

Official Media Lineup

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- **Web site**

KYOCERA Asia Pacific Cutting Tools
<https://asia.kyocera.com/products/cuttingtools/index.html>



- **Application**

KYOCERA Cutting Tools



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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	

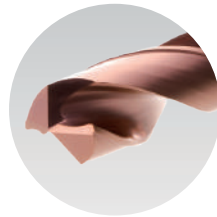
Cutting diameters available in 0.1 mm increments



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



3D / 131 Items
5D / 131 Items



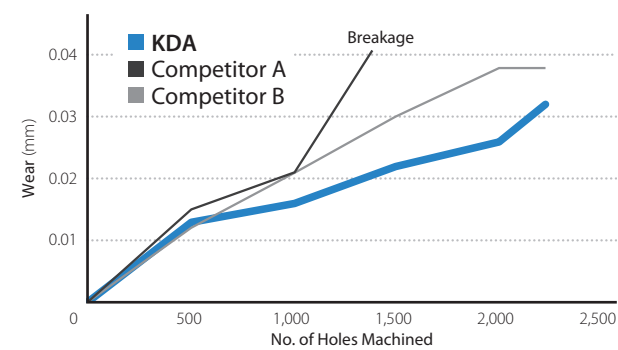
3D / 131 Items
5D / 131 Items

Features
2

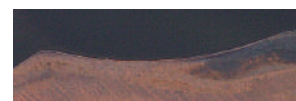
**High-Performance Coating
Maintains Long tool life**

Excellent Wear and Heat Resistance
Aluminum Chrome (AlCr) Coating

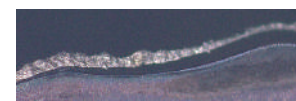
Wear Resistance Comparison (Internal evaluation)



Cutting Conditions: $V_c = 120$ m/min, $f = 0.23$ mm/rev, $H = 24$ mm, Wet (Internal coolant) S50 C BT 50 $\phi 6$ (5D) Type C



KDA



Competitor B

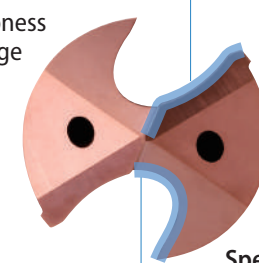
Features
3

Stable Machining with Unique Shape

Curved Cutting-edge Design and
Special Flute Shape

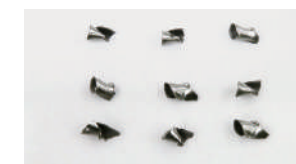
Curved Cutting-edge Design

Excellent sharpness
and cutting edge
strength



Special Flute Shape

Excellent chip control
and high rigidity



KDA

Chip Condition
(Internal evaluation)

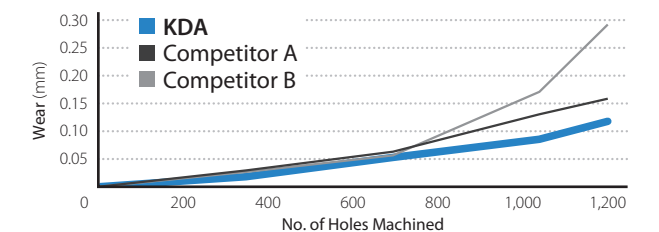
Cutting Conditions:
 $V_c = 80$ m/min, $f = 0.14$ mm/rev,
 $H = 24$ mm, Wet (Internal coolant)
BT 50 $\phi 6$ (5D) Type C

Features
4

Supports a Variety of Workpieces

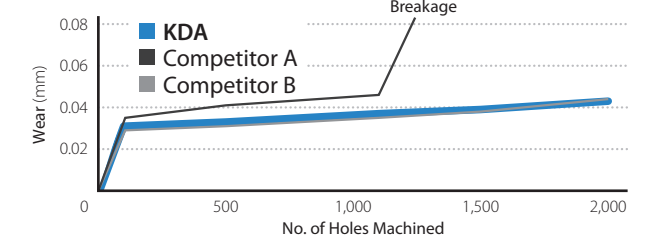
Compatible not only with carbon steel, but also
mold steel, stainless steel, cast iron machining, etc.

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

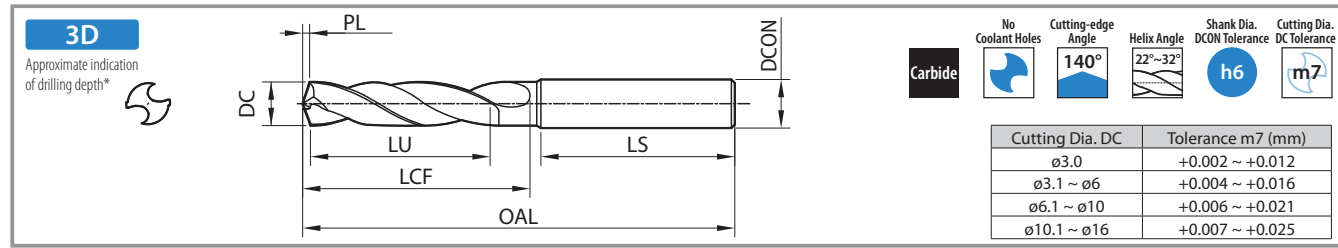


Cutting Conditions: $V_c = 100$ m/min, $f = 0.15$ mm/rev, $H = 24$ mm, Wet (Internal coolant) BT 50 $\phi 6$ (5D) Type C

Stainless Steel SUS 304 (Internal evaluation)



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



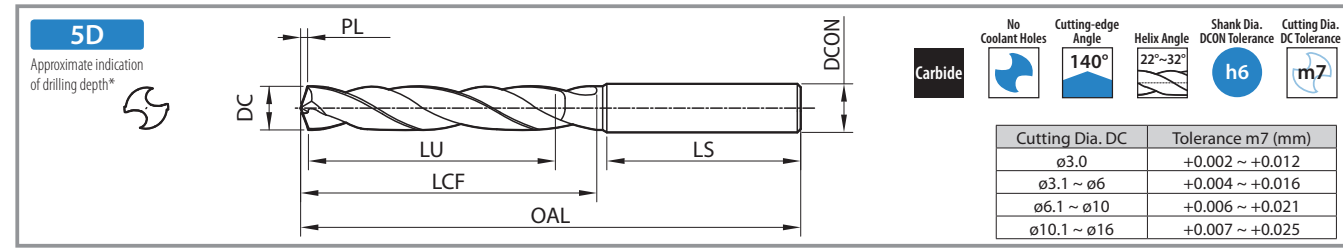
Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0300X03S060N	●	3	6	62	15.5	20	36	0.5
KDA0310X03S060N	●	3.1	6	62	15.3	20	36	0.5
KDA0320X03S060N	●	3.2	6	62	15.2	20	36	0.5
KDA0330X03S060N	●	3.3	6	62	15.0	20	36	0.6
KDA0340X03S060N	●	3.4	6	62	14.9	20	36	0.6
KDA0350X03S060N	●	3.5	6	62	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
KDA0630X03S080N	●	6.3	8	79	24.5	34	36	1.1
KDA0640X03S080N	●	6.4	8	79	24.4	34	36	1.1
KDA0650X03S080N	●	6.5	8	79	24.2	34	36	1.1
KDA0660X03S080N	●	6.6	8	79	24.1	34	36	1.2
KDA0670X03S080N	●	6.7	8	79	23.9	34	36	1.2
KDA0680X03S080N	●	6.8	8	79	23.8	34	36	1.2
KDA0690X03S080N	●	6.9	8	79	23.6	34	36	1.2
KDA0700X03S080N	●	7	8	79	23.5	34	36	1.2
KDA0710X03S080N	●	7.1	8	79	30.3	41	36	1.2
KDA0720X03S080N	●	7.2	8	79	30.2	41	36	1.3
KDA0730X03S080N	●	7.3	8	79	30.0	41	36	1.3
KDA0740X03S080N	●	7.4	8	79	29.9	41	36	1.3
KDA0750X03S080N	●	7.5	8	79	29.7	41	36	1.3
KDA0760X03S080N	●	7.6	8	79	29.6	41	36	1.3
KDA0770X03S080N	●	7.7	8	79	29.4	41	36	1.4
KDA0780X03S080N	●	7.8	8	79	29.3	41	36	1.4
KDA0790X03S080N	●	7.9	8	79	29.1	41	36	1.4
KDA0800X03S080N	●	8	8	79	29.0	41	36	1.4
KDA0810X03S100N	●	8.1	10	89	34.8	47	40	1.4
KDA0820X03S100N	●	8.2	10	89	34.7	47	40	1.4
KDA0830X03S100N	●	8.3	10	89	34.5	47	40	1.5
KDA0840X03S100N	●	8.4	10	89	34.4	47	40	1.5
KDA0850X03S100N	●	8.5	10	89	34.2	47	40	1.5
KDA0860X03S100N	●	8.6	10	89	34.1	47	40	1.5
KDA0870X03S100N	●	8.7	10	89	33.9	47	40	1.5
KDA0880X03S100N	●	8.8	10	89	33.8	47	40	1.6
KDA0890X03S100N	●	8.9	10	89	33.6	47	40	1.6
KDA0900X03S100N	●	9	10	89	33.5	47	40	1.6
KDA0910X03S100N	●	9.1	10	89	33.3	47	40	1.6
KDA0920X03S100N	●	9.2	10	89	33.2	47	40	1.6
KDA0930X03S100N	●	9.3	10	89	33.0	47	40	1.6
KDA0940X03S100N	●	9.4	10	89	32.9	47	40	1.7
KDA0950X03S100N	●	9.5	10	89	32.7	47	40	1.7

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
KDA1340X03S140N	●	13.4	14	107	39.9	60	45	2.4
KDA1350X03S140N	●	13.5	14	107	39.7	60	45	2.4
KDA1360X03S140N	●	13.6	14	107	39.6	60	45	2.4
KDA1370X03S140N	●	13.7	14	107	39.4	60	45	2.4
KDA1380X03S140N	●	13.8	14	107	39.3	60	45	2.5
KDA1390X03S140N	●	13.9	14	107	39.1	60	45	2.5
KDA1400X03S140N	●	14	14	107	39.0	60	45	2.5
KDA1410X03S160N	●	14.1	16	115	43.8	65	48	2.5
KDA1420X03S160N	●	14.2	16	115	43.7	65	48	2.5
KDA1430X03S160N	●	14.3	16	115	43.5	65	48	2.6
KDA1440X03S160N	●	14.4	16	115	43.4	65	48	2.6
KDA1450X03S160N	●	14.5	16	115	43.2	65	48	2.6
KDA1460X03S160N	●	14.6	16	115	43.1	65	48	2.6
KDA1470X03S160N	●	14.7	16	115	42.9	65	48	2.6
KDA1480X03S160N	●	14.8	16	115	42.8	65	48	2.6
KDA1490X03S160N	●	14.9	16	115	42.6	65	48	2.7
KDA1500X03S160N	●	15	16	115	42.5	65	48	2.7
KDA1510X03S160N	●	15.1	16	115	42.3	65	48	2.7
KDA1520X03S160N	●	15.2	16	115	42.2	65	48	2.7
KDA1530X03S160N	●	15.3	16	115	42.0	65	48	2.7
KDA1540X03S160N	●	15.4	16	115	41.9	65	48	2.8
KDA1550X03S160N	●	15.5	16	115	41.7	65	48	2.8
KDA1560X03S160N	●	15.6	16	115	41.6	65	48	2.8
KDA1570X03S160N	●	15.7	16	115	41.4	65	48	2.8
KDA1580X03S160N	●	15.8	16	115	41.3	65	48	2.8
KDA1590X03S160N	●	15.9	16	115	41.1	65	48	2.8
KDA1600X03S160N	●	16	16	115	41.0	65	48	2.9

* Drilling depth is an approximate indication of L/D. Depending on the size, it may be smaller than the listed L/D. ● Standard Stock



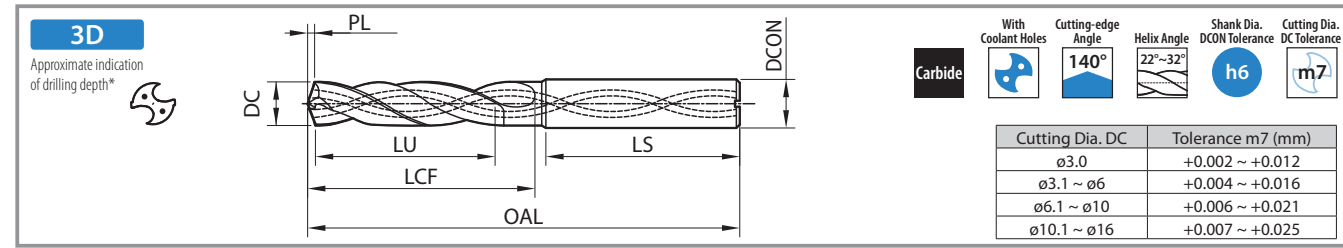
Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0300X05S060N	●	3	6	66	23.5	28	36	0.5
KDA0310X05S060N	●	3.1	6	66	23.3	28	36	0.5
KDA0320X05S060N	●	3.2	6	66	23.2	28	36	0.5
KDA0330X05S060N	●	3.3	6	66	23.0	28	36	0.6
KDA0340X05S060N	●	3.4	6	66	22.9	28	36	0.6
KDA0350X05S060N	●	3.5	6	66	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	1.8
KDA1040X05S120N	●	10.4	12	118	55.4	71	45	1.8
KDA1050X05S120N	●	10.5	12	118	55.2	71	45	1.9
KDA1060X05S120N	●	10.6	12	118	55.1	71	45	1.9
KDA1070X05S120N	●	10.7	12	118	54.9	71	45	1.9
KDA1080X05S120N	●	10.8	12	118	54.8	71	45	1.9
KDA1090X05S120N	●	10.9	12	118	54.6	71	45	1.9
KDA1100X05S120N	●	11	12	118	54.5	71	45	2.0
KDA1110X05S120N	●	11.1	12	118	54.3	71	45	2.0
KDA1120X05S120N	●	11.2	12	118	54.2	71	45	2.0
KDA1130X05S120N	●	11.3	12	118	54.0	71	45	2.0
KDA1140X05S120N	●	11.4	12	118	53.9	71	45	2.0
KDA1150X05S120N	●	11.5	12	118	53.7	71	45	2.0
KDA1160X05S120N	●	11.6	12	118	53.6	71	45	2.1
KDA1170X05S120N	●	11.7	12	118	53.4	71	45	2.1
KDA1180X05S120N	●	11.8	12	118	53.3	71	45	2.1
KDA1190X05S120N	●	11.9	12	118	53.1	71	45	2.1
KDA1200X05S120N	●	12	12	118	53.0	71	45	2.1
KDA1210X05S140N	●	12.1	14	124	58.8	77	45	2.2
KDA1220X05S140N	●	12.2	14	124	58.7	77	45	2.2
KDA1230X05S140N	●	12.3	14	124	58.5	77	45	2.2
KDA1240X05S140N	●	12.4	14	124	58.4	77	45	2.2
KDA1250X05S140N	●	12.5	14	124	58.2	77	45	2.2
KDA1260X05S140N	●	12.6	14	124	58.1	77	45	2.2
KDA1270X05S140N	●	12.7	14	124	57.9	77	45	2.3
KDA1280X05S140N	●	12.8	14	124	57.8	77	45	2.3

Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA1290X05S140N	●	12.9	14	124	57.6	77	45	2.3
KDA1300X05S140N	●	13	14	124	57.5	77	45	2.3
KDA1310X05S140N	●	13.1	14	124	57.3	77	45	2.3
KDA1320X05S140N	●	13.2	14	124	57.2	77	45	2.4
KDA1330X05S140N	●	13.3	14	124	57.0	77	45	2.4
KDA1340X05S140N	●	13.4	14	124	56.9	77	45	2.4
KDA1350X05S140N	●	13.5	14	124	56.7	77	45	2.4
KDA1360X05S140N	●	13.6	14	124	56.6	77	45	2.4
KDA1370X05S140N	●	13.7	14	124	56.4	77	45	2.4
KDA1380X05S140N	●	13.8	14	124	56.3	77	45	2.5
KDA1390X05S140N	●	13.9	14	124	56.1	77	45	2.5
KDA1400X05S140N	●	14	14	124	56.0	77	45	2.5
KDA1410X05S160N	●	14.1	16	133	61.8	83	48	2.5
KDA1420X05S160N	●	14.2	16	133	61.7	83	48	2.5
KDA1430X05S160N	●	14.3	16	133	61.5	83	48	2.6
KDA1440X05S160N	●	14.4	16	133	61.4	83	48	2.6
KDA1450X05S160N	●	14.5	16	133	61.2	83	48	2.6
KDA1460X05S160N	●	14.6	16	133	61.1	83	48	2.6
KDA1470X05S160N	●	14.7	16	133	60.9	83	48	2.6
KDA1480X05S160N	●	14.8	16	133	60.8	83	48	2.6
KDA1490X05S160N	●	14.9	16	133	60.6	83	48	2.7
KDA1500X05S160N	●	15	16	133	60.5	83	48	2.7
KDA1510X05S160N	●	15.1	16	133	60.3	83	48	2.7
KDA1520X05S160N	●	15.2	16	133	60.2	83	48	2.7
KDA1530X05S160N	●	15.3	16	133	60.0	83	48	2.7
KDA1540X05S160N	●	15.4	16	133	59.9	83	48	2.8
KDA1550X05S160N	●	15.5	16	133	59.7	83	48	2.8
KDA1560X05S160N	●	15.6	16	133	59.6	83	48	2.8
KDA1570X05S160N	●	15.7	16	133	59.4	83	48	2.8
KDA1580X05S160N	●	15.8	16	133	59.3	83	48	2.8
KDA1590X05S160N	●	15.9	16	133	59.1	83	48	2.8
KDA1600X05S160N	●	16	16	133	59.0	83	48	2.9

* Drilling depth is an approximate indication of L/D. Depending on the size, it may be smaller than the listed L/D. ● Standard Stock



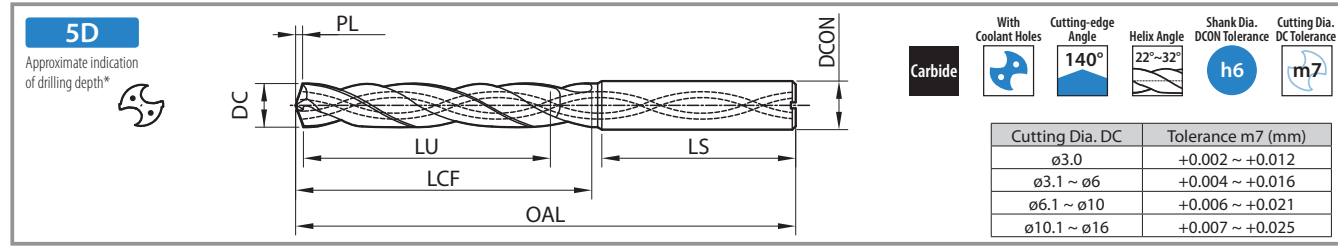
Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0300X03S060C	●	3	6	62	15.5	20	36	0.5
KDA0310X03S060C	●	3.1	6	62	15.3	20	36	0.5
KDA0320X03S060C	●	3.2	6	62	15.2	20	36	0.5
KDA0330X03S060C	●	3.3	6	62	15.0	20	36	0.6
KDA0340X03S060C	●	3.4	6	62	14.9	20	36	0.6
KDA0350X03S060C	●	3.5	6	62	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
KDA1040X03S120C	●	10.4	12	102	39.4	55	45	1.8
KDA1050X03S120C	●	10.5	12	102	39.2	55	45	1.9
KDA1060X03S120C	●	10.6	12	102	39.1	55	45	1.9
KDA1070X03S120C	●	10.7	12	102	38.9	55	45	1.9
KDA1080X03S120C	●	10.8	12	102	38.8	55	45	1.9
KDA1090X03S120C	●	10.9	12	102	38.6	55	45	1.9
KDA1100X03S120C	●	11	12	102	38.5	55	45	2.0
KDA1110X03S120C	●	11.1	12	102	38.3	55	45	2.0
KDA1120X03S120C	●	11.2	12	102	38.2	55	45	2.0
KDA1130X03S120C	●	11.3	12	102	38.0	55	45	2.0
KDA1140X03S120C	●	11.4	12	102	37.9	55	45	2.0
KDA1150X03S120C	●	11.5	12	102	37.7	55	45	2.0
KDA1160X03S120C	●	11.6	12	102	37.6	55	45	2.1
KDA1170X03S120C	●	11.7	12	102	37.4	55	45	2.1
KDA1180X03S120C	●	11.8	12	102	37.3	55	45	2.1
KDA1190X03S120C	●	11.9	12	102	37.1	55	45	2.1
KDA1200X03S120C	●	12	12	102	37.0	55	45	2.1
KDA1210X03S140C	●	12.1	14	107	41.8	60	45	2.2
KDA1220X03S140C	●	12.2	14	107	41.7	60	45	2.2
KDA1230X03S140C	●	12.3	14	107	41.5	60	45	2.2
KDA1240X03S140C	●	12.4	14	107	41.4	60	45	2.2
KDA1250X03S140C	●	12.5	14	107	41.2	60	45	2.2
KDA1260X03S140C	●	12.6	14	107	41.1	60	45	2.2
KDA1270X03S140C	●	12.7	14	107	40.9	60	45	2.3
KDA1280X03S140C	●	12.8	14	107	40.8	60	45	2.3

Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA1290X03S140C	●	12.9	14	107	40.6	60	45	2.3
KDA1300X03S140C	●	13	14	107	40.5	60	45	2.3
KDA1310X03S140C	●	13.1	14	107	40.3	60	45	2.3
KDA1320X03S140C	●	13.2	14	107	40.2	60	45	2.4
KDA1330X03S140C	●	13.3	14	107	40.0	60	45	2.4
KDA1340X03S140C	●	13.4	14	107	39.9	60	45	2.4
KDA1350X03S140C	●	13.5	14	107	39.7	60	45	2.4
KDA1360X03S140C	●	13.6	14	107	39.6	60	45	2.4
KDA1370X03S140C	●	13.7	14	107	39.4	60	45	2.4
KDA1380X03S140C	●	13.8	14	107	39.3	60	45	2.5
KDA1390X03S140C	●	13.9	14	107	39.1	60	45	2.5
KDA1400X03S140C	●	14	14	107	39.0	60	45	2.5
KDA1410X03S160C	●	14.1	16	115	43.8	65	48	2.5
KDA1420X03S160C	●	14.2	16	115	43.7	65	48	2.5
KDA1430X03S160C	●	14.3	16	115	43.5	65	48	2.6
KDA1440X03S160C	●	14.4	16	115	43.4	65	48	2.6
KDA1450X03S160C	●	14.5	16	115	43.2	65	48	2.6
KDA1460X03S160C	●	14.6	16	115	43.1	65	48	2.6
KDA1470X03S160C	●	14.7	16	115	42.9	65	48	2.6
KDA1480X03S160C	●	14.8	16	115	42.8	65	48	2.6
KDA1490X03S160C	●	14.9	16	115	42.6	65	48	2.7
KDA1500X03S160C	●	15	16	115	42.5	65	48	2.7
KDA1510X03S160C	●	15.1	16	115	42.3	65	48	2.7
KDA1520X03S160C	●	15.2	16	115	42.2	65	48	2.7
KDA1530X03S160C	●	15.3	16	115	42.0	65	48	2.7
KDA1540X03S160C	●	15.4	16	115	41.9	65	48	2.8
KDA1550X03S160C	●	15.5	16	115	41.7	65	48	2.8
KDA1560X03S160C	●	15.6	16	115	41.6	65	48	2.8
KDA1570X03S160C	●	15.7	16	115	41.4	65	48	2.8
KDA1580X03S160C	●	15.8	16	115	41.3	65	48	2.8
KDA1590X03S160C	●	15.9	16	115	41.1	65	48	2.8
KDA1600X03S160C	●	16	16	115	41.0	65	48	2.9

* Drilling depth is an approximate indication of L/D. Depending on the size, it may be smaller than the listed L/D. ● Standard Stock



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	55.5	71	45	1.8
KDA1040X05S120C	●	10.4	12	118	55.4	71	45	1.8
KDA1050X05S120C	●	10.5	12	118	55.2	71	45	1.9
KDA1060X05S120C	●	10.6	12	118	55.1	71	45	1.9
KDA1070X05S120C	●	10.7	12	118	54.9	71	45	1.9
KDA1080X05S120C	●	10.8	12	118	54.8	71	45	1.9
KDA1090X05S120C	●	10.9	12	118	54.6	71	45	1.9
KDA1100X05S120C	●	11	12	118	54.5	71	45	2.0
KDA1110X05S120C	●	11.1	12	118	54.3	71	45	2.0
KDA1120X05S120C	●	11.2	12	118	54.2	71	45	2.0
KDA1130X05S120C	●	11.3	12	118	54.0	71	45	2.0
KDA1140X05S120C	●	11.4	12	118	53.9	71	45	2.0
KDA1150X05S120C	●	11.5	12	118	53.7	71	45	2.0
KDA1160X05S120C	●	11.6	12	118	53.6	71	45	2.1
KDA1170X05S120C	●	11.7	12	118	53.4	71	45	2.1
KDA1180X05S120C	●	11.8	12	118	53.3	71	45	2.1
KDA1190X05S120C	●	11.9	12	118	53.1	71	45	2.1
KDA1200X05S120C	●	12	12	118	53.0	71	45	2.1
KDA1210X05S140C	●	12.1	14	124	58.8	77	45	2.2
KDA1220X05S140C	●	12.2	14	124	58.7	77	45	2.2
KDA1230X05S140C	●	12.3	14	124	58.5	77	45	2.2
KDA1240X05S140C	●	12.4	14	124	58.4	77	45	2.2
KDA1250X05S140C	●	12.5	14	124	58.2	77	45	2.2
KDA1260X05S140C	●	12.6	14	124	58.1	77	45	2.2
KDA1270X05S140C	●	12.7	14	124	57.9	77	45	2.3
KDA1280X05S140C	●	12.8	14	124	57.8	77	45	2.3

Description	Stock	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA1290X05S140C	●	12.9	14	124	57.6	77	45	2.3
KDA1300X05S140C	●	13	14	124	57.5	77	45	2.3
KDA1310X05S140C	●	13.1	14	124	57.3	77	45	2.3
KDA1320X05S140C	●	13.2	14	124	57.2	77	45	2.4
KDA1330X05S140C	●	13.3	14	124	57.0	77	45	2.4
KDA1340X05S140C	●	13.4	14	124	56.9	77	45	2.4
KDA1350X05S140C	●	13.5	14	124	56.7	77	45	2.4
KDA1360X05S140C	●	13.6	14	124	56.6	77	45	2.4
KDA1370X05S140C	●	13.7	14	124	56.4	77	45	2.4
KDA1380X05S140C	●	13.8	14	124	56.3	77	45	2.5
KDA1390X05S140C	●	13.9	14	124	56.1	77	45	2.5
KDA1400X05S140C	●	14	14	124	56.0	77	45	2.5
KDA1410X05S160C	●	14.1	16	133	61.8	83	48	2.5
KDA1420X05S160C	●	14.2	16	133	61.7	83	48	2.5
KDA1430X05S160C	●	14.3	16	133	61.5	83	48	2.6
KDA1440X05S160C	●	14.4	16	133	61.4	83	48	2.6
KDA1450X05S160C	●	14.5	16	133	61.2	83	48	2.6
KDA1460X05S160C	●	14.6	16	133	61.1	83	48	2.6
KDA1470X05S160C	●	14.7	16	133	60.9	83	48	2.6
KDA1480X05S160C	●	14.8	16	133	60.8	83	48	2.6
KDA1490X05S160C	●	14.9	16	133	60.6	83	48	2.7
KDA1500X05S160C	●	15	16	133	60.5	83	48	2.7
KDA1510X05S160C	●	15.1	16	133	60.3	83	48	2.7
KDA1520X05S160C	●	15.2	16	133	60.2	83	48	2.7
KDA1530X05S160C	●	15.3	16	133	60.0	83	48	2.7
KDA1540X05S160C	●	15.4	16	133	59.9	83	48	2.8
KDA1550X05S160C	●	15.5	16	133	59.7	83	48	2.8
KDA1560X05S160C	●	15.6	16	133	59.6	83	48	2.8
KDA1570X05S160C	●	15.7	16	133	59.4	83	48	2.8
KDA1580X05S160C	●	15.8	16	133	59.3	83	48	2.8
KDA1590X05S160C	●	15.9	16	133	59.1	83	48	2.8
KDA1600X05S160C	●	16	16	133	59.0	83	48	2.9

* Drilling depth is an approximate indication of L/D. Depending on the size, it may be smaller than the listed L/D. ● Standard Stock

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

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

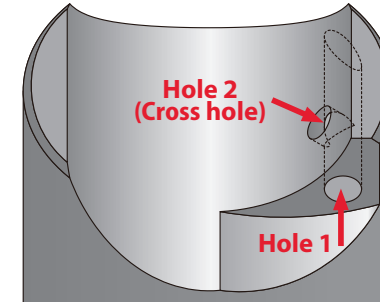
* Drilling depth is an approximate indication of L/D and depends on the size.
Depending on the size, the size may be smaller than the L/D indicated. Check the dimension table.

