	4.3		43.0				
2ZDK044HP-1.5D-LS	MTO	4.4		44.0				
2ZDK045HP-1.5D-LS	●	4.5		45.0				
2ZDK046HP-1.5D-LS	MTO	4.6		46.0				
2ZDK047HP-1.5D-LS	MTO	4.7		47.0				
2ZDK048HP-1.5D-LS	MTO	4.8		48.0				
2ZDK049HP-1.5D-LS	MTO	4.9		49.0				
2ZDK050HP-1.5D-LS	●	5.0		50.0				
2ZDK051HP-1.5D-LS	MTO	5.1	-0.012	51.0				
2ZDK052HP-1.5D-LS	MTO	5.2		52.0				
				6	110			Fig.1

Recommended Workpiece Materials			
P	P	K	N
~30HRC	30~40HRC	Cast Iron	Aluminum & Non Ferrous Material

No. of Flutes : 2



Plunge milling

2ZDK-HP (Drilling Depth Short type Long shank)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	(Unit : mm)				
				Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL	Shape
2ZDK076HP-1.5D-LS	MTO	7.6						
2ZDK077HP-1.5D-LS	MTO	7.7	-0.015	24.0	31.0	6	120	Fig.2
2ZDK078HP-1.5D-LS	MTO	7.8						
2ZDK079HP-1.5D-LS	MTO	7.9						
2ZDK080HP-1.5D-LS	●	8.0		80.0				
2ZDK081HP-1.5D-LS	MTO	8.1		25.0				
2ZDK082HP-1.5D-LS	MTO	8.2	-0.015	31.5				
2ZDK083HP-1.5D-LS	MTO	8.3		26.0	130			Fig.2
2ZDK084HP-1.5D-LS	MTO	8.4						
2ZDK085HP-1.5D-LS	●	8.5		32.0				
2ZDK086HP-1.5D-LS	MTO	8.6		32.0				
2ZDK087HP-1.5D-LS	MTO	8.7		27.0				
2ZDK088HP-1.5D-LS	MTO	8.8	-0.015	32.5				
2ZDK089HP-1.5D-LS	MTO	8.9		28.0	130			Fig.2
2ZDK090HP-1.5D-LS	●	9.0						
2ZDK091HP-1.5D-LS	MTO	9.1						
2ZDK092HP-1.5D-LS	MTO	9.2						
2ZDK093HP-1.5D-LS	MTO	9.3	-0.015	29.0	32.5	8	130	Fig.2
2ZDK094HP-1.5D-LS	MTO	9.4						
2ZDK095HP-1.5D-LS	●	9.5						
2ZDK096HP-1.5D-LS	MTO	9.6	-0.015	30.0	33.5	8	130	Fig.2
2ZDK097HP-1.5D-LS	MTO	9.7						
2ZDK098HP-1.5D-LS	MTO	9.8	-0.015					

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	(Unit : mm)				
				Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL	Shape
2ZDK099HP-1.5D-LS	MTO	9.9	-0.015	31.0	34.5	8	130	Fig.2
2ZDK100HP-1.5D-LS	●	10.0	-0.015	31.0	100.0	10	150	Fig.1
2ZDK101HP-1.5D-LS	MTO	10.1						
2ZDK102HP-1.5D-LS	MTO	10.2						
2ZDK103HP-1.5D-LS	MTO	10.3						
2ZDK104HP-1.5D-LS	MTO	10.4	-0.018					
2ZDK105HP-1.5D-LS	●	10.5						
2ZDK106HP-1.5D-LS	MTO	10.6						
2ZDK107HP-1.5D-LS	MTO	10.7						
2ZDK108HP-1.5D-LS	MTO	10.8						
2ZDK109HP-1.5D-LS	MTO	10.9						
2ZDK110HP-1.5D-LS	●	11.0						
2ZDK111HP-1.5D-LS	MTO	11.1	-0.018					
2ZDK112HP-1.5D-LS	MTO	11.2						
2ZDK113HP-1.5D-LS	MTO	11.3						
2ZDK114HP-1.5D-LS	MTO	11.4						
2ZDK115HP-1.5D-LS	●	11.5						
2ZDK116HP-1.5D-LS	MTO	11.6						
2ZDK117HP-1.5D-LS	MTO	11.7	-0.018	36.0	39.5	10	150	Fig.2
2ZDK118HP-1.5D-LS	MTO	11.8						
2ZDK119HP-1.5D-LS	MTO	11.9						
2ZDK120HP-1.5D-LS	●	12.0	-0.018	37.0	120.0	12	170	Fig.1

Recommended Cutting Conditions **L81**

\* This tool is specially designed for plunge milling and NOT recommended for slotting.  
. The drilling depth should be less than 1.5D(1.5 x DC).

● : Std. Item MTO : Made to order

\* This tool is specially designed for plunge milling and NOT recommended for slotting.

. The drilling depth should be less than 1.5D(1.5 x DC).

Recommended Cutting Conditions **L81**

● : Std. Item MTO : Made to order

# Flat Bottom Drill (Counterboring)

## 2ZDK-HP (Drilling Depth Regular type) NEW



2

MEGACOAT NANO is applied

## 2ZDK-HP (Drilling Depth Regular type)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	(Unit : mm)					
				Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL		
2ZDK030HP-3D	●	3.0	0 -0.010	14	15	6	60		
2ZDK031HP-3D	●	3.1							
2ZDK032HP-3D	●	3.2							
2ZDK033HP-3D	●	3.3							
2ZDK034HP-3D	●	3.4							
2ZDK035HP-3D	●	3.5							
2ZDK036HP-3D	●	3.6							
2ZDK037HP-3D	●	3.7							
2ZDK038HP-3D	●	3.8							
2ZDK039HP-3D	●	3.9							
2ZDK040HP-3D	●	4.0		19	20	6	60		
2ZDK041HP-3D	●	4.1							
2ZDK042HP-3D	●	4.2		20	21				
2ZDK043HP-3D	●	4.3							
2ZDK044HP-3D	●	4.4		21	22				
2ZDK045HP-3D	●	4.5							
2ZDK046HP-3D	●	4.6		23	24				
2ZDK047HP-3D	●	4.7							
2ZDK048HP-3D	●	4.8		24	25				
2ZDK049HP-3D	●	4.9							
2ZDK050HP-3D	●	5.0		25	26				
2ZDK051HP-3D	●	5.1							
2ZDK052HP-3D	●	5.2		26	27				

\* This tool is specially designed for plunge milling and NOT recommended for slotting.

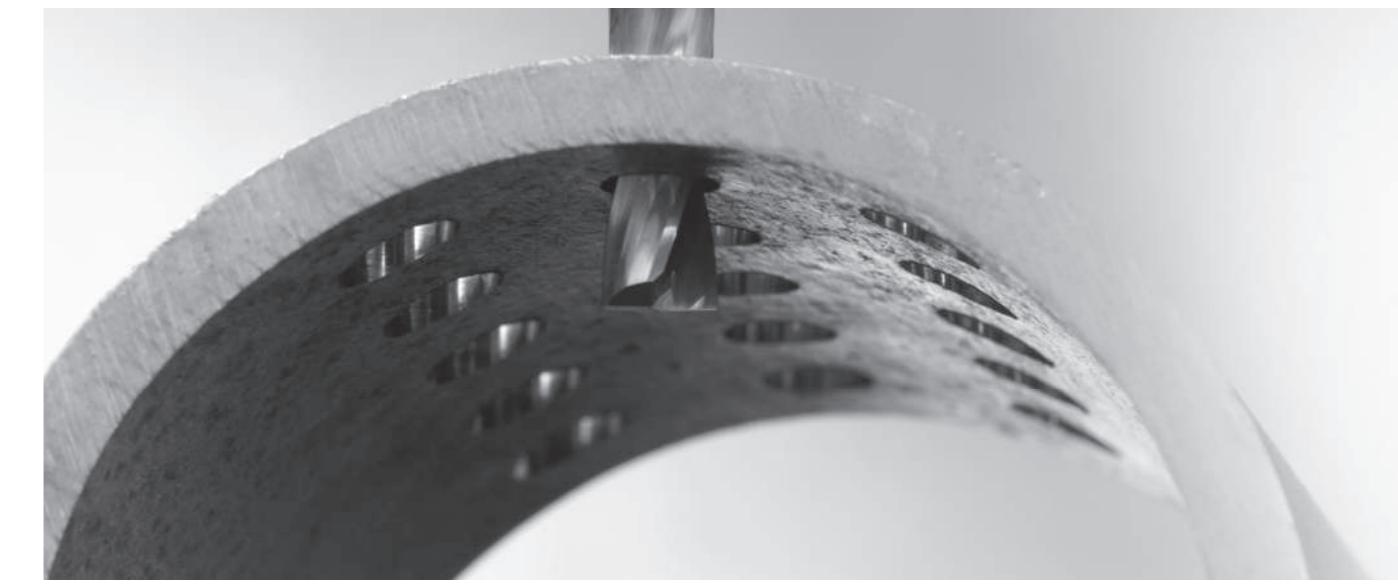
The drilling depth should be less than 3.0D(3.0 x DC).

Recommended Cutting Conditions L80

Recommended Workpiece Materials			
P	P	K	N
~30HRC	30~40HRC	Cast Iron	Aluminum & Non Ferrous Material

MEGACOAT NANO	20°	h5 Shank Dia. (~ø12)	h6 Shank Dia. (ø12.5~)

Plunge milling



## 2ZDK-HP (Drilling Depth Regular type)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	(Unit : mm)			
				Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL
2ZDK076HP-3D	●	7.6	0 -0.015	34	35	8	70
2ZDK077HP-3D	●	7.7					
2ZDK078HP-3D	●	7.8					
2ZDK079HP-3D	●	7.9					
2ZDK080HP-3D	●	8.0					
2ZDK081HP-3D	●	8.1					
2ZDK082HP-3D	●	8.2					
2ZDK083HP-3D	●	8.3					
2ZDK084HP-3D	●	8.4					
2ZDK085HP-3D	●	8.5					
2ZDK086HP-3D	●	8.6					
2ZDK087HP-3D	●	8.7					
2ZDK088HP-3D	●	8.8					
2ZDK089HP-3D	●	8.9					
2ZDK090HP-3D	●	9.0					
2ZDK091HP-3D	●	9.1					
2ZDK092HP-3D	●	9.2					
2ZDK093HP-3D	●	9.3					
2ZDK094HP-3D	●	9.4					
2ZDK095HP-3D	●	9.5					
2ZDK096HP-3D	●	9.6					
2ZDK097HP-3D	●	9.7					
2ZDK098HP-3D	●	9.8					

Recommended Cutting Conditions L80

Plunge milling

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

L55

# Flat Bottom Drill (Counterboring)

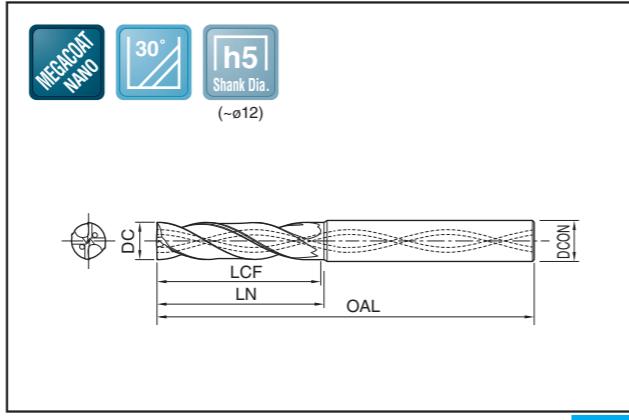
**2ZDK-HP-OH** (Drilling Depth Regular type with oil holes) **NEW**



2

MEGACOAT NANO is applied

Recommended Workpiece Materials			
P	P	K	N
~30HRC	30~40HRC	Cast Iron	Aluminum & Non Ferrous Material



**2ZDK-HP-OH** (Drilling Depth Regular type with oil holes)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	(Unit : mm)			
				Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL
2ZDK030HP-3D-OH	●	3.0	0 -0.010	13.5	15.5	3	68
2ZDK031HP-3D-OH	●	3.1		14	16	4	72
2ZDK032HP-3D-OH	●	3.2		14.4	16.4		
2ZDK033HP-3D-OH	●	3.3		14.9	16.9		
2ZDK034HP-3D-OH	●	3.4		15.3	17.3		
2ZDK035HP-3D-OH	●	3.5		15.8	17.8		
2ZDK036HP-3D-OH	●	3.6		16.2	18.2		
2ZDK037HP-3D-OH	●	3.7		16.7	18.7		
2ZDK038HP-3D-OH	●	3.8		17.1	19.1		
2ZDK039HP-3D-OH	●	3.9		17.6	19.6		
2ZDK040HP-3D-OH	●	4.0	0 -0.012	18	20	5	80
2ZDK041HP-3D-OH	●	4.1		18.5	20.5		
2ZDK042HP-3D-OH	●	4.2		18.9	20.9		
2ZDK043HP-3D-OH	●	4.3		19.4	21.4		
2ZDK044HP-3D-OH	●	4.4		19.8	21.8		
2ZDK045HP-3D-OH	●	4.5		20.3	22.3		
2ZDK046HP-3D-OH	●	4.6		20.7	22.7		
2ZDK047HP-3D-OH	●	4.7		21.2	23.2		
2ZDK048HP-3D-OH	●	4.8		21.6	23.6		
2ZDK049HP-3D-OH	●	4.9		22.1	24.1		
2ZDK050HP-3D-OH	●	5.0	0 -0.015	22.5	24.5	6	82
2ZDK051HP-3D-OH	●	5.1		23	25		
2ZDK052HP-3D-OH	●	5.2		23.4	25.4		

\* This tool is specially designed for plunge milling and NOT recommended for slotting.

The drilling depth should be less than 3.0D(3.0 x DC).

Recommended Cutting Conditions **L81**

No. of Flutes : 2

# 2ZDK-HP-OH

Coolant-Through Holes for Efficient and Stable Machining of Stainless Steel Machining



**2ZDK-HP-OH** (Drilling Depth Regular type with oil holes)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	(Unit : mm)			
				Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL
2ZDK076HP-3D-OH	●	7.6	0 -0.015	34.2	36.2	8	94
2ZDK077HP-3D-OH	●	7.7		34.7	36.7		
2ZDK078HP-3D-OH	●	7.8		35.1	37.1		
2ZDK079HP-3D-OH	●	7.9		35.6	37.6		
2ZDK080HP-3D-OH	●	8.0		36	38		
2ZDK081HP-3D-OH	●	8.1		36.5	38.5		
2ZDK082HP-3D-OH	●	8.2		36.9	38.9		
2ZDK083HP-3D-OH	●	8.3		37.4	39.4		
2ZDK084HP-3D-OH	●	8.4		37.8	39.8		
2ZDK085HP-3D-OH	●	8.5		38.3	40.3		
2ZDK086HP-3D-OH	●	8.6	0 -0.018	38.7	40.7	9	100
2ZDK087HP-3D-OH	●	8.7		39.2	41.2		
2ZDK088HP-3D-OH	●	8.8		39.6	41.6		
2ZDK089HP-3D-OH	●	8.9		40.1	42.1		
2ZDK090HP-3D-OH	●	9.0		40.5	42.5		
2ZDK091HP-3D-OH	●	9.1		41	43	10	106
2ZDK092HP-3D-OH	●	9.2		41.4	43.4		
2ZDK093HP-3D-OH	●	9.3		41.9	43.9		
2ZDK094HP-3D-OH	●	9.4		42.3	44.3		
2ZDK095HP-3D-OH	●	9.5		42.8	44.8		
2ZDK096HP-3D-OH	●	9.6		43.2	45.2		
2ZDK097HP-3D-OH	●	9.7		43.7	45.7		
2ZDK098HP-3D-OH	●	9.8		44.1	46.1		

\* This tool is specially designed for plunge milling and NOT recommended for slotting.

The drilling depth should be less than 3.0D(3.0 x DC).

Recommended Cutting Conditions **L81**

● : Std. Item

# Flat Bottom Drill (Counterboring)

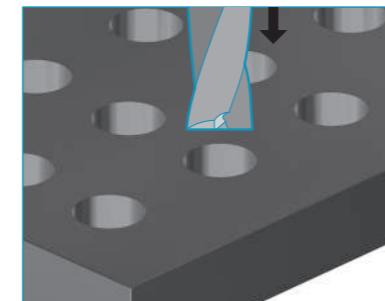
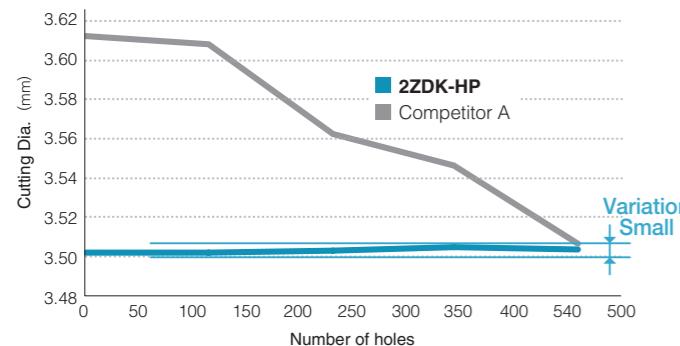
## Drilling in Flat Surface

Cutting Performance Comparison (Internal evaluation)

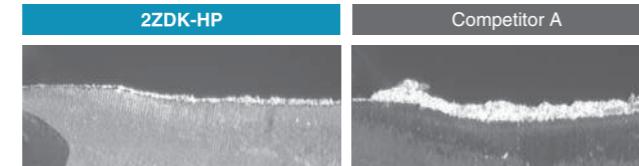
**Drill Dia. : ø3.5mm**

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

Cutting Dia.



Cutting Edge after Machining 500 holes



Cutting Conditions : n = 6,000 min<sup>-1</sup>, Vf = 360 mm/min, Drilling Depth 5 mm, Wet  
Drill Dia. ø3.5 mm (Regular type) Workpiece Material : SCM440

## Comparison with Standard Drill

	Shape of the bottom	Burr	Drilling in Slant Surface
2ZDK-HP			
Standard Drill			

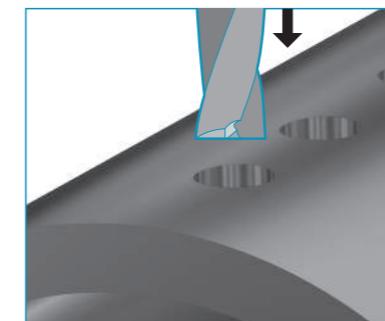
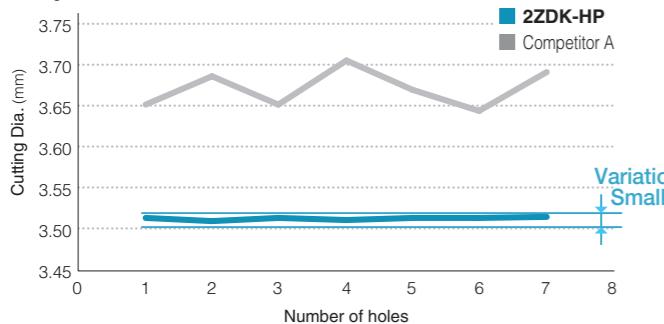
## Drilling in Cylinder Surface

Cutting Performance Comparison (Internal evaluation)

**Drill Dia. : ø3.5mm**

Stable and High Precision Machining with Less Variation in Hole Diameter

Cutting Dia. (ø3.5mm)



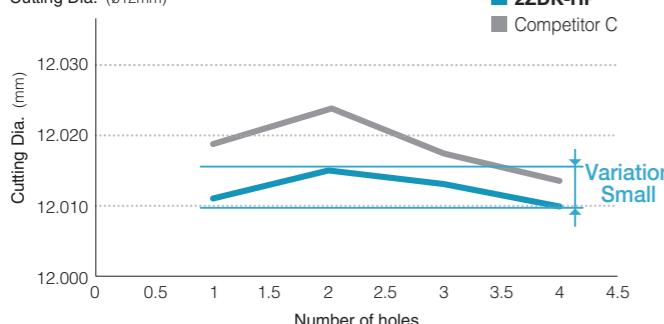
Cutting Conditions : n = 7,000 min<sup>-1</sup>, Vf = 420 mm/min, Wet  
Drill Dia. ø3.5 mm (Regular type)  
Workpiece Material : Carbon Steel Pipe ø17.3 mm (Thickness 3.2 mm)

Cutting Performance Comparison (Internal evaluation)

**Drill Dia. : ø12mm**

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

Cutting Dia. (ø12mm)



Surface Finish and Chips

	2ZDK-HP	Competitor C
Surface Finish		
Chips		

Cutting Conditions : n = 1,800 min<sup>-1</sup>, Vf = 540 mm/min, Wet  
Drill Dia. ø12 mm (Regular type)  
Workpiece Material : Carbon Steel Pipe ø25 mm (Thickness 4 mm)



# Flat Bottom Drill (Counterboring)

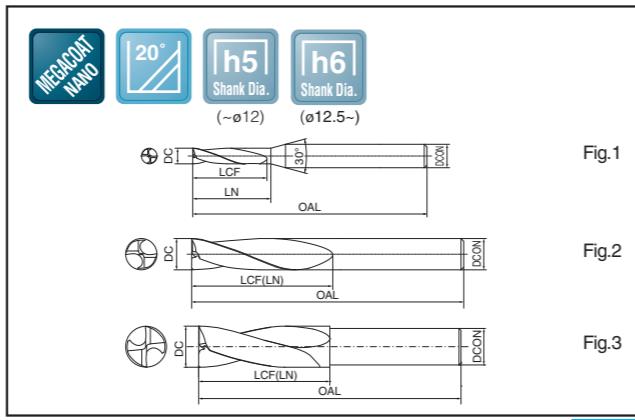
## 2ZDK (Short type)



2

MEGACOAT NANO is applied

Recommended Workpiece Materials			
P	P	K	N
~30HRC	30~40HRC	Cast Iron	Aluminum & Non Ferrous Material



## 2ZDK (Drilling Depth Short type) (Refer to L50 for 2ZDK-HP)

Description	Stock	Outside Dia.		Mill Dia. tolerance	Flute length	Under Neck Length	Shank Dia.	Overall length	Shape	(Unit : mm)			
		DC	DC							LCF	LN	DCON	OAL
2ZDK010S	▲	1.0			3	4							
2ZDK011S	MTO	1.1			3.5	4.5							
2ZDK012S	MTO	1.2			4	5							
2ZDK013S	MTO	1.3			4.5	5.5							
2ZDK014S	MTO	1.4			5	6							
2ZDK015S	▲	1.5			5.5	6.5							
2ZDK016S	▲	1.6			6	7							
2ZDK017S	MTO	1.7			7	8							
2ZDK018S	MTO	1.8			8	9							
2ZDK019S	MTO	1.9			9	10							
2ZDK020S	▲	2.0											
2ZDK021S	MTO	2.1											
2ZDK022S	MTO	2.2											
2ZDK023S	MTO	2.3											
2ZDK024S	▲	2.4											
2ZDK025S	▲	2.5											
2ZDK026S	▲	2.6											
2ZDK027S	▲	2.7											
2ZDK028S	MTO	2.8											
2ZDK029S	▲	2.9											
2ZDK030S	▲	3.0											
2ZDK031S	▲	3.1											
2ZDK032S	MTO	3.2											
2ZDK033S	▲	3.3											
2ZDK034S	▲	3.4											
2ZDK035S	▲	3.5											
2ZDK036S	MTO	3.6											
2ZDK037S	▲	3.7											
2ZDK038S	MTO	3.8											
2ZDK039S	MTO	3.9											
2ZDK040S	▲	4.0											
2ZDK041S	▲	4.1											

Description	Stock	Outside Dia.		Mill Dia. tolerance	Flute length	Under Neck Length	Shank Dia.	Overall length	Shape	(Unit : mm)			
		DC	DC							LCF	LN	DCON	OAL
2ZDK042S	▲	4.2			13	14							
2ZDK043S	▲	4.3			14	15							
2ZDK044S	MTO	4.4			15	16							
2ZDK045S	▲	4.5			16	17							
2ZDK046S	MTO	4.6			17	18							
2ZDK047S	MTO	4.7			18	19							
2ZDK048S	▲	4.8			19	(21)							
2ZDK049S	▲	4.9			20	22							
2ZDK050S	▲	5.0			21	23							
2ZDK051S	▲	5.1			22	24							
2ZDK052S	▲	5.2											
2ZDK053S	▲	5.3											
2ZDK054S	MTO	5.4											
2ZDK055S	▲	5.5											
2ZDK056S	▲	5.6											
2ZDK057S	MTO	5.7											
2ZDK058S	▲	5.8											
2ZDK059S	MTO	5.9											
2ZDK060S	▲	6.0											
2ZDK060S-P	▲	6.0	+0.012	0	19	21	8	70					
2ZDK061S	▲	6.1			19	21							
2ZDK062S	▲	6.2			20	22							
2ZDK063S	▲	6.3			21	23							
2ZDK064S	▲	6.4			22	24							
2ZDK065S	▲	6.5											
2ZDK066S	▲	6.6											
2ZDK067S	MTO	6.7											
2ZDK068S	▲	6.8											
2ZDK069S	MTO	6.9											
2ZDK070S	▲	7.0											
2ZDK071S	MTO	7.1											
2ZDK072S	MTO	7.2											

\* Mill Dia. tolerance of 2ZDK60S-P is plus tolerance.

Recommended Cutting Conditions L82

▲:To be replaced by a new product  
MTO : Made to order

\* This tool is specially designed for plunge milling and NOT recommended for slotting.

. The drilling depth should be less than 1.5D(1.5 x DC).

No. of Flutes : 2

Description	Stock	Outside Dia.	Mill Dia. tolerance	Flute length	Under Neck Length
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# Flat Bottom Drill (Counterboring)

2ZDK



MEGACOAT NANO is applied

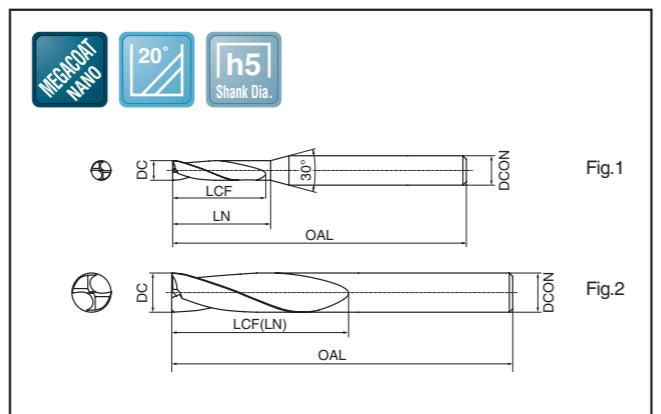
## 2ZDK (Refer to L54 and L55 for 2ZDK-HP)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL	Shape	(Unit : mm)												
									Plunge milling	Shouldering	Slotting	Alloy Steel	Prehardened Steel	Stainless Steel	Spindle Revolution (min⁻¹)	Feed Rate (mm/min)	Outside Dia. DC (mm)	ø1	ø2	ø4	ø6
2ZDK030	▲	3.0	0 -0.010	14	15										25,500	13,200	6,600	4,400	3,300	2,200	1,700
2ZDK033	▲	3.3		15	16										225	230	375	415	420	310	240
2ZDK035	▲	3.5		17	18										19,000	11,000	6,000	4,000	3,000	2,000	1,500
2ZDK040	▲	4.0		19	20										135	140	225	250	250	245	245
2ZDK042	▲	4.2		20	21										22,000	11,000	5,600	3,700	2,800	1,900	1,400
2ZDK045	▲	4.5		21	22										195	220	285	315	310	230	200
2ZDK050	▲	5.0		23	24										18,000	9,500	4,800	3,200	2,400	1,600	1,200
2ZDK053	▲	5.3		24	25										115	130	170	190	185	185	185
2ZDK055	▲	5.5		25	26										17,000	8,800	4,400	3,000	2,200	1,500	1,100
2ZDK056	▲	5.6		26	27										55	80	100	105	105	110	110
2ZDK060	▲	6.0		28	(28)										16,000	8,000	4,000	2,700	2,000	1,300	990
2ZDK065	▲	6.5	0 -0.015	30	31										35	50	60	63	63	65	65
2ZDK068	▲	6.8		31	32										60	60	65	70	70	70	70

\* This tool is specially designed for plunge milling and NOT recommended for slotting.

. The drilling depth should be less than 2D(2 x DC).

Recommended Workpiece Materials			
P ~30HRC	P 30~40HRC	K Cast Iron	N Aluminum & Non Ferrous Material



No. of Flutes : 2

# Recommended Cutting Conditions

2FESS

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø1	ø2	ø4	ø6	ø8	ø12	ø16
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	
	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	
Alloy Steel	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	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	
Prehardened 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	
	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	
Stainless Steel	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	
	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	

\* 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
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	
	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	
Alloy Steel											

# Recommended Cutting Conditions

## 2FESL (Shouldering)

Applications	Workpiece Material	Outside Dia. DC (mm)	ø1	ø2	ø4	ø6	ø8	ø12	ø16
Shouldering	Carbon Steel, Cast Iron	Spindle Revolution (min <sup>-1</sup> )	19,000	9,500	4,800	3,200	2,400	1,600	1,200
		Feed Rate (mm/min)	210	210	210	210	210	210	210
	Alloy Steel	Spindle Revolution (min <sup>-1</sup> )	14,300	7,200	3,600	2,400	2,000	1,300	1,000
		Feed Rate (mm/min)	155	160	160	160	170	170	150
	Prehardened Steel (30 ~ 45HRC)	Spindle Revolution (min <sup>-1</sup> )	11,200	5,600	2,800	1,900	1,600	1,000	800
		Feed Rate (mm/min)	85	85	90	90	100	95	80
	Stainless Steel	Spindle Revolution (min <sup>-1</sup> )	14,300	7,200	3,600	2,400	2,000	1,300	1,000
		Feed Rate (mm/min)	95	95	95	95	105	105	80

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

Slotting is not recommended.

## 2FEKS, 2FEKM

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø3	ø4	ø6	ø8	ø10	ø12	ø16
Shouldering	Carbon Steel, Cast Iron	Shouldering	Spindle Revolution (min <sup>-1</sup> )	9,300	7,000	4,600	3,600	2,900	2,400	2,000
			Feed Rate (mm/min)	450	450	470	430	400	360	320
		Slotting	Spindle Revolution (min <sup>-1</sup> )	7,500	6,000	4,400	3,300	2,700	2,300	1,900
			Feed Rate (mm/min)	240	260	340	340	340	340	320
	Alloy Steel	Shouldering	Spindle Revolution (min <sup>-1</sup> )	8,800	6,600	4,400	3,300	2,600	2,200	1,800
			Feed Rate (mm/min)	370	370	440	400	360	330	290
		Slotting	Spindle Revolution (min <sup>-1</sup> )	7,200	5,400	3,600	2,700	2,200	1,800	1,500
			Feed Rate (mm/min)	270	270	270	270	270	270	270
	Prehardened Steel (30 ~ 45HRC)	Shouldering	Spindle Revolution (min <sup>-1</sup> )	6,400	4,800	3,200	2,400	1,900	1,600	1,200
			Feed Rate (mm/min)	130	130	130	140	140	140	140
		Slotting	Spindle Revolution (min <sup>-1</sup> )	5,300	4,000	2,600	2,000	1,600	1,300	1,000
			Feed Rate (mm/min)	120	120	120	120	120	120	120
	Stainless Steel	Shouldering	Spindle Revolution (min <sup>-1</sup> )	8,000	6,000	4,000	3,000	2,400	2,000	1,500
			Feed Rate (mm/min)	140	140	140	140	140	140	140
		Slotting	Spindle Revolution (min <sup>-1</sup> )	5,300	4,000	2,600	2,000	1,600	1,300	1,000
			Feed Rate (mm/min)	80	90	100	100	100	90	90

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

Slotting is not recommended.

## 4FESM (Shouldering)

Applications	Workpiece Material	Outside Dia. DC (mm)	ø1	ø2	ø4	ø6	ø8	ø12	ø16
Shouldering	Carbon Steel, Cast Iron	Spindle Revolution (min <sup>-1</sup> )	25,500	13,000	6,600	4,400	3,300	2,200	1,700
		Feed Rate (mm/min)	335	345	580	620	625	630	600
	Alloy Steel	Spindle Revolution (min <sup>-1</sup> )	22,000	11,000	5,600	3,700	2,800	1,900	1,400
		Feed Rate (mm/min)	290	290	395	455	455	470	460
	Prehardened Steel (30 ~ 45HRC)	Spindle Revolution (min <sup>-1</sup> )	12,000	7,200	4,200	3,000	2,200	1,500	1,100
		Feed Rate (mm/min)	105	125	150	160	160	165	140
	Stainless Steel	Spindle Revolution (min <sup>-1</sup> )	22,000	11,000	5,600	3,700	2,800	1,900	1,400
		Feed Rate (mm/min)	130	145	165	165	170	175	155

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

Slotting is not recommended.

## 4FEKM (Tough corner edge, Shouldering)

Applications	Workpiece Material	Outside Dia. DC (mm)	ø3	ø4	ø6	ø8	ø10	ø12	ø16
Shouldering	Carbon Steel, Cast Iron	Spindle Revolution (min <sup>-1</sup> )	10,600	8,000	5,300	4,000	3,200	2,700	2,100
		Feed Rate (mm/min)	680	690	770	770	770	770	770
	Alloy Steel	Spindle Revolution (min <sup>-1</sup> )	8,800	6,600	4,400	3,300	2,600	2,200	1,800
		Feed Rate (mm/min)	500	550	620	630	630	630	610
	Prehardened Steel (30 ~ 45HRC)	Spindle Revolution (min <sup>-1</sup> )	6,400	4,800	3,200	2,400	1,900	1,600	1,200
		Feed Rate (mm/min)	180	180	180	190	190	190	190
	Stainless Steel	Spindle Revolution (min <sup>-1</sup> )	8,000	4,800	4,000	2,400	2,300	2,000	1,500
		Feed Rate (mm/min)	190	200	200	200	210	210	210

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

Slotting is not recommended.

# Recommended Cutting Conditions

## 2FESW

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø13
<p>Shouldering Depth of Cut (ap x ae) (mm) 1DC x 0.2DC</p> <p>Slotting Depth of Cut (ap) (mm) 0.2DC</p>	Carbon Steel, Cast Iron	Shouldering	Spindle Revolution (min⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
		Shouldering	Feed Rate (mm/min)	660	640	640	640	520	450	410	400
	Alloy Steel	Slotting	Spindle Revolution (min⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
		Slotting	Feed Rate (mm/min)	550	480	510	530	480	440	410	400
	Prehardened Steel (30 ~ 45HRC)	Shouldering	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
		Shouldering	Feed Rate (mm/min)	420	430	430	430	350	300	270	260
	Stainless Steel	Slotting	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
		Slotting	Feed Rate (mm/min)	300	340	360	370	340	310	270	260
	Stainless Steel	Shouldering	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
		Shouldering	Feed Rate (mm/min)	180	240	240	240	200	170	160	160
		Slotting	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
		Slotting	Feed Rate (mm/min)	120	120	130	130	130	130	130	130

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

## 3FESW

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø13
<p>Shouldering Depth of Cut (ap x ae) (mm) 1DC x 0.2DC</p> <p>Slotting Depth of Cut (ap) (mm) 0.2DC</p>	Carbon Steel, Cast Iron	Shouldering	Spindle Revolution (min⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
		Shouldering	Feed Rate (mm/min)	810	800	800	800	650	560	510	450
	Alloy Steel	Slotting	Spindle Revolution (min⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
		Slotting	Feed Rate (mm/min)	810	800	800	800	650	560	510	450
	Prehardened Steel (30 ~ 45HRC)	Shouldering	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
		Shouldering	Feed Rate (mm/min)	530	530	530	530	430	370	340	300
	Stainless Steel	Slotting	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
		Slotting	Feed Rate (mm/min)	530	530	530	530	430	370	340	300
	Stainless Steel	Shouldering	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
		Shouldering	Feed Rate (mm/min)	140	140	150	150	150	150	150	150
		Slotting	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
		Slotting	Feed Rate (mm/min)	150	150	160	160	160	160	160	160

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

## 4FESW

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø13
<p>Shouldering Depth of Cut (ap x ae) (mm) 1DC x 0.2DC</p> <p>Slotting Depth of Cut (ap) (mm) 0.2DC</p>	Carbon Steel, Cast Iron	Shouldering	Spindle Revolution (min⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
		Shouldering	Feed Rate (mm/min)	960	960	960	960	780	680	620	570
	Alloy Steel	Slotting	Spindle Revolution (min⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
		Slotting	Feed Rate (mm/min)	960	960	960	960	780	680	620	570
	Prehardened Steel (30 ~ 45HRC)	Shouldering	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
		Shouldering	Feed Rate (mm/min)	640	640	640	640	520	450	410	370
	Stainless Steel	Slotting	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
		Slotting	Feed Rate (mm/min)	640	640	640	640	520	450	410	370
	Stainless Steel	Shouldering	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
		Shouldering	Feed Rate (mm/min)	160	160	180	180	180	180	180	180
		Slotting	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
		Slotting	Feed Rate (mm/min)	180	180	200	200	200	200	200	200

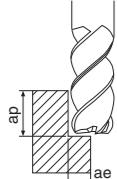
\* Machining with water soluble coolant is recommended for stainless steel.

## 4MFK (Short, Medium), 4MFR (Medium)

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16
<p>Shouldering Short 1.2DC x 0.15DC Medium 1.5DC x 0.15DC</p> <p>Slotting ap ≤ 1DC</p>	Carbon Steel	Shouldering	Spindle Revolution (min⁻¹)	13,800	10,700	8,800	7,500	6,000	4,800	4,000	3,300	
		Slotting	Spindle Revolution (min⁻¹)	13,800	10,700	8,800	7,500	6,000	4,800	4,000	3,300	
<p>Shouldering Short 1.2DC x 0.1DC Medium 1.5DC x 0.1DC</p> <p>Slotting ap ≤ 1DC</p>	Alloy Steel	Shouldering	Spindle Revolution (min⁻¹)	10,600	9,300	8,300	7,400	6,000	4,700	3,800	2,800	
		Slotting	Spindle Revolution (min⁻¹)	10,600	9,300	8,300	7,400	6,000	4,700	3,800	2,800	
<p>Shouldering Short 1.2DC x 0.07DC Medium 1.5DC x 0.07DC</p> <p>Slotting ap ≤ 1DC</p>	Prehardened Steel (30 ~ 45HRC)	Shouldering	Spindle Revolution (min⁻¹)	8,700	6,800	5,500	4,600	3,500	2,800	2,300	1,700	
		Slotting	Spindle Revolution (min⁻¹)	6,700	5,800	4,800	4,000	3,000	2,300	1,900	1,400	
<p>Shouldering Short 1.2DC x 0.1DC Medium 1.5DC x 0.1DC</p> <p>Slotting ap ≤ 0.3DC</p>	Stainless Steel/Titanium Alloys	Shouldering	Spindle Revolution (min⁻¹)	8,700	7,000	6,000	5,200	4,000	3,000	2,500	1,700	
		Slotting	Spindle Revolution (min⁻¹)	6,800	6,000	5,100	4,300	3,400	2,600	2,000	1,400	

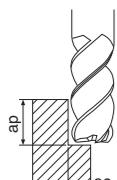
# Recommended Cutting Conditions

## 4TFK (Short, Medium), 4TFR (Medium)

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
	Carbon Steel, Cast Iron	Shouldering	1.5DC x 0.2DC	Spindle Revolution (min⁻¹)	13,800	10,300	8,300	6,900	5,200	4,100	3,400	2,600	2,100
		Slotting	DC ≤ ø12 : ap ≤ 1.0DC DC > ø12 : ap ≤ 12	Spindle Revolution (min⁻¹)	11,100	8,400	6,700	5,600	4,200	3,300	2,800	2,100	1,700
	Alloy Steel	Shouldering	1.5DC x 0.2DC	Spindle Revolution (min⁻¹)	10,600	8,000	6,400	5,300	4,000	3,200	2,700	2,000	1,600
		Slotting	DC ≤ ø12 : ap ≤ 1.0DC DC > ø12 : ap ≤ 12	Spindle Revolution (min⁻¹)	8,500	6,400	5,100	4,200	3,200	2,500	2,100	1,600	1,300
	Prehardened Steel (30 ~ 45HRC)	Shouldering	1.5DC x 0.05DC	Spindle Revolution (min⁻¹)	9,500	7,200	5,700	4,800	3,600	2,900	2,400	1,800	1,400
		Slotting	ap ≤ 0.5 x DC	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,400	1,100
	Stainless Steel	Shouldering	1.5DC x 0.05DC	Spindle Revolution (min⁻¹)	9,500	7,200	5,700	4,800	3,600	2,900	2,400	1,800	1,400
		Slotting	ap ≤ 0.5 x DC	Spindle Revolution (min⁻¹)	5,500	4,200	3,800	3,500	2,800	2,200	1,900	1,400	1,100
	Titanium Alloys	Shouldering	1.5DC x 0.1DC	Spindle Revolution (min⁻¹)	8,500	6,400	5,100	4,200	3,200	2,500	2,100	1,600	1,300
		Slotting	DC ≤ ø12 : ap ≤ 1.0DC DC > ø12 : ap ≤ 12	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,400	1,100
	Superalloy	Shouldering	1.5DC x 0.05DC	Spindle Revolution (min⁻¹)	4,200	3,200	2,500	2,100	1,600	1,300	1,100	800	640
		Slotting	ap ≤ 0.3 x DC	Spindle Revolution (min⁻¹)	3,000	2,200	1,800	1,500	1,100	900	700	600	400

\* Machining with water soluble coolant is recommended for stainless steel, titanium alloys and Superalloy.

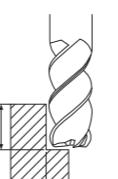
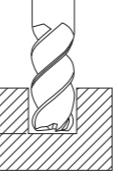
## 4TFK (Long)

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
	Carbon Steel, Cast Iron	Shouldering	2.5DC x 0.1DC	Spindle Revolution (min⁻¹)	11,000	8,200	6,600	5,500	4,200	3,300	2,700	2,100	1,700
		Alloy Steel	2.5DC x 0.1DC	Spindle Revolution (min⁻¹)	6,000	4,600	3,600	3,000	2,300	1,800	1,500	1,100	910
	Prehardened Steel (30 ~ 45HRC)	Shouldering	2.5DC x 0.05DC	Spindle Revolution (min⁻¹)	6,000	4,600	3,600	3,000	2,300	1,800	1,500	1,100	910
		Stainless Steel	2.5DC x 0.05DC	Spindle Revolution (min⁻¹)	4,800	3,600	2,900	2,400	1,800	1,500	1,200	900	700
	Titanium Alloys	Shouldering	2.5DC x 0.05DC	Spindle Revolution (min⁻¹)	4,300	3,200	2,600	2,100	1,600	1,300	1,100	800	700
		Superalloy	2.5DC x 0.02DC	Spindle Revolution (min⁻¹)	2,100	1,600	1,300	1,100	800	650	550	400	320

\* Machining with water soluble coolant is recommended for stainless steel, titanium alloys and Superalloy.

Slotting is not recommended.

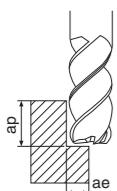
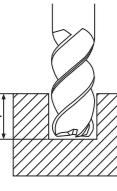
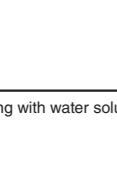
## 3ZFKS (Short), 3ZFKM (Medium)

Applications	Workpiece Material	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	
	Carbon Steel	Shouldering	Short 1.2DC x 0.3DC Medium 1.5DC x 0.3DC	Spindle Revolution (min⁻¹)	13,800	10,700	8,800	7,500	6,600	6,000	4,800	4,000
		Slotting	1DC	Feed Rate (mm/min)	850	950	1,100	1,200	1,100	1,000	910	850
		Plunge milling		Feed Rate (mm/min)	180	170	170	170	160	150	120	100
		Slotting		Feed Rate (mm/min)	570	650	700	730	750	780	800	750
	Alloy Steel	Shouldering	Short 1.2DC x 0.3DC Medium 1.5DC x 0.3DC	Spindle Revolution (min⁻¹)	10,600	9,300	8,300	7,400	6,500	6,000	4,700	3,500
		Slotting	0.5DC	Feed Rate (mm/min)	700	780	900	980	900	850	750	700
		Plunge milling		Feed Rate (mm/min)	120	120	130	140	130	130	120	100
		Slotting		Feed Rate (mm/min)	500	540	570	590	610	600	580	500
	Prehardened Steel (30 ~ 45HRC)	Shouldering	Short 1.2DC x 0.3DC Medium 1.5DC x 0.3DC	Spindle Revolution (min⁻¹)	5,200	4,000	3,200	2,600	2,300	2,000	1,600	1,400
		Slotting	0.5DC	Feed Rate (mm/min)	440	440	490	490	490	440	400	370
		Plunge milling		Feed Rate (mm/min)	90	110	110	130	110	100	80	70
		Slotting		Feed Rate (mm/min)	220	270	270	320	330	330	230	200
	Stainless Steel	Shouldering	Short 1.2DC x 0.2DC Medium 1.5DC x 0.2DC	Spindle Revolution (min⁻¹)	3,300	2,500	2,000	1,700	1,400	1,300	1,100	900
		Slotting	0.5DC	Feed Rate (mm/min)	280	270	330	340	330	330	350	320
		Plunge milling		Feed Rate (mm/min)	20	30	40	40	40	30	20	20
		Slotting		Feed Rate (mm/min)	110	110	130	140	130	130	120	120
	Titanium Alloys	Shouldering	Short 1.2DC x 0.2DC Medium 1.5DC x 0.2DC	Spindle Revolution (min⁻¹)	3,300	2,500	2,000	1,700	1,400	1,300	1,100	900
		Slotting	0.5DC	Feed Rate (mm/min)	280	270	330	340	330	330	350	320
		Plunge milling		Feed Rate (mm/min)	20	30	40	40	40	30	20	20
		Slotting		Feed Rate (mm/min)	110	110	130	140	130	130	120	120

\* Machining with water soluble coolant is recommended for stainless steel and titanium alloys.

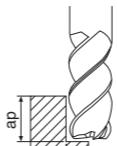
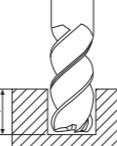
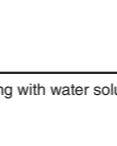
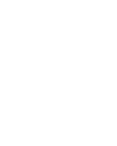
# Recommended Cutting Conditions

## 5DERM

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø4	ø5	ø6	ø8	ø10	ø12
	Medium Carbon Steel High Carbon Steel (> 0.3% C)	Shouldering	Spindle Revolution (min⁻¹)	16,000	12,700	10,600	8,000	6,400	5,300
		Slotting	Feed Rate (mm/min)	2,400	2,500	2,700	2,400	2,200	1,900
	Alloy Steel Alloy Tool Steel (< 330HB) (< 35HRC)	Shouldering	Spindle Revolution (min⁻¹)	16,000	12,700	10,600	8,000	6,400	5,300
		Slotting	Feed Rate (mm/min)	2,400	2,500	2,700	2,400	2,200	1,900
		Shouldering	Spindle Revolution (min⁻¹)	14,300	11,500	9,600	7,200	5,700	4,800
		Slotting	Feed Rate (mm/min)	2,100	1,700	1,900	1,800	1,700	1,700
	Alloy Steel Alloy Tool Steel (340 ~ 450HB) (36 ~ 48HRC)	Shouldering	Spindle Revolution (min⁻¹)	13,000	10,000	8,500	6,400	5,100	4,200
		Slotting	Feed Rate (mm/min)	1,300	1,500	1,700	1,300	1,300	1,300
		Shouldering	Spindle Revolution (min⁻¹)	13,000	10,000	8,500	6,400	5,100	4,200
		Slotting	Feed Rate (mm/min)	1,300	1,500	1,700	1,300	1,300	1,300
	Austenitic Stainless Steel SUS302 SUS303 SUS304	Shouldering	Spindle Revolution (min⁻¹)	9,200	7,300	6,100	4,600	3,700	3,100
		Slotting	Feed Rate (mm/min)	1,400	1,100	1,200	1,100	1,100	1,100
		Shouldering	Spindle Revolution (min⁻¹)	9,200	7,300	6,100	4,600	3,700	3,100
		Slotting	Feed Rate (mm/min)	1,400	1,100	1,200	1,100	1,100	1,100
	Austenitic Stainless Steel SUS316 SUS316L	Shouldering	Spindle Revolution (min⁻¹)	6,400	5,100	4,200	3,200	2,500	2,100
		Slotting	Feed Rate (mm/min)	640	760	640	640	640	640
		Shouldering	Spindle Revolution (min⁻¹)	6,400	5,100	4,200	3,200	2,500	2,100
		Slotting	Feed Rate (mm/min)	640	760	640	640	640	640
	Titanium Alloys	Shouldering	Spindle Revolution (min⁻¹)	4,800	3,800	3,200	2,400	1,900	1,600
		Slotting	Feed Rate (mm/min)	480	380	480	480	380	400
		Shouldering	Spindle Revolution (min⁻¹)	4,800	3,800	3,200	2,400	1,900	1,600
		Slotting	Feed Rate (mm/min)	480	380	480	480	380	400
	Superalloy	Shouldering	Spindle Revolution (min⁻¹)	3,200	2,500	2,100	1,600	1,300	1,100
		Slotting	Feed Rate (mm/min)	160	130	210	240	190	210
		Shouldering	Spindle Revolution (min⁻¹)	3,200	2,500	2,100	1,600	1,300	1,100
		Slotting	Feed Rate (mm/min)	160	130	210	240	190	210
	Gray Cast Iron	Shouldering	Spindle Revolution (min⁻¹)	14,000	11,000	9,000	6,800	5,400	4,500
		Slotting	Feed Rate (mm/min)	2,000	2,200	2,300	2,000	2,200	1,800
		Shouldering	Spindle Revolution (min⁻¹)	14,000	11,000	9,000	6,800	5,400	4,500
		Slotting	Feed Rate (mm/min)	2,000	2,200	2,300	2,000	2,200	1,800
	Nodular Cast Iron Malleable Cast Iron	Shouldering	Spindle Revolution (min⁻¹)	10,000	8,300	6,900	5,200	4,100	3,500
		Slotting	Feed Rate (mm/min)	1,000	1,200	1,000	1,300	1,000	1,000
		Shouldering	Spindle Revolution (min⁻¹)	10,000	8,300	6,900	5,200	4,100	3,500
	Gray Cast Iron	Slotting	Feed Rate (mm/min)	1,000	1,200	1,000	1,300	1,000	1,000
		Shouldering	Spindle Revolution (min⁻¹)	14,000	11,000	9,000	6,800	5,400	4,500
		Slotting	Feed Rate (mm/min)	2,000	2,200	2,300	2,000	2,200	1,800

\* Machining with water soluble coolant is recommended for stainless steel, titanium alloys and superalloy.

## 3UFSM

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø2	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
	Carbon Steel, Cast Iron	Shouldering	Spindle Revolution (min⁻¹)	18,000	12,000	9,200	7,300	6,100	4,600	3,700	3,100	2,300	1,800
		Slotting	Feed Rate (mm/min)	380	430	440	500	510	500	560	560	590	590
	Alloy Steel	Shouldering	Spindle Revolution (min⁻¹)	16,000	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,000	1,600
		Slotting	Feed Rate (mm/min)	190	230	240	290	300	290	280	290	310	350
	Stainless Steel	Shouldering	Spindle Revolution (min⁻¹)	14,000	9,000	6,800	5,400	4,500	3,400	2,700	2,300	1,700	1,400
		Slotting	Feed Rate (mm/min)	250	270	270	320	350	340	360	350	390	420
	Titanium Alloys Heat-resistant Alloys (40 ~ 50HRC)	Shouldering	Spindle Revolution (min⁻¹)	10,000	6,400	4,800	3,800	3,200	2,400	1,900	1,600	1,200	1,000
		Slotting	Feed Rate (mm/min)	120	120	120	140	150	140	140	140	150	180
	Aluminum Alloys	Shouldering	Spindle Revolution (min⁻¹)	6,000	4,200	3,200	2,500	2,100	1,600	1,300	1,100	800	600
		Slotting	Feed Rate (mm/min)	60	90	100	120	110	110	120	110	120	130
		Shouldering	Spindle Revolution (min⁻¹)	32,000	21,000	16,000	13,000	11,000	8,000	6,400	5,300	4,000	3,200
	Aluminum Alloys	Slotting	Feed Rate (mm/min)	670	760	770	900	920	860	1,000	1,100	1,100	1,200
		Shouldering	Spindle Revolution (min⁻¹)	32,000	21,000	16,000	13,000	11,000	8,000	6,400	5,300	4,000	3,200
		Slotting	Feed Rate (mm/min)	480	440	480	590	630	580	670	730	860	960

\* Machining with water soluble coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

# Recommended Cutting Conditions

## 6PFK, 8PFK (Medium)

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25
Shouldering	Carbon Steel, Cast Iron	Shouldering	DC < ø20 : 1.5DC x 0.2DC DC ≥ ø20 : 1.5DC x 0.1DC	Spindle Revolution (min⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,800
					2,650	2,640	2,410	2,250	2,010	1,700	1,500
	Alloy Steel	Shouldering	DC < ø20 : 1.5DC x 0.2DC DC ≥ ø20 : 1.5DC x 0.1DC	Spindle Revolution (min⁻¹)	6,400	4,800	3,800	3,200	2,400	1,900	1,500
					2,250	2,090	1,950	1,910	1,720	1,450	1,220
	Prehardened Steel (30 ~ 38HRC)	Shouldering	1.5DC x 0.1DC	Spindle Revolution (min⁻¹)	5,600	4,200	3,300	2,800	2,100	1,700	1,300
					1,780	1,710	1,520	1,400	1,220	1,120	980
	Stainless Steel Titanium Alloys	Shouldering	1.5DC x 0.05DC	Spindle Revolution (min⁻¹)	5,000	3,800	3,000	2,500	1,900	1,500	1,200
					1,350	1,320	1,200	1,130	970	850	720

\* Machining with water soluble coolant is recommended for stainless steel and titanium alloys.

**Slotting is not recommended.**

## 6PFK, 8PFK (Long)

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25
Shouldering	Carbon Steel, Cast Iron	Shouldering	3.0DC x 0.01DC	Spindle Revolution (min⁻¹)	4,600	3,500	2,800	2,300	1,700	1,400	1,100
					1,830	1,730	1,530	1,380	1,120	880	660
	Alloy Steel	Shouldering	3.0DC x 0.01DC	Spindle Revolution (min⁻¹)	3,700	2,800	2,200	1,800	1,400	1,100	900
					1,490	1,340	1,220	1,120	940	720	540
	Prehardened Steel (30 ~ 38HRC)	Shouldering	3.0DC x 0.01DC	Spindle Revolution (min⁻¹)	2,800	2,100	1,700	1,400	1,100	850	650
					920	680	750	670	550	480	390
	Stainless Steel Titanium Alloys	Shouldering	3.0DC x 0.01DC	Spindle Revolution (min⁻¹)	2,500	1,900	1,500	1,300	950	750	600
					700	670	590	540	440	370	290

\* Machining with water soluble coolant is recommended for stainless steel and titanium alloys.

**Slotting is not recommended.**

## 4JER (Short, Medium)

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Carbon Steel, Cast Iron	Shouldering	1.5DC x 0.1DC	Spindle Revolution (min⁻¹)	6,900	5,200	4,100	3,400	2,600	2,100
					1,500	1,500	1,400	1,400	1,300	1,100
	Alloy Steel	Slotting	DC ≤ ø12:ap ≤ 1.0DC DC > ø12:ap ≤ 12	Spindle Revolution (min⁻¹)	5,600	4,200	3,300	2,800	2,100	1,700
					720	670	620	540	480	360
Shouldering	Alloy Steel	Shouldering	1.5DC x 0.1DC	Spindle Revolution (min⁻¹)	5,300	4,000	3,200	2,700	2,000	1,600
					1,020	920	870	800	720	640
	Prehardened Steel (30 ~ 45HRC)	Slotting	DC ≤ ø12:ap ≤ 1.0DC DC > ø12:ap ≤ 12	Spindle Revolution (min⁻¹)	4,200	3,200	2,500	2,100	1,600	1,300
					530	510	470	450	400	360
Shouldering	Stainless Steel	Shouldering	1.5DC x 0.05DC	Spindle Revolution (min⁻¹)	4,600	3,500	2,800	2,300	1,700	1,300
					850	830	800	770	640	590
	Stainless Steel	Slotting	ap ≤ 0.5 × DC	Spindle Revolution (min⁻¹)	3,700	2,800	2,200	1,900	1,400	1,100
					480	450	440	410	340	300
Shouldering	Titanium Alloys	Shouldering	1.5DC x 0.1DC	Spindle Revolution (min⁻¹)	4,200	3,200	2,500	2,100	1,600	1,300
					580	630	660	600	500	400
	Superalloy Inconel® 718, etc.	Slotting	DC ≤ ø12:ap ≤ 1.0DC DC > ø12:ap ≤ 12	Spindle Revolution (min⁻¹)	3,700	2,800	2,200	1,900	1,400	1,100
					320	340	370	340	260	210
Shouldering	Superalloy Inconel® 718, etc.	Shouldering	1.5DC x 0.05DC	Spindle Revolution (min⁻¹)	2,400	1,800	1,400	1,200	900	720
					330	320	320	320	290	290
	Superalloy Inconel® 718, etc.	Slotting	ap ≤ 0.5 × DC	Spindle Revolution (min⁻¹)	1,600	1,200	950	800	600	480
					180	140	110	100	80	60

\* Machining with water soluble coolant is recommended for stainless steel, titanium alloys and superalloy.

# Recommended Cutting Conditions

## 4 / 5 / 6RFH (Medium)

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering Slotting	Carbon Steel / Alloy Steel / Cast Iron	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	1DC	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
		Slotting	2DC	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
	Prehardened Steel (30 ~ 45HRC)	Shouldering	1.5DC x 0.3DC	Spindle Revolution (min⁻¹)	4,200	3,200	2,500	2,100	1,600	1,300
				Feed Rate (mm/min)	490	620	580	540	490	460
		Slotting	1DC	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	2DC	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
	Stainless Steel	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	1DC	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
		Slotting	2DC	Spindle Revolution (min⁻¹)	5,300	4,000	3,200	2,700	2,000	1,600
				Feed Rate (mm/min)	220	210	250	190	200	200
	Titanium Alloys	Shouldering	1.5DC x 0.3DC	Spindle Revolution (min⁻¹)	4,200	3,200	2,500	2,100	1,600	1,300
				Feed Rate (mm/min)	330	420	410	390	380	370
		Slotting	1DC	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
		Slotting	2DC	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
	Superalloy	Shouldering	1.5DC x 0.2DC	Spindle Revolution (min⁻¹)	800	600	480	400	300	240
				Feed Rate (mm/min)	60	60	60	60	60	60
		Slotting	1DC	Spindle Revolution (min⁻¹)	530	400	320	270	200	160
				Feed Rate (mm/min)	28	28	28	28	28	28
		Slotting	2DC	Spindle Revolution (min⁻¹)	530	400	320	270	200	160
				Feed Rate (mm/min)	20	20	20	20	20	20

\* Machining with water soluble coolant is recommended for stainless steel, titanium alloys and superalloy.

## 4 / 5 / 6RFH (Long)

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering Slotting	Carbon Steel / Alloy Steel / Cast Iron	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
				Spindle Revolution (min⁻¹)	3,400	2,500	2,000	1,700	1,300	1,000
		Shouldering	ap : 4.0DC ae : 0.1DC (DC ≤ ø12) ae : 1.2mm (DC > ø12)	Feed Rate (mm/min)	340	430	410	380	340	320
				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
	Stainless Steel	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
				Spindle Revolution (min⁻¹)	640	480	380	320	240	190
		Shouldering	ap : 4.0DC ae : 0.1DC (DC ≤ ø12) ae : 1.0mm (DC > ø12)	Spindle Revolution (min⁻¹)	20	20	20	20	20	20
				Feed Rate (mm/min)	20	20	20	20	20	20
	Titanium Alloys	Shouldering	ap : 4.0DC ae : 0.1DC (DC ≤ ø12) ae : 1.2mm (DC > ø12)	Spindle Revolution (min⁻¹)	3,400	2,500	2,000	1,700	1,300	1,000
				Feed Rate (mm/min)	230	290	290	270	270	260
				Spindle Revolution (min⁻¹)	640	480	380	320	240	190
				Feed Rate (mm/min)	20	20	20	20	20	20
	Superalloy	Shouldering	ap : 4.0DC 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

\* Machining with water soluble coolant is recommended for stainless steel, titanium alloys and superalloy.

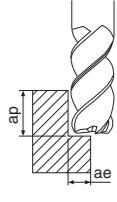
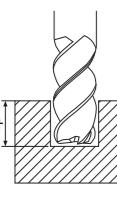
**Slotting is not recommended.**

## 3RDSM, 4RDSM, 5RDSM

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25
Shouldering Slotting	Steel	< 22HRC	1.5DC x 0.5DC	Spindle Revolution(min⁻¹)	11,100	8,400	6,700	5,600	4,200	3,300	2,700
				Feed Rate (mm/min)	1,000	1,000	1,320	1,340	1,340	1,380	
		22 ~ 32HRC	1DC	Spindle Revolution(min⁻¹)	9,300	6,900	5,600	4,600	3,500	2,800	2,200
				Feed Rate (mm/min)	800	800	1,000	1,030	1,040	1,050	1,110
		32 ~ 40HRC	0.75DC	Spindle Revolution(min⁻¹)	7,900	5,900	4,800	4,000	3,000	2,400	1,900
				Feed Rate (mm/min)	550	550	740	740	76		

# Recommended Cutting Conditions

## 4RFSM, 6RFSM

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16		ø20		ø25	
									4 flutes	6 flutes	4 flutes	6 flutes		
 Shouldering	 Slotting	Steel 35 ~ 45HRC	Shouldering 1.5DC x 0.4DC	Spindle Revolution (min⁻¹)	8,000	6,000	4,800	4,000	3,000	3,000	2,400	2,400	1,900	
				Feed Rate (mm/min)	630	630	630	640	640	900	640	930	800	
		Slotting 0.5DC		Spindle Revolution (min⁻¹)	6,400	4,800	3,800	3,200	2,400	2,400	1,900	1,900	1,500	
				Feed Rate (mm/min)	480	480	490	500	500	720	500	750	640	
		Steel 45 ~ 55HRC	Shouldering 1.5DC x 0.33DC	Spindle Revolution (min⁻¹)	5,800	4,400	3,500	2,900	2,200	2,200	1,800	1,800	1,400	
				Feed Rate (mm/min)	350	350	350	350	350	530	350	530	460	
		Slotting 0.5DC		Spindle Revolution (min⁻¹)	4,700	3,500	2,800	2,300	1,800	1,800	1,400	1,400	1,100	
				Feed Rate (mm/min)	280	280	280	280	280	420	280	420	370	
		Steel 55 ~ 60HRC	Shouldering 1.5DC x 0.25DC	Spindle Revolution (min⁻¹)	4,800	3,600	2,900	2,400	1,800	1,800	1,400	1,400	1,100	
				Feed Rate (mm/min)	190	220	230	240	220	320	230	340	310	
		Slotting 0.3DC		Spindle Revolution (min⁻¹)	3,800	2,900	2,300	1,900	1,400	1,400	1,100	1,100	900	
				Feed Rate (mm/min)	150	170	180	180	180	260	180	280	250	
		Stainless Steel	Shouldering 1.5DC x 0.4DC	Spindle Revolution (min⁻¹)	3,700	2,800	2,200	1,900	1,400	1,400	1,100	1,100	900	
				Feed Rate (mm/min)	300	280	260	300	280	420	290	430	380	
		Titanium Alloys < 40HRC	Shouldering 2DC x 0.4DC	Spindle Revolution (min⁻¹)	3,200	2,400	1,900	1,600	1,200	1,200	1,000	1,000	800	
				Feed Rate (mm/min)	390	390	390	390	390	590	390	540	450	
		Slotting 0.5DC		Spindle Revolution (min⁻¹)	3,000	2,200	1,800	1,500	1,100	1,100	900	900	700	
				Feed Rate (mm/min)	310	310	310	310	310	470	310	430	360	
		Heat-resistant Alloys (Ni-base heat-resistant alloys)	Shouldering 1.5DC x 0.25DC	Spindle Revolution (min⁻¹)	3,200	2,400	1,900	1,600	1,200	1,200	1,000	1,000	800	
				Feed Rate (mm/min)	300	300	300	300	300	430	300	430	370	
		Slotting 0.3DC		Spindle Revolution (min⁻¹)	2,500	1,900	1,500	1,300	1,000	1,000	800	800	600	
				Feed Rate (mm/min)	230	230	230	230	230	340	230	340	290	
		Slotting 0.25DC	Shouldering 1DC x 0.2DC	Spindle Revolution (min⁻¹)	1,600	1,200	1,000	800	600	600	500	500	400	
				Feed Rate (mm/min)	100	100	100	100	100	140	100	140	130	
				Spindle Revolution (min⁻¹)	1,300	1,000	800	600	500	500	400	400	300	
				Feed Rate (mm/min)	80	80	80	80	80	120	80	120	100	

\* Machining with water soluble coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

## 2SEB

Applications	Workpiece Material	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø2	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16
	Carbon Steel, Cast Iron	0.05DC x 0.05DC		Spindle Revolution (min⁻¹)	25,900	22,800	21,300	19,700	16,000	14,000	12,800	11,800
				Feed Rate (mm/min)	3,910	3,570	3,290	3,070	2,890	2,660	2,540	2,470
	Tool Steel, Alloy Steel	0.04DC x 0.04DC		Spindle Revolution (min⁻¹)	23,300	20,500	19,100	17,700	15,200	12,600	11,500	10,600
				Feed Rate (mm/min)	3,100	2,880	2,670	2,490	2,330	2,110	2,010	1,970
	Stainless Steel	0.05DC x 0.05DC		Spindle Revolution (min⁻¹)	23,300	20,500	19,100	17,700	15,200	12,600	11,500	10,600
				Feed Rate (mm/min)	3,150	2,880	2,660	2,500	2,370	2,190	2,060	1,970
	Prehardened Steel	0.05DC x 0.05DC		Spindle Revolution (min⁻¹)	23,300	20,500	19,100	17,700	15,200	12,600	11,500	10,600
				Feed Rate (mm/min)	3,150	2,880	2,660	2,500	2,370	2,190	2,060	1,970
	38 ~ 45HRC	0.03DC x 0.03DC		Spindle Revolution (min⁻¹)	20,900	18,500	17,200	15,900	13,700	11,300	10,400	9,500
				Feed Rate (mm/min)	2,550	2,330	2,170	2,040	1,940	1,800	1,680	1,590
	45 ~ 55HRC	0.03DC x 0.03DC		Spindle Revolution (min⁻¹)	18,600	16,400	15,300	14,200	12,200	10,000	9,200	8,500
				Feed Rate (mm/min)	2,060	1,850	1,700	1,600	1,520	1,410	1,320	1,230
	Heat Treated Steel	0.03DC x 0.03DC		Spindle Revolution (min⁻¹)	18,600	16,400	15,300	14,200	12,200	10,000	9,200	8,500
				Feed Rate (mm/min)	2,060	1,850	1,700	1,600	1,520	1,410	1,320	1,230
	55 ~ 60HRC	0.03DC x 0.03DC		Spindle Revolution (min⁻¹)	14,300	12,600	11,800	10,900	9,400	7,700	7,100	6,500
				Feed Rate (mm/min)	1,230	1,130	1,030	980	930	850	800	760

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

## 3UEBS

Applications	Workpiece Material	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12

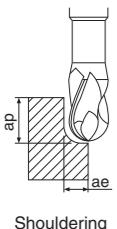




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# Recommended Cutting Conditions

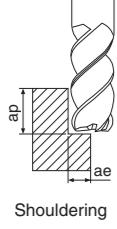
## 4YEBM

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø5	ø6	ø8	ø10	ø12	ø16	ø20
	Low Carbon Steel	Shouldering	1DC x 0.5DC	Spindle Revolution (min⁻¹)	9,400	7,900	5,900	4,700	3,900	2,900	2,400
				Feed Rate (mm/min)	1,020	1,130	1,270	1,020	990	800	760
		Slotting	1DC	Spindle Revolution (min⁻¹)	8,600	7,200	5,400	4,300	3,600	2,700	2,200
				Feed Rate (mm/min)	930	1,030	1,160	930	900	730	700
	Stainless Steel	Shouldering	1DC x 0.5DC	Spindle Revolution (min⁻¹)	5,700	4,800	3,600	2,900	2,400	1,800	1,400
				Feed Rate (mm/min)	620	630	630	640	560	450	390
		Slotting	1DC	Spindle Revolution (min⁻¹)	5,100	4,200	3,200	2,500	2,100	1,600	1,300
				Feed Rate (mm/min)	550	610	570	550	500	400	350
	Titanium Alloys	Shouldering	1DC x 0.3DC	Spindle Revolution (min⁻¹)	3,200	2,700	2,000	1,600	1,300	1,000	800
				Feed Rate (mm/min)	180	190	220	170	170	160	160
		Slotting	0.5DC	Spindle Revolution (min⁻¹)	2,900	2,400	1,800	1,400	1,200	900	700
				Feed Rate (mm/min)	160	170	190	170	170	160	160
	Heat-resistant Alloys	Shouldering	1DC x 0.2DC	Spindle Revolution (min⁻¹)	1,700	1,400	1,000	800	700	500	400
				Feed Rate (mm/min)	70	80	100	80	90	90	80
		Slotting	0.5DC	Spindle Revolution (min⁻¹)	1,400	1,200	900	700	600	400	400
				Feed Rate (mm/min)	60	70	80	80	80	80	70
	Gray Cast Iron	Shouldering	1DC x 0.4DC	Spindle Revolution (min⁻¹)	7,800	6,500	4,900	3,900	3,200	2,400	1,900
				Feed Rate (mm/min)	840	930	1,050	840	820	660	630
		Slotting	1DC	Spindle Revolution (min⁻¹)	7,000	5,800	4,400	3,500	2,900	2,200	1,800
				Feed Rate (mm/min)	760	840	950	760	740	600	570

\* Machining with water soluble coolant is recommended for stainless steel, titanium alloys and heat-resistant alloys.

## 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	
	Tool Steel (< 40HRC) Prehardened Steel	1.5DC x 0.05DC (DC < ø3)	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	
		1.5DC x 0.1DC (ø3 ≤ DC)	Spindle Revolution (min⁻¹)	20,700	20,000	9,900	6,600	5,000	3,300	
			Feed Rate (mm/min)	910	1,750	1,800	2,630	2,650	2,650	
	Heat Treated Steel	45 ~ 55HRC	1.5DC x 0.05DC	Spindle Revolution (min⁻¹)	20,700	16,000	8,000	5,300	4,000	2,700
				Feed Rate (mm/min)	910	1,400	1,400	2,100	2,100	2,100
		55 ~ 60HRC	1.5DC x 0.02DC	Spindle Revolution (min⁻¹)	20,700	12,000	6,000	4,000	3,000	2,000
				Feed Rate (mm/min)	640	730	740	1,100	1,100	1,100
		60 ~ 65HRC	1.5DC x 0.02DC	Spindle Revolution (min⁻¹)	20,700	11,100	5,600	3,700	2,800	1,900
				Feed Rate (mm/min)	550	600	600	880	880	880
		65 ~ 70HRC	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.

## 3AFK (Short)

Workpiece Material	Applications	Depth of Cut (mm) ap x ae	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø7	ø8	ø9	ø10	ø11	ø12	ø16
			Spindle Revolution (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 Alloys	Shouldering	1.5DC x 0.3DC	Spindle Revolution (min⁻¹)	2,400	2,800	3,500	4,200	4,300	4,400	4,500	4,600	4,700	4,700	3,500
	Slotting	1DC	Spindle Revolution (min⁻¹)	1,600	2,000	2,500	3,000	3,100	3,200	3,300	3,400	3,500	3,500	2,200
	Plunge milling	1DC	Spindle Revolution (min⁻¹)	350	350	350	350	350	350	350	350	350	350	350
Workpiece Material	Applications	Depth of Cut (mm) ap x ae	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø7	ø8	ø9	ø10	ø11	ø12	ø16
			Spindle Revolution (min⁻¹)	20,000	19,900	15,900	13,200	11,300	9,900	8,800	7,900	7,200	6,600	4,900
	Aluminum Alloy Casting	1.5DC x 0.3DC	Spindle Revolution (min⁻¹)	2,400	2,500	2,500	2,500	2,600	2,600	2,600	2,600	2,600	2,600	1,900
Aluminum Alloy Casting	Slotting	1DC	Spindle Revolution (min⁻¹)	1,300	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,300
	Plunge milling	1DC	Spindle Revolution (min⁻¹)	300	250	200	200	190	150	150	100	100	80	60

- Water soluble coolant is recommended.
- The cutting conditions should be adjusted based on the overhang of the tool and the machine or workpiece rigidity.
- Spindle revolution and feed rate should be adjusted by the same percentage.
- Pecking may be necessary if chips become clogged while plunge milling.

## 3AFK (Medium)

Workpiece Material	Applications	Depth of Cut (mm) ap x ae	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø7	ø8	ø9	ø10	ø11	ø12	ø16
Spindle Revolution (min⁻¹)	20,000	20,000	19,000	16,000	13,500	12,000	10,500	9,500	8,500	8,000	6,000			



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## Recommended Cutting Conditions (Plunge milling)

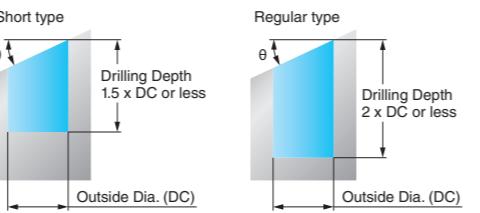
### 2ZDK-HP (Drilling Depth Short type) (Drilling Depth Regular type)

Drilling Depth Short : ap ≤ 1.5DC Regular : ap ≤ 2DC

Workpiece Material	Application	Outside Dia. DC (mm)	ø1	ø1.5	ø2	ø2.5	ø3	ø3.5	ø4	ø4.5	ø5	ø6	ø8	ø10	ø12	ø14	ø16	ø18	ø20
Structural Steel Carbon Steel	Plunge milling	Spindle Revolution (min⁻¹)	20,700	13,800	11,150	9,200	9,100	7,800	6,800	6,100	5,500	4,600	3,500	2,800	2,300	1,800	1,600	1,400	1,300
		Feed Rate (mm/min)	350	350	430	430	520	520	520	520	520	520	520	520	520	480	480	480	480
		Spindle Revolution (min⁻¹)	17,500	11,700	9,600	7,650	7,200	6,200	5,400	4,800	4,400	3,600	2,700	2,200	1,800	1,500	1,350	1,200	1,100
		Feed Rate (mm/min)	290	290	380	380	450	450	450	450	450	450	450	450	450	420	420	420	420
		Spindle Revolution (min⁻¹)	9,600	6,400	5,570	4,460	3,900	3,400	2,900	2,600	2,300	1,900	1,500	1,200	1,000	850	750	650	600
		Feed Rate (mm/min)	120	120	170	170	210	210	210	210	210	210	210	210	210	200	200	200	200
Alloy Steel	Plunge milling	Spindle Revolution (min⁻¹)	15,900	10,600	10,360	8,290	7,200	6,200	5,400	4,800	4,400	3,600	2,700	2,200	1,800	1,550	1,350	1,200	1,100
		Feed Rate (mm/min)	220	250	390	390	390	390	390	390	390	390	390	390	390	360	360	360	360
		Spindle Revolution (min⁻¹)	39,800	26,600	23,000	18,500	17,800	15,200	13,100	11,800	10,500	8,900	6,700	5,400	4,500	3,800	3,400	3,000	2,700
		Feed Rate (mm/min)	900	1,000	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270
		Spindle Revolution (min⁻¹)	29,000	19,200	17,500	14,000	13,100	11,500	10,000	8,800	8,000	6,700	5,000	4,000	3,400	2,900	2,500	2,200	2,000
		Feed Rate (mm/min)	550	550	820	820	820	820	820	820	820	820	820	820	820	820	820	820	820

#### NOT recommended for slotting

- \*This tool is specially designed for plunge milling and NOT recommended for slotting.
- Coolant is recommended.
- Adjust cutting conditions to suit machine rigidity.
- Use chuck and machine with as high rigidity as possible.
- Pecking is recommended when drilling depth is 2D or over.
- Stainless steel machining is NOT recommended.
- Cutting conditions adjustment is required when machining a slant surface, depending on the slant angle. (Ref. to the right figure)  
When workpiece slant angle is 30° or less, reduce the feed rate by 50%.  
When workpiece slant angle is more than 30°, reduce the revolution by 70% and the feed rate by 30%.



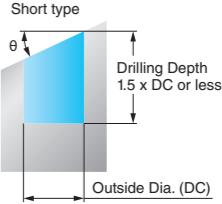
### 2ZDK-HP (Drilling Depth Short type Long shank)

Drilling Depth : ap ≤ 1xD

Workpiece Material	Application	Outside Dia. DC (mm)	ø3	ø3.5	ø4	ø4.5	ø5	ø6	ø8	ø10	ø12
Structural Steel Carbon Steel	Plunge milling	Spindle Revolution (min⁻¹)	10,600	9,100	8,000	7,100	6,400	5,300	4,000	3,200	2,700
		Feed Rate (mm/min)	830	830	830	830	830	830	830	830	830
		Spindle Revolution (min⁻¹)	9,500	8,200	7,200	6,400	5,700	4,800	3,600	2,900	2,400
		Feed Rate (mm/min)	630	630	630	630	630	630	630	630	630
		Spindle Revolution (min⁻¹)	7,400	6,400	5,600	5,000	4,500	3,700	2,800	2,200	1,900
		Feed Rate (mm/min)	365	365	365	365	365	365	365	365	365
Alloy Steel	Plunge milling	Spindle Revolution (min⁻¹)	9,600	8,200	7,200	6,400	5,700	4,800	3,600	2,900	2,400
		Feed Rate (mm/min)	475	475	475	475	475	475	475	475	475
		Spindle Revolution (min⁻¹)	12,700	10,900	9,600	8,500	7,600	6,400	4,800	3,800	3,200
		Feed Rate (mm/min)	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050
		Spindle Revolution (min⁻¹)	9,500	8,200	7,200	6,400	5,700	4,800	3,600	2,900	2,400
		Feed Rate (mm/min)	675	675	675	675	675	675	675	675	675

#### NOT recommended for slotting

- \*This tool is specially designed for plunge milling and NOT recommended for slotting.
- Coolant is recommended.
- Adjust cutting conditions to suit machine rigidity.
- Use chuck and machine with as high rigidity as possible.
- Pecking is recommended when drilling depth is 2D or over.
- Stainless steel machining is NOT recommended.
- Cutting conditions adjustment is required when machining a slant surface, depending on the slant angle. (Ref. to the right figure)  
When workpiece slant angle is 30° or less, reduce the feed rate by 50%.  
When workpiece slant angle is more than 30°, reduce the revolution by 70% and the feed rate by 30%.



### 2ZDK-HP-OH (Drilling Depth Regular type)

Drilling Depth : ap ≤ 3DC

Workpiece Material	Application	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12
Structural Steel Carbon Steel	Plunge milling	Spindle Revolution (min⁻¹)	10,600	7,950	6,350	5,300	3,980	3,180	2,650
		Feed Rate (mm/min)	750	750	750	750	750	750	750
		Spindle Revolution (min⁻¹)	9,550	7,160	5,730	4,770	3,580	2,860	2,390
		Feed Rate (mm/min)	700	680	630	600	600	600	600
		Spindle Revolution (min⁻¹)	5,300	3,980	3,180	2,650	1,990	1,590	1,330
		Feed Rate (mm/min)	300	300	300	300	300	280	280
Alloy Steel	Plunge milling	Spindle Revolution (min⁻¹)	7,430	5,570	5,100	4,240	3,180	2,550	2,120
		Feed Rate (mm/min)	400	400	400	500	500	500	500
		Spindle Revolution (min⁻¹)	9,550	7,160	5,730	4,770	3,580	2,860	2,390
		Feed Rate (mm/min)	580	580	500	500	500	450	450
		Spindle Revolution (min⁻¹)	18,000	13,500	10,800	9,000	6,800	5,400	4,500
		Feed Rate (mm/min)	1,270	1,270	1,270	1,270	1,270	1,270	1,270
Prehardened Steel (30 ~ 45HRC)	Plunge milling	Spindle Revolution (min⁻¹)	13,100	10,000	8,000	6,700	5,000	4,000	3,400
		Feed Rate (mm/min)	900	900	850	850	850	850	850
		Spindle Revolution (min⁻¹)	9,500	8,200	7,200	6,400	5,700	4,800	4,000
		Feed Rate (mm/min)	675	675	675	675			

## Recommended Cutting Conditions (Plunge milling)

2ZDK

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø1	ø2	ø3	ø4	ø5	ø6	ø8
Plunge milling	Structural Steel Carbon Steel	Plunge milling	Spindle Revolution (min <sup>-1</sup> )	19,500	11,200	8,300	6,200	5,000	4,200	3,200
	Alloy Steel		Feed Rate (mm/min)	300	380	520	520	520	520	520
	Prehardened Steel (30 ~ 45HRC)		Spindle Revolution (min <sup>-1</sup> )	19,000	10,000	7,200	5,400	4,400	3,600	2,700
	Nodular Cast Iron		Feed Rate (mm/min)	300	320	450	450	450	450	450
	Aluminum Alloys		Spindle Revolution (min <sup>-1</sup> )	16,000	8,000	3,900	2,900	2,300	1,900	1,500
	Aluminum Alloy Casting		Feed Rate (mm/min)	210	210	210	210	210	210	210
	Structural Steel Carbon Steel		Spindle Revolution (min <sup>-1</sup> )	16,000	10,000	7,200	5,400	4,400	3,600	2,700
	Alloy Steel		Feed Rate (mm/min)	200	300	390	390	390	390	390
	Prehardened Steel (30 ~ 45HRC)		Spindle Revolution (min <sup>-1</sup> )	20,000	20,000	17,800	13,100	10,500	8,900	6,700
	Nodular Cast Iron		Feed Rate (mm/min)	500	850	1,270	1,270	1,270	1,270	1,270

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø10	ø12	ø14	ø16	ø18	ø20
Plunge milling	Structural Steel Carbon Steel	Plunge milling	Spindle Revolution (min <sup>-1</sup> )	2,500	2,100	1,800	1,600	1,400	1,300
	Alloy Steel		Feed Rate (mm/min)	450	450	450	450	450	450
	Prehardened Steel (30 ~ 45HRC)		Spindle Revolution (min <sup>-1</sup> )	2,200	1,800	1,500	1,350	1,200	1,100
	Nodular Cast Iron		Feed Rate (mm/min)	400	400	400	400	400	400
	Aluminum Alloys		Spindle Revolution (min <sup>-1</sup> )	1,200	1,000	850	750	650	600
	Aluminum Alloy Casting		Feed Rate (mm/min)	190	190	190	190	190	190
	Structural Steel Carbon Steel		Spindle Revolution (min <sup>-1</sup> )	2,200	1,800	1,550	1,350	1,200	1,100
	Alloy Steel		Feed Rate (mm/min)	340	340	340	340	340	340
	Prehardened Steel (30 ~ 45HRC)		Spindle Revolution (min <sup>-1</sup> )	5,400	4,500	3,800	3,400	3,000	2,700
	Nodular Cast Iron		Feed Rate (mm/min)	1,270	1,270	1,270	1,270	1,270	1,270

NOT recommended for slotting

\*This tool is specially designed for plunge milling and NOT recommended for slotting.

- Coolant is recommended.
- Adjust cutting conditions to suit machine rigidity.
- Use chuck and machine with as high rigidity as possible.
- Stainless steel machining is NOT recommended.
- Cutting conditions adjustment is required when machining a slant surface, depending on the slant angle. (fig.1)

When workpiece slant angle is 30° or less, reduce the feed rate by 50%.

When workpiece slant angle is more than 30°, reduce the revolution by 70% and the feed rate by 30%.

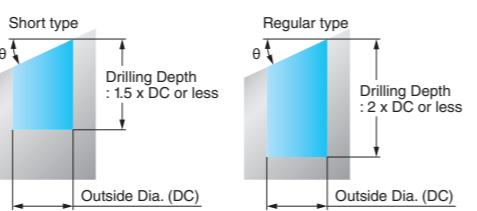


Fig. 1



VALUE AT THE SPINDLE®

2021 Global Product Catalog



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## VALUE AT THE SPINDLE®

KYOCERA SGS Precision Tools (KSPT) is an ISO 9001:2015 Certified manufacturer of industry leading round solid carbide cutting tools. State of the art manufacturing and warehouse facilities have the capacity and processes to meet the quality and delivery demands of customers in all markets around the world. Complete inspections performed within its metallurgical lab and manufacturing quality departments ensure the use of high quality carbide and reliable manufacturing consistency regardless of when a cutting tool is produced.

KSPT is proud to have pioneered some of the world's most advanced cutting technologies due to rigorous testing of tools, coatings, and materials within its Global Innovation Center. It is this commitment to innovation that has launched patented products and technologies like the Z-Carb with its variable geometry and cutting edge preparation, Series 43 APR® and APF® ultra high performance aluminum cutting tools, and the JetStream coolant technology.

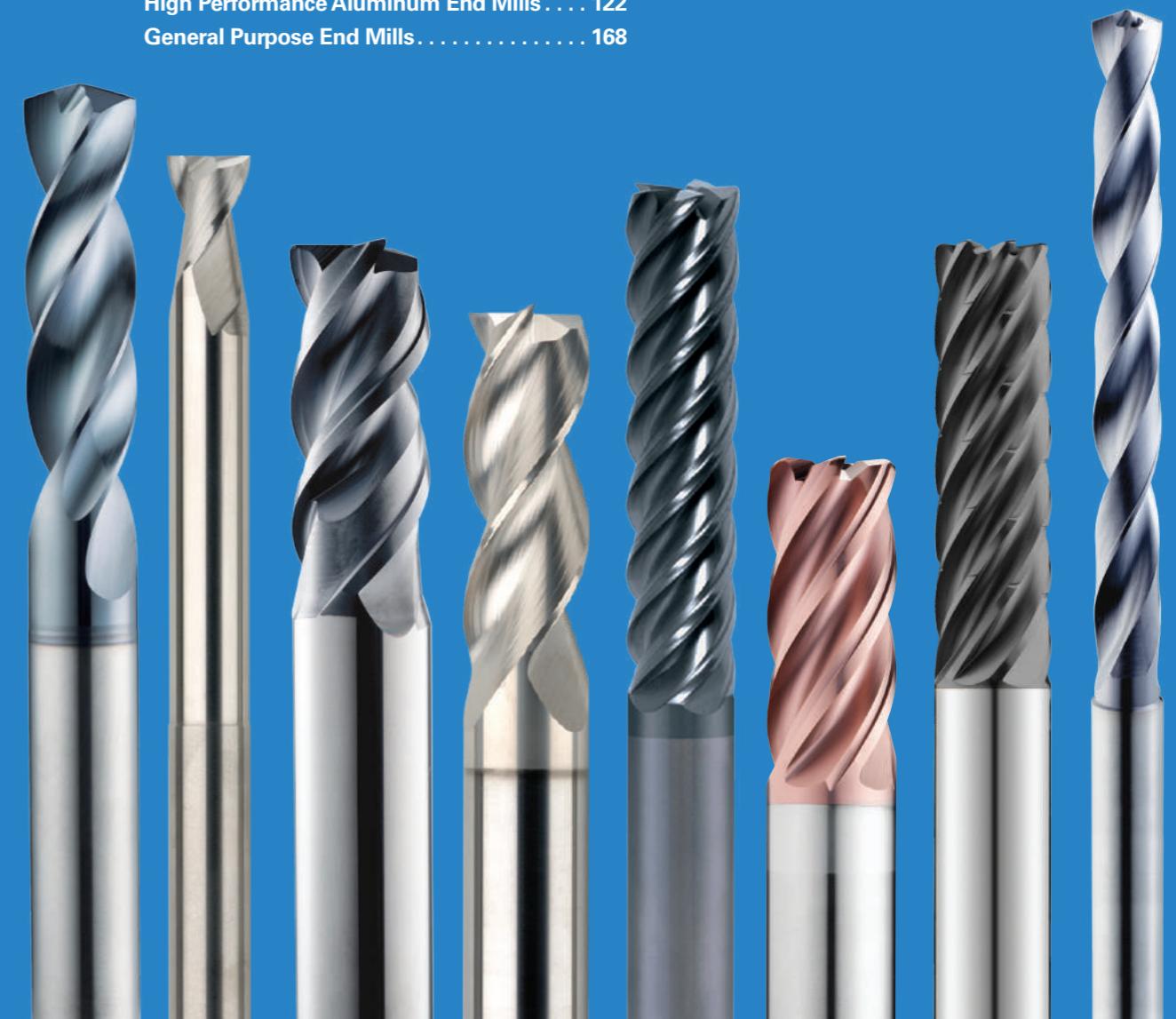
SGS has become an important part of the KYOCERA Precision Tools family, and while the name has changed, one thing has not. Its dedicated people and their relentless commitment to the customer. KSPT Technical Sales Engineers, Application Specialists, and Distribution Partners blanket the globe, delivering reliable service and support to all market segments. It is these people and products that drive innovative application strategies and cutting tool technologies into the end user, continually exceeding expectations and providing the most Value at the Spindle®.



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## VALUE AT THE SPINDLE®



### MORE THAN JUST ANOTHER CUTTING TOOL SUPPLIER

#### KYOCERA SGS PRECISION TOOLS EUROPE, LTD.

The state of the art KYOCERA SGS Precision Tools Europe facility is located in Wokingham, England and is focused on the manufacture of special cutting tools, high accuracy form tools, tool modifications and regrinds. A highly skilled team of professionals specialize in the supply and support of high performance tools for the Aerospace, Medical, Power Generation and Motorsport markets.



#### KYOCERA SGS Precision Tools Europe also offers a full range of end mill and drill products as follows:

- Multi-Million Euro Warehouse Stocking Full Range of Catalog Products
- Same Day Shipment on Stock Items
- Multi-Lingual Sales and Technical Support
- Online Portal for Stock Availability, Pricing, Discount Information and 24-Hour Order Placement
- High Performance Product and Application Training, Including the New KYOCERA SGSTool Clinic

#### Additional services provided at this facility include:

- A Fast Track for Special Tools Via Our Rapid Response Centre
- Product Research and Development
- Product Engineering and Tool Application Support
- CAD/CAM Software Support



### GLOBAL INNOVATION CENTER

#### INNOVATIVE CUTTING TOOL TECHNOLOGIES

The Global Innovation Center is an environment conducive to innovation. Through testing and development, the dedicated KYOCERA SGS Precision Tools Team focuses on the latest technical competence and machining techniques to bring a continuous stream of new products and advancements to market.

- Cutting Edge Equipment
- Highly Engineered Technology
- Incorporation of innovative machine tool technology for Research and Development

#### TECHNICAL TRAINING & EDUCATION

Our knowledge-based selling programs are specifically designed to challenge and educate by facilitating programs that mix classroom presentation with hands-on experience. Our own KSPT team members go through the same core training we provide to our valued distribution partners.

- KSPT Campus Tool Clinics
- On-Site Customer Training
- Basic, Advanced and Expert Level Material
- Market-Driven Knowledge

#### APPLICATION ENGINEERING

The KSPT expertise and global market knowledge allows us to translate customer needs into a commercial sales strategy. The portfolio of KSPT products and services offer an unparalleled track record in performance, cost savings, quality and value at the spindle.

- Market-Driven Productivity Improvements, including the Z-Carb HPR and S-Carb APR/APF®
- Tooling Solutions which include development of new tool geometries, extreme lab testing parameters and extensive field testing
- Technical Support and Troubleshooting
- Research and Development



## TOOLING SERVICES

KSPT is committed to providing superior tooling services in the areas of Reconditioning, Recoating, Regrinding, Specials and Alterations. These services are offered to provide unique solutions and enhanced tool life with involvement from the KSPT Technical Support Team.

KSPT proudly offers Tooling Services in North America and Europe.



## KSPT TOOLING SERVICES FACILITIES

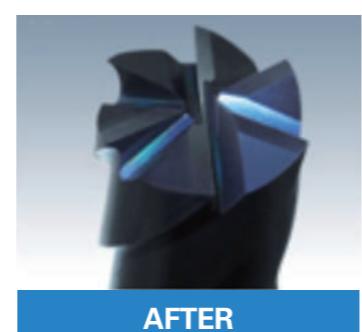
### UNITED STATES OF AMERICA KSPT

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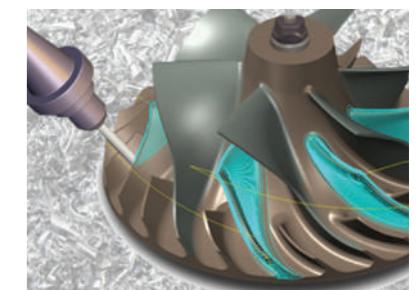
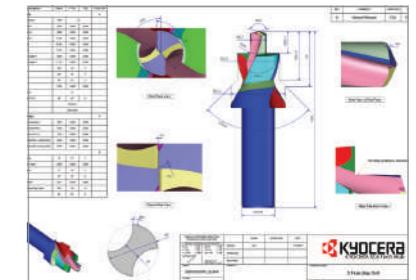
## KYOCERA SGS Tech Hub LLC

The KYOCERA SGS Tech Hub (KSTH) is an independent subsidiary of KYOCERA SGS Precision Tools Inc. created to focus on custom high-performance cutting tool solutions, while exploring emerging technologies. The state-of-the-art custom facility is designed with the purpose and resources to provide MORE than a cutting tool. KSTH provides a complete scope of services and works with customers to tailor solutions from conception to application and beyond.

## SPECIAL CUTTING TOOL SOLUTIONS

KSTH considers each opportunity as a priority project and understands the challenges special tailored tooling present to our end users. Our sole focus is supporting a culture required for applying custom solutions yielding a return on investment with our technical expertise, close collaboration and effective communication. Besides KSTH providing quotation requests within a 24-hour period, we also offer:

- Aggressive Deliveries
- Improved Value Proposition
- Global Resources and Technology
- Full Project Proposal and Management
- Detailed Drawings
- Solid Models
- Process Plans
- Cutting Strategies and Simulations
- Quality Assurance Documentation (ISO 9001:2015 Certified)
- Testing and Validation
- Onsite Application and Optimization Support
- Cradle to Grave Product Support
- Constant Access to KSTH Staff



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web: www.kyocera-techhub.com





KYOCERA SGS Precision Tools  
Medical Division

## WHO WE ARE

With over 20 years of industry experience, KSPT Medical produces unique, customer designed orthopedic devices using highly trained engineers dedicated to new technology. KSPT Medical is a division of KYOCERA SGS Precision Tools, who proudly pioneered some of the world's most advanced metal cutting technology and sells to more than 60 countries. With over 20 years of industry experience, KSPT Medical Division is ISO 13485:2016 Certified and is FDA Registered in the production of medical devices in the orthopedic marketplace.

## ENGINEERING

We approach each opportunity as a project and manage it as such. We pride ourselves on engineering each project to the specific needs of our customers. Providing quotes often within 24 hours and following through with detailed drawings, solid models, process plans, and program simulations if needed. Our goal is to work hand in hand with the end user and maintain constant communication to customize our support to their needs.

## MACHINING CAPABILITIES

- GRINDING
- MILLING
- TURNING
- PROFILING
- BENDING
- Services Offered; Welding, Various Coatings, Anodizing, Passivation, Electropolishing, Laser Etching and HeatTreating



KYOCERA SGS  
Precision Tools Medical Division  
724 East Swihart Street  
Columbia City, Indiana 46725  
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**Leyenda habitual**  
**Légende commune**  
**Gemeinsame Legende**

<b>TO ORDER:</b> Please specify quantity and EDP number.
<b>PARA SU PEDIDO:</b> Por favor especifique cantidad y número de EDP.
<b>POUR COMMANDER:</b> Veuillez préciser la quantité et le code article EDP.
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<b>RETURN POLICY:</b> An RMA number must accompany all product returns. Contact your Customer Service Representative for an RMA number.
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<b>POLITIQUE DE RETOUR:</b> Tous les produits retournés doivent être accompagnés d'un numéro RMA. Contacter votre interlocuteur commercial pour obtenir un numéro RMA.
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REGULATION SAFETY GLASSES SHOULD ALWAYS BE WORN WHEN  
USING HIGH-SPEED CUTTING EQUIPMENT



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DES LUNETTES DE SÉCURITE DOIVENT ÊTRE IMPÉRATIVEMENT  
PORTÉES LORS D'UTILISATION D'OUTILS À GRANDE VITESSE

BEI SCHNELLLAUFENDEN SPANABHEBENDEN MASCHINEN MÜSSEN IMMER  
DIE VORGESCHRIEBENEN SICHERHEITSBRILLEN GETRAGEN WERDEN

**WARNING:** This product can expose you to chemicals including Cobalt, which is known to the State of California to cause cancer. For more information go to [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov)

**ADVERTENCIA:** Este producto puede exponerlo a químicos como el Cobalto, reconocido como cancerígeno en el estado de California. Para mas información visite esta pagina web: [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov)

**ATTENTION:** Ce produit vous expose aux produits chimiques incluant le Cobalt, qui est reconnu par l'Etat de Californie à être une cause de cancer. Pour plus d'information veuillez regarder sur: [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov)

**WARNUNG:** Dieses Produkt kann Sie mit Chemikalien wie Kobalt aussetzen, das dem Staat Kalifornien als krebserregend bekannt ist. Für weitere Informationen, besuchen Sie: [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov)

**INTELLECTUAL PROPERTY**  
**PROPIEDAD INTELECTUAL**  
**PROPRIÉTÉ INTELLECTUELLE**  
**GEISTIGES EIGENTUM**

KYOCERA SGS Precision Tools holds more than 20 patents globally. Please visit our website at [www.kyocera-sgstool.com](http://www.kyocera-sgstool.com) to learn more.

KYOCERA SGS Precision Tools posee más de 20 patentes a nivel mundial. Para más información, visite nuestra página web [www.kyocera-sgstool.com](http://www.kyocera-sgstool.com).

KYOCERA SGS Precision Tools possède plus de 20 brevets mondialement reconnus. Pour plus d'information, veuillez consulter notre site web [www.kyocera-sgstool.com](http://www.kyocera-sgstool.com).

KYOCERA SGS Precision Tools besitzt mehr als 20 Patente weltweit. Bitte besuchen Sie unsere Webseite [www.kyocera-sgstool.com](http://www.kyocera-sgstool.com) für weitere Informationen.

**Common Legend**  
**Leyenda habitual**  
**Légende commune**  
**Gemeinsame Legende**

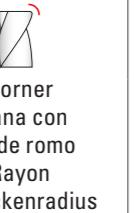
MATERIALS MATERIALES MATÉRIAUX WERKSTOFFE	Steels Aceros Aciers Stähle	Stainless Steels Aceros Inoxidables Aciers inoxydables Nichrostende Stähle	Cast Iron Acero de Fundición Fonte Grauguss	High Temp Alloys Aleaciones Termorresistentes Alliages hautes températures Warmfeste Legierungen
Titanium Titánio Titane Titan	Non-Ferrous No Férricos Non Ferreux Nichteisenmetalle	Plastics/Composites Plásticos/Resinas Plastiques/Composites Kunststoffe/Verbundkunststoffe	Hardened Steels Aceros Endurecidos Aciers Trempés Gehärteter Stahl	

TOOL LENGTH LONGITUDES DE HERRAMIENTAS LONGUEUR DE L'OUTIL WERKZEUGLÄNGE	Stub Corta Court Kurze Bauform	Regular Media Moyen Standard	Long Larga Long Lang	Long Reach Neck Larga con cuello Détalonnage longue portée Freischliff	Extra Long Extra-larga Extra-long Extra-Lang

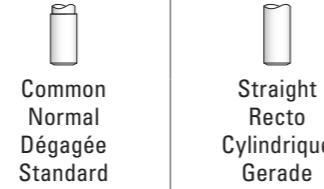
FLUTES FILOS DENTS SCHNEIDEN	2 2 Flutes 2 Filos 2 Dents 2 Schneiden	3 3 Flutes 3 Filos 3 Dents 3 Schneiden	4 4 Flutes 4 Filos 4 Dents 4 Schneiden	5 5 Flutes 5 Filos 5 Dents 5 Schneiden	6 6 Flutes 6 Filos 6 Dents 6 Schneiden	7 7 Flutes 7 Filos 7 Dents 7 Schneiden

**End Mill Legend**  
**Leyenda fresas**  
**Légende fraise**  
**Fräser-Legende**

**END CONFIGURATIONS**  
**CONFIGURACIONES DE LA PUNTA**  
**FORME DE L'OUTIL EN BOUT**  
**ENDENAUSFÜHRUNG**



**SHANK TYPE**  
**TIPO DE VÁSTAGO**  
**TYPE DE TIGE**  
**SCHAFTART**



**SHANK TYPE**  
**TIPO DE VÁSTAGO**  
**TYPE DE TIGE**  
**SCHAFTART**



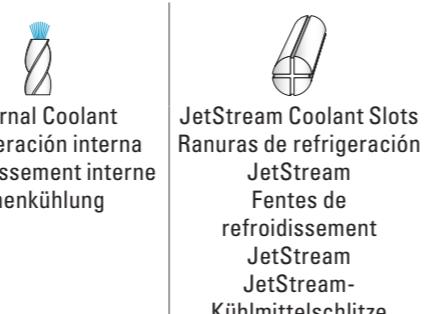
**REACH**  
**ALCANCE**  
**LONGUEUR**  
**NUTZLÄNGE**



**HELIX ANGLES**  
**ANGULOS DE LAS HELICES**  
**SPANWINKEL**  
**ANGLES DE L'HÉLICE**



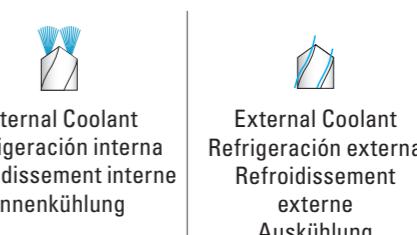
**COOLANT OPTIONS**  
**OPCIONES DE REFRIGERACIÓN**  
**OPTIONS DE REFROIDISSEMENT**  
**KÜHLSCHMIERMITTEL-OPTIONEN**



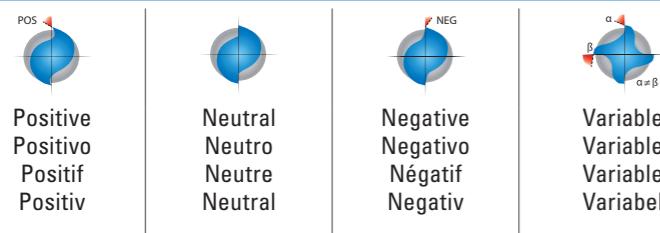
**HELIX ANGLES**  
**ANGULOS DE LAS HELICES**  
**ANGLES DE L'HÉLICE**  
**SPANWINKEL**



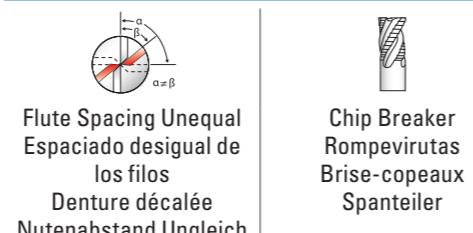
**COOLANT OPTIONS**  
**OPCIONES DE REFRIGERACIÓN**  
**OPTIONS DE REFROIDISSEMENT**  
**KÜHLSCHMIERMITTTEL-OPTIONEN**



**RAKE ANGLE**  
**ANGULO DE DESPRENDIMIENTO**  
**ANGLE DE COUPE**  
**SPANWINKEL**



**ADDITIONAL GEOMETRY**  
**GEOMETRÍAS ADICIONALES**  
**GÉOMÉTRIE SUPPLÉMENTAIRE**  
**WEITERE BAUFORMEN**



**POINT ANGLE**  
**ANGULO DE PUNTA**  
**POINT D'ANGLE**  
**SPITZENWINKEL**



**CHAMFER ANGLE**  
**ÁNGULO DE CHAFLÁN**  
**ANGLE DE CHANFREIN**  
**FASENWINKEL**



All tools are in Right Cut Direction unless noted

Todas las herramientas son con corte a la derecha a menos que se indique lo contrario

Tous les outils ont une coupe à droite, sauf indications contraires

Alle Werkzeuge sind rechtsschneidend, soweit nicht anders angegeben

**Drill Legend**  
**Leyenda brocas**  
**Légende perçage**  
**Bohrer-Legende**

**REACH**  
**ALCANCE**  
**LONGUEUR**  
**NUTZLÄNGE**



# Router Legend

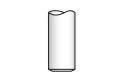
## Leyenda ranuradores

## Légende détourage

## Konturenfräser-Legende

**SHANK TYPE**  
**TIPO DE VÁSTAGO**  
**TYPE DE TIGE**  
**SCHAFTART**

**RAKE ANGLE**  
**ANGULO DE DESPRENDIMIENTO**  
**ANGLE DE PENTE**  
**SPANWINKEL**



Straight  
Recto  
Cylindrique  
Gerade



Positive  
Positivo  
Positif  
Positiv



Neutral  
Neutro  
Neutre  
Neutral



Negative  
Negativo  
Négatif  
Negativ



Variable  
Variable  
Variable  
Variabel

**HELIX ANGLES**  
**ANGULOS DE LAS HELICES**  
**ANGLES DE L'HÉLICE**  
**SPANWINKEL**



Right Spiral  
Hélice con corte  
a la derecha  
Hélice à droite  
Rechtsspirale



Left Spiral  
Hélice con corte  
a la izquierda  
Hélice à gauche  
Linksspirale

**ADDITIONAL GEOMETRY**  
**GEOMETRÍAS ADICIONALES**  
**GÉOMÉTRIE SUPPLÉMENTAIRE**  
**WEITERE BAUFORMEN**



Left Hand Cut  
Direction  
Fresado sentido  
izquierdo  
Coupe vers la  
gauche  
Rechtsschneidend



Right Hand Cut  
Direction  
Fresado sentido  
derecha  
Coupe vers la  
droite  
Linksschneidend



Chip Breaker  
Rompevirutas  
Brise-coopeaux  
Spanbrecher



Drill Point  
Angulo de la Punta  
Point de perçage  
Bohrspitze

**SGS**  
Solid Carbide Tools

Ti-NAMITE® and Di-NAMITE® Tool Coatings are specifically engineered for KSPT solid carbide rotary tools. The coating lineup includes proprietary processes that result in optimized tool life and increased speed and feed rates in a variety of applications.



	Coating	Identifying Color	Layer Structure	Thickness	Hardness (HV)	Coefficient of Friction (Fretting)	Thermal Stability	General Information
<b>TI-NAMITE</b>	Titanium Nitride (TiN)	gold	Multilayer	1–5 microns	2200	0.40–0.65	600°C / 1112°F	A general purpose coating with good adhesion and abrasion resistant properties. Suitable for a wide variety of materials.
<b>TI-NAMITE-A</b>	Aluminum Titanium Nitride (AlTiN)	dark grey	Nano structure	1–5 microns	3700	0.30	1100°C / 2010°F	Excellent thermal and chemical resistance allows for dry cutting and improvements in performance of carbide. The coating has a high hardness giving great protection against abrasive wear and erosion.
<b>TI-NAMITE-B</b>	Titanium DiBoride (TiB <sub>2</sub> )	light grey-silver	Monolayer	1–2 microns	4000	0.10–0.20	850°C / 1562°F	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.
<b>TI-NAMITE-C</b>	Titanium Carbonitride (TiCN)	pink-red	Multilayer	1–5 microns	3000	0.30–0.45	400°C / 752°F	A very wear resistant coating with high toughness and shock resistance. Good in interrupted cuts found in applications like milling.
<b>TI-NAMITE-X</b>	Proprietary (TX)	black	Nano Composite	1–5 microns	3600	0.45	1150°C / 2100°F	The structural design of Ti-Namite-X is adapted to meet a diverse range of applications; everything from high- and low-alloy steels to hardened materials (up to 65 HRC core hardness). Ti-Namite-X is suitable for operations which require high cutting speeds, high temperatures at the cutting edge, and high metal removal rates.
<b>DI-NAMITE</b>	Crystalline Diamond (Diamond)	black	Monolayer	6–20 microns	>8000	0.15–0.20	800°C / 1470°F	This is the hardest coating available with the best abrasion resistance. It is carbon based so it is limited in application capabilities. This coating is suitable for machining highly abrasive, non-ferrous materials such as CFRP and graphite.
<b>TI-NAMITE-M</b>	Proprietary (TM)	copper	Nano Composite	1–5 microns	3600	0.45	1150°C / 2100°F	Features include high wear resistance, reduced friction, and excellent prevention of edge build up. This coating provides superior material removal rates and tool life when used in high performance operations with difficult to machine materials like titanium.

Other coatings available upon request.

**VALUE AT THE SPINDLE<sup>®</sup>**
**High Performance End Mills**

 **Milling**

Please put "S" at the beginning of all page numbers below.

HIGH PERFORMANCE END MILLS	SERIES	DESCRIPTION	PAGE
Z-Carb-HPR	Z5	5 Flute Rougher Square End Fractional	28
	Z5CR	5 Flute Rougher Corner Radius Fractional	28
	Z5MCR	5 Flute Rougher Corner Radius Metric	35
Z-Carb-AP	Z1PCR	4 Flute Variable Rake Corner Radius Fractional	39
	Z1PLC	4 Flute Variable Rake Long Reach Corner Radius Fractional	41
	Z1PLB	4 Flute Variable Rake Ball End Long Reach Fractional	42
	Z1MPCR	4 Flute Variable Rake Corner Radius Metric	45
	Z1MPIC	4 Flute Variable Rake Intermediate Reach Corner Radius Metric	46
	Z1MPLC	4 Flute Variable Rake Long Reach Corner Radius Metric	46
Z-Carb	Z1	4 Flute Variable Geometry Square End Fractional	49
	Z16CR	4 Flute Variable Geometry Corner Radius Fractional	49
	Z1B	4 Flute Variable Geometry Ball End Fractional	50
	Z1M	4 Flute Variable Geometry Square End Metric	53
	Z1MB	4 Flute Variable Geometry Ball End Metric	54
Z-Carb-HTA	ZH1CR	4 Flute Variable Geometry High Temp Alloys Corner Radius Fractional	57
	ZH1MCR	4 Flute Variable Geometry High Temp Alloys Corner Radius Metric	59
	ZH1MCRS	4 Flute Variable Geometry High Temp Alloys Stub Corner Radius Metric	59
Z-Carb-MD	ZD1CR	4 Flute Variable Geometry Hard Materials Long Reach Corner Radius Fractional	61
	ZD1MCR	4 Flute Variable Geometry Hard Materials Long Reach Corner Radius Metric	61
V-Carb	55	5 Flute Finisher & Semi-Finisher Square End Fractional	63
	55CR	5 Flute Finisher & Semi-Finisher Corner Radius Fractional	63
	55M	5 Flute Finisher & Semi-Finisher Square End Metric	65
	55MCR	5 Flute Finisher & Semi-Finisher Corner Radius Metric	65
	55B	5 Flute Finisher & Semi-Finisher Ball End Fractional	68
	55MB	5 Flute Finisher & Semi-Finisher Ball End Metric	68
T-Carb <sup>®</sup>	51	6 Flute High Speed Machining Square End Fractional	74
	51CR	6 Flute High Speed Machining Corner Radius Fractional	74
	51L	6 Flute High Speed Machining Square End Long Reach Fractional	75
	51LC	6 Flute High Speed Machining Long Reach Corner Radius Fractional	75
	51M	6 Flute High Speed Machining Square End Metric	78
	51MCR	6 Flute High Speed Machining Corner Radius Metric	78
	51ML	6 Flute High Speed Machining Square End Long Reach Metric	79
	51MLC	6 Flute High Speed Machining Long Reach Corner Radius Metric	79

*Speed & Feed Recommendations listed after each series*



Please put "S" at the beginning of all page numbers below.

Please put "S" at the beginning of all page numbers below.

HIGH PERFORMANCE END MILLS	SERIES	DESCRIPTION	PAGE
H-Carb	77	7 Flute High Efficiency Square End Fractional	82
	77CR	7 Flute High Efficiency Corner Radius Fractional	82
	77M	7 Flute High Efficiency Square End Metric	84
	77MCR	7 Flute High Efficiency Corner Radius Metric	84
Multi-Carb	66	Multi-Flute Finisher Square End Fractional	90
	66CR	Multi-Flute Finisher Corner Radius Fractional	90
	66M	Multi-Flute Finisher Square End Metric	93
	66MCR	Multi-Flute Finisher Corner Radius Metric	93
Series 33	33CR	3 Flute Difficult to Machine Materials Corner Radius Fractional	97
	33MCR	3 Flute Difficult to Machine Materials Corner Radius Metric	100
Series 7	7	4 Flute Variable Geometry Long Length Square End Fractional	103
	7M	4 Flute Variable Geometry Long Length Square End Metric	103
	7B	4 Flute Variable Geometry Long Length Ball End Fractional	104
	7MB	4 Flute Variable Geometry Long Length Ball End Metric	104
Turbo-Carb	56B	2 Flute Contouring Long Reach Ball End Fractional	107
	56MB	2 Flute Contouring Long Reach Ball End Metric	107
Power-Carb®	57	6 Flute Finisher Square End Fractional	110
	57M	6 Flute Finisher Square End Metric	110
CFRP Slow Helix	27	4 Flute Slow Helix Square End Fractional	113
	27M	4 Flute Slow Helix Square End Metric	113
Picatinny Rail Tools	3	3 Flute Non-Ferrous Recoil Groove Tool Groove Fractional	116
	5	5 Flute Non-Ferrous Dovetail Form Tool Fractional	116
	3	3 Flute Ferrous Recoil Groove Tool Fractional	117
	5	5 Flute Ferrous Dovetail Form Tool Fractional	117
<i>Speed &amp; Feed Recommendations listed after each series</i>			

FRESAS DE ALTO RENDIMIENTO	SERIE	DESCRIPCIÓN	PÁGINA
Z-Carb-HPR	Z5	5 filos, desbastador, punta cuadrada, fraccional	28
	Z5CR	5 filos, desbastador, radio angulado, fraccional	28
	Z5MCR	5 filos, desbastador, radio angulado, métrico	35
	Z1PCR	4 filos, inclinación variable, radio angulado, fraccional	39
Z-Carb-AP	Z1PLC	4 filos, inclinación variable, largo alcance, radio angulado, fraccional	41
	Z1PLB	4 filos, inclinación variable, punta esférica, largo alcance, fraccional	42
	Z1MPCR	4 filos, inclinación variable, radio angulado, métrico	45
	Z1MPIC	4 filos, inclinación variable, medio alcance, radio angulado, métrico	46
Z-Carb	Z1MPLC	4 filos, inclinación variable, largo alcance, radio angulado, métrico	46
	Z1	4 filos, geometría variable, punta cuadrada, fraccional	49
	Z16CR	4 filos, geometría variable, radio angulado, fraccional	49
	Z1B	4 filos, geometría variable, punta esférica, fraccional	50
Z-Carb-HTA	Z1M	4 filos, geometría variable, punta cuadrada, métrico	53
	Z1MB	4 filos, geometría variable, punta esférica, métrico	54
	ZH1CR	4 filos, geometría variable, aleaciones termorresistentes, radio angulado, fraccional	57
	ZH1MCR	4 filos, geometría variable, aleaciones termorresistentes, radio angulado, métrico	59
Z-Carb-MD	ZH1MCRS	4 filos, geometría variable, aleaciones termorresistentes, versión corta, radio angulado, métrico	59
	ZD1CR	4 filos, geometría variable, materiales duros, largo alcance, radio angulado, fraccional	61
	ZD1MCR	4 filos, geometría variable, materiales duros, largo alcance, radio angulado, métrico	61
	V-Carb	55	63
T-Carb®	55CR	5 filos, acabador y semiacabador, punta cuadrada, fraccional	63
	55M	5 filos, acabador y semiacabador, punta cuadrada, métrico	65
	55MCR	5 filos, acabador y semiacabador, radio angulado, métrico	65
	55B	5 filos, acabador y semiacabador, punta esférica, fraccional	68
H-Carb	55MB	5 filos, acabador y semiacabador, punta esférica, métrico	68
	51	6 filos, mecanizado de alta velocidad, punta cuadrada, fraccional	74
	51CR	6 filos mecanizado de alta velocidad, radio angulado, fraccional	74
	51L	6 filos mecanizado de alta velocidad, punta cuadrada, largo alcance, fraccional	75
Multi-Carb	51LC	6 filos mecanizado de alta velocidad, largo alcance, radio angulado, fraccional	75
	51M	6 filos, mecanizado de alta velocidad, punta cuadrada, métrico	78
	51MCR	6 filos mecanizado de alta velocidad, radio angulado, métrico	78
	51ML	6 filos, mecanizado de alta velocidad, punta cuadrada, largo alcance, métrico	79
Serie 33	51MLC	6 filos mecanizado de alta velocidad, largo alcance, radio angulado, métrico	79
	77	7 filos de alta eficiencia, punta cuadrada, fraccional	82
	77CR	7 filos de alta eficiencia, radio angulado, fraccional	82
	77M	7 filos métrica de alta eficiencia, punta cuadrada, métrico	84
Serie 7	77MCR	7 filos métrica de alta eficiencia, radio angulado, métrico	84
	66	Filo múltiple, acabador, punta cuadrada, fraccional	90
	66CR	Filo múltiple, acabador, radio angulado, fraccional	90
	66M	Filo múltiple, acabador, punta cuadrada, métrico	93
Turbo-Carb	66MCR	Filo múltiple, acabador, radio angulado, métrico	93
	33CR	3 filos, materiales difíciles de mecanizar, radio angulado, fraccional	97
	33MCR	3 filos, materiales difíciles de mecanizar, radio angulado, métrico	100
	7	4 filos, geometría variable, longitud larga, punta cuadrada, fraccional	103
Power-Carb®	7M	4 filos, geometría variable, longitud larga, punta cuadrada, métrico	103
	7B	4 filos, geometría variable, longitud larga, punta esférica, fraccional	104
	7MB	4 filos, geometría variable, longitud larga, punta esférica, métrico	104
	56B	2 filos, contorneado, largo alcance, punta esférica, fraccional	107
Helicoidal de avance lento CFRP	56MB	2 filos, contorneado, largo alcance, punta esférica, métrico	107
	57	6 filos, acabador, punta cuadrada, fraccional	110
	57M	6 filos, acabador, punta cuadrada, métrico	110
	27	4 filos, helicoidal de avance lento, punta cuadrada, fraccional	113
Herramientas de riel Picatinny	27M	4 filos, helicoidal de avance lento, punta cuadrada, métrico	113
	Herramienta de ranura de retroceso no ferrosa de 3 filos fraccional	Herramienta de ranura de retroceso no ferrosa de 3 filos fraccional	116
	Herramienta de forma de cola de milano no ferrosa de 5 filos fraccional	Herramienta de forma de cola de milano no ferrosa de 5 filos fraccional	116
	Herramienta de cola de milano ferrosa de 5 filos fraccional	Herramienta de cola de milano ferrosa de 5 filos fraccional	117

*Recomendaciones de velocidades y avances mostradas tras cada serie*

# Fraisage

Please put "S" at the beginning of all page numbers below.

FRAISES A DETOURER UNIVERSELLES	SÉRIES	DESCRIPTION	PAGE
Z-Carb-HPR	Z5	5 dents non rayonné pour l'ébauche (fractionnel)	28
	Z5CR	5 dents rayonnée pour l'ébauche (fractionnel)	28
	Z5MCR	5 dents rayonnée pour l'ébauche (métrique)	35
Z-Carb-AP	Z1PCR	4 dents pas décalé et hélice variable rayonnés (fractionnel)	39
	Z1PLC	4 dents pas décalé et hélice variable rayonnés (fractionnel)	41
	Z1PLB	4 dents à vague de coupe variable longue portée à bout hémisphérique (fractionnel)	42
	Z1MPCR	4 dents pas décalé et hélice variable rayonnés (métrique)	45
	Z1MPIC	4 dents pas décalé, hélice variable, détalonné, rayonnés (métrique)	46
	Z1MPLC	4 dents pas décalé et hélice variable rayonnés (métrique)	46
Z-Carb	Z1	4 dents géométrie variable non rayonné (fractionnel)	49
	Z16CR	4 dents géométrie variable rayonné (fractionnel)	49
	Z1B	4 dents géométrie variable à bout hémisphérique (fractionnel)	50
	Z1M	4 dents géométrie variable non rayonné (métrique)	53
	Z1MB	4 dents géométrie variable à bout hémisphérique (métrique)	54
Z-Carb-HTA	ZH1CR	4 dents géométrie variable alliages haute température rayonné (fractionnel)	57
	ZH1MCR	4 dents géométrie variable alliages haute température rayonné (métrique)	59
	ZH1MCRS	4 dents géométrie variable, alliages haute température, longueur de l'outil court, rayonné (métrique)	59
Z-Carb-MD	ZD1CR	4 dents géométrie variable matériaux durs longue portée rayonné (fractionnel)	61
	ZD1MCR	4 dents géométrie variable matériaux durs longue portée rayonné (métrique)	61
V-Carb	55	5 dents en bout de finition et semi-finition plat (fractionnel)	63
	55CR	5 dents en bout de finition et semi-finition rayonné (fractionnel)	63
	55M	5 dents en bout de finition et semi-finition plat (métrique)	65
	55MCR	5 dents en bout de finition et semi-finition rayonné (métrique)	65
	55B	5 dents en bout de finition et semi-finition hémisphérique (fractionnel)	68
	55MB	5 dents en bout de finition et semi-finition hémisphérique (métrique)	68
T-Carb®	51	6 dents pour usinage grande vitesse non rayonné (fractionnel)	74
	51CR	6 dents pour usinage grande vitesse rayonné (fractionnel)	74
	51L	6 dents pour usinage grande vitesse non rayonné extra longue (fractionnel)	75
	51LC	6 dents pour usinage grande vitesse extra longue rayonné (fractionnel)	75
	51M	6 dents pour usinage grande vitesse non rayonné (métrique)	78
	51MCR	6 dents pour usinage grande vitesse rayonné (métrique)	78
	51ML	6 dents pour usinage grande vitesse non rayonné extra longue (métrique)	79
	51MLC	6 dents pour usinage grande vitesse extra longue rayonné (métrique)	79
H-Carb	77	7 dents hautes performances droite côtes (fractionnel)	82
	77CR	7 dents hautes performances torique côtes (fractionnel)	82
	77M	7 dents hautes performances droite côtes (métrique)	84
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Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

# End Mill Matrix

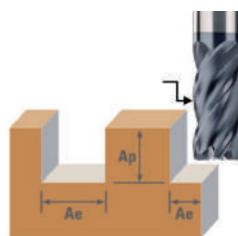
Please put "S" at the beginning of all page numbers below.

# End Mill Matrix

SGS End Mill Matrix				Preferred Cut Type for Series					Toolpath Preference* 1st 2nd	Flute Count												
Name	Series	Page	Material	Heavy	Moderate	Light	Fine	Finish			Cut Diameter Range inch mm	Cut Length Availability (x DC)**	Reach Option (x DC)**	End Styles Square Radius Ball	Chipbreaker Option	Shank Option Solid Round, Weldon Flat, Jet Stream, Coolant Hole	Center Cutting	Maximum Recommended Ramp Angle ***	Helix Angle	Flute Index	Coating	
Series 33	33	97	Steel P0 to P6 Stainless Steel M1 to M3 Cast Iron K1 to K3 High Temp Alloy S1 to S3 Titanium Alloy S4 Hardened Steel H1 to H4 Non Ferrous N1 to N4 Non Ferrous N5 to N7	•••	•••	••	••	•	Standard HEM	3	0.125 to 1.3 to 20	2.25 to 3	—	R	By Request	SR, WF	Yes	90	32 / 48	Unequal	Ti-Nomite-A	
Z-Carb	Z1	49		•••	•••	••	••	•	Standard HEM	4	0.125 to 1.3 to 25	1.25 to 3	—	R, B	By Request	SR, WF, JS	Yes	90	35 / 38	Unequal	Ti-Nomite-A	
Z-Carb-AP	Z1P	39		•••	•••	••	••	•	Standard HEM	4	0.0156 to 1.1 to 25	1 to 3.25	2.5 to 8.5	S, R, B	By Request	SR, WF, JS	Yes	90	35 / 38	Unequal	Ti-Nomite-X	
Z-Carb-HTA	ZH1	57		•••	•••	••	••	•	Standard HEM	4	0.250 to 1.6 to 20	1.25 to 3	—	R	By Request	SR, WF	Yes	20	38 / 41	Unequal	Ti-Nomite-A	
Series 7	7	103		•	•	•	•••	•••	HEM Standard	4	0.125 to 1.3 to 25	2.25 to 8.25	—	S, B	By Request	SR	Yes	1	38	Unequal	Ti-Nomite-A	
Z-Carb HPR	Z5	28		••	•••	•••	••	•	HEM Standard	5	0.125 - 1.6 - 25	1 to 3	—	S, R	By Request	SR, WF, CH	No	7	37	Unequal	Ti-Nomite-M Ti-Nomite-A	
V-Carb	55	63		•	••	•••	•••	•••	HEM Standard	5	0.125 - 1.6 - 20	1.25 to 5	—	S, R, B	By Request	SR, WF	Yes	5	45	Unequal	Ti-Nomite-A	
T-Carb®	51	74		•	•	••	•••	•••	HEM Standard	6	0.250 to 1.6 to 20	1.25 to 3	3.25 to 5.5	S, R	By Request	SR	Yes	3	41	Unequal	Ti-Nomite-X	
H-Carb	77	82		•	•	•	•••	•••	HEM Standard	7	0.250 to 1.6 to 25	2.5 to 4	—	S, R	In Stock Available	SR	No	1	37	Unequal	Ti-Nomite-M Ti-Nomite-A	
Multi Carb	66	90		•	•	•	••	•••	HEM Standard	7, 9, 11	0.188 to 1.6 to 25	1.5 to 3.25	—	S, R	By Request	SR	No	1	35	Equal	Ti-Nomite-A	
Turbo Carb	56B	107		•	•	••	•••	•••	HEM Standard	2	0.031 to 0.750 1 to 20	1	2 to 2.25	B	By Request	SR	Yes	25	30	Equal	Ti-Nomite-A	
Z-Carb-MD	ZD1	61		•••	•••	••	••	••	Standard HEM	4	0.118 to 0.750 5 to 20	1 to 1.25	2.25 to 5	R	By Request	SR	Yes	2	42 / 45	Unequal	Ti-Nomite-A	
Power-Carb®	57	110		•	•	••	•••	•••	HEM Standard	6	0.250 to 0.500 6 to 20	2 to 2.25	—	S	By Request	SR	Yes	1	45	Equal	Ti-Nomite-A	
Ski-Carb	44	163		••	••	••	•••	•••	Standard HEM	2	0.250 to 1.3 to 20	1.25 to 7	—	S, R	By Request	SR, WF	Yes	90	45	Equal	Ti-Nomite-B	
S-Carb® 2 Flute	47	157		•••	•••	••	••	••	Standard HEM	2	0.125 to 1.3 to 25	1 to 3	3 to 9	S, B	By Request	SR	Yes	90	35	Equal	Ti-Nomite-B	
S-Carb® 3 Flute	43	136		•••	•••	••	••	••	Standard HEM	3	0.125 to 1.3 to 25	1 to 7	2.25 to 8.5	S, R, B	By Request	SR	Yes	90	38	Equal	Ti-Nomite-B	
S-Carb® Chipbreaker	43CB	146		•••	•••	••	••	••	NR	Standard HEM	3	0.250 to 1.6 to 20	1 to 7	2.5 to 8.5	R	Standard	SR	Yes	90	38	Equal	Ti-Nomite-B
S-Carb® APR-3®	43APR-3	127		•••	•••	••	••	••	NR	Standard HEM	3	0.750 to 1.12 to 26	1.25 to 1.75	3 to 4	S, R	Standard	CH	Yes	90	38	Unequal	Ti-Nomite-B
S-Carb APR-4®	43APR-4	130		•••	•••	••	••	••	NR	Standard HEM	4	20 to 25	1.25 to 1.75	2.25 to 3.5	S, R	Standard	CH	Yes	90	38 / 41	Unequal	Ti-Nomite-B
S-Carb APF®	43APF	132		•	•	••	•••	•••	Standard HEM	4	0.500 to 0.750 6 to 25	2.5 to 4	3 to 5	S, R	By Request	CH	Yes	25	38 / 41	Unequal	Ti-Nomite-B	
Slow Helix	27	113		•	•	••	•••	•••	Standard HEM	4	0.250 to 0.750 6 to 16	1.75 to 4	—	S	By Request	SR	Yes	5	10, 12	Unequal	Di-Nomite (optional)	
CCR	20-CCR	338		•••	•••	••	••	••	Standard HEM	5, 8, 10, 12	0.250 to 0.500 2 to 12	2.75 to 4	—	S	Standard	SR	Based upon end style	5 (for end cut styles)	15	Equal	Di-Nomite (optional)	
CCR	31-CCR	342		•••	•••	••	••	••	Standard HEM	5, 7, 8, 10	0.250 to 0.500 6 to 12	2.75 to 4	—	S	Standard	SR	Based upon end style	5 (for end cut styles)	15	Equal	Di-Nomite (optional)	
Compression Router	25	345		•	•	••	••	••	Standard HEM	4, 6, 8	0.250 to 0.500 6 to 12	2.75 to 4	—	S	By Request	SR	Yes	5	30	Equal	Di-Nomite (optional)	
Up Cut Router	21	348		•••	•••	••	••	••	Standard HEM	2	0.125 to 0.750 3 to 12	2.5 to 4.25	—	S	By Request	SR	Yes	90	35	Equal	various optional	
Down Cut Router	22	349		•	•	••	••	••	Standard HEM	2	0.125 to 0.750 3 to 12	2.5 to 4.25	—	S	By Request	SR	Yes	—	35	Equal	various optional	

Preferred materials for each Series are highlighted above

Cut depths (Ae & Ap) are based on a percentage of the cutter diameter (DC)



Steel P0 to P6  
Stainless Steel M1 to M3  
Cast Iron K1 to K3  
High Temp Alloy S1 to S3  
Titanium Alloy S4  
Hardened Steel H1 to H4  
Non Ferrous N1 to N4  
Non Ferrous N5 to N7

Steel P0 to P6  
Stainless Steel M1 to M3  
Cast Iron K1 to K3  
High Temp Alloy S1 to S3  
Titanium Alloy S4  
Hardened Steel H1 to H4  
Non Ferrous N1 to N4  
Non Ferrous N5 to N7

Heavy 100%~40% Ae ≤ 100% Ap  
Moderate 100%~40% Ae ≤ 150% Ap  
Light 25%~10% Ae ≤ 250% Ap  
Fine 10%~2% Ae ≤ 450% Ap  
Finish 2%~0% Ae any Ap

Coolant required in these materials  
Plunging not recommended in these materials

Material hardness and machinability affect speed, feed, and cut depths  
Long flute or long reach tools require reduced rates and cut depth  
Unless marked "NR", a high quality finish can be achieved with any Series tool with adjustments to speed and feed

\* HEM toolpaths are usually preferred in most situations. However, standard paths may be more efficient with moderate to heavy cut types  
\*\* some variations of Cut Length and Reach are based upon Cut Diameter  
\*\*\* shown is general recommendation for most materials, lower ramp angles are required for materials with lower machinability

For complete application recommendations refer to the SGS Tool Wizard®

**SGS**  
TOOL WIZARD

# Application Tips

<b>Tool</b>	<ul style="list-style-type: none"> <li>Whenever possible, select an end mill with the largest diameter, shortest flute length, and shortest overall length for the best rigidity</li> <li>Long flute tools are not intended for pocketing, slotting, or heavy profiling – limit Ae to .02D</li> <li>High Performance tools minimize cycle time and extend tool life</li> </ul>
<b>Tool Holders</b>	<ul style="list-style-type: none"> <li>Holders with adequate gripping pressure and TIR are required</li> <li>Stub holders or zero length collet style holders are recommended for heavy stock removal</li> <li>When using solid holders, hand ground screw flats are not recommended</li> </ul>
<b>Workpiece</b>	<ul style="list-style-type: none"> <li>Secure clamping of the workpiece will reduce chatter and deflection</li> </ul>
<b>Machine</b>	<ul style="list-style-type: none"> <li>Spindle must be in optimum condition for precise TIR and maximum tool life</li> <li>Sufficient horsepower is required to perform at recommended speeds and feeds</li> <li>Reduce rates for low power machines to prevent workpiece and / or tool damage</li> </ul>
<b>Coolant</b>	<ul style="list-style-type: none"> <li>Avoid re-milling chips through use of air blast or liquid coolant as necessary</li> <li>Maintain clean coolant with appropriate concentration</li> <li>General recommendations:           <ul style="list-style-type: none"> <li>Water Soluble Oil or Air Blast: Tool Steels, Mold &amp; Die Steels, Carbon or Alloy Steels</li> <li>Water Soluble Oil: Stainless Steels, Titanium, High Temperature Alloys, Non-Ferrous Alloys</li> </ul> </li> </ul>
<b>Methods</b>	<ul style="list-style-type: none"> <li>Climb milling is generally preferred</li> <li>Attention to programming details, tool holders, TIR, balance, fixturing, etc. improve cutting tool performance and extend tool life</li> </ul>

## END MILLING GUIDELINE

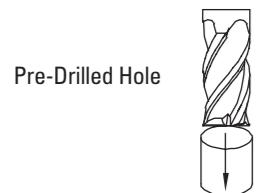
DC = cutting diameter APMX = flute length

Speeds and Feeds for Cut Types are based on Radial Width ( $-|Ae|$ ) and Axial Depth ( $\frac{Ap}{}$ )

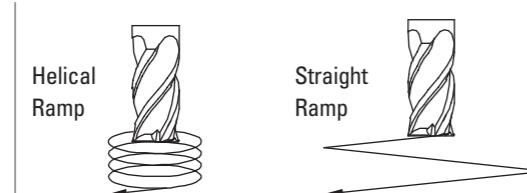
Reductions to Speeds and Feeds may be necessary when:

- Ae and Ap exceed recommendations
- Using long flute or extended reach tools
- Using long tool holders
- Machining materials harder than listed

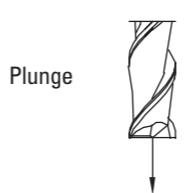
## ENTRY METHODS



Pre-drilling is the preferred entry method for most applications.



Alternative methods are helical and straight ramping. High ramp angles require reduced feed. Lower ramp angles will allow higher feed rates and extend tool life. Use slotting speeds and feeds for ramp angles of 1° to 2°. Reduce feed to 25% when ramp angles approach 6°. General purpose tools and/or difficult to machine materials will require lower ramp angles and reduced feed.



Plunge only in non-ferrous and short-chipping materials using slotting speeds and 25% slotting feeds.

<b>Herramientas</b>	<ul style="list-style-type: none"> <li>Siempre que sea posible, seleccione la herramienta de mayor diámetro y menor longitud total y de filo para obtener una mayor rigidez.</li> <li>Las herramientas con filos largos no son recomendadas para operaciones de apertura de cajas en el maquinado, operación de ranurado o perfilado pesado – limitar la profundidad radial (Ae) a .02D</li> <li>Las herramientas de alto desempeño minimizan el tiempo de ciclo del maquinado y extienden la vida útil de la herramienta</li> </ul>
<b>Portaherramientas</b>	<ul style="list-style-type: none"> <li>Los Portaherramientas deberán tener buena presión de amarre para la sujeción de la herramienta y una concentración máxima indicada (TIR)</li> <li>Se recomienda usar portaherramientas de amarre directo cortos, o de boquilla con longitud cero para lograr un máximo arranque de viruta</li> <li>Cuando se utilicen portaherramientas de amarre directo, no se recomienda hacer manualmente el plano para la sujeción del tornillo en el zanco de la herramienta</li> </ul>
<b>Pieza a maquinar</b>	<ul style="list-style-type: none"> <li>La buena sujeción de la pieza a maquinar reducirá la vibración y la desviación de la herramienta</li> </ul>
<b>Máquina</b>	<ul style="list-style-type: none"> <li>El husillo de la máquina debe estar en condiciones óptimas, para asegurar la concentración de giro (TIR) y asegurar el máximo rendimiento de la herramienta</li> <li>Para lograr los avances y velocidades recomendados, se necesita suficiente potencia (HP) en la máquina</li> <li>Reducir los parámetros de corte en máquinas de baja potencia (HP) para prevenir el daño en la herramienta o pieza de trabajo</li> </ul>
<b>Refrigeración</b>	<ul style="list-style-type: none"> <li>Evite el re-maquinado de virutas usando aire a presión o líquido refrigeración según sea necesario</li> <li>Mantener limpia la refrigeración con su concentración adecuada</li> <li>Recomendaciones generales:           <ul style="list-style-type: none"> <li>Para el maquinado de aceros de herramienta, para Moldes y Dados o Aleaciones de Bajo Carbón, utilice Aceite Soluble en Agua o aire a presión</li> <li>Para el maquinado de Aleaciones Inoxidables, Aleaciones Termorresistentes, Titanio y Aleaciones No Ferrosas, utilice solamente Aceite Soluble en Agua</li> </ul> </li> </ul>
<b>Métodos</b>	<ul style="list-style-type: none"> <li>Se recomienda el maquinado en sentido ascendente o trepado</li> <li>El cuidado en los detalles de la programación, la concentración de giro (TIR) el balance de los portaherramientas, la sujeción de la pieza a maquinar, etc. son factores que contribuyen a prolongar la vida de la herramienta</li> </ul>

## GUÍAS DE FRESADO

DC = diámetro de corte APMX = largo de filo

Las velocidades y avances para cortes están basados en la profundidad radial ( $-|Ae|$ ), y profundidad axial ( $\frac{Ap}{}$ )

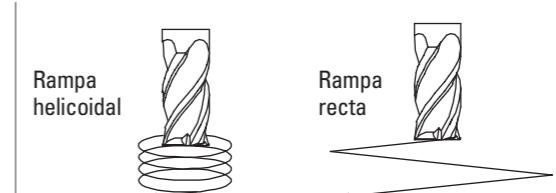
Reducciones en velocidades y avances serán necesarias cuando:

- Ae y Ap excede las recomendaciones
- Se utilicen filos largos o herramientas de largo alcance
- Se utilicen portaherramientas largos
- Se maquinan materiales más duros que los recomendados

## MÉTODOS DE ENTRADA



Preferentemente usar un barreno previo como método de entrada para la mayor parte de las aplicaciones.



Los métodos alternativos son las rampas helicoidales y rectas. Un ángulo elevado de rampa necesita un avance reducido. Un ángulo de rampa inferior permitirá tasas de avance más elevadas y una mayor duración de la herramienta. Usar velocidades y alcances de ranurado para ángulos de rampa de 1° a 2°. Disminuir el avance un 25% cuando los ángulos de rampa se aproximan a 6°. Las herramientas de uso general y/o materiales difíciles de mecanizar precisarán ángulos de rampa inferiores y un avance reducido.



Este método se puede utilizar únicamente en materiales no ferrosos y materiales de formación de virutas cortas, usando la velocidad de ranurado y el 25% de su avance.

# Conseils relatifs à l'application

# Anwendungstipps

<b>Outil</b>	<ul style="list-style-type: none"> <li>Chaque fois que possible, choisissez une fraise de plus grand diamètre possible, la plus courte possible, elle garantira la meilleure rigidité</li> <li>Les outils longs ne sont pas optimum pour l'ébauche, le pocketing, le rainurage – Ae limité à 0,02 D</li> <li>Les outils Haute performance optimisent les temps de cycle et de augmentent la durée de vie</li> </ul>
<b>Porte-outils</b>	<ul style="list-style-type: none"> <li>Des attaches à serrage puissant et à faux rond précis sont recommandés</li> <li>Attaches à méplats ou pinces à serrage nominale sont recommandées pour les ébauches</li> <li>Lorsque vous utilisez des attaches rigides, les serrage de l'outil par vis ne sont pas recommandés</li> </ul>
<b>Pièce</b>	<ul style="list-style-type: none"> <li>Le système de fixation et de bridage de la pièce devra permettre de réduire les vibrations et la déformation</li> </ul>
<b>Machine</b>	<ul style="list-style-type: none"> <li>Broche doit être en bon état optimal au niveau de son faux rond</li> <li>Suffisamment puissance est nécessaire pour effectuer à des vitesses recommandées et se nourrit</li> <li>Réduire les efforts pour les machines de faible puissance pour éviter l'endommagement de la pièce et / ou de l'outil</li> </ul>
<b>Liquide de refroidissement</b>	<ul style="list-style-type: none"> <li>Évitez les recyclage de copeaux par l'utilisation de soufflage d'air comprimé ou de liquide de refroidissement.</li> <li>Maintenir le lubrifiant propre à la concentration appropriée</li> <li>Recommandations générales – <ul style="list-style-type: none"> <li>Huile soluble ou Air comprimé: aciers à outils, aciers pour moules, aciers au carbone ou alliés</li> <li>Huile soluble: aciers inoxydables, titane, alliages à haute température, alliages non ferreux</li> </ul> </li> </ul>
<b>Méthodes</b>	<ul style="list-style-type: none"> <li>L'usinage en avalant est généralement préconisé</li> <li>Attention à la programmation, porte-outils, faux rond, équilibrage, fixation, etc améliorent les performances de l'outil en coupe et prolonge la durée de vie</li> </ul>

## GUIDE DU FRAISAGE

DC = diamètre de coupe APMX = longueur de coupe

Vitesses & avances pour ces cas d'usinage sont basées sur l'engagement radial ( $-|Ae|-$ ), et axial ( $\frac{1}{Ap}$ )

La réduction de la vitesse et de l'avance doit être nécessaire quand:

- Les engagements Ae et Ap sont importants
- Des dentures longues ou des séries longues sont utilisées
- Des attaches longs sont utilisés
- Lors d'usinage de matériaux durs

## TYPES D'ENTREE MATIERE



Le préperçage est la méthode préférable dans la plupart de applications.



Les autres méthodes sont un ramping hélicoïdal et un ramping droit. Les angles de ramping élevés exigent une avance inférieure. Les angles de ramping inférieurs permettent les taux d'avance supérieurs et prolongeront la vie de l'outil. Utilisez des avances et vitesses de mortaisage pour les angles de ramping de 1° à 2°. Réduisez l'avance à 25 % lorsque les angles de ramping avoisinent 6°. Les outils tout usage et/ou les matériaux difficiles à usiner exigeront des angles de ramping inférieurs et une charge réduite.



Plongée uniquement dans les non ferreux. Vitesse rainurage et avances réduites de 25%.

<b>Werkzeug</b>	<ul style="list-style-type: none"> <li>Wählen Sie möglichst immer den Schafträser mit dem größten Durchmesser, der kürzesten Schneide und Gesamtlänge, um eine hohe Steifigkeit zu erhalten</li> <li>Langlochschafträser sind nicht zum Taschen-, Schlitz- oder Profilfräsen bestimmt – die Dehnung auf Ae 0,2 der Streckgrenze nicht überschreiten</li> <li>Hochleistungswerzeuge minimieren die Bearbeitungszeit und verlängern die Werkzeugstandzeit</li> </ul>
<b>Werkzeughalter</b>	<ul style="list-style-type: none"> <li>Es werden Spannzangen mit genauem Rundlauf benötigt</li> <li>Steilkegel oder bündige Spannfutter werden bei hohem Materialabtrag empfohlen</li> <li>Von der Verwendung fester handverschraubter Halterungen wird abgeraten</li> </ul>
<b>Werkstück</b>	<ul style="list-style-type: none"> <li>Sicheres Werkzeugspannen verringert Vibratoren und das Auswandern aus der Spannvorrichtung</li> </ul>
<b>Werkzeugmaschine</b>	<ul style="list-style-type: none"> <li>Die Spindel muss in optimalem Zustand sein, um einen genauen Rundlauf und maximale Standzeit zu erzielen</li> <li>Für die empfohlenen Drehzahlen und Vorschubgeschwindigkeiten ist genügend Leistung bereitzustellen</li> <li>Bei leistungsschwachen Antrieben sind die Werte zu verringern, um Beschädigungen am Werkstück und/oder Werkzeug zu vermeiden</li> </ul>
<b>Kühlmittel</b>	<ul style="list-style-type: none"> <li>Das Stauen der Späne durch Luftstrahl oder flüssige Kühlmittel möglichst verhindern</li> <li>Kühlmittel in geeigneter Konzentration verwenden</li> <li>Allgemeine Empfehlungen: <ul style="list-style-type: none"> <li>Wasser-Öl-Emulsionen oder Luftstrahl: Werkzeugstähle, Form- und Schneidstähle, unlegierte oder legierte Stähle</li> <li>Wasser-Öl-Emulsion: Nichtrostender Stahl, Titan, Warmfeste Legierungen, Nichteisenlegierungen</li> </ul> </li> </ul>
<b>Verfahren</b>	<ul style="list-style-type: none"> <li>Vorzugsweise Gleichlauffräsen anwenden</li> <li>Das Beachten der Fräsparameter, Werkzeughalter, Rundlauf, Auswuchten, Einspannen, usw. verbessert die Schnittleistung und verlängert die Standzeit</li> </ul>

## RICHTWERTE ZUM FRÄSEN

DC = Fräsdurchmesser APMX = Schnittlänge

Drehzahl und Vorschub für Fräsaarbeiten hängen von Radialbreite ( $-|Ae|-$ ) und Frästiefe ( $\frac{1}{Ap}$ ) ab

Drehzahl und Vorschub müssen ggfs. verringert werden wenn:

- die empfohlenen Werte für Ae und Ap überschritten werden
- lange Schneiden oder Langschaftfräser verwendet werden
- lange Werkzeughalter verwendet werden
- die Werkstoffe härter als vorgesehen sind

## VORBEREITUNGEN



Vorbohren ist in den meisten Fällen ratsam.

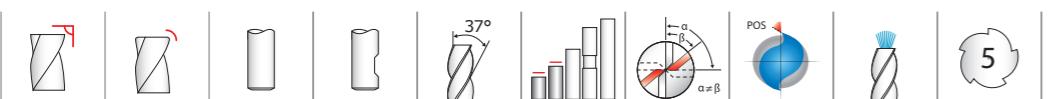


Alternative Verfahren sind Zirkuläreintauchen und Schrägeintauchen. Starke Tauchwinkel erfordern verringerte Vorschubgeschwindigkeiten. Geringe Tauchwinkel ermöglichen höhere Vorschubgeschwindigkeiten und verlängern die Standzeit. Verwenden Sie die Drehzahlen und Vorschübe zum Schlitzfräsen für Tauchwinkel von 1° bis 2°. Den Vorschub auf 25 % verringern, wenn der Tauchwinkel 6° erreicht. Standardwerkzeuge und / oder schwer zu bearbeitende Werkstoffe verlangen kleine Tauchwinkel und verringerte Vorschubgeschwindigkeiten.



Stechen Sie in Nichteisenmetalle und kurzspanende Werkstoffe nur mit Schlitzfräsdrehzahl und 25 % der Schlitzvorschubgeschwindigkeit ein.

## FRACTIONAL Z-Carb-HPR



### TOLERANCES (inch)

1/8-1/4 DIAMETER	
DC	= +0.0000/-0.0012
DCON	= $h_6$
RE	= +0.0000/-0.0020
>1/4-3/8 DIAMETER	
DC	= +0.0000/-0.0016
DCON	= $h_6$
RE	= +0.0000/-0.0020
>3/8-1 DIAMETER	
DC	= +0.0000/-0.0020
DCON	= $h_6$
RE	= +0.0000/-0.0020

## Z5 • Z5CR

FRACTIONAL SERIES

- An ideal balance of helix, indexing, flute depth, rake and relief
- Variable indexing for chatter suppression and patented edge geometry for shearing and strength
- Chatter-free geometry allows deep cutting and high speed machining
- Central coolant hole delivers coolant effectively to the cutting zone enhancing chip removal when pocketing or slotting
- Excels at roughing, ramping, high speed machining and finishing in a variety of materials
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials  $\leq 45$  HRc ( $\leq 420$  Bhn)



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[www.ksptpatents.com](http://www.ksptpatents.com)

### EDP NO.

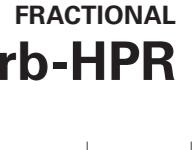
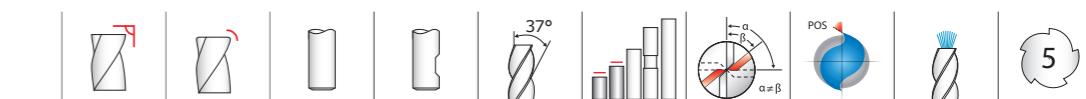
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NON-CUTTING CENTER DIAMETER NCD	TI-NAMITE-A (TA)	TI-NAMITE-A (TA) W/FLAT	TI-NAMITE-A (TA) W/INTERNAL COOLANT	TI-NAMITE-M (TM)	TI-NAMITE-M (TM) W/FLAT	TI-NAMITE-M (TM) W/INTERNAL COOLANT
1/8	1/4	1-1/2	1/8	—	0.0440	38500	—	—	37000	—	—
1/8	1/4	1-1/2	1/8	0.010	0.0440	38771	—	—	38770	—	—
1/8	1/4	1-1/2	1/8	0.015	0.0440	38525	—	—	37001	—	—
1/8	1/4	1-1/2	1/8	0.030	0.0440	38773	—	—	38772	—	—
1/8	3/8	1-1/2	1/8	—	0.0440	37180	—	—	37002	—	—
1/8	3/8	1-1/2	1/8	0.010	0.0440	38775	—	—	38774	—	—
1/8	3/8	1-1/2	1/8	0.015	0.0290	37181	—	—	37003	—	—
1/8	3/8	1-1/2	1/8	0.030	0.0290	38777	—	—	38776	—	—
3/16	5/16	2	3/16	—	0.0660	38501	—	—	37004	—	—
3/16	5/16	2	3/16	0.010	0.0660	38779	—	—	38778	—	—
3/16	5/16	2	3/16	0.015	0.0660	38526	—	—	37005	—	—
3/16	5/16	2	3/16	0.030	0.0660	38781	—	—	38780	—	—
3/16	1/2	2	3/16	—	0.0660	37182	—	—	37006	—	—
3/16	1/2	2	3/16	0.010	0.0660	38783	—	—	38782	—	—
3/16	1/2	2	3/16	0.015	0.0660	37183	—	—	37007	—	—
3/16	1/2	2	3/16	0.030	0.0660	38785	—	—	38784	—	—
1/4	3/8	2-1/2	1/4	—	0.0880	38502	—	—	37008	—	—
1/4	3/8	2-1/2	1/4	0.010	0.0880	38787	—	—	38786	—	—
1/4	3/8	2-1/2	1/4	0.015	0.0880	38527	—	—	37009	—	—
1/4	3/8	2-1/2	1/4	0.030	0.0880	38528	—	—	37010	—	—
1/4	3/8	2-1/2	1/4	0.060	0.0750	38789	—	—	38788	—	—
1/4	3/8	2-1/2	1/4	0.090	0.0880	38791	—	—	38790	—	—
1/4	1/2	2-1/2	1/4	—	0.0880	37184	—	—	37011	—	—
1/4	1/2	2-1/2	1/4	0.010	0.0880	38793	—	—	38792	—	—
1/4	1/2	2-1/2	1/4	0.015	0.0880	37185	—	—	37012	—	—
1/4	1/2	2-1/2	1/4	0.030	0.0880	37186	—	—	37013	—	—
1/4	1/2	2-1/2	1/4	0.060	0.0750	38795	—	—	38794	—	—
1/4	1/2	2-1/2	1/4	0.090	0.0880	38797	—	—	38796	—	—

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### TOLERANCES (inch)

1/8-1/4 DIAMETER	
DC	= +0.0000/-0.0012
DCON	= $h_6$
>1/4-3/8 DIAMETER	
DC	= +0.0000/-0.0016
DCON	= $h_6$
>3/8-1 DIAMETER	
DC	= +0.0000/-0.0020
DCON	= $h_6$
>1 DIAMETER	
DC	= +0.0000/-0.0020
DCON	= $h_6$
>2 DIAMETER	
DC	= +0.0000/-0.0020
DCON	= $h_6$



### TOLERANCES (inch)

1/8-1/4 DIAMETER	
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DCON	= $h_6$
>1/4-3/8 DIAMETER	
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DCON	= $h_6$
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DC	= +0.0000/-0.0020
DCON	= $h_6$
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DC	= +0.0000/-0.0020
DCON	= $h_6$
>2 DIAMETER	
DC	= +0.0000/-0.0020
DCON	= $h_6$

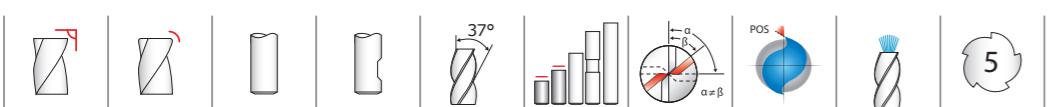
## Z5 • Z5CR

FRACTIONAL SERIES

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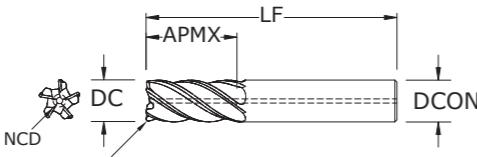
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NON-CUTTING CENTER DIAMETER NCD	TI-NAMITE-A (TA)	TI-NAMITE-A (TA) W/FLAT	TI-NAMITE-A (TA) W/INTERNAL COOLANT	TI-NAMITE-M (TM)	TI-NAMITE-M (TM) W/FLAT	TI-NAMITE-M (TM) W/INTERNAL COOLANT
5/16	7/16	2-1/2	5/16	—	0.1090	38503	—	—	37014	—	—
5/16	7/16	2-1/2	5/16	0.010	0.1090	38799	—	—	38798	—	—
5/16	7/16	2-1/2	5/16	0.015	0.1090	38529	—	—	37015	—	—
5/16	7/16	2-1/2	5/16	0.030	0.1090	38801	—	—	38800	—	—
5/16	7/16	2-1/2	5/16	0.060	0.1090	38803	—	—	38802	—	—
5/16	7/16	2-1/2	5/16	0.090	0.0640	38805	—	—	38804	—	—
5/16	5/8	2-1/2	5/16	—	0.1090	38504	—	—	37016	—	—
5/16</											

## FRACTIONAL Z-Carb-HPR



**TOLERANCES (inch)**

<b>1/8-1/4 DIAMETER</b>
DC = +0.0000/-0.0012
DCON = h <sub>6</sub>
RE = +0.0000/-0.0020
<b>&gt;1/4-3/8 DIAMETER</b>
DC = +0.0000/-0.0016
DCON = h <sub>6</sub>
RE = +0.0000/-0.0020
<b>&gt;3/8-1 DIAMETER</b>
DC = +0.0000/-0.0020
DCON = h <sub>6</sub>
RE = +0.0000/-0.0020



### Z5 • Z5CR FRACTIONAL SERIES

KYOCERA Solid Tools

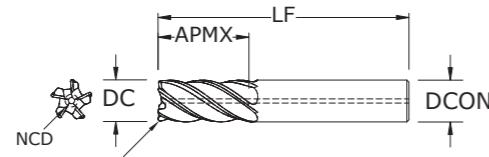
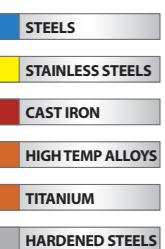
SGS Solid Tools

SGS Micro Tools

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CONTINUED

- An ideal balance of helix, indexing, flute depth, rake and relief
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- Central coolant hole delivers coolant effectively to the cutting zone enhancing chip removal when pocketing or slotting
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- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



EDP NO.

