



KYOCERA Solid Tools



KYOCERA UNIMERCO

ADVANCING PRODUCTIVITY

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Solid drills



Solid drills

03-50

KDA

05-17

QDA

18-37

Gamma Drill™




38-50

Tool selection guide next page



Tool selection guide

Application and selection

Series	Purpose	Internal coolant	Shape	Workpiece material						Overall length xD	Drilling diameter (mm)																			
				Steel	Stainless steel	Titanium alloys	Nickel alloys	Cast iron	Aluminum & Non-ferrous metals		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
				P	M	S	S	K	N																					
Standard	QDA	General		★	★	★	★	★	★	3																				
										5																				
										8																				
										3																				
										5																				
										8																				
High performance	KDA	High productivity		★	★				★	3																				
										5																				
										8																				
										3																				
										5																				
										8																				
	GammaDrill™ (3 cutting edge)	Aluminum							★	5																				
										8																				
										12																				

★ : 1st Recommendation

High efficiency coated solid carbide drill

KDA

KDA is for excellent all-around drilling performance.
Large lineup accommodates a wide variety of applications.

Styles available

Type N Normal type

General purpose design without coolant holes
Economical style for machining with external coolant

Diameter range



Cutting diameters available in 0.1 mm increments



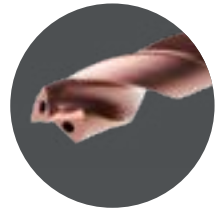
Type C with Coolant hole

Coolant-through design
Provides higher efficiency and stable machining with stainless steel, etc.

Diameter range



Cutting diameters available in 0.1 mm increments

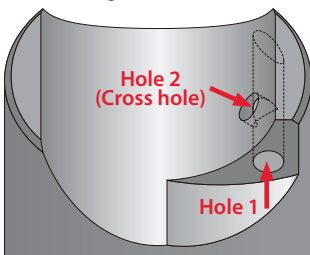


(User evaluation)

Case studies

The KDA extends 20% longer than current tool life.
The condition of the cutting edge was good, and corner wear was less than competitor.

Body 42CrMo4 ø6.9 Drilling



Type C
KDA0690X05S080C

Tool life

KDA

2,400 pcs or more/tool

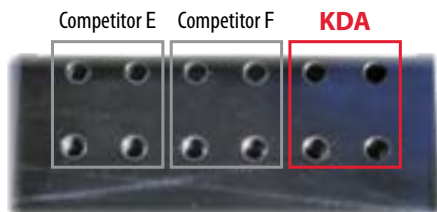
Competitor C
Competitor D

2,000 pcs/tool

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), Turn-mill center

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 (hole depth = 7.5 mm)

KDA

0.022 mm

Competitor E

0.042 mm

Cutting conditions:
Vc = 80 m/min, f = 0.15 mm/rev, hole depth = 15 mm
Wet (External coolant), BT50



1

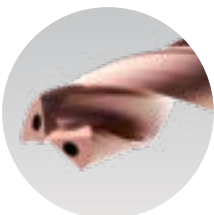
Applicable to a wide range of machining applications

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

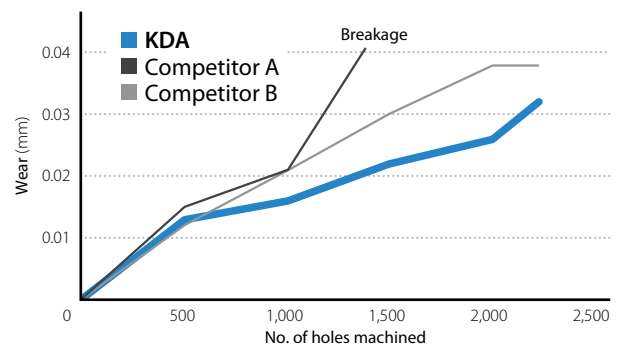


2

High-performance coating maintains long tool life

Excellent wear and heat resistance
 Aluminum Chrome (AlCr) coating

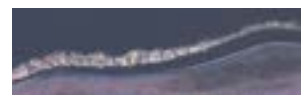
Wear resistance comparison (Internal evaluation)



Cutting conditions: Vc = 120 m/min, f = 0.23 mm/rev, H = 24 mm, Wet (Internal coolant) C50, BT 50, ø6 mm, 5xD, type C



KDA



Competitor B



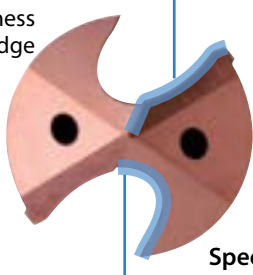
3

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)

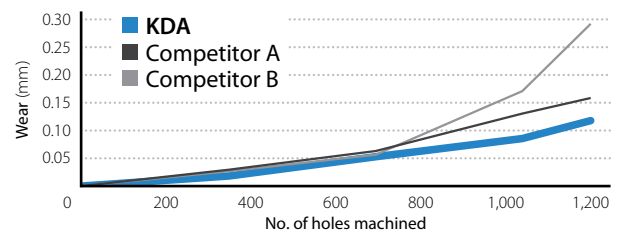
Cutting conditions:
 $V_c = 80 \text{ m/min}$, $f = 0.14 \text{ mm/rev}$,
 hole depth = 24 mm,
 Wet (Internal coolant)
 BT 50 $\phi 6 \text{ mm}$ (5D) Type C

4

Supports a variety of workpieces

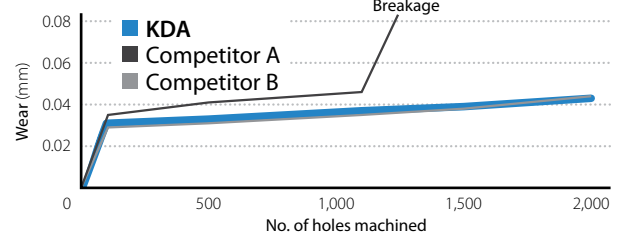
Compatible not only with carbon steel, but also mold steel, stainless steel, cast iron machining, etc.

Alloy steel 42CrMo4 (32 HRC) (Internal evaluation)

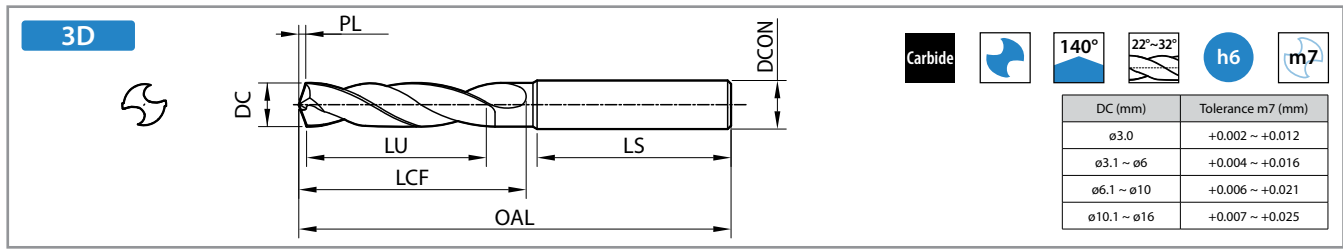


Cutting conditions: $V_c = 100 \text{ m/min}$, $f = 0.15 \text{ mm/rev}$, hole depth = 24 mm, Wet (Internal coolant), BT 50, $\phi 6 \text{ mm}$, 5xD, type C

Stainless steel X5CrNi18-9 (Internal evaluation)



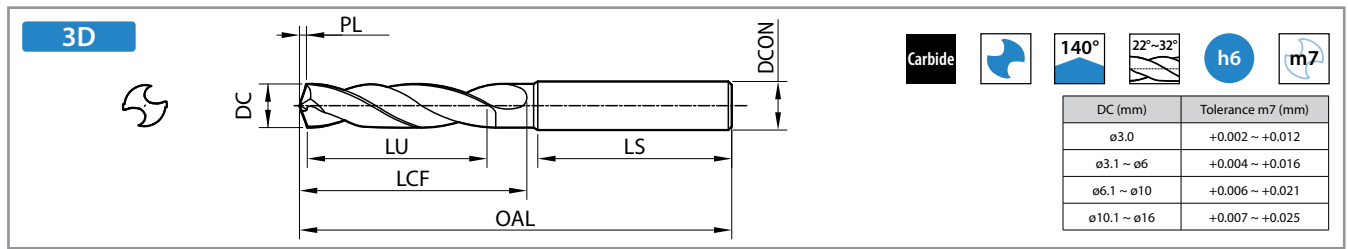
Cutting conditions: $V_c = 80 \text{ m/min}$, $f = 0.14 \text{ mm/rev}$, hole depth = 24 mm, Wet (Internal coolant), BT 50, $\phi 6 \text{ mm}$, 5xD, type C



Description	Availability	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	Availability	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

KDA Type N No coolant holes

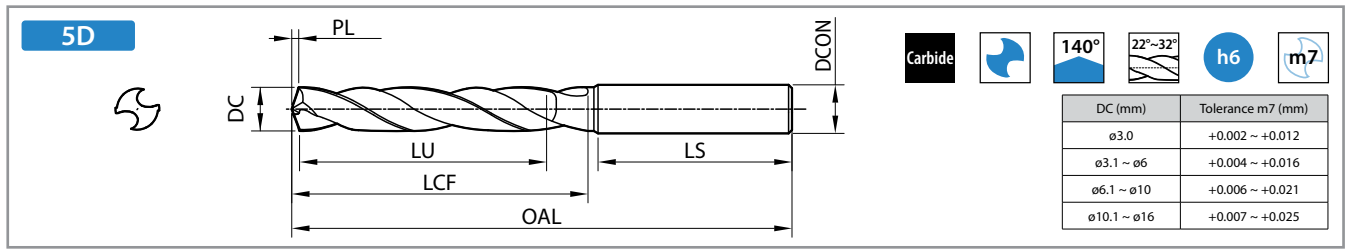


Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0960X03S100N	●	9.6	10	89	32.6	47	40	1.7
KDA0970X03S100N	●	9.7	10	89	32.4	47	40	1.7
KDA0980X03S100N	●	9.8	10	89	32.3	47	40	1.7
KDA0990X03S100N	●	9.9	10	89	32.1	47	40	1.8
KDA1000X03S100N	●	10	10	89	32.0	47	40	1.8
KDA1010X03S120N	●	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	Availability	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.

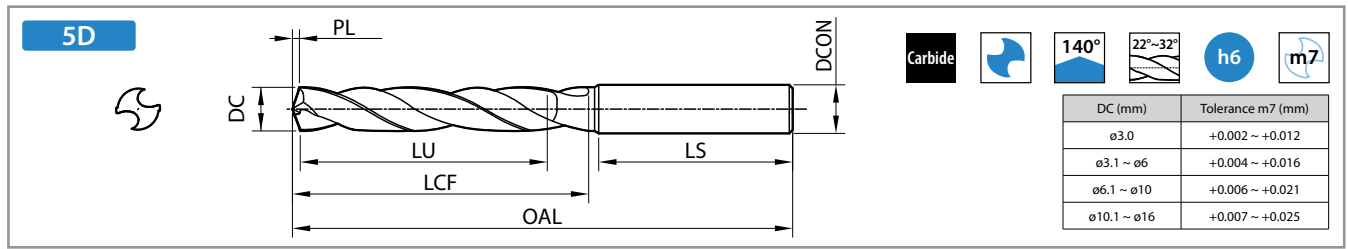
● : Available



Description	Availability	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	Availability	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

KDA Type N No coolant holes

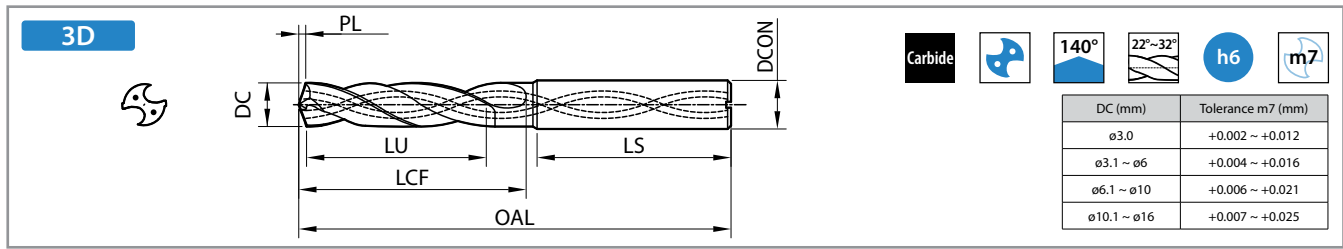


Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0960X05S100N	●	9.6	10	103	46.6	61	40	1.7
KDA0970X05S100N	●	9.7	10	103	46.4	61	40	1.7
KDA0980X05S100N	●	9.8	10	103	46.3	61	40	1.7
KDA0990X05S100N	●	9.9	10	103	46.1	61	40	1.8
KDA1000X05S100N	●	10	10	103	46.0	61	40	1.8
KDA1010X05S120N	●	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	Availability	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

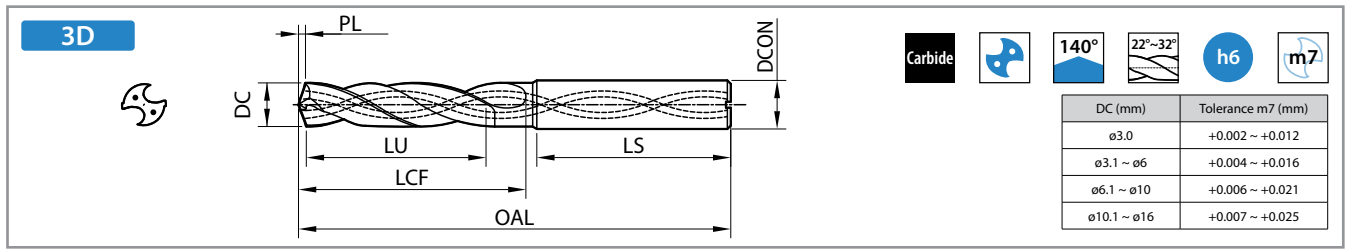
* Drilling depth is an approximate indication of L/D.
Depending on the size, it may be smaller than the listed L/D.

● : Available



Description	Availability	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	Availability	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

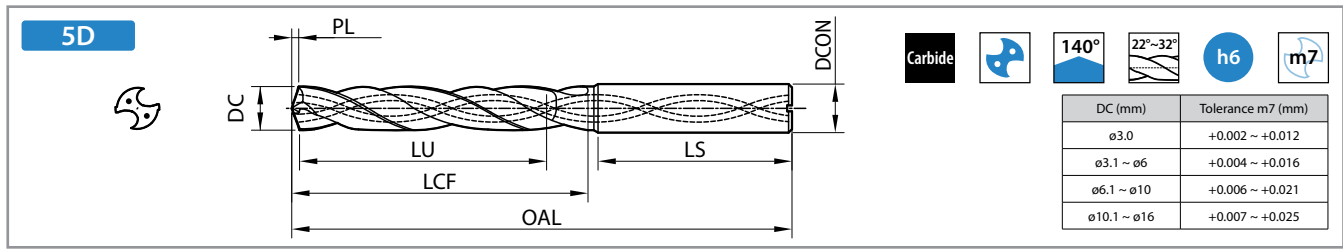


Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
KDA0960X03S100C	●	9.6	10	89	32.6	47	40	1.7
KDA0970X03S100C	●	9.7	10	89	32.4	47	40	1.7
KDA0980X03S100C	●	9.8	10	89	32.3	47	40	1.7
KDA0990X03S100C	●	9.9	10	89	32.1	47	40	1.8
KDA1000X03S100C	●	10	10	89	32.0	47	40	1.8
KDA1010X03S120C	●	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	Availability	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.

● : Available



Description	Availability	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	Availability	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	Availability	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	Availability	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.

● : Available

Icon glossary



Coolant holes



No coolant holes



Cutting-edge angle



Helix angle





Shank dia. DCON tolerance



Cutting dia. DC tolerance

KDA Reference cutting conditions table

KDA **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 (< 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 (< 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 (< 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 (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 (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 (< 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 (< 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. Run out of tool should be in range of 0,02 mm by 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

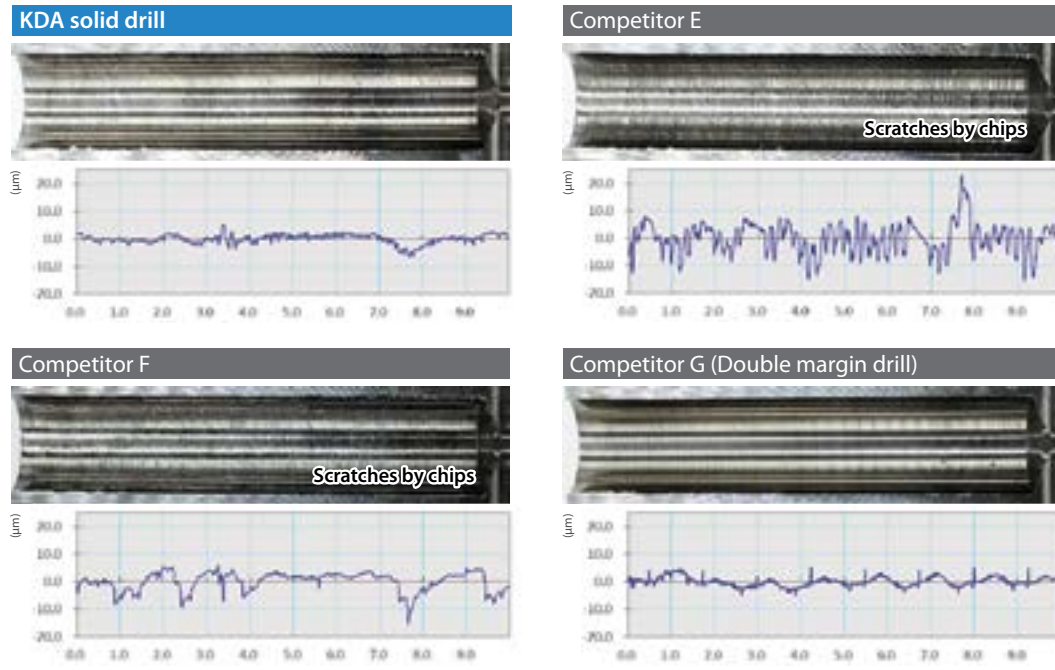
KDA0950X03S100C

KDA	0950	X	03	S100	C
Product name	Cutting dia. DC ø9.5	Drilling depth* (L/D) 03 : 3D 05 : 5D	Shank dia. DCON ø10.0	Type N: No coolant holes C: With coolant holes	

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

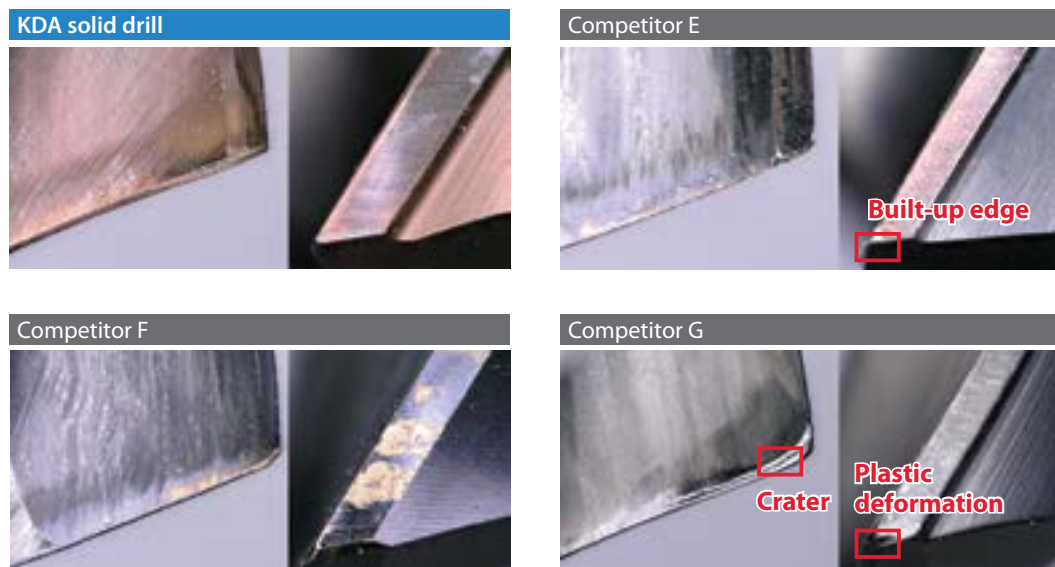
KDA Case studies

Finished surface comparison (Internal evaluation)



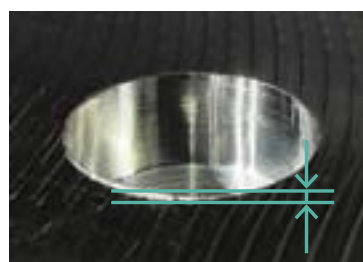
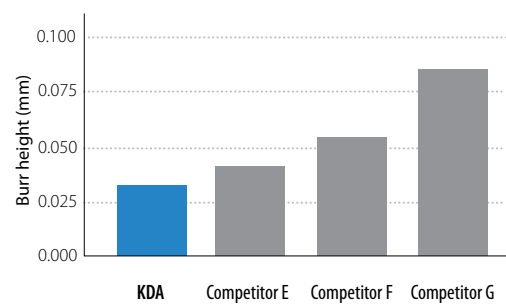
Cutting conditions: \varnothing 8.0 mm, 5xD, 42CrMo4, $v_c = 90$ m/min, $f = 0.20$ mm/rev, hole depth = 40 mm, wet (internal supply), 640 holes (36 m / 26 min.)

Corner wear comparison (Internal evaluation)



Cutting conditions: \varnothing 8.0 mm, 5xD, 42CrMo4, $v_c = 90$ m/min, $f = 0.20$ mm/rev, hole depth = 40 mm, wet (internal supply), 640 holes (36 m / 26 min.)

Burr height comparison (Internal evaluation)



Cutting conditions: \varnothing 8.0 mm, 5xD, 42CrMo4, $v_c = 90$ m/min, $f = 0.20$ mm/rev, wet (internal supply)

Versatile drill for higher productivity

QDA

The QDA drill offers good chip evacuation and the rigid tool design improves tool life significantly.

Styles available Tool range (Z2)

Type N Normal type

General purpose design without coolant holes.
Economical style for machining with external coolant.

Diameter
range

3xD

5xD

Ø3.0 - Ø20.0 mm



Type C With Coolant hole

Coolant-through design provides higher efficiency and
stable machining with stainless steels, etc.

Diameter
range

3xD

5xD

8xD

Ø3.0 - Ø20.0 mm



Micro Internal coolant

Coolant-through design provides extended tool life and
stable machining in various materials.

Diameter
range

5xD

8xD

Ø1.0 - Ø3.0 mm





Coated solid carbide drill

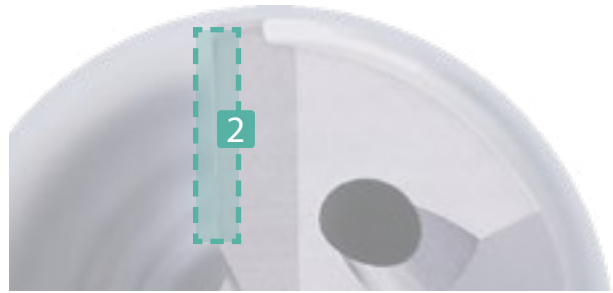
Wider chip pocket

The wider area is offering more space so that the chip pocket enhances a better and smoother chip evacuation.



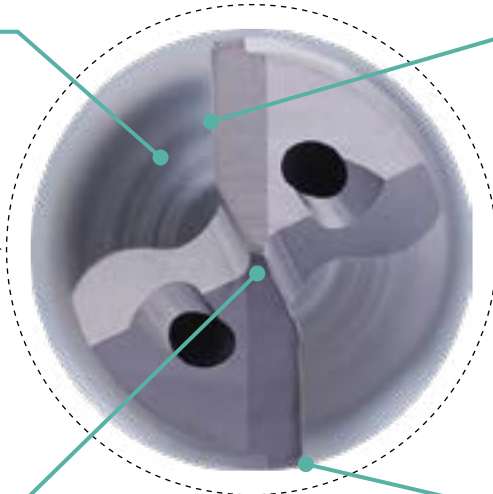
Straight edge profile

Creating shorter chips and offering a reinforced cutting edge for longer tool life while machining on high level.



1 Wider chip pocket
Smoother chip evacuation

2 Straight edge profile
Reinforced cutting edge



3 Bigger K-value
Higher feed rate

4 Corner edge chamfer
Better surface finishing

Core diameter

The QDA is suitable for higher feed rates and the bigger core diameter enhances tool durability drastically.



Corner edge chamfer

This makes it an ideal tool for cast iron and offering better surface finishing in general.



Versatility

Suitable for 5 material groups

P

M

K

N

S



Chip condition

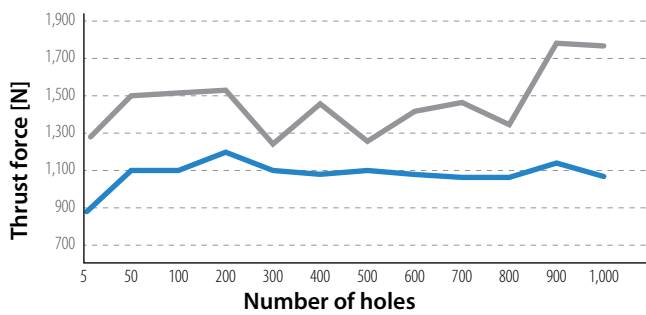
Good chip forming



Cutting conditions: workpiece: stainless steel 316L, VC = 60 mm, f = 0.16 mm/rev.