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
KDA0690X05S080C

Tool life

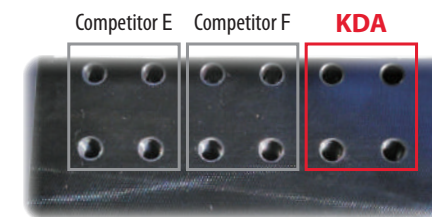
KDA **2,400 pcs or more/1KDA**

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



L

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
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High efficiency chip evacuation L16~L24

High feed rate, High efficiency	4MFK/4MFR	L16
Difficult-to-cut materials, High efficiency	4TFK/4TFR	L20
Multi-functional, High efficiency	3ZFK	L22

Multi-purpose L25

High efficiency, High feed rate with multi-edge	6/8PFK	L26~L27
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Superalloy L28~L29

Roughings L30~L33

Special serrated edge, Difficult-to-cut materials	4/5/6RFH	L30
Serrated edge, Notched edge		L32

Ball-nose End Mills L34~L36

Ball-noses	2SEB	L34
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Hard Materials L37

Special corner-R shaped (For High Feed Rate)	6PDRS	L38~L39
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Aluminum & Non-ferrous Metals L40~L44

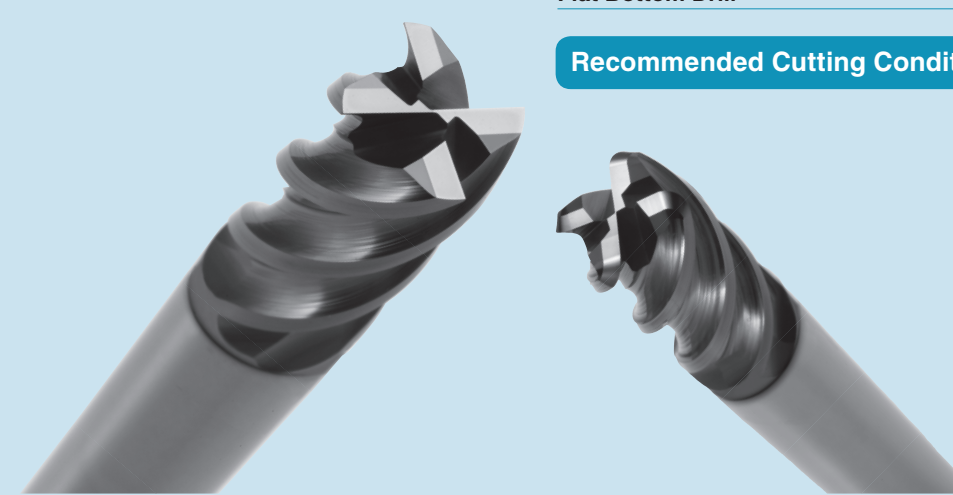
High efficiency, High precision	3AFK	L40
Square (Varied interval flute design with wiper edge)	N Series	L44

Solid Tools for CFRP L45~L47

Drills L48~L62

Flat Bottom Drill	2ZDK-HP	L48
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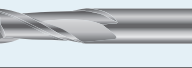




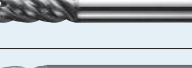


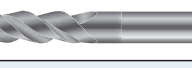

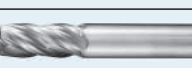
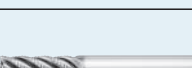
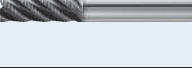









Recommended Cutting Conditions L63~L82



Carbide Substrate

Substrate of all solid end mills is carbide.

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								
									~30HRC P ~30HRC	~40HRC P 30~40HRC	~55HRC H ~55HRC	~68HRC H ~68HRC													
L10-L11	Surface finish oriented	2FES S/ML	2 flutes, Sharp corner edge		MEGACOAT	2	30°	ø0.2-ø16											2FES S/ML	L10-L11					
L12		2FEK S/M	2 flutes, Tough corner edge																			2FEK S/M	L12		
L13		4FESM	4 flutes, Sharp corner edge			4		ø1-ø16	●	○	○	●				○	○				4FESM	L13			
		4FEKM	4 flutes, Tough corner edge																					4FEKM	
L14-L15			2/3/4 FESW	For Automatic Lathes (Overall length 35mm / 45mm)					2/3/4	35°	ø3-ø13											2/3/4 FESW	L14-L15		
L16-L19	High efficiency chip evacuation	4MFK	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		MEGACOAT NANO							●	○		○	○						4MFR			
L22-L23		4TFK	4 flutes Difficult-to-cut materials, High efficiency		4	ø3-ø20	●	○		●	●		○	○					4TFK	L20-L21					
		4TFR	4 flutes Difficult-to-cut materials, High efficiency				MEGACOAT NANO				●	●		○	○							4TFR			
L22-L23			3ZFK S/M	Multi-functional, High efficiency		MEGACOAT	3	40°	ø3-ø16	●	○			●	○					3ZFK S/M	L22-L23				
L24		5DERM	5 flutes, Steel and Difficult-to-cut materials Varied interval flute design		AlTiN	5	38°	ø4-ø25	●	●			●	●			○		5DERM	L24					
L25	Multi-purpose	3UFMS	3 flutes, Multi-purpose		TiAlN	3	45°	ø1-ø20	●	●	○		●	○			●	○	3UFMS	L25					
L26-L27	High efficiency, High feed rate with Multi-edge	6PFK	6/8 flutes, High efficiency, High feed rate, Finishing (Shouldering)		MEGACOAT NANO	6	Variable Lead 42°, 44°	ø6-ø25	●	○	○		●	●				○	○	6PFK	L26-L27				
		8PFK				8																			8PFK
L28-L29	Superalloy	4JER	4 flutes High efficiency, Stable machining		MEGACOAT HARD	4	Variable Lead 32°, 35°	ø6-ø20	●	○			○	○		●			4JER	L28-L29					
L30-L31	Roughing	4RFH	Special serrated edge, Difficult-to-cut materials with Coolant hole		MEGACOAT HARD	4	40°	ø6-ø20	●	●			●	●		○	○			4RFH	L30-L31				
		5RFH				5																			5RFH
		6RFH				6																			
L32		3/4/5 RDSM	Serrated edge		TiAlN	3/4/5	20°	ø4-ø25	●	●			○				●			3/4/5 RDSM	L32				
	3/4/5 RDSL																								
L33		4/6 RFSM	Notched edge			4/6	45°	ø6-ø25	○	●	●	○	○	●		○	○		4/6 RFSM	L33					
L34-L35	Ball-nose	2SEB	High efficiency Ball-nose End Mill with 2 flutes		MEGACOAT NANO	2	30°	ø2-ø16	●	●	●	○	○				○	○	2SEB	L34-L35					
L36		3UEBS	Ball-nose End Mill with 3 flutes		TiAlN	3	30°	ø3-ø12	●	●			○	○			●	○		3UEBS	L36				
		4YEBM	Ball-nose End Mill with 4 flutes		TiAlN	4	38°	ø5-ø20	●	○			●	●		○	○			4YEBM					
L37	Hard materials	4/5/6/7 HFSS	Multi-edge type Negative rake angle Hard Materials Finishing		MEGACOAT HARD	4/5/6/7	45°	ø1-ø12	●	●	●	●								4/5/6/7 HFSS	L37				
		4/5/6/7/8 HFSM				4/5/6/7/8			ø1-ø25																4/5/6/7/8 HFSM
L38-L39	Special corner-R shaped	6PDRS	6 flutes, High feed rate		AlTiN	6	20°	ø6-ø12	●	●	●	●								6PDRS	L38-L39				

● : 1st Choice ○ : 2nd Choice

KYOCERA Solid Tools

KYOCERA Solid Tools

SGS Solid Tools

SGS Solid Tools

SGS Micro Tools

SGS Micro Tools

Carbide Substrate

Substrate of all solid end mills is carbide.

Application and selection

See Page	Applications	Description	Identification System	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				
										~30HRC P ~30HRC	~40HRC P 30~40HRC	~55HRC H ~55HRC	~68HRC H ~68HRC									
L40-L43	Aluminum & Non-ferrous metals	3AFK	2	High efficiency, High precision		-	3	45°	ø3-ø16											●	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

● : 1st Choice ○ : 2nd Choice

Solid End Mill Identification System

1

2 F E S M 020 - 060 - 04 XXXXXXXX

(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	D : 20-29°	B : Ball-nose	S : Short	020	060	04	Corner-R, C width etc. ...
3	U : Multi-purpose	E : 30-39°	R : Radius	M : Medium	↓ 2.0mm	↓ 6.0mm	↓ 4.0mm	
4	Z : Multi-functional, High efficiency	F : 40-49°	S, K : Square	L : Long				
5	Y/D : High efficiency (Difficult-to-cut materials)	G : 50-59°	C : With corner chamfering	W : For Automatic Lathes				
6	R : Roughing							
7	H : Hard materials							
8	N : Aluminum & Non-ferrous metals							

2

4 T F R 030 - 080 - R02

(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	C : 10-19° E : 30-39° F : 40-49°	K : Tough corner edge	030	080	R02 : Corner-R 0.2mm
4	P : Shouldering, High feed rate, Finishing		R : Radius			090 : Under Neck Length 9mm
5	T : High efficiency (Difficult-to-cut materials)		H : Radius (with Coolant Hole)	KCD : Diamond Coating		
6	J : Superalloy		X : Special			
8	A : Aluminum & Non-ferrous metals					
	R : Roughing					
	F : For CFRP					

3

2 S E B 020 - 050 - R10

(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	050	R10
				↓ 2.0mm	↓ 5.0mm	↓ R1.0mm

Icon Glossary

Coating

- MEGACOAT NANO
- MEGACOAT HARD
- MEGACOAT
- TiAlN Coating
- ACTiN Coating
- CVD Diamond Coating
- Uncoated

Shank Dia. Tolerance

- h5 Shank Dia. Tolerance is h5.
- h6 Shank Dia. Tolerance is h6.

Corner Form

- Radius R
- Sharp Sharp corner edge
- Land With corner land
- C With corner chamfering
- Honing Honed

Corner Radius Tolerance

- 0 - -0.02 mm R
- Corner Radius Tolerance is 0--0.02mm.

Ball-nose radius Tolerance

- 0 - -0.02 mm R
- The R tolerance of ball-nose end mill is 0--0.02mm.

No. of Flutes

- 3 3 flutes design

Helix Angle

- 30° Helix Angle 30°

Cutting edge shape


- Roughing

Tool Selection Guide

Introduction

Surface finish oriented

F Series **MEGACOAT is applied** **L10-L15**




(FES)

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

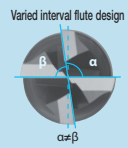
High efficiency, Excellent chip evacuation

M Series **MEGACOAT NANO is applied** **L16-L24**




(4MFK)

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



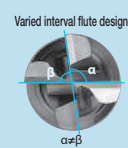
Varied interval flute design

T Series **MEGACOAT NANO is applied** **L20**




(4TFK)

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



Varied interval flute design

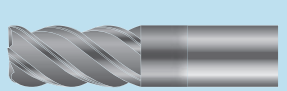
3ZFK **MEGACOAT is applied** **L22**



(3ZFKS)

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.

D Series **L24**




(5DERM)

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

High efficiency, High feed rate

PFK **MEGACOAT NANO is applied** **L26-L27**




(6PFK)

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

Superalloy

J Series **MEGACOAT HARD is applied** **L28-L29**

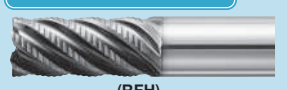


(4JER)

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

Roughing

R Series **MEGACOAT HARD is applied** **L30-L33**




(RFH)

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

Ball-nose End Mill

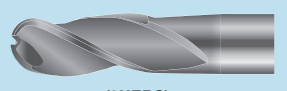
S Series **MEGACOAT NANO is applied** **L34-L36**



(2SEB)


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

U Series **Y Series** **(UEB, YEB)** **L36**




(3UEBS)

Ball-nose end mill with 3/4 flutes



Hard Materials


H Series **MEGACOAT HARD is applied** **L37-L39**



(HFS)

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

P Series **(PDR)** **L38**

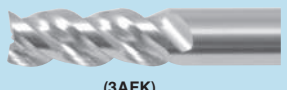


(6PDRS)

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

Aluminum & Non-ferrous Metals

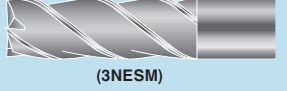
A Series **L40-L44**



(3AFK)

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

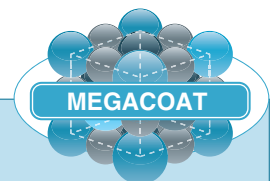
N Series **L44**



(3NESM)

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.

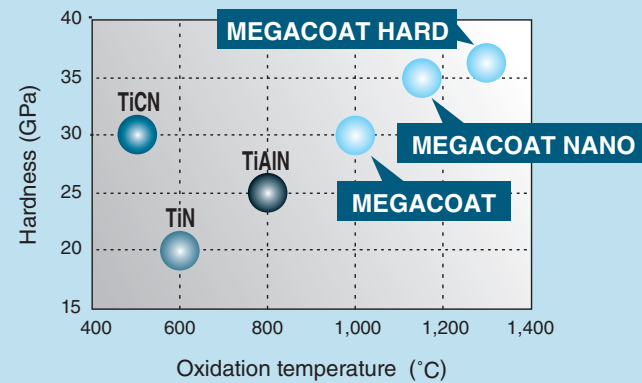
New PVD technology, MEGACOAT



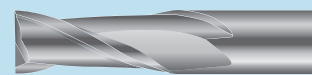
Superior wear and oxidation resistant MEGACOAT

MEGACOAT for Solid End Mill

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

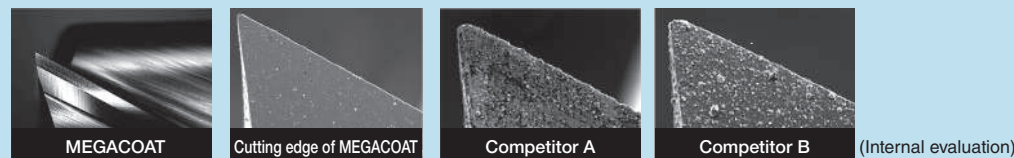


1. MEGACOAT for general milling



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

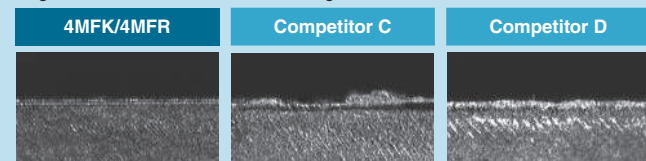


4MFK / 4MFR
L16



4TFK / 4TFR
L20

Long Tool Life with "MEGACOAT NANO"
Doubled Wear Resistance compared to the Competitor's!
Edge Conditions after 140m Machining



[Cutting Conditions: n=6,000min⁻¹, Vf=1,100mm/min, apxae=5.0x0.8mm, ø8, SCM440, Shouldering] (Internal evaluation)

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

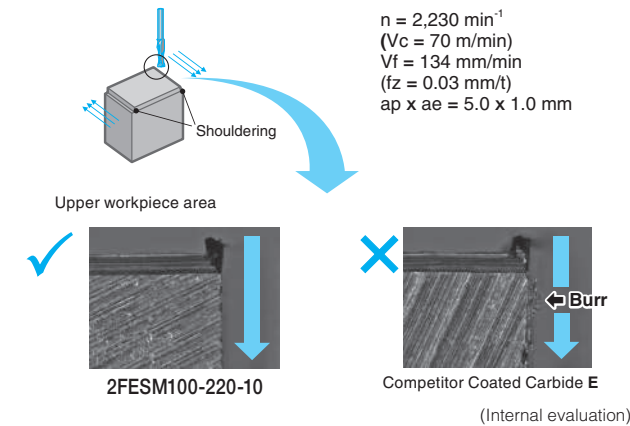
(H Series)

The special multilayer coating provides high hardness and excellent oxidation resistance
Longer tool life and stability at machining of superalloys and hard materials

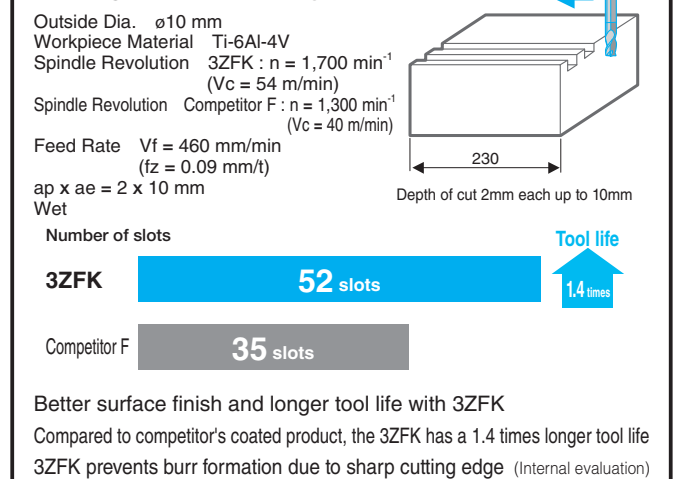
Case Studies

Block SUS304

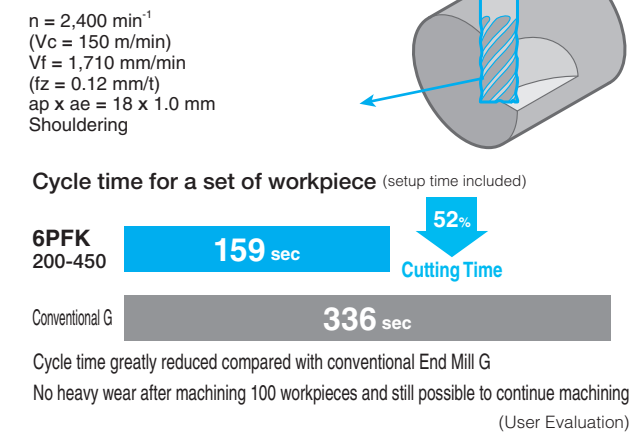
Sharp Cutting Edge Reduced Burrs



Slotting of Titanium Alloy



Machine parts SCM440



Automotive parts S45C

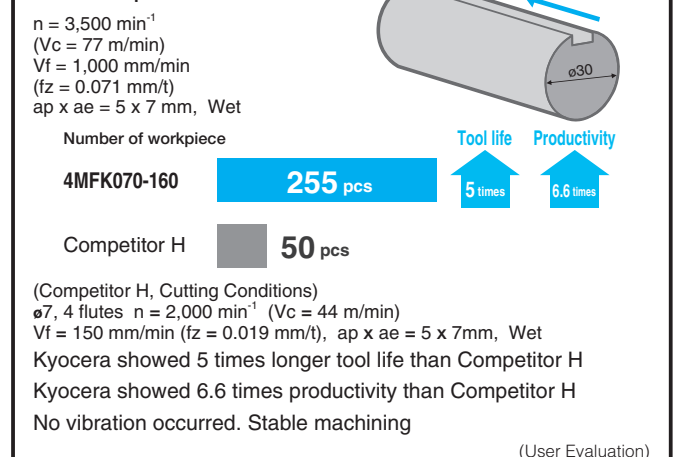
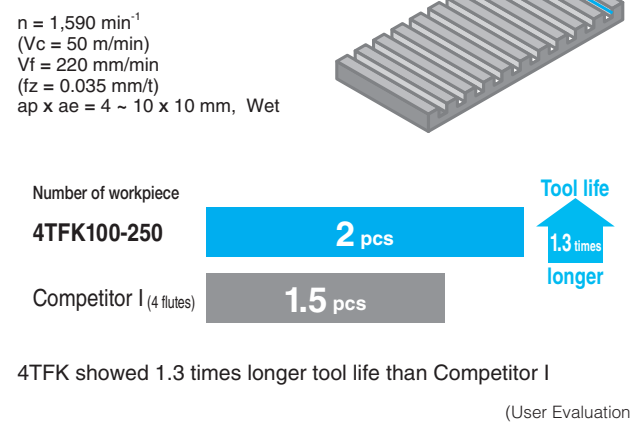
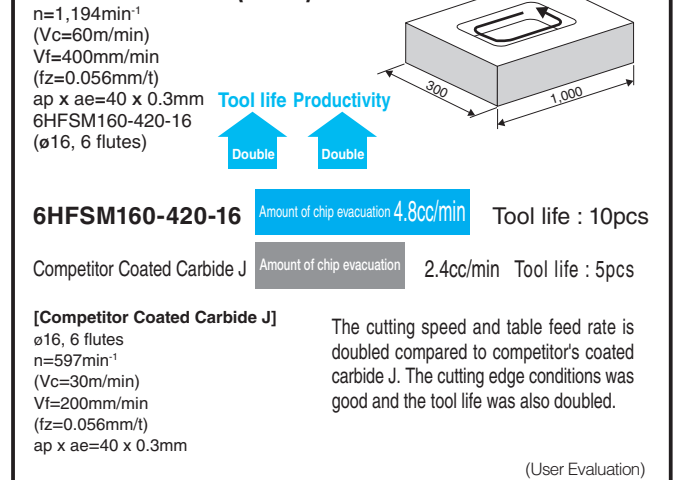


Plate SUS304



Mold Heat Treated Steel (60HRC)



Surface finish oriented, 2 flutes, Sharp corner edge

No. of Flutes : 2

2FESS, 2FESM, 2FESL



MEGACOAT is applied

Recommended Workpiece Materials ★ 1st Choice

P
~30HRC

P
30~40HRC

H
~55HRC

M
Stainless steel

K
Cast Iron

N
Aluminum & Non Ferrous Material

MEGACOAT

Sharp

h5
Shank Dia.

30°

2FESS (Short)

Shouldering Slotting

(Unit : mm)

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

2FESM (Medium)

Shouldering Slotting

(Unit : mm)

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

Recommended Cutting Conditions ● L63

● : Std. Item

2FESM (Medium)

Shouldering Slotting

(Unit : mm)

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

● : Std. Item

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of out	Neck Dia.	Shank Dia.	Overall length	No. of Flutes
		DC		APMX	DN	DCON	LF	ZEFP
2FESM080-190-08	●	8.0	-0.005 -0.025	19.0	-	8	60	2
2FESM080-200-08	●	8.0	-0.005 -0.025	20.0	-	8	60	2
2FESM081-190-10	●	8.1	-0.005 -0.025	19.0	8.3	10	70	2
2FESM082-190-10	●	8.2	-0.005 -0.025	19.0	8.4	10	70	2
2FESM083-190-10	●	8.3	-0.005 -0.025	19.0	8.5	10	70	2
2FESM084-190-10	●	8.4	-0.005 -0.025	19.0	8.6	10	70	2
2FESM085-190-10	●	8.5	-0.005 -0.025	19.0	8.7	10	70	2
2FESM086-190-10	●	8.6	-0.005 -0.025	19.0	8.8	10	70	2
2FESM087-190-10	●	8.7	-0.005 -0.025	19.0	8.9	10	70	2
2FESM088-190-10	●	8.8	-0.005 -0.025	19.0	9.0	10	70	2
2FESM089-190-10	●	8.9	-0.005 -0.025	19.0	9.1	10	70	2
2FESM090-190-10	●	9.0	-0.005 -0.025	19.0	9.2	10	70	2
2FESM091-190-10	●	9.1	-0.005 -0.025	19.0	9.3	10	70	2
2FESM092-190-10	●	9.2	-0.005 -0.025	19.0	9.4	10	70	2
2FESM093-190-10	●	9.3	-0.005 -0.025	19.0	9.5	10	70	2
2FESM094-190-10	●	9.4	-0.005 -0.025	19.0	9.6	10	70	2
2FESM095-190-10	●	9.5	-0.005 -0.025	19.0	9.7	10	70	2
2FESM096-220-10	●	9.6	-0.005 -0.025	22.0	-	10	70	2
2FES								

Surface finish oriented, 2 flutes, Tough corner edge

No. of Flutes : 2

2FEKS, 2FEKM



MEGACOAT is applied

Recommended Workpiece Materials ★ 1st Choice

P
~30HRC

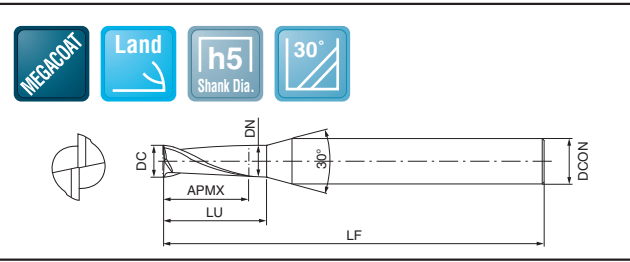
P
30~40HRC

H
~55HRC

M
Stainless steel

K
Cast Iron

N
Aluminum & Non Ferrous Material



2FEKS (Short)

Shouldering Slotting

(Unit : mm)

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

Shouldering Slotting

(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Neck Dia. DN	Under Neck Length LU	Shank Dia. DCON	Overall length LF	No. of Flutes 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	-0.005 -0.025	19.0	-	-	8	60	2
2FEKM085-190-10	●	8.5	-0.005 -0.025	19.0	8.7	26.6	10	70	2
2FEKM090-190-10	●	9.0	-0.005 -0.025	19.0	9.2	26.6	10	70	2
2FEKM095-190-10	●	9.5	-0.005 -0.025	19.0	9.7	26.6	10	70	2
2FEKM100-220-10	●	10.0	-0.005 -0.025	22.0	-	-	10	70	2
2FEKM110-220-12	●	11.0	-0.005 -0.025	22.0	11.2	30.8	12	75	2
2FEKM120-260-12	●	12.0	-0.010 -0.030	26.0	-	-	12	75	2
2FEKM130-260-16	●	13.0	-0.010 -0.030	26.0	13.2	36.4	16	75	2
2FEKM140-260-16	●	14.0	-0.010 -0.030	26.0	14.2	36.4	16	75	2
2FEKM150-300-16	●	15.0	-0.010 -0.030	30.0	15.2	42.0	16	90	2
2FEKM160-320-16	●	16.0	-0.010 -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

No. of Flutes : 4

Sharp corner edge

4FESM

Recommended Workpiece Materials ★ 1st Choice

P
~30HRC

P
30~40HRC

H
~55HRC

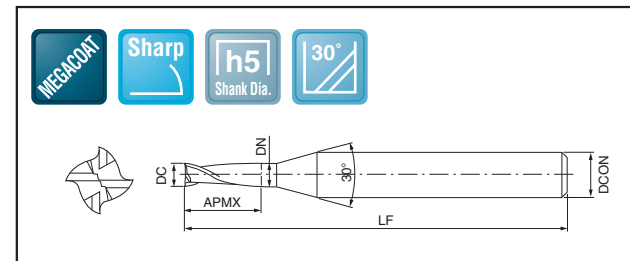
M
Stainless steel

K
Cast Iron

N
Aluminum & Non Ferrous Material



MEGACOAT is applied



4FESM

Shouldering
(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Neck Dia. DN	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP
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	-0.005 -0.025	19.0	-	8	60	4
4FESM080-200-08	●	8.0	-0.005 -0.025	20.0	-	8	60	4
4FESM090-190-10	●	9.0	-0.005 -0.025	19.0	9.2	10	70	4
4FESM100-220-10	●	10.0	-0.005 -0.025	22.0	-	10	70	4
4FESM100-250-10	●	10.0	-0.005 -0.025	25.0	-	10	70	4
4FESM120-260-12	●	12.0	-0.010 -0.030	26.0	-	12	75	4
4FESM140-260-16	●	14.0	-0.010 -0.030	26.0	14.2	16	75	4
4FESM150-300-16	●	15.0	-0.010 -0.030	30.0	15.2	16	90	4
4FESM160-320-16	●	16.0	-0.010 -0.030	32.0	-	16	90	4

● : Std. Item

Tough corner edge

4FEKM

Recommended Workpiece Materials ★ 1st Choice

P
~30HRC

P
30~40HRC

H
~55HRC

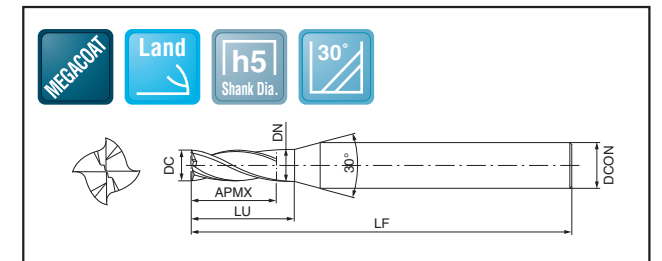
M
Stainless steel

K
Cast Iron

N
Aluminum & Non Ferrous Material



MEGACOAT is applied



4FEKM

Shouldering
(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Neck Dia. DN	Under Neck Length LU	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP
4FEKM030-100-06	●	3.0	0 -0.015	10.0	3.15	12	6	50	4
4FEKM035-100-06	●	3.5	0 -0.015	10.0	3.68	12	6	50	4
4FEKM040-110-06	●	4.0	0 -0.015	11.0	4.2	13.2	6	50	4
4FEKM045-110-06	●	4.5	0 -0.015	11.0	4.7	13.2	6	50	4
4FEKM050-130-06	●	5.0	0 -0.015	13.0	5.2	15.6	6	50	4
4FEKM055-130-06	●	5.5	0 -0.015	13.0	5.7	15.6	6	50	4
4FEKM060-130-06	●	6.0	0 -0.020	13.0	-	-	6	50	4
4FEKM080-190-08	●	8.0	-0.005 -0.025	19.0	-	-	8	60	4
4FEKM100-220-10	●	10.0	-0.005 -0.025	22.0	-	-	10	70	4
4FEKM120-260-12	●	12.0	-0.010 -0.030	26.0	-	-	12	75	4
4FEKM140-260-16	●	14.0	-0.010 -0.030	26.0	14.2	36.4	16	75	4
4FEKM150-300-16	●	15.0	-0.010 -0.030	30.0	15.2	42	16	90	4
4FEKM160-320-16	●	16.0	-0.010 -0.030	32.0	-	-	16	90	4

Recommended Cutting Conditions **L65**

● : Std. Item

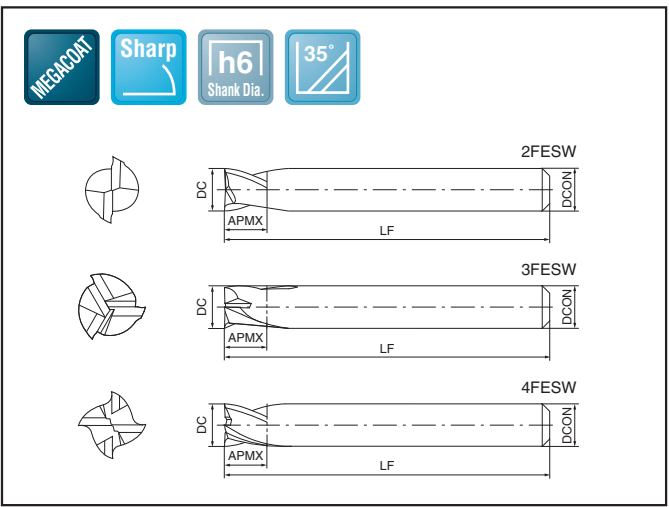
No. of Flutes : 2,3,4

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



Recommended Workpiece Materials ★ 1st Choice

P ~30HRC	P 30~40HRC	H ~55HRC	M Stainless steel	K Cast Iron	N Aluminum & Non Ferrous Material
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MEGACOAT is applied

Sharp Cutting Edge Reduced Burrs

2FESW Shouldering Slotting

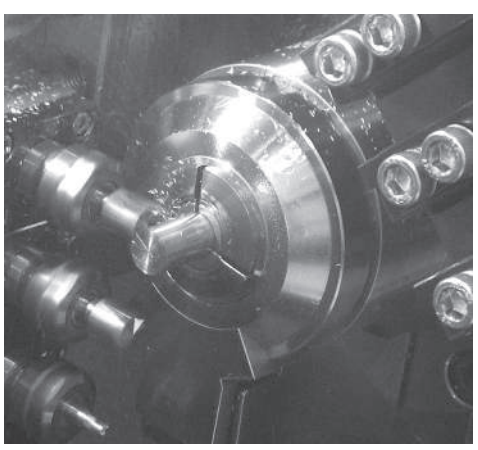
(Unit : mm)

Description	Stock	Outside Dia.		Length of cut		Shank Dia.	Overall length	No. of Flutes
		DC	Mill Dia. tolerance	APMX	DCON			
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 Shouldering Slotting

(Unit : mm)

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



Workpiece Material: Ni-Co alloy

2FES (ø3, 2flutes) Excellent surface finish		Facing of machine parts ·n=2, 150min ⁻¹ (Vc=20m/min) ·Vf=100mm/min (fz=0.023mm/t)
Competitor A (ø3, 2flutes) × Large burrs		

Large burrs (Internal evaluation)

Comparison with competitor's end mill after 600 passes

4FESW Shouldering Slotting

(Unit : mm)

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

(Unit : mm)

Description	Stock	Outside Dia.		Length of cut		Shank Dia.	Overall length	No. of Flutes
		DC	Mill Dia. tolerance	APMX	DCON			
4FESW080-080-08	●	8	0 -0.025	8	8	45	4	
4FESW100-080-07	●	10	0 -0.025	8	7	45	4	
4FESW100-080-10	●	10	0 -0.025	8	10	45	4	
4FESW120-080-10	●	12	0 -0.025	8	10	45	4	
4FESW120-080-12	●	12	0 -0.030	8	12	45	4	
4FESW130-080-13	●	13	0 -0.030	8	13	45	4	

Case Studies

Machine parts S45C
n=3,980min⁻¹
(Vc=100m/min)
Vf=800mm/min
(fz=0.05mm/t)
ap=0.45mm, Wet
4FESW080-080-08 (ø8, 4 flutes)

Four times the productivity!