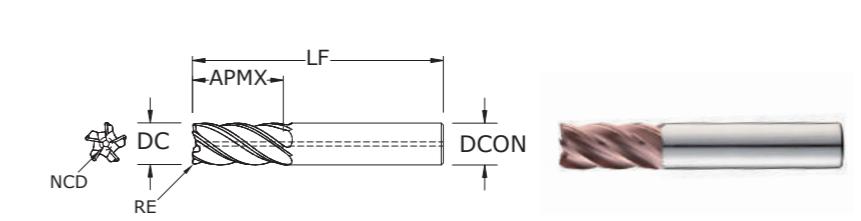
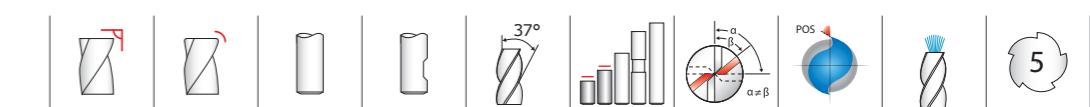
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NON-CUTTING CENTER DIAMETER NCD	TI-NAMITE-A (TA)	TI-NAMITE-A (TA) W/FLAT	TI-NAMITE-A (TA) W/INTERNAL COOLANT	TI-NAMITE-M (TM)	TI-NAMITE-M (TM) W/FLAT	TI-NAMITE-M (TM) W/INTERNAL COOLANT
1/2	5/8	3	1/2	—	0.1750	38506	38512	37320	37024	37030	37321
1/2	5/8	3	1/2	0.010	0.1750	38827	38829	38831	38826	38828	38830
1/2	5/8	3	1/2	0.015	0.1750	38533	38578	37330	37025	37031	37331
1/2	5/8	3	1/2	0.030	0.1750	38534	38579	37332	37026	37032	37333
1/2	5/8	3	1/2	0.060	0.1750	38535	38580	37334	37027	37033	37335
1/2	5/8	3	1/2	0.090	0.1750	38536	38581	37337	37028	37034	37338
1/2	5/8	3	1/2	0.120	0.1750	38537	38582	37339	37029	37035	37340
1/2	1	3	1/2	—	0.1750	38507	38513	37322	37036	37042	37323
1/2	1	3	1/2	0.010	0.1750	38833	38835	38837	38832	38834	38836
1/2	1	3	1/2	0.015	0.1750	38538	38583	37341	37037	37043	37342
1/2	1	3	1/2	0.030	0.1750	38539	38584	37343	37038	37044	37344
1/2	1	3	1/2	0.060	0.1750	38540	38585	37345	37039	37045	37346
1/2	1	3	1/2	0.090	0.1750	38541	38586	37348	37040	37046	37349
1/2	1	3	1/2	0.120	0.1750	38542	38587	37350	37041	37047	37351
1/2	1-1/4	3-1/4	1/2	—	0.1750	37190	37194	37325	37048	37054	37324
1/2	1-1/4	3-1/4	1/2	0.010	0.1750	38839	38841	38843	38838	38840	38842
1/2	1-1/4	3-1/4	1/2	0.015	0.1750	37191	37195	37352	37049	37055	37353
1/2	1-1/4	3-1/4	1/2	0.030	0.1750	37192	37196	37354	37050	37056	37355
1/2	1-1/4	3-1/4	1/2	0.060	0.1750	37193	37197	37356	37051	37057	37357
1/2	1-1/4	3-1/4	1/2	0.090	0.1750	38543	38588	37359	37052	37058	37360
1/2	1-1/4	3-1/4	1/2	0.120	0.1750	38544	38589	37361	37053	37059	37362
5/8	3/4	3-1/2	5/8	—	0.2630	38508	38514	38518	37060	37067	37260
5/8	3/4	3-1/2	5/8	0.010	0.2190	38845	38847	38849	38844	38846	38848
5/8	3/4	3-1/2	5/8	0.015	0.2190	38545	38590	38623	37061	37068	37261
5/8	3/4	3-1/2	5/8	0.030	0.2190	38546	38591	38624	37062	37069	37262
5/8	3/4	3-1/2	5/8	0.060	0.2190	38547	38592	38625	37063	37070	37263
5/8	3/4	3-1/2	5/8	0.090	0.2190	38548	38593	38626	37064	37071	37264
5/8	3/4	3-1/2	5/8	0.120	0.2190	38549	38594	38627	37065	37072	37265
5/8	3/4	3-1/2	5/8	0.190	0.2190	38550	38595	38628	37066	37073	37266
5/8	1-1/4	3-1/2	5/8	—	0.2190	37198	37202	38519	37074	37081	37267

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**TOLERANCES (inch)**

<b>1/8-1/4 DIAMETER</b>
DC = +0.0000/-0.0012
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DCON = h <sub>6</sub>
RE = +0.0000/-0.0020
<b>&gt;3/8-1 DIAMETER</b>
DC = +0.0000/-0.0020
DCON = h <sub>6</sub>
RE = +0.0000/-0.0020

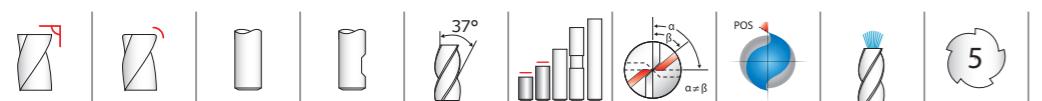


### Z5 • Z5CR FRACTIONAL SERIES

CONTINUED

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NON-CUTTING CENTER DIAMETER NCD	TI-NAMITE-A (TA)	TI-NAMITE-A (TA) W/FLAT	TI-NAMITE-A (TA) W/INTERNAL COOLANT	TI-NAMITE-M (TM)	TI-NAMITE-M (TM) W/FLAT	TI-NAMITE-M (TM) W/INTERNAL COOLANT
5/8	1-1/4	3-1/2	5/8	0.010	0.2190	38851	38853	38855	38850	38852	38854
5/8	1-1/4	3-1/2	5/8	0.015	0.2190	37199	37203	38629	37075	37082	37268
5/8	1-1/4	3-1/2	5/8	0.030	0.2190	37200	37204	38630	37076	37083	37269
5/8	1-1/4	3-1/2	5/8	0.060	0.2190	37201	37205	38631	37077	37084	37270
5/8	1-1/4	3-1/2	5/8	0.090	0.2190	38551	38596	38632	37078	37085	37271
5/8	1-1/4	3-1/2	5/8	0.120	0.2190	38552	38597	38633	37079	37086	37272
5/8	1-1/4	3-1/2	5/8	0.190	0.2190	38553	38598	38634	37080	37087	37273
3/4	7/8	4	3/4	—	0.2630	38509	38515	38520	37088	37095	37274
3/4	7/8	4	3/4	0.010	0.2630	38857	38859	38861	38856	38858	38860
3/4	7/8	4	3/4	0.030	0.2630	38554	38599	38635	37089	37096	37275
3/4	7/8										

# FRACTIONAL Z-Carb-HPR



## Z5 • Z5CR FRACTIONAL SERIES

CONTINUED

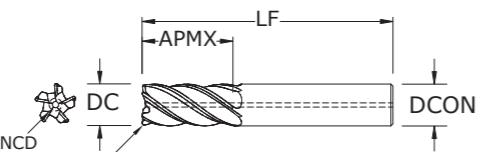
- An ideal balance of helix, indexing, flute depth, rake and relief
- Variable indexing for chatter suppression and patented edge geometry for shearing and strength
- Chatter-free geometry allows deep cutting and high speed machining
- Central coolant hole delivers coolant effectively to the cutting zone enhancing chip removal when pocketing or slotting
- Excels at roughing, ramping, high speed machining and finishing in a variety of materials
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

STEELS
STAINLESS STEELS
CAST IRON
HIGH TEMP ALLOYS
TITANIUM
HARDENED STEELS

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)



TOLERANCES (inch)	
1/8-1/4 DIAMETER	
DC	= +0.0000/-0.0012
DCON	= h <sub>6</sub>
RE	= +0.0000/-0.0020
>1/4-3/8 DIAMETER	
DC	= +0.0000/-0.0016
DCON	= h <sub>6</sub>
RE	= +0.0000/-0.0020
>3/8-1 DIAMETER	
DC	= +0.0000/-0.0020
DCON	= h <sub>6</sub>
RE	= +0.0000/-0.0020

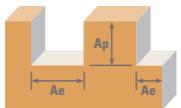


Series Z5, Z5CR Fractional	Hardness	Profile Slot	Ae x DC Ap x DC	Vc (sfm)	DC • in							
					1/8	1/4	3/8	1/2	5/8	3/4	1	
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Profile	≤ 0.5 (444-666)	≤ 1.5	555	RPM 16961	8480	5654	4240	3392	2827	2120
		Slot	1 (352-528)	≤ 1	440	RPM 13446	6723	4482	3362	2689	2241	1681
		Profile	≤ 0.5 (252-378)	≤ 1.5	315	RPM 9626	4813	3209	2407	1925	1604	1203
		Slot	1 (200-300)	≤ 1	250	RPM 7640	3820	2547	1910	1528	1273	955
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Profile	≤ 0.5 (252-378)	≤ 1.5	315	RPM 13446	6723	4482	3362	2689	2241	1681
		Slot	1 (200-300)	≤ 1	250	RPM 7640	3820	2547	1910	1528	1273	955
		Profile	≤ 0.5 (356-534)	≤ 1.5	445	RPM 13599	6800	4533	3400	2720	2267	1700
		Slot	1 (284-426)	≤ 1	355	RPM 10849	5424	3616	2712	2170	1808	1356
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	Profile	≤ 0.5 (220-356)	≤ 1.5	445	RPM 0.00042	0.0011	0.0021	0.0028	0.0031	0.0034	0.0039
		Slot	1 (284-426)	≤ 1	355	RPM 0.00042	0.0011	0.0021	0.0028	0.0031	0.0034	0.0039
		Profile	≤ 0.5 (272-408)	≤ 1.5	340	RPM 10390	5195	3463	2598	2078	1732	1299
		Slot	1 (216-324)	≤ 1	270	RPM 0.00031	0.0008	0.0016	0.0021	0.0023	0.0025	0.0029
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	Profile	≤ 0.5 (260-396)	≤ 1.5	340	RPM 10390	5195	3463	2598	2078	1732	1299
		Slot	1 (216-324)	≤ 1	270	RPM 8251	4126	2750	2063	1650	1375	1031
		Profile	≤ 0.5 (392-588)	≤ 1.5	490	RPM 14974	7487	4991	3744	2995	2496	1872
		Slot	1 (312-468)	≤ 1	390	RPM 11918	5959	3973	2980	2384	1986	1490
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	Profile	≤ 0.5 (272-408)	≤ 1.5	340	RPM 0.00034	0.0009	0.0017	0.0023	0.0026	0.0028	0.0032
		Slot	1 (312-468)	≤ 1	390	RPM 0.00034	0.0009	0.0017	0.0023	0.0026	0.0028	0.0032
		Profile	≤ 0.5 (272-408)	≤ 1.5	340	RPM 10390	5195	3463	2598	2078	1732	1299
		Slot	1 (216-324)	≤ 1	270	RPM 0.00027	0.0007	0.0014	0.0018	0.0020	0.0022	0.0025
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	Profile	≤ 0.5 (272-408)	≤ 1.5	340	RPM 10390	5195	3463	2598	2078	1732	1299
		Slot	1 (216-324)	≤ 1	270	RPM 8251	4126	2750	2063	1650	1375	1031
		Profile	≤ 0.5 (328-472)	≤ 1.5	310	RPM 11.1	14.4	19.3	18.6	16.5	15.1	12.9
		Slot	1 (200-300)	≤ 1	250	RPM 9474	4737	3158	2368	1895	1579	1184
S	STAINLESS STEELS (PH) 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	Profile	≤ 0.5 (248-372)	≤ 1.5	310	RPM 0.00027	0.0007	0.0014	0.0018	0.0020	0.0022	0.0025
		Slot	1 (200-300)	≤ 1	250	RPM 12.8	16.6	22.1	21.3	18.9	17.4	14.8
		Profile	≤ 0.5 (312-468)	≤ 1.5	310	RPM 7640	3820	2547	1910	1528	1273	955
		Slot	1 (200-300)	≤ 1	250	RPM 0.00027	0.0007	0.0014	0.0018	0.0020	0.0022	0.0025
	HARDENED STEELS	Profile	≤ 0.5 (248-372)	≤ 1.5	310	RPM 10.3	13.4	17.8	17.2	15.3	14.0	11.9
		Slot	1 (200-300)	≤ 1	250	RPM 14.0	18.2	24.2	23.4	20.8	19.0	16.2
		Profile	≤ 0.5 (312-468)	≤ 1.5	310	RPM 11.1	14.4	19.3	18.6	16.5	15.1	12.9
		Slot	1 (216-324)	≤ 1	270	RPM 9.474	4737	3158	2368	1895	1579	1184

continued on next page

# FRACTIONAL Z-Carb-HPR

Series  
Z5, Z5CR  
Fractional



Hardness

Ae x DC

Ap x DC

Vc  
(sfm)

	Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in								
					1/8	1/4	3/8	1/2	5/8	3/4	1		
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile 	$\leq 0.5$	$\leq 1.5$	80 (64-96)	RPM	2445	1222	815	611	489	407	306
						Fz	0.00025	0.00068	0.00128	0.00170	0.00187	0.00204	0.00238
		Slot 	1	$\leq 1$	65 (52-78)	RPM	1986	993	662	497	397	331	248
						Fz	0.00025	0.00068	0.00128	0.00170	0.00187	0.00204	0.00238
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile 	$\leq 0.5$	$\leq 1.5$	62 (50-74)	RPM	1895	947	632	474	379	316	237
						Fz	0.00018	0.00048	0.00090	0.00120	0.00130	0.00140	0.00170
		Slot 	1	$\leq 1$	50 (40-60)	RPM	1528	764	509	382	306	255	191
						Fz	0.00018	0.00048	0.00090	0.00120	0.00130	0.00140	0.00170
H	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Profile 	$\leq 0.5$	$\leq 1.5$	215 (172-258)	RPM	6570	3285	2190	1643	1314	1095	821
						Fz	0.0003	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028
		Slot 	1	$\leq 1$	170 (136-204)	RPM	5195	2598	1732	1299	1039	866	649
						Fz	0.0003	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile 	$\leq 0.5$	$\leq 1.5$	75 (60-90)	RPM	2292	1146	764	573	458	382	287
						Fz	0.0003	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028
		Slot 	1	$\leq 1$	60 (48-72)	RPM	1834	917	611	458	367	306	229
						Fz	0.0003	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028
S	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile 	$\leq 0.5$	$\leq 1.5$	185 (148-222)	RPM	5654	2827	1885	1413	1131	942	707
						Fz	0.00028	0.0007	0.0014	0.0018	0.0020	0.0022	0.0026
		Slot 	1	$\leq 1$	145 (116-174)	Feed (ipm)	7.9	9.9	13.2	12.7	11.3	10.4	9.2
						RPM	4431	2216	1477	1108	886	739	554
	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile 	$\leq 0.5$	$\leq 1.5$	185 (148-222)	Fz	0.00028	0.0007	0.0014	0.0018	0.0020	0.0022	0.0026
						Feed (ipm)	6.2	7.8	10.3	10.0	8.9	8.1	7.2

Bhn (Brinell) HRc (Rockwell C)

rpm = Vc x 3.82 / DC

ipm = Fz x 5 x rpm

ramp up to 5 degrees 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 DC maximum)

feed rates listed have chip thinning adjustments included where applicable

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))



## TOLERANCES (mm)

### 6 DIAMETER

DC = +0,000/-0,030

DCON = h6

RE = +0,000/-0,050

### >6-10 DIAMETER

DC = +0,000/-0,040

DCON = h6

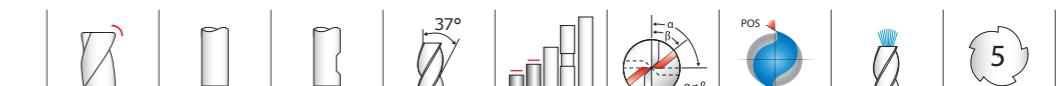
RE = +0,000/-0,050

### >10-25 DIAMETER

DC = +0,000/-0,050

DCON = h6

RE = +0,000/-0,050



- An ideal balance of helix, indexing, flute depth, rake and relief
- Variable indexing for chatter suppression and patented edge geometry for shearing and strength
- Chatter-free geometry allows deep cutting and high speed machining

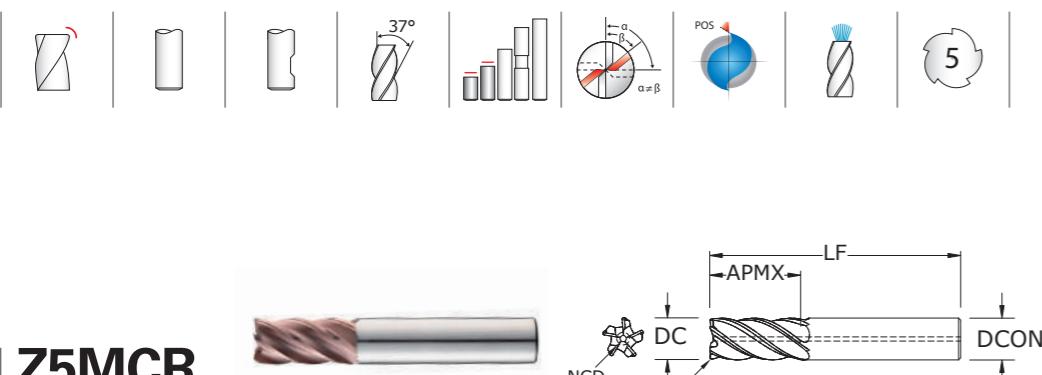
- Central coolant hole delivers coolant effectively to the cutting zone enhancing chip removal when pocketing or slotting
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- Excels at roughing, ramping, high speed machining and finishing in a variety of materials
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NON-CUTTING CENTER DIAMETER NCD	EDP NO.						
						TI-NAMITE-A (TA) TI-NAMITE-A (TA) W/FLAT	TI-NAMITE-A (TA) TI-NAMITE-A (TA) W/INTERNAL COOLANT	TI-NAMITE-M (TM) TI-NAMITE-M (TM) W/FLAT	TI-NAMITE-M (TM) TI-NAMITE-M (TM) W/INTERNAL COOLANT			
6,0	9,0	54,0	6,0	0,5	2,11	48000	—	—	47000	—	—	—
6,0	13,0	57,0	6,0	0,3	2,11	48001	—	—	47001	—	—	—
6,0	13,0	57,0	6,0	0,5	2,11	47120	—	—	47002	—	—	—
6,0	13,0	57,0	6,0	1,0	2,11	48002	—	—	47003	—	—	—
6,0	13,0	57,0	6,0	1,5	2,11	48003	—	—	47004	—	—	—
8,0	11,0	58,0	8,0	0,5	2,79	48004	—	—	47005	—	—	—
8,0	18,0	63,0	8,0	0,5								

# METRIC Z-Carb-HPR



## Z5MCR METRIC SERIES

**CONTINUED**

- An ideal balance of helix, indexing, flute depth, rake and relief
- Variable indexing for chatter suppression and patented edge geometry for shearing and strength
- Chatter-free geometry allows deep cutting and high speed machining
- Central coolant hole delivers coolant effectively to the cutting zone enhancing chip removal when pocketing or slotting
- Enhanced corner geometry with tight tolerance corner radii
- Excels at roughing, ramping, high speed machining and finishing in a variety of materials
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

<b>STEELS</b>
<b>STAINLESS STEELS</b>
<b>CAST IRON</b>
<b>HIGH TEMP ALLOYS</b>
<b>TITANIUM</b>
<b>HARDENED STEELS</b>

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)



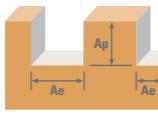
<b>TOLERANCES (mm)</b>	
<b>6 DIAMETER</b>	
DC = +0,000/-0,030	
DCON = h <sub>6</sub>	
RE = +0,000/-0,050	
<b>&gt;6-10 DIAMETER</b>	
DC = +0,000/-0,040	
DCON = h <sub>6</sub>	
RE = +0,000/-0,050	
<b>&gt;10-25 DIAMETER</b>	
DC = +0,000/-0,050	
DCON = h <sub>6</sub>	
RE = +0,000/-0,050	

	<b>Series Z5MCR Metric</b>	<b>Hardness</b>	<b>Vc (m/min)</b>	<b>DC • mm</b>										
				<b>Ae x DC</b>	<b>Ap x DC</b>	<b>RPM</b>	<b>6</b>	<b>8</b>	<b>10</b>	<b>12</b>	<b>16</b>	<b>20</b>	<b>25</b>	
<b>P</b>	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	<b>≤ 275 Bhn or ≤ 28 HRc</b>	<b>Profile</b>	<b>≤ 0.5</b>	<b>≤ 1.5</b>	<b>169 (135-203)</b>	<b>RPM</b>	<b>8967</b>	<b>6725</b>	<b>5380</b>	<b>4484</b>	<b>3363</b>	<b>2690</b>	<b>2152</b>
			<b>Slot</b>	<b>1</b>	<b>≤ 1</b>	<b>134 (107-161)</b>	<b>RPM</b>	<b>7109</b>	<b>5332</b>	<b>4265</b>	<b>3555</b>	<b>2666</b>	<b>2133</b>	<b>1706</b>
	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	<b>≤ 375 Bhn or ≤ 40 HRc</b>	<b>Profile</b>	<b>≤ 0.5</b>	<b>≤ 1.5</b>	<b>96 (77-115)</b>	<b>RPM</b>	<b>5089</b>	<b>3817</b>	<b>3054</b>	<b>2545</b>	<b>1909</b>	<b>1527</b>	<b>1221</b>
			<b>Slot</b>	<b>1</b>	<b>≤ 1</b>	<b>76 (61-91)</b>	<b>RPM</b>	<b>4039</b>	<b>3029</b>	<b>2424</b>	<b>2020</b>	<b>1515</b>	<b>1212</b>	<b>969</b>
<b>K</b>	<b>CAST IRONS (LOW &amp; MEDIUM ALLOY)</b> Gray, Malleable, Ductile	<b>≤ 220 Bhn or ≤ 19 HRc</b>	<b>Profile</b>	<b>≤ 0.5</b>	<b>≤ 1.5</b>	<b>136 (109-163)</b>	<b>RPM</b>	<b>7190</b>	<b>5392</b>	<b>4314</b>	<b>3595</b>	<b>2696</b>	<b>2157</b>	<b>1726</b>
			<b>Slot</b>	<b>1</b>	<b>≤ 1</b>	<b>108 (87-130)</b>	<b>RPM</b>	<b>5736</b>	<b>4302</b>	<b>3441</b>	<b>2868</b>	<b>2151</b>	<b>1721</b>	<b>1377</b>
	<b>CAST IRONS (HIGH ALLOY)</b> Gray, Malleable, Ductile	<b>≤ 260 Bhn or ≤ 26 HRc</b>	<b>Profile</b>	<b>≤ 0.5</b>	<b>≤ 1.5</b>	<b>104 (83-124)</b>	<b>RPM</b>	<b>5493</b>	<b>4120</b>	<b>3296</b>	<b>2747</b>	<b>2060</b>	<b>1648</b>	<b>1318</b>
			<b>Slot</b>	<b>1</b>	<b>≤ 1</b>	<b>82 (66-99)</b>	<b>RPM</b>	<b>4362</b>	<b>3272</b>	<b>2617</b>	<b>2181</b>	<b>1636</b>	<b>1309</b>	<b>1047</b>
<b>M</b>	<b>STAINLESS STEELS (FREE MACHINING)</b> 303, 416, 420F, 430F, 440F	<b>≤ 275 Bhn or ≤ 28 HRc</b>	<b>Profile</b>	<b>≤ 0.5</b>	<b>≤ 1.5</b>	<b>149 (119-179)</b>	<b>RPM</b>	<b>7917</b>	<b>5938</b>	<b>4750</b>	<b>3958</b>	<b>2969</b>	<b>2375</b>	<b>1900</b>
			<b>Slot</b>	<b>1</b>	<b>≤ 1</b>	<b>119 (95-143)</b>	<b>Fz</b>	<b>0.022</b>	<b>0.036</b>	<b>0.045</b>	<b>0.055</b>	<b>0.067</b>	<b>0.075</b>	<b>0.080</b>
	<b>STAINLESS STEELS (DIFFICULT)</b> 304, 304L, 316, 316L	<b>≤ 275 Bhn or ≤ 28 HRc</b>	<b>Profile</b>	<b>≤ 0.5</b>	<b>≤ 1.5</b>	<b>104 (83-124)</b>	<b>RPM</b>	<b>6301</b>	<b>4726</b>	<b>3781</b>	<b>3151</b>	<b>2363</b>	<b>1890</b>	<b>1512</b>
			<b>Slot</b>	<b>1</b>	<b>≤ 1</b>	<b>82 (66-99)</b>	<b>Fz</b>	<b>0.022</b>	<b>0.036</b>	<b>0.045</b>	<b>0.055</b>	<b>0.067</b>	<b>0.075</b>	<b>0.080</b>
<b>SGS Solid Tools</b>	<b>STAINLESS STEELS (PH)</b> 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	<b>≤ 325 Bhn or ≤ 35 HRc</b>	<b>Profile</b>	<b>≤ 0.5</b>	<b>≤ 1.5</b>	<b>94 (76-113)</b>	<b>RPM</b>	<b>5009</b>	<b>3756</b>	<b>3005</b>	<b>2504</b>	<b>1878</b>	<b>1503</b>	<b>1202</b>
			<b>Slot</b>	<b>1</b>	<b>≤ 1</b>	<b>76 (61-91)</b>	<b>Fz</b>	<b>0.017</b>	<b>0.030</b>	<b>0.037</b>	<b>0.043</b>	<b>0.051</b>	<b>0.059</b>	<b>0.063</b>
	<b>SGS Micro Tools</b>		<b>Profile</b>	<b>≤ 0.5</b>	<b>≤ 1.5</b>	<b>94 (76-113)</b>	<b>RPM</b>	<b>4039</b>	<b>3029</b>	<b>2424</b>	<b>2020</b>	<b>1515</b>	<b>1212</b>	<b>969</b>
			<b>Slot</b>	<b>1</b>	<b>≤ 1</b>	<b>76 (61-91)</b>	<b>Fz</b>	<b>0.017</b>	<b>0.030</b>	<b>0.037</b>	<b>0.043</b>	<b>0.051</b>	<b>0.059</b>	<b>0.063</b>

continued on next page

# METRIC Z-Carb-HPR

Series  
Z5MCR  
Metric



Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm											
				6	8	10	12	16	20	25					
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile 	$\leq 0.5$	$\leq 1.5$	24 (20-29)	RPM	1293	969	776	646	485	388	310			
					Fz	0.0160	0.0272	0.0340	0.0409	0.0478	0.0531	0.0599			
					Feed (mm/min)	103	132	132	132	116	103	93			
	Slot 				RPM	1050	788	630	525	394	315	252			
					Fz	0.0160	0.0272	0.0340	0.0409	0.0478	0.0531	0.0599			
					Feed (mm/min)	84	107	107	107	94	84	75			
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile 	$\leq 0.5$	$\leq 1.5$	19 (15-23)	RPM	1002	751	601	501	376	301	240			
					Fz	0.0112	0.0192	0.0239	0.0284	0.0333	0.0371	0.0420			
					Feed (mm/min)	56	72	72	71	63	56	50			
	Slot 				RPM	808	606	485	404	303	242	194			
					Fz	0.0112	0.0192	0.0239	0.0284	0.0333	0.0371	0.0420			
					Feed (mm/min)	45	58	58	57	50	45	41			
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Cr2Mo, Ti4Al4Mo2Sn0.5Si	Profile 	$\leq 0.5$	$\leq 1.5$	66 (52-79)	RPM	3474	2605	2084	1737	1303	1042	834			
					Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.070			
					Feed (mm/min)	333	417	417	417	367	333	292			
	Slot 				RPM	2747	2060	1648	1373	1030	824	659			
					Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.070			
					Feed (mm/min)	264	330	330	330	290	264	231			
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile 	$\leq 0.5$	$\leq 1.5$	23 (18-27)	RPM	1212	909	727	606	454	364	291			
					Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.071			
					Feed (mm/min)	116	145	145	145	128	116	103			
	Slot 				RPM	969	727	582	485	364	291	233			
					Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.071			
					Feed (mm/min)	93	116	116	116	102	93	83			
H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile 	$\leq 0.5$	$\leq 1.5$	56 (45-68)	RPM	2989	2242	1793	1495	1121	897	717			
					Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.065			
					Feed (mm/min)	251	335	335	323	287	263	233			
	Slot 				RPM	2343	1757	1406	1171	879	703	562			
					Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.065			
					Feed (mm/min)	197	262	262	253	225	206	183			

Bhn (Brinell)      HRc (Rockwell C)

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

mm/min = Fz x 5 x rpm

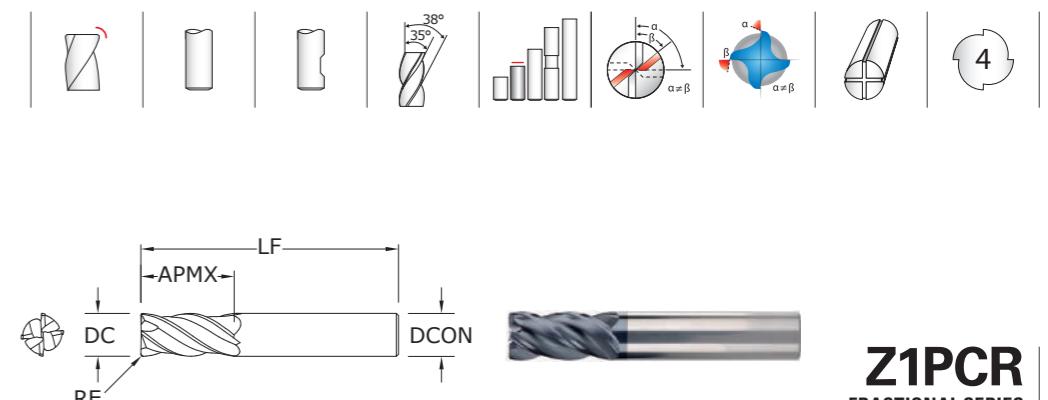
ramp up to 5 degrees using slotting speed and feed rates. Do not plunge.

reduce speed and feed for materials harder than listed

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

feed rates listed have chip thinning adjustments included where applicable

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))



## TOLERANCES (inch)

### <1/8 DIAMETER

DC =  $+0.0005/-0.0005$

DCON =  $h_6$

RE =  $+0.000/-0.0010$

### 1/8-1/4 DIAMETER

DC =  $+0.000/-0.0012$

DCON =  $h_6$

RE =  $+0.000/-0.0020$

### >1/4-3/8 DIAMETER

DC =  $+0.000/-0.0016$

DCON =  $h_6$

RE =  $+0.000/-0.0020$

### >3/8-1 DIAMETER

DC =  $+0.000/-0.0020$

DCON =  $h_6$

RE =  $+0.000/-0.0020$

### STEELS

### STAINLESS STEELS

### CAST IRON

### HIGH TEMP ALLOYS

### TITANIUM

### HARDENED STEELS

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

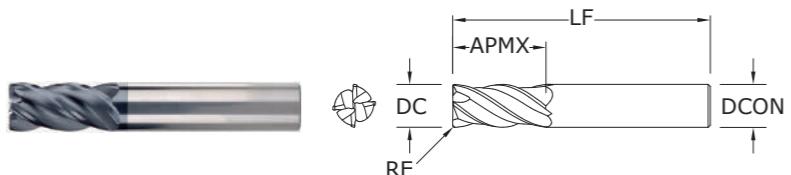
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	EDP NO.		JetStream
					TI-NAMITE-X	TI-NAMITE-X W/FLAT	
1/64	1/32	1-1/2	1/8	.002	36874*	—	—
1/32	5/64	1-1/2	1/8	.005	36875*	—	—
3/64	7/64	1-1/2	1/8	.005	36876*	—	—
1/16	3/16	1-1/2	1/8	.005	36872*	—	—
5/64	3/16	1-1/2	1/8	.005	36877*	—	—
3/32	9/32	1-1/2	1/8	.010	36873*	—	—
7/64	3/8	1-1/2	1/8	.010	36878*	—	—
1/8	3/8	1-1/2	1/8	.010	36370	—	—
1/8	3/8	1-1/2	1/8	.015	36851	—	—
3/16	7/16	2	3/16	.010	36371	—	—
3/16	7/16	2	3/16	.015	36852	—</	

## FRACTIONAL Z-Carb-AP



### Z1PCR FRACTIONAL SERIES

CONTINUED



#### TOLERANCES (inch)

##### <1/8 DIAMETER

**DC** = +0.0005/-0.0005  
**DCON** = h<sub>6</sub>  
**RE** = +0.000/-0.0010

##### 1/8-1/4 DIAMETER

**DC** = +0.000/-0.0012  
**DCON** = h<sub>6</sub>  
**RE** = +0.000/-0.0020

##### >1/4-3/8 DIAMETER

**DC** = +0.000/-0.0016  
**DCON** = h<sub>6</sub>  
**RE** = +0.000/-0.005

##### >3/8-1 DIAMETER

**DC** = +0.000/-0.0020  
**DCON** = h<sub>6</sub>  
**RE** = +0.000/-0.0020

##### >3/8-1 DIAMETER

**DC** = +0.000/-0.0020  
**DCON** = h<sub>6</sub>  
**RE** = +0.000/-0.0020

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

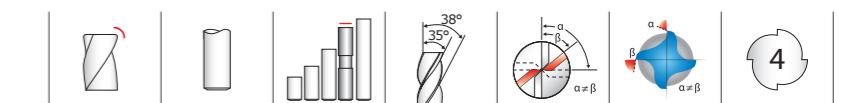
For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

KYOCERA Solid Tools

SGS Solid Tools

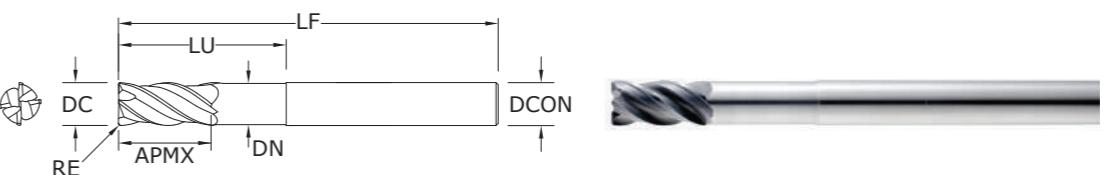
SGS Micro Tools

## FRACTIONAL Z-Carb-AP



### Z1PLC FRACTIONAL SERIES

CONTINUED



#### TOLERANCES (inch)

##### 1/4 DIAMETER

**DC** = +0.0000/-0.0012  
**DCON** = h<sub>6</sub>  
**RE** = +0.000/-0.005

##### >1/4-3/8 DIAMETER

**DC** = +0.0000/-0.0016  
**DCON** = h<sub>6</sub>  
**RE** = +0.000/-0.005

##### >3/8-1 DIAMETER

**DC** = +0.0000/-0.0020  
**DCON** = h<sub>6</sub>  
**RE** = +0.000/-0.005

##### >3/8-1 DIAMETER

**DC** = +0.0000/-0.0020  
**DCON** = h<sub>6</sub>  
**RE** = +0.000/-0.0020

##### >3/8-1 DIAMETER

**DC** = +0.0000/-0.0020  
**DCON** = h<sub>6</sub>  
**RE** = +0.000/-0.0020

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

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

CONTINUED

• Variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level

• Unequal helix design changes the cutting angle to improve harmonics

• Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics

• Long reach design allows for deeper and faster cuts

• Enhanced corner geometry with tight tolerance corner radii

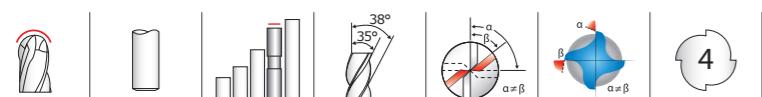
• Recommended for materials ≤ 45 HRC (≤ 420 Bhn)

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

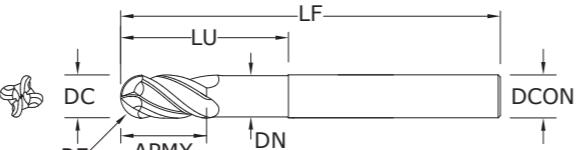
# FRACTIONAL Z-Carb-AP



## Z1PLB

FRACTIONAL SERIES

- Variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Unequal helix design changes the cutting angle to improve harmonics
- Long reach design allows for deeper and faster cuts
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)



RE = 1/2 Cutting Diameter (DC)

inch							EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	Ti-NAMITE-X	
1/4	1/2	4	1/4	1-1/4	.230	36480	
5/16	13/16	4	5/16	1-5/8	.293	36482	
3/8	7/8	5	3/8	1-7/8	.355	36486	
7/16	1	6	7/16	2	.418	38490	
1/2	1	6	1/2	2-1/4	.480	38492	
9/16	1-1/8	6	9/16	2-1/2	.543	38496	
5/8	1-1/4	6	5/8	3	.605	36500	
3/4	1-1/2	6	3/4	3-1/2	.730	36502	
1	1-1/2	6	1	4	.980	36504	

### TOLERANCES (inch)

#### 1/4 DIAMETER

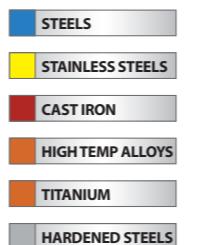
DC = +0.0000/-0.0012  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0006

#### >1/4-3/8 DIAMETER

DC = +0.0000/-0.0016  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0008

#### >3/8-1 DIAMETER

DC = +0.0000/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0010



For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

Series  
Z1, Z16CR, Z1PCR,  
Z1PLC, Z1PLB  
Fractional

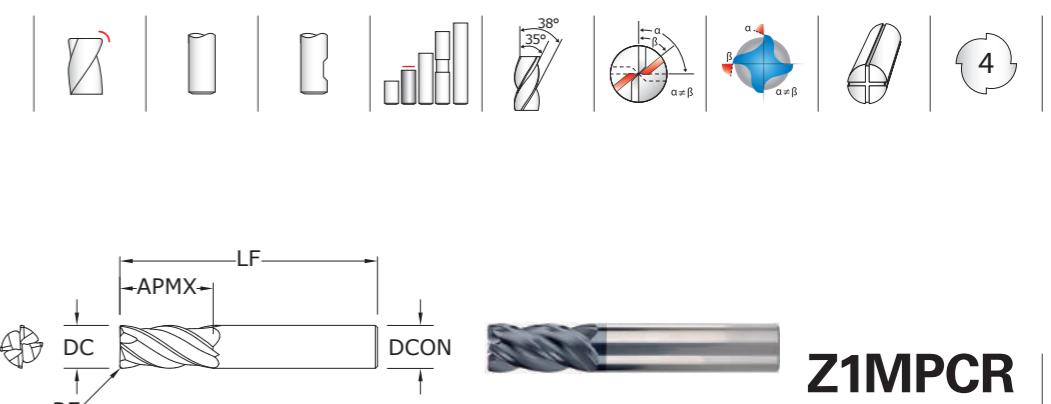
Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in							
				1/64	1/8	1/4	3/8	1/2	5/8	3/4	1
<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Profile ≤ 0.5 (444-666)	≤ 1.5	555 RPM	135904	16961	8480	5654	4240	3392	2827	2120
	Slot ≤ 275 Bhn or ≤ 28 HRc		Fz Feed (ipm)	0.00005	0.00046	0.0012	0.0023	0.0031	0.0034	0.0037	0.0043
<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Profile ≤ 0.5 (252-378)	≤ 1.5	440 RPM	107744	13446	6723	4482	3362	2689	2241	1681
	Slot ≤ 375 Bhn or ≤ 40 HRc		Fz Feed (ipm)	0.00005	0.00046	0.0012	0.0023	0.0031	0.0034	0.0037	0.0043
<b>STAINLESS STEELS (FREE MACHINING)</b> 303, 416, 420F, 430F, 440F	Profile ≤ 0.5 (392-588)	≤ 1.5	315 RPM	77135	9626	4813	3209	2407	1925	1604	1203
	Slot ≤ 275 Bhn or ≤ 28 HRc		Fz Feed (ipm)	0.00004	0.00034	0.0009	0.0017	0.0023	0.0026	0.0028	0.0032
<b>STAINLESS STEELS (DIFFICULT)</b> 304, 304L, 316, 316L	Profile ≤ 0.5 (272-408)	≤ 1.5	490 RPM	119987	14974	7487	4991	3744	2995	2496	1872
	Slot ≤ 275 Bhn or ≤ 28 HRc		Fz Feed (ipm)	0.00004	0.00034	0.0009	0.0017	0.0023	0.0026	0.0028	0.0032
<b>STAINLESS STEELS (PH)</b> 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	Profile ≤ 0.5 (248-372)	≤ 1.5	390 RPM	95500	11918	5959	3973	2980	2384	1986	1490
	Slot ≤ 325 Bhn or ≤ 35 HRc		Fz Feed (ipm)	0.00004	0.00034	0.0009	0.0017	0.0023	0.0026	0.0028	0.0032
<b>CAST IRONS (LOW &amp; MEDIUM ALLOY)</b> Gray, Malleable, Ductile	Profile ≤ 0.5 (356-534)	≤ 1.5	340 RPM	83256	10390	5195	3463	2598	2078	1732	1299
	Slot ≤ 220 Bhn or ≤ 19 HRc		Fz Feed (ipm)	0.00003	0.00027	0.0007	0.0014	0.0018	0.0020	0.0022	0.0025
			270 RPM	66115	8251	4126	2750	2063	1650	1375	1031
			Fz Feed (ipm)	0.00003	0.00027	0.0007	0.0014	0.0018	0.0020	0.0022	0.0025
			310 RPM	75910	9474	4737	3158	2368	1895	1579	1184
			Fz Feed (ipm)	0.00003	0.00027	0.0007	0.0014	0.0018	0.0020	0.0022	0.0025
			250 RPM	61218	7640	3820	2547	1910	1528	1273	955
			Fz Feed (ipm)	0.00003	0.00027	0.0007	0.0014	0.0018	0.0020	0.0022	0.0025
			445 RPM	108968	13599	6800	4533	3400	2720	2267	1700
			Fz Feed (ipm)	0.00005	0.00042	0.0011	0.0021	0.0028	0.0031	0.0034	0.0039
			355 RPM	86929	10849	5424	3616	2712	2170	1808	1356
			Fz Feed (ipm)	0.00005	0.00042	0.0011	0.0021	0.0028	0.0031	0.0034	0.0039

continued on next page

# FRACTIONAL Z-Carb-AP

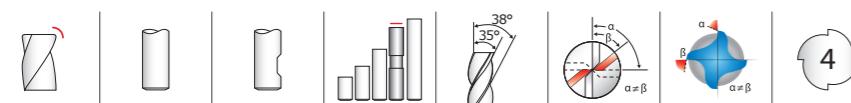
Series Z1, Z16CR, Z1PCR, Z1PLC, Z1PLB Fractional	Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in									
					1/64	1/8	1/4	3/8	1/2	5/8	3/4	1		
K  CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	$\leq 260 \text{ Bhn}$ $\leq 26 \text{ HRc}$	Profile 	$\leq 0.5$	$\leq 1.5$	340	RPM	83256	10390	5195	3463	2598	2078	1732	1299
					(272-408)	Fz	0.00004	0.00031	0.0008	0.0016	0.0021	0.0023	0.0025	0.0029
	$\leq 300 \text{ Bhn}$ $\leq 32 \text{ HRc}$	Slot 	1	$\leq 1$	270	RPM	66115	8251	4126	2750	2063	1650	1375	1031
					(216-324)	Fz	0.00004	0.00031	0.0008	0.0016	0.0021	0.0023	0.0025	0.0029
S  SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	$\leq 300 \text{ Bhn}$ $\leq 32 \text{ HRc}$	Profile 	$\leq 0.5$	$\leq 1.5$	80	RPM	19590	2445	1222	815	611	489	407	306
					(64-96)	Fz	0.00003	0.00025	0.0007	0.0013	0.0017	0.0019	0.0020	0.0024
	$\leq 400 \text{ Bhn}$ $\leq 43 \text{ HRc}$	Slot 	1	$\leq 1$	65	RPM	15917	1986	993	662	497	397	331	248
					(52-78)	Fz	0.00003	0.00025	0.0007	0.0013	0.0017	0.0019	0.0020	0.0024
S  SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	$\leq 400 \text{ Bhn}$ $\leq 43 \text{ HRc}$	Profile 	$\leq 0.5$	$\leq 1.5$	62	RPM	15182	1895	947	632	474	379	316	237
					(50-74)	Fz	0.00002	0.00018	0.0005	0.0009	0.0012	0.0013	0.0014	0.0017
	$\leq 350 \text{ Bhn}$ $\leq 38 \text{ HRc}$	Slot 	1	$\leq 1$	50	RPM	12244	1528	764	509	382	306	255	191
					(40-60)	Fz	0.00002	0.00018	0.0005	0.0009	0.0012	0.0013	0.0014	0.0017
T  TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	$\leq 350 \text{ Bhn}$ $\leq 38 \text{ HRc}$	Profile 	$\leq 0.5$	$\leq 1.5$	215	RPM	52647	6570	3285	2190	1643	1314	1095	821
					(172-258)	Fz	0.00003	0.0003	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028
	$\leq 440 \text{ Bhn}$ $\leq 47 \text{ HRc}$	Slot 	1	$\leq 1$	170	RPM	41628	5195	2598	1732	1299	1039	866	649
					(136-204)	Fz	0.00003	0.0003	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028
T  TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	$\leq 440 \text{ Bhn}$ $\leq 47 \text{ HRc}$	Profile 	$\leq 0.5$	$\leq 1.5$	75	RPM	18365	2292	1146	764	573	458	382	287
					(60-90)	Fz	0.00003	0.0003	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028
	$\leq 375 \text{ Bhn}$ $\leq 40 \text{ HRc}$	Slot 	1	$\leq 1$	60	RPM	14692	1834	917	611	458	367	306	229
					(48-72)	Fz	0.00003	0.0003	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028
H  TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	$\leq 375 \text{ Bhn}$ $\leq 40 \text{ HRc}$	Profile 	$\leq 0.5$	$\leq 1.5$	185	RPM	45301	5654	2827	1885	1413	1131	942	707
					(148-222)	Fz	0.00003	0.00028	0.0007	0.0014	0.0018	0.0020	0.0022	0.0026
	$\leq 375 \text{ Bhn}$ $\leq 40 \text{ HRc}$	Slot 	1	$\leq 1$	145	RPM	35506	4431	2216	1477	1108	886	739	554
					(116-174)	Fz	0.00003	0.00028	0.0007	0.0014	0.0018	0.0020	0.0022	0.0026

Bhn (Brinell)    HRc (Rockwell C)  
 rpm = Vc x 3.82 / DC  
 ipm = Fz x 4 x rpm  
 maximum Slotted Ap for Z1PCR <1/8 diameter and all Z1PLC / Z1PLB is .25 x DC  
 maximum Profile Ae for Z1PCR <1/8 diameter and all Z1PLC / Z1PLB is .20 x DC  
 reduce speed and feed for materials harder than listed  
 reduce feed and Ae when finish milling (.02 x DC maximum)  
 feed rates listed have chip thinning adjustments included where applicable  
 refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))



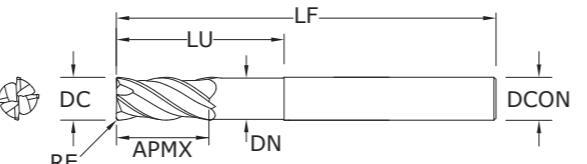
TOLERANCES (mm)		mm	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	Ti-NAMITE-X	Ti-NAMITE-X W/FLAT	EDP NO.	JetStream
CUTTING DIAMETER DC	LENGTH OF CUT APMX								
DC = +0,012/-0,012	1,0	3,0	57,0	6,0	0,1	46873*	—	—	—
DCON = h6	1,5	4,5	57,0	6,0	0,1	46849*	—	—	—
RE = +0,000/-0,025	2,0	6,0	57,0	6,0	0,2	46850*	—	—	—
DC = +0,000/-0,030	2,5	7,0	57,0	6,0	0,2	46874*	—	—	—
DCON = h6	3,0	8,0	57,0	6,0	0,3	46851	—	—	—
RE = +0,000/-0,050	3,0	8,0	57,0	6,0	0,5	46880	—	—	—
DC = +0,000/-0,040	4,0	11,0	57,0	6,0	0,3	46852	—	—	—
DCON = h6	4,0	11,0	57,0	6,0	0,5	46881	—	—	—
RE = +0,000/-0,050	5,0	13,0	57,0	6,0	0,3	46853	—	—	—
DC = +0,000/-0,040	6,0	13,0	57,0	6,0	0,25	46882	—	—	—
DCON = h6	6,0	13,0	57,0	6,0	0,5	46854	—	—	—
RE = +0,000/-0,050	6,0	13,0	57,0	6,0	1,0	46855	—	—	—
DC = +0,000/-0,050	6,0	13,0	57,0	6,0	1,5	46884	—	—	—
DCON = h6	8,0	19,0	63,0	8,0	0,5	46856	—	—	—
RE = +0,000/-0,050	8,0	19,0	63,0	8,0	1,0	46857	—	—	—
DC = +0									

# METRIC Z-Carb-AP



## Z1MPIC • Z1MPLC METRIC SERIES

- Variable rake geometry alters and controls the cutting dynamics taking chatter suppression to an unprecedented level
- Unequal helix design changes the cutting angle to improve harmonics
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Long reach design allows for deeper and faster cuts
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



### EDP NO.

### TOLERANCES (mm)

#### 6 DIAMETER

DC = +0,000/-0,030  
DCON = h<sub>6</sub>  
RE = +0,000/-0,050

#### >6-10 DIAMETER

DC = +0,000/-0,040  
DCON = h<sub>6</sub>  
RE = +0,000/-0,050

#### >10-20 DIAMETER

DC = +0,000/-0,050  
DCON = h<sub>6</sub>  
RE = +0,000/-0,050

#### STEELS

#### STAINLESS STEELS

#### CAST IRON

#### HIGH TEMP ALLOYS

#### TITANIUM

#### HARDENED STEELS

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

mm								EDP NO.	
CUTTING DIAMETER	LENGTH OF CUT	OVERALL LENGTH	SHANK DIAMETER	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	Ti-NAMITE-X	Ti-NAMITE-X W/FLAT	
DC	APMX	LF	DCON						
6,0	8,0	75,0	6,0	24,0	5,49	0,5	46821	—	
8,0	10,0	75,0	8,0	32,0	7,49	1,0	46822	—	
8,0	10,0	75,0	8,0	32,0	7,49	2,0	46823	—	
10,0	12,0	100,0	10,0	40,0	9,50	1,0	46824	—	
10,0	12,0	100,0	10,0	40,0	9,50	2,0	46825	—	
12,0	15,0	100,0	12,0	48,0	11,48	1,0	46826	46928	
12,0	15,0	100,0	12,0	48,0	11,48	1,5	46827	46929	
12,0	15,0	100,0	12,0	48,0	11,48	2,0	46828	46930	
12,0	15,0	100,0	12,0	48,0	11,48	3,0	46829	46931	
12,0	26,0	83,0	12,0	36,0	11,48	2,5	—	42731	
12,0	26,0	83,0	12,0	36,0	11,48	3,0	—	42732	
12,0	26,0	83,0	12,0	36,0	11,48	4,0	—	42733	
16,0	32,0	92,0	16,0	42,0	15,49	2,5	—	42734	
16,0	32,0	92,0	16,0	42,0	15,49	4,0	—	42735	
16,0	32,0	92,0	16,0	42,0	15,49	6,0	—	42736	
16,0	20,0	115,0	16,0	65,0	15,49	1,0	46830	46932	
16,0	20,0	115,0	16,0	65,0	15,49	1,5	46831	46933	
16,0	20,0	115,0	16,0	65,0	15,49	2,0	46832	46934	
16,0	20,0	115,0	16,0	65,0	15,49	3,0	46833	46935	
16,0	20,0	115,0	16,0	65,0	15,49	4,0	46834	46936	
16,0	20,0	115,0	16,0	65,0	15,49	5,0	46835	46937	
20,0	24,0	140,0	20,0	80,0	19,48	1,0	46836	46938	
20,0	24,0	140,0	20,0	80,0	19,48	1,5	46837	46939	
20,0	24,0	140,0	20,0	80,0	19,48	2,0	46838	46940	
20,0	24,0	140,0	20,0	80,0	19,48	3,0	46839	46941	
20,0	24,0	140,0	20,0	80,0	19,48	4,0	46840	46942	
20,0	24,0	140,0	20,0	80,0	19,48	5,0	46841	46943	
20,0	38,0	104,0	20,0	52,0	19,48	2,5	—	42737	
20,0	38,0	104,0	20,0	52,0	19,48	4,0	—	42738	
20,0	38,0	104,0	20,0	52,0	19,48	6,0	—	42739	

Series  
Z1M, Z1MPCR,  
Z1MPIC, Z1MPLC  
Metric

Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm									
				1	3	6	8	10	12	16	20	25	
Profile	≤ 0.5	≤ 1.5	169	RPM	53803	17934	8967	6725	5380	4484	3363	2690	2152
CARB STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	(135-203)	Fz	0.0030	0.0109	0.029	0.049	0.061	0.074	0.087	0.099	0.108	
Slot	1	≤ 1	134	RPM	42654	14218	7109	5332	4265	3555	2666	2133	1706
(Fz)	(107-161)	Feed (mm/min)	512	620	825	1045	1041	1052	928	845	737		
Profile	≤ 0.5	≤ 1.5	96	RPM	30537	10179	5089	3817	3054	2545	1909	1527	1221
ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	(77-115)	Fz	0.0023	0.0081	0.022	0.036	0.045	0.055	0.067	0.075	0.080	
Slot	1	≤ 1	76	RPM	24235	8078	4039	3029	2424	2020	1515	1212	969
(Fz)	(61-91)	Feed (mm/min)	223	262	355	436	436	444	406	364	310		
Profile	≤ 0.5	≤ 1.5	149	RPM	47501	15834	7917	5938	4750	3958	2969	2375	1900
STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	(119-179)	Fz	0.0023	0.0081	0.022	0.036	0.045	0.055	0.067	0.075	0.080	
Slot	1	≤ 1	119	RPM	37807	12602	6301	4726	3781	3151	2363	1890	1512
(Fz)	(95-143)	Feed (mm/min)	348	408	555	681	681	693	633	567	484		
Profile	≤ 0.5	≤ 1.5	104	RPM	32960	10987	5493	4120	3296	2747	2060	1648	1318
STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	(83-124)	Fz	0.0018	0.0064	0.017	0.030	0.037	0.043	0.051	0.059	0.063	
Slot	1	≤ 1	82	RPM	26174	8725	4362	3272	2617	2181	1636	1309	1047
(Fz)	(66-99)	Feed (mm/min)	188	223	297	393	387	375	334	309	264		
Profile	≤ 0.5	≤ 1.5	94	RPM	30052	10017	5009	3756	3005	2504	1878	1503	1202
STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	(76-113)	Fz	0.0018	0.0064	0.017	0.030	0.037	0.043	0.051	0.059	0.063	
Slot	1	≤ 1	76	RPM	24235	8							

# METRIC Z-Carb-AP

Series Z1M, Z1MPCR, Z1MPIC, Z1MPLC Metric	Hardness	Ae x DC Ap x DC	Vc (m/min)	DC • mm													
				1	3	6	8	10	12	16	20	25					
K	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	Profile 	$\leq 0.5$	$\leq 1.5$	104	RPM	32960	10987	5493	4120	3296	2747	2060	1648	1318		
					Fz	0.0020	0.0074	0.020	0.034	0.043	0.050	0.059	0.067	0.074			
		Slot 			82	RPM	26174	8725	4362	3272	2617	2181	1636	1309	1047		
					Fz	0.0020	0.0074	0.020	0.034	0.043	0.050	0.059	0.067	0.074			
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile 	$\leq 0.5$	$\leq 1.5$	24	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 			20	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	Profile 	$\leq 0.5$	$\leq 1.5$	19	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 			20	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	Profile 	$\leq 0.5$	$\leq 1.5$	66	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 			52	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			
H	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile 	$\leq 0.5$	$\leq 1.5$	23	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 			18	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			
	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile 	$\leq 0.5$	$\leq 1.5$	56	RPM	17934	5978	2989	2242	1793	1495	1121	897	717		
					Fz	0.0018	0.0066	0.017	0.030	0.037	0.043	0.051	0.059	0.065			
		Slot 			44	RPM	14057	4686	2343	1757	1406	1171	879	703	562		
					Fz	0.0018	0.0066	0.017	0.030	0.037	0.043	0.051	0.059	0.065			

Bhn (Brinell)      HRc (Rockwell C)

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

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

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

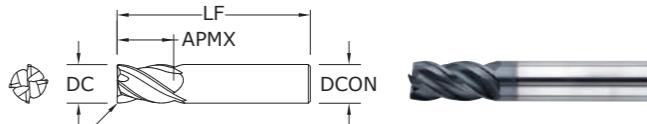
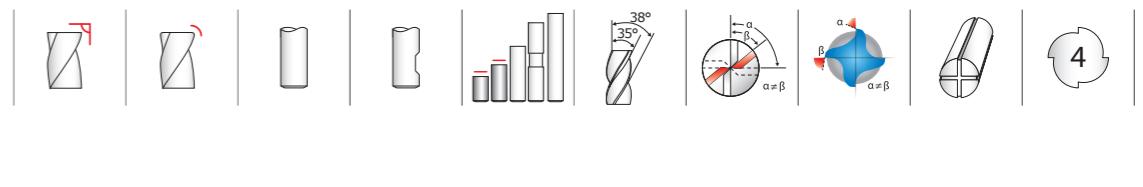
maximum Profile Ae for Z1PCR <3mm diameter and all Z1MPLC / Z1MPLB is .20 x DC

reduce speed and feed for materials harder than listed

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

feed rates listed have chip thinning adjustments included where applicable

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))



## TOLERANCES (inch)

### 1/8-1/4 DIAMETER

DC = +0.0000/-0.0012

DCON = h6

RE = +0.00/-0.002

### >1/4-3/8 DIAMETER

DC = +0.0000/-0.0016

DCON = h6

RE = +0.000/-0.002

### >3/8-3/4 DIAMETER

DC = +0.0000/-0.0020

DCON = h6

RE = +0.000/-0.002

### STEELS

### STAINLESS STEELS

### CAST IRON

### HIGH TEMP ALLOYS

### TITANIUM

### HARDENED STEELS

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

inch					EDP NO.	JetStream
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	TI-NAMITE-X	TI-NAMITE-X W/FLAT
1/8	1/4	1-1/2	1/8	.015	36505	—
1/8	3/8	1-1/2	1/8	—	36404	—
5/32	5/16	2	3/16	.015	36506	—
5/32	7/16	2	3/16	—	36406	—
3/16	3/8	2	3/16	.015	36507	—
3/16	7/16	2	3/16	—	36408	—
7/32	3/8	2	1/4	.020	36508	—
1/4	1/2	2-1/2	1/4	—	36416	—
1/4	7/16	2	1/4	.020	36509	—
1/4	3/4	2-1/2	1/4	—	36596	—
9/32	5/8	2-1/2	5/16	—	36418	—
5/16	1/2	2	5/16	.020	36511	—
5/16	13/16	2-1/2	5/16	—	36420	—
11/32	13/16	2-1/2	3/8	—	36422	—
3/8	5/8	2	3/8	.020	36513	—
3/8	7/8	2-1/2	3/8	—	3642	

# FRACTIONAL Z-Carb



Z1B

## FRACTIONAL SERIES

inch				EDP NO.		
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	Ti-NAMITE-X (TX)	Ti-NAMITE-X (TX) W/FLAT	JetStream
1/8	3/8	1-1/2	1/8	36358	—	—
5/32	7/16	2	3/16	36357	—	—
3/16	7/16	2	3/16	36359	—	—
7/32	7/16	2-1/2	1/4	36361	—	—
1/4	1/2	2-1/2	1/4	36344	—	—
1/4	3/4	2-1/2	1/4	36590	—	—
9/32	5/8	2-1/2	5/16	36353	—	—
5/16	13/16	2-1/2	5/16	36345	—	—
11/32	13/16	2-1/2	3/8	36354	—	—
3/8	7/8	2-1/2	3/8	36346	36539	—
13/32	15/16	2-3/4	7/16	36355	36540	—
7/16	1	2-3/4	7/16	36347	36541	—
15/32	1	3	1/2	36356	36542	—
1/2	1	3	1/2	36348	36543	36846
1/2	1-1/4	3-1/4	1/2	36591	36592	—
9/16	1-1/8	3-1/2	9/16	36349	36544	36847
5/8	1-1/4	3-1/2	5/8	36350	36545	36848
3/4	1-1/2	4	3/4	36351	36546	36849
1	1-1/2	4	1	36352	36547	36850

**RE = 1/2 Cutting Diameter (DC)**

## **TOLERANCES (inch)**

**1/8-1/4 DIAMETER**

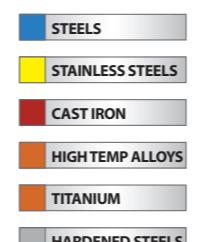
**DC** = +0.0000/-0.0012  
**DCON** = h<sub>6</sub>  
**BE** = +0.0000/-0.0006

>1/4-3/8 DIAMETER

**>1/4-3/8 DIAMETER**  
**DC = +0.0000/-0.0016**  
**DCON = h<sub>6</sub>**  
**DE = -0.0000/+0.0000**

→ 2/8 - 1 PLUMMETED

**>3/8-1 DIAMETER**  
**DC = +0.0000/-0.0020**  
**DCON = h<sub>6</sub>**  
**RE = +0.0000/-0.0010**



For patent  
information visit  
[www.ksnpatents.com](http://www.ksnpatents.com)

Series Z1B Fractional		Hardness		Vc (sfm)		DC • in						
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	555	RPM	16961	8480	5654	4240	3392	2827	2120
				≤ 0.5	≤ 1.5	(444-666)	Fz	0.0004	0.0010	0.0019	0.0025	0.0031
ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc		Slot	440	RPM	13446	6723	4482	3362	2689	2241	1681
				1	≤ 1	(352-528)	Fz	0.0004	0.0010	0.0019	0.0025	0.0031
SUS	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile	315	RPM	9626	4813	3209	2407	1925	1604	1203
				≤ 0.5	≤ 1.5	(252-378)	Fz	0.0003	0.0008	0.0014	0.0019	0.0024
M	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Slot	250	RPM	7640	3820	2547	1910	1528	1273	955
				1	≤ 1	(200-300)	Fz	0.0003	0.0008	0.0014	0.0019	0.0024
PH	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Profile	490	RPM	14974	7487	4991	3744	2995	2496	1872
				≤ 0.5	≤ 1.5	(392-588)	Fz	0.0003	0.0007	0.0014	0.0018	0.0023
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Slot	390	RPM	11918	5959	3973	2980	2384	1986	1490
				1	≤ 1	(312-468)	Fz	0.0003	0.0007	0.0014	0.0018	0.0023
SUS	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	340	RPM	10390	5195	3463	2598	2078	1732	1299
				≤ 0.5	≤ 1.5	(272-408)	Fz	0.0002	0.0006	0.0011	0.0014	0.0018
PH	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Slot	270	RPM	8251	4126	2750	2063	1650	1375	1031
				1	≤ 1	(216-324)	Fz	0.0002	0.0006	0.0011	0.0014	0.0018
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile	310	RPM	9474	4737	3158	2368	1895	1579	1184
				≤ 0.5	≤ 1.5	(248-372)	Fz	0.0002	0.0006	0.0011	0.0014	0.0018
SUS	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Slot	250	RPM	7640	3820	2547	1910	1528	1273	955
				1	≤ 1	(200-300)	Fz	0.0002	0.0006	0.0011	0.0014	0.0018
PH	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Profile	445	RPM	13599	6800	4533	3400	2720	2267	1700
				≤ 0.5	≤ 1.5	(356-534)	Fz	0.0004	0.0010	0.0018	0.0024	0.0030
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Slot	355	RPM	10849	5424	3616	2712	2170	1808	1356
				1	≤ 1	(284-426)	Fz	0.0004	0.0010	0.0018	0.0024	0.0030

*continued on next page*

# FRACTIONAL Z-Carb

Series Z1B Fractional	Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in								
					1/8	1/4	3/8	1/2	5/8	3/4	1		
K	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	Profile 	$\leq 0.5$	$\leq 1.5$	340	RPM	10390	5195	3463	2598	2078	1732	1299
					(272-408)	Fz	0.0003	0.0007	0.0014	0.0018	0.0023	0.0024	0.0025
		Slot 	1	$\leq 1$	270	RPM	8251	4126	2750	2063	1650	1375	1031
					(216-324)	Fz	0.0003	0.0007	0.0014	0.0018	0.0023	0.0024	0.0025
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile 	$\leq 0.5$	$\leq 1.5$	80	RPM	2445	1222	815	611	489	407	306
					(64-96)	Fz	0.0002	0.0004	0.0008	0.0010	0.0013	0.0014	0.0015
		Slot 	1	$\leq 1$	65	RPM	1986	993	662	497	397	331	248
					(52-78)	Fz	0.0002	0.0004	0.0008	0.0010	0.0013	0.0014	0.0015
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile 	$\leq 0.5$	$\leq 1.5$	62	RPM	1895	947	632	474	379	316	237
					(50-74)	Fz	0.0001	0.0003	0.0005	0.0007	0.0008	0.0009	0.0010
		Slot 	1	$\leq 1$	50	RPM	1497	749	499	374	299	250	187
					(40-60)	Fz	0.0001	0.0003	0.0005	0.0007	0.0008	0.0009	0.0010
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Profile 	$\leq 0.5$	$\leq 1.5$	215	RPM	6570	3285	2190	1643	1314	1095	821
					(172-258)	Fz	0.0002	0.0005	0.0010	0.0013	0.0016	0.0017	0.0018
		Slot 	1	$\leq 1$	170	RPM	5195	2598	1732	1299	1039	866	649
					(136-204)	Fz	0.0002	0.0005	0.0010	0.0013	0.0016	0.0017	0.0018
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile 	$\leq 0.5$	$\leq 1.5$	75	RPM	2292	1146	764	573	458	382	287
					(60-90)	Fz	0.0002	0.0005	0.0010	0.0013	0.0016	0.0017	0.0018
		Slot 	1	$\leq 1$	60	RPM	1834	917	611	458	367	306	229
					(48-72)	Fz	0.0002	0.0005	0.0010	0.0013	0.0016	0.0017	0.0018
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile 	$\leq 0.5$	$\leq 1.5$	185	RPM	5654	2827	1885	1413	1131	942	707
					(148-222)	Fz	0.0002	0.0005	0.0010	0.0013	0.0016	0.0017	0.0018
		Slot 	1	$\leq 1$	145	RPM	4431	2216	1477	1108	886	739	554
					(116-174)	Fz	0.0002	0.0005	0.0010	0.0013	0.0016	0.0017	0.0018

Bhn (Brinell)      HRc (Rockwell C)

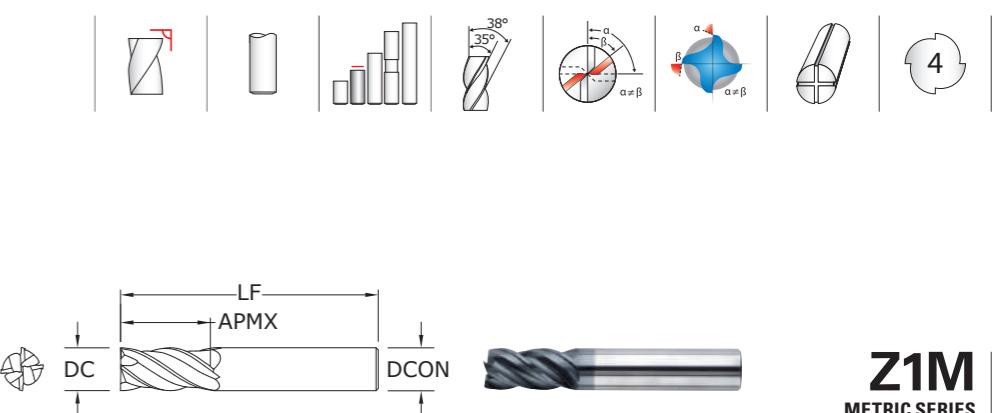
rpm =  $V_c \times 3.82 / DC$

ipm =  $F_z \times 4 \times rpm$

reduce speed and feed for materials harder than listed

reduce feed and Ae when finish milling ( $.02 \times DC$  maximum)

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))



## TOLERANCES (mm)

### 3–6 DIAMETER

DC =  $+0,000/-0,030$

DCON =  $h_6$

### >6–10 DIAMETER

DC =  $+0,000/-0,040$

DCON =  $h_6$

### >10–25 DIAMETER

DC =  $+0,000/-0,050$

DCON =  $h_6$

### STEELS

### STAINLESS STEELS

### CAST IRON

### HIGH TEMP ALLOYS

### TITANIUM

### HARDENED STEELS

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.	
				Ti-NAMITE-X (TX)	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

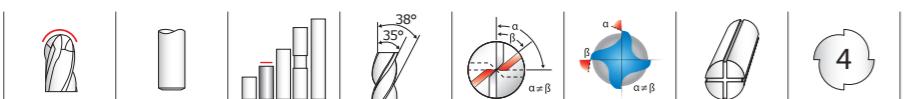
Refer to page 47 for speed & feed recommendations

# METRIC Z-Carb

## Z1M METRIC SERIES

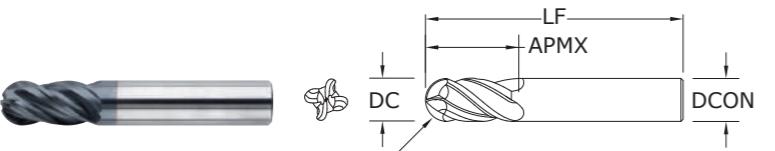
- Variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Unequal helix design reduces damaging harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic 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  $\leq 45$  HRc ( $\leq 420$  Bhn)

# METRIC Z-Carb



## Z1MB METRIC SERIES

- Unequal helix design reduces 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)



	CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.	
	mm					
	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

RE = 1/2 Cutting Diameter (DC)



SOLID CARBIDE END MILLS

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### TOLERANCES (mm)

#### 3-6 DIAMETER

DC = +0,000/-0,030  
DCON = h<sub>6</sub>

RE = +0,000/-0,015

#### >6-10 DIAMETER

DC = +0,000/-0,040  
DCON = h<sub>6</sub>

RE = +0,000/-0,020

#### >10-25 DIAMETER

DC = +0,000/-0,050  
DCON = h<sub>6</sub>

RE = +0,000/-0,025

#### STEELS

#### STAINLESS STEELS

#### CAST IRON

#### HIGH TEMP ALLOYS

#### TITANIUM

#### HARDENED STEELS

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

Series Z1MB Metric	Hardness	Ae x DC    Ap x DC	Vc (m/min)	DC • mm								
				3	6	8	10	12	16	20	25	
P	≤ 275 Bhn or ≤ 28 HRc	≤ 0.5    1	169   134	RPM	17934	8967	6725	5380	4484	3363	2690	2152
		≤ 1.5    ≤ 1	(135-203)   (107-161)	Fz   Feed (mm/min)	0.009   519	0.024   682	0.041   865	0.051   853	0.060   846	0.079   735	0.086   597	0.088   753
	≤ 375 Bhn or ≤ 40 HRc	≤ 0.5	96	RPM	10179	5089	3817	3054	2545	1909	1527	1221
		≤ 1.5    1	(77-115)   (61-91)	Fz   Feed (mm/min)	0.007   217	0.019   310	0.030   362	0.037   368	0.046   372	0.061   323	0.067   262	0.068   330
M	≤ 275 Bhn or ≤ 28 HRc	≤ 0.5    1	149   119	RPM	15834	7917	5938	4750	3958	2969	2375	1900
		≤ 1.5    ≤ 1	(119-179)   (95-143)	Fz   Feed (mm/min)	0.007   456	0.017   532	0.030   709	0.037   709	0.043   684	0.059   699	0.064   608	0.063   475
	≤ 275 Bhn or ≤ 28 HRc	≤ 0.5    1	104   82	RPM	10987	5493	4120	3296	2747	2060	1648	1318
		≤ 1.5    ≤ 1	(83-124)   (66-99)	Fz   Feed (mm/min)	0.005   211	0.014   316	0.023   387	0.029   387	0.034   369	0.046   380	0.051   334	0.050   264
K	≤ 325 Bhn or ≤ 35 HRc	≤ 0.5    1	94   76	RPM	10017	5009	3756	3005	2504	1878	1503	1202
		≤ 1.5    ≤ 1	(76-113)   (61-91)	Fz   Feed (mm/min)	0.005   192	0.014   288	0.023   353	0.029   353	0.034   337	0.046   346	0.051   305	0.050   240
	≤ 220 Bhn or ≤ 19 HRc	≤ 0.5	136   108	RPM	14380	7190	5392	4314	3595	2696	2157	1726
		≤ 1.5    1	(109-163)   (87-130)	Fz   Feed (mm/min)	0.008   483	0.024   690	0.038   828	0.048   828	0.058   828	0.077   713	0.083   587	0.085   468

continued on next page

# METRIC Z-Carb

Series Z1MB Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm									
					3	6	8	10	12	16	20	25		
K	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	Profile 	$\leq 0.5$	$\leq 1.5$	104	RPM	10987	5493	4120	3296	2747	2060	1648	1318
					Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063	
		Slot 	1	$\leq 1$	82	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	
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile 	$\leq 0.5$	$\leq 1.5$	24	RPM	2585	1293	969	776	646	485	388	310
					Fz	0.005	0.010	0.017	0.021	0.024	0.033	0.037	0.038	
		Slot 	1	$\leq 1$	20	RPM	2100	1050	788	630	525	394	315	252
					Fz	0.005	0.010	0.017	0.021	0.024	0.033	0.037	0.038	
T	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile 	$\leq 0.5$	$\leq 1.5$	19	RPM	2003	1002	751	601	501	376	301	240
					Fz	0.002	0.007	0.011	0.013	0.017	0.020	0.024	0.025	
		Slot 	1	$\leq 1$	15	RPM	1583	792	594	475	396	297	238	190
					Fz	0.002	0.007	0.011	0.013	0.017	0.020	0.024	0.025	
H	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Profile 	$\leq 0.5$	$\leq 1.5$	66	RPM	6947	3474	2605	2084	1737	1303	1042	834
					Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
		Slot 	1	$\leq 1$	52	RPM	5493	2747	2060	1648	1373	1030	824	659
					Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
T	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile 	$\leq 0.5$	$\leq 1.5$	23	RPM	2424	1212	909	727	606	454	364	291
					Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
		Slot 	1	$\leq 1$	18	RPM	1939	969	727	582	485	364	291	233
					Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045	
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile 	$\leq 0.5$	$\leq 1.5$	56	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	
		Slot 	1	$\leq 1$	44	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	

Bhn (Brinell)      HRc (Rockwell C)

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

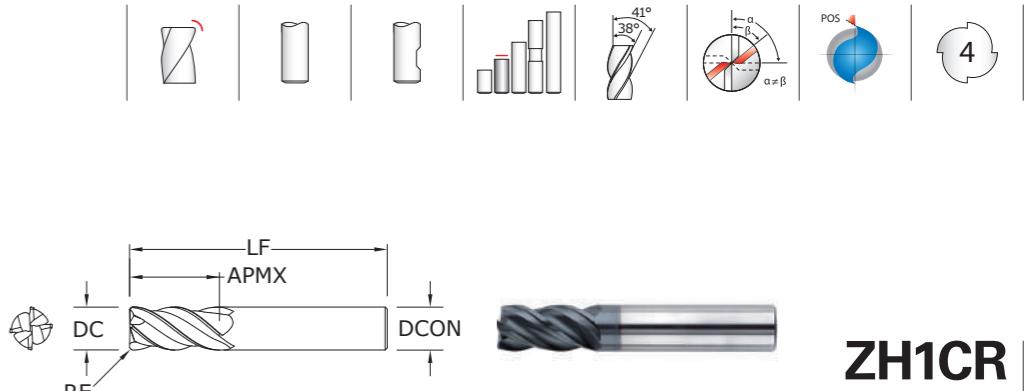
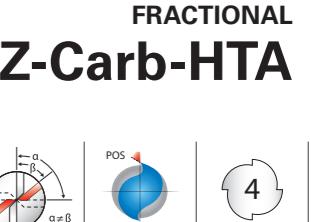
mm/min =  $Fz \times 4 \times rpm$

reduce speed and feed for materials harder than listed

reduce feed and Ae when finish milling ( $.02 \times DC$  maximum)

feed rates listed have chip thinning adjustments included where applicable

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgtool.com](http://www.kyocera-sgtool.com))



## TOLERANCES (inch)

### 1/4 DIAMETER

DC =  $+0.0000/-0.0012$   
DCON =  $h_6$

RE =  $+0.0000/-0.0020$

### >1/4-3/8 DIAMETER

DC =  $+0.0000/-0.0016$

DCON =  $h_6$

RE =  $+0.0000/-0.0020$

### >3/8-1 DIAMETER

DC =  $+0.0000/-0.0020$

DCON =  $h_6$

RE =  $+0.0000/-0.0020$

### HIGH TEMP ALLOYS

### TITANIUM

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	EDP NO.	
					TI-NAMITE-A (AITiN)	TI-NAMITE-A (AITiN) W/FLAT
1/4	1/2	2-1/2	1/4	.020	36570	—
1/4	3/4	2-1/2	1/4	.020	36616	—
5/16	13/16	2-1/2	5/16	.020	36571	—
3/8	7/8	2-1/2	3/8	.020	36572	36555
7/16	1	2-3/4	7/16	.020	36573	36556
1/2	1	3	1/2	.030	36574	36557
9/16	1-1/8	3-1/2	9/16	.030	36618	36617
5/8	1-1/4	3-1/2	5/8	.040	36575	36558
3/4	1-1/2	4	3/4	.040	36576	36559
1	1-1/2	4	1	.040	36577	36560
					36578	36561

- The original Z-Carb design with an enhanced core and higher helix suited for the demands of high temperature alloys
- 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 for difficult to machine materials
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials  $\leq 45$  HRc ( $\leq 420$  Bhn)

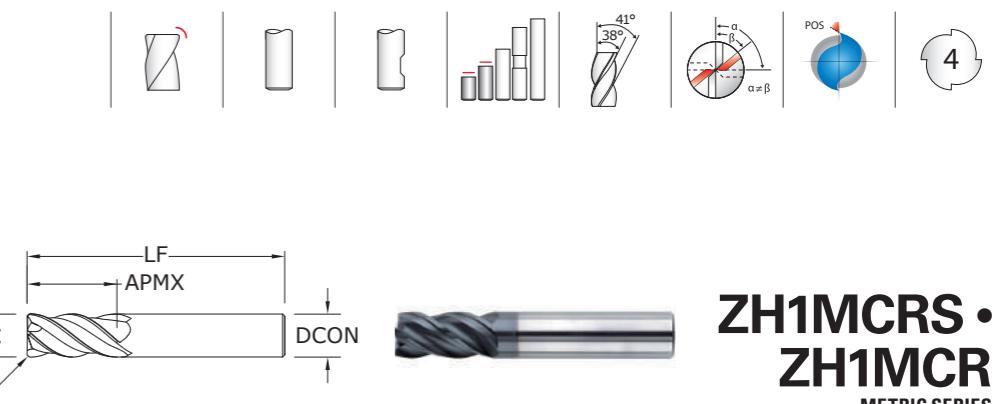
## FRACTIONAL Z-Carb-HTA

Series ZH1CR Fractional	Hardness	Ae x DC	Ap x DC	Vc (sfm)	Diameter (DC) (inch)					
					1/4	3/8	1/2	3/4	1	
<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE)</b> Inconel 601, 617, 625, Incoloy, Monel 400	$\leq 300 \text{ Bhn}$ or $\leq 32 \text{ HRc}$	Profile 	$\leq 0.5$	85 (68-102)	RPM	1299	866	649	433	325
					Fz	0.0007	0.0012	0.0017	0.0020	0.0023
		Slot 	1 $\leq 1$	70 (56-84)	RPM	1070	713	535	357	267
					Fz	0.0007	0.0012	0.0017	0.0020	0.0023
	$\leq 400 \text{ Bhn}$ or $\leq 43 \text{ HRc}$	Profile 	$\leq 0.5$	70 (56-84)	RPM	1070	713	535	357	267
					Fz	0.0005	0.0009	0.0012	0.0014	0.0016
		Slot 	1 $\leq 1$	55 (44-66)	RPM	840	560	420	280	210
					Fz	0.0005	0.0009	0.0012	0.0014	0.0016
<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	$\leq 350 \text{ Bhn}$ or $\leq 38 \text{ HRc}$	Profile 	$\leq 0.5$	215 (172-258)	RPM	3285	2190	1643	1095	821
					Fz	0.0008	0.0015	0.0020	0.0024	0.0028
		Slot 	1 $\leq 1$	170 (136-204)	RPM	2598	1732	1299	866	649
					Fz	0.0008	0.0015	0.0020	0.0024	0.0028
	$\leq 440 \text{ Bhn}$ or $\leq 47 \text{ HRc}$	Profile 	$\leq 0.5$	75 (60-90)	RPM	1146	764	573	382	287
					Fz	0.0008	0.0015	0.0020	0.0024	0.0028
		Slot 	1 $\leq 1$	60 (48-72)	RPM	917	611	458	306	229
					Fz	0.0008	0.0015	0.0020	0.0024	0.0028

Bhn (Brinell)    HRc (Rockwell C)  
 rpm = Vc x 3.82 / DC  
 ipm = Fz x 4 x rpm  
 reduce speed and feed for materials harder than listed  
 reduce feed and Ae when finish milling (.02 x DC maximum)  
 feed rates listed have chip thinning adjustments included where applicable  
 refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))



## METRIC Z-Carb-HTA



### ZH1MCRS • ZH1MCR METRIC SERIES

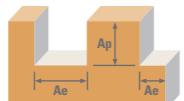
TOLERANCES (mm)		CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	EDP NO.	
HIGH TEMP ALLOYS	TITANIUM						TI-NAMITE-A (AITiN) W/FLAT	TI-NAMITE-A (AITiN)
		6,0	10,0	54,0	6,0	0,50	—	42712
		6,0	13,0	57,0	6,0	0,5	46450	—
		6,0	13,0	57,0	6,0	1,0	46451	—
		6,0	13,0	57,0	6,0	1,5	46452	—
		8,0	12,0	58,0	8,0	0,50	—	42713
		8,0	19,0	63,0	8,0	0,5	46453	—
		8,0	19,0	63,0	8,0	1,0	46454	—
		8,0	19,0	63,0	8,0	1,5	46455	—
		10,0	14,0	66,0	10,0	0,50	—	42714
		10,0	22,0	72,0	10,0	0,5	46456	—
		10,0	22,0	72,0	10,0	1,0	46457	—
		10,0	22,0	72,0	10,0	1,5	46458	—
		10,0	22,0	72,0	10,0	2,0	46459	—
		12,0	16,0	73,0	12,0	0,75	—	42715
		12,0	26,0	83,0	12,0	0,5	46460	46471
		12,0	26,0	83,0	12,0	1,0	46461	46472
		12,0	26,0	83,0	12,0	1,5	46462	46473
		12,0	26,0	83,0	12,0	2,0	46463	46474
		12,0	26,0	83,0	12,0	3,0	46464	46475
		16,0	22,0	82,0	16,0	1,00	—	42716
		16,0	32,0	92,0	16,0	1,5	46465	46476
		16,0	32,0	92,0	16,0	2,0	46466	46477
		16,0	32,0	92,0	16,0	3,0	46467	46478
		16,0	32,0	92,0	16,0	4,0	46482	46483
		20,0	26,0	92,0	20,0	1,00	—	42717
		20,0	38,0	104,0	20,0	3,0	46468	46479
		20,0	38,0	104,0	20,0	4,0	46469	46480
		20,0	38,0	104,0	20,0	5,0	46470	46481

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

- The original Z-Carb design with an enhanced core and higher helix suited for the demands of high temperature alloys
- 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 for difficult to machine materials
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials  $\leq 420 \text{ Bhn}$

# METRIC Z-Carb-HTA

Series  
ZH1MCRS, ZH1MCR  
Metric



Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm					
				6	10	12	20		
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile 	$\leq 0.5$	$\leq 1.5$	26	RPM	1373	824	687	412
				(21-31)	Fz	0.017	0.032	0.041	0.053
	Slot 	1	$\leq 1$	21	RPM	1131	679	565	339
				(17-26)	Fz	0.017	0.032	0.041	0.053
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile 	$\leq 0.5$	$\leq 1.5$	21	RPM	1131	679	565	339
				(17-26)	Fz	0.012	0.024	0.029	0.037
	Slot 	1	$\leq 1$	17	RPM	889	533	444	267
				(13-20)	Fz	0.012	0.024	0.029	0.037
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Profile 	$\leq 0.5$	$\leq 1.5$	66	RPM	3474	2084	1737	1042
				(52-79)	Fz	0.019	0.041	0.049	0.057
	Slot 	1	$\leq 1$	52	RPM	2747	1648	1373	824
				(41-62)	Fz	0.019	0.041	0.049	0.057
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile 	$\leq 0.5$	$\leq 1.5$	23	RPM	1212	727	606	364
				(18-27)	Fz	0.019	0.041	0.049	0.057
	Slot 	1	$\leq 1$	18	RPM	969	582	485	291
				(15-22)	Fz	0.019	0.041	0.049	0.057
Feed (mm/min)				74	95	95	66		

Bhn (Brinell)      HRc (Rockwell C)

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

ipm =  $F_z \times 4 \times rpm$

reduce speed and feed for materials harder than listed

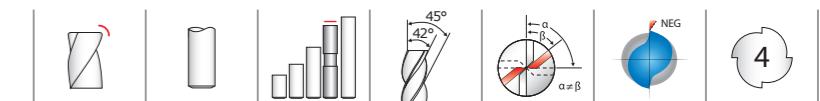
reduce feed and Ae when finish milling (.02 x DC maximum)

feed rates listed have chip thinning adjustments included where applicable

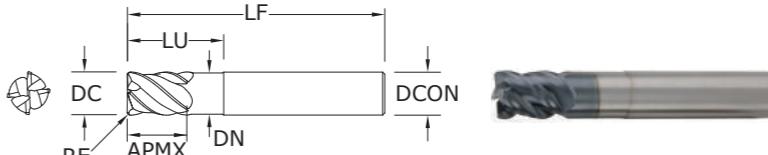
refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgtool.com](http://www.kyocera-sgtool.com))



# FRACTIONAL & METRIC Z-Carb-MD



4



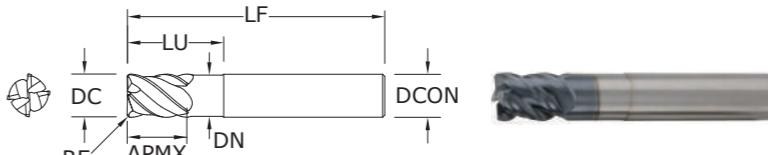
ZD1CR

FRACTIONAL SERIES

TOLERANCES (inch)							
1/8-1/4 DIAMETER							
DC	= +0.0000/-0.0012	DCON	= h <sub>6</sub>	RE	= +0.0000/-0.0020		
1/8	5/32	2-1/2	1/4	1/2	.110	.010	36780
3/16	7/32	2-1/2	1/4	3/4	.172	.020	36781
1/4	9/32	2-1/2	1/4	3/4	.235	.020	36782
5/16	13/32	2-1/2	5/16	1	.297	.040	36783
3/8	15/32	2-1/2	3/8	1	.360	.040	36784
7/16	9/16	2-3/4	7/16	1	.422	.040	36785
1/2	5/8	3	1/2	1-1/4	.485	.040	36786
1/2	5/8	4-1/2	1/2	2-1/4	.485	.040	36787
5/8	3/4	3-1/2	5/8	1-1/2	.610	.040	36788
5/8	3/4	4-1/2	5/8	2-1/4	.610	.040	36789
5/8	3/4	5-1/2	5/8	3-1/4	.610	.040	36790
3/4	15/16	4	3/4	1-3/4	.735	.060	36791
3/4	15/16	4-1/2	3/4	2-1/4	.735	.060	36792
3/4	15/16	5-1/2	3/4	3-1/4	.735	.060	36793

HARDENED STEELS

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)



ZD1MCR

METRIC SERIES

TOLERANCES (mm)							
3-6 DIAMETER							
DC	= +0,000/-0,030	DCON	= h <sub>6</sub>	RE	= +0,000/-0,050		
3,0	4,0	57,0	6,0	15,0	2,62	0,2	46560
4,0	5,0	57,0	6,0	15,0	3,61	0,3	46561
5,0	6,0	57,0	6,0	15,0	4,60	0,5	46562
6,0	7,0	57,0	6,0	15,0	5,61	1,0	46563
8,0	10,0	63,0	8,0	25,0	7,62	1,0	46564
10,0	12,0	72,0	10,0	30,0	9,60	1,0	46565
12,0	15,0	83,0	12,0	35,0	11,61	1,0	46566
16,0	20,0	92,0	16,0	45,0	15,60	1,5	46567
20,0	24,0	104,0	20,0	55,0	19,61	2,0	46568

HARDENED STEELS

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

- The original Z-Carb design with negative rake, heavy core, and higher helix for strength and shearing of hard mold & die materials

- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics

- Enhanced corner geometry with tight tolerance corner radii

- Recommended for materials 35-60HRc (327 to 654 Bhn)

## FRACTIONAL & METRIC Z-Carb-MD

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

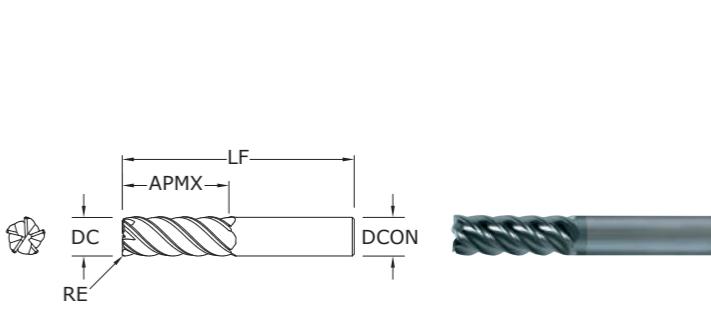
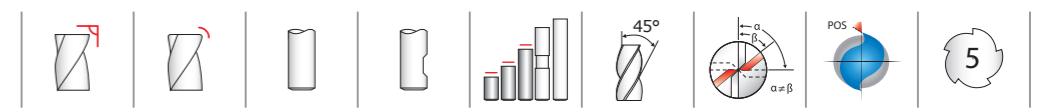
Bhn (Brinell) HRc (Rockwell C)  
rpm =  $V_c \times 3.82 / DC$   
ipm =  $F_z \times 4 \times rpm$   
reduce speed and feed for materials harder than listed  
reduce feed and Ae when finish milling (.02 x DC maximum)  
feed rates listed have chip thinning adjustments included where applicable  
refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

Series ZD1MCR Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	Diameter (DC) (mm)								
					3	6	8	10	12	16	20		
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile 	$\leq 0.4$	$\leq 1$	123 (99-148)	RPM	13087	6544	4908	3926	3272	2454	1963
					Fz (99-148)	0.012	0.029	0.049	0.061	0.072	0.083	0.112	
		Slot 	1	$\leq 0.4$	98 (78-117)	RPM	10340	5170	3878	3102	2585	1939	1551
					Fz (78-117)	0.012	0.029	0.049	0.061	0.072	0.083	0.112	
	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile 	$\leq 0.4$	$\leq 1$	64 (51-77)	RPM	6786	3393	2545	2036	1696	1272	1018
					Fz (51-77)	0.010	0.024	0.041	0.051	0.060	0.068	0.093	
		Slot 	1	$\leq 0.4$	52 (41-62)	RPM	5493	2747	2060	1648	1373	1030	824
					Fz (41-62)	0.010	0.024	0.041	0.051	0.060	0.068	0.093	
TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	$\leq 655$ Bhn or $\leq 60$ HRc	Profile 	$\leq 0.4$	$\leq 1$	27 (22-33)	RPM	2908	1454	1091	872	727	545	436
					Fz (22-33)	0.005	0.012	0.021	0.027	0.031	0.036	0.048	
		Slot 	1	$\leq 0.4$	21 (17-26)	RPM	2262	1131	848	679	565	424	339
					Fz (17-26)	0.005	0.012	0.021	0.027	0.031	0.036	0.048	

Bhn (Brinell) HRc (Rockwell C)  
rpm =  $(V_c \times 1000) / (DC \times 3.14)$   
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 DC maximum)  
feed rates listed have chip thinning adjustments included where applicable  
refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))



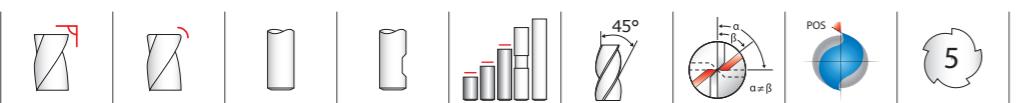
Five Flute End Mills



55 •  
55CR  
FRACTIONAL SERIES

TOLERANCES (inch)						EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	TI-NAMITE-A (AITIN) W/FLAT	TI-NAMITE-A (AITIN) W/FLAT	
DC = +0.0000/-0.0020							
DCON = h6							
RE = +0.0000/-0.0020							
<b>STEELS</b>							
<b>STAINLESS STEELS</b>							
<b>CAST IRON</b>							
<b>HIGH TEMP ALLOYS</b>							
<b>TITANIUM</b>							
<b>HARDENED STEELS</b>							
For patent information visit <a href="http://www.ksptpatents.com">www.ksptpatents.com</a>							
1/8	1/4	1-1/2	1/8	—	32672	—	
1/8	1/4	1-1/2	1/8	.010	32606	—	
1/8	1/2	1-1/2	1/8	—	32655	—	
1/8	1/2	1-1/2	1/8	.010	32607	—	
5/32	5/16	2	3/16	.010	32608	—	
5/32	9/16						

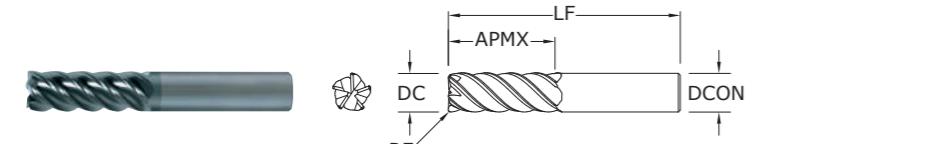
## FRACTIONAL V-Carb



## 55 • 55CR

FRACTIONAL SERIES

CONTINUED



### TOLERANCES (inch)

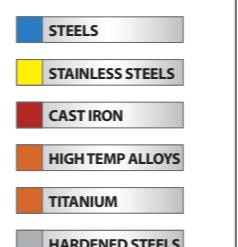
DC = +0.000/-0.0020  
DCON = h6  
RE = +0.000/-0.0020



For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

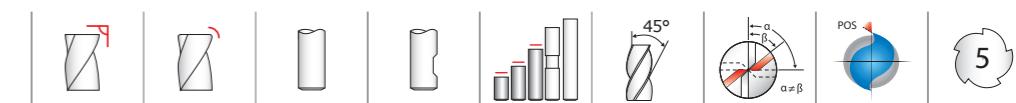
### TOLERANCES (mm)

DC = +0.000/-0.050  
DCON = h6  
RE = +0.000/-0.050



For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

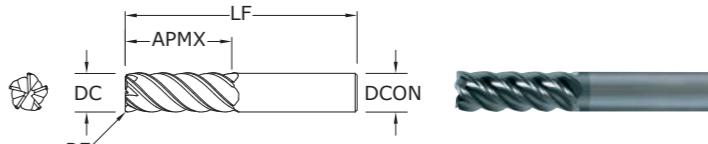
CUTTING DIAMETER DC	LENGTH OF CUT APMX	inch			EDP NO.	
		OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	Ti-NAMITE-A (AlTiN)	Ti-NAMITE-A (AlTiN) W/FLAT
7/16	1	2-3/4	7/16	—	32663	—
7/16	1	2-3/4	7/16	.015	32632	—
7/16	2	4	7/16	.015	32633	—
1/2	5/8	2-1/2	1/2	—	32678	32679
1/2	5/8	2-1/2	1/2	.030	32594	32595
1/2	5/8	2-1/2	1/2	.060	32596	32597
1/2	1-1/4	3	1/2	—	32664	32665
1/2	1-1/4	3	1/2	.030	32575	32576
1/2	1-1/4	3	1/2	.060	32577	32578
1/2	2	4	1/2	.030	32685	—
1/2	2	4	1/2	.060	32686	—
5/8	3/4	3	5/8	—	32680	32681
5/8	3/4	3	5/8	.030	32598	32599
5/8	3/4	3	5/8	.060	32600	32601
5/8	1-5/8	3-1/2	5/8	—	32666	32667
5/8	1-5/8	3-1/2	5/8	.030	32579	32580
5/8	1-5/8	3-1/2	5/8	.060	32581	32582
5/8	2-1/2	5	5/8	.030	32570	—
5/8	2-1/2	5	5/8	.060	32687	—
3/4	1	3	3/4	.030	32602	32603
3/4	1	3	3/4	.060	32604	32605
3/4	1-5/8	4	3/4	—	32668	32669
3/4	1-5/8	4	3/4	.030	32583	32584
3/4	1-5/8	4	3/4	.060	32585	32586
3/4	3-1/4	6	3/4	.030	32571	—
3/4	3-1/4	6	3/4	.060	32688	—
1	1-1/2	4	1	—	32670	32671
1	1-1/2	4	1	.030	32587	32588
1	1-1/2	4	1	.060	32589	32590
1	2-5/8	6	1	.030	32572	—
1	2-5/8	6	1	.060	32689	—



## 55M • 55MCR

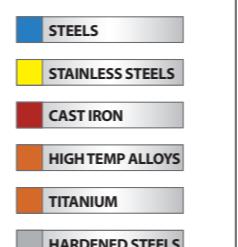
METRIC SERIES

CONTINUED



### TOLERANCES (mm)

DC = +0.000/-0.050  
DCON = h6  
RE = +0.000/-0.050



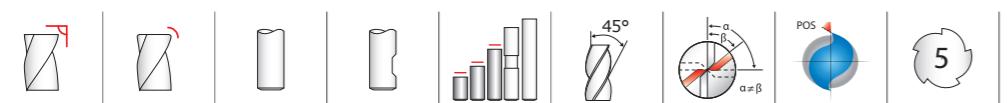
For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	mm			EDP NO.	
		OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	Ti-NAMITE-A (AlTiN)	Ti-NAMITE-A (AlTiN) W/FLAT
6,0	12,0	50,0	6,0	—	42606	—
6,0	12,0	50,0	6,0	0,5	42660	—
6,0	19,0	63,0	6,0	—	42607	—
6,0	19,0	63,0	6,0	0,25	42661	—
6,0	19,0	63,0	6,0	0,5	42662	—
6,0	19,0	63,0	6,0	1,0	42663	—
6,0	19,0	63,0	6,0	1,5	42664	—
6,0	25,0	75,0	6,0	—	42608	—
6,0	25,0	75,0	6,0	0,5	42665	—
8,0	12,0	50,0	8,0	—	42609	—
8,0	12,0	50,0	8,0	0,5	42666	—
8,0	20,0	63,0	8,0	—	42610	—
8,0	20,0	63,0	8,0	0,5	42667	—
8,0	20,0	63,0	8,0	1,0	42668	—
8,0	20,0	63,0	8,0	1,5	42669	—
8,0	20,0	63,0	8,0	2,0	42670	—
8,0	25,0	75,0	8,0	—	42611	—
8,0	25,0	75,0	8,0	0,5	42671	—
10,0	16,0	50,0	10,0	—	42612	—
10,0	16,0	50,0	10,0	0,5	42672	—
10,0	22,0	75,0	10,0	—	42622	42613
10,0	22,0	75,0	10,0	0,5	42673	—
10,0	22,0	75,0	10,0	1,0	42674	—
10,0	22,0	75,0	10,0	1,5	42675	—
10,0	22,0	75,0	10,0	2,0	42676	—
10,0	22,0	75,0	10,0	2,5	42677	—
10,0	38,0	100,0	10,0	—	42614	—
10,0	38,0	100,0	10,0	0,5	42678	—
12,0	19,0	63,0	12,0	—	42615	—
12,0	19,0	63,0	12,0	0,5	42679	—
12,0	25,0	75,0	12,0	—	42616	42623
12,0	25,0	75,0	12,0	0,5	42680	—

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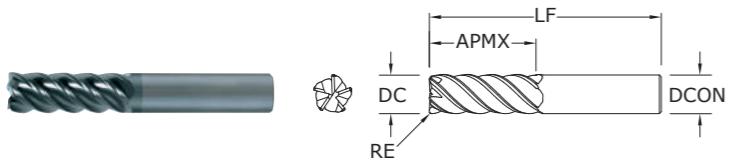
- Unequal indexing, high helix and an ideal rake and relief combination for unmatched finishing capability
- The choice when peak finish quality is the requirement
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

# METRIC V-Carb



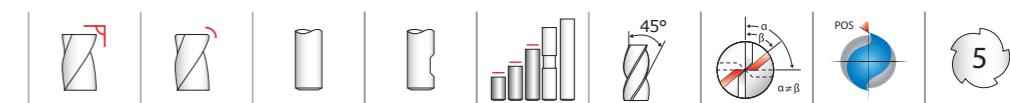
## 55M • 55MCR METRIC SERIES

- Unequal indexing, high helix and an ideal rake and relief combination for unmatched finishing capability
- The choice when peak finish quality is the requirement
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



CUTTING DIAMETER DC	LENGTH OF CUT APMX	mm	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	EDP NO.
12,0	25,0	75,0	12,0	1,0	42681	—
12,0	25,0	75,0	12,0	1,5	42682	—
12,0	25,0	75,0	12,0	2,0	42683	—
12,0	25,0	75,0	12,0	2,5	42684	—
12,0	25,0	75,0	12,0	3,0	42685	—
12,0	50,0	100,0	12,0	—	42617	—
12,0	50,0	100,0	12,0	0,5	42686	—
12,0	50,0	100,0	12,0	3,0	42630	—
12,0	50,0	100,0	12,0	4,0	42631	—
16,0	32,0	89,0	16,0	—	42618	42624
16,0	32,0	89,0	16,0	1,0	42687	—
16,0	32,0	89,0	16,0	1,5	42688	—
16,0	32,0	89,0	16,0	2,0	42689	—
16,0	32,0	89,0	16,0	2,5	42690	—
16,0	32,0	89,0	16,0	3,0	42691	—
16,0	32,0	89,0	16,0	4,0	42692	—
16,0	50,0	100,0	16,0	—	42626	—
16,0	50,0	100,0	16,0	2,0	42656	—
16,0	50,0	100,0	16,0	2,5	42657	—
16,0	50,0	100,0	16,0	3,0	42658	—
16,0	50,0	100,0	16,0	4,0	42659	—
16,0	50,0	100,0	16,0	5,0	42628	—
16,0	75,0	150,0	16,0	—	42619	—
16,0	75,0	150,0	16,0	1,0	42693	—
16,0	75,0	150,0	16,0	3,0	42632	—
16,0	75,0	150,0	16,0	4,0	42633	—
20,0	38,0	100,0	20,0	—	42620	42625
20,0	38,0	100,0	20,0	1,0	42694	—
20,0	38,0	100,0	20,0	1,5	42695	—
20,0	38,0	100,0	20,0	2,0	42696	—
20,0	38,0	100,0	20,0	2,5	42697	—
20,0	38,0	100,0	20,0	3,0	42698	—
20,0	38,0	100,0	20,0	4,0	42699	—
20,0	38,0	100,0	20,0	5,0	42700	—

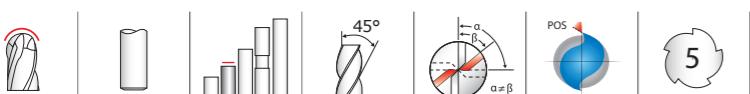
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## 55M • 55MCR METRIC SERIES

CUTTING DIAMETER DC	LENGTH OF CUT APMX	mm	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	EDP NO.
20,0	38,0	100,0	20,0	6,0	42648	—
20,0	50,0	100,0	20,0	—	42627	—
20,0	50,0	100,0	20,0	2,0	42649	—
20,0	50,0	100,0	20,0	2,5	42650	—
20,0	50,0	100,0	20,0	3,0	42651	—
20,0	50,0	100,0	20,0	4,0	42652	—
20,0	50,0	100,0	20,0	5,0	42653	—
20,0	50,0	100,0	20,0	6,0	42654	—
20,0	75,0	150,0	20,0	—	42621	—
20,0	75,0	150,0	20,0	1,0	42701	—
20,0	75,0	150,0	20,0	2,0	42702	—
20,0	75,0	150,0	20,0	3,0	42703	—
20,0	75,0	150,0	20,0	4,0	42704	—
20,0	75,0	150,0	20,0	5,0	42705	—
20,0	75,0	150,0	20,0	6,0	42655	—

CONTINUED



## 55B

## FRACTIONAL SERIES

- Unequal indexing, high helix and an ideal rake and relief combination for unmatched finishing capability
- The choice when peak finish quality is the requirement
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials  $\leq 45$  HRc ( $\leq 420$  Bhn)



inch					EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	Ti-NAMITE-A (AlTiN)	
1/4	3/4	2-1/2	1/4	32500	
5/16	13/16	2-1/2	5/16	32501	
3/8	1	2-1/2	3/8	32502	
1/2	1-1/4	3	1/2	32503	
5/8	1-5/8	3-1/2	5/8	32504	
3/4	1-5/8	4	3/4	32505	
1	1-1/2	4	1	32506	

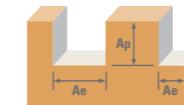
RE = 1/2 Cutting Diameter (DC)



Five Flute End Mills

Series  
55, 55CR, 55B  
Fractional

Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in						
				1/8	1/4	3/8	1/2	5/8	3/4	1



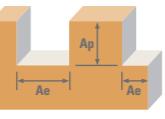
<b>P</b>	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	$\leq 275$ Bhn or $\leq 28$ HRc	Profile HSM	$\leq 0.25$	$\leq 1.5$	385	RPM	11766	5883	3922	2941	2353	1961	1471
				(308-462)		Fz	0.0004	0.0009	0.0017	0.0023	0.0029	0.0028	0.0032	
<b>P</b>	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	$\leq 375$ Bhn or $\leq 40$ HRc	Profile HSM	$\leq 0.25$	$\leq 1.5$	630	RPM	19253	9626	6418	4813	3851	3209	2407
				(504-756)		Fz	0.0007	0.0018	0.0034	0.0046	0.0057	0.0055	0.0064	
<b>P</b>	<b>STAINLESS STEELS</b> (FREE MACHINING) 303, 416, 420F, 430F, 440F	$\leq 275$ Bhn or $\leq 28$ HRc	Profile HSM	$\leq 0.25$	$\leq 1.5$	325	RPM	9932	4966	3311	2483	1986	1655	1242
				(260-390)		Fz	0.0003	0.0007	0.0013	0.0017	0.0022	0.0021	0.0024	
<b>M</b>	<b>STAINLESS STEELS</b> (DIFFICULT) 304, 304L, 316, 316L	$\leq 275$ Bhn or $\leq 28$ HRc	Profile HSM	$\leq 0.25$	$\leq 1.5$	370	RPM	11307	5654	3769	2827	2261	1885	1413
				(296-444)		Fz	0.0003	0.0007	0.0013	0.0017	0.0022	0.0023	0.0024	
<b>M</b>	<b>STAINLESS STEELS</b> (DIFFICULT) 304, 304L, 316, 316L	$\leq 275$ Bhn or $\leq 28$ HRc	Profile HSM	$\leq 0.05$	$\leq 2$	560	RPM	17114	8557	5705	4278	3423	2852	2139
				(448-672)		Fz	0.0005	0.0014	0.0026	0.0034	0.0043	0.0044	0.0048	
<b>M</b>	<b>STAINLESS STEELS</b> (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	$\leq 325$ Bhn or $\leq 35$ HRc	Profile HSM	$\leq 0.25$	$\leq 1.5$	255	RPM	7793	3896	2598	1948	1559	1299	974
				(204-306)		Fz	0.0002	0.0006	0.0012	0.0016	0.0020	0.0021	0.0023	
<b>M</b>	<b>STAINLESS STEELS</b> (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	$\leq 275$ Bhn or $\leq 28$ HRc	Profile HSM	$\leq 0.05$	$\leq 2$	385	RPM	11766	5883	3922	2941	2353	1961	1471
				(308-462)		Fz	0.0005	0.0013	0.0024	0.0032	0.0040	0.0041	0.0045	
<b>M</b>	<b>STAINLESS STEELS</b> (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	$\leq 325$ Bhn or $\leq 35$ HRc	Profile HSM	$\leq 0.25$	$\leq 1.5$	235	RPM	7182	3591	2394	1795	1436	1197	898
				(188-282)		Fz	0.0002	0.0006	0.0010	0.0014	0.0017	0.0018	0.0019	
<b>K</b>	<b>CAST IRONS</b> (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	$\leq 220$ Bhn or $\leq 19$ HRc	Profile HSM	$\leq 0.25$	$\leq 1.5$	355	RPM	10849	5424	3616	2712	2170	1808	1356
				(284-426)		Fz	0.0004	0.0011	0.0021	0.0028	0.0034	0.0036	0.0039	
<b>K</b>	<b>CAST IRONS</b> (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	$\leq 220$ Bhn or $\leq 19$ HRc	Profile HSM	$\leq 0.05$	$\leq 2$	470	RPM	14363	7182	4788	3591	2873	2394	1795
				(376-564)		Fz	0.0004	0.0009	0.0017	0.0023	0.0029	0.0030	0.0032	
<b>K</b>	<b>CAST IRONS</b> (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	$\leq 220$ Bhn or $\leq 19$ HRc	Profile HSM	$\leq 0.05$	$\leq 2$	705	RPM	21545	10772	7182	5386	4309	3591	2693
				(564-846)		Fz	0.0007	0.0018	0.0034	0.0046	0.0057	0.0059	0.0064	

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

# FRACTIONAL V-Carb

# METRIC V-Carb

Series 55, 55CR, 55B Fractional



Hardness Ae x DC Ap x DC Vc (sfm)

DC • in

1/8 1/4 3/8 1/2 5/8 3/4 1

K	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc	Profile 	≤ 0.25	≤ 1.5	360	RPM	11002	5501	3667	2750	2200	1834	1375
						(288-432)	Fz	0.0003	0.0007	0.0013	0.0017	0.0022	0.0023	0.0024
						540	RPM	16502	8251	5501	4126	3300	2750	2063
						(432-648)	Fz	0.0005	0.0014	0.0026	0.0034	0.0043	0.0044	0.0048
						70	RPM	2139	1070	713	535	428	357	267
						(56-84)	Fz	0.0002	0.0006	0.0010	0.0014	0.0017	0.0018	0.0019
						107	RPM	3270	1635	1090	817	654	545	409
						(86-128)	Fz	0.0004	0.0011	0.0021	0.0028	0.0034	0.0036	0.0039
						55	RPM	1681	840	560	420	336	280	210
						(44-66)	Fz	0.0002	0.0004	0.0008	0.0010	0.0013	0.0014	0.0015
						Feed (ipm)	1.3	1.7	2.2	2.1	2.2	2.0	1.6	
						85	RPM	2598	1299	866	649	520	433	325
						(68-102)	Fz	0.0003	0.0008	0.0015	0.0021	0.0026	0.0027	0.0029
						Feed (ipm)	4.0	5.2	6.5	6.8	6.8	5.8	4.7	
						235	RPM	7182	3591	2394	1795	1436	1197	898
						(188-282)	Fz	0.0002	0.0006	0.0012	0.0016	0.0020	0.0021	0.0023
						Feed (ipm)	7.2	10.8	14.4	14.4	14.4	12.6	10.3	
						390	RPM	11918	5959	3973	2980	2384	1986	1490
						(312-468)	Fz	0.0005	0.0013	0.0024	0.0032	0.0040	0.0041	0.0045
						Feed (ipm)	29.8	38.7	47.7	47.7	47.7	40.7	33.5	
						85	RPM	2598	1299	866	649	520	433	325
						(68-102)	Fz	0.0002	0.0006	0.0012	0.0016	0.0020	0.0021	0.0023
						Feed (ipm)	2.6	3.9	5.2	5.2	5.2	4.5	3.7	
						140	RPM	4278	2139	1426	1070	856	713	535
						(112-168)	Fz	0.0005	0.0013	0.0024	0.0032	0.0040	0.0042	0.0045
						Feed (ipm)	10.7	13.9	17.1	17.1	17.1	15.0	12.0	
						175	RPM	5348	2674	1783	1337	1070	891	669
						(140-210)	Fz	0.0002	0.0005	0.0010	0.0013	0.0016	0.0017	0.0018
						Feed (ipm)	5.3	6.7	8.9	8.7	8.6	7.6	6.0	
						290	RPM	8862	4431	2954	2216	1772	1477	1108
						(232-348)	Fz	0.0004	0.0010	0.0019	0.0025	0.0032	0.0033	0.0035
						Feed (ipm)	17.7	22.2	28.1	27.7	28.4	24.4	19.4	

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

rpm = Vc x 3.82 / DC

ipm = Fz x 5 x rpm

reduce speed and feed for materials harder than listed

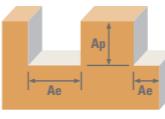
reduce feed and Ae when finish milling (.02 x DC maximum)

reduce Ap to 1 x DC (maximum) when profile milling with long or extra long flute length tools

feed rates listed have chip thinning adjustments included where applicable

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))

Series 55M, 55MCR, 55MB Metric



Hardness Ae x DC Ap x DC Vc (m/min)

DC • mm

6 8 10 12 16 20

P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Hardness	Profile 	≤ 0.25	≤ 1.5	117	RPM	6220	4665	3732	3110	2333	1866
						(94-141)	Fz	0.022	0.036	0.061	0.070	0.072	0.085
						192	RPM	10179	7634	6107	5089	3817	3054
						(154-230)	Fz	0.043	0.073	0.123	0.137	0.141	0.154
						99	RPM	5251	3938	3151	2626	1969	1575
						(79-119)	Fz	0.017	0.028	0.045	0.053	0.054	0.064
						162	RPM	8563	6422	5138	4282	3211	2569
						(129-194)	Fz	0.034	0.055	0.091	0.103	0.105	0.128
						113	RPM	5978	4484	3587	2989	2242	1793
						(90-135)	Fz	0.017	0.028	0.045	0.053	0.059	0.064
						171	RPM	9048	6786	5429	4524	3393	2714
						(137							

# METRIC V-Carb

Series 55M, 55MCR, 55MB Metric						DC • mm							
				Vc (m/min)		6	8	10	12	16	20		
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	Hardness $\leq 220 \text{ Bhn}$ or $\leq 19 \text{ HRc}$	Profile 	$\leq 0.25$	$\leq 1.5$	143	RPM	7594	5695	4556	3797	2848	2278
				(115-172)		Fz	0.022	0.036	0.061	0.070	0.077	0.085	
		HSM 		$\leq 0.05$	$\leq 2$	215	RPM	11391	8543	6834	5695	4271	3417
				(172-258)		Fz	0.043	0.073	0.123	0.137	0.151	0.171	
				Feed (mm/min)		2460	3099	4192	3895	3226	2916		
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	Hardness $\leq 260 \text{ Bhn}$ or $\leq 26 \text{ HRc}$	Profile 	$\leq 0.25$	$\leq 1.5$	110	RPM	5816	4362	3490	2908	2181	1745
				(88-132)		Fz	0.017	0.028	0.045	0.053	0.059	0.064	
		HSM 		$\leq 0.05$	$\leq 2$	165	RPM	8725	6544	5235	4362	3272	2617
				(132-198)		Fz	0.034	0.055	0.091	0.103	0.113	0.128	
				Feed (mm/min)		1466	1815	2373	2251	1843	1675		
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Hardness $\leq 300 \text{ Bhn}$ or $\leq 32 \text{ HRc}$	Profile 	$\leq 0.25$	$\leq 1.5$	21	RPM	1131	848	679	565	424	339
				(17-26)		Fz	0.014	0.021	0.037	0.041	0.046	0.051	
		HSM 		$\leq 0.05$	$\leq 2$	33	RPM	1729	1297	1037	864	648	519
				(26-39)		Fz	0.026	0.045	0.075	0.082	0.092	0.104	
				Feed (mm/min)		228	290	387	353	299	270		
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Hardness $\leq 400 \text{ Bhn}$ or $\leq 43 \text{ HRc}$	Profile 	$\leq 0.25$	$\leq 1.5$	17	RPM	889	666	533	444	333	267
				(13-20)		Fz	0.010	0.017	0.027	0.031	0.036	0.040	
		HSM 		$\leq 0.05$	$\leq 2$	26	RPM	1373	1030	824	687	515	412
				(21-31)		Fz	0.019	0.032	0.056	0.062	0.069	0.077	
				Feed (mm/min)		132	165	231	214	178	159		

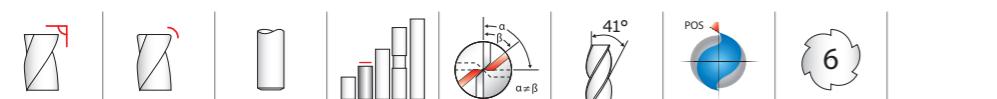
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Series 55M, 55MCR, 55MB Metric						DC • mm							
				Vc (m/min)		6	8	10	12	16	20		
S	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Hardness $\leq 350 \text{ Bhn}$ or $\leq 38 \text{ HRc}$	Profile 	$\leq 0.25$	$\leq 1.5$	72	RPM	3797	2848	2278	1898	1424	1139
				(57-86)		Fz	0.014	0.026	0.043	0.048	0.054	0.061	
		HSM 		$\leq 0.05$	$\leq 2$	119	RPM	6301	4726	3781	3151	2363	1890
				(95-143)		Fz	0.031	0.051	0.085	0.096	0.105	0.120	
				Feed (mm/min)		983	1210	1613	1512	1240	1134		
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3Cr3Sn3Al	Hardness $\leq 440 \text{ Bhn}$ or $\leq 47 \text{ HRc}$	Profile 	$\leq 0.25$	$\leq 1.5$	26	RPM	1373	1030	824	687	515	412
				(21-31)		Fz	0.014	0.026	0.043	0.048	0.054	0.061	
		HSM 		$\leq 0.05$	$\leq 2$	43	RPM	2262	1696	1357	1131	848	679
				(34-51)		Fz	0.031	0.051	0.085	0.096	0.108	0.120	
				Feed (mm/min)		353	434	579	543	456	407		
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Hardness $\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Profile 	$\leq 0.25$	$\leq 1.5$	53	RPM	2827	2121	1696	1414	1060	848
				(43-64)		Fz	0.012	0.021	0.035	0.038	0.044	0.048	
		HSM 		$\leq 0.05$	$\leq 2$	88	RPM	4686	3514	2811	2343	1757	1406
				(71-106)		Fz	0.024	0.041	0.067	0.077	0.084	0.093	
				Feed (mm/min)		562	712	937	900	742	656		

Bhn (Brinell)    HRc (Rockwell C)  
 rpm =  $(V_c \times 1000) / (DC \times 3.14)$   
 mm/min =  $F_z \times 5 \times rpm$   
 reduce speed and feed for materials harder than listed  
 reduce feed and Ae when finish milling (.02 x DC maximum)  
 reduce Ap to 1 x DC (maximum) when profile milling with long or extra long flute length tools  
 feed rates listed have chip thinning adjustments included where applicable  
 refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))

# METRIC V-Carb

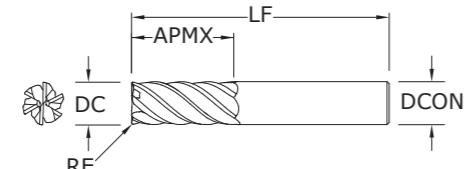
## FRACTIONAL T-Carb



### 51 • 51CR

FRACTIONAL SERIES

- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Eccentric relief provides superior strength and smoother surface finish
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



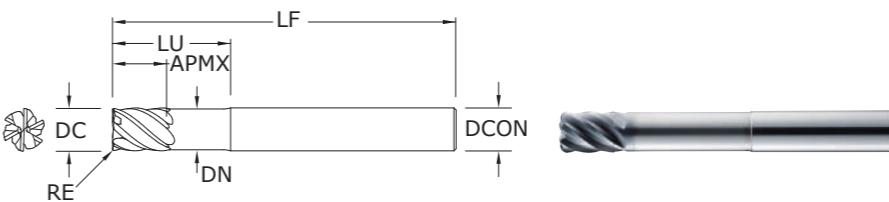
#### TOLERANCES (inch)

DC = +0.0000/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020



For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	EDP NO.
1/4	3/4	2-1/2	1/4	—	35100
1/4	3/4	2-1/2	1/4	.015	35112
1/4	3/4	2-1/2	1/4	.030	35150
3/8	1	2-1/2	3/8	—	35101
3/8	1	2-1/2	3/8	.015	35113
3/8	1	2-1/2	3/8	.030	35114
1/2	1-1/4	3	1/2	—	35102
1/2	1-1/4	3	1/2	.015	35151
1/2	1-1/4	3	1/2	.030	35115
1/2	1-1/4	3	1/2	.060	35152
1/2	1-1/4	3	1/2	.090	35116
1/2	1-1/4	3	1/2	.120	35117
5/8	1-5/8	3-1/2	5/8	—	35103
5/8	1-5/8	3-1/2	5/8	.015	35153
5/8	1-5/8	3-1/2	5/8	.030	35118
5/8	1-5/8	3-1/2	5/8	.060	35154
5/8	1-5/8	3-1/2	5/8	.090	35119
5/8	1-5/8	3-1/2	5/8	.120	35120
5/8	1-5/8	3-1/2	5/8	.190	35155
3/4	1-5/8	4	3/4	—	35104
3/4	1-5/8	4	3/4	.030	35121
3/4	1-5/8	4	3/4	.060	35156
3/4	1-5/8	4	3/4	.090	35122
3/4	1-5/8	4	3/4	.120	35123
3/4	1-5/8	4	3/4	.190	35157
3/4	1-5/8	4	3/4	.250	35158
1	2-5/8	6	1	—	35105
1	2-5/8	6	1	.030	35124
1	2-5/8	6	1	.060	35159
1	2-5/8	6	1	.090	35125
1	2-5/8	6	1	.120	35126
1	2-5/8	6	1	.190	35160
1	2-5/8	6	1	.250	35161



#### TOLERANCES (inch)

DC = +0.0000/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020



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CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	EDP NO.
1/4	3/8	4	1/4	1-1/8	.237	—	35106
1/4	3/8	4	1/4	1-1/8	.237	.015	35127
1/4	3/8	4	1/4	1-1/8	.237	.030	35180
3/8	1/2	4	3/8	2-1/8	.356	—	35107
3/8	1/2	4	3/8	2-1/8	.356	.015	35128
3/8	1/2	4	3/8	2-1/8	.356	.030	35129
1/2	5/8	4	1/2	2-1/4	.475	—	35108
1/2	5/8	4	1/2	2-1/4	.475	.015	35181
1/2	5/8	4	1/2	2-1/4	.475	.030	35130
1/2	5/8	4	1/2	2-1/4	.475	.060	35182
1/2	5/8	4	1/2	2-1/4	.475	.090	35131
1/2	5/8	4	1/2	2-1/4	.475	.120	35132
5/8	3/4	5	5/8	2-1/2	.594	—	35109
5/8	3/4	5	5/8	2-1/2	.594	.015	35183
5/8	3/4	5	5/8	2-1/2	.594	.030	35133
5/8	3/4	5	5/8	2-1/2	.594	.060	35184
5/8	3/4	5	5/8	2-1/2	.594	.090	35134
5/8	3/4	5	5/8	2-1/2	.594	.120	35135
5/8	3/4	5	5/8	2-1/2	.594	.190	35185
3/4	1	6	3/4	3-3/8	.712	—	35110
3/4	1	6	3/4	3-3/8	.712	.030	35136
3/4	1	6	3/4	3-3/8	.712	.060	35186
3/4	1	6	3/4	3-3/8	.712	.090	35137
3/4	1	6	3/4	3-3/8	.712	.120	35138
3/4	1	6	3/4	3-3/8	.712	.190	35187
3/4	1	6	3/4	3-3/8	.712	.250	35188
1	1-1/4	6	1	3-3/8	.950	—	35111
1	1-1/4	6	1	3-3/8	.950	.030	35139
1	1-1/4	6	1	3-3/8	.950	.060	35189
1	1-1/4	6	1	3-3/8	.950	.090	35140
1	1-1/4	6	1	3-3/8	.950	.120	35141
1	1-1/4	6	1	3-3/8	.950	.190	35190
1	1-1/4	6	1	3-3/8	.950	.250	35191

## FRACTIONAL T-Carb®



### 51L • 51LC

FRACTIONAL SERIES

- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Eccentric relief provides superior strength and smoother surface finish
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

• Necked design with blended diameter transitions provide clearance to reach

• Enhanced corner geometry with tight tolerance corner radii

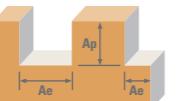
• Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

- Necked design with blended diameter transitions provide clearance to reach
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

# FRACTIONAL T-Carb®

# FRACTIONAL T-Carb®

Series  
51, 51CR, 51L,  
51LC  
Fractional



Ae x DC      Ap x DC      Vc (sfm)

DC • in

1/4    3/8    1/2    5/8    3/4    1

P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Hardness ≤ 275 Bhn or ≤ 28 HRc	Profile HSM	≤ 0.1    ≤ 1 (576-864)	720    RPM	11002	7334	5501	4401	3667	2750
					Fz	0.0020	0.0035	0.0050	0.0055	0.0061	0.0071
P	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Hardness ≤ 375 Bhn or ≤ 40 HRc	Profile HSM	≤ 0.1    ≤ 1 (392-588)	915    RPM	13981	9321	6991	5592	4660	3495
					Fz	0.0028	0.0053	0.0070	0.0077	0.0085	0.0100
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	Hardness ≤ 275 Bhn or ≤ 28 HRc	Profile HSM	≤ 0.1    ≤ 1 (459-561)	490    RPM	7487	4991	3744	2995	2496	1872
					Fz	0.0015	0.0029	0.0038	0.0042	0.0046	0.0054
M	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	Hardness ≤ 275 Bhn or ≤ 28 HRc	Profile HSM	≤ 0.1    ≤ 1 (315-385)	650    RPM	9932	6621	4966	3973	3311	2483
					Fz	0.0021	0.0038	0.0051	0.0056	0.0061	0.0072
H	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	Hardness ≤ 325 Bhn or ≤ 35 HRc	Profile HSM	≤ 0.1    ≤ 1 (293-358)	350    RPM	5348	3565	2674	2139	1783	1337
					Fz	0.0012	0.0023	0.0030	0.0033	0.0036	0.0042
H	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	Hardness ≤ 325 Bhn or ≤ 35 HRc	Profile HSM	≤ 0.1    ≤ 1 (405-495)	450    RPM	6876	4584	3438	2750	2292	1719
					Fz	0.0017	0.0032	0.0042	0.0046	0.0050	0.0059

continued on next page

S	Series 51, 51CR, 51L, 51LC Fractional	Hardness	Profile HSM	≤ 0.1    ≤ 1 (84-126)	105    RPM	1604	1070	802	642	535	401
					Fz	0.0014	0.0027	0.0036	0.0039	0.0043	0.0050
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Hardness ≤ 300 Bhn or ≤ 32 HRc	Profile HSM	≤ 0.05    ≤ 2 (104-156)	130    RPM	1986	1324	993	795	662	497
					Fz	0.0016	0.0036	0.0048	0.0053	0.0058	0.0067
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Hardness ≤ 400 Bhn or ≤ 43 HRc	Profile HSM	≤ 0.1    ≤ 1 (64-96)	80    RPM	1222	815	611	489	407	306
					Fz	0.0010	0.0018	0.0025	0.0027	0.0029	0.0034
S	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Hardness ≤ 350 Bhn or ≤ 38 HRc	Profile HSM	≤ 0.1    ≤ 1 (224-336)	280    RPM	4278	2852	2139	1711	1426	1070
					Fz	0.0010	0.0018	0.0025	0.0027	0.0029	0.0034
S	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Hardness ≤ 440 Bhn or ≤ 47 HRc	Profile HSM	≤ 0.05    ≤ 2 (284-426)	355    RPM	5424	3616	2712	2170	1808	1356
					Fz	0.0013	0.0025	0.0034	0.0037	0.0041	0.0047
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Hardness ≤ 375 Bhn or ≤ 40 HRc	Profile HSM	≤ 0.1    ≤ 1 (124-186)	155    RPM	2368	1579	1184	947	789	592
					Fz	0.0010	0.0018	0.0025	0.0027	0.0029	0.0034
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Hardness ≤ 375 Bhn or ≤ 40 HRc	Profile HSM	≤ 0.05    ≤ 2 (160-240)	200    RPM	3056	2037	1528	1222	1019	764
					Fz	0.0013	0.0025	0.0034	0.0037	0.0041	0.0047
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Hardness ≤ 375 Bhn or ≤ 40 HRc	Profile HSM	≤ 0.1    ≤ 1 (192-288)	240    RPM	3667	2445	1834	1467	1222	917
					Fz	0.0012	0.0023	0.0030	0.0034	0.0037	0.0043
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Hardness ≤ 375 Bhn or ≤ 40 HRc	Profile HSM	≤ 0.05    ≤ 2 (244-366)	305    RPM	4660	3107	2330	1864	1553	1165
					Fz	0.0017	0.0032	0.0042	0.0046	0.0050	0.0059

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

rpm =  $V_c \times 3.82 / DC$

ipm =  $F_z \times 6 \times rpm$

reduce speed and feed for materials harder than listed

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

feed rates listed have chip thinning adjustments included where applicable

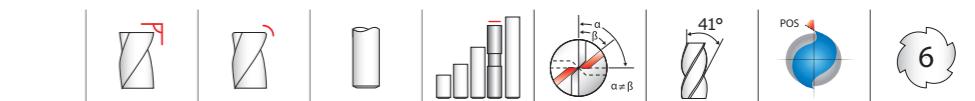
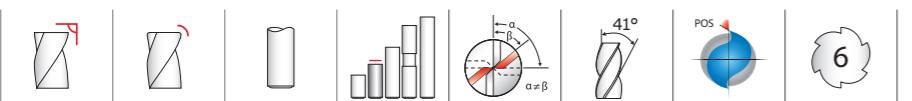
refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))



**51M •  
51MCR**  
**METRIC SERIES**

- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
  - Eccentric relief provides superior strength and smoother finish
  - Enhanced corner geometry with tight tolerance corner radii
  - Recommended for materials  $\leq 45$  HRc ( $< 450$  Phm)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	mm			EDP NO. TI-NAMITE-X (TX)
		OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	
6,0	19,0	63,0	6,0	—	45100
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	—	45101
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	—	45102
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	—	45103
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	—	45104
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	—	45105
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



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SGS Solid Tools

SGS Micro Tools

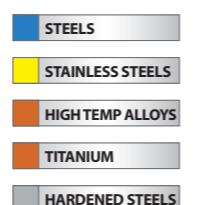
ES  
KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

## **TOLERANCES (mm)**

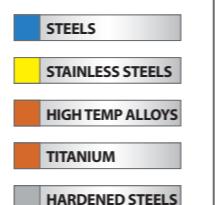
**DC** = +0,000/-0,050  
**DCON** = h<sub>6</sub>  
**RE** = +0,000/-0,050



For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

## TOLERANCES (mm)

**DC** = +0,000/-0,050  
**DCON** = h<sub>6</sub>  
**RE** = +0,000/-0,050



For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

mm							EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	TI-NAMITE-X (TX)
6,0	8,0	75,0	6,0	32,0	5,69	—	45106
6,0	8,0	75,0	6,0	32,0	5,69	0,5	45127
6,0	8,0	75,0	6,0	32,0	5,69	1,0	45187
6,0	8,0	75,0	6,0	32,0	5,69	1,5	45188
8,0	10,0	75,0	8,0	32,0	7,59	—	45107
8,0	10,0	75,0	8,0	32,0	7,59	0,5	45128
8,0	10,0	75,0	8,0	32,0	7,59	1,0	45129
8,0	10,0	75,0	8,0	32,0	7,59	1,5	45189
8,0	10,0	75,0	8,0	32,0	7,59	2,0	45190
10,0	12,0	100,0	10,0	40,0	9,50	—	45108
10,0	12,0	100,0	10,0	40,0	9,50	0,5	45191
10,0	12,0	100,0	10,0	40,0	9,50	1,0	45130
10,0	12,0	100,0	10,0	40,0	9,50	1,5	45131
10,0	12,0	100,0	10,0	40,0	9,50	2,0	45132
10,0	12,0	100,0	10,0	40,0	9,50	2,5	45192
12,0	15,0	100,0	12,0	48,0	11,38	—	45109
12,0	15,0	100,0	12,0	48,0	11,38	0,5	45193
12,0	15,0	100,0	12,0	48,0	11,38	0,76	45194
12,0	15,0	100,0	12,0	48,0	11,38	1,0	45133
12,0	15,0	100,0	12,0	48,0	11,38	1,5	45134
12,0	15,0	100,0	12,0	48,0	11,38	2,0	45135
12,0	15,0	100,0	12,0	48,0	11,38	2,5	45195
12,0	15,0	100,0	12,0	48,0	11,38	3,0	45196
16,0	20,0	115,0	16,0	65,0	15,19	—	45110
16,0	20,0	115,0	16,0	65,0	15,19	1,0	45136
16,0	20,0	115,0	16,0	65,0	15,19	1,5	45137
16,0	20,0	115,0	16,0	65,0	15,19	2,0	45138
16,0	20,0	115,0	16,0	65,0	15,19	2,5	45197
16,0	20,0	115,0	16,0	65,0	15,19	3,0	45198
16,0	20,0	115,0	16,0	65,0	15,19	4,0	45199
20,0	24,0	150,0	20,0	80,0	19,00	—	45111
20,0	24,0	150,0	20,0	80,0	19,00	1,0	45139
20,0	24,0	150,0	20,0	80,0	19,00	1,5	45140
20,0	24,0	150,0	20,0	80,0	19,00	2,0	45141
20,0	24,0	150,0	20,0	80,0	19,00	2,5	45200
20,0	24,0	150,0	20,0	80,0	19,00	3,0	45201
20,0	24,0	150,0	20,0	80,0	19,00	4,0	45202
20,0	24,0	150,0	20,0	80,0	19,00	5,0	45203

- Engineered for High speed Milling using trochoidal and Peel Milling techniques  
eccentric relief provides superior strength and smoother surface finish  
lecked design with blended diameter transitions provide clearance to reach enhanced corner geometry with tight tolerance corner radii recommended for materials  $\leq$  45 HRC  $\leq$  420 Bhn)

**METRIC**  
**T-Carb®**

Series 51M, 51MCR, 51ML, 51MLC Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm							
					6	8	10	12	16	20		
<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	219	RPM	11633	8725	6980	5816	4362	3490
					Fz	0.048	0.081	0.101	0.121	0.142	0.158	
					Feed (mm/min)	3350	4240	4230	4223	3717	3308	
		HSM	$\leq 0.05$	$\leq 2$	279	RPM	14784	11088	8870	7392	5544	4435
	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	149	RPM	7917	5938	4750	3958	2969	2375
					Fz	0.036	0.061	0.077	0.092	0.107	0.119	
					Feed (mm/min)	1710	2173	2195	2185	1906	1696	
		HSM	$\leq 0.05$	$\leq 2$	189	RPM	10017	7513	6010	5009	3756	3005
<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	155	RPM	8240	6180	4944	4120	3090	2472
					Fz	0.035	0.060	0.075	0.090	0.105	0.117	
					Feed (mm/min)	1730	2225	2225	2225	1947	1735	
		HSM	$\leq 0.05$	$\leq 2$	198	RPM	10502	7877	6301	5251	3938	3151
	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	107	RPM	5655	4241	3393	2827	2121	1696
					Fz	0.029	0.049	0.061	0.073	0.086	0.096	
					Feed (mm/min)	984	1247	1242	1238	1094	977	
		HSM	$\leq 0.05$	$\leq 2$	137	RPM	7271	5453	4362	3635	2726	2181
<b>STAINLESS STEELS</b> (FREE MACHINING) 303, 416, 420F, 430F, 440F	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	99	RPM	5251	3938	3151	2626	1969	1575
					Fz	0.029	0.049	0.061	0.073	0.086	0.096	
					Feed (mm/min)	914	1158	1153	1150	1016	907	
		HSM	$\leq 0.05$	$\leq 2$	125	RPM	6624	4968	3975	3312	2484	1987
	$\leq 325 \text{ Bhn}$ or $\leq 35 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	125	RPM	6624	4968	3975	3312	2484	1987
					Fz	0.040	0.069	0.086	0.103	0.120	0.134	
					Feed (mm/min)	1590	2057	2051	2047	1789	1598	
		HSM	$\leq 0.05$	$\leq 2$	125	RPM	6624	4968	3975	3312	2484	1987

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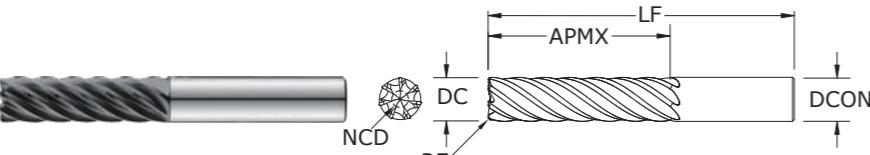
Series 51M, 51MCR, 51ML, 51MLC Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm							
					6	8	10	12	16	20		
<b>SUPER ALLOYS</b> (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	$\leq 300 \text{ Bhn}$ or $\leq 32 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	32	RPM	1696	1272	1018	848	636	509
					Fz	0.034	0.057	0.071	0.085	0.100	0.110	
					Feed (mm/min)	346	435	434	433	382	336	
		HSM	$\leq 0.05$	$\leq 2$	40	RPM	2100	1575	1260	1050	788	630
	$\leq 400 \text{ Bhn}$ or $\leq 43 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	24	RPM	1293	969	776	646	485	388
					Fz	0.023	0.039	0.049	0.059	0.068	0.077	
					Feed (mm/min)	178	227	228	229	198	179	
		HSM	$\leq 0.05$	$\leq 2$	30	RPM	1616	1212	969	808	606	485
<b>SUPER ALLOYS</b> (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	$\leq 350 \text{ Bhn}$ or $\leq 38 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	85	RPM	4524	3393	2714	2262	1696	1357
					Fz	0.023	0.039	0.049	0.059	0.068	0.077	
					Feed (mm/min)	624	794	798	801	692	627	
		HSM	$\leq 0.05$	$\leq 2$	108	RPM	5736	4302	3441	2868	2151	1721
	$\leq 440 \text{ Bhn}$ or $\leq 47 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	47	RPM	2504	1878	1503	1252	939	751
					Fz	0.023	0.039	0.049	0.059	0.068	0.077	
					Feed (mm/min)	346	440	442	443	383	347	
		HSM	$\leq 0.05$	$\leq 2$	61	RPM	3231	2424	1939	1616	1212	969
<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	$\leq 375 \text{ Bhn}$ or $\leq 38 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	73	RPM	3878	2908	2327	1939	1454	1163
					Fz	0.029	0.049	0.061	0.073	0.086	0.096	
					Feed (mm/min)	675	855	852	849	750	670	
		HSM	$\leq 0.05$	$\leq 2$	93	RPM	4928	3696	2957	2464	1848	1478
	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	73	RPM	3878	2908	2327	1939	1454	1163
					Fz	0.029	0.049	0.061	0.073	0.086	0.096	
					Feed (mm/min)	1183	1530	1526	1523	1331	1189	
		HSM	$\leq 0.05$	$\leq 2$	93	RPM	4928	3696	2957	2464	1848	1478
<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Profile	$\leq 0.1$	$\leq 1$	73	RPM	3878	2908	2327	1939	1454	1163
					Fz	0.029	0.049	0.061	0.073	0.086	0.096	
			</									

## FRACTIONAL H-Carb



### 77 • 77CR FRACTIONAL SERIES

- Specializes in deep axial trochoidal and high-speed milling applications
- Optimized core improves rigidity, chip flow and reduces deflection
- Chip Breaker design breaks up chips from the long flute length allowing for better chip flow and evacuation in deep pocketing operations
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



CUTTING DIAMETER DC	LENGTH OF CUT APMX	inch			NON-CUTTING CENTER DIAMETER NCD	EDP NO.			
		OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE		TI-NAMITE-A (TA) EDP NO.	TI-NAMITE-A (TA) CHIP BREAKER EDP NO.	TI-NAMITE-M (TM) EDP NO.	TI-NAMITE-M (TM) CHIP BREAKER EDP NO.
1/4	5/8	2-1/2	1/4	—	0.0845	77100	77102	77101	77103
1/4	5/8	2-1/2	1/4	.015	0.0845	77104	77106	77105	77107
1/4	5/8	2-1/2	1/4	.030	0.0845	77108	77110	77109	77111
1/4	3/4	2-1/2	1/4	—	0.0845	77112	77114	77113	77115
1/4	3/4	2-1/2	1/4	.015	0.0845	77116	77118	77117	77119
1/4	3/4	2-1/2	1/4	.030	0.0845	77120	77122	77121	77123
1/4	1	3	1/4	—	0.0845	77124	77126	77125	77127
1/4	1	3	1/4	.015	0.0845	77128	77130	77129	77131
1/4	1	3	1/4	.030	0.0845	77132	77134	77133	77135
3/8	15/16	3	3/8	—	0.1268	77136	77138	77137	77139
3/8	15/16	3	3/8	.015	0.1268	77140	77142	77141	77143
3/8	15/16	3	3/8	.030	0.1268	77144	77146	77145	77147
3/8	1-1/8	3-1/4	3/8	—	0.1268	77148	77150	77149	77151
3/8	1-1/8	3-1/4	3/8	.015	0.1268	77152	77154	77153	77155
3/8	1-1/8	3-1/4	3/8	.030	0.1268	77156	77158	77157	77159
3/8	1-1/2	3-1/2	3/8	—	0.1268	77160	77162	77161	77163
3/8	1-1/2	3-1/2	3/8	.015	0.1268	77164	77166	77165	77167
3/8	1-1/2	3-1/2	3/8	.030	0.1268	77168	77170	77169	77171
1/2	1-1/4	3-1/4	1/2	—	0.1690	77172	77174	77173	77175
1/2	1-1/4	3-1/4	1/2	.030	0.1690	77176	77178	77177	77179
1/2	1-1/4	3-1/4	1/2	.060	0.1690	77180	77182	77181	77183
1/2	1-1/2	3-1/2	1/2	—	0.1690	77184	77186	77185	77187
1/2	1-1/2	3-1/2	1/2	.030	0.1690	77188	77190	77189	77191
1/2	1-1/2	3-1/2	1/2	.060	0.1690	77192	77194	77193	77195
1/2	2	4	1/2	—	0.1690	77196	77198	77197	77199
1/2	2	4	1/2	.030	0.1690	77200	77202	77201	77203
1/2	2	4	1/2	.060	0.1690	77204	77206	77205	77207
5/8	1-9/16	3-3/4	5/8	—	0.2113	77208	77210	77209	77211
5/8	1-9/16	3-3/4	5/8	.030	0.2113	77212	77214	77213	77215
5/8	1-9/16	3-3/4	5/8	.060	0.2113	77216	77218	77217	77219

continued on next page

### TOLERANCES (inch)

#### 1/8-1/4 DIAMETER

DC = +0.0000/-0.0012  
DCON = h<sub>6</sub>  
RE = +0.000/-0.002

#### >1/4-3/8 DIAMETER

DC = +0.0000/-0.0016  
DCON = h<sub>6</sub>  
RE = +0.000/-0.002

#### >3/8-1 DIAMETER

DC = +0.0000/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.000/-0.002

#### STEELS

#### STAINLESS STEELS

#### CAST IRON

#### HIGH TEMP ALLOYS

#### TITANIUM

#### NON-FERROUS

#### HARDENED STEELS

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

### TOLERANCES (inch)

#### 1/8-1/4 DIAMETER

DC = +0.0000/-0.0012  
DCON = h<sub>6</sub>  
RE = +0.000/-0.002

#### >1/4-3/8 DIAMETER

DC = +0.0000/-0.0016  
DCON = h<sub>6</sub>  
RE = +0.000/-0.002

#### >3/8-1 DIAMETER

DC = +0.0000/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.000/-0.002

#### STEELS

#### STAINLESS STEELS

#### CAST IRON

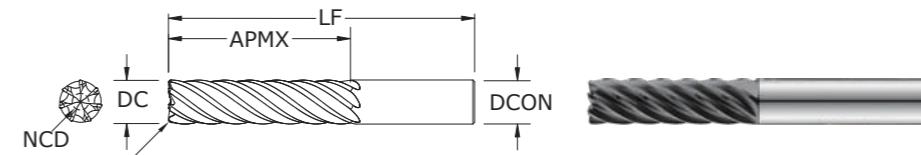
#### HIGH TEMP ALLOYS

#### TITANIUM

#### NON-FERROUS

#### HARDENED STEELS

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)



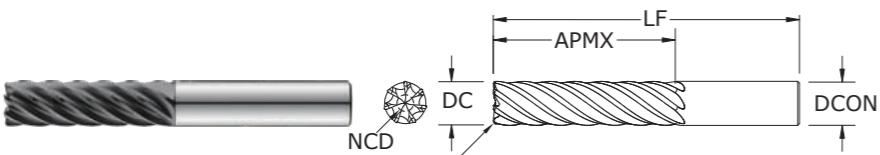
CUTTING DIAMETER DC	LENGTH OF CUT APMX	inch			NON-CUTTING CENTER DIAMETER NCD	EDP NO.				CONTINUED
		OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE		TI-NAMITE-A (TA) EDP NO.	TI-NAMITE-A (TA) CHIP BREAKER EDP NO.	TI-NAMITE-M (TM) EDP NO.	TI-NAMITE-M (TM) CHIP BREAKER EDP NO.	
5/8	1-7/8	4	5/8	—	0.2113	77220	77222	77221	77223	
5/8	1-7/8	4	5/8	.030	0.2113	77224	77226	77225	77227	
5/8	1-7/8	4	5/8	.060	0.2113	77228	77230	77229	77231	
5/8	2-1/2	4-1/2	5/8	—	0.2113	77232	77234	77233	77235	
5/8	2-1/2	4-1/2	5/8	.030	0.2113	77236	77238	77237	77239	
5/8	2-1/2	4-1/2	5/8	.060	0.2113	77240	77242	77241	77243	
3/4	1-7/8	4	3/4	—	0.2535	77244	77246	77245	77247	
3/4	1-7/8	4	3/4	.030	0.2113	77248	77250	77249	77251	
3/4	1-7/8	4	3/4	.060	0.2113	77252	77254	77253	77255	
3/4	1-7/8	4	3/4	.120	0.2113	77256	77258	77257	77259	
3/4	2-1/4	4-1/2	3/4	—	0.2535	77260	77262	77261	77263	
3/4	2-1/4	4-1/2	3/4	.030	0.					

## FRACTIONAL H-Carb



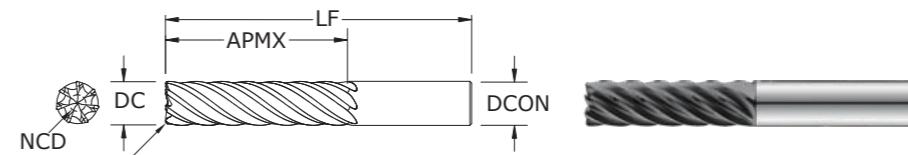
## 77M • 77MCR METRIC SERIES

- Specializes in deep axial trochoidal and high-speed milling applications
- Optimized core improves rigidity, chip flow and reduces deflection
- Chip Breaker design breaks up chips from the long flute length allowing for better chip flow and evacuation in deep pocketing operations
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NON-CUTTING CENTER DIAMETER NCD	EDP NO.			
						TI-NAMITE-A (TA) EDP NO.	TI-NAMITE-A (TA) CHIP BREAKER EDP NO.	TI-NAMITE-M (TM) EDP NO.	TI-NAMITE-M (TM) CHIP BREAKER EDP NO.
6,0	15,0	63,0	6,0	—	2,03	74300	74302	74301	74303
6,0	15,0	63,0	6,0	0,3	2,03	74304	74306	74305	74307
6,0	15,0	63,0	6,0	0,5	2,03	74308	74310	74309	74311
6,0	18,0	63,0	6,0	—	2,03	74316	74318	74317	74319
6,0	18,0	63,0	6,0	0,3	2,03	74320	74322	74321	74323
6,0	18,0	63,0	6,0	0,5	2,03	74324	74326	74325	74327
6,0	24,0	75,0	6,0	—	2,03	74332	74334	74333	74335
6,0	24,0	75,0	6,0	0,3	2,03	74336	74338	74337	74339
6,0	24,0	75,0	6,0	0,5	2,03	74340	74342	74341	74343
8,0	20,0	75,0	8,0	—	2,71	74348	74350	74349	74351
8,0	20,0	75,0	8,0	0,5	2,71	74352	74354	74353	74355
8,0	20,0	75,0	8,0	1,0	2,71	74356	74358	74357	74359
8,0	20,0	75,0	8,0	2,0	2,71	74360	74362	74361	74363
8,0	24,0	75,0	8,0	—	2,71	74364	74366	74365	74367
8,0	24,0	75,0	8,0	0,5	2,71	74368	74370	74369	74371
8,0	24,0	75,0	8,0	1,0	2,71	74372	74374	74373	74375
8,0	24,0	75,0	8,0	2,0	2,71	74376	74378	74377	74379
8,0	32,0	85,0	8,0	—	2,71	74380	74382	74381	74383
8,0	32,0	85,0	8,0	0,5	2,71	74384	74386	74385	74387
8,0	32,0	85,0	8,0	1,0	2,71	74388	74390	74389	74391
8,0	32,0	85,0	8,0	2,0	2,71	74392	74394	74393	74395
10,0	25,0	75,0	10,0	—	3,38	74396	74398	74397	74399
10,0	25,0	75,0	10,0	0,5	3,38	74400	74402	74401	74403
10,0	25,0	75,0	10,0	1,0	3,38	74404	74406	74405	74407
10,0	30,0	80,0	10,0	—	3,38	74408	74410	74409	74411
10,0	30,0	80,0	10,0	0,5	3,38	74412	74414	74413	74415
10,0	30,0	80,0	10,0	1,0	3,38	74416	74418	74417	74419
10,0	40,0	100,0	10,0	—	3,38	74420	74422	74421	74423
10,0	40,0	100,0	10,0	0,5	3,38	74424	74426	74425	74427
10,0	40,0	100,0	10,0	1,0	3,38	74428	74430	74429	74431
12,0	30,0	83,0	12,0	—	4,06	74432	74434	74433	74435
12,0	30,0	83,0	12,0	0,5	4,06	74436	74438	74437	74439
12,0	30,0	83,0	12,0	1,0	4,06	74440	74442	74441	74443
12,0	36,0	83,0	12,0	—	4,06	74444	74446	74445	74447
12,0	36,0	83,0	12,0	0,5	4,06	74448	74450	74449	74451
12,0	36,0	83,0	12,0	1,0	4,06	74452	74454	74453	74455

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## 77M • 77MCR METRIC SERIES

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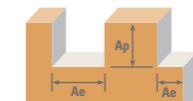
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NON-CUTTING CENTER DIAMETER NCD	EDP NO.			
						TI-NAMITE-A (TA) EDP NO.	TI-NAMITE-A (TA) CHIP BREAKER EDP NO.	TI-NAMITE-M (TM) EDP NO.	TI-NAMITE-M (TM) CHIP BREAKER EDP NO.
12,0	48,0	100,0	12,0	—	4,06	74456	74458	74457	74459
12,0	48,0	100,0	12,0	0,5	4,06	74460	74462	74461	74463
12,0	48,0	100,0	12,0	1,0	4,06	74464	74466	74465	74467
16,0	40,0	92,0	16,0	—	5,41	74468	74470	74469	74471
16,0	40,0	92,0	16,0	0,5	5,41	74472	74474	74473	74475
16,0	40,0	92,0	16,0	1,0	5,41	74476	74478	74477	74479
16,0	48,0	100,0	16,0	—	5,41	74480	74482	74481	74483
16,0	48,0	100,0	16,0	0,5	5,41	74484	74486	74485	74487
16,0	48,0	100,0	16,0	1,0	5,41	74488	74490	74489	74491
16,0	64,0	115,0	16,0	—	5,41	74492	74494	74493	74495
16,0	64,0	115,0	16,0	0,5	5,41	74496	74498	74497	74499
16,0	64,0	115,0	16,0	1,0	5,41	74500	74502	74501	74503
20,0	50,0	100,0	20,0	—	6,76	74504	74506	74505	74507
20,0	50,0	100,0	20,0	0,5	6,76	74508	74510	74509	74511
20,0	50,0	100,0	20,0	1,0	6,76	74512	74514	74513	74515
20,0	50,0	100,0	20,0	2,0	6,76	74516	74518	74517	74519
20,0	60,0	115,0	20,0	—	6,76	74520	74522	74521	74523
20,0	60,0	115,0	20,0	0,5	6,76	74524	74526	74525	74527
20,0	60,0	115,0	20,0	1,0	6,76	74528	74530	74529	74531
20,0	60,0	115,0	20,0	2,0	6,76	74532	74534	74533	74535
20,0	80,0	140,0	20,0	—	6,76	74536	74538	74537	74539
20,0	80,0	140,0	20,0	0,5	6,76	74540	74542	74541	74543
20,0	80,0	140,0	20,0	1,0	6,76	74544			

# FRACTIONAL H-Carb



Series 77, 77CR Fractional	Hardness	Ae x D <sub>1</sub>	Ap x D <sub>1</sub>	Vc (sfm)	D <sub>1</sub> • inch							
					1/4	3/8	1/2	5/8	3/4	1		
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	HSM	2.5xD	816	RPM	11552	7701	5776	4621	3851	2888
			HSM	$\leq 0.2$ $\leq \text{APMX}$	(653-979)	Fz	0.0015	0.0024	0.0031	0.0035	0.0038	0.0042
			HSM	3xD	845	Fz	0.0017	0.0027	0.0035	0.0040	0.0043	0.0047
			HSM	$\leq 0.15$ $\leq \text{APMX}$	(676-1014)	Feed (ipm)	136	146	140	129	116	95
			HSM	4xD	756	Fz	0.0018	0.0028	0.0036	0.0041	0.0044	0.0049
			HSM	$\leq 0.1$ $\leq \text{APMX}$	(605-907)	Feed (ipm)	146	151	146	133	119	99
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	HSM	2.5xD	595	RPM	8419	5613	4210	3368	2806	2105
			HSM	$\leq 0.2$ $\leq \text{APMX}$	(476-714)	Feed (ipm)	53	75	77	66	61	52
			HSM	3xD	616	Fz	0.0010	0.0021	0.0030	0.0033	0.0035	0.0039
			HSM	$\leq 0.15$ $\leq \text{APMX}$	(493-739)	Feed (ipm)	59	83	88	78	69	57
			HSM	4xD	551	Fz	0.0011	0.0022	0.0031	0.0034	0.0036	0.0041
			HSM	$\leq 0.1$ $\leq \text{APMX}$	(441-661)	Feed (ipm)	65	86	91	80	71	60
	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	HSM	2.5xD	646	RPM	9137	6092	4569	3655	3046	2284
			HSM	$\leq 0.2$ $\leq \text{APMX}$	(517-775)	Feed (ipm)	58	72	74	64	60	51
			HSM	3xD	669	Fz	0.0010	0.0019	0.0026	0.0029	0.0031	0.0036
			HSM	$\leq 0.15$ $\leq \text{APMX}$	(535-803)	Feed (ipm)	64	81	83	74	66	58
	M	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	HSM	4xD	598	Fz	0.0011	0.0020	0.0027	0.0030	0.0033	0.0037
			HSM	$\leq 0.1$ $\leq \text{APMX}$	(478-718)	Feed (ipm)	70	85	86	77	70	59
			HSM	2.5xD	425	RPM	6020	4014	3010	2408	2007	1505
			HSM	$\leq 0.2$ $\leq \text{APMX}$	(340-510)	Feed (ipm)	29	39	40	39	37	32
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	HSM	3xD	440	Fz	0.0008	0.0016	0.0021	0.0025	0.0029	0.0034
			HSM	$\leq 0.15$ $\leq \text{APMX}$	(352-528)	Feed (ipm)	34	45	44	42	41	36
			HSM	4xD	394	Fz	0.0008	0.0016	0.0022	0.0026	0.0030	0.0035
			HSM	$\leq 0.1$ $\leq \text{APMX}$	(315-473)	Feed (ipm)	34	45	46	44	42	37
	STAINLESS STEELS (PH) 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	$\leq 325 \text{ Bhn}$ or $\leq 35 \text{ HRc}$	HSM	2.5xD	408	RPM	5776	3851	2888	2310	1925	1444
			HSM	$\leq 0.2$ $\leq \text{APMX}$	(326-490)	Feed (ipm)	28	38	38	37	35	30
			HSM	3xD	422	Fz	0.0008	0.0016	0.0021	0.0025	0.0029	0.0034
			HSM	$\leq 0.15$ $\leq \text{APMX}$	(338-506)	Feed (ipm)	32	43	42	40	39	34
	P	$\leq 220 \text{ Bhn}$ or $\leq 19 \text{ HRc}$	HSM	4xD	378	Fz	0.0008	0.0016	0.0022	0.0026	0.0030	0.0035
			HSM	$\leq 0.1$ $\leq \text{APMX}$	(302-454)	Feed (ipm)	32	43	44	42	40	35
			HSM	2.5xD	714	RPM	10100	6733	5050	4040	3367	2525
			HSM	$\leq 0.2$ $\leq \text{APMX}$	(571-857)	Feed (ipm)	71	85	85	79	78	65
	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	$\leq 260 \text{ Bhn}$ or $\leq 26 \text{ HRc}$	HSM	3xD	739	Fz	0.0011	0.0020	0.0027	0.0033	0.0037	0.0042
			HSM	$\leq 0.15$ $\leq \text{APMX}$	(591-887)	Feed (ipm)	78	94	95	93	87	73
			HSM	4xD	661	Fz	0.0012	0.0021	0.0028	0.0034	0.0039	0.0043
			HSM	$\leq 0.1$ $\leq \text{APMX}$	(529-793)	Feed (ipm)	85	99	99	96	92	76
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	HSM	2.5xD	425	RPM	6020	4014	3010	2408	2007	1505
			HSM	$\leq 0.2$ $\leq \text{APMX}$	(340-510)	Feed (ipm)	29	39	40	39	37	32
			HSM	3xD	440	Fz	0.0008	0.0016	0.0021	0.0025	0.0029	0.0037
			HSM	$\leq 0.15$ $\leq \text{APMX}$	(352-528)	Feed (ipm)	34	45	44	42	41	39
		$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	HSM	4xD	394	Fz	0.0008	0.0016	0.0022	0.0026	0.0030	0.0035
			HSM	$\leq 0.1$ $\leq \text{APMX}$	(315-473)	Feed (ipm)	34	45	46	44	42	37

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Series 77, 77CR Fractional	Hardness	Ae x D <sub>1</sub>	Ap x D <sub>1</sub>	Vc (sfm)	D <sub>1</sub> • inch					
					1/4	3/8	1/2	5/8	3/4	1
N	NON-FERROUS MATERIALS				Not Recommended for this Material Group					
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE)									
T	TITANIUM ALLOYS (DIFFICULT)									
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2									

**METRIC**  
**H-Carb**

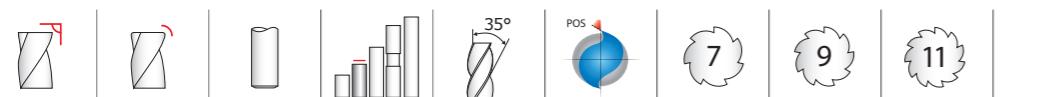


Metric	Series 77M, 77MCR	Hardness	Ae x D <sub>1</sub>	Ap x D <sub>1</sub>	V <sub>c</sub> (m/min)	D <sub>1</sub> • mm							
						6	8	10	12	16	20	25	
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	HSM	2.5xD	284	RPM	12208	9156	7325	6104	4578	3662	2930
			HSM	$\leq 0.2 \leq \text{APMX}$ (227-341)	Feed (ipm)	Fz	0.0413	0.0411	0.0640	0.0711	0.0889	0.1013	0.1050
		$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	HSM	3xD	257	RPM	8068	6051	4841	4034	3025	2420	1936
			HSM	$\leq 0.15 \leq \text{APMX}$ (206-308)	Feed (ipm)	Fz	0.0347	0.0461	0.0717	0.0797	0.0996	0.1135	0.1176
		$\leq 32 \text{ HRc}$	HSM	4xD	230	RPM	9660	7245	5796	4830	3623	2898	2318
			HSM	$\leq 0.1 \leq \text{APMX}$ (184-276)	Feed (ipm)	Fz	0.0362	0.0480	0.0747	0.0830	0.1037	0.1182	0.0919
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	$\leq 400 \text{ Bhn}$ or $\leq 43 \text{ HRc}$	HSM	2.5xD	132	RPM	8068	6051	4841	4034	3025	2420	1936
			HSM	$\leq 0.2 \leq \text{APMX}$ (106-159)	Feed (ipm)	Fz	0.0213	0.0285	0.0512	0.0610	0.0711	0.0827	0.0875
		$\leq 43 \text{ HRc}$	HSM	3xD	138	RPM	8068	6051	4841	4034	3025	2420	1936
			HSM	$\leq 0.15 \leq \text{APMX}$ (111-166)	Feed (ipm)	Fz	0.0239	0.0319	0.0574	0.0683	0.0797	0.0926	0.0980
		$\leq 440 \text{ Bhn}$ or $\leq 47 \text{ HRc}$	HSM	4xD	152	RPM	9660	7245	5796	4830	3623	2898	2318
			HSM	$\leq 0.1 \leq \text{APMX}$ (122-182)	Feed (ipm)	Fz	0.0249	0.0332	0.0597	0.0711	0.0830	0.0964	0.1021
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	HSM	2.5xD	197	RPM	9660	7245	5796	4830	3623	2898	2318
			HSM	$\leq 0.2 \leq \text{APMX}$ (158-236)	Feed (ipm)	Fz	0.0216	0.0285	0.0448	0.0533	0.0635	0.0747	0.0800
		$\leq 32 \text{ HRc}$	HSM	3xD	204	RPM	9660	7245	5796	4830	3623	2898	2318
			HSM	$\leq 0.15 \leq \text{APMX}$ (163-245)	Feed (ipm)	Fz	0.0242	0.0319	0.0502	0.0598	0.0711	0.0837	0.0896
		$\leq 35 \text{ HRc}$	HSM	4xD	182	RPM	9660	7245	5796	4830	3623	2898	2318
			HSM	$\leq 0.1 \leq \text{APMX}$ (146-218)	Feed (ipm)	Fz	0.0252	0.0332	0.0523	0.0622	0.0741	0.0871	0.0933
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	HSM	2.5xD	130	RPM	6369	4777	3822	3185	2389	1911	1529
			HSM	$\leq 0.2 \leq \text{APMX}$ (104-156)	Feed (ipm)	Fz	0.0168	0.0221	0.0371	0.0432	0.0584	0.0693	0.0750
		$\leq 32 \text{ HRc}$	HSM	3xD	134	RPM	6369	4777	3822	3185	2389	1911	1529
			HSM	$\leq 0.15 \leq \text{APMX}$ (107-161)	Feed (ipm)	Fz	0.0188	0.0248	0.0416	0.0484	0.0655	0.0777	0.0840
		$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	HSM	4xD	120	RPM	6369	4777	3822	3185	2389	1911	1529
			HSM	$\leq 0.1 \leq \text{APMX}$ (96-144)	Feed (ipm)	Fz	0.0196	0.0258	0.0433	0.0504	0.0682	0.0809	0.0875
P	STAINLESS STEELS (PH) 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	$\leq 325 \text{ Bhn}$ or $\leq 35 \text{ HRc}$	HSM	2.5xD	124	RPM	6104	4578	3662	3052	2289	1831	1465
			HSM	$\leq 0.2 \leq \text{APMX}$ (99-149)	Feed (ipm)	Fz	0.0168	0.0221	0.0371	0.0432	0.0584	0.0693	0.0750
		$\leq 35 \text{ HRc}$	HSM	3xD	129	RPM	6104	4578	3662	3052	2289	1831	1465
			HSM	$\leq 0.15 \leq \text{APMX}$ (103-155)	Feed (ipm)	Fz	0.0188	0.0248	0.0416	0.0484	0.0655	0.0777	0.0840
		$\leq 40 \text{ HRc}$	HSM	4xD	115	RPM	6104	4578	3662	3052	2289	1831	1465
			HSM	$\leq 0.1 \leq \text{APMX}$ (92-138)	Feed (ipm)	Fz	0.0196	0.0258	0.0433	0.0504	0.0682	0.0809	0.0875
	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	$\leq 220 \text{ Bhn}$ or $\leq 19 \text{ HRc}$	HSM	2.5xD	218	RPM	10722	8041	6433	5361	4021	3217	2573
			HSM	$\leq 0.2 \leq \text{APMX}$ (174-262)	Feed (ipm)	Fz	0.0239	0.0315	0.0474	0.0559	0.0762	0.0880	0.0925
		$\leq 260 \text{ Bhn}$ or $\leq 26 \text{ HRc}$	HSM	3xD	225	RPM	10722	8041	6433	5361	4021	3217	2573
			HSM	$\leq 0.15 \leq \text{APMX}$ (180-270)	Feed (ipm)	Fz	0.0268	0.0353	0.0531	0.0626	0.0854	0.0986	0.1036
		$\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	HSM	4xD	202	RPM	10722	8041	6433	5361	4021	3217	2573
			HSM	$\leq 0.1 \leq \text{APMX}$ (162-242)	Feed (ipm)	Fz	0.0279	0.0368	0.0553	0.0652	0.0889	0.1027	0.1079
N	NON-FERROUS MATERIALS												
	Not Recommended for this Material Group												



Metric	Series 77M, 77MCR	Hardness	Ae x D <sub>1</sub>	Ap x D <sub>1</sub>	V <sub>c</sub> (m/min)	D <sub>1</sub> • mm					
						6	8	10	12	16	20
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE										

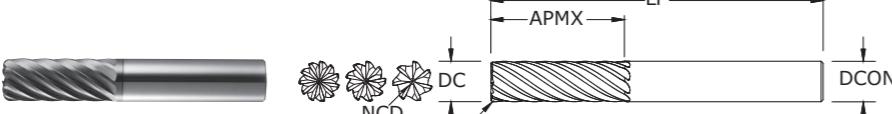
# FRACTIONAL Multi-Carb



**66 •  
66CR**

FRACTIONAL SERIES

- Heavy core and rigid design allow for straight walls
- High flute count design results in smoother cutting performance and enhanced tool life in precise finishing applications
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 Hrc ( $\leq 420$  Bhn)



inch							EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NON-CUTTING CENTER DIAMETER NCD	NO. OF FLUTES	
3/16	5/8	2	3/16	—	0.0550	7	36620
3/16	5/8	2	3/16	.010	0.0550	7	36627
1/4	3/4	2-1/2	1/4	—	0.0650	7	36621
1/4	3/4	2-1/2	1/4	.015	0.0650	7	36628
3/8	1	3	3/8	—	0.0810	7	36622
3/8	1	3	3/8	.015	0.0810	7	36629
1/2	1-1/4	3	1/2	—	0.1340	9	36623
1/2	1-1/4	3	1/2	.030	0.1340	9	36630
1/2	1-1/4	3	1/2	.090	0.1340	9	36631
1/2	1-1/4	3	1/2	.120	0.1340	9	36632
5/8	1-5/8	3-1/2	5/8	—	0.1150	9	36624
5/8	1-5/8	3-1/2	5/8	.030	0.1150	9	36633
5/8	1-5/8	3-1/2	5/8	.090	0.1150	9	36634
5/8	1-5/8	3-1/2	5/8	.120	0.1150	9	36635
3/4	1-5/8	4	3/4	—	0.1750	11	36625
3/4	1-5/8	4	3/4	.030	0.1750	11	36636
3/4	1-5/8	4	3/4	.090	0.1750	11	36637
3/4	1-5/8	4	3/4	.120	0.1750	11	36638
1	2	6	1	—	0.3000	11	36626
1	2	6	1	.030	0.3000	11	36639
1	2	6	1	.090	0.3000	11	36640
1	2	6	1	.120	0.3000	11	36641

Neck Option Available

## TOLERANCES (inch)

DC = +0.0000/-0.0020  
DCON = h6  
RE = +0.0000/-0.0020



For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

Series 66, 66CR Fractional	Hardness		Ae x DC	Ap x DC	Vc (sfm)	DC • in							
						3/16	1/4	3/8	1/2	5/8	3/4	1	
<b>P</b> <b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 Hrc	Profile 	≤ 0.05	≤ 1	635 (508-762)	RPM	12937	9703	6469	4851	3881	3234	2426
		Finish 	≤ 0.02	≤ 2	762 (610-914)	RPM	15524	11643	7762	5822	4657	3881	2911
<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 Hrc	Profile 	≤ 0.05	≤ 1	360 (288-432)	RPM	7334	5501	3667	2750	2200	1834	1375
		Finish 	≤ 0.02	≤ 2	432 (346-518)	RPM	8801	6601	4401	3300	2640	2200	1650
<b>STAINLESS STEELS (FREE MACHINING)</b> 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 Hrc	Profile 	≤ 0.05	≤ 1	560 (448-672)	RPM	11409	8557	5705	4278	3423	2852	2139
		Finish 	≤ 0.02	≤ 2	448 (358-538)	RPM	9127	6845	4564	3423	2738	2282	1711
<b>M</b> <b>STAINLESS STEELS (DIFFICULT)</b> 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 Hrc	Profile 	≤ 0.05	≤ 1	385 (308-462)	RPM	7844	5883	3922	2941	2353	1961	1471
		Finish 	≤ 0.02	≤ 2	462 (370-554)	RPM	9412	7059	4706	3530	2824	2353	1765
<b>STAINLESS STEELS (PH)</b> 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 Hrc	Profile 	≤ 0.05	≤ 1	355 (284-426)	RPM	7233	5424	3616	2712	2170	1808	1356
		Finish 	≤ 0.02	≤ 2	426 (341-511)	RPM	8679	6509	4340	3255	2604	2170	1627
<b>K</b> <b>CAST IRONS (LOW &amp; MEDIUM ALLOY)</b> Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 Hrc	Profile 	≤ 0.05	≤ 1	705 (564-846)	RPM	14363	10772	7182	5386	4309	3591	2693
		Finish 	≤ 0.02	≤ 2	846 (677-1015)	RPM	17236	12927	8618	6463	5171	4309	3232

continued on next page

# FRACTIONAL Multi-Carb

**MULTICarb**  
HIGH PERFORMANCE FINISHING END MILLS

Series 66, 66CR Fractional	Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in						
					3/16	1/4	3/8	1/2	5/8	3/4	1
<b>K</b> <b>CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile</b> ≤ 260 Bhn or ≤ 26 HRc	Profile ≤ 0.05	≤ 1	540 (432-648)	RPM	11002	8251	5501	4126	3300	2750	2063
				Fz	0.0006	0.0009	0.0017	0.0023	0.0029	0.0030	0.0032
	Finish ≤ 0.02	≤ 2	648 (518-778)	RPM	13202	9901	6601	4951	3961	3300	2475
				Fz	0.0005	0.0007	0.0014	0.0018	0.0023	0.0024	0.0026
<b>S</b> <b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400</b> ≤ 300 Bhn or ≤ 32 HRc	Profile ≤ 0.05	≤ 1	105 (84-126)	RPM	2139	1604	1070	802	642	535	401
				Fz	0.0005	0.0007	0.0014	0.0018	0.0023	0.0024	0.0026
	Finish ≤ 0.02	≤ 2	126 (101-151)	RPM	2567	1925	1284	963	770	642	481
				Fz	0.0004	0.0006	0.0011	0.0014	0.0018	0.0019	0.0021
<b>S</b> <b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene</b> ≤ 400 Bhn or ≤ 43 HRc	Profile ≤ 0.05	≤ 1	85 (68-102)	RPM	1732	1299	866	649	520	433	325
				Fz	0.0003	0.0005	0.0009	0.0011	0.0014	0.0015	0.0016
	Finish ≤ 0.02	≤ 2	102 (82-122)	RPM	2078	1559	1039	779	623	520	390
				Fz	0.0002	0.0004	0.0007	0.0009	0.0011	0.0012	0.0013
<b>T</b> <b>TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si</b> ≤ 350 Bhn or ≤ 38 HRc	Profile ≤ 0.05	≤ 1	390 (312-468)	RPM	7946	5959	3973	2980	2384	1986	1490
				Fz	0.0005	0.0008	0.0015	0.0021	0.0026	0.0027	0.0029
	Finish ≤ 0.02	≤ 2	468 (374-562)	RPM	9535	7151	4767	3576	2860	2384	1788
				Fz	0.0004	0.0006	0.0012	0.0017	0.0021	0.0022	0.0023
<b>T</b> <b>TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al</b> ≤ 440 Bhn or ≤ 47 HRc	Profile ≤ 0.05	≤ 1	140 (112-168)	RPM	2852	2139	1426	1070	856	713	535
				Fz	0.0005	0.0008	0.0015	0.0021	0.0026	0.0027	0.0029
	Finish ≤ 0.02	≤ 2	168 (134-202)	RPM	3423	2567	1711	1284	1027	856	642
				Fz	0.0004	0.0006	0.0012	0.0017	0.0021	0.0022	0.0023
<b>H</b> <b>TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2</b> ≤ 375 Bhn or ≤ 40 HRc	Profile ≤ 0.05	≤ 1	290 (232-348)	RPM	5908	4431	2954	2216	1772	1477	1108
				Fz	0.0004	0.0006	0.0012	0.0016	0.0020	0.0021	0.0022
	Finish ≤ 0.02	≤ 2	348 (278-418)	RPM	7090	5317	3545	2659	2127	1772	1329
				Fz	0.0003	0.0005	0.0010	0.0013	0.0016	0.0017	0.0018

Bhn (Brinell)    HRc (Rockwell C)

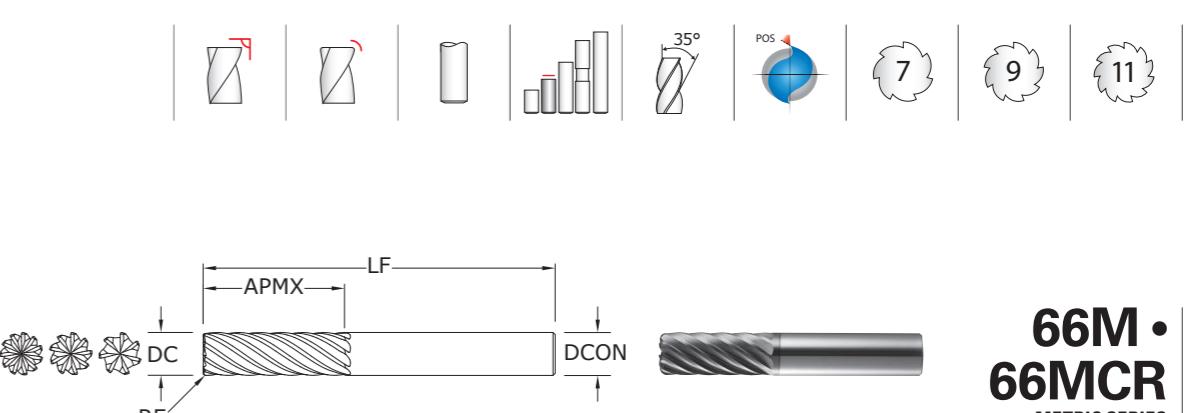
rpm = Vc x 3.82 / DC

ipm = Fz x number of flutes x rpm

reduce speed and feed for materials harder than listed

feed rates listed have chip thinning adjustments included where applicable

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))



TOLERANCES (mm)							EDP NO.
DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NON-CUTTING CENTER DIAMETER NCD	NO. OF FLUTES	TI-NAMITE-X
DC = +0,000/-0,050							
DCON = h6							
RE = +0,000/-0,050							
<b>STEELS</b>							
6,0	19,0	63,0	6,0	—	1,63	7	46620
8,0	20,0	63,0	8,0	0,5	1,63	7	46627
6,0	19,0	63,0	6,0	1,0	1,63	7	46628
8,0	20,0	63,0	8,0	—	1,78	7	46621
8,0	20,0	63,0	8,0	0,5	1,78	7	46629
8,0	20,0	63,0	8,0	1,0	1,78	7	46630
8,0	20,0	63,0	8,0	1,5	1,78	7	46631
10,0	22,0	75,0	10,0	—	2,03	7	46622
10,0	22,0	75,0	10,0	0,5	2,03	7	46632
10,0	22,0	75,0	10,0	1,0	2,03	7	46633
10,0	22,0	75,0	10,0	1,5	2,03	7	46634
10,0	22,0	75,0	10,0	2,0	2,03	7	46635
12,0	26,0	83,0	12,0	—	3,45	9	46623
12,0	26,0	83,0	12,0	1,0	3,45	9	46636
12,0	26,0	83,0	12,0	1,5	3,45	9	46637
12,0	26,0	83,0	12,0	2,0	3,45	9	46638
12,0	26,0	83,0	12,0	2,5	3,45	9	46639
12,0	26,0	83,0	12,0	3,0	3,45	9	46640
16,0	32,0	92,0	16,0	—	2,92	9	46624
16,0	32,0	92,0	16,0	1,0	2,92	9	46641
16,0	32,0	92,0	16,0	1,5	2,92	9	46642
16,0	32,0	92,0	16,0	2,0	2,92	9	46643
16,0	32,0	92,0	16,0	2,5	2,92	9	46644
16,0	32,0	92,0	16,0	3,0	2,92	9	46645
16,0	32,0	92,0	16,0	4,0	2,92	9	46646
20,0	38,0	104,0	20,0	—	4,57	11	46625
20,0	38,0	104,0	20,0	1,0	4,57	11	46647
20,0	38,0	104,0	20,0	1,5	4,57	11	46648
20,0	38,0	104,0	20,0	2,0	4,57	11	46649
20,0	38,0	104,0	20,0	2,5	4,57	11	46650
20,0	38,0	104,0	20,0	3,0	4,57	11	46651
20,0	38,0	104,0	20,0	4,0	4,57	11	46652

continued on next page

Neck Option Available

METRIC  
**Multi-Carb**



HIGH PERFORMANCE FINISHING END MILLS



**66M •  
66MCR**  
METRIC SERIES

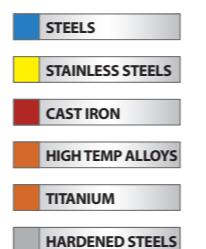
CONTINUED

mm							EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NON-CUTTING CENTER DIAMETER NCD	NO. OF FLUTES	TI-NAMITE-X
20,0	38,0	104,0	20,0	5,0	4,57	11	46653
25,0	38,0	104,0	25,0	—	7,49	11	46626
25,0	38,0	104,0	25,0	1,0	7,49	11	46654
25,0	38,0	104,0	25,0	1,5	7,49	11	46655
25,0	38,0	104,0	25,0	2,0	7,49	11	46656
25,0	38,0	104,0	25,0	2,5	7,49	11	46657
25,0	38,0	104,0	25,0	3,0	7,49	11	46658
25,0	38,0	104,0	25,0	4,0	7,49	11	46659
25,0	38,0	104,0	25,0	5,0	7,49	11	46660