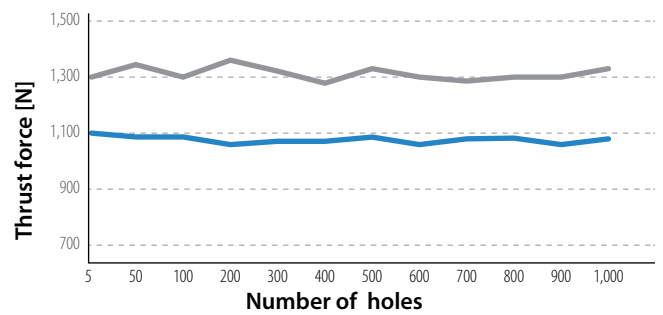
Thrust force (Internal evaluation) (Fz)

St.52



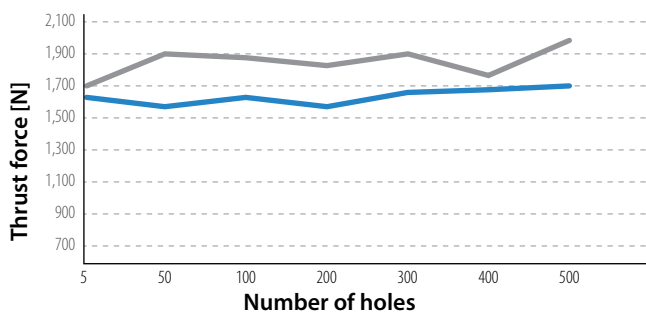
- From average value competitor is **35% higher**
- Lower and more stable thrust force from QDA

GGG40

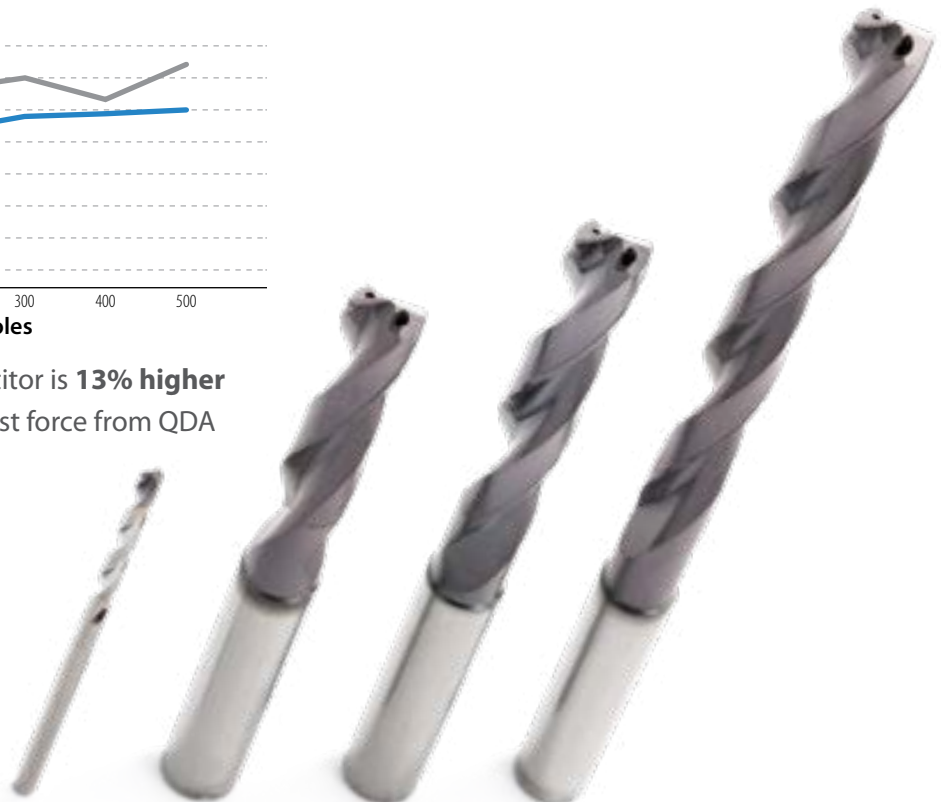


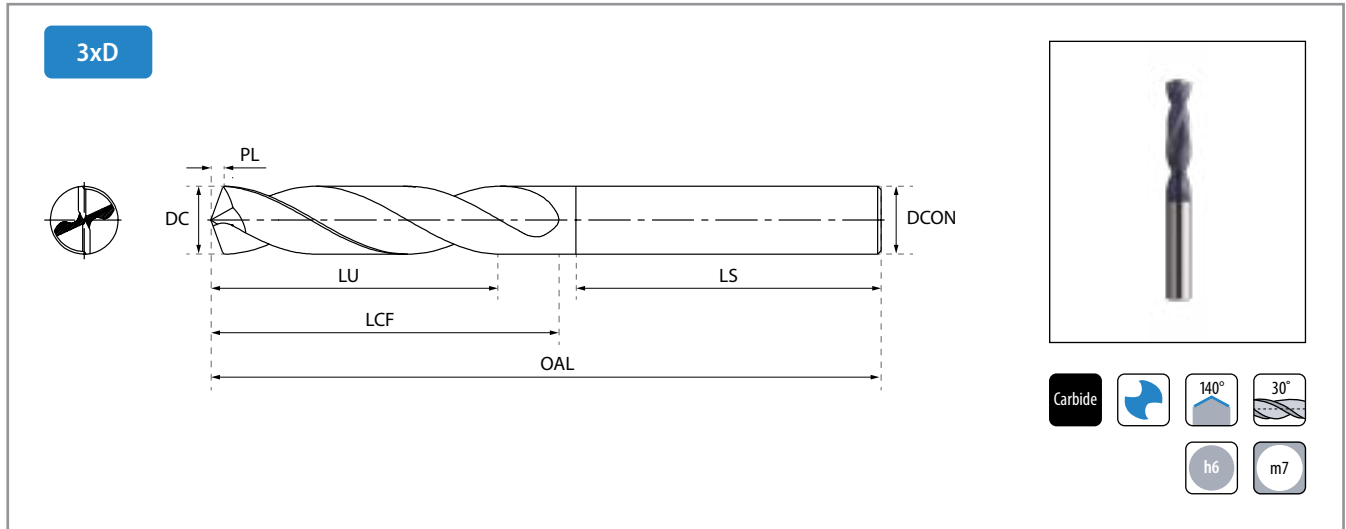
- From average value competitor is **23% higher**
- Lower thrust force from QDA

AISI 304



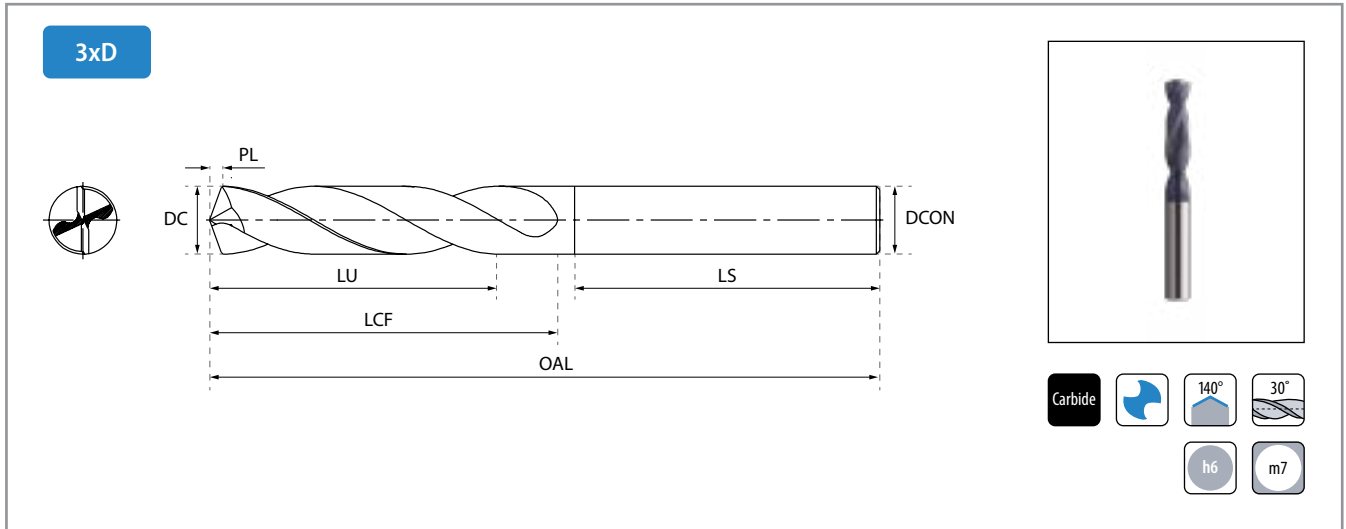
- From average value competitor is **13% higher**
- Lower and more stable thrust force from QDA





Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0300X03S060N	●	3	6	62	14	20	36	0.6
QDA0310X03S060N	●	3.1	6	62	14	20	36	0.6
QDA0320X03S060N	●	3.2	6	62	14	20	36	0.6
QDA0330X03S060N	●	3.3	6	62	14	20	36	0.7
QDA0340X03S060N	●	3.4	6	62	14	20	36	0.7
QDA0350X03S060N	●	3.5	6	62	14	20	36	0.7
QDA0360X03S060N	●	3.6	6	62	14	20	36	0.7
QDA0370X03S060N	●	3.7	6	62	14	20	36	0.7
QDA0380X03S060N	●	3.8	6	66	17	24	36	0.8
QDA0390X03S060N	●	3.9	6	66	17	24	36	0.8
QDA0400X03S060N	●	4	6	66	17	24	36	0.8
QDA0410X03S060N	●	4.1	6	66	17	24	36	0.8
QDA0420X03S060N	●	4.2	6	66	17	24	36	0.8
QDA0430X03S060N	●	4.3	6	66	17	24	36	0.9
QDA0440X03S060N	●	4.4	6	66	17	24	36	0.9
QDA0450X03S060N	●	4.5	6	66	17	24	36	0.9
QDA0460X03S060N	●	4.6	6	66	17	24	36	0.9
QDA0470X03S060N	●	4.7	6	66	17	24	36	0.9
QDA0480X03S060N	●	4.8	6	66	20	28	36	1.0
QDA0490X03S060N	●	4.9	6	66	20	28	36	1.0
QDA0500X03S060N	●	5	6	66	20	28	36	1.0
QDA0510X03S060N	●	5.1	6	66	20	28	36	1.0
QDA0520X03S060N	●	5.2	6	66	20	28	36	1.0
QDA0530X03S060N	●	5.3	6	66	20	28	36	1.0
QDA0540X03S060N	●	5.4	6	66	20	28	36	1.1
QDA0550X03S060N	●	5.5	6	66	20	28	36	1.1
QDA0560X03S060N	●	5.6	6	66	20	28	36	1.1
QDA0570X03S060N	●	5.7	6	66	20	28	36	1.1

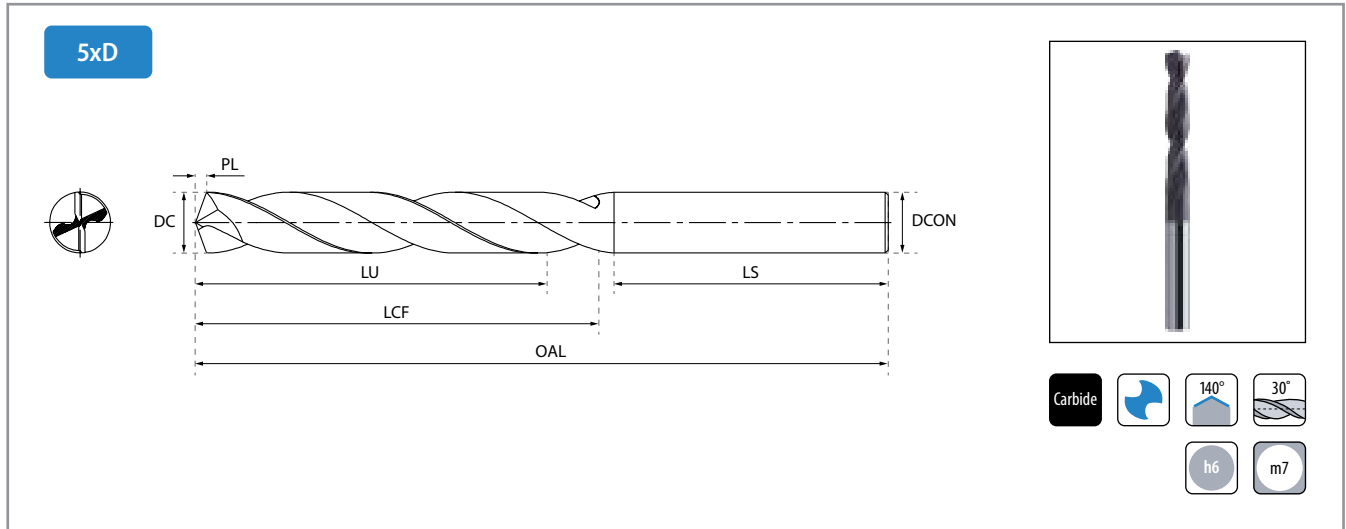
Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0580X03S060N	●	5.8	6	66	20	28	36	1.1
QDA0590X03S060N	●	5.9	6	66	20	28	36	1.2
QDA0600X03S060N	●	6	6	66	20	28	36	1.2
QDA0610X03S080N	●	6.1	8	79	24	34	36	1.2
QDA0620X03S080N	●	6.2	8	79	24	34	36	1.2
QDA0630X03S080N	●	6.3	8	79	24	34	36	1.2
QDA0640X03S080N	●	6.4	8	79	24	34	36	1.3
QDA0650X03S080N	●	6.5	8	79	24	34	36	1.3
QDA0660X03S080N	●	6.6	8	79	24	34	36	1.3
QDA0670X03S080N	●	6.7	8	79	24	34	36	1.3
QDA0680X03S080N	●	6.8	8	79	24	34	36	1.3
QDA0690X03S080N	●	6.9	8	79	24	34	36	1.4
QDA0700X03S080N	●	7	8	79	24	34	36	1.4
QDA0710X03S080N	●	7.1	8	79	29	41	36	1.4
QDA0720X03S080N	●	7.2	8	79	29	41	36	1.4
QDA0730X03S080N	●	7.3	8	79	29	41	36	1.4
QDA0740X03S080N	●	7.4	8	79	29	41	36	1.5
QDA0750X03S080N	●	7.5	8	79	29	41	36	1.5
QDA0760X03S080N	●	7.6	8	79	29	41	36	1.5
QDA0770X03S080N	●	7.7	8	79	29	41	36	1.5
QDA0780X03S080N	●	7.8	8	79	29	41	36	1.5
QDA0790X03S080N	●	7.9	8	79	29	41	36	1.6
QDA0800X03S080N	●	8	8	79	29	41	36	1.6
QDA0810X03S100N	●	8.1	10	89	35	47	40	1.6
QDA0820X03S100N	●	8.2	10	89	35	47	40	1.6
QDA0830X03S100N	●	8.3	10	89	35	47	40	1.6
QDA0840X03S100N	●	8.4	10	89	35	47	40	1.7
QDA0850X03S100N	●	8.5	10	89	35	47	40	1.7



Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0860X03S100N	●	8.6	10	89	35	47	40	1.7
QDA0870X03S100N	●	8.7	10	89	35	47	40	1.7
QDA0880X03S100N	●	8.8	10	89	35	47	40	1.7
QDA0890X03S100N	●	8.9	10	89	35	47	40	1.8
QDA0900X03S100N	●	9	10	89	35	47	40	1.8
QDA0910X03S100N	●	9.1	10	89	35	47	40	1.8
QDA0920X03S100N	●	9.2	10	89	35	47	40	1.8
QDA0930X03S100N	●	9.3	10	89	35	47	40	1.8
QDA0940X03S100N	●	9.4	10	89	35	47	40	1.9
QDA0950X03S100N	●	9.5	10	89	35	47	40	1.9
QDA0960X03S100N	●	9.6	10	89	35	47	40	1.9
QDA0970X03S100N	●	9.7	10	89	35	47	40	1.9
QDA0980X03S100N	●	9.8	10	89	35	47	40	1.9
QDA0990X03S100N	●	9.9	10	89	35	47	40	2.0
QDA1000X03S100N	●	10	10	89	35	47	40	2.0
QDA1010X03S120N	●	10.1	12	102	40	55	45	2.0
QDA1020X03S120N	●	10.2	12	102	40	55	45	2.0
QDA1030X03S120N	●	10.3	12	102	40	55	45	2.0
QDA1040X03S120N	●	10.4	12	102	40	55	45	2.1
QDA1050X03S120N	●	10.5	12	102	40	55	45	2.1
QDA1060X03S120N	●	10.6	12	102	40	55	45	2.1
QDA1070X03S120N	●	10.7	12	102	40	55	45	2.1
QDA1080X03S120N	●	10.8	12	102	40	55	45	2.1
QDA1090X03S120N	●	10.9	12	102	40	55	45	2.2
QDA1100X03S120N	●	11	12	102	40	55	45	2.2
QDA1110X03S120N	●	11.1	12	102	40	55	45	2.2
QDA1120X03S120N	●	11.2	12	102	40	55	45	2.2
QDA1130X03S120N	●	11.3	12	102	40	55	45	2.2

Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA1140X03S120N	●	11.4	12	102	40	55	45	2.3
QDA1150X03S120N	●	11.5	12	102	40	55	45	2.3
QDA1160X03S120N	●	11.6	12	102	40	55	45	2.3
QDA1170X03S120N	●	11.7	12	115	40	55	45	2.3
QDA1180X03S120N	●	11.8	12	115	40	55	45	2.3
QDA1190X03S120N	●	11.9	12	115	40	55	45	2.4
QDA1200X03S120N	●	12	12	115	40	55	45	2.4
QDA1250X03S140N	●	12.5	14	107	43	60	45	2.5
QDA1270X03S140N	●	12.7	14	107	43	60	45	2.5
QDA1300X03S140N	●	13	14	107	43	60	45	2.6
QDA1350X03S140N	●	13.5	14	107	43	60	45	2.7
QDA1370X03S140N	●	13.7	14	107	43	60	45	2.7
QDA1400X03S140N	●	14	14	107	43	60	45	2.8
QDA1450X03S160N	●	14.5	16	115	45	65	48	2.9
QDA1500X03S160N	●	15	16	115	45	65	48	3.0
QDA1550X03S160N	●	15.5	16	115	45	65	48	3.1
QDA1600X03S160N	●	16	16	115	45	65	48	3.2
QDA1650X03S180N	●	16.5	18	123	51	73	48	3.3
QDA1700X03S180N	●	17	18	123	51	73	48	3.4
QDA1750X03S180N	●	17.5	18	123	51	73	48	3.5
QDA1800X03S180N	●	18	18	123	51	73	48	3.6
QDA1850X03S200N	●	18.5	20	131	55	79	50	3.7
QDA1900X03S200N	●	19	20	131	55	79	50	3.8
QDA1950X03S200N	●	19.5	20	131	55	79	50	3.9
QDA2000X03S200N	●	20	20	131	55	79	50	4.0

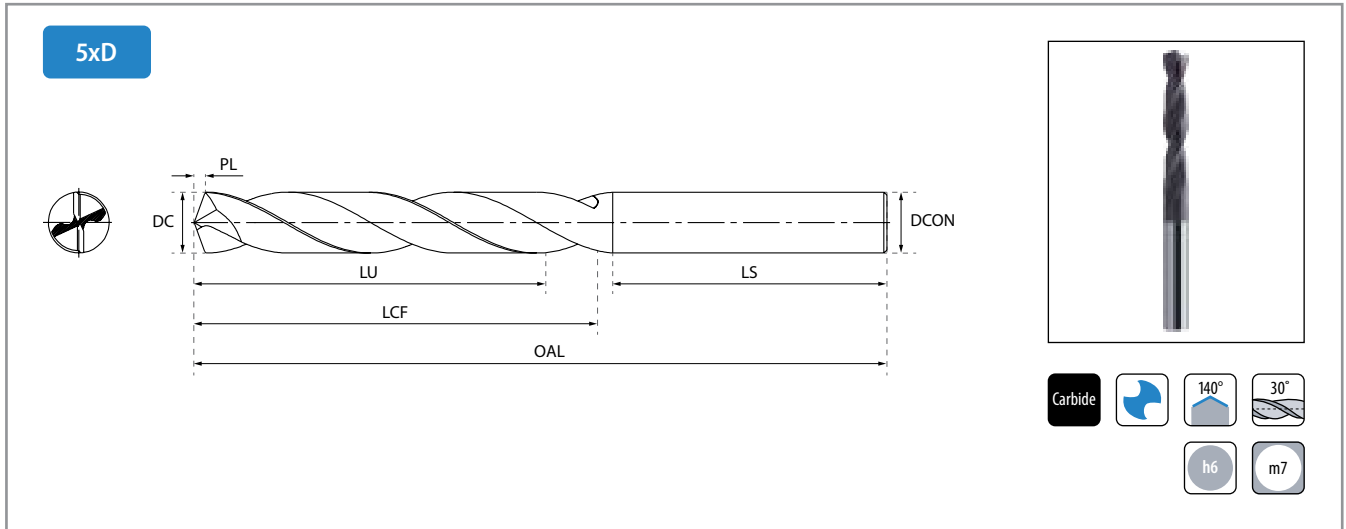
● : Available



Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0300X05S060N	●	3	6	66	23	28	36	0.6
QDA0310X05S060N	●	3.1	6	66	23	28	36	0.6
QDA0320X05S060N	●	3.2	6	66	23	28	36	0.6
QDA0330X05S060N	●	3.3	6	66	23	28	36	0.7
QDA0340X05S060N	●	3.4	6	66	23	28	36	0.7
QDA0350X05S060N	●	3.5	6	66	23	28	36	0.7
QDA0360X05S060N	●	3.6	6	66	23	28	36	0.7
QDA0370X05S060N	●	3.7	6	66	23	28	36	0.7
QDA0380X05S060N	●	3.8	6	74	29	36	36	0.8
QDA0390X05S060N	●	3.9	6	74	29	36	36	0.8
QDA0400X05S060N	●	4	6	74	29	36	36	0.8
QDA0410X05S060N	●	4.1	6	74	29	36	36	0.8
QDA0420X05S060N	●	4.2	6	74	29	36	36	0.8
QDA0430X05S060N	●	4.3	6	74	29	36	36	0.9
QDA0440X05S060N	●	4.4	6	74	29	36	36	0.9
QDA0450X05S060N	●	4.5	6	74	29	36	36	0.9
QDA0460X05S060N	●	4.6	6	74	29	36	36	0.9
QDA0470X05S060N	●	4.7	6	74	29	36	36	0.9
QDA0480X05S060N	●	4.8	6	82	35	44	36	1.0
QDA0490X05S060N	●	4.9	6	82	35	44	36	1.0
QDA0500X05S060N	●	5	6	82	35	44	36	1.0
QDA0510X05S060N	●	5.1	6	82	35	44	36	1.0
QDA0520X05S060N	●	5.2	6	82	35	44	36	1.0
QDA0530X05S060N	●	5.3	6	82	35	44	36	1.0
QDA0540X05S060N	●	5.4	6	82	35	44	36	1.1
QDA0550X05S060N	●	5.5	6	82	35	44	36	1.1
QDA0560X05S060N	●	5.6	6	82	35	44	36	1.1
QDA0570X05S060N	●	5.7	6	82	35	44	36	1.1

Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0580X05S060N	●	5.8	6	82	35	44	36	1.1
QDA0590X05S060N	●	5.9	6	82	35	44	36	1.2
QDA0600X05S060N	●	6	6	82	35	44	36	1.2
QDA0610X05S080N	●	6.1	8	91	43	53	36	1.2
QDA0620X05S080N	●	6.2	8	91	43	53	36	1.2
QDA0630X05S080N	●	6.3	8	91	43	53	36	1.2
QDA0640X05S080N	●	6.4	8	91	43	53	36	1.3
QDA0650X05S080N	●	6.5	8	91	43	53	36	1.3
QDA0660X05S080N	●	6.6	8	91	43	53	36	1.3
QDA0670X05S080N	●	6.7	8	91	43	53	36	1.3
QDA0680X05S080N	●	6.8	8	91	43	53	36	1.3
QDA0690X05S080N	●	6.9	8	91	43	53	36	1.4
QDA0700X05S080N	●	7	8	91	43	53	36	1.4
QDA0710X05S080N	●	7.1	8	91	43	53	36	1.4
QDA0720X05S080N	●	7.2	8	91	43	53	36	1.4
QDA0730X05S080N	●	7.3	8	91	43	53	36	1.4
QDA0740X05S080N	●	7.4	8	91	43	53	36	1.5
QDA0750X05S080N	●	7.5	8	91	43	53	36	1.5
QDA0760X05S080N	●	7.6	8	91	43	53	36	1.5
QDA0770X05S080N	●	7.7	8	91	43	53	36	1.5
QDA0780X05S080N	●	7.8	8	91	43	53	36	1.5
QDA0790X05S080N	●	7.9	8	91	43	53	36	1.6
QDA0800X05S080N	●	8	8	91	43	53	36	1.6
QDA0810X05S100N	●	8.1	10	91	43	53	36	1.6
QDA0820X05S100N	●	8.2	10	103	49	61	36	1.6
QDA0830X05S100N	●	8.3	10	103	49	61	36	1.6
QDA0840X05S100N	●	8.4	10	103	49	61	36	1.7
QDA0850X05S100N	●	8.5	10	103	49	61	36	1.7

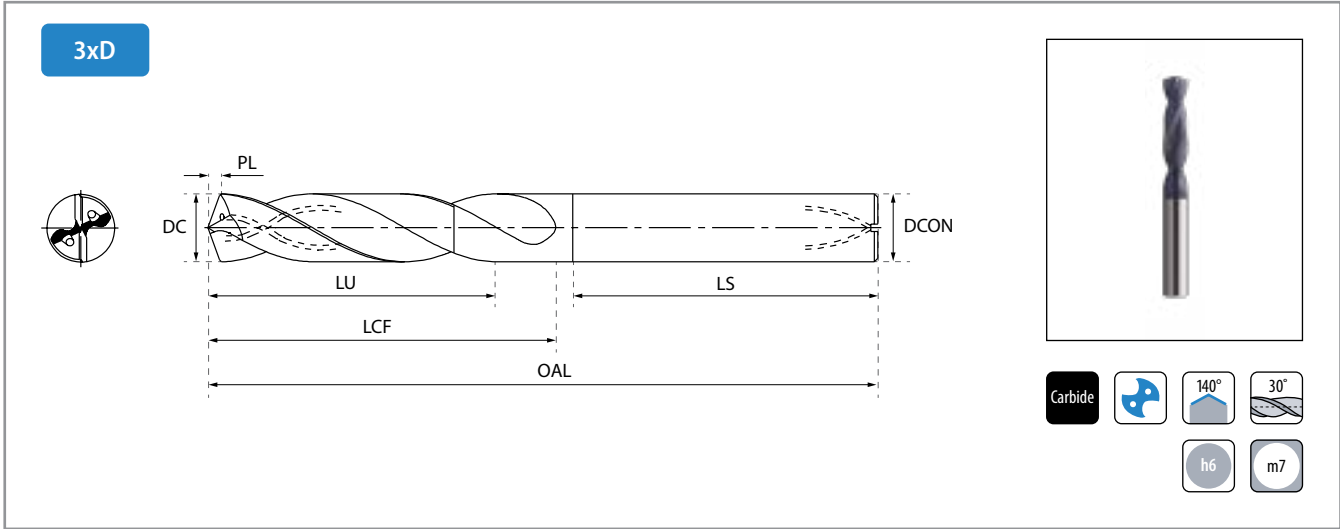
QDA Type N No coolant holes



Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0860X05S100N	●	8.6	10	103	49	61	36	1.7
QDA0870X05S100N	●	8.7	10	103	49	61	36	1.7
QDA0880X05S100N	●	8.8	10	103	49	61	36	1.7
QDA0890X05S100N	●	8.9	10	103	49	61	36	1.8
QDA0900X05S100N	●	9	10	103	49	61	40	1.8
QDA0910X05S100N	●	9.1	10	103	49	61	40	1.8
QDA0920X05S100N	●	9.2	10	103	49	61	40	1.8
QDA0930X05S100N	●	9.3	10	103	49	61	40	1.8
QDA0940X05S100N	●	9.4	10	103	49	61	40	1.9
QDA0950X05S100N	●	9.5	10	103	49	61	40	1.9
QDA0960X05S100N	●	9.6	10	103	49	61	40	1.9
QDA0970X05S100N	●	9.7	10	103	49	61	40	1.9
QDA0980X05S100N	●	9.8	10	103	49	61	40	1.9
QDA0990X05S100N	●	9.9	10	103	49	61	40	2.0
QDA1000X05S100N	●	10	10	103	49	61	40	2.0
QDA1020X05S120N	●	10.2	12	118	56	71	45	2.0
QDA1050X05S120N	●	10.5	12	118	56	71	45	2.1
QDA1080X05S120N	●	10.8	12	118	56	71	45	2.1
QDA1100X05S120N	●	11	12	118	56	71	45	2.2
QDA1120X05S120N	●	11.2	12	118	56	71	45	2.2
QDA1130X05S120N	●	11.3	12	118	56	71	45	2.2
QDA1150X05S120N	●	11.5	12	118	56	71	45	2.3
QDA1180X05S120N	●	11.8	12	118	56	71	45	2.3
QDA1200X05S120N	●	12	12	118	56	71	45	2.4
QDA1220X05S140N	●	12.2	14	124	60	77	45	2.4
QDA1250X05S140N	●	12.5	14	124	60	77	45	2.5
QDA1270X05S140N	●	12.7	14	124	60	77	45	2.5
QDA1280X05S140N	●	12.8	14	124	60	77	45	2.5

Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA1300X05S140N	●	13	14	124	60	77	45	2.6
QDA1330X05S140N	●	13.3	14	124	60	77	45	2.6
QDA1350X05S140N	●	13.5	14	124	60	77	45	2.7
QDA1370X05S140N	●	13.7	14	124	60	77	45	2.7
QDA1380X05S140N	●	13.8	14	124	60	77	45	2.7
QDA1400X05S140N	●	14	14	124	60	77	45	2.7
QDA1450X05S160N	●	14.5	16	133	63	83	48	2.9
QDA1500X05S160N	●	15	16	133	63	83	48	3.0
QDA1530X05S160N	●	15.3	16	133	63	83	48	3.0
QDA1550X05S160N	●	15.5	16	133	63	83	48	3.1
QDA1580X05S160N	●	15.8	16	133	63	83	48	3.1
QDA1600X05S160N	●	16	16	133	63	83	48	3.2
QDA1650X05S180N	●	16.5	18	143	71	93	48	3.3
QDA1700X05S180N	●	17	18	143	71	93	48	3.4
QDA1750X05S180N	●	17.5	18	143	71	93	48	3.5
QDA1800X05S180N	●	18	18	143	71	93	48	3.6
QDA1850X05S200N	●	18.5	20	153	77	101	50	3.7
QDA1900X05S200N	●	19	20	153	77	101	50	3.8
QDA1950X05S200N	●	19.5	20	153	77	101	50	3.9
QDA2000X05S200N	●	20	20	153	77	101	50	4.0

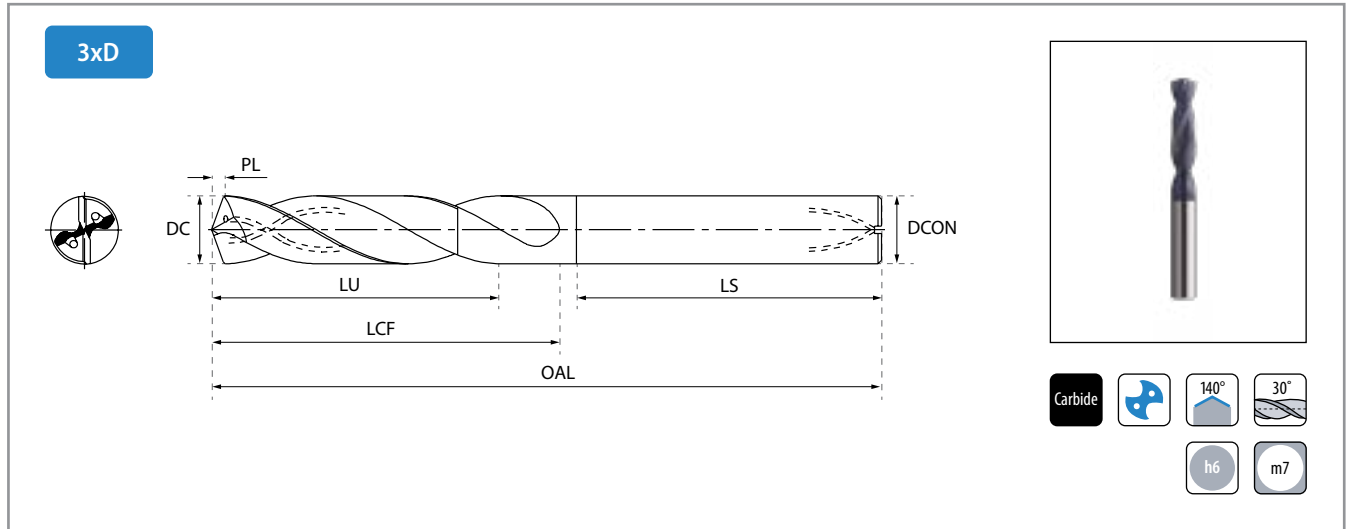
● : Available



Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0300X03S060C	●	3	6	62	14	20	36	0.6
QDA0310X03S060C	●	3.1	6	62	14	20	36	0.6
QDA0320X03S060C	●	3.2	6	62	14	20	36	0.6
QDA0330X03S060C	●	3.3	6	62	14	20	36	0.7
QDA0340X03S060C	●	3.4	6	62	14	20	36	0.7
QDA0350X03S060C	●	3.5	6	62	14	20	36	0.7
QDA0360X03S060C	●	3.6	6	62	14	20	36	0.7
QDA0370X03S060C	●	3.7	6	62	14	20	36	0.7
QDA0380X03S060C	●	3.8	6	66	17	24	36	0.8
QDA0390X03S060C	●	3.9	6	66	17	24	36	0.8
QDA0400X03S060C	●	4	6	66	17	24	36	0.8
QDA0410X03S060C	●	4.1	6	66	17	24	36	0.8
QDA0420X03S060C	●	4.2	6	66	17	24	36	0.8
QDA0430X03S060C	●	4.3	6	66	17	24	36	0.9
QDA0440X03S060C	●	4.4	6	66	17	24	36	0.9
QDA0450X03S060C	●	4.5	6	66	17	24	36	0.9
QDA0460X03S060C	●	4.6	6	6	17	24	36	0.9
QDA0470X03S060C	●	4.7	6	66	17	24	36	0.9
QDA0480X03S060C	●	4.8	6	66	20	28	36	1.0
QDA0490X03S060C	●	4.9	6	66	20	28	36	1.0
QDA0500X03S060C	●	5	6	66	20	28	36	1.0
QDA0510X03S060C	●	5.1	6	66	20	28	36	1.0
QDA0520X03S060C	●	5.2	6	66	20	28	36	1.0
QDA0530X03S060C	●	5.3	6	66	20	28	36	1.0
QDA0540X03S060C	●	5.4	6	66	20	28	36	1.1
QDA0550X03S060C	●	5.5	6	66	20	28	36	1.1
QDA0560X03S060C	●	5.6	6	66	20	28	36	1.1
QDA0570X03S060C	●	5.7	6	66	20	28	36	1.1

Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0580X03S060C	●	5.8	6	66	20	28	36	1.1
QDA0590X03S060C	●	5.9	6	66	20	28	36	1.2
QDA0600X03S060C	●	6	6	66	20	28	36	1.2
QDA0610X03S080C	●	6.1	8	79	24	34	36	1.2
QDA0620X03S080C	●	6.2	8	79	24	34	36	1.2
QDA0630X03S080C	●	6.3	8	79	24	34	36	1.2
QDA0640X03S080C	●	6.4	8	79	24	34	36	1.3
QDA0650X03S080C	●	6.5	8	79	24	34	36	1.3
QDA0660X03S080C	●	6.6	8	79	24	34	36	1.3
QDA0670X03S080C	●	6.7	8	79	24	34	36	1.3
QDA0680X03S080C	●	6.8	8	79	24	34	36	1.3
QDA0690X03S080C	●	6.9	8	79	24	34	36	1.4
QDA0700X03S080C	●	7	8	79	24	34	36	1.4
QDA0710X03S080C	●	7.1	8	79	29	41	36	1.4
QDA0720X03S080C	●	7.2	8	79	29	41	36	1.4
QDA0730X03S080C	●	7.3	8	79	29	41	36	1.4
QDA0740X03S080C	●	7.4	8	79	29	41	36	1.5
QDA0750X03S080C	●	7.5	8	79	29	41	36	1.5
QDA0760X03S080C	●	7.6	8	79	29	41	36	1.5
QDA0770X03S080C	●	7.7	8	79	29	41	36	1.5
QDA0780X03S080C	●	7.8	8	79	29	41	36	1.5
QDA0790X03S080C	●	7.9	8	79	29	41	36	1.6
QDA0800X03S080C	●	8	8	79	29	41	36	1.6
QDA0810X03S100C	●	8.1	10	89	35	47	40	1.6
QDA0820X03S100C	●	8.2	10	89	35	47	40	1.6
QDA0830X03S100C	●	8.3	10	89	35	47	40	1.6
QDA0840X03S100C	●	8.4	10	89	35	47	40	1.7
QDA0850X03S100C	●	8.5	10	89	35	47	40	1.7

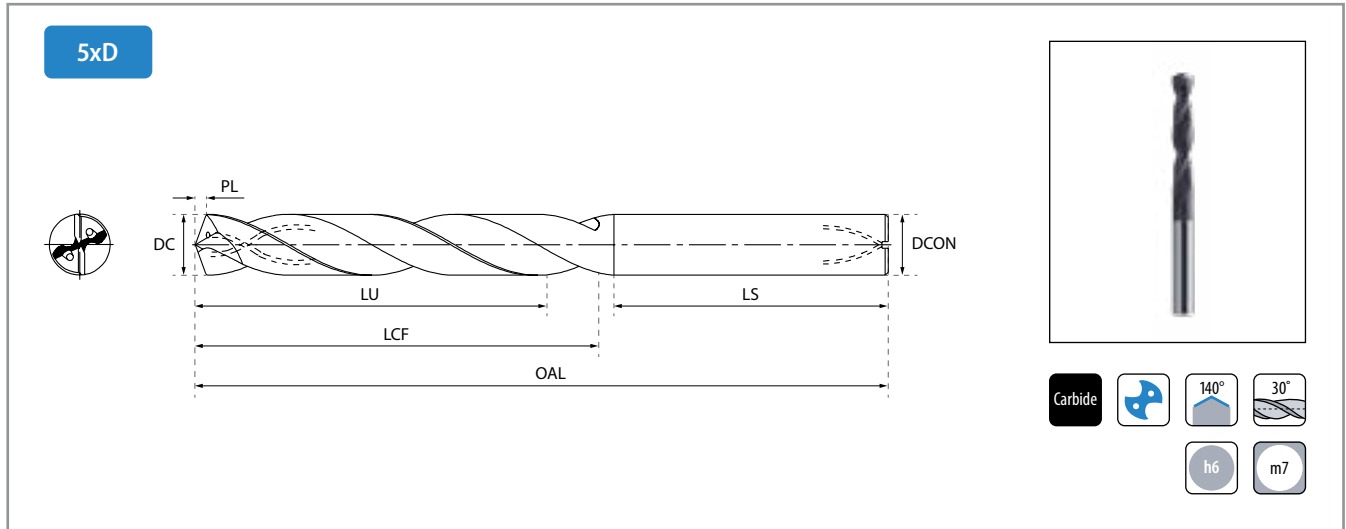
QDA Type C with coolant holes



Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0860X03S100C	●	8.6	10	89	35	47	40	1.7
QDA0870X03S100C	●	8.7	10	89	35	47	40	1.7
QDA0880X03S100C	●	8.8	10	89	35	47	40	1.7
QDA0890X03S100C	●	8.9	10	89	35	47	40	1.8
QDA0900X03S100C	●	9	10	89	35	47	40	1.8
QDA0910X03S100C	●	9.1	10	89	35	47	40	1.8
QDA0920X03S100C	●	9.2	10	89	35	47	40	1.8
QDA0930X03S100C	●	9.3	10	89	35	47	40	1.8
QDA0940X03S100C	●	9.4	10	89	35	47	40	1.9
QDA0950X03S100C	●	9.5	10	89	35	47	40	1.9
QDA0960X03S100C	●	9.6	10	89	35	47	40	1.9
QDA0970X03S100C	●	9.7	10	89	35	47	40	1.9
QDA0980X03S100C	●	9.8	10	89	35	47	40	1.9
QDA0990X03S100C	●	9.9	10	89	35	47	40	2.0
QDA1000X03S100C	●	10	10	89	35	47	40	2.0
QDA1020X03S120C	●	10.2	12	102	40	55	45	2.0
QDA1050X03S120C	●	10.5	12	102	40	55	45	2.1
QDA1080X03S120C	●	10.8	12	102	40	55	45	2.1
QDA1100X03S120C	●	11	12	102	40	55	45	2.2
QDA1120X03S120C	●	11.2	12	102	40	55	45	2.2
QDA1130X03S120C	●	11.3	12	102	40	55	45	2.2
QDA1150X03S120C	●	11.5	12	102	40	55	45	2.3
QDA1180X03S120C	●	11.8	12	102	40	55	45	2.3
QDA1200X03S120C	●	12	12	102	40	55	45	2.4
QDA1220X03S140C	●	12.2	14	107	43	60	45	2.4
QDA1250X03S140C	●	12.5	14	107	43	60	45	2.5
QDA1270X03S140C	●	12.7	14	107	43	60	45	2.5
QDA1280X03S140C	●	12.8	14	107	43	60	45	2.5

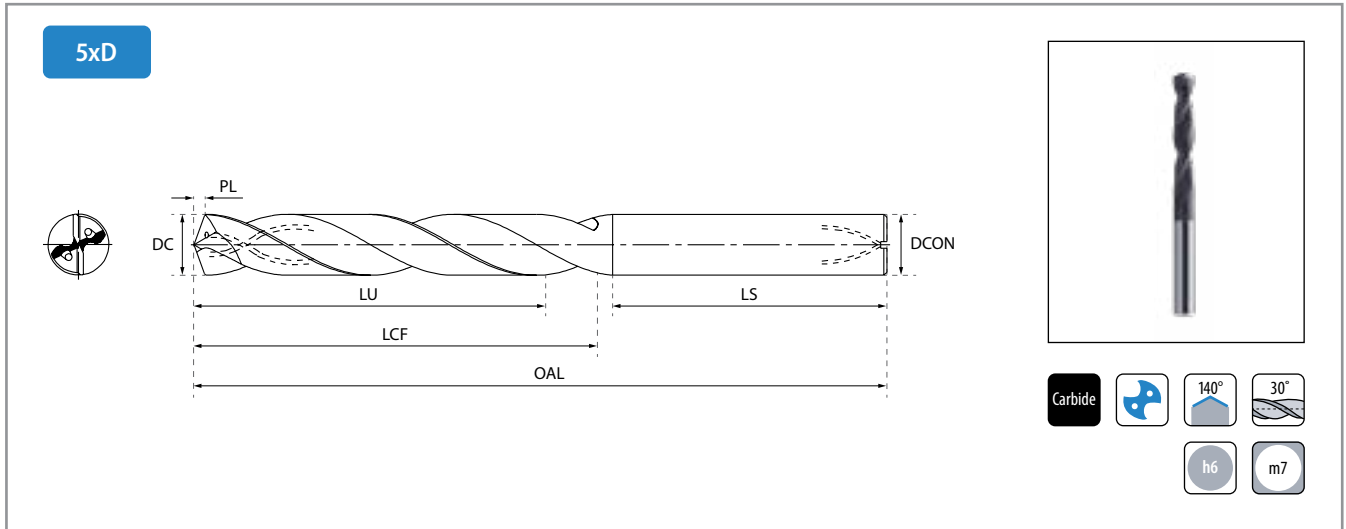
Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA1300X03S140C	●	13	14	107	43	60	45	2.6
QDA1330X03S140C	●	13.3	14	107	43	60	45	2.6
QDA1350X03S140C	●	13.5	14	107	43	60	45	2.7
QDA1370X03S140C	●	13.7	14	107	43	60	45	2.7
QDA1380X03S140C	●	13.8	14	107	43	60	45	2.5
QDA1400X03S140C	●	14	14	107	43	60	45	2.8
QDA1450X03S160C	●	14.5	16	115	45	65	48	2.9
QDA1500X03S160C	●	15	16	115	45	65	48	3.0
QDA1530X03S160C	●	15.3	16	115	45	65	48	3.0
QDA1550X03S160C	●	15.5	16	115	45	65	48	3.1
QDA1580X03S160C	●	15.8	16	115	45	65	48	3.1
QDA1600X03S160C	●	16	16	115	45	65	48	3.2
QDA1650X03S180C	●	16.5	18	123	51	73	48	3.3
QDA1700X03S180C	●	17	16	123	51	73	48	3.4
QDA1750X03S180C	●	17.5	18	123	51	73	48	3.5
QDA1800X03S180C	●	18	18	123	51	73	48	3.6
QDA1850X03S200C	●	18.5	20	131	55	79	50	3.7
QDA1900X03S200C	●	19	20	131	55	79	50	3.8
QDA1950X03S200C	●	19.5	20	131	55	79	50	3.9
QDA2000X03S200C	●	20	20	131	55	79	50	4.0

● : Available



Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0300X05S060C	●	3	6	66	23	28	36	0.6
QDA0310X05S060C	●	3.1	6	66	23	28	36	0.6
QDA0320X05S060C	●	3.2	6	66	23	28	36	0.6
QDA0330X05S060C	●	3.3	6	66	23	8	6	0.7
QDA0340X05S060C	●	3.4	6	66	23	28	36	0.7
QDA0350X05S060C	●	3.5	6	66	23	28	36	0.7
QDA0360X05S060C	●	3.6	6	66	23	28	36	0.7
QDA0370X05S060C	●	3.7	6	66	23	28	36	0.7
QDA0380X05S060C	●	3.8	6	74	29	36	36	0.8
QDA0390X05S060C	●	3.9	6	74	29	36	36	0.8
QDA0400X05S060C	●	4	6	74	29	36	36	0.8
QDA0410X05S060C	●	4.1	6	74	29	36	36	0.8
QDA0420X05S060C	●	4.2	6	74	29	36	36	0.8
QDA0430X05S060C	●	4.3	6	74	29	36	36	0.9
QDA0440X05S060C	●	4.4	6	74	29	36	36	0.9
QDA0450X05S060C	●	4.5	6	74	29	36	36	0.9
QDA0460X05S060C	●	4.6	6	74	29	36	36	0.9
QDA0470X05S060C	●	4.7	6	74	29	36	36	0.9
QDA0480X05S060C	●	4.8	6	82	35	44	36	1.0
QDA0490X05S060C	●	4.9	6	82	35	44	36	1.0
QDA0500X05S060C	●	5	6	82	35	44	36	1.0
QDA0510X05S060C	●	5.1	6	82	35	44	36	1.0
QDA0520X05S060C	●	5.2	6	82	35	44	36	1.0
QDA0530X05S060C	●	5.3	6	82	35	44	36	1.0
QDA0540X05S060C	●	5.4	6	82	35	44	36	1.1
QDA0550X05S060C	●	5.5	6	82	35	44	36	1.1
QDA0560X05S060C	●	5.6	6	82	35	44	36	1.1
QDA0570X05S060C	●	5.7	6	82	35	44	36	1.1

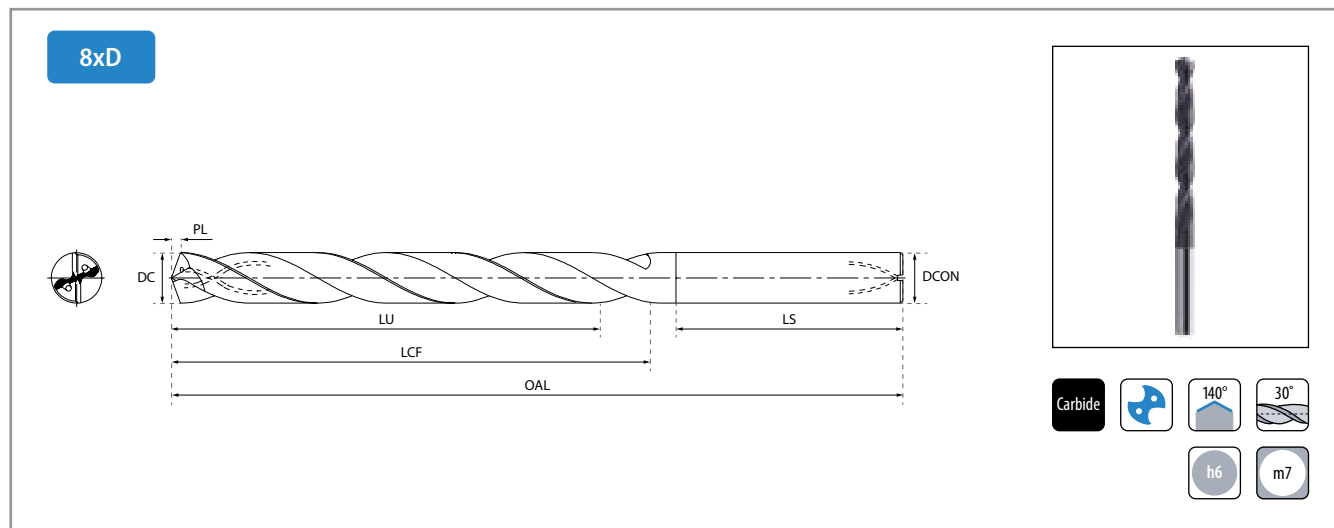
Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0580X05S060C	●	5.8	6	82	35	44	36	1.1
QDA0590X05S060C	●	5.9	6	82	35	44	36	1.2
QDA0600X05S060C	●	6	6	82	35	44	36	1.2
QDA0610X05S080C	●	6.1	8	91	43	53	36	1.2
QDA0620X05S080C	●	6.2	8	91	43	53	36	1.2
QDA0630X05S080C	●	6.3	8	91	43	53	36	1.2
QDA0640X05S080C	●	6.4	8	91	43	53	36	1.3
QDA0650X05S080C	●	6.5	8	91	43	53	36	1.3
QDA0660X05S080C	●	6.6	8	91	43	53	36	1.3
QDA0670X05S080C	●	6.7	8	91	43	53	36	1.3
QDA0680X05S080C	●	6.8	8	91	43	53	36	1.3
QDA0690X05S080C	●	6.9	8	91	43	53	36	1.4
QDA0700X05S080C	●	7	8	91	43	53	36	1.4
QDA0710X05S080C	●	7.1	8	91	43	53	36	1.4
QDA0720X05S080C	●	7.2	8	91	43	53	36	1.4
QDA0730X05S080C	●	7.3	8	91	43	53	36	1.4
QDA0740X05S080C	●	7.4	8	91	43	53	36	1.5
QDA0750X05S080C	●	7.5	8	91	43	53	36	1.5
QDA0760X05S080C	●	7.6	8	91	43	53	36	1.5
QDA0770X05S080C	●	7.7	8	91	43	53	36	1.5
QDA0780X05S080C	●	7.8	8	91	43	53	36	1.5
QDA0790X05S080C	●	7.9	8	91	43	53	36	1.6
QDA0800X05S080C	●	8	8	91	43	53	36	1.6
QDA0810X05S100C	●	8.1	10	103	49	61	40	1.6
QDA0820X05S100C	●	8.2	10	103	49	61	40	1.6
QDA0830X05S100C	●	8.3	10	103	49	61	40	1.6
QDA0840X05S100C	●	8.4	10	103	49	61	40	1.7
QDA0850X05S100C	●	8.5	10	103	49	61	40	1.7



Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0860X05S100C	●	8.6	10	103	43	61	40	1.7
QDA0870X05S100C	●	8.7	10	103	43	61	40	1.7
QDA0880X05S100C	●	8.8	10	103	43	61	40	1.7
QDA0890X05S100C	●	8.9	10	103	43	61	40	1.8
QDA0900X05S100C	●	9	10	103	43	61	40	1.8
QDA0910X05S100C	●	9.1	10	103	43	61	40	1.8
QDA0920X05S100C	●	9.2	10	103	43	61	40	1.8
QDA0930X05S100C	●	9.3	10	103	43	61	40	1.8
QDA0940X05S100C	●	9.4	10	103	43	61	40	1.9
QDA0950X05S100C	●	9.5	10	103	43	61	40	1.9
QDA0960X05S100C	●	9.6	10	103	43	61	40	1.9
QDA0970X05S100C	●	9.7	10	103	43	61	40	1.9
QDA0980X05S100C	●	9.8	10	103	43	61	40	1.9
QDA0990X05S100C	●	9.9	10	103	49	61	40	2.0
QDA1000X05S100C	●	10	10	103	49	61	40	2.0
QDA1020X05S120C	●	10.2	12	118	56	71	45	2.0
QDA1050X05S120C	●	10.5	12	118	56	71	45	2.1
QDA1080X05S120C	●	10.8	12	118	56	71	45	2.1
QDA1100X05S120C	●	11	12	118	56	71	45	2.2
QDA1120X05S120C	●	11.2	12	118	56	71	45	2.2
QDA1130X05S120C	●	11.3	12	118	56	71	45	2.2
QDA1150X05S120C	●	11.5	12	118	56	71	45	2.3
QDA1180X05S120C	●	11.8	12	118	56	71	45	2.3
QDA1200X05S120C	●	12	12	118	56	71	45	2.4
QDA1220X05S140C	●	12.2	14	124	60	77	45	2.4
QDA1250X05S140C	●	12.5	14	124	60	77	45	2.5
QDA1270X05S140C	●	12.7	14	124	60	77	45	2.5
QDA1280X05S140C	●	12.8	14	124	60	77	45	2.5

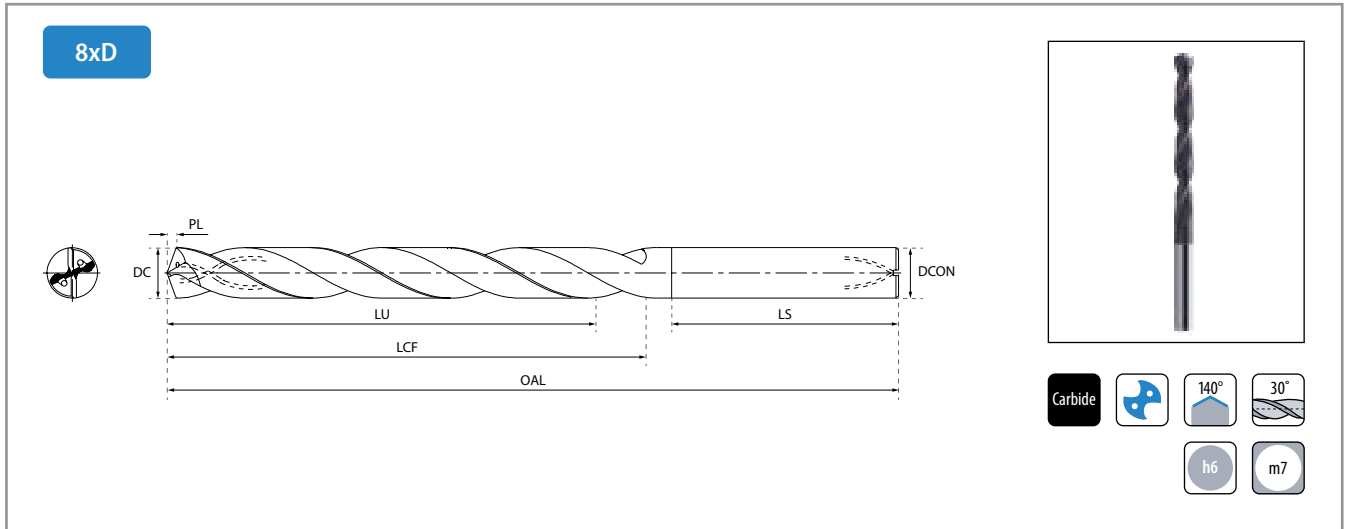
Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA1300X05S140C	●	13	14	124	60	77	45	2.6
QDA1330X05S140C	●	13.3	14	124	60	77	45	2.6
QDA1350X05S140C	●	13.5	14	124	60	77	45	2.7
QDA1370X05S140C	●	13.7	14	124	60	77	45	2.7
QDA1380X05S140C	●	13.8	14	124	60	77	45	2.7
QDA1400X05S140C	●	14	14	124	60	77	45	2.8
QDA1450X05S160C	●	14.5	16	133	63	83	45	2.9
QDA1500X05S160C	●	15	16	133	63	83	48	3.0
QDA1530X05S160C	●	15.3	16	133	63	83	48	3.0
QDA1550X05S160C	●	15.5	16	133	63	83	48	3.1
QDA1580X05S160C	●	15.8	16	133	63	83	48	3.1
QDA1600X05S160C	●	16	16	133	63	83	48	3.2
QDA1650X05S180C	●	16.5	18	143	71	93	48	3.3
QDA1700X05S180C	●	17	18	143	71	93	48	3.4
QDA1750X05S180C	●	17.5	18	143	71	93	48	3.5
QDA1800X05S180C	●	18	18	143	71	93	48	3.6
QDA1850X05S200C	●	18.5	20	153	77	101	50	3.7
QDA1900X05S200C	●	19	20	153	77	101	50	3.8
QDA1950X05S200C	●	19.5	20	153	77	101	50	3.9
QDA2000X05S200C	●	20	20	153	77	101	50	4.0