4FESW080-080-08 Vf=800mm/min
Competitor Coated Carbide B Vf=200mm/min

[Competitor Coated Carbide B]
ø8, 4 flutes
n=2,508min⁻¹
(Vc=63m/min)
Vf=200mm/min
(fz=0.02mm/t)
ap=0.45mm

Both cutting speed and table feed rate were improved. Despite the increase in cutting conditions, burr formation decreased.

(User Evaluation)

Machine parts SUM
n=3,200min⁻¹
(Vc=100m/min)
Vf=640mm/min
(fz=0.05mm/t)
ap x ae=3.5 x 3.0mm, Wet
4FESW100-080-10 (ø10, 4 flutes)

1.6 times the productivity!
Five times the tool life!

4FESW100-080-10 Vf=640mm/min
Competitor Coated Carbide C Vf=400mm/min

[Competitor Coated Carbide C]
ø7, 4 flutes
n=2,000min⁻¹
(Vc=44m/min)
Vf=400mm/min
(fz=0.05mm/t)
apxae=3.5x3.0mm

4FESW has a shorter edge length with improved rigidity, which enabled an increase from conventional ø7 to ø10, thus improving cutting conditions. Compared to conventional tools, tool life improved five times.

(User Evaluation)

4MFK / 4MFR

MEGACOAT NANO is applied

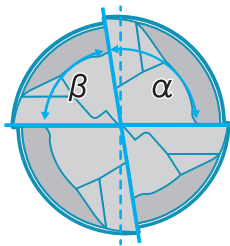
New standard of steel machining

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

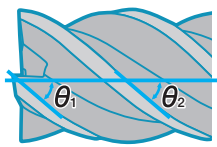
Varied interval flute design



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

$$\alpha \neq \beta$$

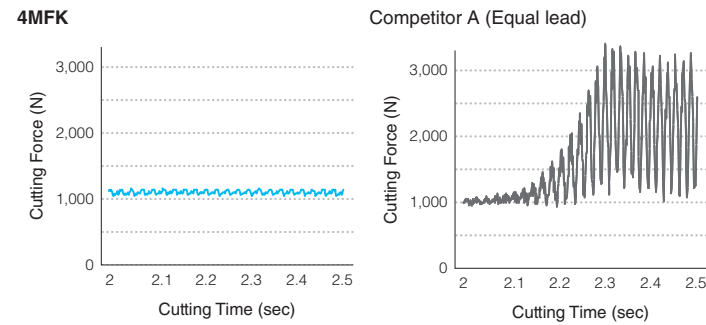
Variable lead



Each flute contains optimized helix angle (lead angle θ), which prevents vibration and achieves a clean surface finish

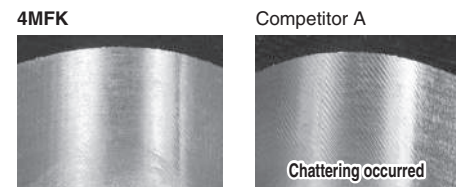
$$\theta_1 \neq \theta_2$$

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



Cutting Conditions : $n = 2,650 \text{ min}^{-1}$, $V_f = 300 \text{ mm/min}$, $ap \times ae = 10 \times 8 \text{ mm}$, End Mill Dia. $\phi 8$, Slotting Wet Workpiece Material : SCM440

Surface Comparison (Internal evaluation)

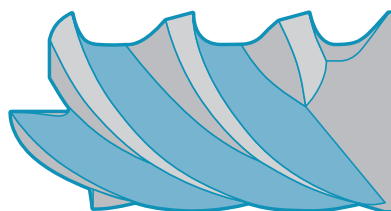


Cutting Conditions : $n = 6,000 \text{ min}^{-1}$, $V_f = 1,500 \text{ mm/min}$, $ap \times ae = 8 \times 2 \text{ mm}$, End Mill Dia. $\phi 8$, Shouldering Wet Workpiece Material : S45C

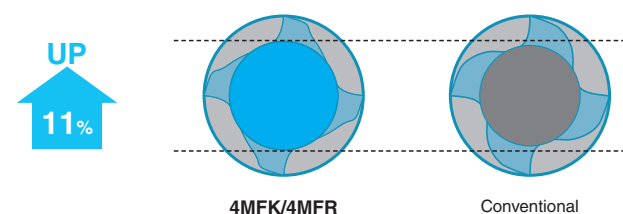
2 Good Chip Evacuation

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

Large Chip Pocket



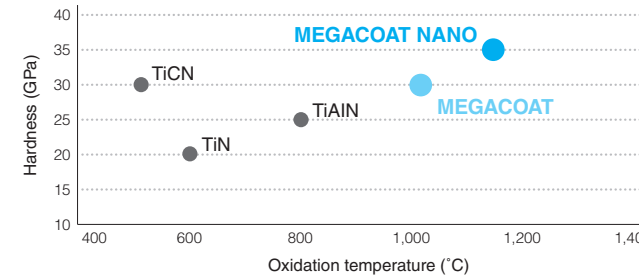
Core diameter comparison (Internal evaluation)



3 Achieves Long Tool Life and Stable Machining

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

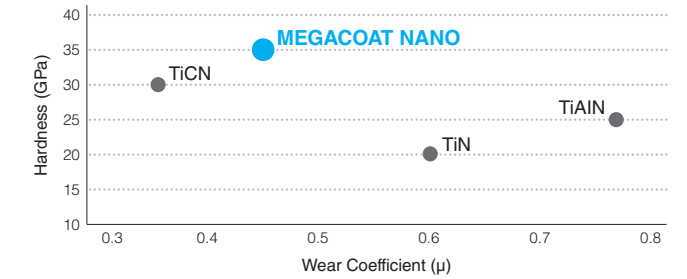
Properties of PVD Coating (Abrasion Resistance)



Low Oxidation resistance High

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

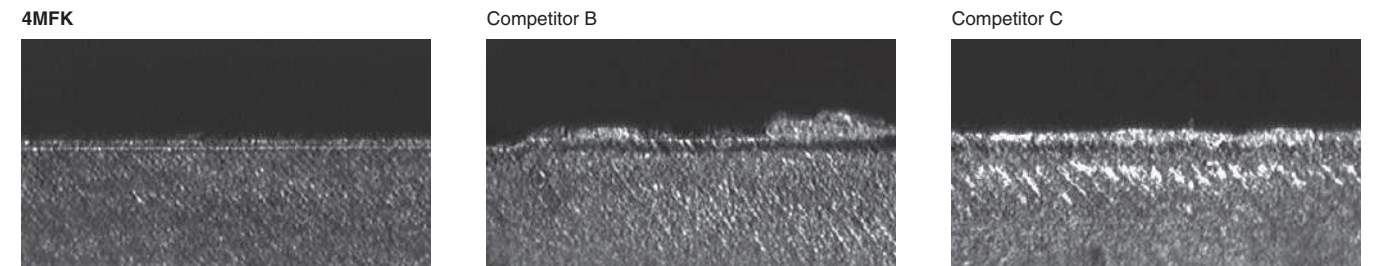
Properties of PVD Coating (Adhesion Resistance)



High Adhesion resistance Low

Stable Machining with Excellent Wear Resistance

Abrasion Resistance Comparison (Internal evaluation)



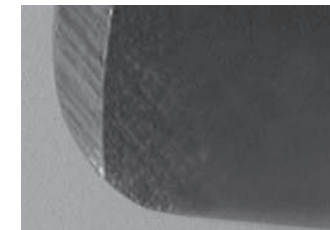
Edge Conditions after 140m Cutting

Cutting Conditions : $n = 6,000 \text{ min}^{-1}$, $V_f = 1,100 \text{ mm/min}$, $ap \times ae = 5.0 \times 0.8 \text{ mm}$, End Mill Dia. $\phi 8$, Shouldering, Wet Workpiece Material : SCM440

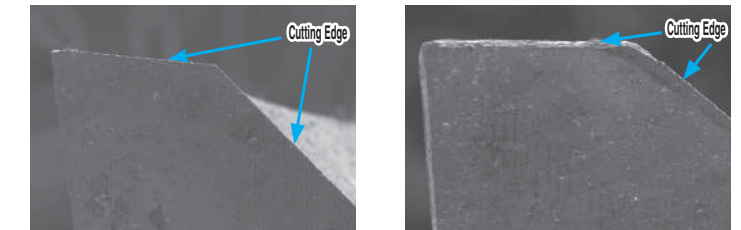
4 High Quality Sharp Edge

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

No. of Flutes : 4

4MFK

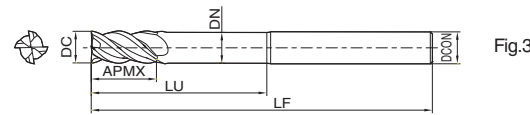
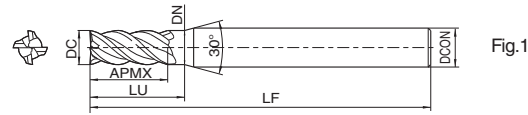
MEGACOAT NANO is applied



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
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MEGACOAT NANO h5 Shank Dia. 42°/44° Land



4MFK (With corner land)

(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	* Cutting edge length	Neck Dia. DN	Inner Neck Length LU	Shank Dia. DCON	Overall Length LF	No. of Flutes ZFP	Shape
4MFK030-045	●		0	4.5	S	5.4					
4MFK030-080	●	3.0	-0.015	8	M	3.15	9.6	6	60	4	
4MFK030-120	●			12	L		14.4				
4MFK035-050	●			5	S	6.0					
4MFK035-095	●	3.5	-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	●	4.0	-0.015	11	M	4.2	13.2	6	60	4	
4MFK040-120	●			12	M (3D)		14.4				
4MFK040-160	●			16	L		19.2				Fig.1
4MFK045-065	●			6.5	S	7.8					
4MFK045-120	●	4.5	-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	-0.015	13	M	5.2	15.6	6	60	4	
4MFK050-200	●			20	L		24.0				
4MFK055-080	●			8	S	9.6					
4MFK055-130	●	5.5	-0.015	13	M	5.7	15.6	6	60	4	
4MFK055-210	●			21	L		25.2				
4MFK060-090	●				S	-	-		60		Fig.2
NEW 4MFK060-090-180	●			9	S'	5.8	18.0				Fig.3
NEW 4MFK060-090-300	●				S'		30.0		70		Fig.3
4MFK060-130	●	6.0	-0.020	13	M			6		4	
4MFK060-150	●			15	M (2.5D)				60		Fig.2
4MFK060-220	●			22	L						
NEW 4MFK065-160	●	6.5	-0.020	16	M	6.7	19.2	8	70	4	
4MFK070-105	●			10.5	S	12.6					
4MFK070-160	●	7.0	-0.020	16	M	7.2	19.2	8	70	4	Fig.1
4MFK070-250	●			25	L		30.0				

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	* Cutting edge length	Neck Dia. DN	Inner Neck Length LU	Shank Dia. DCON	Overall Length LF	No. of Flutes ZFP	Shape
NEW 4MFK075-190	●	7.5	-0.020	19	M	7.7	22.8	8	70	4	Fig.1
4MFK080-120	●				S	-	-		70		Fig.2
NEW 4MFK080-120-240	●			12	S'	7.7	24.0				Fig.3
NEW 4MFK080-120-400	●				S'		40.0	8	80	4	
4MFK080-190	●	8.0	-0.025	19	M				70		Fig.2
4MFK080-200	●			20	M (2.5D)						
4MFK080-280	●			28	L						
NEW 4MFK085-190	●	8.5	-0.025	19	M	8.7	22.8	10	80	4	Fig.1
4MFK090-135	●	9.0	-0.025	13.5	S	9.2	16.2	10	80	4	
4MFK090-205	●			20.5	M		24.6				
NEW 4MFK095-220	●	9.5	-0.025	22	M	9.7	26.4	10	80	4	Fig.1
4MFK100-150	●				S	-	-		80		Fig.2
NEW 4MFK100-150-300	●			15	S'	9.7	30.0				Fig.3
NEW 4MFK100-150-500	●				S'		50.0	10	100	4	
4MFK100-220	●	10.0	-0.025	22	M						
4MFK100-250	●			25	M (2.5D)				80		Fig.2
4MFK100-330	●			33	L						
NEW 4MFK110-260	●	11.0	-0.030	26	M	11.2	31.2	12	100	4	Fig.1
4MFK120-180	●				S	-	-		100		Fig.2
NEW 4MFK120-180-360	●			18	S'	11.7	36.0				Fig.3
NEW 4MFK120-180-600	●				S'		60.0	12	110	4	
4MFK120-260	●	12.0	-0.030	26	M				100		Fig.2
4MFK120-360	●			36	L						
4MFK160-240	●			24	S						
4MFK160-350	●	16.0	-0.030	35	M			16	110	4	Fig.2
4MFK160-480	●			48	L						

Recommended Cutting Conditions L67

* Applications for each cutting edge length

- S : Short Shouldering Slotting
- M : Medium Shouldering Slotting
- S' : Short (Long neck) Shouldering
- L : Long Shouldering

● : Std. Item

No. of Flutes : 4

4MFR

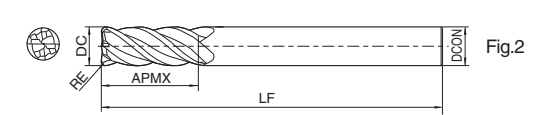
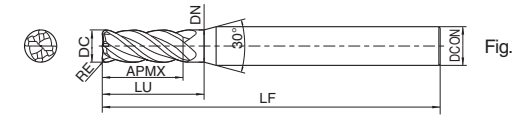
MEGACOAT NANO is applied



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
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MEGACOAT NANO h5 Shank Dia. 42°/44° Radius R



4MFR (Radius)

(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Corner-R RE	Length of cut APMX	Neck Dia. DN	Inner Neck Length LU	Shank Dia. DCON	Overall Length LF	No. of Flutes ZFP	Shape
4MFR030-080-R02	●			0.2							
4MFR030-080-R03	●	3.0	-0.015	0.3	8	3.15	9.6	6	60	4	
4MFR030-080-R05	●			0.5							
4MFR035-095-R02	●			0.2							
4MFR035-095-R03	●	3.5	-0.015	0.3	9.5	3.7	11.4	6	60	4	
4MFR035-095-R05	●			0.5							
4MFR040-110-R02	●			0.2							
4MFR040-110-R03	●	4.0	-0.015	0.3	11	4.2	13.2	6	60	4	
4MFR040-110-R05	●			0.5							
4MFR040-110-R10	●			1.0							
4MFR045-120-R02	●			0.2							Fig.1
4MFR045-120-R03	●	4.5	-0.015	0.3	12	4.7	14.4	6	60	4	
4MFR045-120-R05	●			0.5							
4MFR045-120-R10	●			1.0							
4MFR050-130-R02	●			0.2							
4MFR050-130-R03	●	5.0	-0.015	0.3	13	5.2	15.6	6	60	4	
4MFR050-130-R05	●			0.5							
4MFR050-130-R10	●			1.0							
NEW 4MFR055-130-R02	●			0.2							
4MFR055-130-R03	●	5.5	-0.015	0.3	13	5.7	15.6	6	60	4	
4MFR055-130-R05	●			0.5							
4MFR055-130-R10	●			1.0							
NEW 4MFR060-130-R02	●			0.2							
4MFR060-130-R03	●	6.0	-0.020	0.3	13	-	-	6	60	4	Fig.2
4MFR060-130-R05	●			0.5							
4MFR060-130-R10	●			1.0							
4MFR060-130-R15	●			1.5							

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Corner-R RE	Length of cut APMX	Neck Dia. DN	Inner Neck Length LU	Shank Dia. DCON	Overall Length LF	No. of Flutes ZFP	Shape
NEW 4MFR080-190-R02	●			0.2							
4MFR080-190-R03	●			0.3							
4MFR080-190-R05	●			0.5							
4MFR080-190-R10	●	8.0	-0.025	1.0	19	-	-	8	70	4	
4MFR080-190-R15	●			1.5							
4MFR080-190-R20	●			2.0							
4MFR080-190-R30	●			3.0							
NEW 4MFR100-220-R02	●			0.2							
4MFR100-220-R03	●			0.3							
4MFR100-220-R05	●			0.5							
4MFR100-220-R10	●	10.0	-0.025	1.0	22	-	-	10	80	4	Fig.2
4MFR100-220-R15	●			1.5							
4MFR100-220-R20	●			2.0							
4MFR100-220-R30	●			3.0							
NEW 4MFR120-260-R03	●			0.3							
4MFR120-260-R05	●			0.5							
4MFR120-260-R10	●	12.0	-0.030	1.0	26	-	-	12	100	4	
4MFR120-260-R15	●			1.5							
4MFR120-260-R20	●			2.0							
4MFR120-260-R30	●			3.0							
NEW 4MFR160-350-R10	●			1.0							
4MFR160-350-R15	●	16.0	-0.030	1.5	35	-	-	16	110	4	
4MFR160-350-R20	●			2.0							
4MFR160-350-R30	●			3.0							

Recommended Cutting Conditions L67

● : Std. Item

4TFK / 4TFR

MEGACOAT NANO is applied

High feed and high efficiency machining of difficult-to-cut materials
Resistant to chattering and suppresses burr formation

1 Better chip evacuation at high feed machining

Excellent chip evacuation at high feed by large chip pocket and rake angle

4TFK / 4TFR

Optimum edge shape for high efficiency machining

No chip clogging

End mill cross-section

Cutting conditions : $n = 2,800 \text{ min}^{-1}$, $V_f = 550 \text{ mm/min}$, $a_p = 4 \text{ mm}$
End Mill Dia. $\phi 8 \text{ mm}$, Slotting, Wet Workpiece Material : SUS304

Conventional

Chip clogging

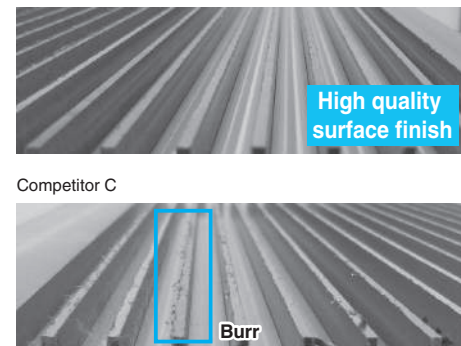
End mill cross-section

Cutting Conditions : $n = 2,800 \text{ min}^{-1}$, $V_f = 270 \text{ mm/min}$, $a_p = 4 \text{ mm}$
End Mill Dia. $\phi 8 \text{ mm}$, Slotting, Wet Workpiece Material : SUS304

2 Decreased burr

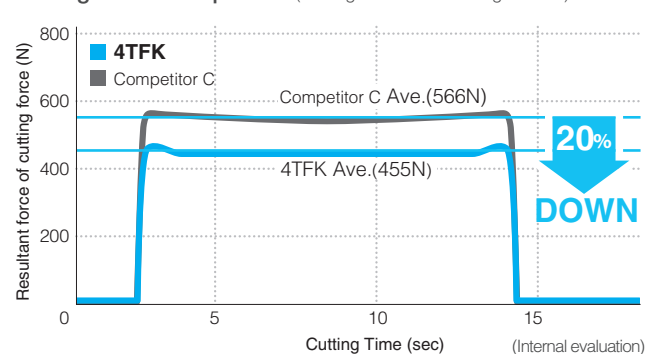
Deep slotting (1xD) by low cutting force design and good chip evacuation

4TFK



Cutting Conditions : $n = 3,200 \text{ min}^{-1}$, $V_f = 150 \text{ mm/min}$, $a_p = 6 \text{ mm}$
End Mill Dia. $\phi 6 \text{ mm}$, Slotting, Wet Workpiece Material : SUS304

Cutting Force Comparison (Cutting force at machining 100mm)



Cutting Conditions : $n = 4,800 \text{ min}^{-1}$, $V_f = 500 \text{ mm/min}$, $a_p = 6 \text{ mm}$
End Mill Dia. $\phi 6 \text{ mm}$, Dry Workpiece Material : SCM440

3 Chattering control by varied interval flute and variable lead design

4TFK, 4TFR

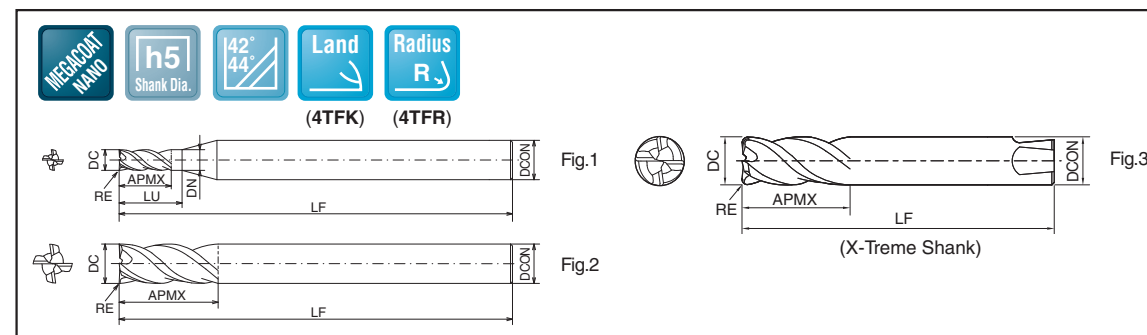
MEGACOAT NANO is applied



Recommended Workpiece Materials



No. of Flutes : 4



4TFK (With corner land)

(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Length of cutting edge DN	Neck Dia. LU	Under Neck Length DCON	Shank Dia. LF	Overall length ZEFP	No. of Flutes	Shape
4TFK030-045	●	3.0	0 -0.015	4.5	S	5.4	3.15	6	60	4	Fig.1
4TFK030-080	●	3.0	0 -0.015	8	M	9.6	3.15	6	60	4	
4TFK030-120	●	3.0	0 -0.015	12	L	14.4	3.15	6	60	4	
4TFK040-060	●	4.0	0 -0.015	6	S	7.2	4.2	6	60	4	
4TFK040-120	●	4.0	0 -0.015	12	M	14.4	4.2	6	60	4	Fig.2
4TFK040-160	●	4.0	0 -0.015	16	L	19.2	4.2	6	60	4	
4TFK050-075	●	5.0	0 -0.015	7.5	S	9	5.2	6	60	4	Fig.1
4TFK050-130	●	5.0	0 -0.015	13	M	15.6	5.2	6	60	4	
4TFK050-200	●	5.0	0 -0.015	20	L	24	5.2	6	60	4	Fig.2
4TFK060-090	●	6.0	0 -0.020	9	S	-	-	6	60	4	
4TFK060-150	●	6.0	0 -0.020	15	M	-	-	6	60	4	Fig.1
4TFK060-220	●	6.0	0 -0.020	22	L	-	-	6	60	4	
4TFK070-105	●	7.0	0 -0.020	10.5	S	12.6	7.2	8	70	4	Fig.2
4TFK070-160	●	7.0	0 -0.020	16	M	19.2	7.2	8	70	4	
4TFK070-250	●	7.0	0 -0.020	25	L	30	7.2	8	70	4	Fig.1
4TFK080-120	●	8.0	-0.005 -0.025	12	S	-	-	8	70	4	
4TFK080-200	●	8.0	-0.005 -0.025	20	M	-	-	8	70	4	Fig.2
4TFK080-280	●	8.0	-0.005 -0.025	28	L	-	-	8	70	4	
4TFK090-135	●	9.0	-0.005 -0.025	13.5	S	16.2	9.2	10	80	4	Fig.1
4TFK090-205	●	9.0	-0.005 -0.025	20.5	M	24.6	9.2	10	80	4	
4TFK100-150	●	10.0	-0.005 -0.025	15	S	-	-	10	80	4	Fig.2
4TFK100-250	●	10.0	-0.005 -0.025	25	M	-	-	10	80	4	
4TFK100-330	●	10.0	-0.005 -0.025	33	L	-	-	10	80	4	Fig.1
4TFK120-180	●	12.0	-0.010 -0.030	18	S	-	-	12	100	4	
4TFK120-260	●	12.0	-0.010 -0.030	26	M	-	-	12	100	4	Fig.2
4TFK120-360	●	12.0	-0.010 -0.030	36	L	-	-	12	100	4	
4TFK160-240	●	16.0	-0.010 -0.030	24	S	-	-	16	110	4	Fig.1
4TFK160-350	●	16.0	-0.010 -0.030	35	M	-	-	16	110	4	
4TFK160-480	●	16.0	-0.010 -0.030	48	L	-	-	16	110	4	Fig.2
4TFK200-300	●	20.0	-0.010 -0.030	30	S	-	-	20	125	4	
4TFK200-450	●	20.0	-0.010 -0.030	45	M	-	-	20	125	4	

* Applications for each cutting edge length

S : Short } Shouldering Slotting
M : Medium }
L : Long } Shouldering

*4TFR...XT Shank (X-Treme Shank) is for NIKKEN X-Treme chuck

4TFR (Radius)

(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Corner-R RE	Length of out APMX	Neck Dia. DN	Under Neck Length LU	Shank Dia. DCON	Overall length LF	No. of Flutes	Shape
4TFR030-080-R02	●	3.0	0 -0.015	0.2	8	3.15	9.6	6	60	4	Fig.1
4TFR030-080-R05	●	3.0	0 -0.015	0.5	8	3.15	9.6	6	60	4	
4TFR040-120-R02	●	4.0	0 -0.015	0.2	12	4.2	14.4	6	60	4	
4TFR040-120-R05	●	4.0	0 -0.015	0.5	12	4.2	14.4	6	60	4	
4TFR050-130-R02	●	5.0	0 -0.015	0.2	13	5.2	15.6	6	60	4	Fig.2
4TFR050-130-R05	●	5.0	0 -0.015	0.5	13	5.2	15.6	6	60	4	
4TFR050-130-R10	●	5.0	0 -0.015	1.0	13	5.2	15.6	6	60	4	Fig.1
4TFR060-150-R03	●	6.0	0 -0.020	0.3	15	-	-	6	60	4	
4TFR060-150-R05	●	6.0	0 -0.020	0.5	15	-	-	6	60	4	
4TFR060-150-R10	●	6.0	0 -0.020	1.0	15	-	-	6	60	4	Fig.2
4TFR080-200-R03	●	8.0	-0.005 -0.025	0.3	20	-	-	8	70	4	
4TFR080-200-R05	●	8.0	-0.005 -0.025	0.5	20	-	-	8	70	4	
4TFR080-200-R10	●	8.0	-0.005 -0.025	1.0	20	-	-	8	70	4	Fig.1
4TFR080-200-R20	●	8.0	-0.005 -0.025	2.0	20	-	-	8	70	4	
4TFR100-250-R03	●	10.0	-0.005 -0.025	0.3	25	-	-	10	80	4	Fig.2
4TFR100-250-R05	●	10.0	-0.005 -0.025	0.5	25	-	-	10	80	4	
4TFR100-250-R10	●	10.0	-0.005 -0.025	1.0	25	-	-	10	80	4	
4TFR100-250-R15	●	10.0	-0.005 -0.025	1.5	25	-	-	10	80	4	Fig.1
4TFR100-250-R20	●	10.0	-0.005 -0.025	2.0	25	-	-	10	80	4	
4TFR100-250-R30	●	10.0	-0.005 -0.025	3.0	25	-	-	10	80	4	Fig.2
4TFR120-260-R05	●	12.0	-0.010 -0.030	0.5	26	-	-	12	100	4	
4TFR120-260-R10	●	12.0	-0.010 -0.030	1.0	26	-	-	12	100	4	
4TFR120-260-R15	●	12.0	-0.010 -0.030	1.5	26	-	-	12	100	4	Fig.1
4TFR120-260-R20	●	12.0	-0.010 -0.030	2.0	26	-	-	12	100	4	
4TFR120-260-R30	●	12.0	-0.010 -0.030	3.0	26	-	-	12	100	4	Fig.2
4TFR160-350-R10	●	16.0	-0.010 -0.030	1.0	35	-	-	16	110	4	
4TFR160-350-R20	●	16.0	-0.010 -0.030	2.0	35	-	-	16	110	4	Fig.1
4TFR160-350-R30	●	16.0	-0.010 -0.030	3.0	35	-	-	16	110	4	
4TFR200-450-R10	●	20.0	-0.010 -0.030	1.0	45	-	-	20	125	4	Fig.2
4TFR200-450-R20	●	20.0	-0.010 -0.030	2.0	45	-	-	20	125	4	
4TFR200-450-R30	●	20.0	-0.010 -0.030	3.0	45	-	-	20	125	4	Fig.1
4TFR120-260-R10-XT	●	12.0	-0.010 -0.030	1.0	26	-	-	12	94	4	
4TFR120-260-R20-XT	●	12.0	-0.010 -0.030	2.0	26	-	-	12	94	4	
4TFR120-260-R30-XT	●	12.0	-0.010 -0.030	3.0	26	-	-	12	94	4	Fig.3
4TFR160-350-R10-XT	●	16.0	-0.010 -0.030	1.0	35	-	-	16	116	4	
4TFR160-350-R20-XT	●	16.0	-0.010 -0.030	2.0	35	-	-	16	116	4	
4TFR160-350-R30-XT	●	16.0	-0.010 -0.030	3.0	35	-	-	16	116	4	Fig.2
4TFR200-450-R10-XT	●	20.0	-0.010 -0.030	1.0	45	-	-	20	130	4	
4TFR200-450-R20-XT	●	20.0	-0.010 -0.030	2.0	45	-	-	20	130	4	
4TFR200-450-R30-XT	●	20.0	-0.010 -0.030	3.0	45	-	-	20	130	4	