Neck Option Available

TOLERANCES (mm)

DC = +0,000/-0,050  
DCON = h<sub>6</sub>  
RE = +0,000/-0,050



For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

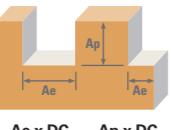
Series 66M, 66MCR Metric	Hardness	Vc (m/min)		DC • mm								
		Ae x DC	Ap x DC	6	8	10	12	16	20	25		
<b>P</b>  <b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile ≤ 0.05	≤ 1 (155-232)	194	RPM	10260	7695	6156	5130	3847	3078	2462
		Finish ≤ 0.02	≤ 2 (186-279)	232	RPM	12312	9234	7387	6156	4617	3693	2955
		Profile ≤ 0.05	≤ 1 (88-132)	110	RPM	5816	4362	3490	2908	2181	1745	1396
		Finish ≤ 0.02	≤ 2 (105-158)	132	RPM	6980	5235	4188	3490	2617	2094	1675
<b>P</b>  <b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	Profile ≤ 0.05	≤ 1 (137-205)	171	RPM	9048	6786	5429	4524	3393	2714	2171
		Finish ≤ 0.02	≤ 2 (109-164)	137	RPM	7238	5429	4343	3619	2714	2171	1737
		Profile ≤ 0.05	≤ 1 (94-141)	117	RPM	6220	4665	3732	3110	2333	1866	1493
		Finish ≤ 0.02	≤ 2 (113-169)	141	RPM	7465	5598	4479	3732	2799	2239	1791
<b>M</b>  <b>STAINLESS STEELS (FREE MACHINING)</b> 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile ≤ 0.05	≤ 1 (87-130)	108	RPM	5736	4302	3441	2868	2151	1721	1377
		Finish ≤ 0.02	≤ 2 (104-156)	Fz	0.017	0.030	0.037	0.043	0.059	0.064	0.065	
		Profile ≤ 0.05	≤ 1 (94-141)	Fz	0.017	0.030	0.037	0.043	0.059	0.064	0.065	
		Finish ≤ 0.02	≤ 2 (113-169)	Feed (mm/min)	731	975	975	1209	1236	1314	1067	
<b>M</b>  <b>STAINLESS STEELS (DIFFICULT)</b> 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile ≤ 0.05	≤ 1 (137-205)	141	RPM	7465	5598	4479	3732	2799	2239	1791
		Finish ≤ 0.02	≤ 2 (113-169)	Fz	0.013	0.024	0.030	0.035	0.047	0.051	0.052	
		Profile ≤ 0.05	≤ 1 (87-130)	Feed (mm/min)	702	17	936	1161	1187	1261	1025	
		Finish ≤ 0.02	≤ 2 (104-156)	Fz	0.013	0.024	0.030	0.035	0.047	0.051	0.052	
<b>M</b>  <b>STAINLESS STEELS (PH)</b> 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Profile ≤ 0.05	≤ 1 (172-258)	215	RPM	11391	8543	6834	5695	4271	3417	2734
		Finish ≤ 0.02	≤ 2 (206-309)	Fz	0.029	0.047	0.059	0.072	0.095	0.101	0.105	
		Profile ≤ 0.05	≤ 1 (172-258)	Feed (mm/min)	2296	2807	2807	3690	3641	3809	3158	
		Finish ≤ 0.02	≤ 2 (206-309)	Fz	0.023	0.038	0.047	0.058	0.076	0.081	0.084	
<b>K</b>  <b>CAST IRONS (LOW &amp; MEDIUM ALLOY)</b> Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile ≤ 0.05	≤ 1 (109-164)	258	RPM	13669	10252	8201	6834	5126	4101	3281
		Finish ≤ 0.02	≤ 2 (109-164)	Feed (mm/min)	2204	2695	2694	3543	3496	3657	3031	

continued on next page

# METRIC Multi-Carb



Series 66M, 66MCR Metric



**Vc • mm**

			6	8	10	12	16	20	25
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<b>K</b>	<b>CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile</b>	Hardness $\leq 260 \text{ Bhn}$ or $\leq 26 \text{ HRc}$	Profile 	$\leq 0.05$	$\leq 1$	165	RPM	8725	6544	5235	4362	3272	2617	2094
						(132-198)	Fz	0.022	0.036	0.045	0.055	0.074	0.080	0.080
<b>S</b>	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400</b>	Hardness $\leq 300 \text{ Bhn}$ or $\leq 32 \text{ HRc}$	Finish 	$\leq 0.02$	$\leq 2$	198	RPM	10470	7852	6282	5235	3926	3141	2513
						(158-237)	Fz	0.017	0.029	0.036	0.044	0.059	0.064	0.064
<b>S</b>	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene</b>	Hardness $\leq 400 \text{ Bhn}$ or $\leq 43 \text{ HRc}$	Profile 	$\leq 0.05$	$\leq 1$	32	RPM	1696	1272	1018	848	636	509	407
						(26-38)	Fz	0.017	0.030	0.037	0.043	0.059	0.064	0.065
<b>H</b>	<b>TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si</b>	Hardness $\leq 350 \text{ Bhn}$ or $\leq 38 \text{ HRc}$	Profile 	$\leq 0.05$	$\leq 1$	26	RPM	1373	1030	824	687	515	412	330
						(21-31)	Fz	0.012	0.019	0.024	0.026	0.036	0.040	0.040
<b>H</b>	<b>TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al</b>	Hardness $\leq 440 \text{ Bhn}$ or $\leq 47 \text{ HRc}$	Profile 	$\leq 0.05$	$\leq 1$	119	RPM	6301	4726	3781	3151	2363	1890	1512
						(95-143)	Fz	0.019	0.032	0.040	0.050	0.067	0.072	0.073
<b>H</b>	<b>TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2</b>	Hardness $\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Finish 	$\leq 0.05$	$\leq 1$	43	RPM	2262	1696	1357	1131	848	679	543
						(34-51)	Fz	0.019	0.032	0.040	0.050	0.067	0.072	0.073
<b>H</b>	<b>TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2</b>	Hardness $\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Profile 	$\leq 0.05$	$\leq 1$	51	RPM	2714	2036	1629	1357	1018	814	651
						(41-61)	Fz	0.015	0.026	0.032	0.040	0.053	0.058	0.058
<b>H</b>	<b>TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2</b>	Hardness $\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Finish 	$\leq 0.05$	$\leq 1$	88	RPM	4686	3514	2811	2343	1757	1406	1125
						(71-106)	Fz	0.014	0.026	0.032	0.038	0.051	0.056	0.055
<b>H</b>	<b>TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2</b>	Hardness $\leq 375 \text{ Bhn}$ or $\leq 40 \text{ HRc}$	Profile 	$\leq 0.05$	$\leq 1$	106	RPM	5623	4217	3374	2811	2108	1687	1349
						(85-127)	Fz	0.012	0.020	0.026	0.031	0.041	0.045	0.044

Bhn (Brinell)      HRc (Rockwell C)

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

mm/min = Fz x number of flutes x rpm

reduce speed and feed for materials harder than listed

feed rates listed have chip thinning adjustments included where applicable

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

## TOLERANCES (inch)

### 1/8-1/4 DIAMETER

DC =  $+0.0000/-0.0012$

DCON =  $h_6$

RE =  $+0.0000/-0.0020$

### >1/4-3/8 DIAMETER

DC =  $+0.0000/-0.0016$

DCON =  $h_6$

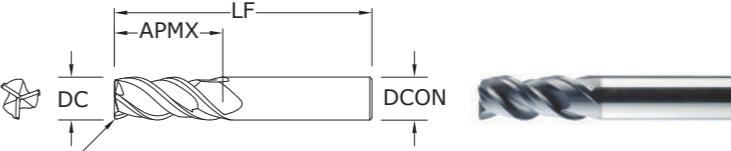
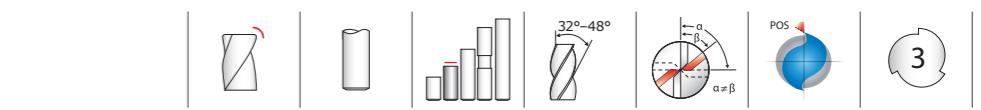
RE =  $+0.0000/-0.0020$

### >3/8-1 DIAMETER

DC =  $+0.0000/-0.0020$

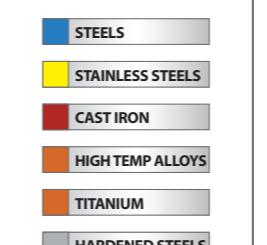
DCON =  $h_6$

RE =  $+0.0000/-0.0020$



**33CR**  
FRACTIONAL SERIES

- Specially engineered step core design provides stability for aggressive ramping and rigidity when flutes are completely engaged
- Open design at axial end accommodates material flow and load reduction during machining operations
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials  $\leq 45 \text{ HRc}$  ( $\leq 420 \text{ Bhn}$ )



For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

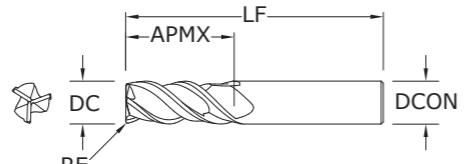
# FRACTIONAL Series 33

Series 33CR Fractional	Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in							
					1/8	1/4	3/8	1/2	5/8	3/4	1	
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 0.5	≤ 1.5	550	RPM	16808	8404	5603	4202	3362	2801	2101
				(440-660)	Fz	0.0005	0.0012	0.0023	0.0031	0.0039	0.0040	0.0043
					Feed (ipm)	25.2	30.3	38.7	39.1	39.3	33.6	27.1
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	1	≤ 1	440	RPM	13446	6723	4482	3362	2689	2241	1681
				(352-528)	Fz	0.0005	0.0012	0.0023	0.0031	0.0039	0.0040	0.0043
					Feed (ipm)	20.2	24.2	30.9	31.3	31.5	26.9	21.7
	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 0.5	≤ 1.5	315	RPM	9626	4813	3209	2407	1925	1604	1203
				(252-378)	Fz	0.0004	0.0009	0.0017	0.0023	0.0029	0.0030	0.0032
					Feed (ipm)	11.6	13.0	16.4	16.6	16.7	14.4	11.6
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	1	≤ 1	250	RPM	7640	3820	2547	1910	1528	1273	955
				(200-300)	Fz	0.0004	0.0009	0.0017	0.0023	0.0029	0.0030	0.0032
					Feed (ipm)	9.2	10.3	13.0	13.2	13.3	11.5	9.2
	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 0.5	≤ 1.5	490	RPM	14974	7487	4991	3744	2995	2496	1872
				(392-588)	Fz	0.0004	0.0010	0.0019	0.0025	0.0031	0.0032	0.0035
					Feed (ipm)	17.1	22.5	28.5	28.1	27.9	24.0	19.7
	K	1	≤ 1	390	RPM	11918	5959	3973	2980	2384	1986	1490
				(312-468)	Fz	0.0004	0.0010	0.0019	0.0025	0.0031	0.0032	0.0035
					Feed (ipm)	13.6	17.9	22.6	22.3	22.2	19.1	15.6
	M	≤ 0.5	≤ 1.5	340	RPM	10390	5195	3463	2598	2078	1732	1299
				(272-408)	Fz	0.0003	0.0008	0.0015	0.0020	0.0025	0.0026	0.0028
					Feed (ipm)	9.4	12.5	15.6	15.6	15.6	13.5	10.9
	K	1	≤ 1	270	RPM	8251	4126	2750	2063	1650	1375	1031
				(216-324)	Fz	0.0003	0.0008	0.0015	0.0020	0.0025	0.0026	0.0028
					Feed (ipm)	7.4	9.9	12.4	12.4	12.4	10.7	8.7
	S	≤ 0.5	≤ 1.5	310	RPM	9474	4737	3158	2368	1895	1579	1184
				(248-372)	Fz	0.0003	0.0008	0.0015	0.0020	0.0025	0.0026	0.0028
					Feed (ipm)	8.5	11.4	14.2	14.2	14.2	12.3	9.9
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	1	≤ 1	250	RPM	7640	3820	2547	1910	1528	1273	955
				(200-300)	Fz	0.0003	0.0008	0.0015	0.0020	0.0025	0.0026	0.0028
					Feed (ipm)	6.9	9.2	11.5	11.5	11.5	9.9	8.0
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3Cr3Sn3Al	≤ 0.5	≤ 1.5	445	RPM	13599	6800	4533	3400	2720	2267	1700
				(356-534)	Fz	0.0004	0.0011	0.0021	0.0028	0.0035	0.0036	0.0039
					Feed (ipm)	14.3	22.4	28.6	28.6	28.6	24.5	19.9
	H	1	≤ 1	355	RPM	10849	5424	3616	2712	2170	1808	1356
				(284-426)	Fz	0.0004	0.0011	0.0021	0.0028	0.0035	0.0036	0.0039
					Feed (ipm)	11.4	17.9	22.8	22.8	22.8	19.5	15.9

continued on next page

Series 33CR Fractional	Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in							
					1/8	1/4	3/8	1/2	5/8	3/4	1	
K	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 0.5	≤ 1.5	340	RPM	10390	5195	3463	2598	2078	1732	1299
				(272-408)	Fz	0.0003	0.0008	0.0016	0.0021	0.0026	0.0027	0.0029
					Feed (ipm)	9.4	12.5	16.6	16.4	16.2	14.0	11.3
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	1	≤ 1	270	RPM	8251	4126	2750	2063	1650	1375	1031
				(216-324)	Fz	0.0003	0.0008	0.0016	0.0021	0.0026	0.0027	0.0029
					Feed (ipm)	7.4	9.9	13.2	13.0	12.9	11.1	9.0
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 0.5	≤ 1.5	80	RPM	2445	1222	815	611	489	407	306
				(64-96)	Fz	0.0003	0.0007	0.0013	0.0017	0.0021	0.0022	0.0024
					Feed (ipm)	1.9	2.6	3.2	3.1	3.1	2.7	2.2
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, 											

METRIC  
Series 33



**33MCR**  
METRIC SERIES

- Specially engineered step core design provides stability for aggressive ramping and rigidity when flutes are completely engaged
- Open design at axial end accommodates material flow and load reduction during machining operations
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

SGS Solid Tools

KYOCERA Solid Tools

SGS Micro Tools

mm						EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	TI-NAMITE-A (AlTiN)	
3,0	9,0	57,0	6,0	0,3	43445	
3,0	9,0	57,0	6,0	0,5	43470	
4,0	12,0	57,0	6,0	0,3	43446	
4,0	12,0	57,0	6,0	0,5	43471	
5,0	15,0	57,0	6,0	0,3	43447	
5,0	15,0	57,0	6,0	0,5	43472	
6,0	18,0	57,0	6,0	0,5	43448	
6,0	18,0	57,0	6,0	1,0	43473	
6,0	18,0	57,0	6,0	1,5	43474	
6,0	18,0	57,0	6,0	2,0	43475	
8,0	20,0	63,0	8,0	0,5	43449	
8,0	20,0	63,0	8,0	1,0	43476	
8,0	20,0	63,0	8,0	1,5	43477	
8,0	20,0	63,0	8,0	2,0	43478	
10,0	27,0	72,0	10,0	0,5	43450	
10,0	27,0	72,0	10,0	1,0	43479	
10,0	27,0	72,0	10,0	1,5	43480	
10,0	27,0	72,0	10,0	2,0	43481	
10,0	27,0	72,0	10,0	2,5	43482	
12,0	30,0	83,0	12,0	0,5	43451	
12,0	30,0	83,0	12,0	1,0	43483	
12,0	30,0	83,0	12,0	1,5	43484	
12,0	30,0	83,0	12,0	2,0	43485	
12,0	30,0	83,0	12,0	2,5	43486	
12,0	30,0	83,0	12,0	3,0	43487	
12,0	30,0	83,0	12,0	4,0	43488	
16,0	38,0	92,0	16,0	1,0	43452	
16,0	38,0	92,0	16,0	1,5	43489	
16,0	38,0	92,0	16,0	2,0	43490	
16,0	38,0	92,0	16,0	2,5	43491	
16,0	38,0	92,0	16,0	3,0	43492	
16,0	38,0	92,0	16,0	4,0	43493	
20,0	46,0	104,0	20,0	1,0	43453	
20,0	46,0	104,0	20,0	2,0	43494	
20,0	46,0	104,0	20,0	2,5	43495	
20,0	46,0	104,0	20,0	3,0	43496	
20,0	46,0	104,0	20,0	4,0	43497	

TOLERANCES (mm)

3–6 DIAMETER

DC = +0,000/-0,030  
DCON = h<sub>6</sub>  
RE = +0,000/-0,050

>6–10 DIAMETER

DC = +0,000/-0,040  
DCON = h<sub>6</sub>  
RE = +0,000/-0,050

>10–20 DIAMETER

DC = +0,000/-0,050  
DCON = h<sub>6</sub>  
RE = +0,000/-0,050

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

Series 33MCR Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm								
					3	6	8	10	12	16	20		
<b>P</b> CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0,5	≤ 1,5	168	RPM	17773	8886	6665	5332	4443	3332	2666
		Slot	1	≤ 1	(134-201)	Fz	0,012	0,029	0,049	0,061	0,074	0,100	0,107
	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0,5	≤ 1,5	134	RPM	14218	7109	5332	4265	3555	2666	2133
		Slot	1	≤ 1	(107-161)	Fz	0,012	0,029	0,049	0,061	0,074	0,100	0,107
<b>M</b> ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0,5	≤ 1,5	96	RPM	10179	5089	3817	3054	2545	1909	1527
		Slot	1	≤ 1	(77-115)	Fz	0,010	0,022	0,036	0,045	0,055	0,074	0,080
	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0,5	≤ 1,5	76	RPM	8078	4039	3029	2424	2020	1515	1212
		Slot	1	≤ 1	(61-91)	Fz	0,010	0,022	0,036	0,045	0,055	0,074	0,080
<b>K</b> STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0,5	≤ 1,5	149	RPM	15834	7917	5938	4750	3958	2969	2375
		Slot	1	≤ 1	(119-179)	Fz	0,009	0,024	0,041	0,051	0,060	0,079	0,085
	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0,5	≤ 1,5	119	RPM	12602	6301	4726	3781	3151	2363	1890
		Slot	1	≤ 1	(95-143)	Fz	0,009	0,024	0,041	0,051	0,060	0,079	0,085
<b>M</b> STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0,5	≤ 1,5	104	RPM	10987	5493	4120	3296	2747	2060	1648
		Slot	1	≤ 1	(83-124)	Fz	0,007	0,019	0,032	0,040	0,048	0,064	0,069
	≤ 325 Bhn or ≤ 35 HRc	Profile	≤ 0,5	≤ 1,5	82	RPM	8725	4362	3272	2617	2181	1636	1309
		Slot	1	≤ 1	(66-99)	Fz	0,007	0,019	0,032	0,040	0,048	0,064	0,069
<b>K</b> STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Profile	≤ 0,5	≤ 1,5	94	RPM	10017	5009	3756	3005	2504	1878	1503
		Slot	1	≤ 1	(76-113)	Fz	0,007	0,019	0,032	0,040	0,048	0,064	0,069
	≤ 220 Bhn or ≤ 19 HRc	Profile	≤ 0,5	≤ 1,5	76	RPM	8078	4039	3029	2424	2020	1515	1212
		Slot	1	≤ 1	(61-91)	Fz	0,007	0,019	0,032	0,040	0,048	0,064	0,069
<b>K</b> CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile	≤ 0,5	≤ 1,5	136	RPM	14380	7190	5392	4314	3595	2696	2157
		Slot	1</td										

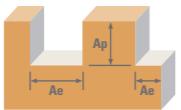
METRIC  
Series 33

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

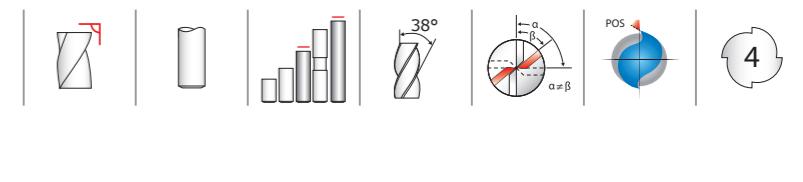
Bhn (Brinell)      HRc (Rockwell C)  
 rpm =  $(V_c \times 1000) / (DC \times 3.14)$   
 mm/min =  $F_z \times 3 \times rpm$   
 reduce speed and feed for materials harder than listed  
 reduce feed and Ae when finish milling (.02 x DC maximum)  
 feed rates listed have chip thinning adjustments included where applicable  
 refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))



Series 33MCR Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm								
					3	6	8	10	12	16	20		
K	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	Profile 	$\leq 0.5$	$\leq 1.5$	104 (83-124)	RPM	10987	5493	4120	3296	2747	2060	1648
					Fz	0.007	0.019	0.034	0.043	0.050	0.067	0.072	
		Slot 	1	$\leq 1$	82 (66-99)	RPM	8725	4362	3272	2617	2181	1636	1309
					Fz	0.007	0.019	0.034	0.043	0.050	0.067	0.072	
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile 	$\leq 0.5$	$\leq 1.5$	24 (20-29)	RPM	2585	1293	969	776	646	485	388
					Fz	0.006	0.017	0.028	0.035	0.041	0.054	0.059	
		Slot 	1	$\leq 1$	20 (16-24)	RPM	2100	1050	788	630	525	394	315
					Fz	0.006	0.017	0.028	0.035	0.041	0.054	0.059	
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile 	$\leq 0.5$	$\leq 1.5$	19 (15-23)	RPM	2003	1002	751	601	501	376	301
					Fz	0.005	0.012	0.019	0.024	0.029	0.038	0.043	
		Slot 	1	$\leq 1$	15 (12-18)	RPM	1583	792	594	475	396	297	238
					Fz	0.005	0.012	0.019	0.024	0.029	0.038	0.043	
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Profile 	$\leq 0.5$	$\leq 1.5$	66 (52-79)	RPM	6947	3474	2605	2084	1737	1303	1042
					Fz	0.007	0.019	0.032	0.040	0.048	0.064	0.069	
		Slot 	1	$\leq 1$	52 (41-62)	RPM	5493	2747	2060	1648	1373	1030	824
					Fz	0.007	0.019	0.032	0.040	0.048	0.064	0.069	
H	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile 	$\leq 0.5$	$\leq 1.5$	23 (18-27)	RPM	2424	1212	909	727	606	454	364
					Fz	0.007	0.019	0.032	0.040	0.048	0.064	0.069	
		Slot 	1	$\leq 1$	18 (15-22)	RPM	1939	969	727	582	485	364	291
					Fz	0.007	0.019	0.032	0.040	0.048	0.064	0.069	
	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile 	$\leq 0.5$	$\leq 1.5$	56 (45-68)	RPM	5978	2989	2242	1793	1495	1121	897
					Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	
		Slot 	1	$\leq 1$	44 (35-53)	RPM	4686	2343	1757	1406	1171	879	703
					Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	

SERIES 7  
HIGH PERFORMANCE END MILLS

FRACTIONAL & METRIC  
Series 7

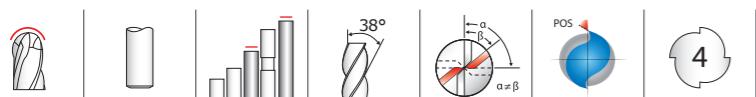


7

TOLERANCES (inch)				EDP NO.	
DC	CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	Ti-NAMITE-X
$= +0.0000/-0.0020$					
$DCON = h_6$					
	1/8	3/4	2-1/4	1/8	70470
	1/8	1	3	1/8	70471
	3/16	3/4	2-1/2	3/16	70472
	3/16	1-1/8	3	3/16	70473
	1/4	1-1/8	3	1/4	70474
	1/4	1-1/2	4	1/4	70475
	5/16	1-1/8	3	5/16	70476
	5/16	1-5/8	4	5/16	70477
	3/8	1-1/8	3	3/8	70478
	3/8	1-3/4	4	3/8	70479
	7/16	2	4-1/2	7/16	70480
	7/16	3	6	7/16	70481
	1/2	2	4-1/2	1/2	70482
	1/2	3	6	1/2	70483
	5/8	2-1/4	5	5/8	70484
	5/8	3	6	5/8	70485
	3/4	2-1/4	5	3/4	70486
	3/4	3	6	3/4	70487
	1	2-1/4	5	1	70488
	1	3	6	1	70489

TOLERANCES (mm)				EDP NO.	
DC	CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	Ti-NAMITE-X	
$= +0.000/+0.050$					
$DCON = h_6$					
	3,0	25,0	75,0	3,0	70551
	4,0	25,0	75,0	4,0	70552
	5,0	25,0	75,0	5,0	70553
	6,0	25,0	75,0	6,0	70554
	8,0	25,0	75,0	8,0	70555
	10,0	38,0	100,0	10,0	70556
	12,0	50,0	100,0	12,0	70557
	12,0	75,0	150,0	12,0	70558
	14,0	75,0	150,0	14,0	70559
	16,0	75,0	150,0	16,0	70560
	18,0	75,0	150,0	18,0	70561
	20,0	75,0	150,0	20,0	70562
	25,0	75,0	150,0	25,0	705

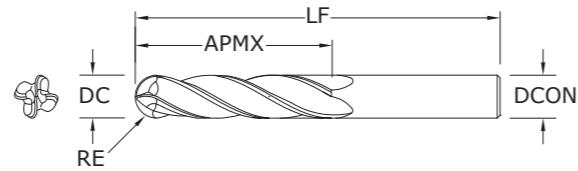
## Series 7



## 7B

## FRACTIONAL SERIES

- Variable pitch allows for improved chatter suppression along with improved surface finish and enhanced tool life
- Raised land and increased core diameter designed to enhance tool life and decrease tool deflection
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

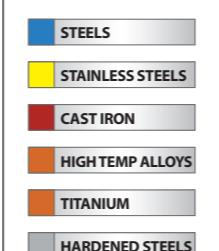


inch					EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	Ti-NAMITE-X	
1/8	3/4	2-1/4	1/8	70441	
1/8	1	3	1/8	70442	
3/16	3/4	2-1/2	3/16	70444	
3/16	1-1/8	3	3/16	70445	
1/4	1-1/8	3	1/4	70447	
1/4	1-1/2	4	1/4	70448	
5/16	1-1/8	3	5/16	70450	
5/16	1-5/8	4	5/16	70451	
3/8	1-1/8	3	3/8	70453	
3/8	1-3/4	4	3/8	70454	
7/16	2	4-1/2	7/16	70456	
7/16	3	6	7/16	70457	
1/2	2	4-1/2	1/2	70459	
1/2	3	6	1/2	70460	
5/8	2-1/4	5	5/8	70462	
5/8	3	6	5/8	70463	
3/4	2-1/4	5	3/4	70465	
3/4	3	6	3/4	70466	
1	2-1/4	5	1	70468	
1	3	6	1	70469	

RE = 1/2 Cutting Diameter (DC)

## TOLERANCES (inch)

DC = +0.0000/-0.0020  
DCON = h6  
RE = +0.0000/-0.0010

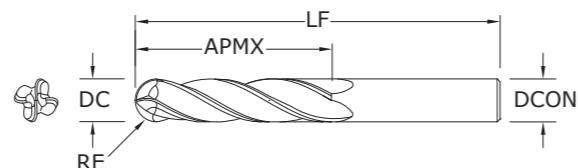


For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

## 7MB

## METRIC SERIES

- Variable pitch allows for improved chatter suppression along with improved surface finish and enhanced tool life
- Raised land and increased core diameter designed to enhance tool life and decrease tool deflection
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

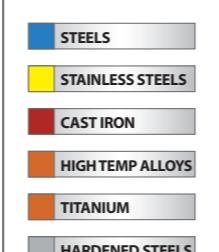


mm					EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	Ti-NAMITE-X	
3,0	25,0	75,0	3,0	70527	
4,0	25,0	75,0	4,0	70529	
5,0	25,0	75,0	5,0	70531	
6,0	25,0	75,0	6,0	70533	
8,0	25,0	75,0	8,0	70535	
10,0	38,0	100,0	10,0	70537	
12,0	50,0	100,0	12,0	70539	
12,0	75,0	150,0	12,0	70540	
14,0	75,0	150,0	14,0	70542	
16,0	75,0	150,0	16,0	70544	
18,0	75,0	150,0	18,0	70546	
20,0	75,0	150,0	20,0	70548	
25,0	75,0	150,0	25,0	70550	

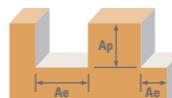
RE = 1/2 Cutting Diameter (DC)

## TOLERANCES (mm)

DC = +0,000/+0,050  
DCON = h6  
RE = +0,000/-0,025



For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)



## Series 7, 7B Fractional

	Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in								
					1/8	1/4	3/8	1/2	5/8	3/4	1		
<b>P</b>	≤ 275 Bhn or ≤ 28 HRc	Finish	≤ 0.02	≤ 2	480	RPM	14669	7334	4890	3667	2934	2445	1834
					(384-576)	Fz	0.0004	0.0010	0.0019	0.0025	0.0032	0.0033	0.0035
<b>M</b>	≤ 375 Bhn or ≤ 40 HRc	Finish	≤ 0.02	≤ 2	275	RPM	8404	4202	2801	2101	1681	1401	1051
					(220-330)	Fz	0.0003	0.0007	0.0014	0.0018	0.0023	0.0024	0.0026
<b>K</b>	≤ 275 Bhn or ≤ 28 HRc	Finish	≤ 0.02	≤ 2	420	RPM	12835	6418	4278	3209	2567	2139	1604
					(336-504)	Fz	0.0004	0.0010	0.0019	0.0025	0.0032	0.0033	0.0035
<b>S</b>	≤ 220 Bhn or ≤ 19 HRc	Finish	≤ 0.02	≤ 2	605	RPM	18489	9244	6163	4622	3698	3081	2311
					(484-726)	Fz	0.0006	0.0015	0.0028	0.0037	0.0046	0.0047	0.0051
<b>H</b>	≤ 260 Bhn or ≤ 26 HRc	Finish	≤ 0.02	≤ 2	465	RPM	14210	7105	4737	3553	2842	2368	1776
					(372-558)	Fz	0.0004	0.0011	0.0021	0.0028	0.0034	0.0036	0.0039
<b>S</b>	≤ 300 Bhn or ≤ 32 HRc	Finish	≤ 0.02	≤ 2	80	RPM	2445	1222	815	611	489	407	306
					(64-96)	Fz	0.0003	0.0007	0.0014	0.0018	0.0023	0.0024	0.0026
<b>S</b>	≤ 400 Bhn or ≤ 43 HRc	Finish	≤ 0.02	≤ 2	65	RPM	1986	993	662	497	397	331	248
					(52-78)	Fz	0.0002	0.0006	0.0010	0.0014	0.0017	0.0018	0.0019
<b>T</b>	≤ 350 Bhn or ≤ 38 HRc	Finish	≤ 0.02	≤ 2	300	RPM	9168	4584	3056	2292	1834	1528	1146
					(240-360)	Fz	0.0004	0.0011	0.0021	0.0028	0.0034	0.0036	0.0039
<b>T</b>	≤ 440 Bhn or ≤ 47 HRc	Finish	≤ 0.02	≤ 2	105	RPM	3209	1604	1070	802	642	535	401
					(84-126)	Fz	0.0004	0.0011	0.0021	0.0028	0.0034	0.0036	0.0039
<b>H</b>	≤ 375 Bhn or ≤ 40 HRc	Finish	≤ 0.02	≤ 2	230	RPM	7029	3514	2343	1757	1406	1171	879

# METRIC Series 7

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

Bhn (Brinell)      HRc (Rockwell C)

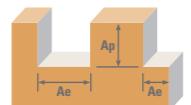
rpm =  $(V_c \times 1000) / (DC \times 3.14)$

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

reduce speed and feed for materials harder than listed

feed rates listed have chip thinning adjustments included where applicable

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

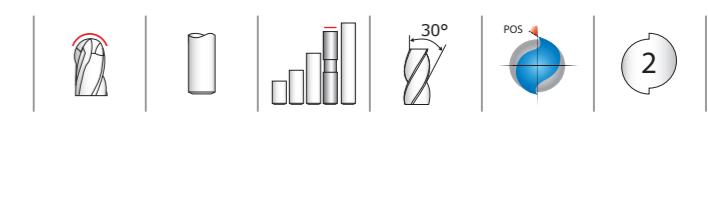


Series  
7M, 7MB  
Metric

	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm								
					3	6	8	10	12	16	20	25	
<b>P</b>	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Finish	146 (117-176)	RPM	15511	7755	5816	4653	3878	2908	2327	1861
					Fz	0.0166	0.043	0.075	0.093	0.110	0.125	0.147	0.160
<b>M</b>	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	Finish	84 (67-101)	RPM	8886	4443	3332	2666	2222	1666	1333	1066
					Fz	0.0122	0.034	0.051	0.069	0.082	0.091	0.109	0.120
<b>K</b>	<b>STAINLESS STEELS (FREE MACHINING)</b> 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Finish	128 (102-154)	RPM	13572	6786	5089	4072	3393	2545	2036	1629
					Fz	0.0086	0.024	0.040	0.048	0.058	0.065	0.077	0.087
<b>S</b>	<b>STAINLESS STEELS (DIFFICULT)</b> 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Finish	88 (71-106)	RPM	9371	4686	3514	2811	2343	1757	1406	1125
					Fz	0.0082	0.022	0.037	0.045	0.048	0.060	0.072	0.078
<b>H</b>	<b>STAINLESS STEELS (PH)</b> 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Finish	81 (65-97)	RPM	8563	4282	3211	2569	2141	1606	1284	1028
					Fz	0.0070	0.019	0.029	0.040	0.048	0.055	0.064	0.070
<b>K</b>	<b>CAST IRONS (LOW &amp; MEDIUM ALLOY)</b> Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Finish	184 (148-221)	RPM	19550	9775	7331	5865	4887	3666	2932	2346
					Fz	0.0132	0.036	0.052	0.075	0.089	0.099	0.117	0.130
<b>S</b>	<b>CAST IRONS (HIGH ALLOY)</b> Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc	Finish	142 (113-170)	RPM	15026	7513	5635	4508	3756	2817	2254	1803
					Fz	0.0132	0.036	0.052	0.075	0.089	0.099	0.117	0.130
<b>H</b>	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE)</b> Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc	Finish	24 (20-29)	RPM	2585	1293	969	776	646	485	388	310
					Fz	0.0072	0.019	0.029	0.037	0.046	0.053	0.061	0.085
<b>S</b>	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE)</b> Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc	Finish	20 (16-24)	RPM	2100	1050	788	630	525	394	315	252
					Fz	0.0075	0.016	0.021	0.030	0.038	0.044	0.051	0.070
<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	Finish	91 (73-110)	RPM	9694	4847	3635	2908	2424	1818	1454	1163	
					Fz	0.0091	0.024	0.040	0.050	0.060	0.070	0.080	0.088
<b>TITANIUM ALLOYS (DIFFICULT)</b> Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al16V6Sn, Ti15V3Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	Finish	32 (26-38)	RPM	3393	1696	1272	1018	848	636	509	407	
					Fz	0.0082	0.019	0.029	0.037	0.046	0.053	0.061	0.085
<b>H</b>	<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Finish	70 (56-84)	RPM	7432	3716	2787	2230	1858	1394	1115	892
					Fz	0.0070	0.019	0.040	0.043	0.048	0.057	0.064	0.070

**Turbo-Carb®**  
HIGH PERFORMANCE CARBIDE END MILLS

FRACTIONAL & METRIC  
**Turbo-Carb**



**56B**  
FRACTIONAL SERIES

TOLERANCES (inch)	inch							EDP NO.
	CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CENTER LINE ANGLE α	REACH LU	NECK DIAMETER DN	
<b>1/32-3/32 DIAMETER</b>								Ti-NAMITE-X
DC = +0.0000/-0.0010	1/32	1/32	3	1/4	8°20'	1/16	.025	93272
DCON = h6	1/16	1/16	3	1/4	7°40'	1/8	.055	93273
RE = +0.0000/-0.0005	3/32	3/32	3	1/4	6°50'	3/16	.085	93274
	1/8	1/8	3	1/4	6°	1/4	.114	93275
	3/16	3/16	3	1/4	3°35'	3/8	.171	93276
<b>&gt;3/32-1/4 DIAMETER</b>								Ti-NAMITE-X
DC = +0.0000/-0.0012	1/4	1/4	3-1/2	1/4	-	1/2	.230	93277
DCON = h6	5/16	5/16	4	5/16	-	5/8	.292	93278
RE = +0.0000/-0.0008	3/8	3/8	4	3/8	-	3/4	.355	93279
	1/2	1/2	4-1/2	1/2	-	1	.480	93280
<b>&gt;3/8-3/4 DIAMETER</b>								Ti-NAMITE-X
DC = +0.0000/-0.0020	5/8	5/8	5-1/2	5/8	-	1-1/4	.610	93281
DCON = h6	3/4	3/4	6-1/2	3/4	-	1-1/2	.735	93282

Neck Option Available

RE = 1/2 Cutting Diameter (DC)

TOLERANCES (mm)	mm							EDP NO.
	CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CENTER LINE ANGLE α	REACH LU	NECK DIAMETER DN	
<b>1-2.5 DIAMETER</b>								Ti-NAMITE-X
DC = +0.000/-0.025	1,0	1,0	76,0	6,0	8°10'	2,0	0,91	91349
DCON = h6	1,5	1,5	76,0	6,0	7°45'	3,0	1,37	91350
RE = +0.000/-0.0013	2,0	2,0	76,0	6,0	7°10'	4,0	1,83	91351
	2,5	2,						

# FRACTIONAL Turbo-Carb

# METRIC Turbo-Carb

Series 56B Fractional	Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in								
					1/32	1/16	1/8	3/16	1/4	3/8	1/2	3/4	
<b>TOOL STEELS MOLD AND DIE STEEL</b> 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	<b>Rough</b>  ≤ 375 Bhn or ≤ 40 HRc	≤ 0.4	≤ 0.1	625	RPM	76400	38200	19100	12733	9550	6367	4775	3183
		(500-750)		Fz	0.0006	0.0015	0.0030	0.0040	0.0050	0.0080	0.0100	0.0120	
	<b>HSM</b> 	≤ 0.4	≤ 0.03	950	RPM	116128	58064	29032	19355	14516	9677	7258	4839
		(760-1140)		Fz	0.0007	0.0017	0.0033	0.0044	0.0060	0.0088	0.0110	0.0130	
<b>TOOL STEELS MOLD AND DIE STEEL</b> 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	<b>Rough</b>  ≤ 475 Bhn or ≤ 50 HRc	≤ 0.4	≤ 0.05	750	RPM	91680	45840	22920	15280	11460	7640	5730	3820
		(600-900)		Fz	0.0005	0.0011	0.0023	0.0030	0.0038	0.0060	0.0075	0.0085	
	<b>HSM</b> 	≤ 0.4	≤ 0.02	1150	RPM	140576	70288	35144	23429	17572	11715	8786	5857
		(920-1380)		Fz	0.0006	0.0012	0.0025	0.0033	0.0042	0.0066	0.0082	0.0100	
<b>TOOL STEELS MOLD AND DIE STEEL</b> 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	<b>Rough</b>  ≤ 655 Bhn or ≤ 60 HRc	≤ 0.4	≤ 0.04	500	RPM	61120	30560	15280	10187	7640	5093	3820	2547
		(400-600)		Fz	0.0004	0.0008	0.0017	0.0023	0.0029	0.0045	0.0057	0.0063	
	<b>HSM</b> 	≤ 0.4	≤ 0.01	1000	RPM	122240	61120	30560	20373	15280	10187	7640	5093
		(800-1200)		Fz	0.0005	0.0009	0.0019	0.0025	0.0032	0.0050	0.0063	0.0071	

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

rpm = Vc x 3.82 / DC

ipm = Fz x 2 x rpm

reduce speed and feed for materials harder than listed

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

feed rates listed have chip thinning adjustments included where applicable

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

Series 56MB Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm								
					1	1.5	3	5	6	10	12	20	
<b>TOOL STEELS MOLD AND DIE STEEL</b> 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	<b>Rough</b>  ≤ 375 Bhn or ≤ 40 HRc	≤ 0.4	≤ 0.1	191	RPM	60748	40498	20249	12150	10125	6075	5062	3037
		(153-229)		Fz	0.015	0.038	0.076	0.102	0.127	0.203	0.254	0.305	
	<b>HSM</b> 	≤ 0.4	≤ 0.03	290	RPM	92235	61490	46117	18447	15372	9223	7686	4612
		(232-348)		Fz	0.018	0.043	0.084	0.112	0.117	0.224	0.279	0.330	
<b>TOOL STEELS MOLD AND DIE STEEL</b> 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	<b>Rough</b>  ≤ 475 Bhn or ≤ 50 HRc	≤ 0.4	≤ 0.05	229	RPM	72833	48556	24278	14567	12139	7283	6069	3642
		(183-275)		Fz	0.013	0.028	0.058	0.076	0.097	0.152	0.191	0.216	
	<b>HSM</b> 	≤ 0.4	≤ 0.02	351	RPM	111636	74424	37212	22327	18606	11164	9303	5582
		(281-421)		Fz	0.015	0.030	0.064	0.084	0.107	0.168	0.208	0.254	
<b>TOOL STEELS MOLD AND DIE STEEL</b> 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	<b>Rough</b>  ≤ 655 Bhn or ≤ 60 HRc	≤ 0.4	≤ 0.04	152	RPM	48344	32229	16115	9669	8057	4834	4029	2417
		(122-182)		Fz	0.010	0.020	0.043	0.058	0.074	0.114	0.145	0.160	
	<b>HSM</b> 	≤ 0.4	≤ 0.01	305	RPM	97005	64670	32335	19401	16168	9701	8084	4850
		(244-366)		Fz	0.013	0.023	0.048	0.064	0.081	0.127	0.160	0.180	

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

rpm = Vc x 1000 / (DC x 3.14)

mm/min = Fz x 2 x rpm

reduce speed and feed for materials harder than listed

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

feed rates listed have chip thinning adjustments included where applicable

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

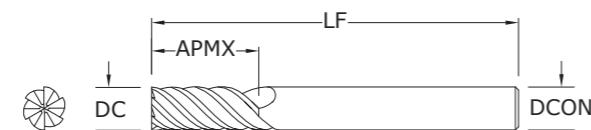
FRACTIONAL & METRIC  
Power-Carb®



**57**

FRACTIONAL SERIES

- Ideal in Trochoidal milling applications in hardened steels and dry machining
- Short flute length and large core design to reduce deflection
- Unsurpassed edge strength with extreme negative rake and eccentric relief
- Recommended for materials 45 to 65 HRc (421 to 739 Bhn)



TOLERANCES (inch)

**1/4 DIAMETER**

DC = +0.0000/-0.0012  
DCON = h<sub>6</sub>

**5/16 DIAMETER**

DC = +0.0000/-0.0016  
DCON = h<sub>6</sub>

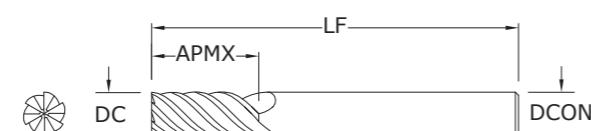
**3/8 DIAMETER**

DC = +0.0000/-0.0016  
DCON = h<sub>6</sub>

**1/2 DIAMETER**

DC = +0.0000/-0.0020  
DCON = h<sub>6</sub>

Neck Option Available



TOLERANCES (mm)

**6 DIAMETER**

DC = +0,000/-0,030  
DCON = h<sub>6</sub>

**8 DIAMETER**

DC = +0,000/-0,040  
DCON = h<sub>6</sub>

**10 DIAMETER**

DC = +0,000/-0,040  
DCON = h<sub>6</sub>

**12-20 DIAMETER**

DC = +0,000/-0,050  
DCON = h<sub>6</sub>

Neck Option Available

HARDENED STEELS

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

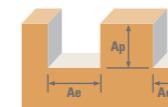
Series  
57  
Fractional

Hardness

Ae x DC

Ap x DC

Vc (sfm)



Slot

1

≤ 0.3

(172-258)

RPM

215

Fz

0.0013

Feed (ipm)

26

30

33

31

TOOL STEELS  
MOLD AND DIE STEEL  
300M, 4340, 52100,  
HP-9-4-20, M50, A2,  
D2, H13, L2, M2, P20,  
S7, T15, W2

≤ 420 Bhn  
or  
≤ 45 HRc

Profile

≤ 0.1

≤ 1.5

(212-318)

RPM

265

Fz

0.0018

Feed (ipm)

44

51

57

53

HSM

≤ 0.04

≤ 1.5

(448-672)

RPM

560

Fz

0.0022

Feed (ipm)

113

136

151

141

Slot

1

≤ 0.3

(96-144)

RPM

120

Fz

0.0010

Feed (ipm)

11

13

15

14

TOOL STEELS  
MOLD AND DIE STEEL  
300M, 4340, 52100,  
HP-9-4-20, M50, A2,  
D2, H13, L2, M2, P20,  
S7, T15, W2

≤ 560 Bhn  
or  
≤ 55 HRc

Profile

≤ 0.1

≤ 1.5

(120-180)

RPM

150

Fz

0.0014

Feed (ipm)

19

23

26

24

HSM

≤ 0.04

≤ 1.5

(392-588)

RPM

490

Fz

0.0018

Feed (ipm)

81

93

105

99

Slot

1

≤ 0.3

(52-78)

RPM

65

Fz

0.0008

Feed (ipm)

5

5

6

6

TOOL STEELS  
MOLD AND DIE STEEL  
300M, 4340, 52100,  
HP-9-4-20, M50, A2,  
D2, H13, L2, M2, P20,  
S7, T15, W2

≤ 740 Bhn  
or  
≤ 65 HRc

Profile

≤ 0.1

≤ 1.5

(64-96)

RPM

80

Fz

0.0011

Feed (ipm)

8

9

10

10

611

TOOL STEELS  
MOLD AND DIE STEEL  
300M, 4340, 52100,  
HP-9-4-20, M50, A2,  
D2, H13, L2, M2, P20,  
S7, T15, W2

≤ 740 Bhn  
or  
≤ 65 HRc

Profile

≤ 0.1

≤ 1.5

(200-300)

RPM

250

Fz

0.0013

Feed (ipm)

30

35

38

36

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

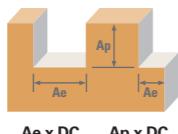
rpm = Vc x 3.82 / DC ipm = Fz x 6 x rpm

reduce speed and feed for materials harder than listed

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

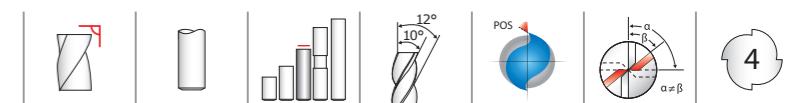
feed rates listed have chip thinning adjustments included where applicable

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

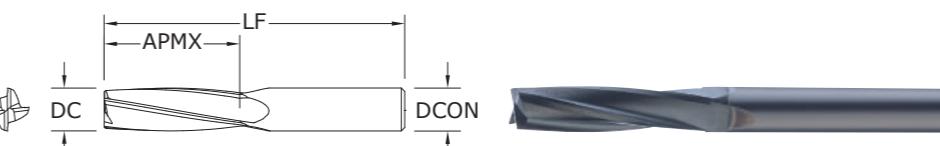


Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm						
				6	8	10	12	16	20	
TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	Slot ≤ 420 Bhn or ≤ 45 HRc	1 ≤ 0.3	66	RPM	3499	2624	2099	1749	1312	1050
			(53-79)	Fz	0.032	0.048	0.064	0.079	0.094	0.109
				Feed (mm/min)	672	756	806	829	740	686
	Profile ≤ 560 Bhn or ≤ 55 HRc	81 ≤ 0.1 ≤ 1.5	81	RPM	4294	3220	2576	2147	1610	1288
			(65-97)	Fz	0.046	0.066	0.089	0.112	0.132	0.152
				Feed (mm/min)	1185	1275	1376	1443	1275	1175
	HSM ≤ 0.04	171 ≤ 1.5	171	RPM	9064	6798	5439	4532	3399	2719
			(137-205)	Fz	0.056	0.084	0.112	0.140	0.170	0.200
				Feed (mm/min)	3046	3426	3655	3807	3467	3263
H TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	Slot ≤ 560 Bhn or ≤ 55 HRc	1 ≤ 0.3	37	RPM	1961	1471	1177	981	735	588
			(30-44)	Fz	0.025	0.038	0.051	0.064	0.077	0.090
				Feed (mm/min)	294	335	360	377	340	318
	Profile ≤ 740 Bhn or ≤ 65 HRc	46 ≤ 0.1 ≤ 1.5	46	RPM	2438	1829	1463	1219	914	732
			(37-55)	Fz	0.036	0.053	0.071	0.089	0.107	0.125
				Feed (mm/min)	527	582	623	651	587	549
	HSM ≤ 0.04	149 ≤ 1.5	149	RPM	7898	5924	4739	3949	2962	2369
			(119-179)	Fz	0.046	0.066	0.089	0.112	0.135	0.158
				Feed (mm/min)	2180	2346	2531	2654	2399	2246
TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	Slot ≤ 740 Bhn or ≤ 65 HRc	1 ≤ 0.3	20	RPM	1060	795	636	530	398	318
			(16-24)	Fz	0.020	0.028	0.038	0.048	0.058	0.068
				Feed (mm/min)	127	134	145	153	138	130
	Profile ≤ 740 Bhn or ≤ 65 HRc	24 ≤ 0.1 ≤ 1.5	24	RPM	1272	954	763	636	477	382
			(19-29)	Fz	0.028	0.041	0.053	0.066	0.078	0.090
				Feed (mm/min)	214	235	243	252	223	206
	HSM ≤ 0.04	76 ≤ 1.5	76	RPM	4029	3021	2417	2014	1511	1209
			(61-91)	Fz	0.033	0.048	0.064	0.079	0.094	0.109
				Feed (mm/min)	798	870	928	955	852	790

Bhn (Brinell)    HRc (Rockwell C)    HSM (High Speed Machining)  
 rpm =  $(V_c \times 1000) / (DC \times 3.14)$   
 mm/min =  $F_z \times 6 \times rpm$   
 reduce speed and feed for materials harder than listed  
 reduce feed and Ae when finish milling (.02 x DC maximum)  
 feed rates listed have chip thinning adjustments included where applicable  
 refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))



4

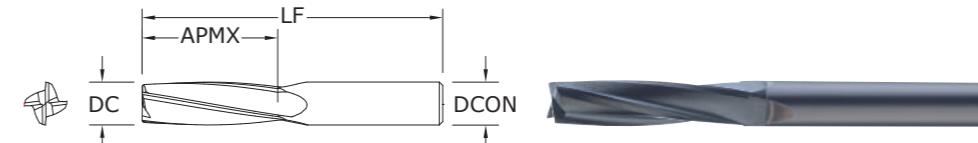


27

FRACTIONAL SERIES

TOLERANCES (inch)				inch		EDP NO.			
DC = +0.0000/-0.0030	DCON = h6	PLASTICS/COMPOSITES		CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	Di-NAMITE® (Diamond)
				1/4	1	2-1/2	1/4	72978	72979
				3/8	1-1/8	2-1/2	3/8	72980	72981
				1/2	1-1/2	3-1/2	1/2	72982	72983
				3/4	1-3/8	4	3/4	72984	72985

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)



27M

METRIC SERIES

TOLERANCES (mm)				mm		EDP NO.			
DC = +0,000/-0,080	DCON = h6	PLASTICS/COMPOSITES		CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	Di-NAMITE® (Diamond)
				6,0	25,0	63,0	6,0	83056	83057
				8,0	25,0	63,0	8,0	83058	83059
				10,0	28,0	63,0	10,0	83060	83061
				12,0	38,0	89,0	12,0	83062	83063
				16,0	48,0	115,0	16,0	83064	83065

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

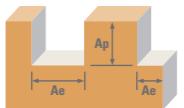
- Slow helix design adds strength to the edge allowing ease for milling highly abrasive materials
- Two levels of chatter suppression: variable helix and indexing
- Excels at roughing (slotting, profiling) and finishing in a variety of plastics and composites

# FRACTIONAL Series 27

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools



Series 27 Fractional	Ae x DC	Ap x DC	Vc (sfm)	DC • in					
				1/4	3/8	1/2	3/4		
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot 	1	≤ 1	400	RPM	6112	4075	3056	2037
				(320-480)	Fz	0.0016	0.0030	0.0040	0.0048
					Feed (ipm)	39	49	49	39
	Profile 	≤ 0.5	≤ 1.5	500	RPM	7640	5093	3820	2547
				(400-600)	Fz	0.0016	0.0030	0.0040	0.0048
					Feed (ipm)	49	61	61	49
	HSM 	≤ 0.5	≤ 2	825	RPM	12606	8404	6303	4202
				(660-990)	Fz	0.0037	0.0069	0.0092	0.0110
					Feed (ipm)	187	232	232	185
GFRP (FIBERGLASS)	Slot 	1	≤ 1	320	RPM	4890	3260	2445	1630
				(256-384)	Fz	0.0016	0.0030	0.0040	0.0048
					Feed (ipm)	31	39	39	31
	Profile 	≤ 0.5	≤ 1.5	400	RPM	6112	4075	3056	2037
				(320-480)	Fz	0.0016	0.0030	0.0040	0.0048
					Feed (ipm)	39	49	49	39
	HSM 	≤ 0.5	≤ 2	660	RPM	10085	6723	5042	3362
				(528-792)	Fz	0.0037	0.0069	0.0092	0.0110
					Feed (ipm)	149	186	186	148
N CARBON, GRAPHITE	Slot 	1	≤ 1	480	RPM	7334	4890	3667	2445
				(384-576)	Fz	0.0020	0.0038	0.0050	0.0060
					Feed (ipm)	59	74	73	59
	Profile 	≤ 0.5	≤ 1.5	600	RPM	9168	6112	4584	3056
				(480-720)	Fz	0.0020	0.0038	0.0050	0.0060
					Feed (ipm)	73	93	92	73
	HSM 	≤ 0.5	≤ 2	990	RPM	15127	10085	7564	5042
				(792-1188)	Fz	0.0046	0.0086	0.0115	0.0138
					Feed (ipm)	278	347	348	278
PLASTICS	Slot 	1	≤ 1	800	RPM	12224	8149	6112	4075
				(640-690)	Fz	0.0020	0.0038	0.0050	0.0060
					Feed (ipm)	98	124	122	98
	Profile 	≤ 0.5	≤ 1.5	1000	RPM	15280	10187	7640	5093
				(800-1200)	Fz	0.0020	0.0038	0.0050	0.0060
					Feed (ipm)	122	155	153	122
	HSM 	≤ 0.5	≤ 2	1650	RPM	25212	16808	12606	8404
				(1320-1980)	Fz	0.0046	0.0086	0.0115	0.0138
					Feed (ipm)	464	578	580	464
MACHINABLE CERAMICS MACHINABLE GLASS	Slot 	1	≤ 1	40	RPM	611	407	306	204
				(32-48)	Fz	0.0008	0.0015	0.0020	0.0024
					Feed (ipm)	2.0	2.4	2.4	2.0
	Profile 	≤ 0.5	≤ 1.5	50	RPM	764	509	382	255
				(40-60)	Fz	0.0008	0.0015	0.0020	0.0024
					Feed (ipm)	2.4	3.1	3.1	2.4
	HSM 	≤ 0.5	≤ 2	85	RPM	1299	866	649	433
				(68-102)	Fz	0.0018	0.0034	0.0046	0.0055
					Feed (ipm)	9.4	11.8	11.9	9.5

HSM (High Speed Machining)

rpm = Vc x 3.82 / DC

ipm = Fz x 4 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

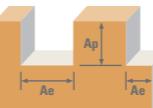
diamond coating will increase tool life in graphite and composite materials

feed rates listed have chip thinning adjustments included where applicable

refer to the SGS Tool Wizard® for complete technical information

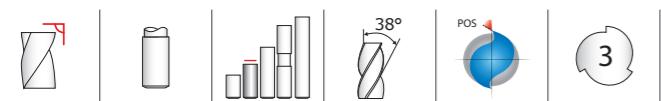
(www.kyocera-sgstoold.com)

# Series 27M Metric



Series 27M Metric	Ae x DC	Ap x DC	Vc (m/min)	DC • mm						
				6	8	10	12	16		
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot 	1	≤ 1	120	RPM	6361	4771	3817	3181	2385
				(96-164)	Fz	0.040	0.065	0.075	0.100	0.120
					Feed (mm/min)	1018	1240	1145	1272	1145
	Profile 	≤ 0.5	≤ 1.5	150	RPM	7951	5963	4771	3976	2982
				(120-180)	Fz	0.040	0.065	0.075	0.100	0.120
					Feed (mm/min)	1272	1550	1431	1590	1431
	HSM 	≤ 0.5	≤ 2	250	RPM	13252	9939	7951	6626	4970
				(200-300)	Fz	0.095	0.145	0.175	0.235	0.280
					Feed (mm/min)	5036	5765	5566	6228	5566
GFRP (FIBERGLASS)	Slot 	1	≤ 1	100	RPM	5301	3976	3181	2650	1988
				(80-120)	Fz	0.040	0.065	0.075	0.100	0.120
					Feed (mm/min)	848	1034	954	1060	954
	Profile 	≤ 0.5	≤ 1.5	120	RPM	6361	4771	3817	3181	2385
				(96-164)	Fz	0.040	0.065	0.075	0.100	0.120
					Feed (mm/min)	1018	1240	1145	1272	1145
	HSM 	≤ 0.5	≤ 2	200	RPM	10602	7951	6361	5301	3976
				(160-240)	Fz	0.095	0.145	0.175	0.235	0.280
					Feed (mm/min)	4029	4612	4453	4983	4453
N CARB										

## FRACTIONAL Picatinny Rail Tools



### Non-Ferrous Recoil Groove Tool

FRACTIONAL SERIES

- Open Flute design improves chip removal at high feed rates.
- Circular land improves surface finish and chatter suppression.
- Symmetrical end gashing improves balance in high speed operations.
- 45 degree chamfer enables slot and deburr in one operation.
- Meets MIL-STD 1913.

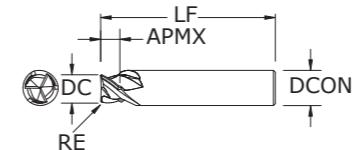
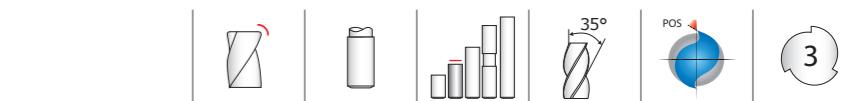
	inch				EDP NO.	
CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	UNCOATED	Ti-NAMITE-B (TiB <sub>2</sub> )	
0.2100	1/4	0.118	1-3/4	34760	34761	

#### TOLERANCES (inch)

DC = +0.0080/-0.0000  
APMX = +0.0060/-0.0000  
DCON = h<sub>6</sub>

#### NON-FERROUS

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)



### Ferrous Recoil Groove Tool

FRACTIONAL SERIES

- Heavy core design adds rigidity for cutting difficult to machine materials.
- Tight corner radius tangency tolerance for quality recoil grooves.
- Specially engineered flute design adds strength and improves chip flow.
- Meets MIL-STD 1913.

	inch				EDP NO.	
CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	Ti-NAMITE-A (TA)	Ti-NAMITE-M (TM)
0.2100	1/4	0.118	1-3/4	.010	33360	33361

#### TOLERANCES (inch)

DC = +0.0080/-0.0000  
APMX = +0.0060/-0.0000  
DCON = h<sub>6</sub>

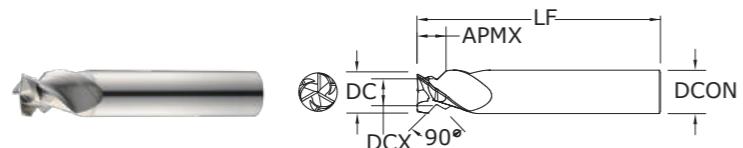
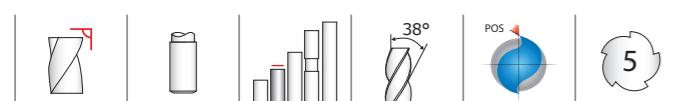
#### STEELS

#### STAINLESS STEELS

#### TITANIUM

#### HARDENED STEELS

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)



### Non-Ferrous Dovetail Form Tool

FRACTIONAL SERIES

- Open Flute design improves chip removal at high feed rates.
- Specially engineered flute shape for improved chip control.
- Circular land improves surface finish and chatter suppression.
- Symmetrical end gashing improves balance in high speed operations.
- Meets MIL-STD 1913.

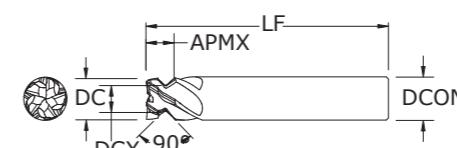
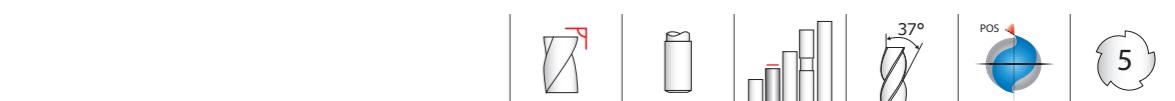
	inch				EDP NO.	
CUTTING DIAMETER DC	INNER CUTTING DIAMETER DCX	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	UNCOATED	Ti-NAMITE-B (TiB <sub>2</sub> )
0.6050	0.384	5/8	0.410	3-1/2	34762	34763

#### TOLERANCES (inch)

DC = +0.0010/-0.0010  
DCON = h<sub>6</sub>

#### NON-FERROUS

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)



### Ferrous Dovetail Form Tool

FRACTIONAL SERIES

- Five-flute design allows for higher machining parameters.
- Open end work design allows for increased chip space.
- Square end configuration with enhanced corner strength to improve corner durability.
- Meets MIL-STD 1913.

	inch				EDP NO.	
CUTTING DIAMETER DC	INNER CUTTING DIAMETER DCX	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	Ti-NAMITE-A (TA)	Ti-NAMITE-M (TM)
0.6050	0.384	5/8	0.410	3-1/2	37391	37390

#### TOLERANCES (inch)

DC = +0.0010/-0.0010  
DCON = h<sub>6</sub>

#### STEELS

#### STAINLESS STEELS

#### TITANIUM

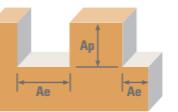
#### HARDENED STEELS

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

## FRACTIONAL

**Picatinny Rail Ferrous Recoil Groove Tool**

**Picatinny Rail  
Ferrous Recoil Groove Tool  
3 Flute  
Made to MIL-STD-1913**



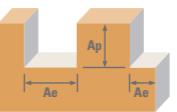
			Ae x DC	Ap x DC	Vc (sfm)	DC • in
						0.2100
<b>P</b>	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Slot	0.210	0.118 (352-528)	RPM 8004 Fz 0.0009 Feed (ipm) 22.99
	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	Slot	0.210	0.118 (200-300)	RPM 4548 Fz 0.0006 Feed (ipm) 9.79
<b>M</b>	<b>STAINLESS STEELS (FREE MACHINING)</b> 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Slot	0.210	0.118 (312-468)	RPM 7094 Fz 0.0007 Feed (ipm) 17.01
	<b>STAINLESS STEELS (DIFFICULT)</b> 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Slot	0.210	0.118 (216-324)	RPM 4911 Fz 0.0006 Feed (ipm) 9.41
	<b>STAINLESS STEELS (PH)</b> 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Slot	0.210	0.118 (200-300)	RPM 4548 Fz 0.0006 Feed (ipm) 8.74
<b>K</b>	<b>CAST IRONS (LOW &amp; MEDIUM ALLOY)</b> Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Slot	0.210	0.118 (216-324)	RPM 4911 Fz 0.0006 Feed (ipm) 9.41
<b>N</b>	<b>ALUMINUM ALLOYS</b> 2017, 2024, 356, 6061, 7075					Tool not recommended for this material group
	<b>ALUMINUM DIE CAST ALLOYS (HIGH SILICONE)</b> A-390, A-392, B-390					Tool not recommended for this material group
	<b>COPPER ALLOYS</b> Alum Bronze, C110, Muntz Brass					Tool not recommended for this material group
	<b>PLASTICS</b> Polycarbonate, PVC, Polypropylene					Tool not recommended for this material group
<b>S</b>	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE)</b> Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc	Slot	0.210	0.118 (52-78)	RPM 1182 Fz 0.0005 Feed (ipm) 2.00
	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE)</b> Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc	Slot	0.210	0.118 (39-59)	RPM 891 Fz 0.0004 Feed (ipm) 1.05
	<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	Slot	0.210	0.118 (136-204)	RPM 3092 Fz 0.0006 Feed (ipm) 5.89
	<b>TITANIUM ALLOYS (DIFFICULT)</b> Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	Slot	0.210	0.118 (48-72)	RPM 1091 Fz 0.0006 Feed (ipm) 2.09
	<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Slot	0.210	0.118 (116-174)	RPM 2638 Fz 0.0005 Feed (ipm) 4.47

Bhn (Brinell)      HRc (Rockwell C)  
when recommended speed exceeds your capability, use maximum available and recalculate ipm  
rpm = Vc x 3.82 / DC  
ipm = Fz x 3 x rpm  
reduce speed and feed for materials harder than listed  
reduce feed and Ae when finish milling (.02 x DC maximum)  
refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))

## FRACTIONAL

**Picatinny Rail Non-Ferrous Recoil Groove Tool**

**Picatinny Rail  
Non-Ferrous Recoil  
Groove Tool  
3 Flute  
Made to MIL-STD-1913**



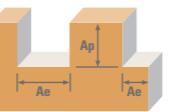
			Ae x DC	Ap x DC	Vc (sfm)	DC • in
						0.2100
<b>P</b>	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536					Tool not recommended for this material group
	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100					Tool not recommended for this material group
<b>M</b>	<b>STAINLESS STEELS (FREE MACHINING)</b> 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Slot	0.210	0.118 (312-468)	Tool not recommended for this material group
	<b>STAINLESS STEELS (DIFFICULT)</b> 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Slot	0.210	0.118 (216-324)	Tool not recommended for this material group
	<b>STAINLESS STEELS (PH)</b> 13-8 PH, 15-5 PH, 17-4 PH, Custom 450					Tool not recommended for this material group
<b>K</b>	<b>CAST IRONS (LOW &amp; MEDIUM ALLOY)</b> Gray, Malleable, Ductile					Tool not recommended for this material group
<b>N</b>	<b>ALUMINUM ALLOYS</b> 2017, 2024, 356, 6061, 7075					Tool not recommended for this material group
	<b>ALUMINUM DIE CAST ALLOYS (HIGH SILICONE)</b> A-390, A-392, B-390					Tool not recommended for this material group
<b>S</b>	<b>COPPER ALLOYS</b> Alum Bronze, C110, Muntz Brass					Tool not recommended for this material group
	<b>PLASTICS</b> Polycarbonate, PVC, Polypropylene					Tool not recommended for this material group
<b>H</b>	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE)</b> Inconel 601, 617, 625, Incoloy, Monel 400	≤ 150 Bhn or ≤ 7 HRc	Slot	0.210	0.118 (1280-1920)	RPM 29105 Fz 0.0026 Feed (ipm) 227.89
	<b>ALUMINUM DIE CAST ALLOYS (HIGH SILICONE)</b> A-390, A-392, B-390	≤ 125 Bhn or ≤ 77 HRb	Slot	0.210	0.118 (480-720)	RPM 10914 Fz 0.0026 Feed (ipm) 85.46
<b>S</b>	<b>COPPER ALLOYS</b> Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	Slot	0.210	0.118 (276-414)	RPM 6276 Fz 0.0022 Feed (ipm) 40.79
	<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si		Slot	0.210	0.118 (1280-1920)	RPM 29105 Fz 0.0044 Feed (ipm) 380.58
<b>TITANIUM ALLOYS (DIFFICULT)</b> Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al						Tool not recommended for this material group
	<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2					Tool not recommended for this material group

Bhn (Brinell)      HRc (Rockwell C)  
when recommended speed exceeds your capability, use maximum available and recalculate ipm  
rpm = Vc x 3.82 / DC  
ipm = Fz x 3 x rpm  
reduce speed and feed for materials harder than listed  
reduce feed and Ae when finish milling (.02 x DC maximum)  
refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))

## FRACTIONAL

**Picatinny Rail Ferrous Dovetail Form Tool**

**Picatinny Rail  
Ferrous Dovetail Form Tool  
5 Flute  
Made to MIL-STD-1913**



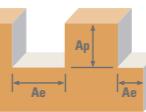
		Ae x DC	Ap x DC	Vc (sfm)	DC • in
					0.6050
<b>P</b>	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ .50 APMX 450 (360-540)	RPM 2841 Fz 0.0032 Feed (ipm) 46.03
	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ .50 APMX 260 (208-312)	RPM 1642 Fz 0.0024 Feed (ipm) 19.68
<b>M</b>	<b>STAINLESS STEELS (FREE MACHINING)</b> 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ .50 APMX 400 (320-480)	RPM 2526 Fz 0.0024 Feed (ipm) 30.28
	<b>STAINLESS STEELS (DIFFICULT)</b> 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ .50 APMX 280 (224-336)	RPM 1768 Fz 0.0019 Feed (ipm) 16.61
	<b>STAINLESS STEELS (PH)</b> 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Profile	≤ .50 APMX 260 (208-312)	RPM 1642 Fz 0.0019 Feed (ipm) 15.42
<b>K</b>	<b>CAST IRONS (LOW &amp; MEDIUM ALLOY)</b> Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile	≤ .50 APMX 280 (224-336)	RPM 1768 Fz 0.0029 Feed (ipm) 25.78
<b>N</b>	<b>ALUMINUM ALLOYS</b> 2017, 2024, 356, 6061, 7075				Tool not recommended for this material group
	<b>ALUMINUM DIE CAST ALLOYS (HIGH SILICONE)</b> A-390, A-392, B-390				Tool not recommended for this material group
	<b>COPPER ALLOYS</b> Alum Bronze, C110, Muntz Brass				Tool not recommended for this material group
<b>S</b>	<b>PLASTICS</b> Polycarbonate, PVC, Polypropylene				Tool not recommended for this material group
	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE)</b> Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc	Profile	≤ .50 APMX 75 (60-90)	RPM 474 Fz 0.0018 Feed (ipm) 4.22
	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE)</b> Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc	Profile	≤ .50 APMX 60 (48-72)	RPM 379 Fz 0.0013 Feed (ipm) 2.39
<b>H</b>	<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	Profile	≤ .50 APMX 180 (144-216)	RPM 1137 Fz 0.0021 Feed (ipm) 11.97
	<b>TITANIUM ALLOYS (DIFFICULT)</b> Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	Profile	≤ .50 APMX 70 (56-84)	RPM 442 Fz 0.0021 Feed (ipm) 4.65
	<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ .50 APMX 145 (116-174)	RPM 916 Fz 0.0019 Feed (ipm) 8.60

Bhn (Brinell)      HRc (Rockwell C)  
when recommended speed exceeds your capability, use maximum available and recalculate ipm  
rpm = Vc x 3.82 / DC  
ipm = Fz x 5 x rpm  
reduce speed and feed for materials harder than listed  
reduce feed and Ae when finish milling (.02 x DC maximum)  
refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))

## FRACTIONAL

**Picatinny Rail Non-Ferrous Dovetail Form Tool**

**Picatinny Rail  
Non-Ferrous Dovetail  
Form Tool  
3 Flute  
Made to MIL-STD-1913**



		Ae x DC	Ap x DC	Vc (sfm)	DC • in
					0.6050
<b>P</b>	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536				Tool not recommended for this material group
	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100				Tool not recommended for this material group
<b>M</b>	<b>STAINLESS STEELS (FREE MACHINING)</b> 303, 416, 420F, 430F, 440F				Tool not recommended for this material group
	<b>STAINLESS STEELS (DIFFICULT)</b> 304, 304L, 316, 316L				Tool not recommended for this material group
	<b>STAINLESS STEELS (PH)</b> 13-8 PH, 15-5 PH, 17-4 PH, Custom 450				Tool not recommended for this material group
<b>K</b>	<b>CAST IRONS (LOW &amp; MEDIUM ALLOY)</b> Gray, Malleable, Ductile				Tool not recommended for this material group
<b>N</b>	<b>ALUMINUM ALLOYS</b> 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	Profile	≤ .50 APMX 2000 (1600-2400)	RPM 12628 Fz 0.0056 Feed (ipm) 211.39
	<b>ALUMINUM DIE CAST ALLOYS (HIGH SILICONE)</b> A-390, A-392, B-390	≤ 125 Bhn or ≤ 77 HRb	Profile	≤ .50 APMX 750 (600-900)	RPM 4736 Fz 0.0056 Feed (ipm) 79.27
<b>S</b>	<b>COPPER ALLOYS</b> Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	Profile	≤ .50 APMX 430 (344-516)	RPM 2715 Fz 0.0046 Feed (ipm) 37.72
	<b>PLASTICS</b> Polycarbonate, PVC, Polypropylene		Profile	≤ .50 APMX 2000 (1600-2400)	RPM 12628 Fz 0.0093 Feed (ipm) 353.03
<b>H</b>	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE)</b> Inconel 601, 617, 625, Incoloy, Monel 400				Tool not recommended for this material group
	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE)</b> Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene				Tool not recommended for this material group
	<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si				Tool not recommended for this material group
<b>TITANIUM ALLOYS (DIFFICULT)</b> Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al					Tool not recommended for this material group
<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2					Tool not recommended for this material group

Bhn (Brinell)      HRc (Rockwell C)  
when recommended speed exceeds your capability, use maximum available and recalculate ipm  
rpm = Vc x 3.82 / DC  
ipm = Fz x 3 x rpm  
reduce speed and feed for materials harder than listed  
reduce feed and Ae when finish milling (.02 x DC maximum)  
refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))

**VALUE AT THE SPINDLE<sup>®</sup>**
**High Performance Aluminum End Mills**

 **Milling**

Please put "S" at the beginning of all page numbers below.

HIGH PERFORMANCE ALUMINUM END MILLS	SERIES	DESCRIPTION	PAGE
S-Carb APR <sup>®</sup> & APF <sup>®</sup>	43APR-3	3 Flute Advanced Productivity Rougher Fractional	127
	43APR-3	3 Flute Advanced Productivity Rougher Metric	129
	43APR-4	4 Flute Advanced Productivity Rougher Metric	130
	43APF	4 Flute Advanced Productivity Finisher Fractional	132
	43MAPF	4 Flute Advanced Productivity Finisher Metric	134
S-Carb <sup>®</sup> (3 Flute)	43	3 Flute Non-Ferrous Square End Fractional	136
	43CR	3 Flute Non-Ferrous Corner Radius Fractional	136
	43L	3 Flute Non-Ferrous Square End Long Reach Fractional	140
	43LC	3 Flute Non-Ferrous Corner Radius End Long Reach Fractional	140
	43EC	3 Flute Non-Ferrous Square End Extra Long Reach Fractional	143
	43B	3 Flute Non-Ferrous Ball End Fractional	144
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	43EB	3 Flute Non-Ferrous Ball End Extra Long Reach Fractional	145
	43M	3 Flute Non-Ferrous Square End Metric (Unpolished Flutes)	149
	43M	3 Flute Non-Ferrous Square End Metric (Polished Flutes)	149
	43MCR	3 Flute Non-Ferrous Corner Radius Metric (Unpolished Flutes)	149
	43MCR	3 Flute Non-Ferrous Corner Radius Metric (Polished Flutes)	149
	43ML	3 Flute Non-Ferrous Square End Long Reach Metric	152
	43MLC	3 Flute Non-Ferrous Long Reach Corner Radius Metric (Unpolished Flutes)	152
	43MLC	3 Flute Non-Ferrous Long Reach Corner Radius Metric (Polished Flutes)	152
	43MB	3 Flute Non-Ferrous Ball End Metric (Polished Flutes)	154
	43CB	3 Flute Rougher Non-Ferrous Chip Breaker Fractional	146
	43LCB	3 Flute Rougher Non-Ferrous Chip Breaker Long Reach Fractional	147
	43MCB	3 Flute Rougher Non-Ferrous Chip Breaker Metric	155
S-Carb <sup>®</sup> (2 Flute)	47	2 Flute Non-Ferrous Square End Fractional	157
	47L	2 Flute Non-Ferrous Square End Long Reach Fractional	157
	47B	2 Flute Non-Ferrous Ball End Fractional	158
	47LB	2 Flute Non-Ferrous Ball End Long Reach Fractional	158
	47M	2 Flute Non-Ferrous Square End Metric	160
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Ski-Carb	44	2 Flute Non-Ferrous Materials Square End Fractional	163
	44M	2 Flute Non-Ferrous Materials Square End Metric	163
	45	2 Flute Non-Ferrous Materials Long Reach Corner Radius Fractional	166

*Speed & Feed Recommendations listed after each series*

# Fresado

Please put "S" at the beginning of all page numbers below.

FRESAS DE ALTO RENDIMIENTO PARA ALUMINIO	SERIE	DESCRIPCIÓN	PÁGINA
S-Carb APR® y APF®	43APR-3	3 filos, productividad avanzada, desbastador, fraccional	127
	43APR-3	3 filos, productividad avanzada, desbastador, métrico	129
	43APR-4	4 filos, productividad avanzada, desbastador, métrico	130
	43APF	4 filos, productividad avanzada, acabador, fraccional	132
	43MAPF	4 filos, productividad avanzada, acabador, métrico	134
S-Carb® (3 filos)	43	3 filos, no férrico, punta cuadrada, fraccional	136
	43CR	3 filos, no férrico, radio angulado, fraccional	136
	43L	3 filos, no férrico, punta cuadrada, largo alcance, fraccional	140
	43LC	3 filos, no férricos, largo alcance, radio angulado, fraccional	140
	43EC	3 filos, no férrico, punta cuadrada, alcance extralargo, fraccional	143
	43B	3 filos, no férrico, punta esférica, fraccional	144
	43LB	3 filos, no férrico, punta esférica, largo alcance, fraccional	145
	43EB	3 filos, no férrico, punta esférica, alcance extralargo, fraccional	145
	43M	3 filos, no férrico, punta cuadrada, métrico (filos no pulidos)	149
	43M	3 filos, no férrico, punta cuadrada, métrico (filos pulidos)	149
	43MCR	3 filos, no férrico, radio angulado, métrico (filos no pulidos)	149
	43MCR	3 filos, no férrico, radio angulado, métrico (filos pulidos)	149
	43MCR	3 filos, no férrico, radio angulado 4xD, métrico (filos pulidos)	149
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Desbastador S-Carb® (3 filos)	43CB	3 filos, desbastador, no férrico, rompevirutas, fraccional	146
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Recomendaciones de velocidades y avances mostradas tras cada serie

# Fraisage

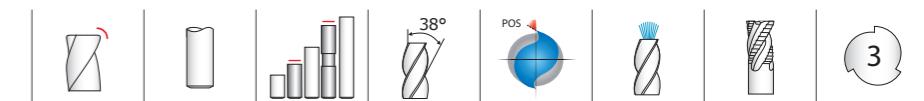
Please put "S" at the beginning of all page numbers below.

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<b>Ski-Carb</b>	44	Zölliger NE-Schaftfräser mit 2 Schneiden ohne Eckenradien	163
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**43APR-3**  
FRACTIONAL SERIES

TOLERANCES (inch)		CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	EDP NO.	Ti-NAMITE-B (TiB <sub>2</sub> )
1/2-1 DIAMETER	DC = -0.0004/-0.004									
NON-FERROUS	DCON = h <sub>6</sub> RE = +/-0.002	1/2	1	3-1/4	1/2	1-1/2	.474	.030	34100	
		1/2	1	3-1/4	1/2	1-1/2	.474	.060	34101	
		1/2	1	3-1/4	1/2	1-1/2	.474	.090	34102	
		1/2	1	3-1/4	1/2	1-1/2	.474	.120	34103	
		5/8	1-3/8	3-5/8	5/8	2	.594	.030	34104*	
		5/8	1-3/8	3-5/8	5/8	2	.594	.060	34105*	
		5/8	1-3/8	3-5/8	5/8	2	.594	.090	34106*	
		5/8	1-3/8	3-5/8	5/8	2	.594	.120	34107*	
		5/8	1-3/8	4-1/4	5/8	2-5/8	.594	.030	34108*	
		5/8	1-3/8	4-1/4	5/8	2-5/8	.594	.060	34109*	
		5/8	1-3/8	4-1/4	5/8	2-5/8	.594	.090	34110*	
		5/8	1-3/8	4-1/4	5/8	2-5/8	.594	.120	34111*	
		3/4	1-3/8	3-5/8	3/4	1-3/4	.713	.030	34112	
		3/4	1-3/8	3-5/8	3/4	1-3/4	.713	.060	34113	
		3/4	1-3/8	3-5/8	3/4	1-3/4	.713	.090	34114	
		3/4	1-3/8	3-5/8	3/4	1-3/4	.713	.120	34115	
		3/4	1-3/8	4-3/8	3/4	2-1/2	.713	.030	34116*	
		3/4	1-3/8	4-3/8	3/4	2-1/2	.713	.060	34117*	
		3/4	1-3/8	4-3/8	3/4	2-1/2	.713	.090	34118*	
		3/4	1-3/8	4-3/8	3/4	2-1/2	.713	.120	34119*	
		3/4	1-3/8	5-1/4	3/4	3-1/4	.713	.030	34120*	
		3/4	1-3/8	5-1/4	3/4	3-1/4	.713	.060	34121*	
		3/4	1-3/8	5-1/4	3/4	3-1/4	.713	.090	34122*	
		3/4	1-3/8	5-1/4	3/4	3-1/4	.713	.120	34123*	
		1	1-3/4	4-1/2	1	2-1/2	.949	.030	34124	
		1	1-3/4	4-1/2	1	2-1/2	.949	.060	34125	
		1	1-3/4	4-1/2	1	2-1/2	.949	.090	34126	
		1	1-3/4	4-1/2	1	2-1/2	.949	.120	34127	
		1	1-3/4	5-1/4	1	3-1/4	.949	.030	34128*	
		1	1-3/4	5-1/4	1	3-1/4	.949	.060	34129*	
		1	1-3/4	5-1/4	1	3-1/4	.949	.090	34130*	
		1	1-3/4	5-1/4	1	3-1/4	.949	.120	34131*	
		1	1-3/4	6-1/4	1	4-1/4	.949	.030	34132*	
		1	1-3/4	6-1/4	1	4-1/4	.949	.060	34133*	
		1	1-3/4	6-1/4	1	4-1/4	.949	.090	34134*	
		1	1-3/4	6-1/4	1	4-1/4	.949	.120	34135*	

\*Variable Helix

- Ultra high-productivity rougher for Aluminum alloys, specifically for aircraft components
- Designed for machine tools with capability of 12 l/min material removal rates
- New 3 flute variable geometry with side exit coolant holes
- Open fluting for deep slotting and profiling
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

# FRACTIONAL S-Carb APR®

Series 43APR-3 Fractional		Ae x DC	Ap x DC	Vc (sfm)	DC • inch	
					0.75	1
N ALUMINIUM ALLOYS 6068, 7075	Slot	1	$\leq 1$	5250	RPM	26740 20055
				(980-6900)	Fz	0.0055 0.0059
					Feed (ipm)	441 355
	Profile	$\leq 0.5$	$\leq 1.5$	5900	RPM	30051 22538
				(980-6900)	Fz	0.0063 0.0067
					Feed (ipm)	568 453
	HSM	$\leq 0.1$	$\leq 2$	6900	RPM	35144 26358
				(980-6900)	Fz	0.0075 0.0079
					Feed (ipm)	791 625
Series 43APR-3L Fractional		Ae x DC	Ap x DC	Vc (sfm)	DC • inch	
					0.5	0.625 0.75 1
N ALUMINIUM ALLOYS 6068, 7075	Slot	1	$\leq 1$	3280	RPM	25059 20047 16706 12530
				(980-6900)	Fz	0.0039 0.0043 0.0047 0.0051
					Feed (ipm)	293 259 236 192
	Profile	$\leq 0.5$	$\leq 1.5$	3950	RPM	30178 24142 20119 15089
				(980-6900)	Fz	0.0047 0.0051 0.0055 0.0059
					Feed (ipm)	426 369 332 267
	HSM	$\leq 0.1$	$\leq 2$	4600	RPM	35144 28115 23429 17572
				(980-6900)	Fz	0.0055 0.0059 0.0063 0.0067
					Feed (ipm)	580 498 443 353

RPM stated may be outside of most machine tools in the smaller sizes, adjust the surface speed but maintain the Fz

For best results use the peak power of the specific machine torque chart.

Typically 10hp is required to remove 45 cubic inches of material (MRR).

Eg. >> (Ae x Ap x Feed) >> Therefore Full slotting 1" dia:  $1 \times 1 \times 355 = 355$  cubic inches, so it needs a min of 78hp.

Larger cuts and chip load consume more power.

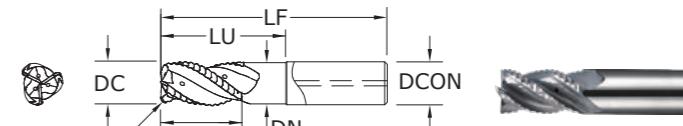
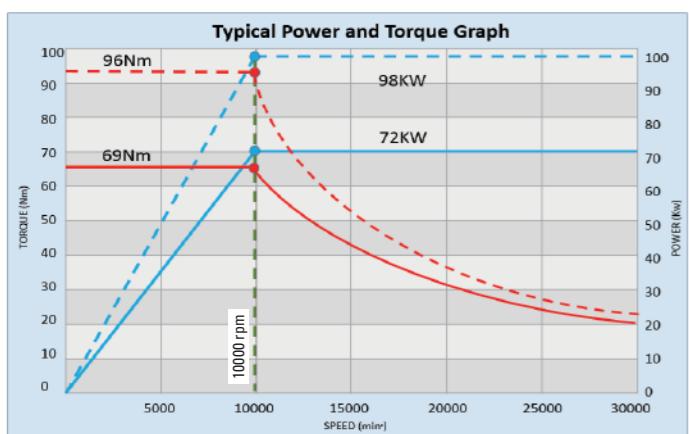
Review the power chart of each machine to determine MAX power for ultimate performance.

Example below shows peak power @ 10,000 rpm.

The new coolant supply is designed for MQL as well as normal emulsion coolant on the same data.

Ensure max MQL flow prior to cutting.

Refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com)).



**43APR-3**  
METRIC SERIES

TOLERANCES (mm)							
12-25 DIAMETER		mm	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	EDP NO. Ti-NAMITE-B (TiB <sub>2</sub> )
DC	= -0,010/-0,100						
DCON	= h <sub>6</sub>						
12,0	-0,010/-0,100	83,0	12,0	39,0	11,4	1,0	44976*
12,0	-0,010/-0,100	83,0	12,0	39,0	11,4	2,0	44977*
12,0	-0,010/-0,100	83,0	12,0	39,0	11,4	3,0	44978*
12,0	-0,010/-0,100	83,0	12,0	39,0	11,4	4,0	44979*
12,0	-0,010/-0,100	95,0	12,0	-	-	-	44975*
16,0	-0,010/-0,100	92,0	16,0	-	-	-	44980
16,0	-0,010/-0,100	92,0	16,0	51,0	15,2	2,0	44981*
16,0	-0,010/-0,100	92,0	16,0	51,0	15,2	3,0	44982*
16,0	-0,010/-0,100	92,0	16,0	51,0	15,2	4,0	44983*
16,0	-0,010/-0,100	108,0	16,0	67,0	15,2	2,0	44985*
16,0	-0,010/-0,100	108,0	16,0	67,0	15,2	3,0	44986*
16,0	-0,010/-0,100	108,0	16,0	67,0	15,2	4,0	44987*
16,0	-0,010/-0,100	124,0	16,0	-	-	-	44984
20,0	-0,010/-0,100	86,0	20,0	-	-	-	44990
20,0	-0,010/-0,100	86,0	20,0	45,0	19,4	3,0	44991
20,0	-0,010/-0,100	86,0	20,0	45,0	19,4	4,0	44992
20,0	-0,010/-0,100	106,0	20,0	-	-	-	44993
20,0	-0,010/-0,100	106,0	20,0	65,0	19,4	2,0	44994*
20,0	-0,010/-0,100	106,0	20,0	65,0	19,4	3,0	44995*
20,0	-0,010/-0,100	106,0	20,0	65,0	19,4	4,0	44996*
20,0	-0,010/-0,100	106,0	20,0	65,0	19,4	5,0	44997*
20,0	-0,010/-0,100	125,0	20,0	84,0	19,0	2,0	45021*
20,0	-0,010/-0,100	125,0	20,0	84,0	19,0	3,0	45022*
20,0	-0,010/-0,100	125,0	20,0	84,0	19,0	4,0	45023*
20,0	-0,010/-0,100	145,0	20,0	-	-	-	45020
25,0	-0,010/-0,100	108,0	25,0	-	-	-	44998
25,0	-0,010/-0,100	108,0	25,0	60,0	24,4	2,0	44999
25,0	-0,010/-0,100	108,0	25,0	60,0	24,4	3,0	45000
25,0	-0,010/-0,100	108,0	25,0	60,0	24,4	4,0	45001
25,0	-0,010/-0,100	140,0	25,0	-	-	-	45002
25,0	-0,010/-0,100	140,0	25,0	80,0	24,4	3,0	45003*
25,0	-0,010/-0,100	140,0	25,0	90,0	24,4	3,0	45004*
25,0	-0,010/-0,100	151,0	25,0	-	-	-	45024
25,0	-0,010/-0,100	151,0	25,0	105,0	23,7	3,0	45025*

\*Variable Helix

METRIC

# S-Carb APR®



3

- Ultra high-productivity rougher for Aluminum alloys, specifically for aircraft components
- Designed for machine tools with capability of 12 l/min per minute material removal rates
- New 3 flute variable geometry with side exit coolant holes
- Open fluting for deep slotting and profiling
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

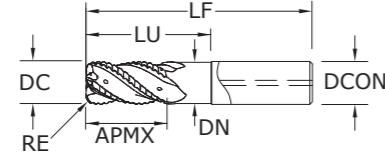
# METRIC S-Carb APR®



## 43APR-4

METRIC SERIES

- Ultra high-productivity rougher for Aluminum alloys, specifically for aircraft components
- Designed for machine tools with capability of 12 l/min per minute material removal rates
- 4 flute variable geometry with side exit coolant holes
- Open fluting for deep slotting and profiling
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)



ADVANCED PRODUCTIVITY ROUNDER

### TOLERANCES (mm)

#### 20–25 DIAMETER

DC = -0,010/-0,100

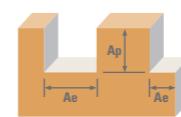
DCON = h<sub>6</sub>

RE = ±0,050

### NON-FERROUS

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

# METRIC S-Carb APR®



Series  
43APR-3  
43APR-4  
Metric

N ALUMINIUM ALLOYS  
6068, 7075

	Ae x DC	Ap x DC	Vc (m/min)	DC • mm	
				APR-3	APR-4
Slot	1	≤ 1	1600	RPM	25461 20369
		(300-2100)	Fz	0.14 0.15	0.12 0.13
Profile	≤ 0.5	≤ 1.5	1800	RPM	28644 22915
		(300-2100)	Fz	0.16 0.17	0.14 0.15
HSM	≤ 0.1	≤ 2	2100	RPM	33418 26735
		(300-2100)	Fz	0.19 0.20	0.16 0.17
			Feed (mm/min)	19048 16041	21388 18180

Series  
43APR-3  
43APR-4  
Metric

N ALUMINIUM ALLOYS  
6068, 7075

	Ae x DC	Ap x DC	Vc (m/min)	DC • mm	
				APR-3 LONG	APR-4
Slot	1	≤ 1	1600	RPM	26522 19892
		(300-2100)	Fz	0.10 0.11	0.12 0.13
Profile	≤ 0.5	≤ 1.5	1800	RPM	31827 23870
		(300-2100)	Fz	0.12 0.13	0.14 0.15
HSM	≤ 0.1	≤ 2	2100	RPM	37131 27849
		(300-2100)	Fz	0.14 0.15	0.16 0.17
			Feed (mm/min)	15595 12532	10694 9090

RPM stated may be outside of most machine tools in the smaller sizes, adjust the surface speed but maintain the Fz. For best results use the peak power of the specific machine torque chart.

Typically 10kw is required to remove 1 litre of material (MMR).

Eg. >> (Ae x Ap x Feed) / 1000000 >> Therefore Full slotting Ø25: 25 x 25 x 7333 = 4.58 Litres so it needs a min of 46Kw.

Larger cuts and chip load consume more power.

Review the power chart of each machine to determine MAX power for ultimate performance.

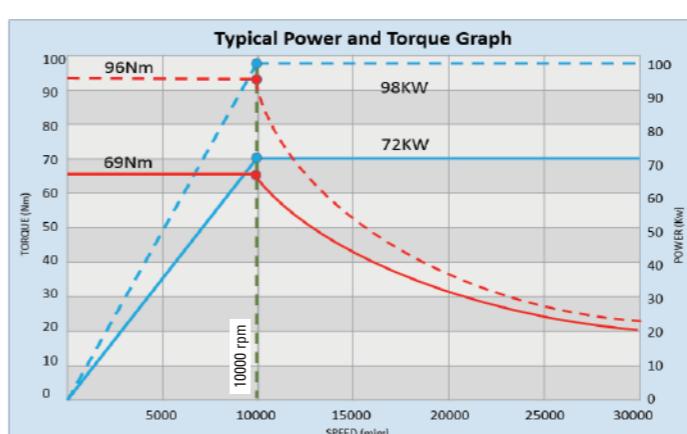
The example below shows peak power @ 10,000 rpm.

The APR-4 design is for ultimate metal removal but typically requires more power, and is also better suited to horizontal machines.

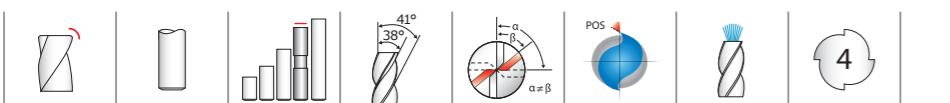
The new coolant supply is designed for MQL as well as normal emulsion coolant on the same data.

Ensure max MQL flow prior to cutting.

Refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com)).

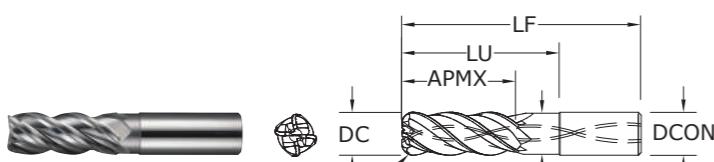


## FRACTIONAL S-Carb APF®



### 43APF FRACTIONAL SERIES

- Ultra high-productivity finished for Aluminum alloys, specifically for aircraft components
- Two levels of chatter suppression: variable helix and indexing
- Designed for single axial pass semi-finishing and finishing
- Polished flutes maximize chip evacuation and provides enhanced finish
- Recommended for materials  $\leq 150$  Bhn ( $\leq 7$  HRc)



#### TOLERANCES (inch)

##### 1/2-3/4 DIAMETER

DC = -0.0004/-0.0020

DCON = h<sub>6</sub>

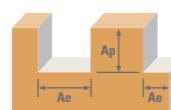
RE = +0.0000/-0.0012

#### NON-FERROUS

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

Available on request: • JetStream Technology

## FRACTIONAL S-Carb APF®



### Series 43APF Fractional

#### Hardness

**ALUMINUM ALLOYS**  
2024, 5052, 5086, 6061,  
6063, 7075

$\leq 150$  Bhn  
or  
 $\leq 7$  HRc

Ae x DC      Ap x DC

Vc

(sfm)

DC • in

1/2      3/4

RPM	20055	13370
-----	-------	-------

Fz	0.0030	0.0050
----	--------	--------

Feed (in/min)	241	267
---------------	-----	-----

RPM	20055	13370
-----	-------	-------

Fz	0.0020	0.0040
----	--------	--------

Feed (in/min)	160	214
---------------	-----	-----

RPM	15051	10034
-----	-------	-------

Fz	0.0030	0.0050
----	--------	--------

Feed (in/min)	181	201
---------------	-----	-----

RPM	15051	10034
-----	-------	-------

Fz	0.0020	0.0040
----	--------	--------

Feed (in/min)	120	161
---------------	-----	-----

**ALUMINUM ALLOYS (LITHIUM)\***  
2090, 2091, 2099, 2195,  
2199, 2297, 8090

$\leq 150$  Bhn  
or  
 $\leq 7$  HRc

Ae x DC      Ap x DC

Vc

(sfm)

1970

DC • in

1/2

3/4

RPM	20055	13370
-----	-------	-------

Fz	0.0030	0.0050
----	--------	--------

Feed (in/min)	181	201
---------------	-----	-----

RPM	15051	10034
-----	-------	-------

Fz	0.0020	0.0040
----	--------	--------

Feed (in/min)	120	161
---------------	-----	-----

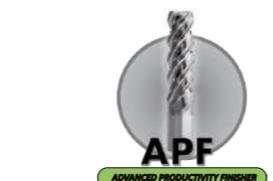
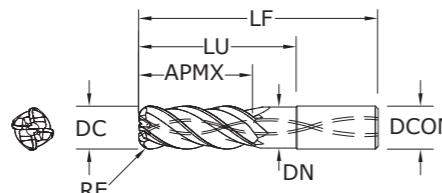
Bhn (Brinell)      HRc (Rockwell C)  
surface speed is dependent on machine spindle and fixturing  
balancing is recommended at ultra high surface speeds  
tool life may be reduced when machining Lithium Alloys  
rpm = Vc x 3.82 / DC  
ipm = Fz x 4 x rpm  
maximum recommended depths shown  
reduce speed and feed for materials harder than listed  
finish cuts typically require reduced feed and cutting depths of 0.02 X DC maximum  
ramp angle = 6° (feed rate = 50%)  
plunging not recommended  
refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

METRIC  
**S-Carb APF®**



**43MAPF**  
METRIC SERIES

- Ultra high-productivity finished for Aluminum alloys, specifically for aircraft components
- Two levels of chatter suppression: variable helix and indexing
- Designed for single axial pass semi-finishing and finishing
- Polished flutes maximize chip evacuation and provides enhanced finish
- Recommended for materials  $\leq 150$  Bhn ( $\leq 7$  HRc)



TOLERANCES (mm)

**6-25 DIAMETER**

DC =  $-0.010/-0.050$

DCON =  $h_6$

RE =  $+0.000/-0.030$

**NON-FERROUS**

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	EDP NO.
6,0	24,0	58,0	6,0	30,0	5,66	—	44627
8,0	32,0	64,0	8,0	40,0	7,57	—	44628
10,0	40,0	80,0	10,0	50,0	9,47	—	44629
12,0	30,0	83,0	12,0	40,0	11,38	—	44630
12,0	30,0	83,0	12,0	40,0	11,38	2,0	44745
12,0	30,0	83,0	12,0	40,0	11,38	3,0	44746
12,0	30,0	83,0	12,0	40,0	11,38	4,0	44747
12,0	30,0	83,0	12,0	50,0	11,38	0,5	44641
12,0	30,0	83,0	12,0	50,0	11,38	5,0	44642
12,0	48,0	100,0	12,0	62,0	11,38	—	44631
12,0	48,0	100,0	12,0	62,0	11,38	2,0	44748
12,0	48,0	100,0	12,0	62,0	11,38	3,0	44749
12,0	48,0	100,0	12,0	62,0	11,38	4,0	44750
16,0	40,0	92,0	16,0	51,0	15,16	—	44634
16,0	40,0	92,0	16,0	51,0	15,16	2,0	44751
16,0	40,0	92,0	16,0	51,0	15,16	3,0	44752
16,0	40,0	92,0	16,0	51,0	15,16	4,0	44753
16,0	42,0	93,0	16,0	51,0	15,16	5,0	44643
16,0	64,0	125,0	16,0	82,0	15,16	—	44635
16,0	64,0	125,0	16,0	82,0	15,16	2,0	44754
16,0	64,0	125,0	16,0	82,0	15,16	3,0	44755
16,0	64,0	125,0	16,0	82,0	15,16	4,0	44756
20,0	50,0	108,0	20,0	63,0	18,97	—	44636
20,0	50,0	108,0	20,0	63,0	18,97	3,0	44757
20,0	50,0	108,0	20,0	63,0	18,97	4,0	44758
20,0	50,0	108,0	20,0	63,0	18,97	5,0	44759
20,0	80,0	150,0	20,0	102,0	18,97	—	44637
20,0	80,0	150,0	20,0	102,0	18,97	3,0	44760
20,0	80,0	150,0	20,0	102,0	18,97	4,0	44761
20,0	80,0	150,0	20,0	102,0	18,97	5,0	44762
25,0	63,0	130,0	25,0	79,0	23,75	—	44638
25,0	63,0	130,0	25,0	79,0	23,75	3,0	44763
25,0	63,0	130,0	25,0	79,0	23,75	4,0	44764
25,0	63,0	130,0	25,0	79,0	23,75	5,0	44765
25,0	100,0	175,0	25,0	120,0	23,75	—	44639
25,0	100,0	175,0	25,0	120,0	23,75	3,0	44766
25,0	100,0	175,0	25,0	120,0	23,75	4,0	44767
25,0	100,0	175,0	25,0	120,0	23,75	5,0	44768

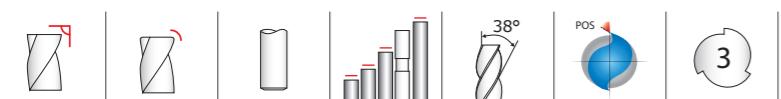
Available on request: • JetStream Technology

METRIC  
**S-Carb APF®**

Series 43MAPF Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm							
					6	8	10	12	16	20	25	
<b>ALUMINUM ALLOYS</b> 2024, 5052, 5086, 6061, 6063, 7075	$\leq 150$ Bhn or $\leq 7$ HRc	Profile	$\leq 0.1$	$\leq 2.5$	800	RPM	42440	31830	25464	21220	15915	
					(640-960)	Fz	0.050	0.055	0.060	0.070	0.100	0.140
<b>ALUMINUM ALLOYS</b> (LITHIUM)* 2090, 2091, 2099, 2195, 2199, 2297, 8090	$\leq 150$ Bhn or $\leq 7$ HRc	Profile	$\leq 0.1$	$\leq 4$	800	RPM	42440	31830	25464	21220	15915	12732
					(640-960)	Fz	0.040	0.045	0.050	0.050	0.070	0.100
<b>NON-FERROUS</b>	$\leq 150$ Bhn or $\leq 7$ HRc	Profile	$\leq 0.1$	$\leq 2.5$	600	RPM	31830	23873	19098	15915	11936	9549
					(480-720)	Fz	0.050	0.055	0.060	0.070	0.100	0.140
<b>NON-FERROUS</b>	$\leq 150$ Bhn or $\leq 7$ HRc	Profile	$\leq 0.1$	$\leq 4$	600	RPM	31830	23873	19098	15915	11936	9549
					(480-720)	Fz	0.040	0.045	0.050	0.050	0.070	0.100

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 =  $(V_c \times 1000) / (DC \times 3.14)$   
mm/min =  $F_z \times 4 \times rpm$   
maximum recommended depths shown  
reduce speed and feed for materials harder than listed  
finish cuts typically require reduced feed and cutting depths of 0.02 X DC maximum  
ramp angle = 6° (feed rate = 50%)  
plunging not recommended  
refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))

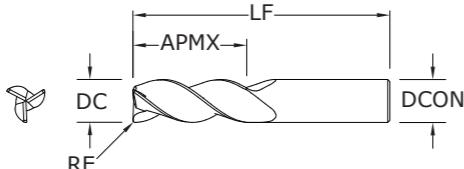
## FRACTIONAL S-Carb®



**43 •  
43CR**

FRACTIONAL SERIES

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)



EDP NO.

UNCOATED

Ti-NAMITE-B

(TiB<sub>2</sub>)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	UNCOATED	Ti-NAMITE-B (TiB <sub>2</sub> )
1/8	3/8	1-1/2	1/8	—	34701	34728
1/8	3/8	1-1/2	1/8	.010	34771	34793
3/16	5/16	2-1/2	3/16	—	34822	34857
3/16	9/16	2	3/16	—	34702	34729
3/16	9/16	2	3/16	.010	34772	34794
3/16	3/4	2-1/2	3/16	—	34823	34858
1/4	3/8	2	1/4	—	34703	34730
1/4	3/8	2-1/2	1/4	.010	35575	35665
1/4	3/8	2-1/2	1/4	.015	35576	35666
1/4	3/8	2-1/2	1/4	.030	35577	35667
1/4	3/8	2-1/2	1/4	.060	35578	35668
1/4	1/2	2-1/2	1/4	—	34824	34859
1/4	3/4	2-1/2	1/4	—	34704	34731
1/4	3/4	2-1/2	1/4	.010	34773	34795
1/4	3/4	2-1/2	1/4	.015	35579	35669
1/4	3/4	2-1/2	1/4	.030	34774	34796
1/4	3/4	2-1/2	1/4	.060	35580	35670
1/4	1	3	1/4	—	34825	34860
1/4	1	3	1/4	.010	35581	35671
1/4	1	3	1/4	.015	35582	35672
1/4	1	3	1/4	.030	35583	35673
1/4	1	3	1/4	.060	35584	35674
1/4	1-1/4	3-1/2	1/4	—	34705	34732
1/4	1-3/4	4	1/4	—	34826	34861
5/16	7/16	2	5/16	—	34706	34733
5/16	5/8	2-1/2	5/16	—	34707	34734
5/16	5/8	2-1/2	5/16	.030	34775	34797
5/16	1-1/4	4	5/16	—	34708	34735
3/8	1/2	2	3/8	—	34709	34736
3/8	1/2	3	3/8	.010	35585	35675
3/8	1/2	3	3/8	.015	35586	35676
3/8	1/2	3	3/8	.030	35587	35677
3/8	1/2	3	3/8	.060	35588	35678
3/8	1/2	3	3/8	.090	35589	35679
3/8	1	2-1/2	3/8	—	34710	34737
3/8	1	2-1/2	3/8	.010	34776	34798

continued on next page



43 •  
43CR FRACTIONAL SERIES

EDP NO.

UNCOATED

Ti-NAMITE-B

(TiB<sub>2</sub>)

### TOLERANCES (inch)

#### 1/8-3/16 DIAMETER

DC = +0.0000/-0.00032  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### 1/4-3/8 DIAMETER

DC = +0.0000/-0.00035  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### 1/2-5/8 DIAMETER

DC = +0.0000/-0.00043  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### 3/4-1 DIAMETER

DC = +0.0000/-0.00051  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### NON-FERROUS

#### PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

### TOLERANCES (inch)

#### 1/8-3/16 DIAMETER

DC = +0.0000/-0.00032  
DCON = h<sub>6</sub>  
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#### 1/4-3/8 DIAMETER

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#### 1/2-5/8 DIAMETER

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DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### 3/4-1 DIAMETER

DC = +0.0000/-0.00051  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### NON-FERROUS

#### PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

### CONTINUED

#### EDP NO.

UNCOATED

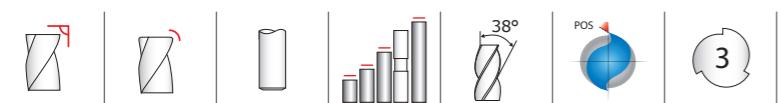
Ti-NAMITE-B

(TiB<sub>2</sub>)

#### CONTINUED

#### EDP NO.

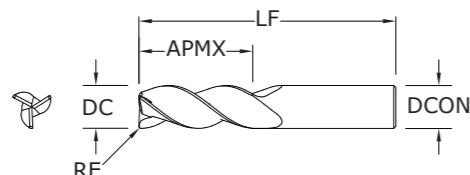
## FRACTIONAL S-Carb®



**43 •  
43CR**

FRACTIONAL SERIES

CONTINUED



CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	EDP NO.
inch					UNCOATED Ti-NAMITE-B (TiB <sub>2</sub> )
1/2	1-5/8	4	1/2	.030	35612 35702
1/2	1-5/8	4	1/2	.060	35613 35703
1/2	1-5/8	4	1/2	.090	35614 35704
1/2	1-5/8	4	1/2	.120	35615 35705
1/2	2	4	1/2	.010	35616 35706
1/2	2	4	1/2	.015	35617 35707
1/2	2	4	1/2	.030	35618 35708
1/2	2	4	1/2	.060	35619 35709
1/2	2	4	1/2	.090	35620 35710
1/2	2	4	1/2	.120	35621 35711
1/2	2	4	1/2	—	34714 34741
1/2	2-1/2	5	1/2	—	34832 34867
1/2	3-1/8	6	1/2	—	34715 34742
5/8	3/4	3	5/8	—	34716 34743
5/8	3/4	3-1/2	5/8	.030	35622 35712
5/8	3/4	3-1/2	5/8	.060	35623 35713
5/8	3/4	3-1/2	5/8	.090	35624 35714
5/8	3/4	3-1/2	5/8	.120	35625 35715
5/8	1-5/8	3-3/4	5/8	—	34717 34744
5/8	1-5/8	3-3/4	5/8	.030	34782 34804
5/8	1-5/8	3-3/4	5/8	.060	34783 34805
5/8	1-5/8	3-3/4	5/8	.090	34784 34806
5/8	1-5/8	3-3/4	5/8	.120	35626 35716
5/8	2-1/8	4	5/8	—	34833 34868
5/8	2-1/2	5	5/8	—	34718 34745
5/8	3-1/4	6	5/8	—	34834 34869
5/8	3-3/4	6	5/8	—	34719 34746
3/4	1	3	3/4	—	34720 34747
3/4	1	4	3/4	.030	35627 35717
3/4	1	4	3/4	.060	35628 35718
3/4	1	4	3/4	.090	35629 35719
3/4	1	4	3/4	.120	35630 35720
3/4	1	4	3/4	.190	35631 35721
3/4	1	4	3/4	.250	35632 35722
3/4	1-5/8	4	3/4	—	34721 34748
3/4	1-5/8	4	3/4	.030	34785 34807

continued on next page



**43 •  
43CR**

FRACTIONAL SERIES

TOLERANCES (inch)

#### 1/8-3/16 DIAMETER

DC = +0.0000/-0.00032  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### 1/4-3/8 DIAMETER

DC = +0.0000/-0.00035  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### 1/2-5/8 DIAMETER

DC = +0.0000/-0.00043  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### 3/4-1 DIAMETER

DC = +0.0000/-0.00051  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### NON-FERROUS

#### PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

TOLERANCES (inch)

#### 1/8-3/16 DIAMETER

DC = +0.0000/-0.00032  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### 1/4-3/8 DIAMETER

DC = +0.0000/-0.00035  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### 1/2-5/8 DIAMETER

DC = +0.0000/-0.00043  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

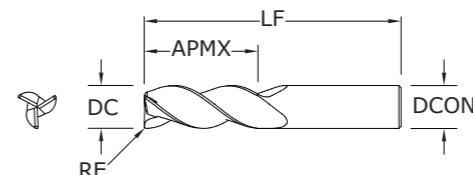
#### 3/4-1 DIAMETER

DC = +0.0000/-0.00051  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### NON-FERROUS

#### PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)



CONTINUED

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	EDP NO.
inch					UNCOATED Ti-NAMITE-B (TiB <sub>2</sub> )
3/4	1-5/8	4	3/4	.060	34786 34808
3/4	1-5/8	4	3/4	.090	34787 34809
3/4	1-5/8	4	3/4	.120	34815 34817
3/4	1-5/8	4	3/4	.190	35633 35723
3/4	1-5/8	4	3/4	.250	35634 35724
3/4	2-1/4	5	3/4	—	34722 34749
3/4	2-1/4	5	3/4	.030	35635 35725
3/4	2-1/4	5	3/4	.060	35636 35726
3/4	2-1/4	5	3/4	.090	35637 35727
3/4	2-1/4	5	3/4	.120	35638 35728
3/4	2-1/4	5	3/4	.190	35639 35729
3/4	2-1/4	5	3/4	.250	35640 35730
3/4	2-1/2	5	3/4	—	34758 34765
3/4	3-1/4	6	3/4	—	34723 34750
1	1-1/4	4	1	—	34724 34751
1	1-1/4	5	1	.030	35641 35731
1	1-1/4	5	1	.060	35642 35732
1	1-1/4	5	1	.090	35643 35733
1	1-1/4	5	1	.120	35644 35734
1	1-1/4	5	1	.190	35645 35735
1	1-1/4	5	1	.250	35646 35736
1	2	4-1/2	1	—	34725 34752
1	2	4-1/2	1	.030	34789 34811
1	2	4-1/2	1	.060	34790 34812
1	2	4-1/2	1	.090	34791 34813
1	2	4-1/2	1	.120	34816 34818
1	2	5	1	.190	35647 35737
1	2	5	1	.250	35648 35738
1	2-5/8	6	1	—	34726 34753
1	3-1/4	6	1	—	34727 34754
1	3-1/4	6	1	.030	35649 35739
1	3-1/4	6	1	.060	35650 35740
1	3-1/4	6	1	.090	35651 35741
1	3-1/4	6	1	.120	35652 35742
1	3-1/4	6	1	.190	35653 35743
1	3-1/4	6	1	.250	35654 35744
1	4-1/8	7	1	—	34835 34870

## FRACTIONAL S-Carb®



**43 •  
43CR**

FRACTIONAL SERIES
KYOCERA Solid Tools

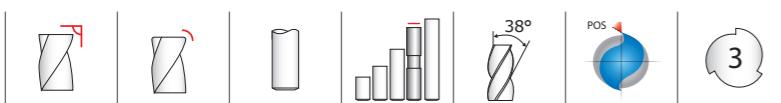
CONTINUED

#### KYOCERA Solid Tools

#### SGS Solid Tools

#### SGS Micro Tools

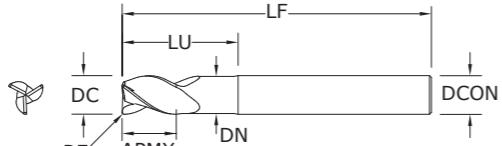
## FRACTIONAL S-Carb®



### 43L • 43LC

FRACTIONAL SERIES

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Necked design with blended diameter transitions provide clearance to reach
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)



#### TOLERANCES (inch)

##### 1/8-3/16 DIAMETER

**DC** = +0.0000/-0.00032  
**DCON** = h<sub>6</sub>  
**RE** = +0.0000/-0.0020

##### 1/4-3/8 DIAMETER

**DC** = +0.0000/-0.00035  
**DCON** = h<sub>6</sub>  
**RE** = +0.0000/-0.0020

##### 1/2-5/8 DIAMETER

**DC** = +0.0000/-0.00043  
**DCON** = h<sub>6</sub>  
**RE** = +0.0000/-0.0020

##### 3/4-1 DIAMETER

**DC** = +0.0000/-0.00051  
**DCON** = h<sub>6</sub>  
**RE** = +0.0000/-0.0020

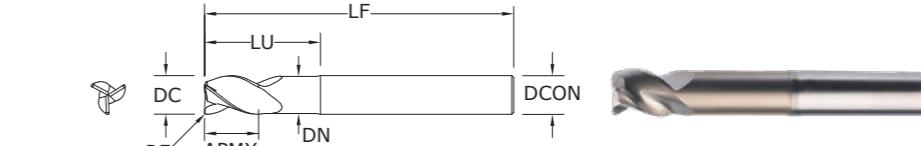
#### NON-FERROUS

#### PLASTICS/COMPOSITES

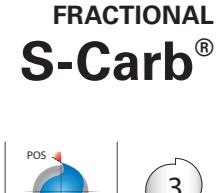
For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

inch								EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	UNCOATED Ti-NAMITE-B (TiB <sub>2</sub> )	EDP NO.	
1/8	5/32	3	1/8	1/2	.105	—	32700	32725	
1/8	5/32	3	1/8	1/2	.105	.010	32751	32815	
1/8	5/32	3	1/8	3/4	.105	—	32691	34888	
3/16	7/32	3	3/16	1/2	.105	—	32701	32726	
3/16	7/32	3	3/16	1/2	.167	.010	32752	32816	
3/16	7/32	3	3/16	3/4	.167	—	32692	34889	
1/4	3/8	2-1/2	1/4	3/4	.230	.015	35787	36235	
1/4	3/8	2-1/2	1/4	3/4	.230	.060	35788	36236	
1/4	3/8	4	1/4	3/4	.230	—	32702	32727	
1/4	3/8	4	1/4	3/4	.230	.010	32753	32817	
1/4	3/8	4	1/4	3/4	.230	.030	32754	32818	
1/4	3/8	4	1/4	1-1/2	.230	—	32703	32728	
1/4	3/8	4	1/4	1-1/2	.230	.010	32755	32819	
1/4	3/8	4	1/4	1-1/2	.230	.030	32756	32820	
1/4	3/8	4	1/4	2-1/8	.230	—	32704	32729	
1/4	3/8	4	1/4	2-1/8	.230	.010	32757	32821	
1/4	3/8	4	1/4	2-1/8	.230	.030	32758	32822	
5/16	7/16	4	5/16	1-1/8	.292	—	32705	32730	
5/16	7/16	4	5/16	1-1/8	.292	.030	32759	32823	
5/16	7/16	4	5/16	2-1/8	.292	—	32706	32731	
5/16	7/16	4	5/16	2-1/8	.292	.030	32760	32824	
3/8	1/2	3	3/8	1-1/8	.355	.015	35791	36239	
3/8	1/2	3	3/8	1-1/8	.355	.090	35792	36240	
3/8	1/2	4	3/8	1-1/8	.355	—	32707	32732	
3/8	1/2	4	3/8	1-1/8	.355	.030	32762	32826	
3/8	1/2	4	3/8	1-1/8	.355	.060	32763	32827	
3/8	1/2	4	3/8	2-1/8	.355	—	32708	32733	
3/8	1/2	4	3/8	2-1/8	.355	.030	32764	32828	
3/8	1/2	4	3/8	2-1/8	.355	.060	32765	32829	
1/2	5/8	3	1/2	1-3/8	.480	.015	35795	36243	
1/2	5/8	4	1/2	1-3/8	.480	—	32709	32734	
1/2	5/8	4	1/2	1-3/8	.480	.030	32767	32831	
1/2	5/8	4	1/2	1-3/8	.480	.060	32768	32832	
1/2	5/8	4	1/2	1-3/8	.480	.090	32769	32833	
1/2	5/8	4	1/2	1-3/8	.480	.120	32770	32834	
1/2	5/8	4	1/2	2-1/4	.480	.015	35796	36244	

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## FRACTIONAL S-Carb®



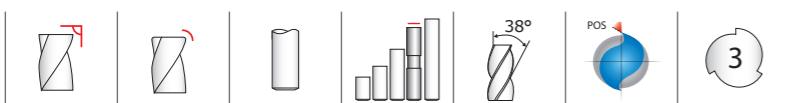
### 43L • 43LC

FRACTIONAL SERIES

CONTINUED

inch								EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	UNCOATED Ti-NAMITE-B (TiB <sub>2</sub> )	EDP NO.	
1/2	5/8	6	1/2	2-1/8	.480	—	32710	32735	
1/2	5/8	6	1/2	2-1/8	.480	.030	32771	32835	
1/2	5/8	6	1/2	2-1/8	.480	.060	32772	32836	
1/2	5/8	6	1/2	2-1/8	.480	.090	32773	32837	
1/2	5/8	6	1/2	2-1/8	.480	.120	32774	32838	
1/2	5/8	6	1/2	3-3/8	.480	—	32711	32736	
1/2	5/8	6	1/2	3-3/8	.480	.030	32775	32839	
1/2	5/8	6	1/2	3-3/8	.480	.060	32776	32840	
1/2	5/8	6	1/2	3-3/8	.480	.090	32777	32841	
1/2	5/8	6	1/2	3-3/8	.480	.120	32778	32842	
1/2	5/8	6	1/2	4-1/4	.480	—	32697	34894	
5/8	3/4	4	5/8	1-3/4	.605	—	32712	32737	
5/8	3/4	4	5/8	1-3/4	.605	.030	32779	32843	
5/8	3/4	4	5/8	1-3/4	.605	.060	32780	32844	
5/8	3/4	4	5/8	1-3/4	.605	.090	32781	32845	
5/8	3/4	4	5/8	1-3/4	.605	.120	32782	32846	
5/8	3/4	4	5/8	2-3/8	.605	—	32713	32738	
5/8	3/4	4	5/8	2-3/8	.605	.030	32783	32847	
5/8	3/4	4	5/8	2-3/8	.605	.060	32784	32848	
5/8	3/4	4	5/8	2-3/8	.605	.090	32785	32849	
5/8	3/4	4	5/8	2-3/8	.605	.120	32786	32850	
5/8	3/4	6	5/8	3-3/8	.605	—	32714	32739	
5/8	3/4	6	5/8	3-3/8	.605	.030	32787	32851	
5/8	3/4	6	5/8	3-3/8	.605	.060	32788	32852	
5/8	3/4	6	5/8	3-3/8	.605	.090	32785	32849	
5/8	3/4	6	5/8</						

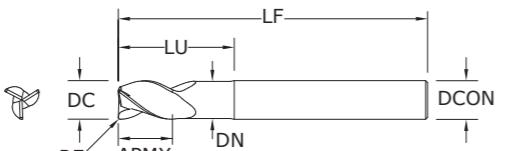
## FRACTIONAL S-Carb®



### 43L • 43LC

FRACTIONAL SERIES

CONTINUED



inch								EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	UNCOATED TI-NAMITE-B (TiB <sub>2</sub> )		
3/4	1	6	3/4	2-3/8	.730	.060	32796	32860	
3/4	1	6	3/4	2-3/8	.730	.090	32797	32861	
3/4	1	6	3/4	2-3/8	.730	.120	32798	32862	
3/4	1	6	3/4	3-3/8	.730	—	32717	32742	
3/4	1	6	3/4	3-3/8	.730	.030	32799	32863	
3/4	1	6	3/4	3-3/8	.730	.060	32800	32864	
3/4	1	6	3/4	3-3/8	.730	.090	32801	32865	
3/4	1	6	3/4	3-3/8	.730	.120	32802	32866	
3/4	1	6	3/4	4-3/8	.730	—	32699	34896	
1	1-1/4	5	1	2-5/8	.980	.190	35809	36257	
1	1-1/4	5	1	2-5/8	.980	.250	35810	36258	
1	1-1/4	6	1	2-3/8	.980	—	32718	32743	
1	1-1/4	6	1	2-3/8	.980	.030	32803	32867	
1	1-1/4	6	1	2-3/8	.980	.060	32804	32868	
1	1-1/4	6	1	2-3/8	.980	.090	32805	32869	
1	1-1/4	6	1	2-3/8	.980	.120	32806	32870	
1	1-1/4	6	1	3-3/8	.980	—	32719	32744	
1	1-1/4	6	1	3-3/8	.980	.030	32807	32871	
1	1-1/4	6	1	3-3/8	.980	.060	32808	32872	
1	1-1/4	6	1	3-3/8	.980	.090	32809	32873	
1	1-1/4	6	1	3-3/8	.980	.120	32810	32874	
1	1-1/4	6	1	3-3/8	.980	.190	35811	36259	
1	1-1/4	6	1	3-3/8	.980	.250	35812	36260	
1	1-1/4	7	1	4-3/8	.980	—	32720	32745	

#### TOLERANCES (inch)

##### 1/8-3/16 DIAMETER

DC = +0.0000/-0.00032  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

##### 1/4-3/8 DIAMETER

DC = +0.0000/-0.00035  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

##### 1/2-5/8 DIAMETER

DC = +0.0000/-0.00043  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

##### 3/4-1 DIAMETER

DC = +0.0000/-0.00051  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

##### 3/4-1 DIAMETER

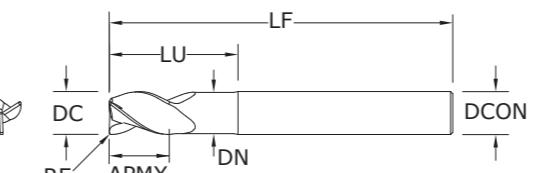
DC = +0.0000/-0.00051  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

##### NON-FERROUS

##### PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)



### 43EC

FRACTIONAL SERIES

CONTINUED

#### TOLERANCES (inch)

##### 1/4-3/8 DIAMETER

DC = +0.0000/-0.00035  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

##### 1/2-5/8 DIAMETER

DC = +0.0000/-0.00043  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

##### 1/2-5/8 DIAMETER

DC = +0.0000/-0.00051  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

##### 1/2-5/8 DIAMETER

DC = +0.0000/-0.00051  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

##### NON-FERROUS

##### PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

inch								EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	UNCOATED TI-NAMITE-B (TiB <sub>2</sub> )		
1/4	3/8	3	1/4	1-1/8	.230	.015	35789	36237	
1/4	3/8	3	1/4	1-1/8	.230	.060	35790	36238	
3/8	1/2	4	3/8	2-1/8	.355	.015	35793	36241	
3/8	1/2	4	3/8	2-1/8	.355	.090	35794	36242	
1/2	5/8	5	1/2	3-3/8	.480	.015	35797	36245	
1/2	5/8	6	1/2	4-1/4	.480	.015	35798	36246	
1/2	5/8	6	1/2	4-1/4	.480	.030	35799	36247	
1/2	5/8	6	1/2	4-1/4	.480	.060	35800	36248	
1/2	5/8	6	1/2	4-1/4	.480	.090	35801	36249	
1/2	5/8	6	1/2	4-1/4	.480	.120	35802	36250	
3/4	1	6	3/4	3-3/8	.730	.190	35805	36253	
3/4	1	6	3/4	3-3/8	.730	.250	35806	36254	
1	1-1/4	7	1	4-3/8	.980	.030	35813	36261	
1	1-1/4	7	1	4-3/8	.980	.060	35814	36262	
1	1-1/4	7	1	4-3/8	.980	.090	35815	36263	
1	1-1/4	7	1	4-3/8	.980	.120	35816	36264	
1	1-1/4	7	1	4-3/8	.980	.190	35817	36265	
1	1-1/4	7	1	4-3/8	.980	.250	35818	36266	

• Circular land allows for increased control at various speed and feed rates and reduces chatter

• Symmetrical end gashing for excellent balance at high speeds and aggressive plowing capability

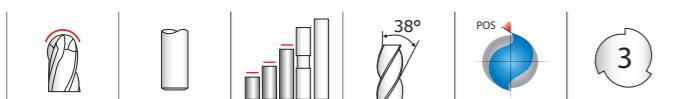
• Open fluting for deep slotting and profiling

• Necked design with blended diameter transitions provide clearance to reach

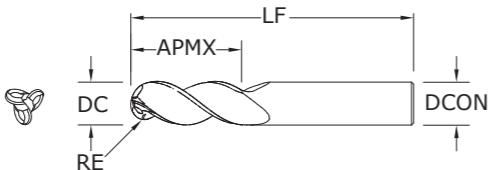
• Enhanced corner geometry with tight tolerance corner radii

• Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

## FRACTIONAL S-Carb®



### 43B FRACTIONAL SERIES



- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Open fluting for deep slotting and profiling
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

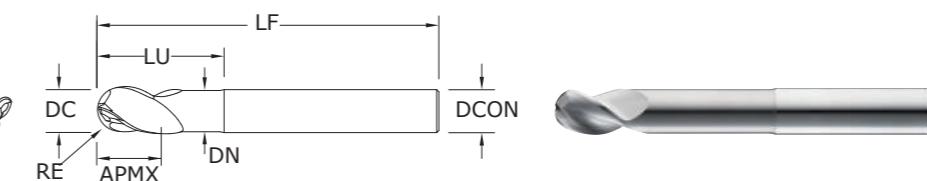
inch				EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	Ti-NAMITE-B (TiB <sub>2</sub> )
1/4	3/8	2	1/4	34916	34972
1/4	3/4	2-1/2	1/4	34917	34973
1/4	1	3	1/4	34918	34974
3/8	1/2	2	3/8	34919	34975
3/8	1	2-1/2	3/8	34920	34976
3/8	1-1/2	3-1/2	3/8	34921	34977
1/2	5/8	2-1/2	1/2	34922	34978
1/2	1	3	1/2	34923	34979
1/2	1-1/4	3	1/2	34924	34980
1/2	1-5/8	4	1/2	34925	34981
1/2	2	4	1/2	34926	34982
5/8	3/4	3	5/8	34927	34983
5/8	1-5/8	4	5/8	34928	34984
3/4	1	3	3/4	34929	34985
3/4	1-5/8	4	3/4	34930	34986
3/4	2-1/4	5	3/4	34931	34987
1	1-1/4	4	1	34932	34988
1	2	5	1	34933	34989
1	3-1/4	6	1	34934	34990

RE = 1/2 Cutting Diameter (DC)

## FRACTIONAL S-Carb®



### 43LB FRACTIONAL SERIES



- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Open fluting for deep slotting and profiling
- Necked design with blended diameter transitions provide clearance to reach
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

#### TOLERANCES (inch)

1/4-3/8 DIAMETER
DC = +0.0000/-0.00035
DCON = h <sub>6</sub>
RE = +0.0005/-0.0005
1/2-5/8 DIAMETER
DC = +0.0000/-0.00043
DCON = h <sub>6</sub>
RE = +0.0005/-0.0005
3/4-1 DIAMETER
DC = +0.0000/-0.00051
DCON = h <sub>6</sub>
RE = +0.0005/-0.0005

#### NON-FERROUS

#### PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

#### TOLERANCES (inch)

1/4-3/8 DIAMETER
DC = +0.0000/-0.00035
DCON = h <sub>6</sub>
RE = +0.0005/-0.0005
1/2-5/8 DIAMETER
DC = +0.0000/-0.00043
DCON = h <sub>6</sub>
RE = +0.0005/-0.0005
3/4-1 DIAMETER
DC = +0.0000/-0.00051
DCON = h <sub>6</sub>
RE = +0.0005/-0.0005

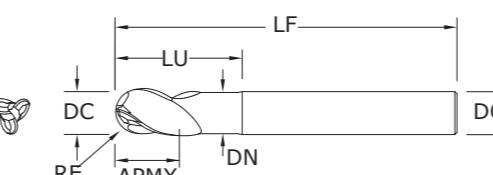
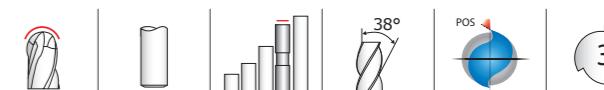
#### NON-FERROUS

#### PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

inch						EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	UNCOATED	Ti-NAMITE-B (TiB <sub>2</sub> )
1/4	3/8	2-1/2	1/4	3/4	.230	34941	35005
3/8	1/2	3	3/8	1-1/8	.355	34943	35007
1/2	5/8	3	1/2	1-3/8	.480	34945	35009
1/2	5/8	4	1/2	2-1/4	.480	34946	35010
5/8	3/4	4	5/8	1-5/8	.605	34949	35013
3/4	1	4	3/4	2	.730	34951	35015
1	1-1/4	5	1	2-5/8	.980	34954	35018
1	1-1/4	6	1	3-3/8	.980	34955	35019

RE = 1/2 Cutting Diameter (DC)



#### TOLERANCES (inch)

1/4-3/8 DIAMETER
DC = -0.0000/-0.00035
DCON = h <sub>6</sub>
RE = +0.0005/-0.0005
1/2-5/8 DIAMETER
DC = -0.0000/-0.00043
DCON = h <sub>6</sub>
RE = +0.0005/-0.0005
3/4-1 DIAMETER
DC = -0.0000/-0.00051
DCON = h <sub>6</sub>
RE = +0.0005/-0.0005

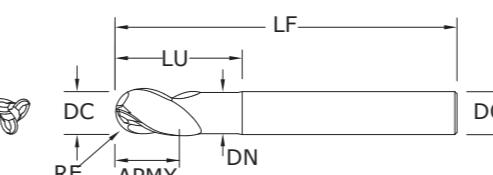
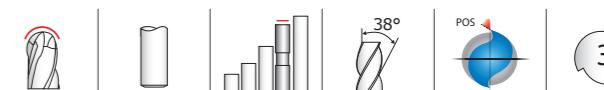
#### NON-FERROUS

#### PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

inch						EDP NO.	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	UNCOATED	Ti-NAMITE-B (TiB <sub>2</sub> )
1/4	3/8	3	1/4	1-1/8	.230	34942	35006
3/8	1/2	4	3/8	2-1/8	.355	34944	35008
1/2	5/8	5	1/2	3-3/8	.480	34947	35011
1/2	5/8	6	1/2	4-1/4	.480	34948	35012
5/8	3/4	6	5/8	3-3/8	.605	34950	35014
3/4	1	6	3/4	3-3/8	.730	34952	35016
1	1-1/4	7	1	4-3/8	.980	34956	35020

RE = 1/2 Cutting Diameter (DC)

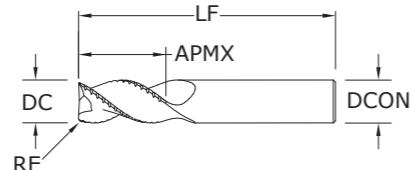


- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Open fluting for deep slotting and profiling
- Necked design with blended diameter transitions provide clearance to reach
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

## FRACTIONAL S-Carb®



### 43CB FRACTIONAL SERIES



- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Chip breakers reduce machine loads up to 15% for increased roughing feed rate capability
- Open fluting for deep slotting and profiling
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	inch			UNCOATED	Ti-NAMITE-B (TiB <sub>2</sub> )	EDP NO.
		OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE			
1/4	3/8	2-1/2	1/4	.020	33390	33450	
1/4	1/2	2-1/2	1/4	.020	33391	33451	
1/4	3/4	2-1/2	1/4	.020	33392	33452	
1/4	1	3	1/4	.020	33393	33453	
1/4	1-1/4	3-1/2	1/4	.020	33394	33454	
1/4	1-3/4	4	1/4	.020	33395	33455	
5/16	7/16	2-1/2	5/16	.020	33396	33456	
5/16	11/16	2-1/2	5/16	.020	33397	33457	
5/16	1	3	5/16	.020	33398	33458	
5/16	2-1/8	4	5/16	.020	33400	33460	
3/8	1/2	3	3/8	.020	33401	33461	
3/8	1	2-1/2	3/8	.020	34300	34305	
3/8	1-1/4	3-1/2	3/8	.020	33402	33462	
3/8	1-1/2	4	3/8	.020	33403	33463	
3/8	2	4	3/8	.020	33404	33464	
1/2	5/8	3	1/2	.030	33406	33466	
1/2	1	3	1/2	.030	33407	33467	
1/2	1-1/4	3-1/4	1/2	.030	34301	34306	
1/2	1-5/8	4	1/2	.030	33408	33468	
1/2	2	4	1/2	.030	33409	33469	
1/2	2-1/2	5	1/2	.030	33410	33470	
1/2	3-1/8	6	1/2	.030	33411	33471	
5/8	3/4	3-1/2	5/8	.030	33412	33472	
5/8	1-5/8	3-3/4	5/8	.030	34302	34307	
5/8	2-1/8	4	5/8	.030	33413	33473	
5/8	3-1/4	6	5/8	.030	33415	33475	
5/8	3-3/4	6	5/8	.030	33416	33476	
3/4	1	4	3/4	.030	33417	33477	
3/4	1-5/8	4	3/4	.030	34303	34308	
3/4	2-1/4	4	3/4	.030	33418	33478	
3/4	3-1/4	6	3/4	.030	33419	33479	
3/4	4	6	3/4	.030	33420	33480	
1	1-1/4	5	1	.030	33421	33481	
1	2	4-1/2	1	.030	34304	34309	
1	2-5/8	6	1	.030	33422	33482	
1	3-1/4	6	1	.030	33423	33483	
1	4-1/8	7	1	.030	33424	33484	

#### TOLERANCES (inch)

##### 1/4-3/8 DIAMETER

DC = +0.0000/-0.00035  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

##### 1/2-5/8 DIAMETER

DC = +0.0000/-0.00043  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

##### 3/4-1 DIAMETER

DC = +0.0000/-0.00051  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

#### NON-FERROUS

#### PLASTICS/COMPOSITES

#### TOLERANCES (inch)

##### 1/4-3/8 DIAMETER

DC = +0.0000/-0.00035  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

##### 1/2-5/8 DIAMETER

DC = +0.0000/-0.00043  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

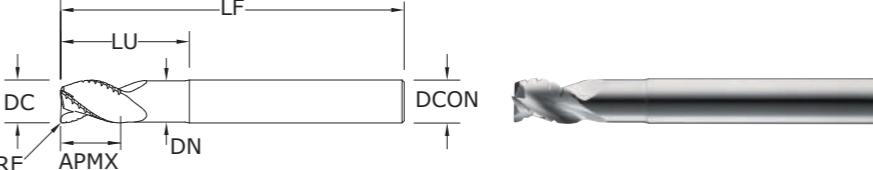
##### 3/4-1 DIAMETER

DC = +0.0000/-0.00051  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

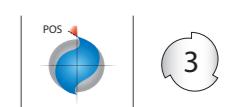
#### NON-FERROUS

#### PLASTICS/COMPOSITES

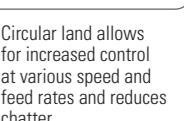
For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)



## FRACTIONAL S-Carb®



### 43LCB FRACTIONAL SERIES



- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Chip breakers reduce machine loads up to 15% for increased roughing feed rate capability
- Open fluting for deep slotting and profiling
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

- Neaked design with blended diameter transitions provide clearance to reach
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Chip breakers reduce machine loads up to 15% for increased roughing feed rate capability
- Open fluting for deep slotting and profiling
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

- Neaked design with blended diameter transitions provide clearance to reach
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

#### SGS Solid Tools



#### SGS Micro Tools



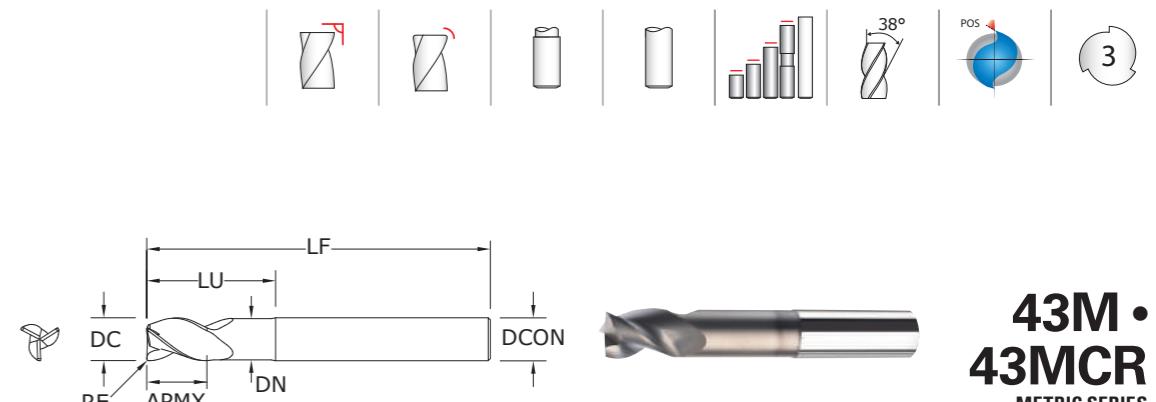
# FRACTIONAL **S-Carb®**



METRIC  
**S-Carb®**

**Series**  
43CR, 43CB, 43LC,  
43, 43L, 43LCB, 43B,  
43LB, 43ELB, 43EC  
**Fractional**

								DC • in						
Material Group	Material Type	Hardness	Ae x DC	Ap x DC	Vc (sfm)		1/8	1/4	3/8	1/2	5/8	3/4	1	
ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075	≤ 150 Bhn or ≤ 7 HRc		Slot		1600	RPM	48896	24448	16299	12224	9779	8149	6112	
				1	≤ 1	(1280-1920)	Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070	0.0085
			Profile		2000	RPM	61120	30560	20373	15280	12224	10187	7640	
	≤ 125 Bhn or ≤ 77 HRb			≤ 0.5	≤ 1.5	(1600-2400)	Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070	0.0085
			Profile		2000	RPM	61120	30560	20373	15280	12224	10187	7640	
				≤ 0.5	≤ 1.5	(1600-2400)	Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070	0.0085
			HSM		3300	RPM	100848	50424	33616	25212	20170	16808	12606	
				≤ 0.05	≤ 2	(2640-3960)	Fz	0.0021	0.0055	0.0105	0.0140	0.0150	0.0165	0.0195
			HSM		3300	RPM	100848	50424	33616	25212	20170	16808	12606	
ALUMINUM DIE CAST ALLOYS (HIGH SILICONE) A-390, A-392, B- 390	≤ 125 Bhn or ≤ 77 HRb		Slot		600	RPM	18336	9168	6112	4584	3667	3056	2292	
				1	≤ 1	(480-720)	Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070	0.0085
			Profile		750	RPM	22920	11460	7640	5730	4584	3820	2865	
	≤ 125 Bhn or ≤ 77 HRb			≤ 0.5	≤ 1.5	(600-900)	Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070	0.0085
			Profile		750	RPM	22920	11460	7640	5730	4584	3820	2865	
				≤ 0.5	≤ 1.5	(600-900)	Feed (ipm)	62	86	103	103	89	80	73
			HSM		1240	RPM	37894	18947	12631	9474	7579	6316	4737	
				≤ 0.05	≤ 2	(992-1488)	Fz	0.0021	0.0055	0.0105	0.0140	0.0150	0.0165	0.0195
			HSM		1240	RPM	37894	18947	12631	9474	7579	6316	4737	
COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass	≤ 140 Bhn or ≤ 3 HRc		Slot		865	RPM	26434	13217	8811	6609	5287	4406	3304	
				1	≤ 1	(692-1038)	Fz	0.0008	0.0020	0.0040	0.0050	0.0055	0.0060	0.0070
			Profile		1080	RPM	33005	16502	11002	8251	6601	5501	4126	
	≤ 140 Bhn or ≤ 3 HRc			≤ 0.5	≤ 1.5	(864-1296)	Fz	0.0008	0.0020	0.0040	0.0050	0.0055	0.0060	0.0070
			Profile		1080	RPM	33005	16502	11002	8251	6601	5501	4126	
				≤ 0.5	≤ 1.5	(864-1296)	Feed (ipm)	79	99	132	124	109	99	87
			HSM		1780	RPM	54397	27198	18132	13599	10879	9066	6800	
				≤ 0.05	≤ 2	(1424-2136)	Fz	0.0017	0.0045	0.0085	0.0115	0.0125	0.0140	0.0160
			HSM		1780	RPM	54397	27198	18132	13599	10879	9066	6800	
COPPER ALLOYS Beryllium Copper C110, Malleable Bronze, Tin Bronze	≤ 200 Bhn or ≤ 23 HRc		Slot		345	RPM	10543	5272	3514	2636	2109	1757	1318	
				1	≤ 1	(276-414)	Fz	0.0008	0.0020	0.0040	0.0050	0.0055	0.0060	0.0070
			Profile		430	RPM	13141	6570	4380	3285	2628	2190	1643	
	≤ 200 Bhn or ≤ 23 HRc			≤ 0.5	≤ 1.5	(344-516)	Fz	0.0008	0.0020	0.0040	0.0050	0.0055	0.0060	0.0070
			Profile		430	RPM	13141	6570	4380	3285	2628	2190	1643	
				≤ 0.5	≤ 1.5	(344-516)	Feed (ipm)	32	39	53	49	43	39	34
			HSM		710	RPM	21698	10849	7233	5424	4340	3616	2712	
				≤ 0.05	≤ 2	(568-852)	Fz	0.0017	0.0045	0.0085	0.0115	0.0125	0.0140	0.0160
			HSM		710	RPM	21698	10849	7233	5424	4340	3616	2712	
PLASTICS ABS, Polycarbonate, PVC, Polypropylene	≤ 150 Bhn or ≤ 7 HRc		Slot		1600	RPM	48896	24448	16299	12224	9779	8149	6112	
				1	≤ 1	(1280-1920)	Fz	0.0015	0.0040	0.0075	0.0100	0.0110	0.0120	0.0140
			Profile		2000	RPM	61120	30560	20373	15280	12224	10187	7640	
	≤ 150 Bhn or ≤ 7 HRc			≤ 0.5	≤ 1.5	(1600-2400)	Fz	0.0015	0.0040	0.0075	0.0100	0.0110	0.0120	0.0140
			Profile		2000	RPM	61120	30560	20373	15280	12224	10187	7640	
				≤ 0.5	≤ 1.5	(1600-2400)	Feed (ipm)	275	367	458	458	403	367	321
			HSM		3300	RPM	100848	50424	33616	25212	20170	16808	12606	
				≤ 0.05	≤ 2	(2640-3960)	Fz	0.0034	0.0090	0.0170	0.0230	0.0250	0.0275	0.0320
			HSM		3300	RPM	100848	50424	33616	25212	20170	16808	12606	



**43M •  
43MCR  
METRIC SERIES**

## **TOLERANCES (mm)**

CUTTING TOOLS (mm.)									EDM TOOL	
6 DIAMETER		CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	REACH LU	NECK DIAMETER DN	POLISHED FLUTE	UNCOATED Ti-NAMITE-B (TiB <sub>2</sub> )
DC	= +0,000/-0,008	3,0	8,0	52,0	6,0	—	—	—	•	— 44890
DCON = h <sub>6</sub>		4,0	11,0	55,0	6,0	—	—	—	•	— 44891
RE	= +0,000/-0,050	5,0	13,0	57,0	6,0	—	—	—	•	— 44892
>6-10 DIAMETER		6,0	13,0	57,0	6,0	—	—	—		44701 44715
DC	= +0,000/-0,009	6,0	13,0	57,0	6,0	1,5	—	—		— 44732
DCON = h <sub>6</sub>		6,0	13,0	57,0	6,0	0,5	—	—	•	— 44902
RE	= +0,000/-0,050	6,0	13,0	57,0	6,0	1,0	—	—	•	— 44894
>10-18 DIAMETER		6,0	13,0	72,0	6,0	—	—	—		44702 44716
DC	= +0,000/-0,011	6,0	13,0	72,0	6,0	0,8	—	—	•	— 44842
DCON = h <sub>6</sub>		6,0	13,0	72,0	6,0	1,2	—	—	•	— 44843
RE	= +0,000/-0,050	6,0	24,0	75,0	6,0	—	—	—	•	— 44893
>18-20 DIAMETER		6,0	24,0	75,0	6,0	0,5	—	—	•	— 44844
DC	= +0,000/-0,013	6,0	24,0	75,0	6,0	1,0	—	—	•	— 44845
DCON = h <sub>6</sub>		8,0	19,0	63,0	8,0	—	—	—		44703 44717
RE	= +0,000/-0,050	8,0	19,0	63,0	8,0	0,3	—	—	•	— 44846
NON-FERROUS		8,0	19,0	63,0	8,0	0,5	—	—	•	— 44847
PLASTICS/COMPOSITES		8,0	19,0	63,0	8,0	1,0	—	—	•	— 44848
For patent information visit <a href="http://www.ksptpatents.com">www.ksptpatents.com</a>		8,0	19,0	63,0	8,0	1,5	—	—	•	— 44849
		8,0	32,0	75,0	8,0	—	—	—	•	— 44895
		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	—	—	—		44705 44719
		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	—	—	—	•	— 44896
		10,0	40,0	100,0	10,0	0,5	—	—	•	— 44858

For patent  
information visit  
[www.konnectants.com](http://www.konnectants.com)

- Circular land allows for increased control at various speed and feed rates and reduces chatter

Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability

Open fluting for deep slotting and profiling

Polished flutes maximize chip evacuation and provides enhanced finish

Enhanced corner geometry with tight tolerance corner radii

Recommended for materials ≤ 150 Bhn (< 7 HRC)

*continued on next page*

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

$$\text{rpm} = V_c \times 3.82 / DC$$

$$ipm = Fz \times 3 \times rpm$$

reduce speed and feed for materials harder than listed

reduce cut depth and feed by 50% for long flute and long reach tools

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

refer to the SGS Tool Wizard® for complete technical information.