● : Available



Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0300X08S060C	●	3	6	85	32	40	36	0.6
QDA0310X08S060C	●	3.1	6	85	32	40	36	0.6
QDA0320X08S060C	●	3.2	6	85	32	40	36	0.6
QDA0330X08S060C	●	3.3	6	85	32	40	36	0.7
QDA0340X08S060C	●	3.4	6	85	32	40	36	0.7
QDA0350X08S060C	●	3.5	6	85	32	40	36	0.7
QDA0360X08S060C	●	3.6	6	85	36	40	36	0.7
QDA0370X08S060C	●	3.7	6	85	36	40	36	0.7
QDA0380X08S060C	●	3.8	6	85	36	40	36	0.8
QDA0390X08S060C	●	3.9	6	85	36	40	36	0.8
QDA0400X08S060C	●	4	6	85	38	46	36	0.8
QDA0410X08S060C	●	4.1	6	85	38	46	36	0.8
QDA0420X08S060C	●	4.2	6	85	38	46	36	0.8
QDA0430X08S060C	●	4.3	6	97	40	46	36	0.9
QDA0440X08S060C	●	4.4	6	97	40	46	36	0.9
QDA0450X08S060C	●	4.5	6	97	44	46	36	0.9
QDA0460X08S060C	●	4.6	6	97	44	46	36	0.9
QDA0470X08S060C	●	4.7	6	97	44	46	36	0.9
QDA0480X08S060C	●	4.8	6	97	44	46	36	1.0
QDA0490X08S060C	●	4.9	6	97	44	46	36	1.0
QDA0500X08S060C	●	5	6	97	48	57	36	1.0
QDA0510X08S060C	●	5.1	6	97	48	57	36	1.0
QDA0520X08S060C	●	5.2	6	97	48	57	36	1.0
QDA0530X08S060C	●	5.3	6	97	48	57	36	1.0
QDA0540X08S060C	●	5.4	6	97	48	57	36	1.1
QDA0550X08S060C	●	5.5	6	97	48	57	36	1.1
QDA0560X08S060C	●	5.6	6	97	48	57	36	1.1
QDA0570X08S060C	●	5.7	6	97	48	57	36	1.1

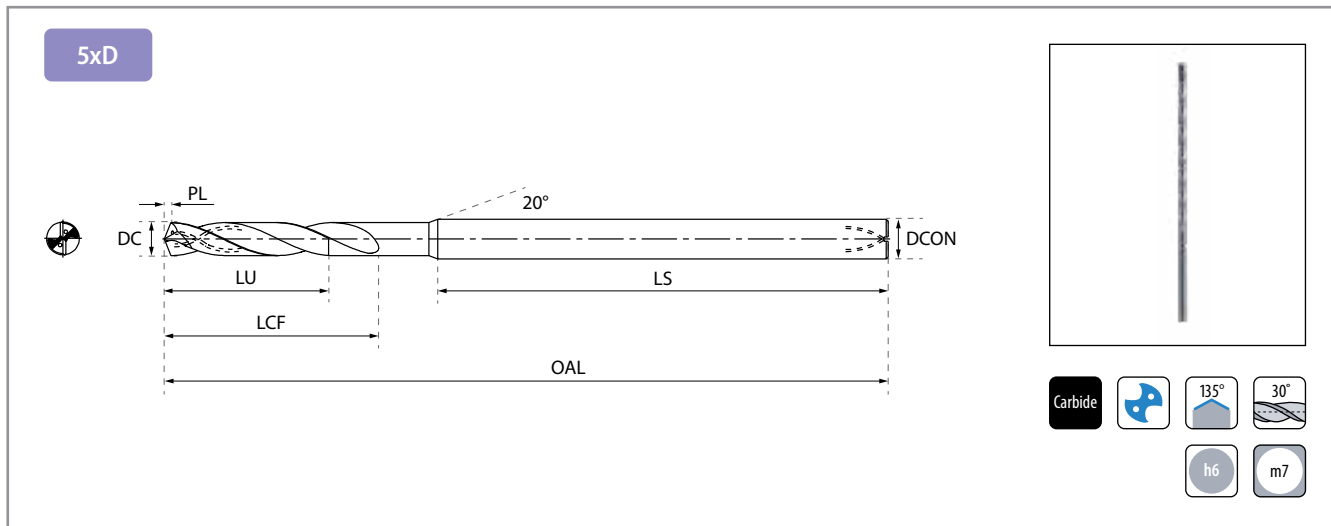
Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0580X08S060C	●	5.8	6	97	48	57	36	1.1
QDA0590X08S060C	●	5.9	6	97	48	57	36	1.2
QDA0600X08S060C	●	6	6	97	48	57	36	1.2
QDA0610X08S080C	●	6.1	8	116	64	76	36	1.2
QDA0620X08S080C	●	6.2	8	116	64	76	36	1.2
QDA0630X08S080C	●	6.3	8	116	64	76	36	1.2
QDA0640X08S080C	●	6.4	8	116	64	76	45	1.3
QDA0650X08S080C	●	6.5	8	116	64	76	36	1.3
QDA0660X08S080C	●	6.6	8	116	64	76	36	1.3
QDA0670X08S080C	●	6.7	8	116	64	76	36	1.3
QDA0680X08S080C	●	6.8	8	116	64	76	36	1.3
QDA0690X08S080C	●	6.9	8	116	64	76	36	1.4
QDA0700X08S080C	●	7	8	116	64	76	36	1.4
QDA0710X08S080C	●	7.1	8	116	64	76	36	1.4
QDA0720X08S080C	●	7.2	8	116	64	76	36	1.4
QDA0730X08S080C	●	7.3	8	116	64	76	36	1.4
QDA0740X08S080C	●	7.4	8	116	64	76	36	1.5
QDA0750X08S080C	●	7.5	8	116	64	76	36	1.5
QDA0760X08S080C	●	7.6	8	116	64	76	36	1.5
QDA0770X08S080C	●	7.7	8	116	64	76	36	1.5
QDA0780X08S080C	●	7.8	8	116	64	76	36	1.5
QDA0790X08S080C	●	7.9	8	116	64	76	36	1.6
QDA0800X08S080C	●	8	8	116	64	76	36	1.6
QDA0810X08S100C	●	8.1	10	142	80	95	40	1.6
QDA0820X08S100C	●	8.2	10	142	80	95	40	1.6
QDA0830X08S100C	●	8.3	10	142	80	95	40	1.6
QDA0840X08S100C	●	8.4	10	142	80	95	40	1.7
QDA0850X08S100C	●	8.5	10	142	80	95	40	1.7



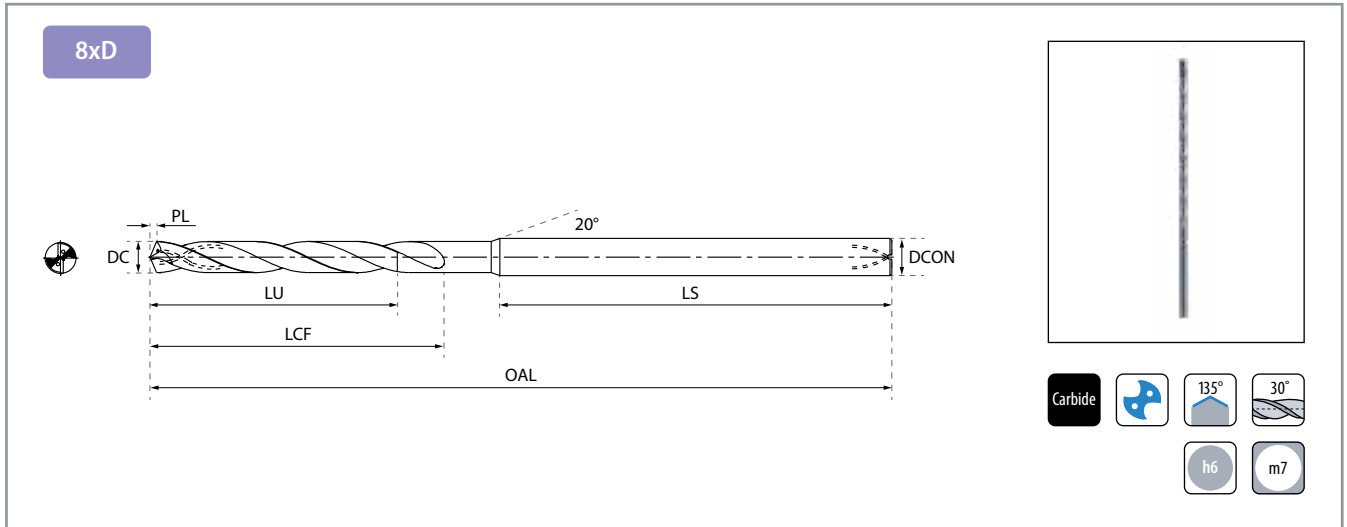
Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0860X08S100C	●	8.6	10	142	80	95	40	1.7
QDA0870X08S100C	●	8.7	10	142	80	95	40	1.7
QDA0880X08S100C	●	8.8	10	142	80	95	40	1.7
QDA0890X08S100C	●	8.9	10	142	80	95	40	1.8
QDA0900X08S100C	●	9	10	142	80	95	40	1.8
QDA0910X08S100C	●	9.1	10	142	80	95	40	1.8
QDA0920X08S100C	●	9.2	10	142	80	95	40	1.8
QDA0930X08S100C	●	9.3	10	142	80	95	40	1.8
QDA0940X08S100C	●	9.4	10	142	80	95	40	1.9
QDA0950X08S100C	●	9.5	10	142	80	95	40	1.9
QDA0960X08S100C	●	9.6	10	142	80	95	40	1.9
QDA0970X08S100C	●	9.7	10	142	80	95	40	1.9
QDA0980X08S100C	●	9.8	10	142	80	95	40	1.9
QDA0990X08S100C	●	9.9	10	142	80	95	40	2.0
QDA1000X08S100C	●	10	10	142	80	95	40	2.0
QDA1020X08S120C	●	10.2	12	163	96	114	45	2.0
QDA1050X08S120C	●	10.5	12	163	96	114	45	2.1
QDA1080X08S120C	●	10.8	12	163	96	114	45	2.1
QDA1100X08S120C	●	11	12	163	96	114	45	2.2
QDA1120X08S120C	●	11.2	12	163	96	114	45	2.2
QDA1130X08S120C	●	11.3	12	163	96	114	45	2.2
QDA1150X08S120C	●	11.5	12	163	96	114	45	2.3
QDA1180X08S120C	●	11.8	12	163	96	114	45	2.3
QDA1200X08S120C	●	12	12	163	96	114	45	2.4
QDA1220X08S140C	●	12.2	14	182	112	133	45	2.4
QDA1250X08S140C	●	12.5	14	182	112	133	45	2.5
QDA1270X08S140C	●	12.7	14	182	112	133	45	2.5
QDA1280X08S140C	●	12.8	14	182	112	133	45	2.5

Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA1300X08S140C	●	13	14	182	112	133	45	2.6
QDA1330X08S140C	●	13.3	14	182	112	133	45	2.6
QDA1350X08S140C	●	13.5	14	182	112	133	45	2.7
QDA1370X08S140C	●	13.7	14	182	112	133	45	2.7
QDA1380X08S140C	●	13.8	14	182	112	133	45	2.7
QDA1400X08S140C	●	14	14	182	112	133	45	2.8
QDA1450X08S160C	●	14.5	16	204	128	152	48	2.9
QDA1500X08S160C	●	15	16	204	128	152	48	3.0
QDA1530X08S160C	●	15.3	16	204	128	152	48	3.0
QDA1550X08S160C	●	15.5	16	204	128	152	48	3.1
QDA1580X08S160C	●	15.8	16	204	128	152	48	3.1
QDA1600X08S160C	●	16	16	204	128	152	48	3.2
QDA1650X08S180C	●	16.5	18	222	144	171	48	3.3
QDA1700X08S180C	●	17	18	222	144	171	48	3.4
QDA1750X08S180C	●	17.5	18	222	144	171	48	3.5
QDA1800X08S180C	●	18	18	222	144	171	48	3.6
QDA1850X08S200C	●	18.5	20	243	160	190	50	3.7
QDA1900X08S200C	●	19	20	243	160	190	50	3.8
QDA1950X08S200C	●	19.5	20	243	160	190	50	3.9
QDA2000X08S200C	●	20	20	243	160	190	50	4.0

● : Available



Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0100X05S030C	●	1	3	50	5	6.5	39.5	0.2
QDA0110X05S030C	●	1.1	3	50	5.7	7.2	38.8	0.2
QDA0120X05S030C	●	1.2	3	50	6.3	7.8	38.2	0.2
QDA0130X05S030C	●	1.3	3	50	7	8.5	37.5	0.3
QDA0140X05S030C	●	1.4	3	50	7.6	9.1	36.9	0.3
QDA0150X05S030C	●	1.5	3	50	8.3	9.8	36.2	0.3
QDA0160X05S030C	●	1.6	3	55	8.9	10.4	35.6	0.3
QDA0170X05S030C	●	1.7	3	55	9.6	11.1	39.9	0.3
QDA0180X05S030C	●	1.8	3	55	10.2	11.7	39.3	0.4
QDA0190X05S030C	●	1.9	3	55	10.9	12.4	38.6	0.4
QDA0200X05S030C	●	2	3	55	11.5	13	38	0.4
QDA0210X05S030C	●	2.1	3	55	12.2	13.7	37.3	0.4
QDA0220X05S030C	●	2.2	3	55	12.8	14.3	36.7	0.4
QDA0230X05S030C	●	2.3	3	55	13.5	15	36	0.5
QDA0240X05S030C	●	2.4	3	55	14.1	15.6	35.4	0.5
QDA0250X05S030	●	2.5	3	55	14.8	16.3	34.7	0.5
QDA0260X05S030C	●	2.6	3	55	15.4	16.9	34.1	0.5
QDA0270X05S030C	●	2.7	3	55	16.1	17.6	33.4	0.5
QDA0280X05S030C	●	2.8	3	55	16.7	18.2	32.8	0.6
QDA0290X05S030C	●	2.9	3	55	17.4	18.9	32.1	0.6



Description	Availability	Dimensions (mm)						
		DC	DCON	OAL	LU	LCF	LS	PL
QDA0100X08S030C	●	1	3	50	8	9.5	36.5	0.2
QDA0110X08S030C	●	1.1	3	50	9	10.5	35.5	0.2
QDA0120X08S030C	●	1.2	3	50	9.9	11.4	34.6	0.2
QDA0130X08S030C	●	1.3	3	50	10.9	12.4	33.6	0.3
QDA0140X08S030C	●	1.4	3	50	11.8	13.3	32.7	0.3
QDA0150X08S030C	●	1.5	3	50	12.8	14.3	31.7	0.3
QDA0160X08S030C	●	1.6	3	50	13.7	15.2	30.8	0.3
QDA0170X08S030C	●	1.7	3	60	14.7	16.2	39.8	0.3
QDA0180X08S030C	●	1.8	3	60	15.6	17.1	38.9	0.4
QDA0190X08S030C	●	1.9	3	60	16.6	18.1	37.9	0.4
QDA0200X08S030C	●	2	3	60	17.5	19	37	0.4
QDA0210X08S030C	●	2.1	3	60	18.5	20	36	0.4
QDA0220X08S030C	●	2.2	3	60	19.4	20.9	35.1	0.4
QDA0230X08S030C	●	2.3	3	60	20.4	21.9	34.1	0.5
QDA0240X08S030C	●	2.4	3	60	21.3	22.8	33.2	0.5
QDA0250X08S030C	●	2.5	3	60	22.3	23.8	32.2	0.5
QDA0260X08S030C	●	2.6	3	60	23.2	24.7	31.3	0.5
QDA0270X08S030C	●	2.7	3	60	24.2	25.7	30.3	0.5
QDA0280X08S030C	●	2.8	3	60	25.1	26.6	29.4	0.6
QDA0290X08S030C	●	2.9	3	60	26.1	27.6	28.4	0.6

QDA Reference cutting conditions table

QDA • External coolant

3D

5D

Workpiece	P01		P02		P03		M01		M02		K01		K02		S01		S02	
	Carbon steel		Alloy steel		Prehardened steel		Stainless steel		Stainless steel		Grey cast iron		Ductile cast iron		Titanium alloy		Nickel alloy	
Properties	-		520 < Rm < 1200		35 ≤ HRC < 45		High machinability		Low machinability		-		-		-		-	
DC (mm)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)
ø3		0.072		0.061		0.060		0.049		0.042		0.070		0.052		0.037		0.036
ø4		0.100		0.085		0.083		0.069		0.061		0.095		0.073		0.055		0.056
ø5		0.128		0.111		0.107		0.088		0.074		0.120		0.096		0.069		0.069
ø6		0.157		0.138		0.132		0.109		0.095		0.145		0.119		0.086		0.082
ø7		0.188		0.166		0.157		0.132		0.113		0.170		0.144		0.100		0.090
ø8		0.221		0.197		0.184		0.156		0.136		0.200		0.171		0.130		0.125
ø9		0.250		0.230		0.212		0.173		0.146		0.226		0.200		0.144		0.125
ø10		0.285		0.264		0.241		0.208		0.167		0.252		0.230		0.175		0.143
ø11	105	0.319	80	0.300	50	0.272	40	0.233	35	0.182	95	0.282	70	0.263	25	0.175	20	0.167
ø12		0.361		0.338		0.303		0.255		0.200		0.308		0.296		0.200		0.167
ø13		0.385		0.357		0.323		0.280		0.222		0.333		0.314		0.200		0.200
ø14		0.413		0.375		0.342		0.270		0.250		0.359		0.332		0.233		0.200
ø15		0.422		0.391		0.360		0.300		0.238		0.371		0.348		0.233		0.200
ø16		0.457		0.406		0.377		0.325		0.271		0.405		0.365		0.260		0.250
ø17		0.475		0.419		0.394		0.313		0.271		0.428		0.379		0.260		0.250
ø18		0.489		0.431		0.409		0.313		0.257		0.447		0.393		0.260		0.250
ø19		0.511		0.442		0.423		0.343		0.300		0.469		0.406		0.260		0.250
ø20		0.529		0.452		0.437		0.329		0.283		0.463		0.418		0.300		0.225

Workpiece	N01		N02		N03	
	Wrought aluminium		Cast aluminium		Copper alloy	
Properties	-		520 < Rm < 1200		35 ≤ HRC < 45	
DC (mm)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)
ø3		0.058		0.063		0.062
ø4		0.081		0.087		0.085
ø5		0.104		0.111		0.110
ø6		0.128		0.138		0.136
ø7		0.155		0.164		0.165
ø8		0.183		0.194		0.194
ø9		0.211		0.222		0.224
ø10		0.241		0.254		0.257
ø11	200	0.272	165	0.287	140	0.290
ø12		0.300		0.321		0.318
ø13		0.322		0.339		0.339
ø14		0.335		0.357		0.361
ø15		0.349		0.368		0.378
ø16		0.365		0.391		0.393
ø17		0.374		0.409		0.399
ø18		0.383		0.412		0.418
ø19		0.394		0.429		0.426
ø20		0.406		0.432		0.430



Type N

Reference cutting data for QDA drill without internal coolant.

Note! These reference cutting data indicators are just for reference. They should be adjusted according to the different cutting environments.

QDA Reference cutting conditions table

QDA • Internal coolant

3D

5D

Workpiece	P01		P02		P03		M01		M02		K01		K02		S01		S02	
	Carbon steel		Alloy steel		Prehardened steel		Stainless steel				Grey cast iron		Ductile cast iron		Titanium alloy		Nickel alloy	
Properties	-		520 < Rm < 1200		35 ≤ HRC < 45		High machinability		Low machinability		-		-		-		-	
DC (mm)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)
ø3		0.063		0.068		0.080		0.048		0.054		0.073		0.071		0.047		0.026
ø4		0.090		0.098		0.110		0.067		0.075		0.104		0.099		0.066		0.039
ø5		0.119		0.132		0.143		0.085		0.094		0.136		0.128		0.085		0.048
ø6		0.151		0.171		0.178		0.106		0.115		0.172		0.160		0.105		0.058
ø7		0.185		0.214		0.215		0.125		0.135		0.211		0.194		0.126		0.075
ø8		0.222		0.261		0.253		0.150		0.160		0.252		0.230		0.156		0.086
ø9		0.262		0.312		0.294		0.168		0.178		0.297		0.268		0.173		0.092
ø10		0.304		0.368		0.337		0.190		0.206		0.344		0.308		0.208		0.108
ø11	175	0.349	120	0.427	65	0.382	60	0.217	50	0.220	140	0.394	105	0.351	40	0.233	35	0.118
ø12		0.396		0.491		0.429		0.250		0.236		0.447		0.395		0.255		0.130
ø13		0.417		0.503		0.457		0.267		0.254		0.472		0.415		0.280		0.133
ø14		0.437		0.511		0.484		0.279		0.275		0.495		0.433		0.270		0.150
ø15		0.454		0.515		0.509		0.292		0.291		0.517		0.449		0.289		0.150
ø16		0.470		0.514		0.534		0.317		0.320		0.537		0.463		0.313		0.157
ø17		0.484		0.509		0.557		0.308		0.320		0.554		0.475		0.313		0.157
ø18		0.496		0.499		0.578		0.336		0.344		0.570		0.485		0.300		0.157
ø19		0.506		0.485		0.599		0.327		0.344		0.585		0.494		0.329		0.183
ø20		0.514		0.466		0.618		0.350		0.375		0.597		0.500		0.314		0.183

Workpiece	N01		N02		N03	
	Wrought aluminium		Cast aluminium		Copper alloy	
Properties	-		520 < Rm < 1200		35 ≤ HRC < 45	
DC (mm)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)
ø3		0.076		0.073		0.077
ø4		0.107		0.102		0.107
ø5		0.140		0.134		0.139
ø6		0.176		0.169		0.172
ø7		0.216		0.204		0.206
ø8		0.256		0.244		0.245
ø9		0.301		0.287		0.281
ø10		0.347		0.327		0.324
ø11	310	0.397	220	0.377	190	0.369
ø12		0.446		0.424		0.408
ø13		0.471		0.450		0.434
ø14		0.486		0.461		0.452
ø15		0.505		0.483		0.472
ø16		0.516		0.500		0.499
ø17		0.522		0.505		0.513
ø18		0.536		0.526		0.531
ø19		0.544		0.532		0.548
ø20		0.540		0.525		0.549



Type C

Reference cutting data for QDA drill with internal coolant.

Note! These reference cutting data indicators are just for reference. They should be adjusted according to the different cutting environments.

QDA Reference cutting conditions table (Z2)

QDA • Internal coolant

8D

Workpiece	P01		P02		P03		M01		M02		K01		K02		S01		S02	
	Carbon steel		Alloy steel		Prehardened steel		Stainless steel		Stainless steel		Grey cast iron		Ductile cast iron		Titanium alloy		Nickel alloy	
Properties	-		520 < Rm < 1200		35 ≤ HRC < 45		High machinability		Low machinability		-		-		-		-	
DC (mm)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)
ø3		0.051		0.056		0.066		0.041		0.047		0.059		0.058		0.037		0.022
ø4		0.073		0.083		0.091		0.055		0.066		0.084		0.082		0.054		0.033
ø5		0.097		0.111		0.117		0.072		0.081		0.110		0.103		0.065		0.040
ø6		0.124		0.141		0.143		0.089		0.100		0.141		0.131		0.084		0.050
ø7		0.151		0.178		0.173		0.109		0.116		0.173		0.161		0.106		0.057
ø8		0.182		0.220		0.209		0.125		0.138		0.206		0.189		0.129		0.067
ø9		0.211		0.258		0.240		0.144		0.147		0.242		0.222		0.138		0.073
ø10		0.248		0.309		0.272		0.169		0.177		0.277		0.255		0.158		0.090
ø11	150	0.282	100	0.359	55	0.319	50	0.180	40	0.192	120	0.320	90	0.281	35	0.182	30	0.100
ø12		0.325		0.407		0.353		0.200		0.209		0.366		0.325		0.200		0.113
ø13		0.338		0.416		0.371		0.215		0.230		0.377		0.330		0.222		0.100
ø14		0.349		0.426		0.385		0.225		0.230		0.396		0.348		0.238		0.114
ø15		0.369		0.418		0.417		0.245		0.244		0.419		0.365		0.225		0.114
ø16		0.387		0.430		0.445		0.270		0.275		0.438		0.383		0.257		0.133
ø17		0.383		0.426		0.436		0.260		0.275		0.443		0.394		0.257		0.133
ø18		0.400		0.417		0.470		0.289		0.275		0.450		0.406		0.243		0.133
ø19		0.400		0.406		0.460		0.278		0.314		0.462		0.388		0.267		0.133
ø20		0.421		0.394		0.511		0.313		0.300		0.470		0.400		0.250		0.160

Workpiece	N01		N02		N03	
	Wrought aluminium		Cast aluminium		Copper alloy	
Properties	-		520 < Rm < 1200		35 ≤ HRC < 45	
DC (mm)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)
ø3		0.064		0.059		0.064
ø4		0.090		0.083		0.089
ø5		0.117		0.109		0.116
ø6		0.148		0.138		0.145
ø7		0.179		0.166		0.173
ø8		0.214		0.199		0.203
ø9		0.252		0.231		0.235
ø10		0.290		0.266		0.273
ø11	260	0.329	190	0.307	160	0.302
ø12		0.375		0.343		0.340
ø13		0.392		0.362		0.360
ø14		0.403		0.375		0.376
ø15		0.416		0.388		0.400
ø16		0.431		0.405		0.416
ø17		0.441		0.411		0.433
ø18		0.450		0.424		0.438
ø19		0.450		0.431		0.456
ø20		0.450		0.426		0.462



Type C Reference cutting data for QDA drill with internal coolant.

Note! These reference cutting data indicators are just for reference. They should be adjusted according to the different cutting environments.

QDA Reference cutting conditions table (Z2)

QDA Micro • Internal coolant

5D

8D

Workpiece	P01		P02		P03		M01		M02		K01		K02		S01		S02	
	Carbon steel		Alloy steel		Prehardened steel		Stainless steel				Grey cast iron		Ductile cast iron		Titanium alloy		Nickel Alloy	
Properties	-		520 < Rm < 1200		35 ≤ HRC < 45		High machinability		Low machinability		-		-		-		-	
DC (mm)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)
ø1.0		0.017		0.016		0.014		0.015		0.014		0.018		0.016		0.013		0.009
ø1.5		0.026		0.024		0.022		0.022		0.021		0.027		0.024		0.019		0.016
ø2.0	90	0.035	80	0.031	65	0.029	60	0.029	40	0.028	85	0.035	65	0.032	30	0.025	20	0.025
ø2.5		0.043		0.039		0.036		0.036		0.035		0.044		0.040		0.031		0.035
ø3.0		0.052		0.047		0.043		0.044		0.042		0.053		0.048		0.038		0.045

Workpiece	N01		N02		N03	
	Wrought aluminium		Cast aluminium		Copper alloy	
Properties	-		520 < Rm < 1200		35 ≤ HRC < 45	
DC (mm)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)	Vc (m/min)	fn (mm/rev)
ø1.0		0.017		0.018		0.016
ø1.5		0.026		0.026		0.024
ø2.0	145	0.035	125	0.035	115	0.032
ø2.5		0.043		0.044		0.040
ø3.0		0.052		0.053		0.049



Micro

Reference cutting data for QDA Micro drill with internal coolant.

Note! These reference cutting data indicators are just for reference. They should be adjusted according to the different cutting environments.