Applicable chuck for 4TFR...XT ● M90

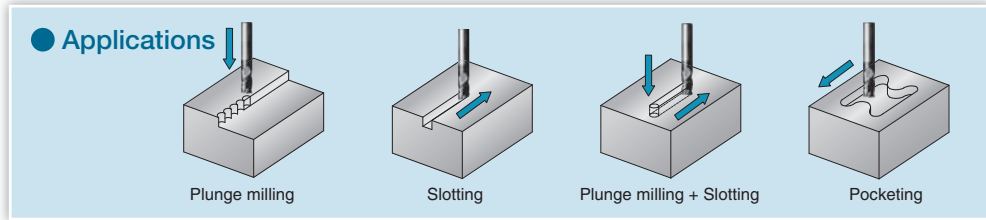
Recommended Cutting Conditions ● L68

● : Std. Item

3ZFK

Triple functions

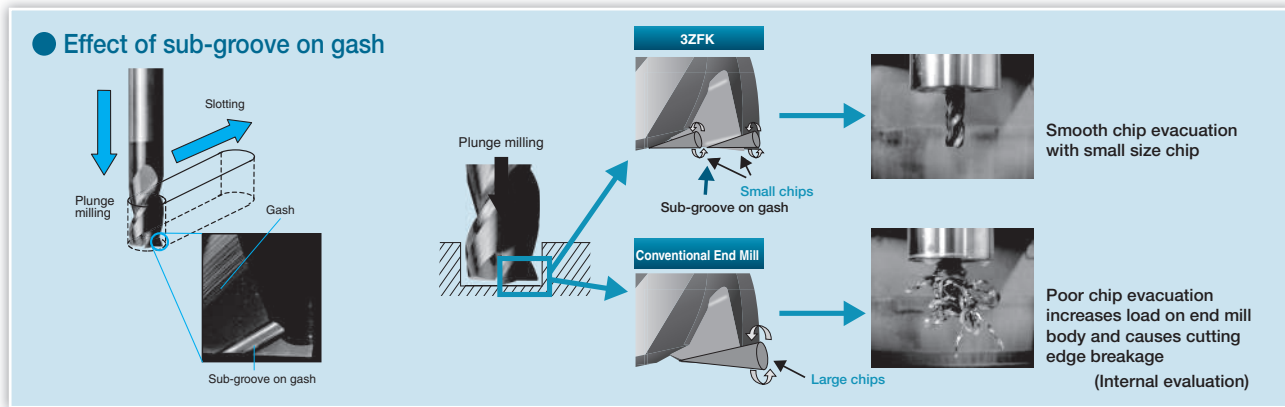
Applicable for plunge milling, slotting and finishing with one end mill



Triple Performances

1. High efficiency machining with new design

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



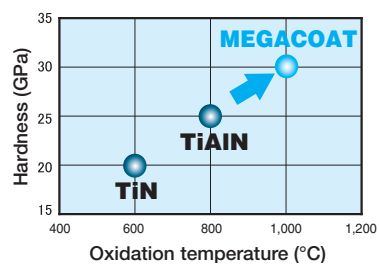
Prevents chip clogging owing to deep flute and gash design



2. Longer tool life with MEGACOAT

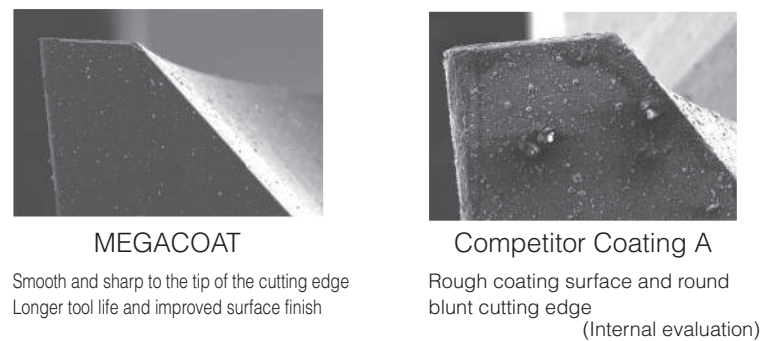
Excellent wear resistance and heat resistance

MEGACOAT is applied



3. Better surface finish owing to sharp cutting edge quality

Smooth and sharp to the tip of the cutting edge
Controls burr formation. Better surface roughness



3ZFKS, 3ZFKM



MEGACOAT is applied

No. of Flutes : 3

Recommended Workpiece Materials ★ 1st Choice

P
~30HRC
P
30~40HRC
M
Stainless steel
S
Titanium Alloy
K
Cast Iron
N
Aluminum & Non Ferrous Material

MEGACOAT
Land
h5
Shank Dia.
40°

Fig.1

Fig.2

3ZFKS (Short)

Shouldering Slotting Plunge milling

3ZFKM (Medium)

Shouldering Slotting 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		
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	
3ZFKS120-180-12	●	12.0	-0.010 -0.030	18.0	-	-	12	75	3	

(Unit : mm)

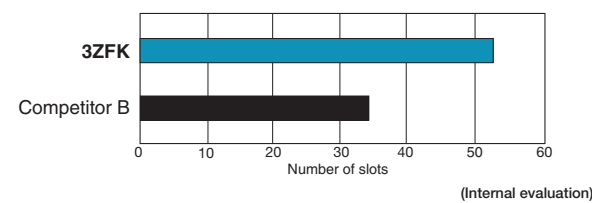
Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of cut	Neck Dia.	Under Neck Length	Shank Dia.	Overall length	No. of Flutes	Shape
		DC	APMX	DN	LU	DCON	LF	ZEFP		
3ZFKM030-060-06	●	3.0	0 -0.015	6.0	3.2	6.5	6	50	3	Fig.2
3ZFKM030-080-06	●	3.0	0 -0.015	8.0	3.2	8.6	6	50	3	
3ZFKM040-080-06	●	4.0	0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

Case Studies

Slotting of Titanium Alloy

Outside Dia.	φ10
Workpiece Material	Ti-6Al-4V
Spindle Revolution	3ZFK : n=1,700min ⁻¹ Competitor B: n=1,300min ⁻¹
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

● : Std. Item

No. of Flutes : 5

5DERM



Recommended Workpiece Materials ★ 1st Choice

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

ACTIN
Radius R
±0.05 mm R
h6 Shank Dia.
38°

Shouldering Slotting
(Unit : mm)

5DERM (Radius)

Description	Stock	Outside Dia.		Length of cut	Shank Dia.	Overall length	Spec of Corners	No. of Flutes
		DC	Mill Dia. tolerance					
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.

Recommended Cutting Conditions ● L70

▲ : To be replaced by a new product

No. of Flutes : 3

3UFSM



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

TiAlN
Sharp
Land
h6 Shank Dia.
45°

Shouldering Slotting
(Unit : mm)

3UFSM

Description	Stock	Outside Dia.		Length of cut	Shank Dia.	Overall length	No. of Flutes
		DC	Mill Dia. tolerance				
3UFSM010-030-04	▲	1	-0.014 -0.028	3	4	50	3
3UFSM015-030-04	▲	1.5	-0.014 -0.028	3	4	50	3
3UFSM020-030-04	▲	2	-0.014 -0.028	3	4	50	3
3UFSM025-040-04	▲	2.5	-0.014 -0.028	4	4	50	3
3UFSM030-080-06	▲	3	-0.014 -0.028	8	6	50	3
3UFSM040-120-06	▲	4	-0.020 -0.038	12	6	50	3
3UFSM050-140-06	▲	5	-0.020 -0.038	14	6	50	3
3UFSM060-160-06	▲	6	-0.020 -0.038	16	6	50	3
3UFSM080-200-08	▲	8	-0.025 -0.047	20	8	63	3
3UFSM100-220-10	▲	10	-0.025 -0.047	22	10	76	3
3UFSM120-250-12	▲	12	-0.032 -0.059	25	12	76	3
3UFSM160-320-16	▲	16	-0.032 -0.059	32	16	89	3
3UFSM200-380-20	▲	20	-0.040 -0.073	38	20	104	3

● Products emphasizing high efficiency machining, three flutes type for general semi finishing.
It is available for slotting and shouldering of wide range of workpiece materials.

Recommended Cutting Conditions ● L71

▲ : To be replaced by a new product

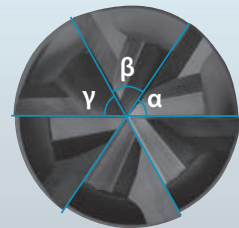
6PFK/8PFK

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



$$\alpha \neq \beta \neq \gamma$$

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

Variable Lead



$$\theta_1 \neq \theta_2 \neq \theta_3$$

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

Surface finish comparison (side surface) End Mill Dia. $\phi 12$ (Internal evaluation)

Workpiece Material	SCM440	SUS304	Ti-6Al-4V
Cutting Conditions	$n=3,300\text{min}^{-1}$ ($V_c=124\text{m/min}$) $V_f=2,000\text{mm/min}$ ($f_z=0.1\text{mm/t}$) $ap \times ae=30 \times 1.5\text{mm}$	$n=2,500\text{min}^{-1}$ ($V_c=94\text{m/min}$) $V_f=1,130\text{mm/min}$ ($f_z=0.08\text{mm/t}$) $ap \times ae=30 \times 0.6\text{mm}$	$n=2,500\text{min}^{-1}$ ($V_c=94\text{m/min}$) $V_f=1,130\text{mm/min}$ ($f_z=0.08\text{mm/t}$) $ap \times ae=30 \times 0.6\text{mm}$
Results	6PFK	6PFK	6PFK
	Competitor A	Competitor A	Competitor A
	Chattering occurred	Chattering occurred	Dull surface due to poor approach

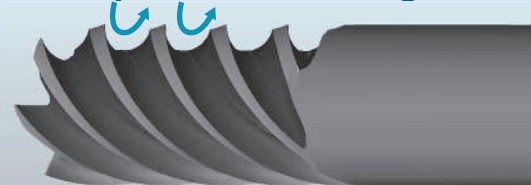
High feed rate and high efficiency shouldering with Multi-edge design (6 flutes / 8 flutes)

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

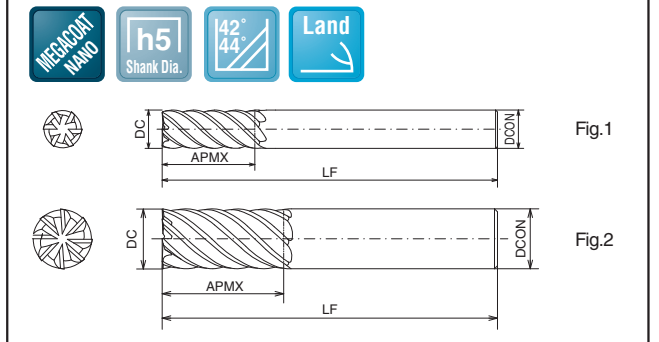
6PFK, 8PFK



MEGACOAT NANO is applied

No. of Flutes : 6,8

Recommended Workpiece Materials ★ 1st Choice



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	Fig.2
8PFK250-1000	●	25.0	-0.010 -0.030	100	25	180	8	

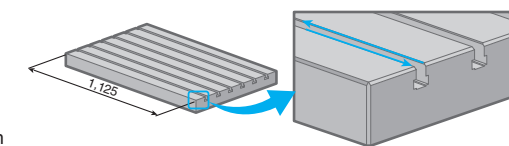
Recommended Cutting Conditions L72

Case Studies

Machine table FC250

6PFK200-450
Finishing (1 pass)
 $n = 2,500 \text{ min}^{-1}$
($V_c = 157 \text{ m/min}$)
 $V_f = 3,500 \text{ mm/min}$
($f_z = 0.23 \text{ mm/t}$)
 $ap \times ae = 35 \times 1.2 \text{ mm}$

Competitor Coated Carbide B (2 passes)
Semi finishing $n = 2,500 \text{ min}^{-1}$ ($V_c = 157 \text{ m/min}$)
 $V_f = 1,500 \text{ mm/min}$ ($f_z = 0.1 \text{ mm/t}$)
 $ap \times ae = 35 \times 1.0 \text{ mm}$
Finishing $n = 2,000 \text{ min}^{-1}$ ($V_c = 125 \text{ m/min}$)
 $V_f = 1,000 \text{ mm/min}$ ($f_z = 0.1 \text{ mm/t}$)
 $ap \times ae = 35 \times 0.2 \text{ mm}$



Cutting Time (1,125mm x 24 slots)

6PFK 200-450 **10 min**



Competitor Coated Carbide B **80 min**

Competitor B 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)

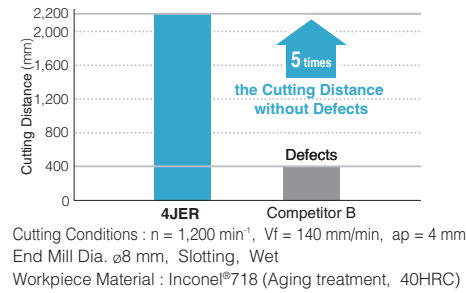
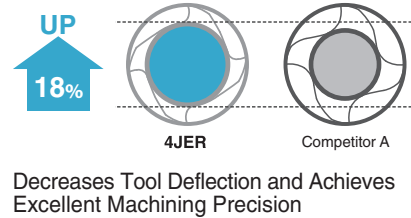
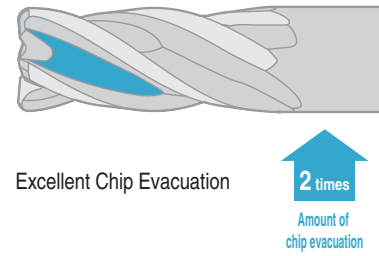
4JER

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

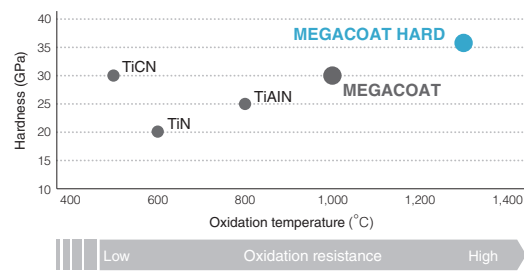
- Chip Pocket for Smooth Chip Evacuation During Slotting Applications
- Core Thickness Comparison
- Slotting Performance Comparison (Internal evaluation)



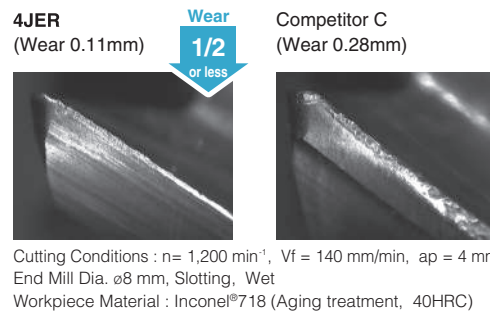
2 Achieves Long Tool Life and Stable Machining

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

● Properties of Coating

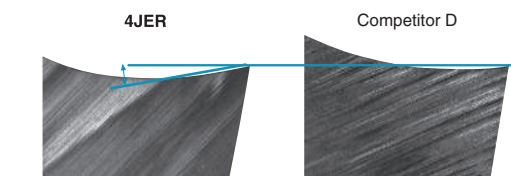


● Wear resistance comparison (Cutting distance 975mm)

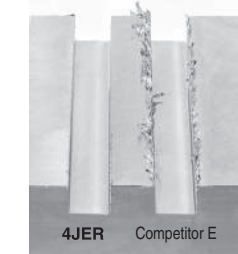


3 Decreased burr

High Sharpness with a Large Rake Angle



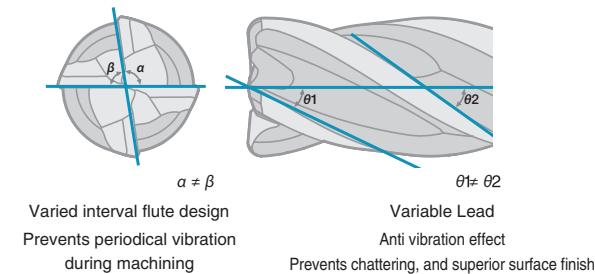
Burring During Slotting (Inconel® 718)



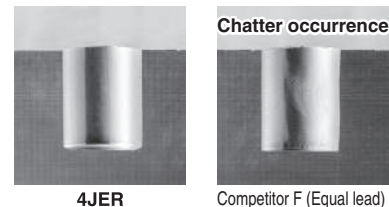
Cutting Conditions : n = 1,200 min⁻¹, Vf = 140 mm/min, ap = 4 mm
End Mill Dia. ø8 mm, Wet

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⁻¹, Vf = 300 mm/min, ap = 20 mm
End Mill Dia. ø16 mm, Width 20mm, Wet

4JER



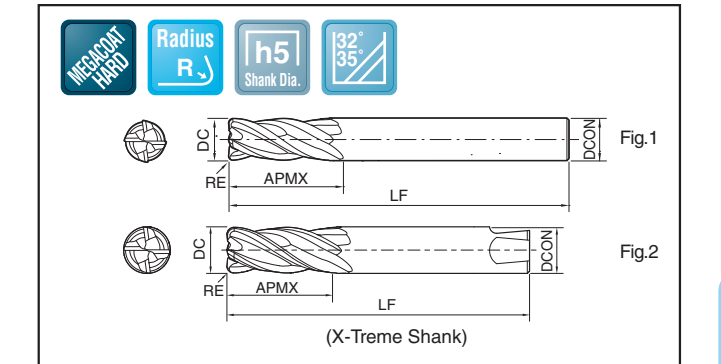
MEGACOAT HARD is applied

4JER (Short)

Shouldering Slotting
(Unit : mm)

Description	Stock	Outside Dia.		Corner-R	Length of cut			Shank Dia.	Overall length	No. of Flutes	Shape
		DC	Mill Dia. tolerance		RE	APMX	DCON				
4JER060-090-R03	●	6.0	0 -0.020	0.3	9	6	60	4			Fig.1
4JER060-090-R05	●			0.5							
4JER060-090-R10	●			1.0							
4JER080-120-R03	●			0.3							
4JER080-120-R05	●	8.0	-0.005 -0.025	0.5	12	8	70	4			
4JER080-120-R10	●			1.0							
4JER080-120-R15	●			1.5							
4JER100-150-R03	●			0.3							
4JER100-150-R05	●			0.5							
4JER100-150-R10	●	10.0	-0.005 -0.025	1.0	15	10	80	4			
4JER100-150-R15	●			1.5							
4JER100-150-R20	●			2.0							
4JER100-150-R30	●			3.0							
4JER120-180-R05	●			0.5							
4JER120-180-R10	●			1.0							
4JER120-180-R15	●	12.0	-0.010 -0.030	1.5	18	12	100	4			
4JER120-180-R20	●			2.0							
4JER120-180-R30	●			3.0							
4JER160-240-R10	●			1.0							
4JER160-240-R20	●	16.0	-0.010 -0.030	2.0	24	16	110	4			
4JER160-240-R30	●			3.0							
4JER200-300-R10	●			1.0							
4JER200-300-R20	●	20.0	-0.010 -0.030	2.0	30	20	125	4			
4JER200-300-R30	●			3.0							

No. of Flutes : 4



4JER (Medium)

Shouldering Slotting
(Unit : mm)

Description	Stock	Outside Dia.		Corner-R	Length of cut			Shank Dia.	Overall length	No. of Flutes	Shape
		DC	Mill Dia. tolerance		RE	APMX	DCON				
4JER060-150-R03	●			0.3							Fig.1
4JER060-150-R05	●	6.0	0 -0.020	0.5	15	6	60	4			
4JER060-150-R10	●			1.0							
4JER080-200-R03	●			0.3							
4JER080-200-R05	●	8.0	-0.005 -0.025	0.5	20	8	70	4			
4JER080-200-R10	●			1.0							
4JER080-200-R15	●			1.5							
4JER100-250-R03	●			0.3							
4JER100-250-R05	●			0.5							
4JER100-250-R10	●	10.0	-0.005 -0.025	1.0	25	10	80	4			
4JER100-250-R15	●			1.5							
4JER100-250-R20	●			2.0							
4JER100-250-R30	●			3.0							
4JER120-260-R05	●			0.5							
4JER120-260-R10	●			1.0							
4JER120-260-R15	●	12.0	-0.010 -0.030	1.5	26	12	100	4			
4JER120-260-R20	●			2.0							
4JER120-260-R30	●			3.0							
4JER160-350-R10	●			1.0							
4JER160-350-R20	●	16.0	-0.010 -0.030	2.0	35	16	110	4			
4JER160-350-R30	●			3.0							
4JER200-450-R10	●			1.0							
4JER200-450-R20	●	20.0	-0.010 -0.030	2.0	45	20	125	4			
4JER200-450-R30	●			3.0							
4JER120-260-R10-XT	●			1.0							Fig.2
4JER120-260-R20-XT	●	12.0	-0.010 -0.030	2.0	26	12	94	4			
4JER120-260-R30-XT	●			3.0							
4JER160-350-R10-XT	●			1.0							
4JER160-350-R20-XT	●	16.0	-0.010 -0.030	2.0	35	16	116	4			
4JER160-350-R30-XT	●			3.0							
4JER200-450-R10-XT	●			1.0							
4JER200-450-R20-XT	●	20.0	-0.010 -0.030	2.0	45	20	130	4			
4JER200-450-R30-XT	●			3.0							

Applicable chuck for 4JER...XT ● M90

Recommended Cutting Conditions ● L73

● : Std. Item

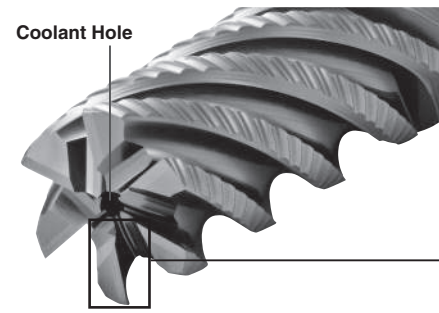
4 / 5 / 6RFH

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

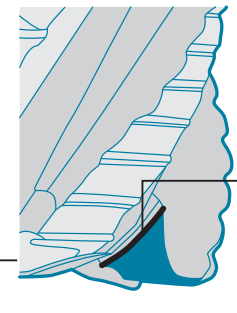
1 High Efficiency Machining with Multi-edge Design

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

Multi-edge Design (ø16 - 6 flutes)



Original Gash Shape



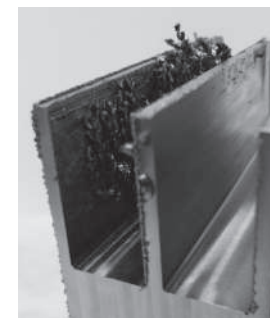
Radius gash creates better chip flow and evacuation

Good Chip Evacuation

Deep Slotting (ap = 2 x DC) for Stainless Steel and Titanium Alloy

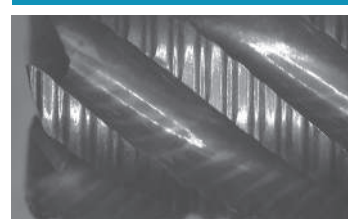
Slotting Performance Comparison (Internal Evaluation)

After Machining 1 Pass



Competitor A

5RFH (Internal and External Coolant)



No Defects when Deep Slotting

Competitor A (External Coolant)



× Defects (Chip Clogging)

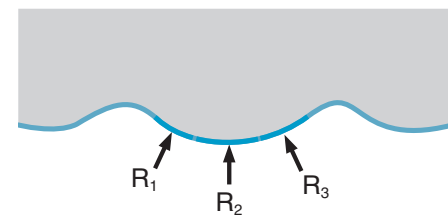
Cutting Conditions : n = 2,550 min⁻¹, Vf = 336 mm/min, ap = 20 mm
End Mill Dia. ø10, Wet, Slotting Workpiece Material : SUS304

2 Defect Resistant

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

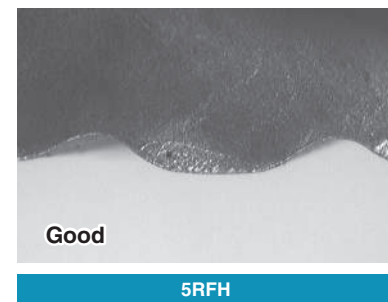
Cutting Conditions : n = 2,900 min⁻¹, Vf = 712 mm/min, ap x ae = 5 x 3 mm
End Mill Dia. ø10, Wet, Shouldering Workpiece Material : Ti-6Al-4V

Special Curved Radius Serrated Edge



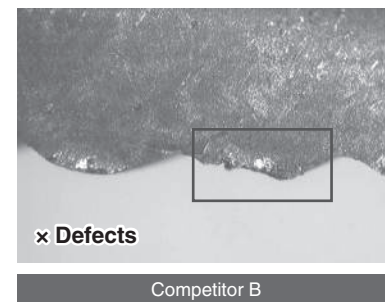
Serrated Curved Edge with Different Radii (Compound Radius Shape)
Distributes cutting pressure and increase defect resistance

Blade Edge after Machining 12m (Internal Evaluation)



Good

5RFH



× Defects

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

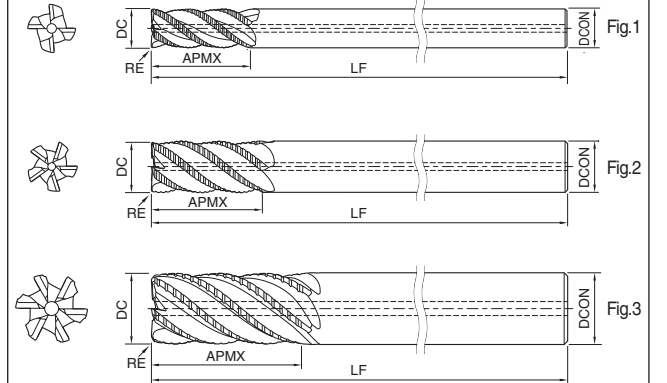
with Coolant hole



No. of Flutes : 4, 5, 6

Recommended Workpiece Materials

★ 1st Choice



4 / 5 / 6RFH (Medium)

Shouldering Slotting

(Unit : mm)

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

* Corner-R dimension is reference only

4 / 5 / 6RFH (Long)

Shouldering

(Unit : mm)

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

* Corner-R dimension is reference only

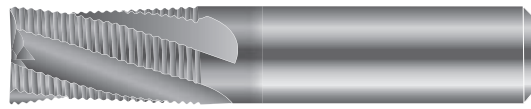
● : Std. Item

Recommended Cutting Conditions L74

Roughing Serrated edge

No. of Flutes : 3,4,5

3RDS, 4RDS, 5RDS



Recommended Workpiece Materials ★ 1st Choice

P
~30HRC
P
30~40HRC
M
Stainless steel
K
Cast Iron

TiAlN
C
h6
Shank Dia.
20°

3RDSTM, 4RDSTM, 5RDSTM
(Medium)

Shouldering Slotting

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia.	Length of cut		Overall length	Spec. of Corners		No. of Flutes
		DC	tolerance	APMX	DCON		LF	CHW	
3RDSTM040-110-06	●	4	-0.030 -0.105	11	6	55	0.3	3	
3RDSTM050-130-06	●	5	-0.030 -0.105	13	6	57	0.3	3	
3RDSTM060-130-06	●	6	-0.030 -0.105	13	6	57	0.3	3	
3RDSTM080-160-08	●	8	-0.040 -0.130	16	8	63	0.3	3	
4RDSTM100-220-10	●	10	-0.040 -0.130	22	10	72	0.5	4	
4RDSTM120-260-12	●	12	-0.050 -0.160	26	12	83	0.5	4	
4RDSTM160-320-16	●	16	-0.050 -0.160	32	16	92	0.5	4	
4RDSTM200-380-20	●	20	-0.065 -0.195	38	20	104	0.5	4	
5RDSTM250-450-25	●	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.