METRIC  
**S-Carb®**



**43M •  
43MCR**  
METRIC SERIES

CONTINUED

mm									EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	REACH LU	NECK DIAMETER DN	POLISHED FLUTE	UNCOATED Ti-NAMITE-B (TiB <sub>2</sub> )	
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	26,0	83,0	12,0	—	—	—		44708 44722	
12,0	26,0	83,0	12,0	1,5	—	—		44814 44733	
12,0	26,0	83,0	12,0	2,0	—	—		44815 44826	
12,0	26,0	83,0	12,0	2,5	—	—		44816 44827	
12,0	26,0	83,0	12,0	3,0	—	—		44817 44734	
12,0	48,0	100,0	12,0	—	—	—	•	—	44897
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	—	—	—	•	—	44898
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
14,0	18,0	125,0	14,0	—	45,0	13,49	•	—	44899
16,0	32,0	92,0	16,0	—	—	—		44711 44725	
16,0	32,0	92,0	16,0	1,5	—	—		44818 44735	
16,0	32,0	92,0	16,0	2,0	—	—		44819 44828	
16,0	32,0	92,0	16,0	2,5	—	—		44820 44829	
16,0	32,0	92,0	16,0	3,0	—	—		44821 44736	
16,0	32,0	92,0	16,0	4,0	—	—	•	—	44871
16,0	64,0	125,0	16,0	—	—	—	•	—	44900
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

continued on next page

TOLERANCES (mm)

**6 DIAMETER**

DC = +0,000/-0,008

DCON = h<sub>6</sub>

RE = +0,000/-0,050

**>6-10 DIAMETER**

DC = +0,000/-0,009

DCON = h<sub>6</sub>

RE = +0,000/-0,050

**>10-18 DIAMETER**

DC = +0,000/-0,011

DCON = h<sub>6</sub>

RE = +0,000/-0,050

**>18-20 DIAMETER**

DC = +0,000/-0,013

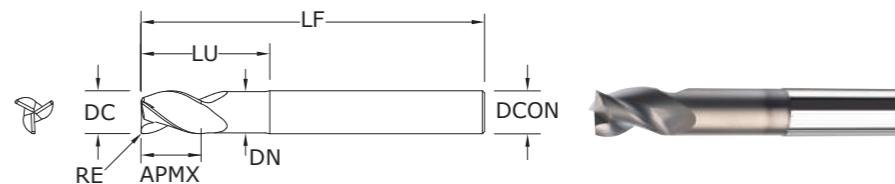
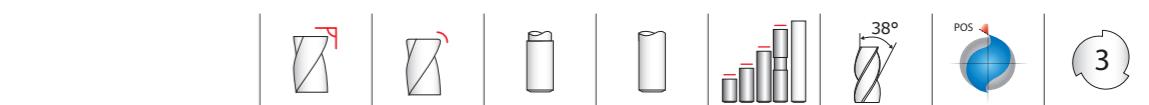
DCON = h<sub>6</sub>

RE = +0,000/-0,050

**NON-FERROUS**

**PLASTICS/COMPOSITES**

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)



**43M •  
43MCR**  
METRIC SERIES

CONTINUED

mm									EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	REACH LU	NECK DIAMETER DN	POLISHED FLUTE	UNCOATED Ti-NAMITE-B (TiB <sub>2</sub> )	
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	—	—	—		44714 44728	
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	
20,0	38,0	104,0	20,0	4,0	—	—	•	—	44879
20,0	80,0	150,0	20,0	—	—	—	•	—	44901
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
25,0	50,0	125,0	25,0	—	—	—		—	44731

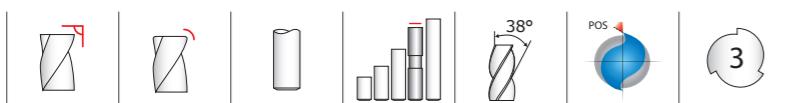
METRIC

**S-Carb®**

SGS Solid Tools

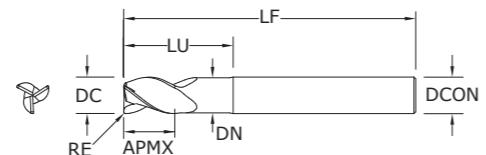
SGS Micro Tools

METRIC  
**S-Carb®**

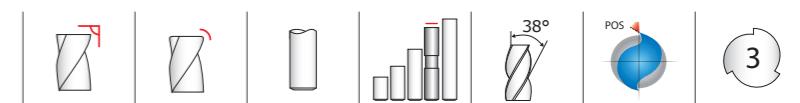


**43ML •  
43MLC**  
METRIC SERIES

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Polished flutes maximize chip evacuation and provides enhanced finish
- Necked design with blended diameter transitions provide clearance to reach
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)



METRIC  
**S-Carb®**



**43ML •  
43MLC**  
METRIC SERIES

KYOCERA Solid Tools

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

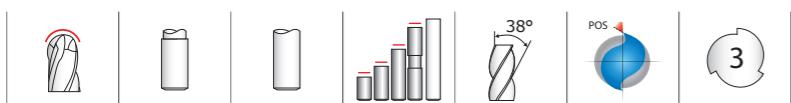
S152

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	POLISHED FLUTE	EDP NO.		TOLERANCES (mm)	
								UNCOATED	TI-NAMITE-B (TiB <sub>2</sub> )	6 DIAMETER	DC = +0,000/-0,008 DCON = h <sub>6</sub>
6,0	10,0	63,0	6,0	20,0	5,49	0,5	—	44769	44789	>6–10 DIAMETER	DC = +0,000/-0,009 DCON = h <sub>6</sub> RE = +0,000/-0,050
6,0	10,0	63,0	6,0	20,0	5,49	1,0	—	44770	44790	>10–18 DIAMETER	DC = +0,000/-0,011 DCON = h <sub>6</sub> RE = +0,000/-0,050
6,0	10,0	75,0	6,0	20,0	5,49	—	—	42706	—	>18–20 DIAMETER	DC = +0,000/-0,013 DCON = h <sub>6</sub> RE = +0,000/-0,050
6,0	13,0	72,0	6,0	30,0	5,49	0,5	—	44771	44791	NON-FERROUS	—
6,0	13,0	72,0	6,0	30,0	5,49	1,0	—	44772	44792	PLASTICS/COMPOSITES	—
8,0	12,0	75,0	8,0	25,0	7,49	—	—	44792	—	For patent information visit <a href="http://www.ksptpatents.com">www.ksptpatents.com</a>	—
8,0	12,0	75,0	8,0	25,0	7,49	—	—	42707	—	—	—
8,0	12,0	75,0	8,0	25,0	7,49	0,3	—	44773	44793	—	—
8,0	12,0	75,0	8,0	25,0	7,49	0,5	—	44774	44794	—	—
8,0	12,0	75,0	8,0	25,0	7,49	0,8	•	44950	—	—	—
8,0	12,0	75,0	8,0	25,0	7,49	1,0	—	44775	44795	—	—
8,0	12,0	75,0	8,0	25,0	7,49	1,2	•	44951	—	—	—
8,0	12,0	75,0	8,0	25,0	7,49	1,5	—	44776	44796	—	—
8,0	12,0	75,0	8,0	25,0	7,49	1,6	•	44952	—	—	—
10,0	14,0	100,0	10,0	35,0	9,48	—	—	42708	—	—	—
10,0	14,0	100,0	10,0	35,0	9,48	0,3	—	44777	44797	—	—
10,0	14,0	100,0	10,0	35,0	9,48	0,5	—	44778	44798	—	—
10,0	14,0	100,0	10,0	35,0	9,48	1,0	—	44779	44799	—	—
10,0	14,0	100,0	10,0	35,0	9,48	1,5	—	44780	44800	—	—
10,0	14,0	100,0	10,0	35,0	9,50	0,8	•	44953	—	—	—
10,0	14,0	100,0	10,0	35,0	9,50	1,2	•	44954	—	—	—
10,0	14,0	100,0	10,0	35,0	9,50	1,6	•	44955	—	—	—
10,0	14,0	100,0	10,0	35,0	9,50	2,4	•	44956	—	—	—
12,0	16,0	100,0	12,0	40,0	11,48	—	—	42709	—	—	—
12,0	16,0	100,0	12,0	40,0	11,48	0,5	—	44781	44801	—	—
12,0	16,0	100,0	12,0	40,0	11,48	0,8	•	44957	—	—	—
12,0	16,0	100,0	12,0	40,0	11,48	1,0	—	44782	44802	—	—
12,0	16,0	100,0	12,0	40,0	11,48	1,2	•	44958	—	—	—
12,0	16,0	100,0	12,0	40,0	11,48	1,5	—	44783	44803	—	—
12,0	16,0	100,0	12,0	40,0	11,48	1,6	•	44959	—	—	—
12,0	16,0	100,0	12,0	40,0	11,48	2,0	—	44784	44804	—	—
12,0	16,0	100,0	12,0	40,0	11,48	2,4	•	44960	—	—	—
12,0	16,0	100,0	12,0	40,0	11,48	2,5	—	44832	44839	—	—
12,0	16,0	100,0	12,0	40,0	11,48	3,0	—	44833	44738	—	—

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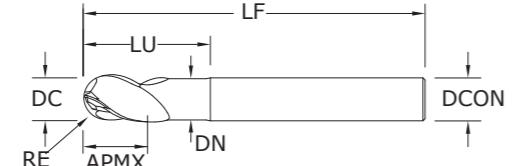
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	CORNER RADIUS RE	POLISHED FLUTE	EDP NO.		TOLERANCES (mm)	
								UNCOATED	TI-NAMITE-B (TiB <sub>2</sub> )	6 DIAMETER	DC = +0,000/-0,008 DCON = h <sub>6</sub>
12,0	16,0	100,0	12,0	40,0	11,48	4,0	—	44834	44741	>6–10 DIAMETER	DC = +0,000/-0,009 DCON = h <sub>6</sub>
14,0	18,0	125,0	14,0	45,0	13,49	1,0	•	—	44961	>10–18 DIAMETER	DC = +0,000/-0,011 DCON = h <sub>6</sub>
14,0	18,0	125,0	14,0	45,0	13,49	2,0	•	—	44962	>18–20 DIAMETER	DC = +0,000/-0,013 DCON = h <sub>6</sub>
14,0	18,0	125,0	14,0	45,0	13,49	3,0	•	—	44963	NON-FERROUS	—
14,0	18,0	125,0	14,0	45,0	13,49	4,0	•	—	44964	PLASTICS/COMPOSITES	—
16,0	20,0	125,0	16,0	50,0	15,47	—	—	—	42710	—	—
16,0	20,0	125,0	16,0	50,0	15,47	2,0	—	44785	44805	—	—
16,0	20,0	125,0	16,0	50,0	15,47	2,5	—	44835	44840	—	—
16,0	20,0	125,0	16,0	50,0	15,47	3,0	—	44836	44739	—	—
16,0	20,0	125,0	16,0	50,0	15,47	4,0	—	44786	44806	—	—
16,0	20,0	125,0	16,0	50,0	15,49	0,8	•	44965	—	—	—
16,0	20,0	125,0	16,0	50,0	15,49	1,2	•	44966	—	—	—
16,0	20,0	125,0	16,0	50,0	15,49	1,6	•	44967	—	—	—
16,0	20,0	125,0	16,0	50,0	15,49	2,4	•	44968	—	—	—
16,0	20,0	125,0	16,0	50,0	15,49	3,2	•	44969	—	—	—
20,0	25,0	150,0	20,0	65,0	19,46	—	—	—			

METRIC  
**S-Carb®**



**43MB**  
METRIC SERIES

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Open fluting for deep slotting and profiling
- Polished flutes maximize chip evacuation and provides enhanced finish
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)



TOLERANCES (mm)

**3 DIAMETER**

DC = +0,000/-0,006  
DCON = h<sub>6</sub>  
RE = +0,0127/-0,0127

**>3-6 DIAMETER**

DC = +0,000/-0,008  
DCON = h<sub>6</sub>  
RE = +0,0127/-0,0127

**>6-10 DIAMETER**

DC = +0,000/-0,009  
DCON = h<sub>6</sub>  
RE = +0,0127/-0,0127

**>10-18 DIAMETER**

DC = +0,000/-0,011  
DCON = h<sub>6</sub>  
RE = +0,0127/-0,0127

**>18-20 DIAMETER**

DC = +0,000/-0,013  
DCON = h<sub>6</sub>  
RE = +0,0127/-0,0127

**>10-18 DIAMETER**

DC = +0,000/-0,011  
DCON = h<sub>6</sub>  
RE = +0,0127/-0,0127

**>18-25 DIAMETER**

DC = +0,000/-0,013  
DCON = h<sub>6</sub>  
RE = +0,0127/-0,0127

TOLERANCES (mm)

**>6-10 DIAMETER**

DC = +0,000/-0,009  
DCON = h<sub>6</sub>  
RE = +0,0127/-0,0127

**>10-18 DIAMETER**

DC = +0,000/-0,011  
DCON = h<sub>6</sub>  
RE = +0,0127/-0,0127

**>18-20 DIAMETER**

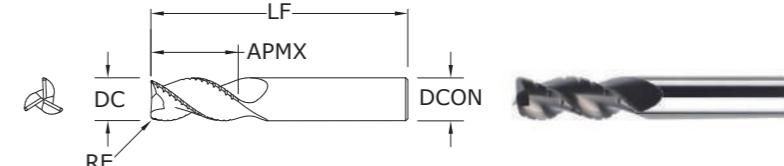
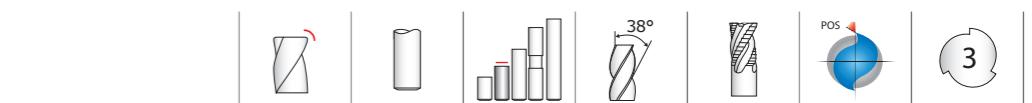
DC = +0,000/-0,013  
DCON = h<sub>6</sub>  
RE = +0,0127/-0,0127

**>10-18 DIAMETER**

DC = +0,000/-0,011  
DCON = h<sub>6</sub>  
RE = +0,0127/-0,0127

**>18-25 DIAMETER**

DC = +0,000/-0,013  
DCON = h<sub>6</sub>  
RE = +0,0127/-0,0127



CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	EDP NO.	
					UNCOATED	TI-NAMITE-B (TiB <sub>2</sub> )
6,0	19,0	63,0	6,0	0,5	44298	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

**43MBC**  
METRIC SERIES

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Chip breakers reduce machine loads up to 15% for increased roughing feed rate capability
- Open fluting for deep slotting and profiling

- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

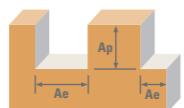
For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

RE = 1/2 Cutting Diameter (DC)

# METRIC S-Carb®

Series  
43M, 43MB, 43MCR,  
43ML, 43MLC,  
43MCB  
Metric



DC • mm

	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm								
					3	6	10	12	16	20	25		
ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075	$\leq 150$ Bhn or $\leq 7$ HRc	Slot 	1	$\leq 1$	490 (392-588)	RPM	52022	26011	15607	13005	9754	7803	6243
		Profile 	$\leq 0.5$	$\leq 1.5$	610 (488-732)	RPM	64762	32381	19429	16190	12143	9714	7771
		HSM 	$\leq 0.05$	$\leq 2$	1005 (804-1206)	RPM	106698	53349	32009	26674	20006	16005	12804
	$\leq 125$ Bhn or $\leq 77$ HRb	Slot 	1	$\leq 1$	185 (148-222)	RPM	19641	9820	5892	4910	3683	2946	2357
		Profile 	$\leq 0.5$	$\leq 1.5$	230 (184-276)	RPM	24418	12209	7326	6105	4578	3663	2930
		HSM 	$\leq 0.05$	$\leq 2$	380 (304-456)	RPM	40343	20172	12103	10086	7564	6052	4841
	$\leq 140$ Bhn or $\leq 3$ HRc	Slot 	1	$\leq 1$	265 (212-318)	RPM	28134	14067	8440	7034	5275	4220	3376
		Profile 	$\leq 0.5$	$\leq 1.5$	330 (264-396)	RPM	35035	17518	10511	8759	6569	5255	4204
		HSM 	$\leq 0.05$	$\leq 2$	545 (436-654)	RPM	57861	28930	17358	14465	10849	8679	6943
N COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass	$\leq 140$ Bhn or $\leq 3$ HRc	Slot 	1	$\leq 1$	105 (84-126)	RPM	11148	5574	3344	2787	2090	1672	1338
		Profile 	$\leq 0.5$	$\leq 1.5$	130 (104-156)	RPM	13802	6901	4141	3450	2588	2070	1656
		HSM 	$\leq 0.05$	$\leq 2$	215 (172-258)	RPM	22826	11413	6848	5706	4280	3424	2739
	$\leq 200$ Bhn or $\leq 23$ HRc	Slot 	1	$\leq 1$	490 (392-588)	RPM	52022	26011	15607	13005	9754	7803	6243
		Profile 	$\leq 0.5$	$\leq 1.5$	610 (488-732)	RPM	64762	32381	19429	16190	12143	9714	7771
		HSM 	$\leq 0.05$	$\leq 2$	1005 (804-1206)	RPM	106698	53349	32009	26674	20006	16005	12804
PLASTICS ABS, Polycarbonate, PVC, Polypropylene	$\leq 140$ Bhn or $\leq 3$ HRc	Slot 	1	$\leq 1$	490 (392-588)	RPM	52022	26011	15607	13005	9754	7803	6243
		Profile 	$\leq 0.5$	$\leq 1.5$	610 (488-732)	RPM	64762	32381	19429	16190	12143	9714	7771
		HSM 	$\leq 0.05$	$\leq 2$	1005 (804-1206)	RPM	106698	53349	32009	26674	20006	16005	12804
	$\leq 140$ Bhn or $\leq 3$ HRc	Slot 	1	$\leq 1$	490 (392-588)	RPM	52022	26011	15607	13005	9754	7803	6243
		Profile 	$\leq 0.5$	$\leq 1.5$	610 (488-732)	RPM	64762	32381	19429	16190	12143	9714	7771
		HSM 	$\leq 0.05$	$\leq 2$	1005 (804-1206)	RPM	106698	53349	32009	26674	20006	16005	12804

Bhn (Brinell)    HRC (Rockwell C)    HRb (Rockwell B)    HSM (High Speed Machining)

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

mm/min =  $F_z \times 3 \times rpm$

reduce speed and feed for materials harder than listed

reduce cut depth and feed by 50% for long flute and long reach tools

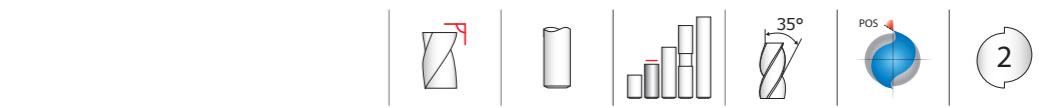
reduce feed and Ae when finish milling (.02 x DC maximum)

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))



# FRACTIONAL S-Carb®

Series  
43M, 43MB, 43MCR,  
43ML, 43MLC,  
43MCB  
Metric



47

FRACTIONAL SERIES

## TOLERANCES (inch)

### 1/8-3/16 DIAMETER

DC =  $+0.0000/-0.00032$

DCON =  $h_6$

### 1/4-3/8 DIAMETER

DC =  $+0.0000/-0.00035$

DCON =  $h_6$

### 1/2-5/8 DIAMETER

DC =  $+0.0000/-0.00043$

DCON =  $h_6$

### 3/4-1 DIAMETER

DC =  $+0.0000/-0.00051$

DCON =  $h_6$

NON-FERROUS

PLASTICS/COMPOSITES

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

## TOLERANCES (inch)

### 1/4-3/8 DIAMETER

DC =  $+0.0000/-0.00035$

DCON =  $h_6$

### 1/2-5/8 DIAMETER

DC =  $+0.0000/-0.00043$

DCON =  $h_6$

### 3/4-1 DIAMETER

DC =  $+0.0000/-0.00051$

DCON =  $h_6$

NON-FERROUS

PLASTICS/COMPOSITES

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	Ti-NAMITE-B (TiB <sub>2</sub> )
				EDP NO.	EDP NO.
1/8	3/8	1-1/2	1/8	34620	34660
3/16	9/16	2	3/16	34621	34661
1/4	3/4	2-1/2	1/4	34622	34662
5/16	13/16	2-1/2	5/16	34623	34663
3/8	1	2-1/2	3/8	34624	34664
1/2	1-1/4	3-1/4	1/2	34625	34665
5/8	1-5/8	3-3/4	5/8	34626	34666
3/4	1-5/8	4	3/4	34627	34667
1	2	4-1/2	1	34628	34668

- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plowing capability
- Recommended for materials  $\leq 150$  Bhn ( $\leq 7$  HRc)

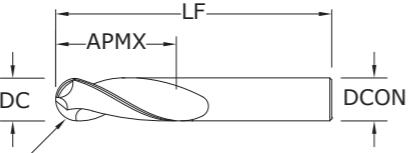
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	

# FRACTIONAL S-Carb®



## 47B FRACTIONAL SERIES

- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plowing capability
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)



### TOLERANCES (inch)

#### 1/8-3/16 DIAMETER

DC = +0.0000/-0.00032

DCON = h<sub>6</sub>

RE = +.0005/-0.0005

#### 1/4-3/8 DIAMETER

DC = +0.0000/-0.00035

DCON = h<sub>6</sub>

RE = +.0005/-0.0005

#### 1/2-5/8 DIAMETER

DC = +0.0000/-0.00043

DCON = h<sub>6</sub>

RE = +.0005/-0.0005

#### 3/4-1 DIAMETER

DC = +0.0000/-0.00051

DCON = h<sub>6</sub>

RE = +.0005/-0.0005

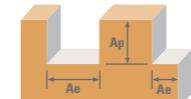
### NON-FERROUS

### PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

RE = 1/2 Cutting Diameter (DC)

# FRACTIONAL S-Carb®



### Series 47, 47B, 47L, 47LB Fractional

	Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in							
					1/8	1/4	3/8	1/2	5/8	3/4	1	
ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	1600	RPM	48896	24448	16299	12224	9779	8149
		Profile	≤ 0.5	≤ 1.5	(1280-1920)	Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070
		HSM	≤ 0.05	≤ 2	(1600-2400)	2000	RPM	61120	30560	20373	15280	12224
ALUMINUM DIE CAST ALLOYS (HIGH SILICONE) A-390, A-392, B-390	≤ 125 Bhn or ≤ 77 HRb	Slot	1	≤ 1	3300	RPM	100848	50424	33616	25212	20170	16808
		Profile	≤ 0.5	≤ 1.5	(2640-3960)	Fz	0.0021	0.0055	0.0105	0.0140	0.0150	0.0165
		HSM	≤ 0.05	≤ 2	(480-720)	Feed (ipm)	424	555	706	706	605	555
COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass	≤ 140 Bhn or ≤ 3 HRc	Slot	1	≤ 1	600	RPM	18336	9168	6112	4584	3667	3056
		Profile	≤ 0.5	≤ 1.5	(600-900)	Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070
		HSM	≤ 0.05	≤ 2	(992-1488)	750	RPM	22920	11460	7640	5730	4584
COPPER ALLOYS Beryllium Copper C110, Manganese Bronze, Tin Bronze	≤ 200 Bhn or ≤ 23 HRc	Slot	1	≤ 1	1240	RPM	37894	18947	12631	9474	7579	6316
		Profile	≤ 0.5	≤ 1.5	(864-1296)	Fz	0.0021	0.0055	0.0105	0.0140	0.0150	0.0165
		HSM	≤ 0.05	≤ 2	(1424-2136)	865	RPM	26434	13217	8811	6609	5287
PLASTICS ABS, Polycarbonate, PVC, Polypropylene		Slot	1	≤ 1	(692-1038)	Feed (ipm)	42	53	70	66	58	53
		Profile	≤ 0.5	≤ 1.5	(1080)	RPM	33005	16502	11002	8251	6601	5501
		HSM	≤ 0.05	≤ 2	(1780)	Fz	0.0008	0.0020	0.0040	0.0050	0.0055	0.0060
Slot		Slot	1	≤ 1	(345)	RPM	10543	5272	3514	2636	2109	1757
		Profile	≤ 0.5	≤ 1.5	(276-414)	Fz	0.0008	0.0020	0.0040	0.0050	0.0055	0.0060
		HSM	≤ 0.05	≤ 2	(430)	Feed (ipm)	17	21	28	26	23	21
Slot		Slot	1	≤ 1	(340)	RPM	13141	6570	4380	3285	2628	2190
		Profile	≤ 0.5	≤ 1.5	(430)	Fz	0.0008	0.0020	0.0040	0.0050	0.0055	0.0060
		HSM	≤ 0.05	≤ 2	(510)	Feed (ipm)	21	26	35	33	29	26
Slot		Slot	1	≤ 1	(710)	RPM	21698	10849	7233	5424	4340	3616
		Profile	≤ 0.5	≤ 1.5	(568-852)	Fz	0.0017	0.0045	0.0085	0.0115	0.0125	0.0140
		HSM	≤ 0.05	≤ 2	(710)	Feed (ipm)	74	98	123	125	108	101
Slot		Slot	1	≤ 1	(1600)	RPM	48896	24448	16299	12224	9779	8149
		Profile	≤ 0.5	≤ 1.5	(1280-1920)	Fz	0.0015	0.0040	0.0075	0.0100	0.0120	0.0140
		HSM	≤ 0.05	≤ 2	(1600)	Feed (ipm)	147	196	244	244	215	196
Slot		Slot	1	≤ 1	(2000)	RPM	61120	30560	20373	15280	12224	10187
		Profile	≤ 0.5	≤ 1.5	(1600-2400)	Fz	0.0015	0.0040	0.0075	0.0100	0.0120	0.0140
		HSM	≤ 0.05	≤ 2	(3300)	Feed (ipm)	183	244	306	306	269	244
Slot		Slot	1	≤ 1	(686)	RPM	100848	50424	33616	25212	20170	16808
		Profile	≤ 0.5	≤ 1.5	(2640-3960)	Fz	0.0034	0.0090	0.0170	0.0230	0.0250	0.0275
		HSM	≤ 0.05	≤ 2	(686)	Feed (ipm)	908	1143	1160	1008	924	807

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

rpm = Vc x 3.82 / DC

ipm = Fz x 2 x rpm

reduce speed and feed for materials harder than listed

reduce cut depth and feed by 50% for long flute and long reach tools

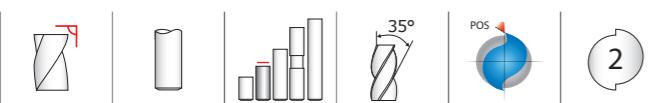
reduce feed and Ae when finish milling (.02 x DC maximum)

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

RE = 1/2 Cutting Diameter (DC)

**METRIC**  
**S-Carb®**



**47M**  
METRIC SERIES

- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plunging capability
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	EDP NO.
3,0	8,0	38,0	3,0	44550	44587
4,0	11,0	50,0	4,0	44551	44588
5,0	13,0	50,0	5,0	44552	44589
6,0	13,0	57,0	6,0	44553	44590
8,0	19,0	63,0	8,0	44554	44591
10,0	22,0	72,0	10,0	44555	44592
12,0	26,0	83,0	12,0	44556	44593
14,0	26,0	83,0	14,0	44557	44594
16,0	32,0	92,0	16,0	44558	44595
20,0	38,0	104,0	20,0	44559	44596
25,0	38,0	104,0	25,0	44560	44597

**TOLERANCES (mm)**

**3 DIAMETER**

DC = +0,000/-0,006  
DCON = h<sub>6</sub>

**>3–6 DIAMETER**

DC = +0,000/-0,008  
DCON = h<sub>6</sub>

**>6–10 DIAMETER**

DC = +0,000/-0,009  
DCON = h<sub>6</sub>

**>10–18 DIAMETER**

DC = +0,000/-0,012  
DCON = h<sub>6</sub>

**>18–25 DIAMETER**

DC = +0,000/-0,013  
DCON = h<sub>6</sub>

**NON-FERROUS**

**PLASTICS/COMPOSITES**

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

**TOLERANCES (mm)**

**6 DIAMETER**

DC = +0,000/-0,008  
DCON = h<sub>6</sub>

**>6–10 DIAMETER**

DC = +0,000/-0,009  
DCON = h<sub>6</sub>

**>10–18 DIAMETER**

DC = +0,000/-0,011  
DCON = h<sub>6</sub>

**>18–20 DIAMETER**

DC = +0,000/-0,013  
DCON = h<sub>6</sub>

**NON-FERROUS**

**PLASTICS/COMPOSITES**

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

**METRIC**  
**S-Carb®**



**47MB**  
METRIC SERIES

- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plunging capability
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	EDP NO.
3,0	8,0	38,0	3,0	44570	44598
4,0	11,0	50,0	4,0	44571	44599
5,0	13,0	50,0	5,0	44572	44600
6,0	13,0	57,0	6,0	44573	44601
8,0	19,0	63,0	8,0	44574	44602
10,0	22,0	72,0	10,0	44575	44603
12,0	26,0	83,0	12,0	44576	44604
14,0	26,0	83,0	14,0	44577	44605
16,0	32,0	92,0	16,0	44578	44606
20,0	37,3	104,0	20,0	44579	44607
25,0	38,0	104,0	25,0	44580	44608

**TOLERANCES (mm)**

**3 DIAMETER**

DC = +0,000/-0,006  
DCON = h<sub>6</sub>

**>3–6 DIAMETER**

DC = +0,000/-0,008  
DCON = h<sub>6</sub>

**>6–10 DIAMETER**

DC = +0,000/-0,009  
DCON = h<sub>6</sub>

**>10–18 DIAMETER**

DC = +0,000/-0,012  
DCON = h<sub>6</sub>

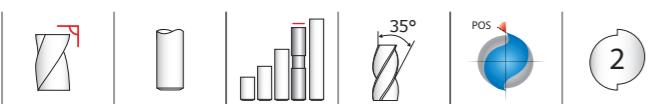
**>18–25 DIAMETER**

DC = +0,000/-0,013  
DCON = h<sub>6</sub>

**NON-FERROUS**

**PLASTICS/COMPOSITES**

RE = 1/2 Cutting Diameter (DC)



**47ML**  
METRIC SERIES

- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plunging capability
- Necked design with blended diameter transitions provide clearance to reach
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	EDP NO.
6,0	10,0	100,0	6,0	54,0	5,62	44561
8,0	12,0	100,0	8,0	54,0	7,62	44610
10,0	12,0	100,0	10,0	54,0	9,62	44611
12,0	16,0	150,0	12,0	80,0	11,62	44612
16,0	20,0	150,0	16,0	80,0	15,62	44613
20,0	25,0	150,0	20,0	80,0	19,62	44614

**TOLERANCES (mm)**

**6 DIAMETER**

DC = +0,000/-0,008  
DCON = h<sub>6</sub>

**>6–10 DIAMETER**

DC = +0,000/-0,009  
DCON = h<sub>6</sub>

**>10–18 DIAMETER**

DC = +0,000/-0,011  
DCON = h<sub>6</sub>

**>18–20 DIAMETER**

DC = +0,000/-0,013  
DCON = h<sub>6</sub>

**NON-FERROUS**

**PLASTICS/COMPOSITES**

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

**TOLERANCES (mm)**

**6 DIAMETER**

DC = +0,000/-0,008  
DCON = h<sub>6</sub>

**>6–10 DIAMETER**

DC = +0,000/-0,009  
DCON = h<sub>6</sub>

**>10–18 DIAMETER**

DC = +0,000/-0,011  
DCON = h<sub>6</sub>

**>18–20 DIAMETER**

DC = +0,000/-0,013  
DCON = h<sub>6</sub>

**NON-FERROUS**

**PLASTICS/COMPOSITES**

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)



**47MLB**  
METRIC SERIES

- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plunging capability
- Necked design with blended diameter transitions provide clearance to reach
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	REACH LU	NECK DIAMETER DN	EDP NO.
6,0	10,0	100,0	6,0	54,0	5,62	44581
8,0	12,0	100,0	8,0	54,0	7,62	44582
10,0	12,0					

Series 47M, 47MB, 47ML, 47MLB Metric		Hardness		Ae x DC	Ap x DC	Vc (m/min)	DC • mm						
							3	6	10	12	16	20	25
ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075	$\leq 150 \text{ Bhn}$ $\text{or} \leq 7 \text{ HRc}$	Slot 	1	$\leq 1$	490 (392-588)	RPM	52022	26011	15607	13005	9754	7803	6243
					Fz (392-588)	0.022 0.060	0.120	0.144	0.166	0.187	0.213		
		Profile 	$\leq 0.5$	$\leq 1.5$	610 (488-732)	RPM	64762	32381	19429	16190	12143	9714	7771
					Fz (488-732)	0.022 0.060	0.120	0.144	0.166	0.187	0.213		
		HSM 	$\leq 0.05$	$\leq 2$	1005 (804-1206)	RPM	106698	53349	32009	26674	20006	16005	12804
					Fz (804-1206)	0.050 0.132	0.280	0.336	0.384	0.440	0.488		
					Feed (mm/min)	2247 3121	3746	3745	3246	2913	2653		
						10754	14083	17925	17924	15364	14084	12484	
ALUMINUM DIE CAST ALLOYS (HIGH SILICONE) A-390, A-392, B- 390	$\leq 125 \text{ Bhn}$ $\text{or} \leq 77 \text{ HRb}$	Slot 	1	$\leq 1$	185 (148-222)	RPM	19641	9820	5892	4910	3683	2946	2357
					Fz (148-222)	0.022 0.060	0.120	0.144	0.166	0.187	0.213		
		Profile 	$\leq 0.5$	$\leq 1.5$	230 (184-276)	RPM	24418	12209	7326	6105	4578	3663	2930
					Fz (184-276)	0.022 0.060	0.120	0.144	0.166	0.187	0.213		
		HSM 	$\leq 0.05$	$\leq 2$	380 (304-456)	RPM	40343	20172	12103	10086	7564	6052	4841
					Fz (304-456)	0.050 0.132	0.280	0.336	0.384	0.440	0.488		
					Feed (mm/min)	4066 5325	6778	6777	5809	5325	4720		
COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass	$\leq 140 \text{ Bhn}$ $\text{or} \leq 3 \text{ HRc}$	Slot 	1	$\leq 1$	265 (212-318)	RPM	28134	14067	8440	7034	5275	4220	3376
					Fz (212-318)	0.019 0.048	0.107	0.120	0.141	0.160	0.175		
		Profile 	$\leq 0.5$	$\leq 1.5$	330 (264-396)	RPM	35035	17518	10511	8759	6569	5255	4204
					Fz (264-396)	0.019 0.048	0.107	0.120	0.141	0.160	0.175		
		HSM 	$\leq 0.05$	$\leq 2$	545 (436-654)	RPM	57861	28930	17358	14465	10849	8679	6943
					Fz (436-654)	0.041 0.108	0.227	0.276	0.320	0.373	0.400		
					Feed (mm/min)	4721 6248	7869	7984	6943	6480	5555		
COPPER ALLOYS Beryllium Copper C110, Manganese Bronze, Tin Bronze	$\leq 200 \text{ Bhn}$ $\text{or} \leq 23 \text{ HRc}$	Slot 	1	$\leq 1$	105 (84-126)	RPM	11148	5574	3344	2787	2090	1672	1338
					Fz (84-126)	0.019 0.048	0.107	0.120	0.141	0.160	0.175		
		Profile 	$\leq 0.5$	$\leq 1.5$	130 (104-156)	RPM	13802	6901	4141	3450	2588	2070	1656
					Fz (104-156)	0.019 0.048	0.107	0.120	0.141	0.160	0.175		
		HSM 	$\leq 0.05$	$\leq 2$	215 (172-258)	RPM	22826	11413	6848	5706	4280	3424	2739
					Fz (172-258)	0.041 0.108	0.227	0.276	0.320	0.373	0.400		
					Feed (mm/min)	1862 2465	3104	3150	2739	2556	2191		
PLASTICS ABS, Polycarbonate, PVC, Polypropylene	$\leq 150 \text{ Bhn}$ $\text{or} \leq 7 \text{ HRc}$	Slot 	1	$\leq 1$	490 (392-588)	RPM	52022	26011	15607	13005	9754	7803	6243
					Fz (392-588)	0.036 0.096	0.200	0.240	0.282	0.320	0.350		
		Profile 	$\leq 0.5$	$\leq 1.5$	610 (488-732)	RPM	64762	32381	19429	16190	12143	9714	7771
					Fz (488-732)	0.036 0.096	0.200	0.240	0.282	0.320	0.350		
		HSM 	$\leq 0.05$	$\leq 2$	1005 (804-1206)	RPM	106698	53349	32009	26674	20006	16005	12804
					Fz (804-1206)	0.082 0.216	0.453	0.552	0.640	0.733	0.800		
					Feed (mm/min)	17412 23045	29022	29446	25607	23473	20487		

Bhn (Brinell)    HRc (Rockwell C)    HRb (Rockwell B)    HSM (High Speed Machining)  
 $\text{rpm} = (\text{Vc} \times 1000) / (\text{DC} \times 3.14)$   
 $\text{mm/min} = \text{Fz} \times 2 \times \text{rpm}$   
 reduce speed and feed for materials harder than listed  
 reduce cut depth and feed by 50% for long flute and long reach tools  
 reduce feed and Ae when finish milling (.02 x DC maximum)  
 refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))

#### TOLERANCES (inch)

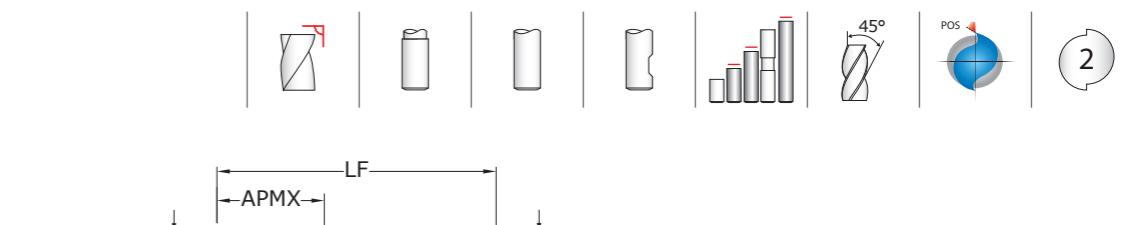
**1/4-3/8 DIAMETER**  
 $\text{DC} = +0.000/-0.00035$   
 $\text{DCON} = h_6$

**1/2-5/8 DIAMETER**  
 $\text{DC} = +0.000/-0.00043$   
 $\text{DCON} = h_6$

**3/4-1 DIAMETER**  
 $\text{DC} = +0.000/-0.00051$   
 $\text{DCON} = h_6$

**NON-FERROUS**  
**PLASTICS/COMPOSITES**

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)



**44**  
FRACTIONAL SERIES

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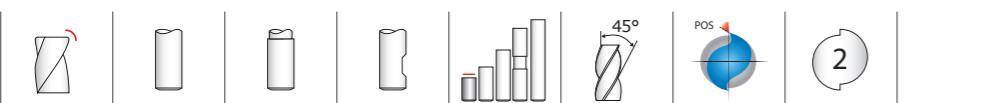
# FRACTIONAL Ski-Carb

Series 44 Fractional	Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in								
					1/8	1/4	3/8	1/2	5/8	3/4	1		
ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075	$\leq 150 \text{ Bhn}$ or $\leq 7 \text{ HRc}$	Slot	1	$\leq 1$	1600 (1280-1920)	RPM	48896	24448	16299	12224	9779	8149	6112
		Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070	0.0085				
		Feed (ipm)	88	122	147	147	127	114	104				
	$\leq 0.5$	Profile	$\leq 0.5$	$\leq 1.5$	2000 (1600-2400)	RPM	61120	30560	20373	15280	12224	10187	7640
		Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070	0.0085				
		Feed (ipm)	110	153	183	183	159	143	130				
	$\leq 0.05$	HSM	$\leq 0.05$	$\leq 2$	3300 (2640-3960)	RPM	100848	50424	33616	25212	20170	16808	12606
		Fz	0.0021	0.0055	0.0105	0.0140	0.0150	0.0165	0.0195				
		Feed (ipm)	424	555	706	706	605	555	492				
ALUMINUM DIE CAST ALLOYS (HIGH SILICONE) A-390, A-392, B- 390	$\leq 125 \text{ Bhn}$ or $\leq 77 \text{ HRb}$	Slot	1	$\leq 1$	600 (480-720)	RPM	18336	9168	6112	4584	3667	3056	2292
		Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070	0.0085				
		Feed (ipm)	33	46	55	55	48	43	39				
	$\leq 0.5$	Profile	$\leq 0.5$	$\leq 1.5$	750 (600-900)	RPM	22920	11460	7640	5730	4584	3820	2865
		Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070	0.0085				
		Feed (ipm)	41	57	69	69	60	53	49				
	$\leq 0.05$	HSM	$\leq 0.05$	$\leq 2$	1240 (992-1488)	RPM	37894	18947	12631	9474	7579	6316	4737
		Fz	0.0021	0.0055	0.0105	0.0140	0.0150	0.0165	0.0195				
		Feed (ipm)	159	208	265	265	227	208	185				
COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass	$\leq 140 \text{ Bhn}$ or $\leq 3 \text{ HRc}$	Slot	1	$\leq 1$	865 (692-1038)	RPM	26434	13217	8811	6609	5287	4406	3304
		Fz	0.0008	0.0020	0.0040	0.0050	0.0055	0.0060	0.0070				
		Feed (ipm)	42	53	70	66	58	53	46				
	$\leq 0.5$	Profile	$\leq 0.5$	$\leq 1.5$	1080 (864-1296)	RPM	33005	16502	11002	8251	6601	5501	4126
		Fz	0.0008	0.0020	0.0040	0.0050	0.0055	0.0060	0.0070				
		Feed (ipm)	53	66	88	83	73	66	58				
	$\leq 0.05$	HSM	$\leq 0.05$	$\leq 2$	1780 (1424-2136)	RPM	54397	27198	18132	13599	10879	9066	6800
		Fz	0.0017	0.0045	0.0085	0.0115	0.0125	0.0140	0.0160				
		Feed (ipm)	185	245	308	313	272	254	218				
COPPER ALLOYS Beryllium Copper C110, Manganese Bronze, Tin Bronze	$\leq 200 \text{ Bhn}$ or $\leq 23 \text{ HRc}$	Slot	1	$\leq 1$	345 (276-414)	RPM	10543	5272	3514	2636	2109	1757	1318
		Fz	0.0008	0.0020	0.0040	0.0050	0.0055	0.0060	0.0070				
		Feed (ipm)	17	21	28	26	23	21	18				
	$\leq 0.5$	Profile	$\leq 0.5$	$\leq 1.5$	430 (344-516)	RPM	13141	6570	4380	3285	2628	2190	1643
		Fz	0.0008	0.0020	0.0040	0.0050	0.0055	0.0060	0.0070				
		Feed (ipm)	21	26	35	33	29	26	23				
	$\leq 0.05$	HSM	$\leq 0.05$	$\leq 2$	710 (568-852)	RPM	21698	10849	7233	5424	4340	3616	2712
		Fz	0.0017	0.0045	0.0085	0.0115	0.0125	0.0140	0.0160				
		Feed (ipm)	74	98	123	125	108	101	87				
PLASTICS ABS, Polycarbonate, PVC, Polypropylene	$\leq 150 \text{ Bhn}$ or $\leq 7 \text{ HRc}$	Slot	1	$\leq 1$	1600 (1280-1920)	RPM	48896	24448	16299	12224	9779	8149	6112
		Fz	0.0015	0.0040	0.0075	0.0100	0.0110	0.0120	0.0140				
		Feed (ipm)	147	196	244	244	215	196	171				
	$\leq 0.5$	Profile	$\leq 0.5$	$\leq 1.5$	2000 (1600-2400)	RPM	61120	30560	20373	15280	12224	10187	7640
		Fz	0.0015	0.0040	0.0075	0.0100	0.0110	0.0120	0.0140				
		Feed (ipm)	183	244	306	306	269	244	214				
	$\leq 0.05$	HSM	$\leq 0.05$	$\leq 2$	3300 (2640-3960)	RPM	100848	50424	33616	25212	20170	16808	12606
		Fz	0.0034	0.0090	0.0170	0.0230	0.0250	0.0275	0.0320				
		Feed (ipm)	686	908	1143	1160	1008	924	807				

Bhn (Brinell)    HRC (Rockwell C)    HRB (Rockwell B)    HSM (High Speed Machining)  
 rpm = Vc x 3.82 / DC  
 ipm = Fz x 2 x rpm  
 reduce speed and feed for materials harder than listed  
 reduce cut depth and feed by 50% for long flute and long reach tools  
 reduce feed and Ae when finish milling (.02 x DC maximum)  
 refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

Series 44M Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm								
					3	6	10	12	16	20	25		
ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075	$\leq 150 \text{ Bhn}$ or $\leq 7 \text{ HRc}$	Slot	1	$\leq 1$	490 (392-588)	RPM	52022	26011	15607	13005	9754	7803	6243
		Fz	0.022	0.060	0.120	0.144	0.16						

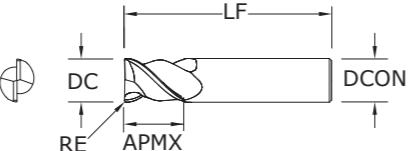
# FRACTIONAL Ski-Carb



**45**

FRACTIONAL SERIES

- Polished ski land with primary and secondary flute wall design minimizes chip interference by directing chips away from secondary flute
- Circular land allows for increased control at various speed and feed rates ultimately reducing chatter
- Recommended for materials  $\leq 150$  Bhn ( $\leq 7$  HRc)



inch						EDP NO.		
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	UNCOATED W/FLAT	UNCOATED Ti-NAMITE-B (TiB <sub>2</sub> ) W/FLAT	Ti-NAMITE-B (TiB <sub>2</sub> ) W/FLAT	
1/4	3/8	2-1/2	3/8	.010	91257	91250	91242	91235
5/16	7/16	2-1/2	3/8	.012	91258	91251	91243	91236
3/8	9/16	2-1/2	3/8	.015	91259	91252	91244	91237
1/2	3/4	3	1/2	.020	91260	91253	91245	91238
5/8	7/8	3-1/2	5/8	.025	91261	91254	91246	91239
3/4	1	4	3/4	.030	91262	91255	91247	91240
1	1-1/4	4	1	.040	91263	91256	91248	91241

Contact your KSPT representative for reach options.

## TOLERANCES (inch)

### 1/4-3/8 DIAMETER

DC =  $+0.0000/-0.00035$

DCON = h<sub>6</sub>

RE =  $+0.0000/-0.0020$

### 1/2-5/8 DIAMETER

DC =  $+0.0000/-0.00043$

DCON = h<sub>6</sub>

RE =  $+0.0000/-0.0020$

### 3/4-1 DIAMETER

DC =  $+0.0000/-0.00051$

DCON = h<sub>6</sub>

RE =  $+0.0000/-0.0020$

## NON-FERROUS

## PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

Series 45 Fractional	Hardness	Ae x DC Ap x DC	Vc (sfm)	DC • in					
				1/4	3/8	1/2	5/8	3/4	
ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075	$\leq 150$ Bhn or $\leq 7$ HRc	Slot 1 $\leq 1$ (1280-1920)	1600 RPM Fz 0.0025 0.0045 0.0060 0.0065 0.0070 0.0085	24448	16299	12224	9779	8149	6112
		Profile $\leq 0.5$ $\leq 1.5$ (1600-2400)	2000 RPM Fz 0.0025 0.0045 0.0060 0.0065 0.0070 0.0085	30560	20373	15280	12224	10187	7640
		HSM $\leq 0.05$ $\leq 2$ (2640-3960)	3300 RPM Fz 0.0055 0.0105 0.0140 0.0150 0.0165 0.0195	50424	33616	25212	20170	16808	12606
	$\leq 125$ Bhn or $\leq 77$ HRb	Slot 1 $\leq 1$ (480-720)	600 RPM Fz 0.0025 0.0045 0.0060 0.0065 0.0070 0.0085	9168	6112	4584	3667	3056	2292
		Profile $\leq 0.5$ $\leq 1.5$ (600-900)	750 RPM Fz 0.0025 0.0045 0.0060 0.0065 0.0070 0.0085	11460	7640	5730	4584	3820	2865
		HSM $\leq 0.05$ $\leq 2$ (992-1488)	1240 RPM Fz 0.0055 0.0105 0.0140 0.0150 0.0165 0.0195	18947	12631	9474	7579	6316	4737
	$\leq 140$ Bhn or $\leq 3$ HRc	Slot 1 $\leq 1$ (692-1038)	865 RPM Fz 0.0020 0.0040 0.0050 0.0055 0.0060 0.0070	13217	8811	6609	5287	4406	3304
		Profile $\leq 0.5$ $\leq 1.5$ (864-1296)	1080 RPM Fz 0.0020 0.0040 0.0050 0.0055 0.0060 0.0070	16502	11002	8251	6601	5501	4126
		HSM $\leq 0.05$ $\leq 2$ (1424-2136)	1780 RPM Fz 0.0045 0.0085 0.0115 0.0125 0.0140 0.0160	27198	18132	13599	10879	9066	6800
COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass	$\leq 200$ Bhn or $\leq 23$ HRc	Slot 1 $\leq 1$ (276-414)	345 RPM Fz 0.0020 0.0040 0.0050 0.0055 0.0060 0.0070	5272	3514	2636	2109	1757	1318
		Profile $\leq 0.5$ $\leq 1.5$ (344-516)	430 RPM Fz 0.0020 0.0040 0.0050 0.0055 0.0060 0.0070	6570	4380	3285	2628	2190	1643
		HSM $\leq 0.05$ $\leq 2$ (568-852)	710 RPM Fz 0.0045 0.0085 0.0115 0.0125 0.0140 0.0160	10849	7233	5424	4340	3616	2712
	$\leq 200$ Bhn or $\leq 23$ HRc	Slot 1 $\leq 1$ (1280-1920)	1600 RPM Fz 0.0040 0.0075 0.0100 0.0110 0.0120 0.0140	24448	16299	12224	9779	8149	6112
		Profile $\leq 0.5$ $\leq 1.5$ (1600-2400)	2000 RPM Fz 0.0040 0.0075 0.0100 0.0110 0.0120 0.0140	30560	20373	15280	12224	10187	7640
		HSM $\leq 0.05$ $\leq 2$ (2640-3960)	3300 RPM Fz 0.0090 0.0170 0.0230 0.0250 0.0275 0.0320	50424	33616	25212	20170	16808	12606

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

rpm =  $V_c \times 3.82 / DC$

ipm =  $F_z \times 2 \times rpm$

reduce speed and feed for materials harder than listed

reduce cut depth and feed by 50% for long flute and long reach tools

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

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

**VALUE AT THE SPINDLE<sup>®</sup>**

## General Purpose End Mills


 **Milling**

Please put "S" at the beginning of all page numbers below.

SERIES	GENERAL PURPOSE END MILLS DESCRIPTION	PAGE
3	2 Flute Square End Standard Length Fractional	176
3L	2 Flute Square End Long Reach Fractional	176
3EL	2 Flute Square End Extended Length Fractional	176
3CR	2 Flute Corner Radius Standard Length Fractional	176
3M	2 Flute Square End Standard Length Metric	179
3XLM	2 Flute Square End Extra Long Reach Metric	179
3B	2 Flute Ball End Standard Length Fractional	180
3LB	2 Flute Ball End Long Reach Fractional	180
3ELB	2 Flute Ball End Extended Length Fractional	180
3MB	2 Flute Ball End Standard Length Metric	182
3XLMB	2 Flute Ball End Extra Long Reach Metric	182
15	2 Flute Double End Square Stub Fractional	183
15M	2 Flute Double End Square Stub Metric	183
15B	2 Flute Double End Ball Stub Fractional	184
15MB	2 Flute Double End Ball Stub Metric	184
17	2 Flute Square End Stub Fractional	185
17M	2 Flute Square End Stub Metric	185
52	2 Flute High Shear Square End Standard Length Fractional	186
52M	2 Flute High Shear Square End Standard Length Metric	186
59	2 Flute Square End Long Reach Fractional	187
59M	2 Flute Square End Long Reach Metric	187
59B	2 Flute Ball End Long Reach Fractional	188
59MB	2 Flute Ball End Long Reach Metric	188
5	3 Flute Square End Standard Length Fractional	189
5M	3 Flute Square End Standard Length Metric	190
5XLM	3 Flute Square End Extra Long Reach Metric	190
5B	3 Flute Ball End Standard Length Fractional	191
5MB	3 Flute Ball End Standard Length Metric	192
5XLMB	3 Flute Ball End Extra Long Reach Metric	192
23	3 Flute Tapered Square End Standard Length Fractional	193
24	3 Flute Tapered Corner Radius Standard Length Fractional	194
1	4 Flute Square End Standard Length Fractional	195
1L	4 Flute Square End Long Reach Fractional	195
1EL	4 Flute Square End Extended Length Fractional	195
1CR	4 Flute Corner Radius Standard Length Fractional	195
1M	4 Flute Square End Standard Length Metric	199
1XLM	4 Flute Square End Extra Long Reach Metric	199
1MCR	4 Flute Corner Radius Standard Length Metric	199

*Speed & Feed Recommendations listed at the end of this section*

Please put "S" at the beginning of all page numbers below.

Please put "S" at the beginning of all page numbers below.

SERIES	GENERAL PURPOSE END MILLS DESCRIPTION	PAGE
1B	4 Flute Ball End Standard Length Fractional	201
1LB	4 Flute Ball End Long Reach Fractional	201
1ELB	4 Flute Ball End Extended Length Fractional	201
1MB	4 Flute Ball End Standard Length Metric	202
1XLMB	4 Flute Ball End Extra Long Reach Metric	202
14	4 Flute Double End Square Stub Fractional	203
14M	4 Flute Double End Square Stub Metric	203
14B	4 Flute Double End Ball Stub Fractional	204
14MB	4 Flute Double End Ball Stub Metric	204
16	4 Flute Square End Stub Fractional	205
16M	4 Flute Square End Stub Metric	205
54	4 Flute High Shear Square End Standard Length Fractional	206
54M	4 Flute High Shear Square End Standard Length Metric	206
61	Multi-Flute Coarse Pitch Rougher Fractional	207
61M	Multi-Flute Coarse Pitch Rougher Metric	207
62	Multi-Flute Fine Pitch Rougher Fractional	208
62M	Multi-Flute Fine Pitch Rougher Metric	209
End Mill Sets	2, 3, & 4 Flute Square End Series 1, 3, 5, 14, 15 2, 3, & 4 Flute Ball End Series 1B, 3B, 5B, 14B ,15B	210 211

*Speed & Feed Recommendations listed at the end of this section*

## Fresado

Please put "S" at the beginning of all page numbers below.

SERIES	DESCRIPCIÓN DE FRESAS DE USO GENERAL	PÁGINA
3	2 filos, punta cuadrada, longitud estándar, fraccional	176
3L	2 filos, punta cuadrada, largo alcance, fraccional	176
3EL	2 filos, punta cuadrada, longitud extendida, fraccional	176
3CR	2 filos, radio angulado, longitud estándar, fraccional	176
3M	2 filos, punta cuadrada, longitud estándar, métrico	179
3XLM	2 filos, punta cuadrada, alcance extralargo, métrico	179
3B	2 filos, punta esférica, longitud estándar, fraccional	180
3LB	2 filos, punta esférica, largo alcance, fraccional	180
3ELB	2 filos, punta esférica, longitud extendida, fraccional	180
3MB	2 filos, punta esférica, longitud estándar, métrico	182
3XLMB	2 filos, punta esférica, alcance extralargo, métrico	182
15	2 filos, pieza doble de punta cuadrada, fraccional	183
15M	2 filos, pieza doble de punta cuadrada, métrico	183
15B	2 filos, pieza doble de punta esférica, fraccional	184
15MB	2 filos, pieza doble de punta esférica, métrico	184
17	2 filos, pieza de punta cuadrada, fraccional	185

SERIE	DESCRIPCIÓN DE FRESAS DE USO GENERAL	PÁGINA
17M	2 filos, pieza de punta cuadrada, métrico	185
52	2 filos, alto rendimiento, punta cuadrada, longitud estándar, fraccional	186
52M	2 filos, alto rendimiento, punta cuadrada, longitud estándar, métrico	186
59	2 filos, punta cuadrada, largo alcance, fraccional	187
59M	2 filos, punta cuadrada, largo alcance, métrico	187
59B	2 filos, punta esférica, largo alcance, fraccional	188
59MB	2 filos, punta esférica, largo alcance, métrico	188
5	3 filos, punta cuadrada, longitud estándar, fraccional	189
5M	3 filos, punta cuadrada, longitud estándar, métrico	190
5XLM	3 filos, punta cuadrada, alcance extralargo, métrico	190
5B	3 filos, punta esférica, longitud estándar, fraccional	191
5MB	3 filos, punta esférica, longitud estándar, métrico	192
5XLMB	3 filos, punta esférica, alcance extralargo, métrico	192
23	3 filos, cónico, punta cuadrada, longitud estándar, fraccional	193
24	3 filos, cónico, radio angulado, longitud estándar, fraccional	194
1	4 filos, punta cuadrada, longitud estándar, fraccional	195
1L	4 filos, punta cuadrada, largo alcance, fraccional	195
1EL	4 filos, punta cuadrada, longitud extendida, fraccional	195
1CR	4 filos, radio angulado, longitud estándar, fraccional	195
1M	4 filos, punta cuadrada, longitud estándar, métrico	199
1XLM	4 filos, punta cuadrada, alcance extralargo, métrico	199
1MCR	4 filos, radio angulado, longitud estándar, métrico	199
1B	4 filos, punta esférica, longitud estándar, fraccional	201
1LB	4 filos, punta esférica, largo alcance, fraccional	201
1ELB	4 filos, punta esférica, longitud extendida, fraccional	201
1MB	4 filos, punta esférica, longitud estándar, métrico	202
1XLMB	4 filos, punta esférica, alcance extralargo, métrico	202
14	4 filos, pieza doble de punta cuadrada, fraccional	203
14M	4 filos, pieza doble de punta cuadrada, métrico	203
14B	4 filos, pieza doble de punta esférica, fraccional	204
14MB	4 filos, pieza doble de punta esférica, métrico	204
16	4 filos, pieza de punta cuadrada, fraccional	205
16M	4 filos, pieza de punta cuadrada, métrico	205
54	4 filos, alto rendimiento, punta cuadrada, longitud estándar, fraccional	206
54M	4 filos, alto rendimiento, punta cuadrada, longitud estándar, métrico	206
61	Filo múltiple, paso grueso, desbastador, fraccional	207
61M	Filo múltiple, paso grueso, desbastador, métrico	207
62	Filo múltiple, paso fino, desbastador, fraccional	208
62M	Filo múltiple, paso fino, desbastador, métrico	209
Juegos de fresas	2, 3 y 4 filos, punta cuadrada, series 1, 3, 5, 14, 15 2, 3 y 4 filos, punta esférica, series 1B, 3B, 5B, 14B ,15B	210 211

*Recomendaciones de Velocidad y Avance mostrados al final de esta sección.*

# Fraisage

Please put "S" at the beginning of all page numbers below.

Please put "S" at the beginning of all page numbers below.

SÉRIES	DESCRIPTION DE FRAISES À USAGE GÉNÉRAL	PAGE
3	2 dents non rayonné longueur standard (fractionnel)	176
3L	2 dents non rayonné longue portée (fractionnel)	176
3EL	2 dents non rayonné extra-long (fractionnel)	176
3CR	2 dents rayonné longueur standard (fractionnel)	176
3M	2 dents non rayonné longueur standard (métrique)	179
3XLM	2 dents non rayonné portée extra-longue (métrique)	179
3B	2 dents à bout hémisphérique longueur standard (fractionnel)	180
3LB	2 dents à bout hémisphérique longue portée (fractionnel)	180
3ELB	2 dents à bout hémisphérique extra-long (fractionnel)	180
3MB	2 dents à bout hémisphérique longueur standard (métrique)	182
3XLMB	2 dents à bout hémisphérique portée extra-longue (métrique)	182
15	2 dents à double bouts plats court (fractionnel)	183
15M	2 dents à double bouts plats court (métrique)	183
15B	2 dents à double bouts hémisphériques court (fractionnel)	184
15MB	2 dents à double bouts hémisphériques court (métrique)	184
17	2 dents non rayonné court (fractionnel)	185
17M	2 dents non rayonné court (métrique)	185
52	2 dents cisaillement élevé non rayonné longueur standard (fractionnel)	186
52M	2 dents cisaillement élevé non rayonné longueur standard (métrique)	186
59	2 dents non rayonné longue portée (fractionnel)	187
59M	2 dents non rayonné longue portée (métrique)	187
59B	2 dents à bout hémisphérique longue portée (fractionnel)	188
59MB	2 dents à bout hémisphérique longue portée (métrique)	188
5	3 dents non rayonné longueur standard (fractionnel)	189
5M	3 dents non rayonné longueur standard (métrique)	190
5XLM	3 dents non rayonné portée extra-longue (métrique)	190
5B	3 dents à bout hémisphérique longueur standard (fractionnel)	191
5MB	3 dents à bout hémisphérique longueur standard (métrique)	192
5XLMB	3 dents à bout hémisphérique portée extra-longue (métrique)	192
23	3 dents conique non rayonné longueur standard (fractionnel)	193
24	3 dents conique rayonné longueur standard (fractionnel)	194
1	4 dents non rayonné longueur standard (fractionnel)	195
1L	4 dents non rayonné longue portée (fractionnel)	195
1EL	4 dents non rayonné extra-long (fractionnel)	195
1CR	4 dents rayonné longueur standard (fractionnel)	195
1M	4 dents non rayonné longueur standard (métrique)	199
1XLM	4 dents non rayonné portée extra-longue (métrique)	199
1MCR	4 dents rayonné longueur standard (métrique)	199
1B	4 dents à bout hémisphérique longueur standard (fractionnel)	201
1LB	4 dents à bout hémisphérique longue portée (fractionnel)	201

SÉRIES	DESCRIPTION DE FRAISES À USAGE GÉNÉRAL	PAGE
1ELB	4 dents à bout hémisphérique extra-long (fractionnel)	201
1MB	4 dents à bout hémisphérique longueur standard (métrique)	202
1XLMB	4 dents à bout hémisphérique portée extra-longue (métrique)	202
14	4 dents à double bouts plats court (fractionnel)	203
14M	4 dents à double bouts plats court (métrique)	203
14B	4 dents à double bouts hémisphériques court (fractionnel)	204
14MB	4 dents à double bouts hémisphériques court (métrique)	204
16	4 dents non rayonné court (fractionnel)	205
16M	4 dents non rayonné court (métrique)	205
54	4 dents cisaillement élevé non rayonné longueur standard (fractionnel)	206
54M	4 dents cisaillement élevé non rayonné longueur standard (métrique)	206
61	Multi-dents à pas gros d'ébauche (fractionnel)	207
61M	Multi-dents à pas gros d'ébauche (métrique)	207
62	Multi-dents à pas fin d'ébauche (fractionnel)	208
62M	Multi-dents à pas fin d'ébauche (métrique)	209
Jeux de fraises	2, 3, & 4 Série goujure non rayonné 1,3,5,14,15	210
	2, 3, & 4 Série goujure à bout hémisphérique 15B, 15MB, 15B, 15MB ,15B, 15MB	211

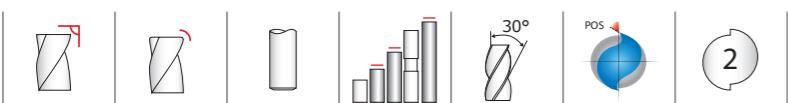
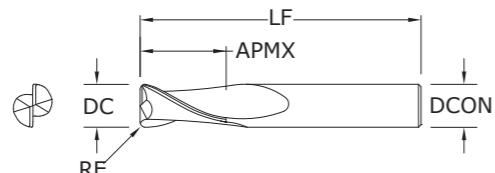
*Les avances et les vitesses recommandées se trouvent à la fin du chapitre.*

SERIE	BESCHREIBUNG DER STANDARD-SCHAFTFRÄSER	SEITE
3	Zölliger Schaftfräser mit 2 Schneiden ohne Eckenradien, Standardlänge	176
3L	Zölliger Langloch-Schaftfräser mit 2 Schneiden ohne Eckenradien	176
3EL	Zölliger Schaftfräser mit 2 Schneiden ohne Eckenradien, extra lang	176
3CR	Zölliger Schaftfräser mit 2 Schneiden mit Eckenradien, Standardlänge	176
3M	Schaftfräser mit 2 Schneiden ohne Eckenradien, Standardlänge	179
3XLM	Langloch-Schaftfräser mit 2 Schneiden ohne Eckenradien	179
3B	Zölliger Radiuschaftfräser mit 2 Schneiden, Standardlänge	180
3LB	Zölliger Langloch-Radiuschaftfräser mit 2 Schneiden	180
3ELB	Zölliger Schaftfräser mit 2 Schneiden, Extra lang	180
3MB	Schaftfräser mit 2 Schneiden, Standardlänge	182
3XLMB	Superlangloch-Schaftfräser mit 2 Schneiden	182
15	Zölliger Schaftfräser mit 2 Schneiden, kurze Ausführung	183
15M	Schaftfräser mit 2 Schneiden, kurze Ausführung	183
15B	Zölliger Doppelend-Radiuschaftfräser mit 2 Schneiden, kurze Ausführung	184
15MB	Doppelend-Radiuschaftfräser mit 2 Schneiden, kurze Ausführung	184
17	Zölliger Schaftfräser mit 2 Schneiden ohne Eckenradien, kurze Ausführung	185
17M	Schaftfräser mit 2 Schneiden ohne Eckenradien, kurze Ausführung	185
52	Zölliger Schaftfräser hoher Scherfestigkeit mit 2 Schneiden ohne Eckenradien, Standardlänge	186
52M	Schaftfräser hoher Scherfestigkeit mit 2 Schneiden ohne Eckenradien, Standardlänge	186
59	Zölliger Langloch-Schaftfräser mit 2 Schneiden ohne Eckenradien	187
59M	Langloch-Schaftfräser mit 2 Schneiden ohne Eckenradien	187
59B	Zölliger Langloch-Radiuschaftfräser mit 2 Schneiden	188
59MB	Langloch-Radiuschaftfräser mit 2 Schneiden	188
5	Zölliger Schaftfräser mit 3 Schneiden ohne Eckenradien, Standardlänge	189
5M	Schaftfräser mit 3 Schneiden ohne Eckenradien, Standardlänge	190
5XLM	Langloch-Schaftfräser mit 3 Schneiden ohne Eckenradien	190
5B	Zölliger Schaftfräser mit 3 Schneiden, Standardlänge	191
5MB	Schaftfräser mit 3 Schneiden, Standardlänge	192
5XLMB	Langloch-Schaftfräser mit 3 Schneiden	192
23	Zölliger Schaftfräser mit 3 Schneiden ohne Eckenradien, Standardlänge	193
24	Zölliger Schaftfräser mit 3 Schneiden mit Eckenradien, Standardlänge	194
1	Zölliger Schaftfräser mit 4 Schneiden ohne Eckenradien, Standardlänge	195
1L	Zölliger Langloch-Schaftfräser mit 4 Schneiden ohne Eckenradien	195
1EL	Zölliger Schaftfräser mit 4 Schneiden ohne Eckenradien, extra lang	195
1CR	Zölliger Schaftfräser mit 4 Schneiden mit Eckenradien, Standardlänge	195
1M	Schaftfräser mit 4 Schneiden ohne Eckenradien, Standardlänge	199
1XLM	Superlangloch-Schaftfräser mit 4 Schneiden ohne Eckenradien	199
1MCR	Schaftfräser mit 4 Schneiden mit Eckenradien, Standardlänge	199
1B	Zölliger Schaftfräser mit 4 Schneiden, Standardlänge	201
1LB	Zölliger Langloch-Radiuschaftfräser mit 4 Schneiden	201

SERIE	BESCHREIBUNG DER STANDARD-SCHAFTFRÄSER	SEITE
1ELB	Zölliger Schaftfräser mit 4 Schneiden, Extra lang	201
1MB	Schaftfräser mit 4 Schneiden, Standardlänge	202
1XLMB	Langloch-Radiuschaftfräser mit 4 Schneiden	202
14	Zölliger Schaftfräser mit 4 Schneiden, kurze Ausführung	203
14M	Schaftfräser mit 4 Schneiden, kurze Ausführung	203
14B	Zölliger Doppelend-Radiuschaftfräser mit 4 Schneiden, kurze Ausführung	204
14MB	Doppelend-Radiuschaftfräser mit 4 Schneiden, kurze Ausführung	204
16	Zölliger Schaftfräser mit 4 Schneiden ohne Eckenradien, kurze Ausführung	205
16M	Schaftfräser mit 4 Schneiden ohne Eckenradien, kurze Ausführung	205
54	Zölliger Schaftfräser hoher Scherfestigkeit mit 4 Schneiden ohne Eckenradien, Standardlänge	206
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61	Zölliger mehrschneidiger fein verzahnter Schruppfräser	207
61M	Mehrschneidiger fein verzahnter Schruppfräser	207
62	Zölliger mehrschneidiger fein verzahnter Schruppfräser	208
62M	Mehrschneidiger fein verzahnter Schruppfräser	209
Richtwerte zum Fräsen	Schaftfräser mit 2, 3 und 4 Schneiden ohne Eckenradien, Serien 1, 3, 5, 14, 15 Radiuschaftfräser mit 2, 3 und 4 Schneiden, Serien 1B, 3B, 5B, 14B ,15B	210 211

*Schnittwertempfehlungen finden Sie am Ende dieses Abschnitts*

## FRACTIONAL

**2 Flute Square End • 2 Flute Corner Radius**
**3•3L•  
3EL•3CR**  
FRACTIONAL SERIES


TOLERANCES (inch)			
DC	= -0.001/-0.002		
DCON	= h <sub>6</sub>		
RE	= +0.0000/-0.0020		

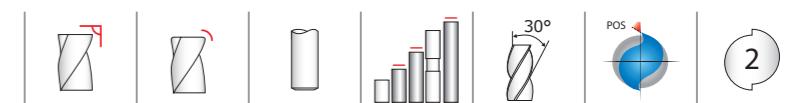
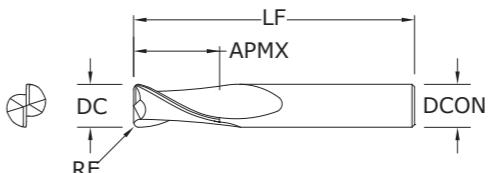
KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

## FRACTIONAL

**2 Flute Square End • 2 Flute Corner Radius**
**3•3L•  
3EL•3CR**  
FRACTIONAL SERIES


TOLERANCES (inch)			
DC	= -0.001/-0.002		
DCON	= h <sub>6</sub>		
RE	= +0.0000/-0.0020		

CONTINUED

**STEELS**  
**STAINLESS STEELS**  
**CAST IRON**  
**HIGH TEMP ALLOYS**  
**TITANIUM**  
**HARDENED STEELS**  
**NON-FERROUS**  
**PLASTICS/COMPOSITES**
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KYOCERA Solid Tools

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S177

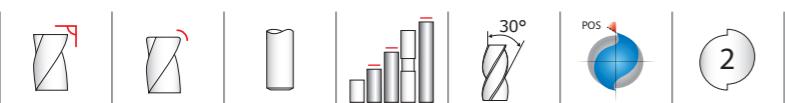
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	EDP NO.				SERIES
					UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	
1/64	1/32	1-1/2	1/8	—	30301	39301	39501	30397	—
1/32	5/64	1-1/2	1/8	—	30303	39303	39503	30398	—
3/64	7/64	1-1/2	1/8	—	30305	39305	39505	30399	—
1/16	3/16	1-1/2	1/8	—	30307	39307	39507	30400	91266
5/64	3/16	1-1/2	1/8	—	30309	39309	39509	30435	—
3/32	9/32	1-1/2	1/8	—	30311	39311	39511	30436	—
7/64	3/8	1-1/2	1/8	—	30313	39313	39513	30437	—
1/8	3/8	1-1/2	1/8	—	30377	39377	39577	30469	—
*1/8	1/2	1-1/2	1/8	—	30315	39315	39515	30438	91270
**1/8	1/2	1-1/2	1/8	.015	38201	38202	38315	38357	—
**1/8	1/2	1-1/2	1/8	.020	38203	38204	38316	38358	—
1/8	3/4	2-1/4	1/8	—	33341	31800	31810	31850	—
1/8	1	3	1/8	—	33343	31938	31948	31958	—
9/64	1/2	2	3/16	—	30317	39317	39517	30439	—
5/32	1/2	2	3/16	—	30319	39319	39519	30440	—
11/64	5/8	2	3/16	—	30321	39321	39521	30441	—
*3/16	5/8	2	3/16	—	30323	39323	39523	30442	91274
**3/16	5/8	2	3/16	.015	38209	38210	38317	38359	—
**3/16	5/8	2	3/16	.020	38211	38212	38318	38360	—
**3/16	5/8	2	3/16	.030	38213	38214	38319	38361	—
3/16	3/4	2-1/2	3/16	—	33301	31820	31825	31851	—
3/16	1-1/8	3	3/16	—	33321	31939	31949	31959	—
13/64	5/8	2-1/2	1/4	—	30325	39325	39525	30443	—
7/32	5/8	2-1/2	1/4	—	30327	39327	39527	30444	—
15/64	3/4	2-1/2	1/4	—	30329	39329	39529	30445	—
*1/4	3/4	2-1/2	1/4	—	30331	39331	39531	30446	91278
**1/4	3/4	2-1/2	1/4	.015	38219	38220	38320	38362	—
**1/4	3/4	2-1/2	1/4	.020	38221	38222	38321	38363	—
**1/4	3/4	2-1/2	1/4	.030	38223	38224	38322	38364	—
**1/4	3/4	2-1/2	1/4	.045	38225	38226	38323	38365	—
1/4	1-1/8	3	1/4	—	33303	31802	31812	31852	—
1/4	1-1/2	4	1/4	—	33323	31940	31950	31960	—
17/64	3/4	2-1/2	5/16	—	30333	39333	39533	30447	—
9/32	3/4	2-1/2	5/16	—	30335	39335	39535	30448	—

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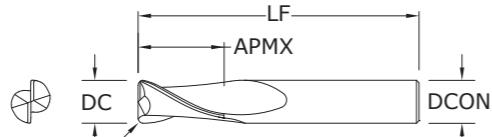
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	EDP NO.				SERIES
					UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	
19/64	13/16	2-1/2	5/16	—	30337	39337	39537	30449	—
*5/16	13/16	2-1/2	5/16	—	30339	39339	39539	30450	91282
**5/16	13/16	2-1/2	5/16	.015	38231	38232	38324	38366	—
**5/16	13/16	2-1/2	5/16	.020	38233	38234	38325	38367	—
**5/16	13/16	2-1/2	5/16	.030	38235	38236	38326	38368	—
**5/16	13/16	2-1/2	5/16	.045	38237	38238	38327	38369	—
5/16	1-1/8	3	5/16	—	33305	31821	31826	31853	—
5/16	1-5/8	4	5/16	—	33325	31941	31951	31961	—
21/64	1	2-1/2	3/8	—	30341	39341	39541	30451	—
11/32	1	2-1/2	3/8	—	30343	39343	39543	30452	—
23/64	1	2-1/2	3/8	—	30345	39345	39545	30453	—
*3/8	1	2-1/2	3/8	—	30347	39347	39547	30454	91286
3/8	1	2-1/2	3/8	.015	38245	38246	38328	38370	—
3/8	1	2-1/2	3/8	.020	38247	38248	38329	38371	—
3/8	1	2-1/2	3/8	.030	38249	38250	38330	38372	—
3/8	1	2-1/2	3/8	.045	38251	38252	38331	38373	—
3/8	1-1/8	3	3/8	—	33307				

## FRACTIONAL

## 2 Flute Square End • 2 Flute Corner Radius

3•3L•  
3EL•3CR  
FRACTIONAL SERIES

CONTINUED



## TOLERANCES (inch)

DC = -0.001/-0.002  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0020

## EDP NO.

UNCOATED

Ti-NAMITE (TiN)

Ti-NAMITE-C (TiCN)

Ti-NAMITE-A (AlTiN)

Di-NAMITE® (Diamond)

## SERIES

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	Di-NAMITE® (Diamond)	SERIES
1/2	3	6	1/2	—	33331	31944	31954	31964	—	3EL
9/16	1-1/8	3-1/2	9/16	—	30365	39365	39565	30463	—	3
5/8	1-1/4	3-1/2	5/8	—	30367	39367	39567	30464	—	3
5/8	1-1/4	3-1/2	5/8	.015	38273	38274	38337	38379	—	3CR
5/8	1-1/4	3-1/2	5/8	.020	38275	38276	38338	38380	—	3CR
5/8	1-1/4	3-1/2	5/8	.030	38277	38278	38339	38381	—	3CR
5/8	1-1/4	3-1/2	5/8	.045	38279	38280	38340	38382	—	3CR
5/8	1-1/4	3-1/2	5/8	.060	38281	38282	38341	38383	—	3CR
5/8	1-1/4	3-1/2	5/8	.090	38283	38284	38342	38384	—	3CR
5/8	2-1/4	5	5/8	—	33313	31823	31817	31857	—	3L
5/8	3	6	5/8	—	33333	31945	31955	31965	—	3EL
11/16	1-3/8	4	3/4	—	30369	39369	39569	30465	—	3
3/4	1-1/2	4	3/4	—	30371	39371	39571	30466	—	3
3/4	1-1/2	4	3/4	.015	38287	38288	38343	38385	—	3CR
3/4	1-1/2	4	3/4	.020	38289	38290	38344	38386	—	3CR
3/4	1-1/2	4	3/4	.030	38291	38292	38345	38387	—	3CR
3/4	1-1/2	4	3/4	.045	38293	38294	38346	38388	—	3CR
3/4	1-1/2	4	3/4	.060	38295	38296	38347	38389	—	3CR
3/4	1-1/2	4	3/4	.090	38297	38298	38348	38390	—	3CR
3/4	1-1/2	4	3/4	.125	38299	38300	38349	38391	—	3L
3/4	3	6	3/4	—	33335	31946	31956	31966	—	3EL
7/8	1-1/2	4	7/8	—	30373	39373	39573	30467	—	3
1	1-1/2	4	1	—	30375	39375	39575	30468	—	3
1	1-1/2	4	1	.015	38301	38302	38350	38392	—	3CR
1	1-1/2	4	1	.020	38303	38304	38351	38393	—	3CR
1	1-1/2	4	1	.030	38305	38306	38352	38394	—	3CR
1	1-1/2	4	1	.045	38307	38308	38353	38395	—	3CR
1	1-1/2	4	1	.060	38309	38310	38354	38396	—	3CR
1	1-1/2	4	1	.090	38311	38312	38355	38397	—	3CR
1	1-1/2	4	1	.125	38313	38314	38356	38398	—	3CR
1	2-1/4	5	1	—	33317	31824	31819	31859	—	3L
1	3	6	1	—	33337	31947	31957	31967	—	3EL
*Series 3 Set					30389	39389	39589	30470	—	3
**Without Flat										

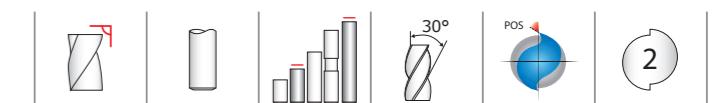
For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

SGS Solid Tools

SGS Micro Tools

## METRIC

## 2 Flute Square End



## TOLERANCES (mm)

DC = +0,000/-0,050  
DCON = h<sub>6</sub>

## EDP NO.

UNCOATED

Ti-NAMITE (TiN)

Ti-NAMITE-C (TiCN)

Ti-NAMITE-A (AlTiN)

## EDP NO.

UNCOATED

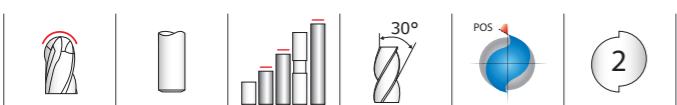
Ti-NAMITE (TiN)

Ti-NAMITE-C (TiCN)

Ti-NAMITE-A (AlTiN)

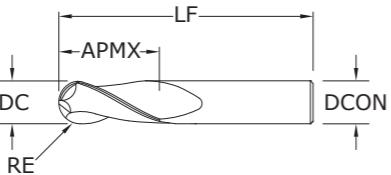
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	SERIES
1,0	4,0	38,0	3,0	40305	48628	48650	48671	3M
1,5	4,5	38,0	3,0	40309	48629	48651	48672	3M
2,0	6,3	38,0	3,0	40313	48630	48652	48673	3M
2,5	9,5	38,0	3,0	40317	48631	48653	48674	3M
3,0	12,0	38,0	3,0	40321	48632	48654	48675	3M
3,0	25,0	75,0	3,0	43301	49427	49440	49453	3XLM
3,5	12,0	50,0	4,0	40325	48633	48655	48676	3M
4,0	14,0	50,0	4,0	40329	48634	48656	48677	3M
4,0	25,0	75,0	4,0	43303	49428	49441	49454	3XLM
4,5	16,0	50,0	6,0	40333	48635	48657	48678	3M
5,0	16,0	50,0	6,0	40337	48636	48658	48679	3M
5,0	25,0	75,0	5,0	43307	49430	49443	49456	3XLM
6,0	19,0	50,0	6,0	40341	48637	48659	48680	3M
6,0	25,0	75,0	6,0	43305	49429	49442	49455	3XLM
7,0	19,0	63,0	8,0	40345	48638	48660	48681	3M
8,0	20,0	63,0	8,0	40349	48639	48661	48682	3M
8,0	25,0	75,0	8,0	43315	49431	49444	49457	3XLM
9,0	22,0	75,0	10,0	40353	48640	48662	48683	3M
10,0	22,0	75,0	10,0	40357	48641	48663	48684	3M
10,0	38,0	100,0	10,0	43325	49432	49445	49458	3XLM
11,0	25,0	75,0	12,0	40361	48642	48664	48685	3M
12,0	25,0	75,0	12,0	40365	48643	48665	48686	3M
12,0	50,0	100,0	12,0	43335	49433	49446	49459	3XLM
12,0	75,0	150,0	12,0	43345	49434	49447	49460	3XLM
14,0	32,0	89,0	14,0	40369	48644	48666	48687	3M
14,0	75,0	150,0	14,0	43355	49435	49448	49461	3XLM
16,0	32,0	89,0						

## FRACTIONAL 2 Flute Ball End



### 3B•3LB• 3ELB

FRACTIONAL SERIES

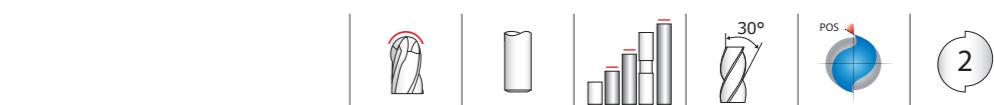


#### TOLERANCES (inch)

DC = -0.0000/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0010

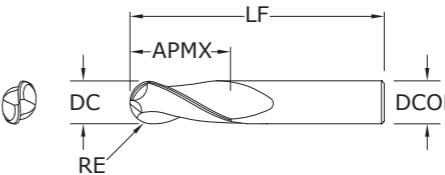
#### TOLERANCES (inch)

DC = -0.0000/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0010



### 3B•3LB• 3ELB

FRACTIONAL SERIES



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

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

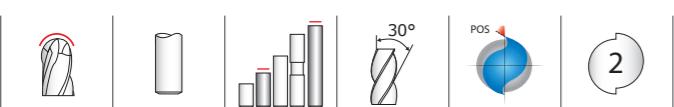
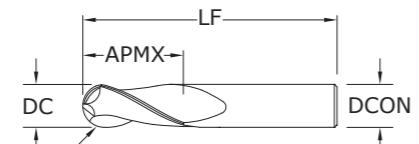
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.			SERIES
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	
1/64	1/32	1-1/2	1/8	30302	39302	39502	3B
1/32	5/64	1-1/2	1/8	30304	39304	39504	3B
3/64	7/64	1-1/2	1/8	30306	39306	39506	3B
1/16	3/16	1-1/2	1/8	30308	39308	39508	3B
5/64	3/16	1-1/2	1/8	30310	39310	39510	3B
3/32	9/32	1-1/2	1/8	30312	39312	39512	3B
7/64	3/8	1-1/2	1/8	30314	39314	39514	3B
1/8	3/8	1-1/2	1/8	30378	39378	39578	3B
*1/8	1/2	1-1/2	1/8	30316	39316	39516	3B
1/8	3/4	2-1/4	1/8	33342	31830	31840	3LB
1/8	1	3	1/8	33344	31968	31978	3ELB
9/64	1/2	2	3/16	30318	39318	39518	3B
5/32	1/2	2	3/16	30320	39320	39520	3B
11/64	5/8	2	3/16	30322	39322	39522	3B
*3/16	5/8	2	3/16	30324	39324	39524	3B
3/16	3/4	2-1/2	3/16	33302	31831	31841	3LB
3/16	1-1/8	3	3/16	33322	31969	31989	3ELB
13/64	5/8	2-1/2	1/4	30326	39326	39526	3B
7/32	5/8	2-1/2	1/4	30328	39328	39528	3B
15/64	3/4	2-1/2	1/4	30330	39330	39530	3B
*1/4	3/4	2-1/2	1/4	30332	39332	39532	3B
1/4	1-1/8	3	1/4	33304	31832	31842	3LB
1/4	1-1/2	4	1/4	33324	31970	31980	3ELB
17/64	3/4	2-1/2	5/16	30334	39334	39534	3B
9/32	3/4	2-1/2	5/16	30336	39336	39536	3B
19/64	13/16	2-1/2	5/16	30338	39338	39538	3B
*5/16	13/16	2-1/2	5/16	30340	39340	39540	3B
5/16	1-1/8	3	5/16	33306	31833	31843	3LB
5/16	1-5/8	4	5/16	33326	31971	31981	3ELB
21/64	1	2-1/2	3/8	30342	39342	39542	3B

continued on next page

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.			SERIES
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	
11/32	1	2-1/2	3/8	30344	39344	39544	3B
23/64	1	2-1/2	3/8	30346	39346	39546	3B
*3/8	1	2-1/2	3/8	30348	39348	39548	3B
3/8	1-1/8	3	3/8	33308	31834	31844	3LB
3/8	1-3/4	4	3/8	33328	31972	31982	3ELB
25/64	1	2-3/4	7/16	30350	39350	39550	3B
13/32	1	2-3/4	7/16	30352	39352	39552	3B
27/64	1	2-3/4	7/16	30354	39354	39554	3B
7/16	1	2-3/4	7/16	30356	39356	39556	3B
7/16	2	4-1/2	7/16	33310	31835	31845	3LB
7/16	3	6	7/16	33330	31973	31983	3ELB
29/64	1	3	1/2	30358	39358	39558	3B
15/32	1	3	1/2	30360	39360	39560	3B
31/64	1	3	1/2	30362	39362	39562	3B
*1/2	1	3	1/2	30364	39364	39564	3B
1/2	2	4-1/2	1/2	33312	31836	31846	3LB
1/2	3	6	1/2	33332	31974	31984	3ELB
9/16	1-1/8	3-1/2	9/16	30366	39366	39566	3B
5/8	1-1/4	3-1/2	5/8	30368	39368	39568	3B
5/8	2-1/4	5	5/8	33314	31837	31847	3LB
5/8	3	6	5/8	33334	31975	31985	3ELB
11/16	1-3/8	4	3/4	30370	39370	39570	3B
3/4	1-1/2	4	3/4	30372	39372	39572	3B
3/4	2-1/4	5	3/4	33316	31838	31848	3LB
3/4	3	6	3/4	33336	31976	31986	3ELB
7/8	1-1/2	4	7/8	30374	39374	39574	3B
1	1-1/2	4	1	30376	39376	39576	3B
1	2-1/4	5	1	33318	31839	31849	3LB
1	3	6	1	33338	31977	31987	3ELB

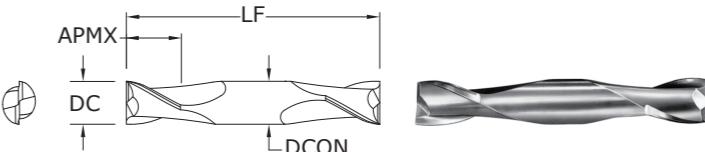
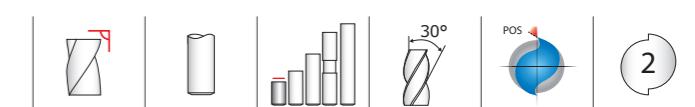
\*Series 3B Set

RE = 1/2 Cutting Diameter (DC)

**2 Flute Ball End**
**3MB•  
3XLMB**  
METRIC SERIES

**TOLERANCES (mm)**  
DC = +0,000/-0,050  
DCON = h<sub>6</sub>  
RE = +0,000/-0,025

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.			SERIES
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	
1,0	4,0	38,0	3,0	40306	48692	48714	3MB
1,5	4,5	38,0	3,0	40310	48693	48715	3MB
2,0	6,3	38,0	3,0	40314	48694	48716	3MB
2,5	9,5	38,0	3,0	40318	48695	48717	3MB
3,0	12,0	38,0	3,0	40322	48696	48718	3MB
3,0	25,0	75,0	3,0	43302	49544	49557	3XLMB
3,5	12,0	50,0	4,0	40326	48697	48719	3MB
4,0	14,0	50,0	4,0	40330	48698	48720	3MB
4,0	25,0	75,0	4,0	43304	49545	49558	3XLMB
4,5	16,0	50,0	6,0	40334	48699	48721	3MB
5,0	16,0	50,0	6,0	40338	48700	48722	3MB
5,0	25,0	75,0	5,0	43308	49547	49560	3XLMB
6,0	19,0	50,0	6,0	40342	48701	48723	3MB
6,0	25,0	75,0	6,0	43306	49546	49559	3XLMB
7,0	19,0	63,0	8,0	40346	48702	48724	3MB
8,0	20,0	63,0	8,0	40350	48703	48725	3MB
8,0	25,0	75,0	8,0	43316	49548	49561	3XLMB
9,0	22,0	75,0	10,0	40354	48704	48726	3MB
10,0	22,0	75,0	10,0	40358	48705	48727	3MB
10,0	38,0	100,0	10,0	43326	49549	49562	3XLMB
11,0	25,0	75,0	12,0	40362	48706	48728	3MB
12,0	25,0	75,0	12,0	40366	48707	48729	3MB
12,0	50,0	100,0	12,0	43336	49550	49563	3XLMB
12,0	75,0	150,0	12,0	43346	49551	49564	3XLMB
14,0	32,0	89,0	14,0	40370	48708	48730	3MB
14,0	75,0	150,0	14,0	43356	49552	49565	3XLMB
16,0	32,0	89,0	16,0	40374	48709	48731	3MB
16,0	75,0	150,0	16,0	43366	49553	49566	3XLMB
18,0	38,0	100,0	18,0	40378	48710	48732	3MB
18,0	75,0	150,0	18,0	43376	49554	49567	3XLMB
20,0	38,0	100,0	20,0	40382	48711	48733	3MB
20,0	75,0	150,0	20,0	43386	49555	49568	3XLMB
25,0	38,0	100,0	25,0	40386	48712	48734	3MB
25,0	75,0	150,0	25,0	43396	49556	49569	3XLMB

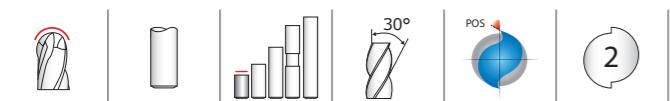
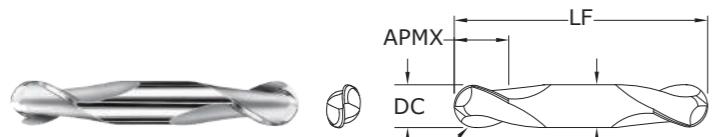
RE = 1/2 Cutting Diameter (DC)

**2 Flute Double End**
**TOLERANCES (inch)**  
DC = +0,000/-0,050  
DCON = h<sub>6</sub>

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.		
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)
1/32	1/16	1-1/2	1/8	31501	31541	39651
3/64	3/32	1-1/2	1/8	31503	31543	39653
1/16	1/8	1-1/2	1/8	31505	31545	39655
5/64	1/8	1-1/2	1/8	31507	31547	39657
3/32	3/16	1-1/2	1/8	31509	31549	39659
7/64	3/16	1-1/2	1/8	31511	31551	39661
*1/8	1/4	1-1/2	1/8	31513	31553	39663
9/64	5/16	2	3/16	31515	31555	39665
5/32	5/16	2	3/16	31517	31557	39667
11/64	5/16	2	3/16	31519	31559	39669
*3/16	3/8	2	3/16	31521	31561	39671
13/64	1/2	2-1/2	1/4	31523	31563	39673
7/32	1/2	2-1/2	1/4	31525	31565	39675
15/64	1/2	2-1/2	1/4	31527	31567	39677
*1/4	1/2	2-1/2	1/4	31529	31569	39679
9/32	1/2	2-1/2	5/16	31531	31571	39681
*5/16	1/2	2-1/2	5/16	31533	31573	39683
*3/8	9/16	2-1/2	3/8	31535	31575	39685
7/16	9/16	2-3/4	7/16	31537	31577	39687
*1/2	5/8	3	1/2	31539	31579	39689
				31589	31581	39691
				31589	31581	39691
				31589	31581	39691

**TOLERANCES (mm)**  
DC = +0,000/-0,050  
DCON = h<sub>6</sub>

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.		
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)
1,0	2,0	38,0	3,0	41505	49010	49031
1,5	3,0	38,0	3,0	41509	49011	49032
2,0	4,0	38,0	3,0	41513	49012	49033
2,5	5,0	38,0	3,0	41517	49013	49034
3,0	6,0	38,0	3,0	41521	49014	49035
3,5	7,0	50,0	4,0	41525	49015	49036
4,0	8,0	50,0	4,0	41529	49016	49037
4,5	9,5	63,0	4,5	41533	49017	49038
5,0	10,0	63,0	5,0	41537	49018	49039
6,0	12,0	63,0	6,0	41541	49019	49040
7,0	12,0	63,0	8,0	41545	49020	49041
8,0	12,0	63,0	8,0	41549	49021	49042
9,0	14,0	75,0	9,0	41553	49022	49043
10,0	14,0	75,0	10,0	41557	49023	49044
11,0	14,0	75,0	12,0	41561	49024	49045
12,0	16,0	75,0	12,0	41565	49025	49046

**2 Flute Double End Ball End**
**15B**  
FRACTIONAL SERIES


## TOLERANCES (inch)

DC = -0.0000/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0010

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	EDP NO.	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1/32	1/16	1-1/2	1/8	31502	31542	39652	31337	
3/64	3/32	1-1/2	1/8	31504	31544	39654	31338	
1/16	1/8	1-1/2	1/8	31506	31546	39656	31339	
5/64	1/8	1-1/2	1/8	31508	31548	39658	31340	
3/32	3/16	1-1/2	1/8	31510	31550	39660	31341	
7/64	3/16	1-1/2	1/8	31512	31552	39662	31342	
*1/8	1/4	1-1/2	1/8	31514	31554	39664	31343	
9/64	5/16	2	3/16	31516	31556	39666	31344	
5/32	5/16	2	3/16	31518	31558	39668	31345	
11/64	5/16	2	3/16	31520	31560	39670	31346	
*3/16	3/8	2	3/16	31522	31562	39672	31347	
13/64	1/2	2-1/2	1/4	31524	31564	39674	31348	
7/32	1/2	2-1/2	1/4	31526	31566	39676	31349	
15/64	1/2	2-1/2	1/4	31528	31568	39678	31350	
*1/4	1/2	2-1/2	1/4	31530	31570	39680	31351	
9/32	1/2	2-1/2	5/16	31532	31572	39682	31352	
*5/16	1/2	2-1/2	5/16	31534	31574	39684	31353	
*3/8	9/16	2-1/2	3/8	31536	31576	39686	31354	
7/16	9/16	2-3/4	7/16	31538	31578	39688	31355	
*1/2	5/8	3	1/2	31540	31580	39690	31356	
				31590	31582	39692	31357	

\*Series 15B Set

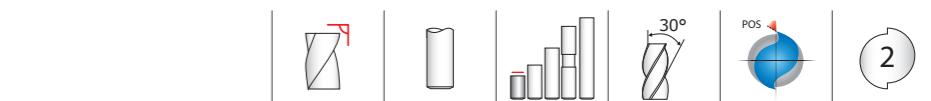
RE = 1/2 Cutting Diameter (DC)

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)
**15MB**  
METRIC SERIES

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	EDP NO.	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1,0	2,0	38,0	3,0	41506	49073	49094	49115	
1,5	3,0	38,0	3,0	41510	49074	49095	49116	
2,0	4,0	38,0	3,0	41514	49075	49096	49117	
2,5	5,0	38,0	3,0	41518	49076	49097	49118	
3,0	6,0	38,0	3,0	41522	49077	49098	49119	
3,5	7,0	50,0	4,0	41526	49078	49099	49120	
4,0	8,0	50,0	4,0	41530	49079	49100	49121	
4,5	9,5	63,0	4,5	41534	49080	49101	49122	
5,0	10,0	63,0	5,0	41538	49081	49102	49123	
6,0	12,0	63,0	6,0	41542	49082	49103	49124	
7,0	12,0	63,0	8,0	41546	49083	49104	49125	
8,0	12,0	63,0	8,0	41550	49084	49105	49126	
9,0	14,0	75,0	9,0	41554	49085	49106	49127	
10,0	14,0	75,0	10,0	41558	49086	49107	49128	
11,0	14,0	75,0	12,0	41562	49087	49108	49129	
12,0	16,0	75,0	12,0	41566	49088	49109	49130	

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

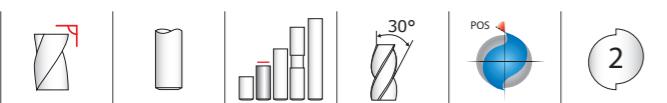
RE = 1/2 Cutting Diameter (DC)

**2 Flute Square End Stub**
**17**  
FRACTIONAL SERIES

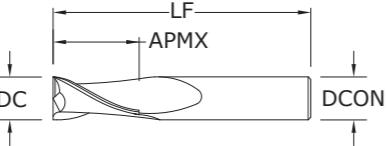
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	EDP NO.	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1/16	1/8	1-1/2	1/8	31701	31750	31303	31358	
3/32	3/16	1-1/2	1/8	31703	31751	31304	31359	
1/8	1/4	1-1/2	1/8	31705	31752	31305	31360	
5/32	5/16	2	3/16	31707	31753	31306	31361	
3/16	3/8	2	3/16	31709	31754	31307	31362	
7/32	7/16	2	1/4	31711	31755	31308	31363	
1/4	1/2	2	1/4	31713	31756	31309	31364	
5/16	1/2	2	5/16	31715	31757	31310	31365	
3/8	5/8	2-1/2	7/16	31717	31758	31311	31366	
7/16	5/8	2-1/2	1/2	31719	31759	31312	31367	
1/2	5/8	2-1/2	1/2	31721	31760	31313	31368	
5/8	3/4	3	5/8	31723	31761	31314	31369	
3/4	1	3	3/4	31725	31762	31315	31370	

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)
**17M**  
METRIC SERIES

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	EDP NO.	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1,0	2,0	38,0	3,0	41705	49262	49283	49304	
1,5	3,0	38,0	3,0	41709	49263	49284	49305	
2,0	4,0	38,0	3,0	41713	49264	49285	49306	
2,5	5,0	38,0	3,0	41717	49265	49286	49307	
3,0	6,0	38,0	3,0	41721	49266	49287	49308	
3,5	7,0	50,0	4,0	41725	49267	49288	49309	
4,0	8,0	50,0	4,0	41729	49268	49289	49310	
4,5	9,5	50,0	4,5	41733	49269	49290	49311	
5,0	10,0	50,0	5,0	41737	49270	49291	49312	
6,0	12,0	50,0	6,0	41741	49271	49292	49313	
7,0	12,0	50,0	8,0	41745	49272	49293	49314	
8,0	12,0	50,0	8,0	41749	49273	49294	49315	
9,0	14,0	50,0	9,0	41753	49274	49295	49316	
10,0</td								

**2 Flute High Shear****52**

FRACTIONAL SERIES



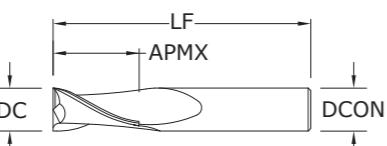
## TOLERANCES (inch)

 $DC = +0.000/-0.0020$   
 $DCON = h_6$ 

## EDP NO.

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	Ti-NAMITE-C (TiCN)
1/16	3/16	1-1/2	1/8	35273	35300
3/32	3/8	1-1/2	1/8	35275	35301
1/8	7/16	1-1/2	1/8	35277	35302
5/32	9/16	2	3/16	35278	35303
3/16	9/16	2	3/16	35279	35304
7/32	5/8	2-1/2	1/4	35280	35305
1/4	3/4	2-1/2	1/4	35281	35306
9/32	3/4	2-1/2	5/16	35282	35307
5/16	13/16	2-1/2	5/16	35283	35308
3/8	7/8	2-1/2	3/8	35285	35309
7/16	1	2-3/4	7/16	35287	35310
1/2	1	3	1/2	35289	35311
9/16	1-1/8	3-1/2	9/16	35291	35312
5/8	1-1/4	3-1/2	5/8	35293	35313
3/4	1-1/2	4	3/4	35295	35314
1	1-1/2	4	1	35297	35315

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

**52M**  
METRIC SERIES

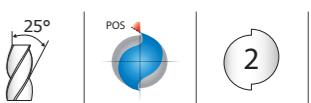
## TOLERANCES (mm)

 $DC = +0.000/-0.050$   
 $DCON = h_6$ 

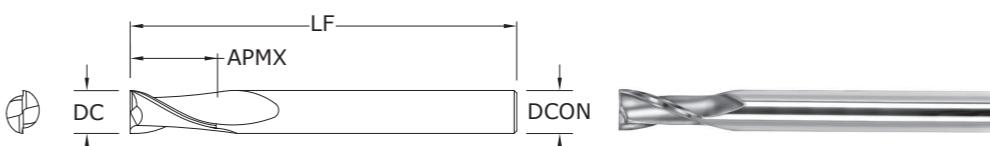
## EDP NO.

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	Ti-NAMITE-C (TiCN)
3,0	7,0	38,0	3,0	45277	49829
3,5	7,0	57,0	6,0	45279	49830
4,0	8,0	57,0	6,0	45281	49831
4,5	8,0	57,0	6,0	45283	49832
5,0	10,0	57,0	6,0	45285	49833
6,0	10,0	57,0	6,0	45287	49834
8,0	16,0	63,0	8,0	45289	49835
10,0	19,0	72,0	10,0	45291	49836
12,0	22,0	83,0	12,0	45293	49837
14,0	22,0	83,0	14,0	45295	49838
16,0	26,0	92,0	16,0	45297	49839
20,0	32,0	104,0	20,0	45299	49840

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**2 Flute Square End Long Reach****59**

FRACTIONAL SERIES



## TOLERANCES (mm)

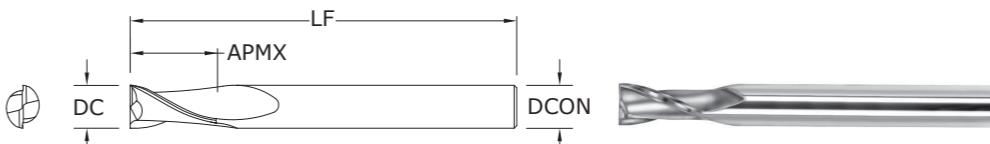
 $DC = +0.000/-0.050$   
 $DCON = h_6$ 

## EDP NO.

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AITiN)
1/8	3/8	2-1/2	1/4	32280	32260	32270
3/16	9/16	3	1/4	32281	32261	32271
1/4	5/8	3-1/2	1/4	32282	32262	32272
5/16	11/16	4	5/16	32283	32263	32273
3/8	7/8	4	3/8	32284	32264	32274
1/2	1	4-1/2	1/2	32285	32265	32275
5/8	1-1/8	5	5/8	32286	32266	32276
3/4	1-3/8	5-1/4	3/4	32287	32267	32277

Neck Option Available

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)



## TOLERANCES (mm)

 $DC = +0.000/-0.050$   
 $DCON = h_6$ 

## EDP NO.

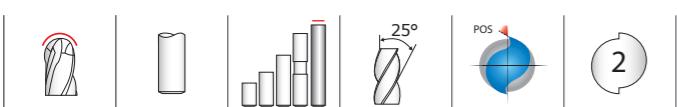
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AITiN)
3,0	9,0	60,0	6,0	43910	43920	43930	43950
4,0	12,0	70,0	6,0	43911	43921	43931	43951
6,0	15,0	80,0	6,0	43912	43922	43932	43952
8,0	20,0	89,0	8,0	43913	43923	43933	43953
10,0	25,0	100,0	10,0	43914	43924	43934	43954
12,0	30,0	110,0	12,0	43915	43925	43935	43955
14,0	35,0	120,0	16,0	43916	43926	43936	43956
16,0	40,0	120,0	16,0	43917	43927	43937	43957
18,0	40,0	130,0	20,0	43918	43928	43938	43958
20,0	45,0	130,0	20,0	43919	43929	43939	43959

Neck Option Available

For patent information visit  
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## FRACTIONAL &amp; METRIC

## 2 Flute Ball End Long Reach

**59B**

FRACTIONAL SERIES

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

For patent  
information visit  
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**59MB**

METRIC SERIES

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

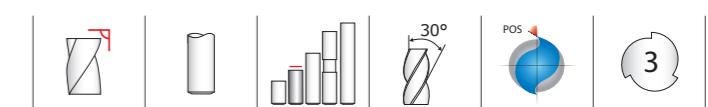
For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.		
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)
3,0	9,0	60,0	6,0	43900	49622	49632
4,0	12,0	70,0	6,0	43901	49623	49633
6,0	15,0	80,0	6,0	43902	49624	49634
8,0	20,0	89,0	8,0	43903	49625	49635
10,0	25,0	100,0	10,0	43904	49626	49636
12,0	30,0	110,0	12,0	43905	49627	49637
14,0	35,0	120,0	16,0	43906	49628	49638
16,0	40,0	120,0	16,0	43907	49629	49639
18,0	40,0	130,0	20,0	43908	49630	49640
20,0	45,0	130,0	20,0	43909	49631	49650

Neck Option Available  
RE = 1/2 Cutting Diameter (DC)

## FRACTIONAL

## 3 Flute Square End

**5**

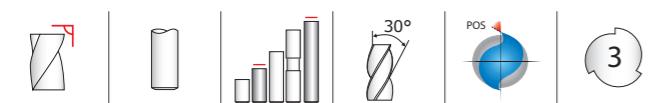
FRACTIONAL SERIES

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.		
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)
1/64	1/32	1-1/2	1/8	30501	39701	30771
1/32	5/64	1-1/2	1/8	30503	39703	30772
3/64	7/64	1-1/2	1/8	30505	39705	30773
1/16	3/16	1-1/2	1/8	30507	39707	30774
5/64	3/16	1-1/2	1/8	30509	39709	30775
3/32	9/32	1-1/2	1/8	30511	39711	30776
7/64	3/8	1-1/2	1/8	30513	39713	30777
1/8	3/8	1-1/2	1/8	30577	39777	30809
*1/8	1/2	1-1/2	1/8	30515	39715	30778
9/64	1/2	2	3/16	30517	39717	30779
5/32	1/2	2	3/16	30519	39719	30780
11/64	5/8	2	3/16	30521	39721	30781
*3/16	5/8	2	3/16	30523	39723	30782
13/64	5/8	2-1/2	1/4	30525	39725	30783
7/32	5/8	2-1/2	1/4	30527	39727	30784
15/64	3/4	2-1/2	1/4	30529	39729	30785
*1/4	3/4	2-1/2	1/4	30531	39731	30786
17/64	3/4	2-1/2	5/16	30533	39733	30787
9/32	3/4	2-1/2	5/16	30535	39735	30788
19/64	13/16	2-1/2	5/16	30537	39737	30789
*5/16	13/16	2-1/2	5/16	30539	39739	30790
21/64	1	2-1/2	3/8	30541	39741	30791
11/32	1	2-1/2	3/8	30543	39743	30792
23/64	1	2-1/2	3/8	30545	39745	30793
*3/8	1	2-1/2	3/8	30547	39747	30794
25/64	1	2-3/4	7/16	30549	39749	30795
13/32	1	2-3/4	7/16	30551	39751	30796
27/64	1	2-3/4	7/16	30553	39753	30797
7/16	1	2-3/4	7/16	30555	39755	30798
29/64	1	3	1/2	30557	39757	30799
15/32	1	3	1/2	30559	39759	30800
31/64	1	3	1/2	30561	39761	30801
*1/2	1	3	1/2	30563	39763	30802
9/16	1-1/8	3-1/2	9/16	30565	39765	30803
5/8	1-1/4	3-1/2	5/8	30567	39767	30804
11/16	1-3/8	4	3/4	30569	39769	30805
3/4	1-1/2	4	3/4	30571	39771	30806
7/8	1-1/2	4	7/8	30573	39773	30807
1	1-1/2	4	1	30575	39775	30808

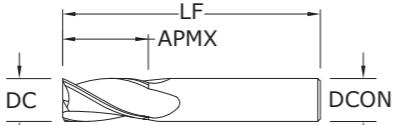
\*Series 5 Set

METRIC

# 3 Flute Square End



**5M •  
5XLM**  
METRIC SERIES



TOLERANCES (mm)  
DC = +0,000/-0,050  
DCON = h<sub>6</sub>

KYOCERA Solid Tools

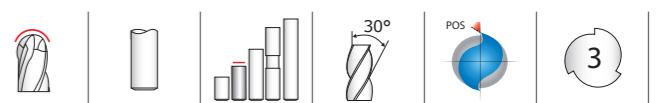
SGS Solid Tools

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

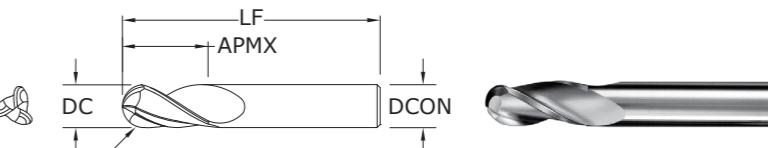
SGS Micro Tools

FRACTIONAL

# 3 Flute Ball End



**5B**  
FRACTIONAL SERIES



TOLERANCES (inch)  
DC = -0.0000/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0010

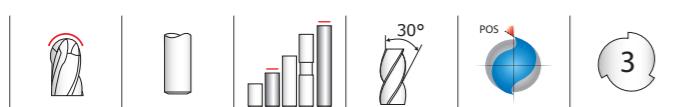
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	EDP NO.	inch	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	EDP NO.		
1/64	1/32	1-1/2	1/8	30502	30851	30602	31130		1/64	1/32	1-1/2	1/8	30504	30852	30604	31131
1/32	5/64	1-1/2	1/8	30504	30852	30604	31131		3/64	7/64	1-1/2	1/8	30506	30853	30606	31132
3/64	7/64	1-1/2	1/8	30508	30854	30608	31133		1/16	3/16	1-1/2	1/8	30510	30855	30610	31134
1/16	3/16	1-1/2	1/8	30512	30856	30612	31135		5/64	3/16	1-1/2	1/8	30514	30857	30902	31136
5/64	3/16	1-1/2	1/8	30578	30889	30943	31168		7/64	3/8	1-1/2	1/8	30516	30858	30904	31137
7/64	3/8	1-1/2	1/8	30520	30860	30908	31139		1/8	3/8	1-1/2	1/8	30522	30861	30910	31140
1/8	3/8	1-1/2	1/8	30524	30862	30912	31141		9/64	1/2	2	3/16	30526	30863	30914	31142
9/64	1/2	2	3/16	30528	30864	30916	31143		5/32	1/2	2	3/16	30530	30865	30918	31144
5/32	1/2	2	3/16	30532	30866	30920	31145		11/64	5/8	2	3/16	30534	30867	30921	31146
11/64	5/8	2	3/16	30536	30868	30922	31147		*1/8	1/2	1-1/2	1/8	30538	30869	30923	31148
*1/8	1/2	1-1/2	1/8	30540	30870	30924	31149		9/32	3/4	2-1/2	5/16	30542	30871	30925	31150
9/32	3/4	2-1/2	5/16	30544	30872	30926	31151		19/64	13/16	2-1/2	5/16	30546	30873	30927	31152
19/64	13/16	2-1/2	5/16	30548	30874	30928	31153		*5/16	13/16	2-1/2	5/16	30550	30875	30929	31154
*5/16	13/16	2-1/2	5/16	30552	30876	30930	31155		21/64	1	2-1/2	3/8	30554	30877	30931	31156
21/64	1	2-1/2	3/8	30556	30878	30932	31157		11/32	1	2-1/2	3/8	30558	30879	30933	31158
11/32	1	2-1/2	3/8	30560	30880	30934	31159		23/64	1	2-1/2	3/8	30562	30881	30935	31160
23/64	1	2-1/2	3/8	30564	30882	30936	31161		*3/8	1	2-1/2	3/8	30566	30884	30938	31163
*3/8	1	2-1/2	3/8	30568	30886	30940	31165		25/64	1	2-3/4	7/16	30570	30888	30942	31167
25/64	1	2-3/4	7/16	30572	30886	30944	31169		13/32	1	2-3/4	7/16	30574	30887	30941	31166
13/32	1	2-3/4	7/16	30576	30888	30942	31167		27/64	1	2-3/4	7/16	30578	30889	30944	31169
27/64	1	2-3/4	7/16	30580	30890	30946	31170		7/16	1	2-3/4	7/16	30582	30891	30948	31172
7/16	1	2-3/4	7/16	30584	30892	30949	31173		29/64	1	3	1/2	30586	30893	30950	31174
29/64	1	3	1/2	30588	30894	30952	31175		15/32	1	3	1/2	30590	30895	30954	31176
15/32	1	3	1/2	30592	30896	30956	31177		31/64	1	3	1/2	30594	30897	30958	31178
31/64	1	3	1/2	30596	30898	30959	31179		*1/2	1	3	1/2	30598	30899	30960	31180
*1/2	1	3	1/2	30600	30900	30962	31181		9/16	1-1/8	3-1/2	9/16	30602	30902	30964	31182
9/16	1-1/8	3-1/2	9/16	30604	30904	30966	31183		5/8	1-1/4	3-1/2	5/8	30606	30906	30968	31184
5/8	1-1/4	3-1/2	5/8	30608	30908	30970	31185		11/16	1-3/8	4	3/4	30610	30910	30972	31186
11/16	1-3/8	4	3/4	30612	30912	30974	31187		3/4	1-1/2	4	3/4	30614	30914	30976	31188
3/4	1-1/2	4	3/4	30616	30916	30978	31189		7/8	1-1/2	4	7/8	30618	30918	30980	31190
7/8	1-1/2	4	7/8	30620	30920	30982	31191		1	1-1/2	4	1	30622	30922	30984	31192

\*Series 5B Set

RE = 1/2 Cutting Diameter (DC)

METRIC

# **3 Flute Ball End**



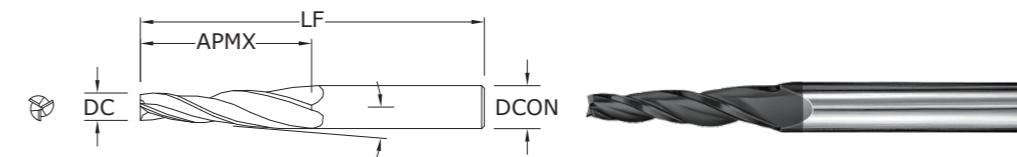
**5MB•  
5XLMB**

## METRIC SERIES

mm				EDP NO.				SERIES
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AITiN)	
1,0	4,0	38,0	3,0	40506	48820	48842	48863	5MB
1,5	4,5	38,0	3,0	40510	48821	48843	48864	5MB
2,0	6,3	38,0	3,0	40514	48822	48844	48865	5MB
2,5	9,5	38,0	3,0	40518	48823	48845	48866	5MB
3,0	12,0	38,0	3,0	40522	48824	48846	48867	5MB
3,0	25,0	75,0	3,0	43502	49583	49596	49609	5XLMB
3,5	12,0	50,0	4,0	40526	48825	48847	48868	5MB
4,0	14,0	50,0	4,0	40530	48826	48848	48869	5MB
4,0	25,0	75,0	4,0	43504	49584	49597	49610	5XLMB
4,5	16,0	50,0	6,0	40534	48827	48849	48870	5MB
5,0	16,0	50,0	6,0	40538	48828	48850	48871	5MB
5,0	25,0	75,0	5,0	43508	49586	49599	49612	5XLMB
6,0	19,0	50,0	6,0	40542	48829	48851	48872	5MB
6,0	25,0	75,0	6,0	43506	49585	49598	49611	5XLMB
7,0	19,0	63,0	8,0	40546	48830	48852	48873	5MB
8,0	20,0	63,0	8,0	40550	48831	48853	48874	5MB
8,0	25,0	75,0	8,0	43516	49587	49600	49613	5XLMB
9,0	22,0	75,0	10,0	40554	48832	48854	48875	5MB
10,0	22,0	75,0	10,0	40558	48833	48855	48876	5MB
10,0	38,0	100,0	10,0	43526	49588	49601	49614	5XLMB
11,0	25,0	75,0	12,0	40562	48834	48856	48877	5MB
12,0	25,0	75,0	12,0	40566	48835	48857	48878	5MB
12,0	50,0	100,0	12,0	43536	49589	49602	49615	5XLMB
12,0	75,0	150,0	12,0	43546	49590	49603	49616	5XLMB
14,0	32,0	89,0	14,0	40570	48836	48858	48879	5MB
14,0	75,0	150,0	14,0	43556	49591	49604	49617	5XLMB
16,0	32,0	89,0	16,0	40574	48837	48859	48880	5MB
16,0	75,0	150,0	16,0	43566	49592	49605	49618	5XLMB
18,0	38,0	100,0	18,0	40578	48838	48860	48881	5MB
18,0	75,0	150,0	18,0	43576	49593	49606	49619	5XLMB
20,0	38,0	100,0	20,0	40582	48839	48861	48882	5MB
20,0	75,0	150,0	20,0	43586	49594	49607	49620	5XLMB
25,0	38,0	100,0	25,0	40586	48840	48862	48883	5MB
25,0	75,0	150,0	25,0	43596	49595	49608	49621	5XLMB

RE = 1/2 Cutting Diameter (DC)

$RE = 1/2$  Cutting Diameter (DC)



**TOLERANCES (inch)**

---

**DC** = -0.0000/-0.0020  
**DCON** =  $h_6$

inch					EDP NO.			
SHANK DIAMETER DCON	CENTER LINE ANGLE $\alpha$	SMALL DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1/4	1°	1/8	1-1/2	3	32301	32370	32302	32345
1/4	1°30'	1/8	1-1/2	3	32303	32371	32304	32346
1/4	2°	1/8	1-1/4	3	32305	32372	32306	32347
1/4	3°	1/8	1	3	32307	32373	32308	32348
1/4	5°	1/8	3/4	3	32309	32374	32310	32349
1/4	7°	1/8	1/2	3	32311	32375	32312	32350
1/4	10°	3/32	1/2	3	32313	32376	32314	32351
3/8	1°	3/16	1-3/4	3-1/2	32315	32377	32316	32352
3/8	1°30'	3/16	1-3/4	3-1/2	32317	32378	32318	32353
3/8	2°	3/16	1-3/4	3-1/2	32319	32379	32320	32354
3/8	3°	5/32	1-3/4	3-1/2	32321	32380	32322	32355
3/8	5°	1/8	1-1/2	3-1/2	32323	32381	32324	32356
3/8	7°	1/8	1	3-1/2	32325	32382	32326	32357
3/8	10°	1/8	3/4	3-1/2	32327	32383	32328	32358
1/2	1°	1/4	2	4	32329	32384	32330	32359
1/2	2°	1/4	2	4	32333	32385	32334	32360
1/2	3°	1/4	2	4	32335	32386	32336	32361
1/2	5°	1/4	1-1/4	4	32337	32387	32338	32362
1/2	7°	3/16	1-1/4	4	32339	32388	32340	32363
1/2	10°	1/8	1	4	32341	32389	32342	32364

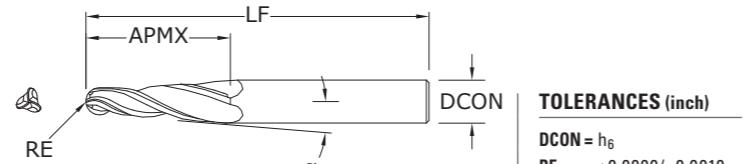
For patent  
information visit

FRACTIONAL  
Tapered Ball End



24

FRACTIONAL SERIES



TOLERANCES (inch)

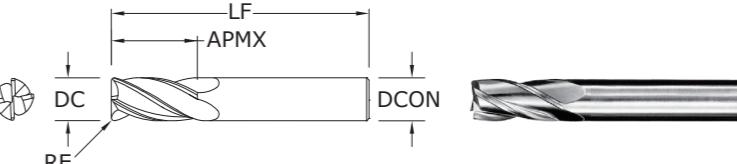
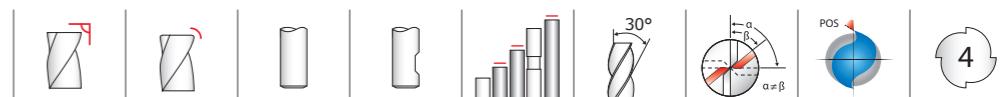
DCON =  $h_6$

RE = +0.0000/-0.0010

inch					EDP NO.			
SHANK DIAMETER DCON	CENTER LINE ANGLE $\alpha$	RADIUS RE	LENGTH OF CUT APMX	OVERALL LENGTH LF	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1/4	1°	.062	1-1/2	3	32402	32403	32445	32470
1/4	1°30'	.062	1-1/2	3	32404	32405	32446	32471
1/4	2°	.062	1-1/4	3	32406	32407	32447	32472
1/4	3°	.062	1	3	32408	32409	32448	32473
1/4	5°	.062	3/4	3	32410	32411	32449	32474
1/4	7°	.062	1/2	3	32412	32413	32450	32475
1/4	10°	.047	1/2	3	32414	32415	32451	32476
3/8	1°	.093	1-3/4	3-1/2	32416	32417	32452	32477
3/8	1°30'	.093	1-3/4	3-1/2	32418	32419	32453	32478
3/8	2°	.093	1-3/4	3-1/2	32420	32421	32454	32479
3/8	3°	.078	1-3/4	3-1/2	32422	32423	32455	32480
3/8	5°	.062	1-1/2	3-1/2	32424	32425	32456	32481
3/8	7°	.062	1	3-1/2	32426	32427	32457	32482
3/8	10°	.062	3/4	3-1/2	32428	32429	32458	32483
1/2	1°	.125	2	4	32430	32431	32459	32484
1/2	2°	.125	2	4	32434	32435	32460	32485
1/2	3°	.125	2	4	32436	32437	32461	32486
1/2	5°	.125	1-1/4	4	32438	32439	32462	32487
1/2	7°	.093	1-1/4	4	32440	32441	32463	32488
1/2	10°	.062	1	4	32442	32443	32464	32489

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

FRACTIONAL  
4 Flute Square End • 4 Flute Corner Radius



TOLERANCES (inch)

DC = +0.0000/-0.0020

1CR DC = -0.0010/-0.0020

DCON =  $h_6$

RE = +0.0000/-0.002

1•1L•  
1EL•1CR  
FRACTIONAL SERIES

inch					EDP NO.					SERIES	
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	UNCOATED	UNCOATED W/ FLAT	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	Ti-NAMITE-A (AlTiN) W/FLAT	Di-NAMITE® (Diamond)
1/64	1/32	1-1/2	1/8	—	30101	—	39101	39001	30191	—	—
1/32	5/64	1-1/2	1/8	—	30103	—	39103	39003	30192	—	—
3/64	7/64	1-1/2	1/8	—	30105	—	39105	39005	30193	—	—
1/16	3/16	1-1/2	1/8	—	30107	—	39107	39007	30194	—	91268
5/64	3/16	1-1/2	1/8	—	30109	—	39109	39009	30195	—	1
3/32	9/32	1-1/2	1/8	—	30111	—	39111	39011	30196	—	1
7/64	3/8	1-1/2	1/8	—	30113	—	39113	39013	30197	—	1
1/8	3/8	1-1/2	1/8	—	30177	—	39177	39077	30029	—	1
*1/8	1/2	1-1/2	1/8	—	30115	—	39115	39015	30198	—	91272
**1/8	1/2	1-1/2	1/8	.015	38001	38002	38115	38157	—	—	1CR
**1/8	1/2	1-1/2	1/8	.020	38003	38004	38116	38158	—	—	1CR
1/8	3/4	2-1/4	1/8	—	33141	—	31727	31737	31747	—	1L
1/8	1	3	1/8	—	33143	—	31860	31870	31880	—	1EL
9/64	1/2	2	3/16	—	30117	—	39117	39017	30199	—	1
5/32	1/2	2	3/16	—	30119	—	39119	39019	30000	—	1
11/64	5/8	2	3/16	—	30121	—	39121	39021	30001	—	1
*3/16	5/8	2	3/16	—	30123	—	39123	39023	30002	—	91276
**3/16	5/8	2	3/16	.015	38009	38010	38117	38159	—	—	1CR
**3/16	5/8	2	3/16	.020	38011	38012	38118	38160	—	—	1CR
**3/16	5/8	2	3/16	.030	38013	38014	38119	38161	—	—	1CR
3/16	3/4	2-1/2	3/16	—	33101	—	31728	31738	31748	—	1L
3/16	1-1/8	3	3/16	—	33121	—	31861	31871	31881	—	1EL
13/64	5/8	2-1/2	1/4	—	30125	—	39125	39025	30003	—	1
7/32	5/8	2-1/2	1/4	—	30127	—	39127	39027	30004	—	1
15/64	3/4	2-1/2	1/4	—	30129	—	39129	39029	30005	—	1
*1/4	3/4	2-1/2	1/4	—	30131	30300	39131	39031	30006	—	91280
**1/4	3/4	2-1/2	1/4	.015	38019	38020	38120	38162	—	—	1CR
**1/4	3/4	2-1/2	1/4	.020	38021	38022	38121	38163	—	—	1CR
**1/4	3/4	2-1/2	1/4	.030	38023	38024	38122	38164	—	—	1CR
**1/4	3/4	2-1/2	1/4	.045	38025	38026	38123	38165	—	—	1CR

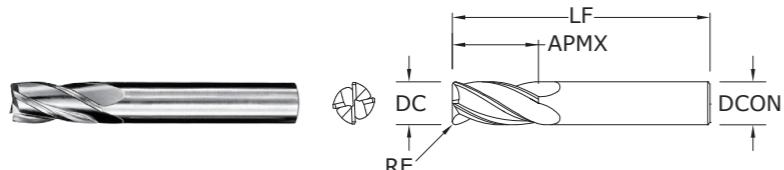
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## FRACTIONAL

**4 Flute Square End • 4 Flute Corner Radius**

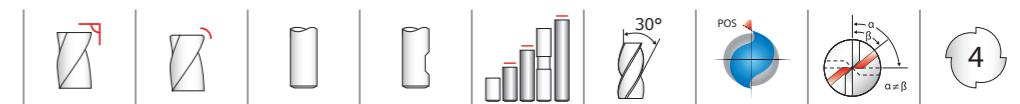
**1•1L•  
1EL•1CR**  
FRACTIONAL SERIES

CONTINUED



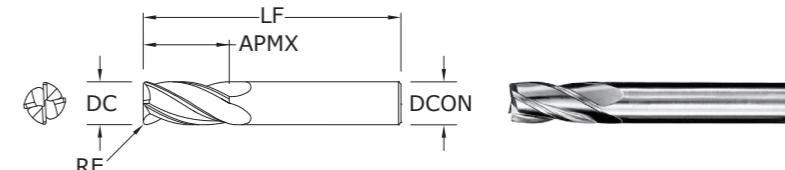
## TOLERANCES (inch)

DC = +0.0000/-0.0020  
1CR DC = -0.0010/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.000/-0.002

**4 Flute Square End • 4 Flute Corner Radius**

**1•1L•  
1EL•1CR**  
FRACTIONAL SERIES

CONTINUED

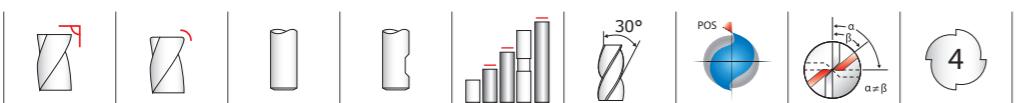


## TOLERANCES (inch)

DC = +0.0000/-0.0020  
1CR DC = -0.0010/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.000/-0.002

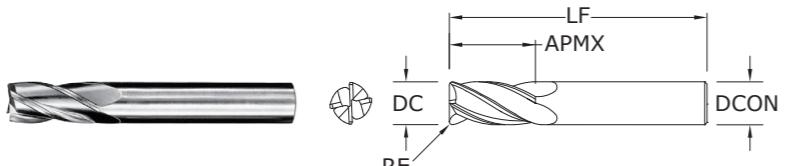
For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

## FRACTIONAL

**4 Flute Square End • 4 Flute Corner Radius**

**1•1L•  
1EL•1CR**  
FRACTIONAL SERIES

CONTINUED

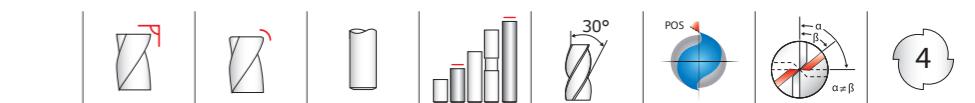


## TOLERANCES (inch)

DC = +0.0000/-0.0020  
1CR DC = -0.0010/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.000/-0.002

## TOLERANCES (mm)

DC = +0,000/-0,050  
DCON = h<sub>6</sub>  
RE = +0,000/-0,050

**METRIC**  
**4 Flute Square End • 4 Flute Corner Radius**

**1M•1XLM•  
1MCR**  
METRIC SERIES

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

SGS Solid Tools

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

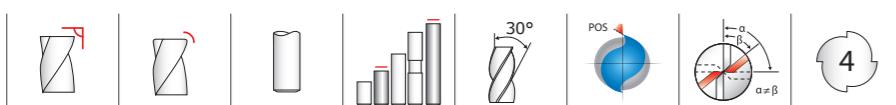
	inch					EDP NO.							SERIES
	CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	UNCOATED	UNCOATED W/ FLAT	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	Ti-NAMITE-A (AlTiN) W/FLAT	Di-NAMITE® (Diamond)	
1	1-1/2	4	1	—	—	30175	30183	39175	39075	30028	30383	—	1
1	1-1/2	4	1	.015	—	38101	38102	38150	38192	—	—	—	1CR
1	1-1/2	4	1	.020	—	38103	38104	38151	38193	—	—	—	1CR
1	1-1/2	4	1	.030	—	38105	38106	38152	38194	—	—	—	1CR
1	1-1/2	4	1	.045	—	38107	38108	38153	38195	—	—	—	1CR
1	1-1/2	4	1	.060	—	38109	38110	38154	38196	—	—	—	1CR
1	1-1/2	4	1	.090	—	38111	38112	38155	38197	—	—	—	1CR
1	1-1/2	4	1	.125	—	38113	38114	38156	38198	—	—	—	1CR
1	2-1/4	5	1	—	—	33117	—	31736	31746	31769	—	—	1L
1	3	6	1	—	—	33137	—	31869	31879	31889	—	—	1EL
*Series 1 Set					—	30189	—	39189	39089	30030	—	—	1
**Without Flat													

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	SHANK DIAMETER DCON	EDP NO.			SERIES
					UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	
1,0	4,0	38,0	—	3,0	40105	48500	48522	48543
1,5	4,5	38,0	—	3,0	40109	48501	48523	48544
2,0	6,3	38,0	—	3,0	40113	48502	48524	48545
2,5	9,5	38,0	—	3,0	40117	48503	48525	48546
3,0	12,0	38,0	—	3,0	40121	48504	48526	48547
3,0	25,0	75,0	—	3,0	43101	49388	49401	49414
3,5	12,0	50,0	—	4,0	40125	48505	48527	48548
4,0	14,0	50,0	—	4,0	40129	48506	48528	48549
4,0	25,0	75,0	—	4,0	43103	49389	49402	49415
4,0	14,0	50,0	0,25	4,0	—	—	—	40000
4,0	14,0	50,0	0,50	4,0	—	—	—	40001
4,0	14,0	50,0	1,00	4,0	—	—	—	40003
4,5	16,0	50,0	—	6,0	40133	48507	48529	48550
5,0	16,0	50,0	0,25	6,0	—	—	—	40004
5,0	16,0	50,0	0,50	6,0	—	—	—	40005
5,0	16,0	50,0	1,00	6,0	—	—	—	40007
5,0	16,0	50,0	—	6,0	40137	48508	48530	48551
5,0	25,0	75,0	—	5,0	43107	49391	49404	49417
6,0	19,0	50,0	—	6,0	40141	48509	48531	48552
6,0	25,0	75,0	—	6,0	43105	49390	49403	49416
6,0	19,0	50,0	0,25	6,0	—	—	—	40009
6,0	19,0	50,0	0,50	6,0	—	—	—	40010
6,0	19,0	50,0	0,75	6,0	—	—	—	40011
6,0	19,0	50,0	1,00	6,0	—	—	—	40012
7,0	19,0	63,0	—	8,0	40145	48510	48532	48553
8,0	20,0	63,0	—	8,0	40149	48511	48533	48554
8,0	25,0	75,0	—	8,0	43115	49392	49405	49418
8,0	20,0	63,0	0,50	8,0	—	—	—	40015
8,0	20,0	63,0	0,75	8,0	—	—	—	40016
8,0	20,0	63,0	1,00	8,0	—	—	—	40017
8,0	20,0	63,0	1,50	8,0	—	—	—	40019
8,0	20,0	63,0	2,00	8,0	—	—	—	40020
9,0	22,0	75,0	—	10,0	40153	48512	48534	48555
10,0	22,0	75,0	—	10,0	40157	48513	48535	48556

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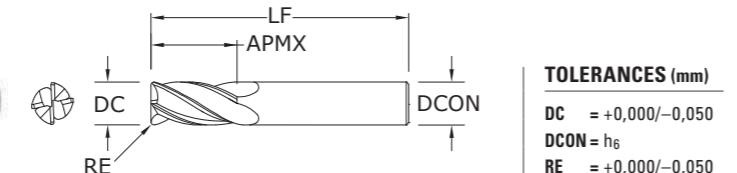
METRIC

## 4 Flute Square End • 4 Flute Corner Radius



**1M • 1XLM •  
1MCR**

METRIC SERIES

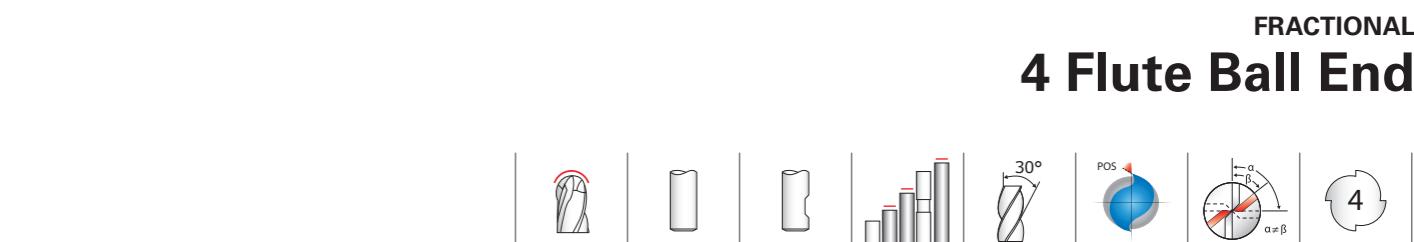


TOLERANCES (mm)  
DC = +0,000/-0,050  
DCON = h6  
RE = +0,000/-0,050

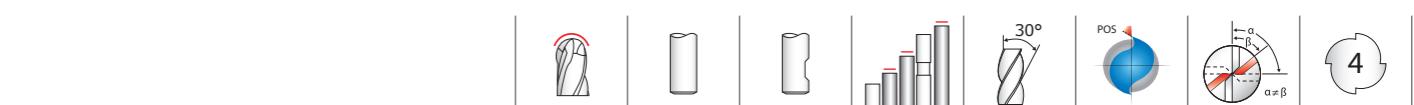
CONTINUED

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	SHANK DIAMETER DCON	EDP NO.				SERIES
					UNCOATED	TI-NAMITE (TiN)	TI-NAMITE-C (TiCN)	TI-NAMITE-A (AlTiN)	
10,0	38,0	100,0	—	10,0	43125	49393	49406	49419	1XLM
10,0	22,0	75,0	0,50	10,0	—	—	—	40021	1MCR
10,0	22,0	75,0	1,00	10,0	—	—	—	40023	1MCR
10,0	22,0	75,0	1,50	10,0	—	—	—	40024	1MCR
10,0	22,0	75,0	2,00	10,0	—	—	—	40025	1MCR
11,0	25,0	75,0	—	12,0	40161	48514	48536	48557	1M
12,0	25,0	75,0	—	12,0	41665	48515	48537	48558	1M
12,0	50,0	100,0	—	12,0	43135	49394	49407	49420	1XLM
12,0	75,0	150,0	—	12,0	43145	49395	49408	49421	1XLM
12,0	25,0	75,0	0,50	12,0	—	—	—	40028	1MCR
12,0	25,0	75,0	1,00	12,0	—	—	—	40030	1MCR
12,0	25,0	75,0	1,50	12,0	—	—	—	40031	1MCR
12,0	25,0	75,0	2,00	12,0	—	—	—	40032	1MCR
14,0	32,0	89,0	—	14,0	40169	48516	48538	48559	1M
14,0	75,0	150,0	—	14,0	43155	49396	49409	49422	1XLM
16,0	32,0	89,0	—	16,0	40173	48517	48539	48560	1M
16,0	75,0	150,0	—	16,0	43165	49397	49410	49423	1XLM
16,0	32,0	89,0	0,50	16,0	—	—	—	40035	1MCR
16,0	32,0	89,0	1,00	16,0	—	—	—	40037	1MCR
16,0	32,0	89,0	1,50	16,0	—	—	—	40038	1MCR
16,0	32,0	89,0	2,00	16,0	—	—	—	40039	1MCR
18,0	38,0	100,0	—	18,0	40177	48518	48540	48561	1M
18,0	75,0	150,0	—	18,0	43175	49398	49411	49424	1XLM
20,0	38,0	100,0	—	20,0	40181	48519	48541	48562	1M
20,0	75,0	150,0	—	20,0	43185	49399	49412	49425	1XLM
25,0	38,0	100,0	—	25,0	40185	48520	48542	48563	1M
25,0	75,0	150,0	—	25,0	43195	49400	49413	49426	1XLM

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)



## 4 Flute Ball End

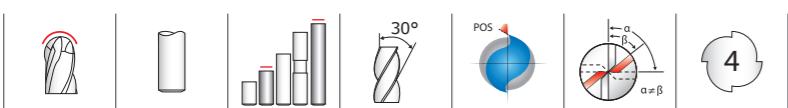
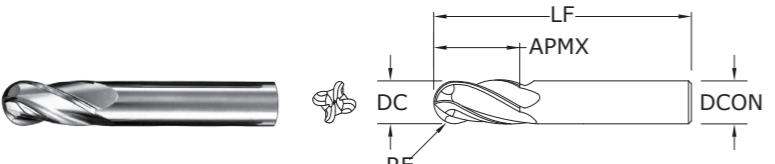


TOLERANCES (inch)				EDP NO.	TOLERANCES (inch)				EDP NO.
DC	= +0,000/-0,0020	UNCOATED	TI-NAMITE (TiN)	DCON	APMX	DC	RE	UNCOATED	TI-NAMITE (TiN)
DCON = h6	RE = +0,000/-0,0010	—	—	—	—	—	—	—	—

**1B • 1LB •  
1ELB**

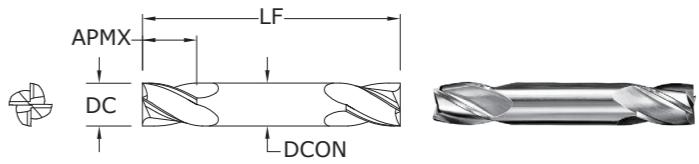
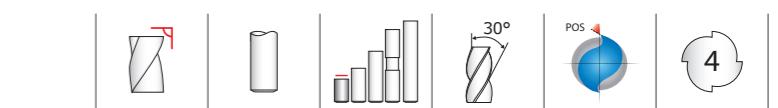
FRACTIONAL SERIES

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.				SERIES			
				UNCOATED	UNCOATED W/FLAT	TI-NAMITE (TiN)	TI-NAMITE-C (TiCN)				
1/64	1/32	1-1/2	1/8	30102	—	39102	39002	30031	—	—	1B
1/32	5/64	1-1/2	1/8	30104	—	39104	39004	30032	—	—	1B
3/64	7/64	1-1/2	1/8	30106	—	39106	39006	30033	—	—	1B
1/16	3/16	1-1/2	1/8	30108	—	39108	39008	30034	—	91269	1B
5/64	3/16	1-1/2	1/8	30110	—	39110	39010	30035	—	—	1B
3/32	9/32	1-1/2	1/8	30112	—	39112	39012	30036	—	—	1B
7/64	3/8	1-1/2	1/8	30114	—	39114	39014	30037	—	—	1B
*1/8	3/8	1-1/2	1/8	30178	—	39178	39078	30069	—	—	1B
1/8	1/2	1-1/2	1/8	30116	—	39116	39016	30038	—	91273	1B
1/8	3/4	2-1/4	1/8	33142	—	31770	31780	31790	—	—	1LB
1/8	1	3	1/8	33144	—	31900	31918	31928	—	—	1ELB
9/64	1/2	2	3/16	30118	—	39118	39018	30039	—	—	1B
5/32	1/2	2	3/16	30120	—	39120	39020	30040	—	—	1B
11/64	5/8	2	3/16	30122	—	39122	39022	30041	—	—	1B
*3/16	5/8	2	3/16	30124	—	39124	39024	30042	—	91277	1B
3/16	3/4	2-1/2	3/16	33102	—	31771	31781	31791	—	—	1LB
3/16	1-1/8	3	3/16	33122	—	31902	31919	31929	—	—	1ELB
13/64	5/8	2-1/2	1/4	30126	—	39126	39026	30043	—	—	1B
7/32	5/8	2-1/2	1/4	30128	—	39128	39028	30044	—	—	1B
15/64	3/4	2-1/2	1/4	30130	—	39130	39030	30045	—	—	1B
*1/4	3/4	2-1/2	1/4	30132	—	39132	39032	30046	—	91281	1B
1/4	1-1/8	3	1/4	33104	—	31772	31782	31792	—	—	1LB
1/4	1-1/2	4	1/4	33124	—	31904	31920	31930	—	—	1ELB
17/64	3/4	2-1/2	5/16	30134	—	39134	39034	30047	—	—	1B
9/32	3/4	2-1/2	5/16	30136	—	39136	39036	30048	—	—	1B
19/64	13/16	2-1/2	5/16	30138	—	39138	39038	30049	—	—	1B
*5/16	13/16	2-1/2	5/16	30140	—	39140	39040	30050	—	91285	1B
5/16											

**4 Flute Ball End**
**1MB•  
1XLMB**  
METRIC SERIES

**TOLERANCES (mm)**  
DC = +0,000/-0,050  
DCON = h6  
RE = +0,000/-0,025

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.			SERIES
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	
1,0	4,0	38,0	3,0	40106	48564	48586	1MB
1,5	4,5	38,0	3,0	40110	48565	48587	1MB
2,0	6,3	38,0	3,0	40114	48566	48588	1MB
2,5	9,5	38,0	3,0	40118	48567	48589	1MB
3,0	12,0	38,0	3,0	40122	48568	48590	1MB
3,0	25,0	75,0	3,0	43102	49505	49518	1XLMB
3,5	12,0	50,0	4,0	40126	48569	48591	1MB
4,0	14,0	50,0	4,0	40130	48570	48592	1MB
4,0	25,0	75,0	4,0	43104	49506	49519	1XLMB
4,5	16,0	50,0	6,0	40134	48571	48593	1MB
5,0	16,0	50,0	6,0	40138	48572	48594	1MB
5,0	25,0	75,0	5,0	43108	49508	49521	1XLMB
6,0	19,0	50,0	6,0	40142	48573	48595	1MB
6,0	25,0	75,0	6,0	43106	49507	49520	1XLMB
7,0	19,0	63,0	8,0	40146	48574	48596	1MB
8,0	20,0	63,0	8,0	40150	48575	48597	1MB
8,0	25,0	75,0	8,0	43116	49509	49522	1XLMB
9,0	22,0	75,0	10,0	40154	48576	48598	1MB
10,0	22,0	75,0	10,0	40158	48577	48620	1MB
10,0	38,0	100,0	10,0	43126	49510	49523	1XLMB
11,0	25,0	75,0	12,0	40162	48578	48600	1MB
12,0	25,0	75,0	12,0	40166	48579	48601	1MB
12,0	50,0	100,0	12,0	43136	49511	49524	1XLMB
12,0	75,0	150,0	12,0	43146	49512	49525	1XLMB
14,0	32,0	89,0	14,0	40170	48580	48602	1MB
14,0	75,0	150,0	14,0	43156	49513	49526	1XLMB
16,0	32,0	89,0	16,0	40174	48581	48603	1MB
16,0	75,0	150,0	16,0	43166	49514	49527	1XLMB
18,0	38,0	100,0	18,0	40178	48582	48604	1MB
18,0	75,0	150,0	18,0	43176	49515	49528	1XLMB
20,0	38,0	100,0	20,0	40182	48583	48605	1MB
20,0	75,0	150,0	20,0	43186	49516	49529	1XLMB
25,0	38,0	100,0	25,0	40186	48584	48606	1MB
25,0	75,0	150,0	25,0	43196	49517	49530	1XLMB

RE = 1/2 Cutting Diameter (DC)

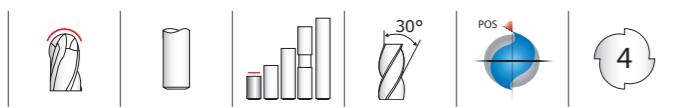
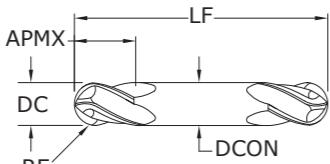
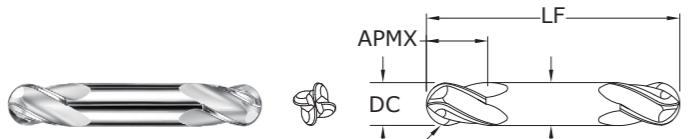
**4 Flute Double End**
**TOLERANCES (inch)**  
DC = +0,000/-0,020  
DCON = h6

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.		
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)
1/32	1/16	1-1/2	1/8	31401	31441	39601
3/64	3/32	1-1/2	1/8	31403	31443	39603
1/16	1/8	1-1/2	1/8	31405	31445	39605
5/64	1/8	1-1/2	1/8	31407	31447	39607
3/32	3/16	1-1/2	1/8	31409	31449	39609
7/64	3/16	1-1/2	1/8	31411	31451	39611
*1/8	1/4	1-1/2	1/8	31413	31453	39613
9/64	5/16	2	3/16	31415	31455	39615
5/32	5/16	2	3/16	31417	31457	39617
11/64	5/16	2	3/16	31419	31459	39619
*3/16	3/8	2	3/16	31421	31461	39621
13/64	1/2	2-1/2	1/4	31423	31463	39623
7/32	1/2	2-1/2	1/4	31425	31465	39625
15/64	1/2	2-1/2	1/4	31427	31467	39627
*1/4	1/2	2-1/2	1/4	31429	31469	39629
9/32	1/2	2-1/2	5/16	31431	31471	39631
*5/16	1/2	2-1/2	5/16	31433	31473	39633
*3/8	9/16	2-1/2	3/8	31435	31475	39635
7/16	9/16	2-3/4	7/16	31437	31477	39637
*1/2	5/8	3	1/2	31439	31479	39639
				31489	31481	39641
				31489	31481	39641

**TOLERANCES (mm)**  
DC = +0,000/-0,050  
DCON = h6

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.		
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)
1,0	2,0	38,0	3,0	41405	48884	48905
1,5	3,0	38,0	3,0	41409	48885	48906
2,0	4,0	38,0	3,0	41413	48886	48907
2,5	5,0	38,0	3,0	41417	48887	48908
3,0	6,0	38,0	3,0	41421	48888	48909
3,5	7,0	50,0	4,0	41425	48889	48910
4,0	8,0	50,0	4,0	41429	48890	48911
4,5	9,5	63,0	4,5	41433	48891	48912
5,0	10,0	63,0	5,0	41437	48892	48913
6,0	12,0	63,0	6,0	41441	48893	48914
7,0	12,0	63,0	8,0	41445	48894	48915
8,0	12,0	63,0	8,0	41449	48895	48916
9,0	14,0	75,0	9,0	41453	48896	48917
10,0	14,0	75,0	10,0	41457	48897	48918
11,0	14,0	75,0	12,0	41461	48898	48919
12,0	16,0	75,0	12,0	41465	48899	48920

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

**4 Flute Double End Ball End**
**14B**  
FRACTIONAL SERIES

**TOLERANCES (inch)**  
DC = +0.0000/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0010

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.		
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)
1/32	1/16	1-1/2	1/8	31402	31442	39602
3/64	3/32	1-1/2	1/8	31404	31444	39604
1/16	1/8	1-1/2	1/8	31406	31446	39606
5/64	1/8	1-1/2	1/8	31408	31448	39608
3/32	3/16	1-1/2	1/8	31410	31450	39610
7/64	3/16	1-1/2	1/8	31412	31452	39612
*1/8	1/4	1-1/2	1/8	31414	31454	39614
9/64	5/16	2	3/16	31416	31456	39616
5/32	5/16	2	3/16	31418	31458	39618
11/64	5/16	2	3/16	31420	31460	39620
*3/16	3/8	2	3/16	31422	31462	39622
13/64	1/2	2-1/2	1/4	31424	31464	39624
7/32	1/2	2-1/2	1/4	31426	31466	39626
15/64	1/2	2-1/2	1/4	31428	31468	39628
*1/4	1/2	2-1/2	1/4	31430	31470	39630
9/32	1/2	2-1/2	5/16	31432	31472	39632
*5/16	1/2	2-1/2	5/16	31434	31474	39634
*3/8	9/16	2-1/2	3/8	31436	31476	39636
7/16	9/16	2-3/4	7/16	31438	31478	39638
*1/2	5/8	3	1/2	31440	31480	39640
				31490	31482	39642
						31217

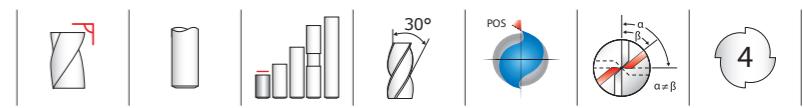
\*Series 14B Set

RE = 1/2 Cutting Diameter (DC)

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)
**14MB**  
METRIC SERIES

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.		
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)
1,0	2,0	38,0	3,0	41406	48947	48968
1,5	3,0	38,0	3,0	41410	48948	48990
2,0	4,0	38,0	3,0	41414	48949	48970
2,5	5,0	38,0	3,0	41418	48950	48971
3,0	6,0	38,0	3,0	41422	48951	48972
3,5	7,0	50,0	4,0	41426	48952	48973
4,0	8,0	50,0	4,0	41430	48953	48974
4,5	9,5	63,0	4,5	41434	48954	48975
5,0	10,0	63,0	5,0	41438	48955	48976
6,0	12,0	63,0	6,0	41442	48956	48977
7,0	12,0	63,0	8,0	41446	48957	48978
8,0	12,0	63,0	8,0	41450	48958	48979
9,0	14,0	75,0	9,0	41454	48959	48980
10,0	14,0	75,0	10,0	41458	48960	48981
11,0	14,0	75,0	12,0	41462	48961	48982
12,0	16,0	75,0	12,0	41466	48962	48983

RE = 1/2 Cutting Diameter (DC)

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)**4 Flute Square End Stub**
**16**  
FRACTIONAL SERIES

**TOLERANCES (inch)**  
DC = -0.0000/-0.0020  
DCON = h<sub>6</sub>

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.		
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)
1/16	1/8	1-1/2	1/8	31601	31650	31238
3/32	3/16	1-1/2	1/8	31603	31651	31252
1/8	1/4	1-1/2	1/8	31605	31652	31240
5/32	5/16	2	3/16	31607	31653	31241
3/16	3/8	2	3/16	31609	31654	31242
7/32	7/16	2	1/4	31611	31655	31243
1/4	1/2	2	1/4	31613	31656	31244
5/16	1/2	2	5/16	31615	31657	31245
3/8	5/8	2	3/8	31617	31658	31246
7/16	5/8	2-1/2	7/16	31619	31659	31247
1/2	5/8	2-1/2	1/2	31621	31660	31248
5/8	3/4	3	5/8	31623	31661	31249
3/4	1	3	3/4	31625	31662	31250

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)
**16M**  
METRIC SERIES

**TOLERANCES (mm)**  
DC = +0,000/-0,050  
DCON = h<sub>6</sub>

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	EDP NO.		
				UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)
1,0	2,0	38,0	3,0	41605	49136	49157
1,5	3,0	38,0	3,0	41609	49137	49158
2,0	4,0	38,0	3,0	41613	49138	49159
2,5	5,0	38,0	3,0	41617	49139	49160
3,0	6,0	38,0	3,0	41621	49140	49161
3,5	7,0	50,0	4,0	41625	49141	49162
4,0	8,0	50,0	4,0	41629	49142	49163
4,5	9,5	50,0	4,5	41633	49143	49164
5,0	10,0	50,0	5,0	41637	49144	49165
6,0	12,0	50,0	6,0	41641	49145	49166
7,0	12,0	50,0	8,0	41645	49146	49167
8,0	12,0	50,0	8,0	41649	49147	49168
9,0	14,0	50,0	9,0	41653	49148	49169
10,0	16,0	50,0	10,0	41657	49149	49170
11,0	19,0	63,0	12,0	41661	49150	49171
12,0						

**4 Flute High Shear****54**

FRACTIONAL SERIES

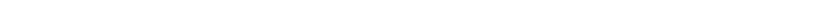


NON-FERROUS



PLASTICS/COMPOSITES

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

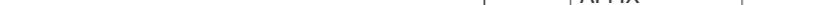


## TOLERANCES (inch)

DC = +0.0000/-0.0020  
DCON = h<sub>6</sub>  
RE = +0.0050/-0.0050

EDP NO.

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	Ti-NAMITE-C (TiCN)
1/16	3/16	1-1/2	1/8	35473	35500
3/32	3/8	1-1/2	1/8	35475	35501
1/8	7/16	1-1/2	1/8	35477	35502
5/32	9/16	2	3/16	35478	35503
3/16	9/16	2	3/16	35479	35504
7/32	5/8	2-1/2	1/4	35480	35505
1/4	3/4	2-1/2	1/4	35481	35506
9/32	3/4	2-1/2	5/16	35482	35507
5/16	13/16	2-1/2	5/16	35483	35508
3/8	7/8	2-1/2	3/8	35485	35509
7/16	1	2-3/4	7/16	35487	35510
1/2	1	3	1/2	35489	35511
9/16	1-1/8	3-1/2	9/16	35491	35512
5/8	1-1/4	3-1/2	5/8	35493	35513
3/4	1-1/2	4	3/4	35495	35514
1	1-1/2	4	1	35497	35515

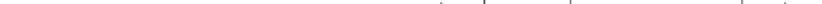


## TOLERANCES (mm)

DC = +0,000/-0,050  
DCON = h<sub>6</sub>  
RE = +0,000/-0,025

EDP NO.

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	Ti-NAMITE-C (TiCN)
3,0	8,0	38,0	3,0	45477	45478
3,5	10,0	57,0	6,0	45479	45480
4,0	11,0	57,0	6,0	45481	45482
4,5	11,0	57,0	6,0	45483	45484
5,0	13,0	57,0	6,0	45485	45486
6,0	13,0	57,0	6,0	45487	45488
8,0	19,0	63,0	8,0	45489	45490
10,0	22,0	72,0	10,0	45491	45492
12,0	26,0	83,0	12,0	45493	45494
14,0	26,0	83,0	14,0	45495	45496
16,0	32,0	92,0	16,0	45497	45498
20,0	38,0	104,0	20,0	45499	45500



## TOLERANCES (mm)

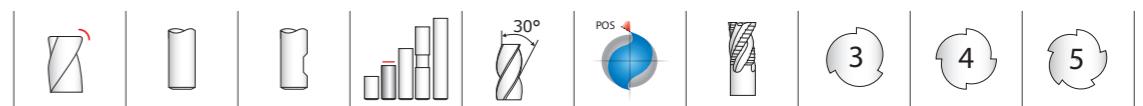
DC = +0,000/-0,100  
DCON = h<sub>6</sub>  
RE = +0,127/-0,127

EDP NO.

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NO. OF FLUTES	EDP NO.
*1/4	3/4	2-1/2	1/4	.045	3	36107 36106 36110
*5/16	3/4	2-1/2	5/16	.045	3	36109 36108 36111
3/8	7/8	2-1/2	3/8	.060	3	36113 36112 36114
1/2	1	3	1/2	.060	4	36117 36116 36118
5/8	1-1/4	3-1/2	5/8	.060	4	36121 36120 36122
3/4	1-5/8	4	3/4	.060	4	36125 36124 36126
1	1-3/4	4	1	.060	5	36129 36128 36130



\*Without Flat

**Single End Roughers (Coarse Pitch)****61**

FRACTIONAL SERIES



NON-FERROUS

PLASTICS/COMPOSITES

HARDENED STEELS

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

## TOLERANCES (inch)

DC = +0.0000/-0.0040  
DCON = h<sub>6</sub>  
RE = +0.0050/-0.0050

EDP NO.

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NO. OF FLUTES	EDP NO.
*1/4	3/4	2-1/2	1/4	.045	3	36107 36106 36110
*5/16	3/4	2-1/2	5/16	.045	3	36109 36108 36111
3/8	7/8	2-1/2	3/8	.060	3	36113 36112 36114
1/2	1	3	1/2	.060	4	36117 36116 36118
5/8	1-1/4	3-1/2	5/8	.060	4	36121 36120 36122
3/4	1-5/8	4	3/4	.060	4	36125 36124 36126
1	1-3/4	4	1	.060	5	36129 36128 36130

**61M**

METRIC SERIES



NON-FERROUS

PLASTICS/COMPOSITES

HARDENED STEELS

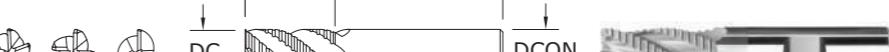
For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

## TOLERANCES h10 (mm)

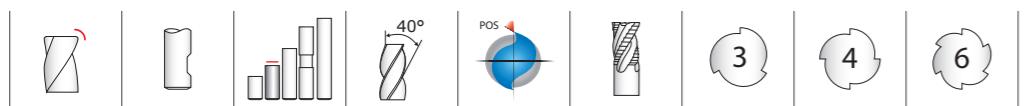
DC = +0,000/-0,100  
DCON = h<sub>6</sub>  
RE = +0,127/-0,127

EDP NO.

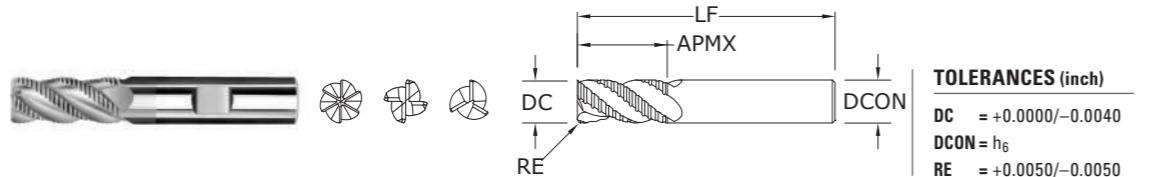
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NO. OF FLUTES	EDP NO.
6,0	19,0	63,0	6,0	1,14	3	46107 46106 46110
8,0	19,0	63,0	8,0	1,14	3	46109 46108 46111
10,0	22,0	72,0	10,0	1,52	3	46113 46112 46114
12,0	26,0	83,0	12,0	1,52	4	46117 46116 46118
16,0	32,0	92,0	16,0	1,52	4	46121 46120 46122
20,0	38,0	104,0	20,0	1,52	4	46129 46128 46132
25,0	44,0	104,0	25,0	1,52	5	46131 46130 46133



## FRACTIONAL

**Single End Roughers (Fine Pitch)****62**

FRACTIONAL SERIES



**TOLERANCES (inch)**  
 DC = +0.0000/-0.0040  
 DCON =  $h_6$   
 RE = +0.0050/-0.0050

**STAINLESS STEELS**  
**HIGH TEMP ALLOYS**  
**TITANIUM**  
 For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

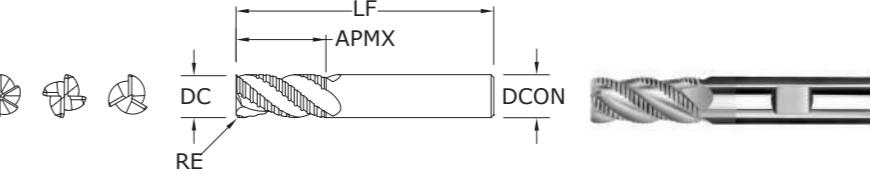
\*Without Flat

## METRIC

**Single End Roughers (Fine Pitch)****62M**

METRIC SERIES

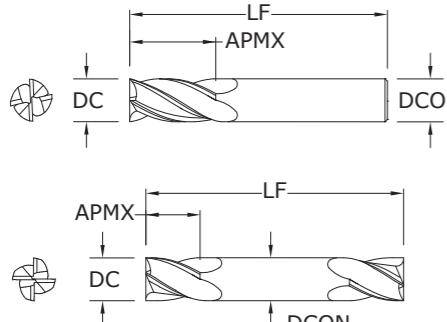
**TOLERANCES h10 (mm)**  
 DC = +0,000 / -0,100  
 DCON =  $h_6$   
 RE = +0,127 / -0,127



**STAINLESS STEELS**  
**HIGH TEMP ALLOYS**  
**TITANIUM**  
 For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

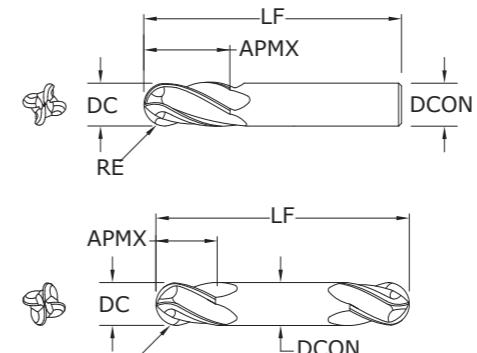
EDP NO.						
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	CORNER RADIUS RE	NO. OF FLUTES	EDP NO.
6,0	19,0	63,0	6,0	1,14	3	46207 46206 46210
8,0	19,0	63,0	8,0	1,14	3	46209 46208 46211
10,0	22,0	72,0	10,0	1,52	3	46213 46212 46214
12,0	26,0	83,0	12,0	1,52	4	46217 46216 46218
16,0	32,0	92,0	16,0	1,52	4	46221 46220 46222
20,0	38,0	104,0	20,0	1,52	4	46229 46228 46232
25,0	44,0	104,0	25,0	1,52	5	46231 46230 46233

## FRACTIONAL End Mill Sets



Pictured:  
Series 1 4 Flute  
Single End Square  
Endmill Set

CUTTING DIAMETER DC	SINGLE END LENGTH OF CUT APMX	DOUBLE END LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON
1/8	1/2	1/4	1-1/2	1/8
3/16	5/8	3/8	2	3/16
1/4	3/4	1/2	2-1/2	1/4
5/16	13/16	1/2	2-1/2	5/16
3/8	1	9/16	2-1/2	3/8
1/2	1	5/8	3	1/2



Pictured:  
Series 1 4 Flute Single  
End Ball Endmill Set

CUTTING DIAMETER DC	SINGLE END LENGTH OF CUT APMX	DOUBLE END LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON
1/8	1/2	1/4	1-1/2	1/8
3/16	5/8	3/8	2	3/16
1/4	3/4	1/2	2-1/2	1/4
5/16	13/16	1/2	2-1/2	5/16
3/8	1	9/16	2-1/2	3/8
1/2	1	5/8	3	1/2

RE = 1/2 Cutting Diameter (DC)

## Square End FRACTIONAL SERIES



For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

DESCRIPTION	EDP NO.			
	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
Series 1 – 4 Flute, Single End	30189	39189	39089	30030
Series 3 – 2 Flute, Single End	30389	39389	39589	30470
Series 5 – 3 Flute, Single End	30589	39789	30810	30850
Series 14 – 4 Flute, Double End	31489	31481	39641	31190
Series 15 – 2 Flute, Double End	31589	31581	39691	31336

## Ball End FRACTIONAL SERIES



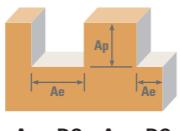
For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

DESCRIPTION	EDP NO.			
	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
Series 1B – 4 Flute, Single End	30190	39190	39090	30070
Series 3B – 2 Flute, Single End	30390	39390	39590	30600
Series 5B – 3 Flute, Single End	30590	30900	30944	31169
Series 14B – 4 Flute, Double End	31490	31482	39642	31217
Series 15B – 2 Flute, Double End	31590	31582	39692	31357

## FRACTIONAL

# 2 Flute: Square & Ball End

# 4 Flute: Square & Ball End



Diamond 1, 1B, 3, 3B Fractional	Vc (sfm)	DC • in						
		Ae x DC	Ap x DC	1/8	1/4	5/16		
GRAPHITE Ultrafine, Superfine	Profile 	720  ≤ 0.25  (576-864)	RPM	22003	11002	8801	7334	5501
			Fz	0.0009	0.0023	0.0036	0.0043	0.0058
			Feed 2 flutes (ipm)	38.3	50.6	63.4	63.1	63.8
	Slot 	580  ≤ 1  (464-696)	Fz	0.0075	0.0020	0.0031	0.0038	0.0050
			Feed 2 flutes (ipm)	265.9	35.4	44.0	44.9	44.3
			Feed 4 flutes (ipm)	531.7	70.9	87.9	89.8	88.6
	Profile 	385  ≤ 0.25  (308-462)	RPM	11766	5883	4706	3922	2941
			Fz	0.0005	0.0014	0.0022	0.0026	0.0035
			Feed 2 flutes (ipm)	12.2	16.5	20.7	20.4	20.6
COMPOSITES FRP, CFRP, GRP	Profile 	350  ≤ 1  (280-420)	Fz	0.0005	0.0012	0.0019	0.0023	0.0030
			Feed 2 flutes (ipm)	9.6	12.8	16.3	16.4	16.0
			Feed 3 flutes (ipm)	19.3	25.7	32.5	32.8	32.1
	Slot 	1200  ≤ 0.25  (960-1440)	RPM	36672	18336	14669	12224	9168
			Fz	0.0009	0.0023	0.0036	0.0043	0.0058
			Feed 2 flutes (ipm)	63.8	84.3	105.6	105.1	106.3
	Profile 	960  ≤ 1  (768-1152)	Fz	0.0008	0.0020	0.0031	0.0038	0.0050
			Feed 2 flutes (ipm)	44.0	58.7	72.8	74.3	73.3
			Feed 3 flutes (ipm)	88.0	117.4	145.5	148.6	146.7

rpm =  $(V_c \times 3.82) / DC$   
 ipm = Fz x number of flutes x rpm  
 finish cuts typically require reduced feed and cut depths (.02 x D maximum)  
 refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

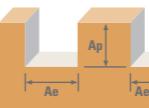
# FRACTIONAL

# 2 Flute: Square, Double, Stub, Long, Ball, Corner Radius

# 3 Flute: Square, Ball, Tapered

# 4 Flute: Square, Double, Stub, Ball, Corner Radius

# Tapered: Square, Radius



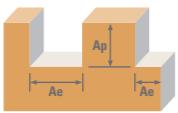
Series 1, 3, 5, 14, 15, 16, 17, 23, 24, 59 Fractional	Hardness	Flutes	Ae x DC	Ap x DC	Vc (sfm)	DC • in							
						1/64	1/32	1/16	1/8	1/4	3/8	1/2	
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Profile	2	≤ 0.50	≤ 1.5	460 (368-552)	RPM	112461	56230	28115	14058	7029	4686
		Slot	2	1	≤ 1	335 (268-402)	Fz	0.00003	0.00006	0.00013	0.0003	0.0008	0.0015
		Profile	3	≤ 0.25	≤ 1.5	335 (268-402)	Feed (ipm)	10.1	10.1	11.0	12.7	16.9	21.1
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Slot	3	1	≤ 0.5	335 (268-402)	RPM	81901	40950	20475	10238	5119	3413
		Profile	4	≤ 0.25	≤ 1.5	335 (268-402)	Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011
		Slot	4	1	≤ 0.4	335 (268-402)	Feed (ipm)	9.8	9.8	10.6	12.3	16.4	20.5
	M	Profile	2	≤ 0.50	≤ 1.5	370 (296-444)	RPM	90458	45229	22614	11307	5654	3769
		Slot	3	≤ 0.25	≤ 1.5	370 (296-444)	Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011
		Profile	4	≤ 0.25	≤ 1.5	370 (296-444)	Feed (ipm)	3.6	4.5	4.1	4.5	6.8	8.3
	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	Slot	2	1	≤ 1	270 (216-324)	RPM	66010	33005	16502	8251	4126	2750
		Profile	3	≤ 0.25	≤ 1.5	270 (216-324)	Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011
		Slot	4	1	≤ 0.4	270 (216-324)	Feed (ipm)	5.3	6.6	5.9	6.6	9.9	12.1
	N	Profile	2	≤ 0.50	≤ 1.5	255 (204-306)	RPM	62342	31171	15586	7793	3896	2598
		Slot	3	≤ 0.25	≤ 1.5	255 (204-306)	Fz	0.00002	0.00004	0.00008	0.0002	0.0005	0.0009
		Profile	4	≤ 0.25	≤ 1.5	255 (204-306)	Feed (ipm)	2.5	2.5	2.5	2.6	3.9	4.7
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L, 17-4 PH, 15-5, 13-4, Custom 450	Slot	2	1	≤ 1	185 (148-222)	RPM	45229	22614	11307	5654	2827	1885
		Profile	3	≤ 0.25	≤ 1.5	185 (148-222)	Fz	0.00002	0.00004	0.00008	0.0002	0.0005	0.0009
		Slot	4	1	≤ 0.4	185 (148-222)	Feed (ipm)	3.6	3.6	3.6	3.8	5.7	6.8
	K	Profile	2	≤ 0.50	≤ 1.5	335 (268-402)	RPM	81901	40950	20475	10238	5119	3413
		Slot	3	≤ 0.25	≤ 1.5	335 (268-402)	Fz	0.00003	0.00006	0.00013	0.0003	0.0008	0.0015
		Profile	4	≤ 0.25	≤ 1.5	335 (268-402)	Feed (ipm)	4.9	4.9	5.3	6.1	8.2	10.2
	CAST IRONS Gray, Malleable, Ductile	Slot	2	1	≤ 1	245 (196-294)	RPM	59898	29949	14974	7487	3744	2496
		Profile	3	≤ 0.25	≤ 1.5	245 (196-294)	Fz	0.00003	0.00006	0.00013	0.0003	0.0008	0.0015
		Slot	4	1	≤ 0.4	245 (196-294)	Feed (ipm)	3.6	3.6	3.9	4.5	6.0	7.5
	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	Profile	2	≤ 0.50	≤ 1.5	880 (704-1056)	RPM	215142	107571	53786	26893	13446	8964
		Slot	3	≤ 0.25	≤ 1.5	880 (704-1056)	Fz	0.00006	0.00013	0.00025	0.0006	0.0016	0.0030
		Profile	4	≤ 0.25	≤ 1.5	880 (704-1056)	Feed (ipm)	25.8	28.0	26.9	32.3	43.0	53.8
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	Slot	2	1	≤ 1	640 (512-768)	RPM	156467	78234	39117	19558	9779</	

## FRACTIONAL

- 2 Flute: Square, Double, Stub, Long, Ball, Corner Radius**  
**3 Flute: Square, Ball, Tapered**  
**4 Flute: Square, Double, Stub, Ball, Corner Radius**  
**Tapered: Square, Radius**

## FRACTIONAL

- 2 Flute: High Shear**  
**4 Flute: High Shear**

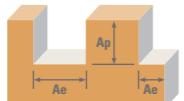


Series 1, 3, 5, 14, 15, 16, 17, 23, 24, 59 Fractional	Hardness	Flutes	Ae x DC	Ap x DC	Vc (sfm)	DC • in								
						1/64	1/32	1/16	1/8	1/4	3/8	1/2	3/4	1
N  PLASTICS Polycarbonate, PVC, Polypropylene	≤ 150 Bhn or ≤ 7 HRc	Profile	2 ≤ 0.50 ≤ 1.5	(704-1056)	880 RPM	215142	107571	53786	26893	13446	8964	6723	4482	3362
					Fz	0.00006	0.00013	0.00025	0.0006	0.0016	0.0030	0.0040	0.0048	0.0056
					Feed (ipm)	25.8	28.0	26.9	32.3	43.0	53.8	53.8	43.0	37.6
		Slot	2 1 ≤ 1	(512-768)	640 RPM	156467	78234	39117	19558	9779	6519	4890	3260	2445
					Fz	0.00006	0.00013	0.00025	0.0006	0.0016	0.0030	0.0040	0.0048	0.0056
					Feed (ipm)	18.8	20.3	19.6	23.5	31.3	39.1	39.1	31.3	27.4
		Profile	2 ≤ 0.50 ≤ 1.5	(528-792)	660 RPM	161357	80678	40339	20170	10085	6723	5042	3362	2521
					Fz	0.00006	0.00013	0.00025	0.0006	0.0016	0.0030	0.0040	0.0048	0.0056
					Feed (ipm)	19.4	21.0	20.2	24.2	32.3	40.3	40.3	32.3	28.2
		GRAPHITE	3 ≤ 0.25 ≤ 1.5	(384-576)	480 RPM	117350	58675	29338	14669	7334	4890	3667	2445	1834
					Fz	0.00006	0.00013	0.00025	0.0006	0.0016	0.0030	0.0040	0.0048	0.0056
					Feed (ipm)	14.1	15.3	14.7	17.6	23.5	29.3	29.3	23.5	20.5
S  SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 718, Incoloy 800, Monel 400, Rene, Waspalloy	≤ 300 Bhn or ≤ 32 HRc	Profile	2 ≤ 0.50 ≤ 1.5	(52-78)	65 RPM	15891	7946	3973	1986	993	662	497	331	248
					Fz	0.00002	0.00003	0.00006	0.0002	0.0004	0.0008	0.0010	0.0012	0.0014
					Feed (ipm)	0.6	0.5	0.5	0.7	0.7	1.1	1.0	0.8	0.7
		Slot	2 1 ≤ 1	(36-54)	45 RPM	11002	5501	2750	1375	688	458	344	229	172
					Fz	0.00002	0.00003	0.00006	0.0002	0.0004	0.0008	0.0010	0.0012	0.0014
					Feed (ipm)	0.4	0.3	0.3	0.5	0.5	0.7	0.7	0.6	0.5
		TITANIUM ALLOYS	2 ≤ 0.25 ≤ 1.5	(104-156)	180 RPM	44006	22003	11002	5501	2750	1834	1375	917	688
					Fz	0.00002	0.00004	0.00008	0.0002	0.0005	0.0009	0.0012	0.0014	0.0017
					Feed (ipm)	1.8	1.8	1.8	2.2	2.8	3.3	3.3	2.6	2.3
H  TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc	Profile	2 ≤ 0.50 ≤ 1.5	(144-216)	130 RPM	31782	15891	7946	3973	1986	1324	993	662	497
					Fz	0.00002	0.00004	0.00008	0.0002	0.0005	0.0009	0.0012	0.0014	0.0017
					Feed (ipm)	1.3	1.3	1.3	1.6	2.0	2.4	2.4	1.9	1.7
		Slot	2 1 ≤ 1	(104-156)	315 RPM	77011	38506	19253	9626	4813	3209	2407	1604	1203
					Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021
					Feed (ipm)	3.1	3.9	3.5	3.9	5.8	7.1	7.2	5.8	5.1
		Profile	2 ≤ 0.25 ≤ 1.5	(252-378)	230 RPM	56230	28115	14058	7029	3514	2343	1757	1171	879
					Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021
					Feed (ipm)	2.2	2.8	2.5	2.8	4.2	5.2	5.3	4.2	3.7
		Slot	2 1 ≤ 1	(184-276)	230 RPM	3.4	4.2	3.8	4.2	6.3	7.7	7.9	6.3	5.5
					Feed (ipm)	4.5	5.6	5.1	5.6	8.4	10.3	10.5	8.4	7.4

Bhn (Brinell)      HRc (Rockwell C)  
 rpm =  $(V_c \times 3.82) / DC$   
 ipm = Fz x number of flutes x rpm  
 reduce speed and feed for materials harder than listed  
 for tapered end mills, base the speed on the largest diameter contacting  
 the workpiece and the feed on the smallest diameter  
 limit cut depths of long and extra long flute mills to .05 x DC when slotting  
 or profiling  
 reduce feed and Ae when finish milling (.02 x DC maximum)  
 refer to the SGS Tool Wizard® for complete technical information  
 ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

Series 52, 54 Fractional	Hardness	Flutes	Ae x DC	Ap x DC	Vc (sfm)	DC • in						
						1360	RPM	41562	20781	13854	10390	
N  ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075	≤ 150 Bhn or ≤ 7 HRc	Profile	2 ≤ 0.3 ≤ 1.5	(1088-1632)	1360 RPM	Fz	0.00069	0.0018	0.0034	0.0046	0.0055	0.0064
					Feed (ipm)	57.4	74.8	94.2	95.6	76.2	66.5	
					1090 RPM	33310	16655	11103	8328	5552	4164	
		Slot	2 1 ≤ 1	(872-1308)	Fz	0.00063	0.0017	0.0032	0.0042	0.0050	0.0059	
					Feed (ipm)	42.0	56.6	71.1	70.0</			

## FRACTIONAL

**Single End Roughers (Coarse Pitch)**

Series 61 Fractional	Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in						
					1/4	3/8	1/2	3/4	1		
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Profile Slot	$\leq 0.5$	$\leq 1.5$	500 (400-600)	RPM Fz Feed (ipm)	7640 0.0006 13.8	5093 0.0011 16.8	3820 0.0014 21.4	2547 0.0017 17.3	1910 0.0020 19.1
					400 (320-480)	RPM Fz Feed (ipm)	6112 0.0006 11.0	4075 0.0011 13.4	3056 0.0014 17.1	2037 0.0017 13.9	1528 0.0020 15.3
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Profile Slot	$\leq 0.5$	$\leq 1.5$	365 (292-438)	RPM Fz Feed (ipm)	5577 6.7 6.7	3718 8.9 8.9	2789 12.3 12.3	1859 9.7 9.7	1394 10.5 10.5
					295 (236-354)	RPM Fz Feed (ipm)	4508 5.4 5.4	3005 7.2 7.2	2254 9.9 9.9	1503 7.8 7.8	1127 8.5 8.5
K	CAST IRONS Gray, Malleable, Ductile	Profile Slot	$\leq 0.5$	$\leq 1.5$	365 (292-438)	RPM Fz Feed (ipm)	5577 0.0008 13.4	3718 0.0015 16.7	2789 0.0020 22.3	1859 0.0024 17.8	1394 0.0028 19.5
					295 (236-354)	RPM Fz Feed (ipm)	4508 0.0008 10.8	3005 0.0015 13.5	2254 0.0020 18.0	1503 0.0024 14.4	1127 0.0028 15.8
	H	Profile Slot	$\leq 0.5$	$\leq 1.5$	345 (276-414)	RPM Fz Feed (ipm)	5272 0.0006 9.5	3514 0.0009 9.5	2636 0.0015 15.8	1757 0.0018 12.7	1318 0.0021 13.8
					275 (220-330)	RPM Fz Feed (ipm)	4202 0.0006 7.6	2801 0.0009 7.6	2101 0.0015 12.6	1401 0.0018 10.1	1051 0.0021 11.0

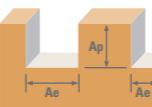
Bhn (Brinell) HRc (Rockwell C)

rpm =  $(V_c \times 3.82) / DC$ ipm =  $F_z \times \text{number of flutes} \times rpm$ 

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

## FRACTIONAL

**Single End Roughers (Fine Pitch)**

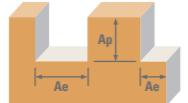
Series 62 Fractional	Hardness	Ae x DC	Ap x DC	Vc (sfm)	DC • in					
					1/4	3/8	1/2	3/4	1	
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	Profile Slot	$\leq 0.5$	$\leq 1.5$	405 (324-486)	RPM Fz Feed (ipm)	6188 11.1 11.1	4126 13.6 13.6	3094 18.6 15.7	2063 15.7 19.5
					325 (260-390)	RPM Fz Feed (ipm)	4966 8.9 8.9	3311 10.9 10.9	2483 14.9 12.6	1655 12.6 15.6
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L, 17-4PH, 15-5PH, 13-4PH, Custom 450	Profile Slot	$\leq 0.5$	$\leq 1.5$	280 (224-336)	RPM Fz Feed (ipm)	4278 6.4 6.4	2852 7.7 7.7	2139 10.3 8.6	1426 10.9 10.9
					225 (180-270)	RPM Fz Feed (ipm)	3438 5.2 5.2	2292 6.2 6.2	1719 8.3 8.3	1146 6.9 8.8
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspalloy	Profile Slot	$\leq 0.5$	$\leq 1.5$	70 (56-84)	RPM Fz Feed (ipm)	1070 1.3 1.3	713 1.7 1.7	535 2.1 2.1	357 1.9 1.9
					56 (45-67)	RPM Fz Feed (ipm)	856 0.0004 1.0	570 0.0008 1.4	428 0.0010 1.7	285 0.0013 1.5
	TITANIUM ALLOYS Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo25Sn0.5Si, Ti10Al2Fe3Al, Ti5Al5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Mo, Ti6Al6V6Sn, Ti152 Cr3Sn3Al	Profile Slot	$\leq 0.5$	$\leq 1.5$	155 (124-186)	RPM Fz Feed (ipm)	2368 3.6 3.6	1579 4.3 4.3	1184 5.7 5.7	789 4.7 6.0
					195 (156-234)	RPM Fz Feed (ipm)	2980 0.0005 4.5	1986 0.0009 5.4	1490 0.0012 7.2	993 0.0015 6.0

Bhn (Brinell) HRc (Rockwell C)

rpm =  $(V_c \times 3.82) / DC$ ipm =  $F_z \times \text{number of flutes} \times rpm$ 

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

**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 DC	Ap x DC	Vc (m/min)	DC • mm										
						0.4	0.75	1.5	3	6	10	12	20	25		
P	≤ 175 Bhn or ≤ 7 HRc	Profile	140	RPM	111483 59458 29729 14864 7432 4459 3716 2230 1784	Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070	
			2	≤ 0.50	≤ 1.5	(112-168)	Feed (mm/min)	178	178	184	208	282	357	357	285	250
			3	≤ 0.25	≤ 1.5			268	268	276	312	424	535	535	428	375
			4	≤ 0.25	≤ 1.5			357	357	369	416	565	713	713	571	499
		Slot	102	RPM	81189 43301 21650 10825 5413 3248 2706 1624 1299	Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070	
			2	1	≤ 1	(82-123)	Feed (mm/min)	130	130	134	152	206	260	260	208	182
			3	1	≤ 0.5			195	195	201	227	309	390	390	312	273
			4	1	≤ 0.4			260	260	268	303	411	520	520	416	364
		Profile	102	RPM	81189 43301 21650 10825 5413 3248 2706 1624 1299	Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052	
			2	≤ 0.50	≤ 1.5	(82-123)	Feed (mm/min)	81	104	95	130	152	188	195	156	135
			3	≤ 0.25	≤ 1.5			122	156	143	195	227	283	292	234	203
			4	≤ 0.25	≤ 1.5			162	208	191	260	303	377	390	312	270
		Slot	75	RPM	59377 31668 15834 7917 3958 2375 1979 1188 950	Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052	
			2	1	≤ 1	(60-90)	Feed (mm/min)	59	76	70	95	111	138	143	114	99
			3	1	≤ 0.5			119	152	139	190	222	276	285	228	198
			4	1	≤ 0.4			119	152	139	190	222	276	285	228	198
M	≤ 275 Bhn or ≤ 28 HRc	Profile	113	RPM	89671 47825 23912 11956 5978 3587 2989 1793 1435	Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052	
			2	≤ 0.50	≤ 1.5	(90-135)	Feed (mm/min)	90	115	105	143	167	208	215	172	149
			3	≤ 0.25	≤ 1.5			135	172	158	215	251	312	323	258	224
			4	≤ 0.25	≤ 1.5			179	230	210	287	335	416	430	344	298
		Slot	82	RPM	65436 34899 17449 8725 4362 2617 2181 1309 1047	Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052	
			2	1	≤ 1	(66-99)	Feed (mm/min)	65	84	77	105	122	152	157	126	109
			3	1	≤ 0.5			98	126	115	157	183	228	236	188	163
			4	1	≤ 0.4			131	168	154	209	244	304	314	251	218
		Profile	78	RPM	61800 32960 16480 8240 4120 2472 2060 1236 989	Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042	
			2	≤ 0.50	≤ 1.5	(62-93)	Feed (mm/min)	62	66	63	66	99	119	119	91	83
			3	≤ 0.25	≤ 1.5			93	99	94	99	148	178	179	137	125
			4	≤ 0.25	≤ 1.5			124	132	125	132	198	237	239	183	166
K	≤ 275 Bhn or ≤ 28 HRc	Profile	56	RPM	44836 23912 11956 5978 2989 1793 1495 897 717	Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042	
			2	1	≤ 1	(45-68)	Feed (mm/min)	45	48	45	48	72	86	87	66	60
			3	1	≤ 0.5			67	72	68	72	108	129	130	100	90
			4	1	≤ 0.4			90	96	91	96	143	172	173	133	121
		Slot	102	RPM	81189 43301 21650 10825 5413 3248 2706 1624 1299	Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070	
			2	≤ 0.50	≤ 1.5	(82-123)	Feed (mm/min)	130	130	134	152	206	260	260	208	182
			3	≤ 0.25	≤ 1.5			195	195	201	227	309	390	390	312	273
			4	≤ 0.25	≤ 1.5			260	260	268	303	411	520	520	416	364
		Profile	75	RPM	59377 31668 15834 7917 3958 2375 1979 1188 950	Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070	
			2	1	≤ 1	(60-90)	Feed (mm/min)	95	95	98	111	150	190	190	152	133
			3	1	≤ 0.5			143	143	147	166	226	285	285	228	200
			4	1	≤ 0.4			190	190	196	222	301	380	380	304	266
N	≤ 150 Bhn or ≤ 7 HRc	Profile	268	RPM	213272 113745 56872 28436 14218 8531 7109 4265 3412	Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140	
			2	≤ 0.50	≤ 1.5	(215-322)	Feed (mm/min)	640	728	682	796	1081	1365	1365	1092	955
			3	≤ 0.25	≤ 1.5			960	1092	1024	1130	1565	1939	1939	1426	1357
			4	1	≤ 1	(156-234)	Feed (mm/min)	698	794							

## 2 Flute: High Shear 4 Flute: High Shear

Series 52M, 54M Metric	Hardness	Flutes	Ae x DC	Ap x DC	Vc (m/min)	DC • mm					
						3	6	10	12	20	25
ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075	$\leq 150$ Bhn or $\leq 7$ HRc	Profile	2	$\leq 0.3$	$\leq 1.5$	415	RPM	43947	21973	13184	10987
						Fz	0.0166	0.043	0.091	0.110	0.147
		Slot	4	$\leq 0.3$	$\leq 1.5$	(332-497)	Feed (mm/min)	1459	1890	2399	2417
						2918	3779	4799	4834	3876	3375
		Profile	2	1	$\leq 1$	332	RPM	35222	17611	10567	8806
						Fz	0.0151	0.041	0.085	0.101	0.133
		Slot	4	1	$\leq 0.25$	(266-399)	Feed (mm/min)	1064	1444	1796	1779
						2127	2888	3593	3557	2811	2502
	ALUMINUM DIE CAST ALLOYS (HIGH SILICON) A-390, A-392, B-390	$\leq 125$ Bhn or $\leq 77$ HRc	Profile	2	$\leq 0.3$	$\leq 1.5$	155	RPM	16480	8240	4944
						Fz	0.0166	0.043	0.091	0.110	0.147
						(124-187)	Feed (mm/min)	547	709	900	906
						1094	1417	1800	1813	1454	1266
		Slot	4	1	$\leq 1$	125	RPM	13249	6624	3975	3312
						Fz	0.0151	0.041	0.085	0.101	0.133
		Profile	2	1	$\leq 1$	(100-150)	Feed (mm/min)	400	543	676	669
						800	1086	1351	1338	1057	941
		$\leq 140$ Bhn or $\leq 3$ HRc	Profile	2	$\leq 0.3$	$\leq 1.5$	180	RPM	19065	9533	5720
						Fz	0.0094	0.024	0.053	0.062	0.083
						(144-216)	Feed (mm/min)	358	458	606	591
						717	915	1213	1182	949	851
			Slot	4	1	$\leq 0.25$	145	RPM	15349	7675	4605
						Fz	0.0086	0.024	0.048	0.058	0.077
		$\leq 200$ Bhn or $\leq 23$ HRc	Profile	2	$\leq 0.3$	$\leq 1.5$	72	RPM	7594	3797	2278
						Fz	0.0094	0.024	0.053	0.062	0.083
						(57-86)	Feed (mm/min)	143	182	241	235
			Slot	4	1	$\leq 0.25$	58	RPM	6140	3070	1842
						Fz	0.0086	0.024	0.048	0.058	0.077
						(46-69)	Feed (mm/min)	106	147	177	178
						211	295	354	356	284	250

continued on next page

Series 52M, 54M Metric	Hardness	Flutes	Ae x DC	Ap x DC	Vc (m/min)	DC • mm					
						3	6	10	12	20	25
PLASTICS ABS, Polycarbonate, PVC, Polypropylene	$\leq 150$ Bhn or $\leq 7$ HRc	Profile	2	$\leq 0.3$	$\leq 1.5$	488	RPM	51702	25851	15511	12926
						Fz	0.0264	0.072	0.149	0.178	0.237
		Slot	4	$\leq 0.3$	$\leq 1.5$	(390-585)	Feed (mm/min)	2730	3723	4622	4601
						5460	7445	9244	9203	7352	6204
		Profile	2	1	$\leq 1$	390	RPM	41362	20681	12409	10340
						Fz	0.0240	0.065	0.136	0.163	0.210
		Slot	4	1	$\leq 0.25$	(312-468)	Feed (mm/min)	1985	2689	3375	3371
						3971	5377	6750	6742	5212	4725
	$\leq 125$ Bhn or $\leq 77$ HRc	Profile	2	$\leq 0.3$	$\leq 1.5$	219	RPM	23266	11633	6980	5816
						Fz	0.0197	0.053	0.109	0.132	0.173
		Slot	4	$\leq 0.3$	$\leq 1.5$	(176-263)	Feed (mm/min)	917	1233	1522	1536
						1833	2466	3043	3071	2415	2122
		Profile	2	1	$\leq 1$	175	RPM	18580	9290	5574	4645
						Fz	0.0180	0.048	0.101	0.120	0.160
	COPPER ALLOYS Aluminum Bronze, Muntz Brass, Naval, Brass, Red Brass	$\leq 140$ Bhn or $\leq 3$ HRc	Slot	4	$\leq 0.25$	(140-210)	Feed (mm/min)	669	892	1126	1115
						1338	1784	2252	2230	1784	1561
			Profile	2	$\leq 0.3$	$\leq 1.5$	$\leq 1.5$	$\leq 1.5$	$\leq 1.5$	$\leq 1.5$	$\leq 1.5$
						$\leq 1.5$	$\leq 1.5$	$\leq 1.5$	$\leq 1.5$	$\leq 1.5$	$\leq 1.5$

# Single End Roughers (Coarse Pitch)

Series 61M Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm						
					6	10	12	20	25		
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Profile 	$\leq 0.5$	$\leq 1.5$	152	RPM	8078	4847	4039	2424	1939
					Fz	0.014	0.029	0.034	0.045	0.050	
		Slot 	1	$\leq 1$	122	RPM	6463	3878	3231	1939	1551
					Fz	0.014	0.029	0.034	0.045	0.050	
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Profile 	$\leq 0.5$	$\leq 1.5$	111	RPM	5897	3538	2949	1769	1415
					Fz	0.010	0.021	0.026	0.035	0.038	
		Slot 	1	$\leq 1$	90	RPM	4766	2860	2383	1430	1144
					Fz	0.010	0.021	0.026	0.035	0.038	
K	CAST IRONS Gray, Malleable, Ductile	Profile 	$\leq 0.5$	$\leq 1.5$	111	RPM	5897	3538	2949	1769	1415
					Fz	0.019	0.040	0.048	0.064	0.070	
		Slot 	1	$\leq 1$	90	RPM	4766	2860	2383	1430	1144
					Fz	0.019	0.040	0.048	0.064	0.070	
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile 	$\leq 0.5$	$\leq 1.5$	105	RPM	5574	3344	2787	1672	1338
					Fz	0.014	0.024	0.036	0.048	0.053	
		Slot 	1	$\leq 1$	84	RPM	4443	2666	2222	1333	1066
					Fz	0.014	0.024	0.036	0.048	0.053	

Bhn (Brinell)      HRc (Rockwell C)

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

mm/min = Fz x number of flutes x rpm

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

# Single End Roughers (Fine Pitch)

Series 62M Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm						
					6	10	12	20	25		
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	Profile 	$\leq 0.5$	$\leq 1.5$	123	RPM	6544	3926	3272	1963	1570
					Fz	0.014	0.029	0.036	0.051	0.053	
		Slot 	1	$\leq 1$	99	RPM	5251	3151	2626	1575	1260
					Fz	0.014	0.029	0.036	0.051	0.053	
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L, 17-4PH, 15-5PH, 13-4PH, Custom 450	Profile 	$\leq 0.5$	$\leq 1.5$	85	RPM	4524	2714	2262	1357	1086
					Fz	0.012	0.024	0.029	0.040	0.043	
		Slot 	1	$\leq 1$	69	RPM	3635	2181	1818	1091	872
					Fz	0.012	0.024	0.029	0.040	0.043	
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspalloy	Profile 	$\leq 0.5$	$\leq 1.5$	21	RPM	1131	679	565	339	271
					Fz	0.010	0.021	0.024	0.035	0.035	
		Slot 	1	$\leq 1$	17	RPM	905	543	452	271	217
					Fz	0.010	0.021	0.024	0.035	0.035	
	TITANIUM ALLOYS Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo25Sn0.5Si, Ti10Al2Fe3Al, Ti5Al53Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Mo, Ti6Al6V6Sn, Ti152 Cr3Sn3Al	Profile 	$\leq 0.5$	$\leq 1.5$	47	RPM	2504	1503	1252	751	601
					Fz	0.012	0.024	0.029	0.040	0.043	
		Slot 	1	$\leq 1$	59	RPM	3151	1890	1575	945	756
					Fz	0.012	0.024	0.029	0.040	0.043	

Bhn (Brinell)      HRc (Rockwell C)

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

mm/min = Fz x number of flutes x rpm

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

## VALUE AT THE SPINDLE®

### High Performance Drills



### USA Hole Making

Please put "S" at the beginning of all page numbers below.