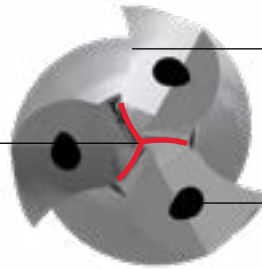
For process robustness and high performance

GammaDrill™

With 3 cutting edges and polished flutes GammaDrill™ provides robustness with very high penetration rates. Both standard and special geometries are available.

150° point angle

Optimised cutting geometries and special designed point angle.



3 cutting edges

High performance machining with 3 cutting edges

Internal coolant

Integrated coolant provides smooth machining and extended tool life

Styles available Tool range

Standard

General purpose design with internal coolant.

Diameter range

5×D

8×D

12×D

Ø4.0 - Ø20 mm

Cutting diameters available in 0.1 mm increments.



Customised

Get your special designed GammaDrill™ solution with optional diameters, step and coolant holes*.

Diameter range of your choice

~12×D

Ø3.3 - Ø32 mm

Cutting diameters available in 0.1 mm increments.
* Customised GammaDrill™ without internal coolant optional.





Highlights

- Standard and customised dimensions
- Easy cutting geometries
- Polished flutes
- Internal coolant
- Special 150° point angle
- Up to 5 times Re•New™
- Up to 700.000 holes
- Available from Ø3.3 mm to Ø32 mm



1 Recommended solution for smooth machining and high quality finishing

For efficient process and high performance machining*

Standard series and special designed drills for processing robustness with very high penetration rates

GammaDrill™ is designed for demanding and challenging applications in aluminium alloys.

Its main features are process robustness and excellent hole quality when drilling with high penetration rates.

The high penetration rates and extended service life results in lower production costs.

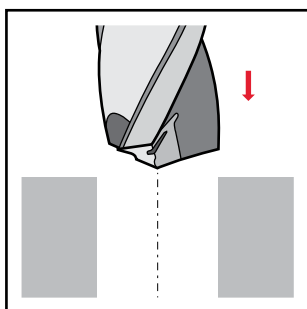
** Also suitable for machines with limited torque available.*



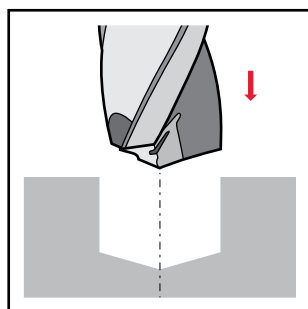
On average GammaDrill™ is **4x closer** to the target diameter than competitor tools, even when feed rate is increased.

Applications

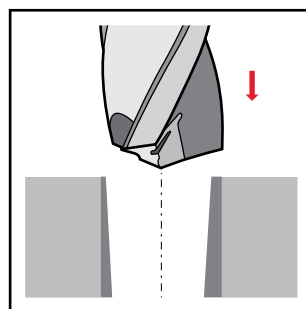
Great hole quality on straight plans



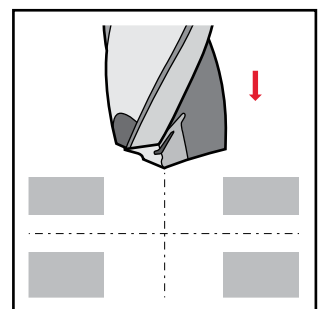
Through holes



Bottom holes



Precast holes



Cross holes

2 Tool performance and hole quality

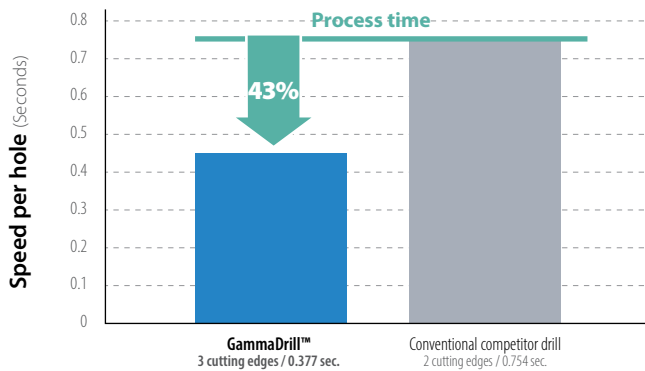
High speed machining

Material

6082 T6

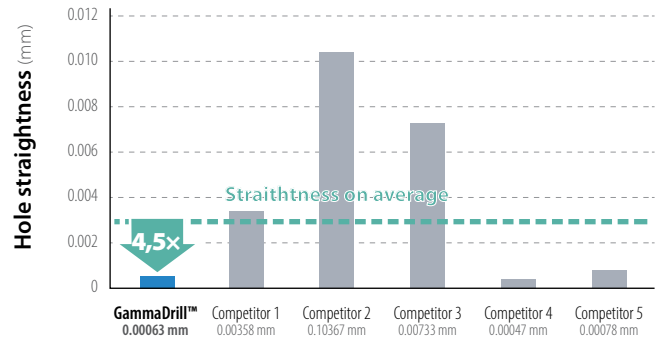
Comparing in equal test conditions shows, that the efficiency from GammaDrill™ is greater, while maintaining excellent hole quality - even when feed rate is increased.

Drilling speed $V_c=300, F=0.4 \cdot \varnothing 8.0$ mm



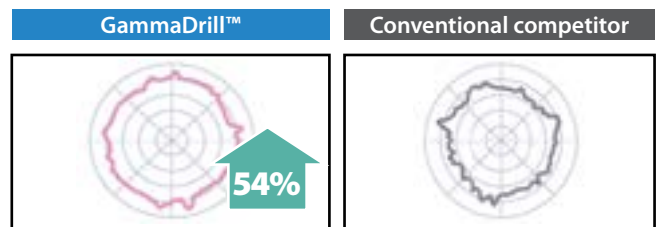
Comparing performance levels reveals GammaDrill™ is machining **43% faster** than conventional drills with 2 cutting edges operating within recommended cutting data.

Hole straightness $V_c=300, F=0.4 \cdot \varnothing 8.0$ mm • Drilling depth 30 mm



Hole straightness is **4,5 x straighter** than competitor tools on average – even when feed rate is increased.

Average roundness Internal test



On average GammaDrill™ creates **54% better** hole roundness than compared competitor tools.

Polished surfaces



Easy cutting geometries



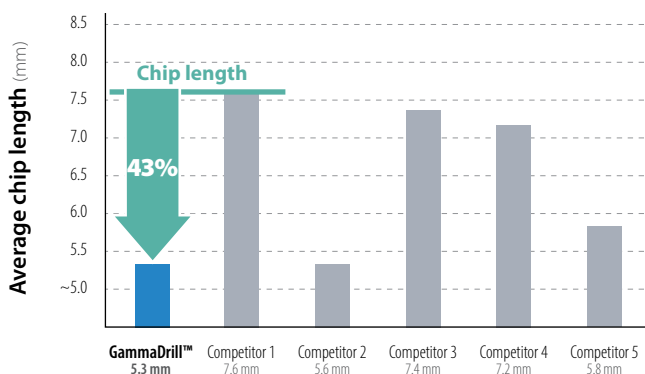
Special 150° point angle

3 Chip length and burr formation

GammaDrill™ compared to competitors

Even at increased and very high feed rates GammaDrill™ is outperforming most competitors - and under the right conditions, it even outperforms itself.

Chip quality $V_c=300, F=0.4 \cdot \varnothing 8.0$ mm



The average chips are **27% shorter**, when using GammaDrill™. Even at high feed rate, GammaDrill™ still outperforms most competitors.

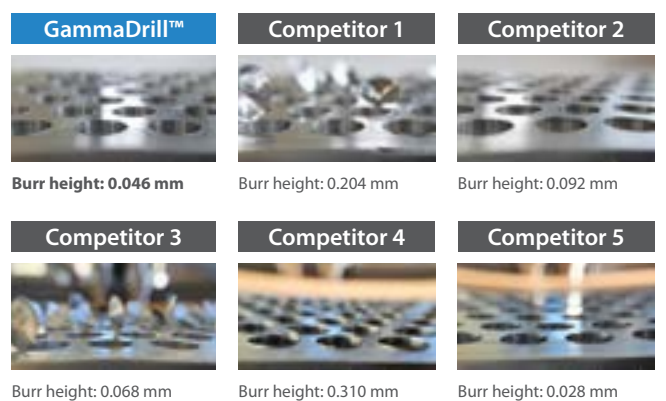


GammaDrill™ chips • $F=0.4$ mm/rev



Average surface roughness is **20% better** than compared competitor drills.

Burr formation Internal test



GammaDrill™ has an **85% reduced** exit burr height - even when the feed is more than doubled.

When standard doesn't cut it



Customised GammaDrill™

Unique tools on demand

Expertise and Tool Decider

Standard solutions may not always work. Sometimes you need a customised solution that has been tailored to your specific production situation. This include special geometries on point thinning, edge preparation and the possibility for step length variations. To do this, our consultants combine their expertise, know-how – and a software called Tool Decider.

Geometries on demand

With Tool Decider, we can rapidly customise specific special GammaDrill™ solutions on request, that matches your need.

When customising solutions we successfully meet your specific requirements with tool design and optimised cutting performance through adjusted cutting data.

GammaDrill with special geometry can be delivered within **10 working days**.

Special design made easy Tool Decider

With Tool Decider we have optimised our workflow all the way from your request to shipping the tools.

- Always high quality tools
- Guaranteed short delivery time
- Competitive price vs. performance ratio
- Optimised tool solution for each application



How it works Four simple steps to get your special designed tool





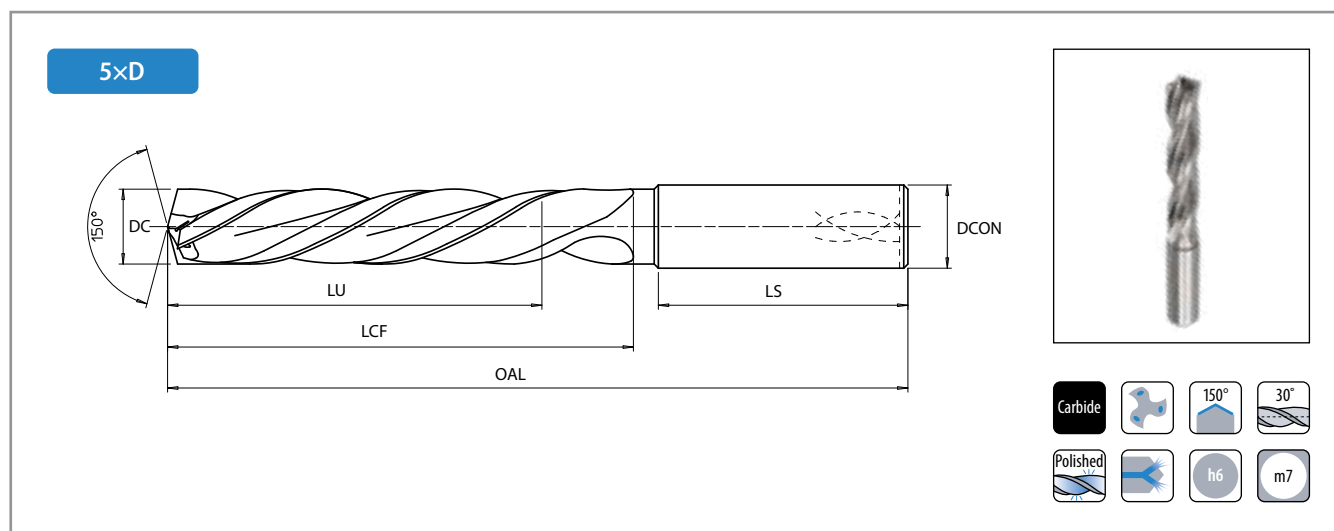
GammaDrill™

AROUND THE DRILL

- Standard dimensions from Ø4 mm up
- Customized dimensions from Ø3.3 mm up
- Polished flutes
- Easy cutting geometries
- 3 cutting edges
- Special 150° point angle
- Internal coolant
- Keeps hole quality at increased cutting speeds



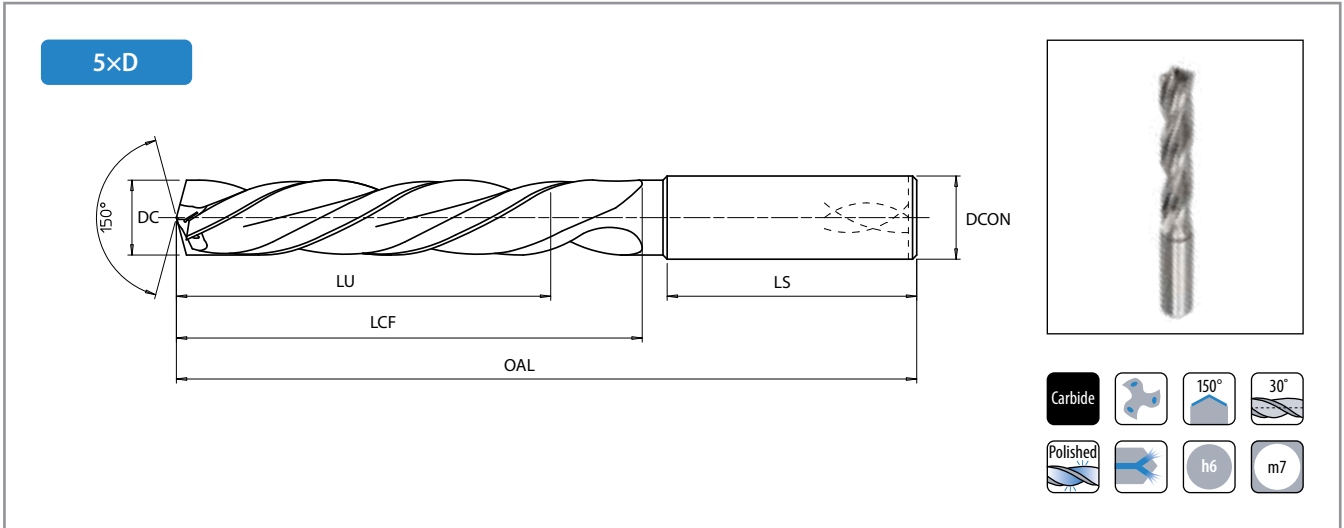
GammaDrill™ Dimensions



Description	DC (mm)	DC (inch)	DCON	OAL	LCF	LU	LS	Item no.
4.00 5xD IC Z3 S6	4.00		6	74	36	29	36	258870.0400
4.10 5xD IC Z3 S6	4.10		6	74	36	29	36	258870.0410
4.20 5xD IC Z3 S6	4.20		6	74	36	29	36	258870.0420
4.30 5xD IC Z3 S6	4.30		6	74	36	29	36	258870.0430
4.37 5xD IC Z3 S6	4.37	11/64	6	74	36	29	36	258870.0437
4.40 5xD IC Z3 S6	4.40		6	74	36	29	36	258870.0440
4.50 5xD IC Z3 S6	4.50		6	74	36	29	36	258870.0450
4.60 5xD IC Z3 S6	4.60		6	74	36	29	36	258870.0460
4.70 5xD IC Z3 S6	4.70		6	74	36	29	36	258870.0470
4.76 5xD IC Z3 S6	4.76	3/16	6	82	44	35	36	258870.0476
4.80 5xD IC Z3 S6	4.80		6	82	44	35	36	258870.0480
4.90 5xD IC Z3 S6	4.90		6	82	44	35	36	258870.0490
5.00 5xD IC Z3 S6	5.00		6	82	44	35	36	258870.0500
5.10 5xD IC Z3 S6	5.10		6	82	44	35	36	258870.0510
5.16 5xD IC Z3 S6	5.16	13/64	6	82	44	35	36	258870.0516
5.20 5xD IC Z3 S6	5.20		6	82	44	35	36	258870.0520
5.30 5xD IC Z3 S6	5.30		6	82	44	35	36	258870.0530
5.40 5xD IC Z3 S6	5.40		6	82	44	35	36	258870.0540
5.50 5xD IC Z3 S6	5.50		6	82	44	35	36	258870.0550
5.56 5xD IC Z3 S6	5.56	7/32	6	82	44	35	36	258870.0556
5.60 5xD IC Z3 S6	5.60		6	82	44	35	36	258870.0560
5.70 5xD IC Z3 S6	5.70		6	82	44	35	36	258870.0570
5.80 5xD IC Z3 S6	5.80		6	82	44	35	36	258870.0580
5.90 5xD IC Z3 S6	5.90		6	82	44	35	36	258870.0590
5.95 5xD IC Z3 S6	5.95	15/64	6	82	44	35	36	258870.0595
6.00 5xD IC Z3 S6	6.00		6	82	44	35	36	258870.0600
6.10 5xD IC Z3 S8	6.10		8	91	53	43	36	258870.0610
6.20 5xD IC Z3 S8	6.20		8	91	53	43	36	258870.0620
6.30 5xD IC Z3 S8	6.30		8	91	53	43	36	258870.0630
6.35 5xD IC Z3 S8	6.35	1/4	8	91	53	43	36	258870.0635
6.40 5xD IC Z3 S8	6.40		8	91	53	43	36	258870.0640
6.50 5xD IC Z3 S8	6.50		8	91	53	43	36	258870.0650
6.60 5xD IC Z3 S8	6.60		8	91	53	43	36	258870.0660
6.70 5xD IC Z3 S8	6.70		8	91	53	43	36	258870.0670

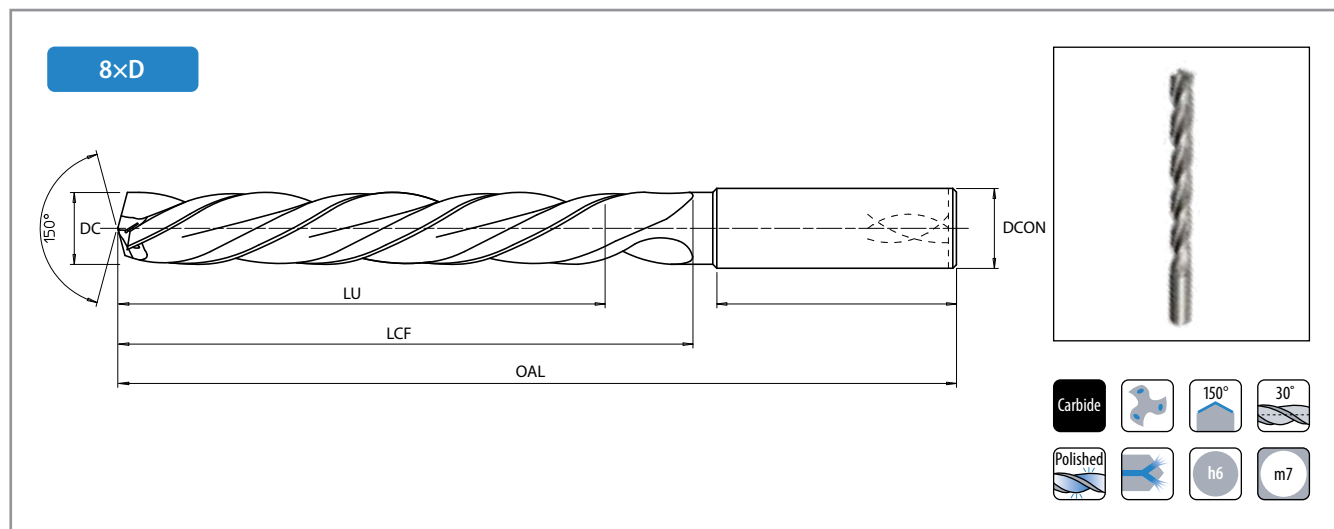
Description	DC (mm)	DC (inch)	DCON	OAL	LCF	LU	LS	Item no.
6.75 5xD IC Z3 S8	6.75	17/64	8	91	53	43	36	258870.0675
6.80 5xD IC Z3 S8	6.80		8	91	53	43	36	258870.0680
6.90 5xD IC Z3 S8	6.90		8	91	53	43	36	258870.0690
7.00 5xD IC Z3 S8	7.00		8	91	53	43	36	258870.0700
7.10 5xD IC Z3 S8	7.10		8	91	53	43	36	258870.0710
7.14 5xD IC Z3 S8	7.14	9/32	8	91	53	43	36	258870.0714
7.20 5xD IC Z3 S8	7.20		8	91	53	43	36	258870.0720
7.30 5xD IC Z3 S8	7.30		8	91	53	43	36	258870.0730
7.40 5xD IC Z3 S8	7.40		8	91	53	43	36	258870.0740
7.50 5xD IC Z3 S8	7.50		8	91	53	43	36	258870.0750
7.54 5xD IC Z3 S8	7.54	19/64	8	91	53	43	36	258870.0754
7.60 5xD IC Z3 S8	7.60		8	91	53	43	36	258870.0760
7.70 5xD IC Z3 S8	7.70		8	91	53	43	36	258870.0770
7.80 5xD IC Z3 S8	7.80		8	91	53	43	36	258870.0780
7.90 5xD IC Z3 S8	7.90		8	91	53	43	36	258870.0790
7.94 5xD IC Z3 S8	7.94	5/16	8	91	53	43	36	258870.0794
8.00 5xD IC Z3 S8	8.00		8	91	53	43	36	258870.0800
8.10 5xD IC Z3 S10	8.10		10	103	61	49	40	258870.0810
8.20 5xD IC Z3 S10	8.20		10	103	61	49	40	258870.0820
8.30 5xD IC Z3 S10	8.30		10	103	61	49	40	258870.0830
8.33 5xD IC Z3 S10	8.33	21/64	10	103	61	49	40	258870.0833
8.40 5xD IC Z3 S10	8.40		10	103	61	49	40	258870.0840
8.50 5xD IC Z3 S10	8.50		10	103	61	49	40	258870.0850
8.60 5xD IC Z3 S10	8.60		10	103	61	49	40	258870.0860
8.70 5xD IC Z3 S10	8.70		10	103	61	49	40	258870.0870
8.73 5xD IC Z3 S10	8.73	11/32	10	103	61	49	40	258870.0873
8.80 5xD IC Z3 S10	8.80		10	103	61	49	40	258870.0880
8.90 5xD IC Z3 S10	8.90		10	103	61	49	40	258870.0890
9.00 5xD IC Z3 S10	9.00		10	103	61	49	40	258870.0900
9.10 5xD IC Z3 S10	9.10		10	103	61	49	40	258870.0910
9.13 5xD IC Z3 S10	9.13	23/64	10	103	61	49	40	258870.0913
9.20 5xD IC Z3 S10	9.20		10	103	61	49	40	258870.0920
9.30 5xD IC Z3 S10	9.30		10	103	61	49	40	258870.0930
9.40 5xD IC Z3 S10	9.40		10	103	61	49	40	258870.0940

GammaDrill™ Dimensions



Description	DC (mm)	DC (inch)	DCON	OAL	LCF	LU	LS	Item no.
9.50 5xD IC Z3 S10	9.50		10	103	61	49	40	258870.0950
9.53 5xD IC Z3 S10	9.53	3/8	10	103	61	49	40	258870.0953
9.60 5xD IC Z3 S10	9.60		10	103	61	49	40	258870.0960
9.70 5xD IC Z3 S10	9.70		10	103	61	49	40	258870.0970
9.80 5xD IC Z3 S10	9.80		10	103	61	49	40	258870.0980
9.90 5xD IC Z3 S10	9.90		10	103	61	49	40	258870.0990
9.92 5xD IC Z3 S10	9.92	25/64	10	103	61	49	40	258870.0992
10.00 5xD IC Z3 S10	10.00		10	103	61	49	40	258870.1000
10.10 5xD IC Z3 S12	10.10		12	118	71	56	45	258870.1010
10.20 5xD IC Z3 S12	10.20		12	118	71	56	45	258870.1020
10.30 5xD IC Z3 S12	10.30		12	118	71	56	45	258870.1030
10.32 5xD IC Z3 S12	10.32	13/32	12	118	71	56	45	258870.1032
10.40 5xD IC Z3 S12	10.40		12	118	71	56	45	258870.1040
10.50 5xD IC Z3 S12	10.50		12	118	71	56	45	258870.1050
10.60 5xD IC Z3 S12	10.60		12	118	71	56	45	258870.1060
10.70 5xD IC Z3 S12	10.70		12	118	71	56	45	258870.1070
10.72 5xD IC Z3 S12	10.72	27/64	12	118	71	56	45	258870.1072
10.80 5xD IC Z3 S12	10.80		12	118	71	56	45	258870.1080
10.90 5xD IC Z3 S12	10.90		12	118	71	56	45	258870.1090
11.00 5xD IC Z3 S12	11.00		12	118	71	56	45	258870.1100
11.10 5xD IC Z3 S12	11.10		12	118	71	56	45	258870.1110
11.11 5xD IC Z3 S12	11.11	7/16	12	118	71	56	45	258870.1111
11.20 5xD IC Z3 S12	11.20		12	118	71	56	45	258870.1120
11.30 5xD IC Z3 S12	11.30		12	118	71	56	45	258870.1130
11.40 5xD IC Z3 S12	11.40		12	118	71	56	45	258870.1140
11.50 5xD IC Z3 S12	11.50		12	118	71	56	45	258870.1150
11.60 5xD IC Z3 S12	11.60		12	118	71	56	45	258870.1160
11.70 5xD IC Z3 S12	11.70		12	118	71	56	45	258870.1170
11.80 5xD IC Z3 S12	11.80		12	118	71	56	45	258870.1180
11.90 5xD IC Z3 S12	11.90		12	118	71	56	45	258870.1190
12.00 5xD IC Z3 S12	12.00		12	118	71	56	45	258870.1200
12.50 5xD IC Z3 S14	12.50		14	124	77	60	45	258870.1250
12.80 5xD IC Z3 S14	12.80		14	124	77	60	45	258870.1280
13.00 5xD IC Z3 S14	13.00		14	124	77	60	45	258870.1300