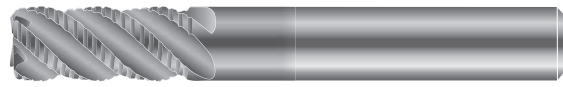
Recommended Cutting Conditions L75

● : Std. Item

Roughing Notched edge

No. of Flutes : 4,6

4RFSM, 6RFSM



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

TiAlN
C
h6
Shank Dia.
45°

4RFSM

Shouldering Slotting

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia.	Length of cut	Shank Dia.	Overall length	Spec. of Corners		No. of Flutes
		DC	tolerance	APMX	DCON	LF	CHW	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	

● 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 L76

● : Std. Item

KYOCERA Solid Tools

SGS Solid Tools

SGS Micro Tools

KYOCERA Solid Tools

SGS Solid Tools

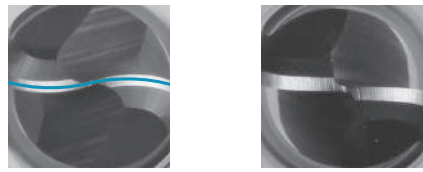
SGS Micro Tools

2SEB

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

Point 1 Sharp cutting with special nose geometry

Arc-like cutting edge distributes the cutting force and controls wear progress

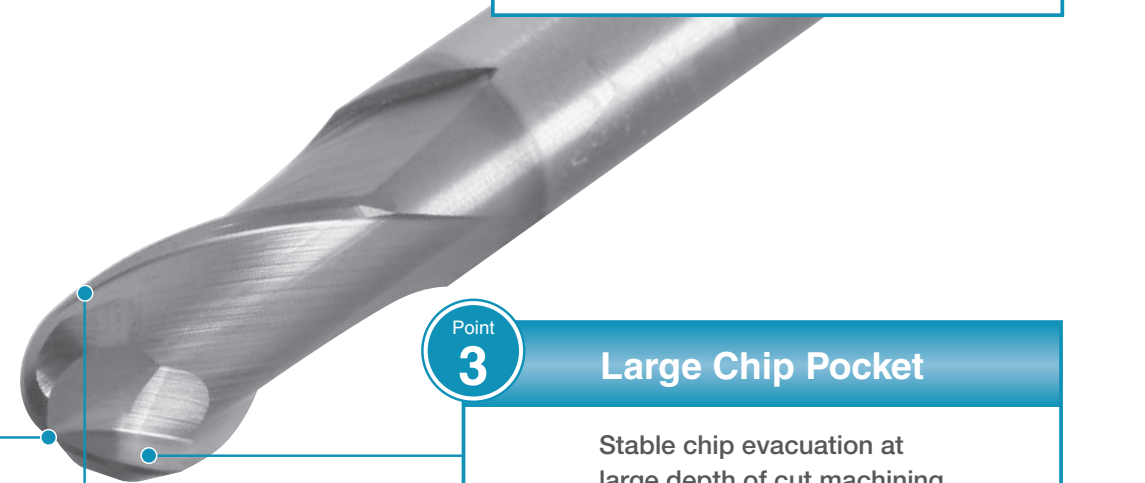
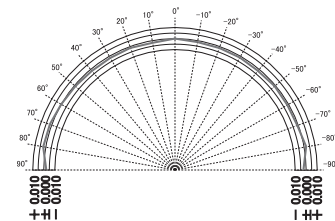


2SEB

Conventional
(Internal evaluation)

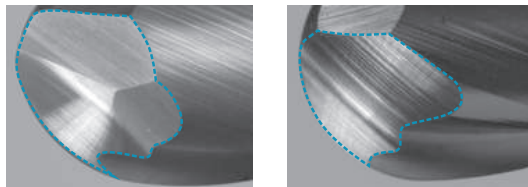
Point 2 $R \pm 0.005\text{mm}$ close tolerance edge diameter (R8.0 excluded)

Excellent surface finish quality when using entire cutting edge in machining of the mold's draft angle or profiling



Point 3 Large Chip Pocket

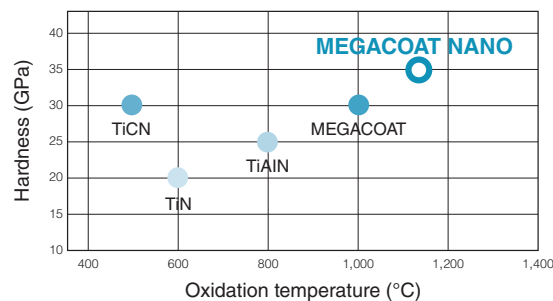
Stable chip evacuation at large depth of cut machining



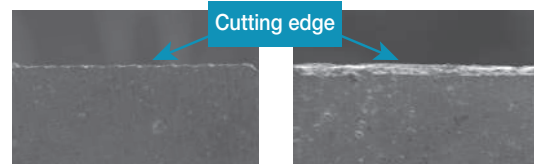
2SEB

Conventional
(Internal evaluation)

Point 4 High quality cutting edge by MEGACOAT NANO



Smooth and sharp cutting edge with superior wear resistance and adhesion resistance



2SEB

Competitor A
(Internal evaluation)

2SEB



MEGACOAT NANO is applied

No. of Flutes : 2

Recommended Workpiece Materials ★ 1st Choice

P ~30HRC	P 30~40HRC	H ~55HRC	H ~68HRC	M Stainless steel	K Cast Iron
--------------------	----------------------	--------------------	--------------------	-----------------------------	-----------------------

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

Fig.1

Fig.2

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

Copying

(Unit : mm)

Description	Stock	Radius of Ball-nose	Radius of Ball-nose	Outside Dia.	Length of cut	Neck Dia.	Under Neck Length	Shank Dia.	Overall length	No. of Flutes	Shape
		RE	Tolerance	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	
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.2
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	
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	

Solid End Mill Identification System

2 S E B 020 - 050 - R10

(1) (2) (3) (4) (5) (6) (7)

(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

No. of Flutes : 3

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



Recommended Workpiece Materials ★ 1st Choice

P
~30HRC
P
30~40HRC
M
Stainless steel
S
Titanium Alloy
K
Cast Iron
N
Aluminum & Non-Ferrous Material

TiAlN
±0.01 mm
R
h6
Shank Dia.
30°

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

Copying

(Unit : mm)

Description	Stock	* Radius of Ball-nose		Length of cut	Shank Dia.	Overall length
		RE	DC			
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



No. of Flutes : 4

Recommended Workpiece Materials ★ 1st Choice

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

TiAlN
h6
Shank Dia.
±0.01 mm
R
38°

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

Shouldering Slotting

(Unit : mm)

Description	Stock	* Radius of Ball-nose		Length of cut	Neck Dia.	Under Neck Length	Shank Dia.	Overall length
		RE	DC					
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.

▲ : To be replaced by a new product

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

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

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



MEGACOAT HARD is applied

High Efficiency Machining

Recommended Workpiece Materials ★ 1st Choice

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

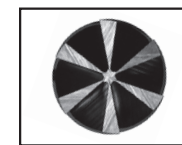
MEGACOAT HARD
Land
h5
Shank Dia.
45°

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

Shouldering

(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Neck Dia. DN	Under Neck Length LU	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP	Shape	
											4HFSS010-040-06
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	Fig.1	
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		
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.

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

Shouldering

(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Length of cut APMX	Neck Dia. DN	Under Neck Length LU	Shank Dia. DCON	Overall length LF	No. of Flutes ZEFP	Shape	
											4HFMS010-050-06
4HFMS020-090-06	●	2	0 -0.015	9	2.10	10.8	6	60	4		
4HFMS030-120-06	●	3	0 -0.015	12	3.15	14.4	6	60	4		
4HFMS040-140-06	●	4	0 -0.015	14	4.2	16.8	6	60	4		
4HFMS050-170-06	●	5	0 -0.015	17	5.2	20.4	6	60	4		
5HFMS040-140-06	●	4	0 -0.015	14	4.2	16.8	6	60	5	Fig.1	
6HFMS060-170-06	●	6	0 -0.020	17	-	-	6	60	6		
6HFMS070-200-08	●	7	-0.005 -0.025	20	7.2	24.0	8	70	6		
6HFMS080-230-08	●	8	-0.005 -0.025	23	-	-	8	70	6		
6HFMS100-280-10	●	10	-0.005 -0.025	28	-	-	10	80	6		
6HFMS120-330-12	●	12	-0.010 -0.030	33	-	-	12	90	6		
6HFMS140-370-16	●	14	-0.010 -0.030	37	14.2	44.4	16	105	6		
6HFMS150-420-16	●	15	-0.010 -0.030	42	15.2	50.4	16	105	6		
6HFMS160-420-16	●	16	-0.010 -0.030	42	-	-	16	105	6		
6HFMS200-480-20	●	20	-0.010 -0.030	48	-	-	20	110	6		
7HFMS060-170-06	●	6	0 -0.020	17	-	-	6	60	7		Fig.1
7HFMS080-230-08	●	8	-0.005 -0.025	23	-	-	8	70	7		
7HFMS100-280-10	●	10	-0.005 -0.025	28	-	-	10	80	7		
7HFMS120-330-12	●	12	-0.010 -0.030	33	-	-	12	90	7		
7HFMS160-420-16	●	16	-0.010 -0.030	42	-	-	16	105	7		
8HFMS250-530-25	●	25	-0.010 -0.030	53	-	-	25	125	8		

Recommended Cutting Conditions L78

● : Std. Item

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

No. of Flutes : 6

6PDRS



Recommended Workpiece Materials ★ 1st Choice

P ~30HRC	P 30~40HRC	H ~55HRC	H ~68HRC
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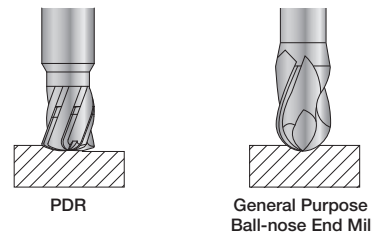
6PDRS

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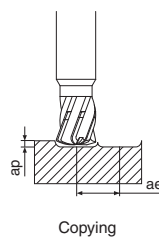
(Unit : mm)

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.



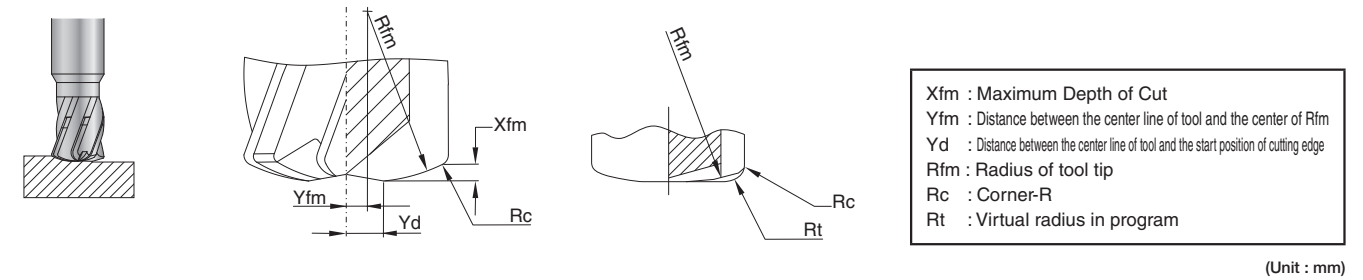
Recommended Cutting Conditions



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 ⁻¹)	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
Carbon Steel / Alloy Steel < 45HRC	ø10: 0.53 x 5.5mm (0.53 x 0.55DC)	Spindle Revolution (min ⁻¹)	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

6PDRS Ramping / Arc cutting

Details of 6PDRS cutting edge shape

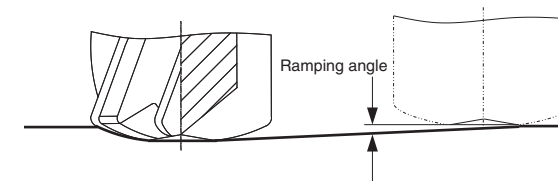


Description	Outside Dia.	Maximum Depth of Cut	Radius of tool tip	Corner-R	Distance between the center line of tool and the center of Rfm	Distance between the center line of tool and the start position of cutting edge	Virtual radius in program
	DC	Xfm	Rfm	Rc	Yfm	Yd	Rt
6PDRS060-045-06	6	0.32	6	0.62	0.75	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.

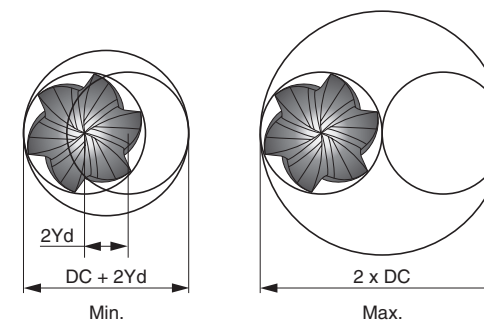


Ramping angle	1°	2°	3°	4°	5°
Ratio of feed rate	100%	70%	50%	30%	10%

- 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.



(Unit : mm)

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

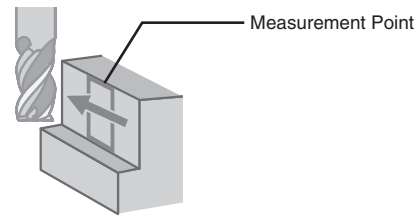
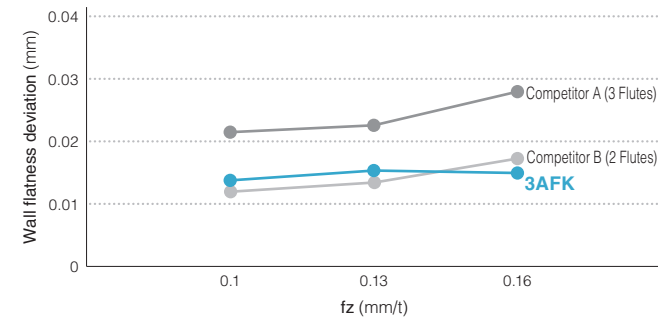
Stable Machining with Sharp Edge for Anti-chattering Performance

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)

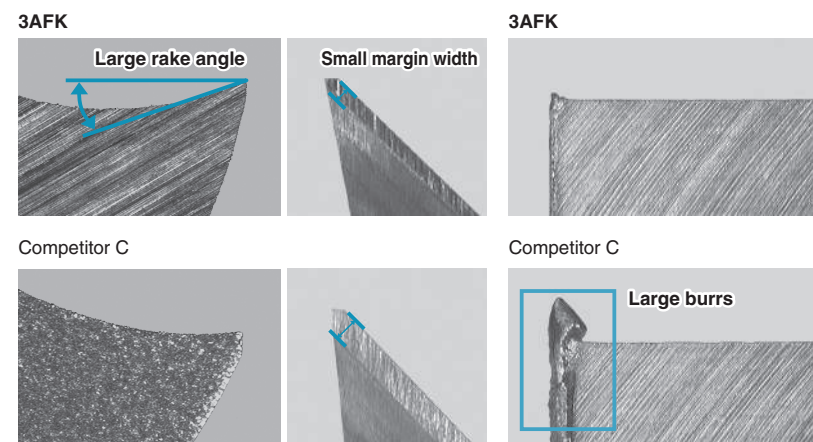


Cutting Conditions : n = 11,700 min⁻¹, Vf = 3,500 - 5,600 mm/min, ap x ae = 15 x 1 mm
End Mill Dia. ø10, Shouldering, Down-cut, Wet, HSK A63 Workpiece Material : A5052

2 Decreased burr

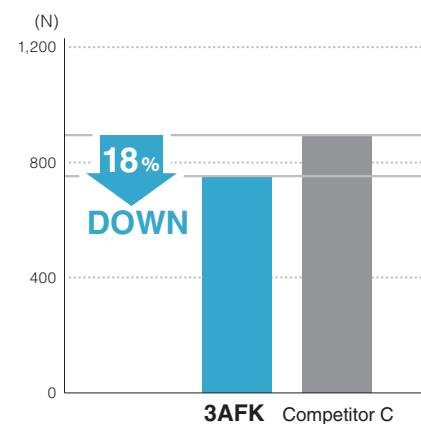
Excellent Sharpness with Large Rake Angle and Small Margin Width

Comparison of the Rake Angle and Margin Width (Internal evaluation) Burr Comparison after Machining (Internal evaluation)



Burr Comparison after Machining Cutting Conditions : n = 11,700 min⁻¹, 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)

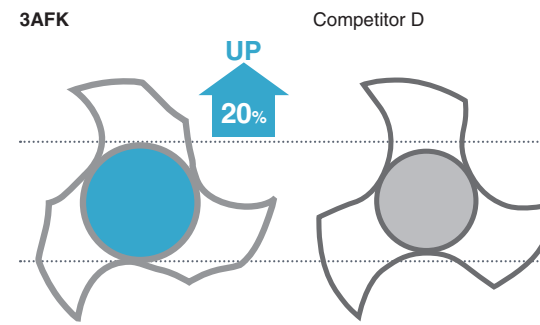


Cutting Conditions : n = 11,700 min⁻¹, Vf = 3,400 mm/min, ap x ae = 10 x 10 mm
End Mill Dia. ø10, Slotting, Wet, BT50 Workpiece Material : A5052

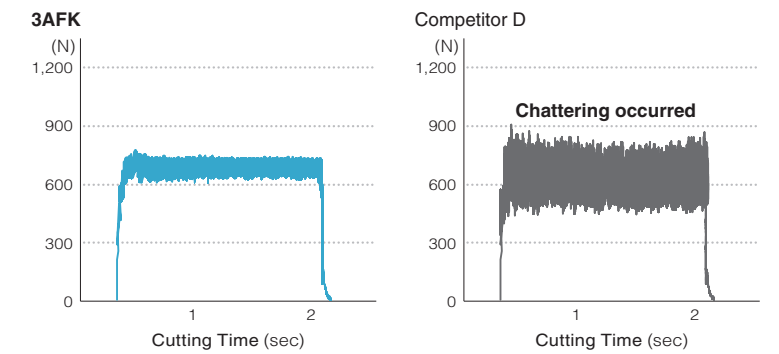
3 Resistance to chattering

Larger Core Thickness to Reduce Chattering

Core Thickness Comparison (Internal evaluation)

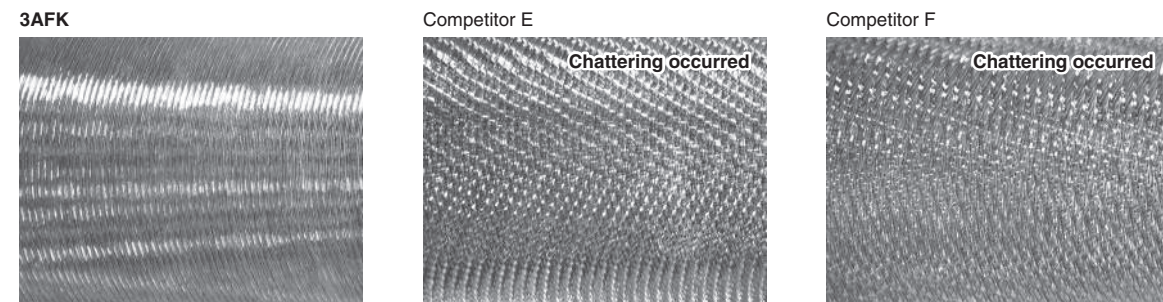


Cutting Force Comparison (Internal evaluation)



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

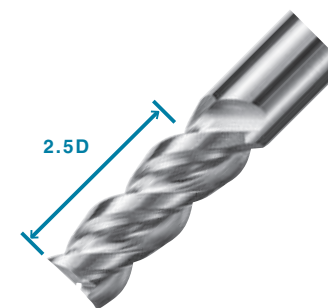
Comparison of Bottom Surface at Slotting (Internal evaluation)



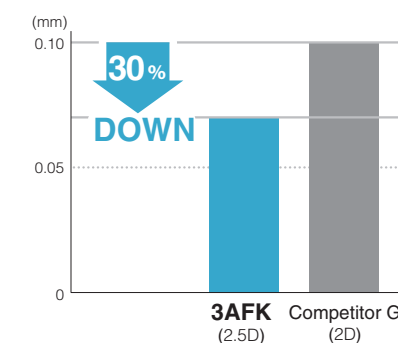
Cutting Conditions : n = 11,100 min⁻¹, Vf = 2,600 mm/min, ap = 10 mm, Wet Workpiece Material : A5052

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

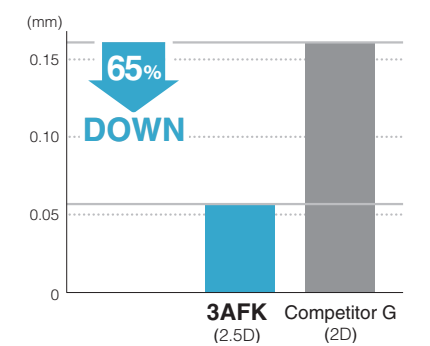
Stable Machining even while Deep Slotting



Comparison of wall flatness (Internal evaluation)



Burr Height Comparison (Internal evaluation)



Cutting Conditions : n = 11,100 min⁻¹, 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

No. of Flutes : 3

3AFK



Recommended Workpiece Materials ★ 1st Choice

N
Aluminum & Non-ferrous Metals

Uncoated Land h5 Shank Dia. 45°



3AFK (Short : 1.5D)

Shouldering Slotting 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						
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	Fig.3	
3AFK060-090-180	●	6.0	0 -0.005	9	5.7	18	6	70	3	Fig.2	
3AFK070-105-210	●	7.0	0 -0.015	10.5	6.7	21	8	80	3	Fig.1	
3AFK080-120	●	8.0	0 -0.006	12	-	-	8	80	3	Fig.3	
3AFK080-120-240	●	8.0	0 -0.006	12	7.7	24	8	80	3	Fig.2	
3AFK090-135-270	●	9.0	0 -0.015	13.5	8.7	27	10	90	3	Fig.1	
3AFK100-150	●	10.0	0 -0.006	15	-	-	10	90	3	Fig.3	
3AFK100-150-300	●	10.0	0 -0.006	15	9.7	30	10	90	3	Fig.2	
3AFK110-165-330	●	11.0	0 -0.015	16.5	10.7	33	12	110	3	Fig.1	
3AFK120-180	●	12.0	0 -0.008	18	-	-	12	110	3	Fig.3	
3AFK120-180-360	●	12.0	0 -0.008	18	11.7	36	12	110	3	Fig.2	
3AFK160-240	●	16.0	0 -0.008	24	-	-	16	120	3	Fig.3	
3AFK160-240-480	●	16.0	0 -0.008	24	15.7	48	16	120	3	Fig.2	

Recommended Cutting Conditions L79

● : Std. Item

3AFK (Medium : 2.5D)

Shouldering Slotting 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						
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	Fig.3	
3AFK060-150-300	●	6.0	0 -0.005	15	5.7	30	6	70	3	Fig.2	
3AFK070-175-350	●	7.0	0 -0.015	17.5	6.7	35	8	80	3	Fig.1	
3AFK080-200	●	8.0	0 -0.006	20	-	-	8	80	3	Fig.3	
3AFK080-200-400	●	8.0	0 -0.006	20	7.7	40	8	80	3	Fig.2	
3AFK090-225-450	●	9.0	0 -0.015	22.5	8.7	45	10	90	3	Fig.1	
3AFK100-250	●	10.0	0 -0.006	25	-	-	10	90	3	Fig.3	
3AFK100-250-500	●	10.0	0 -0.006	25	9.7	50	10	90	3	Fig.2	
3AFK110-275-550	●	11.0	0 -0.015	27.5	10.7	55	12	110	3	Fig.1	
3AFK120-300	●	12.0	0 -0.008	30	-	-	12	110	3	Fig.3	
3AFK120-300-600	●	12.0	0 -0.008	30	11.7	60	12	110	3	Fig.2	
3AFK160-400	●	16.0	0 -0.008	40	-	-	16	120	3	Fig.3	
3AFK160-400-800	●	16.0	0 -0.008	40	15.7	80	16	120	3	Fig.2	

Recommended Cutting Conditions L79

● : Std. Item

No. of Flutes : 3

3NESM



Recommended Workpiece Materials ★ 1st Choice

N
Aluminum & Non-Ferrous Material

Uncoated Land h6 Shank Dia. 38°

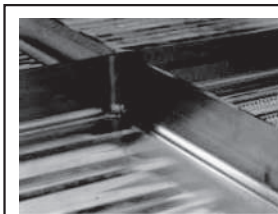
Shouldering Slotting

(Unit : mm)

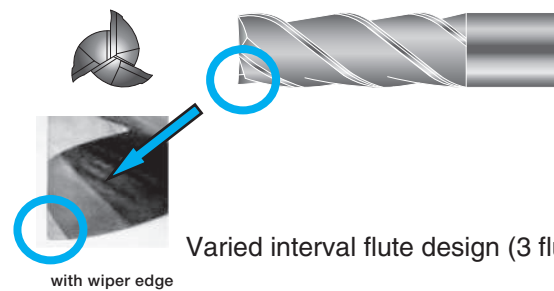
Description	Stock	Outside Dia.	Mill Dia. tolerance	Length of cut		Shank Dia.		Overall length	No. of Flutes
		DC		APMX	DCON	LF	ZEFP		
3NESM030-120-06	●	3	-0.014 -0.028	12	6	50	3		
3NESM040-120-06	●	4	-0.020 -0.038	12	6	50	3		
3NESM050-140-06	●	5	-0.020 -0.038	14	6	50	3		
3NESM060-160-06	●	6	0 -0.008	16	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.



Finished surface of aluminum alloy at high speed machining.
Reached 0.25µmRa
(Bottom face / side face / corner)



Varied interval flute design (3 flutes)

with wiper edge

Recommended Cutting Conditions **L79**

● : Std. Item

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

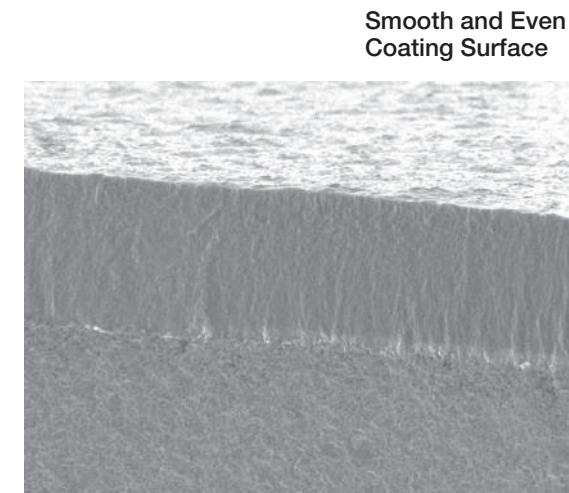
End Mill 4FCX-KCD

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

Smooth and Even
Coating Surface

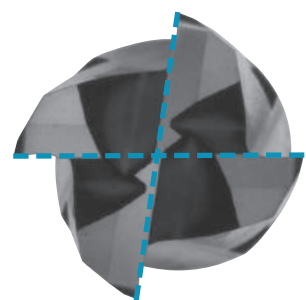


Solid Tools for CFRP

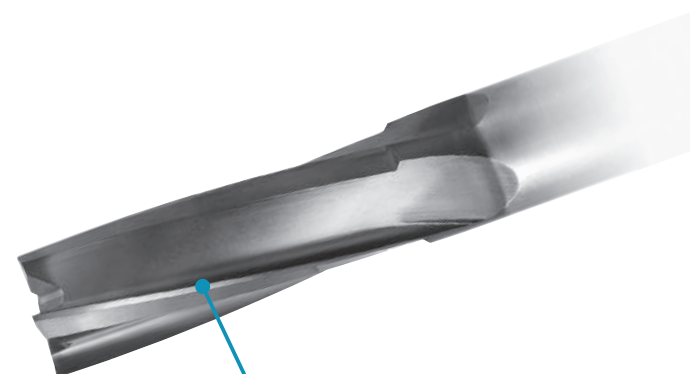
2 Special Tool Geometry Coated with a Smooth Diamond Coating Reduces Cutting Force Long Tool Life, High Precision and High Quality Machining of CFRP

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

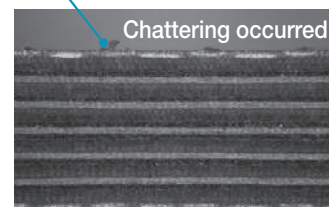


Cutting edge with excellent sharpness

Surface Finish Comparison (Internal evaluation)

Excellent surface finish (Side wall)

Burr (Uncut fiber)

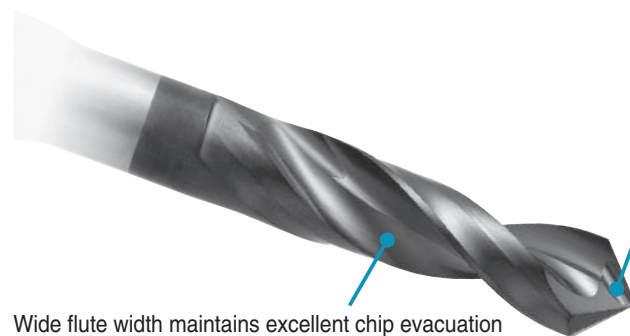


Kyocera

Conventional A

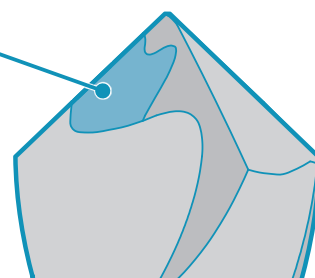
Cutting Conditions : $V_c = 280$ m/min, $f = 0.1$ mm/rev
Outside Dia. $\phi 10$ mm, $a_e = 10$ mm (Slotting), Dry Workpiece Material : CFRP 4.6 mm (Thickness)

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

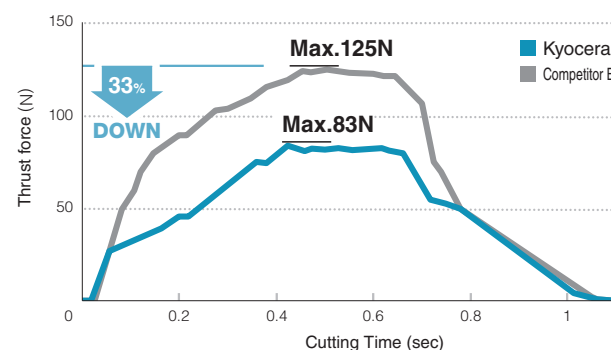


Wide flute width maintains excellent chip evacuation

Unique Rake Face

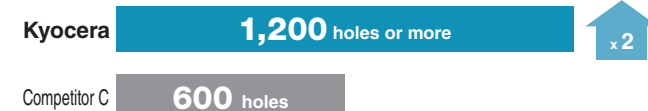


Cutting Force Comparison (Internal evaluation)



Cutting Conditions : $V_c = 100$ m/min, $f = 0.08$ mm/rev
Outside Dia. $\phi 6$ mm (Special order item), Dry Workpiece Material : CFRP 4.6 mm (Thickness)

No. of Cutting Holes Comparison (Internal evaluation)



Surface finish



Provides high quality surface finish and long tool life

Cutting Conditions : $V_c = 100$ m/min, $f = 0.08$ mm/rev
Outside Dia. $\phi 7$ mm (Special order item), Dry Workpiece Material : CFRP 4.6 mm (Thickness)

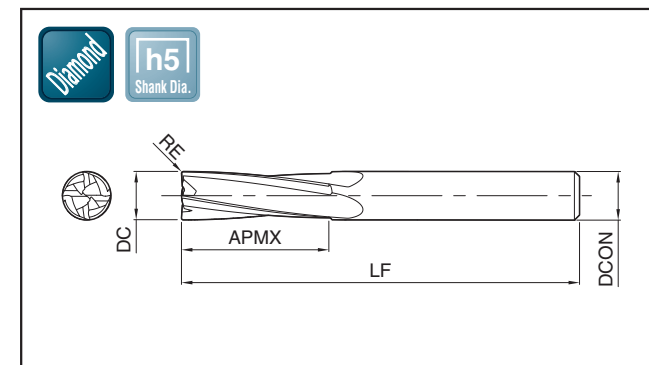
4FCX-KCD NEW



No. of Flutes : 4

Recommended Workpiece Materials ★ 1st Choice

N
Non Metal



Shouldering
(Unit : mm)