HIGH PERFORMANCE DRILLS	SERIES	DESCRIPTION	APPLICATION ● PREFERRED ○ ALTERNATE	PAGE
Hi-PerCarb®	135 (3xD)	2 Flute External Coolant Double Margin 3xD	● ○ ○ ○ ○ ○	231
	135 (5xD)	2 Flute External Coolant Double Margin 5xD	● ○ ○ ○ ○ ○	240
	131N (3xD)	3 Flute External Coolant Triple Margin 3xD	● ○ ○ ○ ○ ○	250
	131N (5xD)	3 Flute External Coolant Triple Margin 5xD	● ○ ○ ○ ○ ○	254
	141K (5xD)	3 Flute Internal Coolant Triple Margin 5xD	● ○ ○ ○ ○ ○	260
Ice-Carb®	140 (5xD)	2 Flute Internal Coolant 5xD	● ○ ○ ○ ○ ○	266
	140 (8xD)	2 Flute Internal Coolant 8xD	● ○ ○ ○ ○ ○	274
CFRP 8 Facet	120	2 Flute External Coolant Double Margin CFRP	● ○ ○ ○ ○ ○	282

*Speed & Feed Recommendations listed after each series*

### Spain Hole Making

Please put "S" at the beginning of all page numbers below.

BROCAS DE ALTO RENDIMIENTO	SERIE	DESCRIPCIÓN	APPLICATION ● PREFERRED ○ ALTERNATE	PÁGINA
Hi-PerCarb®	135 (3xD)	2 filos, refrigeración externa, doble margen, 3xD	● ○ ○ ○ ○ ○	231
	135 (5xD)	2 filos, refrigeración externa, doble margen, 5xD	● ○ ○ ○ ○ ○	240
	131N (3xD)	3 filos, refrigeración externa, triple margen, 3xD	● ○ ○ ○ ○ ○	250
	131N (5xD)	3 filos, refrigeración externa, triple margen, 5xD	● ○ ○ ○ ○ ○	254
	141K (5xD)	3 filos, refrigeración interna, triple margen, 5xD	● ○ ○ ○ ○ ○	260
Ice-Carb®	140 (5xD)	2 filos, refrigeración interna, 5xD	● ○ ○ ○ ○ ○	266
	140 (8xD)	2 filos, refrigeración interna, 8xD	● ○ ○ ○ ○ ○	274
De 8 caras CFRP	120	2 filos, refrigeración externa, doble margen, CFRP	● ○ ○ ○ ○ ○	282

*Recomendaciones de velocidades y avances mostradas tras cada serie*

# Outils de perçage

Please put "S" at the beginning of all page numbers below.

FORETS HAUTE PERFORMANCE	SÉRIES	DESCRIPTION	APPLICATION ● PREFERRED ○ ALTERNATE	PAGE
Hi-PerCarb®	135 (3xD)	2 dents refroidissement externe à double listel 3xD	● ● ○ ○ ● ○	231
	135 (5xD)	2 dents refroidissement externe à double listel 5xD	● ● ○ ○ ● ○	240
	131N (3xD)	3 dents refroidissement externe à triple listel 3xD	● ○ ○ ○ ○ ○	250
	131N (5xD)	3 dents refroidissement externe à triple listel 5xD	● ○ ○ ○ ○ ○	254
	141K (5xD)	3 dents refroidissement interne à triple listel 5xD	● ○ ○ ○ ○ ○	260
Ice-Carb®	140 (5xD)	2 dents refroidissement interne 5xD	● ● ○ ○ ○ ○	266
	140 (8xD)	2 dents refroidissement interne 8xD	● ● ○ ○ ○ ○	274
	CFRP à 8 facettes	120	2 dents refroidissement externe à double listel CFRP	● ○ ○ ○ ○ ○

Recommandations de vitesse et avance indiquées après chaque série

# Bohren

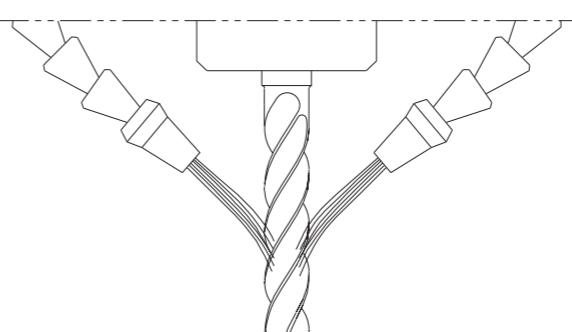
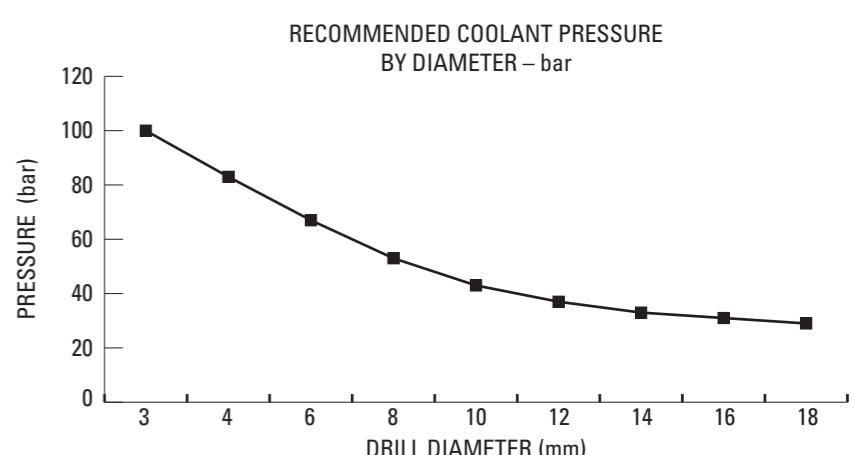
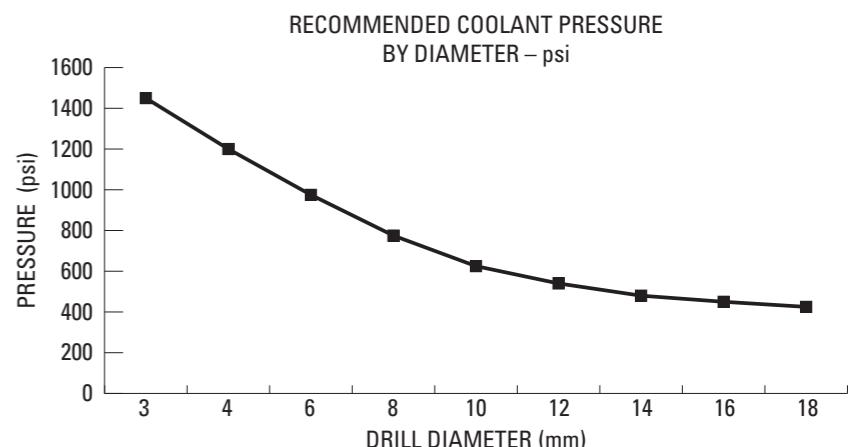
Please put "S" at the beginning of all page numbers below.

HOCHLEISTUNGS-BOHRER	SERIE	BESCHREIBUNG	APPLICATION ● PREFERRED ○ ALTERNATE	SEITE
Hi-PerCarb®	135 (3xD)	Doppelfasenbohrer 3xD mit 2 Schneiden und Außenkühlung	● ● ○ ○ ● ○	231
	135 (5xD)	Doppelfasenbohrer 5xD mit 2 Schneiden und Außenkühlung	● ● ○ ○ ● ○	240
	131N (3xD)	Dreifasenbohrer 3xD mit 3 Schneiden und Außenkühlung	● ○ ○ ○ ○ ○	250
	131N (5xD)	Dreifasenbohrer 5xD mit 3 Schneiden und Außenkühlung	● ○ ○ ○ ○ ○	254
	141K (5xD)	Dreifasenbohrer 5xD mit 3 Schneiden und Innenkühlung	● ○ ○ ○ ○ ○	260
Ice-Carb®	140 (5xD)	Bohrer 5xD mit 2 Schneiden und Innenkühlung	● ● ○ ○ ○ ○	266
	140 (8xD)	Bohrer 8xD mit 2 Schneiden und Innenkühlung	● ● ○ ○ ○ ○	274
CFRP 8 Facet	120	Doppelfasenbohrer CFRP mit 2 Schneiden und Außenkühlung	● ○ ○ ○ ○ ○	282

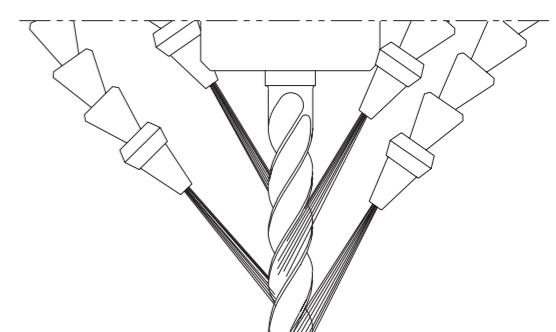
Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

- Coolant works to mobilize chips away from the cut zone, reduce the heat created during the cutting process and minimize friction.
- It is important to optimize the coolant pressure and position in order to gain the full benefits coolant offers the cutting process.
- Proper coolant application promotes greater operating parameters, greater material removal rates, improved surface finishes, predictable tool life, reduced power consumption and reduced cycle times.
- Pressure is important, but more importantly is consistency of the pressure and application onto the tool; intermittent cooling of carbide leads to thermal stressing of the material and the formation of "microcracks."

- Proper cleanliness and filtration of coolants is important in order for the coolant to maintain its beneficial properties, and also to avoid a reduction in coolant pressure or the possibility of clogging the coolant channels in coolant through drills.



LARGE TIP – LOW VELOCITY  
NO COVERAGE AT MAXIMUM DEPTH

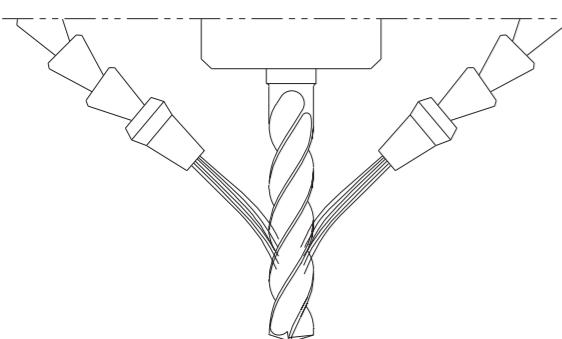
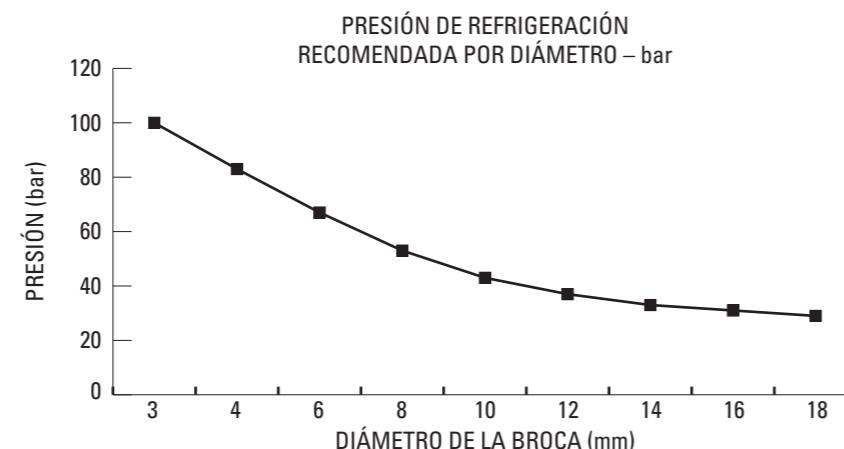
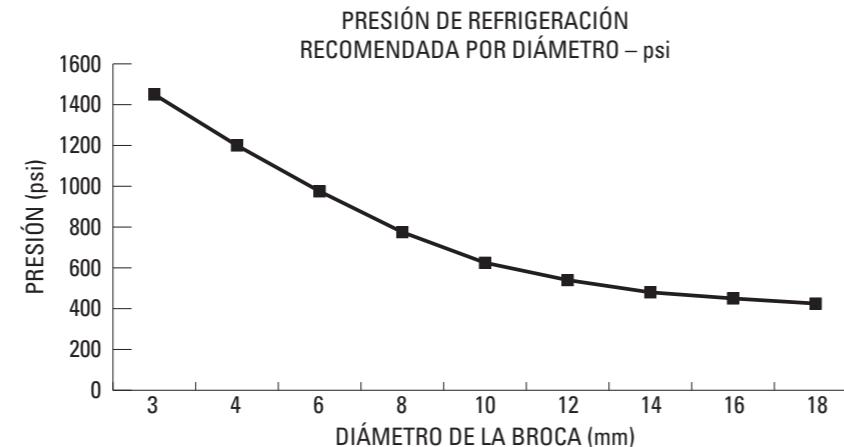


SMALL TIP – HIGH VELOCITY  
COMPLETE COVERAGE

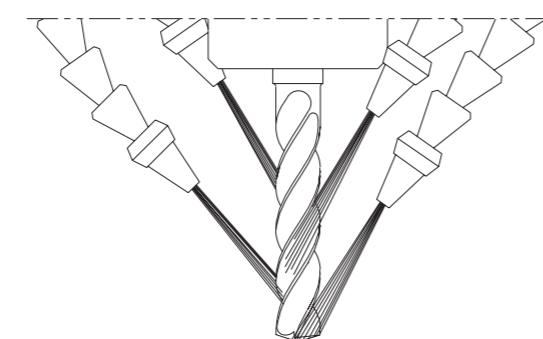
- Reducing the nozzle size helps maximize the cooling benefits of the unique double margin design on the Hi-PerCarb drill by increasing velocity. Aim the nozzles in line with the secondary flute located between the two margins as well as the flute for best results.

## Recomendaciones en operación de taladrado

- El líquido de refrigeración actúa movilizando las virutas fuera de la zona de corte, disminuyendo el calor generado durante el proceso de corte y minimizando la fricción.
- Es importante optimizar la presión de la refrigeración y la posición para poder obtener todos los beneficios del refrigerante durante el proceso de corte.
- Una aplicación apropiada de la refrigeración fomenta mayores parámetros de operación, mayores índices de eliminación de material, acabados de superficie mejorados, una duración de la herramienta más predecible, bajo consumo de energía y un tiempo de ciclo reducido.
- La presión del refrigerante es importante, pero lo es más el flujo continuo aplicado a la herramienta; una refrigeración intermitente en el carburo puede ocasionar un estrés térmico en el material y la formación de "micro-fisuras".
- Una limpieza y filtración adecuadas son importantes para que el refrigerante mantenga sus propiedades y beneficios; por otra parte, se evita la reducción de la presión o la posibilidad de obstruir los canales de refrigeración de la broca.



PUNTA GRANDE – BAJA VELOCIDAD  
SIN ALCANCE A PROFUNDIDAD MÁXIMA



PUNTA PEQUEÑA – ALTA VELOCIDAD  
COMPLETO ALCANCE

- Reducir el tamaño de la boquilla ayuda a maximizar los beneficios de refrigeración del exclusivo diseño de doble margen de la broca. Hi-PerCarb aumentando la velocidad. Coloque las boquillas en línea con el segundo filo que se encuentra entre los dos márgenes y también el filo para obtener mejores resultados.

## Opérations de perçage Recommandations en matière de refroidissement

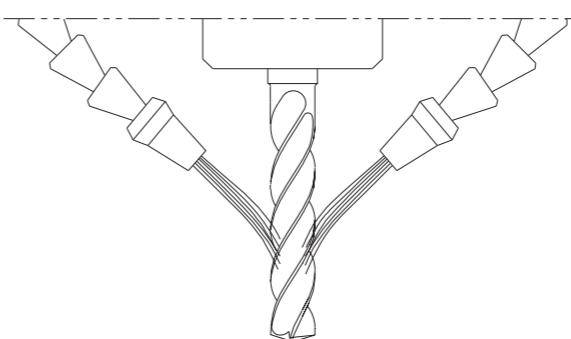
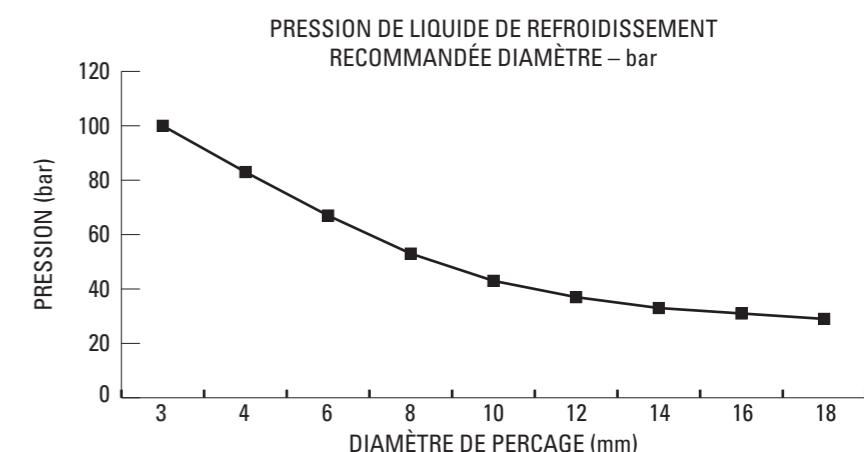
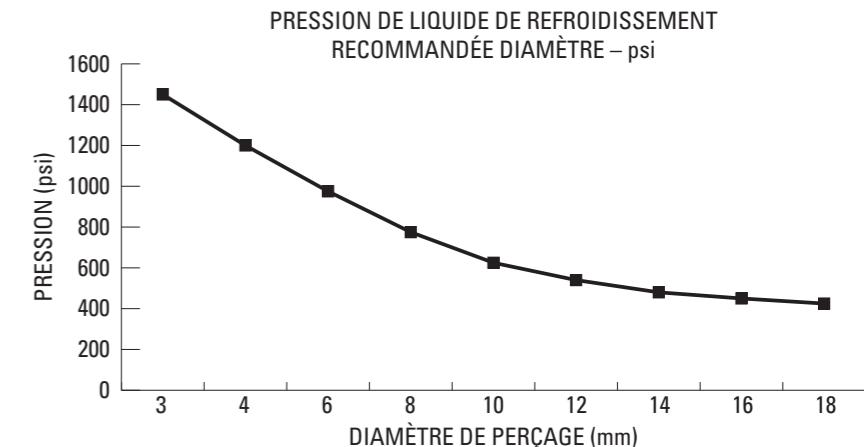
- Le liquide de refroidissement sert à éloigner les copeaux de la zone de coupe, à réduire la chaleur dégagée durant la coupe et à minimiser la friction.

- Il est important d'optimiser la pression et la position du réfrigérant pour en retirer les bénéfices maximums durant la coupe.

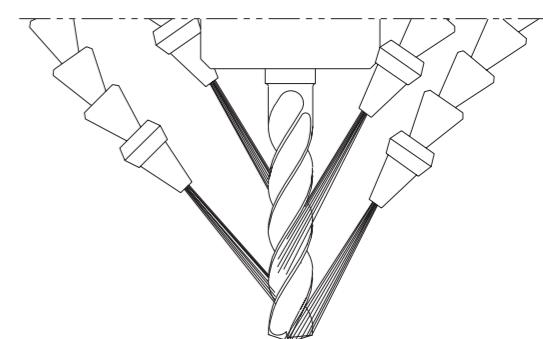
- L'application adéquate de réfrigérant se traduit par des paramètres opératoires supérieurs, des taux d'élimination supérieurs des matériaux, de plus belles finitions des surfaces, une durée de vie des outils prévisible, moins de consommation d'énergie et des temps de cycle réduits.

- La pression est importante, mais une pression régulière et l'application sur l'outil sont des facteurs encore plus importants ; le refroidissement intermittent du carbure se traduit par des contraintes thermiques pour le matériau et la formation de microfissures.

- La propreté et le filtrage adéquats des réfrigérants sont importants pour qu'ils conservent leur propriétés, mais aussi pour éviter la réduction de pression du réfrigérant ou le risque d'obstruction des conduits à réfrigérant dans les perceuses à réfrigérant intégré.



POINTE LARGE – BASSE VITESSE  
PAS DE COUVERTURE À LA PROFONDEUR MAXIMUM



POINTE FINA – GRANDE VITESSE  
COUVERTURE COMPLÈTE

- La réduction de la taille de l'embout permet de maximiser les bienfaits du refroidissement du concept à double listel original de la perceuse Hi-PerCarb en augmentant la vitesse. Pour les meilleurs résultats, orientez les embouts dans l'axe de la goujure secondaire située entre les deux listels, de même que la goujure primaire.

# Bohrarbeiten Kühlmittelempfehlungen

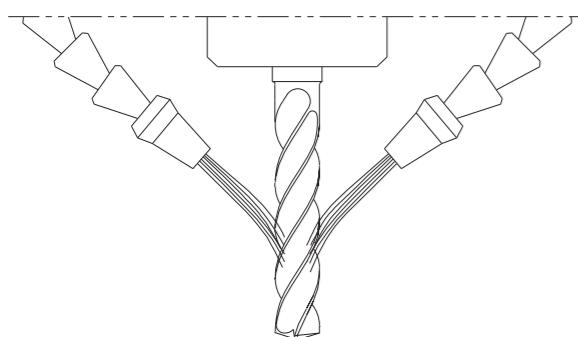
■ Kühlmittel dienen dazu, die Späne aus dem Schneidenbereich zu entfernen, die beim Schneiden erzeugte Wärme abzutransportieren und die Reibung zu verringern.

■ Es kommt darauf an, den Külschmiermitteldruck und die Zufuhr zu optimieren, um alle Vorteile beim Bohren nutzen zu können.

■ Der richtige Külschmiermitteleinsatz ermöglicht höhere Schnittparameter, höheren Materialabtrag, bessere Oberflächengüte, vorhersehbare Standzeiten und geringere Leistungsaufnahme und Laufzeiten.

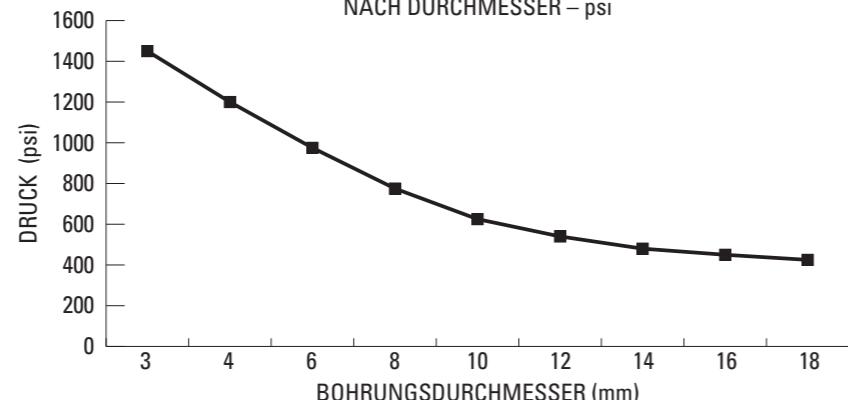
■ Der Druck ist wichtig, aber wichtiger ist dessen Konstanz und die Zufuhr zum Werkzeug. Unterbrochene Kühlung des Hartmetalls führt zur thermischen Belastung und Bildung von "Mikrorissen".

■ Kühlmitte sind sauber zu halten und zu filtern, damit die Qualität des Kühlmittels erhalten bleibt und der Kühlmitteldruck durch Verstopfung der Kühlmittelkanäle im Bohrer nicht absinkt.

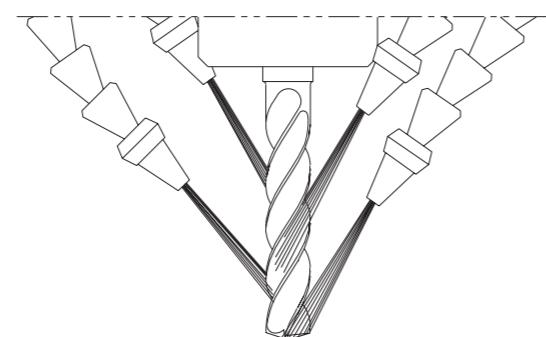
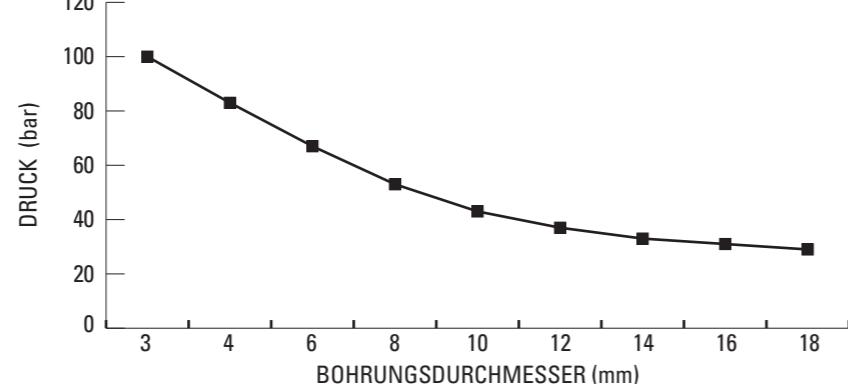


BREITE QUERSCHNEIDE – GERINGE DREHZAHL  
KEINE VOLLSTÄNDIGE BENETZUNG BEI MAX. BOHRUNGSTIEFE

EMPFOHLENER KÜLSCHMIERMITTELDRUCK  
NACH DURCHMESSER – psi



EMPFOHLENER KÜHLMITTELDRUCK  
NACH DURCHMESSER – bar



SCHMALE QUERSCHNEIDE – HOHE DREHZAHL  
VOLLSTÄNDIGE BENETZUNG

■ Durch Verringern der Düsengröße können die vorteilhaften Eigenschaften der Doppelfase genutzt werden, um die Drehzahl des Hi-PerCarb-Bohrers zu steigern. Richten Sie die Düsen auf die Nebennut zwischen beiden Fasen sowie auf die Schneiden aus, um beste Ergebnisse zu erzielen.



HIGH PERFORMANCE CARBIDE DRILLS

FRACTIONAL & METRIC  
Hi-PerCarb®



135 3xD

FRACTIONAL & METRIC SERIES

TOLERANCES (inch)

≤.1181 DIAMETER

DC = +.00008/+,.00047

DCON = h<sub>6</sub>

>.1181–.2362 DIAMETER

DC = +.00016/+,.00063

DCON = h<sub>6</sub>

>.2362–.3937 DIAMETER

DC = +.00024/+,.00083

DCON = h<sub>6</sub>

>.3937–.7087 DIAMETER

DC = +.00028/+,.00098

DCON = h<sub>6</sub>

>.7087–1.1811 DIAMETER

DC = +.00031/+,.00114

DCON = h<sub>6</sub>

TOLERANCES (mm)

≤3 DIAMETER

DC = +0,002/+0,012

DCON = h<sub>6</sub>

>3–6 DIAMETER

DC = +0,004/+0,016

DCON = h<sub>6</sub>

>6–10 DIAMETER

DC = +0,006/+0,021

DCON = h<sub>6</sub>

>10–18 DIAMETER

DC = +0,007/+0,025

DCON = h<sub>6</sub>

>18–30 DIAMETER

DC = +0,008/+0,029

DCON = h<sub>6</sub>

STEELS

STAINLESS STEELS

CAST IRON

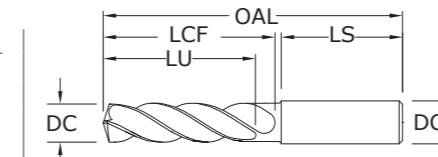
HIGH TEMP ALLOYS

TITANIUM

NON-FERROUS

HARDENED STEELS

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135 3xD

FRACTIONAL & METRIC SERIES

- Double margin design improves accuracy and surface finish along with increased strength for aggressive drilling
- Specialized self-centering notched point eliminates the need for spot drilling decreasing thrust and deflection
- Engineered edge protection improves edge strength and reduces edge fatigue allowing for increased feed rates
- Recommended for materials ≤ 56 HRC ( $\leq 577 \text{ Bhn}$ )

\*Single Margin

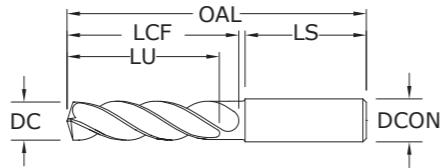
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## 135 3xD

FRACTIONAL & METRIC SERIES

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CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	EDP NO. Ti-NAMITE-A (AITIN)
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
#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

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HIGH PERFORMANCE CARBIDE DRILLS

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	inch & mm		EDP NO. Ti-NAMITE-A (AITIN)
									EDP NO.	CONTINUED	
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 mm	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	M7 X 0,75		8,0	79,0	34,0	28,0	36,0		51604
6,25 mm	0.2461				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
6,4 mm</td											



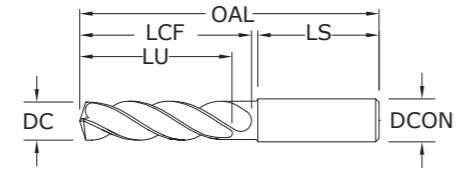
HIGH PERFORMANCE CARBIDE DRILLS



## 135 3xD

FRACTIONAL & METRIC SERIES

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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
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				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				12,0	102,0	55,0	45,0	45,0	63192
11,1 mm	0.4370		M12 X 1	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

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HIGH PERFORMANCE CARBIDE DRILLS

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	inch & mm					Ti-NAMITE-A (AITIN)	
				SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS		
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
	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
33/64	0.5156	13.10	9/16-18		5/8	4-1/4	2-5/16	1-7/8	1-49/64	51364
17/32	0.5312	13.49	5/8-11		5/8	4-1/				

FRACTIONAL  
**Hi-PerCarb®**

FRACTIONAL  
**Hi-PerCarb®**

Series 135 3D Fractional		Hardness	Vc (sfm)	DC • in						
				1/32	1/8	1/4	3/8	1/2	5/8	7/8
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc (308-462)	385 RPM Fr Feed (ipm)	47062 0.0010 45.0	11766 0.0038 45.0	5883 0.0076 45.0	3922 0.0115 45.0	2941 0.0153 45.0	2353 0.0191 45.0	1681 0.0268 45.0
		≤ 275 Bhn or ≤ 28 HRc (280-420)	350 RPM Fr Feed (ipm)	42784 0.0009 38.0	10696 0.0036 38.0	5348 0.0071 38.0	3565 0.0107 38.0	2674 0.0142 38.0	2139 0.0178 38.0	1528 0.0249 38.0
		≤ 425 Bhn or ≤ 45 HRc (160-240)	200 RPM Fr Feed (ipm)	24448 0.0007 18.0	6112 0.0029 18.0	3056 0.0059 18.0	2037 0.0088 18.0	1528 0.0118 18.0	1222 0.0147 18.0	873 0.0206 18.0
		≤ 275 Bhn or ≤ 28 HRc (240-360)	300 RPM Fr Feed (ipm)	36672 0.0007 27.0	9168 0.0029 27.0	4584 0.0059 27.0	3056 0.0088 27.0	2292 0.0118 27.0	1834 0.0147 27.0	1310 0.0206 27.0
		≤ 375 Bhn or ≤ 40 HRc (148-222)	185 RPM Fr Feed (ipm)	22614 0.0006 14.5	5654 0.0026 14.5	2827 0.0051 14.5	1885 0.0077 14.5	1413 0.0103 14.5	1131 0.0128 14.5	808 0.0180 14.5
		≤ 450 Bhn or ≤ 48 HRc (104-156)	130 RPM Fr Feed (ipm)	15891 0.0004 7.0	3973 0.0018 7.0	1986 0.0035 7.0	1324 0.0053 7.0	993 0.0070 7.0	795 0.0088 7.0	568 0.0123 7.0
		≤ 185 Bhn or ≤ 9 HRc (220-330)	275 RPM Fr Feed (ipm)	33616 0.0006 21.5	8404 0.0026 21.5	4202 0.0051 21.5	2801 0.0077 21.5	2101 0.0102 21.5	1681 0.0128 21.5	1201 0.0179 21.5
		≤ 275 Bhn or ≤ 28 HRc (136-204)	170 RPM Fr Feed (ipm)	20781 0.0005 10.5	5195 0.0020 10.5	2598 0.0040 10.5	1732 0.0061 10.5	1299 0.0081 10.5	1039 0.0101 10.5	742 0.0141 10.5
		≤ 275 Bhn or ≤ 28 HRc (72-108)	90 RPM Fr Feed (ipm)	11002 0.0005 5.5	2750 0.0020 5.5	1375 0.0040 5.5	917 0.0060 5.5	688 0.0080 5.5	550 0.0100 5.5	393 0.0140 5.5
		≤ 375 Bhn or ≤ 40 HRc (52-78)	65 RPM Fr Feed (ipm)	7946 0.0004 3.5	1986 0.0018 3.5	993 0.0035 3.5	662 0.0053 3.5	497 0.0070 3.5	397 0.0088 3.5	284 0.0123 3.5
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc (256-384)	320 RPM Fr Feed (ipm)	39117 0.0012 45.0	9779 0.0046 45.0	4890 0.0092 45.0	3260 0.0138 45.0	2445 0.0184 45.0	1956 0.0230 45.0	1397 0.0322 45.0
		≤ 260 Bhn or ≤ 26 HRc (228-342)	285 RPM Fr Feed (ipm)	34838 0.0011 40.0	8710 0.0046 40.0	4355 0.0092 40.0	2903 0.0138 40.0	2177 0.0184 40.0	1742 0.0230 40.0	1244 0.0321 40.0

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Series 135 3D Fractional		Hardness	Vc (sfm)	DC • in						
				1/32	1/8	1/4	3/8	1/2	5/8	7/8
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (560-840)	700 RPM Fr Feed (ipm)	85568 105.0	21392 105.0	10696 105.0	7131 105.0	5348 105.0	4278 105.0	3056 105.0
		≤ 150 Bhn or ≤ 7 HRc (480-720)	600 RPM Fr Feed (ipm)	73344 91.0	18336 91.0	9168 91.0	6112 91.0	4584 91.0	3667 91.0	2619 91.0
		≤ 140 Bhn or ≤ 3 HRc (400-600)	500 RPM Fr Feed (ipm)	61120 24.5	15280 24.5	7640 24.5	5093 24.5	3820 24.5	3056 24.5	2183 24.5
		≤ 200 Bhn or ≤ 23 HRc (320-480)	400 RPM Fr Feed (ipm)	48896 24.5	12224 24.5	6112 24.5	4075 24.5	3056 24.5	2445 24.5	1746 24.5
		≤ 300 Bhn or ≤ 32 HRc (44-66)	55 RPM Fr Feed (ipm)	6723 1.3	1681 1.3	840 1.3	560 1.3	420 1.3	336 1.3	240 1.3
		≤ 400 Bhn or ≤ 43 HRc (24-36)	30 RPM Fr Feed (ipm)	3667 0.6	917 0.6	458 0.6	306 0.6	229 0.6	183 0.6	131 0.6
		≤ 275 Bhn or ≤ 28 HRc (108-162)	135 RPM Fr Feed (ipm)	16502 7.3	4126 7.3	2063 7.3	1375 7.3	1031 7.3	825 7.3	589 7.3
		≤ 350 Bhn or ≤ 38 HRc (80-120)	100 RPM Fr Feed (ipm)	12224 5.0	3056 5.0	1528 5.0	1019 5.0	764 5.0	611 5.0	437 5.0
		≤ 440 Bhn or ≤ 47 HRc (44-66)	55 RPM Fr Feed (ipm)	6723 2.0	1681 2.0	840 2.0	560 2.0	420 2.0	336 2.0	240 2.0
		≤ 200 Bhn or ≤ 13 HRc (104-156)	130 RPM Fr Feed (ipm)	15891 3.2	3973 3.2	1986 3.2	1324 3.2	993 3.2	795 3.2	568 3.2
H	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 375 Bhn or ≤ 40 HRc (72-108)	90 RPM Fr Feed (ipm)	11002 3.2	2750 3.2	1375 3.2	1019 3.2	688 3.2	550 3.2	393 3.2
		≤ 475 Bhn or ≤ 50 HRc (60-90)	75 RPM Fr Feed (ipm)	9168 1.8	2292 1.8	1146 1.8	764 1.8	573 1.8	458 1.8	327 1.8
		≤ 375 Bhn or ≤ 40 HRc (52-78)	90 RPM Fr Feed (ipm)	11002 10.5	2750 10.5	1375 10.5	1019 10.5	688 10.5	550 10.5	393 10.5
		≤ 475 Bhn or ≤ 50 HRc (60-90)	75 RPM Fr Feed (ipm)	9168 1.8	2292 1.8	1146 1.8	764 1.8	573 1.8	458 1.8	327 1.8
TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2										

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

rpm = Vc x 3.82 / DC

ipm = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

METRIC  
**Hi-PerCarb®**

METRIC  
**Hi-PerCarb®**

Series 135 3D Metric		Hardness	Vc (m/min)	DC • mm							
				1.5	3	6	8	10	12	16	20
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc (94-141)	117 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 (85-128)	107 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 (49-73)	61 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 (73-110)	91 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 (45-68)	56 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 (32-48)	40 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
		≤ 185 Bhn or ≤ 9 HRc (67-101)	84 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 (41-62)	52 RPM Fr Feed (mm/min)	10987 0.024 260	5493 0.047 260	2747 0.095 260	2060 0.126 260	1648 0.158 260	1373 0.189 260	1030 0.252 260	824 0.316 260
		≤ 275 Bhn or ≤ 28 HRc (22-33)	27 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 (16-24)	20 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
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 220 Bhn or ≤ 19 HRc (78-117)	98 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 (69-104)	87 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
		≤ 220 Bhn or ≤ 19 HRc (78-117)	98 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 (69-104)	87 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
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc (78-117)	98 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 (69-104)	87 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
		≤ 220 Bhn or ≤ 19 HRc (78-117)	98 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 (69-104)	87 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

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Series 135 3D Metric		Hardness	Vc (m/min)	DC • mm							
1.5	3			1.5	3	6	8	10	12	16	20
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (171-256)	213 RPM Fr Feed (mm/min)	45239 0.059 2690	22620 0.119 2690	11310 0.238 2690	8482 0.317 2690	6786 0.396 2690	5655 0.476 2690	4241 0.634 2690	3393 0.793 2690
		≤ 150 Bhn or ≤ 7 HRc (146-219)	183 RPM Fr Feed (mm/min)	38777 0.060 2325	19388 0.120 2325	9694 0.240 2325	7271 0.320 2325	5816 0.400 2325	4847 0.480 2325	3635 0.640 2325	2908 0.799 2325
		≤ 140 Bhn or ≤ 3 HRc (122-183)	152 RPM Fr Feed (mm/min)	32314 0.024 776	16157 0.048 776	8078 0.096 776	6059 0.128 776	4847 0.160 776	4039 0.192 776	3029 0.256 776	2424 0.320 776
		≤ 200 Bhn or ≤ 23 HRc (98-146)	122 RPM Fr Feed (mm/min)	25851 0.024 630	12926 0.049 630	6463 0.097 630	4847 0.130 630	3878 0.162 630	3231 0.205 630	2424 0.260 630	1939 0.325 630
		≤ 300 Bhn or ≤ 32 HRc (13-20)	17 RPM Fr Feed (mm/min)	3555 0.010 35	1777 0.020 35	889 0.039 35	666 0.053 35	533 0.066 35	444 0.079 35	333 0.105 35	267 0.131 35
		≤ 400 Bhn or ≤ 43 HRc (7-11)	9 RPM Fr Feed (mm/min)	1939 0.008 15	969 0.015 15	485 0.031 15	364 0.041 15	291 0.052 15	242 0.062 15	182 0.083 15	145 0.103 15
		≤ 275 Bhn or ≤ 28 HRc (33-49)	41 RPM Fr Feed (mm/min)	8725 0.021 185	4362 0.042 185	2181 0.085 185	1636 0.113 185	1309 0.141 185	1091 0.170 185	818 0.226 185	654 0.283 185
		≤ 350 Bhn or ≤ 38 HRc (24-37)	30 RPM Fr Feed (mm/min)	6463 0.019 125	3231 0.039 125	1616 0.077 125	1212 0.103 125	969 0.129 125	808 0.155 125	606 0.	



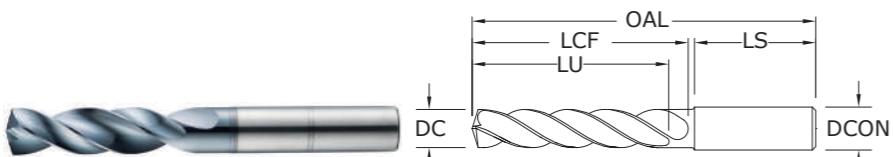
HIGH PERFORMANCE CARBIDE DRILLS



## 135 5xD

FRACTIONAL & METRIC SERIES

- Double margin design improves accuracy and surface finish along with increased strength for aggressive drilling
- Specialized self-centering notched point eliminates the need for spot drilling decreasing thrust and deflection
- Engineered edge protection improves edge strength and reduces edge fatigue allowing for increased feed rates
- Recommended for materials ≤ 56 HRc (≤ 577 Bhn)



### TOLERANCES (inch)

#### ≤.1181 DIAMETER

DC = +.00008/+0.00047

DCON = h<sub>6</sub>

#### >.1181-.2362 DIAMETER

DC = +.00016/+0.00063

DCON = h<sub>6</sub>

#### >.2362-.3937 DIAMETER

DC = +.00024/+0.00083

DCON = h<sub>6</sub>

#### >.3937-.7087 DIAMETER

DC = +.00028/+0.00098

DCON = h<sub>6</sub>

#### >.7087-1.1811 DIAMETER

DC = +.00031/+0.00114

DCON = h<sub>6</sub>

### TOLERANCES (mm)

#### ≤3 DIAMETER

DC = +0.002/+0.012

DCON = h<sub>6</sub>

#### >3-6 DIAMETER

DC = +0.004/+0.016

DCON = h<sub>6</sub>

#### >6-10 DIAMETER

DC = +0.006/+0.021

DCON = h<sub>6</sub>

#### >10-18 DIAMETER

DC = +0.007/+0.025

DCON = h<sub>6</sub>

#### >18-30 DIAMETER

DC = +0.008/+0.029

DCON = h<sub>6</sub>

### STEELS

### STAINLESS STEELS

### CAST IRON

### HIGH TEMP ALLOYS

### TITANIUM

### NON-FERROUS

### HARDENED STEELS

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

\*Single Margin

continued on next page



HIGH PERFORMANCE CARBIDE DRILLS

## 135 5xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	inch & mm					Ti-NAMITE-A (AlTiN)
				SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	
3.5 mm	0.1378				6.0	66.0	28.0	23.0	36.0
#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
#27	0.1440	3.66		1/4	3	1	53/64	1-7/16	52318
3.7 mm	0.1457		M4.5 X 0.75	6.0	66.0	28.0	23.0	36.0	64107
#26	0.1470	3.73	3/16-24	1/4	3	1	53/64	1-7/16	52319
#25	0.1495	3.80	10-24	1/4	3-1/4	1-1/4	1-5/64	1-7/16	51584
3.8 mm	0.1496			6.0	74.0	36.0	29.0	36.0	64108
#24	0.1520	3.86	10-28	1/4	3-1/4	1-1/4	1-5/64	1-7/16	52321
3.9 mm	0.1535			6.0	74.0	36.0	29.0	36.0	64109
#23	0.1540	3.91		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52322
5/32	0.1562	3.97		1/4	3-1/4	1-1/4	1-5/64	1-7/16	51585
#22	0.1570	3.99	10-30	1/4	3-1/4	1-1/4	1-5/64	1-7/16	52323
4.0 mm	0.1575		M4.5 X 0.5	6.0	74.0	36.0	29.0	36.0	64110
#21	0.1590	4.04	10-32	1/4	3-1/4	1-1/4	1-5/64	1-7/16	51586
#20	0.1610	4.09	13/64-24	1/4	3-1/4	1-1/4	1-5/64	1-7/16	51587
4.1 mm	0.1614			6.0	74.0	36.0	29.0	36.0	64111
4.2 mm	0.1654		M5 / M5 X 0.75	6.0	74.0	36.0	29.0	36.0	64112
#19	0.1660	4.22		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52324
4.3 mm	0.1693			6.0	74.0	36.0	29.0	36.0	64113
#18	0.1695	4.31		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52325
11/64	0.1719	4.37		1/4	3-1/4	1-1/4	1-5/64	1-7/16	51588
#17	0.1730	4.39		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52326
4.4 mm	0.1732			6.0	74.0	36.0	29.0	36.0	64114
4.5 mm	0.1772		M5 X 0.5	6.0	74.0	36.0	29.0	36.0	64115
#15	0.1800	4.57		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52327
4.6 mm	0.1811			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
5.3 mm	0.2087			6.0	82.0	44.0	35.0	36.0	64124
#4	0.2090	5.31	1/4-24	1/4	3-1/4	1-3/4	1-37/64	1-7/16	51508



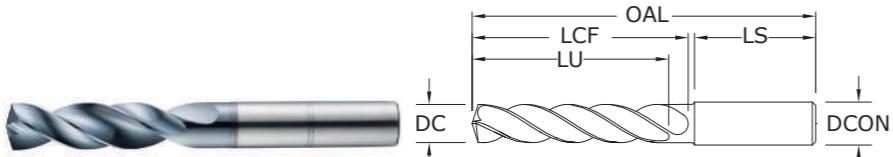
HIGH PERFORMANCE CARBIDE DRILLS



## 135 5xD

FRACTIONAL & METRIC SERIES

- Double margin design improves accuracy and surface finish along with increased strength for aggressive drilling
- Specialized self-centering notched point eliminates the need for spot drilling decreasing thrust and deflection
- Engineered edge protection improves edge strength and reduces edge fatigue allowing for increased feed rates
- Recommended for materials ≤ 56 HRc (≤ 577 Bhn)



inch & mm									EDP NO.
CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	Ti-NAMITE-A (AITIN)
5,4 mm	0,2126			6,0	82,0	44,0	35,0	36,0	64125
#3	0,2130	5,41	1/4-28	1/4	3-1/4	1-3/4	1-37/64	1-7/16	51509
5,5 mm	0,2165	M6 X 0,5		6,0	82,0	44,0	35,0	36,0	64126
7/32	0,2188	5,56	1/4-32	1/4	3-1/4	1-3/4	1-37/64	1-7/16	51510
5,6 mm	0,2205			6,0	82,0	44,0	35,0	36,0	64127
#2	0,2210	5,61		1/4	3-1/4	1-3/4	1-37/64	1-7/16	52335
5,7 mm	0,2244			6,0	82,0	44,0	35,0	36,0	64128
#1	0,2280	5,79		1/4	3-1/4	1-3/4	1-37/64	1-7/16	52336
5,8 mm	0,2283			6,0	82,0	44,0	35,0	36,0	64129
5,9 mm	0,2323			6,0	82,0	44,0	35,0	36,0	64130
A	0,2340	5,94		1/4	3-1/4	1-3/4	1-37/64	1-7/16	52337
15/64	0,2344	5,95		1/4	3-1/4	1-3/4	1-37/64	1-7/16	51591
6,0 mm	0,2362		M7 X 1	6,0	82,0	44,0	35,0	36,0	64131
B	0,2380	6,05		1/4	3 5/8	2-5/64	1-51/64	1-7/16	52338
6,1 mm	0,2402			8,0	91,0	53,0	43,0	36,0	64132
C	0,2420	6,15		1/4	3 5/8	2-5/64	1-51/64	1-7/16	52339
6,2 mm	0,2441			8,0	91,0	53,0	43,0	36,0	64133
D	0,2460	6,25		1/4	3 5/8	2-5/64	1-51/64	1-7/16	52340
6,25 mm	0,2461		M7 X 0,75	8,0	91,0	53,0	43,0	36,0	64134
6,3 mm	0,2480			8,0	91,0	53,0	43,0	36,0	64135
1/4	0,2500	6,35		1/4	3-5/8	2-5/64	1-51/64	1-7/16	51511
6,4 mm	0,2520			8,0	91,0	53,0	43,0	36,0	64136
6,5 mm	0,2559			8,0	91,0	53,0	43,0	36,0	64137
F	0,2570	6,53	5/16-18	5/16	3-5/8	2-5/64	1-51/64	1-7/16	51512
6,6 mm	0,2598			8,0	91,0	53,0	43,0	36,0	64138
G	0,2610	6,63		5/16	3 5/8	2 5/64	1 51/64	1 7/16	52341
6,7 mm	0,2638			8,0	91,0	53,0	43,0	36,0	64139
17/64	0,2656	6,75	5/16-20	5/16	3-5/8	2-5/64	1-51/64	1-7/16	51513
H	0,2660	6,76		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52342
6,8 mm	0,2677		M8 X 1,25	8,0	91,0	53,0	43,0	36,0	64140
6,9 mm	0,2717			8,0	91,0	53,0	43,0	36,0	64141
I	0,2720	6,91	5/16-24	5/16	3-5/8	2-5/64	1-51/64	1-7/16	51514
7,0 mm	0,2756		M8 X 1	8,0	91,0	53,0	43,0	36,0	64142
J	0,2770	7,04		5/16	3 5/8	2-5/64	1-51/64	1-7/16	52343
7,1 mm	0,2795			8,0	91,0	53,0	43,0	36,0	64143
K	0,2810	7,14		5/16	3 5/8	2-5/64	1-51/64	1-7/16	52344
9/32	0,2812	7,14	5/16-32	5/16	3-5/8	2-5/64	1-51/64	1-7/16	51515
7,2 mm	0,2835			8,0	91,0	53,0	43,0	36,0	64144

continued on next page

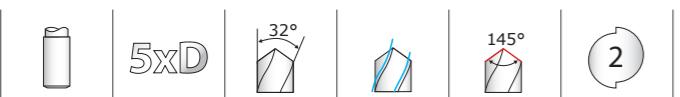
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HIGH PERFORMANCE CARBIDE DRILLS

CONTINUED

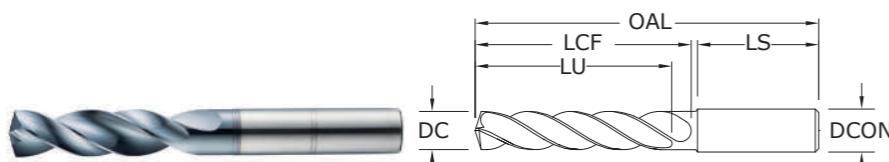
CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	inch & mm					EDP NO.
				SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	
7,25 mm	0,2854		M8 X 0,75	8,0	91,0	53,0	43,0	36,0	64145
7,3 mm	0,2874			8,0	91,0	53,0	43,0	36,0	64146
L	0,2900	7,37		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52345
7,4 mm	0,2913			8,0	91,0	53,0	43,0	36,0	64147
M	0,2950	7,49		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52346
7,5 mm	0,2953		M8 X 0,5	8,0	91,0	53,0	43,0	36,0	64148
19/64	0,2969	7,54		5/16	3-5/8	2-5/64	1-51/64	1-7/16	51516
7,6 mm	0,2992			8,0	91,0	53,0	43,0	36,0	64149
N	0,3020	7,67		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52347
7,7 mm	0,3031			8,0	91,0	53,0	43,0	36,0	64150
7,8 mm	0,3071		M9 X 1,25	8,0	91,0	53,0	43,0	36,0	64151
7,9 mm	0,3110			8,0	91,0	53,0	43,0	36,0	64152
5/16	0,3125	7,94	3/8-16	5/16	3-5/8	2-5/64	1-51/64	1-7/16	51517
8,0 mm	0,3150		M9 X 1	8,0	91,0	53,0	43,0	36,0	64153
O	0,3160	8,03		3/8	4	2-13/32	2-1/8	1-9/16	52348
8,1 mm	0,3189			10,0	103,0	61,0	49,0	40,0	64154
8,2 mm	0,3228			10,0	103,0	61,0	49,0	40,0	64155
P	0,3230	8,20		3/8	4	2-13/32	2-1/8	1-9/16	51518
8,3 mm	0,3268			10,0	103,0	61,0	49,0	40,0	64156
21/64	0,3281	8,33	3/8-20	3/8	4	2-13/32	2-1/8	1-9/16	51519
8,4 mm	0,3307			10,0	103,0	61,0	49,0	40,0	64157
Q	0,3320	8,43	3/8-24	3/8	4	2-13/32	2-1/8	1-9/16	51520
8,5 mm	0,3346		M10 X 1,5	10,0	103,0	61,0	49,0	40,0	64158
8,6 mm	0,3386			10,0	103,0	61,0	49,0	40,0	64159
R	0,3390	8,61	3/8-32	3					



## 135 5xD

### FRACTIONAL & METRIC SERIES

- Double margin design improves accuracy and surface finish along with increased strength for aggressive drilling
- Specialized self-centering notched point eliminates the need for spot drilling decreasing thrust and deflection
- Engineered edge protection improves edge strength and reduces edge fatigue allowing for increased feed rates
- Recommended for materials ≤ 56 HRc (≤ 577 Bhn)



#### TOLERANCES (inch)

##### ≤.1181 DIAMETER

DC = +.00008/+0.00047

DCON = h<sub>6</sub>

##### >.1181-.2362 DIAMETER

DC = +.00016/+0.00063

DCON = h<sub>6</sub>

##### >.2362-.3937 DIAMETER

DC = +.00024/+0.00083

DCON = h<sub>6</sub>

##### >.3937-.7087 DIAMETER

DC = +.00028/+0.00098

DCON = h<sub>6</sub>

##### >.7087-1.1811 DIAMETER

DC = +.00031/+0.00114

DCON = h<sub>6</sub>

#### TOLERANCES (mm)

##### ≤3 DIAMETER

DC = +0.002/+0.012

DCON = h<sub>6</sub>

##### >3-6 DIAMETER

DC = +0.004/+0.016

DCON = h<sub>6</sub>

##### >6-10 DIAMETER

DC = +0.006/+0.021

DCON = h<sub>6</sub>

##### >10-18 DIAMETER

DC = +0.007/+0.025

DCON = h<sub>6</sub>

##### >18-30 DIAMETER

DC = +0.008/+0.029

DCON = h<sub>6</sub>

#### STEELS

#### STAINLESS STEELS

#### CAST IRON

#### HIGH TEMP ALLOYS

#### TITANIUM

#### NON-FERROUS

#### HARDENED STEELS

continued on next page

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HIGH PERFORMANCE CARBIDE DRILLS

## 135 5xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	inch & mm						EDP NO.
				SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	Ti-NAMITE-A (AITIN)	
35/64	0.5469	13.89	5/8-12	5/8	4-7/8	3-1/32	2-19/32	1-49/64	51537	
14,0 mm	0.5512	M16 X 2	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	M16 X 1,5	16,0	133,0	83,0	63,0	48,0	64201	
37/64	0.5781	14.68	5/8-18	5/8	5-1/4	3-1/4	2-3/4	1-57/64	51539	
15,0 mm	0.5906	M16 X 1	M16 X 1	16,0	133,0	83,0	63,0	48,0	64202	
19/32	0.5938	15.08	11/16-11	5/8	5-1/4	3-1/4	2-3/4	1-57/64	51592	
39/64	0.6094	15.48	11/16-12	5/8	5-1/4	3-1/4	2-3/4	1-57/64	51593	
15,5 mm	0.6102	M18 X 2,5	M18 X 2,5	16,0	133,0	83,0	63,0	48,0	64203	
5/8	0.6250	15.88	11/16-16	5/8	5-1/4	3-1/4	2-3/4	1-57/64	51540	
16,0 mm	0.6299			16,0	133,0	83,0	63,0	48,0	64204	
41/64	0.6406	16.27	11/16-24	3/4	5-5/8	3-5/8	3-3/16	1-57/64	51594	
16,5 mm	0.6496	M18 X 1,5	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	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	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	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	

FRACTIONAL  
Hi-PerCarb®

FRACTIONAL  
Hi-PerCarb®

Series 135 5D Fractional	Hardness	Vc (sfm)	DC • in							
			1/32	1/8	1/4	3/8	1/2	5/8	7/8	
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc (276-414)	345 RPM Fr Feed (ipm)	42173 0.0010 42.0	10543 0.0040 42.0	5272 0.0080 42.0	3514 0.0120 42.0	2636 0.0159 42.0	2109 0.0199 42.0	1506 0.0279 42.0
		≤ 275 Bhn or ≤ 28 HRc (248-372)	310 RPM Fr Feed (ipm)	37894 0.0009 34.0	9474 0.0036 34.0	4737 0.0072 34.0	3158 0.0108 34.0	2368 0.0144 34.0	1895 0.0179 34.0	1353 0.0251 34.0
		≤ 425 Bhn or ≤ 45 HRc (144-216)	180 RPM Fr Feed (ipm)	22003 0.0007 16.5	5501 0.0030 16.5	2750 0.0060 16.5	1834 0.0090 16.5	1375 0.0120 16.5	1100 0.0150 16.5	786 0.0210 16.5
		≤ 275 Bhn or ≤ 28 HRc (216-324)	270 RPM Fr Feed (ipm)	33005 0.0008 25.0	8251 0.0030 25.0	4126 0.0061 25.0	2750 0.0091 25.0	2063 0.0121 25.0	1650 0.0151 25.0	1179 0.0212 25.0
		≤ 375 Bhn or ≤ 40 HRc (132-198)	165 RPM Fr Feed (ipm)	20170 0.0006 13.0	5042 0.0026 13.0	2521 0.0052 13.0	1681 0.0077 13.0	1261 0.0103 13.0	1008 0.0129 13.0	720 0.0180 13.0
		≤ 450 Bhn or ≤ 48 HRc (92-138)	115 RPM Fr Feed (ipm)	14058 0.0004 6.2	3514 0.0018 6.2	1757 0.0035 6.2	1171 0.0053 6.2	879 0.0071 6.2	703 0.0088 6.2	502 0.0123 6.2
		≤ 185 Bhn or ≤ 9 HRc (200-300)	250 RPM Fr Feed (ipm)	30560 0.0006 19.5	7640 0.0026 19.5	3820 0.0051 19.5	2547 0.0077 19.5	1910 0.0102 19.5	1528 0.0128 19.5	1091 0.0179 19.5
		≤ 275 Bhn or ≤ 28 HRc (120-180)	150 RPM Fr Feed (ipm)	18336 0.0005 9.0	4584 0.0020 9.0	2292 0.0039 9.0	1528 0.0059 9.0	1146 0.0079 9.0	917 0.0098 9.0	655 0.0137 9.0
		≤ 275 Bhn or ≤ 28 HRc (64-96)	80 RPM Fr Feed (ipm)	9779 0.0005 4.8	2445 0.0020 4.8	1222 0.0039 4.8	815 0.0059 4.8	611 0.0079 4.8	489 0.0098 4.8	349 0.0137 4.8
		≤ 375 Bhn or ≤ 40 HRc (44-66)	55 RPM Fr Feed (ipm)	6723 0.0004 3.0	1681 0.0018 3.0	840 0.0036 3.0	560 0.0054 3.0	420 0.0071 3.0	336 0.0089 3.0	240 0.0125 3.0
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc (240-360)	300 RPM Fr Feed (ipm)	36672 0.0011 41.0	9168 0.0045 41.0	4584 0.0089 41.0	3056 0.0134 41.0	2292 0.0179 41.0	1834 0.0224 41.0	1310 0.0313 41.0
		≤ 260 Bhn or ≤ 26 HRc (212-318)	265 RPM Fr Feed (ipm)	32394 0.0011 37.0	8098 0.0046 37.0	4049 0.0091 37.0	2699 0.0137 37.0	2025 0.0183 37.0	1620 0.0228 37.0	1157 0.0320 37.0

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Series 135 5D Fractional	Hardness	Vc (sfm)	DC • in							
			1/32	1/8	1/4	3/8	1/2	5/8	7/8	
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (508-762)	635 RPM Fr Feed (ipm)	77622 0.0012 96.0	19406 0.0049 96.0	9703 0.0099 96.0	6469 0.0148 96.0	4851 0.0198 96.0	3881 0.0247 96.0	2772 0.0346 96.0
		≤ 150 Bhn or ≤ 7 HRc (432-648)	540 RPM Fr Feed (ipm)	66010 0.0012 82.0	16502 0.0050 82.0	8251 0.0099 82.0	5501 0.0149 82.0	4126 0.0199 82.0	3300 0.0248 82.0	2357 0.0348 82.0
		≤ 140 Bhn or ≤ 3 HRc (360-540)	450 RPM Fr Feed (ipm)	55008 0.0005 27.5	13752 0.0020 27.5	6876 0.0040 27.5	4584 0.0060 27.5	3438 0.0080 27.5	2750 0.0100 27.5	1965 0.0140 27.5
		≤ 200 Bhn or ≤ 23 HRc (288-432)	360 RPM Fr Feed (ipm)	44006 0.0005 22.0	11002 0.0020 22.0	5501 0.0040 22.0	3667 0.0060 22.0	2750 0.0080 22.0	2200 0.0100 22.0	1572 0.0140 22.0
		≤ 300 Bhn or ≤ 32 HRc (32-48)	40 RPM Fr Feed (ipm)	4890 0.0002 1.0	1222 0.0008 1.0	611 0.0016 1.0	407 0.0025 1.0	306 0.0033 1.0	244 0.0041 1.0	175 0.0057 1.0
		≤ 400 Bhn or ≤ 43 HRc (16-24)	20 RPM Fr Feed (ipm)	2445 0.0002 0.4	611 0.0007 0.4	306 0.0013 0.4	204 0.0020 0.4	153 0.0026 0.4	122 0.0033 0.4	87 0.0046 0.4
		≤ 275 Bhn or ≤ 28 HRc (84-126)	105 RPM Fr Feed (ipm)	12835 0.0005 5.8	3209 0.0018 5.8	1604 0.0036 5.8	1070 0.0054 5.8	802 0.0072 5.8	642 0.0090 5.8	458 0.0127 5.8
		≤ 350 Bhn or ≤ 38 HRc (64-96)	80 RPM Fr Feed (ipm)	9779 0.0004 3.9	2445 0.0016 3.9	1222 0.0032 3.9	815 0.0048 3.9	611 0.0064 3.9	489 0.0080 3.9	349 0.0112 3.9
		≤ 440 Bhn or ≤ 47 HRc (34-50)	42 RPM Fr Feed (ipm)	5134 0.0003 1.6	1284 0.0012 1.6	642 0.0025 1.6	428 0.0037 1.6	321 0.0050 1.6	257 0.0062 1.6	183 0.0087 1.6
H	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 200 Bhn or ≤ 13 HRc (96-144)	120 RPM Fr Feed (ipm)	14669 0.0006 9.4	3667 0.0026 9.4	1834 0.0051 9.4	1222 0.0077 9.4	917 0.0103 9.4	733 0.0128 9.4	524 0.0179 9.4
		≤ 375 Bhn or ≤ 40 HRc (64-96)	80 RPM Fr Feed (ipm)	9779 0.0003 2.9	2445 0.0012 2.9	1222 0.0024 2.9	815 0.0036 2.9	611 0.0047 2.9	489 0.0059 2.9	349 0.0083 2.9
		≤ 475 Bhn or ≤ 50 HRc (56-84)	70 RPM Fr Feed (ipm)	8557 0.0002 1.7	2139 0.0008 1.7	1070 0.0016 1.7	713 0.0024 1.7	535 0.0032 1.7	428 0.0040 1.7	306 0.0056 1.7
		≤ 220 Bhn or ≤ 19 HRc (240-360)	30 RPM Fr Feed (ipm)	36672 0.0011 41.0	9168 0.0045 41.0	4584 0.0089 41.0	3056 0.0134 41.0	2292 0.0179 41.0	1834 0.0224 41.0	1310 0.0313 41.0

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

rpm = Vc x 3.82 / DC

ipm = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

METRIC  
**Hi-PerCarb®**

METRIC  
**Hi-PerCarb®**

Series 135M 5D Metric		Hardness	Vc (m/min)	DC • mm							
1.5	3	6	8	10	12	16	20				
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc (84-126)	105 RPM Fr Feed (mm/min)	22297 0.048 1060 0.095 1060 0.190 1060 0.254 1060 0.317 1060 0.380	11148 0.095 1060 0.171 1060 0.228 1060 0.285 1060 0.341 1060 0.455	5574 0.190 1060 0.285 1060 0.341 1060 0.455 1060 0.569	4181 0.254 1060 0.341 1060 0.455 1060 0.569	3344 0.317 1060 0.455 1060 0.569	2787 0.380 1060 0.569	2090 0.507 1060	1672 0.634
		≤ 275 Bhn or ≤ 28 HRc (76-113)	94 RPM Fr Feed (mm/min)	20035 0.043 855 0.085 855 0.171 855 0.228 855 0.285 855 0.341	10017 0.085 855 0.171 855 0.228 855 0.285 855 0.341 855 0.455	5009 0.171 855 0.228 855 0.285 855 0.341 855 0.455	3756 0.228 855 0.285 855 0.341 855 0.455	3005 0.285 855 0.341 855 0.455	2504 0.341 855	1878 0.455 855	1503 0.569
		≤ 425 Bhn or ≤ 45 HRc (44-66)	55 RPM Fr Feed (mm/min)	11633 0.036 415 0.071 415 0.143 415 0.190 415 0.238 415 0.285	5816 0.071 415 0.143 415 0.190 415 0.238 415 0.285 415 0.381	2908 0.143 415 0.190 415 0.238 415 0.285 415 0.381	2181 0.190 415 0.238 415 0.285 415 0.381	1745 0.238 415 0.285 415 0.381	1454 0.285 415	1091 0.381 415	872 0.476
		≤ 275 Bhn or ≤ 28 HRc (66-99)	82 RPM Fr Feed (mm/min)	17449 0.036 625 0.072 625 0.143 625 0.191 625 0.239 625 0.287	8725 0.072 625 0.143 625 0.191 625 0.239 625 0.287 625 0.382	4362 0.143 625 0.191 625 0.239 625 0.287 625 0.382	3272 0.191 625 0.239 625 0.287 625 0.382	2617 0.239 625 0.287 625 0.382	2181 0.287 625	1636 0.382 625	1309 0.478
		≤ 375 Bhn or ≤ 40 HRc (40-60)	50 RPM Fr Feed (mm/min)	10664 0.031 330 0.062 330 0.124 330 0.165 330 0.206 330 0.248	5332 0.062 330 0.124 330 0.165 330 0.206 330 0.248 330 0.330	2666 0.124 330 0.165 330 0.206 330 0.248 330 0.330	1999 0.165 330 0.206 330 0.248 330 0.330	1600 0.206 330 0.248 330 0.330	1333 0.248 330 0.330	1000 0.330 330	800 0.413
		≤ 450 Bhn or ≤ 48 HRc (28-42)	35 RPM Fr Feed (mm/min)	7432 0.022 160 0.043 160 0.086 160 0.115 160 0.144 160 0.172	3716 0.043 160 0.086 160 0.115 160 0.144 160 0.172 160 0.230	1858 0.086 160 0.115 160 0.144 160 0.172 160 0.230	1394 0.115 160 0.144 160 0.172 160 0.230	1115 0.144 160 0.172 160 0.230	929 0.172 160 0.230	697 0.230 160	557 0.287
		≤ 185 Bhn or ≤ 9 HRc (61-91)	76 RPM Fr Feed (mm/min)	16157 0.031 495 0.061 495 0.123 495 0.163 495 0.204 495 0.245	8078 0.061 495 0.123 495 0.163 495 0.204 495 0.245 495 0.327	4039 0.123 495 0.163 495 0.204 495 0.245 495 0.327	3029 0.163 495 0.204 495 0.245 495 0.327	2424 0.204 495 0.245 495 0.327	2020 0.245 495 0.327	1515 0.327 495	1212 0.408
		≤ 275 Bhn or ≤ 28 HRc (37-55)	46 RPM Fr Feed (mm/min)	9694 0.024 230 0.047 230 0.095 230 0.127 230 0.158	4847 0.047 230 0.095 230 0.127 230 0.158 230 0.190	2424 0.095 230 0.127 230 0.158 230 0.190	1818 0.127 230 0.158 230 0.190	1454 0.158 230 0.190	1212 0.190 230	909 0.253 230	727 0.316
		≤ 275 Bhn or ≤ 28 HRc (20-29)	24 RPM Fr Feed (mm/min)	5170 0.023 120 0.046 120 0.093 120 0.124	2585 0.046 120 0.093 120 0.124 120 0.155	1293 0.093 120 0.124 120 0.155	969 0.124 120 0.155 120 0.186	776 0.155 120 0.186 120 0.248	646 0.186 120 0.248	485 0.309	388 0.309
		≤ 375 Bhn or ≤ 40 HRc (13-20)	17 RPM Fr Feed (mm/min)	3555 0.021 75 0.042 75 0.084	1777 0.042 75 0.084 75 0.113	889 0.084 75 0.113 75 0.141	666 0.113 75 0.141 75 0.169	533 0.141 75 0.169 75 0.225	444 0.169 75 0.225	333 0.225	267 0.281
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc (73-110)	91 RPM Fr Feed (mm/min)	19388 0.054 1050 0.108 1050 0.217	9694 0.108 1050 0.217 1050 0.289	4847 0.217 1050 0.289 1050 0.361	3635 0.289 1050 0.361 1050 0.433	2908 0.361 1050 0.433 1050 0.578	2424 0.433 1050 0.578	1818 0.578 1050	1454 0.722
		≤ 260 Bhn or ≤ 26 HRc (65-97)	81 RPM Fr Feed (mm/min)	17126 0.055 935 0.109 935 0.218	8563 0.109 935 0.218 935 0.291	4282 0.218 935 0.291 935 0.364	3211 0.291 935 0.364 935 0.437	2569 0.364 935 0.437 935 0.582	2141 0.437 935 0.582	1606 0.582 935	1284 0.728
		≤ 220 Bhn or ≤ 19 HRc (73-110)	91 RPM Fr Feed (mm/min)	19388 0.054 1050 0.108 1050 0.217	9694 0.108 1050 0.217 1050 0.289	4847 0.217 1050 0.289 1050 0.361	3635 0.289 1050 0.361 1050 0.433	2908 0.361 1050 0.433 1050 0.578	2424 0.433 1050 0.578	1818 0.578 1050	1454 0.722
		≤ 260 Bhn or ≤ 26 HRc (65-97)	81 RPM Fr Feed (mm/min)	17126 0.055 935 0.109 935 0.218	8563 0.109 935 0.218 935 0.291	4282 0.218 935 0.291 935 0.364	3211 0.291 935 0.364 935 0.437	2569 0.364 935 0.437 935 0.582	2141 0.437 935 0.582	1606 0.582 935	1284 0.728

continued on next page

Series 135M 5D Metric		Hardness	Vc (m/min)	DC • mm							
1.5	3			1.5	3	6	8	10	12	16	20
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (155-232)	194 RPM Fr Feed (mm/min)	41039 0.059 2430 0.118	20519 0.118 2430 0.237	10260 0.237 2430 0.316	7695 0.316 2430 0.395	6156 0.395 2430 0.474	5130 0.474 2430 0.632	3847 0.632 2430 0.790	3078 0.790
		≤ 150 Bhn or ≤ 7 HRc (132-198)	165 RPM Fr Feed (mm/min)	34899 0.059 2065 0.118	17449 0.118 2065 0.237	8725 0.237 2065 0.316	6544 0.316 2065 0.394	5235 0.394 2065 0.473	4362 0.473 2065 0.631	3272 0.631 2065 0.789	2617 0.789
		≤ 140 Bhn or ≤ 3 HRc (110-165)	137 RPM Fr Feed (mm/min)	29082 0.027 775 0.053	14541 0.053 775 0.107	7271 0.107 775 0.142	5453 0.142 775 0.178	4362 0.178 775 0.213	3635 0.213 775 0.284	2726 0.284 775 0.355	2181 0.355
		≤ 200 Bhn or ≤ 23 HRc (88-132)	110 RPM Fr Feed (mm/min)	23266 0.027 630 0.054	11633 0.054 630 0.108	5816 0.108 630 0.144	4362 0.144 630 0.181	3490 0.181 630 0.217	2908 0.217 630 0.289	2181 0.289 630 0.361	1745 0.361
		≤ 300 Bhn or ≤ 32 HRc (10-15)	12 RPM Fr Feed (mm/min)	2585 0.010 25 0.019	1293 0.019 25 0.039	646 0.039 25 0.052	485 0.052 25 0.064	388 0.064 25 0.077	323 0.077 25 0.103	242 0.103 25 0.129	194 0.129
		≤ 400 Bhn or ≤ 43 HRc (5-7)	6 RPM Fr Feed (mm/min)	1293 0.007 9 0.014	646 0.014 9 0.028	323 0.028 9 0.037	194 0.037 9 0.046	162 0.046 9 0.056	121 0.056 9 0.074	97 0.074	97 0.093
		≤ 275 Bhn or ≤ 28 HRc (26-38)	32 RPM Fr Feed (mm/min)	6786 0.021 145 0.043	3393						



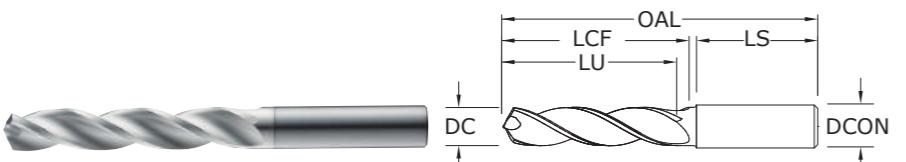
HIGH PERFORMANCE CARBIDE DRILLS



## 131N 3xD

FRACTIONAL & METRIC SERIES

- Triple margin design improves hole stability and size control while providing superior finish, roundness and cylindricity
- Self-stabilizing pyramid point design stabilizes the drill on contact with the workpiece
- Open flute structure efficiently transports chips while maintaining strength at high feed rates
- Sculpted gash allows chips to easily flow away from the drill center
- Recommended for materials ≤ 175 Bhn (≤ 16 HRc)



inch & mm								EDP NO.	
CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	UNCOATED Ti-NAMITE-B (TiB <sub>2</sub> )
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

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HIGH PERFORMANCE CARBIDE DRILLS

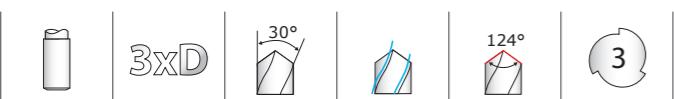
131N 3xD  
FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	inch & mm				EDP NO.	UNCOATED Ti-NAMITE-B (TiB <sub>2</sub> )	
				SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU			
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	
6,0 mm	0.2362		M7 X 1	6,0	66,0	28,0	20,0	36,0	64630 67630	
6,1 mm	0.2402				8,0	79,0	34,0	24,0	36,0	64631 67631
6,2 mm	0.2441		M7 X 0,75	8,0	79,0	34,0	24,0	36,0	64632 67632	
6,3 mm	0.2480				8,0	79,0	34,0	24,0	36,0	64633 67633
1/4	0.2500	6.35			8,0	79,0	34,0	24,0	36,0	54610 54710
6,4 mm	0.2520				8,0	79,0	34,0	24,0	36,0	64634 67634
6,5 mm	0.2559				8,0	79,0	34,0	24,0	36,0	64635 67635
F	0.2570	6.53	5/16-18		8,0	79,0	34,0	24,0	36,0	54611 54711
6,6 mm	0.2598				8,0	79,0	34,0	24,0	36,0	64636 67636
6,7 mm	0.2638				8,0	79,0	34,0	24,0	36,0	64637 67637
17/64	0.2656	6.75	5/16-20		8,0	79,0	34,0	24,0	36,0	54612 54712
6,8 mm	0.2677		M8 X 1,25		8,0	79,0	34,0	24,0	36,0	64638 67638
6,9 mm	0.2717		5/16-24		8,0	79,0	34,0	24,0	36,0	64639 67639
7,0 mm	0.2756		M8 X 1		8,0	79,0	34,0	24,0	36,0	64640 67640
7,1 mm	0.2795				8,0	79,0	41,0	29,0	36,0	64641 67641
9/32	0.2812	7.14	5/16-32		8,0	79,0	41,0	29,0	36,0	54613 54713
7,2 mm	0.2835		M8 X 0,75		8,0	79,0	41,0	29,0	36,0	64642 67642
7,3 mm	0.2874				8,0	79,0	41,0	29,0	36,0	64643 67643
7,4 mm	0.2913				8,0	79,0	41,0</td			



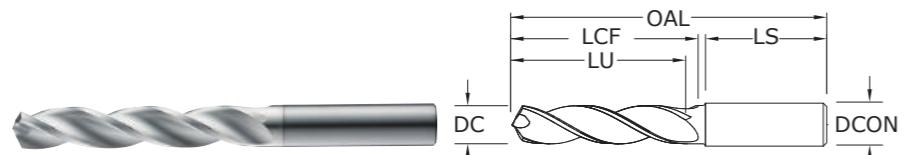
HIGH PERFORMANCE CARBIDE DRILLS



## 131N 3xD

FRACTIONAL & METRIC SERIES

- Triple margin design improves hole stability and size control while providing superior finish, roundness and cylindricity
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- Recommended for materials ≤ 175 Bhn (≤ 16 HRc)



inch & mm								EDP NO.		
CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	UNCOATED Ti-NAMITE-B (TiB <sub>2</sub> )	EDP NO.
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

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HIGH PERFORMANCE CARBIDE DRILLS

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	inch & mm				EDP NO.	CONTINUED
				SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED SHANK LENGTH LU		
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
1/2	0,5000	12,70		14,0	107,0	60,0	43,0	45,0	54628 54728
12,8 mm	0,5039		M14 X 1,25	14,0	107,0	60,0	43,0	45,0	64692 67692
13,0 mm	0,5118		M14 X 1	14,0	107,0	60,0	43,0	45,0	64693 67693
33/64	0,5156	13,10	9/16-18	14,0	107,0	60,0	43,0	45,0	54629 54729
13,5 mm	0,5315		5/8-11	14,0	107,0	60,0	43,0	45,0	64694 67694
13,8 mm	0,5433			14,0	107,0	60,0	43,0	45,0	64695 67695
14,0 mm	0,5512		M16 X 2	14,0	107,0	60,0	43,0	45,0	64696 67696
9/16	0,5625	14,29		16,0	115,0	65,0	45,0	48,0	54630 54730
14,5 mm	0,5709		M16 X 1,5	16,0	115,0	65,0	45,0	48,0	64697 67697
37/64	0,5781	14,68	5/8-18	16,0	115,0	65,0	45,0	48,0	54631 54731
14,8 mm	0,5827			16,0	115,0	65,0	45,0	48,0	64698 67698
15,0 mm	0,5906		M16 X 1	16,0	115,0	65,0	45,0	48,0	64699 67699
15,5 mm	0,6102		M18 X 2,5	16,0	115,0	65,0	45,0	48,0	64700 67700
15,8 mm	0,6220			16,0	115,0	65,0	45,0	48,0	64701 67701
5/8	0,6250	15,88	11/16-16	16,0	115,0	65,0	45,0	48,0	54632 54732
16,0 mm	0,6299			16,0	115,0	65,0	45,0	48,0	64702 67702
21/32	0,6562	16,67	3/4-10	18,0	123,0	73,0	51,0	48,0	54633 54733
11/16	0,6875	17,46	3/4-16	18,0	123,0	73,0	51,0	48,0	54634 54734
3/4	0,7500	19,05	13/16-16	20,0	131,0	79,0	55,0	50,0	54635 54735

### TOLERANCES (inch)

#### ≤.1181 DIAMETER

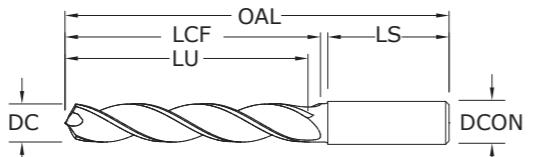
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## 131N 5xD

FRACTIONAL & METRIC SERIES

- Triple margin design improves hole stability and size control while providing superior finish, roundness and cylindricity
- Self-stabilizing pyramid point design stabilizes the drill on contact with the workpiece
- Open flute structure efficiently transports chips while maintaining strength at high feed rates
- Sculpted gash allows chips to easily flow away from the drill center
- Recommended for materials ≤ 175 Bhn (≤ 16 HRc)



CUTTING DIAMETER DC	DECIMAL EQUIV. 0.1181	METRIC EQUIV. M3,5 X 0,35	TAP SIZE REFERENCE ONLY	inch & mm				EDP NO.
				SHANK Diameter DCON	OVERALL OAL	FLUTE LENGTH LCF	CLEARED SHANK LENGTH LU	
3,0 mm	0.1181			6,0	66,0	28,0	23,0	65000 64800
3,1 mm	0.1220			6,0	66,0	28,0	23,0	65001 64801
1/8	0.1250	3.18		6,0	66,0	28,0	23,0	55000 54800
3,2 mm	0.1260	M3,5 X 0,35		6,0	66,0	28,0	23,0	65002 64802
3,3 mm	0.1299	M4 X 0,7		6,0	66,0	28,0	23,0	65003 64803
3,4 mm	0.1339			6,0	66,0	28,0	23,0	65004 64804
#29	0.1360	3.45	8-32,8-36	6,0	66,0	28,0	23,0	55001 54801
3,5 mm	0.1378		M4 X 0,5	6,0	66,0	28,0	23,0	65005 64805
9/64	0.1406	3.57		6,0	66,0	28,0	23,0	55002 54802
3,6 mm	0.1417		M4 X 0,35	6,0	66,0	28,0	23,0	65006 64806
3,7 mm	0.1457		M4,5 X 0,75	6,0	66,0	28,0	23,0	65007 64807
3,8 mm	0.1496		10-24	6,0	74,0	36,0	29,0	65008 64808
3,9 mm	0.1535			6,0	74,0	36,0	29,0	65009 64809
5/32	0.1562	3.97		6,0	74,0	36,0	29,0	55003 54803
4,0 mm	0.1575		M4,5 X 0,5	6,0	74,0	36,0	29,0	65010 64810
#21	0.1590	4.04	10-32	6,0	74,0	36,0	29,0	55004 54804
4,1 mm	0.1614			6,0	74,0	36,0	29,0	65011 64811
4,2 mm	0.1654		M5 / M5 X 0,75	6,0	74,0	36,0	29,0	65012 64812
4,3 mm	0.1693			6,0	74,0	36,0	29,0	65013 64813
11/64	0.1719	4.37		6,0	74,0	36,0	29,0	55005 54805
4,4 mm	0.1732		12-24	6,0	74,0	36,0	29,0	65014 64814
4,5 mm	0.1772		M5 X 0,5	6,0	74,0	36,0	29,0	65015 64815
4,6 mm	0.1811		12-28	6,0	74,0	36,0	29,0	65016 64816
4,7 mm	0.1850		12-32	6,0	74,0	36,0	29,0	65017 64817
3/16	0.1875	4.76		6,0	82,0	44,0	35,0	55006 54806
4,8 mm	0.1890		7/32-32	6,0	82,0	44,0	35,0	65018 64818
4,9 mm	0.1929			6,0	82,0	44,0	35,0	65019 64819
5,0 mm	0.1969		M6 X 1	6,0	82,0	44,0	35,0	65020 64820
5,1 mm	0.2008		1/4-20	6,0	82,0	44,0	35,0	65021 64821
13/64	0.2031	5.16		6,0	82,0	44,0	35,0	55007 54807
5,2 mm	0.2047		M6 X 0,75	6,0	82,0	44,0	35,0	65022 64822
5,3 mm	0.2087			6,0	82,0	44,0	35,0	65023 64823
5,4 mm	0.2126			6,0	82,0	44,0	35,0	65024 64824
5,5 mm	0.2165		M6 X 0,5	6,0	82,0	44,0	35,0	65025 64825
7/32	0.2188	5.56	1/4-32	6,0	82,0	44,0	35,0	55008 54808

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HIGH PERFORMANCE CARBIDE DRILLS

**131N 5xD**  
FRACTIONAL & METRIC SERIES

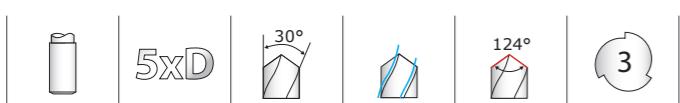
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CUTTING DIAMETER DC	DECIMAL EQUIV. 0.2205	METRIC EQUIV. M7 X 1	TAP SIZE REFERENCE ONLY	inch & mm				EDP NO.
				SHANK DIAMETER DCON	OVERALL OAL	FLUTE LENGTH LCF	CLEARED SHANK LENGTH LU	
5,6 mm	0.2244			6,0	82,0	44,0	35,0	65026 64826
5,7 mm	0.2283			6,0	82,0	44,0	35,0	65027 64827
5,8 mm	0.2323			6,0	82,0	44,0	35,0	65028 64828
5,9 mm	0.2364			6,0	82,0	44,0	35,0	65029 64829
15/64	0.2402			6,0	82,0	44,0	35,0	55009 54809
6,0 mm	0.2441			6,0	82,0	44,0	35,0	65030 64830
6,1 mm	0.2480			8,0	91,0	53,0	43,0	65031 64831
6,2 mm	0.2520			8,0	91,0	53,0	43,0	65032 64832
6,3 mm	0.2559			8,0	91,0	53,0	43,0	65033 64833
1/4	0.2598			8,0	91,0	53,0	43,0	55010 54810
6,4 mm	0.2638			8,0	91,0	53,0	43,0	65034 64834
6,5 mm	0.2677			8,0	91,0	53,0	43,0	65035 64835
F	0.2717			8,0	91,0	53,0	43,0	55011 54811
6,6 mm	0.2756			8,0	91,0	53,0	43,0	65036 64836
6,7 mm	0.2795			8,0	91,0	53,0	43,0	65037 64837
17/64	0.2835			8,0	91,0	53,0	43,0	55012 54812
6,8 mm	0.2874			8,0	91,0	53,0	43,0	65038 64838
6,9 mm	0.2913			8,0	91,0	53,0	43,0	65039 64839
7,0 mm	0.2953			8,0	91,0	53,0	43,0	65040 64840
7,1 mm	0.2992			8,0	91,0	53,0	43,0	65041 64841
7,2 mm	0.3031			8,0	91,0	53,0	43,0	65042 64842
7,3 mm	0.3071			8,0	91,0	53,0	43,0	65043 64843
7,4 mm	0.3110			8,0	91,0	53,0	43,0	65044 64844
7,5 mm	0.3150			8,0	91,0	53,0	43,0	65045 64845
19/64	0.3190			8,0	91,0	53,0	43,0	55014 54814
7,6 mm	0.3228			8,0	91,0	53,0	43,0	65046 64846
7,7 mm	0.3268			8,0	91,0	53,0	43,0	65047 64847
7,8 mm	0.3307			8,0	91,0	53,0	43,0	65048 64848
7,9 mm	0.3346			8,0	91,0	53,0	43,0	65049 64849
5/16	0.3386			8,0	91,0	53,0	43,0	55015 54815
8,0 mm	0.3425			10,0	103,0	61,0	49,0	65051 64851
8,1 mm	0.3465			10,0	103,0</			

FRACTIONAL & METRIC  
Hi-PerCarb®



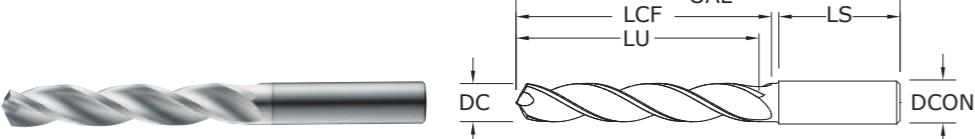
HIGH PERFORMANCE CARBIDE DRILLS



**131N 5xD**

FRACTIONAL & METRIC SERIES

- Triple margin design improves hole stability and size control while providing superior finish, roundness and cylindricity
- Self-stabilizing pyramid point design stabilizes the drill on contact with the workpiece
- Open flute structure efficiently transports chips while maintaining strength at high feed rates
- Sculpted gash allows chips to easily flow away from the drill center
- Recommended for materials ≤ 175 Bhn (≤ 16 HRc)



TOLERANCES (inch)

≤.1181 DIAMETER

DC = +.00008/+0.00047  
DCON = h<sub>6</sub>

>.1181-.2362 DIAMETER

DC = +.00016/+0.00063

DCON = h<sub>6</sub>

>.2362-.3937 DIAMETER

DC = +.00024/+0.00083

DCON = h<sub>6</sub>

>.3937-.7087 DIAMETER

DC = +.00028/+0.00098

DCON = h<sub>6</sub>

>.7087-.1181 DIAMETER

DC = +.00031/+0.00114

DCON = h<sub>6</sub>

TOLERANCES (mm)

≤3 DIAMETER

DC = +0.002/+0.012  
DCON = h<sub>6</sub>

>3-6 DIAMETER

DC = +0.004/+0.016  
DCON = h<sub>6</sub>

>6-10 DIAMETER

DC = +0.006/+0.021  
DCON = h<sub>6</sub>

>10-18 DIAMETER

DC = +0.007/+0.025  
DCON = h<sub>6</sub>

NON-FERROUS

PLASTICS/COMPOSITES

continued on next page



HIGH PERFORMANCE CARBIDE DRILLS

FRACTIONAL & METRIC  
Hi-PerCarb®

**131N 5xD**  
FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER DC	DECIMAL EQUIV. EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	inch & mm				EDP NO.	UNCOATED Ti-NAMITE-B (TiB <sub>2</sub> )
				SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED SHANK LENGTH LU		
11,9 mm 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 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 12,5 mm	0.4921		M14 X 1,5	14,0	124,0	77,0	60,0	45,0	65091 64891
1/2	0.5000	12.70		14,0	124,0	77,0	60,0	45,0	55028 54828
12,8 mm 12,8 mm	0.5039		M14 X 1,25	14,0	124,0	77,0	60,0	45,0	65092 64892
13,0 mm 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 13,5 mm	0.5315		5/8-11	14,0	124,0	77,0	60,0	45,0	65094 64894
13,8 mm 13,8 mm	0.5433			14,0	124,0	77,0	60,0	45,0	65095 64895
14,0 mm 14,0 mm	0.5512		M16 X 2	14,0	124,0	77,0	60,0	45,0	65096 64896
9/16	0.5625	14.29		16,0	133,0	83,0	63,0	48,0	55030 54830
14,5 mm 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 14,8 mm	0.5827			16,0	133,0	83,0	63,0	48,0	65098 64898
15,0 mm 15,0 mm	0.5906		M16 X 1	16,0	133,0	83,0	63,0	48,0	65099 64899
15,5 mm 15,5 mm	0.6102		M18 X 2,5	16,0	133,0	83,0	63,0	48,0	65100 64900
15,8 mm 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 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

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

**FRACTIONAL**  
**Hi-PerCarb®**

**METRIC**  
**Hi-PerCarb®**

Series 131N 3D & 5D Fractional		Hardness	Vc (sfm)	DC • in								
1/8	3/16	1/4	3/8	1/2	5/8	3/4						
<b>ALUMINUM ALLOYS</b> < 12% Si 6061, 2024, 7075	$\leq 150 \text{ Bhn}$ or $\leq 7 \text{ HRc}$ (640-960)	800	RPM	24448	16299	12224	8149	6112	4890	4075		
		Fr	0.0055	0.0083	0.0110	0.0166	0.0221	0.0276	0.0331			
		Feed (ipm)	135	135	135	135	135	135	135			
<b>ALUMINUM ALLOYS</b> > 12% Si A356.0, 390.0, 319.0	$\leq 125 \text{ Bhn}$ or $\leq 77 \text{ HRb}$ (480-720)	600	RPM	18336	12224	9168	6112	4584	3667	3056		
		Fr	0.0055	0.0082	0.0109	0.0164	0.0218	0.0273	0.0327			
		Feed (ipm)	100	100	100	100	100	100	100			
<b>COPPER ALLOYS</b> Alum Bronze, Muntz Brass, Navel Brass	$\leq 175 \text{ Bhn}$ or $\leq 16 \text{ HRc}$ (440-660)	550	RPM	16808	11205	8404	5603	4202	3362	2801		
		Fr	0.0020	0.0030	0.0040	0.0061	0.0081	0.0101	0.0121			
		Feed (ipm)	34	34	34	34	34	34	34			
<b>PLASTICS</b> Acrylic, PVC, Polypropylene	$\leq 450 \text{ Bhn}$ (360-540)	450	RPM	13752	9168	6876	4584	3438	2750	2292		
		Fr	0.0025	0.0037	0.0049	0.0074	0.0099	0.0124	0.0148			
		Feed (ipm)	34	34	34	34	34	34	34			

Bhn (Brinell)    HRc (Rockwell C)    HRb (Rockwell B)

rpm = Vc x 3.82 / DC

ipm = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

Series 131N 3D & 5D Metric		Hardness	Vc (m/min)	DC • mm								
3	6	8	10	12	14	16						
<b>ALUMINUM ALLOYS</b> < 12% Si 6061, 2024, 7075	$\leq 150 \text{ Bhn}$ or $\leq 7 \text{ HRc}$ (195-293)	244	RPM	25851	12926	9694	7755	6463	5540	4847		
		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			
<b>ALUMINUM ALLOYS</b> > 12% Si A356.0, 390.0, 319.0	$\leq 125 \text{ Bhn}$ or $\leq 77 \text{ HRb}$ (146-219)	183	RPM	19388	9694	7271	5816	4847	4155	3635		
		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			
<b>COPPER ALLOYS</b> Alum Bronze, Muntz Brass, Navel Brass	$\leq 175 \text{ Bhn}$ or $\leq 16 \text{ HRc}$ (134-201)	168	RPM	17773	8886	6665	5332	4443	3808	3332		
		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			
<b>PLASTICS</b> Acrylic, PVC, Polypropylene	$\leq 137 \text{ Bhn}$ (110-165)	137	RPM	14541	7271	5453	4362	3635	3116	2726		
		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			

Bhn (Brinell)    HRc (Rockwell C)    HRb (Rockwell B)

rpm = (Vc x 1000) / (DC x 3.14)

mm/min = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))



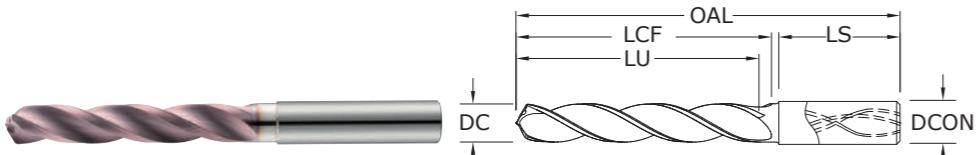
HIGH PERFORMANCE CARBIDE DRILLS



## 141K 5xD

FRACTIONAL & METRIC SERIES

- Triple margin design improves hole stability and size control while providing superior finish, roundness and cylindricity
- Self-stabilizing pyramid point design stabilizes the drill on contact with the workpiece
- Open flute structure efficiently transports chips while maintaining strength at high feed rates
- Sculpted gash allows chips to easily flow away from the drill center
- Recommended for materials ≤ 400 Bhn (≤ 43 HRc)



inch & mm								EDP NO.	
CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	Ti-NAMITE-M (TM)
3,0 mm	0.1181			6,0	66,0	28,0	23,0	36,0	65160
3,1 mm	0.1220			6,0	66,0	28,0	23,0	36,0	65161
1/8	0.1250	3.18		6,0	66,0	28,0	23,0	36,0	55160
3,2 mm	0.1260	M3,5 X 0,35		6,0	66,0	28,0	23,0	36,0	65162
3,3 mm	0.1299	M4 X 0,7		6,0	66,0	28,0	23,0	36,0	65163
3,4 mm	0.1339			6,0	66,0	28,0	23,0	36,0	65164
#29	0.1360	3.45	8-32,8-36	6,0	66,0	28,0	23,0	36,0	55161
3,5 mm	0.1378	M4 X 0,5		6,0	66,0	28,0	23,0	36,0	65165
9/64	0.1406	3.57		6,0	66,0	28,0	23,0	36,0	55162
3,6 mm	0.1417	M4 X 0,35		6,0	66,0	28,0	23,0	36,0	65166
3,7 mm	0.1457	M4,5 X 0,75		6,0	66,0	28,0	23,0	36,0	65167
3,8 mm	0.1496		10-24	6,0	74,0	36,0	29,0	36,0	65168
3,9 mm	0.1535			6,0	74,0	36,0	29,0	36,0	65169
5/32	0.1562	3.97		6,0	74,0	36,0	29,0	36,0	55163
4,0 mm	0.1575		M4,5 X 0,5	6,0	74,0	36,0	29,0	36,0	65170
#21	0.1590	4.04	10-32	6,0	74,0	36,0	29,0	36,0	55164
4,1 mm	0.1614			6,0	74,0	36,0	29,0	36,0	65171
4,2 mm	0.1654		M5 / M5 x 0,75	6,0	74,0	36,0	29,0	36,0	65172
4,3 mm	0.1693			6,0	74,0	36,0	29,0	36,0	65173
11/64	0.1719	4.37		6,0	74,0	36,0	29,0	36,0	55165
4,4 mm	0.1732		12-24	6,0	74,0	36,0	29,0	36,0	65174
4,5 mm	0.1772		M5 X 0,5	6,0	74,0	36,0	29,0	36,0	65175
4,6 mm	0.1811		12-28	6,0	74,0	36,0	29,0	36,0	65176
4,7 mm	0.1850		12-32	6,0	74,0	36,0	29,0	36,0	65177
3/16	0.1875	4.76		6,0	82,0	44,0	35,0	36,0	55166
4,8 mm	0.1890		7/32-32	6,0	82,0	44,0	35,0	36,0	65178
4,9 mm	0.1929			6,0	82,0	44,0	35,0	36,0	65179
5,0 mm	0.1969		M6 X 1	6,0	82,0	44,0	35,0	36,0	65180
5,1 mm	0.2008		1/4-20	6,0	82,0	44,0	35,0	36,0	65181
13/64	0.2031	5.16		6,0	82,0	44,0	35,0	36,0	55167
5,2 mm	0.2047		M6 X 0,75	6,0	82,0	44,0	35,0	36,0	65182
5,3 mm	0.2087			6,0	82,0	44,0	35,0	36,0	65183
5,4 mm	0.2126			6,0	82,0	44,0	35,0	36,0	65184
5,5 mm	0.2165		M6 X 0,5	6,0	82,0	44,0	35,0	36,0	65185
7/32	0.2188	5.56	1/4-32	6,0	82,0	44,0	35,0	36,0	55168
5,6 mm	0.2205			6,0	82,0	44,0	35,0	36,0	65186

continued on next page

### CAST IRON

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HIGH PERFORMANCE CARBIDE DRILLS

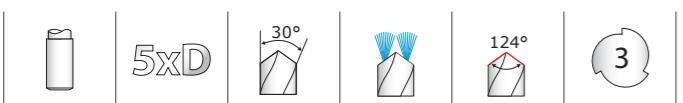
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CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	EDP NO.	Ti-NAMITE-M (TM)
5,7 mm	0.2244			6,0	82,0	44,0	35,0	36,0	65187	
5,8 mm	0.2283			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	
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			

FRACTIONAL & METRIC  
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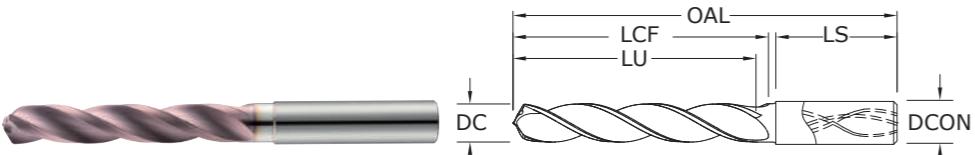
HIGH PERFORMANCE CARBIDE DRILLS



**141K 5xD**

FRACTIONAL & METRIC SERIES

- Triple margin design improves hole stability and size control while providing superior finish, roundness and cylindricity
- Self-stabilizing pyramid point design stabilizes the drill on contact with the workpiece
- Open flute structure efficiently transports chips while maintaining strength at high feed rates
- Sculpted gash allows chips to easily flow away from the drill center
- Recommended for materials ≤ 400 Bhn (≤ 43 HRc)



inch & mm								EDP NO.	
CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	Ti-NAMITE-M (TM)
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

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HIGH PERFORMANCE CARBIDE DRILLS

FRACTIONAL & METRIC  
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**141K 5xD**  
FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	EDP NO.	Ti-NAMITE-M (TM)
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	
1/2	0.5000	12.70			14,0	124,0	77,0	60,0	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	

**TOLERANCES (mm)**

**≤1181 DIAMETER**

DC = +.00008/+0.0047

DCON = h<sub>6</sub>

**>1181–2362 DIAMETER**

DC = +.00016/+0.0063

DCON = h<sub>6</sub>

**>2362–3937 DIAMETER**

DC = +.00024/+0.0083

DCON = h<sub>6</sub>

**>3937–7087 DIAMETER**

FRACTIONAL  
**Hi-PerCarb®**

METRIC  
**Hi-PerCarb®**

Series 141K 5D Fractional	Hardness	Vc (sfm)	DC • in							
			1/8	3/16	1/4	3/8	1/2	5/8	3/4	
GRAY CAST IRON FERRITIC ASTM A48: CLASS 20 SAE J431C: GRADE 1800	≤ 150 Bhn or ≤ 80 HRb (360-540)	450	RPM	13752	9168	6876	4584	3438	2750	2292
			Fr	0.0049	0.0074	0.0099	0.0148	0.0198	0.0247	0.0297
			Feed (ipm)	68	68	68	68	68	68	68
GRAY CAST IRON PEARLITIC ASTM A48: CLASS 30, 35, 40 SAE J431C: GRADE 3000	≤ 220 Bhn or ≤ 19 HRc (300-450)	375	RPM	11460	7640	5730	3820	2865	2292	1910
			Fr	0.0039	0.0059	0.0079	0.0118	0.0157	0.0196	0.0236
			Feed (ipm)	45	45	45	45	45	45	45
K COMPACTED GRAPHITE IRON	≤ 250 Bhn or ≤ 25 HRc (260-390)	325	RPM	9932	6621	4966	3311	2483	1986	1655
			Fr	0.0039	0.0059	0.0079	0.0118	0.0157	0.0196	0.0236
			Feed (ipm)	39	39	39	39	39	39	39
MALLEABLE CAST IRON FERRITIC ASTM A220: GRADE 40010 SAE J158: GRADE M4504	≤ 160 Bhn or ≤ 3 HRc (360-540)	450	RPM	13752	9168	6876	4584	3438	2750	2292
			Fr	0.0049	0.0074	0.0099	0.0148	0.0198	0.0247	0.0297
			Feed (ipm)	68	68	68	68	68	68	68
MALLEABLE CAST IRON MARTENSITE ASTM A220: GRADE 90001 SAE J158: GRADE M8501	≤ 320 Bhn or ≤ 34 HRc (200-300)	250	RPM	7640	5093	3820	2547	1910	1528	1273
			Fr	0.0031	0.0047	0.0063	0.0094	0.0126	0.0157	0.0188
			Feed (ipm)	24	24	24	24	24	24	24

Bhn (Brinell)    HRc (Rockwell C)    HRb (Rockwell B)

rpm = Vc x 3.82 / DC

ipm = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

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

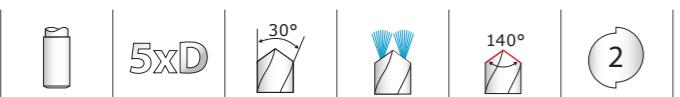
(Brinell)    HRc (Rockwell C)    HRb (Rockwell B)

rpm = (Vc x 1000) / (DC x 3.14)

mm/min = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))



## 140 5xD

### FRACTIONAL & METRIC SERIES

- Coolant through design promotes controlled and consistent operating temperatures improving coolant flow to the cut while maintaining strength
- Split point geometry for improved drill penetration and accuracy
- Controlled edge honing for longevity
- Negative corner position strengthens and protects
- Recommended for materials ≤ 60 HRc (≤ 654 Brn)

inch & mm								EDP NO.	
CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	TI-NAMITE-A (AITIN)
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

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For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)



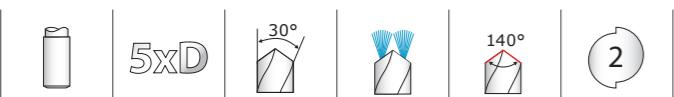
## 140 5xD

### FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	inch & mm			EDP NO.
					OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	
7/32	0.2188	5.56	1/4-32	6,0	82,0	44,0	35,0	51912
5,6 mm	0.2205			6,0	82,0	44,0	35,0	63924
5,7 mm	0.2244			6,0	82,0	44,0	35,0	63925
5,8 mm	0.2283			6,0	82,0	44,0	35,0	63926
5,9 mm	0.2323			6,0	82,0	44,0	35,0	63927
15/64	0.2344	5.95		6,0	82,0	44,0	35,0	51913
6,0 mm	0.2362		M7 X 1	6,0	82,0	44,0	35,0	63928
6,1 mm	0.2402			8,0	91,0	53,0	43,0	63929
6,2 mm	0.2441		M7 X 0,75	8,0	91,0	53,0	43,0	63930
6,3 mm	0.2480			8,0	91,0	53,0	43,0	63931
1/4	0.2500	6.35		8,0	91,0	53,0	43,0	51914
6,4 mm	0.2520			8,0	91,0	53,0	43,0	63932
6,5 mm	0.2559			8,0	91,0	53,0	43,0	63933
F	0.2570	6.53	5/16-18	8,0	91,0	53,0	43,0	51915
6,6 mm	0.2598			8,0	91,0	53,0	43,0	63934
6,7 mm	0.2638			8,0	91,0	53,0	43,0	63935
17/64	0.2656	6.75	5/16-20	8,0	91,0	53,0	43,0	51916
6,8 mm	0.2677		M8 X 1,25	8,0	91,0	53,0	43,0	63936
6,9 mm	0.2717			8,0	91,0	53,0	43,0	63999
7,0 mm	0.2756		M8 X 1	8,0	91,0	53,0	43,0	63937
7,1 mm	0.2795			8,0	91,0	53,0	43,0	63938
9/32	0.2812	7.14	5/16-32	8,0	91,0	53,0	43,0	51918
7,2 mm	0.2835		M8 X 0,75	8,0	91,0	53,0	43,0	63939
7,3 mm	0.2874			8,0	91,0	53,0	43,0	63940
7,4 mm	0.2913			8,0	91,0	53,0	43,0	63941
7,5 mm	0.2953		M8 X 0,5	8,0	91,0	53,0	43,0	63942
19/64	0.2969	7.54		8,0	91,0	53,0	43,0	51919
7,6 mm	0.2992			8,0	91,0	53,0	43,0	63943
7,7 mm	0.3031			8,0	91,0	53,0	43,0	63944
7,8 mm	0.3071		M9 X 1,25	8,0	91,0	53,0	43,0	63945
7,9 mm	0.3110			8,0	91,0	53,0	43,0	63946
5/16	0.3125	7.94	3/8-16	8,0	91,0	53,0	43,0	51920
8,0 mm	0.3150		M9 X 1	8,0	91,0	53,0	43,0	63947
8,1 mm	0.3189			10,0	103,0	61,0	49,0	63948
8,2 mm								

FRACTIONAL & METRIC  
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**140 5xD**

FRACTIONAL & METRIC SERIES

- Coolant through design promotes controlled and consistent operating temperatures improving coolant flow to the cut while maintaining strength
- Split point geometry for improved drill penetration and accuracy
- Controlled edge honing for longevity
- Negative corner position strengthens and protects
- Recommended for materials ≤ 60 HRc ( $\leq 654$  Bhn)

inch & mm									EDP NO.
CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	TI-NAMITE-A (AITIN)
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
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

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**140 5xD**  
FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	EDP NO.	Ti-NAMITE-A (AITIN)
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
1/2	0.5000	12.70			14,0	124,0	77,0	60,0	45,0	51934
12,8 mm	0.5039		M14 X 1,25		14,0	124,0	77,0	60,0	45,0	63988
13,0 mm	0.5118		M14 X 1		14,0	124,0	77,0	60,0	45,0	63989
33/64	0.5156	13.10	9/16-18		14,0	124,0	77,0	60,0	45,0	51935
13,5 mm	0.5315		5/8-11		14,0	124,0	77,0	60,0	45,0	64001
13,8 mm	0.5433				14,0	124,0	77,0	60,0	45,0	63990
14,0 mm	0.5512		M16 X 2		14,0	124,0	77,0	60,0	45,0	63991
9/16	0.5625	14.29			16,0	133,0	83,0	63,0	48,0	51937
14,5 mm	0.5709		M16 X 1,5		16,0	133,0	83,0	63,0	48,0	63992
37/64	0.5781	14.68	5/8-18		16,0	133,0	83,0	63,0	48,0	51938
14,8 mm	0.5827				16,0	133,0	83,0	63,0	48,0	63993
15,0 mm	0.5906		M16 X 1		16,0	133,0	83,0	63,0	48,0	63994
15,5 mm	0.6102		M18 X 2,5		16,0	133,0	83,0	63,0	48,0	63995
15,8 mm	0.6220				16,0	133,0	83,0	63,0	48,0	63996
5/8	0.6250	15.88	11/16-16		16,0	133,0	83,0	63,0	48,0	51939
16,0 mm	0.6299				16,0	133,0	83,0	63,0	48,0	63997
21/32	0.6562	16.67	3/4-10		18,0	143,0	93,0	71,0	48,0	51940
11/16	0.6875	17.46	3/4-16		18,0	143,0	93,0	71,0	48,0	51941
3/4	0.7500	19.05	13/16-16		20,0	153,0	101,0	77,0	50,0	51942

FRACTIONAL  
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Series 140 5D Fractional	Hardness	Vc (sfm)	DC • in								
			1/8	3/16	1/4	3/8	1/2	5/8	3/4		
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn	425	RPM	12988	8659	6494	4329	3247	2598	2165
		or ≤ 7 HRc	(340-510)	Fr	0.0039	0.0059	0.0079	0.0118	0.0157	0.0196	0.0236
				Feed (ipm)	51.0	51.0	51.0	51.0	51.0	51.0	51.0
		≤ 275 Bhn	380	RPM	11613	7742	5806	3871	2903	2323	1935
		or ≤ 28 HRc	(304-456)	Fr	0.0035	0.0053	0.0071	0.0106	0.0141	0.0177	0.0212
				Feed (ipm)	41.0	41.0	41.0	41.0	41.0	41.0	41.0
		≤ 425 Bhn	220	RPM	6723	4482	3362	2241	1681	1345	1121
		or ≤ 45 HRc	(176-264)	Fr	0.0030	0.0045	0.0059	0.0089	0.0119	0.0149	0.0178
				Feed (ipm)	20.0	20.0	20.0	20.0	20.0	20.0	20.0
		≤ 275 Bhn	330	RPM	10085	6723	5042	3362	2521	2017	1681
		or ≤ 28 HRc	(264-396)	Fr	0.0030	0.0045	0.0059	0.0089	0.0119	0.0149	0.0178
				Feed (ipm)	30.0	30.0	30.0	30.0	30.0	30.0	30.0
ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100		≤ 375 Bhn	200	RPM	6112	4075	3056	2037	1528	1222	1019
		or ≤ 40 HRc	(160-240)	Fr	0.0025	0.0038	0.0051	0.0076	0.0101	0.0127	0.0152
				Feed (ipm)	15.5	15.5	15.5	15.5	15.5	15.5	15.5
		≤ 450 Bhn	140	RPM	4278	2852	2139	1426	1070	856	713
		or ≤ 48 HRc	(112-168)	Fr	0.0018	0.0027	0.0036	0.0054	0.0072	0.0090	0.0108
				Feed (ipm)	7.7	7.7	7.7	7.7	7.7	7.7	7.7
		≤ 185 Bhn	305	RPM	9321	6214	4660	3107	2330	1864	1553
		or ≤ 9 HRc	(244-366)	Fr	0.0026	0.0039	0.0051	0.0077	0.0103	0.0129	0.0154
				Feed (ipm)	24.0	24.0	24.0	24.0	24.0	24.0	24.0
		≤ 275 Bhn	195	RPM	5959	3973	2980	1986	1490	1192	993
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	or ≤ 28 HRc	(156-234)	Fr	0.0020	0.0030	0.0040	0.0060	0.0081	0.0101	0.0121
				Feed (ipm)	12.0	12.0	12.0	12.0	12.0	12.0	12.0
		≤ 275 Bhn	150	RPM	4584	3056	2292	1528	1146	917	764
		or ≤ 28 HRc	(120-180)	Fr	0.0020	0.0030	0.0040	0.0060	0.0079	0.0099	0.0119
				Feed (ipm)	9.1	9.1	9.1	9.1	9.1	9.1	9.1
		≤ 375 Bhn	110	RPM	3362	2241	1681	1121	840	672	560
		or ≤ 40 HRc	(88-132)	Fr	0.0018	0.0027	0.0036	0.0054	0.0071	0.0089	0.0107
				Feed (ipm)	6.0	6.0	6.0	6.0	6.0	6.0	6.0
		≤ 220 Bhn	360	RPM	11002	7334	5501	3667	2750	2200	1834
		or ≤ 19 HRc	(288-432)	Fr	0.0045	0.0068	0.0091	0.0136	0.0182	0.0227	0.0273
K	CAST IRONS Gray, Malleable, Ductile			Feed (ipm)	50.0	50.0	50.0	50.0	50.0	50.0	50.0
		≤ 260 Bhn	335	RPM	10238	6825	5119	3413	2559	2048	1706
		or ≤ 26 HRc	(268-402)	Fr	0.0045	0.0068	0.0091	0.0136	0.0182	0.0227	0.0273
				Feed (ipm)	46.5	46.5	46.5	46.5	46.5	46.5	46.5

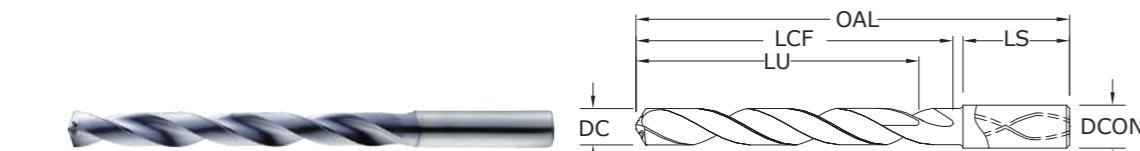
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Series 140 5D Fractional	Hardness	Vc (sfm)	DC • in								
			1/8	3/16	1/4	3/8	1/2	5/8	3/4		
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn	770	RPM	23531	15687	11766	7844	5883	4706	3922
		or ≤ 47 HRb	(616-924)	Fr	0.0049	0.0073	0.0098	0.0147	0.0195	0.0244	0.0293
				Feed (ipm)	115.0	115.0	115.0	115.0	115.0	115.0	115.0
		≤ 150 Bhn	660	RPM	20170	13446	10085	6723	5042	4034	3362
		or ≤ 7 HRc	(528-792)	Fr	0.0050	0.0074	0.0099	0.0149	0.0198	0.0248	0.0297
				Feed (ipm)	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		≤ 140 Bhn	550	RPM	16808	11205	8404	5603	4202	3362	2801
		or ≤ 3 HRc	(440-660)	Fr	0.0020	0.0030	0.0040	0.0060	0.0080	0.0100	0.0120
				Feed (ipm)	33.5	33.5	33.5	33.5	33.5	33.5	33.5
		≤ 200 Bhn	440	RPM	13446	8964	6723	4482	3362	2689	2241
S	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	or ≤ 23 HRc	(352-528)	Fr	0.0020	0.0030	0.0040	0.0060	0.0080	0.0100	0.0120
				Feed (ipm)	27.0	27.0	27.0	27.0	27.0	27.0	27.0
		≤ 300 Bhn	95	RPM	2903	1935	1452	968	726	581	484
		or ≤ 32 HRc	(76-114)	Fr	0.0008	0.0012	0.0016	0.0024	0.0032	0.0040	0.0048
				Feed (ipm)	2.3	2.3	2.3	2.3	2.3	2.3	2.3
		≤ 400 Bhn	50	RPM	1528	1019	764	509	382	306	255
		or ≤ 43 HRc	(40-60)	Fr	0.0007	0.0010	0.0013	0.0020	0.0026	0.0033	0.0039
				Feed (ipm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		≤ 275 Bhn	215	RPM	6570	4380	3285	2190	1643	1314	1095
		or ≤ 28 HRc	(172-258)	Fr	0.0018	0					

Series 140M 5D Metric		Hardness	Vc (m/min)	DC • mm							
				3	6	8	10	12	14	16	
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	130 (104-155)	RPM Fr Feed (mm/min)	13733 0.095 1300	6867 0.189 1300	5150 0.252 1300	4120 0.316 1300	3433 0.379 1300	2943 0.442 1300	2575 0.505 1300
		≤ 275 Bhn or ≤ 28 HRc	116 (93-139)	RPM Fr Feed (mm/min)	12279 0.086 1050	6140 0.171 1050	4605 0.228 1050	3684 0.285 1050	3070 0.342 1050	2631 0.399 1050	2302 0.456 1050
		≤ 425 Bhn or ≤ 45 HRc	67 (54-80)	RPM Fr Feed (mm/min)	7109 0.071 505	3555 0.142 505	2666 0.189 505	2133 0.237 505	1777 0.284 505	1523 0.332 505	1333 0.379 505
		≤ 275 Bhn or ≤ 28 HRc	101 (80-121)	RPM Fr Feed (mm/min)	10664 0.071 760	5332 0.143 760	3999 0.190 760	3199 0.238 760	2666 0.285 760	2285 0.333 760	1999 0.380 760
		≤ 375 Bhn or ≤ 40 HRc	61 (49-73)	RPM Fr Feed (mm/min)	6463 0.062 400	3231 0.124 400	2424 0.165 400	1939 0.206 400	1616 0.248 400	1385 0.289 400	1212 0.330 400
		≤ 450 Bhn or ≤ 48 HRc	43 (34-51)	RPM Fr Feed (mm/min)	4524 0.043 195	2262 0.086 195	1696 0.115 195	1357 0.144 195	1131 0.172 195	969 0.201 195	848 0.230 195
		≤ 185 Bhn or ≤ 9 HRc	93 (74-112)	RPM Fr Feed (mm/min)	9856 0.061 605	4928 0.123 605	3696 0.164 605	2957 0.205 605	2464 0.246 605	2112 0.286 605	1848 0.327 605
		≤ 275 Bhn or ≤ 28 HRc	59 (48-71)	RPM Fr Feed (mm/min)	6301 0.048 300	3151 0.095 300	2363 0.127 300	1890 0.159 300	1575 0.190 300	1350 0.222 300	1181 0.254 300
		≤ 275 Bhn or ≤ 28 HRc	46 (37-55)	RPM Fr Feed (mm/min)	4847 0.047 230	2424 0.095 230	1818 0.127 230	1454 0.158 230	1212 0.190 230	1039 0.221 230	909 0.253 230
		≤ 375 Bhn or ≤ 40 HRc	34 (27-40)	RPM Fr Feed (mm/min)	3555 0.042 150	1777 0.084 150	1333 0.113 150	1066 0.141 150	889 0.169 150	762 0.197 150	666 0.225 150
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 220 Bhn or ≤ 19 HRc	110 (88-132)	RPM Fr Feed (mm/min)	11633 0.109 1270	5816 0.218 1270	4362 0.291 1270	3490 0.364 1270	2908 0.437 1270	2493 0.509 1270	2181 0.582 1270
		≤ 260 Bhn or ≤ 26 HRc	102 (82-123)	RPM Fr Feed (mm/min)	10825 0.109 1180	5413 0.218 1180	4059 0.291 1180	3248 0.363 1180	2706 0.436 1180	2320 0.509 1180	2030 0.581 1180
		≤ 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
		≤ 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
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 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
		≤ 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
		≤ 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

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Series 140M 5D Metric		Hardness	Vc (m/min)	DC • 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
		≤ 200 Bhn or ≤ 13 HRc	44 (35-53)	RPM Fr Feed (mm/min)	4686 0.061 285	2343 0.122 285	1757 0.162 285	1406 0.203 285	1171 0.243 285	1004 0.284 285	879 0.324 285
		≤ 375 Bhn or ≤ 40 HRc	29 (23-35)	RPM Fr Feed (mm/min)	3070 0.029 90	1535 0.059 90	1151 0.078 90	921 0.098 90	767 0.117 90	658 0.137 90	576 0.156 90
		≤ 475 Bhn or ≤ 50 HRc	26 (21-31)	RPM Fr Feed (mm/min)	2747 0.018 50	1373 0.036 50	1030 0.049 50	824 0.061 50	687 0.073 50	589 0.085 50	515 0.097 50
		≤ 220 Bhn or ≤ 19 HRc	110 (88-132)	RPM Fr Feed (mm/min)	11633 0.109 1270	5816 0.218 1270	4362 0.291 1270	3490 0.364 1270	2908 0.437 1270	2493 0.509 1270	2181 0.582 1270
		≤ 260 Bhn or ≤ 26 HRc	102 (82-123)	RPM Fr Feed (mm/min)	10825 0.109 1180	5413 0.218 1180	4059 0.291 1180	3248 0.363 1180	2706 0.436 1180	2320 0.509 1180	2030 0.581 1180
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 22									



## 140 8xD

### FRACTIONAL & METRIC SERIES

- Coolant through design promotes controlled and consistent operating temperatures improving coolant flow to the cut while maintaining strength
- Split point geometry for improved drill penetration and accuracy
- Controlled edge honing for longevity
- Negative corner position strengthens and protects
- Recommended for materials ≤ 60 HRc (≤ 654 Brn)

inch & mm								EDP NO.	
CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	TI-NAMITE-A (AITIN)
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

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For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)



## 140 8xD

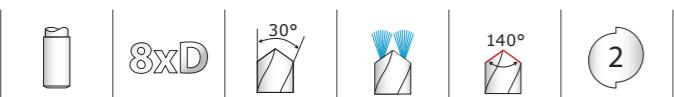
### FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	inch & mm		EDP NO.
									Ti-NAMITE-A (AITIN)		
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	
6,0 mm	0.2362		M7 X 1	6,0	95,0	57,0	48,0	36,0		63605	
6,1 mm	0.2402			8,0	114,0	76,0	64,0	36,0		63606	
6,2 mm	0.2441		M7 X 0,75	8,0	114,0	76,0	64,0	36,0		63607	
6,3 mm	0.2480			8,0	114,0	76,0	64,0	36,0		63608	
1/4	0.2500	6.35		8,0	114,0	76,0	64,0	36,0		51811	
6,4 mm	0.2520			8,0	114,0	76,0	64,0	36,0		63609	
6,5 mm	0.2559			8,0	114,0	76,0	64,0	36,0		63610	
F	0.2570	6.53	5/16-18	8,0	114,0	76,0	64,0	36,0		51812	
6,6 mm	0.2598			8,0	114,0	76,0	64,0	36,0		63611	
6,7 mm	0.2638			8,0	114,0	76,0	64,0	36,0		63612	
17/64	0.2656	6.75	5/16-20	8,0	114,0	76,0	64,0	36,0		51813	
6,8 mm	0.2677		M8 X 1,25	8,0	114,0	76,0	64,0	36,0		63613	
6,9 mm	0.2717			8,0	114,0	76,0	64,0	36,0		63614	
7,0 mm	0.2756		M8 X 1	8,0	114,0	76,0	64,0	36,0		63615	
7,1 mm	0.2795			8,0	114,0	76,0	64,0	36,0		63616	
9/32	0.2812	7.14	5/16-32	8,0	114,0	76,0	64,0	36,0		51814	
7,2 mm	0.2835		M8 X 0,75	8,0	114,0	76,0	64,0	36,0		63617	
7,3 mm	0.2874			8,0	114,0	76,0	64,0	36,0		63618	
7,4 mm	0.2913			8,0	114,0	76,0	64,0	36,0		63619	
7,5 mm	0.2953		M8 X 0,5	8,0	114,0	76,0	64,0	36,0		63620	
19/64	0.2969	7.54		8,0	114,0	76,0	64,0	36,0		51815	
7,6 mm	0.2992			8,0	114,0	76,0	64,0	36,0		63621	
7,7 mm</											



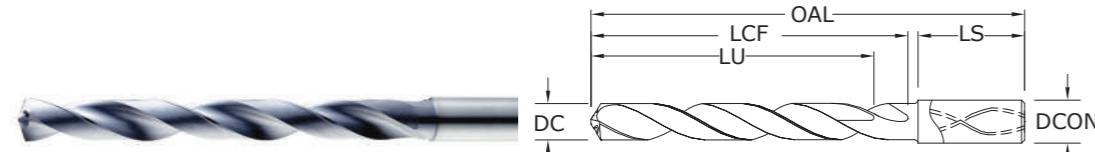
High Performance Internal Coolant Drills



## 140 8xD

FRACTIONAL & METRIC SERIES

- Coolant through design promotes controlled and consistent operating temperatures improving coolant flow to the cut while maintaining strength
- Split point geometry for improved drill penetration and accuracy
- Controlled edge honing for longevity
- Negative corner position strengthens and protects
- Recommended for materials ≤ 60 HRc ( $\leq 654$  Bhn)



inch & mm										EDP NO.
CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS	Ti-NAMITE-A (AITIN)	EDP NO.
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	
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	

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High Performance Internal Coolant Drills

## 140 8xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	inch & mm					EDP NO.	
				SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	SHANK LENGTH LS		
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			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			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
1/2	0.5000	12.70			14,0	178,0	133,0	112,0	45,0	51829
12,8 mm	0.5039		M14 X 1,25		14,0	178,0	133,0	112,0	45,0	63667
13,0 mm	0.5118		M14 X 1		14,0	178,0	133,0	112,0	45,0	63668
33/64	0.5156	13.10			14,0	178,0	133,0	112,0	45,0	51830
13,5 mm	0.5315				14,0	178,0	133,0	112,0	45,0	63669
13,8 mm	0.5433				14,0	178,0	133,0	112,0	45,0	63670
14,0 mm	0.5512		M16 X 2		14,0	178,0	133,0	112,0	45,0	63671
9/16	0.5625	14.29			16,0	203,0	152,0	128,0	48,0	51831
14,5 mm	0.5709		M16 X 1,5		16,0	203,0	152,0	128,0	48,0	63672
37/64	0.5781	14.68			16,0	203,0	152,0	128,0	48,0	51832
14,8 mm	0.5827				16,0	203,0	152,0	128,0	48,0	63673
15,0 mm	0.5906		M16 X 1		16,0	203,0	152,0	128,0	48,0	63674
15,5 mm	0.6102		M18 X 2,5		16,0	203,0	152,0	128,0	48,0	63675
15,8 mm	0.6220				16,0	203,0	152,0	128,0	48,0	63676
5/8	0.6250	15.88			16,0	203,0	152,0			

**FRACTIONAL  
ICe-Carb®**

Series 140 8D Fractional		Hardness	Vc (sfm)	DC • in							
				1/8	3/16	1/4	3/8	1/2	5/8	3/4	
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc (324-486)	405	RPM	12377	8251	6188	4126	3094	2475	2063
				Fr	0.0036	0.0053	0.0071	0.0107	0.0142	0.0178	0.0213
				Feed (ipm)	44.0	44.0	44.0	44.0	44.0	44.0	44.0
		≤ 275 Bhn or ≤ 28 HRc (296-444)	370	RPM	11307	7538	5654	3769	2827	2261	1885
				Fr	0.0030	0.0045	0.0060	0.0090	0.0120	0.0150	0.0180
				Feed (ipm)	34.0	34.0	34.0	34.0	34.0	34.0	34.0
		≤ 425 Bhn or ≤ 45 HRc (168-252)	210	RPM	6418	4278	3209	2139	1604	1284	1070
				Fr	0.0026	0.0039	0.0051	0.0077	0.0103	0.0129	0.0154
				Feed (ipm)	16.5	16.5	16.5	16.5	16.5	16.5	16.5
		≤ 275 Bhn or ≤ 28 HRc (256-384)	320	RPM	9779	6519	4890	3260	2445	1956	1630
				Fr	0.0026	0.0038	0.0051	0.0077	0.0102	0.0128	0.0153
				Feed (ipm)	25.0	25.0	25.0	25.0	25.0	25.0	25.0
ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100		≤ 375 Bhn or ≤ 40 HRc (152-228)	190	RPM	5806	3871	2903	1935	1452	1161	968
				Fr	0.0020	0.0030	0.0040	0.0059	0.0079	0.0099	0.0119
				Feed (ipm)	11.5	11.5	11.5	11.5	11.5	11.5	11.5
		≤ 450 Bhn or ≤ 48 HRc (108-162)	135	RPM	4126	2750	2063	1375	1031	825	688
				Fr	0.0016	0.0024	0.0032	0.0047	0.0063	0.0079	0.0095
				Feed (ipm)	6.5	6.5	6.5	6.5	6.5	6.5	6.5
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 185 Bhn or ≤ 9 HRc (232-348)	290	RPM	8862	5908	4431	2954	2216	1772	1477
				Fr	0.0020	0.0030	0.0039	0.0059	0.0079	0.0099	0.0118
				Feed (ipm)	17.5	17.5	17.5	17.5	17.5	17.5	17.5
		≤ 275 Bhn or ≤ 28 HRc (144-216)	180	RPM	5501	3667	2750	1834	1375	1100	917
				Fr	0.0018	0.0027	0.0036	0.0055	0.0073	0.0091	0.0109
				Feed (ipm)	10.0	10.0	10.0	10.0	10.0	10.0	10.0
K	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc (104-156)	130	RPM	3973	2649	1986	1324	993	795	662
				Fr	0.0018	0.0026	0.0035	0.0053	0.0070	0.0088	0.0106
				Feed (ipm)	7.0	7.0	7.0	7.0	7.0	7.0	7.0
		≤ 375 Bhn or ≤ 40 HRc (76-114)	95	RPM	2903	1935	1452	968	726	581	484
				Fr	0.0016	0.0023	0.0031	0.0047	0.0062	0.0078	0.0093
				Feed (ipm)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc (280-420)	350	RPM	10696	7131	5348	3565	2674	2139	1783
				Fr	0.0037	0.0056	0.0075	0.0112	0.0150	0.0187	0.0224
				Feed (ipm)	40.0	40.0	40.0	40.0	40.0	40.0	40.0
		≤ 260 Bhn or ≤ 26 HRc (248-372)	310	RPM	9474	6316	4737	3158	2368	1895	1579
				Fr	0.0039	0.0059	0.0078	0.0117	0.0156	0.0195	0.0234
				Feed (ipm)	37.0	37.0	37.0	37.0	37.0	37.0	37.0

continued on next page

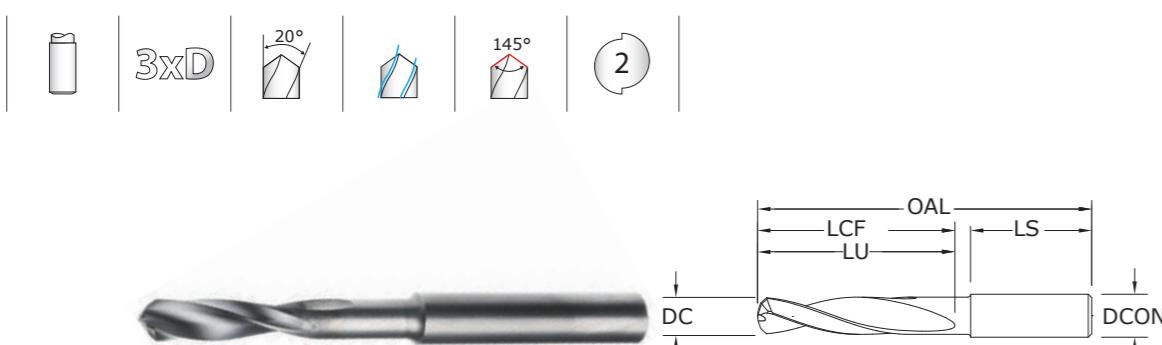
Series 140 8D Fractional		Hardness	Vc (sfm)	DC • in							
1/8	3/16			1/4	3/8	1/2	5/8	3/4			
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (584-876)	730	RPM	22309	14873	11154	7436	5577	4462	3718
				Fr	0.0045	0.0067	0.0090	0.0134	0.0179	0.0224	0.0269
				Feed (ipm)	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		≤ 150 Bhn or ≤ 7 HRc (508-762)	635	RPM	19406	12937	9703	6469	4851	3881	3234
				Fr	0.0046	0.0070	0.0093	0.0139	0.0186	0.0232	0.0278
				Feed (ipm)	90.0	90.0	90.0	90.0	90.0	90.0	90.0
		≤ 140 Bhn or ≤ 3 HRc (204-306)	255	RPM	7793	5195	3896	2598	1948	1559	1299
				Fr	0.0018	0.0027	0.0036	0.0054	0.0072	0.0090	0.0108
				Feed (ipm)	14.0	14.0	14.0	14.0	14.0	14.0	14.0
		≤ 200 Bhn or ≤ 23 HRc (188-282)	235	RPM	7182	4788	3591	2394	1795	1436	1197
S	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 300 Bhn or ≤ 32 HRc (52-78)	65	RPM	1986	1324	993	662	497	397	331
				Fr	0.0009	0.0013	0.0017	0.0026	0.0034	0.0043	0.0051
				Feed (ipm)	1.7	1.7	1.7	1.7	1.7	1.7	1.7
		≤ 400 Bhn or ≤ 43 HRc (28-42)	35	RPM	1070	713	535	357	267	214	178
				Fr	0.0006	0.0008	0.0011	0.0017	0.0022	0.0028	0.0034
				Feed (ipm)	0.6	0.6	0.6	0.6	0.6	0.6	0.6
		≤ 275 Bhn or ≤ 28 HRc (148-222)	185	RPM	5654	3769	2				

Series 140M 8D Metric		Hardness	Vc (m/min)	DC • 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 (100-170)	123 RPM Fr Feed (mm/min)	13087 0.085 0.171 1118	6544 0.228 0.285 1118	4908 0.342 0.399 1118	3926 0.399 0.455 1118	3272 0.455 0.455 1118	2804 0.455 0.455 1118	2454 0.455 0.455 1118
		≤ 275 Bhn or ≤ 28 HRc (90-135)	113 RPM Fr Feed (mm/min)	11956 0.072 0.144 864	5978 0.193 0.241 864	4484 0.241 0.289 864	3587 0.289 0.337 864	2989 0.337 0.385 864	2562 0.385 0.385 864	2242 0.385 0.385 864
		≤ 425 Bhn or ≤ 45 HRc (51-77)	64 RPM Fr Feed (mm/min)	6786 0.062 0.124 419	3393 0.165 0.206 419	2545 0.206 0.247 419	2036 0.247 0.288 419	1696 0.288 0.329 419	1454 0.329 0.329 419	1272 0.329 0.329
		≤ 275 Bhn or ≤ 28 HRc (78-117)	98 RPM Fr Feed (mm/min)	10340 0.061 0.123 635	5170 0.164 0.205 635	3878 0.205 0.246 635	3102 0.246 0.287 635	2585 0.287 0.328 635	2216 0.328 0.328 635	1939 0.328 0.328
		≤ 375 Bhn or ≤ 40 HRc (46-69)	58 RPM Fr Feed (mm/min)	6140 0.048 0.095 292	3070 0.127 0.159 292	2302 0.159 0.190 292	1842 0.190 0.222 292	1535 0.222 0.254 292	1316 0.254 0.254 292	1151 0.254 0.254
		≤ 450 Bhn or ≤ 48 HRc (33-49)	41 RPM Fr Feed (mm/min)	4362 0.038 0.076 165	2181 0.101 0.126 165	1636 0.126 0.126 165	1309 0.126 0.151 165	1091 0.151 0.177 165	935 0.177 0.202 165	818 0.202 0.202
		≤ 185 Bhn or ≤ 9 HRc (71-106)	88 RPM Fr Feed (mm/min)	9371 0.047 0.095 445	4686 0.126 0.158 445	3514 0.158 0.190 445	2811 0.190 0.221 445	2343 0.221 0.253 445	2008 0.253 0.253 445	1757 0.253 0.253
		≤ 275 Bhn or ≤ 28 HRc (44-66)	55 RPM Fr Feed (mm/min)	5816 0.044 0.087 254	2908 0.116 0.146 254	2181 0.146 0.175 254	1745 0.175 0.204 254	1454 0.204 0.233 254	1246 0.233 0.233 254	1091 0.233 0.233
		≤ 275 Bhn or ≤ 28 HRc (32-48)	40 RPM Fr Feed (mm/min)	4201 0.042 0.085 178	2100 0.113 0.141 178	1575 0.141 0.169 178	1260 0.169 0.198 178	1050 0.198 0.226 178	900 0.226 0.226 178	788 0.226 0.226
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 375 Bhn or ≤ 40 HRc (23-35)	29 RPM Fr Feed (mm/min)	3070 0.037 0.074 114	1535 0.099 0.124 114	1151 0.124 0.149 114	921 0.149 0.174 114	767 0.174 0.199 114	658 0.199 0.199 114	576 0.199 0.199
		≤ 220 Bhn or ≤ 19 HRc (85-128)	107 RPM Fr Feed (mm/min)	11310 0.090 0.180 1016	5655 0.240 0.299 1016	4241 0.299 0.359 1016	3393 0.359 0.419 1016	2827 0.419 0.479 1016	2424 0.479 0.479 1016	2121 0.479 0.479
		≤ 260 Bhn or ≤ 26 HRc (76-113)	94 RPM Fr Feed (mm/min)	10017 0.094 0.188 940	5009 0.250 0.313 940	3756 0.313 0.375 940	3005 0.375 0.438 940	2504 0.438 0.500 940	2147 0.438 0.500 940	1878 0.500 0.500
		≤ 200 Bhn or ≤ 13 HRc (34-51)	43 RPM Fr Feed (mm/min)	4524 0.048 0.095 216	2262 0.095 0.127 216	1696 0.127 0.159 216	1357 0.159 0.191 216	1131 0.191 0.223 216	969 0.223 0.255 216	848 0.255 0.255
		≤ 375 Bhn or ≤ 40 HRc (22-33)	27 RPM Fr Feed (mm/min)	2908 0.026 0.052 76	1454 0.070 0.087 76	1091 0.087 0.087 76	872 0.087 0.087 76	727 0.087 0.105 76	623 0.105 0.122 76	545 0.122 0.140
		≤ 475 Bhn or ≤ 50 HRc (20-29)	24 RPM Fr Feed (mm/min)	2585 0.015 0.029 38	1293 0.039 0.049 38	969 0.049 0.059 38	776 0.059 0.069 38	646 0.069 0.069 38	554 0.069 0.079	485 0.079 0.079
		≤ 275 Bhn or ≤ 28 HRc (45-68)	56 RPM Fr Feed (mm/min)	5978 0.038 0.076 229	2989 0.076 0.102 229	2242 0.102 0.127 229	1793 0.127 0.153 229	1495 0.153 0.178 229	1281 0.178 0.204	1121 0.204 0.204
		≤ 350 Bhn or ≤ 38 HRc (34-51)	43 RPM Fr Feed (mm/min)	4524 0.028 0.056 127	2262 0.056 0.075 127	1696 0.075 0.094 127	1357 0.094 0.112 127	1131 0.112 0.131 127	969 0.131 0.150	848 0.150 0.150
		≤ 440 Bhn or ≤ 47 HRc (18-27)	23 RPM Fr Feed (mm/min)	2424 0.024 0.048 58	1212 0.048 0.064 58	909 0.064 0.080 58	727 0.080 0.096 58	606 0.096 0.112 58	519 0.112 0.129	454 0.129 0.129
		≤ 200 Bhn or ≤ 13 HRc (34-51)	43 RPM Fr Feed (mm/min)	4524 0.048 0.095 216	2262 0.095 0.127 216	1696 0.127 0.159 216	1357 0.159 0.191 216	1131 0.191 0.223 216	969 0.223 0.255 216	848 0.255 0.255
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc (85-128)	107 RPM Fr Feed (mm/min)	11310 0.090 0.180 1016	5655 0.240 0.299 1016	4241 0.299 0.359 1016	3393 0.359 0.419 1016	2827 0.419 0.479 1016	2424 0.479 0.479 1016	2121 0.479 0.479
		≤ 260 Bhn or ≤ 26 HRc (76-113)	94 RPM Fr Feed (mm/min)	10017 0.094 0.188 940	5009 0.250 0.313 940	3756 0.313 0.375 940	3005 0.375 0.438 940	2504 0.438 0.500 940	2147 0.438 0.500 940	1878 0.500 0.500
		≤ 375 Bhn or ≤ 40 HRc (22-33)	27 RPM Fr Feed (mm/min)	2908 0.026 0.052 76	1454 0.070 0.087 76	1091 0.087 0.087 76	872 0.087 0.087 76	727 0.087 0.105 76	623 0.105 0.122 76	545 0.122 0.140
		≤ 475 Bhn or ≤ 50 HRc (20-29)	24 RPM Fr Feed (mm/min)	2585 0.015 0.029 38	1293 0.039 0.049 38	969 0.049 0.059 38	776 0.059 0.069 38	646 0.069 0.069 38	554 0.069 0.079	485 0.079 0.079

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Series 140M 8D Metric		Hardness	Vc (m/min)	DC • mm						
				3	6	8	10	12	14	16
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (178-267)	223 RPM Fr Feed (mm/min)	23589 0.108 0.215 2540	11795 0.287 0.359 2540	8846 0.359 0.431 2540	7077 0.431 0.502 2540	5897 0.502 0.574 2540	5055 0.574 0.6423 2540	

FRACTIONAL & METRIC  
Series 120



**120**  
FRACTIONAL & METRIC SERIES

- Double margin design stabilizes the drill for greater hole accuracy and improved surface finish
- Notched point reduces thrust force over conventional designs
- 8 facet point reduces fiber breakout and delamination on exit
- 90 degree secondary chamfer angle improves hole entrance and exit quality

inch & mm							EDP NO.
CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF/LU	SHANK LENGTH LS	Di-NAMITE® (Diamond)
#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

TOLERANCES (inch)

DC = +0.0000/-0.0005  
DCON = h<sub>6</sub>

TOLERANCES (mm)

DC = +0.000/-0.013  
DCON = h<sub>6</sub>

PLASTICS/COMPOSITES

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

N	Series 120 Fractional	Vc (sfm) (256-384)	DC • in							
			1/8	3/16	1/4	5/16	3/8	7/16	1/2	
	CFRP, AFRP (Carbon Fiber, Aramid Fiber)	320	RPM	9779	6519	4890	3912	3260	2794	2445
		Fr	0.0006	0.0009	0.0012	0.0015	0.0018	0.0021	0.0024	
		Feed (ipm)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	
	GFRP (Fiberglass)	240	RPM	7334	4890	3667	2934	2445	2096	1834
		Fr	0.0006	0.0009	0.0012	0.0015	0.0018	0.0021	0.0024	
		Feed (ipm)	4.4	4.4	4.4	4.4	4.4	4.4	4.4	
	CARBON, GRAPHITE	400	RPM	12224	8149	6112	4890	4075	3493	3056
		Fr	0.0008	0.0012	0.0016	0.0020	0.0024	0.0028	0.0032	
		Feed (ipm)	9.8	9.8	9.8	9.8	9.8	9.8	9.8	

rpm = Vc x 3.82 / DC  
ipm = Fr x rpm  
adjust speed and / or feed based on resin type and / or fiber structure  
refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))

N	Series 120 Metric	Vc (m/min) (80-120)	DC • mm							
			2.5	3	4	6	8	10	12	
	CFRP, AFRP (Carbon Fiber, Aramid Fiber)	100	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	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	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	

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

**VALUE AT THE SPINDLE<sup>®</sup>**

## General Purpose Drills


 **Hole Making**

Please put "S" at the beginning of all page numbers below.

GENERAL PURPOSE DRILLS	SERIES	DESCRIPTION	PAGE
2 Flute	101	2 Flute Slow Spiral	288
Short Length Self Centering (DIN6539)	108M Plus	2 Flute Short Length DIN 6539	293
Straight Flute	106	Straight Flute 140 Point Geometry	300
3 Flute with 150 Point Geometry	103	3 Flute 150 Point Geometry	304

GENERAL PURPOSE COUNTERSINKS	SERIES	DESCRIPTION	PAGE
Combined Drill & Countersink	301	2 Flute Straight Flute Combined Drill and Countersink Fractional	310
	301M	2 Flute Straight Flute Combined Drill and Countersink Metric	311
Single Flute Countersink	601	Single Flute Fractional	316
3 Flute Countersink	603	3 Flute Fractional	319
6 Flute Countersink	606	6 Flute Fractional	322

GENERAL PURPOSE REAMERS	SERIES	DESCRIPTION	PAGE
Straight Flute Accu-Reamer	200	Accu-Reamer	326
Straight Flute Reamer	201M	Metric Reamer	330

*Speed & Feed Recommendations listed after each series*

# Taladrado

Please put "S" at the beginning of all page numbers below.

BROCAS DE USO GENERAL	SERIE	DESCRIPCIÓN	PÁGINA
2 filos	101	2 filos, espiral de avance lento	288
Autocentrante de longitud corta (DIN6539)	108M Plus	2 filos, longitud corta, DIN 6539	293
Filo recto	106	Filo recto, geometría de 140 puntos	300
3 filos con geometría de 150 puntos	103	3 filos, geometría de 150 puntos	304

BROCAS DE USO AVELLANADORES	SERIE	DESCRIPCIÓN	PÁGINA
Broca y avellanador combinados	301	2 filos, filo recto, broca y avellanador combinados, fraccional	310
	301M	2 filos, filo recto, broca y avellanador combinados, métrico	311
Avellanador de filo único	601	Filo único, fraccional	316
Avellanador de 3 filos	603	3 filos, fraccional	319
Avellanador de 6 filos	606	6 filos, fraccional	322

BROCAS DE USO ESCARIADORES	SERIE	DESCRIPCIÓN	PÁGINA
Escariador Accu de filo recto	200	Escariador Accu	326
Escariador de filo recto	201M	Escariador métrico	330

Recomendaciones de velocidades y avances mostradas tras cada serie

# Bohren

Please put "S" at the beginning of all page numbers below.

STANDARD-BOHRER	SERIE	BESCHREIBUNG	SEITE
2 Schneiden	101	2 Schneiden mit kleinem Spanwinkel	288
Kurze Bauform Selbstzentrierung (DIN 6539)	108M Plus	2 Schneiden Kurze Bauform DIN 6539	293
Gerade Schneiden	106	Gerade Schneiden Spitzengeometrie 140	300
3 Schneiden mit Spitzengeometrie 150	103	3 Schneiden Spitzengeometrie 150	304

STANDARD-BOHRER	SERIE	BESCHREIBUNG	SEITE
Senkbohrer	301	Zölliger Senkbohrer mit 2 geraden Schneiden	310
	301M	Metrischer Senkbohrer mit 2 geraden Schneiden	311
Senker mit 1 Schneide	601	Zölliger Bohrer mit 1 Schneide	316
Senkbohrer mit 1 Schneide	603	Zölliger Bohrer mit 3 Schneiden	319
Senkbohrer mit 6 Schneiden	606	Zölliger Bohrer mit 6 Schneiden	322

STANDARD-BOHRER	SERIE	BESCHREIBUNG	SEITE
Reibahlen mit gerader Schneide	200	Accu-Reamer	326
Reibahle mit gerader Schneide	201M	Metrische Reibahle	330

Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

# Outils de perçage

Please put "S" at the beginning of all page numbers below.