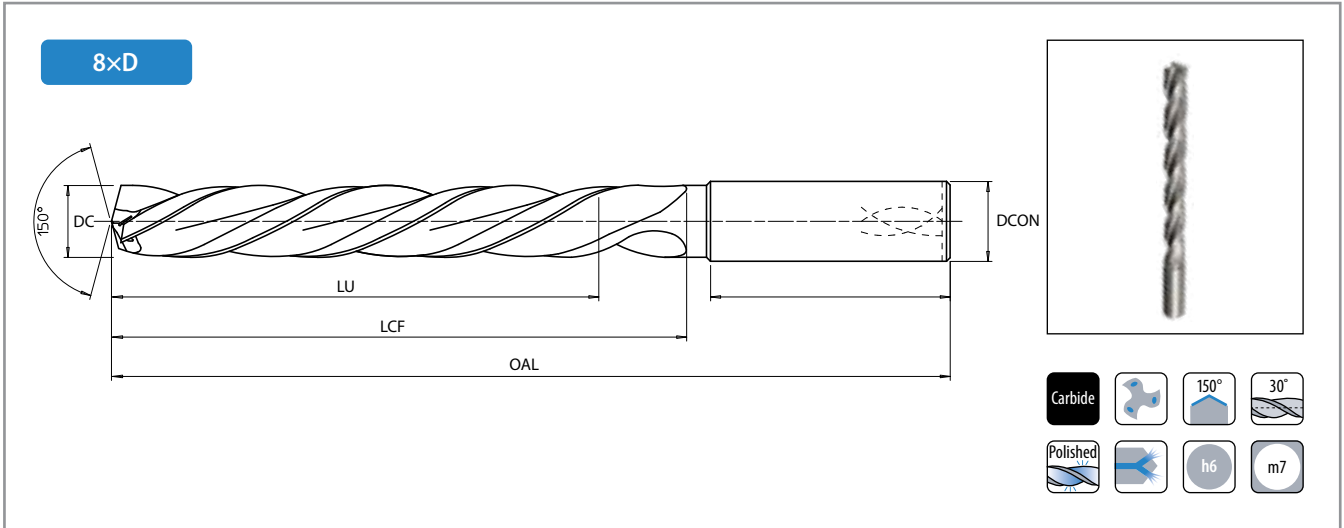
Description	DC (mm)	DC (inch)	DCON	OAL	LCF	LU	LS	Item no.
13.50 5xD IC Z3 S14	13.50		14	124	77	60	45	258870.1350
13.80 5xD IC Z3 S14	13.80		14	124	77	60	45	258870.1380
14.00 5xD IC Z3 S14	14.00		14	124	77	60	45	258870.1400
14.29 5xD IC Z3 S16	14.29	9/16	16	133	83	63	48	258870.1429
14.50 5xD IC Z3 S16	14.50		16	133	83	63	48	258870.1450
14.68 5xD IC Z3 S16	14.68	37/64	16	133	83	63	48	258870.1468
14.80 5xD IC Z3 S16	14.80		16	133	83	63	48	258870.1480
15.00 5xD IC Z3 S16	15.00		16	133	83	63	48	258870.1500
15.08 5xD IC Z3 S16	15.08	19/32	16	133	83	63	48	258870.1508
15.50 5xD IC Z3 S16	15.50		16	133	83	63	48	258870.1550
15.80 5xD IC Z3 S16	15.80		16	133	83	63	48	258870.1580
15.88 5xD IC Z3 S16	15.88	5/8	16	133	83	63	48	258870.1588
16.00 5xD IC Z3 S16	16.00		16	133	83	63	48	258870.1600
16.50 5xD IC Z3 S18	16.50		18	143	93	71	48	258870.1650
16.67 5xD IC Z3 S18	16.67	21/32	18	143	93	71	48	258870.1667
16.80 5xD IC Z3 S18	16.80		18	143	93	71	48	258870.1680
17.00 5xD IC Z3 S18	17.00		18	143	93	71	48	258870.1700
17.46 5xD IC Z3 S18	17.46	11/16	18	143	93	71	48	258870.1746
17.50 5xD IC Z3 S18	17.50		18	143	93	71	48	258870.1750
17.80 5xD IC Z3 S18	17.80		18	143	93	71	48	258870.1780
17.86 5xD IC Z3 S18	17.86	45/64	18	143	93	71	48	258870.1786
18.00 5xD IC Z3 S18	18.00		18	143	93	71	48	258870.1800
18.26 5xD IC Z3 S20	18.26	23/32	20	153	101	77	50	258870.1826
18.50 5xD IC Z3 S20	18.50		20	153	101	77	50	258870.1850
18.80 5xD IC Z3 S20	18.80		20	153	101	77	50	258870.1880
19.00 5xD IC Z3 S20	19.00		20	153	101	77	50	258870.1900
19.05 5xD IC Z3 S20	19.05	3/4	20	153	101	77	50	258870.1905
19.50 5xD IC Z3 S20	19.50		20	153	101	77	50	258870.1950
19.80 5xD IC Z3 S20	19.80		20	153	101	77	50	258870.1980
20.00 5xD IC Z3 S20	20.00		20	153	101	77	50	258870.2000



Description	DC (mm)	DC (inch)	DCON	OAL	LCF	LU	LS	Item no.
4.00 8xD IC Z3 S6	4.00		6	81	43	36	36	258871.0400
4.10 8xD IC Z3 S6	4.10		6	81	43	36	36	258871.0410
4.20 8xD IC Z3 S6	4.20		6	81	43	36	36	258871.0420
4.30 8xD IC Z3 S6	4.30		6	81	43	36	36	258871.0430
4.37 8xD IC Z3 S6	4.37	11/64	6	81	43	36	36	258871.0437
4.40 8xD IC Z3 S6	4.40		6	81	43	36	36	258871.0440
4.50 8xD IC Z3 S6	4.50		6	81	43	36	36	258871.0450
4.60 8xD IC Z3 S6	4.60		6	81	43	36	36	258871.0460
4.70 8xD IC Z3 S6	4.70		6	81	43	36	36	258871.0470
4.76 8xD IC Z3 S6	4.76	3/16	6	95	57	48	36	258871.0476
4.80 8xD IC Z3 S6	4.80		6	95	57	48	36	258871.0480
4.90 8xD IC Z3 S6	4.90		6	95	57	48	36	258871.0490
5.00 8xD IC Z3 S6	5.00		6	95	57	48	36	258871.0500
5.10 8xD IC Z3 S6	5.10		6	95	57	48	36	258871.0510
5.16 8xD IC Z3 S6	5.16	13/64	6	95	57	48	36	258871.0516
5.20 8xD IC Z3 S6	5.20		6	95	57	48	36	258871.0520
5.30 8xD IC Z3 S6	5.30		6	95	57	48	36	258871.0530
5.40 8xD IC Z3 S6	5.40		6	95	57	48	36	258871.0540
5.50 8xD IC Z3 S6	5.50		6	95	57	48	36	258871.0550
5.56 8xD IC Z3 S6	5.56	7/32	6	95	57	48	36	258871.0556
5.60 8xD IC Z3 S6	5.60		6	95	57	48	36	258871.0560
5.70 8xD IC Z3 S6	5.70		6	95	57	48	36	258871.0570
5.80 8xD IC Z3 S6	5.80		6	95	57	48	36	258871.0580
5.90 8xD IC Z3 S6	5.90		6	95	57	48	36	258871.0590
5.95 8xD IC Z3 S6	5.95	15/64	6	95	57	48	36	258871.0595
6.00 8xD IC Z3 S6	6.00		6	95	57	48	36	258871.0600
6.10 8xD IC Z3 S8	6.10		8	114	76	64	36	258871.0610
6.20 8xD IC Z3 S8	6.20		8	114	76	64	36	258871.0620
6.30 8xD IC Z3 S8	6.30		8	114	76	64	36	258871.0630
6.35 8xD IC Z3 S8	6.35	1/4	8	114	76	64	36	258871.0635
6.40 8xD IC Z3 S8	6.40		8	114	76	64	36	258871.0640
6.50 8xD IC Z3 S8	6.50		8	114	76	64	36	258871.0650
6.60 8xD IC Z3 S8	6.60		8	114	76	64	36	258871.0660
6.70 8xD IC Z3 S8	6.70		8	114	76	64	36	258871.0670

Description	d1 (mm)	d1 (inch)	d2	l1	l2	l3	l4	Item no.
6.75 8xD IC Z3 S8	6.75	17/64	8	114	76	64	36	258871.0675
6.80 8xD IC Z3 S8	6.80		8	114	76	64	36	258871.0680
6.90 8xD IC Z3 S8	6.90		8	114	76	64	36	258871.0690
7.00 8xD IC Z3 S8	7.00		8	114	76	64	36	258871.0700
7.10 8xD IC Z3 S8	7.10		8	114	76	64	36	258871.0710
7.14 8xD IC Z3 S8	7.14	9/32	8	114	76	64	36	258871.0714
7.20 8xD IC Z3 S8	7.20		8	114	76	64	36	258871.0720
7.30 8xD IC Z3 S8	7.30		8	114	76	64	36	258871.0730
7.40 8xD IC Z3 S8	7.40		8	114	76	64	36	258871.0740
7.50 8xD IC Z3 S8	7.50		8	114	76	64	36	258871.0750
7.54 8xD IC Z3 S8	7.54	19/64	8	114	76	64	36	258871.0754
7.60 8xD IC Z3 S8	7.60		8	114	76	64	36	258871.0760
7.70 8xD IC Z3 S8	7.70		8	114	76	64	36	258871.0770
7.80 8xD IC Z3 S8	7.80		8	114	76	64	36	258871.0780
7.90 8xD IC Z3 S8	7.90		8	114	76	64	36	258871.0790
7.94 8xD IC Z3 S8	7.94	5/16	8	114	76	64	36	258871.0794
8.00 8xD IC Z3 S8	8.00		8	114	76	64	36	258871.0800
8.10 8xD IC Z3 S10	8.10		10	142	95	80	40	258871.0810
8.20 8xD IC Z3 S10	8.20		10	142	95	80	40	258871.0820
8.30 8xD IC Z3 S10	8.30		10	142	95	80	40	258871.0830
8.33 8xD IC Z3 S10	8.33	21/64	10	142	95	80	40	258871.0833
8.40 8xD IC Z3 S10	8.40		10	142	95	80	40	258871.0840
8.50 8xD IC Z3 S10	8.50		10	142	95	80	40	258871.0850
8.60 8xD IC Z3 S10	8.60		10	142	95	80	40	258871.0860
8.70 8xD IC Z3 S10	8.70		10	142	95	80	40	258871.0870
8.73 8xD IC Z3 S10	8.73	11/32	10	142	95	80	40	258871.0873
8.80 8xD IC Z3 S10	8.80		10	142	95	80	40	258871.0880
8.90 8xD IC Z3 S10	8.90		10	142	95	80	40	258871.0890
9.00 8xD IC Z3 S10	9.00		10	142	95	80	40	258871.0900
9.10 8xD IC Z3 S10	9.10		10	142	95	80	40	258871.0910
9.13 8xD IC Z3 S10	9.13	23/64	10	142	95	80	40	258871.0913
9.20 8xD IC Z3 S10	9.20		10	142	95	80	40	258871.0920
9.30 8xD IC Z3 S10	9.30		10	142	95	80	40	258871.0930
9.40 8xD IC Z3 S10	9.40		10	142	95	80	40	258871.0940

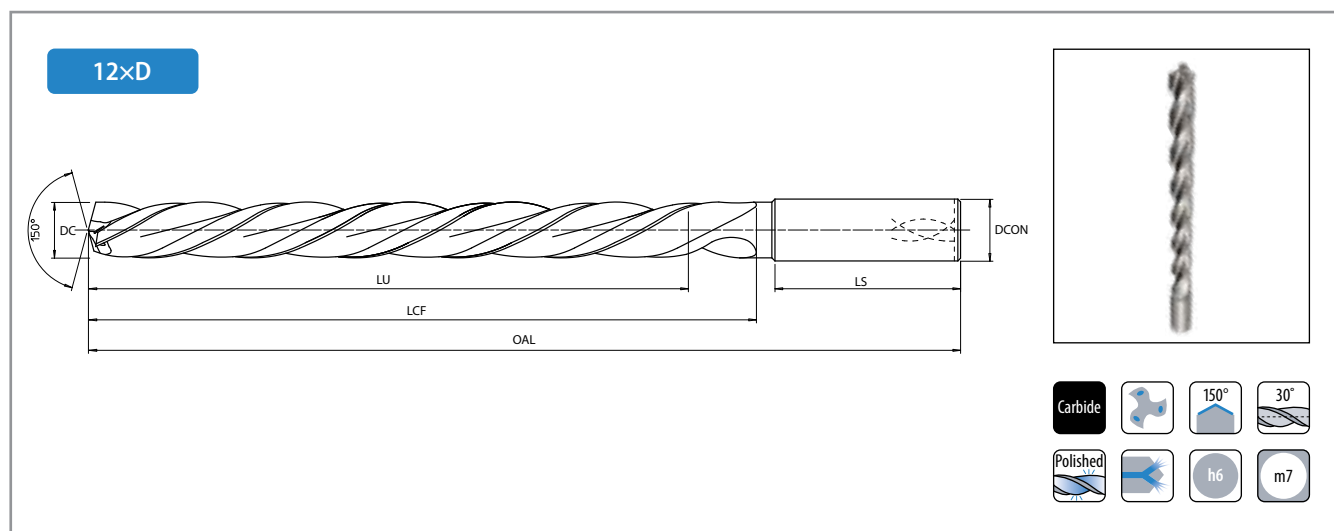
GammaDrill™ Dimensions



Description	DC (mm)	DC (inch)	DCON	OAL	LCF	LU	LS	Item no.
9.50 8xD IC Z3 S10	9.50		10	142	95	80	40	258871.0950
9.53 8xD IC Z3 S10	9.53	3/8	10	142	95	80	40	258871.0953
9.60 8xD IC Z3 S10	9.60		10	142	95	80	40	258871.0960
9.70 8xD IC Z3 S10	9.70		10	142	95	80	40	258871.0970
9.80 8xD IC Z3 S10	9.80		10	142	95	80	40	258871.0980
9.90 8xD IC Z3 S10	9.90		10	142	95	80	40	258871.0990
9.92 8xD IC Z3 S10	9.92	25/64	10	142	95	80	40	258871.0992
10.00 8xD IC Z3 S10	10.00		10	142	95	80	40	258871.1000
10.10 8xD IC Z3 S12	10.10		12	162	114	96	45	258871.1010
10.20 8xD IC Z3 S12	10.20		12	162	114	96	45	258871.1020
10.30 8xD IC Z3 S12	10.30		12	162	114	96	45	258871.1030
10.32 8xD IC Z3 S12	10.32	13/32	12	162	114	96	45	258871.1032
10.40 8xD IC Z3 S12	10.40		12	162	114	96	45	258871.1040
10.50 8xD IC Z3 S12	10.50		12	162	114	96	45	258871.1050
10.60 8xD IC Z3 S12	10.60		12	162	114	96	45	258871.1060
10.70 8xD IC Z3 S12	10.70		12	162	114	96	45	258871.1070
10.72 8xD IC Z3 S12	10.72	27/64	12	162	114	96	45	258871.1072
10.80 8xD IC Z3 S12	10.80		12	162	114	96	45	258871.1080
10.90 8xD IC Z3 S12	10.90		12	162	114	96	45	258871.1090
11.00 8xD IC Z3 S12	11.00		12	162	114	96	45	258871.1100
11.10 8xD IC Z3 S12	11.10		12	162	114	96	45	258871.1110
11.11 8xD IC Z3 S12	11.11	7/16	12	162	114	96	45	258871.1111
11.20 8xD IC Z3 S12	11.20		12	162	114	96	45	258871.1120
11.30 8xD IC Z3 S12	11.30		12	162	114	96	45	258871.1130
11.40 8xD IC Z3 S12	11.40		12	162	114	96	45	258871.1140
11.50 8xD IC Z3 S12	11.50		12	162	114	96	45	258871.1150
11.60 8xD IC Z3 S12	11.60		12	162	114	96	45	258871.1160
11.70 8xD IC Z3 S12	11.70		12	162	114	96	45	258871.1170
11.80 8xD IC Z3 S12	11.80		12	162	114	96	45	258871.1180
11.90 8xD IC Z3 S12	11.90		12	162	114	96	45	258871.1190
12.00 8xD IC Z3 S12	12.00		12	162	114	96	45	258871.1200
12.50 8xD IC Z3 S14	12.50		14	178	133	112	45	258871.1250
12.80 8xD IC Z3 S14	12.80		14	178	133	112	45	258871.1280
13.00 8xD IC Z3 S14	13.00		14	178	133	112	45	258871.1300

Description	DC (mm)	DC (inch)	DCON	OAL	LCF	LU	LS	Item no.
13.50 8xD IC Z3 S14	13.50		14	178	133	112	45	258871.1350
13.80 8xD IC Z3 S14	13.80		14	178	133	112	45	258871.1380
14.00 8xD IC Z3 S14	14.00		14	178	133	112	45	258871.1400
14.29 8xD IC Z3 S16	14.29	9/16	16	203	152	128	48	258871.1429
14.50 8xD IC Z3 S16	14.50		16	203	152	128	48	258871.1450
14.68 8xD IC Z3 S16	14.68	37/64	16	203	152	128	48	258871.1468
14.80 8xD IC Z3 S16	14.80		16	203	152	128	48	258871.1480
15.00 8xD IC Z3 S16	15.00		16	203	152	128	48	258871.1500
15.08 8xD IC Z3 S16	15.08	19/32	16	203	152	128	48	258871.1508
15.50 8xD IC Z3 S16	15.50		16	203	152	128	48	258871.1550
15.80 8xD IC Z3 S16	15.80		16	203	152	128	48	258871.1580
15.88 8xD IC Z3 S16	15.88	5/8	16	203	152	128	48	258871.1588
16.00 8xD IC Z3 S16	16.00		16	203	152	128	48	258871.1600
16.50 8xD IC Z3 S18	16.50		18	222	152	128	48	258871.1650
16.67 8xD IC Z3 S18	16.67	21/32	18	222	152	128	48	258871.1667
16.80 8xD IC Z3 S18	16.80		18	222	152	128	48	258871.1680
17.00 8xD IC Z3 S18	17.00		18	222	152	128	48	258871.1700
17.46 8xD IC Z3 S18	17.46	11/16	18	222	152	128	48	258871.1746
17.50 8xD IC Z3 S18	17.50		18	222	152	128	48	258871.1750
17.80 8xD IC Z3 S18	17.80		18	222	152	128	48	258871.1780
17.86 8xD IC Z3 S18	17.86	45/64	18	222	152	128	48	258871.1786
18.00 8xD IC Z3 S18	18.00		18	222	152	128	48	258871.1800
18.26 8xD IC Z3 S20	18.26	23/32	20	243	190	160	50	258871.1826
18.50 8xD IC Z3 S20	18.50		20	243	190	160	50	258871.1850
18.80 8xD IC Z3 S20	18.80		20	243	190	160	50	258871.1880
19.00 8xD IC Z3 S20	19.00		20	243	190	160	50	258871.1900
19.05 8xD IC Z3 S20	19.05	3/4	20	243	190	160	50	258871.1905
19.50 8xD IC Z3 S20	19.50		20	243	190	160	50	258871.1950
19.80 8xD IC Z3 S20	19.80		20	243	190	160	50	258871.1980
20.00 8xD IC Z3 S20	20.00		20	243	190	160	50	258871.2000

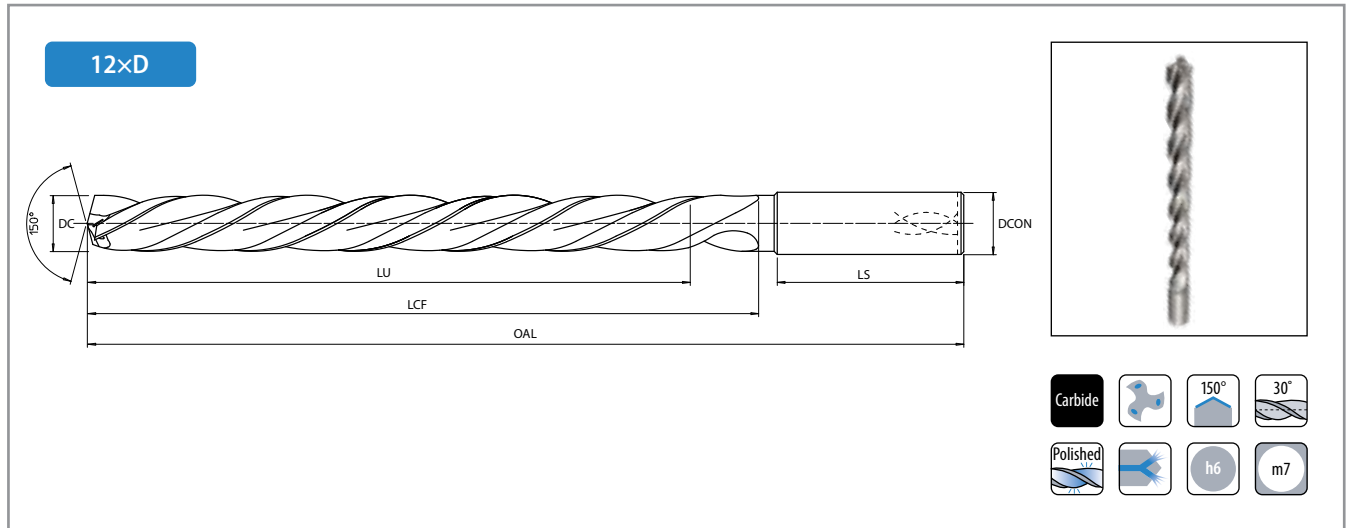
GammaDrill™ Dimensions



Description	DC (mm)	DC (inch)	DCON	OAL	LCF	LU	LS	Item no.
4.00 12xD IC Z3 S6	4.00		6	102	64	58	36	258872.0400
4.10 12xD IC Z3 S6	4.10		6	102	64	58	36	258872.0410
4.20 12xD IC Z3 S6	4.20		6	102	64	58	36	258872.0420
4.30 12xD IC Z3 S6	4.30		6	102	64	58	36	258872.0430
4.37 12xD IC Z3 S6	4.37	11/64	6	102	64	58	36	258872.0437
4.40 12xD IC Z3 S6	4.40		6	102	64	58	36	258872.0440
4.50 12xD IC Z3 S6	4.50		6	102	64	58	36	258872.0450
4.60 12xD IC Z3 S6	4.60		6	102	64	58	36	258872.0460
4.70 12xD IC Z3 S6	4.70		6	102	64	58	36	258872.0470
4.76 12xD IC Z3 S6	4.76	3/16	6	116	78	70	36	258872.0476
4.80 12xD IC Z3 S6	4.80		6	116	78	70	36	258872.0480
4.90 12xD IC Z3 S6	4.90		6	116	78	70	36	258872.0490
5.00 12xD IC Z3 S6	5.00		6	116	78	70	36	258872.0500
5.10 12xD IC Z3 S6	5.10		6	116	78	70	36	258872.0510
5.16 12xD IC Z3 S6	5.16	13/64	6	116	78	70	36	258872.0516
5.20 12xD IC Z3 S6	5.20		6	116	78	70	36	258872.0520
5.30 12xD IC Z3 S6	5.30		6	116	78	70	36	258872.0530
5.40 12xD IC Z3 S6	5.40		6	116	78	70	36	258872.0540
5.50 12xD IC Z3 S6	5.50		6	116	78	70	36	258872.0550
5.56 12xD IC Z3 S6	5.56	7/32	6	116	78	70	36	258872.0556
5.60 12xD IC Z3 S6	5.60		6	116	78	70	36	258872.0560
5.70 12xD IC Z3 S6	5.70		6	116	78	70	36	258872.0570
5.80 12xD IC Z3 S6	5.80		6	116	78	70	36	258872.0580
5.90 12xD IC Z3 S6	5.90		6	116	78	70	36	258872.0590
5.95 12xD IC Z3 S6	5.95	15/64	6	116	78	70	36	258872.0595
6.00 12xD IC Z3 S6	6.00		6	116	78	70	36	258872.0600
6.10 12xD IC Z3 S8	6.10		8	146	108	94	36	258872.0610
6.20 12xD IC Z3 S8	6.20		8	146	108	94	36	258872.0620
6.30 12xD IC Z3 S8	6.30		8	146	108	94	36	258872.0630
6.35 12xD IC Z3 S8	6.35	1/4	8	146	108	94	36	258872.0635
6.40 12xD IC Z3 S8	6.40		8	146	108	94	36	258872.0640
6.50 12xD IC Z3 S8	6.50		8	146	108	94	36	258872.0650
6.60 12xD IC Z3 S8	6.60		8	146	108	94	36	258872.0660
6.70 12xD IC Z3 S8	6.70		8	146	108	94	36	258872.0670

Description	DC (mm)	DC (inch)	DCON	OAL	LCF	LU	LS	Item no.
6.75 12xD IC Z3 S8	6.75	17/64	8	146	108	94	36	258872.0675
6.80 12xD IC Z3 S8	6.80		8	146	108	94	36	258872.0680
6.90 12xD IC Z3 S8	6.90		8	146	108	94	36	258872.0690
7.00 12xD IC Z3 S8	7.00		8	146	108	94	36	258872.0700
7.10 12xD IC Z3 S8	7.10		8	146	108	94	36	258872.0710
7.14 12xD IC Z3 S8	7.14	9/32	8	146	108	94	36	258872.0714
7.20 12xD IC Z3 S8	7.20		8	146	108	94	36	258872.0720
7.30 12xD IC Z3 S8	7.30		8	146	108	94	36	258872.0730
7.40 12xD IC Z3 S8	7.40		8	146	108	94	36	258872.0740
7.50 12xD IC Z3 S8	7.50		8	146	108	94	36	258872.0750
7.54 12xD IC Z3 S8	7.54	19/64	8	146	108	94	36	258872.0754
7.60 12xD IC Z3 S8	7.60		8	146	108	94	36	258872.0760
7.70 12xD IC Z3 S8	7.70		8	146	108	94	36	258872.0770
7.80 12xD IC Z3 S8	7.80		8	146	108	94	36	258872.0780
7.90 12xD IC Z3 S8	7.90		8	146	108	94	36	258872.0790
7.94 12xD IC Z3 S8	7.94	5/16	8	146	108	94	36	258872.0794
8.00 12xD IC Z3 S8	8.00		8	146	108	94	36	258872.0800
8.10 12xD IC Z3 S10	8.10		10	162	120	110	40	258872.0810
8.20 12xD IC Z3 S10	8.20		10	162	120	110	40	258872.0820
8.30 12xD IC Z3 S10	8.30		10	162	120	110	40	258872.0830
8.33 12xD IC Z3 S10	8.33	21/64	10	162	120	110	40	258872.0833
8.40 12xD IC Z3 S10	8.40		10	162	120	110	40	258872.0840
8.50 12xD IC Z3 S10	8.50		10	162	120	110	40	258872.0850
8.60 12xD IC Z3 S10	8.60		10	162	120	110	40	258872.0860
8.70 12xD IC Z3 S10	8.70		10	162	120	110	40	258872.0870
8.73 12xD IC Z3 S10	8.73	11/32	10	162	120	110	40	258872.0873
8.80 12xD IC Z3 S10	8.80		10	162	120	110	40	258872.0880
8.90 12xD IC Z3 S10	8.90		10	162	120	110	40	258872.0890
9.00 12xD IC Z3 S10	9.00		10	162	120	110	40	258872.0900
9.10 12xD IC Z3 S10	9.10		10	162	120	110	40	258872.0910
9.13 12xD IC Z3 S10	9.13	23/64	10	162	120	110	40	258872.0913
9.20 12xD IC Z3 S10	9.20		10	162	120	110	40	258872.0920
9.30 12xD IC Z3 S10	9.30		10	162	120	110	40	258872.0930
9.40 12xD IC Z3 S10	9.40		10	162	120	110	40	258872.0940

GammaDrill™ Dimensions



Description	DC (mm)	DC (inch)	DCON	OAL	LCF	LU	LS	Item no.
9.50 12xD IC Z3 S10	9.50		10	162	120	110	40	258872.0950
9.53 12xD IC Z3 S10	9.53	3/8	10	162	120	110	40	258872.0953
9.60 12xD IC Z3 S10	9.60		10	162	120	110	40	258872.0960
9.70 12xD IC Z3 S10	9.70		10	162	120	110	40	258872.0970
9.80 12xD IC Z3 S10	9.80		10	162	120	110	40	258872.0980
9.90 12xD IC Z3 S10	9.90		10	162	120	110	40	258872.0990
9.92 12xD IC Z3 S10	9.92	25/64	10	162	120	110	40	258872.0992
10.00 12xD IC Z3 S10	10.00		10	162	120	110	40	258872.1000
10.10 12xD IC Z3 S12	10.10		12	204	156	142	45	258872.1010
10.20 12xD IC Z3 S12	10.20		12	204	156	142	45	258872.1020
10.30 12xD IC Z3 S12	10.30		12	204	156	142	45	258872.1030
10.32 12xD IC Z3 S12	10.32	13/32	12	204	156	142	45	258872.1032
10.40 12xD IC Z3 S12	10.40		12	204	156	142	45	258872.1040
10.50 12xD IC Z3 S12	10.50		12	204	156	142	45	258872.1050
10.60 12xD IC Z3 S12	10.60		12	204	156	142	45	258872.1060
10.70 12xD IC Z3 S12	10.70		12	204	156	142	45	258872.1070
10.72 12xD IC Z3 S12	10.72	27/64	12	204	156	142	45	258872.1072
10.80 12xD IC Z3 S12	10.80		12	204	156	142	45	258872.1080
10.90 12xD IC Z3 S12	10.90		12	204	156	142	45	258872.1090
11.00 12xD IC Z3 S12	11.00		12	204	156	142	45	258872.1100
11.10 12xD IC Z3 S12	11.10		12	204	156	142	45	258872.1110
11.11 12xD IC Z3 S12	11.11	7/16	12	204	156	142	45	258872.1111
11.20 12xD IC Z3 S12	11.20		12	204	156	142	45	258872.1120
11.30 12xD IC Z3 S12	11.30		12	204	156	142	45	258872.1130
11.40 12xD IC Z3 S12	11.40		12	204	156	142	45	258872.1140
11.50 12xD IC Z3 S12	11.50		12	204	156	142	45	258872.1150
11.60 12xD IC Z3 S12	11.60		12	204	156	142	45	258872.1160
11.70 12xD IC Z3 S12	11.70		12	204	156	142	45	258872.1172
11.80 12xD IC Z3 S12	11.80		12	204	156	142	45	258872.1180
11.90 12xD IC Z3 S12	11.90		12	204	156	142	45	258872.1190
12.00 12xD IC Z3 S12	12.00		12	204	156	142	45	258872.1200
12.50 12xD IC Z3 S14	12.50		14	230	182	166	45	258872.1250
12.80 12xD IC Z3 S14	12.80		14	230	182	166	45	258872.1280
13.00 12xD IC Z3 S14	13.00		14	230	182	166	45	258872.1300