Description	Stock	Outside Dia.		Length of cut		Shank Dia.		Overall length		No. of Flutes	
		DC	RE	APMX	DCON	LF	ZEFP				
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				

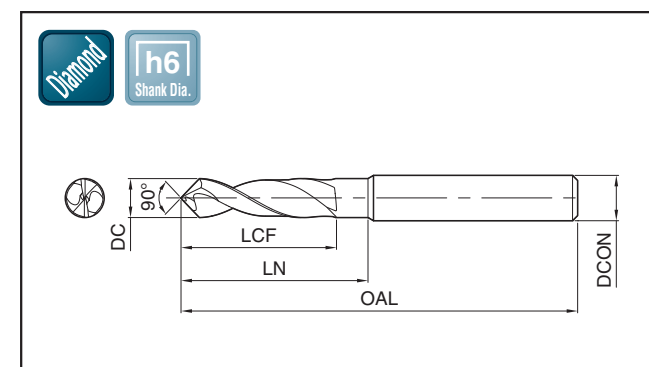
* Special order items such as routers are also available

2ZDF-KCD NEW



Recommended Workpiece Materials ★ 1st Choice

N
Non Metal



(Unit : mm)

Description	Stock	Outside Dia.		Flute length	Under Neck Length	Overall length	Shank Dia.
		DC (mm)	DC (inch)	LCF	LN	OAL	DCON
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) Series	(2) Outside Dia.	(3) Others
2ZDF : Drill for CFRP	04763 ↓ 4.763mm	KCD : Diamond Coating

● : Std. Item

Recommended Cutting Conditions **L79**

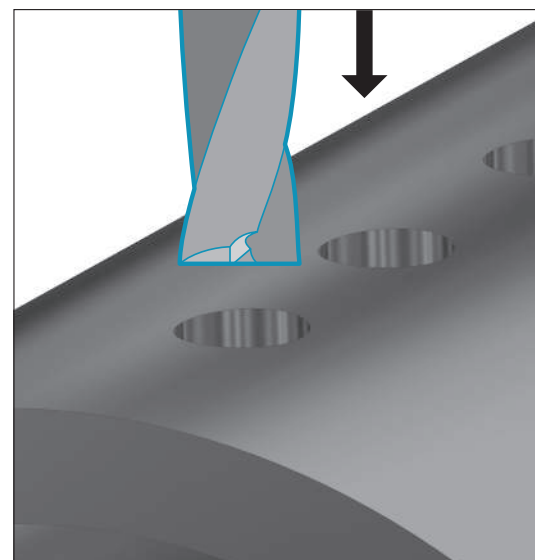
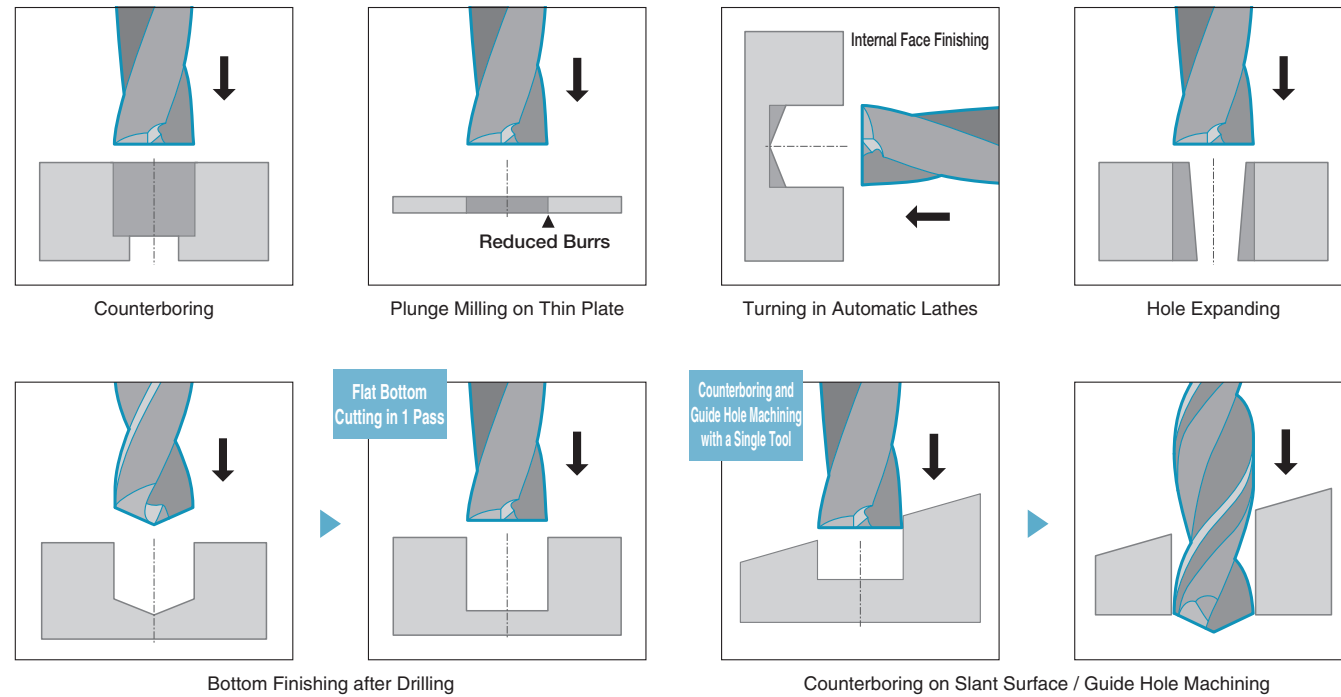
2ZDK-HP NEW

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



Drilling in Cylinder and Curved Surfaces

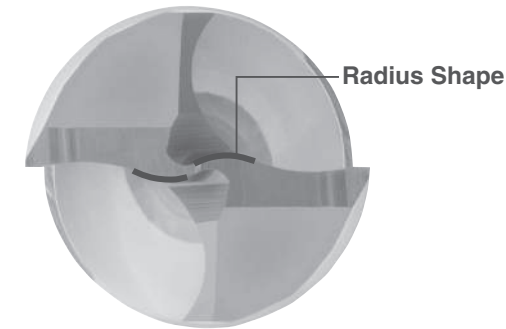
Achieves Stable Machining even in Difficult Drilling Situations

2 High-Precision Machining

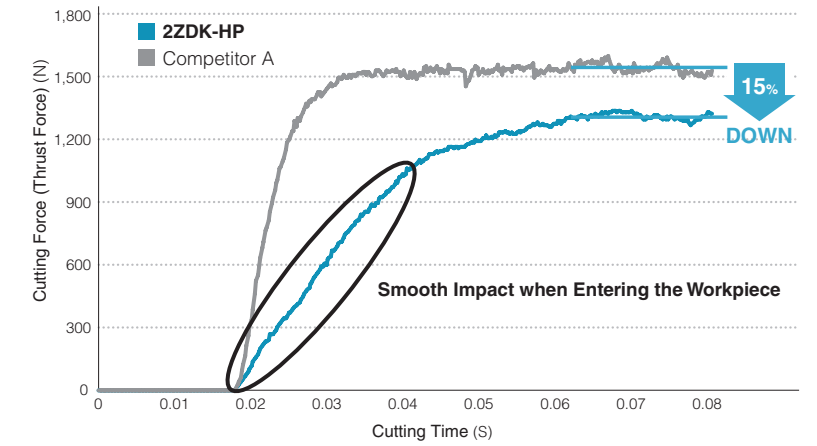
Chisel Edge with S-curve Provides Lower Cutting Forces

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

Special Thinning Shape



Cutting Force Comparison (Internal evaluation)

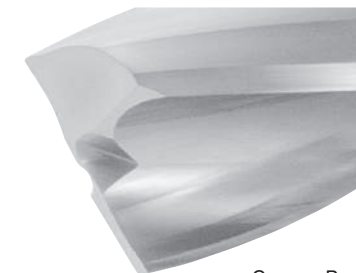


Cutting Conditions : n = 1,800 min⁻¹, Vf = 400 mm/min, Drilling Depth 10 mm, Dry Drill Dia. ø12 mm (3D type) Workpiece Material : S50C

3 Decreased burr

Low Cutting Force with Flat Bottom and Sharp Cutting Edge
Decreased burr

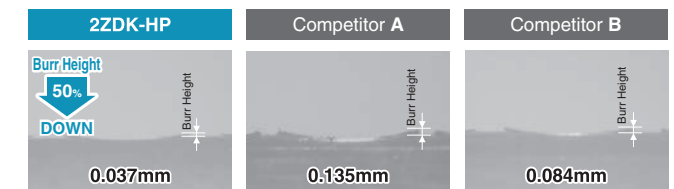
Low Cutting Force Corner Edge Design



Corner : Positive Rake Angle

Burr Comparison (Internal evaluation)

Drilling in Cylinder Surface

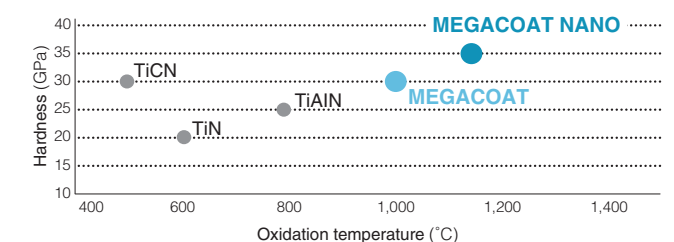


Cutting Conditions : n = 7,000 min⁻¹, Vf = 420 mm/min, Wet Drill Dia. ø3.5 mm (3D type) Workpiece Material : Carbon Steel Pipe ø17.3 mm (Thickness 3.2 mm)

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



Low Oxidation resistance High

Flat Bottom Drill (Counterboring)

No. of Flutes : 2

2ZDK-HP (Drilling Depth Short type) NEW

Recommended Workpiece Materials

P
~30HRC

P
30~40HRC

K
Cast Iron

N
Aluminum &
Non Ferrous Material

MEGACOAT NANO

20°

h5
Shank Dia.
(-ø12)

h6
Shank Dia.
(ø12.5-)



MEGACOAT NANO is applied

2ZDK-HP (Drilling Depth Short type)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL	Shape
		DC						
2ZDK010HP-1.5D	●	1.0	0 -0.010	3.5	4.3	4	50	Fig.1
2ZDK011HP-1.5D	●	1.1						
2ZDK012HP-1.5D	●	1.2						
2ZDK013HP-1.5D	●	1.3						
2ZDK014HP-1.5D	●	1.4						
2ZDK015HP-1.5D	●	1.5						
2ZDK016HP-1.5D	●	1.6						
2ZDK017HP-1.5D	●	1.7						
2ZDK018HP-1.5D	●	1.8						
2ZDK019HP-1.5D	●	1.9						
2ZDK020HP-1.5D	●	2.0	0 -0.012	6.5	7.3	6	60	Fig.1
2ZDK021HP-1.5D	●	2.1						
2ZDK022HP-1.5D	●	2.2						
2ZDK023HP-1.5D	●	2.3						
2ZDK024HP-1.5D	●	2.4						
2ZDK025HP-1.5D	●	2.5						
2ZDK026HP-1.5D	●	2.6						
2ZDK027HP-1.5D	●	2.7						
2ZDK028HP-1.5D	●	2.8						
2ZDK029HP-1.5D	●	2.9						
2ZDK030HP-1.5D	●	3.0	0 -0.012	10	11	6	60	Fig.1
2ZDK031HP-1.5D	●	3.1						
2ZDK032HP-1.5D	●	3.2						
2ZDK033HP-1.5D	●	3.3						
2ZDK034HP-1.5D	●	3.4						

Description	Stock	Outside Dia.	Mill Dia. tolerance	Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL	Shape
		DC						
2ZDK035HP-1.5D	●	3.5	0 -0.012	11	12	6	60	Fig.1
2ZDK036HP-1.5D	●	3.6						
2ZDK037HP-1.5D	●	3.7						
2ZDK038HP-1.5D	●	3.8						
2ZDK039HP-1.5D	●	3.9						
2ZDK040HP-1.5D	●	4.0						
2ZDK041HP-1.5D	●	4.1						
2ZDK042HP-1.5D	●	4.2						
2ZDK043HP-1.5D	●	4.3						
2ZDK044HP-1.5D	●	4.4						
2ZDK045HP-1.5D	●	4.5	0 -0.018	14	15	10	80	Fig.1
2ZDK046HP-1.5D	●	4.6						
2ZDK047HP-1.5D	●	4.7						
2ZDK048HP-1.5D	●	4.8						
2ZDK049HP-1.5D	●	4.9						
2ZDK050HP-1.5D	●	5.0						
2ZDK051HP-1.5D	●	5.1						
2ZDK052HP-1.5D	●	5.2						
2ZDK053HP-1.5D	●	5.3						
2ZDK054HP-1.5D	●	5.4						
2ZDK055HP-1.5D	●	5.5	0 -0.021	17	18	16	125	Fig.2
2ZDK056HP-1.5D	●	5.6						
2ZDK057HP-1.5D	●	5.7						
2ZDK058HP-1.5D	●	5.8						
2ZDK059HP-1.5D	●	5.9						

* This tool is specially designed for plunge milling and NOT recommended for slotting. Recommended Cutting Conditions ● L80
 · The drilling depth should be less than 1.5D(1.5 x DC).

2ZDK-HP (Drilling Depth Short type)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Flute length		Under Neck Length		Shank Dia. DCON	Overall length OAL	Shape
		DC		LCF	LN	DCON	OAL			
2ZDK060HP-1.5D	●	6.0	0 -0.012	19	21	6	60	8	70	Fig.1
2ZDK061HP-1.5D	●	6.1								
2ZDK062HP-1.5D	●	6.2								
2ZDK063HP-1.5D	●	6.3								
2ZDK064HP-1.5D	●	6.4								
2ZDK065HP-1.5D	●	6.5								
2ZDK066HP-1.5D	●	6.6								
2ZDK067HP-1.5D	●	6.7								
2ZDK068HP-1.5D	●	6.8								
2ZDK069HP-1.5D	●	6.9								
2ZDK070HP-1.5D	●	7.0	0 -0.015	22	24	6	60	10	80	Fig.1
2ZDK071HP-1.5D	●	7.1								
2ZDK072HP-1.5D	●	7.2								
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	0 -0.018	25	27	10	80	12	100	Fig.1
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	0 -0.018	28	30	16	125	20	125	Fig.1
2ZDK091HP-1.5D	●	9.1								
2ZDK092HP-1.5D	●	9.2								
2ZDK093HP-1.5D	●	9.3								
2ZDK094HP-1.5D	●	9.4								
2ZDK095HP-1.5D	●	9.5								
2ZDK096HP-1.5D	●	9.6								
2ZDK097HP-1.5D	●	9.7								
2ZDK098HP-1.5D	●	9.8								

Description	Stock	Outside Dia.	Mill Dia. tolerance	Flute length		Under Neck Length		Shank Dia. DCON	Overall length OAL	Shape						
		DC		LCF	LN	DCON	OAL									
2ZDK099HP-1.5D	●	9.9	0 -0.015	31	33	10	80	12	100	Fig.1						
2ZDK100HP-1.5D	●	10.0														
2ZDK101HP-1.5D	●	10.1														
2ZDK102HP-1.5D	●	10.2														
2ZDK103HP-1.5D	●	10.3														
2ZDK104HP-1.5D	●	10.4														
2ZDK105HP-1.5D	●	10.5														
2ZDK106HP-1.5D	●	10.6														
2ZDK107HP-1.5D	●	10.7														
2ZDK108HP-1.5D	●	10.8														
2ZDK109HP-1.5D	●	10.9	0 -0.018	34	36	12	100	12	100	Fig.2						
2ZDK110HP-1.5D	●	11.0														
2ZDK111HP-1.5D	●	11.1														
2ZDK112HP-1.5D	●	11.2														
2ZDK113HP-1.5D	●	11.3														
2ZDK114HP-1.5D	●	11.4														
2ZDK115HP-1.5D	●	11.5														
2ZDK116HP-1.5D	●	11.6														
2ZDK117HP-1.5D	●	11.7														
2ZDK118HP-1.5D	●	11.8														
2ZDK119HP-1.5D	●	11.9	0 -0.018	37	39	16	115	16	115	Fig.2						
2ZDK120HP-1.5D	●	12.0														
2ZDK125HP-1.5D	●	12.5														
2ZDK130HP-1.5D	●	13.0														
2ZDK135HP-1.5D	●	13.5														
2ZDK140HP-1.5D	●	14.0														
2ZDK145HP-1.5D	●	14.5														
2ZDK150HP-1.5D	●	15.0														
2ZDK155HP-1.5D	●	15.5														
2ZDK160HP-1.5D	●	16.0		0 -0.018	52						52	16	115	16	115	Fig.2
2ZDK165HP-1.5D	●	16.5														
2ZDK170HP-1.5D	●	17.0														
2ZDK175HP-1.5D	●	17.5														
2ZDK180HP-1.5D	●	18.0														
2ZDK185HP-1.5D	●	18.5														
2ZDK190HP-1.5D	●	19.0														
2ZDK195HP-1.5D	●	19.5														
2ZDK200HP-1.5D	●	20.0	0 -0.021		60	60	16	125	16	125	Fig.2					
2ZDK200HP-1.5D	●	20.0			62	62										

Recommended Cutting Conditions ● L80

● : Std. Item

● : Std. Item

Flat Bottom Drill (Counterboring)

No. of Flutes : 2

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



MEGACOAT NANO is applied

Recommended Workpiece Materials

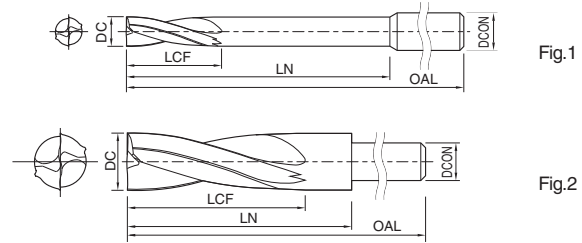


Fig.1

Fig.2

Plunge milling

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

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL	Shape
		DC						
2ZDK030HP-1.5D-LS	●	3.0	$0_{-0.010}$	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		12.0	39.0			
2ZDK040HP-1.5D-LS	●	4.0	$0_{-0.012}$		40.0	6	100	Fig.1
2ZDK041HP-1.5D-LS	MTO	4.1			41.0			
2ZDK042HP-1.5D-LS	MTO	4.2		13.0	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		14.0	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		15.0	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	$0_{-0.012}$	16.0	51.0	6	110	Fig.1
2ZDK052HP-1.5D-LS	MTO	5.2			52.0			

* 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

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

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL	Shape
		DC						
2ZDK076HP-1.5D-LS	MTO	7.6						
2ZDK077HP-1.5D-LS	MTO	7.7						
2ZDK078HP-1.5D-LS	MTO	7.8	$0_{-0.015}$	24.0	31.0	6	120	Fig.2
2ZDK079HP-1.5D-LS	MTO	7.9						
2ZDK080HP-1.5D-LS	●	8.0			80.0			Fig.1
2ZDK081HP-1.5D-LS	MTO	8.1		25.0				
2ZDK082HP-1.5D-LS	MTO	8.2			31.5			
2ZDK083HP-1.5D-LS	MTO	8.3	$0_{-0.015}$			8	130	Fig.2
2ZDK084HP-1.5D-LS	MTO	8.4		26.0	32.0			
2ZDK085HP-1.5D-LS	●	8.5						
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						
2ZDK089HP-1.5D-LS	MTO	8.9	$0_{-0.015}$			8	130	Fig.2
2ZDK090HP-1.5D-LS	●	9.0		28.0	32.5			
2ZDK091HP-1.5D-LS	MTO	9.1						
2ZDK092HP-1.5D-LS	MTO	9.2						
2ZDK093HP-1.5D-LS	MTO	9.3						
2ZDK094HP-1.5D-LS	MTO	9.4	$0_{-0.015}$	29.0	32.5	8	130	Fig.2
2ZDK095HP-1.5D-LS	●	9.5						
2ZDK096HP-1.5D-LS	MTO	9.6						
2ZDK097HP-1.5D-LS	MTO	9.7	$0_{-0.015}$	30.0	33.5	8	130	Fig.2
2ZDK098HP-1.5D-LS	MTO	9.8						

* 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

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL	Shape
		DC						
2ZDK099HP-1.5D-LS	MTO	9.9	$0_{-0.015}$	31.0	34.5	8	130	Fig.2
2ZDK100HP-1.5D-LS	●	10.0	$0_{-0.015}$	31.0	100.0	10	150	Fig.1
2ZDK101HP-1.5D-LS	MTO	10.1		31.0				
2ZDK102HP-1.5D-LS	MTO	10.2			35.5			
2ZDK103HP-1.5D-LS	MTO	10.3		32.0				
2ZDK104HP-1.5D-LS	MTO	10.4	$0_{-0.018}$		36.0			
2ZDK105HP-1.5D-LS	●	10.5				10	150	Fig.2
2ZDK106HP-1.5D-LS	MTO	10.6		33.0	36.5			
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		34.0	37.5			
2ZDK111HP-1.5D-LS	MTO	11.1						
2ZDK112HP-1.5D-LS	MTO	11.2	$0_{-0.018}$			10	150	Fig.2
2ZDK113HP-1.5D-LS	MTO	11.3		35.0	38.5			
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	$0_{-0.018}$	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	$0_{-0.018}$	37.0	120.0	12	170	Fig.1

Flat Bottom Drill (Counterboring)

No. of Flutes : 2

2ZDK-HP (Drilling Depth Regular type) NEW



MEGACOAT NANO is applied

Recommended Workpiece Materials

P
~30HRC

P
30~40HRC

K
Cast Iron

N
Aluminum &
Non Ferrous Material

MEGACOAT NANO

20°
Shank Dia.
(-ø12)

h5
Shank Dia.
(ø12.5-)

h6
Shank Dia.

2ZDK-HP (Drilling Depth Regular type)

Plunge milling

(Unit : mm)

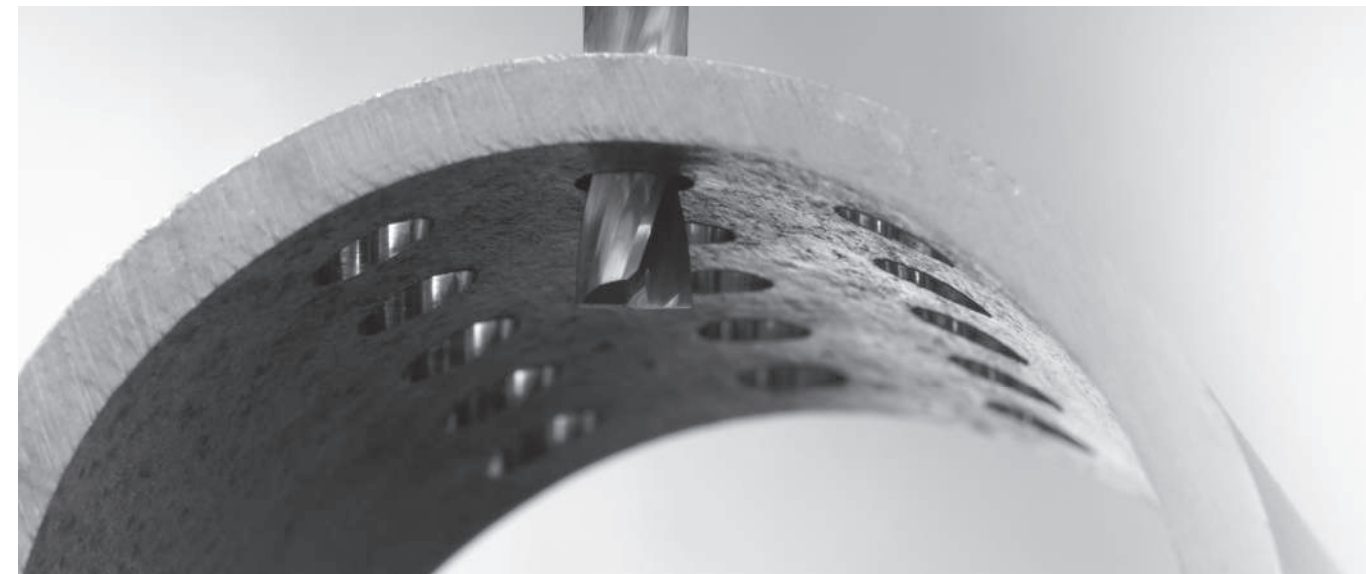
Description	Stock	Outside Dia.	Mill Dia. tolerance	Flute length		Under Neck Length		Shank Dia.	Overall length
		DC		LCF	LN	DCON	OAL		
2ZDK030HP-3D	●	3.0	⁰ / _{-0.010}	14	15	6	60		
2ZDK031HP-3D	●	3.1							
2ZDK032HP-3D	●	3.2							
2ZDK033HP-3D	●	3.3							
2ZDK034HP-3D	●	3.4		15	16				
2ZDK035HP-3D	●	3.5							
2ZDK036HP-3D	●	3.6							
2ZDK037HP-3D	●	3.7							
2ZDK038HP-3D	●	3.8		17	18				
2ZDK039HP-3D	●	3.9							
2ZDK040HP-3D	●	4.0							
2ZDK041HP-3D	●	4.1							
2ZDK042HP-3D	●	4.2	⁰ / _{-0.012}	19	20	6	60		
2ZDK043HP-3D	●	4.3							
2ZDK044HP-3D	●	4.4							
2ZDK045HP-3D	●	4.5							
2ZDK046HP-3D	●	4.6		20	21				
2ZDK047HP-3D	●	4.7							
2ZDK048HP-3D	●	4.8							
2ZDK049HP-3D	●	4.9							
2ZDK050HP-3D	●	5.0		21	22				
2ZDK051HP-3D	●	5.1							
2ZDK052HP-3D	●	5.2							

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Flute length		Under Neck Length		Shank Dia.	Overall length	
		DC		LCF	LN	DCON	OAL			
2ZDK053HP-3D	●	5.3	⁰ / _{-0.012}	24	25	6	60			
2ZDK054HP-3D	●	5.4								
2ZDK055HP-3D	●	5.5								
2ZDK056HP-3D	●	5.6								
2ZDK057HP-3D	●	5.7	26	27						
2ZDK058HP-3D	●	5.8								
2ZDK059HP-3D	●	5.9								
2ZDK060HP-3D	●	6.0								
2ZDK061HP-3D	●	6.1	⁰ / _{-0.012}	28	29					
2ZDK062HP-3D	●	6.2								
2ZDK063HP-3D	●	6.3								
2ZDK064HP-3D	●	6.4								
2ZDK065HP-3D	●	6.5	⁰ / _{-0.015}	30	31	8	70			
2ZDK066HP-3D	●	6.6								
2ZDK067HP-3D	●	6.7								
2ZDK068HP-3D	●	6.8								
2ZDK069HP-3D	●	6.9	31	32						
2ZDK070HP-3D	●	7.0								
2ZDK071HP-3D	●	7.1								
2ZDK072HP-3D	●	7.2								
2ZDK073HP-3D	●	7.3	32	33						
2ZDK074HP-3D	●	7.4								
2ZDK075HP-3D	●	7.5								

* This tool is specially designed for plunge milling and NOT recommended for slotting. Recommended Cutting Conditions **L80**
 - The drilling depth should be less than 3.0D(3.0 x DC).

● : Std. Item



2ZDK-HP (Drilling Depth Regular type)

Plunge milling

(Unit : mm)

Description	Stock	Outside Dia.	Mill Dia. tolerance	Flute length		Under Neck Length		Shank Dia.	Overall length	
		DC		LCF	LN	DCON	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	36	36						
2ZDK081HP-3D	●	8.1								
2ZDK082HP-3D	●	8.2								
2ZDK083HP-3D	●	8.3								
2ZDK084HP-3D	●	8.4	⁰ / _{-0.015}	36	37					
2ZDK085HP-3D	●	8.5								
2ZDK086HP-3D	●	8.6								
2ZDK087HP-3D	●	8.7								
2ZDK088HP-3D	●	8.8	39	40						
2ZDK089HP-3D	●	8.9								
2ZDK090HP-3D	●	9.0								
2ZDK091HP-3D	●	9.1								
2ZDK092HP-3D	●	9.2	40	41	10	80				
2ZDK093HP-3D	●	9.3								
2ZDK094HP-3D	●	9.4								
2ZDK095HP-3D	●	9.5								
2ZDK096HP-3D	●	9.6	42	43						
2ZDK097HP-3D	●	9.7								
2ZDK098HP-3D	●	9.8								

● : Std. Item

Recommended Cutting Conditions **L80**

Description	Stock	Outside Dia.	Mill Dia. tolerance	Flute length		Under Neck Length		Shank Dia.	Overall length	
		DC		LCF	LN	DCON	OAL			
2ZDK099HP-3D	●	9.9	⁰ / _{-0.015}	42	43	10	80			
2ZDK100HP-3D	●	10.0								
2ZDK101HP-3D	●	10.1								
2ZDK102HP-3D	●	10.2								
2ZDK103HP-3D	●	10.3	45	46						
2ZDK104HP-3D	●	10.4								
2ZDK105HP-3D	●	10.5								
2ZDK106HP-3D	●	10.6								
2ZDK107HP-3D	●	10.7	46	47						
2ZDK108HP-3D	●	10.8								
2ZDK109HP-3D	●	10.9								
2ZDK110HP-3D	●	11.0								
2ZDK111HP-3D	●	11.1	⁰ / _{-0.018}	47	48	12	100			
2ZDK112HP-3D	●	11.2								
2ZDK113HP-3D	●	11.3								
2ZDK114HP-3D	●	11.4								
2ZDK115HP-3D	●	11.5	51	52						
2ZDK116HP-3D	●	11.6								
2ZDK117HP-3D	●	11.7								
2ZDK118HP-3D	●	11.8								
2ZDK119HP-3D	●	11.9	53	54						
2ZDK120HP-3D	●	12.0								

Flat Bottom Drill (Counterboring)

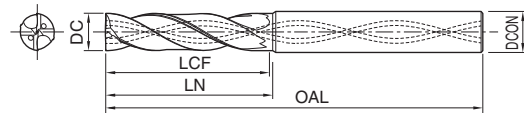
No. of Flutes : 2

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



MEGACOAT NANO is applied

Recommended Workpiece Materials



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

Description	Stock	Outside Dia.		Flute length	Under Neck Length	Shank Dia.	Overall length
		DC	Mill Dia. tolerance				
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		18	20		
2ZDK041HP-3D-OH	●	4.1	⁰ / _{-0.012}	18.5	20.5	5	80
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		22.5	24.5		
2ZDK051HP-3D-OH	●	5.1		23	25	6	82
2ZDK052HP-3D-OH	●	5.2		23.4	25.4		

Description	Stock	Outside Dia.		Flute length	Under Neck Length	Shank Dia.	Overall length		
		DC	Mill Dia. tolerance						
2ZDK053HP-3D-OH	●	5.3		23.9	25.9	6	82		
2ZDK054HP-3D-OH	●	5.4		24.3	26.3				
2ZDK055HP-3D-OH	●	5.5		24.8	26.8				
2ZDK056HP-3D-OH	●	5.6		25.2	27.2				
2ZDK057HP-3D-OH	●	5.7	⁰ / _{-0.012}	25.7	27.7				
2ZDK058HP-3D-OH	●	5.8		26.1	28.1				
2ZDK059HP-3D-OH	●	5.9		26.6	28.6				
2ZDK060HP-3D-OH	●	6.0		27	29				
2ZDK061HP-3D-OH	●	6.1		27.5	29.5				
2ZDK062HP-3D-OH	●	6.2		27.9	29.9				
2ZDK063HP-3D-OH	●	6.3		28.4	30.4	7	88		
2ZDK064HP-3D-OH	●	6.4		28.8	30.8				
2ZDK065HP-3D-OH	●	6.5		29.3	31.3				
2ZDK066HP-3D-OH	●	6.6		29.7	31.7				
2ZDK067HP-3D-OH	●	6.7		30.2	32.2				
2ZDK068HP-3D-OH	●	6.8	⁰ / _{-0.015}	30.6	32.6				
2ZDK069HP-3D-OH	●	6.9		31.1	33.1				
2ZDK070HP-3D-OH	●	7.0		31.5	33.5				
2ZDK071HP-3D-OH	●	7.1		32	34			8	94
2ZDK072HP-3D-OH	●	7.2		32.4	34.4				
2ZDK073HP-3D-OH	●	7.3		32.9	34.9				
2ZDK074HP-3D-OH	●	7.4		33.3	35.3				
2ZDK075HP-3D-OH	●	7.5		33.8	35.8				

* This tool is specially designed for plunge milling and NOT recommended for slotting. Recommended Cutting Conditions **L81**
 · The drilling depth should be less than 3.0D(3.0 x DC).