FORETS UNIVERSEL	SÈRIES	DESCRIPTION	PAGE
2 dents	101	2 dents à spirale lente	288
Court autocentrant (DIN 6539)	108M Plus	2 dents court DIN 6539	293
Denture droite	106	Denture droite à angle de pointe 140°	300
3 dents à angle de pointe 150°	103	3 dents à angle de pointe 150°	304

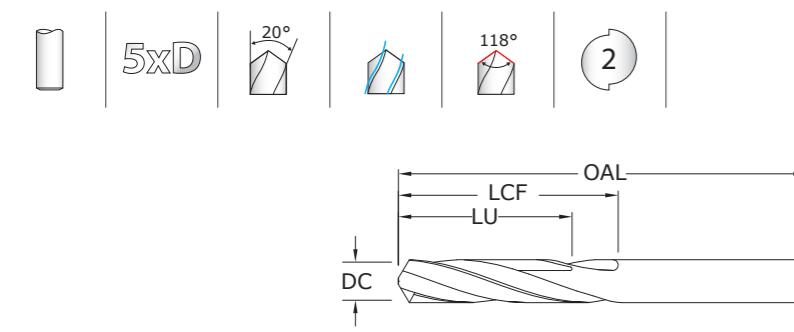
  

FORETS À FRAISER	SÈRIES	DESCRIPTION	PAGE
Foret et foret à fraiser combinés	301	2 dents denture droite foret et foret à fraiser combinés (fractionnel)	310
	301M	2 dents denture droite foret et foret à fraiser combinés (métrique)	311
Foret à fraiser à dent simple	601	Foret à dent simple (fractionnel)	316
Foret à fraiser 3 dents	603	3 dents (fractionnel)	319
Foret à fraiser 6 dents	606	6 dents (fractionnel)	322

FORETS À ALÉSOIRS	SÈRIES	DESCRIPTION	PAGE
Alésoir denture droite Accu-Reamer	200	Alésoir Accu-Reamer	326
Alésoir denture droite	201M	Alésoir (métrique)	330

Recommandations de vitesse et avance indiquées après chaque série

**2 Flute Drills • Metric: DIN 338**
**101**  
FRACTIONAL & METRIC SERIES
Pictured:  
Series 101 Drill Set

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	EDP NO.		TOLERANCES (inch)	
						UNCOATED	Ti-NAMITE-A (AlTiN)	DC = +0.0000/-0.0005	DC = +0,0000/-0,0127
#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		

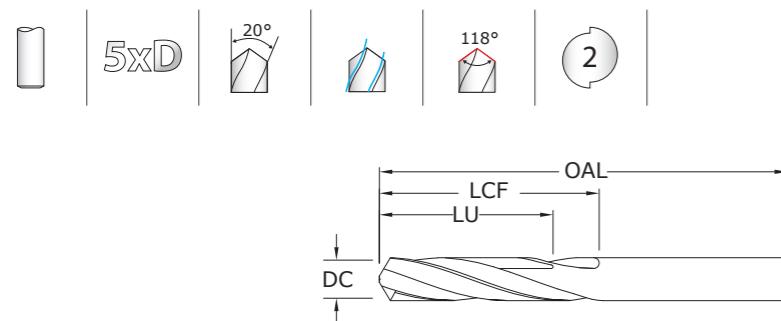
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**2 Flute Drills • Metric: DIN 338****101**

FRACTIONAL &amp; METRIC SERIES

CONTINUED

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	EDP NO.	
						UNCOATED	Ti-NAMITE-A (AlTiN)
#51	0.0670	1.70	1-1/2	3/4	39/64	51051	57109
#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

**2 Flute Drills • Metric: DIN 338****101**

FRACTIONAL &amp; METRIC SERIES

CONTINUED

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	EDP NO.		TOLERANCES (inch) DC = +0.0000/-0.0005
						UNCOATED	Ti-NAMITE-A (AlTiN)	
3,9 mm	0.1535		75,0	43,0	34,0	61075	68317	
#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	

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Pictured:  
Series 101 Drill Set**2 Flute Drills • Metric: DIN 338****101**

FRACTIONAL &amp; METRIC SERIES

CONTINUED

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	EDP NO.	
						UNCOATED	Ti-NAMITE-A (AlTiN)
#2	0.2210	5.61	3	1-3/4	1-13/32	51002	57168
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					

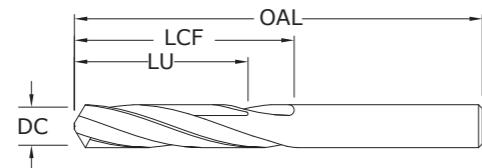
## FRACTIONAL &amp; METRIC

## 2 Flute Drills • Metric: DIN 338

**101**

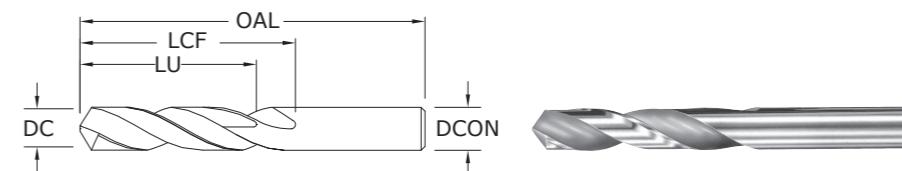
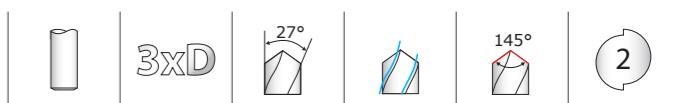
FRACTIONAL &amp; METRIC SERIES

CONTINUED

Pictured:  
Series 101 Drill Set

## METRIC

## Short Length Self Centering Drills • DIN 6539

**108M Plus**

METRIC SERIES

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

SGS Solid Tools

KYOCERA Solid Tools

CUTTING DIAMETER DC	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	EDP NO.		TOLERANCES (inch)
						UNCOATED	Ti-NAMITE-A (AITiN)	
8,6 mm	0,3386		125,0	81,0	64,0	61112	68354	DC = +0,0000/-0,0005
R	0,3390	8,61	4	2-1/2	2	51218	57194	DC = +0,0000/-0,0127
8,7 mm	0,3425		125,0	81,0	64,0	61113	68355	STEELS
11/32	0,3438	8,73	4	2-1/2	2	51122	57195	STAINLESS STEELS
8,8 mm	0,3465		125,0	81,0	64,0	61114	68356	CAST IRON
S	0,3480	8,84	4	2-1/2	2	51219	57196	HIGH TEMP ALLOYS
8,9 mm	0,3504		125,0	81,0	64,0	61115	68357	TITANIUM
9,0 mm	0,3543		125,0	81,0	64,0	61039	68287	HARDENED STEELS
T	0,3580	9,09	4-1/4	2-3/4	2-13/64	51220	57197	NON-FERROUS
9,1 mm	0,3583		125,0	81,0	64,0	61116	68358	PLASTICS/COMPOSITES
23/64	0,3594	9,13	4-1/4	2-3/4	2-13/64	51123	57198	
9,2 mm	0,3622		125,0	81,0	64,0	61117	68359	
9,3 mm	0,3661		125,0	81,0	64,0	61118	68360	
U	0,3680	9,35	4-1/4	2-3/4	2-13/64	51221	57199	
9,4 mm	0,3701		125,0	81,0	64,0	61119	68361	
9,5 mm	0,3740		125,0	81,0	64,0	61041	68288	
*3/8	0,3750	9,53	4-1/4	2-3/4	2-13/64	51124	57200	
V	0,3770	9,58	4-1/4	2-3/4	2-13/64	51222	57201	
9,6 mm	0,3780		133,0	87,0	69,0	61120	68362	
9,7 mm	0,3819		133,0	87,0	69,0	61121	68363	
9,8 mm	0,3858		133,0	87,0	69,0	61122	68364	
W	0,3860	9,80	4-1/2	2-7/8	2-19/64	51223	57202	
9,9 mm	0,3898		133,0	87,0	69,0	61123	68365	
25/64	0,3906	9,92	4-1/2	2-7/8	2-19/64	51125	57203	
10,0 mm	0,3937		133,0	87,0	69,0	61043	68289	
X	0,3970	10,08	4-1/2	2-7/8	2-19/64	51224	57204	
10,2 mm	0,4016		133,0	87,0	69,0	61124	68366	
Y	0,4040	10,26	4-1/2	2-7/8	2-19/64	51225	57205	
13/32	0,4062	10,32	4-1/2	2-7/8	2-19/64	51126	57206	
Z	0,4130	10,49	4-1/2	2-7/8	2-19/64	51226	57207	
10,5 mm	0,4134		133,0	87,0	69,0	61045	68290	
27/64	0,4219	10,72	4-1/2	2-7/8	2-19/64	51127	57208	
11,0 mm	0,4331		142,0	94,0	75,0	61047	68291	
7/16	0,4375	11,11	4-1/2	2-7/8	2-19/64	51128	57209	
11,5 mm	0,4528		142,0	94,0	75,0	61049	68292	
29/64	0,4531	11,51	4-3/4	3	2-13/32	51129	57210	
15/32	0,4688	11,91	4-3/4	3	2-13/32	51130	57211	
12,0 mm	0,4724		151,0	101,0	80,0	61051	68293	
31/64	0,4844	12,30	4-3/4	3	2-13/32	51131	57212	
1/2	0,5000	12,70	4-3/4	3	2-13/32	51132	57213	

\*Series 101 Set

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

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

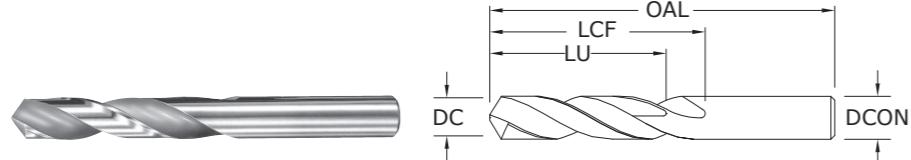
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# Short Length Self Centering Drills • DIN 6539



## 108M Plus METRIC SERIES

CONTINUED



## TOLERANCES (mm)

## &lt;3 DIAMETER

DC = +0,000/-0,010

DCON = h<sub>6</sub>

## &gt;3-6 DIAMETER

DC = +0,000/-0,012

DCON = h<sub>6</sub>

## &gt;6-10 DIAMETER

DC = +0,000/-0,015

DCON = h<sub>6</sub>

## &gt;10-16 DIAMETER

DC = +0,000/-0,018

DCON = h<sub>6</sub>

## STEELS

## STAINLESS STEELS

## CAST IRON

## HIGH TEMP ALLOYS

## TITANIUM

## HARDENED STEELS

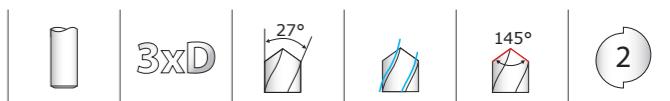
## NON-FERROUS

## PLASTICS/COMPOSITES

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

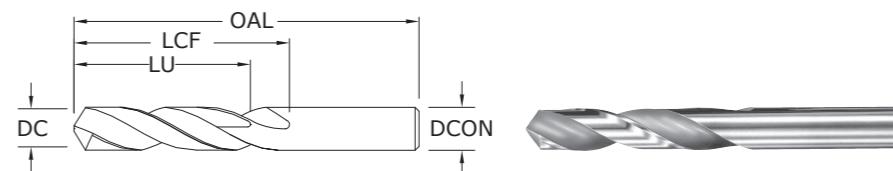
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# Short Length Self Centering Drills • DIN 6539



## 108M Plus METRIC SERIES

CONTINUED



## TOLERANCES (mm)

## &lt;3 DIAMETER

DC = +0,000/-0,010

DCON = h<sub>6</sub>

## &gt;3-6 DIAMETER

DC = +0,000/-0,012

DCON = h<sub>6</sub>

## &gt;6-10 DIAMETER

DC = +0,000/-0,015

DCON = h<sub>6</sub>

## &gt;10-16 DIAMETER

DC = +0,000/-0,018

DCON = h<sub>6</sub>

## STEELS

## STAINLESS STEELS

## CAST IRON

## HIGH TEMP ALLOYS

## TITANIUM

## HARDENED STEELS

## NON-FERROUS

## PLASTICS/COMPOSITES

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

CUTTING DIAMETER DC/DCON	OVERALL LENGTH OAL	mm	FLUTE LENGTH LCF	CLEARED LENGTH LU	UNCOATED	EDP NO., Ti-NAMITE-A (AITIN)
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

FRACTIONAL  
2 Flute Drills

Series 101 Fractional	Hardness	Vc (sfm)	DC • in							
			1/64	1/32	1/16	1/8	1/4	3/8	1/2	
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc (212-318)	265 RPM Fr Feed (ipm)	64787 0.00021 0.0004 13.5	32394 0.0008 0.0017 13.5	16197 0.0033 0.0050 13.5	8098 0.0067 0.0067 13.5	4049 0.0050 0.0047 13.5	2699 0.0063 0.0063 6.0	2025 0.0034 0.0034 6.0
		≤ 300 Bhn or ≤ 32 HRc (100-150)	125 RPM Fr Feed (ipm)	30560 0.00020 0.0004	15280 0.0008 0.0016	7640 0.0031 0.0047	3820 0.0047 0.0063	1910 0.0063 0.0063	1273 0.0063 0.0063	955 0.0063 0.0063
		≤ 425 Bhn or ≤ 45 HRc (68-102)	85 RPM Fr Feed (ipm)	20781 0.00011 0.0002	10390 0.0004 0.0008	5195 0.0008 0.0017	2598 0.0025 0.0034	1299 0.0025 0.0034	866 0.0034 0.0034	649 0.0034 0.0034
		≤ 275 Bhn or ≤ 28 HRc (184-276)	230 RPM Fr Feed (ipm)	56230 0.00019 0.0004	28115 0.0007 0.0015	14058 0.0030 0.0045	7029 0.0045 0.0060	3514 0.0060 0.0060	2343 0.0060 0.0060	1757 0.0060 0.0060
		≤ 375 Bhn or ≤ 40 HRc (116-174)	145 RPM Fr Feed (ipm)	35450 0.00019 0.0004	17725 0.0007 0.0015	8862 0.0030 0.0045	4431 0.0045 0.0060	2216 0.0060 0.0060	1477 0.0060 0.0060	1108 0.0060 0.0060
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 450 Bhn or ≤ 48 HRc (48-72)	60 RPM Fr Feed (ipm)	14669 0.00008 0.0002	7334 0.0003 0.0003	3667 0.0007 0.0013	1834 0.0013 0.0020	917 0.0020 0.0026	611 0.0026 0.0026	458 0.0026 0.0026
		≤ 250 Bhn or ≤ 24 HRc (168-252)	210 RPM Fr Feed (ipm)	51341 0.00015 0.0003	25670 0.0006 0.0012	12835 0.0024 0.0036	6418 0.0036 0.0048	3209 0.0048 0.0048	2139 0.0048 0.0048	1604 0.0048 0.0048
		≤ 330 Bhn or ≤ 36 HRc (88-132)	110 RPM Fr Feed (ipm)	26893 0.00009 0.0002	13446 0.0004 0.0007	6723 0.0015 0.0022	3362 0.0022 0.0030	1681 0.0030 0.0030	1121 0.0030 0.0030	840 0.0030 0.0030
		≤ 275 Bhn or ≤ 28 HRc (52-78)	65 RPM Fr Feed (ipm)	15891 0.00010 0.0002	7946 0.0005 0.0009	3973 0.0018 0.0025	1986 0.0025 0.0035	993 0.0035 0.0035	662 0.0035 0.0035	497 0.0035 0.0035
		≤ 375 Bhn or ≤ 40 HRc (44-66)	55 RPM Fr Feed (ipm)	13446 0.00010 0.0002	6723 0.0004 0.0008	3362 0.0015 0.0023	1681 0.0023 0.0031	840 0.0031 0.0031	560 0.0031 0.0031	420 0.0031 0.0031
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 220 Bhn or ≤ 19 HRc (224-336)	280 RPM Fr Feed (ipm)	68454 0.00026 0.0005	34227 0.0010 0.0010	17114 0.0020 0.0041	8557 0.0041 0.0061	4278 0.0061 0.0082	2852 0.0082 0.0082	2139 0.0082 0.0082
		≤ 330 Bhn or ≤ 36 HRc (200-300)	250 RPM Fr Feed (ipm)	61120 0.00025 0.0005	30560 0.0010 0.0010	15280 0.0020 0.0041	7640 0.0041 0.0061	3820 0.0061 0.0081	2547 0.0081 0.0081	1910 0.0081 0.0081
		≤ 220 Bhn or ≤ 19 HRc (224-336)	17.5 RPM Fr Feed (ipm)	15.5 0.00026 0.0005	15.5 0.0010 0.0010	17.5 0.0020 0.0041	17.5 0.0041 0.0061	17.5 0.0061 0.0082	17.5 0.0082 0.0082	17.5 0.0082 0.0082
		≤ 330 Bhn or ≤ 36 HRc (200-300)	15.5 RPM Fr Feed (ipm)	15.5 0.00025 0.0005	15.5 0.0010 0.0010	15.5 0.0020 0.0041	15.5 0.0041 0.0061	15.5 0.0061 0.0081	15.5 0.0081 0.0081	15.5 0.0081 0.0081
continued on next page										

Series 101 Fractional	Hardness	Vc (sfm)	DC • in							
			1/64	1/32	1/16	1/8	1/4	3/8	1/2	
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (432-648)	540 RPM Fr Feed (ipm)	132019 0.00030 0.0006	66010 0.0012 0.0024	33005 0.0024 0.0048	16502 0.0048 0.0073	8251 0.0073 0.0097	5501 0.0097 0.0126	4126 0.0126 0.0126
		≤ 150 Bhn or ≤ 7 HRc (364-546)	455 RPM Fr Feed (ipm)	111238 0.00031 0.0006	55619 0.0013 0.0025	27810 0.0025 0.0050	13905 0.0050 0.0076	6952 0.0076 0.0101	4635 0.0101 0.0101	3476 0.0101 0.0101
		≤ 140 Bhn or ≤ 3 HRc (152-228)	190 RPM Fr Feed (ipm)	46451 0.00015 0.0003	23226 0.0006 0.0012	11613 0.0012 0.0024	5806 0.0024 0.0048	2903 0.0048 0.0072	1935 0.0072 0.0088	1452 0.0088 0.0088
		≤ 200 Bhn or ≤ 23 HRc (140-210)	175 RPM Fr Feed (ipm)	42784 0.00015 0.0003	21392 0.0006 0.0012	10696 0.0012 0.0024	5348 0.0024 0.0048	2674 0.0048 0.0076	1783 0.0076 0.0094	1337 0.0094 0.0094
		500 RPM Fr Feed (ipm)	122240 0.00031 0.0006	61120 0.0012 0.0025	30560 0.0025 0.0050	15280 0.0050 0.0075	7640 0.0075 0.0099	5093 0.0099 0.0109	3820 0.0109 0.0109	3820 0.0109 0.0109
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 220 Bhn or ≤ 19 HRc (32-48)	40 RPM Fr Feed (ipm)	9779 0.00010 0.0002	4890 0.0004 0.0008	2445 0.0008 0.0016	1222 0.0016 0.0025	611 0.0025 0.0033	407 0.0033 0.0033	306 0.0033 0.0033
		≤ 320 Bhn or ≤ 34 HRc (20-30)	25 RPM Fr Feed (ipm)	6112 0.00010 0.0002	3056 0.0004 0.0008	1528 0.0008 0.0016	764 0.0016 0.0024	382 0.0024 0.0031	255 0.0031 0.0031	191 0.0031 0.0031
		≤ 425 Bhn or ≤ 45 HRc (16-24)	20 RPM Fr Feed (ipm)	4890 0.00004 0.0001	2445 0.0002 0.0003	1222 0.0003 0.0007	611 0.0007 0.0010	306 0.0010 0.0013	204 0.0013 0.0013	153 0.0013 0.0013
		≤ 275 Bhn or ≤ 28 HRc (68-102)	85 RPM Fr Feed (ipm)	20781 0.00020 0.0004	10390 0.0008 0.0016	5195 0.0016 0.0032	2598 0.0032 0.0049	1299 0.0049 0.0065	866 0.0065 0.0065	649 0.0065 0.0065
		≤ 350 Bhn or ≤ 38 HRc (52-78)	65 RPM Fr Feed (ipm)	15891 0.00011 0.0002	7946 0.0004 0.0008	3973 0.0008 0.0017	1986 0.0017 0.0026	993 0.0026 0.0034	662 0.0034 0.0034	497 0.0034 0.0034
S	TITANIUM ALLOYS (DIFFICULT) Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 440 Bhn or ≤ 47 HRc (44-66)	55 RPM Fr Feed (ipm)	13446 0.00010 0.0002	6723 0.0004 0.00					

# 2 Flute Drills

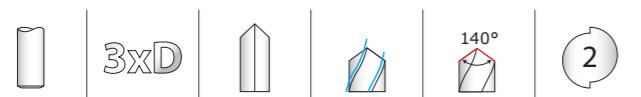
## Short Length Self Centering Drills • DIN 6539

	Series 101M, 108M Metric	Hardness	$V_c$ (m/min)	DC • 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
		≤ 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
		≤ 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
		≤ 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
ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 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
		≤ 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
		≤ 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
		≤ 330 Bhn or ≤ 36 HRc (27-40)	34	RPM	10664	3555	1777	1333	1066	889	666
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F			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
		≤ 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
		≤ 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
		≤ 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
K	CAST IRONS Gray, Malleable, Ductile			Feed (mm/min)	440	440	440	440	440	440	440
		≤ 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

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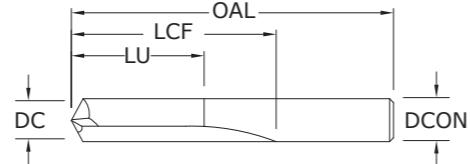
	Series 101M, 108M Metric	Hardness	$V_c$ (m/min)	DC • mm							
				1	3	6	8	10	12	16	
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (132-198)	165	RPM	52348	17449	8725	6544	5235	4362	3272
				Fr	0.020	0.060	0.120	0.160	0.200	0.240	0.319
				Feed (mm/min)	1045	1045	1045	1045	1045	1045	1045
		≤ 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
		≤ 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
S	COPPER ALLOYS Alum Bronze, C110, Muntz Brass			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
		≤ 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
				Feed (mm/min)	25	25	25	25	25	25	25
		≤ 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
				Feed (mm/min)	15	15	15	15	15	15	15
		≤ 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
S	TITANIUM ALLOYS (DIFFICULT) Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si,<br										

# Straight Flute Drills • Metric: DIN 6539



106

FRACTIONAL &amp; METRIC SERIES



# Straight Flute Drills • Metric: DIN 6539

106

FRACTIONAL &amp; METRIC SERIES

CONTINUED

CUTTING DIAMETER DC/DCON	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	EDP NO.	
						UNCOATED	TI-NAMITE-A (AITN)
1,0 mm	0.0394	26,0	6,0	4,5	66001	66002	
#60	0.0400	1.02	1-1/2	1/2	13/32	56060	56269
#59	0.0410	1.04	1-1/2	1/2	13/32	56059	56268
#58	0.0420	1.07	1-1/2	1/2	13/32	56058	56267
#57	0.0430	1.09	1-1/2	1/2	13/32	56057	56266
#56	0.0465	1.18	1-1/2	1/2	13/32	56056	56265
3/64	0.0469	1.19	1-1/2	1/2	13/32	56103	56135
#55	0.0520	1.32	1-1/2	1/2	13/32	56055	56264
#54	0.0550	1.40	1-1/2	1/2	13/32	56054	56263
1,5 mm	0.0591	32,0	9,0	7,0	66003	66004	
#53	0.0595	1.51	1-1/2	1/2	13/32	56053	56262
1/16	0.0625	1.59	1-1/2	5/8	1/2	56104	56136
#52	0.0635	1.61	1-11/16	11/16	35/64	56052	56261
#51	0.0670	1.70	1-11/16	11/16	35/64	56051	56260
#50	0.0700	1.78	1-11/16	11/16	35/64	56050	56259
#49	0.0730	1.85	1-11/16	11/16	35/64	56049	56258
#48	0.0760	1.93	1-11/16	11/16	35/64	56048	56257
5/64	0.0781	1.98	1-11/16	11/16	35/64	56105	56137
#47	0.0785	1.99	1-3/4	3/4	39/64	56047	56256
2,0 mm	0.0787	38,0	12,0	9,0	66005	66006	
#46	0.0810	2.06	1-3/4	3/4	39/64	56046	56255
#45	0.0820	2.08	1-3/4	3/4	39/64	56045	56254
#44	0.0860	2.18	1-3/4	3/4	39/64	56044	56253
#43	0.0890	2.26	1-3/4	3/4	39/64	56043	56252
#42	0.0935	2.37	1-3/4	3/4	39/64	56042	56251
3/32	0.0938	2.38	1-3/4	3/4	39/64	56106	56138
#41	0.0960	2.44	1-13/16	13/16	21/32	56041	56250
#40	0.0980	2.49	1-13/16	13/16	21/32	56040	56249
2,5 mm	0.0984	43,0	14,0	11,0	66007	66008	
#39	0.0995	2.53	1-13/16	13/16	21/32	56039	56248
#38	0.1015	2.58	1-13/16	13/16	21/32	56038	56247
#37	0.1040	2.64	1-13/16	13/16	21/32	56037	56246
#36	0.1065	2.71	1-13/16	13/16	21/32	56036	56245
7/64	0.1094	2.78	1-13/16	13/16	21/32	56107	56139
#35	0.1100	2.79	1-7/8	7/8	45/64	56035	56244
#34	0.1110	2.82	1-7/8	7/8	45/64	56034	56243

continued on next page

## TOLERANCES (inch)

DC = +0.0000/-0.0005  
DCON = h<sub>6</sub>

## TOLERANCES (mm)

DC = +0,0000/-0,0127  
DCON = h<sub>6</sub>

- STEELS
- CAST IRON
- HARDENED STEELS

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

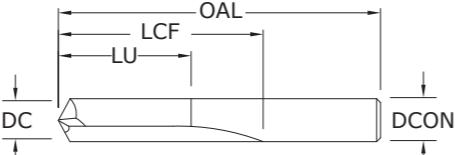
CUTTING DIAMETER DC/DCON	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	EDP NO.	
						UNCOATED	TI-NAMITE-A (AITN)
#33	0.1130	2.87	1-7/8	7/8	45/64	56033	56242
#32	0.1160	2.95	1-7/8	7/8	45/64	56032	56241
3,0 mm	0.1181	46,0	16,0	12,0	66009	66010	
#31	0.1200	3.05	1-7/8	7/8	45/64	56031	56240
1/8	0.1250	3.18	1-7/8	7/8	45/64	56108	56140
#30	0.1285	3.26	1-15/16	15/16	3/4	56030	56239
#29	0.1360	3.45	1-15/16	15/16	3/4	56029	56238
3,5 mm	0.1378	52,0	20,0	15,0	66011	66012	
#28	0.1405	3.57	1-15/16	15/16	3/4	56028	56237
9/64	0.1406	3.57	1-15/16	15/16	3/4	56109	56141
#27	0.1440	3.66	2-1/16	1	51/64	56027	56236
#26	0.1470	3.73	2-1/16	1	51/64	56026	56235
#25	0.1495	3.80	2-1/16	1	51/64	56025	56234
#24	0.1520	3.86	2-1/16	1	51/64	56024	56233
#23	0.1540	3.91	2-1/16	1	51/64	56023	56232
5/32	0.1562	3.97	2-1/16	1	51/64	56110	56142
#22	0.1570	3.99	2-1/8	1-1/16	55/64	56022	56231
4,0 mm	0.1575	55,0	22,0	17,0	66013	66014	
#21	0.1590	4.04	2-1/8	1-1/16	55/64	56021	56230
#20	0.1610	4.09	2-1/8	1-1/16	55/64	56020	56229
#19	0.1660	4.22	2-1/8	1-1/16	55/64	56019	56228
#18	0.1695	4.31	2-1/8	1-1/16	55/64	56018	56227
11/64	0.1719	4.37	2-1/8	1-1/16	55/64	56111	56143
#17	0.1730	4.39	2-3/16	1-1/8	29/32	56017	56226
#16	0.1770	4.50	2-3/16	1-1/8	29/32	56016	56225
4,5 mm	0.1772	58,0	24,0	18,0	66015	66016	
#15	0.1800	4.57	2-3/16	1-1/8	29/32	56015	56224
#14	0.1820	4.62	2-3/16	1-1/8	29/32	56014	56223
#13	0.1850	4.70	2-3/16	1-1/8	29/32	56013	56222
3/16	0.1875	4.76	2-3/16	1-1/8	29/32	56112	56144
#12	0.1890	4.80	2-3/16	1-1/8	29/32	56012	56221
#11	0.1910	4.85	2-3/16	1-1/8	29/32	56011	56220
#10	0.1935	4.91	2-3/16	1-1/8	29/32	56010	56219
#9	0.1960	4.98	2-1/4	1-3/16	61/64	56009	56218
5,0 mm	0.19						

# Straight Flute Drills • Metric: DIN 6539



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FRACTIONAL &amp; METRIC SERIES



CUTTING DIAMETER DC / DCON	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	EDP NO.	
						UNCOATED	Ti-NAMITE-A (AITIN)
15/64	0.2344	5.95	2-7/16	1-5/16	1-3/64	56115	56147
6,0 mm	0.2362		66,0	28,0	21,0	66021	66045
1/4	0.2500	6.35	2-1/2	1-3/8	1-7/64	56116	56148
6,5 mm	0.2559		70,0	31,0	23,0	66022	66046
17/64	0.2656	6.75	2-5/8	1-7/16	1-7/64	56117	56149
7,0 mm	0.2756		74,0	34,0	25,0	66023	66024
9/32	0.2812	7.14	2-11/16	1-1/2	1-13/64	56118	56150
7,5 mm	0.2953		74,0	34,0	25,0	66025	66026
19/64	0.2969	7.54	2-3/4	1-9/16	1-1/4	56119	56151
5/16	0.3125	7.94	2-13/16	1-5/8	1-19/64	56120	56152
8,0 mm	0.3150		79,0	37,0	27,0	66027	66028
21/64	0.3281	8.33	2-15/16	1-11/16	1-23/64	56121	56153
8,5 mm	0.3346		79,0	37,0	27,0	66029	66030
11/32	0.3438	8.73	3	1-11/16	1-23/64	56122	56154
9,0 mm	0.3543		84,0	40,0	29,0	66031	66032
23/64	0.3594	9.13	3-1/16	1-3/4	1-13/32	56123	56155
9,5 mm	0.3740		84,0	40,0	29,0	66033	66034
3/8	0.3750	9.53	3-1/8	1-13/16	1-29/64	56124	56156
25/64	0.3906	9.92	3-1/4	1-7/8	1-1/2	56125	56157
10,0 mm	0.3937		89,0	43,0	31,0	66035	66036
13/32	0.4062	10.32	3-5/16	1-15/16	1-35/64	56126	56158
10,5 mm	0.4134		89,0	43,0	31,0	66037	66038
27/64	0.4219	10.72	3-3/8	2	1-39/64	56127	56159
11,0 mm	0.4331		95,0	47,0	33,0	66039	66040
7/16	0.4375	11.11	3-7/16	2-1/16	1-21/32	56128	56160
11,5 mm	0.4528		95,0	47,0	33,0	66041	66042
29/64	0.4531	11.51	3-9/16	2-1/8	1-45/64	56129	56161
15/32	0.4688	11.91	3-5/8	2-1/8	1-45/64	56130	56162
12,0 mm	0.4724		102,0	51,0	35,0	66043	66044
31/64	0.4844	12.30	3-11/16	2-3/16	1-3/4	56131	56163
1/2	0.5000	12.70	3-3/4	2-1/4	1-51/64	56132	56164

## TOLERANCES (inch)

DC = +0.0000/-0.0005  
DCON = h<sub>6</sub>

## TOLERANCES (mm)

DC = +0.0000/-0.0127  
DCON = h<sub>6</sub>

STEELS

CAST IRON

HARDENED STEELS

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

Series 106 Fractional	Hardness	Vc (sfm)	DC • in					
			1/16	1/8	3/16	1/4	3/8	1/2
P ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 500 Bhn or ≤ 52 HRc (48-72)	60	RPM	3667	1834	1222	917	611
		Fr	0.0004	0.0007	0.0011	0.0014	0.0021	0.0028
		Feed (ipm)	1.3	1.3	1.3	1.3	1.3	1.3
	≤ 615 Bhn or ≤ 58 HRc (40-60)	50	RPM	3056	1528	1019	764	509
		Fr	0.0004	0.0008	0.0012	0.0016	0.0024	0.0031
		Feed (ipm)	1.2	1.2	1.2	1.2	1.2	1.2
K CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc (200-300)	250	RPM	15280	7640	5093	3820	2547
		Fr	0.0010	0.0020	0.0030	0.0041	0.0061	0.0081
		Feed (ipm)	15.5	15.5	15.5	15.5	15.5	15.5
	≤ 330 Bhn or ≤ 36 HRc (156-234)	195	RPM	11918	5959	3973	2980	1986
		Fr	0.0010	0.0020	0.0030	0.0040	0.0060	0.0081
		Feed (ipm)	12.0	12.0	12.0	12.0	12.0	12.0
H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 500 Bhn or ≤ 52 HRc (48-72)	60	RPM	3667	1834	1222	917	611
		Fr	0.0004	0.0007	0.0011	0.0014	0.0021	0.0028
		Feed (ipm)	1.3	1.3	1.3	1.3	1.3	1.3
	≤ 615 Bhn or ≤ 58 HRc (40-60)	50	RPM	3056	1528	1019	764	509
		Fr	0.0004	0.0008	0.0012	0.0016	0.0024	0.0031
		Feed (ipm)	1.2	1.2	1.2	1.2	1.2	1.2

Bhn (Brinell) HRc (Rockwell C)

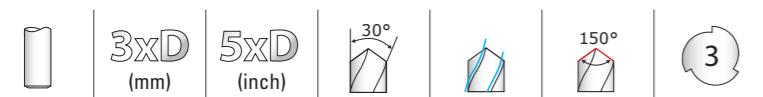
rpm = Vc x 3.82 / DC

ipm = Fr x rpm

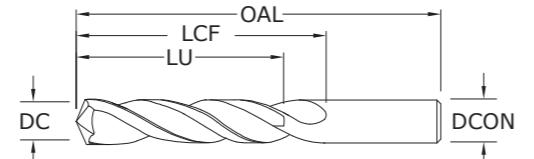
reduce speed and feed 30 percent when using uncoated drills

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

Series 106M Metric	Hardness	Vc (m/min)	DC • mm					
			1	3	6	8	10	12
P ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 500 Bhn or ≤ 52 HRc (15-22)	18	RPM	5816	1939	969	727	582
		Fr	0.006	0.018	0.035	0.047	0.058	0.070
		Feed (mm/min)	34	34	34	34	34	34
	≤ 615 Bhn or ≤ 58 HRc (12-18)	15	RPM	4847	1616	808	606	485
		Fr	0.006	0.017	0.033	0.045	0.056	0.067
		Feed (mm/min)	27	27	27	27	27	27
K CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc (61-91)	76	RPM	24235	8078	4039	3029	2424
		Fr	0.016	0.048	0.096	0.128	0.160	0.192
		Feed (mm/min)	395	395	395	395	395	395
	≤ 330 Bhn or ≤ 36 HRc (48-71)	59	RPM	18904	6301	3151	2363	1890
		Fr	0.016	0.048	0.096	0.128	0.160	0.192
		Feed (mm/min)	305	305	305	305	305	305

**3 Flute Drills • Metric: DIN 6539****103**

FRACTIONAL &amp; METRIC SERIES



CUTTING DIAMETER DC / DCON	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	EDP NO.		TOLERANCES (inch)	
						UNCOATED	TI-NAMITE-A (AITIN)	DC = +0.0000/-0.0005	DCON = h <sub>6</sub>
#36	0.1065	2.71	2-1/4	1-1/4	1	53036	58011		
7/64	0.1094	2.78	2-1/4	1-1/4	1	53107	58012		
#35	0.1100	2.79	2-1/4	1-1/4	1	53035	58013		
#34	0.1110	2.82	2-1/4	1-1/4	1	53034	58014		
#33	0.1130	2.87	2-1/4	1-1/4	1	53033	58015		
#32	0.1160	2.95	2-1/4	1-1/4	1	53032	58016		
3,0 mm	0.1181	46,0	16,0	12,0	63000	68965			
#31	0.1200	3.05	2-1/4	1-1/4	1	53031	58017		
3,1 mm	0.1220	49,0	18,0	14,0	63044	68966			
1/8	0.1250	3.18	2-1/4	1-1/4	1	53108	58018		
3,2 mm	0.1260	49,0	18,0	14,0	63045	68967			
#30	0.1285	3.26	2-1/4	1-1/4	1	53030	58019		
3,3 mm	0.1299	49,0	18,0	14,0	63001	68968			
3,4 mm	0.1339	52,0	20,0	15,0	63046	68969			
#29	0.1360	3.45	2-1/2	1-3/8	1-7/64	53029	58020		
3,5 mm	0.1378	52,0	20,0	15,0	63002	68970			
#28	0.1405	3.57	2-1/2	1-3/8	1-7/64	53028	58021		
9/64	0.1406	3.57	2-1/2	1-3/8	1-7/64	53109	58022		
3,6 mm	0.1417	52,0	20,0	15,0	63047	68971			
#27	0.1440	3.66	2-1/2	1-3/8	1-7/64	53027	58023		
3,7 mm	0.1457	52,0	20,0	15,0	63003	68972			
#26	0.1470	3.73	2-1/2	1-3/8	1-7/64	53026	58024		
#25	0.1495	3.80	2-1/2	1-3/8	1-7/64	53025	58025		
3,8 mm	0.1496	55,0	22,0	17,0	63048	68973			
#24	0.1520	3.86	2-1/2	1-3/8	1-7/64	53024	58026		
3,9 mm	0.1535	55,0	22,0	17,0	63049	68974			
#23	0.1540	3.91	2-1/2	1-3/8	1-7/64	53023	58027		
5/32	0.1562	3.97	2-1/2	1-3/8	1-7/64	53110	58028		
#22	0.1570	3.99	2-1/2	1-3/8	1-7/64	53022	58029		
4,0 mm	0.1575	55,0	22,0	17,0	63004	68975			
#21	0.1590	4.04	2-1/2	1-3/8	1-7/64	53021	58030		
#20	0.1610	4.09	2-1/2	1-3/8	1-7/64	53020	58031		
4,1 mm	0.1614	55,0	22,0	17,0	63050	68976			
4,2 mm	0.1654	55,0	22,0	17,0	63005	68977			
#19	0.1660	4.22	2-3/4	1-5/8	1-19/64	53019	58032		
4,3 mm	0.1693	58,0	24,0	18,0	63051	68978			
#18	0.1695	4.31	2-3/4	1-5/8	1-19/64	53018	58033		
11/64	0.1719	4.37	2-3/4	1-5/8	1-19/64	53111	58034		
#17	0.1730	4.39	2-3/4	1-5/8	1-19/64	53017	58035		
4,4 mm	0.1732	58,0	24,0	18,0	63052	68979			

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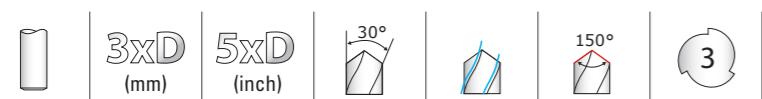
**3 Flute Drills • Metric: DIN 6539****103**

FRACTIONAL &amp; METRIC SERIES

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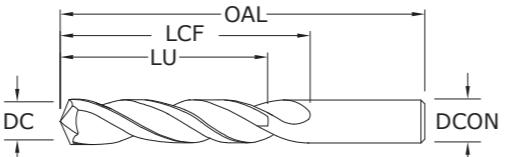
CUTTING DIAMETER DC / DCON	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	EDP NO.	UNCOATED	TI-NAMITE-A (AITIN)
#16	0.1770	4.50	2-3/4	1-5/8	1-19/64	53016	58036	
4,5 mm	0.1772	58,0	24,0	18,0	63006	68980		
#15	0.1800	4.57	2-3/4	1-5/18	1-19/64	53015	58037	
4,6 mm	0.1811	58,0	24,0	18,0	63053	68981		
#14	0.1820	4.62	2-3/4	1-5/8	1-19/64	53014	58038	
#13	0.1850	4.70	2-3/4	1-5/8	1-19/64	53013	58039	
4,7 mm	0.1850	58,0	24,0	18,0	63054	68982		
3/16	0.1875	4.76	2-3/4	1-5/8	1-19/64	53112	58040	
#12	0.1890	4.80	2-3/4	1-5/8	1-19/64	53012	58041	
4,8 mm	0.1890	62,0	26,0	20,0	63055	68983		
#11	0.1910	4.85	2-3/4	1-5/8	1-19/64	53011	58042	
4,9 mm	0.1929	62,0	26,0	20,0	63056	68984		
#10	0.1935	4.91	2-3/4	1-5/8	1-19/64	53010	58043	
#9	0.1960	4.98	3	1-3/4	1-13/32	53009	58044	
5,0 mm	0.1969	62,0	26,0	20,0	63007	68985		
#8	0.1990	5.05	3	1-3/4	1-13/32	53008	58045	
5,1 mm	0.2008	62,0	26,0	20,0	63057	68986		
#7	0.2010	5.11	3	1-3/4	1-13/32	53007	58046	
13/64	0.2031	5.16	3	1-3/4	1-13/32	53113	58047	
#6	0.2040	5.18	3	1-3/4	1-13/32	53006	58048	
5,2 mm	0.2047	62,0	26,0	20,0	63008	68987		
#5	0.2055	5.22	3	1-3/4	1-13/32	53005	58049	
5,3 mm	0.2087	62,0	26,0	20,0	63058	68988		
#4	0.2090	5.31	3	1-3/4	1-13/32	53004	58050	
5,4 mm	0.2126	66,0	28,0	21,0	63059	68989		
#3	0.2130	5.41	3	1-3/4	1-13/32	53003	58051	
5,5 mm	0.2165	66,0	28,0	21,0	63009	68990		
7/32	0.2188	5.56	3	1-3/4	1-13/32	53114	58052	
5,6 mm	0.2205	66,0	28,0	21,0	63060	68991		
#2	0.2210	5.61	3	1-3/4	1-13/32	53002	58053	
5,7 mm	0.2244	66,0	28,0	21,0	63061	68992		
#1	0.2280	5.79	3	1-3/4	1-13/32	53001	58054	
5,8 mm	0.2283	66,0						

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FRACTIONAL &amp; METRIC SERIES



EDP NO.

CUTTING DIAMETER DC/DCON	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	UNCOATED	TI-NAMITE-A (AITIN)	EDP NO.
17/64	0.2656	6.75	3-1/2	2-1/8	1-45/64	53117	58064	
H	0.2660	6.76	3-1/2	2-1/8	1-45/64	53208	58065	
6,8 mm	0.2677		74,0	34,0	25,0	63013	69003	
6,9 mm	0.2717		74,0	34,0	25,0	63069	69004	
I	0.2720	6.91	3-1/2	2-1/8	1-45/64	53209	58066	
7,0 mm	0.2756		74,0	34,0	25,0	63014	69005	
J	0.2770	7.04	3-1/2	2-1/8	1-45/64	53210	58067	
7,1 mm	0.2795		74,0	34,0	25,0	63070	69006	
K	0.2810	7.14	3-1/2	2-1/8	1-45/64	53211	58068	
9/32	0.2812	7.14	3-1/2	2-1/8	1-45/64	53118	58069	
7,2 mm	0.2835		74,0	34,0	25,0	63015	69007	
7,3 mm	0.2874		74,0	34,0	25,0	63071	69008	
L	0.2900	7.37	3-1/2	2-1/8	1-45/64	53212	58070	
7,4 mm	0.2913		74,0	34,0	25,0	63072	69009	
M	0.2950	7.49	3-3/4	2-3/8	1-29/32	53213	58071	
7,5 mm	0.2953		74,0	34,0	25,0	63016	69010	
19/64	0.2969	7.54	3-3/4	2-3/8	1-29/32	53119	58072	
7,6 mm	0.2992		79,0	37,0	27,0	63073	69011	
N	0.3020	7.67	2-3/8	2-3/8	1-29/32	53214	58073	
7,7 mm	0.3031		79,0	37,0	27,0	63074	69012	
7,8 mm	0.3071		79,0	37,0	27,0	63075	69013	
7,9 mm	0.3110		79,0	37,0	27,0	63076	69014	
5/16	0.3125	7.94	3-3/4	2-3/8	1-29/32	53120	58074	
8,0 mm	0.3150		79,0	37,0	27,0	63017	69015	
O	0.3160	8.03	3-3/4	2-3/8	1-29/32	53215	58075	
8,1 mm	0.3189		79,0	37,0	27,0	63077	69016	
8,2 mm	0.3228		79,0	37,0	27,0	63018	69017	
P	0.3230	8.20	3-3/4	2-3/8	1-29/32	53216	58076	
8,3 mm	0.3268		79,0	37,0	27,0	63078	69018	
21/64	0.3281	8.33	4	2-1/2	2	53121	58077	
8,4 mm	0.3307		79,0	37,0	27,0	63019	69019	
Q	0.3320	8.43	4	2-1/2	2	53217	58078	
8,5 mm	0.3346		79,0	37,0	27,0	63020	69020	
8,6 mm	0.3386		84,0	40,0	29,0	63021	69021	
R	0.3390	8.61	4	2-1/2	2	53218	58079	
8,7 mm	0.3425		84,0	40,0	29,0	63079	69022	
11/32	0.3438	8.73	4	2-1/2	2	53122	58080	
8,8 mm	0.3465		84,0	40,0	29,0	63022	69023	
S	0.3480	8.84	4	2-1/2	2	53219	58081	
8,9 mm	0.3504		84,0	40,0	29,0	63080	69024	
9,0 mm	0.3543		84,0	40,0	29,0	63023	69025	
T	0.3580	9.09	4-1/4	2-3/4	2-13/64	53220	58082	

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FRACTIONAL & METRIC SERIES  
CONTINUED

CUTTING DIAMETER DC/DCON	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH OAL	FLUTE LENGTH LCF	CLEARED LENGTH LU	EDP NO.	UNCOATED	TI-NAMITE-A (AITIN)
9,1 mm	0.3583		84,0	40,0	29,0	63081	69026	
23/64	0.3594	9.13	4-1/4	2-3/4	2-13/64	53123	58083	
9,2 mm	0.3622		84,0	40,0	29,0	63024	69027	
9,3 mm	0.3661		84,0	40,0	29,0	63082	69028	
U	0.3680	9.35	4-1/4	2-3/4	2-13/64	53221	58084	
9,4 mm	0.3701		84,0	40,0	29,0	63083	69029	
9,5 mm	0.3740		84,0	40,0	29,0	63025	69030	
3/8	0.3750	9.53	4-1/4	2-3/4	2-13/64	53124	58085	
V	0.3770	9.58	4-1/4	2-3/4	2-13/64	53222	58086	
9,6 mm	0.3780		89,0	43,0	31,0	63084	69031	
9,7 mm	0.3819		89,0	43,0	31,0	63085	69032	
9,8 mm	0.3858		89,0	43,0	31,0	63086	69033	
W	0.3860	9.80	4-1/2	2-7/8	2-19/64	53223	58087	
9,9 mm	0.3898		89,0	43,0	31,0	63087	69034	
25/64	0.3906	9.92	4-1/2	2-7/8	2-19/64	53125	58088	
10,0 mm	0.3937		89,0	43,0	31,0	63026	69035	
X	0.3970	10.08	4-1/2	2-7/8	2-19/64	53224	58089	
10,1 mm	0.3976		89,0	43,0	31,0	63088	69036	
10,2 mm	0.4016		89,0	43,0	31,0	63027	69037	
Y	0.4040	10.26	4-1/2	2-7/8	2-19/64	53225	58090	
13/32	0.4062	10.32	4-1/2	2-7/8	2-19/64	53126	58091	
10,4 mm	0.4094		89,0	43,0	31,0	63028	69038	
Z	0.4130	10.49	4-1/2	2-7/8	2-19/64	53226	58092	
10,5 mm	0.4134		89,0	43,0	31,0	63029	69039	
10,7 mm	0.4213		95,0	47,0	33,0	63030	69040	
27/64	0.4219	10.72	4-1/2	2-7/8	2-19/64	53127	58093	
10,8 mm	0.4252		95,0	47,0	33,0	63031	69041	
11,0 mm	0.4331		95,0	47,0	33,0	63032	69042	
7/16	0.4375	11.11	4-1/2	2-7/8	2-19/64	53128	58094	
11,5 mm	0.4528		95,0	47,0	33,0	63033	69043	
29/64	0.4531	11.51	4-3/4	3	2-13/32	53129	58095	
15/32	0.4688	11.91	4-3/4	3	2-13/32	53130	58096	
12,0 mm	0.4724		102,0	51,0	35,0	63034	69044	
31/64	0.4844	12.30	4-3/4	3	2-13/32	53131	58097	
12,5 mm	0.4921		102,0	51,0	35,0	63035	69045	
1/2	0.5000	12.70	4-3/4					

## FRACTIONAL

## 3 Flute Drills

	Series 103 Fractional	Hardness	Vc (sfm)	DC • in						
				1/8	1/4	3/8	1/2	5/8	3/4	
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc (236-354)	295	RPM	9015	4508	3005	2254	1803	1503
				Fr	0.0026	0.0051	0.0077	0.0102	0.0128	0.0153
				Feed (ipm)	23.0	23.0	23.0	23.0	23.0	23.0
		≤ 300 Bhn or ≤ 32 HRc (208-312)	260	RPM	7946	3973	2649	1986	1589	1324
				Fr	0.0023	0.0045	0.0068	0.0091	0.0113	0.0136
				Feed (ipm)	18.0	18.0	18.0	18.0	18.0	18.0
		≤ 425 Bhn or ≤ 45 HRc (120-180)	150	RPM	4584	2292	1528	1146	917	764
				Fr	0.0013	0.0026	0.0039	0.0052	0.0065	0.0079
				Feed (ipm)	6.0	6.0	6.0	6.0	6.0	6.0
		≤ 275 Bhn or ≤ 28 HRc (184-276)	230	RPM	7029	3514	2343	1757	1406	1171
				Fr	0.0019	0.0038	0.0058	0.0077	0.0096	0.0115
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc (116-174)	145	RPM	4431	2216	1477	1108	886	739
				Fr	0.0019	0.0038	0.0058	0.0077	0.0096	0.0115
				Feed (ipm)	8.5	8.5	8.5	8.5	8.5	8.5
		≤ 450 Bhn or ≤ 48 HRc (92-138)	115	RPM	3514	1757	1171	879	703	586
				Fr	0.0005	0.0010	0.0015	0.0020	0.0026	0.0031
				Feed (ipm)	1.8	1.8	1.8	1.8	1.8	1.8
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc (200-300)	250	RPM	7640	3820	2547	1910	1528	1273
				Fr	0.0026	0.0052	0.0079	0.0105	0.0131	0.0157
				Feed (ipm)	20.0	20.0	20.0	20.0	20.0	20.0
		≤ 330 Bhn or ≤ 36 HRc (156-234)	195	RPM	5959	2980	1986	1490	1192	993
				Fr	0.0026	0.0052	0.0078	0.0104	0.0130	0.0156
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (432-648)	540	RPM	16502	8251	5501	4126	3300	2750
				Fr	0.0032	0.0064	0.0096	0.0128	0.0161	0.0193
				Feed (ipm)	53.0	53.0	53.0	53.0	53.0	53.0
		≤ 150 Bhn or ≤ 7 HRc (364-546)	455	RPM	13905	6952	4635	3476	2781	2317
				Fr	0.0032	0.0065	0.0097	0.0129	0.0162	0.0194
N	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc (244-366)	305	RPM	9321	4660	3107	2330	1864	1553
				Fr	0.0019	0.0039	0.0058	0.0077	0.0097	0.0116
				Feed (ipm)	18.0	18.0	18.0	18.0	18.0	18.0
		≤ 200 Bhn or ≤ 23 HRc (128-192)	160	RPM	4890	2445	1630	1222	978	815
				Fr	0.0016	0.0033	0.0049	0.0065	0.0082	0.0098
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc (68-102)	85	RPM	2598	1299	866	649	520	433
				Fr	0.0013	0.0026	0.0039	0.0052	0.0065	0.0079
				Feed (ipm)	3.4	3.4	3.4	3.4	3.4	3.4
		≤ 375 Bhn or ≤ 40 HRc (52-78)	65	RPM	1986	993	662	497	397	331
				Fr	0.0007	0.0013	0.0020	0.0026	0.0033	0.0039
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 475 Bhn or ≤ 50 HRc (40-60)	50	RPM	1528	764	509	382	306	255
				Fr	0.0007	0.0013	0.0020	0.0026	0.0033	0.0039
				Feed (ipm)	1.0	1.0	1.0	1.0	1.0	1.0

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

rpm = Vc x 3.82 / DC

ipm = Fr x rpm

reduce speed and feed 30 percent when using uncoated drills

reduce speed and feed for materials harder than listed

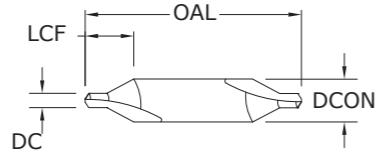
refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

	Series 103M Metric	Hardness	Vc (m/min)	DC • mm						
				3	6	10	12	16	20	
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc (72-108)	90	RPM	9533	4766	2860	2383	1787	1430
				Fr	0.062	0.124	0.206	0.248	0.330	0.413
				Feed (mm/min)	590	590	590	590	590	590
		≤ 300 Bhn or ≤ 32 HRc (63-95)	79	RPM	8402	4201	2520	2100	1575	1260
				Fr	0.055	0.110	0.183	0.219	0.292	0.365
				Feed (mm/min)	460	460	460	460	460	460
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 425 Bhn or ≤ 45 HRc (37-55)	46	RPM	4847	2424	1454	1212	909	727
				Fr	0.032	0.064	0.107	0.128	0.171	0.213
				Feed (mm/min)	155	155	155	155	155	155
		≤ 275 Bhn or ≤ 28 HRc (56-84)	70	RPM	7432	3716	2230	1858	1394	1115
				Fr	0.046	0.093	0.155	0.186	0.248	0.309
				Feed (mm/min)	345	345	345	345	345	345
K	CAST IRONS Gray, Malleable, Ductile	≤ 375 Bhn or ≤ 40 HRc (35-53)	44	RPM	4686	2343	1406	1171	879	703
				Fr	0.046	0.092	0.153	0.184	0.245	0.306
				Feed (mm/min)	215	215	215	215	215	215
		≤ 450 Bhn or ≤ 48 HRc (28-42)	35	RPM	3716	1858	1115	929	697	557

## FRACTIONAL

**Combined Drill & Countersink****301**

FRACTIONAL SERIES

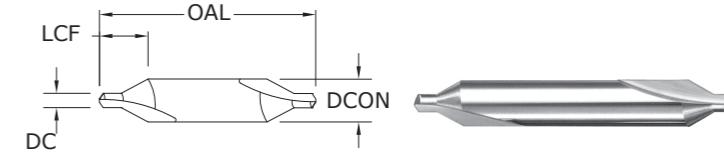
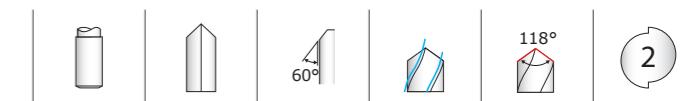
Pictured:  
Series 301 Set

SIZE	DRILL DIAMETER DC	BODY DIAMETER DCON	inch		EDP NO.	TOLERANCES (inch)
			OVERALL LENGTH OAL	FLUTE LENGTH LCF		
*00	.025	1/8	1-1/2	.125	57005	57015
*0	1/32	1/8	1-1/2	.130	57006	57016
*1	3/64	1/8	1-1/2	.135	57007	57017
*2	5/64	3/16	1-7/8	.200	57008	57018
*3	7/64	1/4	2	.280	57009	57019
*4	1/8	5/16	2-1/8	.340	57010	57020
*5	3/16	7/16	2-3/4	.475	57011	57021
*6	7/32	1/2	3	.540	57012	57022
*Series 301 Set	—	—	—	—	57075	—

TOLERANCES (inch)	
DC	= +0,003/-0,000
DCON	= -0,0001/-0,0005
<b>STEELS</b>	
<b>STAINLESS STEELS</b>	
<b>CAST IRON</b>	
<b>HIGH TEMP ALLOYS</b>	
<b>TITANIUM</b>	
<b>HARDENED STEELS</b>	
<b>NON-FERROUS</b>	
<b>PLASTICS/COMPOSITES</b>	

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

## METRIC

**Combined Drill & Countersink****301M**

METRIC SERIES

DRILL DIAMETER DC	BODY DIAMETER DCON	mm		EDP NO.
		OVERALL LENGTH OAL	FLUTE LENGTH LCF	
0,5	3,15	20,0	3,0	67005 67035
0,8	3,15	20,0	3,5	67007 67037
1	3,15	31,5	3,5	67009 67039
1,25	3,15	31,5	4,0	67011 67041
1,6	4,0	35,5	5,0	67013 67043
2	5,0	40,0	6,0	67015 67045
2,5	6,3	45,0	7,0	67017 67047
3,15	8,0	50,0	9,0	67019 67049
4	10,0	56,0	11,0	67021 67051
5	12,5	63,0	14,0	67023 67053

TOLERANCES (mm)	
DC	= +0,076/-0,000
DCON	= -0,0025/-0,0127
<b>STEELS</b>	
<b>STAINLESS STEELS</b>	
<b>CAST IRON</b>	
<b>HIGH TEMP ALLOYS</b>	
<b>TITANIUM</b>	
<b>HARDENED STEELS</b>	
<b>NON-FERROUS</b>	
<b>PLASTICS/COMPOSITES</b>	

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# FRACTIONAL Combined Drill & Countersink

Series 301 Fractional	Hardness	Vc (sfm)	DC • in					
			1/32	5/64	1/8	3/16	7/32	
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc (212-318)	265 RPM	8098	5399	3239	2314	2025
			Fr	0.00068	0.0010	0.0017	0.0024	0.0027
			Feed (ipm)	5.5	5.5	5.5	5.5	5.5
		≤ 300 Bhn or ≤ 32 HRc (100-150)	125 RPM	3820	2547	1528	1091	955
			Fr	0.00065	0.0010	0.0016	0.0023	0.0026
			Feed (ipm)	2.5	2.5	2.5	2.5	2.5
		≤ 425 Bhn or ≤ 45 HRc (68-102)	85 RPM	2598	1732	1039	742	649
			Fr	0.00038	0.0006	0.0010	0.0013	0.0015
			Feed (ipm)	1.0	1.0	1.0	1.0	1.0
		≤ 275 Bhn or ≤ 28 HRc (184-276)	230 RPM	7029	4686	2812	2008	1757
			Fr	0.00064	0.0010	0.0016	0.0022	0.0026
			Feed (ipm)	4.5	4.5	4.5	4.5	4.5
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc (116-174)	145 RPM	4431	2954	1772	1266	1108
			Fr	0.00059	0.0009	0.0015	0.0021	0.0023
			Feed (ipm)	2.6	2.6	2.6	2.6	2.6
		≤ 450 Bhn or ≤ 48 HRc (48-72)	60 RPM	1834	1222	733	524	458
			Fr	0.00027	0.0004	0.0007	0.0010	0.0011
			Feed (ipm)	0.5	0.5	0.5	0.5	0.5
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 250 Bhn or ≤ 24 HRc0 (168-252)	210 RPM	6418	4278	2567	1834	1604
			Fr	0.00048	0.0007	0.0012	0.0017	0.0019
			Feed (ipm)	3.1	3.1	3.1	3.1	3.1
		≤ 330 Bhn or ≤ 36 HRc (88-132)	110 RPM	3362	2241	1345	960	840
			Fr	0.00028	0.0004	0.0007	0.0010	0.0011
			Feed (ipm)	0.9	0.9	0.9	0.9	0.9
		≤ 275 Bhn or ≤ 28 HRc (52-78)	65 RPM	1986	1324	795	568	497
			Fr	0.00036	0.0005	0.0009	0.0013	0.0014
			Feed (ipm)	0.7	0.7	0.7	0.7	0.7
		≤ 375 Bhn or ≤ 40 HRc (44-66)	55 RPM	1681	1121	672	480	420
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-PH, 17-4 PH, Custom 450		Fr	0.00032	0.0005	0.0008	0.0011	0.0013
			Feed (ipm)	0.5	0.5	0.5	0.5	0.5
		≤ 220 Bhn or ≤ 19 HRc (224-336)	280 RPM	8557	5705	3423	2445	2139
			Fr	0.00084	0.0013	0.0021	0.0029	0.0034
			Feed (ipm)	7.2	7.2	7.2	7.2	7.2
K	CAST IRONS Gray, Malleable, Ductile	≤ 330 Bhn or ≤ 36 HRc (200-300)	250 RPM	7640	5093	3056	2183	1910
			Fr	0.00084	0.0013	0.0021	0.0029	0.0034
			Feed (ipm)	6.4	6.4	6.4	6.4	6.4

continued on next page

# FRACTIONAL Combined Drill & Countersink

Series 301 Fractional	Hardness	Vc (sfm)	DC • in					
			1/32	5/64	1/8	3/16	7/32	
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (432-648)	540 RPM	16502	11002	6601	4715	4126
			Fr	0.00100	0.0015	0.0025	0.0035	0.0040
			Feed (ipm)	16.5	16.5	16.5	16.5	16.5
		≤ 150 Bhn or ≤ 7 HRc (364-546)	455 RPM	13905	9270	5562	3973	3476
			Fr	0.00100	0.0015	0.0025	0.0035	0.0040
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc (152-228)	190 RPM	5806	3871	2323	1659	1452
			Fr	0.00048	0.0007	0.0012	0.0017	0.0019
		≤ 200 Bhn or ≤ 23 HRc (140-210)	175 RPM	5348	3565	2139	1528	1337
			Fr	0.00048	0.0007	0.0012	0.0017	0.0019
		≤ 220 Bhn or ≤ 19 HRc (32-48)	500 RPM	15280	10187	6112	4366	3820
S	PLASTICS Polycarbonate, PVC		Fr	0.00100	0.0015	0.0025	0.0035	0.0040
			Feed (ipm)	15.3	15.3	15.3	15.3	15.3
		≤ 220 Bhn or ≤ 19 HRc (32-48)	40 RPM	1222	815	489	349	306
			Fr	0.00036	0.0005	0.0009	0.0013	0.0014
			Feed (ipm)	0.4	0.4	0.4	0.4	0.4
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 320 Bhn or ≤ 34 HRc (20-30)	25 RPM	764	509	306	218	191
			Fr	0.00033	0.0005	0.0008	0.0011	0.0013
		≤ 425 Bhn or ≤ 45 HRc (16-24)	20 RPM	611	407	244	175	153
			Fr	0.00016	0.0002	0.0004	0.0006	0.0007
			Feed (ipm)	0.1	0.1	0.1	0.1	0.1
H	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc (68-102)	85 RPM	2598	1732	1039	742	649
			Fr	0.00064	0.0010	0.0016	0.0022	0.0026
			Feed (ipm)	1.7	1.7	1.7	1.7	1.7
		≤ 350 Bhn or ≤ 38 HRc (52-78)	65 RPM	1986	1324	795	568	497
			Fr	0.00036	0.0005	0.0009	0.0013	0.0014
	TOOL STEELS AZ, D2, H13, L2, M2, P20, S7, T15, W2	≤ 440 Bhn or ≤ 47 HRc (44-66)	65 RPM	0.7	0.7	0.7	0.7	0.7
			Fr	0.00032	0.0005	0.0008	0.0011	0.0013
			Feed (ipm)	0.5	0.5	0.5	0.5	0.5
		≤ 250 Bhn or ≤ 24 HRc (68-102)	55 RPM	1681	1121	672	480	420
			Fr	0.00035	0.0005	0.0009	0.0012	0.0014
SGS Micro Tools	SGS Solid Tools	≤ 375 Bhn or ≤ 40 HRc (44-66)</						

# Combined Drill & Countersink

Series 301M Metric	Hardness	Vc (m/min)	DC • mm				
			1	1.6	2.5	4	5
P	≤ 175 Bhn or ≤ 7 HRc (65-97)	81 RPM	8155	6422	4078	2569	2055
		Fr	0.017	0.022	0.034	0.054	0.068
		Feed (mm/min)	139	139	139	139	139
	≤ 300 Bhn or ≤ 32 HRc (30-46)	38 RPM	3847	3029	1923	1212	969
		Fr	0.016	0.020	0.032	0.051	0.064
		Feed (mm/min)	62	62	62	62	62
	≤ 425 Bhn or ≤ 45 HRc (21-31)	26 RPM	2616	2060	1308	824	659
		Fr	0.010	0.013	0.020	0.032	0.039
		Feed (mm/min)	26	26	26	26	26
	≤ 275 Bhn or ≤ 28 HRc (56-84)	70 RPM	7078	5574	3539	2230	1784
ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100		Fr	0.016	0.020	0.032	0.051	0.063
		Feed (mm/min)	113	113	113	113	113
	≤ 375 Bhn or ≤ 40 HRc (35-53)	44 RPM	4462	3514	2231	1406	1125
		Fr	0.015	0.019	0.030	0.048	0.060
		Feed (mm/min)	67	67	67	67	67
M	≤ 450 Bhn or ≤ 48 HRc (15-22)	18 RPM	1847	1454	923	582	465
		Fr	0.007	0.009	0.014	0.022	0.028
		Feed (mm/min)	13	13	13	13	13
	≤ 250 Bhn or ≤ 24 HRc (51-77)	64 RPM	6463	5089	3231	2036	1629
		Fr	0.012	0.015	0.024	0.038	0.048
STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 330 Bhn or ≤ 36 HRc (27-40)	34 RPM	3385	2666	1693	1066	853
		Fr	0.007	0.009	0.014	0.023	0.028
		Feed (mm/min)	24	24	24	24	24
	≤ 275 Bhn or ≤ 28 HRc (16-24)	20 RPM	2000	1575	1000	630	504
		Fr	0.009	0.011	0.018	0.029	0.036
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	1693	1333	846	533	427
		Fr	0.008	0.011	0.017	0.026	0.033
		Feed (mm/min)	14	14	14	14	14
	≤ 220 Bhn or ≤ 19 HRc (68-102)	85 RPM	8617	6786	4309	2714	2171
		Fr	0.021	0.027	0.042	0.067	0.083
K	≤ 330 Bhn or ≤ 36 HRc (61-91)	76 RPM	7694	6059	3847	2424	1939
		Fr	0.021	0.027	0.042	0.067	0.084
		Feed (mm/min)	162	162	162	162	162

continued on next page

Series 301M Metric	Hardness	Vc (m/min)	DC • mm				
			1	1.6	2.5	4	5
N	≤ 80 Bhn or ≤ 47 HRb (132-198)	165 RPM	16619	13087	8309	5235	4188
		Fr	0.025	0.032	0.050	0.079	0.099
		Feed (mm/min)	415	415	415	415	415
	≤ 150 Bhn or ≤ 7 HRc (111-166)	139 RPM	14003	11027	7001	4411	3529
		Fr	0.025	0.032	0.050	0.079	0.099
		Feed (mm/min)	350	350	350	350	350
	≤ 140 Bhn or ≤ 3 HRc (46-69)	58 RPM	5847	4605	2924	1842	1474
		Fr	0.012	0.015	0.024	0.038	0.048
		Feed (mm/min)	70	70	70	70	70
	≤ 200 Bhn or ≤ 23 HRc (43-64)	53 RPM	5386	4241	2693	1696	1357
PLASTICS Polycarbonate, PVC	≤ 220 Bhn or ≤ 19 HRc (10-15)	152 RPM	15388	12118	7694	4847	3878
		Fr	0.025	0.032	0.050	0.079	0.099
		Feed (mm/min)	385	385	385	385	385
	≤ 320 Bhn or ≤ 34 HRc (6-9)	12 RPM	1231	969	616	388	310
		Fr	0.009	0.011	0.018	0.028	0.035
S	≤ 425 Bhn or ≤ 45 HRc (5-7)	8 RPM	769	606	385	242	194
		Fr	0.008	0.010	0.016	0.025	0.031
		Feed (mm/min)	6	6	6	6	6
	≤ 275 Bhn or ≤ 28 HRc (21-31)	6 RPM	616	485	308	194	155
		Fr	0.003	0.004	0.006	0.010	0.013
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc (21-31)	26 RPM	2616	2060	1308	824	659
		Fr	0.016	0.020	0.032	0.051	0.064
		Feed (mm/min)	42	42	42	42	42
	≤ 350 Bhn or ≤ 38 HRc (16-24)	20 RPM	2000	1575	1000	630	504
		Fr	0.009	0.011	0.018	0.029	0.036
H	≤ 440 Bhn or ≤ 47 HRc (13-20)	17 RPM	1693	1333	846	533	427
		Fr	0.008	0.011	0.017	0.026	0.033
		Feed (mm/min)	14	14	14	14	14
	≤ 250 Bhn or ≤ 24 HRc (21-31)	26 RPM	2616	2060	1308	824	659
		Fr	0.009	0.012	0.018	0.029	0.036
TOOL STEELS AZ, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc (21-31)	24 RPM	24	24	24	24	24
	≤ 375 Bhn or ≤ 40 HRc (13-20)	17 RPM	1693	1333	846	533	427
		Fr	0.004	0.005	0.008	0.013	0.016
		Feed (mm/min)	7	7	7	7	7
	≤ 475 Bhn or ≤ 50 HRc (10-15)	12 RPM	1231	969	616	388	310
		Fr	0.004	0.005	0.008	0.013	0.016
		Feed (mm/min)	5	5	5	5	5

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

rpm = (Vc x 1000) / (DCON x 3.14)

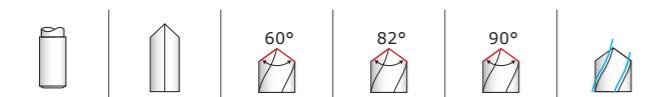
mm/min = Fr x rpm

reduce speed and feed 30 percent when using uncoated drills

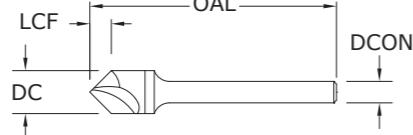
reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

## FRACTIONAL

**Single Flute Countersink****601**

FRACTIONAL SERIES



CUTTING DIAMETER DC	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	EDP NO.		
				UNCOATED 60°	UNCOATED 82°	UNCOATED 90°
1/8	1/8	1-1/2	.062	—	—	74201
1/8	1/8	1-1/2	.072	—	74101	—
1/8	1/8	1-1/2	.108	74001	—	—
3/16	3/16	2	.094	—	—	74204
3/16	3/16	2	.108	—	74104	—
3/16	3/16	2	.163	74004	—	—
1/4	1/4	2	.125	—	—	74207
1/4	1/4	2	.144	—	74107	—
1/4	1/4	2	.217	74007	—	—
*3/8	1/4	2-13/16	.188	—	—	74210
*3/8	1/4	2-13/16	.216	—	74110	—
*3/8	1/4	2-13/16	.325	74010	—	—
*1/2	1/4	2-7/8	.250	—	—	74213
*1/2	1/4	2-7/8	.288	—	74113	—
*1/2	1/4	2-7/8	.433	74013	—	—
*5/8	3/8	3	.313	—	—	74216
*5/8	3/8	3	.360	—	74116	—
*5/8	3/8	3	.541	74016	—	—
*3/4	1/2	3	.375	—	—	74219
*3/4	1/2	3	.431	—	74119	—
*3/4	1/2	3	.650	74019	—	—
*1	1/2	3-1/4	.500	—	—	74222
*1	1/2	3-1/4	.575	—	74122	—
*1	1/2	3-1/4	.866	74022	—	—

\*Steel Shank / Con mango de acero / Avec queue en acier / Mit Stahlschaft

## TOLERANCES (inch)

## 1/8-1/4 DIAMETER

DC = +0.0000/-0.0005

## 3/8-1 DIAMETER

DC = +0.003/-0.000

Included Angle +1°/-1°

## STEELS

## STAINLESS STEELS

## CAST IRON

## HIGH TEMP ALLOYS

## TITANIUM

## HARDENED STEELS

## NON-FERROUS

For patent  
information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

Series 601 Fractional	Hardness	Vc (sfm)	DC • in							
			1/8	3/16	1/4	3/8	1/2	3/4	1	
P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	125 (100-150)	RPM	3820	2547	1910	1273	955	637	478
		Fr	0.0005	0.0008	0.0010	0.0016	0.0021	0.0031	0.0042	
		Feed (ipm)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
	≤ 300 Bhn or ≤ 32 HRc	60 (48-72)	RPM	1834	1222	917	611	458	306	229
		Fr	0.0005	0.0007	0.0010	0.0015	0.0020	0.0029	0.0039	
		Feed (ipm)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	
M ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 425 Bhn or ≤ 45 HRc	45 (36-54)	RPM	1375	917	688	458	344	229	172
		Fr	0.0003	0.0004	0.0006	0.0009	0.0012	0.0017	0.0023	
		Feed (ipm)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
	≤ 275 Bhn or ≤ 28 HRc	95 (76-114)	RPM	2903	1935	1452	968	726	484	363
		Fr	0.0004	0.0007	0.0009	0.0013	0.0018	0.0027	0.0036	
		Feed (ipm)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 375 Bhn or ≤ 40 HRc	60 (48-72)	RPM	1834	1222	917	611	458	306	229
		Fr	0.0004	0.0007	0.0009	0.0013	0.0017	0.0026	0.0035	
		Feed (ipm)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
	≤ 450 Bhn or ≤ 48 HRc	35 (28-42)	RPM	1070	713	535	357	267	178	134
		Fr	0.0003	0.0004	0.0006	0.0008	0.0011	0.0017	0.0022	
		Feed (ipm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 250 Bhn or ≤ 24 HRc	53 (42-64)	RPM	1620	1080	810	540	405	270	202
		Fr	0.0003	0.0005	0.0006	0.0009	0.0012	0.0019	0.0025	
		Feed (ipm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	≤ 330 Bhn or ≤ 36 HRc	46 (37-55)	RPM	1406	937	703	469	351	234	176
		Fr	0.0002	0.0003	0.0004	0.0006	0.0009	0.0013	0.0017	
		Feed (ipm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
K CAST IRONS Gray, Malleable, Ductile	≤ 275 Bhn or ≤ 28 HRc	28 (22-34)	RPM	856	570	428	285	214	143	107
		Fr	0.0004	0.0005	0.0007	0.0011	0.0014	0.0021	0.0028	
		Feed (ipm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
	≤ 375 Bhn or ≤ 40 HRc	21 (17-25)	RPM	642	428	321	214	160	107	80
		Fr	0.0002	0.0002	0.0003	0.0005	0.0006	0.0009	0.0012	
		Feed (ipm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
K CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	105 (84-126)	RPM	3209	2139	1604	1070	802	535	401
		Fr	0.0006	0.0009	0.0012	0.0018	0.0024	0.0036	0.0047	
		Feed (ipm)	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
	≤ 330 Bhn or ≤ 36 HRc	75 (60-90)	RPM	2292	1528	1146	764	573	382	287
		Fr	0.0006	0.0009	0.0012	0.0018	0.0024	0.0037	0.0049	
		Feed (ipm)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	

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# FRACTIONAL Single Flute Countersink

Series 601 Fractional	Hardness	Vc (sfm)	DC • in						
			1/8	3/16	1/4	3/8	1/2	3/4	1
N  ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (180-270)	225 RPM	6876	4584	3438	2292	1719	1146	860
		Fr	0.0008	0.0011	0.0015	0.0023	0.0030	0.0045	0.0061
	≤ 150 Bhn or ≤ 7 HRc (152-228)	190 RPM	5806	3871	2903	1935	1452	968	726
		Fr	0.0008	0.0011	0.0015	0.0023	0.0030	0.0045	0.0061
	≤ 140 Bhn or ≤ 3 HRc (76-114)	95 RPM	2903	1935	1452	968	726	484	363
		Fr	0.0004	0.0006	0.0008	0.0011	0.0015	0.0023	0.0030
COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 200 Bhn or ≤ 23 HRc (64-96)	80 RPM	2445	1630	1222	815	611	407	306
		Fr	0.0004	0.0006	0.0008	0.0012	0.0016	0.0025	0.0033
	≤ 220 Bhn or ≤ 19 HRc (14-22)	18 RPM	550	367	275	183	138	92	69
		Fr	0.0002	0.0003	0.0004	0.0005	0.0007	0.0011	0.0015
	≤ 320 Bhn or ≤ 34 HRc (11-17)	14 RPM	428	285	214	143	107	71	53
		Fr	0.0002	0.0004	0.0005	0.0007	0.0009	0.0014	0.0019
S  SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 425 Bhn or ≤ 45 HRc (10-14)	12 RPM	367	244	183	122	92	61	46
		Fr	0.0003	0.0004	0.0005	0.0008	0.0011	0.0016	0.0022
	≤ 275 Bhn or ≤ 28 HRc (29-43)	36 RPM	1100	733	550	367	275	183	138
		Fr	0.0005	0.0007	0.0009	0.0014	0.0018	0.0027	0.0036
	≤ 350 Bhn or ≤ 38 HRc (22-34)	28 RPM	856	570	428	285	214	143	107
		Fr	0.0004	0.0005	0.0007	0.0011	0.0014	0.0021	0.0028
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 440 Bhn or ≤ 47 HRc (17-25)	21 RPM	642	428	321	214	160	107	80
		Fr	0.0002	0.0002	0.0003	0.0005	0.0006	0.0009	0.0012
	≤ 250 Bhn or ≤ 24 HRc (28-42)	35 RPM	1070	713	535	357	267	178	134
		Fr	0.0003	0.0004	0.0006	0.0008	0.0011	0.0017	0.0022
	≤ 375 Bhn or ≤ 40 HRc (20-30)	25 RPM	764	509	382	255	191	127	96
		Fr	0.0001	0.0002	0.0003	0.0004	0.0005	0.0008	0.0010
H  TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 475 Bhn or ≤ 50 HRc (16-24)	20 RPM	611	407	306	204	153	102	76
		Fr	0.0002	0.0002	0.0003	0.0005	0.0007	0.0010	0.0013
		Feed (ipm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

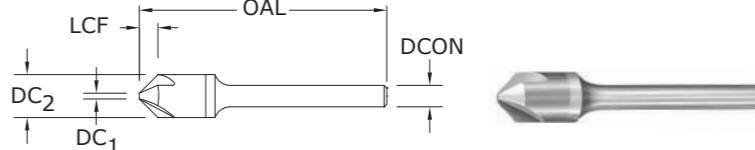
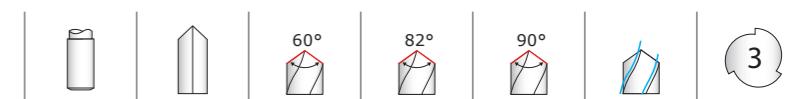
rpm = Vc x 3.82 / DC

ipm = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

# FRACTIONAL 3 Flute Countersink



603

FRACTIONAL SERIES

TOLERANCES (inch)	inch					EDP NO.		
	CUTTING DIAMETER DC <sub>2</sub>	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	TIP DIAMETER DC <sub>1</sub>	UNCOATED 60°	UNCOATED 82°	UNCOATED 90°
1/8-1/4 DIAMETER DC = +0.0000/-0.0005	1/8	1/8	1-1/2	.045	.040	—	—	74225
3/8-1 DIAMETER DC = +0.003/-0.000	1/8	1/8	1-1/2	.049	.040	—	74125	—
Included Angle +1°/-1°	1/8	1/8	1-1/2	.078	.035	74025	—	—
STEELS	3/16	3/16	2	.071	.060	—	—	74228
STAINLESS STEELS	3/16	3/16	2	.073	.060	—	74128	—
CAST IRON	3/16	3/16	2	.123	.045	74028	—	—
HIGH TEMP ALLOYS	1/4	1/4	2	.090	.100	—	—	74231
TITANIUM	1/4	1/4	2	.086	.100	—	74131	—
HARDENED STEELS	1/4	1/4	2	.156	.070	74031	—	—
NON-FERROUS	*3/8	1/4	2-13/16	.138	.108	—	—	74234
For patent information visit <a href="http://www.ksptpatents.com">www.ksptpatents.com</a>	*3/8	1/4	2-13/16	.154	.108	—	74134	—
	*3/8	1/4	2-13/16	.238	.100	74034	—	—
	*1/2	1/4	2-7/8	.194	.122	—	—	74237
	*1/2	1/4	2-7/8	.217	.122	—	74137	—
	*1/2	1/4	2-7/8	.335	.113	74037	—	—
	*5/8	3/8	3	.249	.138	—	—	74240
	*5/8	3/8	3	.280	.138	—	74140	—
	*5/8	3/8	3	.430	.128	74040	—	—
	*3/4	1/2	3	.304	.153	—	—	74243
	*3/4	1/2	3	.343	.153	—	74143	—
	*3/4	1/2	3	.526	.143	74043	—	—
	*1	1/2	3-1/4	.421	.168	—	—	74246
	*1	1/2	3-1/4	.479	.168	—	74146	—
	*1	1/2	3-1/4	.729	.158	74046	—	—

\*Steel Shank / Con mango de acero / Avec queue en acier / Mit Stahlschaft

NOTE: DC<sub>1</sub> dimension varies based on angle. Contact your KSPT representative or consult SGS Tool Wizard® for dimension information.

## FRACTIONAL

**3 Flute Countersink**

Series 603 Fractional	Hardness	Vc (sfm)	DC • in								
			1/8	3/16	1/4	3/8	1/2	3/4	1		
C	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc (100-150)	125	RPM	3820	2547	1910	1273	955	637	478
				Fr	0.0008	0.0012	0.0016	0.0024	0.0031	0.0047	0.0063
				Feed (ipm)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
		≤ 300 Bhn or ≤ 32 HRc (48-72)	60	RPM	1834	1222	917	611	458	306	229
				Fr	0.0007	0.0011	0.0014	0.0021	0.0028	0.0043	0.0057
				Feed (ipm)	1.3	1.3	1.3	1.3	1.3	1.3	1.3
		≤ 425 Bhn or ≤ 45 HRc (36-54)	45	RPM	1375	917	688	458	344	229	172
				Fr	0.0004	0.0007	0.0009	0.0013	0.0017	0.0026	0.0035
				Feed (ipm)	0.6	0.6	0.6	0.6	0.6	0.6	0.6
		≤ 275 Bhn or ≤ 28 HRc (76-114)	95	RPM	2903	1935	1452	968	726	484	363
				Fr	0.0007	0.0010	0.0014	0.0021	0.0028	0.0041	0.0055
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc (48-72)	60	RPM	1834	1222	917	611	458	306	229
				Fr	0.0007	0.0010	0.0013	0.0020	0.0026	0.0039	0.0052
				Feed (ipm)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
		≤ 450 Bhn or ≤ 48 HRc (28-42)	35	RPM	1070	713	535	357	267	178	134
				Fr	0.0004	0.0006	0.0007	0.0011	0.0015	0.0022	0.0030
				Feed (ipm)	0.4	0.4	0.4	0.4	0.4	0.4	0.4
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 250 Bhn or ≤ 24 HRc (42-64)	53	RPM	1620	1080	810	540	405	270	202
				Fr	0.0004	0.0006	0.0009	0.0013	0.0017	0.0026	0.0035
				Feed (ipm)	0.7	0.7	0.7	0.7	0.7	0.7	0.7
		≤ 330 Bhn or ≤ 36 HRc (37-55)	46	RPM	1406	937	703	469	351	234	176
				Fr	0.0004	0.0005	0.0007	0.0011	0.0014	0.0021	0.0028
				Feed (ipm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
		≤ 275 Bhn or ≤ 28 HRc (22-34)	28	RPM	856	570	428	285	214	143	107
				Fr	0.0005	0.0007	0.0009	0.0014	0.0019	0.0028	0.0037
				Feed (ipm)	0.4	0.4	0.4	0.4	0.4	0.4	0.4
		≤ 375 Bhn or ≤ 40 HRc (17-25)	21	RPM	642	428	321	214	160	107	80
K	CAST IRONS Gray, Malleable, Ductile			Fr	0.0002	0.0002	0.0003	0.0005	0.0006	0.0009	0.0012
				Feed (ipm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		≤ 220 Bhn or ≤ 19 HRc (84-126)	105	RPM	3209	2139	1604	1070	802	535	401
				Fr	0.0009	0.0014	0.0018	0.0027	0.0036	0.0054	0.0072
				Feed (ipm)	2.9	2.9	2.9	2.9	2.9	2.9	2.9

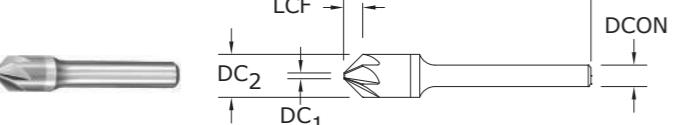
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Series 603 Fractional	Hardness	Vc (sfm)	DC • in								
			1/8	3/16	1/4	3/8	1/2	3/4	1		
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (180-270)	225	RPM	6876	4584	3438	2292	1719	1146	860
				Fr	0.0011	0.0017	0.0023	0.0034	0.0045	0.0068	0.0091
				Feed (ipm)	7.8	7.8	7.8	7.8	7.8	7.8	7.8
		≤ 150 Bhn or ≤ 7 HRc (152-228)	190	RPM	5806	3871	2903	1935	1452	968	726
				Fr	0.0011	0.0017	0.0022	0.0034	0.0045	0.0067	0.0090
				Feed (ipm)	6.5	6.5	6.5	6.5	6.5	6.5	6.5
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc (76-114)	95	RPM	2903	1935	1452	968	726	484	363
				Fr	0.0006	0.0009	0.0012	0.0018	0.0023	0.0035	0.0047
				Feed (ipm)	1.7	1.7	1.7	1.7	1.7	1.7	1.7
		≤ 200 Bhn or ≤ 23 HRc (64-96)	80	RPM	2445	1630	1222	815	611	407	306
				Fr	0.0006	0.0009	0.0011	0.0017	0.0023	0.0034	0.0046
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 220 Bhn or ≤ 19 HRc (14-22)	18	RPM	550	367	275	183	138	92	69
				Fr	0.0004	0.0005	0.0007	0.0011	0.0015	0.0022	0.0029
				Feed (ipm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		≤ 320 Bhn or ≤ 34 HRc (11-17)	14	RPM	428	285	214	143	107	71	53
				Fr	0.0002	0.0004	0.0005	0.0007	0.0009	0.0014	0.0019
				Feed (ipm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		≤ 425 Bhn or ≤ 45 HRc (10-14)	12	RPM	367	244	183	122	92	61	46
				Fr	0.0003	0.0004	0.0005	0.0008	0.0011	0.0016	0.0022
				Feed (ipm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		≤ 275 Bhn or ≤ 28 HRc (29-43)	36	RPM	1100	733	550	367	275	183	138
H	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 350 Bhn or ≤ 38 HRc (22-34)	28	RPM	856	570	428	285	214	143	107
				Fr	0.0006	0.0009	0.0012	0.0018	0.0023	0.0035	0.0047
				Feed (ipm)	0.5	0.5	0.5</				

## FRACTIONAL

**6 Flute Countersink****606**

FRACTIONAL SERIES



CUTTING DIAMETER DC <sub>2</sub>	SHANK DIAMETER DCON	OVERALL LENGTH OAL	FLUTE LENGTH LCF	TIP DIAMETER DC <sub>1</sub>	EDP NO.		
					UNCOATED 60°	UNCOATED 82°	UNCOATED 90°
1/8	1/8	1-1/2	.045	.035	—	—	74249
1/8	1/8	1-1/2	.052	.035	—	74149	—
1/8	1/8	1-1/2	.078	.035	74049	—	—
3/16	3/16	2	.071	.045	—	—	74252
3/16	3/16	2	.082	.045	—	74152	—
3/16	3/16	2	.123	.045	74052	—	—
1/4	1/4	2	.090	.070	—	—	74255
1/4	1/4	2	.104	.070	—	74155	—
1/4	1/4	2	.156	.070	74055	—	—
*3/8	1/4	2-13/16	.138	.100	—	—	74258
*3/8	1/4	2-13/16	.158	.100	—	74158	—
*3/8	1/4	2-13/16	.238	.100	74058	—	—
*1/2	1/4	2-7/8	.170	.160	—	—	74261
*1/2	1/4	2-7/8	.196	.160	—	74161	—
*1/2	1/4	2-7/8	.294	.160	74061	—	—
*5/8	3/8	3	.218	.190	—	—	74264
*5/8	3/8	3	.250	.190	—	74164	—
*5/8	3/8	3	.377	.190	74064	—	—
*3/4	1/2	3	.265	.220	—	—	74267
*3/4	1/2	3	.305	.220	—	74167	—
*3/4	1/2	3	.459	.220	74067	—	—
*1	1/2	3-1/4	.370	.260	—	—	74270
*1	1/2	3-1/4	.426	.260	—	74170	—
*1	1/2	3-1/4	.641	.260	74070	—	—

\*Steel Shank / Con mango de acero / Avec queue en acier / Mit Stahlschaft

NOTE: DC<sub>1</sub> dimension varies based on angle. Contact your KSPT representative or consult SGS Tool Wizard® for dimension information.

## TOLERANCES (inch)

## 1/8-1/4 DIAMETER

DC = +0.0000/-0.0005

## 3/8-1 DIAMETER

DC = +0.003/-0.000

Included Angle +1°/-1°

## STEELS

## STAINLESS STEELS

## CAST IRON

## HIGH TEMP ALLOYS

## TITANIUM

## NON-FERROUS

## HARDENED STEELS

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

Series 606 Fractional	Hardness	Vc (sfm)	DC • in							
			1/8	3/16	1/4	3/8	1/2	3/4	1	
P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	125 (100-150)	RPM	3820	2547	1910	1273	955	637	478
		Fr	0.0010	0.0016	0.0021	0.0031	0.0042	0.0063	0.0084	
		Feed (ipm)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
	≤ 300 Bhn or ≤ 32 HRc	60 (48-72)	RPM	1834	1222	917	611	458	306	229
		Fr	0.0010	0.0015	0.0020	0.0029	0.0039	0.0059	0.0079	
		Feed (ipm)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	
M ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 425 Bhn or ≤ 45 HRc	45 (36-54)	RPM	1375	917	688	458	344	229	172
		Fr	0.0006	0.0009	0.0012	0.0017	0.0023	0.0035	0.0047	
		Feed (ipm)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
	≤ 275 Bhn or ≤ 28 HRc	95 (76-114)	RPM	2903	1935	1452	968	726	484	363
		Fr	0.0009	0.0013	0.0018	0.0027	0.0036	0.0054	0.0072	
		Feed (ipm)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	
S STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 375 Bhn or ≤ 40 HRc	60 (48-72)	RPM	1834	1222	917	611	458	306	229
		Fr	0.0009	0.0014	0.0019	0.0028	0.0037	0.0056	0.0074	
		Feed (ipm)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	
	≤ 450 Bhn or ≤ 48 HRc	35 (28-42)	RPM	1070	713	535	357	267	178	134
		Fr	0.0006	0.0008	0.0011	0.0017	0.0022	0.0034	0.0045	
		Feed (ipm)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
K CAST IRONS Gray, Malleable, Ductile	(42-64)	Fr	0.0006	0.0009	0.0012	0.0019	0.0025	0.0037	0.0049	
	≤ 330 Bhn or ≤ 36 HRc	46 (37-55)	RPM	1406	937	703	469	351	234	176
		Fr	0.0005	0.0007	0.0010	0.0015	0.0020	0.0030	0.0040	
		Feed (ipm)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	
	≤ 275 Bhn or ≤ 28 HRc	28 (22-34)	RPM	856	570	428	285	214	143	107
		Fr	0.0007	0.0011	0.0014	0.0021	0.0028	0.0042	0.0056	
S SGS Solid Tools	≤ 375 Bhn or ≤ 40 HRc	21 (17-25)	RPM	642	428	321	214	160	107	80
		Fr	0.0003	0.0005	0.0006	0.0009	0.0012	0.0019	0.0025	
		Feed (IPM)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
	≤ 220 Bhn or ≤ 19 HRc	105 (84-126)	RPM	3209	2139	1604	1070	802	535	401
		Fr	0.0012	0.0018	0.0024	0.0036	0.0049	0.0073	0.0097	
		Feed (ipm)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	
S SGS Micro Tools	≤ 330 Bhn or ≤ 36 HRc	75 (60-90)	RPM	2292	1528	1146	764	573	382	287
		Fr	0.0012	0.0018	0.0024	0.0037	0.0049	0.0073	0.0098	
		Feed (ipm)	2.8	2.8	2.8	2.8	2.8	2.8	2.8	

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# 6 Flute Countersink

Series 606 Fractional	Hardness	Vc (sfm)	DC • in							
			1/8	3/16	1/4	3/8	1/2	3/4	1	
<b>N</b>  <b>ALUMINUM ALLOYS</b> 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (180-270)	225	RPM	6876	4584	3438	2292	1719	1146	860
			Fr	0.0015	0.0022	0.0030	0.0045	0.0060	0.0090	0.0120
			Feed (ipm)	10.3	10.3	10.3	10.3	10.3	10.3	10.3
	≤ 150 Bhn or ≤ 7 HRc (152-228)	190	RPM	5806	3871	2903	1935	1452	968	726
			Fr	0.0015	0.0022	0.0030	0.0045	0.0060	0.0090	0.0120
			Feed (ipm)	8.7	8.7	8.7	8.7	8.7	8.7	8.7
<b>COPPER ALLOYS</b> Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc (76-114)	95	RPM	2903	1935	1452	968	726	484	363
			Fr	0.0008	0.0011	0.0015	0.0023	0.0030	0.0045	0.0061
			Feed (ipm)	2.2	2.2	2.2	2.2	2.2	2.2	2.2
	≤ 200 Bhn or ≤ 23 HRc (64-96)	80	RPM	2445	1630	1222	815	611	407	306
			Fr	0.0008	0.0012	0.0016	0.0023	0.0031	0.0047	0.0062
			Feed (ipm)	1.9	1.9	1.9	1.9	1.9	1.9	1.9
<b>S</b>  <b>SUPER ALLOYS</b> (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 220 Bhn or ≤ 19 HRc (14-22)	18	RPM	550	367	275	183	138	92	69
			Fr	0.0005	0.0008	0.0011	0.0016	0.0022	0.0033	0.0044
			Feed (ipm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	≤ 320 Bhn or ≤ 34 HRc (11-17)	14	RPM	428	285	214	143	107	71	53
			Fr	0.0005	0.0007	0.0009	0.0014	0.0019	0.0028	0.0037
			Feed (ipm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 425 Bhn or ≤ 45 HRc (10-14)	12	RPM	367	244	183	122	92	61	46
			Fr	0.0003	0.0004	0.0005	0.0008	0.0011	0.0016	0.0022
			Feed (ipm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	≤ 275 Bhn or ≤ 28 HRc (29-43)	36	RPM	1100	733	550	367	275	183	138
			Fr	0.0009	0.0014	0.0018	0.0027	0.0036	0.0055	0.0073
			Feed (ipm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0

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Series 606 Fractional	Hardness	Vc (sfm)	DC • in							
			1/8	3/16	1/4	3/8	1/2	3/4	1	
<b>H</b>  <b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc (28-42)	35	RPM	1070	713	535	357	267	178	134
			Fr	0.0006	0.0008	0.0011	0.0017	0.0022	0.0034	0.0045
			Feed (ipm)	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	≤ 375 Bhn or ≤ 40 HRc (20-30)	25	RPM	764	509	382	255	191	127	96
			Fr	0.0003	0.0004	0.0005	0.0008	0.0010	0.0016	0.0021
			Feed (ipm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>S</b>  <b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 475 Bhn or ≤ 50 HRc (16-24)	20	RPM	611	407	306	204	153	102	76
			Fr	0.0003	0.0005	0.0007	0.0010	0.0013	0.0020	0.0026
			Feed (ipm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

rpm = Vc x 3.82 / DC

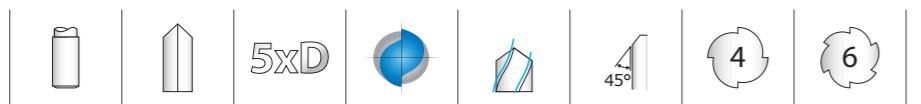
ipm = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

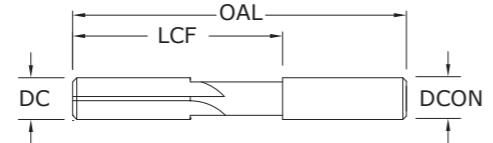
# 6 Flute Countersink

# Straight Flute Accu-Reamer



200

FRACTIONAL SERIES



inch					
CUTTING DIAMETER DC	SHANK DIAMETER DCON	MAXIMUM REAM LENGTH LCF	OVERALL LENGTH OAL	NO. OF FLUTES	EDP NO.
UNCOATED					
3/64	3/64	3/4	1-1/2	4	70003
1/16	1/16	3/4	1-1/2	4	70004
5/64	5/64	1	2	4	70005
3/32	3/32	1-1/4	2-1/4	4	70006
7/64	7/64	1-1/4	2-1/4	4	70007
1/8	1/8	1-1/4	2-1/4	4	70008
9/64	9/64	1-1/2	2-1/2	4	70009
5/32	5/32	1-1/2	2-1/2	4	70010
11/64	11/64	1-3/4	2-3/4	4	70011
3/16	3/16	1-3/4	2-3/4	4	70012
13/64	13/64	2	3	4	70013
7/32	7/32	2	3	4	70014
15/64	15/64	2	3	4	70015
1/4	1/4	2	3	4	70016
17/64	17/64	2-1/4	3-1/4	6	70017
9/32	9/32	2-1/4	3-1/4	6	70018
19/64	19/64	2-1/4	3-1/4	6	70019
5/16	5/16	2-1/4	3-1/4	6	70020
21/64	21/64	2-3/8	3-1/2	6	70021
11/32	11/32	2-3/8	3-1/2	6	70022
23/64	23/64	2-3/8	3-1/2	6	70023
3/8	3/8	2-3/8	3-1/2	6	70024
25/64	25/64	2-7/8	4	6	70025
13/32	13/32	2-7/8	4	6	70026
27/64	27/64	2-7/8	4	6	70027
7/16	7/16	2-7/8	4	6	70028
29/64	29/64	2-7/8	4	6	70029
15/32	15/32	2-7/8	4	6	70030
31/64	31/64	2-7/8	4	6	70031
1/2	1/2	2-7/8	4	6	70032

continued on next page

## TOLERANCES (inch)

DC = +0.0002/-0.0000  
DCON = +0.0002/-0.0000

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

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

## TOLERANCES (inch)

DC = +0.0002/-0.0000  
DCON = +0.0002/-0.0000

inch					
CUTTING DIAMETER DC	SHANK DIAMETER DCON	MAXIMUM REAM LENGTH LCF	OVERALL LENGTH OAL	NO. OF FLUTES	
.0470 - .0625	1/16	3/4	1-1/2	4	
.0626 - .0781	5/64	1	2	4	
.0782 - .0938	3/32	1-1/4	2-1/4	4	
.0939 - .1094	7/64	1-1/4	2-1/4	4	
.1095 - .1250	1/8	1-1/4	2-1/4	4	
.1251 - .1406	9/64	1-1/2	2-1/2	4	
.1407 - .1562	5/32	1-1/2	2-1/2	4	
.1563 - .1719	11/64	1-3/4	2-3/4	4	
.1720 - .1875	3/16	1-3/4	2-3/4	4	
.1876 - .2031	13/64	2	3	4	
.2032 - .2188	7/32	2	3	4	
.2189 - .2344	15/64	2	3	4	
.2345 - .2500	1/4	2	3	4	
.2501 - .2656	17/64	2-1/4	3-1/4	6	
.2657 - .2812	9/32	2-1/4	3-1/4	6	
.2813 - .2969	19/64	2-1/4	3-1/4	6	
.2970 - .3125	5/16	2-1/4	3-1/4	6	
.3126 - .3281	21/64	2-3/8	3-1/2	6	
.3282 - .3438	11/32	2-3/8	3-1/2	6	
.3439 - .3594	23/64	2-3/8	3-1/2	6	
.3595 - .3750	3/8	2-3/8	3-1/2	6	
.3751 - .3906	25/64	2-7/8	4	6	
.3907 - .4062	13/32	2-7/8	4	6	
.4063 - .4219	27/64	2-7/8	4	6	
.4220 - .4375	7/16	2-7/8	4	6	
.4376 - .4531	29/64	2-7/8	4	6	
.4532 - .4688	15/32	2-7/8	4	6	
.4689 - .4844	31/64	2-7/8	4	6	
.4845 - .5000	1/2	2-7/8	4	6	

200

FRACTIONAL SERIES



CONTINUED

SER 200 Fractional reamers can be ordered to specific diameters according to the size range of Cutting Diameter DC. Please order as:

- 200. Then the size of the cut diameter in fractional format.
- i.e. 200.0492
- Description: Series 200 size 0.0492
- For Metric sizes convert to fractional inches (i.e.  $\div 25.4$ )
- The above sample would be a 1.25mm size ( $1.25 \div 25.4 = 0.0492"$ )

All other dimensions are fractional as per table including the Shank

# Straight Flute Accu-Reamer

Series 200 Fractional	Hardness	Vc (sfm)	DC • in							
			1/16	1/8	3/16	1/4	5/16	3/8	1/2	
P	≤ 175 Bhn or ≤ 7 HRc (120-180)	150	RPM	9168	4584	3056	2292	1834	1528	1146
	Fr	0.0018	0.0035	0.0053	0.0071	0.0088	0.0106	0.0141		
	Feed (ipm)	16.5	16.0	16.2	16.3	16.1	16.2	16.2		
	75	RPM	4584	2292	1528	1146	917	764	573	
	Fr	0.0016	0.0031	0.0047	0.0062	0.0078	0.0093	0.0124		
	Feed (ipm)	7.3	7.1	7.2	7.1	7.2	7.1	7.1		
	55	RPM	3362	1681	1121	840	672	560	420	
	Fr	0.0009	0.0019	0.0028	0.0037	0.0046	0.0056	0.0074		
	Feed (ipm)	3.0	3.2	3.1	3.1	3.1	3.1	3.1		
	115	RPM	7029	3514	2343	1757	1406	1171	879	
ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Fr	0.0015	0.0030	0.0045	0.0060	0.0075	0.0090	0.0120		
	Feed (ipm)	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
	70	RPM	4278	2139	1426	1070	856	713	535	
	Fr	0.0015	0.0030	0.0045	0.0060	0.0075	0.0090	0.0120		
	Feed (ipm)	6.4	6.4	6.4	6.4	6.4	6.4	6.4		
	45	RPM	2750	1375	917	688	550	458	344	
	Fr	0.0009	0.0019	0.0028	0.0037	0.0046	0.0056	0.0074		
	Feed (ipm)	2.5	2.6	2.6	2.5	2.5	2.6	2.5		
	75	RPM	4584	2292	1528	1146	917	764	573	
	Fr	0.0010	0.0020	0.0029	0.0039	0.0049	0.0059	0.0078		
M	Feed (ipm)	4.6	4.6	4.4	4.5	4.5	4.5	4.5		
	55	RPM	3362	1681	1121	840	672	560	420	
	Fr	0.0008	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060		
	Feed (ipm)	2.7	2.5	2.6	2.5	2.6	2.5	2.5		
	35	RPM	2139	1070	713	535	428	357	267	
	Fr	0.0010	0.0020	0.0029	0.0039	0.0049	0.0059	0.0078		
	Feed (ipm)	2.1	2.1	2.1	2.1	2.1	2.1	2.1		
	25	RPM	1528	764	509	382	306	255	191	
	Fr	0.0006	0.0013	0.0019	0.0025	0.0031	0.0038	0.0050		
	Feed (ipm)	0.9	1.0	1.0	1.0	0.9	1.0	1.0		
K	125	RPM	7640	3820	2547	1910	1528	1273	955	
	Fr	0.0020	0.0040	0.0060	0.0081	0.0101	0.0121	0.0161		
	Feed (ipm)	15.3	15.3	15.3	15.5	15.4	15.4	15.4		
	95	RPM	5806	2903	1935	1452	1161	968	726	
	Fr	0.0020	0.0040	0.0060	0.0081	0.0101	0.0121	0.0161		
	Feed (ipm)	11.6	11.6	11.6	11.8	11.7	11.7	11.7		
	270	RPM	16502	8251	5501	4126	3300	2750	2063	
	Fr	0.0025	0.0050	0.0075	0.0100	0.0125	0.0150	0.0200		
	Feed (ipm)	41.3	41.3	41.3	41.3	41.3	41.3	41.3		
	230	RPM	14058	7029	4686	3514	2812	2343	1757	
N	Fr	0.0025	0.0050	0.0075	0.0100	0.0125	0.0150	0.0200		
	35.1	Feed (ipm)	35.1	35.1	35.1	35.1	35.1	35.1		
	115	RPM	7029	3514	2343	1757	1406	1171	879	
	Fr	0.0013	0.0026	0.0038	0.0051	0.0064	0.0077	0.0102		
	Feed (ipm)	9.1	9.1	8.9	9.0	9.0	9.0	9.0		
	95	RPM	5806	2903	1935	1452	1161	968	726	
	Fr	0.0013	0.0026	0.0038	0.0051	0.0064	0.0077	0.0102		
	7.5	Feed (ipm)	7.5	7.5	7.4	7.4	7.4	7.4		
	200	RPM	5806	2903	1935	1452	1161	968	726	
	Fr	0.0013	0.0026	0.0038	0.0051	0.0064	0.0077	0.0102		

continued on next page

# Fractional Straight Flute Accu-Reamer

Series 200 Fractional	Hardness	Vc (sfm)	DC • in							
			1/16	1/8	3/16	1/4	5/16	3/8	1/2	
S	≤ 220 Bhn or ≤ 19 HRc (16-24)	20	RPM	1222	611	407	306	244	204	153
	Fr	0.0008	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060		
	Feed (ipm)	1.0	0.9	0.9	0.9	0.9	0.9	0.9		
	15	RPM	917	458	306	229	183	153	115	
	Fr	0.0006	0.0013	0.0019	0.0025	0.0031	0.0038	0.0050		
	Feed (ipm)	0.6	0.6	0.6	0.6	0.6	0.6	0.6		
	≤ 320 Bhn or ≤ 34 HRc (12-18)	10	RPM	611	306	204	153	122	102	76
	Fr	0.0004	0.0007	0.0011	0.0015	0.0018	0.0022	0.0029		
	Feed (ipm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2		
	45	RPM	2750	1375	917	688	550	458	344	
H	≤ 275 Bhn or ≤ 28 HRc (36-54)	40	RPM	2445	1222	815	611	489	407	306
	Fr	0.0010	0.0020	0.0029	0.0039	0.0049	0.0059	0.0078		
	Feed (ipm)	2.4	2.4	2.4	2.4	2.4	2.4	2.4		
	25	RPM	1528	764	509	382	306	255	191	
	Fr	0.0006	0.0013	0.0019	0.0025	0.0031	0.0038	0.0050		
	Feed (ipm)	0.9	1.0	1.0	1.0	0.9	1.0	1.0		
	≤ 250 Bhn or ≤ 24 HRc (32-48)	20	RPM	1222	611	407	306	244	204	153
	Fr									

# Straight Flute Reamer

**201M**

METRIC SERIES



CUTTING DIAMETER DC	SHANK DIAMETER DCON	MAXIMUM REAM LENGTH LCF	OVERALL LENGTH OAL	NO. OF FLUTES	EDP NO.	UNCOATED
1,0	1,0	6,0	32,0	4	81001	
1,5	1,5	9,5	38,0	4	81003	
2,0	2,0	12,7	44,0	4	81005	
2,5	2,5	12,7	50,0	4	81007	
3,0	3,0	16,0	57,0	4	81009	
3,5	3,5	19,0	63,0	4	81011	
4,0	4,0	19,0	63,0	4	81013	
4,5	4,5	22,0	70,0	4	81015	
5,0	5,0	25,0	75,0	4	81017	
5,5	5,5	25,0	75,0	4	81019	
6,0	6,0	25,0	75,0	4	81021	
7,0	7,0	28,0	82,0	6	81023	
8,0	8,0	28,0	82,0	6	81025	
9,0	9,0	31,0	89,0	6	81027	
10,0	10,0	31,0	89,0	6	81029	

## TOLERANCES (mm)

## 1-6 DIAMETER

DC = +0,008/-0,000

## &gt;6-10 DIAMETER

DC = +0,010/-0,000

## STEELS

## STAINLESS STEELS

## CAST IRON

## HIGH TEMP ALLOYS

## TITANIUM

## NON-FERROUS

## HARDENED STEELS

For patent information visit  
[www.ksptpatents.com](http://www.ksptpatents.com)

Series 201M Metric	Hardness	Vc (m/min)	DC • mm							
			1	2	3	4	6	8	10	
P	≤ 175 Bhn or ≤ 7 HRc (37-55)	46	RPM	14541	7271	4847	3635	2424	1818	1454
			Fr	0.028	0.056	0.085	0.113	0.169	0.226	0.282
			Feed (mm/min)	410	410	410	410	410	410	410
	≤ 300 Bhn or ≤ 32 HRc (18-27)	23	RPM	7271	3635	2424	1818	1212	909	727
			Fr	0.025	0.050	0.074	0.099	0.149	0.198	0.248
			Feed (mm/min)	180	180	180	180	180	180	180
	≤ 425 Bhn or ≤ 45 HRc (13-20)	17	RPM	5332	2666	1777	1333	889	666	533
			Fr	0.015	0.030	0.044	0.059	0.089	0.119	0.148
			Feed (mm/min)	79	79	79	79	79	79	79
	≤ 275 Bhn or ≤ 28 HRc (28-42)	35	RPM	11148	5574	3716	2787	1858	1394	1115
			Fr	0.024	0.048	0.072	0.096	0.144	0.192	0.240
			Feed (mm/min)	268	268	268	268	268	268	268
ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc (17-26)	21	RPM	6786	3393	2262	1696	1131	848	679
			Fr	0.024	0.048	0.072	0.096	0.144	0.192	0.240
			Feed (mm/min)	163	163	163	163	163	163	163
	≤ 450 Bhn or ≤ 48 HRc (11-16)	14	RPM	4362	2181	1454	1091	727	545	436
			Fr	0.015	0.030	0.045	0.060	0.089	0.119	0.149
			Feed (mm/min)	65	65	65	65	65	65	65
	≤ 250 Bhn or ≤ 24 HRc (18-27)	23	RPM	7271	3635	2424	1818	1212	909	727
			Fr	0.015	0.030	0.045	0.059	0.089	0.119	0.149
			Feed (mm/min)	108	108	108	108	108	108	108
	≤ 330 Bhn or ≤ 36 HRc (13-20)	17	RPM	5332	2666	1777	1333	889	666	533
M	≤ 275 Bhn or ≤ 28 HRc (9-13)	11	RPM	3393	1696	1131	848	565	424	339
			Fr	0.015	0.029	0.044	0.059	0.088	0.118	0.147
			Feed (mm/min)	50	50	50	50	50	50	50
	≤ 375 Bhn or ≤ 40 HRc (6-9)	8	RPM	2424	1212	808	606	404	303	242
			Fr	0.010	0.020	0.030	0.040	0.059	0.079	0.099
			Feed (mm/min)	24	24	24	24	24	24	24
	≤ 220 Bhn or ≤ 19 HRc (30-46)	38	RPM	12118	6059	4039	3029	2020	1515	1212
			Fr	0.032	0.064	0.097	0.129	0.193	0.257	0.322
			Feed (mm/min)	390	390	390	390	390	390	390
	≤ 330 Bhn or ≤ 36 HRc (23-35)	29	RPM	9209	4605	3070	2302	1535	1151	921
K	CAST IRONS Gray, Malleable, Ductile		Fr	0.032	0.064	0.096	0.128	0.192	0.256	0.320
			Feed (mm/min)	295	295	295	295	295	295	295

continued on next page

# Straight Flute Reamer

# Straight Flute Reamer

Series 201M Metric	Hardness	Vc (m/min)	DC • mm						
			1	2	3	4	6	8	10
N  ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb (66-99)	82 RPM Fr Feed (mm/min)	26174 0.040 1047	13087 0.080 1047	8725 0.120 1047	6544 0.160 1047	4362 0.240 1047	3272 0.320 1047	2617 0.400 1047
	≤ 150 Bhn or ≤ 7 HRc (56-84)	70 RPM Fr Feed (mm/min)	22297 0.040 892	11148 0.080 892	7432 0.120 892	5574 0.160 892	3716 0.240 892	2787 0.320 892	2230 0.400 892
	≤ 140 Bhn or ≤ 3 HRc (28-42)	35 RPM Fr Feed (mm/min)	11148 0.020 227	5574 0.041 227	3716 0.061 227	2787 0.081 227	1858 0.122 227	1394 0.163 227	1115 0.204 227
	≤ 200 Bhn or ≤ 23 HRc (23-35)	29 RPM Fr Feed (mm/min)	9209 0.020 188	4605 0.041 188	3070 0.061 188	2302 0.082 188	1535 0.122 188	1151 0.163 188	921 0.204 188
	≤ 220 Bhn or ≤ 19 HRc (5-7)	6 RPM Fr Feed (mm/min)	1939 0.012 23	969 0.024 23	646 0.036 23	485 0.047 23	323 0.071 23	242 0.095 23	194 0.119 23
	≤ 320 Bhn or ≤ 34 HRc (4-5)	5 RPM Fr Feed (mm/min)	1454 0.010 15	727 0.021 15	485 0.031 15	364 0.041 15	242 0.062 15	182 0.083 15	145 0.103 15
S  SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 425 Bhn or ≤ 45 HRc (2-4)	3 RPM Fr Feed (mm/min)	969 0.006 6	485 0.012 6	323 0.019 6	242 0.025 6	162 0.037 6	121 0.050 6	97 0.062 6
	≤ 275 Bhn or ≤ 28 HRc (11-16)	14 RPM Fr Feed (mm/min)	4362 0.024 105	2181 0.048 105	1454 0.072 105	1091 0.096 105	727 0.144 105	545 0.193 105	436 0.241 105
	≤ 350 Bhn or ≤ 38 HRc (9-13)	11 RPM Fr Feed (mm/min)	3393 0.015 50	1696 0.029 50	1131 0.044 50	848 0.059 50	565 0.088 50	424 0.118 50	339 0.147 50
	≤ 440 Bhn or ≤ 47 HRc (6-9)	8 RPM Fr Feed (mm/min)	2424 0.010 24	1212 0.020 24	808 0.030 24	606 0.040 24	404 0.059 24	303 0.079 24	242 0.099 24

continued on next page

Series 201M Metric	Hardness	Vc (m/min)	DC • mm						
			1	2	3	4	6	8	10
H  TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc (10-15)	12 RPM Fr Feed (mm/min)	3878 0.015 60	1939 0.031 60	1293 0.046 60	969 0.062 60	646 0.093 60	485 0.124 60	388 0.155 60
	≤ 375 Bhn or ≤ 40 HRc (6-9)	8 RPM Fr Feed (mm/min)	2424 0.010 24	1212 0.020 24	808 0.030 24	606 0.040 24	404 0.059 24	303 0.079 24	242 0.099 24
	≤ 475 Bhn or ≤ 50 HRc (5-7)	6 RPM Fr Feed (mm/min)	1939 0.006 12	969 0.012 12	646 0.019 12	485 0.025 12	323 0.037 12	242 0.050 12	194 0.062 12
	≤ 655 Bhn or ≤ 60 HRc (3-5)	4 RPM Fr Feed (mm/min)	1272 0.006 8	636 0.013 8	424 0.019 8	318 0.025 8	212 0.038 8	159 0.050 8	127 0.063 8

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

rpm = (Vc x 1000) / (DC x 3.14)

mm/min = Fr x rpm

increase speed and feed 30 percent when using coated reamers

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information ([www.kyocera-sgstoold.com](http://www.kyocera-sgstoold.com))

# Straight Flute Reamer

## VALUE AT THE SPINDLE<sup>®</sup>

### Routers



### Routing

Please put "S" at the beginning of all page numbers below.

HIGH PERFORMANCE ROUTERS	SERIES	DESCRIPTION	PAGE
Carbon Composite	20-CCR	Multi-Flute Carbon Composite Fractional	338
	20M-CCR	Multi-Flute Carbon Composite Metric	338
	20-CCR-LHC	Multi-Flute Carbon Composite Left Hand Cut Fractional	339
	20M-CCR-LHC	Multi-Flute Carbon Composite Left Hand Cut Metric	339
Coarse Cut Carbon Composite	31-CCR	Multi-Flute Coarse Composite Fractional	342
	31M-CCR	Multi-Flute Coarse Composite Metric	342
Compression	25	Multi-Flute Compression Fractional	345
	25M	Multi-Flute Compression Metric	345

GENERAL PURPOSE ROUTERS	SERIES	DESCRIPTION	PAGE
Up Cut	21	2 Flute Up Cut Fractional	348
	21M	2 Flute Up Cut Metric	348
Down Cut	22	2 Flute Down Cut Fractional	349
	22M	2 Flute Down Cut Metric	349

*Speed & Feed Recommendations listed after each series*

## Ranurado

Please put "S" at the beginning of all page numbers below.

RANURADORES DE ALTO RENDIMIENTO	SERIE	DESCRIPCIÓN	PÁGINA
Compuesto de carbono	20-CCR	Filo múltiple, compuesto de carbono, fraccional	338
	20M-CCR	Filo múltiple, compuesto de carbono, métrico	338
	20-CCR-LHC	Filo múltiple, carbon composite corte hélice izquierda fraccional	339
	20M-CCR-LHC	Filo múltiple, carbo composite corte hélice izquierda métrico	339
Compuesto de carbono de corte grueso	31-CCR	Filo múltiple, compuesto grueso, fraccional	342
	31M-CCR	Filo múltiple, compuesto grueso, métrico	342
Compresión	25	Filo múltiple, compresión, fraccional	345
	25M	Filo múltiple, compresión, métrico	345
RANURADORES DE USO GENERAL	SERIE	DESCRIPCIÓN	PÁGINA
Corte ascendente	21	2 filos, corte ascendente, fraccional	348
	21M	2 filos, corte ascendente, métrico	348
Corte descendente	22	2 filos, corte descendente, fraccional	349
	22M	2 filos, corte descendente, métrico	349

Recomendaciones de velocidades y avances mostradas tras cada serie

## Détourage

Please put "S" at the beginning of all page numbers below.

FRAISES A DETOURER HAUTE PERFORMANCE	SÉRIES	DESCRIPTION	PAGE
Composites carbone	20-CCR	Multi-dents pour composites carbone (fractionnel)	338
	20M-CCR	Multi-dents pour composites carbone (métrique)	338
	20-CCR-LHC	Multi-dents carbon composite coupe à gauche (fractionnel)	339
	20M-CCR-LHC	Multi-dents carbon composite coupe à gauche (métrique)	339
Pour composites carbone coupe grossière	31-CCR	Multi-dents pour composites grossiers (fractionnel)	342
	31M-CCR	Multi-dents pour composites grossiers (métrique)	342
Compression	25	Multi-dents de compression (fractionnel)	345
	25M	Multi-dents de compression (métrique)	345
FRAISES À DÉTOURER UNIVERSELLES	SÉRIES	DESCRIPTION	PAGE
Coupe ascendante	21	2 dents coupe ascendante (fractionnel)	348
	21M	2 dents coupe ascendante (métrique)	348
Coupe descendante	22	2 dents coupe descendante (fractionnel)	349
	22M	2 dents coupe descendante (métrique)	349

Recommendations de vitesse et avance indiquées après chaque série

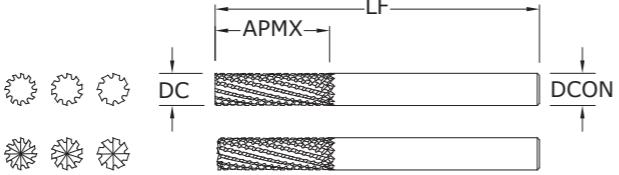
## Konturenfräsen

Please put "S" at the beginning of all page numbers below.

HOCHLEISTUNGS-KONTURENFRÄSER	SERIE	BESCHREIBUNG	SEITE
Kohlefaserbundwerkstoff	20-CCR	Zölliger Konturenfräser für Kohlefaserbundwerkstoff	338
	20M-CCR	Konturenfräser für Kohlefaserbundwerkstoff	338
	20-CCR-LHC	Mehrschneider Carbon Composite Links geschnittene zöllig	339
	20M-CCR-LHC	Mehrschneider Carbon Composite Links geschnittene metrisch	339
Grobschnitt Kohlefaserbundwerkstoff	31-CCR	Zölliger Konturenfräser für Verbundkunststoff	342
	31M-CCR	Konturenfräser für Verbundkunststoff	342
Gegenläufiger Drall	25	Zölliger Gegenläufiger Konturenfräser	345
	25M	Gegenläufiger Konturenfräser	345
STANDARD-KONTURENFRÄSER	SERIE	BESCHREIBUNG	SEITE
Rechtsspirale	21	Zölliger VHM-Fräser mit 2 Schneiden (ziehend)	348
	21M	VHM-Fräser mit 2 Schneiden (ziehend)	348
Linksspirale	22	Zölliger VHM-Fräser mit 2 Schneiden (drückend)	349
	22M	VHM-Fräser mit 2 Schneiden (drückend)	349

*Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie*

## FRACTIONAL &amp; METRIC

**Carbon Composite****20-CCR**  
FRACTIONAL SERIES

- Multi-flute design and positive geometry to shear with minimal pressure and delamination
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	NO. OF FLUTES	END STYLE	EDP NO.	
						UNCOATED	Di-NAMITE® (Diamond)
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

## TOLERANCES (inch)

DC = +.000/-0.005  
DCON = h<sub>6</sub>

## PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

FRACTIONAL & METRIC  
**Carbon Composite****20-CCR-LHC**  
FRACTIONAL SERIES

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	NO. OF FLUTES	END STYLE	EDP NO.	
						UNCOATED	Di-NAMITE® (Diamond)
1/4	1	2-1/2	1/4	8	No End Cutting	73070	73078
1/4	1	2-1/2	1/4	8	End Cutting	73071	73079
5/16	1	2-1/2	5/16	10	No End Cutting	73072	73080
5/16	1	2-1/2	5/16	10	End Cutting	73073	73081
3/8	1-1/8	2-1/2	3/8	12	No End Cutting	73074	73082
3/8	1-1/8	2-1/2	3/8	12	End Cutting	73075	73083

## TOLERANCES (inch)

DC = +.000/-0.005  
DCON = h<sub>6</sub>

## PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

- Multi-flute design and positive geometry to shear with minimal pressure and delamination
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

**20M-CCR**  
METRIC SERIES

## SGS Micro Tools

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	NO. OF FLUTES	END STYLE	EDP NO.	
						UNCOATED	Ti-NAMITE-B (TiB <sub>2</sub> )
2,0	6,0	38,0	3,0	5	End Cutting	82930	83100
3,0	10,0	38,0	3,0	5	End Cutting	82931	83101
4,0	12,0	50,0	4,0	5	End Cutting	82932	83102
5,0	15,0	50,0	6,0	5	End Cutting	82933	83103
6,0	25,0	63,0	6,0	8	No End Cutting	82966	83104
6,0	25,0	63,0	6,0	8	End Cutting	82967	83105
8,0	25,0	63,0	8,0	10	No End Cutting	82968	83106
8,0	25,0	63,0	8,0	10	End Cutting	82969	83107
10,0	28,0	63,0	10,0	12	No End Cutting	82970	83108
10,0	28,0	63,0	10,0	12	End Cutting	82971	83109
12,0	38,0	89,0	12,0	12	No End Cutting	82972	83110
12,0	38,0	89,0	12,0	12	End Cutting	82973	83043

## TOLERANCES (mm)

DC = +0,000/-0,130  
DCON = h<sub>6</sub>

## PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

## TOLERANCES (mm)

DC = +0,000/-0,130  
DCON = h<sub>6</sub>

## PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	NO. OF FLUTES	END STYLE	EDP NO.	
						UNCOATED	Di-NAMITE® (Diamond)
6,0	25,0	63,0	6,0	8	No End Cutting	83220	83230
6,0	25,0	63,0	6,0	8	End Cutting	83221	83231
8,0	25,0	63,0	8,0	10	No End Cutting	83222	83232
8,0	25,0	63,0	8,0	10	End Cutting	83223	83233
10,0	28,0	63,0	10,0	12	No End Cutting	83224	83234
10,0	28,0	63,0	10,0	12	End Cutting	83225	83235

- Multi-flute design and positive geometry to shear with minimal pressure and delamination
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

# FRACTIONAL Carbon Composite

Series 20 Fractional			Vc (sfm)	DC • in					
	Ae x DC	Ap x DC		1/4	5/16	3/8	1/2		
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot 	1	≤ 1	400 (320-480)	RPM	6112	4890	4075	3056
		Fr	0.0049	0.0094	0.0135	0.0180			
		Feed (ipm)	30	46	55	55			
	Profile 	≤ 0.5	≤ 1.5	500 (400-600)	RPM	7640	6112	5093	3820
		Fr	0.0049	0.0094	0.0135	0.0180			
		Feed (ipm)	38	58	69	69			
	HSM 	≤ 0.05	≤ 2	825 (660-990)	RPM	12606	10085	8404	6303
		Fr	0.0111	0.0215	0.0309	0.0413			
		Feed (ipm)	140	217	260	260			
GFRP (FIBERGLASS)	Slot 	1	≤ 1	320 (256-384)	RPM	4890	3912	3260	2445
		Fr	0.0049	0.0095	0.0135	0.0180			
		Feed (ipm)	24	37	44	44			
	Profile 	≤ 0.5	≤ 1.5	400 (320-480)	RPM	6112	4890	4075	3056
		Fr	0.0049	0.0095	0.0135	0.0180			
		Feed (ipm)	30	46	55	55			
	HSM 	≤ 0.05	≤ 2	660 (528-792)	RPM	10085	8068	6723	5042
		Fr	0.0110	0.0214	0.0311	0.0414			
		Feed (ipm)	111	173	209	209			
CARBON, GRAPHITE	Slot 	1	≤ 1	480 (384-576)	RPM	7334	5868	4890	3667
		Fr	0.0064	0.0124	0.0180	0.0240			
		Feed (ipm)	47	73	88	88			
	Profile 	≤ 0.5	≤ 1.5	600 (480-720)	RPM	9168	7334	6112	4584
		Fr	0.0064	0.0124	0.0180	0.0240			
		Feed (ipm)	59	91	110	110			
	HSM 	≤ 0.05	≤ 2	990 (792-1188)	RPM	15127	12102	10085	7564
		Fr	0.0147	0.0287	0.0412	0.0549			
		Feed (ipm)	223	347	415	415			
PLASTICS	Slot 	1	≤ 1	665 (640-690)	RPM	10161	8129	6774	5081
		Fr	0.0077	0.0150	0.0217	0.0241			
		Feed (ipm)	78	122	147	147			
	Profile 	≤ 0.5	≤ 1.5	1000 (800-1200)	RPM	15280	12224	10187	7640
		Fr	0.0077	0.0150	0.0217	0.0241			
		Feed (ipm)	118	183	221	184			
	HSM 	≤ 0.05	≤ 2	1650 (1320-1980)	RPM	25212	20170	16808	12606
		Fr	0.0147	0.0287	0.0413	0.0551			
		Feed (ipm)	370	579	694	694			

HSM (high speed machining)  
rpm = Vc x 3.82 / DC

ipm = Fr x rpm

adjust parameters based on resin type and fiber structure

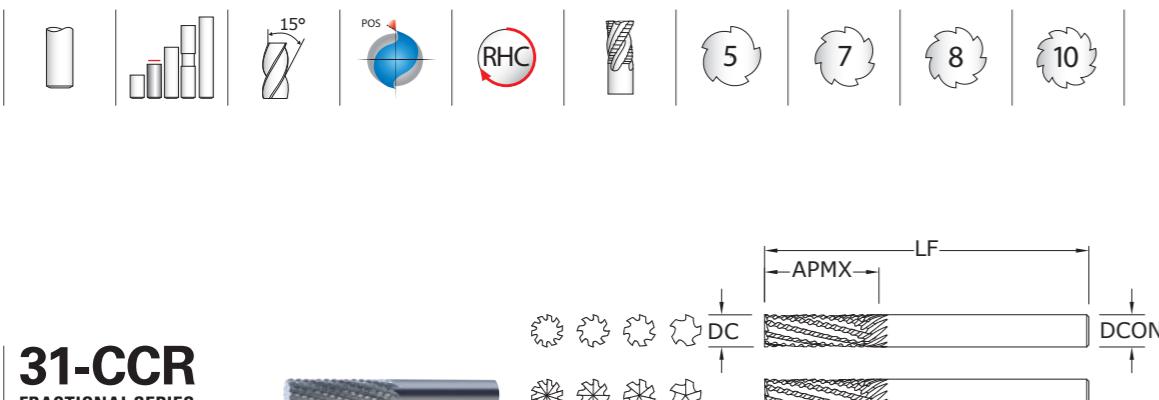
reduce speed when overheating causes melting or damage to resin

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 SGS Tool Wizard® for complete technical information  
(www.kyocera-sgstool.com)

Series 20M Metric			Vc (m/min)	DC • mm						
	Ae x DC	Ap x DC		3	6	8	10	12		
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot 	1	≤ 1	120 (96-164)	RPM	12722	6361	4771	3817	3181
		Fr	0.055	0.113	0.243	0.366	0.439			
		Feed (mm/min)	700	720	1160	1395	1395			
	Profile 	≤ 0.5	≤ 1.5	150 (120-180)	RPM	15903	7951	5963	4771	3976
		Fr	0.055	0.113	0.243	0.366	0.439			
		Feed (mm/min)	875	900	1450	1744	1744			
	HSM 	≤ 0.05	≤ 2	250 (200-300)	RPM	26504	13252	9939	7951	6626
		Fr	0.126	0.260	0.556	0.833	1.000			
		Feed (mm/min)	3350	3450	5527	6625	6625			
GFRP (FIBERGLASS)	Slot 	1	≤ 1	100 (80-120)	RPM	10602	5301	3976	3181	2650
		Fr	0.054	0.111	0.236	0.357	0.428			
		Feed (mm/min)	570	587	940	1135	1135			
	Profile 	≤ 0.5	≤ 1.5	120 (96-164)	RPM	12722	6361	4771	3817	3181
		Fr	0.054	0.111	0.236	0.357	0.428			
		Feed (mm/min)	684	704	1128	1362	1362			
	HSM 	≤ 0.05	≤ 2	200 (160-240)	RPM	21203	10602	7951	6361	5301
		Fr	0.124	0.261	0.557	1.011	1.213			
		Feed (mm/min)	2629	2765	4430	6430	6430			
CARBON, GRAPHITE	Slot 	1	≤ 1	145 (116-174)	RPM	15372	7686	5765	4612	3843
		Fr	0.069	0.152	0.323	0.482	0.579			
		Feed (mm/min)	1061	1165	1860	2224	2224			
	Profile 	≤ 0.5	≤ 1.5	185 (148-222)	RPM	19613	9807	7355	5884	4903
		Fr	0.069	0.152	0.323	0.482	0.579			
		Feed (mm/min)	1353	1486	2373	2838	2838			
	HSM 	≤ 0.05	≤ 2	300 (240-360)	RPM	31805	15903	11927	9542	7951
		Fr	0.159	0.348	0.740	1.109	1.331			
		Feed (mm/min)	5057	5535	8820	10580	10580			
PLASTICS	Slot 	1	≤ 1	245 (196-294)	RPM	25974	12987	9		

## FRACTIONAL

**Coarse Cut Carbon Composite****31-CCR**

## FRACTIONAL SERIES

- Fewer, deeper flutes to prevent clogging in heavy routing
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

**31M-CCR**

## METRIC SERIES

- Fewer, deeper flutes to prevent clogging in heavy routing
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics



## FRACTIONAL

**Coarse Cut Carbon Composite**

	Series 31 Fractional	Vc (sfm)	DC • in					
			Ae x DC	Ap x DC	1/4	5/16	3/8	1/2
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot	400	RPM	6112	4890	4075	3056	
	1	≤ 1	(320-480)	Fr	0.0029	0.0065	0.0088	0.0147
	Profile	500	RPM	7640	6112	5093	3820	
GFRP (FIBERGLASS)	HSM	825	RPM	12606	10085	8404	6303	
	1	≤ 0.05	(660-990)	Fr	0.0069	0.0151	0.0206	0.0344
	Slot	320	RPM	4890	3912	3260	2445	
CARBON, GRAPHITE	Profile	400	RPM	6112	4890	4075	3056	
	1	≤ 0.5	(320-480)	Fr	0.0031	0.0066	0.0089	0.0147
	HSM	660	RPM	10085	8068	6723	5042	
PLASTICS	1	≤ 0.05	(528-792)	Fr	0.0069	0.0150	0.0205	0.0343
	Slot	480	RPM	7334	5868	4890	3667	
	Profile	600	RPM	9168	7334	6112	4584	
PLASTICS/COMPOSITES	HSM	990	RPM	15127	12102	10085	7564	
	1	≤ 0.5	(792-1188)	Fr	0.0092	0.0201	0.0275	0.0459
	Slot	800	RPM	12224	9779	8149	6112	
CARBON, GRAPHITE	Profile	1000	RPM	15280	12224	10187	7640	
	1	≤ 1	(640-690)	Fr	0.0040	0.0087	0.0119	0.0200
	HSM	1650	RPM	25212	20170	16808	12606	
PLASTICS/COMPOSITES	1	≤ 0.5	(1320-1980)	Fr	0.0092	0.0201	0.0275	0.0459
	Slot	800	RPM	12224	9779	8149	6112	
	Profile	1000	RPM	15280	12224	10187	7640	
PLASTICS	HSM	1650	RPM	25212	20170	16808	12606	
	1	≤ 0.5	(1320-1980)	Fr	0.0092	0.0201	0.0275	0.0459
	Slot	800	RPM	12224	9779	8149	6112	

HSM (high speed machining)

rpm =  $V_c \times 3.82 / DC$ ipm =  $Fr \times rpm$ 

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

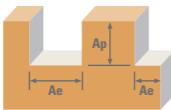
dust collection is vital when machining dry

diamond coating will increase tool life in graphite and composite materials

refer to the SGS Tool Wizard® for complete technical information

(www.kyocera-sgstoold.com)

# Coarse Cut Carbon Composite

Series  
31M  
Metric

Ae x DC

Ap x DC

Vc  
(m/min)

DC • mm

		6	8	10	12
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CFRP, AFRP  
(CARBON FIBER,  
ARAMID FIBER)

Slot	1	$\leq 1$	120 (96-164)	RPM	6361	4771	3817	3181
				Fr	0.071	0.170	0.244	0.366
				Feed (mm/min)	450	810	930	1165
Profile	$\leq 0.5$	$\leq 1.5$	150 (120-180)	RPM	7951	5963	4771	3976
				Fr	0.071	0.170	0.244	0.366
				Feed (mm/min)	563	1013	1163	1456
HSM	$\leq 0.05$	$\leq 2$	250 (200-300)	RPM	13252	9939	7951	6626
				Fr	0.162	0.388	0.555	0.832
				Feed (mm/min)	2150	3860	4415	5515

GFRP  
(FIBERGLASS)

Slot	1	$\leq 1$	100 (80-120)	RPM	5301	3976	3181	2650
				Fr	0.069	0.165	0.237	0.357
				Feed (mm/min)	365	655	755	945
Profile	$\leq 0.5$	$\leq 1.5$	120 (96-164)	RPM	6361	4771	3817	3181
				Fr	0.069	0.165	0.237	0.357
				Feed (mm/min)	438	786	906	1134
HSM	$\leq 0.05$	$\leq 2$	200 (160-240)	RPM	10602	7951	6361	5301
				Fr	0.163	0.390	0.557	0.834
				Feed (mm/min)	1725	3100	3540	4420

N

CARBON, GRAPHITE

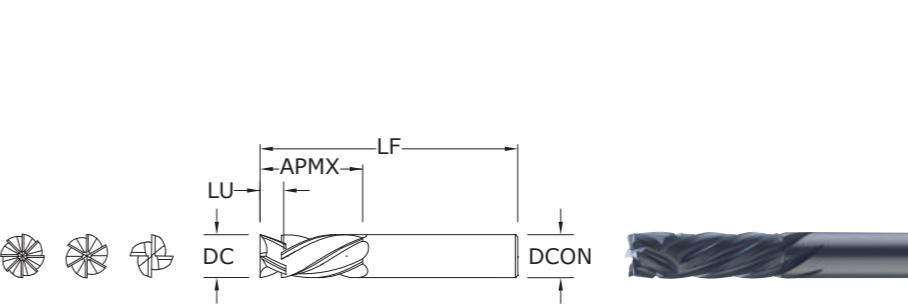
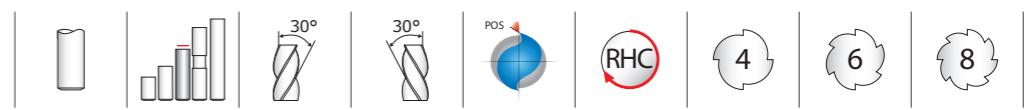
Slot	1	$\leq 1$	145 (116-174)	RPM	7686	5765	4612	3843
				Fr	0.095	0.226	0.321	0.483
				Feed (mm/min)	728	1300	1480	1855
Profile	$\leq 0.5$	$\leq 1.5$	185 (148-222)	RPM	9807	7355	5884	4903
				Fr	0.095	0.226	0.321	0.483
				Feed (mm/min)	929	1659	1888	2367
HSM	$\leq 0.05$	$\leq 2$	300 (240-360)	RPM	15903	11927	9542	7951
				Fr	0.217	0.517	0.739	1.111
				Feed (mm/min)	3450	6170	7050	8830

PLASTICS

Slot	1	$\leq 1$	245 (196-294)	RPM	12987	9740	7792	6494
				Fr	0.094	0.223	0.318	0.477
				Feed (mm/min)	1215	2175	2475	3100
Profile	$\leq 0.5$	$\leq 1.5$	305 (244-366)	RPM	16168	12126	9701	8084
				Fr	0.094	0.223	0.318	0.477
				Feed (mm/min)	1513	2708	3081	3859
HSM	$\leq 0.05$	$\leq 2$	505 (404-606)	RPM	26769	20077	16062	13385
				Fr	0.215	0.512	0.731	1.098
				Feed (mm/min)	5760	10280	11745	14700

HSM (high speed machining)  
rpm =  $(V_c \times 1000) / (DC \times 3.14)$ mm/min = Fr 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 occurfinish 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 SGS Tool Wizard® for complete technical information  
(www.kyocera-sgstool.com)

# FRACTIONAL & METRIC Compression



25

FRACTIONAL SERIES

## TOLERANCES (inch)

DC = +.000/-003  
DCON = h6

PLASTICS/COMPOSITES

For patent  
information visit  
www.ksptpatents.com

inch

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	INTERSECT LENGTH LU	NO. OF FLUTES	EDP NO.
1/4	1	2-1/2	1/4	11/64	4	72970 72971
5/16	1	2-1/2	5/16	7/32	4	72972 72973
3/8	1-1/8	2-1/2	3/8	17/64	6	72974 72975
1/2	1-1/2	3-1/2	1/2	23/64	8	72976 72977

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

## TOLERANCES (mm)

DC = +0,000/-0,080  
DCON = h6

PLASTICS/COMPOSITES

For patent  
information visit  
www.ksptpatents.com

CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	INTERSECT LENGTH LU	NO. OF FLUTES	EDP NO.
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

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

25M

METRIC SERIES

# FRACTIONAL Compression

Series 25 Fractional	Ae x DC	Ap x DC	Vc (sfm)	DC • in				
				1/4	5/16	3/8	1/2	
CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Profile 	≤ 0.5	≤ 1.5	500 (400-600)	RPM 7640 Fz 0.0016 Feed (ipm) 49	6112 0.0030 73	5093 0.0040 122	3820 0.0048 147
	HSM 	≤ 0.05	≤ 2	825 (660-990)	RPM 12606 Fz 0.0037 Feed (ipm) 187	10085 0.0069 278	8404 0.0092 464	6303 0.0110 555
	Profile 	≤ 0.5	≤ 1.5	400 (320-480)	RPM 6112 Fz 0.0016 Feed (ipm) 39	4890 0.0030 59	4075 0.0040 98	3056 0.0048 117
	HSM 	≤ 0.05	≤ 2	660 (528-792)	RPM 10085 Fz 0.0037 Feed (ipm) 149	8068 0.0069 223	6723 0.0092 371	5042 0.0110 444
GFRP (FIBERGLASS)	Profile 	≤ 0.5	≤ 1.5	600 (480-720)	RPM 9168 Fz 0.0020 Feed (ipm) 73	7334 0.0038 111	6112 0.0050 183	4584 0.0060 220
	HSM 	≤ 0.05	≤ 2	990 (792-1188)	RPM 15127 Fz 0.0046 Feed (ipm) 278	12102 0.0086 416	10085 0.0115 696	7564 0.0138 835
	Profile 	≤ 0.5	≤ 1.5	1000 (800-1200)	RPM 15280 Fz 0.0020 Feed (ipm) 122	12224 0.0038 186	10187 0.0050 306	7640 0.0060 367
	HSM 	≤ 0.05	≤ 2	1650 (1320-1980)	RPM 25212 Fz 0.0046 Feed (ipm) 464	20170 0.0086 694	16808 0.0115 1160	12606 0.0138 1392
CARBON, GRAPHITE	Profile 	≤ 0.5	≤ 1.5	50 (40-60)	RPM 764 Fz 0.0008 Feed (ipm) 2.4	611 0.0015 3.7	509 0.0020 6.1	382 0.0024 7.3
	HSM 	≤ 0.05	≤ 2	85 (68-102)	RPM 1299 Fz 0.0018 Feed (ipm) 9.4	1039 0.0034 14.1	866 0.0046 23.9	649 0.0055 28.6
	Profile 	≤ 0.5	≤ 1.5	85 (68-102)	RPM 1299 Fz 0.0018 Feed (ipm) 9.4	1039 0.0034 14.1	866 0.0046 23.9	649 0.0055 28.6
	HSM 	≤ 0.05	≤ 2	85 (68-102)	RPM 1299 Fz 0.0018 Feed (ipm) 9.4	1039 0.0034 14.1	866 0.0046 23.9	649 0.0055 28.6
MACHINABLE CERAMICS MACHINABLE GLASS								

HSM (high speed machining)  
rpm = Vc x 3.82 / DC

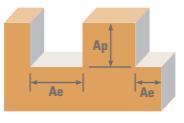
ipm = Fz x number of flutes x rpm

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  
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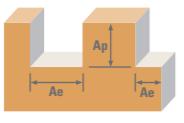


# METRIC Compression

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

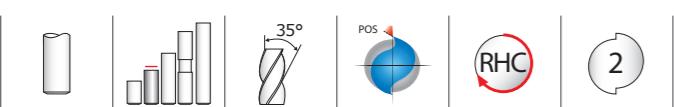
HSM (high speed machining)  
rpm = (Vc x 1000) / (DC x 3.14)  
mm/min = Fz x number of flutes x rpm  
adjust parameters based on resin type and fiber structure  
reduce speed when overheating causes melting or damage to resin  
reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths  
rates shown are for use without coolant; rates may be increased with coolant  
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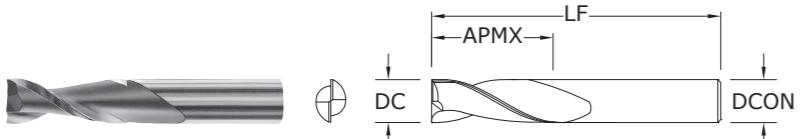


## FRACTIONAL &amp; METRIC

## Up Cut

**21**

FRACTIONAL SERIES



inch					EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	
1/8	1/2	2	1/4	90001	
5/32	5/8	2-1/2	1/4	90005	
3/16	3/4	2-1/2	1/4	90009	
1/4	3/4	2-1/2	1/4	90013	
1/4	1	2-1/2	1/4	90017	
5/16	1	2-1/2	5/16	90021	
5/16	1	3	1/2	90025	
3/8	1	2-1/2	3/8	90029	
3/8	1-1/4	3	1/2	90033	
1/2	1-1/4	3	1/2	90037	
1/2	1-1/2	3-1/2	1/2	90041	
1/2	2	4	1/2	90045	
5/8	2	4-1/2	5/8	90049	
3/4	2	4-1/2	3/4	90053	

## TOLERANCES (inch)

DC = +.000/-0.003  
DCON = h<sub>6</sub>

PLASTICS/COMPOSITES

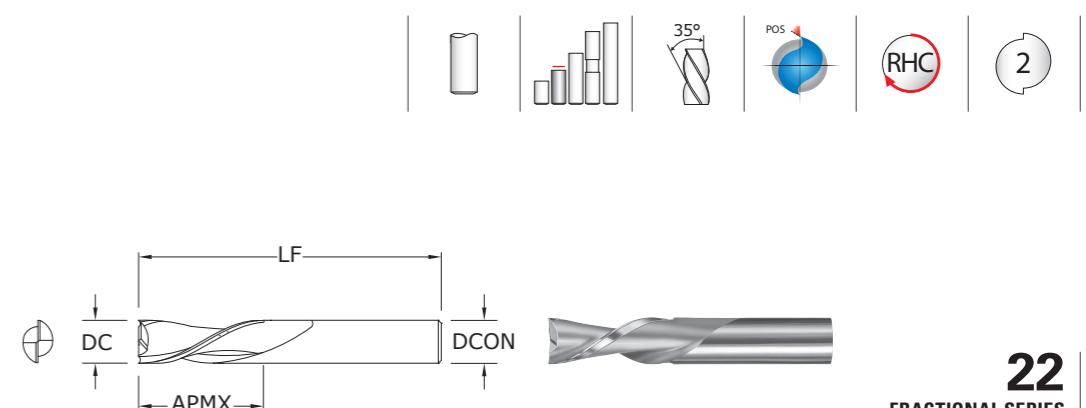
For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

## TOLERANCES (inch)

DC = +.000/-0.003  
DCON = h<sub>6</sub>

PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

**22**

FRACTIONAL SERIES

inch					EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	
1/8	1/2	2	1/4	91001	
5/32	5/8	2-1/2	1/4	91005	
3/16	3/4	2-1/2	1/4	91009	
1/4	3/4	2-1/2	1/4	91013	
1/4	1	2-1/2	1/4	91017	
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3/8	1	2-1/2	3/8	91029	
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1/2	1-1/2	3-1/2	1/2	91041	
1/2	2	4	1/2	91045	
5/8	2	4-1/2	5/8	91049	
3/4	2	4-1/2	3/4	91053	

## 21M

METRIC SERIES

mm					EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	
3,0	13,0	50,0	6,0	90101	
4,0	16,0	63,0	6,0	90107	
5,0	19,0	63,0	6,0	90109	
6,0	25,0	63,0	6,0	90113	
8,0	25,0	63,0	8,0	90121	
10,0	31,0	75,0	10,0	90129	
12,0	31,0	75,0	12,0	90137	

## TOLERANCES (mm)

DC = +0,000/-0,080  
DCON = h<sub>6</sub>

PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

## TOLERANCES (mm)

DC = +0,000/-0,080  
DCON = h<sub>6</sub>

PLASTICS/COMPOSITES

For patent information visit [www.ksptpatents.com](http://www.ksptpatents.com)

mm					EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	
3,0	13,0	50,0	6,0	91101	
4,0	16,0	63,0	6,0	91107	
5,0	19,0	63,0	6,0	91109	
6,0	25,0	63,0	6,0	91113	
8,0	25,0	63,0	8,0	91121	
10,0	31,0	75,0	10,0	91129	
12,0	31,0	75,0	12,0	91137	

## 22M

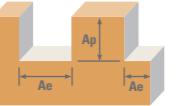
METRIC SERIES

mm					EDP NO.
CUTTING DIAMETER DC	LENGTH OF CUT APMX	OVERALL LENGTH LF	SHANK DIAMETER DCON	UNCOATED	
3,0	13,0	50,0	6,0	91101	
4,0	16,0	63,0	6,0	91107	
5,0	19,0	63,0	6,0	91109	
6,0	25,0	63,0	6,0	91113	
8,0	25,0	63,0	8,0	91121	
10,0	31,0	75,0	10,0	91129	
12,0	31,0	75,0	12,0	91137	

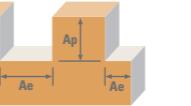
## SGS Micro Tools

S349

# FRACTIONAL Up Cut Down Cut

Series 21, 22 Fractional				Vc (sfm)	DC • in					
		Ae x DC	Ap x DC		1/8	1/4	3/8	1/2	3/4	
HARDWOODS	Slot	1	≤ 1	1550 (1240-1860)	RPM Fz	47368 0.0008	23684 0.0015	15789 0.0025	11842 0.0030	7895 0.0045
	Profile	≤ 0.5	≤ 1.5	1550 (1240-1860)	RPM Fz	47368 0.0008	23684 0.0015	15789 0.0025	11842 0.0030	7895 0.0045
	Slot	1	≤ 1	1950 (1560-2340)	RPM Fz	59592 0.0010	29796 0.0020	19864 0.0030	14898 0.0035	9932 0.0055
	Profile	≤ 0.5	≤ 1.5	1950 (1560-2340)	RPM Fz	59592 0.0010	29796 0.0020	19864 0.0030	14898 0.0035	9932 0.0055
SOFTWOODS	Slot	1	≤ 1	1950 (1560-2340)	RPM Fz	59592 0.0013	29796 0.0025	19864 0.0040	14898 0.0050	9932 0.0075
	Profile	≤ 0.5	≤ 1.5	1950 (1560-2340)	RPM Fz	59592 0.0013	29796 0.0025	19864 0.0040	14898 0.0050	9932 0.0075
	Slot	1	≤ 1	1950 (1560-2340)	RPM Feed (ipm)	59592 155	29796 149	19864 159	14898 149	9932 149
	Profile	≤ 0.5	≤ 1.5	1950 (1560-2340)	RPM Feed (ipm)	59592 155	29796 149	19864 159	14898 149	9932 149
PLYWOODS	Slot	1	≤ 1	1950 (1560-2340)	RPM Fz	59592 0.0013	29796 0.0025	19864 0.0040	14898 0.0050	9932 0.0075
	Profile	≤ 0.5	≤ 1.5	1950 (1560-2340)	RPM Fz	59592 0.0013	29796 0.0025	19864 0.0040	14898 0.0050	9932 0.0075
	Slot	1	≤ 1	1950 (1560-2340)	RPM Feed (ipm)	59592 95	29796 101	19864 99	14898 104	9932 99
	Profile	≤ 0.5	≤ 1.5	1950 (1560-2340)	RPM Feed (ipm)	59592 95	29796 101	19864 99	14898 104	9932 99
N PLASTICS	Slot	1	≤ 1	1950 (1560-2340)	RPM Fz	59592 0.0008	29796 0.0017	19864 0.0025	14898 0.0035	9932 0.0050
	Profile	≤ 0.5	≤ 1.5	1950 (1560-2340)	RPM Fz	59592 0.0008	29796 0.0017	19864 0.0025	14898 0.0035	9932 0.0050
	Slot	1	≤ 1	1950 (1560-2340)	RPM Feed (ipm)	59592 95	29796 101	19864 99	14898 104	9932 99
	Profile	≤ 0.5	≤ 1.5	1950 (1560-2340)	RPM Feed (ipm)	59592 95	29796 101	19864 99	14898 104	9932 99

rpm =  $V_c \times 3.82 / DC$   
ipm =  $F_z \times 2 \times rpm$

Series 21M, 22M Metric				Vc (m/min)	DC • mm					
		Ae x DC	Ap x DC		3	6	10	12	20	
HARDWOODS	Slot	1	≤ 1	470 (376-564)	RPM Fz	49828 0.020	24914 0.040	14948 0.065	12457 0.075	7474 0.115
	Profile	≤ 0.5	≤ 1.5	470 (376-564)	RPM Fz	49828 0.020	24914 0.040	8155 0.065	4241 0.075	1509 0.115
	Slot	1	≤ 1	600 (480-720)	RPM Feed (mm/min)	31805 3181	19083 3181	15903 2862	9542 2672	9542 2672
	Profile	≤ 0.5	≤ 1.5	600 (480-720)	RPM Feed (mm/min)	63610 3181	31805 3181	19083 2862	15903 84971	303467 84971
SOFTWOODS	Slot	1	≤ 1	600 (480-720)	RPM Fz	63610 0.025	31805 0.050	19083 0.075	15903 0.090	9542 0.140
	Profile	≤ 0.5	≤ 1.5	600 (480-720)	RPM Fz	63610 0.025	31805 0.050	19083 0.075	15903 0.090	303467 0.140
	Slot	1	≤ 1	600 (480-720)	RPM Feed (mm/min)	3817 4135	4135 3817	3976 3976	3626 3626	9542 3626
	Profile	≤ 0.5	≤ 1.5	600 (480-720)	RPM Feed (mm/min)	63610 3817	31805 4135	19083 3817	15903 3976	303467 115318
PLYWOODS	Slot	1	≤ 1	600 (480-720)	RPM Fz	63610 0.030	31805 0.065	19083 0.100	15903 0.125	9542 0.190
	Profile	≤ 0.5	≤ 1.5	600 (480-720)	RPM Fz	63610 0.030	31805 0.065	19083 0.100	15903 0.125	303467 0.190
	Slot	1	≤ 1	600 (480-720)	RPM Feed (mm/min)	2544 2481	2544 2481	2862 2862	2385 2385	9542 2385
	Profile	≤ 0.5	≤ 1.5	600 (480-720)	RPM Feed (mm/min)	63610 2544	31805 2544	19083 2481	15903 2862	9542 2385
N PLASTICS	Slot	1	≤ 1	600 (480-720)	RPM Fz	63610 0.020	31805 0.040	19083 0.065	15903 0.090	9542 0.125
	Profile	≤ 0.5	≤ 1.5	600 (480-720)	RPM Fz	63610 0.020	31805 0.040	19083 0.065	15903 0.090	9542 0.125

rpm =  $(V_c \times 1000) / (DC \times 3.14)$   
mm/min =  $F_z \times 2 \times rpm$

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74509.....	85	74597.....	85	77185.....	82	77273.....	83	82968.....	338	90017.....	348	91352.....	.10

## Decimal Equivalents

Fraction • Number • Letter • Metric Sizes

INCH	METRIC	DECIMAL EQUIVALENT	INCH	METRIC	DECIMAL EQUIVALENT	INCH	METRIC	DECIMAL EQUIVALENT	INCH	METRIC	DECIMAL EQUIVALENT	INCH	METRIC	DECIMAL EQUIVALENT	INCH	METRIC	DECIMAL EQUIVALENT	INCH	METRIC	DECIMAL EQUIVALENT		
–	0,10	0.0039	–	1,60	0.0630	9/64	3,57	0.1406	#1	5,79	0.2280	R	8,61	0.3390	–	13,00	0.5118	–	67	—	401	58
–	0,20	0.0079	#52	1,61	0.0635	–	3,60	0.1417	–	5,80	0.2283	–	8,70	0.3425	33/64	13,10	0.5156	70	—	126	432	63
–	0,25	0.0098	–	1,65	0.0650	#27	3,66	0.1440	–	5,90	0.2323	11/32	8,73	0.3438	17/32	13,49	0.5312	73	—	132	448	65
–	0,30	0.0118	#51	1,70	0.0669	–	3,70	0.1457	15/64	5,95	0.2344	–	8,75	0.3445	–	13,50	0.5315	75	—	136	455	66
#80	0,34	0.0135	–	1,75	0.0689	#26	3,73	0.1470	15/64	5,95	0.2344	–	8,80	0.3465	35/64	13,89	0.5469	77	—	140	463	67
–	0,35	0.0138	#50	1,78	0.0700	–	3,75	0.1476	–	6,00	0.2362	S	8,84	0.3480	–	14,00	0.5512	80	—	147	479	69
#79	0,37	0.0145	–	1,80	0.0709	#25	3,80	0.1495	B	6,05	0.2380	–	8,90	0.3504	9/16	14,29	0.5625	82	—	153	494	72
1/64	0,40	0.0156	#49	1,85	0.0728	–	3,80	0.1496	–	6,10	0.2402	–	9,00	0.3543	–	14,50	0.5709	84	—	159	525	76
#78	0,41	0.0160	–	1,90	0.0748	#24	3,86	0.1520	C	6,15	0.2420	T	9,09	0.3580	37/64	14,68	0.5781	86	—	165	540	78
–	0,45	0.0177	#48	1,93	0.0760	–	3,90	0.1535	–	6,20	0.2441	–	9,10	0.3583	–	15,00	0.5906	89	—	177	556	81
#77	0,46	0.0180	–	1,95	0.0768	#23	3,91	0.1540	D	6,25	0.2461	23/64	9,13	0.3594	19/32	15,08	0.5938	91	—	186	602	88
–	0,50	0.0197	5/64	1,98	0.0781	5/32	3,97	0.1562	–	6,30	0.2480	–	9,20	0.3622	39/64	15,48	0.6094	93	—	197	632	92
#76	0,51	0.0200	#47	1,99	0.0785	#22	3,99	0.1570	E	6,35	0.2500	–	9,25	0.3642	–	15,50	0.6102	96	—	216	664	97
#75	0,53	0.0210	–	2,00	0.0787	–	4,00	0.1575	1/4	6,35	0.2500	–	9,30	0.3661	5/8	15,88	0.6250	97	—	223	695	101
–	0,55	0.0217	–	2,05	0.0807	#21	4,04	0.1590	–	6,40	0.2520	U	9,35	0.3680	–	16,00	0.6299	98	21	230	756	110
#74	0,57	0.0225	#46	2,06	0.0810	#20	4,09	0.1610	–	6,50	0.2559	–	9,40	0.3701	41/64	16,27	0.6406	–	22	236	772	112
–	0,60	0.0236	#45	2,08	0.0820	–	4,10	0.1614	F	6,53	0.2570	–	9,50	0.3740	–	16,50	0.6496	–	23	242	787	114
#73	0,61	0.0240	–	2,10	0.0827	–	4,20	0.1654	–	6,60	0.2598	3/8	9,53	0.3750	21/32	16,67	0.6562	–	24	248	818	118
#72	0,64	0.0250	–	2,15	0.0846	#19	4,22	0.1660	G	6,63	0.2610	V	9,56	0.3770	–	17,00	0.6693	–	25	254	849	123
–	0,65	0.0256	#44	2,18	0.0860	–	4,25	0.1673	–	6,70	0.2638	–	9,60	0.3780	43/64	17,07	0.6719	–	27	266	865	125
#71	0,66	0.0260	–	2,20	0.0866	–	4,30	0.1693	17/64	6,75	0.2656	–	9,70	0.3819	11/16	17,46	0.6875	–	28	272	895	130
–	0,70	0.0276	–	2,25	0.0886	#18	4,31	0.1695	H	6,76	0.2660	–	9,75	0.3839	–	17,50	0.6890	–	29	278	911	132
#70	0,71	0.0280	#43	2,26	0.0890	11/64	4,37	0.1719	–	6,80	0.2677	W	9,80	0.3858	45/64	17,86	0.7031	–	30	284	942	136
#69	0,74	0.0292	–	2,30	0.0906	#17	4,39	0.1730	–	6,90	0.2717	–	9,90	0.3898	–	18,00	0.7087	–	31	293	973	141
–	0,75	0.0295	–	2,35	0.0925	–	4,40	0.1732	I	6,91	0.2720	25/64	9,92	0.3906	23/32	18,26	0.7188	–	32	302	988	143
#68	0,79	0.0310	#42	2,37	0.0935	#16	4,50	0.1770	–	7,00	0.2756	–	10,00	0.3937	–	18,50	0.7283	–	33	310	1019	147
1/32	0,79	0.0313	3/32	2,38	0.0938	–	4,50	0.1772	J	7,04	0.2770	X	10,08	0.3970	47/64	18,65	0.7344	–	34	319	1050	152
–	0,80	0.0315	–	2,40	0.0945	#15	4,57	0.1800	–	7,10	0.2795	–	10,10	0.3976	–	19,00	0.7480	–	35	328	1096	159
#67	0,81	0.0320	#41	2,44	0.0960	–	4,60	0.1811	K	7,14	0.2810	–	10,20	0.4016	3/4	19,05	0.7500	–	37	345	1127	163
#66	0,84	0.0330	–	2,45	0.0965	#14	4,62	0.1820	9/32	7,14	0.2812	Y	10,26	0.4040	49/64	19,45	0.7656	–	38	353	1158	168
–	0,85	0.0335	#40	2,50	0.0984	#13	4,70	0.1850	–	7,20	0.2835	–	10,30	0.4055	–	19,50	0.7677	–	39	362	1189	172
#65	0,89	0.0350	#39	2,53	0.0995	–	4,75	0.1870	–	7,25	0.2854	13/32	10,32	0.4062	25/32	19,84	0.7812	–	40	370	1235	179
–	0,90	0.0354	#38	2,58	0.1015	3/16	4,76	0.1875	–	7,30	0.2874	–	10,40	0.4094	–	20,00	0.7874	–	41	381	1266	183
#64	0,91	0.0360	–	2,60	0.1024	#12	4,80	0.1890	L	7,37	0.2900	Z	10,49	0.4130	51/64	20,24	0.7969	–	42	391	1312	190
#63	0,94	0.0370	#37	2,64	0.1040	#11	4,85	0.1910	–	7,40	0.2913	–	10,50	0.4134	–	20,50	0.8071	–	44	411	1359	197
–	0,95	0.03																				



VALUE AT THE SPINDLE®

## Micro Tool Catalog



*New Expanded Offering*

**[www.sgsmicrotools.com](http://www.sgsmicrotools.com)**

ISO 9001:2015 Certified

KYOCERA SGS Precision Tools (KSPT) is an ISO-certified manufacturer of industry leading round solid carbide cutting tools. State of the art manufacturing and warehouse facilities have the capacity and processes to meet the quality and delivery demands of customers in all markets around the world. Complete inspections performed within its metallurgical lab and manufacturing quality departments ensure the use of high quality carbide and reliable manufacturing consistency regardless of when a cutting tool is produced.

KSPT is proud to have pioneered some of the world's most advanced cutting technologies due to rigorous testing of tools, coatings, and materials within its Global Innovation Center. It is this commitment to innovation that has launched patented products and technologies like the Z-Carb with its variable geometry and cutting edge preparation, Series 43 APR® and APF® ultra high performance aluminum cutting tools, and the JetStream coolant technology.

SGS has become an important part of the KYOCERA Precision Tools family, and while the name has changed, one thing has not. Its dedicated people and their relentless commitment to the customer. KSPT Technical Sales Engineers, Application Specialists, and Distribution Partners blanket the globe, delivering reliable service and support to all market segments. It is these people and products that drive innovative application strategies and cutting tool technologies into the end user, continually exceeding expectations and providing the most Value at the Spindle®.



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New Expanded Tools

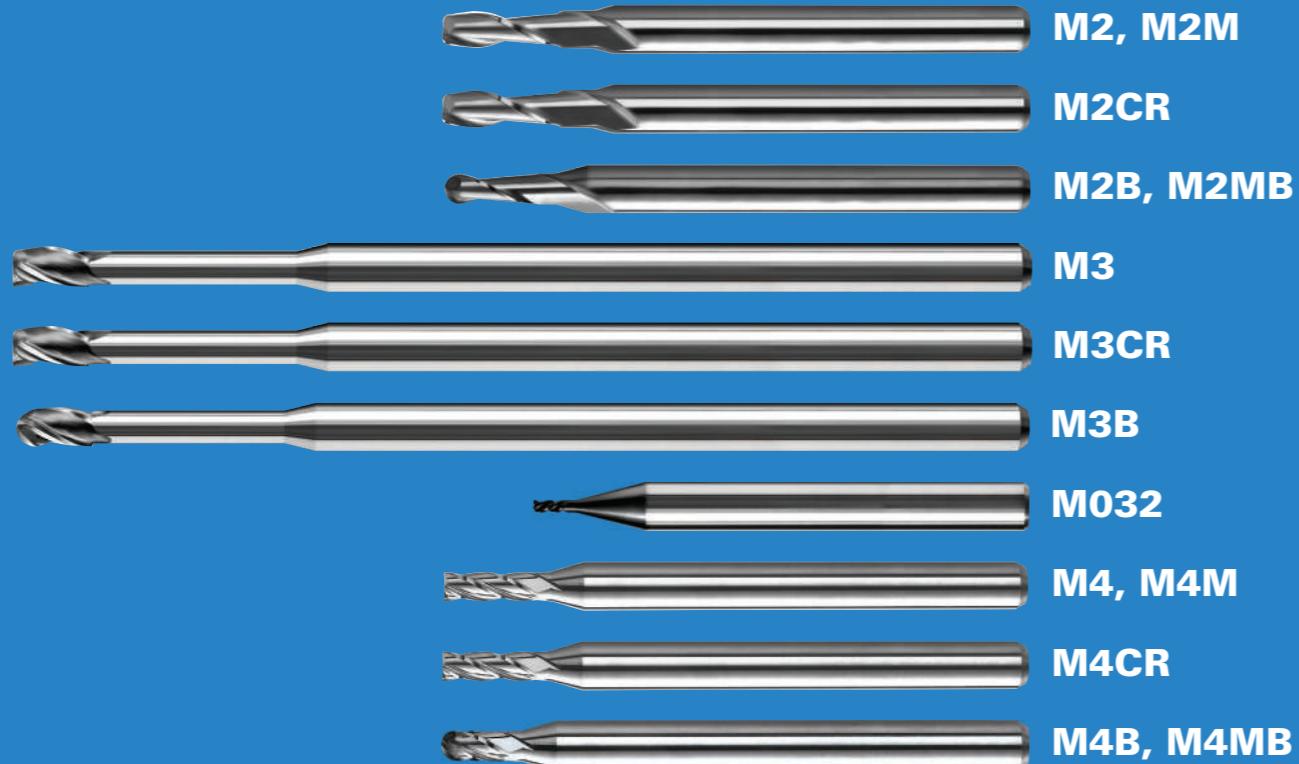
# KSPT MICRO END MILLS

## SMALL TOOLS. EPIC PROPORTIONS.

KYOCERA SGS Precision Tools (KSPT) commitment to providing superior quality round solid carbide cutting tools is unwavering, and these efforts are being taken one step further by introducing an impressive micro tool expansion. With a staggering expansion of over 2,500 tools in various lengths of cut, reach variations, end configurations and coating options, the portfolio can satisfy a variety of machining applications tailored for small diameter milling environments. Explore the portfolio below and discover how these small tools can deliver epic VALUE AT THE SPINDLE®!

### EXPANSION HIGHLIGHTS:

- 2, 3, and 4 flutes in square, corner radii, and ball nose end configurations options standard
- Lengths of cut ranging from 1.5 times diameter through 12 times diameter
- Expansive reach options ranging from 3 times diameter through 25 times diameter overall reach
- Fractional tools on 1/8" common shank and metric tools on 3MM and 4MM shanks to suit global application demands
- Uncoated options for tools in expanded and legacy portfolio
- Offered in Ti-NAMITE®-A coating for superior chip flow at low spindle speeds in a variety of applications
- All micro tools are manufactured in accordance with KSPT ISO 9001: 2015 quality standards



# CASE STUDY M4 8XD MICRO END MILL

### INDUSTRY

AEROSPACE

### MATERIAL

347 Stainless Steel (28 HRc Hardness)

### PRODUCT

M4 8XD Micro End Mills

### APPLICATION

Plunging

### COMPETITOR

3 Flute Extended Reach Micro End Mill

### COOLANT

Soluble Flood

### TOOL INFORMATION

0.07" Dia / 0.21" LOC / 2" OAL

### GOALS

The goals of this study were to significantly reduce job cost through the implementation of superior tooling and increased manufacturing efficiencies.

### STRATEGY

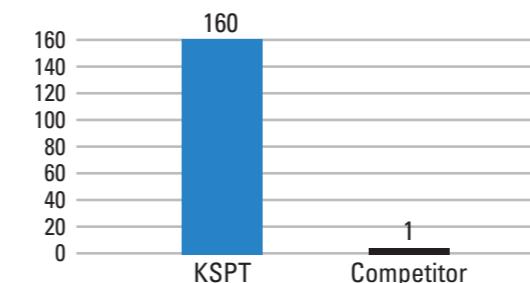
KSPT approached the job with a 4 flute 8XD Micro End Mill. The four flute design allows for higher feed rates and decreased deflection, improving productivity and surface finish.

	KSPT	COMPETITOR
TOOL DIAMETER	.07"	.07
SPEED	6600 RPM	3400 RPM
FEED	4 IPM	2 IPM
RADIAL CUT (AE)	N/A	N/A
AXIAL CUT (AP)	0.38	0.38
CYCLE TIME	6 SECONDS	11.4 SECONDS

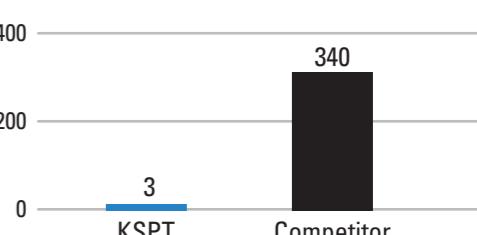
### RESULTS

The overall findings of this study indicate **KSPT's 4 flute micro end mill blew away the competitor's 3 flute tool** in efficiency and effectiveness. **KSPT's tool was able to capacitate a 48% higher speed and a 50% greater feed rate**. Those combined efficiencies were able to **cut the cycle time in half!** Because of the higher quality tool, the customer was able to **produce 160 parts per KSPT tool**. The competitor's 3 flute end mill was only able to produce 1 part per tool. Thus, the **tool change cost was reduced by over 99%**. Additionally, since KSPT only used 3 total tools to complete the job, the customer benefited from a **new tool cost reduction by over 99%**. The **M4 8XD 4 flute micro end mill ultimately saved the customer a grand total of \$12,030.34, resulting in a 98.88% cost reduction!** These tools, albeit small, are an epic step forward for micro machining.

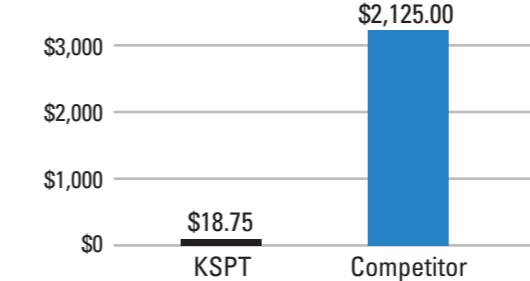
#### TOTAL PARTS AVAILABLE PERTOOL



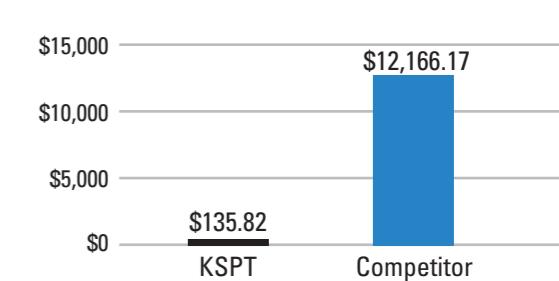
#### NEW TOOLS REQUIRED TO COMPLETE THE JOB



#### TOOL CHANGE COST



#### TOTAL COST



# KSPT MICRO DRILLS

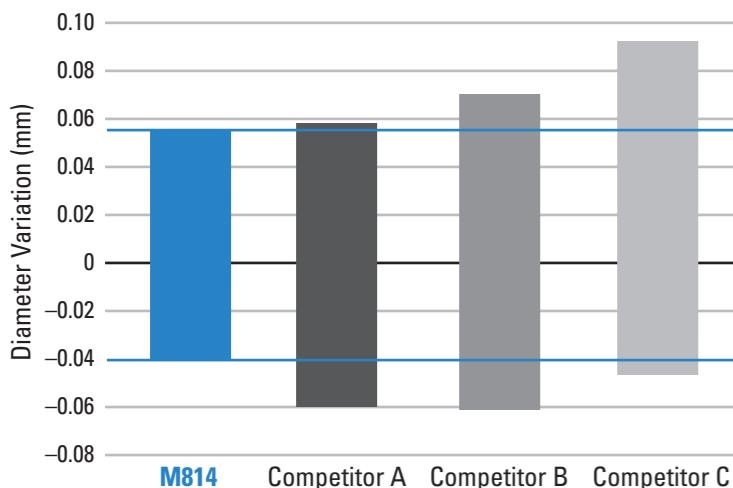
## SMALL TOOLS. EPIC PROPORTIONS.

KYOCERA SGS Precision Tools (KSPT) commitment to providing superior quality round solid carbide cutting tools is unwavering, and these efforts are being taken one step further by introducing an impressive micro tool expansion. Within the expansion, KSPT introduces a new lineup of micro drills totaling more than 1,400 tools with a variety of coolant and length options to meet the demands of global hole making applications. Explore the portfolio below and discover how these small tools can deliver epic VALUE AT THE SPINDLE®!

### DRILL PORTFOLIO HIGHLIGHTS:

- 2 flutes for optimal chip evacuation and cutting edge strength
- Internal coolant options on select series promotes controlled and consistent operating temperatures
- Lengths of cut ranging from 3 times diameter through 15 times diameter
- Fractional tools on 1/8" common shank and metric tools on 3MM and 4MM shanks to suit global market demands
- Uncoated options standard in select series
- Offered with Ti-NAMITE®-A coating for superior tool life and all-around value across a variety of applications
- Select series offered in new Ti-NAMITE®-Cr (AlCrN) coating for exceptional wear resistance in wet and dry drilling of cast iron and steel materials up to 52 HRC
- All micro tools are manufactured in accordance with KSPT ISO 9001: 2015 quality standards

HOLE DIAMETER VARIATION  
SERIES M814



### M814

- Split point and double margin design provide superior hole finish and size control
- Coolant hole feature allows straight through drilling without a peck cycle
- High-performance Ti-NAMITE®-Cr coating and mirror polished fluting increase tool life and productivity in moderate-to-difficult workpiece materials
- Available from stock in a selection of popular lengths and diameters
- Application specific sub-micron grain carbide designed specifically for micro-tool applications
- Manufactured in accordance with KSPT ISO certified quality procedures



**M814 8XD**

**M814 15XD**

### M105

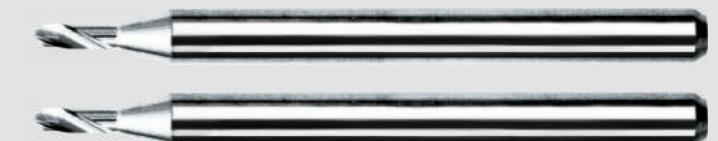
- 4-facet point design stabilizes on entry for superior hole size control and tool life
- Mirror surface finishes improve chip flow as hole depth increases
- Ti-NAMITE®-A coating and uncoated options for the ultimate performance in a variety of ferrous and non-ferrous workpiece materials
- Available from stock in a selection of popular lengths and diameters
- Application specific sub-micron grain carbide designed specifically for micro-tool applications
- Manufactured in accordance with KSPT ISO certified quality procedures



**M105**

### M080 & M081

- 4-facet point design, stub length, and mirror finish provide the highest quality spot
- Ti-NAMITE®-A coating and uncoated options for the ultimate performance and tool life in a variety of ferrous and non-ferrous workpiece materials
- Available from stock in all popular diameters and point configurations
- Application specific sub-micron grain carbide designed specifically for micro-tool applications
- Manufactured in accordance with KSPT ISO certified quality procedures



**M080**

**M081**

### M226 & L226

- 4-facet point design stabilizes on entry for superior hole size control and tool life (>.08mm)
- Mirror surface finishes improve chip flow as hole depth increases
- Ti-NAMITE®-A coating and uncoated options for the ultimate performance in a variety of ferrous and non-ferrous workpiece materials
- Right and left hand cut available from stock in a wide selection of popular lengths and diameters
- Application specific sub-micron grain carbide designed specifically for micro-tool applications
- Manufactured in accordance with KSPT ISO certified quality procedures



**M226**

**L226**

### Ti-NAMITE-A

With excellent thermal and chemical resistance, Ti-NAMITE®-A (AlTiN) allows for dry cutting and improvements in performance of carbide. The coating has a high hardness giving ultimate protection against abrasive wear and erosion. Ideal for cast iron, high temperature alloys, steels, 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)

#### KYOCERA SGS PRECISION TOOLS AlTiN COATING PERFORMANCE (LAB RESULTS)

SEM photography shows the KSPT proprietary coating method provides a significant reduction in macro particle deposition on the tool surface, which contributes to increased performance due to smoother chip flow. Another benefit of the KSPT micro-tool coating is a significant reduction in edge rounding due to excessive thickness, typical of most normal coatings.