Description	DC (mm)	DC (inch)	DCON	OAL	LCF	LU	LS	Item no.
13.50 12xD IC Z3 S14	13.50		14	230	182	166	45	258872.1350
13.80 12xD IC Z3 S14	13.80		14	230	182	166	45	258872.1380
14.00 12xD IC Z3 S14	14.00		14	230	182	166	45	258872.1400
14.29 12xD IC Z3 S16	14.29	9/16	16	260	208	192	48	258872.1429
14.50 12xD IC Z3 S16	14.50		16	260	208	192	48	258872.1450
14.68 12xD IC Z3 S16	14.68	37/64	16	260	208	192	48	258872.1468
14.80 12xD IC Z3 S16	14.80		16	260	208	192	48	258872.1480
15.00 12xD IC Z3 S16	15.00		16	260	208	192	48	258872.1500
15.08 12xD IC Z3 S16	15.08	19/32	16	260	208	192	48	258872.1508
15.50 12xD IC Z3 S16	15.50		16	260	208	192	48	258872.1550
15.80 12xD IC Z3 S16	15.80		16	260	208	192	48	258872.1580
15.88 12xD IC Z3 S16	15.88	5/8	16	260	208	192	48	258872.1588
16.00 12xD IC Z3 S16	16.00		16	260	208	192	48	258872.1600
16.50 12xD IC Z3 S18	16.50		18	285	234	216	48	258872.1650
16.67 12xD IC Z3 S18	16.67	21/32	18	285	234	216	48	258872.1667
16.80 12xD IC Z3 S18	16.80		18	285	234	216	48	258872.1680
17.00 12xD IC Z3 S18	17.00		18	285	234	216	48	258872.1700
17.46 12xD IC Z3 S18	17.46	11/16	18	285	234	216	48	258872.1746
17.50 12xD IC Z3 S18	17.50		18	285	234	216	48	258872.1750
17.80 12xD IC Z3 S18	17.80		18	285	234	216	48	258872.1780
17.86 12xD IC Z3 S18	17.86	45/54	18	285	234	216	48	258872.1786
18.00 12xD IC Z3 S18	18.00		18	285	234	216	48	258872.1800
18.26 12xD IC Z3 S20	18.26	23/32	20	310	258	240	50	258872.1826
18.50 12xD IC Z3 S20	18.50		20	310	258	240	50	258872.1850
18.80 12xD IC Z3 S20	18.80		20	310	258	240	50	258872.1880
19.00 12xD IC Z3 S20	19.00		20	310	258	240	50	258872.1900
19.05 12xD IC Z3 S20	19.05	3/4	20	310	258	240	50	258872.1905
19.50 12xD IC Z3 S20	19.50		20	310	258	240	50	258872.1950
19.80 12xD IC Z3 S20	19.80		20	310	258	240	50	258872.1980
20.00 12xD IC Z3 S20	20.00		20	310	258	240	50	258872.2000

Cutting data Recommended

UMC*	Material	Cutting speed Vc [m/min]				Feed F=mm/rev				
		Internal coolant	External coolant	MQL	Air	Ø4.0	Ø6.5	Ø9.5	Ø14.0	Ø20.2
N1.1	Aluminium / Non-alloy and alloy / < 3% Si	300	200	250	-	0.25	0.36	0.43	0.51	0.60
N1.2	Aluminium / Alloy / ≤ 7% Si	250	180	200	-	0.32	0.46	0.55	0.66	0.79
N1.3	Aluminium / Alloy / > 7-12% Si	220	150	180	-	0.32	0.46	0.55	0.66	0.79
N1.4	Aluminium / Alloy / > 12% Si	180	120	150	-	0.32	0.46	0.55	0.66	0.79

* Unimerco Material Classification.

Note: Recommended cutting conditions above is for 5xD type. As drilling depth increases (5xD ⇒ 8xD ⇒ 12xD), feed rates should be reduced.
 Recommended feed rate: 5xD type = 100%. 8xD type = 80% or less. 12xD type = 70% or less.
 Recommended cutting speed: 5xD type = 100%. 8xD type = 80% or less. 12xD type = 70% or less.

Caution! Pilot drilling for GammaDrill™ 8xD type or deeper

- Please follow recommendations for larger drill depths to maintain maximum hole quality.

1 Make a center spot

Use GammaDrill™ 5xD type or shorter.
 Center spot should be at least half of cutting diameter.

2 Drill hole

Use GammaDrill™ 8xD/12xD type or special designed GammaDrill™ above 8xD type.
 Check cutting data above and be aware of reduced cutting speed for larger drilling depths.



Solid end mills



Solid end mills

51-96













2/ 3QFSM	53-54
4QFSM-VG 4QFSM-VGL 4QFSM-VE	55-57
4/ 5QFRM-VE 4/ 5QFRM-VG	58-59
5QECL-VTL	60
4QFSM-H 4QFRM-H	61-62
2KMB	66-67
2/ 3/ 5FES	78-81
4JER	82-85
3/ 4/ 5RDS	86-87
4/ 5/ 6RFH	88-92
2SEB	93-95

Tool selection guide next page



Tool selection guide

Application and selection

Series	Purpose	Workpiece material							Description	No. of flutes	Corner shape	DC (mm)	Length of cut	Coolant holes	Shape (Shank type)	Features	
		Steel ~30HRC	Hard materials ~68HRC	Stainless steel	Titanium alloys	Heat resistant alloy	Cast iron	Aluminum & Non-ferrous metals									
		P	H	M	S	S	K	N									
Standard	General	★		★				★	★	2QFSM	2	Square	3-20	Medium	No	 Cylindrical	Superior cutting edge preparation for extended tool life. Improved edge strength for high chipping resistance. MEGACOAT for long tool life.
		★		★				★	★	3QFSM	3	Square					
VG	General / High performance	★		★	★			★	★	4QFSM-VG	4	Square	3-20	Medium	No	 Cylindrical	Varied interval flute design and with positive rake angle. Superior anti vibration performance and improved edge strength for high chipping resistance.
VGL	General / High performance / Torus	★		★	★			★	★	4QFRM-VGL	4	Radius	3-20	Medium	No	 Weldon	Varied interval flute design and with positive rake angle. Superior anti vibration performance and improved edge strength for high chipping resistance. Long reach by recess.
VE	Exotic material	☆		★	★					4QFSM-VE	4	Square	3-20	Medium	No	 Cylindrical	Low cutting force design for smooth cutting operations. Positive rake angle for smooth chip evacuation. Varied interval flute design with sharp edge.
		☆		★	★				4QFRM-VE	Radius							
		☆		★	★					5QFRM-VE	5	Radius	6-20				
VTL	Trochoidal milling	★		★	★			★		5QECL-VTL	5	Chamfer	6-16	Long	Yes	 Weldon	Odd number of cutting edges for improved smooth running during trochoidal milling. Unique chipbreaker geometry produces controlled, short chips. Improved chip evacuation.
H	Hard material		★							4QFSM-H	4	Square	3-20	Medium	No	 Cylindrical	Longer tool life and stable machining at hard materials due to superior wear resistance and high oxidation resistance of MEGACOAT. Stability oriented design for reliable machining process.
			★						4QFRM-H	Radius							
F	Finishing/Sharp cutting for Automatic lathe	★	☆	★				☆		2/3/4FESW	2/3/4	Square	3-13	Extra short	No	 Cylindrical	MEGACOAT and sharp cutting edge enable high precision finishing owing to excellent wear and heat resistance.
J	HRSA	☆		☆	☆	★				4JER	4	Radius	6-20	Short & Medium	No	 Cylindrical	High efficiency and stable machining for Heat Resistant Alloys such as Inconel®. Long tool life machining with MEGACOAT HARD for excellent heat resistance
R	High efficiency rougher	★		☆				★		3/4/5RDS	3/4/5	Chamfer	4-25	Medium & long	No	 Cylindrical	High efficiency machining of Difficult-to-cut material with multi-edge design and coolant hole Deep slotting (ap = 2 x DC) for Stainless Steel and Titanium Alloy Serrated edge
		★		★	★	☆	☆			4/5/6RFH	4/5/6	Radius	6-20	Medium & long	Yes	 Cylindrical	
B	High precision ball-nose endmills		★							2KMB	2	Ball	0.1-4	Medium & short (long neck)	No	 Ball	Micro precision machining for hardened material, supporting up to 70 HRC. Excellent surface finish with MEGACOAT HARD EX coating technology.
		★	★	☆				☆		2SEB	2	Ball	2-16	Medium	No	 Ball	High efficiency ball-nose end mill with 2 flutes Sharp cutting with special nose geometry Close tolerance edge diameter (R±0.005mm, ø16 excluded) Stable chip evacuation by a large chip pocket design

★ : 1st Recommendation ☆ : 2nd Recommendation

For general machining

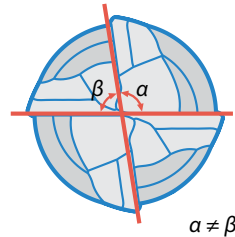
Q Series

Long tool life and smooth surface finish in medium – finishing application. Stable machining in steel, stainless steel and hard material <68 HRC.



1 Varied interval flute design

Superior anti vibration performance due to variable pitch flute design



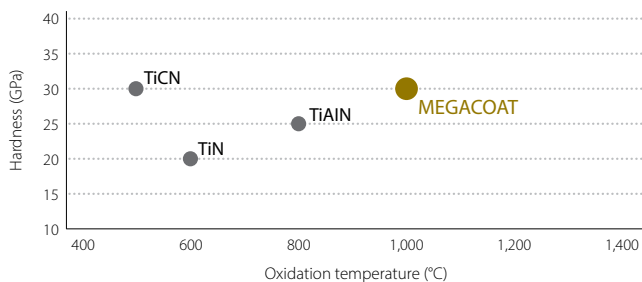
2 Wide variety of machining operations

High efficiency machining for steel, stainless steel and hardened material <68HRC

3 Long tool life with MEGACOAT

Superior wear and oxidation resistance with MEGACOAT

Coating properties (In-house evaluation)



Wear resistance evaluation

4QFSM-VG
(Cutting distance 3,900 mm)



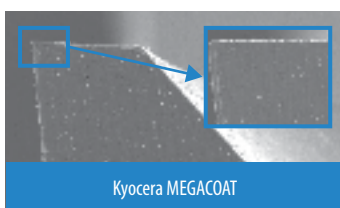
Wear
1/2
or smaller

Competitor A
(Cutting distance 1,900 mm, breakage)

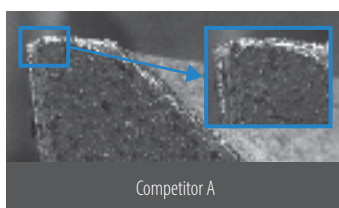


Cutting conditions:
N = 2,918 min⁻¹, Vf = 678 mm/min, ap x ae = 12 x 9.6 mm
Machining diameter ø 12 mm, 4 teeth, slotting, dry
Workpiece: 42CrMo4V

Smooth endmill surface reduces welding and allows stable machining



Smooth and sharp to the tip of the cutting edge.
Longer tool life and improved surface finish.

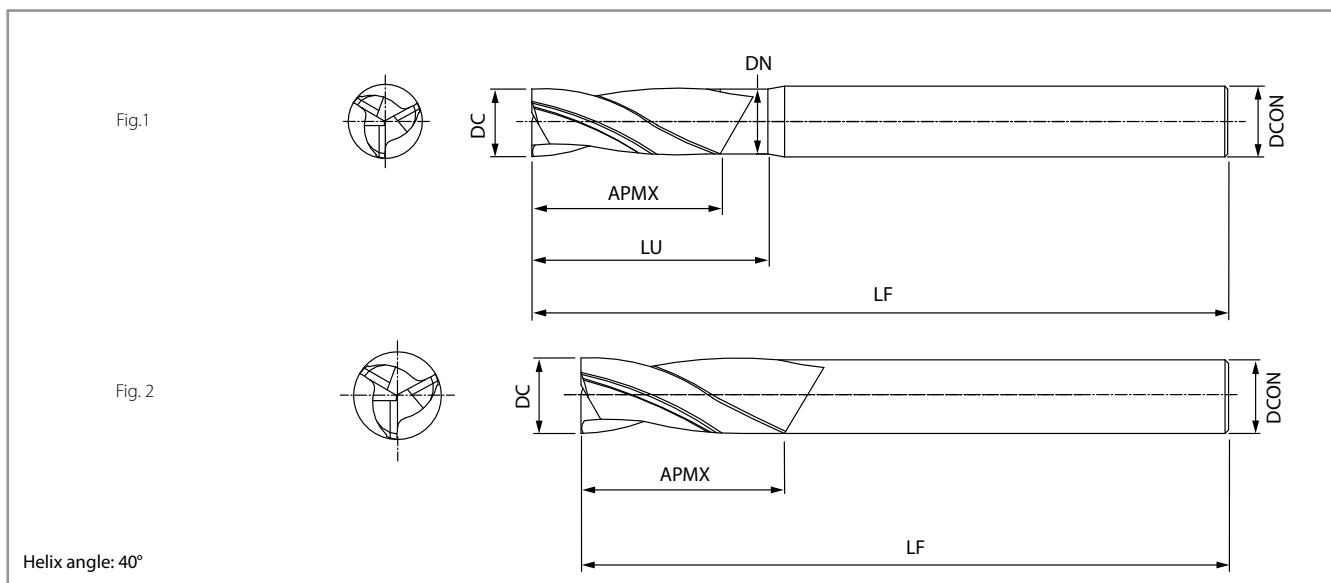


Coating surface is rough and delamination is visible.
The cutting edge is rounded.



Major delamination of cutting edge and exposed material is noticeable.

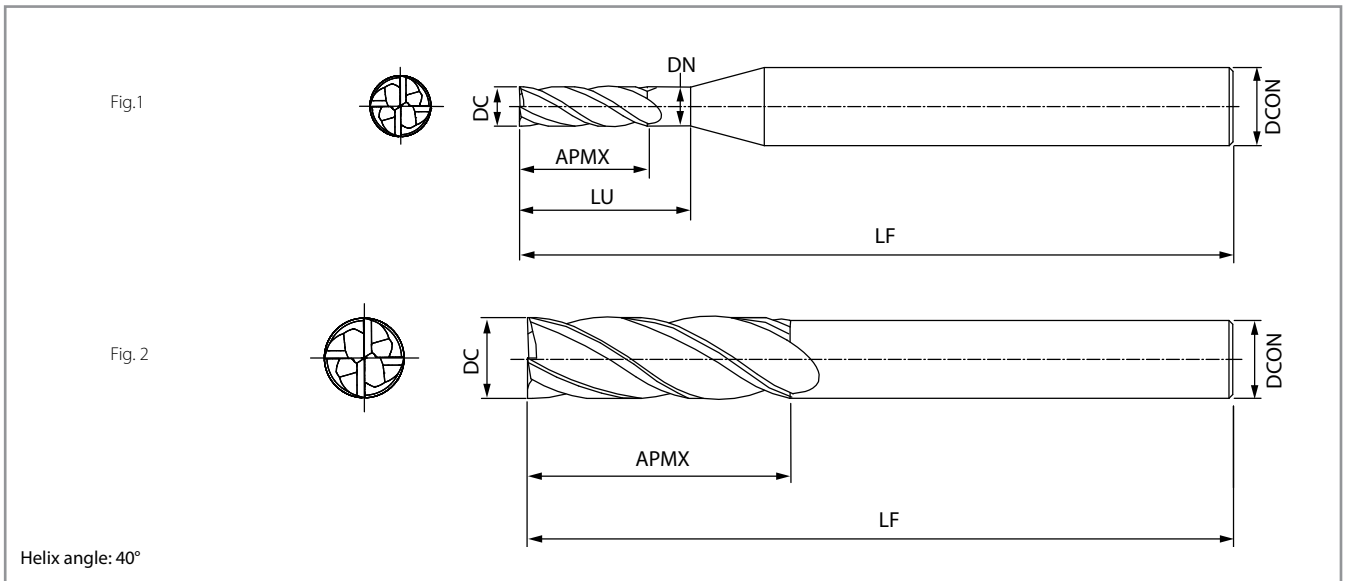
2/ 3QFSM Square type Dimensions



Description	Availability	DC	APMX	DN	LU	DCON (h6)	LF	ZEFP	Shape
2QFSM030-090-03	●	3.0	9.0	-	-	3.0	40.0	2	Fig. 2
2QFSM030-090-06	●	3.0	9.0	3.0	11.0	6.0	50.0	2	Fig. 1
2QFSM040-120-04	●	4.0	12.0	-	-	4.0	50.0	2	Fig. 2
2QFSM040-120-06	●	4.0	12.0	4.0	14.0	6.0	50.0	2	Fig. 1
2QFSM050-150-05	●	5.0	15.0	-	-	5.0	50.0	2	Fig. 2
2QFSM050-150-06	●	5.0	15.0	5.0	17.0	6.0	50.0	2	Fig. 1
2QFSM060-160-06	●	6.0	16.0	-	-	6.0	50.0	2	Fig. 2
2QFSM060-200-06	●	6.0	20.0	-	-	6.0	60.0	2	Fig. 2
2QFSM080-200-08	●	8.0	20.0	-	-	8.0	64.0	2	Fig. 2
2QFSM100-220-10	●	10.0	22.0	-	-	10.0	70.0	2	Fig. 2
2QFSM120-250-12	●	12.0	25.0	-	-	12.0	90.0	2	Fig. 2
2QFSM160-320-16	●	16.0	32.0	-	-	16.0	90.0	2	Fig. 2
2QFSM200-380-20	●	20.0	38.0	-	-	20.0	100.0	2	Fig. 2
3QFSM030-090-03	●	3.0	9.0	-	-	3.0	40.0	3	Fig. 2
3QFSM030-090-06	●	3.0	9.0	3.0	11.0	6.0	50.0	3	Fig. 1
3QFSM040-120-04	●	4.0	12.0	-	-	4.0	50.0	3	Fig. 2
3QFSM040-120-06	●	4.0	12.0	4.0	14.0	6.0	50.0	3	Fig. 1
3QFSM050-150-05	●	5.0	15.0	-	-	5.0	50.0	3	Fig. 2
3QFSM050-150-06	●	5.0	15.0	5.0	17.0	6.0	50.0	3	Fig. 1
3QFSM060-160-06	●	6.0	16.0	-	-	6.0	50.0	3	Fig. 2
3QFSM060-200-06	●	6.0	20.0	-	-	6.0	60.0	3	Fig. 2
3QFSM080-200-08	●	8.0	20.0	-	-	8.0	64.0	3	Fig. 2
3QFSM100-220-10	●	10.0	22.0	-	-	10.0	70.0	3	Fig. 2
3QFSM120-250-12	●	12.0	25.0	-	-	12.0	75.0	3	Fig. 2
3QFSM160-320-16	●	16.0	32.0	-	-	16.0	90.0	3	Fig. 2
3QFSM200-380-20	●	20.0	38.0	-	-	20.0	100.0	3	Fig. 2

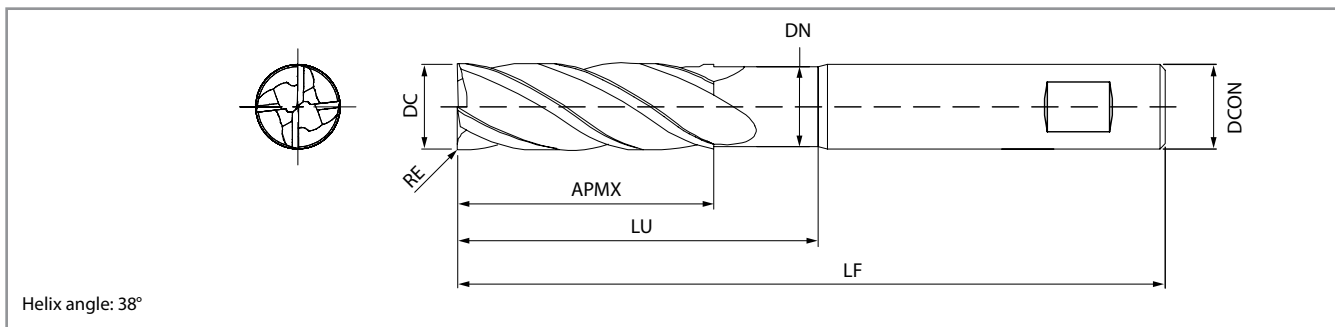
● : Available

4QFSM-VG Square type Dimensions



Description	Availability	DC	APMX	DN	LU	DCON (h6)	LF	ZEFP	Shape
4QFSM030-090-03-VG	●	3.0	9.0	-	-	3.0	50.0	4	Fig. 2
4QFSM030-090-06-VG	●	3.0	9.0	3.0	11.0	6.0	50.0	4	Fig. 1
4QFSM040-120-04-VG	●	4.0	12.0	-	-	4.0	50.0	4	Fig. 2
4QFSM040-120-06-VG	●	4.0	12.0	4.0	14.0	6.0	50.0	4	Fig. 1
4QFSM050-150-05-VG	●	5.0	15.0	-	-	5.0	50.0	4	Fig. 2
4QFSM060-160-06-VG	●	6.0	16.0	-	-	6.0	50.0	4	Fig. 2
4QFSM060-200-06-VG	●	6.0	20.0	-	-	6.0	60.0	4	Fig. 2
4QFSM080-220-08-VG	●	8.0	22.0	-	-	8.0	64.0	4	Fig. 2
4QFSM100-270-10-VG	●	10.0	27.0	-	-	10.0	70.0	4	Fig. 2
4QFSM100-220-10-VG	●	10.0	22.0	-	-	10.0	75.0	4	Fig. 2
4QFSM120-320-12-VG	●	12.0	32.0	-	-	12.0	75.0	4	Fig. 2
4QFSM160-320-16-VG	●	16.0	32.0	-	-	16.0	90.0	4	Fig. 2
4QFSM200-380-20-VG	●	20.0	38.0	-	-	20.0	100.0	4	Fig. 2

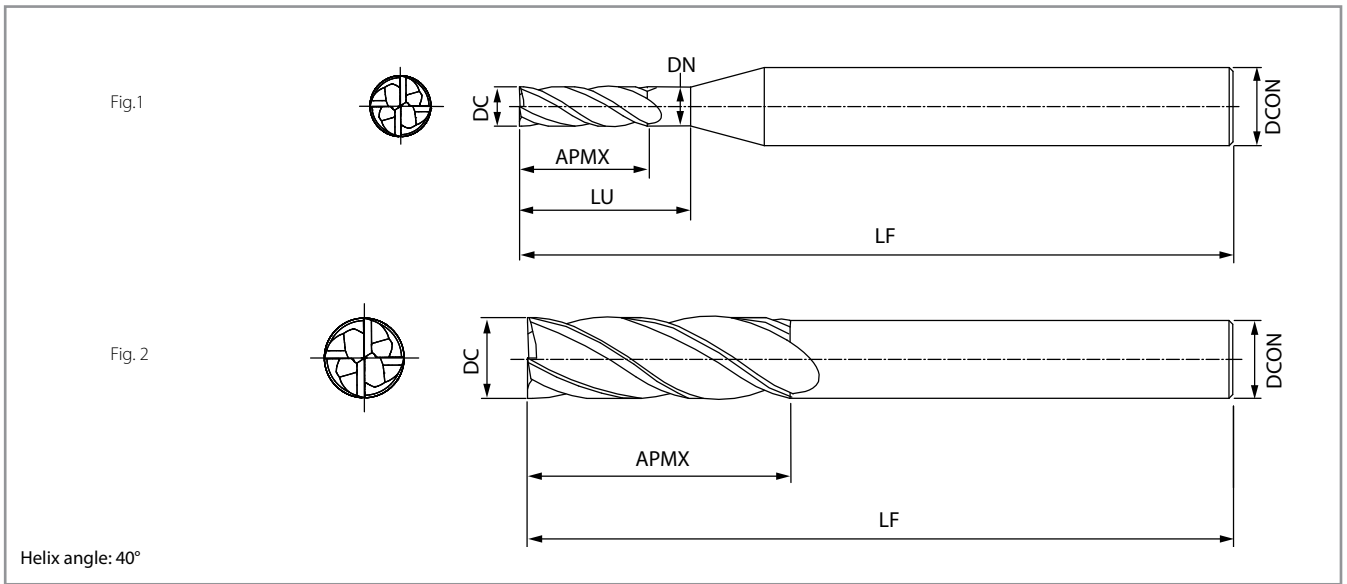
● : Available



Description	Availability	DC	RE	APMX	DN	LU	DCON (h6)	LF	ZEFP
4QFRM030-090-06-R03-VGL	●	3.0	0.3	9.0	2.8	15.0	6.0	57.0	4
4QFRM030-090-06-R05-VGL	●	3.0	0.5	9.0	2.8	15.0	6.0	57.0	4
4QFRM040-120-06-R03-VGL	●	4.0	0.3	12.0	3.7	20.0	6.0	57.0	4
4QFRM040-120-06-R05-VGL	●	4.0	0.5	12.0	3.7	20.0	6.0	57.0	4
4QFRM050-150-06-R03-VGL	●	5.0	0.3	15.0	4.6	22.0	6.0	57.0	4
4QFRM050-150-06-R05-VGL	●	5.0	0.5	15.0	4.6	22.0	6.0	57.0	4
4QFRM060-160-06-R03-VGL	●	6.0	0.3	16.0	5.5	22.0	6.0	57.0	4
4QFRM060-160-06-R05-VGL	●	6.0	0.5	16.0	5.5	22.0	6.0	57.0	4
4QFRM060-160-06-R10-VGL	●	6.0	1.0	16.0	5.5	22.0	6.0	57.0	4
4QFRM080-200-08-R03-VGL	●	8.0	0.3	20.0	7.4	26.0	8.0	64.0	4
4QFRM080-200-08-R05-VGL	●	8.0	0.5	20.0	7.4	26.0	8.0	64.0	4
4QFRM080-200-08-R10-VGL	●	8.0	1.0	20.0	7.4	26.0	8.0	64.0	4
4QFRM080-200-08-R20-VGL	●	8.0	2.0	20.0	7.4	26.0	8.0	64.0	4
4QFRM100-220-10-R05-VGL	●	10.0	0.5	22.0	9.2	30.0	10.0	70.0	4
4QFRM100-220-10-R10-VGL	●	10.0	1.0	22.0	9.2	30.0	10.0	70.0	4
4QFRM100-220-10-R20-VGL	●	10.0	2.0	22.0	9.2	30.0	10.0	70.0	4
4QFRM120-250-12-R05-VGL	●	12.0	0.5	25.0	11.0	35.0	12.0	83.0	4
4QFRM120-250-12-R10-VGL	●	12.0	1.0	25.0	11.0	35.0	12.0	83.0	4
4QFRM120-250-12-R20-VGL	●	12.0	2.0	25.0	11.0	35.0	12.0	83.0	4
4QFRM160-320-16-R05-VGL	●	16.0	0.5	32.0	15.0	42.0	16.0	90.0	4
4QFRM160-320-16-R10-VGL	●	16.0	1.0	32.0	15.0	42.0	16.0	90.0	4
4QFRM160-320-16-R20-VGL	●	16.0	2.0	32.0	15.0	42.0	16.0	90.0	4
4QFRM160-320-16-R30-VGL	●	16.0	3.0	32.0	15.0	42.0	16.0	90.0	4
4QFRM200-380-20-R05-VGL	●	20.0	0.5	38.0	19.0	50.0	20.0	100.0	4
4QFRM200-380-20-R10-VGL	●	20.0	1.0	38.0	19.0	50.0	20.0	100.0	4
4QFRM200-380-20-R20-VGL	●	20.0	2.0	38.0	19.0	50.0	20.0	100.0	4
4QFRM200-380-20-R30-VGL	●	20.0	3.0	38.0	19.0	50.0	20.0	100.0	4