● : Std. Item

2ZDK-HP-OH

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



NEW

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

Description	Stock	Outside Dia.		Flute length	Under Neck Length	Shank Dia.	Overall length
		DC	Mill Dia. tolerance				
2ZDK076HP-3D-OH	●	7.6		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		38.7	40.7	9	100
2ZDK087HP-3D-OH	●	8.7	⁰ / _{-0.015}	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		
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	10	106
2ZDK097HP-3D-OH	●	9.7		43.7	45.7		
2ZDK098HP-3D-OH	●	9.8		44.1	46.1		

Description	Stock	Outside Dia.		Flute length	Under Neck Length	Shank Dia.	Overall length
		DC	Mill Dia. tolerance				
2ZDK099HP-3D-OH	●	9.9		44.6	46.6	10	106
2ZDK100HP-3D-OH	●	10.0	⁰ / _{-0.015}	45	47		
2ZDK101HP-3D-OH	●	10.1		45.5	47.5	11	116
2ZDK102HP-3D-OH	●	10.2		45.9	47.9		
2ZDK103HP-3D-OH	●	10.3		46.4	48.4		
2ZDK104HP-3D-OH	●	10.4		46.8	48.8		
2ZDK105HP-3D-OH	●	10.5		47.3	49.3		
2ZDK106HP-3D-OH	●	10.6		47.7	49.7		
2ZDK107HP-3D-OH	●	10.7		48.2	50.2		
2ZDK108HP-3D-OH	●	10.8		48.6	50.6		
2ZDK109HP-3D-OH	●	10.9		49.1	51.1		
2ZDK110HP-3D-OH	●	11.0	⁰ / _{-0.018}	49.5	51.5		
2ZDK111HP-3D-OH	●	11.1		50	52		
2ZDK112HP-3D-OH	●	11.2		50.4	52.4		
2ZDK113HP-3D-OH	●	11.3		50.9	52.9		
2ZDK114HP-3D-OH	●	11.4		51.3	53.3		
2ZDK115HP-3D-OH	●	11.5		51.8	53.8		
2ZDK116HP-3D-OH	●	11.6		52.2	54.2		
2ZDK117HP-3D-OH	●	11.7		52.7	54.7		
2ZDK118HP-3D-OH	●	11.8		53.1	55.1		
2ZDK119HP-3D-OH	●	11.9		53.6	55.6		
2ZDK120HP-3D-OH	●	12.0		54	56		

* This tool is specially designed for plunge milling and NOT recommended for slotting. Recommended Cutting Conditions **L81**
 · The drilling depth should be less than 3.0D(3.0 x DC).

● : Std. Item

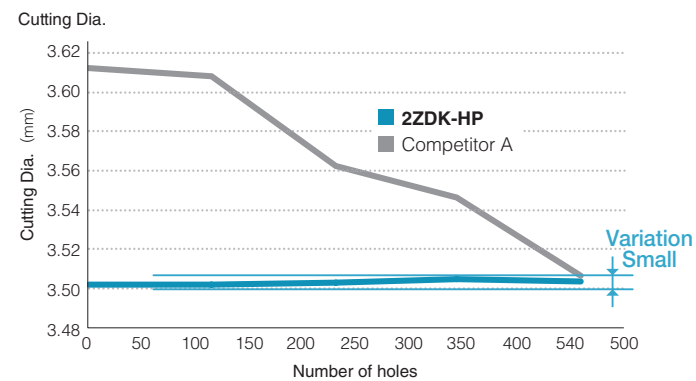
Flat Bottom Drill (Counterboring)

Drilling in Flat Surface

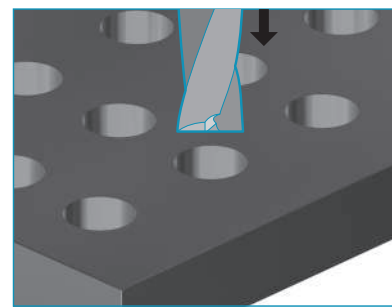
Cutting Performance Comparison (Internal evaluation)

Drill Dia. : $\phi 3.5\text{mm}$

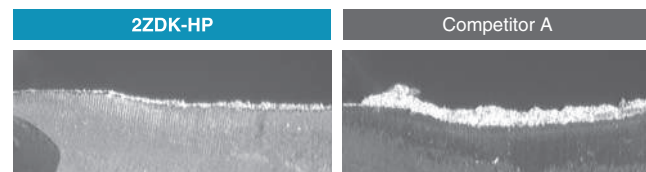
Stable and High Precision Machining with Less Variation in Hole Diameter
Excellent Cutting Edge Condition



Cutting Conditions : $n = 6,000 \text{ min}^{-1}$, $V_f = 360 \text{ mm/min}$, Drilling Depth 5 mm, Wet
Drill Dia. $\phi 3.5 \text{ mm}$ (Regular type) Workpiece Material : SCM440



Cutting Edge after Machining 500 holes



Comparison with Standard Drill

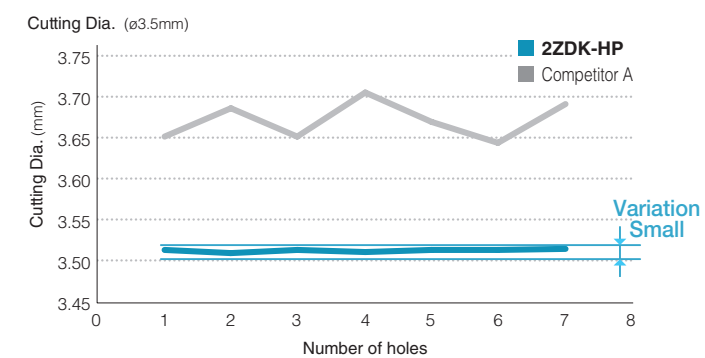
	Shape of the bottom	Burr	Drilling in Slant Surface
2ZDK-HP	Almost even	Decreased burr	Stable machining (Lowered the Feed)
Standard Drill	Same as Bottom Shape	Burr Build-up	Unstable

Drilling in Cylinder Surface

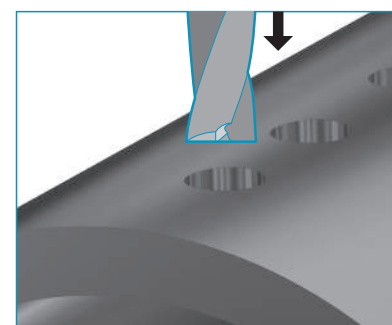
Cutting Performance Comparison (Internal evaluation)

Drill Dia. : $\phi 3.5\text{mm}$

Stable and High Precision Machining with Less Variation in Hole Diameter



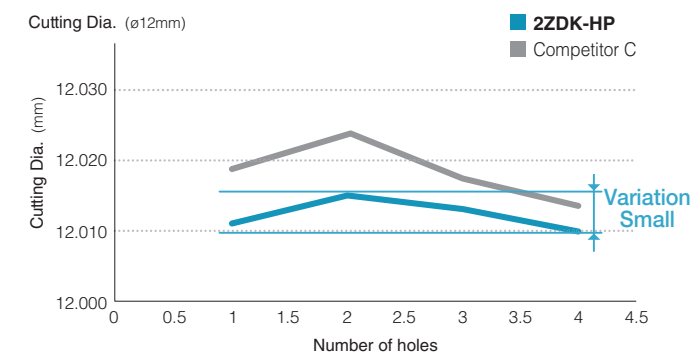
Cutting Conditions : $n = 7,000 \text{ min}^{-1}$, $V_f = 420 \text{ mm/min}$, Wet Drill Dia. $\phi 3.5 \text{ mm}$ (Regular type)
Workpiece Material : Carbon Steel Pipe $\phi 17.3 \text{ mm}$ (Thickness 3.2 mm)



Cutting Performance Comparison (Internal evaluation)

Drill Dia. : $\phi 12\text{mm}$

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



Surface Finish and Chips

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

Cutting Conditions : $n = 1,800 \text{ min}^{-1}$, $V_f = 540 \text{ mm/min}$, Wet Drill Dia. $\phi 12 \text{ mm}$ (Regular type)
Workpiece Material : Carbon Steel Pipe $\phi 25 \text{ mm}$ (Thickness 4 mm)



Flat Bottom Drill (Counterboring)

No. of Flutes : 2

2ZDK (Short type)



MEGACOAT NANO is applied

Recommended Workpiece Materials

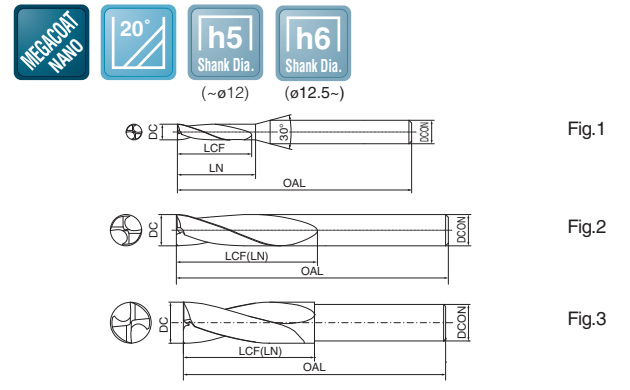


Fig.1

Fig.2

Fig.3

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

Plunge milling

Description	Stock	Outside Dia.		Mill Dia. tolerance	Flute length	Underfeed Length	Shank Dia.	Overall length	Shape
		DC	OAL						
2ZDK010S	▲	1.0		0 -0.010	3	4	4	50	Fig.1
2ZDK011S	MTO	1.1							
2ZDK012S	MTO	1.2	3.5		4.5				
2ZDK013S	MTO	1.3	4		5				
2ZDK014S	MTO	1.4	4.5		5.5				
2ZDK015S	▲	1.5	5		6				
2ZDK016S	▲	1.6	5.5		6.5				
2ZDK017S	MTO	1.7	6		7				
2ZDK018S	MTO	1.8	7		8				
2ZDK019S	MTO	1.9	8		9				
2ZDK020S	▲	2.0	9		10				
2ZDK021S	MTO	2.1	10		11				
2ZDK022S	MTO	2.2	11		12				
2ZDK023S	MTO	2.3	12		13				
2ZDK024S	▲	2.4	13	14					
2ZDK025S	▲	2.5		0 -0.012			6	60	Fig.1
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	Underfeed Length	Shank Dia.	Overall length	Shape
		DC	OAL						
2ZDK042S	▲	4.2		0 -0.012	13	14	6	60	Fig.1
2ZDK043S	▲	4.3							
2ZDK044S	MTO	4.4							
2ZDK045S	▲	4.5							
2ZDK046S	MTO	4.6							
2ZDK047S	MTO	4.7							
2ZDK048S	▲	4.8							
2ZDK049S	▲	4.9							
2ZDK050S	▲	5.0							
2ZDK051S	▲	5.1							
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	Fig.2
2ZDK061S	▲	6.1		0 -0.015	19	21	8	70	Fig.1
2ZDK062S	▲	6.2							
2ZDK063S	▲	6.3							
2ZDK064S	▲	6.4							
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							

* 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).

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

Recommended Cutting Conditions **L82**

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

2ZDK (Drilling Depth Short type) (Refer to L50 and L51 for 2ZDK-HP)

Plunge milling

Description	Stock	Outside Dia.		Mill Dia. tolerance	Flute length	Underfeed Length	Shank Dia.	Overall length	Shape		
		DC	OAL								
2ZDK073S	▲	7.3		0 -0.015	23		8	70	Fig.1		
2ZDK074S	MTO	7.4									
2ZDK075S	▲	7.5									
2ZDK076S	MTO	7.6									
2ZDK077S	▲	7.7			24	25					
2ZDK078S	▲	7.8									
2ZDK079S	MTO	7.9			25	27				Fig.2	
2ZDK080S	▲	8.0									
2ZDK081S	MTO	8.1			0 -0.015	26	28	10	80	Fig.1	
2ZDK082S	▲	8.2									
2ZDK083S	MTO	8.3									
2ZDK084S	MTO	8.4									
2ZDK085S	▲	8.5				27	29				
2ZDK086S	MTO	8.6									
2ZDK087S	▲	8.7		28		30					
2ZDK088S	▲	8.8									
2ZDK089S	MTO	8.9		29		31					
2ZDK090S	▲	9.0									
2ZDK091S	MTO	9.1		30		32					
2ZDK092S	MTO	9.2									
2ZDK093S	MTO	9.3		31		33				Fig.2	
2ZDK094S	MTO	9.4									
2ZDK095S	▲	9.5		32	34	12	100	Fig.1			
2ZDK096S	MTO	9.6									
2ZDK097S	MTO	9.7		33	(33)						
2ZDK098S	▲	9.8									
2ZDK099S	MTO	9.9		34							
2ZDK100S	▲	10.0									
2ZDK101S	MTO	10.1		35							
2ZDK102S	MTO	10.2									
2ZDK103S	▲	10.3		36							
2ZDK104S	MTO	10.4									

* 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).

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

Description	Stock	Outside Dia.		Mill Dia. tolerance	Flute length	Underfeed Length	Shank Dia.	Overall length	Shape	
		DC	OAL							
2ZDK105S	▲	10.5		0 -0.018	33	35	12	100	Fig.1	
2ZDK106S	MTO	10.6								
2ZDK107S	MTO	10.7								
2ZDK108S	MTO	10.8								
2ZDK109S	MTO	10.9			34	36				
2ZDK110S	▲	11.0								
2ZDK111S	MTO	11.1			35	37				
2ZDK112S	MTO	11.2								
2ZDK113S	MTO	11.3			36	38				
2ZDK114S	MTO	11.4								
2ZDK115S	▲	11.5			37	(39)				Fig.2
2ZDK116S	MTO	11.6								
2ZDK117S	MTO	11.7			38	40				
2ZDK118S	MTO	11.8								
2ZDK119S	MTO	11.9		39	41					
2ZDK120S	▲	12.0								
2ZDK125S	▲	12.5		0 -0.021	41	43	16	115	Fig.2	
2ZDK130S	▲	13.0								
2ZDK135S	▲	13.5								
2ZDK140S	▲	14.0								
2ZDK145S	▲	14.5			42	44				Fig.3
2ZDK150S	▲	15.0								
2ZDK155S	▲	15.5			43	45				
2ZDK160S	▲	16.0								
2ZDK165S	▲	16.5			44	46				
2ZDK170S	▲	17.0								
2ZDK175S	▲	17.5			45	47				
2ZDK180S	▲	18.0								
2ZDK185S	▲	18.5			46	48				
2ZDK190S	▲	19.0								
2ZDK195S	▲	19.5		47	49					
2ZDK200S	▲	20.0								

Recommended Cutting Conditions **L82**

Flat Bottom Drill (Counterboring)

No. of Flutes : 2

2ZDK



MEGACOAT NANO is applied

Recommended Workpiece Materials

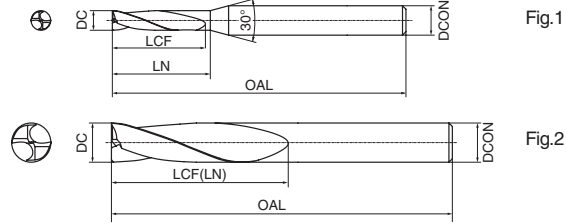


Fig.1

Fig.2

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

Plunge milling

(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL	Shape
2ZDK030	▲	3.0	$\begin{matrix} 0 \\ -0.010 \end{matrix}$	14	15	6	60	Fig.1
2ZDK033	▲	3.3	$\begin{matrix} 0 \\ -0.012 \end{matrix}$	15	16			
2ZDK035	▲	3.5		17	18			
2ZDK040	▲	4.0		19	20			
2ZDK042	▲	4.2		20	21			
2ZDK045	▲	4.5		21	22			
2ZDK050	▲	5.0		23	24			
2ZDK053	▲	5.3		24	25			
2ZDK055	▲	5.5		25	26			
2ZDK056	▲	5.6		26	27			
2ZDK060	▲	6.0		$\begin{matrix} 0 \\ -0.015 \end{matrix}$	28	(28)	8	70
2ZDK065	▲	6.5	30		31			
2ZDK068	▲	6.8	31		32			

(Unit : mm)

Description	Stock	Outside Dia. DC	Mill Dia. tolerance	Flute length LCF	Under Neck Length LN	Shank Dia. DCON	Overall length OAL	Shape
2ZDK070	▲	7.0	$\begin{matrix} 0 \\ -0.015 \end{matrix}$	32	33	8	70	Fig.1
2ZDK075	▲	7.5		34	35			
2ZDK080	▲	8.0		36	(36)			
2ZDK085	▲	8.5		38	39			
2ZDK088	▲	8.8	$\begin{matrix} 0 \\ -0.015 \end{matrix}$	39	40	10	80	Fig.1
2ZDK090	▲	9.0		40	41			
2ZDK095	▲	9.5		42	43			
2ZDK100	▲	10.0		45	(45)			
2ZDK103	▲	10.3		46	47			
2ZDK105	▲	10.5		47	48			
2ZDK110	▲	11.0	$\begin{matrix} 0 \\ -0.018 \end{matrix}$	51	52	12	100	Fig.1
2ZDK115	▲	11.5		53	54			
2ZDK120	▲	12.0		54	(54)			

* 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 Cutting Conditions

2FESS

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

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

2FESM

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

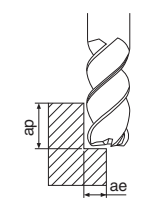
* Machining with water soluble coolant is recommended for stainless steel.

Recommended Cutting Conditions L82

▲ : To be replaced by a new product

Recommended Cutting Conditions

2FESL (Shouldering)

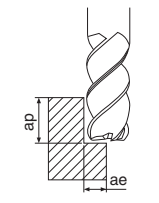
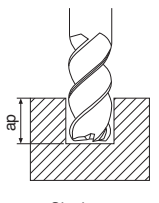


Applications	Workpiece Material	Outside Dia. DC (mm)	ø1	ø2	ø4	ø6	ø8	ø12	ø16
Shouldering Depth of Cut (ap x ae) (mm) 2.5DC x 0.05DC (DC < ø3) 2.5DC x 0.1DC (DC ≥ ø3)	Carbon Steel, Cast Iron	Spindle Revolution (min ⁻¹)	19,000	9,500	4,800	3,200	2,400	1,600	1,200
		Feed Rate (mm/min)	210	210	210	210	210	210	210
	Alloy Steel	Spindle Revolution (min ⁻¹)	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 ⁻¹)	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 ⁻¹)	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.

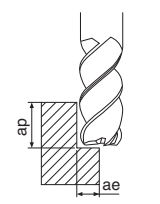
2FEKS, 2FEKM

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø3	ø4	ø6	ø8	ø10	ø12	ø16
Shouldering Depth of Cut (ap x ae) (mm) 1.2DC x 0.1DC	Carbon Steel, Cast Iron	Shouldering	Spindle Revolution (min ⁻¹)	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 ⁻¹)	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 ⁻¹)	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 ⁻¹)	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 ⁻¹)	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 ⁻¹)	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 ⁻¹)	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 ⁻¹)	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.

4FESM (Shouldering)

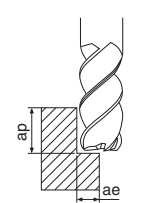


Applications	Workpiece Material	Outside Dia. DC (mm)	ø1	ø2	ø4	ø6	ø8	ø12	ø16
Shouldering Depth of Cut (ap x ae) (mm) 1.5DC x 0.05DC (DC < ø3) 1.5DC x 0.1DC (DC ≥ ø3)	Carbon Steel, Cast Iron	Spindle Revolution (min ⁻¹)	25,500	13,000	6,600	4,400	3,300	2,200	1,700
		Feed Rate (mm/min)	335	345	580	620	625	630	600
	Alloy Steel	Spindle Revolution (min ⁻¹)	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 ⁻¹)	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 ⁻¹)	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 Depth of Cut (ap x ae) (mm) 1.5DC x 0.1DC	Carbon Steel, Cast Iron	Spindle Revolution (min ⁻¹)	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 ⁻¹)	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 ⁻¹)	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 ⁻¹)	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
	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
			Feed Rate (mm/min)	660	640	640	640	520	450	410	400
		Slotting	Spindle Revolution (min ⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
			Feed Rate (mm/min)	550	480	510	530	480	440	410	400
	Alloy Steel	Shouldering	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
			Feed Rate (mm/min)	420	430	430	430	350	300	270	260
		Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
			Feed Rate (mm/min)	300	340	360	370	340	310	270	260
	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
			Feed Rate (mm/min)	160	160	160	160	140	140	140	140
		Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
			Feed Rate (mm/min)	110	110	120	120	120	120	120	120
Stainless Steel	Shouldering	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800	
		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	
		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
	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
			Feed Rate (mm/min)	810	800	800	800	650	560	510	450
		Slotting	Spindle Revolution (min ⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
			Feed Rate (mm/min)	810	800	800	800	650	560	510	450
	Alloy Steel	Shouldering	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
			Feed Rate (mm/min)	530	530	530	530	430	370	340	300
		Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
			Feed Rate (mm/min)	530	530	530	530	430	370	340	300
	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
			Feed Rate (mm/min)	200	200	200	200	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
			Feed Rate (mm/min)	140	140	150	150	150	150	150	150
Stainless Steel	Shouldering	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800	
		Feed Rate (mm/min)	300	300	300	300	240	210	200	200	
	Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800	
		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
	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
			Feed Rate (mm/min)	960	960	960	960	780	680	620	570
		Slotting	Spindle Revolution (min ⁻¹)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
			Feed Rate (mm/min)	960	960	960	960	780	680	620	570
	Alloy Steel	Shouldering	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
			Feed Rate (mm/min)	640	640	640	640	520	450	410	370
		Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
			Feed Rate (mm/min)	640	640	640	640	520	450	410	370
	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
			Feed Rate (mm/min)	240	240	240	240	210	210	210	210
		Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800
			Feed Rate (mm/min)	160	160	180	180	180	180	180	180
Stainless Steel	Shouldering	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800	
		Feed Rate (mm/min)	360	360	360	360	300	260	240	240	
	Slotting	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,800	
		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
	Carbon Steel	Shouldering	Short 1.2DC x 0.15DC Medium 1.5DC x 0.15DC	Spindle Revolution (min ⁻¹)	13,800	10,700	8,800	7,500	6,000	4,800	4,000	3,300
				Feed Rate (mm/min)	1,400	1,400	1,400	1,500	1,500	1,400	1,400	1,300
		Slotting	ap ≤ 1DC	Spindle Revolution (min ⁻¹)	13,800	10,700	8,800	7,500	6,000	4,800	4,000	3,300
				Feed Rate (mm/min)	620	700	750	780	830	850	800	750
	Alloy Steel	Shouldering	Short 1.2DC x 0.1DC Medium 1.5DC x 0.1DC	Spindle Revolution (min ⁻¹)	10,600	9,300	8,300	7,400	6,000	4,700	3,800	2,800
				Feed Rate (mm/min)	1,000	1,000	1,000	1,100	1,100	1,000	1,000	900
		Slotting	ap ≤ 1DC	Spindle Revolution (min ⁻¹)	10,600	9,300	8,300	7,400	6,000	4,700	3,800	2,800
				Feed Rate (mm/min)	500	510	520	530	550	570	530	450
	Prehardened Steel (30 ~ 45HRC)	Shouldering	Short 1.2DC x 0.07DC Medium 1.5DC x 0.07DC	Spindle Revolution (min ⁻¹)	8,700	6,800	5,500	4,600	3,500	2,800	2,300	1,700
				Feed Rate (mm/min)	670	730	790	840	900	810	770	630
		Slotting	ap ≤ 1DC	Spindle Revolution (min ⁻¹)	6,700	5,800	4,800	4,000	3,000	2,300	1,900	1,400
				Feed Rate (mm/min)	320	330	360	370	400	420	380	300
Stainless Steel Titanium Alloys	Shouldering	Short 1.2DC x 0.1DC Medium 1.5DC x 0.1DC	Spindle Revolution (min ⁻¹)	8,700	7,000	6,000	5,200	4,000	3,000	2,500	1,700	
			Feed Rate (mm/min)	670	720	780	830	840	760	710	520	
	Slotting	ap ≤ 0.3DC	Spindle Revolution (min ⁻¹)	6,800	6,000	5,100	4,300	3,400	2,600	2,000	1,400	
			Feed Rate (mm/min)	190	220	240	250	250	240	230	190	

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

4MFK (Long)

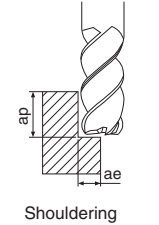
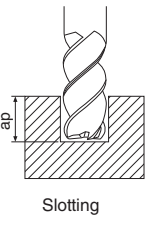
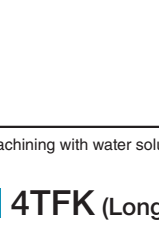

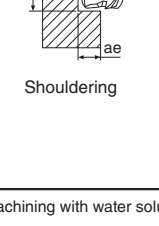



Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16		
	Carbon Steel	Shouldering	3DC x 0.02DC	Spindle Revolution (min ⁻¹)	11,000	8,500	7,000	6,000	4,800	3,800	3,200	2,600		
				Feed Rate (mm/min)	910	910	910	970	970	910	910	840		
				Alloy Steel	Shouldering	Spindle Revolution (min ⁻¹)	6,500	5,700	5,100	4,500	3,700	2,900	2,300	1,700
						Feed Rate (mm/min)	540	540	540	600	600	540	540	490
	Prehardened Steel (30 ~ 45HRC)	Shouldering	Spindle Revolution (min ⁻¹)	4,900	3,900	3,100	2,600	2,000	1,600	1,300	1,000			
			Feed Rate (mm/min)	330	360	400	420	450	400	380	310			
	Stainless Steel Titanium Alloys	Shouldering	Spindle Revolution (min ⁻¹)	4,300	3,500	3,000	2,600	2,000	1,500	1,300	900			
			Feed Rate (mm/min)	330	360	390	410	420	380	350	260			

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

Slotting is not recommended.

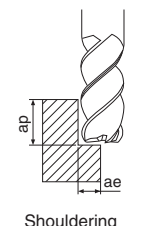
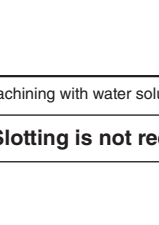



Recommended Cutting Conditions

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
				Feed Rate (mm/min)	1,490	1,570	1,590	1,660	1,630	1,490	1,410	1,240	1,080
	Carbon Steel, Cast Iron	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
				Feed Rate (mm/min)	770	790	790	800	750	690	600	540	410
	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
				Feed Rate (mm/min)	900	1,020	1,020	1,020	920	870	800	720	640
	Alloy Steel	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
				Feed Rate (mm/min)	540	530	550	590	570	530	500	450	410
	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
				Feed Rate (mm/min)	690	760	810	850	830	800	770	640	590
	Prehardened Steel (30 ~ 45HRC)	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
				Feed Rate (mm/min)	480	540	570	600	550	490	460	380	340
	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
				Feed Rate (mm/min)	690	760	810	850	830	800	770	640	590
	Stainless Steel	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
				Feed Rate (mm/min)	120	130	180	360	420	370	340	280	250
	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
				Feed Rate (mm/min)	500	520	520	640	700	730	670	560	450
	Titanium Alloys	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
				Feed Rate (mm/min)	290	330	330	350	370	410	380	290	230
	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
				Feed Rate (mm/min)	250	250	250	250	240	230	220	210	200
	Superalloy	Slotting	ap ≤ 0.3 x DC	Spindle Revolution (min ⁻¹)	3,000	2,200	1,800	1,500	1,100	900	700	600	400
				Feed Rate (mm/min)	90	100	100	100	110	130	120	90	70

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

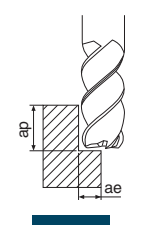

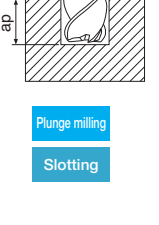
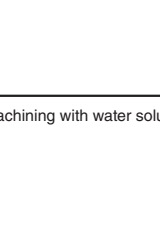



4TFK (Long)

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
				Feed Rate (mm/min)	970	1,020	1,030	1,080	1,060	970	920	810	700
	Alloy Steel	Shouldering	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
				Feed Rate (mm/min)	490	550	550	550	500	470	430	390	350
	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
				Feed Rate (mm/min)	490	550	550	550	500	470	430	390	350
	Stainless Steel	Shouldering	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
				Feed Rate (mm/min)	350	380	410	430	420	400	390	320	300
	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
				Feed Rate (mm/min)	250	260	260	320	350	370	340	280	230
	Superalloy	Shouldering	2.5DC x 0.02DC	Spindle Revolution (min ⁻¹)	2,100	1,600	1,300	1,100	800	650	550	400	320
				Feed Rate (mm/min)	125	125	125	125	120	115	110	105	100

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

Slotting is not recommended.