NORMAL AlTiN MICRO-TOOL COATING @ 1.06KX MAGNIFICATION



KSPT PROPRIETARY AlTiN MICRO-TOOL COATING @ 1.06KX MAGNIFICATION

### Ti-NAMITE CR

With very high wear resistance and excellent hot hardness, Ti-NAMITE®-Cr (AlCrN) allows for wet and dry machining versatility at the highest of cutting speeds for increased machine utilization and productivity. The coating provides optimal thermal shock stability and is ideal for cast iron and steel applications up to 52 HRc.

Hardness (HV): 3200  
 Oxidation Temperature: 1100°C / 2010°F  
 Coefficient of Friction: 0.35  
 Thickness: 1 – 4 Microns (based on tool diameter)

**TO ORDER:** Please specify quantity and EDP number.

**RETURN POLICY:** An RMA number must accompany all product returns. Contact your Customer Service Representative for an RMA number.



REGULATION SAFETY GLASSES SHOULD ALWAYS BE WORN WHEN USING HIGH-SPEED CUTTING EQUIPMENT



**WARNING:** This product can expose you to chemicals including Cobalt, which is known to the State of California to cause cancer. For more information go to [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov)

#### MATERIALS



Steels



Stainless Steels



Cast Iron



High Temp Alloys



Titanium



Non-Ferrous



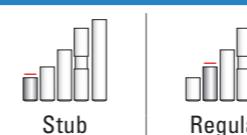
Plastics/Composites



Hardened Steels

#### END MILLS

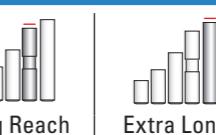
##### TOOL LENGTH



Stub



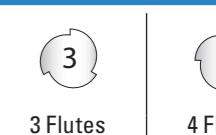
Regular



Long



Long Reach



Extra Long

##### FLUTES



2 Flutes



3 Flutes



4 Flutes

##### END CONFIGURATIONS



Ball



Corner



Square



Common



Right Spiral



Profile Angle



Positive

All tools are in Right Cut Direction unless noted

#### DRILLS

##### SHANK TYPE



Common

##### HELIX ANGLES



Right Spiral



Left Spiral

##### COOLANT OPTIONS

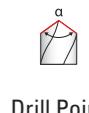


Internal Coolant



External Coolant

##### POINT ANGLE



Drill Point

##### REACH



1.5xD

1.5xD Reach



3xD

3xD Reach



5xD

5xD Reach



8xD

8xD Reach



12xD

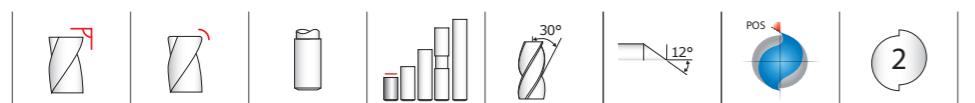
12xD Reach



15xD

15xD Reach

## FRACTIONAL

**M2 • M2CR • 1.5xD**

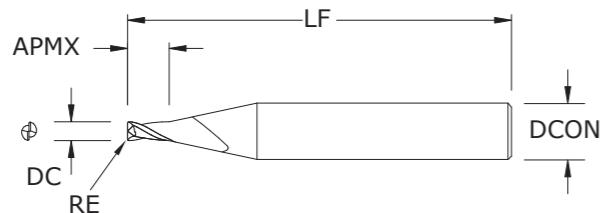
**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M2 • M2CR  
1.5xD**

FRACTIONAL SERIES

- Two flute design is ideal for softer alloyed, non-ferrous material applications that require slotting or involve heavy chip loads.
- Enhanced corner geometry with tight tolerance corner radii.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.



New Expanded Tools

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			EDP NO.	
		LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	UNCOATED	TI-NAMITE-A (AITiN)
0.004	1/8	0.006	1-1/2	—	04004	04000
0.005	1/8	0.008	1-1/2	—	00301	02201
0.006	1/8	0.009	1-1/2	—	00302	02202
0.007	1/8	0.011	1-1/2	—	00303	02203
0.008	1/8	0.012	1-1/2	—	00304	02204
0.009	1/8	0.014	1-1/2	—	00305	02205
0.010	1/8	0.015	1-1/2	—	00306	02206
0.011	1/8	0.017	1-1/2	—	00307	02207
0.012	1/8	0.018	1-1/2	—	00308	02208
0.013	1/8	0.020	1-1/2	—	00309	02209
0.014	1/8	0.021	1-1/2	—	00310	02210
0.015	1/8	0.023	1-1/2	—	00311	02211
0.015	1/8	0.023	1-1/2	0.003	08500	08641
0.016	1/8	0.024	1-1/2	—	00312	02212
0.017	1/8	0.026	1-1/2	—	00313	02213
0.018	1/8	0.027	1-1/2	—	00314	02214
0.019	1/8	0.029	1-1/2	—	00315	02215
0.020	1/8	0.030	1-1/2	—	00316	02216
0.020	1/8	0.030	1-1/2	0.003	08502	08643
0.020	1/8	0.030	1-1/2	0.005	08504	08645
0.021	1/8	0.032	1-1/2	—	00317	02217
0.022	1/8	0.033	1-1/2	—	00318	02218
0.023	1/8	0.035	1-1/2	—	00319	02219
0.024	1/8	0.036	1-1/2	—	00320	02220
0.025	1/8	0.038	1-1/2	—	00321	02221
0.025	1/8	0.038	1-1/2	0.010	08505	08646
0.026	1/8	0.039	1-1/2	—	00322	02222
0.027	1/8	0.041	1-1/2	—	00323	02223
0.028	1/8	0.042	1-1/2	—	00324	02224
0.029	1/8	0.044	1-1/2	—	00325	02225
0.030	1/8	0.045	1-1/2	—	00326	02226
0.030	1/8	0.045	1-1/2	0.010	08507	08648
0.031	1/8	0.047	1-1/2	—	00327	02227
0.032	1/8	0.048	1-1/2	—	00328	02228
0.033	1/8	0.050	1-1/2	—	00329	02229
0.034	1/8	0.051	1-1/2	—	00330	02230

continued on next page

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

New Expanded Tools

## TOLERANCES (inch)

## .004-.120 DIAMETER

DC = +0.000/-0.001

DCON = h6

RE = +0.0000/-0.0005

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

NON-FERROUS

PLASTICS/COMPOSITES

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			EDP NO.	
		LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	UNCOATED	TI-NAMITE-A (AITiN)
0.035	1/8	0.053	1-1/2	—	00331	02231
0.035	1/8	0.053	1-1/2	0.005	08509	08650
0.035	1/8	0.053	1-1/2	0.010	08511	08652
0.036	1/8	0.054	1-1/2	—	00332	02232
0.037	1/8	0.056	1-1/2	—	00333	02233
0.038	1/8	0.057	1-1/2	—	00334	02234
0.039	1/8	0.059	1-1/2	—	00335	02235
0.040	1/8	0.060	1-1/2	—	00336	02236
0.040	1/8	0.060	1-1/2	0.005	08513	08654
0.040	1/8	0.060	1-1/2	0.010	08515	08656
0.041	1/8	0.062	1-1/2	—	00337	02368
0.042	1/8	0.063	1-1/2	—	00338	02369
0.043	1/8	0.065	1-1/2	—	00339	02370
0.044	1/8	0.066	1-1/2	—	00340	02371
0.045	1/8	0.068	1-1/2	—	00341	02372
0.045	1/8	0.068	1-1/2	0.005	08517	08658
0.045	1/8	0.068	1-1/2	0.010	08519	08660
0.046	1/8	0.069	1-1/2	—	00342	02373
0.047	1/8	0.071	1-1/2	—	00343	02374
0.048	1/8	0.072	1-1/2	—	00344	02375
0.049	1/8	0.074	1-1/2	—	00345	02376
0.050	1/8	0.075	1-1/2	—	00346	02377
0.050	1/8	0.075	1-1/2	0.005	08521	08662
0.050	1/8	0.075	1-1/2	0.010	08523	08664
0.050	1/8	0.075	1-1/2	0.015	08525	08666
0.051	1/8	0.077	1-1/2	—	00347	02378
0.052	1/8	0.078	1-1/2	—	00348	02379
0.053	1/8	0.080	1-1/2	—	00349	02380
0.054	1/8	0.081	1-1/2	—	00350	02381
0.055	1/8	0.083	1-1/2	—	00351	02382
0.055	1/8	0.083	1-1/2	0.005	08527	08668
0.055	1/8	0.083	1-1/2	0.010	08529	08670
0.055	1/8	0.083	1-1/2	0.015	08531	08672
0.056	1/8	0.084	1-1/2	—	00352	02383
0.057	1/8	0.086	1-1/2	—	00353	02384
0.058	1/8	0.087	1-1/2	—	00354	02385

**M2 • M2CR • 1.5xD**

## FRACTIONAL

**M2 • M2CR  
1.5xD**

FRACTIONAL SERIES

continued

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FRACTIONAL  
**M2 • M2CR • 1.5xD**



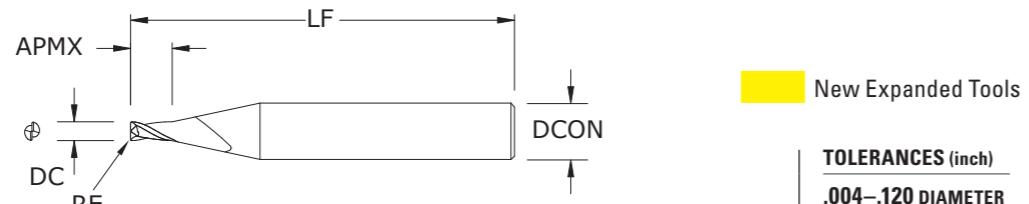
**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

**M2 • M2CR  
1.5xD**

FRACTIONAL SERIES

continued



New Expanded Tools

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	EDP NO.	
					UNCOATED	TI-NAMITE-A (AITiN)
0.059	1/8	0.089	1-1/2	—	00355	02386
0.060	1/8	0.090	1-1/2	—	00356	02387
0.060	1/8	0.090	1-1/2	0.005	08533	08674
0.060	1/8	0.090	1-1/2	0.010	08535	08676
0.060	1/8	0.090	1-1/2	0.015	08537	08678
0.062	1/8	0.093	1-1/2	—	00357	02388
0.065	1/8	0.098	1-1/2	—	00358	02389
0.065	1/8	0.098	1-1/2	0.005	08539	08680
0.065	1/8	0.098	1-1/2	0.010	08541	08682
0.065	1/8	0.098	1-1/2	0.015	08543	08684
0.070	1/8	0.105	1-1/2	—	00359	02390
0.070	1/8	0.105	1-1/2	0.005	08545	08686
0.070	1/8	0.105	1-1/2	0.010	08547	08688
0.070	1/8	0.105	1-1/2	0.015	08549	08690
0.075	1/8	0.112	1-1/2	—	04006	04002
0.075	1/8	0.113	1-1/2	0.005	08551	08692
0.075	1/8	0.113	1-1/2	0.010	08553	08694
0.075	1/8	0.113	1-1/2	0.015	08555	08696
0.075	1/8	0.113	1-1/2	0.020	08557	08698
0.078	1/8	0.117	1-1/2	—	00360	02391
0.080	1/8	0.120	1-1/2	—	00361	02392
0.080	1/8	0.120	1-1/2	0.005	08559	08700
0.080	1/8	0.120	1-1/2	0.010	08561	08702
0.080	1/8	0.120	1-1/2	0.015	08563	08704
0.080	1/8	0.120	1-1/2	0.020	08565	08706
0.085	1/8	0.128	1-1/2	—	00362	02393
0.085	1/8	0.128	1-1/2	0.005	08567	08708
0.085	1/8	0.128	1-1/2	0.010	08569	08710
0.085	1/8	0.128	1-1/2	0.015	08571	08712
0.085	1/8	0.128	1-1/2	0.020	08573	08714
0.090	1/8	0.135	1-1/2	—	00363	02394
0.090	1/8	0.135	1-1/2	0.005	08575	08716
0.090	1/8	0.135	1-1/2	0.010	08577	08718
0.090	1/8	0.135	1-1/2	0.015	08579	08720
0.090	1/8	0.135	1-1/2	0.020	08581	08722
0.093	1/8	0.140	1-1/2	—	00364	02395

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**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

TOLERANCES (inch)

.004-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

RE = +0.0000/-0.0005



New Expanded Tools

New Expanded Tools

FRACTIONAL  
**M2 • M2CR • 1.5xD**

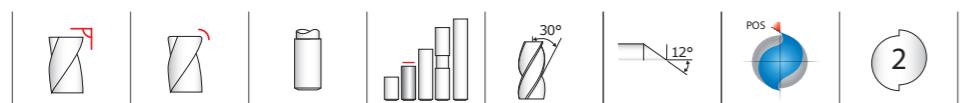
**M2 • M2CR  
1.5xD**

FRACTIONAL SERIES

continued

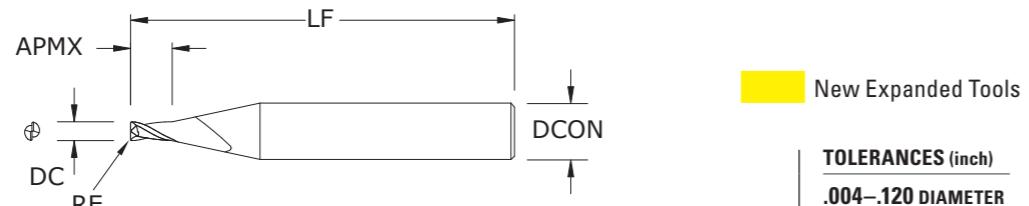
CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	EDP NO.	
					UNCOATED	TI-NAMITE-A (AITiN)
0.095	1/8	0.143	1-1/2	—	00365	02396
0.095	1/8	0.143	1-1/2	0.005	08583	08724
0.095	1/8	0.143	1-1/2	0.010	08585	08726
0.095	1/8	0.143	1-1/2	0.015	08587	08728
0.095	1/8	0.143	1-1/2	0.020	08589	08730
0.100	1/8	0.150	1-1/2	—	00366	02397
0.100	1/8	0.150	1-1/2	0.005	08591	08732
0.100	1/8	0.150	1-1/2	0.010	08593	08734
0.100	1/8	0.150	1-1/2	0.015	08595	08736
0.100	1/8	0.150	1-1/2	0.020	08597	08738
0.100	1/8	0.150	1-1/2	0.030	08599	08740
0.105	1/8	0.158	1-1/2	—	00367	02398
0.105	1/8	0.158	1-1/2	0.005	08601	08742
0.105	1/8	0.158	1-1/2	0.010	08603	08744
0.105	1/8	0.158	1-1/2	0.015	08605	08746
0.105	1/8	0.158	1-1/2	0.020	08607	08748
0.105	1/8	0.158	1-1/2	0.030	08609	08750
0.110	1/8	0.165	1-1/2	—	00368	02399
0.110	1/8	0.165	1-1/2	0.005	08611	08752
0.110	1/8	0.165	1-1/2	0.010	08613	08754
0.110	1/8	0.165	1-1/2	0.020	08615	08756
0.110	1/8	0.165	1-1/2	0.030	08617	08758
0.110	1/8	0.165	1-1/2	0.040	08619	08760
0.115	1/8	0.173	1-1/2	—	00369	02400
0.115	1/8	0.173	1-1/2	0.005	08621	08762
0.115	1/8	0.173	1-1/2	0.010	08623	08764
0.115	1/8	0.173	1-1/2	0.015	08625	08766
0.115	1/8	0.173	1-1/2	0.020	08627	08768
0.115	1/8	0.173	1-1/2	0.030	08629	08770
0.120	1/8	0.180	1-1/2	—	00370	02401
0.120	1/8	0.180	1-1/2	0.005	08631	08772
0.120	1/8	0.180	1-1/2	0.010	08633	08774
0.120	1/8	0.180	1-1/2	0.015	08635	08776
0.120	1/8	0.180	1-1/2	0.020	08637	08778
0.120	1/8	0.180	1-1/2	0.030	08639	08780

FRACTIONAL  
**M2 • M2CR • 3xD**



**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA



**M2 • M2CR  
3xD**

FRACTIONAL SERIES

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CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			EDP NO.	
		LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	UNCOATED	TI-NAMITE-A (AITiN)
0.004	1/8	0.012	1-1/2	—	04005	04001
0.005	1/8	0.015	1-1/2	—	00811	02275
0.006	1/8	0.018	1-1/2	—	00812	02276
0.007	1/8	0.021	1-1/2	—	00813	02277
0.008	1/8	0.024	1-1/2	—	00814	02278
0.009	1/8	0.027	1-1/2	—	00815	02279
0.010	1/8	0.030	1-1/2	—	00816	02280
0.011	1/8	0.033	1-1/2	—	00817	02281
0.012	1/8	0.036	1-1/2	—	00818	02282
0.013	1/8	0.039	1-1/2	—	00819	02283
0.014	1/8	0.042	1-1/2	—	00820	02284
0.015	1/8	0.045	1-1/2	—	00821	02285
0.015	1/8	0.045	1-1/2	0.003	08501	08642
0.016	1/8	0.048	1-1/2	—	00822	02286
0.017	1/8	0.051	1-1/2	—	00823	02287
0.018	1/8	0.054	1-1/2	—	00824	02288
0.019	1/8	0.057	1-1/2	—	00825	02289
0.020	1/8	0.060	1-1/2	—	00826	02290
0.020	1/8	0.060	1-1/2	0.003	08503	08644
0.020	1/8	0.060	1-1/2	0.005	04020	04021
0.021	1/8	0.063	1-1/2	—	00827	02291
0.022	1/8	0.066	1-1/2	—	00828	02292
0.023	1/8	0.069	1-1/2	—	00829	02293
0.024	1/8	0.072	1-1/2	—	00830	02294
0.025	1/8	0.075	1-1/2	—	00831	02295
0.025	1/8	0.075	1-1/2	0.005	04022	04023
0.025	1/8	0.075	1-1/2	0.010	08506	08647
0.026	1/8	0.078	1-1/2	—	00832	02296
0.027	1/8	0.081	1-1/2	—	00833	02297
0.028	1/8	0.084	1-1/2	—	00834	02298
0.029	1/8	0.087	1-1/2	—	00835	02299
0.030	1/8	0.090	1-1/2	—	00836	02300
0.030	1/8	0.090	1-1/2	0.010	08508	08649
0.031	1/8	0.093	1-1/2	—	00837	02301
0.032	1/8	0.096	1-1/2	—	00838	02302
0.033	1/8	0.099	1-1/2	—	00839	02303

continued on next page

**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

New Expanded Tools

New Expanded Tools

FRACTIONAL  
**M2 • M2CR • 3xD**

**M2 • M2CR  
3xD**

FRACTIONAL SERIES

TOLERANCES (inch)

.004-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

RE = +0.0000/-0.0005

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

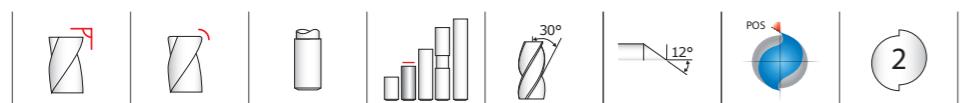
NON-FERROUS

PLASTICS/COMPOSITES

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			EDP NO.	
		LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	UNCOATED	TI-NAMITE-A (AITiN)
0.034	1/8	0.102	1-1/2	—	00840	02304
0.035	1/8	0.105	1-1/2	—	00841	02305
0.035	1/8	0.105	1-1/2	0.005	08510	08651
0.035	1/8	0.105	1-1/2	0.010	08512	08653
0.036	1/8	0.108	1-1/2	—	00842	02306
0.037	1/8	0.111	1-1/2	—	00843	02307
0.038	1/8	0.114	1-1/2	—	00844	02308
0.039	1/8	0.117	1-1/2	—	00845	02309
0.040	1/8	0.120	1-1/2	—	00846	02310
0.040	1/8	0.120	1-1/2	0.005	08514	08655
0.040	1/8	0.120	1-1/2	0.010	08516	08657
0.041	1/8	0.123	1-1/2	—	00479	02436
0.042	1/8	0.126	1-1/2	—	00480	02437
0.043	1/8	0.129	1-1/2	—	00481	02438
0.044	1/8	0.132	1-1/2	—	00482	02439
0.045	1/8	0.135	1-1/2	—	00483	02440
0.045	1/8	0.135	1-1/2	0.005	08518	08659
0.045	1/8	0.135	1-1/2	0.010	08520	08661
0.046	1/8	0.138	1-1/2	—	00484	02441
0.047	1/8	0.141	1-1/2	—	00485	02442
0.048	1/8	0.144	1-1/2	—	00486	02443
0.049	1/8	0.147	1-1/2	—	00487	02444
0.050	1/8	0.150	1-1/2	—	00488	02445
0.050	1/8	0.150	1-1/2	0.005	08522	08663
0.050	1/8	0.150	1-1/2	0.010	08524	08665
0.050	1/8	0.150	1-1/2	0.015	08526	08667
0.051	1/8	0.153	1-1/2	—	00489	02446
0.052	1/8	0.156	1-1/2	—	00490	02447
0.053	1/8	0.159	1-1/2	—	00491	02448
0.054	1/8	0.162	1-1/2	—	00492	02449
0.055	1/8	0.165	1-1/2	—	00493	02450
0.055	1/8	0.165	1-1/2	0.005	08528	08669
0.055	1/8	0.165	1-1/2	0.010	08530	08671
0.055	1/8	0.165	1-1/2	0.015	08532	08673
0.056	1/8	0.168	1-1/2	—	00494	02451
0.057	1/8	0.171	1-1/2	—	00495	02452

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FRACTIONAL  
**M2 • M2CR • 3xD**



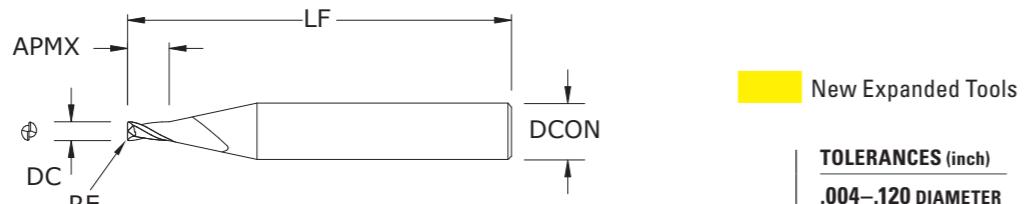
**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

**M2 • M2CR  
3xD**

FRACTIONAL SERIES

continued



New Expanded Tools

KYOCERA Solid Tools

SGS Micro Tools

SGS Solid Tools

continued on next page

**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

FRACTIONAL  
**M2 • M2CR • 3xD**

New Expanded Tools

**M2 • M2CR  
3xD**

FRACTIONAL SERIES

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

TOLERANCES (inch)

.004-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

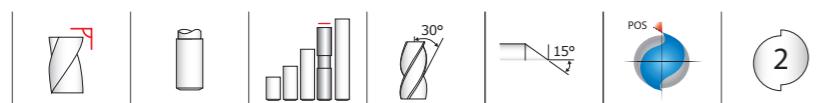
RE = +0.0000/-0.0005

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

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	EDP NO.	
					UNCOATED	TI-NAMITE-A (AITiN)
0.058	1/8	0.174	1-1/2	—	00496	02453
0.059	1/8	0.177	1-1/2	—	00865	02454
0.060	1/8	0.180	1-1/2	—	00498	02455
0.060	1/8	0.180	1-1/2	0.005	08534	08675
0.060	1/8	0.180	1-1/2	0.010	08536	08677
0.060	1/8	0.180	1-1/2	0.015	08538	08679
0.062	1/8	0.186	1-1/2	—	00499	02456
0.065	1/8	0.195	1-1/2	—	00500	02457
0.065	1/8	0.195	1-1/2	0.005	08540	08681
0.065	1/8	0.195	1-1/2	0.010	08542	08683
0.065	1/8	0.195	1-1/2	0.015	08544	08685
0.070	1/8	0.210	1-1/2	—	00501	02458
0.070	1/8	0.210	1-1/2	0.005	08546	08687
0.070	1/8	0.210	1-1/2	0.010	08548	08689
0.070	1/8	0.210	1-1/2	0.015	08550	08691
0.075	1/8	0.225	1-1/2	—	04007	04003
0.075	1/8	0.225	1-1/2	0.005	08552	08693
0.075	1/8	0.225	1-1/2	0.010	08554	08695
0.075	1/8	0.225	1-1/2	0.015	08556	08697
0.075	1/8	0.225	1-1/2	0.020	08558	08699
0.078	1/8	0.234	1-1/2	—	00870	02459
0.080	1/8	0.240	1-1/2	—	00503	02460
0.080	1/8	0.240	1-1/2	0.005	08560	08701
0.080	1/8	0.240	1-1/2	0.010	08562	08703
0.080	1/8	0.240	1-1/2	0.015	08564	08705
0.080	1/8	0.240	1-1/2	0.020	08566	08707
0.085	1/8	0.255	1-1/2	—	00504	02461
0.085	1/8	0.255	1-1/2	0.005	08568	08709
0.085	1/8	0.255	1-1/2	0.010	08570	08711
0.085	1/8	0.255	1-1/2	0.015	08572	08713
0.085	1/8	0.255	1-1/2	0.020	08574	08715
0.090	1/8	0.270	1-1/2	—	00505	02462
0.090	1/8	0.270	1-1/2	0.005	08576	08717
0.090	1/8	0.270	1-1/2	0.010	08578	08719
0.090	1/8	0.270	1-1/2	0.015	08580	08721
0.090	1/8	0.270	1-1/2	0.020	08582	08723

continued

## FRACTIONAL

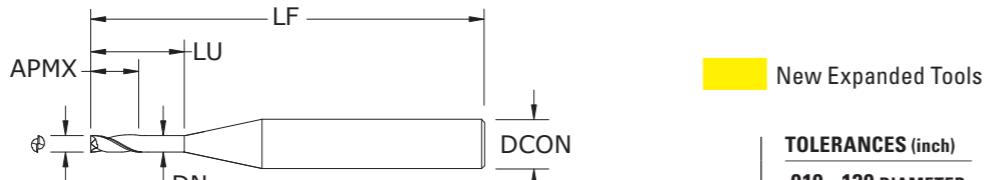
**M2 • 3xD • 8xD Overall Reach**

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M2 • 3xD  
8xD**

FRACTIONAL SERIES



New Expanded Tools

- Two flute design is ideal for softer alloyed, non-ferrous material applications that require slotting or involve heavy chip loads.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

inch							EDP NO.	
CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	UNCOATED TI-NAMITE-A (AITIN)	EDP NO.	
.010	1/8	0.030	0.080	0.009	1-1/2	09353	03400	
.015	1/8	0.045	0.120	0.014	1-1/2	09355	03401	
.020	1/8	0.060	0.160	0.018	1-1/2	09357	03402	
.025	1/8	0.075	0.200	0.023	1-1/2	09359	03403	
.030	1/8	0.090	0.240	0.028	1-1/2	09361	03404	
.031	1/8	0.093	0.248	0.029	1-1/2	09363	03405	
.035	1/8	0.105	0.280	0.032	1-1/2	09365	03406	
.040	1/8	0.120	0.320	0.037	1-1/2	09367	03407	
.045	1/8	0.135	0.360	0.042	2	09369	03408	
.047	1/8	0.141	0.376	0.044	2	09371	03409	
.050	1/8	0.150	0.400	0.047	2	09373	03410	
.055	1/8	0.165	0.440	0.051	2	09375	03411	
.060	1/8	0.180	0.480	0.056	2	09377	03412	
.062	1/8	0.186	0.496	0.058	2	09379	03413	
.065	1/8	0.195	0.520	0.061	2	09381	03414	
.070	1/8	0.210	0.560	0.065	2	09383	03415	
.075	1/8	0.225	0.600	0.070	2	09385	03416	
.078	1/8	0.234	0.624	0.073	2	09387	03417	
.080	1/8	0.240	0.640	0.075	2	09389	03418	
.085	1/8	0.255	0.680	0.079	2	09391	03419	
.090	1/8	0.270	0.720	0.084	2	09393	03420	
.093	1/8	0.279	0.744	0.087	2	09395	03421	
.095	1/8	0.285	0.760	0.089	2	09397	03422	
.100	1/8	0.300	0.800	0.094	2	09399	03423	
.110	1/8	0.330	0.880	0.103	2	09401	03424	
.115	1/8	0.345	0.920	0.108	2	09403	03425	
.120	1/8	0.360	0.960	0.112	2	09405	03426	

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h6

## STEELS

## STAINLESS STEELS

## CAST IRON

## HIGH TEMP ALLOYS

## TITANIUM

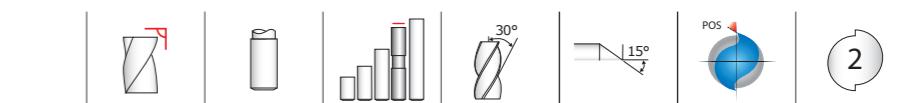
## HARDENED STEELS

## NON-FERROUS

## PLASTICS/COMPOSITES

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**FRACTIONAL  
M2 • 3xD • 12xD Overall Reach**

New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h6

## STEELS

## STAINLESS STEELS

## CAST IRON

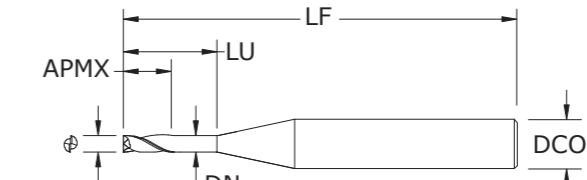
## HIGH TEMP ALLOYS

## TITANIUM

## HARDENED STEELS

## NON-FERROUS

## PLASTICS/COMPOSITES

**M2 • 3xD  
12xD**

FRACTIONAL SERIES

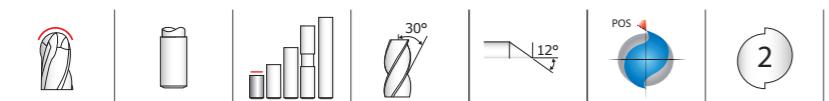
inch							EDP NO.	
CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	UNCOATED TI-NAMITE-A (AITIN)	EDP NO.	
.010	1/8	0.030	0.120	0.009	1-1/2	09352	03427	
.015	1/8	0.045	0.180	0.014	1-1/2	09354	03428	
.020	1/8	0.060	0.240	0.018	1-1/2	09356	03429	
.025	1/8	0.075	0.300	0.023	1-1/2	09358	03430	
.030	1/8	0.090	0.360	0.028	2	09360	03431	
.031	1/8	0.093	0.372	0.029	2	09362	03432	
.035	1/8	0.105	0.420	0.032	2	09364	03433	
.040	1/8	0.120	0.480	0.037	2	09366	03434	
.045	1/8	0.135	0.540	0.042	2	09368	03435	
.047	1/8	0.141	0.564	0.044	2	09370	03436	
.050	1/8	0.150	0.600	0.047	2	09372	03437	
.055	1/8	0.165	0.660	0.051	2	09374	03438	
.060	1/8	0.180	0.720	0.056	2	09376	03439	
.062	1/8	0.186	0.744	0.058	2	09378	03440	
.065	1/8	0.195	0.780	0.061	2	09380	03441	
.070	1/8	0.210	0.840	0.065	2	09382	03442	
.075	1/8	0.225	0.900	0.070	2	09384	03443	
.078	1/8	0.234	0.936	0.073	2-1/2	09386	03444	
.080	1/8	0.240	0.960	0.075	2-1/2	09388	03445	
.085	1/8	0.255	1.020	0.079	2-1/2	09390	03446	
.090	1/8	0.270	1.080	0.084	2-1/2	09392	03447	
.093	1/8	0.279	1.116	0.087	2-1/2	09394	03448	
.095	1/8	0.285	1.140	0.089	2-1/2	09396	03449	
.100	1/8	0.300	1.200	0.094	2-1/2	09398	03450	
.110	1/8	0.330	1.320	0.103	2-1/2	09400	03451	
.115	1/8	0.345	1.380	0.108	2-1/2	09402	03452	
.120	1/8	0.360	1.440	0.112	2-1/2	09404	03453	

## FRACTIONAL

**M2 • 3xD • 12xD Overall Reach**

- Two flute design is ideal for softer alloyed, non-ferrous material applications that require slotting or involve heavy chip loads.
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- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

FRACTIONAL  
**M2B • 1.5xD**

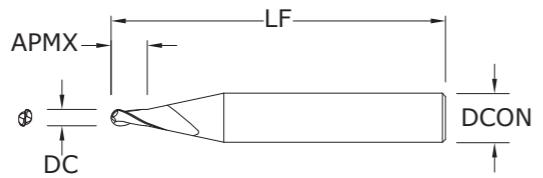


**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

**M2B • 1.5xD**  
FRACTIONAL SERIES

- Two flute design is ideal for softer alloyed, non-ferrous material applications that require slotting or involve heavy chip loads.
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- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.



New Expanded Tools

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	
				UNCOATED	TI-NAMITE-A (AITiN)
0.005	1/8	0.008	1-1/2	00669	03029
0.006	1/8	0.009	1-1/2	00670	03030
0.007	1/8	0.011	1-1/2	00671	03031
0.008	1/8	0.012	1-1/2	00672	03032
0.009	1/8	0.014	1-1/2	00673	03033
0.010	1/8	0.015	1-1/2	00674	03034
0.011	1/8	0.017	1-1/2	00675	03035
0.012	1/8	0.018	1-1/2	00676	03036
0.013	1/8	0.020	1-1/2	00677	03037
0.014	1/8	0.021	1-1/2	00678	03038
0.015	1/8	0.023	1-1/2	00679	03039
0.016	1/8	0.024	1-1/2	00680	03040
0.017	1/8	0.026	1-1/2	00681	03041
0.018	1/8	0.027	1-1/2	00682	03042
0.019	1/8	0.029	1-1/2	00683	03043
0.020	1/8	0.030	1-1/2	00684	03044
0.021	1/8	0.032	1-1/2	00685	03045
0.022	1/8	0.033	1-1/2	00686	03046
0.023	1/8	0.035	1-1/2	00687	03047
0.024	1/8	0.036	1-1/2	00688	03048
0.025	1/8	0.038	1-1/2	00689	03049
0.026	1/8	0.039	1-1/2	00690	03050
0.027	1/8	0.041	1-1/2	00691	03051
0.028	1/8	0.042	1-1/2	00692	03052
0.029	1/8	0.044	1-1/2	00693	03053
0.030	1/8	0.045	1-1/2	00694	03054
0.031	1/8	0.047	1-1/2	00695	03055
0.032	1/8	0.048	1-1/2	00696	03056
0.033	1/8	0.050	1-1/2	00697	03057
0.034	1/8	0.051	1-1/2	00698	03058
0.035	1/8	0.053	1-1/2	00699	03059
0.036	1/8	0.054	1-1/2	00700	03060
0.037	1/8	0.056	1-1/2	00701	03061
0.038	1/8	0.057	1-1/2	00702	03062
0.039	1/8	0.059	1-1/2	00703	03063
0.040	1/8	0.060	1-1/2	00704	03064

RE = 1/2 Cutting Diameter (DC)

continued on next page

**MICRO**  
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Solid Carbide Tools

KYOCERA

New Expanded Tools

TOLERANCES (inch)

.005-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>



CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	
				UNCOATED	TI-NAMITE-A (AITiN)
0.041	1/8	0.062	1-1/2	00705	02504
0.042	1/8	0.063	1-1/2	00706	02505
0.043	1/8	0.065	1-1/2	00707	02506
0.044	1/8	0.066	1-1/2	00708	02507
0.045	1/8	0.068	1-1/2	00709	02508
0.046	1/8	0.069	1-1/2	00710	02509
0.047	1/8	0.071	1-1/2	00711	02510
0.048	1/8	0.072	1-1/2	00712	02511
0.049	1/8	0.074	1-1/2	00713	02512
0.050	1/8	0.075	1-1/2	00714	02513
0.051	1/8	0.077	1-1/2	00715	02514
0.052	1/8	0.078	1-1/2	00716	02515
0.053	1/8	0.080	1-1/2	00717	02516
0.054	1/8	0.081	1-1/2	00718	02517
0.055	1/8	0.083	1-1/2	00719	02518
0.056	1/8	0.084	1-1/2	00720	02519
0.057	1/8	0.086	1-1/2	00721	02520
0.058	1/8	0.087	1-1/2	00722	02521
0.059	1/8	0.089	1-1/2	00723	02522
0.060	1/8	0.090	1-1/2	00724	02523
0.062	1/8	0.093	1-1/2	00725	02524
0.065	1/8	0.098	1-1/2	00726	02525
0.070	1/8	0.105	1-1/2	00727	02526
0.075	1/8	0.112	1-1/2	04010	04008
0.078	1/8	0.117	1-1/2	00728	02527
0.080	1/8	0.120	1-1/2	00729	02528
0.085	1/8	0.128	1-1/2	00730	02529
0.090	1/8	0.135	1-1/2	00731	02530
0.093	1/8	0.140	1-1/2	00732	02531
0.095	1/8	0.143	1-1/2	00733	02532
0.100	1/8	0.150	1-1/2	00734	02533
0.105	1/8	0.158	1-1/2	00735	02534
0.110	1/8	0.165	1-1/2	00736	02535
0.115	1/8	0.173	1-1/2	00737	02536
0.120	1/8	0.180	1-1/2	00738	02537

RE = 1/2 Cutting Diameter (DC)

FRACTIONAL  
**M2B • 1.5xD**

**M2B • 1.5xD**  
FRACTIONAL SERIES

continued

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

## FRACTIONAL M2B • 3xD



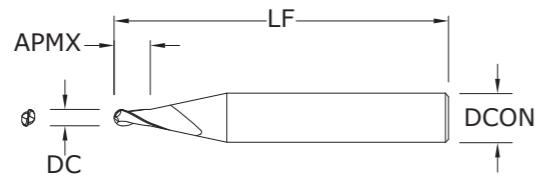
**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

## M2B • 3xD

FRACTIONAL SERIES

- Two flute design is ideal for softer alloyed, non-ferrous material applications that require slotting or involve heavy chip loads.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.



New Expanded Tools

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	
				UNCOATED	TI-NAMITE-A (AITiN)
0.005	1/8	0.015	1-1/2	00443	03103
0.006	1/8	0.018	1-1/2	00444	03104
0.007	1/8	0.021	1-1/2	00445	03105
0.008	1/8	0.024	1-1/2	00446	03106
0.009	1/8	0.027	1-1/2	00447	03107
0.010	1/8	0.030	1-1/2	00448	03108
0.011	1/8	0.033	1-1/2	00449	03109
0.012	1/8	0.036	1-1/2	00450	03110
0.013	1/8	0.039	1-1/2	00451	03111
0.014	1/8	0.042	1-1/2	00452	03112
0.015	1/8	0.045	1-1/2	00453	03113
0.016	1/8	0.048	1-1/2	00454	03114
0.017	1/8	0.051	1-1/2	00455	03115
0.018	1/8	0.054	1-1/2	00456	03116
0.019	1/8	0.057	1-1/2	00457	03117
0.020	1/8	0.060	1-1/2	00458	03118
0.021	1/8	0.063	1-1/2	00459	03119
0.022	1/8	0.066	1-1/2	00460	03120
0.023	1/8	0.069	1-1/2	00461	03121
0.024	1/8	0.072	1-1/2	00462	03122
0.025	1/8	0.075	1-1/2	00463	03123
0.026	1/8	0.078	1-1/2	00464	03124
0.027	1/8	0.081	1-1/2	00465	03125
0.028	1/8	0.084	1-1/2	00466	03126
0.029	1/8	0.087	1-1/2	00467	03127
0.030	1/8	0.090	1-1/2	00468	03128
0.031	1/8	0.093	1-1/2	00469	03129
0.032	1/8	0.096	1-1/2	00470	03130
0.033	1/8	0.099	1-1/2	00471	03131
0.034	1/8	0.102	1-1/2	00472	03132
0.035	1/8	0.105	1-1/2	00473	03133
0.036	1/8	0.108	1-1/2	00474	03134
0.037	1/8	0.111	1-1/2	00475	03135
0.038	1/8	0.114	1-1/2	00476	03136
0.039	1/8	0.117	1-1/2	00477	03137
0.040	1/8	0.120	1-1/2	00478	03138

continued on next page

**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

New Expanded Tools

## TOLERANCES (inch)

### .005-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>



CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	
				UNCOATED	TI-NAMITE-A (AITiN)
0.041	1/8	0.123	1-1/2	00847	02572
0.042	1/8	0.126	1-1/2	00848	02573
0.043	1/8	0.129	1-1/2	00849	02574
0.044	1/8	0.132	1-1/2	00850	02575
0.045	1/8	0.135	1-1/2	00851	02576
0.046	1/8	0.138	1-1/2	00852	02577
0.047	1/8	0.141	1-1/2	00853	02578
0.048	1/8	0.144	1-1/2	00854	02579
0.049	1/8	0.147	1-1/2	00855	02580
0.050	1/8	0.150	1-1/2	00856	02581
0.051	1/8	0.153	1-1/2	00857	02582
0.052	1/8	0.156	1-1/2	00858	02583
0.053	1/8	0.159	1-1/2	00859	02584
0.054	1/8	0.162	1-1/2	00860	02585
0.055	1/8	0.165	1-1/2	00861	02586
0.056	1/8	0.168	1-1/2	00862	02587
0.057	1/8	0.171	1-1/2	00863	02588
0.058	1/8	0.174	1-1/2	00864	02589
0.059	1/8	0.177	1-1/2	00497	02590
0.060	1/8	0.180	1-1/2	00866	02591
0.062	1/8	0.186	1-1/2	00867	02592
0.065	1/8	0.195	1-1/2	00868	02593
0.070	1/8	0.210	1-1/2	00869	02594
0.075	1/8	0.225	1-1/2	04011	04009
0.078	1/8	0.234	1-1/2	00502	02595
0.080	1/8	0.240	1-1/2	00871	02596
0.085	1/8	0.255	1-1/2	00872	02597
0.090	1/8	0.270	1-1/2	00873	02598
0.093	1/8	0.279	1-1/2	00874	02599
0.095	1/8	0.285	1-1/2	00875	02600
0.100	1/8	0.300	1-1/2	00876	02601
0.105	1/8	0.315	1-1/2	00877	02602
0.110	1/8	0.330	1-1/2	00510	02603
0.115	1/8	0.345	1-1/2	00879	02604
0.120	1/8	0.360	1-1/2	00880	02605

continued

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

## FRACTIONAL

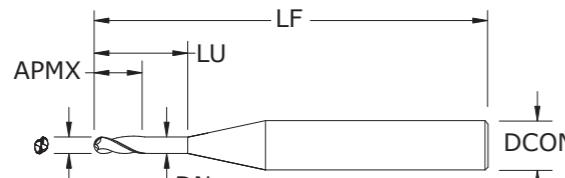
**M2B • 3xD • 8xD Overall Reach**

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M2B • 3xD  
8xD**  
FRACTIONAL SERIES

- Two flute design is ideal for softer alloyed, non-ferrous material applications that require slotting or involve heavy chip loads.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.



## New Expanded Tools

## TOLERANCES (inch)

.010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

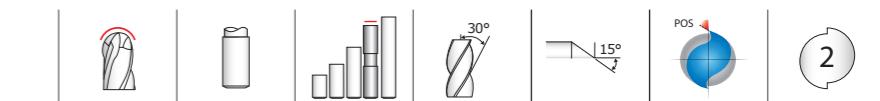
NON-FERROUS

PLASTICS/COMPOSITES

inch							EDP NO.	
CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	UNCOATED TI-NAMITE-A (AITIN)		
0.010	1/8	0.030	0.080	0.009	1-1/2	09299	03697	
0.015	1/8	0.045	0.120	0.014	1-1/2	09301	03698	
0.020	1/8	0.060	0.160	0.018	1-1/2	09303	03699	
0.025	1/8	0.075	0.200	0.023	1-1/2	09305	03700	
0.030	1/8	0.090	0.240	0.028	1-1/2	09307	03701	
0.031	1/8	0.093	0.248	0.029	1-1/2	09309	03702	
0.035	1/8	0.105	0.280	0.032	1-1/2	09311	03703	
0.040	1/8	0.120	0.320	0.037	1-1/2	09313	03704	
0.045	1/8	0.135	0.360	0.042	2	09315	03705	
0.047	1/8	0.141	0.376	0.044	2	09317	03706	
0.050	1/8	0.150	0.400	0.047	2	09319	03707	
0.055	1/8	0.165	0.440	0.051	2	09321	03708	
0.060	1/8	0.180	0.480	0.056	2	09323	03709	
0.062	1/8	0.186	0.496	0.058	2	09325	03710	
0.065	1/8	0.195	0.520	0.061	2	09327	03711	
0.070	1/8	0.210	0.560	0.065	2	09329	03712	
0.075	1/8	0.225	0.600	0.070	2	09331	03713	
0.078	1/8	0.234	0.624	0.073	2	09333	03714	
0.080	1/8	0.240	0.640	0.075	2	09335	03715	
0.085	1/8	0.255	0.680	0.079	2	09337	03716	
0.090	1/8	0.270	0.720	0.084	2	09339	03717	
0.093	1/8	0.279	0.744	0.087	2	09341	03718	
0.095	1/8	0.285	0.760	0.089	2	09343	03719	
0.100	1/8	0.300	0.800	0.094	2	09345	03720	
0.110	1/8	0.330	0.880	0.103	2	09347	03721	
0.115	1/8	0.345	0.920	0.108	2	09349	03722	
0.120	1/8	0.360	0.960	0.112	2	09351	03723	

RE = 1/2 Cutting Diameter (DC)

## FRACTIONAL

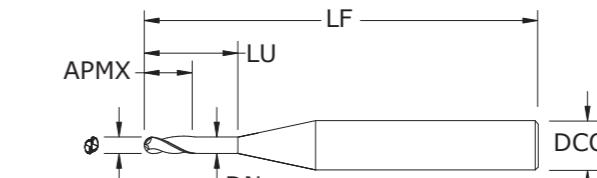
**M2B • 3xD • 12xD Overall Reach**

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

## FRACTIONAL SERIES

- Two flute design is ideal for softer alloyed, non-ferrous material applications that require slotting or involve heavy chip loads.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.



## New Expanded Tools

## TOLERANCES (inch)

.010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

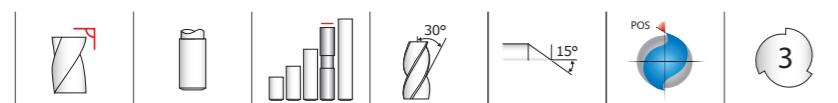
NON-FERROUS

PLASTICS/COMPOSITES

inch							EDP NO.	
CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	UNCOATED TI-NAMITE-A (AITIN)		
0.010	1/8	0.030	0.120	0.009	1-1/2	09298	03724	
0.015	1/8	0.045	0.180	0.014	1-1/2	09300	03725	
0.020	1/8	0.060	0.240	0.018	1-1/2	09302	03726	
0.025	1/8	0.075	0.300	0.023	1-1/2	09304	03727	
0.030	1/8	0.090	0.360	0.028	2	09306	03728	
0.031	1/8	0.093	0.372	0.029	2	09308	03729	
0.035	1/8	0.105	0.420	0.032	2	09310	03730	
0.040	1/8	0.120	0.480	0.037	2	09312	03731	
0.045	1/8	0.135	0.540	0.042	2	09314	03732	
0.047	1/8	0.141	0.564	0.044	2	09316	03733	
0.050	1/8	0.150	0.600	0.047	2	09318	03734	
0.055	1/8	0.165	0.660	0.051	2	09320	03735	
0.060	1/8	0.180	0.720	0.056	2	09322	03736	
0.062	1/8	0.186	0.744	0.058	2	09324	03737	
0.065	1/8	0.195	0.780	0.061	2	09326	03738	
0.070	1/8	0.210	0.840	0.065	2	09328	03739	
0.075	1/8	0.225	0.900	0.070	2	09330	03740	
0.078	1/8	0.234	0.936	0.073	2-1/2	09332	03741	
0.080	1/8	0.240	0.960	0.075	2-1/2	09334	03742	
0.085	1/8	0.255	1.020	0.079	2-1/2	09336	03743	
0.090	1/8	0.270	1.080	0.084	2-1/2	09338	03744	
0.093	1/8	0.279	1.116	0.087	2-1/2	09340	03745	
0.095	1/8	0.285	1.140	0.089	2-1/2	09342	03746	
0.100	1/8	0.300	1.200	0.094	2-1/2	09344	03747	
0.110	1/8	0.330	1.320	0.103	2-1/2	09346	03748	
0.115	1/8	0.345	1.380	0.108	2-1/2	09348	03749	
0.120	1/8	0.360	1.440	0.112	2-1/2	09350	03750	

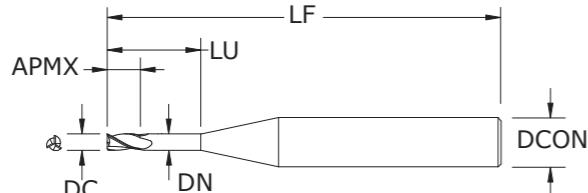
RE = 1/2 Cutting Diameter (DC)

## FRACTIONAL

**M3 • 1.5xD • 3xD Overall Reach**

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M3 • 1.5xD  
3xD**  
FRACTIONAL SERIES


New Expanded Tools

- Three flute design features improved chip space over four flutes and increased strength and feed capability over two flutes.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

inch							EDP NO.	
CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	UNCOATED	TI-NAMITE-A (AlTiN)	
0.010	1/8	0.015	0.030	0.009	2-1/2	09599	03508	
0.015	1/8	0.023	0.045	0.014	2-1/2	09606	03509	
0.020	1/8	0.030	0.060	0.018	2-1/2	09613	03510	
0.025	1/8	0.038	0.075	0.023	2-1/2	09620	03511	
0.030	1/8	0.045	0.090	0.028	2-1/2	09627	03512	
0.031	1/8	0.047	0.093	0.029	2-1/2	09634	03513	
0.035	1/8	0.053	0.105	0.032	2-1/2	09641	03514	
0.040	1/8	0.060	0.120	0.037	2-1/2	09648	03515	
0.045	1/8	0.068	0.135	0.042	2-1/2	09655	03516	
0.047	1/8	0.071	0.141	0.044	2-1/2	09662	03517	
0.050	1/8	0.075	0.150	0.047	2-1/2	09669	03518	
0.055	1/8	0.083	0.165	0.051	2-1/2	09676	03519	
0.060	1/8	0.090	0.180	0.056	2-1/2	09683	03520	
0.062	1/8	0.093	0.186	0.058	2-1/2	09690	03521	
0.065	1/8	0.098	0.195	0.061	2-1/2	09697	03522	
0.070	1/8	0.105	0.210	0.065	2-1/2	09704	03523	
0.075	1/8	0.113	0.225	0.070	2-1/2	09711	03524	
0.078	1/8	0.117	0.234	0.073	2-1/2	09718	03525	
0.080	1/8	0.120	0.240	0.075	2-1/2	09725	03526	
0.085	1/8	0.128	0.255	0.079	2-1/2	09732	03527	
0.090	1/8	0.135	0.270	0.084	2-1/2	09739	03528	
0.093	1/8	0.140	0.279	0.087	2-1/2	09746	03529	
0.095	1/8	0.143	0.285	0.089	2-1/2	09753	03530	
0.100	1/8	0.150	0.300	0.094	2-1/2	09760	03531	
0.110	1/8	0.165	0.330	0.103	2-1/2	09767	03532	
0.115	1/8	0.173	0.345	0.108	2-1/2	09774	03533	
0.120	1/8	0.180	0.360	0.112	2-1/2	09781	03534	

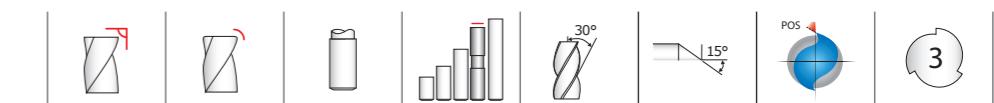
KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**FRACTIONAL  
M3 • M3CR • 1.5xD • 5xD Overall Reach**

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

New Expanded Tools

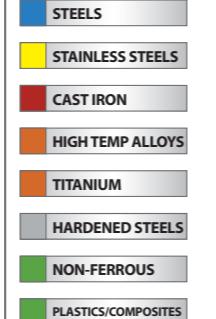
## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

RE = +0.0000/-0.0005



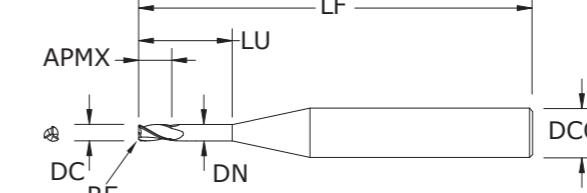
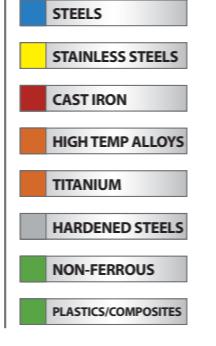
## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

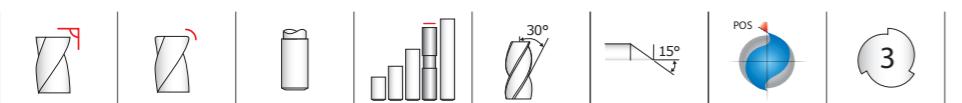
DCON = h<sub>6</sub>

RE = +0.0000/-0.0005


**M3 • M3CR • 1.5xD • 5xD  
Overall Reach**  
FRACTIONAL SERIES

inch							EDP NO.	
CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	CORNER RADIUS RE	UNCOATED	TI-NAMITE-A (AlTiN)
0.010	1/8	0.015	0.050	0.009	2-1/2	-	09600	03535
0.015	1/8	0.023	0.075	0.014	2-1/2	-	09607	03536
0.015	1/8	0.023	0.075	0.014	2-1/2	0.003	08782	08884
0.020	1/8	0.030	0.100	0.018	2-1/2	-	09614	03537
0.020	1/8	0.030	0.100	0.018	2-1/2	0.005	08785	08887
0.025	1/8	0.038	0.125	0.023	2-1/2	-	09621	03538
0.025	1/8	0.038	0.125	0.023	2-1/2	0.005	08788	08890
0.030	1/8	0.045	0.150	0.028	2-1/2	-	09628	03539
0.030	1/8	0.045	0.150	0.028	2-1/2	0.005	08791	08893
0.031	1/8	0.047	0.155	0.029	2-1/2	-	09635	03540
0.035	1/8	0.053	0.175	0.032	2-1/2	-	09642	03541
0.035	1/8	0.053	0.175	0.032	2-1/2	0.005	08794	08896
0.035	1/8	0.053	0.175	0.032	2-1/2	0.010	08797	08899
0.040	1/8	0.060	0.200	0.037	2-1/2	-	09649	03542
0.040	1/8	0.060	0.200	0.037	2-1/2	0.010	08803	08905
0.045	1/8	0.068	0.225	0.042	2-1/2	-	09656	03543
0.045	1/8	0.068	0.225	0.042	2-1/2	0.005	08800	08902
0.045	1/8	0.068	0.225	0.042	2-1/2	0.010	08803	08905
0.047	1/8	0.071	0.235	0.044	2-1/2	-	09663	03544
0.050	1/8	0.075	0.250	0.047	2-1/2	-	09670	03545
0.050	1/8	0.075	0.250	0.047	2-1/2	0.005	08812	08914
0.050	1/8	0.075	0.250	0.047	2-1/2	0.010	08815	08917
0.050	1/8	0.075	0.250	0.047	2-1/2	0.015	08818	08920
0.055	1/8	0.083	0.275	0.051	2-1/2	-	09677	03546
0.060	1/8	0.090	0.300	0.056	2-1/2	-	09684	03547
0.060	1/8	0.090	0.300	0.056	2-1/2	0.005	08821	08923
0.060	1/8	0.090	0.300	0.056	2-1/2	0.010	08824	08926
0.060	1/8	0.090	0.300	0.056	2-1/2	0.015	08827	08929
0.062	1/8	0.093	0.310					

## FRACTIONAL

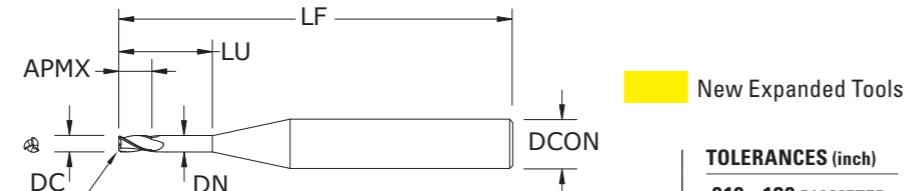
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5xD**

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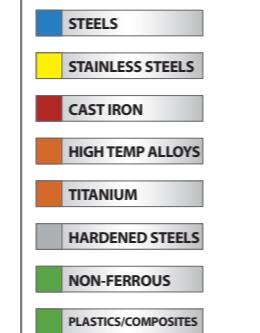
continued



New Expanded Tools

## TOLERANCES (inch)

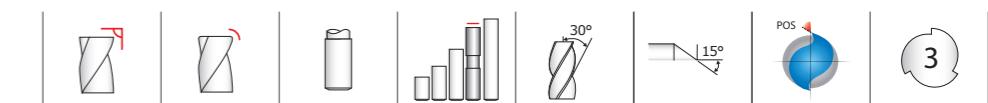
.010-.120 DIAMETER  
DC = +0.000/-0.001  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0005



CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	CORNER RADIUS RE	EDP NO.	
							UNCOATED	TI-NAMITE-A (AITIN)
0.070	1/8	0.105	0.350	0.065	2-1/2	0.015	08836	08938
0.075	1/8	0.113	0.375	0.070	2-1/2	—	09712	03551
0.078	1/8	0.117	0.390	0.073	2-1/2	—	09719	03552
0.080	1/8	0.120	0.400	0.075	2-1/2	—	09726	03553
0.080	1/8	0.120	0.400	0.075	2-1/2	0.005	08839	08941
0.080	1/8	0.120	0.400	0.075	2-1/2	0.010	08842	08944
0.080	1/8	0.120	0.400	0.075	2-1/2	0.015	08845	08947
0.085	1/8	0.128	0.425	0.079	2-1/2	—	09733	03554
0.090	1/8	0.135	0.450	0.084	2-1/2	—	09740	03555
0.090	1/8	0.135	0.450	0.084	2-1/2	0.005	08848	08950
0.090	1/8	0.135	0.450	0.084	2-1/2	0.010	08851	08953
0.090	1/8	0.135	0.450	0.084	2-1/2	0.015	08854	08956
0.093	1/8	0.140	0.465	0.087	2-1/2	—	09747	03556
0.095	1/8	0.143	0.475	0.089	2-1/2	—	09754	03557
0.100	1/8	0.150	0.500	0.094	2-1/2	—	09761	03558
0.100	1/8	0.150	0.500	0.094	2-1/2	0.005	08857	08959
0.100	1/8	0.150	0.500	0.094	2-1/2	0.010	08860	08962
0.100	1/8	0.150	0.500	0.094	2-1/2	0.015	08863	08965
0.110	1/8	0.165	0.550	0.103	2-1/2	—	09768	03559
0.110	1/8	0.165	0.550	0.103	2-1/2	0.005	08866	08968
0.110	1/8	0.165	0.550	0.103	2-1/2	0.010	08869	08971
0.110	1/8	0.165	0.550	0.103	2-1/2	0.015	08872	08974
0.115	1/8	0.173	0.575	0.108	2-1/2	—	09775	03560
0.120	1/8	0.180	0.600	0.112	2-1/2	—	09782	03561
0.120	1/8	0.180	0.600	0.112	2-1/2	0.005	08875	08977
0.120	1/8	0.180	0.600	0.112	2-1/2	0.010	08878	08980
0.120	1/8	0.180	0.600	0.112	2-1/2	0.015	08881	08983

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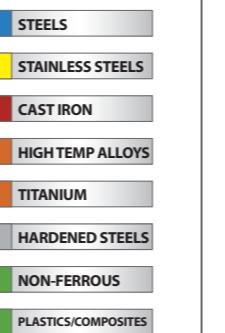
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New Expanded Tools

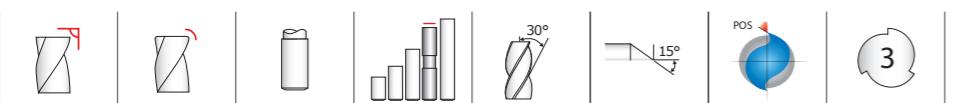
## TOLERANCES (inch)

.010-.120 DIAMETER  
DC = +0.000/-0.001  
DCON = h<sub>6</sub>  
RE = +0.0000/-0.0005



CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	CORNER RADIUS RE	EDP NO.	
							UNCOATED	TI-NAMITE-A (AITIN)
0.010	1/8	0.015	0.080	0.009	2-1/2	—	09601	03562
0.015	1/8	0.023	0.120	0.014	2-1/2	—	09608	03563
0.015	1/8	0.023	0.120	0.014	2-1/2	0.003	08783	08885
0.020	1/8	0.030	0.160	0.018	2-1/2	—	09615	03564
0.020	1/8	0.030	0.160	0.018	2-1/2	0.005	08786	08888
0.025	1/8	0.038	0.200	0.023	2-1/2	—	09622	03565
0.025	1/8	0.038	0.200	0.023	2-1/2	0.005	08789	08891
0.030	1/8	0.045	0.240	0.028	2-1/2	—	09629	03566
0.030	1/8	0.045	0.240	0.028	2-1/2	0.005	08792	08894
0.031	1/8	0.047	0.248	0.029	2-1/2	—	09636	03567
0.035	1/8	0.053	0.280	0.032	2-1/2	—	09643	03568
0.035	1/8	0.053	0.280	0.032	2-1/2	0.005	08795	08897
0.035	1/8	0.053	0.280	0.032	2-1/2	0.010	08798	08900
0.040	1/8	0.060	0.320	0.037	2-1/2	—	09650	03569
0.040	1/8	0.060	0.320	0.037	2-1/2	0.010	08801	08903
0.045	1/8	0.068	0.360	0.042	2-1/2	—	09657	03570
0.045	1/8	0.068	0.360	0.042	2-1/2	0.005	08807	08909
0.045	1/8	0.068	0.360	0.042	2-1/2	0.010	08810	08912
0.047	1/8	0.071	0.376	0.044	2-1/2	—	09664	03571
0.050	1/8	0.075	0.400	0.047	2-1/2	—	09671	03572
0.050	1/8	0.075	0.400	0.047	2-1/2	0.005	08813	08915
0.050	1/8	0.075	0.400	0.047	2-1/2	0.010	08816	08918
0.050	1/8	0.075	0.400	0.047	2-1/2	0.015	08819	08921
0.055	1/8	0.083	0.440	0.051	2-1/2	—	09678	03573
0.060	1/8	0.090	0.480	0.056	2-1/2	—	09685	03574
0.060	1/8	0.090	0.480	0.056	2-1/2	0.005	08822	08924
0.060	1/8	0.090	0.480	0.056	2-1/2	0.010	08825	08927
0.060	1/8	0.090	0.480	0.056	2-1/2	0.015	08828	08930
0.062	1/8	0.093	0.496	0.058	2-1/2	—	09692	03575
0.065	1/8	0.098	0.520	0.061	2-1/2	—	09699	03576
0.070	1/8	0.105	0.560	0.065	2-1/2	—	09706	03577
0.070	1/8	0.105	0.560	0.065	2-1/2	0.005	08831	08933
0.070	1/8	0.105	0.560	0.065	2-1/2	0.010	08834	08936
0.070	1/8	0.105	0.560	0.065	2-1/2	0.015	08837	08939
0.075	1							

## FRACTIONAL

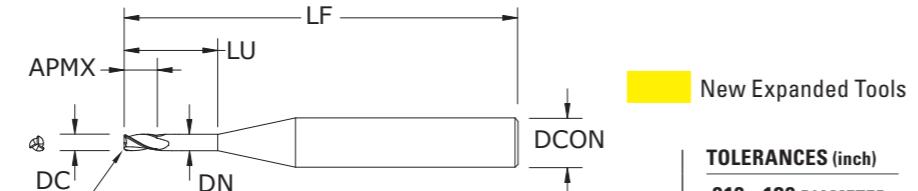
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**MICRO  
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Solid Carbide Tools

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8xD**

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New Expanded Tools

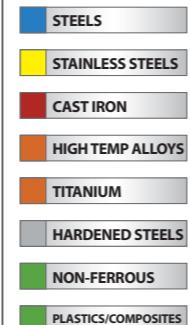
## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

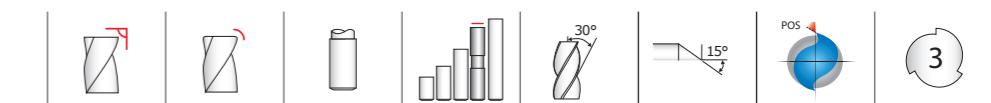
RE = +0.0000/-0.0005



CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	CORNER RADIUS RE	EDP NO.	
							UNCOATED	TI-NAMITE-A (AITiN)
0.078	1/8	0.117	0.624	0.073	2-1/2	-	09720	03579
0.080	1/8	0.120	0.640	0.075	2-1/2	-	09727	03580
0.080	1/8	0.120	0.640	0.075	2-1/2	0.005	08840	08942
0.080	1/8	0.120	0.640	0.075	2-1/2	0.010	08843	08945
0.080	1/8	0.120	0.640	0.075	2-1/2	0.015	08846	08948
0.085	1/8	0.128	0.680	0.079	2-1/2	-	09734	03581
0.090	1/8	0.135	0.720	0.084	2-1/2	-	09741	03582
0.090	1/8	0.135	0.720	0.084	2-1/2	0.005	08849	08951
0.090	1/8	0.135	0.720	0.084	2-1/2	0.010	08852	08954
0.090	1/8	0.135	0.720	0.084	2-1/2	0.015	08855	08957
0.093	1/8	0.140	0.744	0.087	2-1/2	-	09748	03583
0.095	1/8	0.143	0.760	0.089	2-1/2	-	09755	03584
0.100	1/8	0.150	0.800	0.094	2-1/2	-	09762	03585
0.100	1/8	0.150	0.800	0.094	2-1/2	0.005	08858	08960
0.100	1/8	0.150	0.800	0.094	2-1/2	0.010	08861	08963
0.100	1/8	0.150	0.800	0.094	2-1/2	0.015	08864	08966
0.110	1/8	0.165	0.880	0.103	2-1/2	-	09769	03586
0.110	1/8	0.165	0.880	0.103	2-1/2	0.005	08867	08969
0.110	1/8	0.165	0.880	0.103	2-1/2	0.010	08870	08972
0.110	1/8	0.165	0.880	0.103	2-1/2	0.015	08873	08975
0.115	1/8	0.173	0.920	0.108	2-1/2	-	09776	03587
0.120	1/8	0.180	0.960	0.112	2-1/2	-	09783	03588
0.120	1/8	0.180	0.960	0.112	2-1/2	0.005	08876	08978
0.120	1/8	0.180	0.960	0.112	2-1/2	0.010	08879	08981
0.120	1/8	0.180	0.960	0.112	2-1/2	0.015	08882	08984

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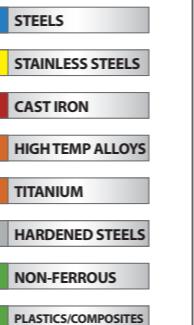
## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

RE = +0.0000/-0.0005

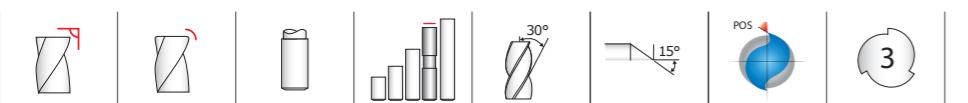


## inch

## CUTTING DIAMETER DC SHANK DIAMETER DCON LENGTH OF CUT APMX REACH LU NECK DIAMETER DN OVERALL LENGTH LF CORNER RADIUS RE UNCOATED TI-NAMITE-A (AITiN) EDP NO.

0.010	1/8	0.015	0.120	0.009	2-1/2	-	09595	03589	03589
0.015	1/8	0.023	0.180	0.014	2-1/2	-	09602	03590	03590
0.015	1/8	0.023	0.180	0.014	2-1/2	0.003	08784	08886	08886
0.020	1/8	0.030	0.240	0.018	2-1/2	-	09609	03591	03591
0.020	1/8	0.030	0.240	0.018	2-1/2	0.005	08787	08889	08889
0.025	1/8	0.038	0.300	0.023	2-1/2	-	09616	03592	03592
0.025	1/8	0.038	0.300	0.023	2-1/2	0.005	08790	08892	08892
0.030	1/8	0.045	0.360	0.028	2-1/2	-	09623	03593	03593
0.030	1/8	0.045	0.360	0.028	2-1/2	0.005	08793	08895	08895
0.031	1/8	0.047	0.372	0.029	2-1/2	-	09630	03594	03594
0.035	1/8	0.053	0.420	0.032	2-1/2	-	09637	03595	03595
0.035	1/8	0.053	0.420	0.032	2-1/2	0.005	08796	08898	08898
0.035	1/8	0.053	0.420	0.032	2-1/2	0.010	08799	08901	08901
0.040	1/8	0.060	0.480	0.037	2-1/2	-	09644	03596	03596
0.040	1/8	0.060	0.480	0.037	2-1/2	0.010	08802	08904	08904
0.040	1/8	0.060	0.480	0.037	2-1/2	0.010	08805	08907	08907
0.045	1/8	0.068	0.540	0.042	2-1/2	-	09651	03597	03597
0.045	1/8	0.068	0.540	0.042	2-1/2	0.005	08808	08910	08910
0.045	1/8	0.068	0.540	0.042	2-1/2	0.010	08811	08913	08913
0.047	1/8	0.071	0.564	0.044	2-1/2	-	09658	03598	03598
0.050	1/8	0.075	0.600	0.047	2-1/2	-	09665	03599	03599
0.050	1/8	0.075	0.600	0.047	2-1/2	0.005	08814	08916	08916
0.050	1/8	0.075	0.600	0.047	2-1/2	0.010	08817	08919	08919
0.050	1/8	0.075	0.600	0.047	2-1/2	0.015	08820	08922	08922
0.055	1/8	0.083	0.660	0.051	2-1/2	-	09672	03600	03600
0.060	1/8	0.090	0.720	0.056	2-1/2	-	09679	03601	03601
0.060	1/8	0.090	0.720	0.056	2-1/2	0.005	08823	08925	08925
0.060	1/8	0.090	0.720	0.056	2-1/2	0.010	08826	08928	08928
0.060	1/8	0.090	0.720	0.056	2-1/2	0.015	08829	08931	08931
0.062	1/8	0.093	0.744	0.058	2-1/2	-	09686	03602	03602
0.065	1/8	0.098	0.780	0.061	2-1/2	-	09693	03603	03603
0.070	1/8	0.105	0.840	0.065	2-1/2	-	09700	03604	03604
0.070	1/8	0.105	0.840	0.065	2-1/2	0.005	08832	089	

## FRACTIONAL

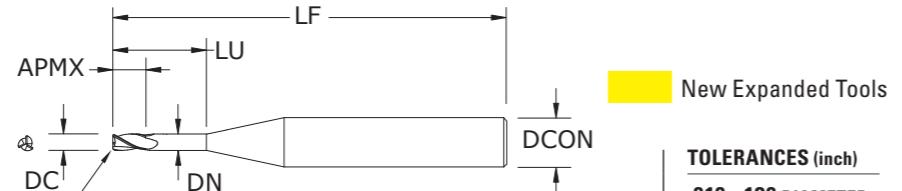
**M3 • M3CR • 1.5xD • 12xD Overall Reach**
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**M3 • M3CR • 1.5xD  
12xD**

FRACTIONAL SERIES

continued



New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

RE = +0.0000/-0.0005

## STEELS

## STAINLESS STEELS

## CAST IRON

## HIGH TEMP ALLOYS

## TITANIUM

## HARDENED STEELS

## NON-FERROUS

## PLASTICS/COMPOSITES

New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

## STEELS

## STAINLESS STEELS

## CAST IRON

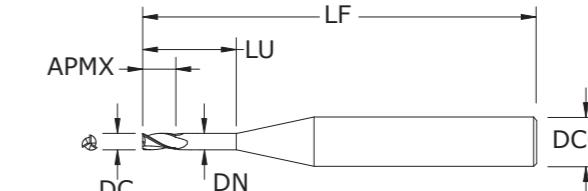
## HIGH TEMP ALLOYS

## TITANIUM

## HARDENED STEELS

## NON-FERROUS

## PLASTICS/COMPOSITES

**M3 • 1.5xD  
15xD**

FRACTIONAL SERIES

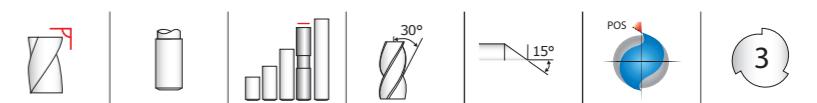
New Expanded Tools

## inch

## EDP NO.

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	UNCOATED	TI-NAMITE-A (AITIN)	EDP NO.
0.010	1/8	0.015	0.150	0.009	2-1/2	09596	03616	
0.015	1/8	0.023	0.225	0.014	2-1/2	09603	03617	
0.020	1/8	0.030	0.300	0.018	2-1/2	09610	03618	
0.025	1/8	0.038	0.375	0.023	2-1/2	09617	03619	
0.030	1/8	0.045	0.450	0.028	2-1/2	09624	03620	
0.031	1/8	0.047	0.465	0.029	2-1/2	09631	03621	
0.035	1/8	0.053	0.525	0.032	2-1/2	09638	03622	
0.040	1/8	0.060	0.600	0.037	2-1/2	09645	03623	
0.045	1/8	0.068	0.675	0.042	2-1/2	09652	03624	
0.047	1/8	0.071	0.705	0.044	2-1/2	09659	03625	
0.050	1/8	0.075	0.750	0.047	2-1/2	09666	03626	
0.055	1/8	0.083	0.825	0.051	2-1/2	09673	03627	
0.060	1/8	0.090	0.900	0.056	2-1/2	09680	03628	
0.062	1/8	0.093	0.930	0.058	2-1/2	09687	03629	
0.065	1/8	0.098	0.975	0.061	2-1/2	09694	03630	
0.070	1/8	0.105	1.050	0.065	2-1/2	09701	03631	
0.075	1/8	0.113	1.125	0.070	2-1/2	09708	03632	
0.078	1/8	0.117	1.170	0.073	2-1/2	09715	03633	
0.080	1/8	0.120	1.200	0.075	2-1/2	09722	03634	
0.085	1/8	0.128	1.275	0.079	2-1/2	09729	03635	
0.090	1/8	0.135	1.350	0.084	2-1/2	09736	03636	
0.093	1/8	0.140	1.395	0.087	3	09743	03637	
0.095	1/8	0.143	1.425	0.089	3	09750	03638	
0.100	1/8	0.150	1.500	0.094	3	09757	03639	
0.110	1/8	0.165	1.650	0.103	3	09764	03640	
0.115	1/8	0.173	1.725	0.108	3	09771	03641	
0.120	1/8	0.180	1.800	0.112	3	09778	03642	

## FRACTIONAL

**M3 • 1.5xD • 15xD Overall Reach**

- Three flute design features improved chip space over four flutes and increased strength and feed capability over two flutes.

- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.

- High performance carbide substrate designed specifically for Micro Tool applications.

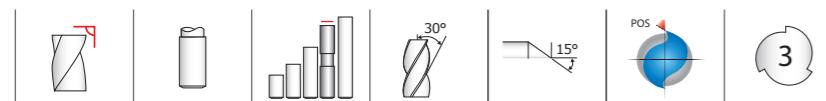
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.

- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.

- All tools in stock to meet customer order requirements.

- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

## FRACTIONAL

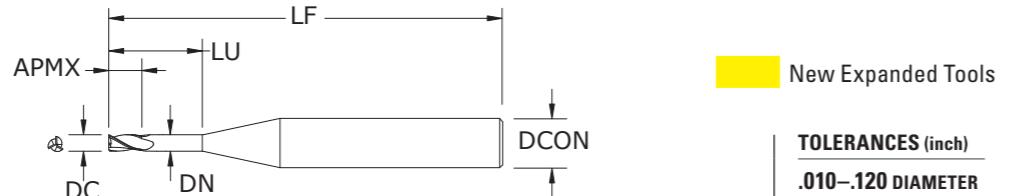
**M3 • 1.5xD • 20xD Overall Reach**
**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M3 • 1.5xD  
20xD**

FRACTIONAL SERIES

- Three flute design features improved chip space over four flutes and increased strength and feed capability over two flutes.
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New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

## STEELS

## STAINLESS STEELS

## CAST IRON

## HIGH TEMP ALLOYS

## TITANIUM

## HARDENED STEELS

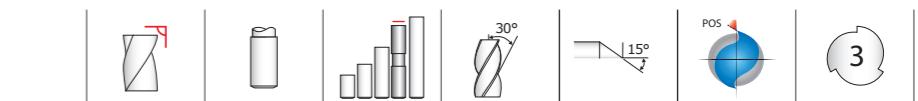
## NON-FERROUS

## PLASTICS/COMPOSITES

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			OVERALL LENGTH LF	EDP NO.	
		LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN		UNCOATED	TI-NAMITE-A (AITIN)
0.010	1/8	0.015	0.200	0.009	2-1/2	09597	03643
0.015	1/8	0.023	0.300	0.014	2-1/2	09604	03644
0.020	1/8	0.030	0.400	0.018	2-1/2	09611	03645
0.025	1/8	0.038	0.500	0.023	2-1/2	09618	03646
0.030	1/8	0.045	0.600	0.028	2-1/2	09625	03647
0.031	1/8	0.047	0.620	0.029	2-1/2	09632	03648
0.035	1/8	0.053	0.700	0.032	2-1/2	09639	03649
0.040	1/8	0.060	0.800	0.037	2-1/2	09646	03650
0.045	1/8	0.068	0.900	0.042	2-1/2	09653	03651
0.047	1/8	0.071	0.940	0.044	2-1/2	09660	03652
0.050	1/8	0.075	1.000	0.047	2-1/2	09667	03653
0.055	1/8	0.083	1.100	0.051	2-1/2	09674	03654
0.060	1/8	0.090	1.200	0.056	2-1/2	09681	03655
0.062	1/8	0.093	1.240	0.058	2-1/2	09688	03656
0.065	1/8	0.098	1.300	0.061	3	09695	03657
0.070	1/8	0.105	1.400	0.065	3	09702	03658
0.075	1/8	0.113	1.500	0.070	3	09709	03659
0.078	1/8	0.117	1.560	0.073	3	09716	03660
0.080	1/8	0.120	1.600	0.075	3	09723	03661
0.085	1/8	0.128	1.700	0.079	3	09730	03662
0.090	1/8	0.135	1.800	0.084	3	09737	03663
0.093	1/8	0.140	1.860	0.087	3	09744	03664
0.095	1/8	0.143	1.900	0.089	3	09751	03665
0.100	1/8	0.150	2.000	0.094	4	09758	03666
0.110	1/8	0.165	2.200	0.103	4	09765	03667
0.115	1/8	0.173	2.300	0.108	4	09772	03668
0.120	1/8	0.180	2.400	0.112	4	09779	03669

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**FRACTIONAL  
M3 • 1.5xD • 20xD Overall Reach**

New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

## STEELS

## STAINLESS STEELS

## CAST IRON

## HIGH TEMP ALLOYS

## TITANIUM

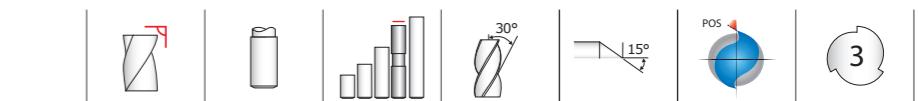
## HARDENED STEELS

## NON-FERROUS

## PLASTICS/COMPOSITES

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			OVERALL LENGTH LF	EDP NO.	
		LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN		UNCOATED	TI-NAMITE-A (AITIN)
0.010	1/8	0.015	0.250	0.009	2-1/2	09598	03670
0.015	1/8	0.023	0.375	0.014	2-1/2	09605	03671
0.020	1/8	0.030	0.500	0.018	2-1/2	09612	03672
0.025	1/8	0.038	0.625	0.023	2-1/2	09619	03673
0.030	1/8	0.045	0.750	0.028	2-1/2	09626	03674
0.031	1/8	0.047	0.775	0.029	2-1/2	09633	03675
0.035	1/8	0.053	0.875	0.032	2-1/2	09640	03676
0.040	1/8	0.060	1.000	0.037	2-1/2	09647	03677
0.045	1/8	0.068	1.125	0.042	2-1/2	09654	03678
0.047	1/8	0.071	1.175	0.044	2-1/2	09661	03679
0.050	1/8	0.075	1.250	0.047	2-1/2	09668	03680
0.055	1/8	0.083	1.375	0.051	3	09675	03681
0.060	1/8	0.090	1.500	0.056	3	09682	03682
0.062	1/8	0.093	1.550	0.058	3	09689	03683
0.065	1/8	0.098	1.625	0.061	3	09696	03684
0.070	1/8	0.105	1.750	0.065	3	09703	03685
0.075	1/8	0.113	1.875	0.070	3	09710	03686
0.078	1/8	0.117	1.950	0.073	4	09717	03687
0.080	1/8	0.120	2.000	0.075	4	09724	03688
0.085	1/8	0.128	2.125	0.079	4	09731	03689
0.090	1/8	0.135	2.250	0.084	4	09738	03690
0.093	1/8	0.140	2.325	0.087	4	09745	03691
0.095	1/8	0.143	2.375	0.089	4	09752	03692
0.100	1/8	0.150	2.500	0.094	4	09759	03693
0.110	1/8	0.165	2.750	0.103	4	09766	03694
0.115	1/8	0.173	2.875	0.108	4	09773	03695
0.120	1/8	0.180	3.000	0.112	4	09780	03696

## FRACTIONAL

**M3 • 1.5xD • 25xD Overall Reach**

## KYOCERA Solid Tools

- Three flute design features improved chip space over four flutes and increased strength and feed capability over two flutes.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

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- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

## FRACTIONAL

**M3B • 1.5xD • 3xD Overall Reach**

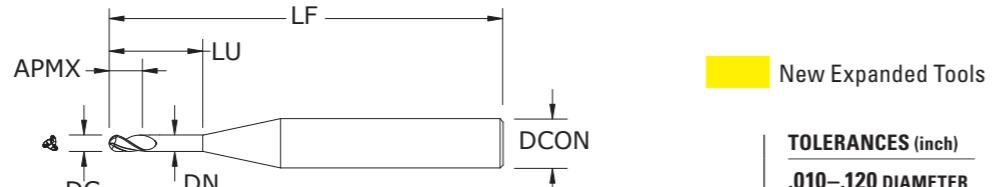
**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M3B • 1.5xD  
3xD**

FRACTIONAL SERIES

- Three flute design features improved chip space over four flutes and increased strength and feed capability over two flutes.
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- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

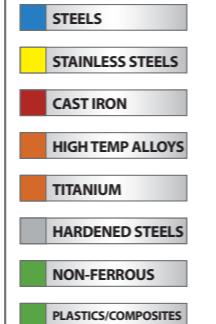


New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

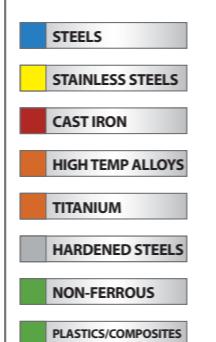
DC = +0.000/-0.001

DCON = h<sub>6</sub>

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

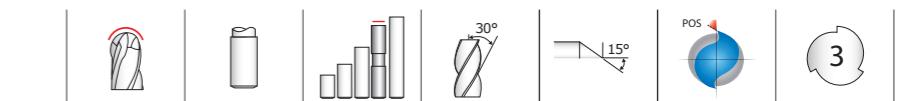
DCON = h<sub>6</sub>

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			OVERALL LENGTH LF	UNCOATED	TI-NAMITE-A (AITiN)	EDP NO.
		LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN				
0.010	1/8	0.015	0.030	0.009	2-1/2	09410	03805	
0.015	1/8	0.023	0.045	0.014	2-1/2	09417	03806	
0.020	1/8	0.030	0.060	0.018	2-1/2	09424	03807	
0.025	1/8	0.038	0.075	0.023	2-1/2	09431	03808	
0.030	1/8	0.045	0.090	0.028	2-1/2	09438	03809	
0.031	1/8	0.047	0.093	0.029	2-1/2	09445	03810	
0.035	1/8	0.053	0.105	0.032	2-1/2	09452	03811	
0.040	1/8	0.060	0.120	0.037	2-1/2	09459	03812	
0.045	1/8	0.068	0.135	0.042	2-1/2	09466	03813	
0.047	1/8	0.071	0.141	0.044	2-1/2	09473	03814	
0.050	1/8	0.075	0.150	0.047	2-1/2	09480	03815	
0.055	1/8	0.083	0.165	0.051	2-1/2	09487	03816	
0.060	1/8	0.090	0.180	0.056	2-1/2	09494	03817	
0.062	1/8	0.093	0.186	0.058	2-1/2	09501	03818	
0.065	1/8	0.098	0.195	0.061	2-1/2	09508	03819	
0.070	1/8	0.105	0.210	0.065	2-1/2	09515	03820	
0.075	1/8	0.113	0.225	0.070	2-1/2	09522	03821	
0.078	1/8	0.117	0.234	0.073	2-1/2	09529	03822	
0.080	1/8	0.120	0.240	0.075	2-1/2	09536	03823	
0.085	1/8	0.128	0.255	0.079	2-1/2	09543	03824	
0.090	1/8	0.135	0.270	0.084	2-1/2	09550	03825	
0.093	1/8	0.140	0.279	0.087	2-1/2	09557	03826	
0.095	1/8	0.143	0.285	0.089	2-1/2	09564	03827	
0.100	1/8	0.150	0.300	0.094	2-1/2	09571	03828	
0.110	1/8	0.165	0.330	0.103	2-1/2	09578	03829	
0.115	1/8	0.173	0.345	0.108	2-1/2	09585	03830	
0.120	1/8	0.180	0.360	0.112	2-1/2	09592	03831	

RE = 1/2 Cutting Diameter (DC)

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KYOCERA

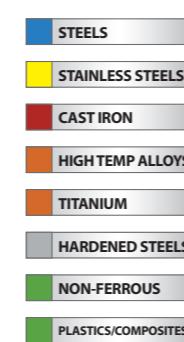
**FRACTIONAL  
M3B • 1.5xD • 5xD Overall Reach**

New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

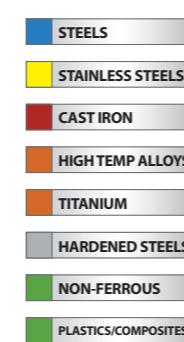
DC = +0.000/-0.001

DCON = h<sub>6</sub>

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

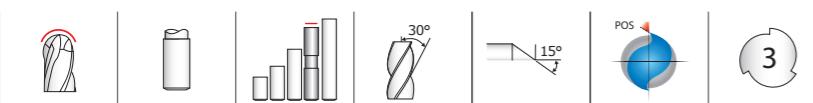
DCON = h<sub>6</sub>

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			OVERALL LENGTH LF	UNCOATED	TI-NAMITE-A (AITiN)	EDP NO.
		LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN				
0.010	1/8	0.015	0.050	0.009	2-1/2	09411	03832	
0.015	1/8	0.023	0.075	0.014	2-1/2	09418	03833	
0.020	1/8	0.030	0.100	0.018	2-1/2	09425	03834	
0.025	1/8	0.038	0.125	0.023	2-1/2	09432	03835	
0.030	1/8	0.045	0.150	0.028	2-1/2	09439	03836	
0.031	1/8	0.047	0.155	0.029	2-1/2	09446	03837	
0.035	1/8	0.053	0.175	0.032	2-1/2	09453	03838	
0.040	1/8	0.060	0.200	0.037	2-1/2	09460	03839	
0.045	1/8	0.068	0.225	0.042	2-1/2	09467	03840	
0.047	1/8	0.071	0.235	0.044	2-1/2	09474	03841	
0.050	1/8	0.075	0.250	0.047	2-1/2	09481	03842	
0.055	1/8	0.083	0.275	0.051	2-1/2	09488	03843	
0.060	1/8	0.090	0.300	0.056	2-1/2	09495	03844	
0.062	1/8	0.093	0.310	0.058	2-1/2	09502	03845	
0.065	1/8	0.098	0.325	0.061	2-1/2	09509	03846	
0.070	1/8	0.105	0.350	0.065	2-1/2	09516	03847	
0.075	1/8	0.113	0.375	0.070	2-1/2	09523	03848	
0.078	1/8	0.117	0.390	0.073	2-1/2	09530	03849	
0.080	1/8	0.120	0.400	0.075	2-1/2	09537	03850	
0.085	1/8	0.128	0.425	0.079	2-1/2	09544	03851	
0.090	1/8	0.135	0.450	0.084	2-1/2	09551	03852	
0.093	1/8	0.140	0.465	0.087	2-1/2	09558	03853	
0.095	1/8	0.143	0.475	0.089	2-1/2	09565	03854	
0.100	1/8	0.150	0.500	0.094	2-1/2	09572	03855	
0.110	1/8	0.165	0.550	0.103	2-1/2	09579	03856	
0.115	1/8	0.173	0.575	0.108	2-1/2	09586	03857	
0.120	1/8	0.180	0.600	0.112	2-1/2	09593	03858	

RE = 1/2 Cutting Diameter (DC)

## FRACTIONAL

## FRACTIONAL

**M3B • 1.5xD • 8xD Overall Reach**

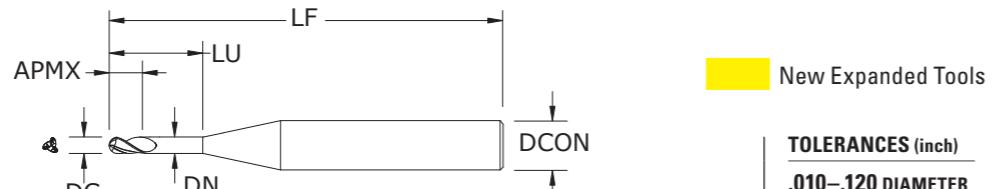
**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M3B • 1.5xD  
8xD**

FRACTIONAL SERIES

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- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

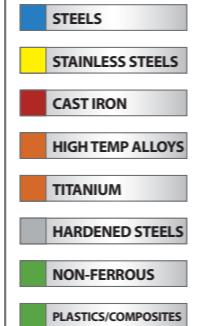


New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

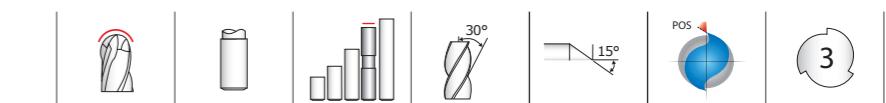
DCON = h<sub>6</sub>

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			OVERALL LENGTH LF	UNCOATED	TI-NAMITE-A (AITiN)	EDP NO.
		LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN				
0.010	1/8	0.015	0.080	0.009	2-1/2	09412	03859	
0.015	1/8	0.023	0.120	0.014	2-1/2	09419	03860	
0.020	1/8	0.030	0.160	0.018	2-1/2	09426	03861	
0.025	1/8	0.038	0.200	0.023	2-1/2	09433	03862	
0.030	1/8	0.045	0.240	0.028	2-1/2	09440	03863	
0.031	1/8	0.047	0.248	0.029	2-1/2	09447	03864	
0.035	1/8	0.053	0.280	0.032	2-1/2	09454	03865	
0.040	1/8	0.060	0.320	0.037	2-1/2	09461	03866	
0.045	1/8	0.068	0.360	0.042	2-1/2	09468	03867	
0.047	1/8	0.071	0.376	0.044	2-1/2	09475	03868	
0.050	1/8	0.075	0.400	0.047	2-1/2	09482	03869	
0.055	1/8	0.083	0.440	0.051	2-1/2	09489	03870	
0.060	1/8	0.090	0.480	0.056	2-1/2	09496	03871	
0.062	1/8	0.093	0.496	0.058	2-1/2	09503	03872	
0.065	1/8	0.098	0.520	0.061	2-1/2	09510	03873	
0.070	1/8	0.105	0.560	0.065	2-1/2	09517	03874	
0.075	1/8	0.113	0.600	0.070	2-1/2	09524	03875	
0.078	1/8	0.117	0.624	0.073	2-1/2	09531	03876	
0.080	1/8	0.120	0.640	0.075	2-1/2	09538	03877	
0.085	1/8	0.128	0.680	0.079	2-1/2	09545	03878	
0.090	1/8	0.135	0.720	0.084	2-1/2	09552	03879	
0.093	1/8	0.140	0.744	0.087	2-1/2	09559	03880	
0.095	1/8	0.143	0.760	0.089	2-1/2	09566	03881	
0.100	1/8	0.150	0.800	0.094	2-1/2	09573	03882	
0.110	1/8	0.165	0.880	0.103	2-1/2	09580	03883	
0.115	1/8	0.173	0.920	0.108	2-1/2	09587	03884	
0.120	1/8	0.180	0.960	0.112	2-1/2	09594	03885	

RE = 1/2 Cutting Diameter (DC)

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**FRACTIONAL  
M3B • 1.5xD • 12xD Overall Reach**

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

## FRACTIONAL

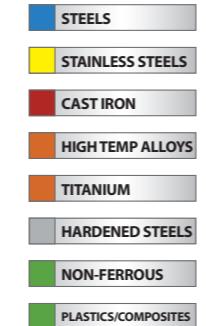
**M3B • 1.5xD  
12xD**

FRACTIONAL SERIES

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			OVERALL LENGTH LF	UNCOATED	TI-NAMITE-A (AITiN)	EDP NO.
		LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN				
0.010	1/8	0.015	0.120	0.009	2-1/2	09406	03886	
0.015	1/8	0.023	0.180	0.014	2-1/2	09413	03887	
0.020	1/8	0.030	0.240	0.018	2-1/2	09420	03888	
0.025	1/8	0.038	0.300	0.023	2-1/2	09427	03889	
0.030	1/8	0.045	0.360	0.028	2-1/2	09434	03890	
0.031	1/8	0.047	0.372	0.029	2-1/2	09441	03891	
0.035	1/8	0.053	0.420	0.032	2-1/2	09448	03892	
0.040	1/8	0.060	0.480	0.037	2-1/2	09455	03893	
0.045	1/8	0.068	0.540	0.042	2-1/2	09462	03894	
0.047	1/8	0.071	0.564	0.044	2-1/2	09469	03895	
0.050	1/8	0.075	0.600	0.047	2-1/2	09476	03896	
0.055	1/8	0.083	0.660	0.051	2-1/2	09483	03897	
0.060	1/8	0.090	0.720	0.056	2-1/2	09490	03898	
0.062	1/8	0.093	0.744	0.058	2-1/2	09497	03899	
0.065	1/8	0.098	0.780	0.061	2-1/2	09504	03900	
0.070	1/8	0.105	0.840	0.065	2-1/2	09511	03901	
0.075	1/8	0.113	0.900	0.070	2-1/2	09518	03902	
0.078	1/8	0.117	0.936	0.073	2-1/2	09525	03903	
0.080	1/8	0.120	0.960	0.075	2-1/2	09532	03904	
0.085	1/8	0.128	1.020	0.079	2-1/2	09539	03905	
0.090	1/8	0.135	1.080	0.084	2-1/2	09546	03906	
0.093	1/8	0.140	1.116	0.087	2-1/2	09553	03907	
0.095	1/8	0.143	1.140	0.089	2-1/2	09560	03908	
0.100	1/8	0.150	1.200	0.094	2-1/2	09567	03909	
0.110	1/8	0.165	1.320	0.103	2-1/2	09574	03910	
0.115	1/8	0.173	1.380	0.108	2-1/2	09581	03911	
0.120	1/8	0.180	1.440	0.112	2-1/2	09588	03912	

RE = 1/2 Cutting Diameter (DC)

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

## FRACTIONAL

**M3B • 1.5xD • 15xD Overall Reach**

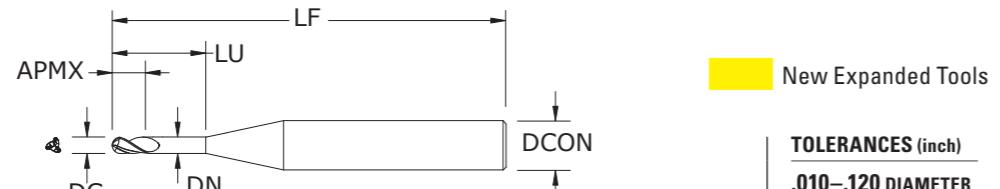
**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M3B • 1.5xD  
15xD**

FRACTIONAL SERIES

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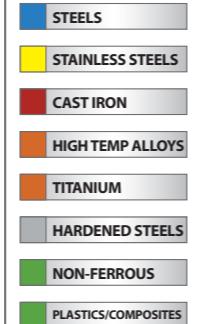


New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			OVERALL LENGTH LF	EDP NO.	
		LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN		UNCOATED	TI-NAMITE-A (AITIN)
0.010	1/8	0.015	0.150	0.009	2-1/2	09407	03913
0.015	1/8	0.023	0.225	0.014	2-1/2	09414	03914
0.020	1/8	0.030	0.300	0.018	2-1/2	09421	03915
0.025	1/8	0.038	0.375	0.023	2-1/2	09428	03916
0.030	1/8	0.045	0.450	0.028	2-1/2	09435	03917
0.031	1/8	0.047	0.465	0.029	2-1/2	09442	03918
0.035	1/8	0.053	0.525	0.032	2-1/2	09449	03919
0.040	1/8	0.060	0.600	0.037	2-1/2	09456	03920
0.045	1/8	0.068	0.675	0.042	2-1/2	09463	03921
0.047	1/8	0.071	0.705	0.044	2-1/2	09470	03922
0.050	1/8	0.075	0.750	0.047	2-1/2	09477	03923
0.055	1/8	0.083	0.825	0.051	2-1/2	09484	03924
0.060	1/8	0.090	0.900	0.056	2-1/2	09491	03925
0.062	1/8	0.093	0.930	0.058	2-1/2	09498	03926
0.065	1/8	0.098	0.975	0.061	2-1/2	09505	03927
0.070	1/8	0.105	1.050	0.065	2-1/2	09512	03928
0.075	1/8	0.113	1.125	0.070	2-1/2	09519	03929
0.078	1/8	0.117	1.170	0.073	2-1/2	09526	03930
0.080	1/8	0.120	1.200	0.075	2-1/2	09533	03931
0.085	1/8	0.128	1.275	0.079	2-1/2	09540	03932
0.090	1/8	0.135	1.350	0.084	2-1/2	09547	03933
0.093	1/8	0.140	1.395	0.087	3	09554	03934
0.095	1/8	0.143	1.425	0.089	3	09561	03935
0.100	1/8	0.150	1.500	0.094	3	09568	03936
0.110	1/8	0.165	1.650	0.103	3	09575	03937
0.115	1/8	0.173	1.725	0.108	3	09582	03938
0.120	1/8	0.180	1.800	0.112	3	09589	03939

RE = 1/2 Cutting Diameter (DC)

**MICRO  
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KYOCERA

**FRACTIONAL  
M3B • 1.5xD • 20xD Overall Reach**

New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			OVERALL LENGTH LF	EDP NO.	
		LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN		UNCOATED	TI-NAMITE-A (AITIN)
0.010	1/8	0.015	0.200	0.009	2-1/2	09408	03940
0.015	1/8	0.023	0.300	0.014	2-1/2	09415	03941
0.020	1/8	0.030	0.400	0.018	2-1/2	09422	03942
0.025	1/8	0.038	0.500	0.023	2-1/2	09429	03943
0.030	1/8	0.045	0.600	0.028	2-1/2	09436	03944
0.031	1/8	0.047	0.620	0.029	2-1/2	09443	03945
0.035	1/8	0.053	0.700	0.032	2-1/2	09450	03946
0.040	1/8	0.060	0.800	0.037	2-1/2	09457	03947
0.045	1/8	0.068	0.900	0.042	2-1/2	09464	03948
0.047	1/8	0.071	0.940	0.044	2-1/2	09471	03949
0.050	1/8	0.075	1.000	0.047	2-1/2	09478	03950
0.055	1/8	0.083	1.100	0.051	2-1/2	09485	03951
0.060	1/8	0.090	1.200	0.056	2-1/2	09492	03952
0.062	1/8	0.093	1.240	0.058	2-1/2	09499	03953
0.065	1/8	0.098	1.300	0.061	3	09506	03954
0.070	1/8	0.105	1.400	0.065	3	09513	03955
0.075	1/8	0.113	1.500	0.070	3	09520	03956
0.078	1/8	0.117	1.560	0.073	3	09527	03957
0.080	1/8	0.120	1.600	0.075	3	09534	03958
0.085	1/8	0.128	1.700	0.079	3	09541	03959
0.090	1/8	0.135	1.800	0.084	3	09548	03960
0.093	1/8	0.140	1.860	0.087	3	09555	03961
0.095	1/8	0.143	1.900	0.089	3	09562	03962
0.100	1/8	0.150	2.000	0.094	4	09569	03963
0.110	1/8	0.165	2.200	0.103	4	09576	03964
0.115	1/8	0.173	2.300	0.108	4	09583	03965
0.120	1/8	0.180	2.400	0.112	4	09590	03966

RE = 1/2 Cutting Diameter (DC)

## FRACTIONAL

**M3B • 1.5xD • 20xD Overall Reach**

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- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

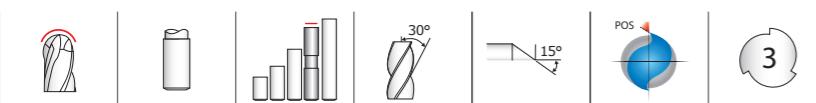
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

SGS Micro Tools

M41

M40

## FRACTIONAL

**M3B • 1.5xD • 25xD Overall Reach**

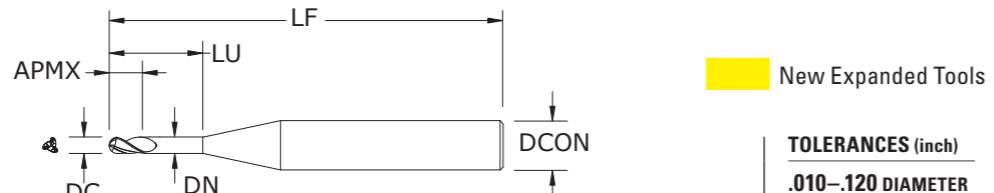
**MICRO  
SGS®**  
Solid Carbide Tools

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**M3B • 1.5xD  
25xD**

FRACTIONAL SERIES

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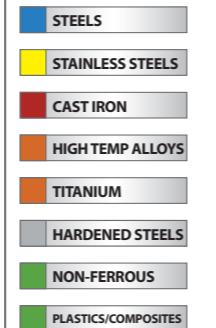


New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			OVERALL LENGTH LF	EDP NO.
		LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN		
0.010	1/8	0.015	0.250	0.009	2-1/2	09409 03967
0.015	1/8	0.023	0.375	0.014	2-1/2	09416 03968
0.020	1/8	0.030	0.500	0.018	2-1/2	09423 03969
0.025	1/8	0.038	0.625	0.023	2-1/2	09430 03970
0.030	1/8	0.045	0.750	0.028	2-1/2	09437 03971
0.031	1/8	0.047	0.775	0.029	2-1/2	09444 03972
0.035	1/8	0.053	0.875	0.032	2-1/2	09451 03973
0.040	1/8	0.060	1.000	0.037	2-1/2	09458 03974
0.045	1/8	0.068	1.125	0.042	2-1/2	09465 03975
0.047	1/8	0.071	1.175	0.044	2-1/2	09472 03976
0.050	1/8	0.075	1.250	0.047	2-1/2	09479 03977
0.055	1/8	0.083	1.375	0.051	3	09486 03978
0.060	1/8	0.090	1.500	0.056	3	09493 03979
0.062	1/8	0.093	1.550	0.058	3	09500 03980
0.065	1/8	0.098	1.625	0.061	3	09507 03981
0.070	1/8	0.105	1.750	0.065	3	09514 03982
0.075	1/8	0.113	1.875	0.070	3	09521 03983
0.078	1/8	0.117	1.950	0.073	4	09528 03984
0.080	1/8	0.120	2.000	0.075	4	09535 03985
0.085	1/8	0.128	2.125	0.079	4	09542 03986
0.090	1/8	0.135	2.250	0.084	4	09549 03987
0.093	1/8	0.140	2.325	0.087	4	09556 03988
0.095	1/8	0.143	2.375	0.089	4	09563 03989
0.100	1/8	0.150	2.500	0.094	4	09570 03990
0.110	1/8	0.165	2.750	0.103	4	09577 03991
0.115	1/8	0.173	2.875	0.108	4	09584 03992
0.120	1/8	0.180	3.000	0.112	4	09591 03993

RE = 1/2 Cutting Diameter (DC)

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New Expanded Tools

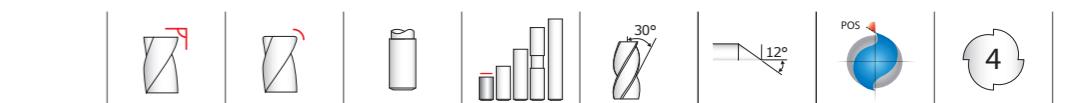
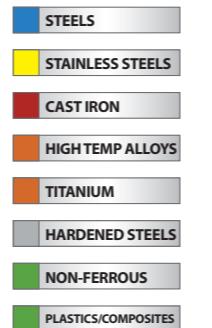
## TOLERANCES (inch)

## .005-.120 DIAMETER

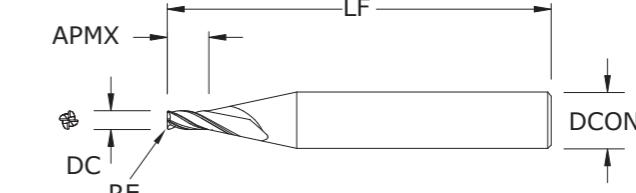
DC = +0.000/-0.001

DCON = h<sub>6</sub>

RE = +0.0000/-0.0005

**M4 • M4CR • 1.5xD****M4 • M4CR  
1.5xD**

FRACTIONAL SERIES

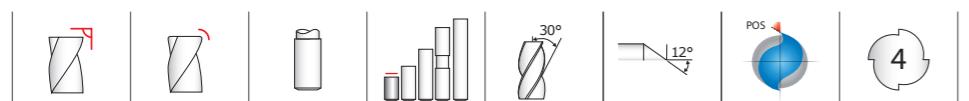


New Expanded Tools

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			OVERALL LENGTH LF	CORNER RADIUS RE	EDP NO.
		LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE			
0.005	1/8	0.008	1-1/2	—	00372 02238		
0.006	1/8	0.009	1-1/2	—	00373 02239		
0.007	1/8	0.011	1-1/2	—	00374 02240		
0.008	1/8	0.012	1-1/2	—	00375 02241		
0.009	1/8	0.014	1-1/2	—	00376 02242		
0.010	1/8	0.015	1-1/2	—	00377 02243		
0.011	1/8	0.017	1-1/2	—	00378 02244		
0.012	1/8	0.018	1-1/2	—	00379 02245		
0.013	1/8	0.020	1-1/2	—	00380 02246		
0.014	1/8	0.021	1-1/2	—	00381 02247		
0.015	1/8	0.023	1-1/2	—	00382 02248		
0.015	1/8	0.023	1-1/2	0.003	08986 09126		
0.016	1/8	0.024	1-1/2	—	00383 02249		
0.017	1/8	0.026	1-1/2	—	00384 02250		
0.018	1/8	0.027	1-1/2	—	00385 02251		
0.019	1/8	0.029	1-1/2	—	00386 02252		
0.020	1/8	0.030	1-1/2	—	00387 02253		
0.020	1/8	0.030	1-1/2	0.003	08988 09128		
0.020	1/8	0.030	1-1/2	0.005	04024 04025		
0.021	1/8	0.032	1-1/2	—	00388 02254		
0.022	1/8	0.033	1-1/2	—	00389 02255		
0.023	1/8	0.035	1-1/2	—	00390 02256		
0.024	1/8	0.036	1-1/2	—	00391 02257		
0.025	1/8	0.038	1-1/2	—	00392 02258		
0.025	1/8	0.038	1-1/2	0.005	04026 04027		
0.025	1/8	0.038	1-1/2	0.010	08990 09130		
0.026	1/8	0.039	1-1/2	—	00393 02259		
0.027	1/8	0.041	1-1/2	—	00394 02260		
0.028	1/8	0.042	1-1/2	—	00395 02261		
0.029	1/8	0.044	1-1/2	—	00396 02262		
0.030	1/8	0.045	1-1/2	—	00397 02263		
0.030	1/8	0.045	1-1/2	0.010	08992 09132		
0.031	1/8	0.047	1-1/2	—	00398 02264		
0.032	1/8	0.048	1-1/2	—	00399 02265		
0.033	1/8	0.050	1-1/2	—	00400 02266		
0.034	1/8	0.051	1-1/2	—	00401 02267		

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FRACTIONAL  
**M4 • M4CR • 1.5xD**

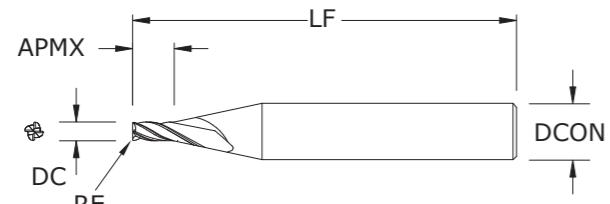


**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

**M4 • M4CR  
1.5xD**  
FRACTIONAL SERIES

continued



New Expanded Tools

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	EDP NO.	
					UNCOATED	TI-NAMITE-A (AITiN)
0.035	1/8	0.053	1-1/2	—	00402	02268
0.035	1/8	0.053	1-1/2	0.005	08994	09134
0.035	1/8	0.053	1-1/2	0.010	08996	09136
0.036	1/8	0.054	1-1/2	—	00403	02269
0.037	1/8	0.056	1-1/2	—	00404	02270
0.038	1/8	0.057	1-1/2	—	00405	02271
0.039	1/8	0.059	1-1/2	—	00406	02272
0.040	1/8	0.060	1-1/2	—	00407	02273
0.040	1/8	0.060	1-1/2	0.005	08998	09138
0.040	1/8	0.060	1-1/2	0.010	09000	09140
0.041	1/8	0.062	1-1/2	—	00408	02402
0.042	1/8	0.063	1-1/2	—	00409	02403
0.043	1/8	0.065	1-1/2	—	00410	02404
0.044	1/8	0.066	1-1/2	—	00411	02405
0.045	1/8	0.068	1-1/2	—	00412	02406
0.045	1/8	0.068	1-1/2	0.005	09002	09142
0.045	1/8	0.068	1-1/2	0.010	09004	09144
0.046	1/8	0.069	1-1/2	—	00413	02407
0.047	1/8	0.071	1-1/2	—	00414	02408
0.048	1/8	0.072	1-1/2	—	00415	02409
0.049	1/8	0.074	1-1/2	—	00416	02410
0.050	1/8	0.075	1-1/2	—	00417	02411
0.050	1/8	0.075	1-1/2	0.005	09006	09146
0.050	1/8	0.075	1-1/2	0.010	09008	09148
0.050	1/8	0.075	1-1/2	0.015	09010	09150
0.051	1/8	0.077	1-1/2	—	00418	02412
0.052	1/8	0.078	1-1/2	—	00419	02413
0.053	1/8	0.080	1-1/2	—	00420	02414
0.054	1/8	0.081	1-1/2	—	00421	02415
0.055	1/8	0.083	1-1/2	—	00422	02416
0.055	1/8	0.083	1-1/2	0.005	09012	09152
0.055	1/8	0.083	1-1/2	0.010	09014	09154
0.055	1/8	0.083	1-1/2	0.015	09016	09156
0.056	1/8	0.084	1-1/2	—	00423	02417

continued on next page

**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

New Expanded Tools

FRACTIONAL

**M4 • M4CR • 1.5xD**

TOLERANCES (inch)

.005-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

RE = +0.0000/-0.0005

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

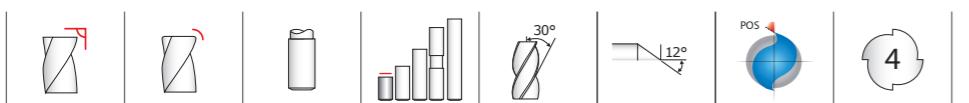
NON-FERROUS

PLASTICS/COMPOSITES

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	EDP NO.	
					UNCOATED	TI-NAMITE-A (AITiN)
0.057	1/8	0.086	1-1/2	—	00424	02418
0.058	1/8	0.087	1-1/2	—	00425	02419
0.059	1/8	0.089	1-1/2	—	00426	02420
0.060	1/8	0.090	1-1/2	—	00427	02421
0.060	1/8	0.090	1-1/2	0.005	09018	09158
0.060	1/8	0.090	1-1/2	0.010	09020	09160
0.060	1/8	0.090	1-1/2	0.015	09022	09162
0.062	1/8	0.093	1-1/2	—	00428	02422
0.065	1/8	0.098	1-1/2	—	00429	02423
0.065	1/8	0.098	1-1/2	0.005	09024	09164
0.065	1/8	0.098	1-1/2	0.010	09026	09166
0.065	1/8	0.098	1-1/2	0.015	09028	09168
0.070	1/8	0.105	1-1/2	—	00430	02424
0.070	1/8	0.105	1-1/2	0.005	09030	09170
0.070	1/8	0.105	1-1/2	0.010	09032	09172
0.070	1/8	0.105	1-1/2	0.015	09034	09174
0.075	1/8	0.1125	1-1/2	—	04014	04012
0.075	1/8	0.113	1-1/2	0.005	09036	09176
0.075	1/8	0.113	1-1/2	0.010	09038	09178
0.075	1/8	0.113	1-1/2	0.015	09040	09180
0.075	1/8	0.113	1-1/2	0.020	09042	09182
0.078	1/8	0.117	1-1/2	—	00431	02425
0.080	1/8	0.120	1-1/2	—	00432	02426
0.080	1/8	0.120	1-1/2	0.005	09044	09184
0.080	1/8	0.120	1-1/2	0.010	09046	09186
0.080	1/8	0.120	1-1/2	0.015	09048	09188
0.080	1/8	0.120	1-1/2	0.020	09050	09190
0.085	1/8	0.128	1-1/2	—	00433	02427
0.085	1/8	0.128	1-1/2	0.005	09052	09192
0.085	1/8	0.128	1-1/2	0.010	09054	09194
0.085	1/8	0.128	1-1/2	0.015	09056	09196
0.085	1/8	0.128	1-1/2	0.020	09058	09198
0.090	1/8	0.135	1-1/2	—	00434	02428
0.090	1/8	0.135	1-1/2	0.005	09060	09200

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## FRACTIONAL

**M4 • M4CR • 1.5xD**

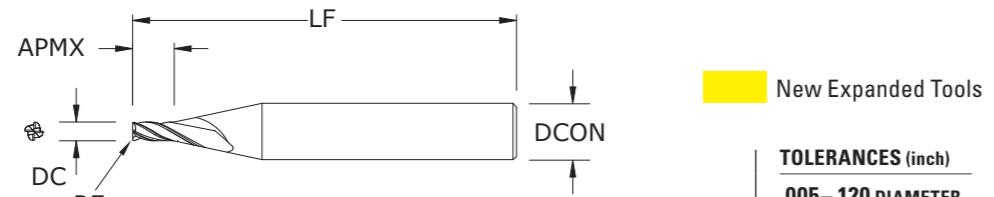
**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M4 • M4CR  
1.5xD**

FRACTIONAL SERIES

continued



New Expanded Tools

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	EDP NO.	
					UNCOATED	TI-NAMITE-A (AITIN)
0.090	1/8	0.135	1-1/2	0.010	09062	09202
0.090	1/8	0.135	1-1/2	0.015	09064	09204
0.090	1/8	0.135	1-1/2	0.020	09066	09206
0.093	1/8	0.140	1-1/2	—	00435	02429
0.095	1/8	0.143	1-1/2	—	00436	02430
0.095	1/8	0.143	1-1/2	0.005	09068	09208
0.095	1/8	0.143	1-1/2	0.010	09070	09210
0.095	1/8	0.143	1-1/2	0.015	09072	09212
0.095	1/8	0.143	1-1/2	0.020	09074	09214
0.100	1/8	0.150	1-1/2	—	00437	02431
0.100	1/8	0.150	1-1/2	0.005	09076	09216
0.100	1/8	0.150	1-1/2	0.010	09078	09218
0.100	1/8	0.150	1-1/2	0.015	09080	09220
0.100	1/8	0.150	1-1/2	0.020	09082	09222
0.100	1/8	0.150	1-1/2	0.030	09084	09224
0.105	1/8	0.158	1-1/2	—	00438	02432
0.105	1/8	0.158	1-1/2	0.005	09086	09226
0.105	1/8	0.158	1-1/2	0.010	09088	09228
0.105	1/8	0.158	1-1/2	0.015	09090	09230
0.105	1/8	0.158	1-1/2	0.020	09092	09232
0.105	1/8	0.158	1-1/2	0.030	09094	09234
0.110	1/8	0.165	1-1/2	—	00439	02433
0.110	1/8	0.165	1-1/2	0.005	09096	09236
0.110	1/8	0.165	1-1/2	0.010	09098	09238
0.110	1/8	0.165	1-1/2	0.015	09100	09240
0.110	1/8	0.165	1-1/2	0.020	09102	09242
0.110	1/8	0.165	1-1/2	0.030	09104	09244
0.115	1/8	0.173	1-1/2	—	00440	02434
0.115	1/8	0.173	1-1/2	0.005	09106	09246
0.115	1/8	0.173	1-1/2	0.010	09108	09248
0.115	1/8	0.173	1-1/2	0.015	09110	09250
0.115	1/8	0.173	1-1/2	0.020	09112	09252
0.115	1/8	0.173	1-1/2	0.030	09114	09254
0.120	1/8	0.180	1-1/2	—	00441	02435

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**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

New Expanded Tools

## TOLERANCES (inch)

## .005-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

RE = +0.0000 / -0.0005

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

NON-FERROUS

PLASTICS/COMPOSITES

New Expanded Tools

**M4 • M4CR  
1.5xD**

FRACTIONAL SERIES

continued

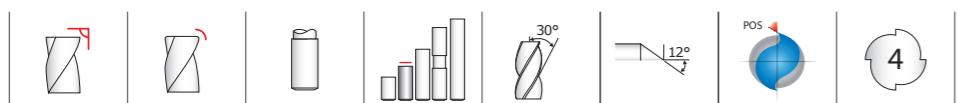
CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	EDP NO.	
					UNCOATED	TI-NAMITE-A (AITiN)
0.120	1/8	0.180	1-1/2	0.005	09116	09256
0.120	1/8	0.180	1-1/2	0.010	09118	09258
0.120	1/8	0.180	1-1/2	0.015	09120	09260
0.120	1/8	0.180	1-1/2	0.020	09122	09262
0.120	1/8	0.180	1-1/2	0.030	09124	09264

KYOCERA Solid Tools

SGS Solid Tools

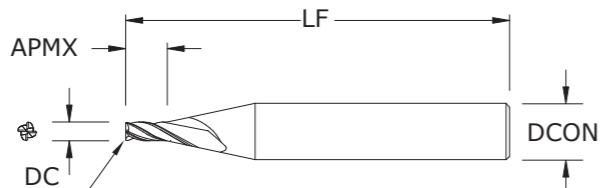
SGS Micro Tools

## FRACTIONAL

**M4 • M4CR • 3xD**

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M4 • M4CR • 3xD**

FRACTIONAL SERIES

- Four flute design allows for higher feed rates and decreased deflection, improving productivity and surface finish.
- Enhanced corner geometry with tight tolerance corner radii
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	UNCOATED	TI-NAMITE-A (AITiN)	EDP NO.
0.005	1/8	0.015	1-1/2	—	00514	02312	
0.006	1/8	0.018	1-1/2	—	00515	02313	
0.007	1/8	0.021	1-1/2	—	00516	02314	
0.008	1/8	0.024	1-1/2	—	00517	02315	
0.009	1/8	0.027	1-1/2	—	00518	02316	
0.010	1/8	0.030	1-1/2	—	00519	02317	
0.011	1/8	0.033	1-1/2	—	00520	02318	
0.012	1/8	0.036	1-1/2	—	00521	02319	
0.013	1/8	0.039	1-1/2	—	00522	02320	
0.014	1/8	0.042	1-1/2	—	00523	02321	
0.015	1/8	0.045	1-1/2	—	00524	02322	
0.015	1/8	0.045	1-1/2	0.003	08987	09127	
0.016	1/8	0.048	1-1/2	—	00525	02323	
0.017	1/8	0.051	1-1/2	—	00526	02324	
0.018	1/8	0.054	1-1/2	—	00527	02325	
0.019	1/8	0.057	1-1/2	—	00528	02326	
0.020	1/8	0.060	1-1/2	—	00529	02327	
0.020	1/8	0.060	1-1/2	0.003	08989	09129	
0.020	1/8	0.060	1-1/2	0.005	04028	04029	
0.021	1/8	0.063	1-1/2	—	00530	02328	
0.022	1/8	0.066	1-1/2	—	00531	02329	
0.023	1/8	0.069	1-1/2	—	00532	02330	
0.024	1/8	0.072	1-1/2	—	00533	02331	
0.025	1/8	0.075	1-1/2	—	00534	02332	
0.025	1/8	0.075	1-1/2	0.005	04030	04031	
0.025	1/8	0.075	1-1/2	0.010	08991	09131	
0.026	1/8	0.078	1-1/2	—	00535	02333	
0.027	1/8	0.081	1-1/2	—	00536	02334	
0.028	1/8	0.084	1-1/2	—	00537	02335	
0.029	1/8	0.087	1-1/2	—	00538	02336	
0.030	1/8	0.090	1-1/2	—	00539	02337	
0.030	1/8	0.090	1-1/2	0.010	08993	09133	
0.031	1/8	0.093	1-1/2	—	00540	02338	
0.032	1/8	0.096	1-1/2	—	00541	02339	
0.033	1/8	0.099	1-1/2	—	00542	02340	
0.034	1/8	0.102	1-1/2	—	00543	02341	

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**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**FRACTIONAL**  
**M4 • M4CR • 3xD**
**M4 • M4CR • 3xD**

FRACTIONAL SERIES

continued

## TOLERANCES (inch)

.004-.120 DIAMETER

DC = +0.000/-0.001

DCON = h6

RE = +0.0000/-0.0005

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

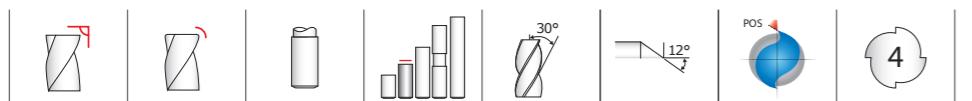
NON-FERROUS

PLASTICS/COMPOSITES

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	UNCOATED	TI-NAMITE-A (AITiN)	EDP NO.
0.035	1/8	0.105	1-1/2	—	00544	02342	
0.035	1/8	0.105	1-1/2	0.005	08995	09135	
0.035	1/8	0.105	1-1/2	0.010	08997	09137	
0.036	1/8	0.108	1-1/2	—	00545	02343	
0.037	1/8	0.111	1-1/2	—	00546	02344	
0.038	1/8	0.114	1-1/2	—	00547	02345	
0.039	1/8	0.117	1-1/2	—	00548	02346	
0.040	1/8	0.120	1-1/2	—	00549	02347	
0.040	1/8	0.120	1-1/2	0.005	08999	09139	
0.040	1/8	0.120	1-1/2	0.010	09001	09141	
0.041	1/8	0.123	1-1/2	—	00550	02470	
0.042	1/8	0.126	1-1/2	—	00551	02471	
0.043	1/8	0.129	1-1/2	—	00552	02472	
0.044	1/8	0.132	1-1/2	—	00553	02473	
0.045	1/8	0.135	1-1/2	—	00554	02474	
0.045	1/8	0.135	1-1/2	0.005	09003	09143	
0.045	1/8	0.135	1-1/2	0.010	09005	09145	
0.046	1/8	0.138	1-1/2	—	00555	02475	
0.047	1/8	0.141	1-1/2	—	00556	02476	
0.048	1/8	0.144	1-1/2	—	00557	02477	
0.049	1/8	0.147	1-1/2	—	00558	02478	
0.050	1/8	0.150	1-1/2	—	00559	02479	
0.050	1/8	0.150	1-1/2	0.005	09007	09147	
0.050	1/8	0.150	1-1/2	0.010	09009	09149	
0.050	1/8	0.150	1-1/2	0.015	09011	09151	
0.051	1/8	0.153	1-1/2	—	00560	02480	
0.052	1/8	0.156	1-1/2	—	00561	02481	
0.053	1/8	0.159	1-1/2	—	00562	02482	
0.054	1/8	0.162	1-1/2	—	00563	02483	
0.055	1/8	0.165	1-1/2	—	00564	02484	
0.055	1/8	0.165	1-1/2	0.005	09013	09153	
0.055	1/8	0.165	1-1/2	0.010	09015	09155	
0.055	1/8	0.165	1-1/2	0.015	09017	09157	
0.056	1/8	0.168	1-1/2	—	00565	02485	
0.057	1/8	0.171	1-1/2	—	00566	02486	
0.058	1/8	0.174	1-1/2	—	00567	02487	

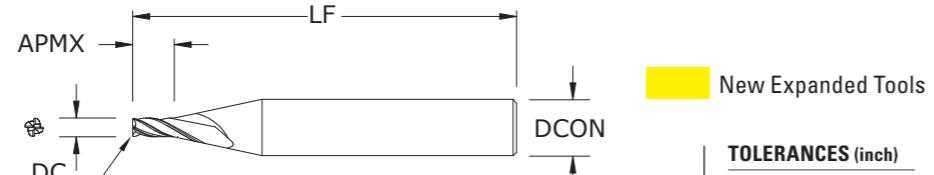
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## FRACTIONAL

**M4 • M4CR • 3xD**

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M4 • M4CR • 3xD**

FRACTIONAL SERIES

continued

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			EDP NO.	
		LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	UNCOATED	TI-NAMITE-A (AITIN)
0.059	1/8	0.177	1-1/2	—	00568	02488
0.060	1/8	0.180	1-1/2	—	00569	02489
0.060	1/8	0.180	1-1/2	0.005	09019	09159
0.060	1/8	0.180	1-1/2	0.010	09021	09161
0.060	1/8	0.180	1-1/2	0.015	09023	09163
0.062	1/8	0.186	1-1/2	—	00570	02490
0.065	1/8	0.195	1-1/2	—	00571	02491
0.065	1/8	0.195	1-1/2	0.005	09025	09165
0.065	1/8	0.195	1-1/2	0.010	09027	09167
0.065	1/8	0.195	1-1/2	0.015	09029	09169
0.070	1/8	0.210	1-1/2	—	00572	02492
0.070	1/8	0.210	1-1/2	0.005	09031	09171
0.070	1/8	0.210	1-1/2	0.010	09033	09173
0.070	1/8	0.210	1-1/2	0.015	09035	09175
0.075	1/8	0.225	1-1/2	—	04015	04013
0.075	1/8	0.225	1-1/2	0.005	09037	09177
0.075	1/8	0.225	1-1/2	0.010	09039	09179
0.075	1/8	0.225	1-1/2	0.015	09041	09181
0.075	1/8	0.225	1-1/2	0.020	09043	09183
0.078	1/8	0.234	1-1/2	—	00573	02493
0.080	1/8	0.240	1-1/2	—	00574	02494
0.080	1/8	0.240	1-1/2	0.005	09045	09185
0.080	1/8	0.240	1-1/2	0.010	09047	09187
0.080	1/8	0.240	1-1/2	0.015	09049	09189
0.080	1/8	0.240	1-1/2	0.020	09051	09191
0.085	1/8	0.255	1-1/2	—	00575	02495
0.085	1/8	0.255	1-1/2	0.005	09053	09193
0.085	1/8	0.255	1-1/2	0.010	09055	09195
0.085	1/8	0.255	1-1/2	0.015	09057	09197
0.085	1/8	0.255	1-1/2	0.020	09059	09199
0.090	1/8	0.270	1-1/2	—	00576	02496
0.090	1/8	0.270	1-1/2	0.005	09061	09201
0.090	1/8	0.270	1-1/2	0.010	09063	09203
0.090	1/8	0.270	1-1/2	0.015	09065	09205
0.090	1/8	0.270	1-1/2	0.020	09067	09207
0.093	1/8	0.279	1-1/2	—	00577	02497

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**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

New Expanded Tools

## TOLERANCES (inch)

## .004-.120 DIAMETER

DC = +0.000/-0.001

DCON = h6

RE = +0.0000/-0.0005

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

New Expanded Tools

## FRACTIONAL

**M4 • M4CR • 3xD**

FRACTIONAL SERIES

continued

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			EDP NO.	
		LENGTH OF CUT APMX	OVERALL LENGTH LF	CORNER RADIUS RE	UNCOATED	TI-NAMITE-A (AITIN)
0.095	1/8	0.285	1-1/2	—	00578	02498
0.095	1/8	0.285	1-1/2	0.005	09069	09209
0.095	1/8	0.285	1-1/2	0.010	09071	09211
0.095	1/8	0.285	1-1/2	0.015	09073	09213
0.095	1/8	0.285	1-1/2	0.020	09075	09215
0.100	1/8	0.300	1-1/2	—	00579	02499
0.100	1/8	0.300	1-1/2	0.005	09077	09217
0.100	1/8	0.300	1-1/2	0.010	09079	09219
0.100	1/8	0.300	1-1/2	0.015	09081	09221
0.100	1/8	0.300	1-1/2	0.020	09083	09223
0.100	1/8	0.300	1-1/2	0.030	09085	09225
0.105	1/8	0.315	1-1/2	—	00580	02500
0.105	1/8	0.315	1-1/2	0.005	09087	09227
0.105	1/8	0.315	1-1/2	0.010	09089	09229
0.105	1/8	0.315	1-1/2	0.015	09091	09231
0.105	1/8	0.315	1-1/2	0.020	09093	09233
0.105	1/8	0.315	1-1/2	0.030	09095	09235
0.110	1/8	0.330	1-1/2	—	00581	02501
0.110	1/8	0.330	1-1/2	0.005	09097	09237
0.110	1/8	0.330	1-1/2	0.010	09099	09239
0.110	1/8	0.330	1-1/2	0.020	09101	09241
0.110	1/8	0.330	1-1/2	0.030	09103	09243
0.110	1/8	0.330	1-1/2	0.040	09105	09245
0.115	1/8	0.345	1-1/2	—	00582	02502
0.115	1/8	0.345	1-1/2	0.005	09107	09247
0.115	1/8	0.345	1-1/2	0.010	09109	09249
0.115	1/8	0.345	1-1/2	0.015	09111	09251
0.115	1/8	0.345	1-1/2	0.020	09113	09253
0.115	1/8	0.345	1-1/2	0.030	09115	09255
0.120	1/8	0.360	1-1/2	—	00583	02503
0.120	1/8	0.360	1-1/2	0.005	09117	09257
0.120	1/8	0.360	1-1/2	0.010	09119	09259
0.120	1/8	0.360	1-1/2	0.015	09121	09261
0.120	1/8	0.360	1-1/2	0.020	09123	09263
0.120	1/8	0.360	1-1/2	0.030	09125	09265

## FRACTIONAL

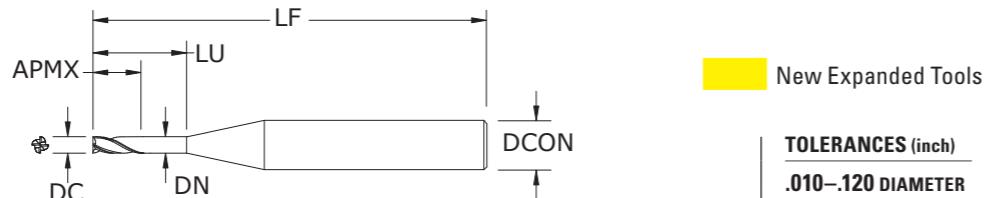
**M4 • 3xD • 8xD Overall Reach**

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M4 • 3xD  
8xD**  
FRACTIONAL SERIES

- Four flute design allows for higher feed rates and decreased deflection, improving productivity and surface finish.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.



New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

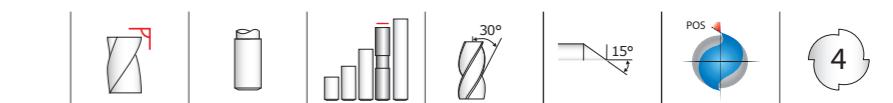
DC = +0.000/-0.001

DCON = h<sub>6</sub>

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	EDP NO.
0.010	1/8	0.030	0.080	0.009	1-1/2	09839 03454
0.015	1/8	0.045	0.120	0.014	1-1/2	09841 03455
0.020	1/8	0.060	0.160	0.018	1-1/2	09843 03456
0.025	1/8	0.075	0.200	0.023	1-1/2	09845 03457
0.030	1/8	0.090	0.240	0.028	1-1/2	09847 03458
0.031	1/8	0.093	0.248	0.029	1-1/2	09849 03459
0.035	1/8	0.105	0.280	0.032	1-1/2	09851 03460
0.040	1/8	0.120	0.320	0.037	1-1/2	09853 03461
0.045	1/8	0.135	0.360	0.042	2	09855 03462
0.047	1/8	0.141	0.376	0.044	2	09857 03463
0.050	1/8	0.150	0.400	0.047	2	09859 03464
0.055	1/8	0.165	0.440	0.051	2	09861 03465
0.060	1/8	0.180	0.480	0.056	2	09863 03466
0.062	1/8	0.186	0.496	0.058	2	09865 03467
0.065	1/8	0.195	0.520	0.061	2	09867 03468
0.070	1/8	0.210	0.560	0.065	2	09869 03469
0.075	1/8	0.225	0.600	0.070	2	09871 03470
0.078	1/8	0.234	0.624	0.073	2	09873 03471
0.080	1/8	0.240	0.640	0.075	2	09875 03472
0.085	1/8	0.255	0.680	0.079	2	09877 03473
0.090	1/8	0.270	0.720	0.084	2	09879 03474
0.093	1/8	0.279	0.744	0.087	2	09881 03475
0.095	1/8	0.285	0.760	0.089	2	09883 03476
0.100	1/8	0.300	0.800	0.094	2	09885 03477
0.110	1/8	0.330	0.880	0.103	2	09887 03478
0.115	1/8	0.345	0.920	0.108	2	09889 03479
0.120	1/8	0.360	0.960	0.112	2	09891 03480

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

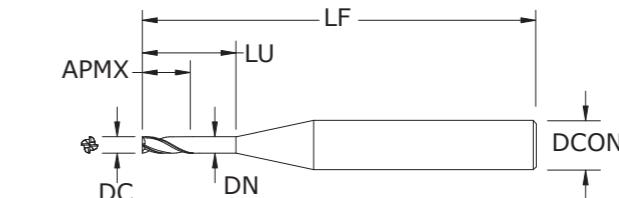
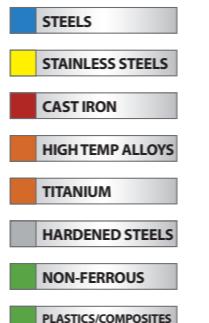
**FRACTIONAL**  
**M4 • 3xD • 12xD Overall Reach**

New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>
**M4 • 3xD  
12xD**  
FRACTIONAL SERIES

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	EDP NO.
0.010	1/8	0.030	0.120	0.009	1-1/2	09838 03481
0.015	1/8	0.045	0.180	0.014	1-1/2	09840 03482
0.020	1/8	0.060	0.240	0.018	1-1/2	09842 03483
0.025	1/8	0.075	0.300	0.023	1-1/2	09844 03484
0.030	1/8	0.090	0.360	0.028	2	09846 03485
0.031	1/8	0.093	0.372	0.029	2	09848 03486
0.035	1/8	0.105	0.420	0.032	2	09850 03487
0.040	1/8	0.120	0.480	0.037	2	09852 03488
0.045	1/8	0.135	0.540	0.042	2	09854 03489
0.047	1/8	0.141	0.564	0.044	2	09856 03490
0.050	1/8	0.150	0.600	0.047	2	09858 03491
0.055	1/8	0.165	0.660	0.051	2	09860 03492
0.060	1/8	0.180	0.720	0.056	2	09862 03493
0.062	1/8	0.186	0.744	0.058	2	09864 03494
0.065	1/8	0.195	0.780	0.061	2	09866 03495
0.070	1/8	0.210	0.840	0.065	2	09868 03496
0.075	1/8	0.225	0.900	0.070	2	09870 03497
0.078	1/8	0.234	0.936	0.073	2-1/2	09872 03498
0.080	1/8	0.240	0.960	0.075	2-1/2	09874 03499
0.085	1/8	0.255	1.020	0.079	2-1/2	09876 03500
0.090	1/8	0.270	1.080	0.084	2-1/2	09878 03501
0.093	1/8	0.279	1.116	0.087	2-1/2	09880 03502
0.095	1/8	0.285	1.140	0.089	2-1/2	09882 03503
0.100	1/8	0.300	1.200	0.094	2-1/2	09884 03504
0.110	1/8	0.330	1.320	0.103	2-1/2	09886 03505
0.115	1/8	0.345	1.380	0.108	2-1/2	09888 03506
0.120	1/8	0.360	1.440	0.112	2-1/2	09890 03507

- Four flute design allows for higher feed rates and decreased deflection, improving productivity and surface finish.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

FRACTIONAL  
**M4L • 5xD**

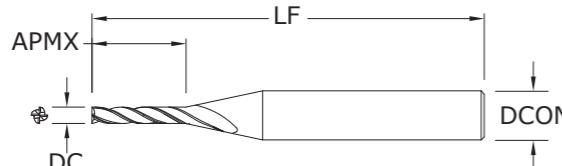


**MICRO**  
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**M4L • 5xD**  
FRACTIONAL SERIES

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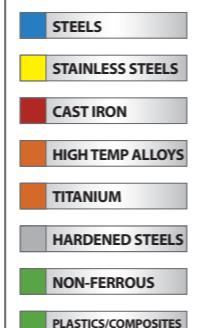
New Expanded Tools

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	
				UNCOATED	TI-NAMITE-A (AITiN)
0.010	1/8	0.050	2-1/2	00584	02640
0.015	1/8	0.075	2-1/2	00585	02641
0.020	1/8	0.100	2-1/2	00586	02642
0.025	1/8	0.125	2-1/2	00587	02643
0.030	1/8	0.150	2-1/2	00588	02644
0.031	1/8	0.155	2-1/2	00589	02645
0.035	1/8	0.175	2-1/2	00590	02646
0.040	1/8	0.200	2-1/2	00591	02647
0.045	1/8	0.225	2-1/2	00592	02648
0.047	1/8	0.235	2-1/2	00593	02649
0.050	1/8	0.250	2-1/2	00594	02650
0.055	1/8	0.275	2-1/2	00595	02651
0.060	1/8	0.300	2-1/2	00596	02652
0.062	1/8	0.310	2-1/2	00597	02653
0.065	1/8	0.325	2-1/2	00598	02654
0.070	1/8	0.350	2-1/2	00599	02655
0.075	1/8	0.375	2-1/2	00600	02656
0.078	1/8	0.390	2-1/2	00601	02657
0.080	1/8	0.400	2-1/2	00602	02658
0.085	1/8	0.425	2-1/2	00603	02659
0.090	1/8	0.450	2-1/2	00604	02660
0.093	1/8	0.465	2-1/2	00605	02661
0.095	1/8	0.475	2-1/2	00606	02662
0.100	1/8	0.500	2-1/2	00607	02663
0.110	1/8	0.550	2-1/2	00608	02664
0.115	1/8	0.575	2-1/2	00609	02665
0.120	1/8	0.600	2-1/2	00610	02666

TOLERANCES (inch)

.010-.120 DIAMETER

DC = +0.000/-0.001  
DCON = h<sub>6</sub>



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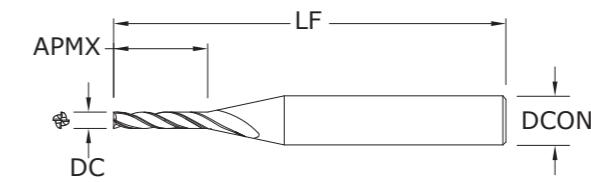
KYOCERA

New Expanded Tools

TOLERANCES (inch)

.010-.120 DIAMETER

DC = +0.000/-0.001  
DCON = h<sub>6</sub>



**M4E • 8xD**  
FRACTIONAL SERIES

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CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	
				UNCOATED	TI-NAMITE-A (AITiN)
0.010	1/8	0.080	2-1/2	00611	02667
0.015	1/8	0.120	2-1/2	00612	02668
0.020	1/8	0.160	2-1/2	00613	02669
0.025	1/8	0.200	2-1/2	00614	02670
0.030	1/8	0.240	2-1/2	00615	02671
0.031	1/8	0.248	2-1/2	00616	02672
0.035	1/8	0.280	2-1/2	00617	02673
0.040	1/8	0.320	2-1/2	00618	02674
0.045	1/8	0.360	2-1/2	00619	02675
0.047	1/8	0.376	2-1/2	00620	02676
0.050	1/8	0.400	2-1/2	00621	02677
0.055	1/8	0.440	2-1/2	00622	02678
0.060	1/8	0.480	2-1/2	00623	02679
0.062	1/8	0.496	2-1/2	00624	02680
0.065	1/8	0.520	2-1/2	00625	02681
0.070	1/8	0.560	2-1/2	00626	02682
0.075	1/8	0.600	2-1/2	00627	02683
0.078	1/8	0.624	2-1/2	00628	02684
0.080	1/8	0.640	2-1/2	00629	02685
0.085	1/8	0.680	2-1/2	00630	02686
0.090	1/8	0.720	2-1/2	00631	02687
0.093	1/8	0.744	2-1/2	00632	02688
0.095	1/8	0.760	2-1/2	00633	02689
0.100	1/8	0.800	2-1/2	00634	02690
0.110	1/8	0.880	2-1/2	00635	02691
0.115	1/8	0.920	2-1/2	00636	02692
0.120	1/8	0.960	2-1/2	00637	02693

- Four flute design allows for higher feed rates and decreased deflection, improving productivity and surface finish.
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SGS Micro Tools

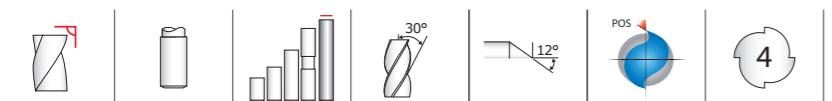
SGS Solid Tools

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

## FRACTIONAL M4X • 12xD



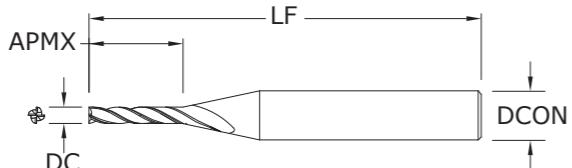
**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

## M4X • 12xD

FRACTIONAL SERIES

- Four flute design allows for higher feed rates and decreased deflection, improving productivity and surface finish.
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New Expanded Tools

### TOLERANCES (inch)

#### .015-.120 DIAMETER

DC = +0.000/-0.001  
DCON = h<sub>6</sub>



CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	UNCOATED	TI-NAMITE-A (AITiN)
0.015	1/8	0.180	2-1/2	00639	02694
0.020	1/8	0.240	2-1/2	00640	02695
0.025	1/8	0.300	2-1/2	00641	02696
0.030	1/8	0.360	2-1/2	00642	02697
0.031	1/8	0.372	2-1/2	00643	02698
0.035	1/8	0.420	2-1/2	00644	02699
0.040	1/8	0.480	2-1/2	00645	02700
0.045	1/8	0.540	2-1/2	00646	02701
0.047	1/8	0.564	2-1/2	00647	02702
0.050	1/8	0.600	2-1/2	00648	02703
0.055	1/8	0.660	2-1/2	00649	02704
0.060	1/8	0.720	2-1/2	00650	02705
0.062	1/8	0.744	2-1/2	00651	02706
0.065	1/8	0.780	2-1/2	00652	02707
0.070	1/8	0.840	2-1/2	00653	02708
0.075	1/8	0.900	2-1/2	00654	02709
0.078	1/8	0.936	2-1/2	00655	02710
0.080	1/8	0.960	2-1/2	00656	02711
0.085	1/8	1.020	2-1/2	00657	02712
0.090	1/8	1.080	2-1/2	00658	02713
0.093	1/8	1.116	2-1/2	00659	02714
0.095	1/8	1.140	2-1/2	00660	02715
0.100	1/8	1.200	2-1/2	00661	02716
0.110	1/8	1.320	2-1/2	00662	02717
0.115	1/8	1.380	2-1/2	00663	02718
0.120	1/8	1.440	2-1/2	00664	02719

**MICRO**  
**SGS**  
Solid Carbide Tools

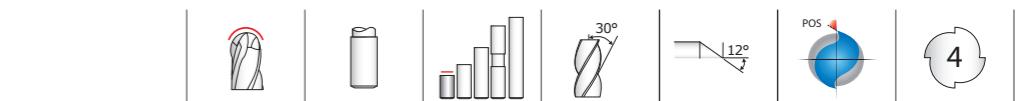
KYOCERA

New Expanded Tools

### TOLERANCES (inch)

#### .010-.120 DIAMETER

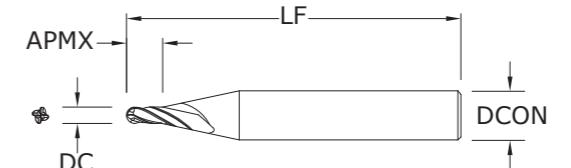
DC = +0.000/-0.001  
DCON = h<sub>6</sub>



## FRACTIONAL M4B • 1.5xD

## M4B • 1.5xD

FRACTIONAL SERIES



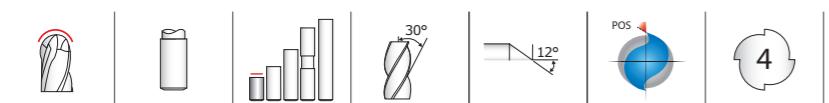
New Expanded Tools

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	UNCOATED	TI-NAMITE-A (AITiN)
0.010	1/8	0.015	1-1/2	00745	03071
0.011	1/8	0.017	1-1/2	00746	03072
0.012	1/8	0.018	1-1/2	00747	03073
0.013	1/8	0.020	1-1/2	00748	03074
0.014	1/8	0.021	1-1/2	00749	03075
0.015	1/8	0.023	1-1/2	00750	03076
0.016	1/8	0.024	1-1/2	00751	03077
0.017	1/8	0.026	1-1/2	00752	03078
0.018	1/8	0.027	1-1/2	00753	03079
0.019	1/8	0.029	1-1/2	00754	03080
0.020	1/8	0.030	1-1/2	00755	03081
0.021	1/8	0.032	1-1/2	00756	03082
0.022	1/8	0.033	1-1/2	00757	03083
0.023	1/8	0.035	1-1/2	00758	03084
0.024	1/8	0.036	1-1/2	00759	03085
0.025	1/8	0.038	1-1/2	00760	03086
0.026	1/8	0.039	1-1/2	00761	03087
0.027	1/8	0.041	1-1/2	00762	03088
0.028	1/8	0.042	1-1/2	00763	03089
0.029	1/8	0.044	1-1/2	00764	03090
0.030	1/8	0.045	1-1/2	00765	03091
0.031	1/8	0.047	1-1/2	00766	03092
0.032	1/8	0.048	1-1/2	00767	03093
0.033	1/8	0.050	1-1/2	00768	03094
0.034	1/8	0.051	1-1/2	00769	03095
0.035	1/8	0.053	1-1/2	00770	03096
0.036	1/8	0.054	1-1/2	00771	03097
0.037	1/8	0.056	1-1/2	00772	03098
0.038	1/8	0.057	1-1/2	00773	03099
0.039	1/8	0.059	1-1/2	00774	03100
0.040	1/8	0.060	1-1/2	00775	03101
0.041	1/8	0.062	1-1/2	00776	02538
0.042	1/8	0.063	1-1/2	00777	02539
0.043	1/8	0.065	1-1/2	00778	02540

RE = 1/2 Cutting Diameter (DC)

continued on next page

FRACTIONAL  
**M4B • 1.5xD**



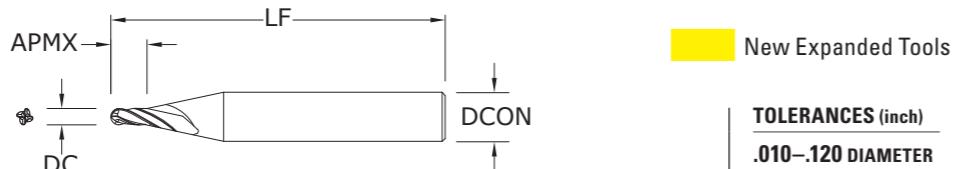
**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

**M4B • 1.5xD**

FRACTIONAL SERIES

continued



New Expanded Tools

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	
				UNCOATED	TI-NAMITE-A (AITiN)
0.044	1/8	0.066	1-1/2	00779	02541
0.045	1/8	0.068	1-1/2	00780	02542
0.046	1/8	0.069	1-1/2	00781	02543
0.047	1/8	0.071	1-1/2	00782	02544
0.048	1/8	0.072	1-1/2	00783	02545
0.049	1/8	0.074	1-1/2	00784	02546
0.050	1/8	0.075	1-1/2	00785	02547
0.051	1/8	0.077	1-1/2	00786	02548
0.052	1/8	0.078	1-1/2	00787	02549
0.053	1/8	0.080	1-1/2	00788	02550
0.054	1/8	0.081	1-1/2	00789	02551
0.055	1/8	0.083	1-1/2	00790	02552
0.056	1/8	0.084	1-1/2	00791	02553
0.057	1/8	0.086	1-1/2	00792	02554
0.058	1/8	0.087	1-1/2	00793	02555
0.059	1/8	0.089	1-1/2	00794	02556
0.060	1/8	0.090	1-1/2	00795	02557
0.062	1/8	0.093	1-1/2	00796	02558
0.065	1/8	0.098	1-1/2	00797	02559
0.070	1/8	0.105	1-1/2	00798	02560
0.075	1/8	0.112	1-1/2	04018	04016
0.078	1/8	0.117	1-1/2	00799	02561
0.080	1/8	0.120	1-1/2	00800	02562
0.085	1/8	0.128	1-1/2	00801	02563
0.090	1/8	0.135	1-1/2	00802	02564
0.093	1/8	0.140	1-1/2	00803	02565
0.095	1/8	0.143	1-1/2	00804	02566
0.100	1/8	0.150	1-1/2	00805	02567
0.105	1/8	0.158	1-1/2	00806	02568
0.110	1/8	0.165	1-1/2	00807	02569
0.115	1/8	0.173	1-1/2	00808	02570
0.120	1/8	0.180	1-1/2	00809	02571

RE = 1/2 Cutting Diameter (DC)

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

New Expanded Tools

TOLERANCES (inch)

.010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

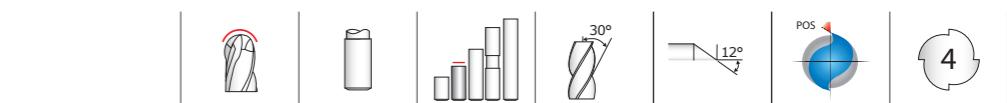
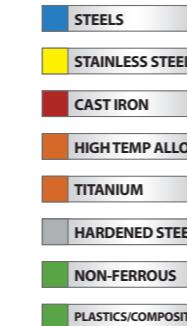


TOLERANCES (inch)

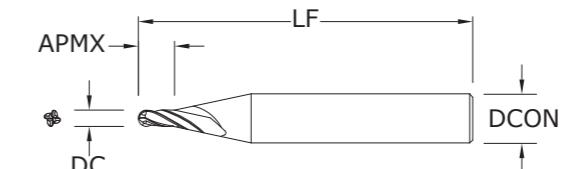
.010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>



FRACTIONAL  
**M4B • 3xD**



**M4B • 3xD**

FRACTIONAL SERIES

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	
				UNCOATED	TI-NAMITE-A (AITiN)
0.010	1/8	0.030	1-1/2	00887	03145
0.011	1/8	0.033	1-1/2	00888	03146
0.012	1/8	0.036	1-1/2	00889	03147
0.013	1/8	0.039	1-1/2	00890	03148
0.014	1/8	0.042	1-1/2	00891	03149
0.015	1/8	0.045	1-1/2	00892	03150
0.016	1/8	0.048	1-1/2	00893	03151
0.017	1/8	0.051	1-1/2	00894	03152
0.018	1/8	0.054	1-1/2	00895	03153
0.019	1/8	0.057	1-1/2	00896	03154
0.020	1/8	0.060	1-1/2	00897	03155
0.021	1/8	0.063	1-1/2	00898	03156
0.022	1/8	0.066	1-1/2	00899	03157
0.023	1/8	0.069	1-1/2	00900	03158
0.024	1/8	0.072	1-1/2	00901	03159
0.025	1/8	0.075	1-1/2	00902	03160
0.026	1/8	0.078	1-1/2	00903	03161
0.027	1/8	0.081	1-1/2	00904	03162
0.028	1/8	0.084	1-1/2	00905	03163
0.029	1/8	0.087	1-1/2	00906	03164
0.030	1/8	0.090	1-1/2	00907	03165
0.031	1/8	0.093	1-1/2	00908	03166
0.032	1/8	0.096	1-1/2	00909	03167
0.033	1/8	0.099	1-1/2	00910	03168
0.034	1/8	0.102	1-1/2	00911	03169
0.035	1/8	0.105	1-1/2	00912	03170
0.036	1/8	0.108	1-1/2	00913	03171
0.037	1/8	0.111	1-1/2	00914	03172
0.038	1/8	0.114	1-1/2	00915	03173
0.039	1/8	0.117	1-1/2	00916	03174
0.040	1/8	0.120	1-1/2	00917	03175
0.041	1/8	0.123	1-1/2	00918	02606
0.042	1/8	0.126	1-1/2	00919	02607
0.043	1/8	0.129	1-1/2	00920	02608

RE = 1/2 Cutting Diameter (DC)

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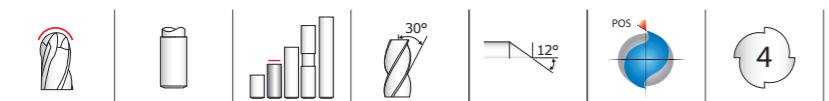
KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

- Four flute design allows for higher feed rates and decreased deflection, improving productivity and surface finish.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

FRACTIONAL  
**M4B • 3xD**



**M4B • 3xD**

FRACTIONAL SERIES

continued

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	
				UNCOATED	TI-NAMITE-A (AlTiN)
0.044	1/8	0.132	1-1/2	00921	02609
0.045	1/8	0.135	1-1/2	00922	02610
0.046	1/8	0.138	1-1/2	00923	02611
0.047	1/8	0.141	1-1/2	00924	02612
0.048	1/8	0.144	1-1/2	00925	02613
0.049	1/8	0.147	1-1/2	00926	02614
0.050	1/8	0.150	1-1/2	00927	02615
0.051	1/8	0.153	1-1/2	00928	02616
0.052	1/8	0.156	1-1/2	00929	02617
0.053	1/8	0.159	1-1/2	00930	02618
0.054	1/8	0.162	1-1/2	00931	02619
0.055	1/8	0.165	1-1/2	00932	02620
0.056	1/8	0.168	1-1/2	00933	02621
0.057	1/8	0.171	1-1/2	00934	02622
0.058	1/8	0.174	1-1/2	00935	02623
0.059	1/8	0.177	1-1/2	00936	02624
0.060	1/8	0.180	1-1/2	00937	02625
0.062	1/8	0.186	1-1/2	00938	02626
0.065	1/8	0.195	1-1/2	00939	02627
0.070	1/8	0.210	1-1/2	00940	02628
0.075	1/8	0.225	1-1/2	04019	04017
0.078	1/8	0.234	1-1/2	00941	02629
0.080	1/8	0.240	1-1/2	00942	02630
0.085	1/8	0.255	1-1/2	00943	02631
0.090	1/8	0.270	1-1/2	00944	02632
0.093	1/8	0.279	1-1/2	00945	02633
0.095	1/8	0.285	1-1/2	00946	02634
0.100	1/8	0.300	1-1/2	00947	02635
0.105	1/8	0.315	1-1/2	00948	02636
0.110	1/8	0.330	1-1/2	00949	02637
0.115	1/8	0.345	1-1/2	00950	02638
0.120	1/8	0.360	1-1/2	00951	02639

RE = 1/2 Cutting Diameter (DC)

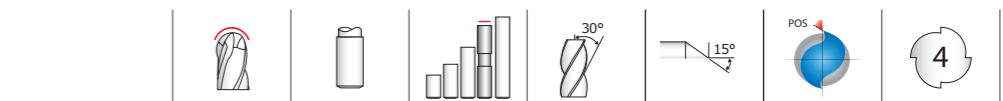
**MICRO SGS**  
Solid Carbide Tools

KYOCERA

**MICRO SGS**  
Solid Carbide Tools

KYOCERA

FRACTIONAL  
**M4B • 3xD • 8xD Overall Reach**



New Expanded Tools

TOLERANCES (inch)

.010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h6

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

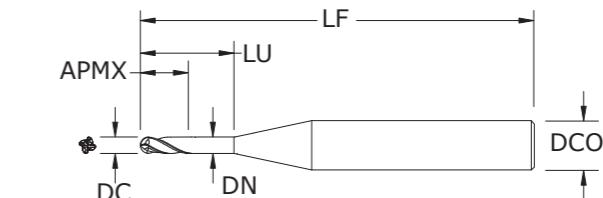
TOLERANCES (inch)

.010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h6

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



**M4B • 3xD  
8xD**

FRACTIONAL SERIES

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	EDP NO.	
						UNCOATED	TI-NAMITE-A (AlTiN)
0.010	1/8	0.030	0.080	0.009	1-1/2	09785	03751
0.015	1/8	0.045	0.120	0.014	1-1/2	09787	03752
0.020	1/8	0.060	0.160	0.018	1-1/2	09789	03753
0.025	1/8	0.075	0.200	0.023	1-1/2	09791	03754
0.030	1/8	0.090	0.240	0.028	1-1/2	09793	03755
0.031	1/8	0.093	0.248	0.029	1-1/2	09795	03756
0.035	1/8	0.105	0.280	0.032	1-1/2	09797	03757
0.040	1/8	0.120	0.320	0.037	1-1/2	09799	03758
0.045	1/8	0.135	0.360	0.042	2	09801	03759
0.047	1/8	0.141	0.376	0.044	2	09803	03760
0.050	1/8	0.150	0.400	0.047	2	09805	03761
0.055	1/8	0.165	0.440	0.051	2	09807	03762
0.060	1/8	0.180	0.480	0.056	2	09809	03763
0.062	1/8	0.186	0.496	0.058	2	09811	03764
0.065	1/8	0.195	0.520	0.061	2	09813	03765
0.070	1/8	0.210	0.560	0.065	2	09815	03766
0.075	1/8	0.225	0.600	0.070	2	09817	03767
0.078	1/8	0.234	0.624	0.073	2	09819	03768
0.080	1/8	0.240	0.640	0.075	2	09821	03769
0.085	1/8	0.255	0.680	0.079	2	09823	03770
0.090	1/8	0.270	0.720	0.084	2	09825	03771
0.093	1/8	0.279	0.744	0.087	2	09827	03772
0.095	1/8	0.285	0.760	0.089	2	09829	03773
0.100	1/8	0.300	0.800	0.094	2	09831	03774
0.110	1/8	0.330	0.880	0.103	2	09833	03775
0.115	1/8	0.345	0.920	0.108	2	09835	03776
0.120	1/8	0.360	0.960	0.112	2	09837	03777

RE = 1/2 Cutting Diameter (DC)

- Four flute design allows for higher feed rates and decreased deflection, improving productivity and surface finish.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

## FRACTIONAL

**M4B • 3xD • 12xD Overall Reach**

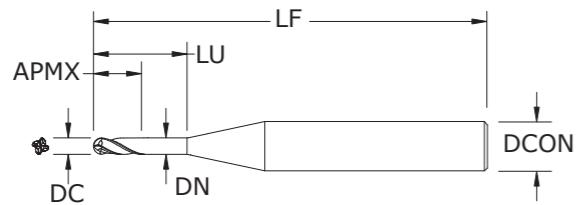
**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M4B • 3xD  
12xD**

FRACTIONAL SERIES

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New Expanded Tools

## TOLERANCES (inch)

## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			OVERALL LENGTH LF	EDP NO.
		LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN		
0.010	1/8	0.030	0.120	0.009	1-1/2	09784 03778
0.015	1/8	0.045	0.180	0.014	1-1/2	09786 03779
0.020	1/8	0.060	0.240	0.018	1-1/2	09788 03780
0.025	1/8	0.075	0.300	0.023	1-1/2	09790 03781
0.030	1/8	0.090	0.360	0.028	2	09792 03782
0.031	1/8	0.093	0.372	0.029	2	09794 03783
0.035	1/8	0.105	0.420	0.032	2	09796 03784
0.040	1/8	0.120	0.480	0.037	2	09798 03785
0.045	1/8	0.135	0.540	0.042	2	09800 03786
0.047	1/8	0.141	0.564	0.044	2	09802 03787
0.050	1/8	0.150	0.600	0.047	2	09804 03788
0.055	1/8	0.165	0.660	0.051	2	09806 03789
0.060	1/8	0.180	0.720	0.056	2	09808 03790
0.062	1/8	0.186	0.744	0.058	2	09810 03791
0.065	1/8	0.195	0.780	0.061	2	09812 03792
0.070	1/8	0.210	0.840	0.065	2	09814 03793
0.075	1/8	0.225	0.900	0.070	2	09816 03794
0.078	1/8	0.234	0.936	0.073	2-1/2	09818 03795
0.080	1/8	0.240	0.960	0.075	2-1/2	09820 03796
0.085	1/8	0.255	1.020	0.079	2-1/2	09822 03797
0.090	1/8	0.270	1.080	0.084	2-1/2	09824 03798
0.093	1/8	0.279	1.116	0.087	2-1/2	09826 03799
0.095	1/8	0.285	1.140	0.089	2-1/2	09828 03800
0.100	1/8	0.300	1.200	0.094	2-1/2	09830 03801
0.110	1/8	0.330	1.320	0.103	2-1/2	09832 03802
0.115	1/8	0.345	1.380	0.108	2-1/2	09834 03803
0.120	1/8	0.360	1.440	0.112	2-1/2	09836 03804

RE = 1/2 Cutting Diameter (DC)

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M4B • 3xD  
12xD**

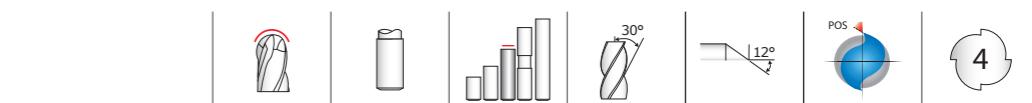
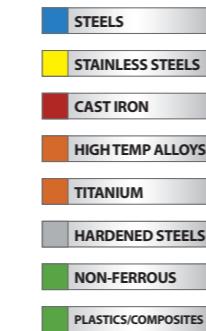
FRACTIONAL SERIES

New Expanded Tools

## TOLERANCES (inch)

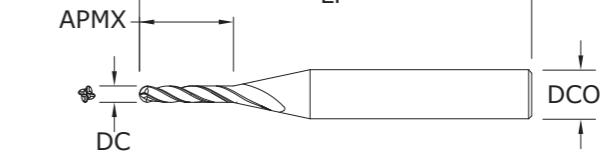
## .010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

**FRACTIONAL  
M4LB • 5xD**

**M4LB • 5xD**  
FRACTIONAL SERIES



New Expanded Tools

CUTTING DIAMETER DC	SHANK DIAMETER DCON	inch			OVERALL LENGTH LF	EDP NO.
		LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN		
0.010	1/8	0.050	2-1/2		00952	02720
0.015	1/8	0.075	2-1/2		00953	02721
0.020	1/8	0.100	2-1/2		00954	02722
0.025	1/8	0.125	2-1/2		00955	02723
0.030	1/8	0.150	2-1/2		00956	02724
0.031	1/8	0.155	2-1/2		00957	02725
0.035	1/8	0.175	2-1/2		00958	02726
0.040	1/8	0.200	2-1/2		00959	02727
0.045	1/8	0.225	2-1/2		00960	02728
0.047	1/8	0.235	2-1/2		00961	02729
0.050	1/8	0.250	2-1/2		00962	02730
0.055	1/8	0.275	2-1/2		00963	02731
0.060	1/8	0.300	2-1/2		00964	02732
0.062	1/8	0.310	2-1/2		00965	02733
0.065	1/8	0.325	2-1/2		00966	02734
0.070	1/8	0.350	2-1/2		00967	02735
0.075	1/8	0.375	2-1/2		00968	02736
0.078	1/8	0.390	2-1/2		00969	02737
0.080	1/8	0.400	2-1/2		00970	02738
0.085	1/8	0.425	2-1/2		00971	02739
0.090	1/8	0.450	2-1/2		00972	02740
0.093	1/8	0.465	2-1/2		00973	02741
0.095	1/8	0.475	2-1/2		00974	02742
0.100	1/8	0.500	2-1/2		00975	02743
0.110	1/8	0.550	2-1/2		00976	02744
0.115	1/8	0.575	2-1/2		00977	02745
0.120	1/8	0.600	2-1/2		00978	02746

RE = 1/2 Cutting Diameter (DC)

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- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
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- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

FRACTIONAL  
**M4EB • 8xD**



**M4EB • 8xD**  
FRACTIONAL SERIES

- Four flute design allows for higher feed rates and decreased deflection, improving productivity and surface finish.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	UNCOATED	EDP NO.
0.010	1/8	0.080	2-1/2	00979	02747
0.015	1/8	0.120	2-1/2	00980	02748
0.020	1/8	0.160	2-1/2	00981	02749
0.025	1/8	0.200	2-1/2	00982	02750
0.030	1/8	0.240	2-1/2	00983	02751
0.031	1/8	0.248	2-1/2	00984	02752
0.035	1/8	0.280	2-1/2	00985	02753
0.040	1/8	0.320	2-1/2	00986	02754
0.045	1/8	0.360	2-1/2	00987	02755
0.047	1/8	0.376	2-1/2	00988	02756
0.050	1/8	0.400	2-1/2	00989	02757
0.055	1/8	0.440	2-1/2	00990	02758
0.060	1/8	0.480	2-1/2	00991	02759
0.062	1/8	0.496	2-1/2	00992	02760
0.065	1/8	0.520	2-1/2	00993	02761
0.070	1/8	0.560	2-1/2	00994	02762
0.075	1/8	0.600	2-1/2	00995	02763
0.078	1/8	0.624	2-1/2	00996	02764
0.080	1/8	0.640	2-1/2	00997	02765
0.085	1/8	0.680	2-1/2	00998	02766
0.090	1/8	0.720	2-1/2	00999	02767
0.093	1/8	0.744	2-1/2	01000	02768
0.095	1/8	0.760	2-1/2	01001	02769
0.100	1/8	0.800	2-1/2	01002	02770
0.110	1/8	0.880	2-1/2	01003	02771
0.115	1/8	0.920	2-1/2	01004	02772
0.120	1/8	0.960	2-1/2	01005	02773

RE = 1/2 Cutting Diameter (DC)



New Expanded Tools

TOLERANCES (inch)

.010-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>



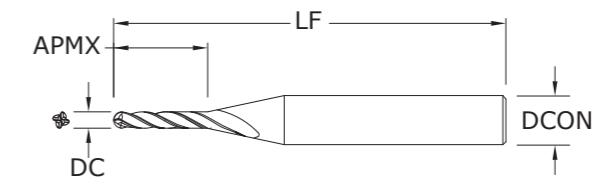
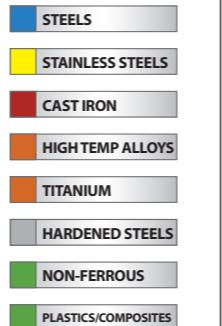
New Expanded Tools

TOLERANCES (inch)

.015-.120 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>



**M4XB • 12xD**  
FRACTIONAL SERIES

CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	UNCOATED	EDP NO.
0.015	1/8	0.180	2-1/2	01007	02774
0.020	1/8	0.240	2-1/2	01008	02775
0.025	1/8	0.300	2-1/2	01009	02776
0.030	1/8	0.360	2-1/2	01010	02777
0.031	1/8	0.372	2-1/2	01011	02778
0.035	1/8	0.420	2-1/2	01012	02779
0.040	1/8	0.480	2-1/2	01013	02780
0.045	1/8	0.540	2-1/2	01014	02781
0.047	1/8	0.564	2-1/2	01015	02782
0.050	1/8	0.600	2-1/2	01016	02783
0.055	1/8	0.660	2-1/2	01017	02784
0.060	1/8	0.720	2-1/2	01018	02785
0.062	1/8	0.744	2-1/2	01019	02786
0.065	1/8	0.780	2-1/2	01020	02787
0.070	1/8	0.840	2-1/2	01021	02788
0.075	1/8	0.900	2-1/2	01022	02789
0.078	1/8	0.936	2-1/2	01023	02790
0.080	1/8	0.960	2-1/2	01024	02791
0.085	1/8	1.020	2-1/2	01025	02792
0.090	1/8	1.080	2-1/2	01026	02793
0.093	1/8	1.116	2-1/2	01027	02794
0.095	1/8	1.140	2-1/2	01028	02795
0.100	1/8	1.200	2-1/2	01029	02796
0.110	1/8	1.320	2-1/2	01030	02797
0.115	1/8	1.380	2-1/2	01031	02798
0.120	1/8	1.440	2-1/2	01032	02799

RE = 1/2 Cutting Diameter (DC)

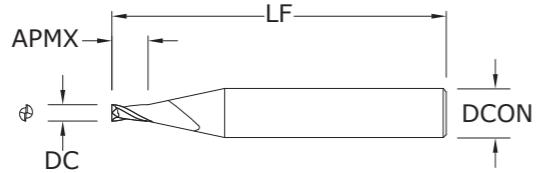
- Four flute design allows for higher feed rates and decreased deflection, improving productivity and surface finish.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

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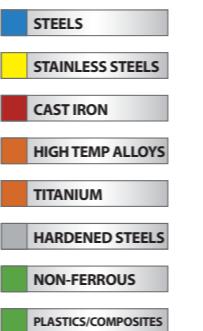
- Two flute design is ideal for softer alloyed, non-ferrous material applications that require slotting or involve heavy chip loads.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
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## TOLERANCES (mm)

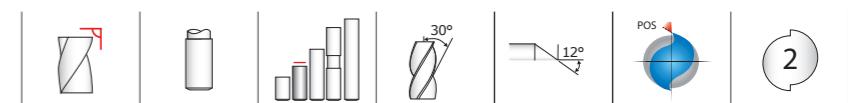
## 0,1–3,0 DIAMETER

DC = +0,0000/-0,0254  
DCON = h<sub>6</sub>

CUTTING DIAMETER DC	DECIMAL EQUIVALENT	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	UNCOATED	TI-NAMITE-A (AITiN)
0,1	0,0039	3,0	0,1	38,0	05002	05000	
0,2	0,0079	3,0	0,3	38,0	01801	02801	
0,3	0,0118	3,0	0,4	38,0	01802	02802	
0,4	0,0157	3,0	0,6	38,0	01803	02803	
0,5	0,0197	3,0	0,7	38,0	01804	02804	
0,6	0,0236	3,0	0,9	38,0	01805	02805	
0,7	0,0276	3,0	1,0	38,0	01806	02806	
0,8	0,0315	3,0	1,2	38,0	01807	02807	
0,9	0,0354	3,0	1,3	38,0	01808	02808	
1,0	0,0394	3,0	1,5	38,0	01809	02809	
1,0	0,0394	4,0	1,5	50,0	01861	02819	
1,1	0,0433	3,0	1,6	38,0	01810	02860	
1,1	0,0433	4,0	1,6	50,0	01862	02892	
1,2	0,0472	3,0	1,8	38,0	01811	02861	
1,2	0,0472	4,0	1,8	50,0	01863	02893	
1,3	0,0512	3,0	1,9	38,0	01812	02862	
1,3	0,0512	4,0	1,9	50,0	01864	02894	
1,4	0,0551	3,0	2,1	38,0	01813	02863	
1,4	0,0551	4,0	2,1	50,0	01865	02895	
1,5	0,0591	3,0	2,2	38,0	01814	02864	
1,5	0,0591	4,0	2,2	50,0	01866	02896	
1,6	0,0630	3,0	2,4	38,0	01815	02865	
1,6	0,0630	4,0	2,4	50,0	01867	02897	
1,7	0,0669	3,0	2,5	38,0	01816	02866	
1,7	0,0669	4,0	2,5	50,0	01868	02898	
1,8	0,0709	3,0	2,7	38,0	01817	02867	
1,8	0,0709	4,0	2,7	50,0	01869	02899	
1,9	0,0748	3,0	2,8	38,0	01818	02868	
1,9	0,0748	4,0	2,8	50,0	01870	02900	
2,0	0,0787	3,0	3,0	38,0	01819	02869	
2,0	0,0787	4,0	3,0	50,0	01871	02901	
2,5	0,0984	3,0	3,7	38,0	01820	02870	
2,5	0,0984	4,0	3,7	50,0	01872	02902	
3,0	0,1181	3,0	4,5	38,0	01821	02871	
3,0	0,1181	4,0	4,5	50,0	01873	02903	

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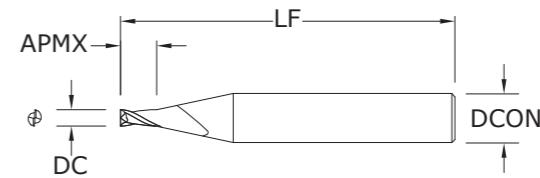
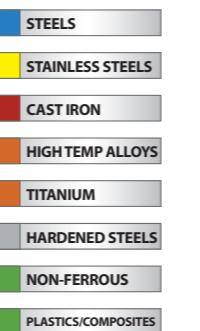
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New Expanded Tools

## TOLERANCES (mm)

## 0,1–3,0 DIAMETER

DC = +0,0000/-0,0254  
DCON = h<sub>6</sub>

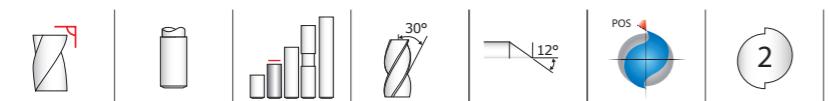
- Two flute design is ideal for softer alloyed, non-ferrous material applications that require slotting or involve heavy chip loads.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
- Advanced geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality.
- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

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CUTTING DIAMETER DC	DECIMAL EQUIVALENT	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	UNCOATED	TI-NAMITE-A (AITiN)
0,1	0,0039	3,0	0,3	38,0	05003	05001	
0,2	0,0079	3,0	0,6	38,0	01823	02811	
0,2	0,0079	4,0	0,6	50,0	01875	02349	
0,3	0,0118	3,0	0,9	38,0	01824	02350	
0,3	0,0118	4,0	0,9	50,0	01876	02360	
0,4	0,0157	3,0	1,2	38,0	01825	02351	
0,4	0,0157	4,0	1,2	50,0	01877	02361	
0,5	0,0197	3,0	1,5	38,0	01826	02352	
0,5	0,0197	4,0	1,5	50,0	01878	02362	
0,6	0,0236	3,0	1,8	38,0	01827	02353	
0,6	0,0236	4,0	1,8	50,0	01879	02363	
0,7	0,0276	3,0	2,1	38,0	01828	02354	
0,7	0,0276	4,0	2,1	50,0	01880	02364	
0,8	0,0315	3,0	2,4	38,0	01829	02355	
0,8	0,0315	4,0	2,4	50,0	01881	02365	
0,9	0,0354	3,0	2,7	38,0	01830	02356	
0,9	0,0354	4,0	2,7	50,0	01882	02366	
1,0	0,0394	3,0	3,0	38,0	01831	02357	
1,0	0,0394	4,0	3,0	50,0	01883	02367	
1,1	0,0433	3,0	3,3	38,0	01832	02872	
1,1	0,0433	4,0	3,3	50,0	01884	02904	
1,2	0,0472	3,0	3,6	38,0	01833	02873	
1,2	0,0472	4,0	3,6	50,0	01885	02905	
1,3	0,0512	3,0	3,9	38,0	01834	02874	
1,3	0,0512	4,0	3,9	50,0	01886	02906	
1,4	0,0551	3,0	4,2	38,0	01835	02875	
1,4	0,0551	4,0	4,2	50,0	01887	02907	
1,5	0,0591	3,0	4,5	38,0	01836	02876	
1,5	0,0591	4,0	4,5	50,0	01888	02908	
1,6	0,0630	3,0	4,8	38,0	01837	02877	
1,6	0,0630	4,0	4,8	50,0	01889	02909	
1,7	0,0669	3,0	5,1	38,0	01838	02878	
1,7	0,0669	4,0	5,1	50,0	01890	02910	
1,8	0,0709	3,0	5,4	38,0	01839	02879	

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METRIC  
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METRIC SERIES

continued

CUTTING DIAMETER DC	DECIMAL EQUIVALENT	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.
1,8	0,0709	4,0	5,4	50,0	01891 02911
1,9	0,0748	3,0	5,7	38,0	01840 02880
1,9	0,0748	4,0	5,7	50,0	01892 02912
2,0	0,0787	3,0	6,0	38,0	01841 02881
2,0	0,0787	4,0	6,0	50,0	01893 02913
2,1	0,0827	3,0	6,3	38,0	01842 02882
2,2	0,0866	3,0	6,6	38,0	01843 02883
2,3	0,0906	3,0	6,9	38,0	01844 02884
2,4	0,0945	3,0	7,2	38,0	01845 02885
2,5	0,0984	3,0	7,5	38,0	01846 02886
2,5	0,0984	4,0	7,5	50,0	01894 02914
2,6	0,1024	3,0	7,8	38,0	01847 02887
2,7	0,1063	3,0	8,1	38,0	01848 02888
2,8	0,1102	3,0	8,4	38,0	01849 02889
2,9	0,1142	3,0	8,7	38,0	01850 02890
3,0	0,1181	3,0	9,0	38,0	01851 02891
3,0	0,1181	4,0	9,0	50,0	01895 02915

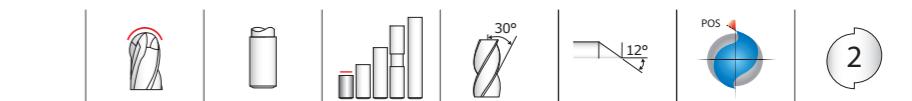
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METRIC  
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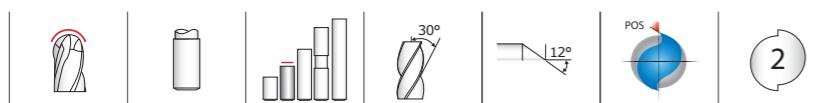


**M2MB • 1.5xD**  
METRIC SERIES

CUTTING DIAMETER DC	DECIMAL EQUIVALENT	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.
0,1	0,0039	3,0	0,1	38,0	05017 05004
0,2	0,0079	3,0	0,3	38,0	05019 05006
0,3	0,0118	3,0	0,3	38,0	05021 05008
0,4	0,0157	3,0	0,6	38,0	05023 05010
0,5	0,0197	3,0	0,7	38,0	01900 03180
0,6	0,0236	3,0	0,9	38,0	01901 03181
0,7	0,0276	3,0	1,0	38,0	01902 03182
0,8	0,0315	3,0	1,2	38,0	01903 03183
0,9	0,0354	3,0	1,3	38,0	01904 03184
1,0	0,0394	3,0	1,5	38,0	01905 03185
1,0	0,0394	4,0	1,5	50,0	02009 02849
1,1	0,0433	3,0	1,6	38,0	01906 02916
1,1	0,0433	4,0	1,6	50,0	02010 02980
1,2	0,0472	3,0	1,8	38,0	01907 02917
1,2	0,0472	4,0	1,8	50,0	02011 02981
1,3	0,0512	3,0	1,9	38,0	01908 02918
1,3	0,0512	4,0	1,9	50,0	02012 02982
1,4	0,0551	3,0	2,1	38,0	01909 02919
1,4	0,0551	4,0	2,1	50,0	02013 02983
1,5	0,0591	3,0	2,2	38,0	01910 02920
1,5	0,0591	4,0	2,2	50,0	02014 02984
1,6	0,0630	3,0	2,4	38,0	01911 02921
1,6	0,0630	4,0	2,4	50,0	02015 02985
1,7	0,0669	3,0	2,5	38,0	01912 02922
1,7	0,0669	4,0	2,5	50,0	02016 02986
1,8	0,0709	3,0	2,7	38,0	01913 02923
1,8	0,0709	4,0	2,7	50,0	02017 02987
1,9	0,0748	3,0	2,8	38,0	01914 02924
1,9	0,0748	4,0	2,8	50,0	02018 02988
2,0	0,0787	3,0	3,0	38,0	01915 02925
2,0	0,0787	4,0	3,0	50,0	02019 02989
2,5	0,0984	3,0	3,7	38,0	01916 02926
2,5	0,0984	4,0	3,7	50,0	02020 02990
3,0	0,1181	3,0	4,5	38,0	01917 02927
3,0	0,1181	4,0	4,5	50,0	02021 02991

RE = 1/2 Cutting Diameter (DC)

- Two flute design is ideal for softer alloyed, non-ferrous material applications that require slotting or involve heavy chip loads.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- High performance carbide substrate designed specifically for Micro Tool applications.
- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
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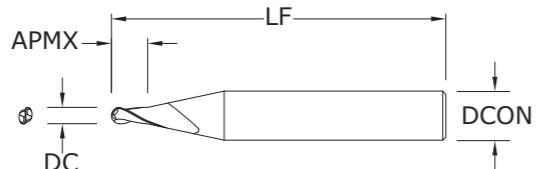
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METRIC SERIES

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New Expanded Tools

CUTTING DIAMETER DC	DECIMAL EQUIVALENT	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	UNCOATED	TI-NAMITE-A (AITIN)
0,1	0,0039	3,0	0,3	38,0	05018	05005	
0,2	0,0079	3,0	0,6	38,0	05020	05007	
0,3	0,0118	3,0	0,9	38,0	05022	05009	
0,4	0,0157	3,0	1,2	38,0	05024	05011	
0,5	0,0197	3,0	1,5	38,0	05025	05012	
0,5	0,0197	4,0	1,5	50,0	02048	03200	
0,6	0,0236	3,0	1,8	38,0	05026	05013	
0,6	0,0236	4,0	1,8	50,0	02049	03201	
0,7	0,0276	3,0	2,1	38,0	05027	05014	
0,7	0,0276	4,0	2,1	50,0	02050	03202	
0,8	0,0315	3,0	2,4	38,0	05028	05015	
0,8	0,0315	4,0	2,4	50,0	02051	03203	
0,9	0,0354	3,0	2,7	38,0	05029	05016	
0,9	0,0354	4,0	2,7	50,0	02052	03204	
1,0	0,0394	3,0	3,0	38,0	01949	02829	
1,0	0,0394	4,0	3,0	50,0	02053	03205	
1,1	0,0433	3,0	3,3	38,0	01950	02940	
1,1	0,0433	4,0	3,3	50,0	02054	03004	
1,2	0,0472	3,0	3,6	38,0	01951	02941	
1,2	0,0472	4,0	3,6	50,0	02055	03005	
1,3	0,0512	3,0	3,9	38,0	01952	02942	
1,3	0,0512	4,0	3,9	50,0	02056	03006	
1,4	0,0551	3,0	4,2	38,0	01953	02943	
1,4	0,0551	4,0	4,2	50,0	02057	03007	
1,5	0,0591	3,0	4,5	38,0	01954	02944	
1,5	0,0591	4,0	4,5	50,0	02058	03008	
1,6	0,0630	3,0	4,8	38,0	01955	02945	
1,6	0,0630	4,0	4,8	50,0	02059	03009	
1,7	0,0669	3,0	5,1	38,0	01956	02946	
1,7	0,0669	4,0	5,1	50,0	02060	03010	
1,8	0,0709	3,0	5,4	38,0	01957	02947	
1,8	0,0709	4,0	5,4	50,0	02061	03011	
1,9	0,0748	3,0	5,7	38,0	01958	02948	
1,9	0,0748	4,0	5,7	50,0	02062	03012	

RE = 1/2 Cutting Diameter (DC)

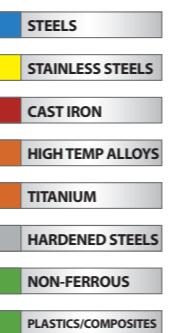
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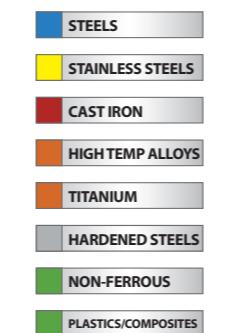
## TOLERANCES (mm)

## 0,1–3,0 DIAMETER

DC = +0,0000/-0,0254  
DCON = h6

## TOLERANCES (mm)

## 0,1–3,0 DIAMETER

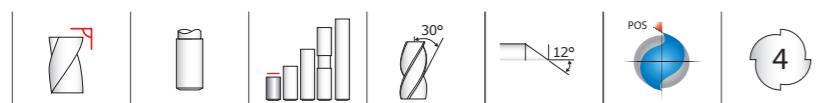
DC = +0,0000/-0,0254  
DCON = h6**M2MB • 3xD****M2MB • 3xD**  
METRIC SERIES

continued

CUTTING DIAMETER DC	DECIMAL EQUIVALENT	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	UNCOATED	TI-NAMITE-A (AITIN)
2,0	0,0787	3,0	6,0	38,0	01959	02949	
2,0	0,0787	4,0	6,0	50,0	02063	03013	
2,1	0,0827	3,0	6,3	38,0	01960	02950	
2,2	0,0866	3,0	6,6	38,0	01961	02951	
2,3	0,0906	3,0	6,9	38,0	01962	02952	
2,4	0,0945	3,0	7,2	38,0	01963	02953	
2,5	0,0984	3,0	7,5	38,0	01964	02954	
2,5	0,0984	4,0	7,5	50,0	02064	03014	
2,6	0,1024	3,0	7,8	38,0	01965	02955	
2,7	0,1063	3,0	8,1	38,0	01966	02956	
2,8	0,1102	3,0	8,4	38,0	01967	02957	
2,9	0,1142	3,0	8,7	38,0	01968	02958	
3,0	0,1181	3,0	9,0	38,0	01969	02959	
3,0	0,1181	4,0	9,0	50,0	02065	03015	

RE = 1/2 Cutting Diameter (DC)

METRIC

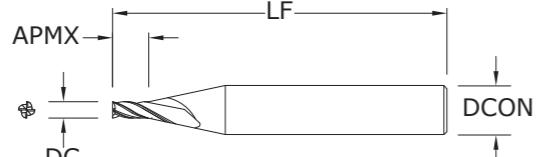
**M4M • 1.5xD**
**MICRO  
SGS®**  
Solid Carbide Tools

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**M4M • 1.5xD**

METRIC SERIES

- Four flute design allows for higher feed rates and decreased deflection, improving productivity and surface finish.
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
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- Broad portfolio, offering consistent lengths of cut, to ensure application demands are met.
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- All tools in stock to meet customer order requirements.
- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.