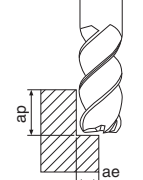
3ZFKS (Short), 3ZFKM (Medium)

Applications	Workpiece Material	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø7	ø8	ø10	ø12	ø16
	Carbon Steel	Shouldering Short 1.2DC x 0.3DC Medium 1.5DC x 0.3DC Plunge milling Slotting 1DC	Spindle Revolution (min ⁻¹)	13,800	10,700	8,800	7,500	6,600	6,000	4,800	4,000	3,000
				Feed Rate (mm/min)	850	950	1,100	1,200	1,100	1,000	910	850
	Alloy Steel	Shouldering Short 1.2DC x 0.3DC Medium 1.5DC x 0.3DC Plunge milling Slotting 0.5DC	Spindle Revolution (min ⁻¹)	10,600	9,300	8,300	7,400	6,500	6,000	4,700	3,500	1,900
				Feed Rate (mm/min)	700	780	900	980	900	850	750	700
	Prehardened Steel (30 ~ 45HRC)	Shouldering Short 1.2DC x 0.3DC Medium 1.5DC x 0.3DC Plunge milling Slotting 0.5DC	Spindle Revolution (min ⁻¹)	5,200	4,000	3,200	2,600	2,300	2,000	1,600	1,400	1,000
				Feed Rate (mm/min)	440	440	490	490	490	440	400	370
	Stainless Steel	Shouldering Short 1.2DC x 0.2DC Medium 1.5DC x 0.2DC Plunge milling Slotting 0.5DC	Spindle Revolution (min ⁻¹)	3,300	2,500	2,000	1,700	1,400	1,300	1,100	900	750
				Feed Rate (mm/min)	280	270	330	340	330	330	350	320
	Titanium Alloys	Shouldering Short 1.2DC x 0.2DC Medium 1.5DC x 0.2DC Plunge milling Slotting 0.5DC	Spindle Revolution (min ⁻¹)	3,300	2,500	2,000	1,700	1,400	1,300	1,100	900	750
				Feed Rate (mm/min)	20	30	40	40	40	30	20	20
	Titanium Alloys	Shouldering Short 1.2DC x 0.2DC Medium 1.5DC x 0.2DC Plunge milling Slotting 0.5DC	Spindle Revolution (min ⁻¹)	3,300	2,500	2,000	1,700	1,400	1,300	1,100	900	750
				Feed Rate (mm/min)	20	30	40	40	40	30	20	20
	Titanium Alloys	Shouldering Short 1.2DC x 0.2DC Medium 1.5DC x 0.2DC Plunge milling Slotting 0.5DC	Spindle Revolution (min ⁻¹)	3,300	2,500	2,000	1,700	1,400	1,300	1,100	900	750
				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.

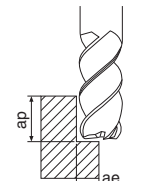
Recommended Cutting Conditions

5DERM

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø4	ø5	ø6	ø8	ø10	ø12	
 <p>Shouldering</p> <p>Depth of Cut (ap x ae) (mm)</p> <p>1.5DC x 0.5DC</p>	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	
		Shouldering	Feed Rate (mm/min)	2,400	2,500	2,700	2,400	2,200	1,900	
			Slotting	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)	14,300	11,500	9,600	7,200	5,700	4,800
			Shouldering	Feed Rate (mm/min)	2,100	1,700	1,900	1,800	1,700	1,700
			Slotting	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
			Shouldering	Feed Rate (mm/min)	1,300	1,500	1,700	1,300	1,300	1,300
			Slotting	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	
		Shouldering	Feed Rate (mm/min)	1,400	1,100	1,200	1,100	1,100	1,100	
		Slotting	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	
		Shouldering	Feed Rate (mm/min)	640	760	640	640	640	640	
		Slotting	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	
		Shouldering	Feed Rate (mm/min)	480	380	480	480	380	400	
		Slotting	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	
		Shouldering	Feed Rate (mm/min)	160	130	210	240	190	210	
		Slotting	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	
		Shouldering	Feed Rate (mm/min)	2,000	2,200	2,300	2,000	2,200	1,800	
		Slotting	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	
		Shouldering	Feed Rate (mm/min)	1,000	1,200	1,000	1,300	1,000	1,000	
		Slotting	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	

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

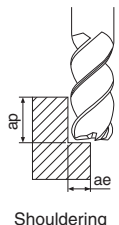
3UFSM

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø2	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20	
 <p>Shouldering</p> <p>Depth of Cut (ap x ae) (mm)</p> <p>1.5DC x 0.1DC</p>	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	
		Shouldering	Feed Rate (mm/min)	380	430	440	500	510	500	560	560	590	590	
		Slotting	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	
	Alloy 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	
		Shouldering	Feed Rate (mm/min)	250	270	270	320	350	340	360	350	390	420	
		Slotting	Spindle Revolution (min ⁻¹)	11,000	7,400	5,600	4,500	3,700	2,800	2,200	1,900	1,400	1,100	
		Slotting	Feed Rate (mm/min)	130	130	150	180	190	180	170	180	190	210	
	Stainless Steel	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	
		Shouldering	Feed Rate (mm/min)	180	170	170	210	230	220	230	220	220	230	
		Slotting	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	
Titanium Alloys Heat-resistant Alloys (40 ~ 50HRC)	Shouldering	Spindle Revolution (min ⁻¹)	6,000	4,200	3,200	2,500	2,100	1,600	1,300	1,100	800	600		
	Shouldering	Feed Rate (mm/min)	60	90	100	120	110	110	120	110	120	130		
	Slotting	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)	50	60	70	80	90	90	90	80	90	100		
Aluminum Alloys	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		
	Shouldering	Feed Rate (mm/min)	670	760	770	900	920	860	1,000	1,100	1,100	1,200		
	Slotting	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

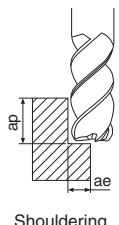
6PFK, 8PFK (Medium)

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25
 <p>Shouldering</p>	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
				Feed Rate (mm/min)	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
				Feed Rate (mm/min)	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
				Feed Rate (mm/min)	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
				Feed Rate (mm/min)	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.

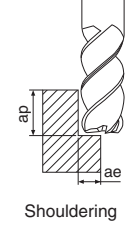
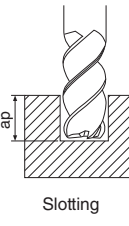
6PFK, 8PFK (Long)

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25
 <p>Shouldering</p>	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
				Feed Rate (mm/min)	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
				Feed Rate (mm/min)	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
				Feed Rate (mm/min)	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
				Feed Rate (mm/min)	700	670	590	540	440	370	290

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

Slotting is not recommended.

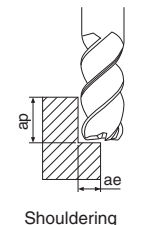
4JER (Short, Medium)

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20
 <p>Shouldering</p>  <p>Slotting</p>	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
				Feed Rate (mm/min)	1,500	1,500	1,400	1,400	1,300	1,100
		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
				Feed Rate (mm/min)	720	670	620	540	480	360
	Alloy Steel	Shouldering	1.5DC x 0.1DC	Spindle Revolution (min ⁻¹)	5,300	4,000	3,200	2,700	2,000	1,600
				Feed Rate (mm/min)	1,020	920	870	800	720	640
		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
				Feed Rate (mm/min)	530	510	470	450	400	360
	Prehardened Steel (30 - 45HRC)	Shouldering	1.5DC x 0.05DC	Spindle Revolution (min ⁻¹)	4,600	3,500	2,800	2,300	1,700	1,300
				Feed Rate (mm/min)	850	830	800	770	640	590
		Slotting	ap ≤ 0.5 x DC	Spindle Revolution (min ⁻¹)	3,700	2,800	2,200	1,900	1,400	1,100
				Feed Rate (mm/min)	480	450	440	410	340	300
Stainless Steel	Shouldering	1.5DC x 0.05DC	Spindle Revolution (min ⁻¹)	4,800	3,600	2,900	2,400	1,800	1,400	
			Feed Rate (mm/min)	850	830	800	770	640	590	
	Slotting	ap ≤ 0.5 x DC	Spindle Revolution (min ⁻¹)	3,500	2,800	2,200	1,900	1,400	1,100	
			Feed Rate (mm/min)	300	280	250	230	190	170	
Titanium Alloys	Shouldering	1.5DC x 0.1DC	Spindle Revolution (min ⁻¹)	4,200	3,200	2,500	2,100	1,600	1,300	
			Feed Rate (mm/min)	580	630	660	600	500	400	
	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	
			Feed Rate (mm/min)	320	340	370	340	260	210	
Superalloy Inconel® 718, etc.	Shouldering	1.5DC x 0.05DC	Spindle Revolution (min ⁻¹)	2,400	1,800	1,400	1,200	900	720	
			Feed Rate (mm/min)	330	320	320	320	320	290	
	Slotting	ap ≤ 0.5 x DC	Spindle Revolution (min ⁻¹)	1,600	1,200	950	800	600	480	
			Feed Rate (mm/min)	180	140	110	100	80	60	

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

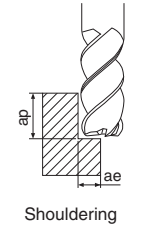
Recommended Cutting Conditions

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
	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
			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)	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
			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	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
			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	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
			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	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
			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.

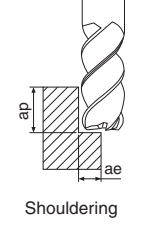
4 / 5 / 6RFH (Long)

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20						
	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						
				Prehardened Steel (30 ~ 45HRC)	Shouldering	ap : 4.0DC ae : 0.1DC (DC ≤ ø12) ae : 1.2mm (DC > ø12)	Spindle Revolution (min ⁻¹)	3,400	2,500	2,000	1,700	1,300	1,000			
							Feed Rate (mm/min)	340	430	410	380	340	320			
							Stainless Steel	Shouldering	ap : 4.0DC ae : 0.1DC (DC ≤ ø12) ae : 1.2mm (DC > ø12)	Spindle Revolution (min ⁻¹)	5,100	3,800	3,100	2,500	1,900	1,500
										Feed Rate (mm/min)	290	290	290	280	270	270
	Titanium Alloys	Shouldering	ap : 4.0DC ae : 0.1DC (DC ≤ ø12) ae : 1.2mm (DC > ø12)							Spindle Revolution (min ⁻¹)	3,400	2,500	2,000	1,700	1,300	1,000
										Feed Rate (mm/min)	230	290	290	270	270	260
				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.

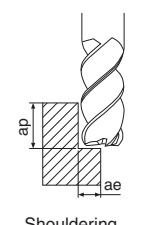
Slotting is not recommended.

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	
	Steel	< 22HRC	Shouldering	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	1,340	1,380
		22 ~ 32HRC	Slotting	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	Shouldering	1.5DC x 0.4DC	Spindle Revolution (min ⁻¹)	9,600	7,200	5,700	4,800	3,600	2,900	2,300
					Feed Rate (mm/min)	720	720	860	860	860	920	1,030
		40 ~ 45HRC	Slotting	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	740	760	860
		45 ~ 50HRC	Shouldering	1.5DC x 0.4DC	Spindle Revolution (min ⁻¹)	6,400	4,800	3,800	3,200	2,400	1,900	1,500
					Feed Rate (mm/min)	320	320	410	410	400	400	400
		45 ~ 50HRC	Slotting	0.6DC	Spindle Revolution (min ⁻¹)	5,300	4,000	3,200	2,600	2,000	1,600	1,300
					Feed Rate (mm/min)	260	260	340	340	330	330	330
45 ~ 50HRC	Shouldering	1DC x 0.4DC	Spindle Revolution (min ⁻¹)	4,800	3,600	2,900	2,400	1,800	1,400	1,100		
			Feed Rate (mm/min)	220	220	260	260	250	250	250		
45 ~ 50HRC	Slotting	0.5DC	Spindle Revolution (min ⁻¹)	4,300	3,200	2,600	2,200	1,600	1,300	1,000		
			Feed Rate (mm/min)	180	180	240	230	220	220	220		
45 ~ 50HRC	Shouldering	1DC x 0.3DC	Spindle Revolution (min ⁻¹)	4,200	3,200	2,500	2,100	1,600	1,300	1,000		
			Feed Rate (mm/min)	150	150	180	180	170	170	170		
45 ~ 50HRC	Slotting	0.4DC	Spindle Revolution (min ⁻¹)	3,800	2,900	2,300	1,900	1,400	1,100	900		
			Feed Rate (mm/min)	140	140	170	160	160	150	150		
Stainless Steel	Stainless Steel	Shouldering	1.5DC x 0.4DC	Spindle Revolution (min ⁻¹)	3,700	2,800	2,200	1,900	1,400	1,100	900	
				Feed Rate (mm/min)	190	230	310	300	340	310	360	
Stainless Steel	Stainless Steel	Slotting	0.5DC	Spindle Revolution (min ⁻¹)	2,700	2,000	1,600	1,300	1,000	800	600	
				Feed Rate (mm/min)	110	130	180	170	190	180	190	
Cast Iron	Cast Iron	Shouldering	1.5DC x 0.5DC	Spindle Revolution (min ⁻¹)	9,600	7,200	5,700	4,800	3,600	2,900	2,300	
				Feed Rate (mm/min)	850	850	1,030	1,030	1,030	1,100	1,380	
Cast Iron	Cast Iron	Slotting	1DC	Spindle Revolution (min ⁻¹)	7,900	5,900	4,800	4,000	3,000	2,400	1,900	
				Feed Rate (mm/min)	700	700	900	900	900	910	1,140	

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

3RDSL, 4RDSL, 5RDSL (Shouldering)

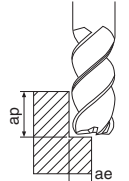
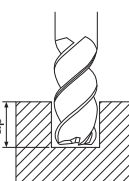
Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25		
	Steel	< 22HRC	2.5DC x 0.5DC	Spindle Revolution (min ⁻¹)	7,800	5,900	4,700	3,900	2,900	2,300	1,900		
				Feed Rate (mm/min)	700	700	770	780	840	840	940		
				22 ~ 32HRC	2.5DC x 0.4DC	Spindle Revolution (min ⁻¹)	6,700	5,000	4,000	3,400	2,500	2,000	1,600
						Feed Rate (mm/min)	500	500	600	600	600	640	720
				32 ~ 40HRC	2.5DC x 0.4DC	Spindle Revolution (min ⁻¹)	4,500	3,400	2,700	2,200	1,700	1,300	1,100
						Feed Rate (mm/min)	220	220	290	290	280	280	280
		40 ~ 45HRC	2.5DC x 0.4DC	Spindle Revolution (min ⁻¹)	3,400	2,500	2,000	1,700	1,300	1,000	800		
				Feed Rate (mm/min)	150	150	180	180	180	180	180		
		45 ~ 50HRC	2.5DC x 0.3DC	Spindle Revolution (min ⁻¹)	2,900	2,200	1,800	1,500	1,100	900	700		
				Feed Rate (mm/min)	110	110	130	130	120	120	120		
		Stainless Steel	Stainless Steel	Shouldering	1.5DC x 0.1DC	Spindle Revolution (min ⁻¹)	3,700	2,800	2,200	1,900	1,400	1,100	900
						Feed Rate (mm/min)	120	150	200	200	220	200	230
Cast Iron	Cast Iron	Shouldering	2.5DC x 0.5DC	Spindle Revolution (min ⁻¹)	6,700	5,000	4,000	3,400	2,500	2,000	1,600		
				Feed Rate (mm/min)	600	600	720	720	720	770	970		

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

Slotting is not recommended.

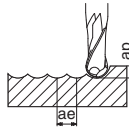
Recommended Cutting Conditions

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	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
		45 - 55HRC	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	
	55 - 60HRC	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	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		
Slotting	0.5DC	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)	200	190	180	200	190	290	210	310	270		
Titanium Alloys	< 40HRC	Shouldering	2DC 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)	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	
> 40HRC	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		
Heat-resistant Alloys (Ni-base heat-resistant alloys)	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	
	Slotting	0.25DC	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	
 Copying	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	9,500	
			Feed Rate (mm/min)	3,910	3,570	3,290	3,070	2,890	2,660	2,540	2,500	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	8,500	
			Feed Rate (mm/min)	3,100	2,880	2,670	2,490	2,330	2,110	2,010	1,980	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	8,500	
			Feed Rate (mm/min)	3,150	2,880	2,660	2,500	2,370	2,190	2,060	1,970	1,920	
	Prehardened Steel	30 - 38HRC	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	8,500
		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	7,700
				Feed Rate (mm/min)	2,550	2,330	2,170	2,040	1,940	1,800	1,680	1,590	1,550
	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	6,800	
			Feed Rate (mm/min)	2,060	1,850	1,700	1,600	1,520	1,410	1,320	1,230	1,190	
	Heat Treated Steel	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	6,800
Feed Rate (mm/min)				2,060	1,850	1,700	1,600	1,520	1,410	1,320	1,230	1,190	
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	5,200	
Feed Rate (mm/min)	1,230	1,130	1,030	980	930	850	800	780	760				

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

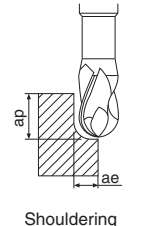
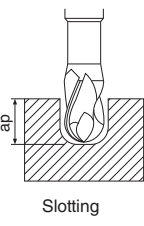
3UEBS

Applications	Workpiece Material	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12
 Copying	Carbon Steel, Cast Iron (< 20HRC)	0.2DC x 0.3DC	Spindle Revolution (min ⁻¹)	13,300	10,000	8,000	6,600	5,000	4,000	3,300
			Feed Rate (mm/min)	600	870	840	850	1,400	1,200	990
	Alloy Steel (< 35HRC)	0.2DC x 0.3DC	Spindle Revolution (min ⁻¹)	10,600	8,000	6,400	5,300	4,000	3,200	2,700
			Feed Rate (mm/min)	410	500	610	640	940	830	730
	Prehardened Steel (30 - 45HRC)	0.1DC x 0.2DC	Spindle Revolution (min ⁻¹)	7,400	5,600	4,500	3,700	2,800	2,200	1,900
			Feed Rate (mm/min)	220	250	257	280	250	240	230
	Stainless Steel	0.05DC x 0.1DC	Spindle Revolution (min ⁻¹)	5,800	4,400	3,500	2,900	2,200	1,800	1,500
			Feed Rate (mm/min)	160	180	190	180	190	190	170

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

Recommended Cutting Conditions

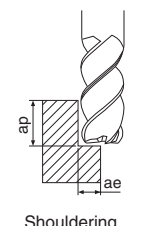
4YE8M

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø5	ø6	ø8	ø10	ø12	ø16	ø20
 Shouldering  Slotting	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)

4HF8M, 5HF8M, 6HF8M, 7HF8M, 8HF8M (Shouldering)

Applications	Workpiece Material	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø1	ø2	ø4	ø6	ø8	ø12	
 Shouldering	Tool Steel (< 40HRC) Prehardened Steel	1.5DC x 0.05DC (DC < ø3)	1.5DC x 0.1DC (ø3 ≤ DC)	Spindle Revolution (min ⁻¹)	20,700	20,000	11,100	7,400	5,600	3,700
				Feed Rate (mm/min)	910	1,750	2,000	2,900	2,930	2,930
	Tool Steel, Heat Treated Steel (40 ~ 45HRC) Prehardened Steel	1.5DC x 0.05DC	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) Spindle Revolution (min ⁻¹)	ø3	ø4	ø5	ø6	ø7	ø8	ø9	ø10	ø11	ø12	ø16
				Aluminum Alloys	Shouldering	1.5DC x 0.3DC	Feed Rate (mm/min)	2,400	2,800	3,500	4,200	4,300	4,400	4,500
Aluminum Alloys	Slotting	1DC	Feed Rate (mm/min)	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	350	350	350	350	350	350	350	350	350
Aluminum Alloy Casting	Shouldering	1.5DC x 0.3DC	Feed Rate (mm/min)	2,400	2,500	2,500	2,500	2,500	2,600	2,600	2,600	2,600	2,600	1,900
Aluminum Alloy Casting	Slotting	1DC	Feed Rate (mm/min)	1,300	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,800	1,300
				Plunge milling	1DC	300	250	200	200	190	150	150	100	100

- 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) Spindle Revolution (min ⁻¹)	ø3	ø4	ø5	ø6	ø7	ø8	ø9	ø10	ø11	ø12	ø16
				Aluminum Alloys	Shouldering	2.5DC x 0.3DC	Feed Rate (mm/min)	2,300	2,600	3,200	3,600	3,600	3,600	3,700
Aluminum Alloys	Slotting	0.5DC	Feed Rate (mm/min)	1,500	1,900	2,300	2,600	2,600	2,700	2,700	2,800	2,900	2,900	1,600
				Plunge milling	0.5DC	300	300	300	300	300	300	300	300	300
Aluminum Alloy Casting	Shouldering	2.5DC x 0.3DC	Feed Rate (mm/min)	2,300	2,200	2,000	2,000	2,000	2,000	2,000	2,000	2,100	2,100	1,500
Aluminum Alloy Casting	Slotting	0.5DC	Feed Rate (mm/min)	1,300	1,300	1,300	1,400	1,400	1,400	1,400	1,400	1,400	1,500	1,100
				Plunge milling	0.5DC	300	200	150	160	160	120	120	80	80

- 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.

3NESM

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø3	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Aluminum Alloys	Shouldering	1.5DC x 0.5DC	Spindle Revolution (min ⁻¹)	34,000	17,000	13,000	10,200	8,500	6,400	5,100
				Feed Rate (mm/min)	2,750	2,750	2,750	2,750	2,750	2,750	2,750
Slotting		Slotting	1DC	Spindle Revolution (min ⁻¹)	26,500	13,000	9,800	8,000	6,600	5,000	4,000
				Feed Rate (mm/min)	1,100	1,100	1,100	1,100	1,100	1,100	1,100

4FCX-KCD

Workpiece Material	Cutting Conditions	DC (mm)		
		ø8	ø10	ø12
CFRP	Spindle Revolution (min ⁻¹)	6,000~10,000	4,800~8,000	4,000~6,600
	Feed Rate (mm/rev)	0.05~0.08	0.05~0.08	0.05~0.08

2ZDF-KCD

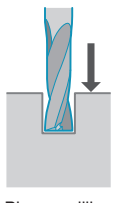
Workpiece Material	Cutting Conditions	DC (mm)		
		ø4.763	ø6.350	ø7.938
CFRP	Spindle Revolution (min ⁻¹)	3,400~6,700	2,500~5,000	2,000~4,000
	Feed Rate (mm/rev)	0.04~0.06	0.05~0.08	0.05~0.08

- The recommended cutting conditions are for Dry machining.
- Adjust cutting conditions according to the machine rigidity, the workpiece rigidity and the overhang length.
- Take sufficient measurement against the dust during machining.

Recommended Cutting Conditions (Plunge milling)

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

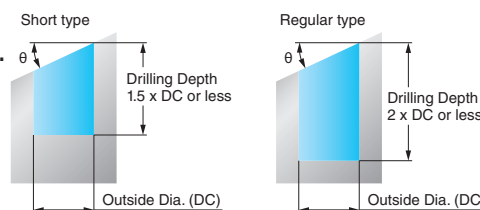
Drilling Depth Short : $ap \leq 1.5DC$ Regular : $ap \leq 2DC$

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
Feed Rate (mm/min)	350	350	430		430	520	520	520	520	520	520	520	520	520	520	480	480	480	480
Alloy Steel	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	450	420	420	420	420
Prehardened Steel (30 ~ 45HRC)	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	210	200	200	200	200
Nodular Cast Iron	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	390	360	360	360	360
Aluminum Alloys	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	1,270
Aluminum Alloy Casting	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	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)

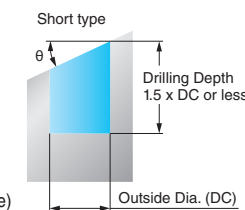
Drilling Depth : $ap \leq 1 \times D$

Workpiece Material	Application	Outside Dia. DC (mm)	ø3	ø3.5	ø4	ø4.5	ø5	ø6	ø8	ø10	ø12
			Structural Steel Carbon Steel	Spindle Revolution (min ⁻¹)	10,600	9,100	8,000	7,100	6,400	5,300	4,000
Feed Rate (mm/min)	830	830	830	830	830	830	830	830	830	830	
Alloy Steel	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	630	
Prehardened Steel (30 ~ 45HRC)	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	365	
Nodular Cast Iron	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	475	
Aluminum Alloys	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	1,050	
Aluminum Alloy Casting	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	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)

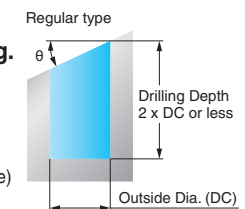
Drilling Depth : $ap \leq 3DC$

Workpiece Material	Application	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12
			Structural Steel Carbon Steel	Spindle Revolution (min ⁻¹)	10,600	7,950	6,350	5,300	3,980
Feed Rate (mm/min)	750	750	750	750	750	750	750	750	
Alloy Steel	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	600	
Prehardened Steel (30 ~ 45HRC)	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	300	280	280	
Stainless Steel	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	500	
Nodular Cast Iron	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	450	
Aluminum Alloys	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	1,270	
Aluminum Alloy Casting	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	850	

NOT recommended for slotting

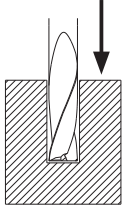
***This tool is specially designed for plunge milling and NOT recommended for slotting.**

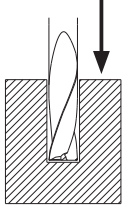
- Internal coolant is recommended.
 - Adjust cutting conditions to suit machine rigidity.
 - Use chuck and machine with as high rigidity as possible.
 - Pecking is recommended when drilling depth is 2D or over.
 - Cutting conditions adjustment is required when machining a slant surface, depending on 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%.
- If there is insufficient chip evacuation at the specified drill depth, it is recommended to peck or change cutting conditions.
- Pre-drilling is recommended if cutting is unstable.
 - Pre-drilling and pecking are recommended for stainless steel machining.



Recommended Cutting Conditions (Plunge milling)

2ZDK

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø1	ø2	ø3	ø4	ø5	ø6	ø8	
 <p>Plunge milling</p>	Structural Steel Carbon Steel	Spindle Revolution (min ⁻¹)		19,500	11,200	8,300	6,200	5,000	4,200	3,200	
		Feed Rate (mm/min)		300	380	520	520	520	520	520	520
	Alloy Steel	Spindle Revolution (min ⁻¹)		19,000	10,000	7,200	5,400	4,400	3,600	2,700	
		Feed Rate (mm/min)		300	320	450	450	450	450	450	450
	Prehardened Steel (30 ~ 45HRC)	Spindle Revolution (min ⁻¹)		16,000	8,000	3,900	2,900	2,300	1,900	1,500	
		Feed Rate (mm/min)		210	210	210	210	210	210	210	210
	Nodular Cast Iron	Spindle Revolution (min ⁻¹)		16,000	10,000	7,200	5,400	4,400	3,600	2,700	
		Feed Rate (mm/min)		200	300	390	390	390	390	390	390
	Aluminum Alloys	Spindle Revolution (min ⁻¹)		20,000	20,000	17,800	13,100	10,500	8,900	6,700	
		Feed Rate (mm/min)		500	850	1,270	1,270	1,270	1,270	1,270	1,270
	Aluminum Alloy Casting	Spindle Revolution (min ⁻¹)		20,000	20,000	13,100	10,000	8,000	6,700	5,000	
		Feed Rate (mm/min)		450	750	820	820	820	820	820	820

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø10	ø12	ø14	ø16	ø18	ø20	
 <p>Plunge milling</p>	Structural Steel Carbon Steel	Spindle Revolution (min ⁻¹)		2,500	2,100	1,800	1,600	1,400	1,300	
		Feed Rate (mm/min)		450	450	450	450	450	450	450
	Alloy Steel	Spindle Revolution (min ⁻¹)		2,200	1,800	1,500	1,350	1,200	1,100	
		Feed Rate (mm/min)		400	400	400	400	400	400	400
	Prehardened Steel (30 ~ 45HRC)	Spindle Revolution (min ⁻¹)		1,200	1,000	850	750	650	600	
		Feed Rate (mm/min)		190	190	190	190	190	190	190
	Nodular Cast Iron	Spindle Revolution (min ⁻¹)		2,200	1,800	1,550	1,350	1,200	1,100	
		Feed Rate (mm/min)		340	340	340	340	340	340	340
	Aluminum Alloys	Spindle Revolution (min ⁻¹)		5,400	4,500	3,800	3,400	3,000	2,700	
		Feed Rate (mm/min)		1,270	1,270	1,270	1,270	1,270	1,270	1,270
	Aluminum Alloy Casting	Spindle Revolution (min ⁻¹)		4,000	3,400	2,900	2,500	2,200	2,000	
		Feed Rate (mm/min)		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.
- 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%.

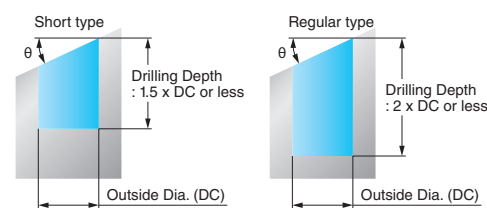


Fig. 1



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