New Expanded Tools

## TOLERANCES (mm)

## 0,1–3,0 DIAMETER

 $DC = +0,0000/-0,0254$   
 $DCON = h_6$ 


CUTTING DIAMETER DC	DECIMAL EQUIVALENT	mm SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	UNCOATED	TI-NAMITE-A (AITIN)
0,1	0,0039	3,0	0,15	38,0	05112	05076	
0,2	0,0079	3,0	0,30	38,0	05113	05077	
0,3	0,0118	3,0	0,45	38,0	05114	05078	
0,4	0,0157	3,0	0,60	38,0	05115	05079	
0,5	0,0197	3,0	0,75	38,0	05116	05080	
0,6	0,0236	3,0	0,90	38,0	05117	05081	
0,7	0,0276	3,0	1,05	38,0	05118	05082	
0,8	0,0315	3,0	1,20	38,0	05119	05083	
0,9	0,0354	3,0	1,35	38,0	05120	05084	
1,0	0,0394	3,0	1,50	38,0	05121	05085	
1,1	0,0433	3,0	1,65	38,0	09282	09290	
1,2	0,0472	3,0	1,80	38,0	09283	09291	
1,3	0,0512	3,0	1,95	38,0	09284	09292	
1,4	0,0551	3,0	2,10	38,0	09285	09293	
1,5	0,0591	3,0	2,25	38,0	05122	05086	
1,6	0,0630	3,0	2,40	38,0	09286	09294	
1,7	0,0669	3,0	2,55	38,0	09287	09295	
1,8	0,0709	3,0	2,70	38,0	09288	09296	
1,9	0,0748	3,0	2,85	38,0	09289	09297	
2,0	0,0787	3,0	3,00	38,0	05123	05087	
2,1	0,0827	3,0	3,15	38,0	09270	09278	
2,2	0,0866	3,0	3,30	38,0	09271	09279	
2,3	0,0906	3,0	3,45	38,0	09272	09280	
2,4	0,0945	3,0	3,60	38,0	09273	09281	
2,5	0,0984	3,0	3,75	38,0	05124	05088	
3,0	0,1181	3,0	4,50	38,0	05125	05089	

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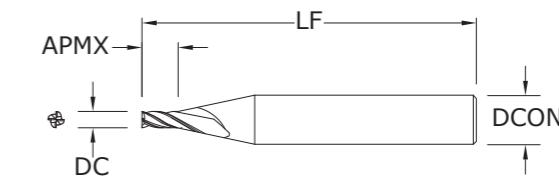
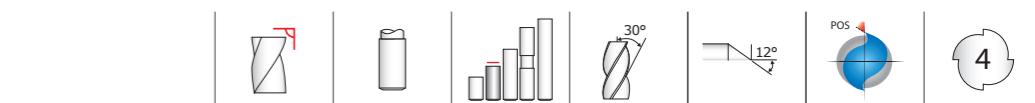
**M4M • 1.5xD**

METRIC SERIES

New Expanded Tools

## TOLERANCES (mm)

## 0,1–3,0 DIAMETER

 $DC = +0,0000/-0,0254$   
 $DCON = h_6$ 


METRIC

**M4M • 3xD****M4M • 3xD**  
METRIC SERIES

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

CUTTING DIAMETER DC	DECIMAL EQUIVALENT	mm SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	UNCOATED	TI-NAMITE-A (AITIN)
0,1	0,0039	3,0	0,3	38,0	05090	05054	
0,2	0,0079	3,0	0,6	38,0	05091	05055	
0,3	0,0118	3,0	0,9	38,0	05092	05056	
0,4	0,0157	3,0	1,2	38,0	05093	05057	
0,5	0,0197	3,0	1,5	38,0	05094	05058	
0,6	0,0236	3,0	1,8	38,0	05095	05059	
0,7	0,0276	3,0	2,1	38,0	05096	05060	
0,8	0,0315	3,0	2,4	38,0	05097	05061	
0,9	0,0354	3,0	2,7	38,0	05098	05062	
1,0	0,0394	3,0	3,0	38,0	05099	05063	
1,1	0,0433	3,0	3,3	38,0	05100	05064	
1,2	0,0472	3,0	3,6	38,0	05101	05065	
1,3	0,0512	3,0	3,9	38,0	05102	05066	
1,4	0,0551	3,0	4,2	38,0	05103	05067	
1,5	0,0591	3,0	4,5	38,0	05104	05068	
1,6	0,0630	3,0	4,8	38,0	05105	05069	
1,7	0,0669	3,0	5,1	38,0	05106	05070	
1,8	0,0709	3,0	5,4	38,0	05107	05071	
1,9	0,0748	3,0	5,7	38,0	05108	05072	
2,0	0,0787	3,0	6,0	38,0	05109	05073	
2,1	0,0827	3,0	6,3	38,0	09266	09274	
2,2	0,0866	3,0	6,6	38,0	09267	09275	
2,3	0,0906	3,0	6,9	38,0	09268	09276	
2,4	0,0945	3,0	7,2	38,0	09269	09277	
2,5	0,0984	3,0	7,5	38,0	05110	05074	
3,0	0,1181	3,0	9,0	38,0	05111	05075	

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- All micro tools are manufactured in accordance with the KSPT ISO certified quality procedures.

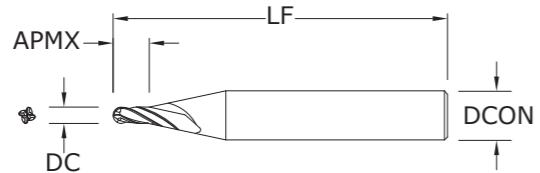
**M4MB • 1.5xD**
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**M4MB • 1.5xD**

METRIC SERIES

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New Expanded Tools

CUTTING DIAMETER DC	DECIMAL EQUIVALENT	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	
					UNCOATED	TI-NAMITE-A (AITIN)
0,4	0,0157	3,0	0,6	38,0	05042	05030
0,5	0,0197	3,0	0,7	38,0	05044	05032
0,6	0,0236	3,0	0,9	38,0	05046	05034
0,7	0,0276	3,0	1,0	38,0	05048	05036
0,8	0,0315	3,0	1,2	38,0	05050	05038
0,9	0,0354	3,0	1,3	38,0	05052	05040
1,0	0,0394	3,0	1,5	38,0	01927	03195
1,0	0,0394	4,0	1,5	50,0	02031	02859
1,1	0,0433	3,0	1,6	38,0	01928	02928
1,1	0,0433	4,0	1,6	50,0	02032	02992
1,2	0,0472	3,0	1,8	38,0	01929	02929
1,2	0,0472	4,0	1,8	50,0	02033	02993
1,3	0,0512	3,0	1,9	38,0	01930	02930
1,3	0,0512	4,0	1,9	50,0	02034	02994
1,4	0,0551	3,0	2,1	38,0	01931	02931
1,4	0,0551	4,0	2,1	50,0	02035	02995
1,5	0,0591	3,0	2,2	38,0	01932	02932
1,5	0,0591	4,0	2,2	50,0	02036	02996
1,6	0,0630	3,0	2,4	38,0	01933	02933
1,6	0,0630	4,0	2,4	50,0	02037	02997
1,7	0,0669	3,0	2,5	38,0	01934	02934
1,7	0,0669	4,0	2,5	50,0	02038	02998
1,8	0,0709	3,0	2,7	38,0	01935	02935
1,8	0,0709	4,0	2,7	50,0	02039	02999
1,9	0,0748	3,0	2,8	38,0	01936	02936
1,9	0,0748	4,0	2,8	50,0	02040	03000
2,0	0,0787	3,0	3,0	38,0	01937	02937
2,0	0,0787	4,0	3,0	50,0	02041	03001
2,5	0,0984	3,0	3,7	38,0	01938	02938
2,5	0,0984	4,0	3,7	50,0	02042	03002
3,0	0,1181	3,0	4,5	38,0	01939	02939
3,0	0,1181	4,0	4,5	50,0	02043	03003

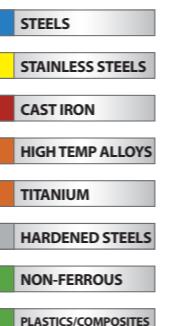
RE = 1/2 Cutting Diameter (DC)

## TOLERANCES (mm)

## 0,4–3,0 DIAMETER

DC = +0,0000/-0,0254

DCON = h6


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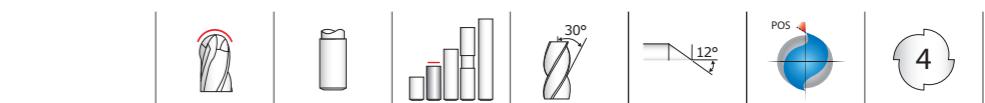
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## TOLERANCES (mm)

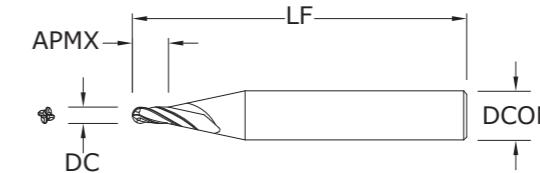
## 0,4–3,0 DIAMETER

DC = +0,0000/-0,0254

DCON = h6

**M4MB • 3xD**

METRIC SERIES



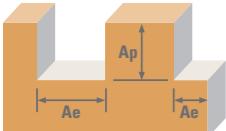
## New Expanded Tools

CUTTING DIAMETER DC	DECIMAL EQUIVALENT	SHANK DIAMETER DCON	LENGTH OF CUT APMX	OVERALL LENGTH LF	EDP NO.	
					UNCOATED	TI-NAMITE-A (AITIN)
0,4	0,0157	3,0	1,2	38,0	05043	05031
0,5	0,0197	3,0	1,5	38,0	05045	05033
0,6	0,0236	3,0	1,8	38,0	05047	05035
0,7	0,0276	3,0	2,1	38,0	05049	05037
0,8	0,0315	3,0	2,4	38,0	05051	05039
0,9	0,0354	3,0	2,7	38,0	05053	05041
1,0	0,0394	3,0	3,0	38,0	01979	02839
1,0	0,0394	4,0	3,0	50,0	02075	03215
1,1	0,0433	3,0	3,3	38,0	01980	02960
1,1	0,0433	4,0	3,3	50,0	02076	03016
1,2	0,0472	3,0	3,6	38,0	01981	02961
1,2	0,0472	4,0	3,6	50,0	02077	03017
1,3	0,0512	3,0	3,9	38,0	01982	02962
1,3	0,0512	4,0	3,9	50,0	02078	03018
1,4	0,0551	3,0	4,2	38,0	01983	02963
1,4	0,0551	4,0	4,2	50,0	02079	03019
1,5	0,0591	3,0	4,5	38,0	01984	02964
1,5	0,0591	4,0	4,5	50,0	02080	03020
1,6	0,0630	3,0	4,8	38,0	01985	02965
1,6	0,0630	4,0	4,8	50,0	02081	03021
1,7	0,0669	3,0	5,1	38,0	01986	02966
1,7	0,0669	4,0	5,1	50,0	02082	03022
1,8	0,0709	3,0	5,4	38,0	01987	02967
1,8	0,0709	4,0	5,4	50,0	02083	03023
1,9	0,0748	3,0	5,7	38,0	01988	02968
1,9	0,0748	4,0	5,7	50,0	02084	03024
2,0	0,0787	3,0	6,0	38,0	01989	02969
2,0	0,0787	4,0	6,0	50,0	02085	03025
2,1	0,0827	3,0	6,3	38,0	01990	02970
2,2	0,0866	3,0	6,6	38,0	01991	02971
2,3	0,0906	3,0	6,9	38,0	01992	02972
2,4	0,0945	3,0	7,2	38,0	01993	02973
2,5	0,0984	3,0	7,5	38,0	01994	02974
2,5	0,0984	4,0	7,5	50,0	02086	03026
2,6	0,1024	3,0	7,8	38,0	01995	02975
2,7	0,1063	3,0	8,1	38,0	01996	02976
2,8	0,1102	3,0	8,4	38,0	01997	02977
2,9	0,1142	3,0	8,7	38,0	01998	02978
3,0	0,1181	3,0	9,0	38,0	01999	02979
3,0	0,1181	4,0	9,0	50,0	02087	03027

RE = 1/2 Cutting Diameter (DC)

# FRACTIONAL & METRIC Speeds and Feeds

- Instructions:**
- rpm = use speed from INCH or METRIC Baseline chart
  - ipm = INCH Baseline Feed (ipm) x Feed Multiplier [from selected chart below]
  - mm/min = METRIC Baseline Feed (mm/min) x Feed Multiplier [from selected chart below]
  - Reduce speed and feed 30 percent when using uncoated tools
  - Find Width of Cut (Ae) and Depth of Cut (Ap) recommendations on chart below
  - refer to the KYOCERA SGS Tool Wizard® or sgsmicrotools.com for detailed technical charts by series



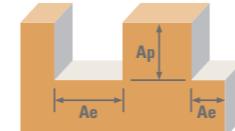
INCH		Flute Length	1.5 x DC		3 x DC			
2-Flute, Square, Corner Radius & Ball Without Reach		Feed Multiplier	1		0.9			
		Width/Depth	Ae x DC	Ap x DC	Ae x DC	Ap x DC		
P	H	Diameter (DC)	≤0.0312	>0.0312	≤0.0312	>0.0312		
<b>ALL</b>		Profile	≤.30	≤.50	≤1	≤.10	≤.25	≤2
<b>ALL</b>		Slot	1	≤.20	≤.50	1	≤.15	≤.35

INCH		Flute Length	1.5 x DC		3 x DC		5 x DC		8 x DC		12 x DC						
4-Flute, Square, Corner Radius & Ball Without Reach		Feed Multiplier	1.57		1.41		0.59		0.59		0.36						
		Width/Depth	Ae x DC	Ap x DC	Ae x DC	Ap x DC	Ae x DC	Ap x DC	Ae x DC	Ap x DC	Ae x DC	Ap x DC					
P	H	Diameter (DC)	≤0.0312	>0.0312	≤0.0312	>0.0312	≤0.0312	>0.0312	≤0.0312	>0.0312	≤0.0312	>0.0312					
<b>ALL</b>		Profile	≤.30	≤.50	≤1	≤.10	≤.25	≤2	≤.10	≤.25	≤3	≤.05	≤.10	≤4	≤.03	≤.06	≤6
<b>ALL</b>		Slot	1	≤.20	≤.50	1	≤.15	≤.35	1	≤.10	≤.20						

METRIC		Flute Length	1.5 x DC		3 x DC							
2-Flute Square & Ball Without Reach		Feed Multiplier	1		0.9							
		Width/Depth	Ae x DC	Ap x DC	Ae x DC	Ap x DC						
P	H	Diameter (DC)	≤0.0312	>0.0312	≤0.0312	>0.0312						
<b>ALL</b>		Profile	≤.30	≤.50	≤1	≤.10	≤.25	≤2				
<b>ALL</b>		Slot	1	≤.20	≤.50	1	≤.15	≤.35				

METRIC		Flute Length	1.5 x DC		3 x DC						
4-Flute Square & Ball Without Reach		Feed Multiplier	1.57		1.41						
		Width/Depth	Ae x DC	Ap x DC	Ae x DC	Ap x DC					
P	H	Diameter (DC)	≤0.0312	>0.0312	≤0.0312	>0.0312					
<b>ALL</b>		Profile	≤.30	≤.50	≤1	≤.10	≤.25	≤2			
<b>ALL</b>		Slot	1	≤.20	≤.50	1	≤.15	≤.35			

- Instructions:**
- rpm = use speed from INCH or METRIC Baseline chart
  - ipm = INCH Baseline Feed (ipm) x Feed Multiplier [from selected chart below]
  - mm/min = METRIC Baseline Feed (mm/min) x Feed Multiplier [from selected chart below]
  - Reduce speed and feed 30 percent when using uncoated tools
  - Find Width of Cut (Ae) and Depth of Cut (Ap) recommendations on chart below
  - refer to the KYOCERA SGS Tool Wizard® or sgsmicrotools.com for detailed technical charts by series



INCH		Flute Length	8 x DC		12 x DC				
2-Flute Square & Ball With Reach		Feed Multiplier	0.6		0.5				
		Width/Depth	Ae x DC	Ap x DC	Ae x DC	Ap x DC			
P	H	Diameter (DC)	≤0.0312	>0.0312	≤0.0312	>0.0312			
<b>ALL</b>		Profile	≤.25	≤.50	≤.30	≤.22	≤.45	≤.25	
<b>ALL</b>		Slot	1	≤.07	≤.17	1	≤.06	≤.15	

INCH		Flute Length	3 x DC		5 x DC		8 x DC		12 x DC		15 x DC		20 x DC		25 x DC								
3-Flute Square, Corner Radius & Ball With Reach		Feed Multiplier	1.4		1.15		0.9		0.7		0.6		0.45		0.35								
		Width/Depth	Ae x DC	Ap x DC																			
P	H	Diameter (DC)	≤0.0312	>0.0312	≤0.0312	>0.0312	≤0.0312	>0.0312	≤0.0312	>0.0312	≤0.0312	>0.0312	≤0.0312	>0.0312	≤0.0312	>0.0312	≤0.0312	>0.0312					
<b>ALL</b>		Profile	≤.30	≤.60	≤.5	≤.30	≤.60	≤.35	≤.25	≤.50	≤.30	≤.22	≤.45	≤.25	≤.15	≤.30	≤.25	≤.12	≤.25	≤.20	≤.12	≤.25	≤.20
<b>ALL</b>		Slot	1	≤.15	≤.30	1	≤.08	≤.20	1	≤.07	≤.17	1	≤.06	≤.15	1	≤.04	≤.10	1	≤.04	≤.10			

INCH		Flute Length	8 x DC		12 x DC	
4-Flute Square & Ball With Reach		Feed Multiplier	0.95			

# FRACTIONAL Baseline

INCH Baseline Speed and Feed Square, Corner Radius & Ball End With and Without Reach		DC • in								
	Hardness	Vc (sfm)	0.0050    0.0156    0.0312	0.0625    0.0938    0.1200						
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Profile (292-438)	365 RPM	278860 89378 44689	22309 14865 11619					
			Fz (2.05)	0.000022 0.00007 0.00013	0.00027 0.00041 0.00052					
		Slot (232-348)	290 RPM	221560 71013 35506	17725 11810 9232					
			Fz	0.000022 0.00007 0.00013	0.00027 0.00041 0.00052					
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Profile (168-252)	210 RPM	160440 51423 25712	12835 8552 6685					
			Fz	0.000019 0.00006 0.00012	0.00024 0.00036 0.00046					
		Slot (132-198)	165 RPM	126060 40404 20202	10085 6720 5253					
			Fz	0.000019 0.00006 0.00012	0.00024 0.00036 0.00046					
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	Profile (272-408)	340 RPM	259760 83256 41628	20781 13846 10823					
			Fz	0.000022 0.00007 0.00013	0.00027 0.00041 0.00052					
		Slot (216-324)	270 RPM	206280 66115 33058	16502 10996 8595					
			Fz	0.000022 0.00007 0.00013	0.00027 0.00041 0.00052					
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	Profile (188-282)	235 RPM	179540 57545 28772	14363 9570 7481					
			Fz	0.000019 0.00006 0.00012	0.00024 0.00036 0.00046					
		Slot (148-222)	185 RPM	141340 45301 22651	11307 7534 5889					
			Fz	0.000019 0.00006 0.00012	0.00024 0.00036 0.00046					
M	STAINLESS STEELS (PH) 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	Profile (172-258)	215 RPM	164260 52647 26324	13141 8756 6844					
			Fz	0.000014 0.00004 0.00008	0.00017 0.00025 0.00033					
		Slot (136-204)	170 RPM	129880 41628 20814	10390 6923 5412					
			Fz	0.000014 0.00004 0.00008	0.00017 0.00025 0.00033					
	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	Profile (244-366)	305 RPM	233020 74686 37343	18642 12421 9709					
			Fz	0.000022 0.00007 0.00014	0.00027 0.00041 0.00052					
		Slot (196-294)	245 RPM	187180 59994 29997	14974 9978 7799					
			Fz	0.000022 0.00007 0.00014	0.00027 0.00041 0.00052					
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	Profile (800-1200)	1000 RPM	764000 244872 122436	61120 40725 31833					
			Fz	0.000064 0.00020 0.00040	0.00080 0.00120 0.00153					
		Slot (640-960)	800 RPM	611200 195897 97949	48896 32580 25467					
			Fz	0.000064 0.00020 0.00040	0.00080 0.00120 0.00153					
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	Profile (412-618)	515 RPM	393460 126109 63054	31477 20973 16394					
			Fz	0.000048 0.00015 0.00030	0.00060 0.00090 0.00115					
		Slot (328-492)	410 RPM	313240 100397 50199	25059 16697 13052					
			Fz	0.000048 0.00015 0.00030	0.00060 0.00090 0.00115					

continued on next page

INCH Baseline Speed and Feed Square, Corner Radius & Ball End With and Without Reach		DC • in								
	Hardness	Vc (sfm)	0.0050    0.0156    0.0312	0.0625    0.0938    0.1200						
N	PLASTICS Polycarbonate, PVC, Polypropylene	Profile (800-1200)	1000 RPM	764000 244872 122436	61120 40725 31833					
			Fz	0.000064 0.00020 0.00040	0.00080 0.00120 0.00153					
		Slot (640-960)	800 RPM	611200 195897 97949	48896 32580 25467					
			Fz	0.000064 0.00020 0.00040	0.00080 0.00120 0.00153					
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile (48-72)	60 RPM	45840 14692 7346	3667 2443 1910					
			Fz	0.000012 0.00004 0.00008	0.00015 0.00023 0.00029					
		Slot (36-54)	45 RPM	34380 11019 5510	2750 1833 1433					
			Fz	0.000012 0.00004 0.00008	0.00015 0.00023 0.00029					
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile (36-54)	45 RPM	34380 11019 5510	2750 1833 1433					
			Fz	0.000008 0.00003 0.00005	0.00010 0.00015 0.00019					
		Slot (28-42)	35 RPM	26740 8571 4285	2139 1425 1114					
			Fz	0.000008 0.00003 0.00005	0.00010 0.00015 0.00019					
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Profile (128-192)	160 RPM	122240 39179 19590	9779 6516 5093					
			Fz	0.000014 0.00004 0.00008	0.00017 0.00025 0.00033					
		Slot (104-156)	130 RPM	99320 31833 15917	7946 5294 4138					
			Fz	0.000014 0.00004 0.00008	0.00017 0.00025 0.00033					
S	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3Cr3Sn3Al	Profile (48-72)	60 RPM	45840 14692 7346	3667 2443 1910					
			Fz	0.000010 0.00003 0.00006	0.0					

**Baseline**

**METRIC Baseline**  
Speed and Feed  
Square & Ball End  
With and Without Reach Hardness

					DC • (mm)							
					Vc (m/min)	0.1	0.5	1	1.5	2	2.5	3
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	$\leq 275 \text{ Bhn}$ $\text{or} \leq 28 \text{ HRc}$	Profile	111 (89-134)	RPM	353837	70767	35384	23589	17692	14153	11795
			Fz	0.00043	0.00216	0.00432	0.00648	0.00865	0.01081	0.01297		
			Slot	88 (71-106)	RPM	281131	56226	28113	18742	14057	11245	9371
			Fz	0.00043	0.00216	0.00432	0.00648	0.00865	0.01081	0.01297		
		$\leq 375 \text{ Bhn}$ $\text{or} \leq 40 \text{ HRc}$	Profile	64 (51-77)	RPM	203577	40715	20358	13572	10179	8143	6786
			Fz	0.00038	0.00192	0.00384	0.00576	0.00769	0.00961	0.01153		
			Slot	50 (40-60)	RPM	159954	31991	15995	10664	7998	6398	5332
			Fz	0.00038	0.00192	0.00384	0.00576	0.00769	0.00961	0.01153		
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	$\leq 275 \text{ Bhn}$ $\text{or} \leq 28 \text{ HRc}$	Profile	104 (83-124)	RPM	329602	65920	32960	21973	16480	13184	10987
			Fz	0.00043	0.00216	0.00432	0.00648	0.00865	0.01081	0.01295		
			Slot	82 (66-99)	RPM	261742	52348	26174	17449	13087	10470	8725
			Fz	0.00043	0.00216	0.00432	0.00648	0.00865	0.01081	0.01295		
		$\leq 325 \text{ Bhn}$ $\text{or} \leq 35 \text{ HRc}$	Profile	72 (57-86)	RPM	227813	45563	22781	15188	11391	9113	7594
			Fz	0.00038	0.00192	0.00385	0.00577	0.00769	0.00961	0.01154		
			Slot	56 (45-68)	RPM	179342	35868	17934	11956	8967	7174	5978
			Fz	0.00038	0.00192	0.00385	0.00577	0.00769	0.00961	0.01154		
	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	$\leq 275 \text{ Bhn}$ $\text{or} \leq 28 \text{ HRc}$	Profile	66 (52-79)	RPM	208425	41685	20842	13895	10421	8337	6947
			Fz	0.00027	0.00136	0.00272	0.00408	0.00544	0.00680	0.00819		
			Slot	52 (41-62)	RPM	164801	32960	16480	10987	8240	6592	5493
			Fz	0.00027	0.00136	0.00272	0.00408	0.00544	0.00680	0.00819		
		$\leq 325 \text{ Bhn}$ $\text{or} \leq 35 \text{ HRc}$	Profile	93 (74-112)	RPM	295672	59134	29567	19711	14784	11827	9856
			Fz	0.00043	0.00217	0.00433	0.00650	0.00866	0.01083	0.01301		
			Slot	75 (60-90)	RPM	237507	47501	23751	15834	11875	9500	7917
			Fz	0.00043	0.00217	0.00433	0.00650	0.00866	0.01083	0.01301		
	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	$\leq 220 \text{ Bhn}$ $\text{or} \leq 19 \text{ HRc}$	Profile	305 (244-366)	RPM	969416	193883	96942	64628	48471	38777	32314
			Fz	0.00128	0.00639	0.01277	0.01916	0.02555	0.03193	0.03832		
			Slot	244 (195-293)	RPM	775533	155107	77553	51702	38777	31021	25851
			Fz	0.00128	0.00639	0.01277	0.01916	0.02555	0.03193	0.03832		
		$\leq 140 \text{ Bhn}$ $\text{or} \leq 3 \text{ HRc}$	Profile	157 (126-188)	RPM	499249	99850	49925	33283	24962	19970	16642
			Fz	0.00096	0.00479	0.00959	0.01438	0.01917	0.02396	0.02876		
			Slot	125 (100-150)	RPM	397461	79492	39746	26497	19873	15898	13249
			Fz	0.00096	0.00479	0.00959	0.01438	0.01917	0.02396	0.02876		

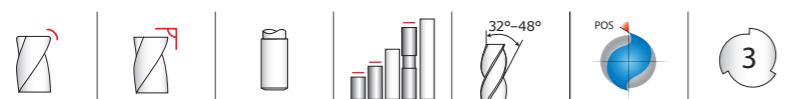
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**Baseline**

**METRIC Baseline**  
Speed and Feed  
Square & Ball End  
With and Without Reach Hardness

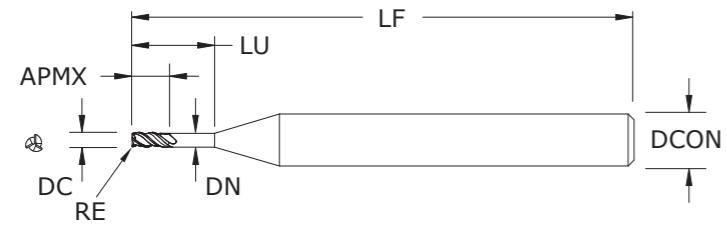
					DC • (mm)							
					Vc (m/min)	0.1	0.5	1	1.5	2	2.5	3
N	PLASTICS Polycarbonate, PVC, Polypropylene	$\leq 275 \text{ Bhn}$ $\text{or} \leq 28 \text{ HRc}$	Profile	305 (244-366)	RPM	969416	193883	96942	64628	48471	38777	32314
			Fz	0.00128	0.00639	0.01277	0.01916	0.02555	0.03193	0.03832		
		$\leq 300 \text{ Bhn}$ $\text{or} \leq 32 \text{ HRc}$	Slot	244 (195-293)	RPM	775533	155107	77553	51702	38777	31021	25851
			Fz	0.00128	0.00639	0.01277	0.01916	0.02555	0.03193	0.03832		
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	$\leq 300 \text{ Bhn}$ $\text{or} \leq 32 \text{ HRc}$	Profile	18 (15-22)	RPM	58165	11633	5816	3878	2908	2327	1939
			Fz	0.00024	0.00121	0.00242	0.00362	0.00483	0.00604	0.00722		
		$\leq 400 \text{ Bhn}$ $\text{or} \leq 43 \text{ HRc}$	Slot	14 (11-16)	RPM	43624	8725	4362	2908	2181	1745	1454
			Fz	0.00024	0.00121	0.00242	0.00362	0.00483	0.00604	0.00722		
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	$\leq 400 \text{ Bhn}$ $\text{or} \leq 43 \text{ HRc}$	Profile	14 (11-16)	RPM	43624	8725	4362	2908	2181	1745	1454
			Fz	0.00016	0.00080	0.00161	0.00241	0.00322	0.00402	0.00486		
		$\leq 350 \text{ Bhn}$ $\text{or} \leq 38 \text{ HRc}$	Slot									

## FRACTIONAL M032



## M032

FRACTIONAL SERIES



- Variable helix design improves stability, extends tool life, and improves part quality in challenging applications
- Reinforced shank maximizes rigidity, especially in applications requiring additional tool extension
- Proprietary coating allows for superior chip flow, driving industry leading productivity and value, even at low spindle speeds.
- Available from stock in a selection of popular diameters, flute lengths, and end configurations
- Application specific sub-micron grain carbide designed specifically for micro-tool applications
- Manufactured in accordance with KSPT ISO certified quality procedures

	inch							EDP NO.
	CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	CORNER RADIUS RE	TI-NAMITE-A (AITiN)
	0.0312	1/4	0.063	—	—	2-1/2	—	05271
	0.0312	1/4	0.063	0.155	0.029	2-1/2	—	05272
	0.0312	1/4	0.063	—	—	2-1/2	0.006	05270
	0.0312	1/4	0.094	—	—	2-1/2	—	05274
	0.0312	1/4	0.094	—	—	2-1/2	0.006	05273
	0.0312	1/4	0.094	0.155	0.029	2-1/2	0.006	05275
	0.0469	1/4	0.094	—	—	2-1/2	—	05277
	0.0469	1/4	0.094	0.230	0.043	2-1/2	—	05278
	0.0469	1/4	0.094	—	—	2-1/2	0.010	05276
	0.0469	1/4	0.141	—	—	2-1/2	—	05280
	0.0469	1/4	0.141	—	—	2-1/2	0.010	05279
	0.0469	1/4	0.141	0.230	0.043	2-1/2	0.010	05281
	0.0625	1/4	0.140	—	—	2-1/2	—	05283
	0.0625	1/4	0.140	0.312	0.058	2-1/2	—	05284
	0.0625	1/4	0.140	—	—	2-1/2	0.010	05282
	0.0625	1/4	0.188	—	—	2-1/2	—	05286
	0.0625	1/4	0.188	—	—	2-1/2	0.010	05285
	0.0625	1/4	0.188	0.312	0.058	2-1/2	0.010	05287
	0.0781	1/4	0.140	—	—	2-1/2	—	05289
	0.0781	1/4	0.140	0.390	0.072	2-1/2	—	05290
	0.0781	1/4	0.140	—	—	2-1/2	0.010	05288
	0.0781	1/4	0.234	—	—	2-1/2	—	05292
	0.0781	1/4	0.234	—	—	2-1/2	0.010	05291
	0.0781	1/4	0.234	0.390	0.072	2-1/2	0.010	05293
	0.0938	1/4	0.188	—	—	2-1/2	—	05295
	0.0938	1/4	0.188	0.465	0.086	2-1/2	—	05296
	0.0938	1/4	0.188	—	—	2-1/2	0.010	05294
	0.0938	1/4	0.375	—	—	2-1/2	—	05298
	0.0938	1/4	0.375	—	—	2-1/2	0.010	05297
	0.0938	1/4	0.375	0.465	0.086	2-1/2	0.010	05299
	0.1094	1/4	0.188	—	—	2-1/2	—	05301
	0.1094	1/4	0.188	0.545	0.101	2-1/2	—	05302
	0.1094	1/4	0.188	—	—	2-1/2	0.010	05300
	0.1094	1/4	0.438	—	—	2-1/2	—	05304
	0.1094	1/4	0.438	—	—	2-1/2	0.010	05303
	0.1094	1/4	0.438	0.545	0.101	2-1/2	0.010	05305

**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

**MICRO**  
**SGS**  
Solid Carbide Tools

KYOCERA

New Expanded Tools

### TOLERANCES (inch)

#### .031-.109 DIAMETER

DC = +0.000/-0.001

DCON = h<sub>6</sub>

RE = +0.002/-0.002

#### STEELS

#### STAINLESS STEELS

#### CAST IRON

#### HIGH TEMP ALLOYS

#### TITANIUM

#### HARDENED STEELS

#### NON-FERROUS

#### PLASTICS/COMPOSITES

### TOLERANCES (mm)

#### 1.0-3.0 DIAMETER

DC = +0,000/-0,0254

DCON = h<sub>6</sub>

RE = +0,050/-0,050

#### STEELS

#### STAINLESS STEELS

#### CAST IRON

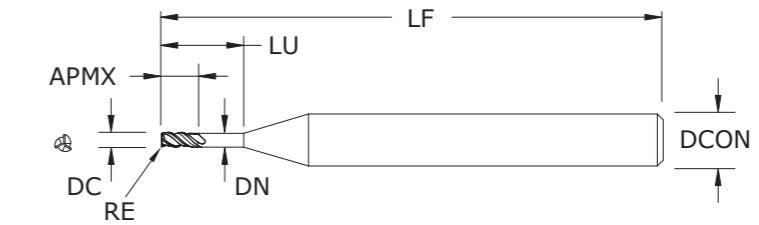
#### HIGH TEMP ALLOYS

#### TITANIUM

#### HARDENED STEELS

#### NON-FERROUS

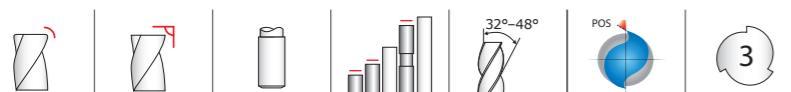
#### PLASTICS/COMPOSITES



New Expanded Tools

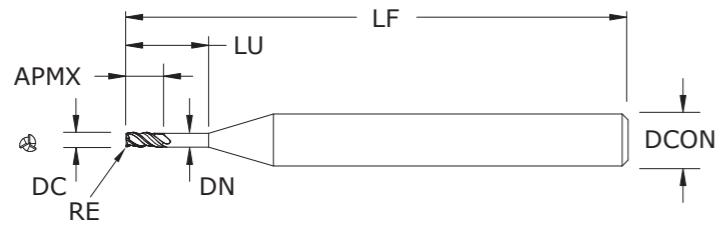
	mm							EDP NO.
	CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF	CORNER RADIUS RE	TI-NAMITE-A (AITiN)
	1,0	6,0	1,5	—	—	63,5	—	05324
	1,0	6,0	1,5	—	—	63,5	0,1	05321
	1,0	6,0	1,5	—	—	63,5	0,2	05322
	1,0	6,0	3,0	—	—	63,5	0,3	05323
	1,0	6,0	3,0	—	—	63,5	—	05328
	1,0	6,0	3,0	—	—	63,5	0,1	05325
	1,0	6,0	3,0	—	—	63,5	0,2	05326
	1,0	6,0	3,0	—	—	63,5	0,3	05327
	1,0	6,0	3,0	10,0	0,92	75,0	—	05332
	1,0	6,0	3,0	10,0	0,92	63,5	0,1	05329
	1,0	6,0	3,0	10,0	0,92	63,5	0,2	05330
	1,0	6,0	3,0	10,0	0,92	63,5	0,3	05331
	1,5	6,0	2,5	—	—	63,5	—	05310
	1,5	6,0	2,5	—	—	63,5	0,1	05306
	1,5	6,0	2,5	—	—	63,5	0,2	05307
	1,5	6,0	2,5	—	—	63,5	0,3	05308
	1,5	6,0	2,5	—	—	63,5	0,5	05309
	1,5	6,0	4,5	—	—	63,5	—	05315
	1,5	6,0	4,5	—	—	63,5	0,1	05311
	1,5	6,0	4,5	—	—	63,5	0,2	05312
	1,5	6,0	4,5	—	—	63,5	0,3	05313
	1,5	6,0	4,5	—	—	63,5	0,5	05314
	1,5	6,0	4,5	15,0	1,38	75,0	—	05320
	1,5	6,0	4,5	15,0	1,38	63,5	0,1	05316
	1,5	6,0	4,5	15,0	1,38	63,5	0,2	05317
	1,5	6,0	4,5	15,0	1,38	63,5	0,3	05318
	1,5	6,0	4,5	15,0	1,38	63,5	0,5	05319
	2,0	6,0						

METRIC

**M032****M032**

METRIC SERIES

continued



CUTTING DIAMETER DC	SHANK DIAMETER DCON	LENGTH OF CUT APMX	mm			TI-NAMITE-A (AITIN)	EDP NO.
			REACH LU	NECK DIAMETER DN	OVERALL LENGTH LF		
2,0	6,0	6,0	—	—	63,5	0,5	05351
2,0	6,0	6,0	20,0	1,84	75,0	—	05356
2,0	6,0	6,0	20,0	1,84	63,5	0,2	05353
2,0	6,0	6,0	20,0	1,84	63,5	0,3	05354
2,0	6,0	6,0	20,0	1,84	63,5	0,5	05355
2,5	6,0	4,0	—	—	63,5	—	05336
2,5	6,0	4,0	—	—	63,5	0,2	05333
2,5	6,0	4,0	—	—	63,5	0,3	05334
2,5	6,0	4,0	—	—	63,5	0,5	05335
2,5	6,0	7,5	—	—	63,5	—	05340
2,5	6,0	7,5	—	—	63,5	0,2	05337
2,5	6,0	7,5	—	—	63,5	0,3	05338
2,5	6,0	7,5	—	—	63,5	0,5	05339
2,5	6,0	7,5	25,0	2,3	75,0	—	05344
2,5	6,0	7,5	25,0	2,3	63,5	0,2	05341
2,5	6,0	7,5	25,0	2,3	63,5	0,3	05342
2,5	6,0	7,5	25,0	2,3	63,5	0,5	05343
3,0	6,0	5,0	—	—	63,5	—	05361
3,0	6,0	5,0	—	—	63,5	0,2	05357
3,0	6,0	5,0	—	—	63,5	0,3	05358
3,0	6,0	5,0	—	—	63,5	0,5	05359
3,0	6,0	5,0	—	—	63,5	1,0	05360
3,0	6,0	9,0	—	—	63,5	—	05366
3,0	6,0	9,0	—	—	63,5	0,2	05362
3,0	6,0	9,0	—	—	63,5	0,3	05363
3,0	6,0	9,0	—	—	63,5	0,5	05364
3,0	6,0	9,0	—	—	63,5	1,0	05365
3,0	6,0	9,0	30,0	2,76	75,0	—	05371
3,0	6,0	9,0	30,0	2,76	63,5	0,2	05367
3,0	6,0	9,0	30,0	2,76	63,5	0,3	05368
3,0	6,0	9,0	30,0	2,76	63,5	0,5	05369
3,0	6,0	9,0	30,0	2,76	63,5	1,0	05370

**MICRO**  
**SGS**  
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New Expanded Tools

## TOLERANCES (mm)

## 1,0–3,0 DIAMETER

DC = +0,0000/-0,0254

DCON = h<sub>6</sub>

RE = +0,050/-0,050

## STEELS

## STAINLESS STEELS

## CAST IRON

## HIGH TEMP ALLOYS

## TITANIUM

## HARDENED STEELS

## NON-FERROUS

## PLASTICS/COMPOSITES

**FRACTIONAL**  
**Series M032**

Series M032 Fractional	Hardness	Vc (sfm)		DC • in				
		Ae x DC	Ap x DC	1/32	5/64	7/64		
P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.25	≤ 1	790 (632-948)	RPM 96570	38628	27591
		Slot	1	≤ .5	630 (504-756)	RPM 77011	30804	22003
		Finish	≤ .02	1	1565 (1252-1878)	RPM 191306	76522	54659
P ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.25	≤ 1	450 (360-540)	RPM 55008	22003	15717
		Slot	1	≤ .5	360 (288-432)	RPM 44006	17603	12573
		Finish	≤ .02	1	895 (716-1074)	RPM 109405	43762	31259
P ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 560 Bhn or ≤ 55 HRc	Profile	≤ 0.25	≤ 1	93 (74-112)	RPM 11368	4547	3248
		Slot	1	≤ .5	65 (52-78)	RPM 7946	3178	2270
		Finish	≤ .02	1	167 (134-200)	RPM 20414	8166	5833
H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.25	≤ 1	69 (55-83)	RPM 8435	3374	2410
		Slot	1	≤ .5	50 (40-60)	RPM 6112	2445	1746
		Finish	≤ .02	1	124 (99-149)	RPM 15158	6063	4331
K CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile	≤ 0.25	≤ 1	620 (496-744)	RPM 75789	30316	21654
		Slot	1	≤ .5	450 (360-540)	RPM 55008	22003	15717
		Finish	≤ .02	1	1115 (892-1338)	RPM 136298	54519	38942

continued on next page

# FRACTIONAL Series M032

# METRIC Series M032

Series M032 Fractional		Hardness			Vc (sfm)	DC • in			
Ae x DC	Ap x DC		1/32	5/64		7/64			
<b>M STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L</b>	<b>Profile</b> ≤ 0.25 ≤ 1	≤ 275 Bhn or ≤ 28 HRc	335	RPM	40950	16380	11700		
			(268-402)	Fz	0.00008	0.00020	0.00028		
				Feed (ipm)	9.9	9.9	9.9		
	<b>Slot</b> 1 ≤ .5		245	RPM	29949	11980	8557		
			(196-294)	Fz	0.00007	0.00017	0.00023		
				Feed (ipm)	6.0	6.0	6.0		
	<b>Finish</b> ≤ .02 1	(484-726)	605	RPM	73955	29582	21130		
				Fz	0.00012	0.00031	0.00043		
				Feed (ipm)	27.5	27.5	27.5		
<b>M STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450</b>	<b>Profile</b> ≤ 0.25 ≤ 1	≤ 325 Bhn or ≤ 35 HRc	310	RPM	37894	15158	10827		
			(248-372)	Fz	0.00008	0.00020	0.00028		
				Feed (ipm)	9.0	9.0	9.0		
	<b>Slot</b> 1 ≤ .5		225	RPM	27504	11002	7858		
			(180-270)	Fz	0.00007	0.00017	0.00023		
				Feed (ipm)	5.5	5.5	5.5		
	<b>Finish</b> ≤ .02 1	(444-666)	555	RPM	67843	27137	19384		
				Fz	0.00013	0.00031	0.00044		
				Feed (ipm)	25.5	25.5	25.5		
<b>S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene</b>	<b>Profile</b> ≤ 0.5 ≤ 1.5	≤ 400 Bhn or ≤ 43 HRc	200	RPM	24448	9779	6985		
			(160-240)	Fz	0.00007	0.00017	0.00024		
				Feed (ipm)	5.1	5.1	5.1		
	<b>Slot</b> 1 ≤ 1		145	RPM	17725	7090	5064		
			(116-174)	Fz	0.00006	0.00015	0.00021		
				Feed (ipm)	3.2	3.2	3.2		
	<b>Finish</b> ≤ .02 1	(288-432)	360	RPM	44006	17603	12573		
				Fz	0.00011	0.00027	0.00038		
				Feed (ipm)	14.5	14.5	14.5		
<b>S TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si</b>	<b>Profile</b> ≤ 0.5 ≤ 1.5	≤ 350 Bhn or ≤ 38 HRc	245	RPM	29949	11980	8557		
			(196-294)	Fz	0.00007	0.00018	0.00025		
				Feed (ipm)	6.3	6.3	6.3		
	<b>Slot</b> 1 ≤ 1		180	RPM	22003	8801	6287		
			(144-216)	Fz	0.00006	0.00015	0.00021		
				Feed (ipm)	3.9	3.9	3.9		
	<b>Finish</b> ≤ .02 1	(352-528)	440	RPM	53786	21514	15367		
				Fz	0.00011	0.00028	0.00039		
				Feed (ipm)	18.0	18.0	18.0		

Bhn (Brinell)      HRc (Rockwell C)  
 rpm = Vc x 3.82 / DC  
 ipm = Fz x 3 x rpm (Fz x 3 x max available rpm when recommendation exceeds machine limit)  
 ramp up to 5 degrees using slotting speed and feed rates. Do not plunge.  
 reduce speed and feed for materials harder than listed  
 refer to the KYOCERA SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))

Series M032 Metric		Hardness			Vc (m/min)	DC • mm			
Ae x DC	Ap x DC		1	2		3			
<b>P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536</b>	<b>Profile</b> ≤ 0.25 ≤ 1	≤ 275 Bhn or ≤ 28 HRc	241	RPM	76584	38292	25528		
			(193-289)	Fz	0.0029	0.0057	0.0086		
				Feed (mm/min)	660	660	660		
	<b>Slot</b> 1 ≤ .5		192	RPM	61073	30537	20358		
			(154-230)	Fz	0.0028	0.0057	0.0085		
				Feed (ipm)	521	521	521		
	<b>Finish</b> ≤ .02 1		477	RPM	151714	75857	50571		
			(382-572)	Fz	0.0053	0.0106	0.0159		
				Feed (ipm)	2413	2413	2413		
<b>P ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100</b>	<b>Profile</b> ≤ 0.25 ≤ 1	≤ 375 Bhn or ≤ 40 HRc	137	RPM	43624	21812	14541		
			(110-165)	Fz	0.0021	0.0043	0.0064		
				Feed (ipm)	279	279	279		
	<b>Slot</b> 1 ≤ .5		110	RPM	34899	17449	11633		
			(88-132)	Fz	0.0022	0.0043	0.0065		
				Feed (ipm)	226	226	226		
	<b>Finish</b> ≤ .02 1		273	RPM	86763	43381	28921		
			(218-327)	Fz	0.0039	0.0078	0.0117		
				Feed (ipm)	1016	1016	1016		
<b>P ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100</b>	<b>Profile</b> ≤ 0.25 ≤ 1	≤ 560 Bhn or ≤ 55 HRc	28	RPM	9016	4508	3005		
			(23-34)	Fz	0.0009	0.0018	0.0026		
				Feed (ipm)	24	24	24		
	<b>Slot</b> 1 ≤ .5		20	RPM	6301	3151	2100		
			(16-24)	Fz	0.0008	0.0016	0.0025		
				Feed (ipm)	15	15	15		
	<b>Finish</b> ≤ .02 1		51	RPM	16189	8095	5396		
			(41-61)	Fz	0.0014	0.0029	0.0043		
				Feed (ipm)	70	70	70		
<b>H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2</b>	<b>Profile</b> ≤ 0.25 ≤ 1	≤ 375 Bhn or ≤ 40 HRc	21	RPM	6689	3344	2230		
			(17-25)	Fz	0.0009	0.0019	0.0028		
				Feed (ipm)	19	19	19		
	<b>Slot</b> 1 ≤ .5		15	RPM	4847	2424	1616		
			(12-18)	Fz	0.0008	0.0016	0.0024		
				Feed (ipm)	11	11	11		
	<b>Finish</b> ≤ .02 1		38	RPM	12021	6010	4007		

# METRIC Series M032

Series M032 Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm				
					1	2	3		
M  STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	$\leq 275 \text{ Bhn}$ or $\leq 28 \text{ HRc}$	Profile	$\leq 0.25$	$\leq 1$	102 (82-123)	RPM Fz Feed (ipm)	32475 0.0026 251	16238 0.0052 251	10825 0.0077 251
		Slot	1	$\leq .5$	75 (60-90)	RPM Fz Feed (ipm)	23751 0.0021 152	11875 0.0043 152	7917 0.0064 152
		Finish	$\leq .02$	1	184 (148-221)	RPM Fz Feed (ipm)	58650 0.0040 699	29325 0.0079 699	19550 0.0119 699
	$\leq 325 \text{ Bhn}$ or $\leq 35 \text{ HRc}$  PH 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	Profile	$\leq 0.25$	$\leq 1$	94 (76-113)	RPM Fz Feed (ipm)	30052 0.0025 229	15026 0.0051 229	10017 0.0076 229
		Slot	1	$\leq .5$	69 (55-82)	RPM Fz Feed (ipm)	21812 0.0021 140	10906 0.0043 140	7271 0.0064 140
		Finish	$\leq .02$	1	169 (135-203)	RPM Fz Feed (ipm)	53803 0.0040 648	26901 0.0080 648	17934 0.0120 648
		Profile	$\leq 0.5$	$\leq 1.5$	61 (49-73)	RPM Fz Feed (ipm)	19388 0.0022 130	9694 0.0045 130	6463 0.0067 130
		Slot	1	$\leq 1$	44 (35-53)	RPM Fz Feed (ipm)	14057 0.0019 81	7028 0.0039 81	4686 0.0058 81
		Finish	$\leq .02$	1	110 (88-132)	RPM Fz Feed (ipm)	34899 0.0035 368	17449 0.0070 368	11633 0.0106 368
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	$\leq 0.5$	$\leq 1.5$	75 (60-90)	RPM Fz Feed (ipm)	23751 0.0022 160	11875 0.0045 160	7917 0.0067 160
		Slot	1	$\leq 1$	55 (44-66)	RPM Fz Feed (ipm)	17449 0.0019 99	8725 0.0038 99	5816 0.0057 99
		Finish	$\leq .02$	1	134 (107-161)	RPM Fz Feed (ipm)	42654 0.0036 457	21327 0.0071 457	14218 0.0107 457
	$\leq 350 \text{ Bhn}$ or $\leq 38 \text{ HRc}$	Profile	$\leq 0.5$	$\leq 1.5$	55 (44-66)	RPM Fz Feed (ipm)	17449 0.0019 99	8725 0.0038 99	5816 0.0057 99
		Slot	1	$\leq 1$	134 (107-161)	RPM Fz Feed (ipm)	42654 0.0036 457	21327 0.0071 457	14218 0.0107 457

Bhn (Brinell)      HRc (Rockwell C)

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

mm/min =  $F_z \times 3 \times rpm$  (Fz x 3 x max available rpm when recommendation exceeds machine limit)

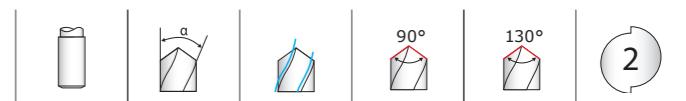
reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))



KYOCERA

# FRACTIONAL 2 Flute Spotting External Coolant



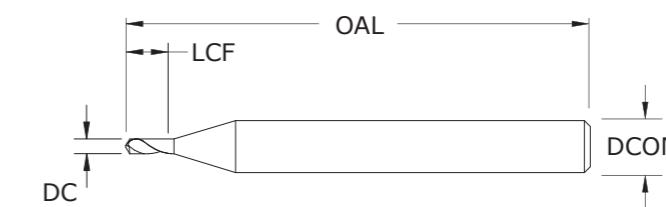
New Expanded Tools

## TOLERANCES (inch)

.005-.125 DIAMETER

DC = +0.0000/-0.0003

DCON = h6



## M080

FRACTIONAL SERIES

- 4-facet point design, stub length, and mirror finish provide the highest quality spot
- Ti-Namite A coating and uncoated options for the ultimate performance and tool life in a variety of ferrous and non-ferrous workpiece materials

- Available from stock in all popular diameters and point configurations

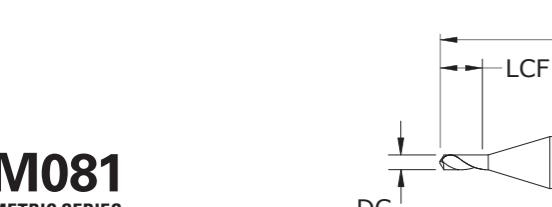
- Application specific sub-micron grain carbide designed specifically for micro-tool applications

- Manufactured in accordance with KSPT ISO certified quality procedures

CUTTING DIAMETER DC	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	
					UNCOATED	TI-NAMITE-A (AITiN)
0.0050	1/8	0.025	1-1/2	90	07016	07000
0.0100	1/8	0.035	1-1/2	90	07017	07001
0.0150	1/8	0.045	1-1/2	90	07018	07002
0.0200	1/8	0.050	1-1/2	90	07019	07003
0.0312	1/8	0.090	1-1/2	90	07020	07004
0.0625	1/8	0.200	1-1/2	90	07021	07005
0.0938	1/8	0.200	1-1/2	90	07022	07006
0.1250	1/8	0.200	1-1/2	90	07023	07007
0.0050	1/8	0.025	1-1/2	130	07024	07008
0.0100	1/8	0.035	1-1/2	130	07025	07009
0.0150	1/8	0.045	1-1/2	130	07026	07010
0.0200	1/8	0.050	1-1/2	130	07027	07011
0.0312	1/8	0.090	1-1/2	130	07028	07012
0.0625	1/8	0.200	1-1/2	130	07029	07013
0.0938	1/8	0.200	1-1/2	130	07030	07014
0.1250	1/8	0.200	1-1/2	130	07031	07015

METRIC

## 2 Flute Spotting External Coolant


**M081**  
METRIC SERIES

- 4-facet point design, stub length, and mirror finish provide the highest quality spot
- Ti-Namite A coating and uncoated options for the ultimate performance and tool life in a variety of ferrous and non-ferrous workpiece materials
- Available from stock in all popular diameters and point configurations
- Application specific sub-micron grain carbide designed specifically for micro-tool applications
- Manufactured in accordance with KSPT ISO certified quality procedures

**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

New Expanded Tools

## TOLERANCES (mm)

## 0.15–3.0 DIAMETER

DC = +0.000/-0.008

DCON = h<sub>6</sub>

	Series M080	Hardness	V <sub>c</sub> (sfm)	DC • in						
				0.005	0.010	0.020	0.040	0.080	0.125	
P	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	280 (224-336)	RPM	213920	106960	53480	26740	13370	8557
				Fz	0.00010	0.00021	0.0004	0.0008	0.0016	0.0026
				Feed (ipm)	22.0	22.0	22.0	22.0	22.0	22.0
H	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	180 (144-216)	RPM	137520	68760	34380	17190	8595	5501
				Fz	0.00010	0.00019	0.0004	0.0008	0.0015	0.0024
				Feed (ipm)	13.3	13.3	13.3	13.3	13.3	13.3
K	<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 475 Bhn or ≤ 50 HRc	70 (56-84)	RPM	53480	26740	13370	6685	3343	2139
				Fz	0.00004	0.00008	0.0002	0.0003	0.0006	0.0010
				Feed (ipm)	2.1	2.1	2.1	2.1	2.1	2.1
M	<b>CAST IRONS</b> Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	280 (224-336)	RPM	213920	106960	53480	26740	13370	8557
				Fz	0.00007	0.00015	0.0003	0.0006	0.0012	0.0018
				Feed (ipm)	15.8	15.8	15.8	15.8	15.8	15.8
M	<b>STAINLESS STEELS (FREE MACHINING)</b> 303, 416, 420F, 430F, 440F	≤ 250 Bhn or ≤ 24 HRc	210 (168-252)	RPM	160440	80220	40110	20055	10028	6418
				Fz	0.00011	0.00021	0.0004	0.0008	0.0017	0.0026
				Feed (ipm)	17.0	17.0	17.0	17.0	17.0	17.0
S	<b>STAINLESS STEELS (DIFFICULT)</b> 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	≤ 275 Bhn or ≤ 28 HRc	180 (144-216)	RPM	137520	68760	34380	17190	8595	5501
				Fz	0.0001	0.0002	0.0004	0.0008	0.0015	0.0024
				Feed (ipm)	13.3	13.3	13.3	13.3	13.3	13.3
S	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE)</b> Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 320 Bhn or ≤ 34 HRc	70 (56-84)	RPM	53480	26740	13370	6685	3343	2139
				Fz	0.00006	0.00012	0.0002	0.0005	0.0010	0.0015
				Feed (ipm)	3.2	3.2	3.2	3.2	3.2	3.2
N	<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	120 (96-144)	RPM	91680	45840	22920	11460	5730	3667
				Fz	0.00006	0.00012	0.0002	0.0005	0.0010	0.0015
				Feed (ipm)	5.6	5.6	5.6	5.6	5.6	5.6
N	<b>ALUMINUM ALLOYS</b> 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	600 (480-720)	RPM	458400	229200	114600	57300	28650	18336
				Fz	0.00012	0.00024	0.0005	0.0009	0.0019	0.0029
				Feed (ipm)	54.0	54.0	54.0	54.0	54.0	54.0
N	<b>COPPER ALLOYS</b> Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	190 (152-228)	RPM	145160	72580	36290	18145	9073	5806
				Fz	0.00010	0.00019	0.0004	0.0008	0.0016	0.0024
				Feed (ipm)	14.1	14.1	14.1	14.1	14.1	14.1
N	<b>PLASTICS</b> Polycarbonate, PVC		500 (400-600)	RPM	382000	191000	95500	47750	23875	15280
				Fz	0.00012	0.00024	0.0005	0.0009	0.0019	0.0029
				Feed (ipm)	45.0	45.0	45.0	45.0	45.0	45.0

## Note:

- Bhn (Brinell)    HRc (Rockwell C)    HRb (Rockwell B)
- rpm = V<sub>c</sub> x 3.82 / DC
- ipm = Fr x rpm (Fr x maximum available rpm when recommendation exceeds machine limit)
- reduce speed and feed 30% when using uncoated drills
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard® or sgsmicrotools.com for complete technical information

FRACTIONAL

## Series M080

**Series M081**

	Series M081	Hardness	$V_c$ (m/min)	DC • mm						
				0.15	0.25	0.5	1	2	3	
P	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	$\leq 175$ Bhn $\leq 7$ HRc	85 (68-102)	RPM	180958	108575	54287	27144	13572	9048
				Fz	0.0031	0.0051	0.0103	0.0206	0.0412	0.0618
				Feed (mm/min)	559	559	559	559	559	559
H	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	$\leq 275$ Bhn $\leq 28$ HRc	55 (44-66)	RPM	116330	69798	34899	17449	8725	5816
				Fz	0.0029	0.0048	0.0097	0.0194	0.0387	0.0581
				Feed (mm/min)	338	338	338	338	338	338
K	<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2	$\leq 475$ Bhn $\leq 50$ HRc	21 (17-26)	RPM	45239	27144	13572	6786	3393	2262
				Fz	0.0012	0.0020	0.0039	0.0079	0.0157	0.0236
				Feed (mm/min)	53	53	53	53	53	53
M	<b>CAST IRONS</b> Gray, Malleable, Ductile	$\leq 220$ Bhn $\leq 19$ HRc	85 (68-102)	RPM	180958	108575	54287	27144	13572	9048
				Fz	0.0022	0.0037	0.0074	0.0148	0.0296	0.0444
				Feed (mm/min)	401	401	401	401	401	401
M	<b>STAINLESS STEELS</b> (FREE MACHINING) 303, 416, 420F, 430F, 440F	$\leq 250$ Bhn $\leq 24$ HRc	64 (51-77)	RPM	135718	81431	40715	20358	10179	6786
				Fz	0.0032	0.0053	0.0106	0.0212	0.0424	0.0636
				Feed (mm/min)	432	432	432	432	432	432
S	<b>STAINLESS STEELS</b> (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	$\leq 275$ Bhn $\leq 28$ HRc	55 (44-66)	RPM	116330	69798	34899	17449	8725	5816
				Fz	0.0029	0.0048	0.0097	0.0194	0.0387	0.0581
				Feed (mm/min)	338	338	338	338	338	338
S	<b>SUPER ALLOYS</b> (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	$\leq 320$ Bhn $\leq 34$ HRc	21 (17-26)	RPM	45239	27144	13572	6786	3393	2262
				Fz	0.0018	0.0030	0.0060	0.0120	0.0240	0.0359
				Feed (mm/min)	81	81	81	81	81	81
N	<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	$\leq 350$ Bhn $\leq 38$ HRc	37 (29-44)	RPM	77553	46532	23266	11633	5816	3878
				Fz	0.0018	0.0031	0.0061	0.0122	0.0245	0.0367
				Feed (mm/min)	142	142	142	142	142	142
N	<b>ALUMINUM ALLOYS</b> 2017, 2024, 356, 6061, 7075	$\leq 150$ Bhn $\leq 7$ HRc	183 (146-219)	RPM	387767	232660	116330	58165	29082	19388
				Fz	0.0035	0.0059	0.0118	0.0236	0.0472	0.0707
				Feed (mm/min)	1372	1372	1372	1372	1372	1372
N	<b>COPPER ALLOYS</b> Alum Bronze, C110, Muntz Brass	$\leq 140$ Bhn $\leq 3$ HRc	58 (46-69)	RPM	122793	73676	36838	18419	9209	6140
				Fz	0.0029	0.0049	0.0097	0.0194	0.0389	0.0583
				Feed (mm/min)	358	358	358	358	358	358
N	<b>PLASTICS</b> Polycarbonate, PVC		152 (122-183)	RPM	323139	193883	96942	48471	24235	16157
				Fz	0.0035	0.0059	0.0118	0.0236	0.0472	0.0707
				Feed (mm/min)	1143	1143	1143	1143	1143	1143

Note:

- Bhn (Brinell)    HRc (Rockwell C)    HRb (Rockwell B)
- rpm =  $(V_c \times 1000) / (DC \times 3.14)$
- mm/min = Fr x rpm (Fr x maximum available rpm when recommendation exceeds machine limit)
- reduce speed and feed 30% when using uncoated drills
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard® or sgsmicrotools.com for complete technical information



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**2 Flute External Coolant •**  
**Standard & Extended Length**


## TOLERANCES (inch)

## TOLERANCES (mm)

## STEELS

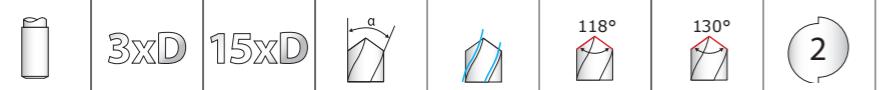
## TITANIUM

## NON-FERROUS

## HARDENED STEELS

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	
						UNCOATED	TI-NAMITE-A (AITiN)
0,1mm	0.0040	1/8	0.040	1-1/2	118	07088	07098
0,1mm	0.0040	1/8	0.070	1-1/2	118	07089	07099
0,13mm	0.0050	1/8	0.040	1-1/2	118	07064	07066
0,13mm	0.0050	1/8	0.070	1-1/2	118	07065	07067
#97	0.0059	1/8	0.080	1-1/2	118	07236	07068
#97	0.0059	1/8	0.120	1-1/2	118	07237	07069
#96	0.0063	1/8	0.080	1-1/2	118	07238	07070
#96	0.0063	1/8	0.120	1-1/2	118	07239	07071
#95	0.0067	1/8	0.080	1-1/2	118	07240	07072
#95	0.0067	1/8	0.120	1-1/2	118	07241	07073
#94	0.0071	1/8	0.100	1-1/2	118	07242	07074
#94	0.0071	1/8	0.150	1-1/2	118	07243	07075
#93	0.0075	1/8	0.100	1-1/2	118	07244	07076
#93	0.0075	1/8	0.150	1-1/2	118	07245	07077
#92	0.0079	1/8	0.100	1-1/2	118	07246	07078
#92	0.0079	1/8	0.150	1-1/2	118	07247	07079
#91	0.0083	1/8	0.100	1-1/2	118	07248	07080
#91	0.0083	1/8	0.150	1-1/2	118	07249	07081
#90	0.						

## FRACTIONAL &amp; METRIC

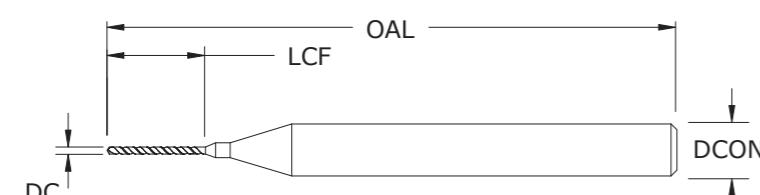
2 Flute External Coolant •  
Standard & Extended Length

**MICRO**  
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KYOCERA

**M105**  
FRACTIONAL & METRIC SERIES

continued



New Expanded Tools

## TOLERANCES (inch)

≤.125 DIAMETER

DC = +.0000/+0.0003

DCON = h<sub>6</sub>

## TOLERANCES (mm)

0,1-3,0 DIAMETER

DC = +0,000/+0,008

DCON = h<sub>6</sub>

## STEELS

## STAINLESS STEELS

## CAST IRON

## HIGH TEMP ALLOYS

## TITANIUM

## NON-FERROUS

## HARDENED STEELS

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	
						UNCOATED	TI-NAMITE-A (AITiN)
#83	0.0120	1/8	0.225	1-1/2	118	07268	07100
#83	0.0120	1/8	0.280	1-1/2	118	07269	07101
#82	0.0125	1/8	0.225	1-1/2	118	07270	07102
#82	0.0125	1/8	0.280	1-1/2	118	07271	07103
#81	0.0130	1/8	0.225	1-1/2	118	07272	07104
#81	0.0130	1/8	0.280	1-1/2	118	07273	07105
#80	0.0135	1/8	0.225	1-1/2	130	07274	07106
#80	0.0135	1/8	0.280	1-1/2	130	07275	07107
0,35mm	0.0138	1/8	0.225	1-1/2	130	07118	07122
0,35mm	0.0138	1/8	0.280	1-1/2	130	07119	07123
#79	0.0145	1/8	0.225	1-1/2	130	07278	07110
#79	0.0145	1/8	0.280	1-1/2	130	07279	07111
1/64	0.0156	1/8	0.250	1-1/2	130	07280	07112
1/64	0.0156	1/8	0.295	1-1/2	130	07281	07113
0,4mm	0.0157	1/8	0.250	1-1/2	130	07148	07233
0,4mm	0.0157	1/8	0.295	1-1/2	130	07232	07234
#78	0.0160	1/8	0.250	1-1/2	130	07284	07116
#78	0.0160	1/8	0.295	1-1/2	130	07285	07117
0,45mm	0.0177	1/8	0.250	1-1/2	130	07137	07143
0,45mm	0.0177	1/8	0.295	1-1/2	130	07140	07145
#77	0.0180	1/8	0.250	1-1/2	130	07288	07120
#77	0.0180	1/8	0.295	1-1/2	130	07289	07121
0,5mm	0.0197	1/8	0.260	1-1/2	130	07257	07267
0,5mm	0.0197	1/8	0.310	1-1/2	130	07266	07276
#76	0.0200	1/8	0.260	1-1/2	130	07292	07124
#76	0.0200	1/8	0.310	1-1/2	130	07293	07125
#75	0.0210	1/8	0.310	1-1/2	130	07294	07126
0,55mm	0.0217	1/8	0.340	1-1/2	130	07235	07256
#74	0.0225	1/8	0.340	1-1/2	130	07296	07128
0,6mm	0.0236	1/8	0.340	1-1/2	130	07283	07286
#73	0.0240	1/8	0.340	1-1/2	130	07298	07130
#72	0.0250	1/8	0.340	1-1/2	130	07299	07131
0,65mm	0.0256	1/8	0.340	1-1/2	130	07277	07282
#71	0.0260	1/8	0.340	1-1/2	130	07301	07133

continued on next page

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FRACTIONAL & METRIC  
2 Flute External Coolant •  
Standard & Extended Length

**M105**

FRACTIONAL & METRIC SERIES

continued

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	
						UNCOATED	TI-NAMITE-A (AITiN)
0,7mm	0.0276	1/8	0.400	1-1/2	130	07291	07295
#70	0.0280	1/8	0.400	1-1/2	130	07303	07135
#69	0.0292	1/8	0.400	1-1/2	130	07304	07136
0,75mm	0.0295	1/8	0.400	1-1/2	130	07287	07290
#68	0.0310	1/8	0.400	1-1/2	130	07306	07138
1/32	0.0312	1/8	0.400	1-1/2	130	07307	07139
0,8mm	0.0315	1/8	0.400	1-1/2	130	07302	07305
#67	0.0320	1/8	0.400	1-1/2	130	07309	07141
#66	0.0330	1/8	0.400	1-1/2	130	07310	07142
0,85mm	0.0335	1/8	0.400	1-1/2	130	07297	07300
#65	0.0350	1/8	0.400	1-1/2	130	07312	07144
0,9mm	0.0354	1/8	0.400	1-1/2	130	07313	07316
#64	0.0360	1/8	0.400	1-1/2	130	07314	07146
#63	0.0370	1/8	0.400	1-1/2	130	07315	07147
0,95mm	0.0374	1/8	0.400	1-1/2	130	07308	07311
#62	0.0380	1/8	0.400	1-1/2	130	07317	07149
#61	0.0390	1/8	0.400	1-1/2	130	07318	07150
1,0mm	0.0394	1/8	0.400	1-1/2	130	07319	07151
#60	0.0400	1/8	0.400	1-1/2	130	07320	07152
#59	0.0410	1/8	0.400	1-1/2	130	07321	07153
1,05mm	0.0413	1/8	0.400	1-1/2	130	07322	07154
#58	0.0420	1/8	0.400	1-1/2	130	07323	07155
#57	0.0430	1/8	0.400	1-1/2	130	07324	07156
1,1mm	0.0433	1/8	0.400	1-1/2	130	07325	07157
1,12mm	0.0440	1/8	0.400	1-1/2	130	07326	07158
1,15mm	0.0453	1/8	0.400	1-1/2	130	07327	07159
#56	0.0465	1/8	0.400	1-1/2	130	07328	07160
3/64	0.0469	1/8	0.400	1-1/2	130	07329	07161
1,2mm	0.0472	1/8	0.400	1-1/2	130	07330	07162
1,25mm	0.0492	1/8	0.400	1-1/2	130	07331	07163
1,3mm	0.0512	1/8	0.400	1-1/2	130	07332	07164
#55	0.0520	1/8	0.400	1-1/2	130	07333	

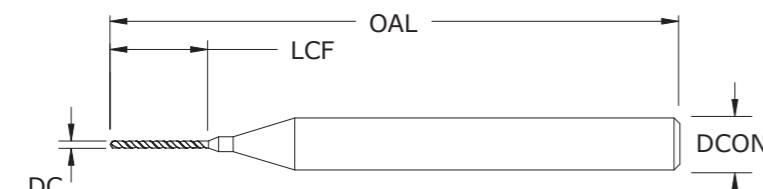
## FRACTIONAL &amp; METRIC

**2 Flute External Coolant •  
Standard & Extended Length**
**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**M105**  
FRACTIONAL & METRIC SERIES

continued



New Expanded Tools

## TOLERANCES (inch)

## ≤.125 DIAMETER

DC = +.0000/+0.0003

DCON = h<sub>6</sub>

## TOLERANCES (mm)

## 0.1-3.0 DIAMETER

DC = +0.000/+0.008

DCON = h<sub>6</sub>

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	
						UNCOATED	TI-NAMITE-A (AITiN)
#51	0.0670	1/8	0.400	1-1/2	130	07346	07178
1,75mm	0.0689	1/8	0.400	1-1/2	130	07347	07179
#50	0.0700	1/8	0.400	1-1/2	130	07348	07180
1,8mm	0.0709	1/8	0.400	1-1/2	130	07349	07181
1,85mm	0.0728	1/8	0.400	1-1/2	130	07350	07182
#49	0.0730	1/8	0.400	1-1/2	130	07351	07183
1,9mm	0.0748	1/8	0.400	1-1/2	130	07352	07184
#48	0.0760	1/8	0.400	1-1/2	130	07353	07185
1,95mm	0.0768	1/8	0.400	1-1/2	130	07354	07186
5/64	0.0781	1/8	0.400	1-1/2	130	07355	07187
#47	0.0785	1/8	0.400	1-1/2	130	07356	07188
2,0mm	0.0787	1/8	0.400	1-1/2	130	07357	07189
2,05mm	0.0807	1/8	0.400	1-1/2	130	07358	07190
#46	0.0810	1/8	0.400	1-1/2	130	07359	07191
#45	0.0820	1/8	0.400	1-1/2	130	07360	07192
2,1mm	0.0827	1/8	0.400	1-1/2	130	07361	07193
2,15mm	0.0846	1/8	0.400	1-1/2	130	07362	07194
#44	0.0860	1/8	0.400	1-1/2	130	07363	07195
2,2mm	0.0866	1/8	0.400	1-1/2	130	07364	07196
2,25mm	0.0886	1/8	0.400	1-1/2	130	07365	07197
#43	0.0890	1/8	0.400	1-1/2	130	07366	07198
2,3mm	0.0906	1/8	0.400	1-1/2	130	07367	07199
2,35mm	0.0925	1/8	0.400	1-1/2	130	07368	07200
#42	0.0935	1/8	0.400	1-1/2	130	07369	07201
3/32	0.0938	1/8	0.400	1-1/2	130	07370	07202
2,4mm	0.0945	1/8	0.400	1-1/2	130	07371	07203
#41	0.0960	1/8	0.400	1-1/2	130	07372	07204
2,45mm	0.0965	1/8	0.400	1-1/2	130	07373	07205
#40	0.0980	1/8	0.400	1-1/2	130	07374	07206
2,5mm	0.0984	1/8	0.400	1-1/2	130	07375	07207
#39	0.0995	1/8	0.400	1-1/2	130	07376	07208
2,55mm	0.1004	1/8	0.400	1-1/2	130	07377	07209
#38	0.1015	1/8	0.400	1-1/2	130	07378	07210
2,6mm	0.1024	1/8	0.400	1-1/2	130	07379	07211

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**2 Flute External Coolant •  
Standard & Extended Length****M105**

FRACTIONAL &amp; METRIC SERIES

continued

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	
						UNCOATED	TI-NAMITE-A (AITiN)
#37	0.1040	1/8	0.400	1-1/2	130	07380	07212
2,65mm	0.1043	1/8	0.400	1-1/2	130	07381	07213
2,7mm	0.1063	1/8	0.400	1-1/2	130	07382	07214
#36	0.1065	1/8	0.400	1-1/2	130	07383	07215
2,75mm	0.1083	1/8	0.400	1-1/2	130	07384	07216
7/64	0.1094	1/8	0.400	1-1/2	130	07385	07217
#35	0.1100	1/8	0.400	1-1/2	130	07386	07218
2,8mm	0.1102	1/8	0.400	1-1/2	130	07387	07219
#34	0.1110	1/8	0.400	1-1/2	130	07388	07220
2,85mm	0.1122	1/8	0.400	1-1/2	130	07389	07221
#33	0.1130	1/8	0.400	1-1/2	130	07390	07222
2,9mm	0.1142	1/8	0.400	1-1/2	130	07391	07223
#32	0.1160	1/8	0.400	1-1/2	130	07392	07224
2,95mm	0.1161	1/8	0.400	1-1/2	130	07393	07225
3,0mm	0.1181	1/8	0.400	1-1/2	130	07394	07226
#31	0.1200	1/8	0.400	1-1/2	130	07395	07227
3,05mm	0.1201	1/8	0.400	1-1/2	130	07396	07228
3,1mm	0.1220	1/8	0.400	1-1/2	130	07397	07229
3,15mm	0.1240	1/8	0.400	1-1/2	130	07398	07230
1/8	0.1250	1/8	0.400	1-1/2	130	07399	07231

KYOCERA Solid Tools

SGS Micro Tools

SGS Solid Tools

SGS Micro Tools

# FRACTIONAL Series M105

		Hardness	Vc (sfm)	DC • in						
	Series M105			0.004	0.010	0.020	0.040	0.080	0.125	
P	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	$\leq 175 \text{ Bhn}$ $\leq 7 \text{ HRc}$	130 (104-156)	RPM	124150	49660	24830	12415	6208	3973
				Fz	0.00012	0.00029	0.0006	0.0012	0.0023	0.0036
				Feed (ipm)	14.3	14.3	14.3	14.3	14.3	14.3
H	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	$\leq 275 \text{ Bhn}$ $\leq 28 \text{ HRc}$	195 (156-234)	RPM	186225	74490	37245	18623	9311	5959
				Fz	0.00010	0.00026	0.0005	0.0010	0.0021	0.0033
				Feed (ipm)	19.4	19.4	19.4	19.4	19.4	19.4
K	<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2	$\leq 475 \text{ Bhn}$ $\leq 50 \text{ HRc}$	80 (64-96)	RPM	76400	30560	15280	7640	3820	2445
				Fz	0.00005	0.00013	0.0003	0.0005	0.0010	0.0016
				Feed (ipm)	4.0	4.0	4.0	4.0	4.0	4.0
M	<b>CAST IRONS</b> Gray, Malleable, Ductile	$\leq 220 \text{ Bhn}$ $\leq 19 \text{ HRc}$	280 (224-336)	RPM	267400	106960	53480	26740	13370	8557
				Fz	0.00007	0.00016	0.0003	0.0007	0.0013	0.0020
				Feed (ipm)	17.5	17.5	17.5	17.5	17.5	17.5
M	<b>STAINLESS STEELS</b> (FREE MACHINING) 303, 416, 420F, 430F, 440F	$\leq 275 \text{ Bhn}$ $\leq 28 \text{ HRc}$	65 (52-78)	RPM	62075	24830	12415	6208	3104	1986
				Fz	0.00009	0.00022	0.0004	0.0009	0.0017	0.0027
				Feed (ipm)	5.4	5.4	5.4	5.4	5.4	5.4
S	<b>STAINLESS STEELS</b> (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	$\leq 325 \text{ Bhn}$ $\leq 35 \text{ HRc}$	40 (32-48)	RPM	38200	15280	7640	3820	1910	1222
				Fz	0.0001	0.0002	0.0004	0.0007	0.0014	0.0022
				Feed (ipm)	2.7	2.7	2.7	2.7	2.7	2.7
S	<b>SUPER ALLOYS</b> (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	$\leq 320 \text{ Bhn}$ $\leq 34 \text{ HRc}$	50 (40-60)	RPM	47750	19100	9550	4775	2388	1528
				Fz	0.00004	0.00011	0.0002	0.0004	0.0009	0.0014
				Feed (ipm)	2.1	2.1	2.1	2.1	2.1	2.1
S	<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	$\leq 350 \text{ Bhn}$ $\leq 38 \text{ HRc}$	50 (40-60)	RPM	47750	19100	9550	4775	2388	1528
				Fz	0.00005	0.00013	0.0003	0.0005	0.0010	0.0016
				Feed (ipm)	2.5	2.5	2.5	2.5	2.5	2.5
N	<b>ALUMINUM ALLOYS</b> 2017, 2024, 356, 6061, 7075	$\leq 150 \text{ Bhn}$ $\leq 7 \text{ HRc}$	245 (196-294)	RPM	233975	93590	46795	23398	11699	7487
				Fz	0.00020	0.00049	0.0010	0.0020	0.0039	0.0062
				Feed (ipm)	46.1	46.1	46.1	46.1	46.1	46.1
N	<b>COPPER ALLOYS</b> Alum Bronze, C110, Muntz Brass	$\leq 140 \text{ Bhn}$ $\leq 3 \text{ HRc}$	180 (144-216)	RPM	171900	68760	34380	17190	8595	5501
				Fz	0.00020	0.00049	0.0010	0.0020	0.0039	0.0062
				Feed (ipm)	33.9	33.9	33.9	33.9	33.9	33.9
N	<b>PLASTICS</b> Polycarbonate, PVC		245 (196-294)	RPM	233975	93590	46795	23398	11699	7487
				Fz	0.00020	0.00049	0.0010	0.0020	0.0039	0.0062
				Feed (ipm)	46.1	46.1	46.1	46.1	46.1	46.1

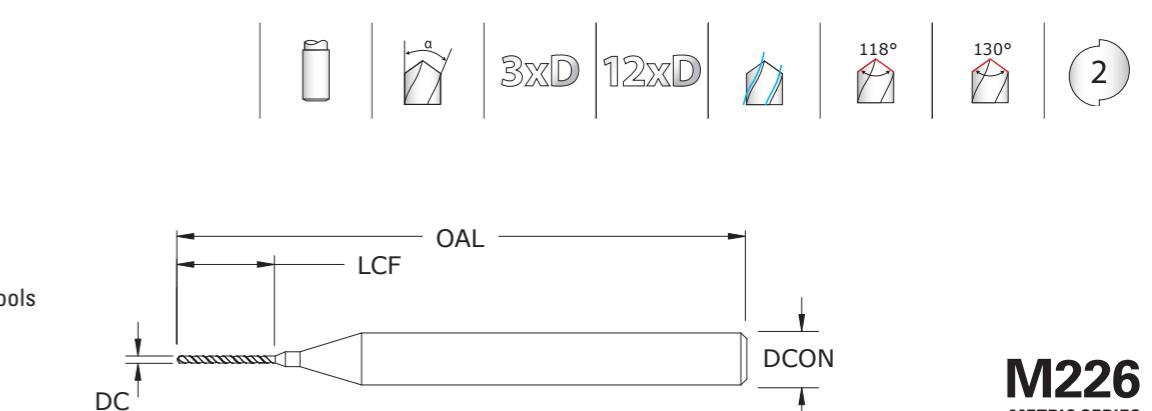
**Note:**

- Bhn (Brinell)      HRc (Rockwell C)      HRb (Rockwell B)
- rpm =  $V_c \times 3.82 / DC$
- ipm =  $F_z \times rpm$  ( $F_z$  x maximum available rpm when recommendation exceeds machine limit)
- reduce speed and feed 30% when using uncoated drills
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard® or sgsmicrotools.com for complete technical information



KYOCERA

# METRIC 2 Flute External Coolant



## TOLERANCES (mm)

### 0.04–3.0 DIAMETER

DC = +0.000/-0.008

DCON = h6



CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	UNCOATED	TI-NAMITE-A (AITIN)
0,04	0.0016	3,0	0,5	38,0	118	07722		
0,04	0.0018	3,0	0,6	38,0	118	07723		
0,05	0.0020	3,0	0,8	38,0	118	07724		
0,06	0.0024	3,0	0,8	38,0	118	07725		
0,07	0.0028	3,0	1,3	38,0	118	07726		
0,08	0.0031	3,0	1,3	38,0	118	07727		
0,09	0.0035	3,0	1,3	38,0	118	07728		
0,10	0.0039	3,0	1,0	38,0	118	07729		
0,11	0.0043	3,0	1,0	38,0	118	07730		
0,12	0.0047	3,0	1,0	38,0	118	07731		
0,13	0.0051	3,0	1,0	38,0	118	07732		
0,14	0.0055	3,0	1,0	38,0	118	07733		
0,15	0.0059	3,0	2,0	38,0	118	07734		
0,16	0.0063	3,0	2,0	38,0	118	07735		
0,17	0.0067	3,0	2,0	38,0	118	07736		
0,18	0.0071	3,0	2,5	38,0	118	07737		
0,19	0.0075	3,0	2,5	38,0	118	07738		
0,20	0.0079	3,0	2,5	38,0	118	07739		
0,21	0.0083	3,0	2,5	38,0	118	07740		
0,22	0.							

METRIC

## 2 Flute External Coolant



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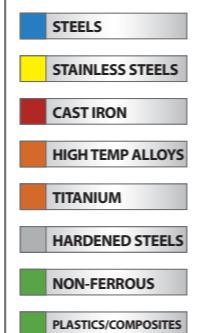
continued

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	
						UNCOATED	TI-NAMITE-A (AITiN)
0,39	0,0154	3,0	6,4	38,0	130	07758	07414
0,40	0,0157	3,0	6,4	38,0	130	07759	07415
0,41	0,0161	3,0	6,4	38,0	130	07760	07416
0,42	0,0165	3,0	6,4	38,0	130	07761	07417
0,43	0,0169	3,0	6,4	38,0	130	07762	07418
0,44	0,0173	3,0	6,4	38,0	130	07763	07419
0,45	0,0177	3,0	6,4	38,0	130	07764	07420
0,46	0,0181	3,0	6,4	38,0	130	07765	07421
0,47	0,0185	3,0	6,4	38,0	130	07766	07422
0,48	0,0189	3,0	6,6	38,0	130	07767	07423
0,49	0,0193	3,0	6,6	38,0	130	07768	07424
0,50	0,0197	3,0	6,6	38,0	130	07769	07425
0,51	0,0201	3,0	6,6	38,0	130	07770	07426
0,52	0,0205	3,0	6,6	38,0	130	07771	07427
0,53	0,0209	3,0	6,6	38,0	130	07772	07428
0,54	0,0213	3,0	6,6	38,0	130	07773	07429
0,55	0,0217	3,0	8,6	38,0	130	07774	07430
0,56	0,0220	3,0	8,6	38,0	130	07775	07431
0,57	0,0224	3,0	8,6	38,0	130	07776	07432
0,58	0,0228	3,0	8,6	38,0	130	07777	07433
0,59	0,0232	3,0	8,6	38,0	130	07778	07434
0,60	0,0236	3,0	8,6	38,0	130	07779	07435
0,61	0,0240	3,0	8,6	38,0	130	07780	07436
0,62	0,0244	3,0	8,6	38,0	130	07781	07437
0,63	0,0248	3,0	8,6	38,0	130	07782	07438
0,64	0,0252	3,0	8,6	38,0	130	07783	07439
0,65	0,0256	3,0	8,6	38,0	130	07784	07440
0,66	0,0260	3,0	8,6	38,0	130	07785	07441
0,67	0,0264	3,0	8,6	38,0	130	07786	07442
0,68	0,0268	3,0	8,6	38,0	130	07787	07443
0,69	0,0272	3,0	8,6	38,0	130	07788	07444
0,70	0,0276	3,0	10,2	38,0	130	07789	07445
0,71	0,0280	3,0	10,2	38,0	130	07790	07446
0,72	0,0283	3,0	10,2	38,0	130	07791	07447
0,73	0,0287	3,0	10,2	38,0	130	07792	07448
0,74	0,0291	3,0	10,2	38,0	130	07793	07449

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## TOLERANCES (mm)

**0,04–3,0 DIAMETER**  
DC = +0,000/-0,008  
DCON = h<sub>6</sub>



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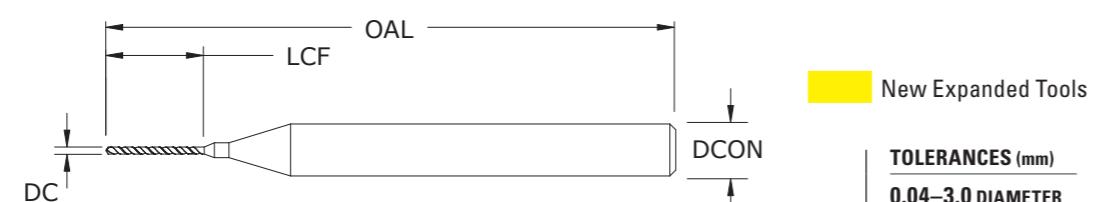
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## New Expanded Tools

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	UNCOATED	TI-NAMITE-A (AITiN)
0,75	0,0295	3,0	10,2	38,0	130	07794	07450	
0,75	0,0295	3,0	11,0	50,0	130	07795	07451	
0,76	0,0299	3,0	10,2	38,0	130	07796	07452	
0,77	0,0303	3,0	10,2	38,0	130	07797	07453	
0,78	0,0307	3,0	10,2	38,0	130	07798	07454	
0,79	0,0311	3,0	10,2	38,0	130	07799	07455	
0,80	0,0315	3,0	10,2	38,0	130	07800	07456	
0,80	0,0315	3,0	11,0	50,0	130	07801	07457	
0,81	0,0319	3,0	10,2	38,0	130	07802	07458	
0,82	0,0323	3,0	10,2	38,0	130	07803	07459	
0,83	0,0327	3,0	10,2	38,0	130	07804	07460	
0,84	0,0331	3,0	10,2	38,0	130	07805	07461	
0,85	0,0335	3,0	10,2	38,0	130	07806	07462	
0,85	0,0335	3,0	13,0	50,0	130	07807	07463	
0,86	0,0339	3,0	10,2	38,0	130	07808	07464	
0,87	0,0343	3,0	10,2	38,0	130	07809	07465	
0,88	0,0346	3,0	10,2	38,0	130	07810	07466	
0,89	0,0350	3,0	10,2	38,0	130	07811	07467	
0,90	0,0354	3,0	10,2	38,0	130	07812	07468	
0,90	0,0354	3,0	13,0	50,0	130	07813	07469	
0,91	0,0358	3,0	10,2	38,0	130	07814	07470	
0,92	0,0362	3,0	10,2	38,0	130	07815	07471	
0,93	0,0366	3,0	10,2	38,0	130	07816	07472	
0,94	0,0370	3,0	10,2	38,0	130	07817	07473	
0,95	0,0374	3,0	10,2	38,0	130	07818	07474	
0,95	0,0374	3,0	15,0	50,0	130	07819	07475	
0,96	0,0378	3,0	10,2	38,0	130	07820	07476	
0,97	0,0382	3,0	10,2	38,0	130	07821	07477	
0,98	0,0386	3,0	10,2	38,0	130	07822	07478	
0,99	0,0390	3,0	10,2	38,0	130	07823	07479	
1,00	0,0394	3,0	10,2	38,0	130	07824	07480	
1,00	0,0394	3,0	15,0	50,0	130	07825	07481	
1,01	0,0398	3,0	10,2	38,0	130	07826	07482	
1,02	0,0402	3,0	10,2	38,0	130	07827	07483	
1,03	0,0406	3,0	10,2	38,0	130	07828	07484	
1,04	0,0409	3,0	10,2	38,0	130	07829	07485	
1,05	0,0413	3,0	10,2	38,0	130	07830	07486	
1,05	0,0413	3,0	17,0	50,0	130	07831	07487	
1,06	0,0417	3,0	10,2	38,0	130	07832	07488	
1,07	0,0421	3,0	10,2	38,0	130	07833	07489	
1,08	0,0425	3,0	10,2	38,0	130	07834	07490	
1,09	0,							

**2 Flute External Coolant**
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METRIC SERIES

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CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	
						UNCOATED	TI-NAMITE-A (AlTiN)
1,13	0.0445	3,0	10,2	38,0	130	07840	07496
1,14	0.0449	3,0	10,2	38,0	130	07841	07497
1,15	0.0453	3,0	10,2	38,0	130	07842	07498
1,15	0.0453	3,0	17,0	50,0	130	07843	07499
1,16	0.0457	3,0	10,2	38,0	130	07844	07500
1,17	0.0461	3,0	10,2	38,0	130	07845	07501
1,18	0.0465	3,0	10,2	38,0	130	07846	07502
1,19	0.0469	3,0	10,2	38,0	130	07847	07503
1,20	0.0472	3,0	10,2	38,0	130	07848	07504
1,20	0.0472	3,0	17,0	50,0	130	07849	07505
1,21	0.0476	3,0	10,2	38,0	130	07850	07506
1,22	0.0480	3,0	10,2	38,0	130	07851	07507
1,23	0.0484	3,0	10,2	38,0	130	07852	07508
1,24	0.0488	3,0	10,2	38,0	130	07853	07509
1,25	0.0492	3,0	10,2	38,0	130	07854	07510
1,25	0.0492	3,0	19,0	50,0	130	07855	07511
1,26	0.0496	3,0	10,2	38,0	130	07856	07512
1,27	0.0500	3,0	10,2	38,0	130	07857	07513
1,28	0.0504	3,0	10,2	38,0	130	07858	07514
1,29	0.0508	3,0	10,2	38,0	130	07859	07515
1,30	0.0512	3,0	10,2	38,0	130	07860	07516
1,30	0.0512	3,0	19,0	50,0	130	07861	07517
1,31	0.0516	3,0	10,2	38,0	130	07862	07518
1,32	0.0520	3,0	10,2	38,0	130	07863	07519
1,33	0.0524	3,0	10,2	38,0	130	07864	07520
1,34	0.0528	3,0	10,2	38,0	130	07865	07521
1,35	0.0531	3,0	10,2	38,0	130	07866	07522
1,35	0.0531	3,0	19,0	50,0	130	07867	07523
1,36	0.0535	3,0	10,2	38,0	130	07868	07524
1,37	0.0539	3,0	10,2	38,0	130	07869	07525
1,38	0.0543	3,0	10,2	38,0	130	07870	07526
1,39	0.0547	3,0	10,2	38,0	130	07871	07527
1,40	0.0551	3,0	10,2	38,0	130	07872	07528
1,40	0.0551	3,0	19,0	50,0	130	07873	07529
1,41	0.0555	3,0	10,2	38,0	130	07874	07530
1,42	0.0559	3,0	10,2	38,0	130	07875	07531

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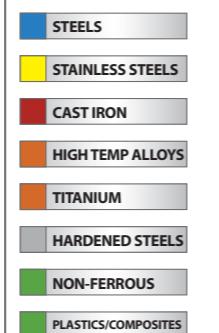
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## TOLERANCES (mm)

## 0,04–3,0 DIAMETER

DC = +0,000/-0,008

DCON = h<sub>6</sub>

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	
						UNCOATED	TI-NAMITE-A (AlTiN)
1,43	0.0563	3,0	10,2	38,0	130	07876	07532
1,44	0.0567	3,0	10,2	38,0	130	07877	07533
1,45	0.0571	3,0	10,2	38,0	130	07878	07534
1,45	0.0571	3,0	20,0	50,0	130	07879	07535
1,46	0.0575	3,0	10,2	38,0	130	07880	07536
1,47	0.0579	3,0	10,2	38,0	130	07881	07537
1,48	0.0583	3,0	10,2	38,0	130	07882	07538
1,49	0.0587	3,0	10,2	38,0	130	07883	07539
1,50	0.0591	3,0	10,2	38,0	130	07884	07540
1,50	0.0591	3,0	20,0	50,0	130	07885	07541
1,51	0.0594	3,0	10,2	38,0	130	07886	07542
1,52	0.0598	3,0	10,2	38,0	130	07887	07543
1,53	0.0602	3,0	10,2	38,0	130	07888	07544
1,54	0.0606	3,0	10,2	38,0	130	07889	07545
1,55	0.0610	3,0	10,2	38,0	130	07890	07546
1,55	0.0610	3,0	20,0	50,0	130	07891	07547
1,56	0.0614	3,0	10,2	38,0	130	07892	07548
1,57	0.0618	3,0	10,2	38,0	130	07893	07549
1,58	0.0622	3,0	10,2	38,0	130	07894	07550
1,59	0.0626	3,0	10,2	38,0	130	07895	07551
1,60	0.0630	3,0	10,2	38,0	130	07896	07552
1,60	0.0630	3,0	20,0	50,0	130	07897	07553
1,61	0.0634	3,0	10,2	38,0	130	07898	07554
1,62	0.0638	3,0	10,2	38,0	130	07899	07555
1,63	0.0642	3,0	10,2	38,0	130	07900	07556
1,64	0.0646	3,0	10,2	38,0	130	07901	07557
1,65	0.0650	3,0	10,2	38,0	130	07902	07558
1,65	0.0650	3,0	20,0	50,0	130	07903	07559
1,66	0.0654	3,0	10,2	38,0	130	07904	07560
1,67	0.0657	3,0	10,2	38,0	130	07905	07561
1,68	0.0661	3,0	10,2	38,0	130	07906	07562
1,69	0.0665	3,0	10,2	38,0	130	07907	07563
1,70	0.0669	3,0	10,2	38,0	130	07908	07564
1,70	0.0669	3,0	20,0	50,0	130	07909	07565
1,71	0.0673	3,0	10,2	38,0	130	07910	07566
1,72	0.0677	3,0	10,2	38,0	130	07911	07567
1,73	0.0681	3,0	10,2	38,0	130	07912	07568
1,74	0.0685	3,0	10,2	38,0	130	07913	07569
1,75	0.0689	3,0	10,2	38,0	130	07914	07570
1,75	0.0689						

**2 Flute External Coolant**
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**M226**  
METRIC SERIES

continued

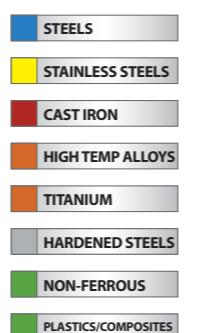
CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	
						UNCOATED	TI-NAMITE-A (AlTiN)
1,81	0.0713	3,0	10,2	38,0	130	07922	07578
1,82	0.0717	3,0	10,2	38,0	130	07923	07579
1,83	0.0720	3,0	10,2	38,0	130	07924	07580
1,84	0.0724	3,0	10,2	38,0	130	07925	07581
1,85	0.0728	3,0	10,2	38,0	130	07926	07582
1,85	0.0728	3,0	22,8	60,0	130	07927	07583
1,86	0.0732	3,0	10,2	38,0	130	07928	07584
1,87	0.0736	3,0	10,2	38,0	130	07929	07585
1,88	0.0740	3,0	10,2	38,0	130	07930	07586
1,89	0.0744	3,0	10,2	38,0	130	07931	07587
1,90	0.0748	3,0	10,2	38,0	130	07932	07588
1,90	0.0748	3,0	22,8	60,0	130	07933	07589
1,91	0.0752	3,0	10,2	38,0	130	07934	07590
1,92	0.0756	3,0	10,2	38,0	130	07935	07591
1,93	0.0760	3,0	10,2	38,0	130	07936	07592
1,94	0.0764	3,0	10,2	38,0	130	07937	07593
1,95	0.0768	3,0	10,2	38,0	130	07938	07594
1,95	0.0768	3,0	24,0	60,0	130	07939	07595
1,96	0.0772	3,0	10,2	38,0	130	07940	07596
1,97	0.0776	3,0	10,2	38,0	130	07941	07597
1,98	0.0780	3,0	10,2	38,0	130	07942	07598
1,99	0.0783	3,0	10,2	38,0	130	07943	07599
2,00	0.0787	3,0	10,2	38,0	130	07944	07600
2,00	0.0787	3,0	24,0	60,0	130	07945	07601
2,01	0.0791	3,0	10,2	38,0	130	07946	07602
2,02	0.0795	3,0	10,2	38,0	130	07947	07603
2,03	0.0799	3,0	10,2	38,0	130	07948	07604
2,04	0.0803	3,0	10,2	38,0	130	07949	07605
2,05	0.0807	3,0	10,2	38,0	130	07950	07606
2,05	0.0807	3,0	25,2	60,0	130	07951	07607
2,06	0.0811	3,0	10,2	38,0	130	07952	07608
2,07	0.0815	3,0	10,2	38,0	130	07953	07609
2,08	0.0819	3,0	10,2	38,0	130	07954	07610
2,09	0.0823	3,0	10,2	38,0	130	07955	07611
2,10	0.0827	3,0	10,2	38,0	130	07956	07612
2,10	0.0827	3,0	25,2	60,0	130	07957	07613

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## TOLERANCES (mm)

**0,04–3,0 DIAMETER**  
DC = +0,000/-0,008  
DCON = h<sub>6</sub>


CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	continued
2,11	0.0831	3,0	10,2	38,0	130	07958	07614
2,12	0.0835	3,0	10,2	38,0	130	07959	07615
2,13	0.0839	3,0	10,2	38,0	130	07960	07616
2,14	0.0843	3,0	10,2	38,0	130	07961	07617
2,15	0.0846	3,0	10,2	38,0	130	07962	07618
2,15	0.0846	3,0	26,4	60,0	130	07963	07619
2,16	0.0850	3,0	10,2	38,0	130	07964	07620
2,17	0.0854	3,0	10,2	38,0	130	07965	07621
2,18	0.0858	3,0	10,2	38,0	130	07966	07622
2,19	0.0862	3,0	10,2	38,0	130	07967	07623
2,20	0.0866	3,0	10,2	38,0	130	07968	07624
2,21	0.0870	3,0	10,2	38,0	130	07970	07626
2,22	0.0874	3,0	10,2	38,0	130	07971	07627
2,23	0.0878	3,0	10,2	38,0	130	07972	07628
2,24	0.0882	3,0	10,2	38,0	130	07973	07629
2,25	0.0886	3,0	10,2	38,0	130	07974	07630
2,25	0.0886	3,0	27,6	60,0	130	07975	07631
2,26	0.0890	3,0	10,2	38,0	130	07976	07632
2,27	0.0894	3,0	10,2	38,0	130	07977	07633
2,28	0.0898	3,0	10,2	38,0	130	07978	07634
2,29	0.0902	3,0	10,2	38,0	130	07979	07635
2,30	0.0906	3,0	10,2	38,0	130	07980	07636
2,30	0.0906	3,0	27,6	60,0	130	07981	07637
2,31	0.0909	3,0	10,2	38,0	130	07982	07638
2,32	0.0913	3,0	10,2	38,0	130	07983	07639
2,33	0.0917	3,0	10,2	38,0	130	07984	07640
2,34	0.0921	3,0	10,2	38,0	130	07985	07641
2,35	0.0925	3,0	10,2	38,0	130	07986	07642
2,35	0.0925	3,0	28,8	60,0	130	07987	07643
2,36	0.0929	3,0	10,2	38,0	130	07988	07644
2,37	0.0933	3,0	10,2	38,0	130	07989	07645
2,38	0.0937	3,0	10,2	38,0	130	07990	07646
2,39	0.0941	3,0	10,2	38,0	130	07991	07647
2,40	0.0945	3,0	10,2	38,0	130	07992	07648
2,40	0.0945	3,0	28,8	60,0	130	07993	07649
2,41	0.0949	3,0	10,2	38,0	130	07994	07650
2,42	0.0953	3,0	10,2	38,0	130	07995	07651
2,43	0.0957	3,0	10,2	38,0	130	07996	07652
2,44	0.0961	3,0	10,2	38,0	130	07997	07653
2,45	0.0965	3,0	10,2	38,0	130	07998	07654
2,45	0.0965	3,0	30,0	60,0	130	07999	07655
2,46	0.0969	3,0	10,2	38,0	130	08000	07656
2,47	0.0972	3,0	10,2	38,0	130	08001	07657
2,48	0.0976	3,0	10,2	38,0	130	08002	07658

METRIC

## 2 Flute External Coolant



**MICRO  
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KYOCERA

**M226**  
METRIC SERIES

continued

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	
						UNCOATED	TI-NAMITE-A (AITiN)
2,50	0,0984	3,0	10,2	38,0	130	08004	07660
2,50	0,0984	3,0	30,0	60,0	130	08005	07661
2,51	0,0988	3,0	10,2	38,0	130	08006	07662
2,52	0,0992	3,0	10,2	38,0	130	08007	07663
2,53	0,0996	3,0	10,2	38,0	130	08008	07664
2,54	0,1000	3,0	10,2	38,0	130	08009	07665
2,55	0,1004	3,0	10,2	38,0	130	08010	07666
2,55	0,1004	3,0	31,2	60,0	130	08011	07667
2,56	0,1008	3,0	10,2	38,0	130	08012	07668
2,57	0,1012	3,0	10,2	38,0	130	08013	07669
2,58	0,1016	3,0	10,2	38,0	130	08014	07670
2,59	0,1020	3,0	10,2	38,0	130	08015	07671
2,60	0,1024	3,0	10,2	38,0	130	08016	07672
2,60	0,1024	3,0	31,2	60,0	130	08017	07673
2,61	0,1028	3,0	10,2	38,0	130	08018	07674
2,62	0,1031	3,0	10,2	38,0	130	08019	07675
2,63	0,1035	3,0	10,2	38,0	130	08020	07676
2,64	0,1039	3,0	10,2	38,0	130	08021	07677
2,65	0,1043	3,0	10,2	38,0	130	08022	07678
2,65	0,1043	3,0	32,4	60,0	130	08023	07679
2,66	0,1047	3,0	10,2	38,0	130	08024	07680
2,67	0,1051	3,0	10,2	38,0	130	08025	07681
2,68	0,1055	3,0	10,2	38,0	130	08026	07682
2,69	0,1059	3,0	10,2	38,0	130	08027	07683
2,70	0,1063	3,0	10,2	38,0	130	08028	07684
2,70	0,1063	3,0	32,4	60,0	130	08029	07685
2,71	0,1067	3,0	10,2	38,0	130	08030	07686
2,72	0,1071	3,0	10,2	38,0	130	08031	07687
2,73	0,1075	3,0	10,2	38,0	130	08032	07688
2,74	0,1079	3,0	10,2	38,0	130	08033	07689
2,75	0,1083	3,0	10,2	38,0	130	08034	07690
2,75	0,1083	3,0	33,6	60,0	130	08035	07691
2,76	0,1087	3,0	10,2	38,0	130	08036	07692
2,77	0,1091	3,0	10,2	38,0	130	08037	07693
2,78	0,1094	3,0	10,2	38,0	130	08038	07694
2,79	0,1098	3,0	10,2	38,0	130	08039	07695

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New Expanded Tools

## TOLERANCES (mm)

## 0,04–3,0 DIAMETER

DC = +0,000/-0,008

DCON = h<sub>6</sub>

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	UNCOATED	TI-NAMITE-A (AITiN)
2,80	0,1102	3,0	10,2	38,0	130	08040	07696	
2,80	0,1102	3,0	33,6	60,0	130	08041	07697	
2,81	0,1106	3,0	10,2	38,0	130	08042	07698	
2,82	0,1110	3,0	10,2	38,0	130	08043	07699	
2,83	0,1114	3,0	10,2	38,0	130	08044	07700	
2,84	0,1118	3,0	10,2	38,0	130	08045	07701	
2,85	0,1122	3,0	10,2	38,0	130	08046	07702	
2,85	0,1122	3,0	34,8	60,0	130	08047	07703	
2,86	0,1126	3,0	10,2	38,0	130	08048	07704	
2,87	0,1130	3,0	10,2	38,0	130	08049	07705	
2,88	0,1134	3,0	10,2	38,0	130	08050	07706	
2,89	0,1138	3,0	10,2	38,0	130	08051	07707	
2,90	0,1142	3,0	10,2	38,0	130	08052	07708	
2,90	0,1142	3,0	34,8	60,0	130	08053	07709	
2,91	0,1146	3,0	10,2	38,0	130	08054	07710	
2,92	0,1150	3,0	10,2	38,0	130	08055	07711	
2,93	0,1154	3,0	10,2	38,0	130	08056	07712	
2,94	0,1157	3,0	10,2	38,0	130	08057	07713	
2,95	0,1161	3,0	10,2	38,0	130	08058	07714	
2,95	0,1161	3,0	36,0	60,0	130	08059	07715	
2,96	0,1165	3,0	10,2	38,0	130	08060	07716	
2,97	0,1169	3,0	10,2	38,0	130	08061	07717	
2,98	0,1173	3,0	10,2	38,0	130	08062	07718	
2,99	0,1177	3,0	10,2	38,0	130	08063	07719	
3,00	0,1181	3,0	10,2	38,0	130	08064	07720	
3,00	0,1181	3,0	36,0	60,0	130	08065	07721	

METRIC

## 2 Flute External Coolant

**M226**  
METRIC SERIES

continued

KYOCERA Solid Tools

SGS Micro Tools

M107

## 2 Flute Left Hand Cut External Coolant



**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**L226**

METRIC SERIES

- 4-facet point design stabilizes on entry for superior hole size control and tool life (>.08mm). 2-facet point on .08 and smaller.
- Mirror surface finishes improve chip flow as hole depth increases
- Ti-Namite A coating and uncoated options for the ultimate performance in a variety of ferrous and non-ferrous workpiece materials
- Available from stock in a selection of popular lengths and diameters
- Application specific sub-micron grain carbide designed specifically for micro-tool applications
- Manufactured in accordance with KSPT ISO certified quality procedures

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	
						UNCOATED	TI-NAMITE-A (AITIN)
0,04	0,0016	3,0	0,5	38,0	118	08228	—
0,05	0,0020	3,0	0,8	38,0	118	08229	—
0,06	0,0024	3,0	0,8	38,0	118	08230	—
0,07	0,0028	3,0	1,3	38,0	118	08231	—
0,08	0,0031	3,0	1,3	38,0	118	08232	—
0,09	0,0035	3,0	1,3	38,0	118	08233	—
0,10	0,0039	3,0	1,0	38,0	118	08234	—
0,11	0,0043	3,0	1,0	38,0	118	08235	—
0,12	0,0047	3,0	1,0	38,0	118	08236	—
0,13	0,0051	3,0	1,0	38,0	118	08237	—
0,14	0,0055	3,0	2,0	38,0	118	08238	—
0,15	0,0059	3,0	2,0	38,0	118	08239	—
0,16	0,0063	3,0	2,0	38,0	118	08240	—
0,17	0,0067	3,0	2,0	38,0	118	08241	—
0,18	0,0071	3,0	2,5	38,0	118	08242	—
0,19	0,0075	3,0	2,5	38,0	118	08243	—
0,20	0,0079	3,0	2,5	38,0	118	08244	—
0,21	0,0083	3,0	2,5	38,0	118	08245	—
0,22	0,0087	3,0	2,5	38,0	118	08246	—
0,23	0,0091	3,0	3,8	38,0	118	08247	—
0,24	0,0094	3,0	3,8	38,0	118	08248	—
0,25	0,0098	3,0	3,8	38,0	118	08249	08066
0,26	0,0102	3,0	3,8	38,0	118	08250	08067
0,27	0,0106	3,0	3,8	38,0	118	08251	08068
0,28	0,0110	3,0	3,8	38,0	118	08252	08069
0,29	0,0114	3,0	3,8	38,0	118	08253	08070
0,30	0,0118	3,0	5,7	38,0	118	08254	08071
0,31	0,0122	3,0	5,7	38,0	118	08255	08072
0,32	0,0126	3,0	5,7	38,0	118	08256	08073
0,33	0,0130	3,0	5,7	38,0	118	08257	08074
0,34	0,0134	3,0	5,7	38,0	118	08258	08075
0,35	0,0138	3,0	5,7	38,0	130	08259	08076
0,36	0,0142	3,0	5,7	38,0	130	08260	08077
0,37	0,0146	3,0	5,7	38,0	130	08261	08078
0,38	0,0150	3,0	6,4	38,0	130	08262	08079
0,39	0,0154	3,0	6,4	38,0	130	08263	08080

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KYOCERA

## 2 Flute Left Hand Cut External Coolant

**L226**  
METRIC SERIES

continued

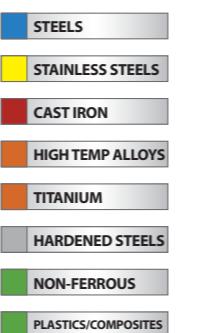
New Expanded Tools

### TOLERANCES (mm)

#### 0,04–3,0 DIAMETER

DC = +0,000/-0,008

DCON = h<sub>6</sub>



CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	UNCOATED	TI-NAMITE-A (AITIN)
0,40	0,0157	3,0	6,4	38,0	130	08264	08081	
0,41	0,0161	3,0	6,4	38,0	130	08265	08082	
0,42	0,0165	3,0	6,4	38,0	130	08266	08083	
0,43	0,0169	3,0	6,4	38,0	130	08267	08084	
0,44	0,0173	3,0	6,4	38,0	130	08268	08085	
0,45	0,0177	3,0	6,4	38,0	130	08269	08086	
0,46	0,0181	3,0	6,4	38,0	130	08270	08087	
0,47	0,0185	3,0	6,4	38,0	130	08271	08088	
0,48	0,0189	3,0	6,6	38,0	130	08272	08089	
0,49	0,0193	3,0	6,6	38,0	130	08273	08090	
0,50	0,0197	3,0	6,6	38,0	130	08274	08091	
0,51	0,0201	3,0	6,6	38,0	130	08275	08092	
0,52	0,0205	3,0	6,6	38,0	130	08276	08093	
0,53	0,0209	3,0	6,6	38,0	130	08277	08094	
0,54	0,0213	3,0	6,6	38,0	130	08278	08095	
0,55	0,0217	3,0	8,6	38,0	130	08279	08096	
0,56	0,0220	3,0	8,6	38,0	130	08280	08097	
0,57	0,0224	3,0	8,6	38,0	130	08281	08098	
0,58	0,0228	3,0	8,6	38,0	130	08282	08099	
0,59	0,0232	3,0	8,6	38,0	130	08283	08100	
0,60	0,0236	3,0	8,6	38,0	130	08284	08101	
0,61	0,0240	3,0	8,6	38,0	130	08285	08102	
0,62	0,0244	3,0	8,6	38,0	130	08286	08103	
0,63	0,0248	3,0	8,6	38,0	130	08287	08104	
0,64	0,0252	3,0	8,6	38,0	130	08288	08105	
0,65	0,0256	3,0	8,6	38,0	130	08289	08106	
0,66	0,0260	3,0	8,6	38,0	130	08290	08107	
0,67	0,0264	3,0	8,6	38,0	130	08291	08108	
0,68	0,0268	3,0	8,6	38,0	130	08292	08109	
0,69	0,0272	3,0	8,6	38,0	130	08293	08110	
0,70	0,0276	3,0	10,2	38,0	130	08294	08111	
0,71	0,0280	3,0	10,2	38,0	130	08295	08112	
0,72	0,0283	3,0	10,2	38,0	130	08296	08113	
0,73	0,0287	3,0	10,2	38,0	130	08297	08114	
0,74	0,0291	3,0	10,2	38,0	130	08298	08115	
0,75	0,0295	3,0	10,2	38,0	130	08299	08116	
0,75	0,0295	3,0	11,0	50,0	130	08300	08117	
0,76	0,0299	3,0	1					

METRIC

## 2 Flute Left Hand Cut External Coolant



**MICRO  
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**L226**  
METRIC SERIES

continued

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.
mm						UNCOATED TI-NAMITE-A (AITIN)
0,84	0,0331	3,0	10,2	38,0	130	08310 08127
0,85	0,0335	3,0	10,2	38,0	130	08311 08128
0,85	0,0335	3,0	13,0	50,0	130	08312 08129
0,86	0,0339	3,0	10,2	38,0	130	08313 08130
0,87	0,0343	3,0	10,2	38,0	130	08314 08131
0,88	0,0346	3,0	10,2	38,0	130	08315 08132
0,89	0,0350	3,0	10,2	38,0	130	08316 08133
0,90	0,0354	3,0	10,2	38,0	130	08317 08134
0,90	0,0354	3,0	13,0	50,0	130	08318 08135
0,91	0,0358	3,0	10,2	38,0	130	08319 08136
0,92	0,0362	3,0	10,2	38,0	130	08320 08137
0,93	0,0366	3,0	10,2	38,0	130	08321 08138
0,94	0,0370	3,0	10,2	38,0	130	08322 08139
0,95	0,0374	3,0	10,2	38,0	130	08323 08140
0,95	0,0374	3,0	15,0	50,0	130	08324 08141
0,96	0,0378	3,0	10,2	38,0	130	08325 08142
0,97	0,0382	3,0	10,2	38,0	130	08326 08143
0,98	0,0386	3,0	10,2	38,0	130	08327 08144
0,99	0,0390	3,0	10,2	38,0	130	08328 08145
1,00	0,0394	3,0	10,2	38,0	130	08329 08146
1,00	0,0394	3,0	15,0	50,0	130	08330 08147
1,05	0,0413	3,0	10,2	38,0	130	08331 08148
1,05	0,0413	3,0	17,0	50,0	130	08332 08149
1,10	0,0433	3,0	10,2	38,0	130	08333 08150
1,10	0,0433	3,0	17,0	50,0	130	08334 08151
1,15	0,0453	3,0	10,2	38,0	130	08335 08152
1,15	0,0453	3,0	17,0	50,0	130	08336 08153
1,20	0,0472	3,0	10,2	38,0	130	08337 08154
1,20	0,0472	3,0	17,0	50,0	130	08338 08155
1,25	0,0492	3,0	10,2	38,0	130	08339 08156
1,25	0,0492	3,0	19,0	50,0	130	08340 08157
1,30	0,0512	3,0	10,2	38,0	130	08341 08158
1,30	0,0512	3,0	19,0	50,0	130	08342 08159
1,35	0,0531	3,0	10,2	38,0	130	08343 08160
1,35	0,0531	3,0	19,0	50,0	130	08344 08161
1,40	0,0551	3,0	10,2	38,0	130	08345 08162

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## 2 Flute Left Hand Cut External Coolant

METRIC

**L226**

METRIC SERIES

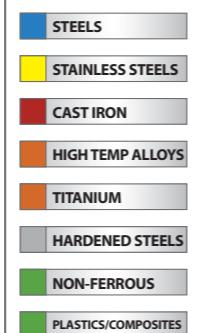
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New Expanded Tools

## TOLERANCES (mm)

## 0,04–3,0 DIAMETER

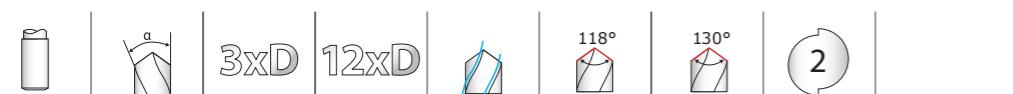
DC = +0,000/-0,008

DCON = h<sub>6</sub>

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	EDP NO.	UNCOATED	TI-NAMITE-A (AITIN)
1,40	0,0551	3,0	19,0	50,0	130	08346 08163		
1,45	0,0571	3,0	10,2	38,0	130	08347 08164		
1,45	0,0571	3,0	20,0	50,0	130	08348 08165		
1,50	0,0591	3,0	10,2	38,0	130	08349 08166		
1,50	0,0591	3,0	20,0	50,0	130	08350 08167		
1,55	0,0610	3,0	10,2	38,0	130	08351 08168		
1,55	0,0610	3,0	20,0	50,0	130	08352 08169		
1,60	0,0630	3,0	10,2	38,0	130	08353 08170		
1,60	0,0630	3,0	20,0	50,0	130	08354 08171		
1,65	0,0650	3,0	10,2	38,0	130	08355 08172		
1,65	0,0650	3,0	20,0	50,0	130	08356 08173		
1,70	0,0669	3,0	10,2	38,0	130	08357 08174		
1,70	0,0669	3,0	20,0	50,0	130	08358 08175		
1,75	0,0689	3,0	10,2	38,0	130	08359 08176		
1,75	0,0689	3,0	20,0	50,0	130	08360 08177		
1,80	0,0709	3,0	10,2	38,0	130	08361 08178		
1,80	0,0709	3,0	20,0	50,0	130	08362 08179		
1,85	0,0728	3,0	10,2	38,0	130	08363 08180		
1,85	0,0728	3,0	22,8	60,0	130	08364 08181		
1,90	0,0748	3,0	10,2	38,0	130	08365 08182		
1,90	0,0748	3,0	22,8	60,0	130	08366 08183		
1,95	0,0768	3,0	10,2	38,0	130	08367 08184		
1,95	0,0768	3,0	23,4	60,0	130	08368 08185		
2,00	0,0787	3,0	10,2	38,0	130	08369 08186		
2,00	0,0787	3,0	24,0	60,0	130	08370 08187		
2,05	0,0807	3,0	10,2	38,0	130	08371 08188		
2,05	0,0807	3,0	25,2	60,0	130	08372 08189		
2,10	0,0827	3,0	10,2	38,0	130	08373 08190		
2,10	0,0827	3,0	25,2	60,0	130	08374 08191		
2,15	0,0846	3,0	10,2	38,0	130	08375 08192		
2,15	0,0846	3,0	26,4	60,0	130	08376 08193		
2,20	0,0866	3,0	10,2	38,0	130	08377 08194		
2,20	0,0866	3,0	26,4	60,0	130	08378 08195		
2,25	0,0886	3,0	10,2	38,0	130	08379 08196		
2,25	0,0886	3,0	27,6	60,0	130	08380 08197		
2,30	0,0906	3,0	10,2	38,0	130	08381 08198		
2,30	0,0906	3,0	27,6	60,0	130	08382 08199		
2,35	0,0925	3,0	10,2	38,0	130	08383 08200		
2,35	0,0925	3,0	28,8	60,0	130	08384 08201		
2,40	0,0945	3,0	10,2	38,0	130	08385 08202		
2,40	0,0945	3,0	28,8	60,0	130	08386 08203		
2,45	0,0965	3						

METRIC

## 2 Flute Left Hand Cut External Coolant



**L226**  
METRIC SERIES

continued

CUTTING DIAMETER DC	DECIMAL EQUIV.	SHANK DIAMETER DCON	FLUTE LENGTH LCF	OVERALL LENGTH OAL	POINT ANGLE	UNCOATED	TI-NAMITE-A (AITIN)	EDP NO.
2,55	0.1004	3,0	31,2	60,0	130	08392	08209	
2,60	0.1024	3,0	10,2	38,0	130	08393	08210	
2,60	0.1024	3,0	31,2	60,0	130	08394	08211	
2,65	0.1043	3,0	10,2	38,0	130	08395	08212	
2,65	0.1043	3,0	32,4	60,0	130	08396	08213	
2,70	0.1063	3,0	10,2	38,0	130	08397	08214	
2,70	0.1063	3,0	32,4	60,0	130	08398	08215	
2,75	0.1083	3,0	10,2	38,0	130	08399	08216	
2,75	0.1083	3,0	33,6	60,0	130	08400	08217	
2,80	0.1102	3,0	10,2	38,0	130	08401	08218	
2,80	0.1102	3,0	33,6	60,0	130	08402	08219	
2,85	0.1122	3,0	10,2	38,0	130	08403	08220	
2,85	0.1122	3,0	34,8	60,0	130	08404	08221	
2,90	0.1142	3,0	10,2	38,0	130	08405	08222	
2,90	0.1142	3,0	34,8	60,0	130	08406	08223	
2,95	0.1161	3,0	10,2	38,0	130	08407	08224	
2,95	0.1161	3,0	36,0	60,0	130	08408	08225	
3,00	0.1181	3,0	10,2	38,0	130	08409	08226	
3,00	0.1181	3,0	36,0	60,0	130	08410	08227	

**MICRO  
SGS®**  
Solid Carbide Tools

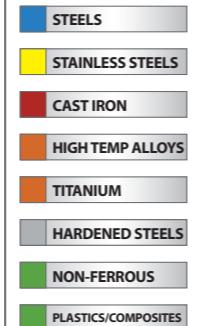
KYOCERA

New Expanded Tools

## TOLERANCES (mm)

## 0,04–3,0 DIAMETER

DC = +0,000/-0,008

DCON = h<sub>6</sub>

	Series M226 • L226	Hardness	V <sub>c</sub> (m/min)	DC • mm						
				0.04	0.25	0.5	1	2	3	
<b>P</b>	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	40 (32-48)	RPM	315060	50410	25205	12602	6301	4201
				Fz	0.001	0.007	0.014	0.029	0.058	0.086
<b>P</b>	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	59 (48-71)	RPM	472590	75614	37807	18904	9452	6301
				Fz	0.001	0.007	0.013	0.026	0.052	0.078
<b>H</b>	<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 475 Bhn or ≤ 50 HRc	24 (20-29)	RPM	193883	31021	15511	7755	3878	2585
				Fz	0.001	0.003	0.007	0.013	0.026	0.039
<b>K</b>	<b>CAST IRONS</b> Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	85 (68-102)	RPM	678591	108575	54287	27144	13572	9048
				Fz	0.001	0.004	0.008	0.016	0.033	0.049
<b>M</b>	<b>STAINLESS STEELS</b> (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	20 (16-24)	RPM	157530	25205	12602	6301	3151	2100
				Fz	0.001	0.005	0.011	0.022	0.044	0.065
<b>M</b>	<b>STAINLESS STEELS</b> (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	≤ 325 Bhn or ≤ 35 HRc	12 (10-15)	RPM	96942	15511	7755	3878	1939	1293
				Fz	0.001	0.004	0.009	0.018	0.035	0.053
<b>S</b>	<b>SUPER ALLOYS</b> (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 320 Bhn or ≤ 34 HRc	15 (12-18)	RPM	121177	19388	9694	4847	2424	1616
				Fz	0.000	0.003	0.006	0.011	0.022	0.033
<b>S</b>	<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	15 (12-18)	RPM	121177	19388	9694	4847	2424	1616
				Fz	0.001	0.004	0.008	0.017	0.034	0.051
<b>N</b>	<b>ALUMINUM ALLOYS</b> 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	75 (60-90)	RPM	593768	95003	47501	23751	11875	7917
				Fz	0.002	0.012	0.025	0.049	0.099	0.148
<b>N</b>	<b>COPPER ALLOYS</b> Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	55 (44-66)	RPM	436237	69798	34899	17449	8725	5816
				Fz	0.002	0.012	0.025	0.049	0.099	0.148
<b>N</b>	<b>PLASTICS</b> Polycarbonate, PVC		75 (60-90)	RPM	593768	95003	47501	23751	11875	7917
				Fz	0.002	0.012	0.025	0.049	0.099	0.148
<b>N</b>				Feed (mm/min)	1171	1171	1171	1171	1171	1171

## Note:

- Bhn (Brinell)    HRc (Rockwell C)    HRb (Rockwell B)
- rpm = V<sub>c</sub> x 3.82 / DC
- ipm = Fr x rpm (Fr x maximum available rpm when recommendation exceeds machine limit)
- reduce speed and feed 30% when using uncoated drills
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard® or sgsmicrotools.com for complete technical information

METRIC

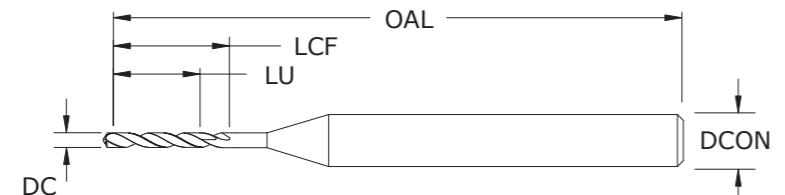
## Series M226 • L226

METRIC

## 2 Flute Internal Coolant


**M814**  
METRIC SERIES

- Split point and double margin design provide superior hole finish and size control
- Coolant hole feature allows straight through drilling without a peck cycle
- Proprietary high-performance coating and mirror polished fluting increase tool life and productivity in moderate-to-difficult workpiece materials
- Available from stock in a selection of popular lengths and diameters
- Application specific sub-micron grain carbide designed specifically for micro-tool applications
- Manufactured in accordance with KSPT ISO certified quality procedures


**MICRO  
SGS®**  
Solid Carbide Tools

KYOCERA

**MICRO  
SGS®**  
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SGS Solid Tools

KYOCERA Solid Tools

SGS Micro Tools

METRIC

## 2 Flute Internal Coolant

**M814**  
METRIC SERIES
*continued*

CUTTING DIAMETER DC	DECIMAL EQUIVALENT	SHANK DIAMETER DCON	FLUTE LENGTH LCF	CLEARED LENGTH LU	OVERALL LENGTH OAL	EDP NO.	TI-NAMITE-CR (AICrN)
1,3	0.0512	4,0	24,8	19,5	64,0	06034	
1,4	0.0551	4,0	26,3	21,0	64,0	06035	
1,5	0.0591	4,0	27,8	22,5	64,0	06036	
1,6	0.0630	4,0	29,3	24,0	81,0	06037	
1,7	0.0669	4,0	30,8	25,5	81,0	06038	
1,8	0.0709	4,0	33,0	27,0	81,0	06039	
1,9	0.0748	4,0	34,5	28,5	81,0	06040	
2,0	0.0787	4,0	36,0	30,0	81,0	06041	
2,1	0.0827	4,0	37,5	31,5	81,0	06042	
2,2	0.0866	4,0	41,1	33,0	81,0	06043	
2,3	0.0906	4,0	42,6	34,5	81,0	06044	
2,4	0.0945	4,0	44,1	36,0	81,0	06045	
2,5	0.0984	4,0	45,6	37,5	90,0	06046	
2,6	0.1024	4,0	47,1	39,0	90,0	06047	
2,7	0.1063	4,0	48,6	40,5	90,0	06048	
2,8	0.1102	4,0	50,1	42,0	90,0	06049	
2,9	0.1142	4,0	52,5	43,5	90,0	06050	
3,0	0.1181	4,0	54,0	45,0	90,0	06051	
3,1	0.1220	4,0	55,5	46,5	106,0	06052	
3,2	0.1260	4,0	57,0	48,0	106,0	06053	
3,3	0.1299	4,0	58,5	49,5	106,0	06054	
3,4	0.1339	4,0	61,9	51,0	106,0	06055	
3,5	0.1378	4,0	63,4	52,5	106,0	06056	
3,6	0.1417	4,0	64,9	54,0	106,0	06057	
3,7	0.1457	4,0	66,4	55,5	106,0	06058	
3,8	0.1496	4,0	67,9	57,0	106,0	06059	
3,9	0.1535	4,0	69,4	58,6	106,0	06060	
4,0	0.1575	4,0	70,9	60,0	106,0	06061	

*continued on next page*

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

M115

M114

# Series M814 8xD

Series M814 8xD		Hardness	Vc (m/min)	DC • mm				
				1	2	3	4	
P	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	125 (100-150)	RPM	39746	19873	13249	9937
				Fz	0.0229	0.0458	0.0686	0.0915
				Feed (mm/min)	909	909	909	909
H	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	94 (76-113)	RPM	30052	15026	10017	7513
				Fz	0.0216	0.0431	0.0647	0.0862
				Feed (mm/min)	648	648	648	648
K	<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 475 Bhn or ≤ 50 HRc	46 (37-55)	RPM	14541	7271	4847	3635
				Fz	0.0101	0.0203	0.0304	0.0405
				Feed (mm/min)	147	147	147	147
M	<b>CAST IRONS</b> Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	110 (88-132)	RPM	34899	17449	11633	8725
				Fz	0.0318	0.0636	0.0954	0.1272
				Feed (mm/min)	1110	1110	1110	1110
M	<b>STAINLESS STEELS</b> (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	55 (44-66)	RPM	17449	8725	5816	4362
				Fz	0.0178	0.0355	0.0533	0.0710
				Feed (mm/min)	310	310	310	310
S	<b>STAINLESS STEELS</b> (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	≤ 325 Bhn or ≤ 35 HRc	38 (30-46)	RPM	12118	6059	4039	3029
				Fz	0.0140	0.0281	0.0421	0.0562
				Feed (mm/min)	170	170	170	170
S	<b>SUPER ALLOYS</b> (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 320 Bhn or ≤ 34 HRc	27 (22-33)	RPM	8725	4362	2908	2181
				Fz	0.0096	0.0192	0.0288	0.0384
				Feed (mm/min)	84	84	84	84
N	<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	46 (37-55)	RPM	14541	7271	4847	3635
				Fz	0.0093	0.0185	0.0278	0.0370
				Feed (mm/min)	135	135	135	135
N	<b>ALUMINUM ALLOYS</b> 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	130 (104-155)	RPM	41200	20600	13733	10300
				Fz	0.0395	0.0789	0.1184	0.1578
				Feed (mm/min)	1626	1626	1626	1626
N	<b>COPPER ALLOYS</b> Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	99 (79-119)	RPM	31506	15753	10502	7877
				Fz	0.0407	0.0814	0.1221	0.1629
				Feed (mm/min)	1283	1283	1283	1283

Note:  
 • Bhn (Brinell)      HRc (Rockwell C)      HRb (Rockwell B)

• rpm =  $(V_c \times 1000) / (DC \times 3.14)$

• mm/min = Fr x rpm (Fr x maximum available rpm when recommendation exceeds machine limit)

• reduce speed and feed 30% when using uncoated drills

• reduce speed and feed for materials harder than listed

• refer to the KYOCERA SGS Tool Wizard® or sgsmicrotools.com for complete technical information

# Series M814 15xD

Series M814 15xD		Hardness	Vc (m/min)	DC • mm				
				1	2	3	4	
P	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	125 (100-150)	RPM	39746	19873	13249	9937
				Fz	0.0160	0.0320	0.0479	0.0639
				Feed (mm/min)	635	635	635	635
H	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	94 (76-113)	RPM	30052	15026	10017	7513
				Fz	0.0139	0.0279	0.0418	0.0558
				Feed (mm/min)	419	419	419	419
K	<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 475 Bhn or ≤ 50 HRc	46 (37-55)	RPM	14541	7271	4847	3635
				Fz	0.0070	0.0140	0.0210	0.0279
				Feed (mm/min)	102	102	102	102
M	<b>CAST IRONS</b> Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	110 (68-132)	RPM	34899	17449	11633	8725
				Fz	0.0229	0.0459	0.0688	0.0917
				Feed (mm/min)	800	800	800	800
M	<b>STAINLESS STEELS</b> (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	55 (44-66)	RPM	17449	8725	5816	4362
				Fz	0.0127	0.0253	0.0380	0.0507
				Feed (mm/min)	221	221	221	221
S	<b>STAINLESS STEELS</b> (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	≤ 325 Bhn or ≤ 35 HRc	38 (30-46)	RPM	12118	6059	4039	3029
				Fz	0.0094	0.0189	0.0283	0.0377
				Feed (mm/min)	114	114	114	114
S	<b>SUPER ALLOYS</b> (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 320 Bhn or ≤ 34 HRc	27 (22-33)	RPM	8725	4362	2908	2181
				Fz	0.0064	0.0128	0.0192	0.0256
				Feed (mm/min)	56	56	56	56
N	<b>TITANIUM ALLOYS</b> Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	46 (37-55)	RPM	14541	7271	4847	3635
				Fz	0.0077	0.0154	0.0231	0.0307
				Feed (mm/min)	112	112	112	112
N	<b>ALUMINUM ALLOYS</b> 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	130 (104-155)	RPM	41200	20600	13733	10300
				Fz	0.0287	0.0573	0.0860	0.1147
				Feed (mm/min)	1181	1181	1181	1181
N	<b>COPPER ALLOYS</b> Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	99 (79-119)	RPM	31506	15753	10502	7877
				Fz	0.0286	0.0572	0.0859	0.1145
				Feed (mm/min)	902	902	902	902

Note:  
 • Bhn (Brinell)      HRc (Rockwell C)      HRb (Rockwell B)

# **EDP Number Index**

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Please put "M" at the beginning of all page numbers below.

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00786	58	00854	23	00927	60	00994	64	01831	67	01912	69
00787	58	00855	23	00928	60	00995	64	01832	67	01913	69
00788	58	00856	23	00929	60	00996	64	01833	67	01914	69
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00790	58	00858	23	00931	60	00998	64	01835	67	01916	69
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00793	58	00861	23	00934	60	01001	64	01838	67	01928	74
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00799	58	00867	23	00940	60	01008	65	01844	68	01934	74
00800	58	00868	23	00941	60	01009	65	01845	68	01935	74
00801	58	00869	23	00942	60	01010	65	01846	68	01936	74
00802	58	00870	16	00943	60	01011	65	01847	68	01937	74
00803	58	00871	23	00944	60	01012	65	01848	68	01938	74
00804	58	00872	23	00945	60	01013	65	01849	68	01939	74
00805	58	00873	23	00946	60	01014	65	01850	68	01949	70
00806	58	00874	23	00947	60	01015	65	01851	68	01950	70
00807	58	00875	23	00948	60	01016	65	01861	66	01951	70
00808	58	00876	23	00949	60	01017	65	01862	66	01952	70
00809	58	00877	23	00950	60	01018	65	01863	66	01953	70
00811	14	00878	17	00951	60	01019	65	01864	66	01954	70
00812	14	00879	23	00952	63	01020	65	01865	66	01955	70
00813	14	00880	23	00953	63	01021	65	01866	66	01956	70
00814	14	00887	59	00954	63	01022	65	01867	66	01957	70
00815	14	00888	59	00955	63	01023	65	01868	66	01958	70
00816	14	00889	59	00956	63	01024	65	01869	66	01959	71
00817	14	00890	59	00957	63	01025	65	01870	66	01960	71
00818	14	00891	59	00958	63	01026	65	01871	66	01961	71
00819	14	00892	59	00959	63	01027	65	01872	66	01962	71
00820	14	00893	59	00960	63	01028	65	01873	66	01963	71
00821	14	00894	59	00961	63	01029	65	01875	67	01964	71
00822	14	00895	59	00962	63	01030	65	01876	67	01965	71
00823	14	00896	59	00963	63	01031	65	01877	67	01966	71
00824	14	00897	59	00964	63	01032	65	01878	67	01967	71
00825	14	00898	59	00965	63	01801	66	01879	67	01968	71
00826	14	00899	59	00966	63	01802	66	01880	67	01969	71
00827	14	00900	59	00967	63	01803	66	01881	67	01979	75
00828	14	00901	59	00968	63	01804	66	01882	67	01980	75
00829	14	00902	59	00969	63	01805	66	01883	67	01981	75
00830	14	00903	59	00970	63	01806	66	01884	67	01982	75
00831	14	00904	59	00971	63	01807	66	01885	67	01983	75
00832	14	00905	59	00972	63	01808	66	01886	67	01984	75
00833	14	00906	59	00973	63	01809	66	01887	67	01985	75
00834	14	00907	59	00974	63	01810	66	01888	67	01986	75
00835	14	00908	59	00975	63	01811	66	01889	67	01987	75
00836	14	00909	59	00976	63	01812	66	01890	67	01988	75
00837	14	00910	59	00977	63	01813	66	01891	68	01989	75
00838	14	00911	59	00978	63	01814	66	01892	68	01990	75
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09021.....50	09088.....46	09155.....49	09222.....46	09289.....72	09356.....19	09423.....42	09490.....39	09549.....42	09608.....29	09667.....34	09726.....28	09785.....61	09844.....53		
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09047.....50	09114.....46	09181.....50	09248.....46	09315.....24	09382.....19	09449.....40	09516.....37	09575.....40	09634.....26	09693.....31	09752.....35	09811.....61	09870.....53		
09048.....45	09115.....51	09182.....45	09249.....51	09316.....25	09383.....18	09450.....41	09517.....38	09576.....41	09635.....27	09694.....33	09753.....26	09812.....62	09871.....52		
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09050.....45	09117.....51	09184.....45	09251.....51	09318.....25	09385.....18	09452.....36	09519.....40	09578.....36	09637.....31	09696.....35	09755.....30	09814.....62	09873.....52		
09051.....50	09118.....47	09185.....50	09252.....46	09319.....24	09386.....19	09453.....37	09520.....41	09579.....37	09638.....33	09697.....26	09756.....32	09815.....61	09874.....53		
09052.....45	09119.....51	09186.....45	09253.....51	09320.....25	09387.....18	09454.....38	09521.....42	09580.....38	09639.....34	09698.....27	09757.....33	09816.....62	09875.....52		
09053.....50	09120.....47	09187.....50	09254.....46	09321.....24	09388.....19	09455.....39	09522.....36	09581.....39	09640.....35	09699.....29	09758.....34	09817.....61	09876.....5		

## Decimal Equivalents

Fraction • Number • Letter • Metric Sizes

INCH	METRIC	DECIMAL EQUIVALENT	INCH	METRIC	DECIMAL EQUIVALENT	INCH	METRIC	DECIMAL EQUIVALENT	INCH	METRIC	DECIMAL EQUIVALENT	INCH	METRIC	DECIMAL EQUIVALENT	INCH	METRIC	DECIMAL EQUIVALENT	INCH	METRIC	DECIMAL EQUIVALENT		
–	0,10	0.0039	–	1,60	0.0630	9/64	3,57	0.1406	#1	5,79	0.2280	R	8,61	0.3390	–	13,00	0.5118	67	–	121	401	58
–	0,20	0.0079	#52	1,61	0.0635	–	3,60	0.1417	–	5,80	0.2283	–	8,70	0.3425	33/64	13,10	0.5156	70	–	126	432	63
–	0,25	0.0098	–	1,65	0.0650	#27	3,66	0.1440	–	5,90	0.2323	11/32	8,73	0.3438	17/32	13,49	0.5312	73	–	132	448	65
–	0,30	0.0118	#51	1,70	0.0669	–	3,70	0.1457	15/64	5,95	0.2344	–	8,75	0.3445	–	13,50	0.5315	75	–	136	455	66
#80	0,34	0.0135	–	1,75	0.0689	#26	3,73	0.1470	15/64	5,95	0.2344	–	8,80	0.3465	35/64	13,89	0.5469	77	–	140	463	67
–	0,35	0.0138	#50	1,78	0.0700	–	3,75	0.1476	–	6,00	0.2362	S	8,84	0.3480	–	14,00	0.5512	80	–	147	479	69
#79	0,37	0.0145	–	1,80	0.0709	#25	3,80	0.1495	B	6,05	0.2380	–	8,90	0.3504	9/16	14,29	0.5625	82	–	153	494	72
1/64	0,40	0.0156	#49	1,85	0.0728	–	3,80	0.1496	–	6,10	0.2402	–	9,00	0.3543	–	14,50	0.5709	84	–	159	525	76
#78	0,41	0.0160	–	1,90	0.0748	#24	3,86	0.1520	C	6,15	0.2420	T	9,09	0.3580	37/64	14,68	0.5781	86	–	165	540	78
–	0,45	0.0177	#48	1,93	0.0760	–	3,90	0.1535	–	6,20	0.2441	–	9,10	0.3583	–	15,00	0.5906	89	–	177	556	81
#77	0,46	0.0180	–	1,95	0.0768	#23	3,91	0.1540	D	6,25	0.2461	23/64	9,13	0.3594	19/32	15,08	0.5938	91	–	186	602	88
–	0,50	0.0197	5/64	1,98	0.0781	5/32	3,97	0.1562	–	6,30	0.2480	–	9,20	0.3622	39/64	15,48	0.6094	93	–	197	632	92
#76	0,51	0.0200	#47	1,99	0.0785	#22	3,99	0.1570	E	6,35	0.2500	–	9,25	0.3642	–	15,50	0.6102	96	–	216	664	97
#75	0,53	0.0210	–	2,00	0.0787	–	4,00	0.1575	1/4	6,35	0.2500	–	9,30	0.3661	5/8	15,88	0.6250	97	–	223	695	101
–	0,55	0.0217	–	2,05	0.0807	#21	4,04	0.1590	–	6,40	0.2520	U	9,35	0.3680	–	16,00	0.6299	98	21	230	756	110
#74	0,57	0.0225	#46	2,06	0.0810	#20	4,09	0.1610	–	6,50	0.2559	–	9,40	0.3701	41/64	16,27	0.6406	–	22	236	772	112
–	0,60	0.0236	#45	2,08	0.0820	–	4,10	0.1614	F	6,53	0.2570	–	9,50	0.3740	–	16,50	0.6496	–	23	242	787	114
#73	0,61	0.0240	–	2,10	0.0827	–	4,20	0.1654	–	6,60	0.2598	3/8	9,53	0.3750	21/32	16,67	0.6562	–	24	248	818	118
#72	0,64	0.0250	–	2,15	0.0846	#19	4,22	0.1660	G	6,63	0.2610	V	9,56	0.3770	–	17,00	0.6693	–	25	254	849	123
–	0,65	0.0256	#44	2,18	0.0860	–	4,25	0.1673	–	6,70	0.2638	–	9,60	0.3780	43/64	17,07	0.6719	–	27	266	865	125
#71	0,66	0.0260	–	2,20	0.0866	–	4,30	0.1693	17/64	6,75	0.2656	–	9,70	0.3819	11/16	17,46	0.6875	–	28	272	895	130
–	0,70	0.0276	–	2,25	0.0886	#18	4,31	0.1695	H	6,76	0.2660	–	9,75	0.3839	–	17,50	0.6890	–	29	278	911	132
#70	0,71	0.0280	#43	2,26	0.0890	11/64	4,37	0.1719	–	6,80	0.2677	W	9,80	0.3858	45/64	17,86	0.7031	–	30	284	942	136
#69	0,74	0.0292	–	2,30	0.0906	#17	4,39	0.1730	–	6,90	0.2717	–	9,90	0.3898	–	18,00	0.7087	–	31	293	973	141
–	0,75	0.0295	–	2,35	0.0925	–	4,40	0.1732	I	6,91	0.2720	25/64	9,92	0.3906	23/32	18,26	0.7188	–	32	302	988	143
#68	0,79	0.0310	#42	2,37	0.0935	#16	4,50	0.1770	–	7,00	0.2756	–	10,00	0.3937	–	18,50	0.7283	–	33	310	1019	147
1/32	0,79	0.0313	3/32	2,38	0.0938	–	4,50	0.1772	J	7,04	0.2770	X	10,08	0.3970	47/64	18,65	0.7344	–	34	319	1050	152
–	0,80	0.0315	–	2,40	0.0945	#15	4,57	0.1800	–	7,10	0.2795	–	10,10	0.3976	–	19,00	0.7480	–	35	328	1096	159
#67	0,81	0.0320	#41	2,44	0.0960	–	4,60	0.1811	K	7,14	0.2810	–	10,20	0.4016	3/4	19,05	0.7500	–	37	345	1127	163
#66	0,84	0.0330	–	2,45	0.0965	#14	4,62	0.1820	9/32	7,14	0.2812	Y	10,26	0.4040	49/64	19,45	0.7656	–	38	353	1158	168
–	0,85	0.0335	#40	2,50	0.0984	#13	4,70	0.1850	–	7,20	0.2835	–	10,30	0.4055	–	19,50	0.7677	–	39	362	1189	172
#65	0,89	0.0350	#39	2,53	0.0995	–	4,75	0.1870	–	7,25	0.2854	13/32	10,32	0.4062	25/32	19,84	0.7812	–	40	370	1235	179
–	0,90	0.0354	#38	2,58	0.1015	3/16	4,76	0.1875	–	7,30	0.2874	–	10,40	0.4094	–	20,00	0.7874	–	41	381	1266	183
#64	0,91	0.0360	–	2,60	0.1024	#12	4,80	0.1890	L	7,37	0.2900	Z	10,49	0.4130	51/64	20,24	0.7969	–	42	391	1312	190
#63	0,94	0.0370	#37	2,64	0.1040	#11	4,85	0.1910	–	7,40	0.2913	–	10,50	0.4134	–	20,50	0.8071	–	44	411	1359	197
–	0,95	0.																				