● : Available

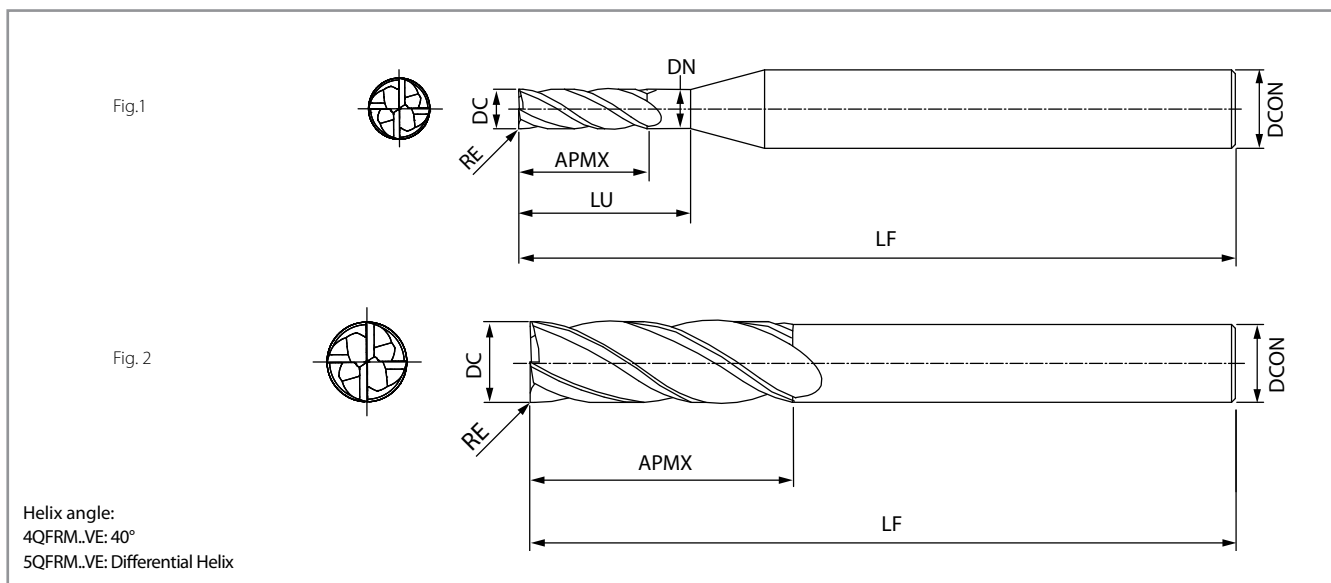
4QFSM-VE Square type Dimensions



Description	Availability	DC	APMX	DN	LU	DCON (h6)	LF	ZEFP	Shape
4QFSM030-090-06-VE	●	3.0	9.0	3.0	11.0	6.0	50.0	4	Fig. 1
4QFSM040-120-06-VE	●	4.0	12.0	4.0	14.0	6.0	50.0	4	Fig. 1
4QFSM050-130-06-VE	●	5.0	13.0	5.0	15.0	6.0	50.0	4	Fig. 1
4QFSM060-130-06-VE	●	6.0	13.0	-	-	6.0	50.0	4	Fig. 2
4QFSM080-200-08-VE	●	8.0	20.0	-	-	8.0	64.0	4	Fig. 2
4QFSM100-220-10-VE	●	10.0	22.0	-	-	10.0	70.0	4	Fig. 2
4QFSM120-260-12-VE	●	12.0	26.0	-	-	12.0	75.0	4	Fig. 2
4QFSM160-320-16-VE	●	16.0	32.0	-	-	16.0	90.0	4	Fig. 2
4QFSM200-380-20-VE	●	20.0	38.0	-	-	20.0	100.0	4	Fig. 2

● : Available

4/ 5QFRM-VE Radius type Dimensions



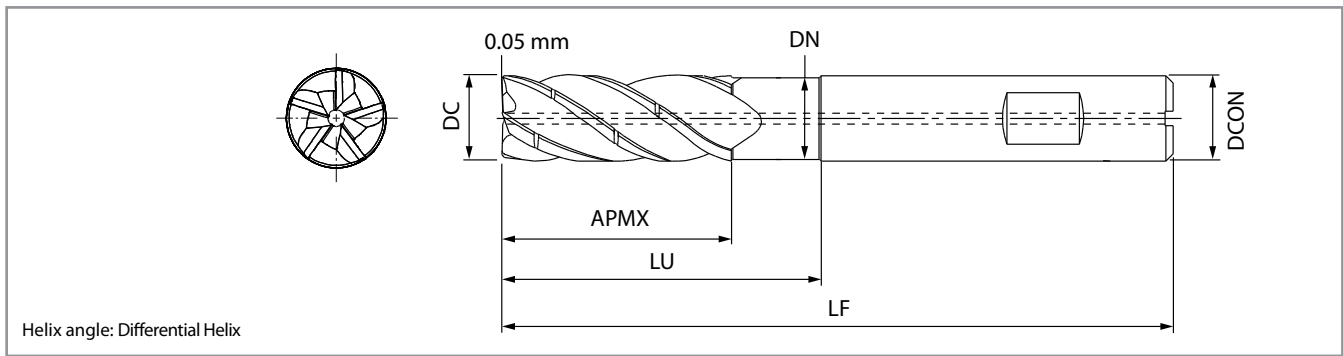
Description	Availability	DC	RE	APMX	DN	LU	DCON (h6)	LF	ZEFP	Shape
4QFRM030-090-03-R03-VE	●	3.0	0.3	9.0	-	-	3.0	40.0	4	Fig. 2
4QFRM030-090-03-R05-VE	●	3.0	0.5	9.0	-	-	3.0	40.0	4	Fig. 2
4QFRM030-090-06-R03-VE	●	3.0	0.3	9.0	3.0	11.0	6.0	50.0	4	Fig. 1
4QFRM030-090-06-R05-VE	●	3.0	0.5	9.0	3.0	11.0	6.0	50.0	4	Fig. 1
4QFRM040-120-04-R03-VE	●	4.0	0.3	12.0	-	-	4.0	50.0	4	Fig. 2
4QFRM040-120-04-R05-VE	●	4.0	0.5	12.0	-	-	4.0	50.0	4	Fig. 2
4QFRM040-120-06-R03-VE	●	4.0	0.3	12.0	4.0	14.0	6.0	50.0	4	Fig. 1
4QFRM040-120-06-R05-VE	●	4.0	0.5	12.0	4.0	14.0	6.0	50.0	4	Fig. 1
4QFRM050-150-06-R03-VE	●	5.0	0.3	15.0	5.0	17.0	6.0	50.0	4	Fig. 1
4QFRM050-150-06-R05-VE	●	5.0	0.5	15.0	5.0	17.0	6.0	50.0	4	Fig. 1
4QFRM060-160-06-R03-VE	●	6.0	0.3	16.0	-	-	6.0	50.0	4	Fig. 2
4QFRM060-160-06-R05-VE	●	6.0	0.5	16.0	-	-	6.0	50.0	4	Fig. 2
4QFRM060-160-06-R10-VE	●	6.0	1.0	16.0	-	-	6.0	50.0	4	Fig. 2
4QFRM080-200-08-R03-VE	●	8.0	0.3	20.0	-	-	8.0	64.0	4	Fig. 2
4QFRM080-200-08-R05-VE	●	8.0	0.5	20.0	-	-	8.0	64.0	4	Fig. 2
4QFRM080-200-08-R10-VE	●	8.0	1.0	20.0	-	-	8.0	64.0	4	Fig. 2
4QFRM080-200-08-R20-VE	●	8.0	2.0	20.0	-	-	8.0	64.0	4	Fig. 2
4QFRM100-220-10-R05-VE	●	10.0	0.5	22.0	-	-	10.0	70.0	4	Fig. 2
4QFRM100-220-10-R10-VE	●	10.0	1.0	22.0	-	-	10.0	70.0	4	Fig. 2
4QFRM100-220-10-R15-VE	●	10.0	1.5	22.0	-	-	10.0	70.0	4	Fig. 2
4QFRM100-220-10-R20-VE	●	10.0	2.0	22.0	-	-	10.0	70.0	4	Fig. 2
4QFRM120-250-12-R05-VE	●	12.0	0.5	25.0	-	-	12.0	75.0	4	Fig. 2
4QFRM120-250-12-R10-VE	●	12.0	1.0	25.0	-	-	12.0	75.0	4	Fig. 2

● : Available

4/ 5QFRM-VG Radius type Dimensions

Description	Availability	DC	RE	APMX	DN	LU	DCON (h6)	LF	ZEFP	Shape
4QFRM030-090-03-R03-VE	●	3.0	0.3	9.0	-	-	3.0	40.0	4	Fig. 2
4QFRM030-090-03-R05-VE	●	3.0	0.5	9.0	-	-	3.0	40.0	4	Fig. 2
4QFRM030-090-06-R03-VE	●	3.0	0.3	9.0	3.0	11.0	6.0	50.0	4	Fig. 1
4QFRM030-090-06-R05-VE	●	3.0	0.5	9.0	3.0	11.0	6.0	50.0	4	Fig. 1
4QFRM040-120-04-R03-VE	●	4.0	0.3	12.0	-	-	4.0	50.0	4	Fig. 2
4QFRM040-120-04-R05-VE	●	4.0	0.5	12.0	-	-	4.0	50.0	4	Fig. 2
4QFRM040-120-06-R03-VE	●	4.0	0.3	12.0	4.0	14.0	6.0	50.0	4	Fig. 1
4QFRM040-120-06-R05-VE	●	4.0	0.5	12.0	4.0	14.0	6.0	50.0	4	Fig. 1
4QFRM050-150-06-R03-VE	●	5.0	0.3	15.0	5.0	17.0	6.0	50.0	4	Fig. 1
4QFRM050-150-06-R05-VE	●	5.0	0.5	15.0	5.0	17.0	6.0	50.0	4	Fig. 1
4QFRM060-160-06-R03-VE	●	6.0	0.3	16.0	-	-	6.0	50.0	4	Fig. 2
4QFRM060-160-06-R05-VE	●	6.0	0.5	16.0	-	-	6.0	50.0	4	Fig. 2
4QFRM060-160-06-R10-VE	●	6.0	1.0	16.0	-	-	6.0	50.0	4	Fig. 2
4QFRM080-200-08-R03-VE	●	8.0	0.3	20.0	-	-	8.0	64.0	4	Fig. 2
4QFRM080-200-08-R05-VE	●	8.0	0.5	20.0	-	-	8.0	64.0	4	Fig. 2
4QFRM080-200-08-R10-VE	●	8.0	1.0	20.0	-	-	8.0	64.0	4	Fig. 2
4QFRM080-200-08-R20-VE	●	8.0	2.0	20.0	-	-	8.0	64.0	4	Fig. 2
4QFRM100-220-10-R05-VE	●	10.0	0.5	22.0	-	-	10.0	70.0	4	Fig. 2
4QFRM100-220-10-R10-VE	●	10.0	1.0	22.0	-	-	10.0	70.0	4	Fig. 2
4QFRM100-220-10-R15-VE	●	10.0	1.5	22.0	-	-	10.0	70.0	4	Fig. 2
4QFRM100-220-10-R20-VE	●	10.0	2.0	22.0	-	-	10.0	70.0	4	Fig. 2
4QFRM120-250-12-R05-VE	●	12.0	0.5	25.0	-	-	12.0	75.0	4	Fig. 2
4QFRM120-250-12-R10-VE	●	12.0	1.0	25.0	-	-	12.0	75.0	4	Fig. 2
4QFRM120-250-12-R20-VE	●	12.0	2.0	25.0	-	-	12.0	75.0	4	Fig. 2
4QFRM120-250-12-R30-VE	●	12.0	3.0	25.0	-	-	12.0	75.0	4	Fig. 2
4QFRM160-320-16-R10-VE	●	16.0	1.0	32.0	-	-	16.0	90.0	4	Fig. 2
4QFRM160-320-16-R20-VE	●	16.0	2.0	32.0	-	-	16.0	90.0	4	Fig. 2
4QFRM160-320-16-R30-VE	●	16.0	3.0	32.0	-	-	16.0	90.0	4	Fig. 2
4QFRM200-380-20-R10-VE	●	20.0	1.0	38.0	-	-	20.0	100.0	4	Fig. 2
4QFRM200-380-20-R20-VE	●	20.0	2.0	38.0	-	-	20.0	100.0	4	Fig. 2
4QFRM200-380-20-R30-VE	●	20.0	3.0	38.0	-	-	20.0	100.0	4	Fig. 2
5QFRM060-250-06-R01-VE	●	6.0	0.1	25.0	-	-	6.0	75.0	5	Fig. 2
5QFRM080-250-08-R02-VE	●	8.0	0.2	25.0	-	-	8.0	75.0	5	Fig. 2
5QFRM100-380-10-R02-VE	●	10.0	0.2	38.0	-	-	10.0	100.0	5	Fig. 2
5QFRM120-450-12-R03-VE	●	12.0	0.3	45.0	-	-	12.0	100.0	5	Fig. 2
5QFRM160-550-16-R03-VE	●	16.0	0.3	55.0	-	-	16.0	125.0	5	Fig. 2
5QFRM200-650-20-R03-VE	●	20.0	0.3	65.0	-	-	20.0	125.0	5	Fig. 2

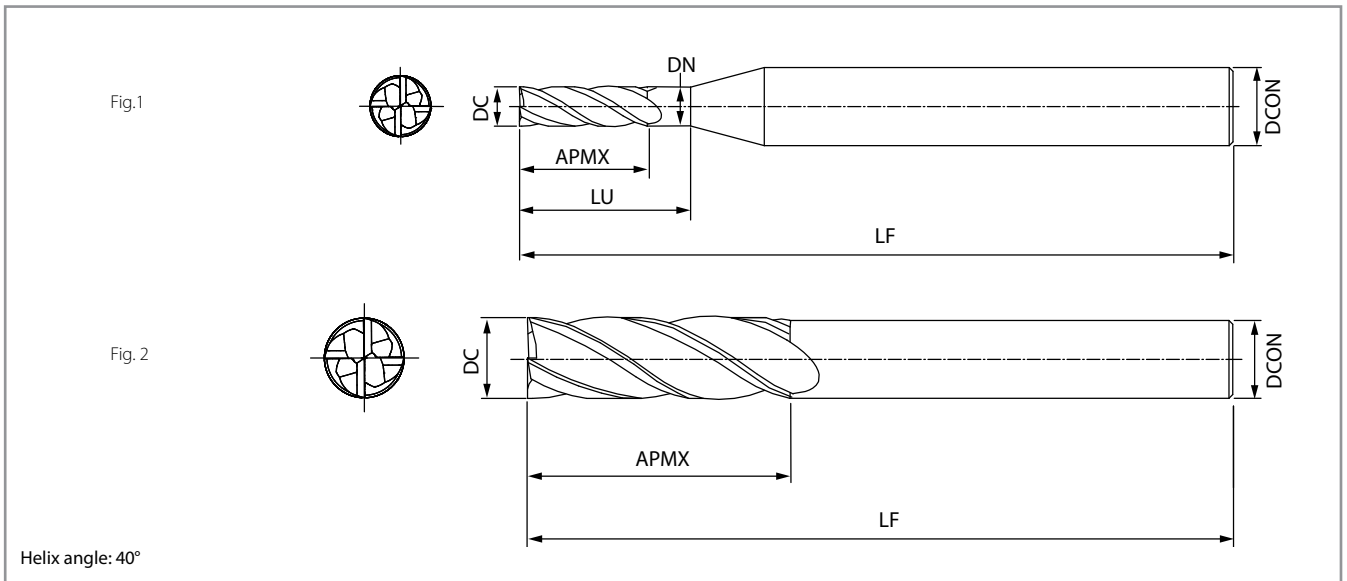
● : Available



Description	Availability	DC	APMX	DN	LU	DCON (h6)	LF	ZEFP
5QECL060-320-06VTL	●	6.0	32.0	5.60	38.0	6.0	75.0	5
5QECL080-420-08VTL	●	8.0	42.0	7.60	46.0	8.0	83.0	5
5QECL100-520-10VTL	●	10.0	52.0	9.50	59.0	10.0	100.0	5
5QECL120-620-12VTL	●	12.0	62.0	11.40	73.0	12.0	119.0	5
5QECL160-820-16VTL	●	16.0	82.0	15.20	91.0	16.0	140.0	5

●: Available

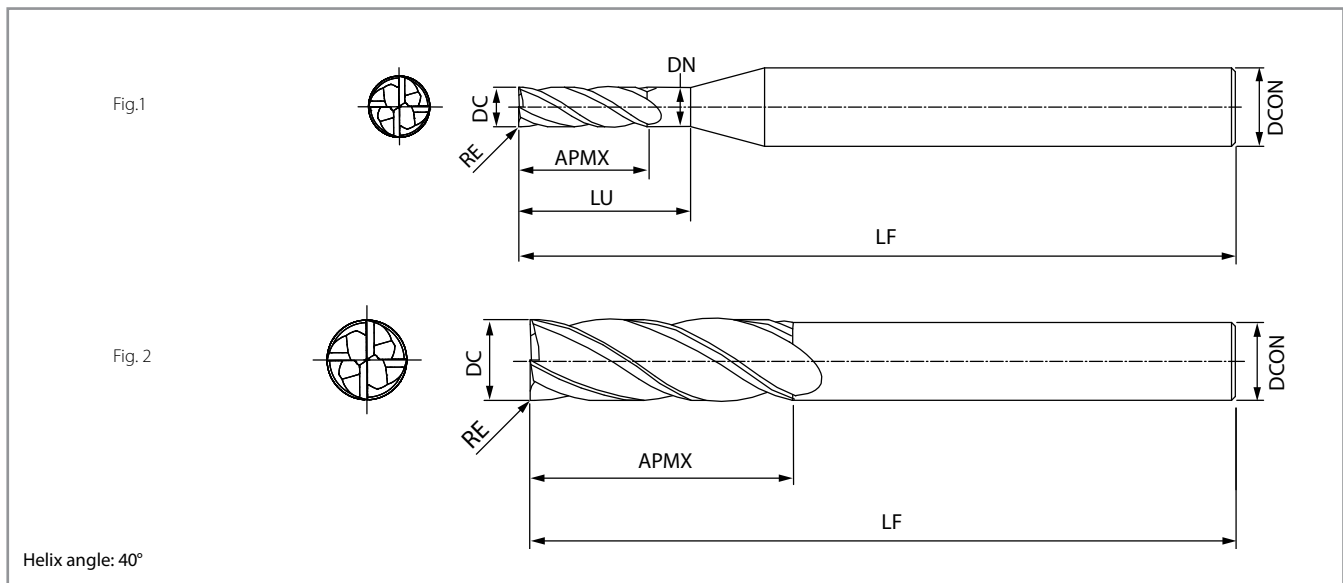
4QFSM-H Square type Dimensions



Description	Availability	DC	APMX	DN	LU	DCON (h6)	LF	ZEFP	Shape
4QFSM030-090-06-H	●	3.0	9.0	3.0	11.0	6.0	50.0	4	Fig. 1
4QFSM040-120-06-H	●	4.0	12.0	4.0	14.0	6.0	50.0	4	Fig. 1
4QFSM050-150-06-H	●	5.0	15.0	5.0	17.0	6.0	50.0	4	Fig. 1
4QFSM060-160-06-H	●	6.0	16.0	-	-	6.0	50.0	4	Fig. 2
4QFSM080-200-08-H	●	8.0	20.0	-	-	8.0	64.0	4	Fig. 2
4QFSM100-220-10-H	●	10.0	22.0	-	-	10.0	70.0	4	Fig. 2
4QFSM120-250-12-H	●	12.0	25.0	-	-	12.0	75.0	4	Fig. 2
4QFSM160-320-16-H	●	16.0	32.0	-	-	16.0	90.0	4	Fig. 2
4QFSM200-380-20-H	●	20.0	38.0	-	-	20.0	100.0	4	Fig. 2

● : Available

4QFRM-H Radius type Dimensions



Description	Availability	DC	RE	APMX	DN	LU	DCON (h6)	LF	ZEFP	Shape
4QFRM030-090-03-R03-H	●	3.0	0.3	9.0	-	-	3.0	40.0	4	Fig. 2
4QFRM030-090-03-R05-H	●	3.0	0.5	9.0	-	-	3.0	40.0	4	Fig. 2
4QFRM030-090-06-R03-H	●	3.0	0.3	9.0	3.0	11.0	6.0	50.0	4	Fig. 1
4QFRM030-090-06-R05-H	●	3.0	0.5	9.0	3.0	11.0	6.0	50.0	4	Fig. 1
4QFRM040-120-04-R03-H	●	4.0	0.3	12.0	-	-	4.0	50.0	4	Fig. 2
4QFRM040-120-04-R05-H	●	4.0	0.5	12.0	-	-	4.0	50.0	4	Fig. 2
4QFRM040-120-06-R03-H	●	4.0	0.3	12.0	4.0	14.0	6.0	50.0	4	Fig. 1
4QFRM040-120-06-R05-H	●	4.0	0.5	12.0	4.0	14.0	6.0	50.0	4	Fig. 1
4QFRM050-150-06-R03-H	●	5.0	0.3	15.0	5.0	17.0	6.0	50.0	4	Fig. 1
4QFRM050-150-06-R05-H	●	5.0	0.5	15.0	5.0	17.0	6.0	50.0	4	Fig. 1
4QFRM060-160-06-R03-H	●	6.0	0.3	16.0	-	-	6.0	50.0	4	Fig. 2
4QFRM060-160-06-R05-H	●	6.0	0.5	16.0	-	-	6.0	50.0	4	Fig. 2
4QFRM060-160-06-R10-H	●	6.0	1.0	16.0	-	-	6.0	50.0	4	Fig. 2
4QFRM080-200-08-R03-H	●	8.0	0.3	20.0	-	-	8.0	64.0	4	Fig. 2
4QFRM080-200-08-R05-H	●	8.0	0.5	20.0	-	-	8.0	64.0	4	Fig. 2
4QFRM080-200-08-R10-H	●	8.0	1.0	20.0	-	-	8.0	64.0	4	Fig. 2
4QFRM080-200-08-R20-H	●	8.0	2.0	20.0	-	-	8.0	64.0	4	Fig. 2
4QFRM100-220-10-R05-H	●	10.0	0.5	22.0	-	-	10.0	70.0	4	Fig. 2
4QFRM100-220-10-R10-H	●	10.0	1.0	22.0	-	-	10.0	70.0	4	Fig. 2
4QFRM100-220-10-R15-H	●	10.0	1.5	22.0	-	-	10.0	70.0	4	Fig. 2
4QFRM100-220-10-R20-H	●	10.0	2.0	22.0	-	-	10.0	70.0	4	Fig. 2
4QFRM120-250-12-R05-H	●	12.0	0.5	25.0	-	-	12.0	75.0	4	Fig. 2
4QFRM120-250-12-R10-H	●	12.0	1.0	25.0	-	-	12.0	75.0	4	Fig. 2
4QFRM120-250-12-R20-H	●	12.0	2.0	25.0	-	-	12.0	75.0	4	Fig. 2
4QFRM120-250-12-R30-H	●	12.0	3.0	25.0	-	-	12.0	75.0	4	Fig. 2
4QFRM160-320-16-R10-H	●	16.0	1.0	32.0	-	-	16.0	90.0	4	Fig. 2
4QFRM160-320-16-R20-H	●	16.0	2.0	32.0	-	-	16.0	90.0	4	Fig. 2
4QFRM160-320-16-R30-H	●	16.0	3.0	32.0	-	-	16.0	90.0	4	Fig. 2
4QFRM200-380-20-R10-H	●	20.0	1.0	38.0	-	-	20.0	100.0	4	Fig. 2
4QFRM200-380-20-R20-H	●	20.0	2.0	38.0	-	-	20.0	100.0	4	Fig. 2
4QFRM200-380-20-R30-H	●	20.0	3.0	38.0	-	-	20.0	100.0	4	Fig. 2

● : Available

2/ 3QFSM Cutting conditions

2QFSM

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Carbon steel	0.80 Dc × 0.45 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	444	455	476	502	525	546	566	613	655
	Stainless steel	0.70 Dc × 0.45 Dc	Revolution [min-1]	8,488	6,366	5,093	4,244	3,183	2,546	2,122	1,592	1,273
			Table feed [mm/min]	306	331	357	382	407	433	458	509	560
	Grey cast iron	0.80 Dc × 0.45 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	444	455	476	502	525	546	566	613	655
	Ductile cast iron	0.65 Dc × 0.45 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228	1,857	1,393	1,114
			Table feed [mm/min]	208	234	258	290	318	343	368	423	479
	Titanium alloy	0.80 Dc × 0.45 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	229	258	290	312	344	371	398	451	506
	Non ferrous metal	0.85 Dc × 0.45 Dc	Revolution [min-1]	16,977	12,732	10,186	8,488	6,366	5,093	4,244	3,183	2,546
			Table feed [mm/min]	509	535	570	594	611	642	671	719	769
Slotting	Carbon steel	0.60 Dc × 1.00 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	257	280	280	303	315	329	338	368	396
	Stainless steel	0.50 Dc × 1.00 Dc	Revolution [min-1]	8,488	6,366	5,093	4,244	3,183	2,546	2,122	1,592	1,273
			Table feed [mm/min]	187	204	224	238	255	270	289	321	351
	Grey cast iron	0.60 Dc × 1.00 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	257	280	280	303	315	329	338	368	396
	Ductile cast iron	0.55 Dc × 1.00 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228	1,857	1,393	1,114
			Table feed [mm/min]	104	123	134	156	167	183	197	226	254
	Titanium alloy	0.45 Dc × 1.00 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	153	172	183	204	224	241	258	294	328
	Non ferrous metal	0.65 Dc × 1.00 Dc	Revolution [min-1]	16,977	12,732	10,186	8,488	6,366	5,093	4,244	3,183	2,546
			Table feed [mm/min]	306	306	326	340	357	377	390	420	453

3QFSM

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Carbon steel	0.80 Dc × 0.45 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	665	683	714	753	788	819	849	919	982
	Stainless steel	0.70 Dc × 0.45 Dc	Revolution [min-1]	8,488	6,366	5,093	4,244	3,183	2,546	2,122	1,592	1,273
			Table feed [mm/min]	458	497	535	573	611	649	688	764	840
	Grey cast iron	0.80 Dc × 0.45 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	665	683	714	753	788	819	849	919	982
	Ductile cast iron	0.65 Dc × 0.45 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228	1,857	1,393	1,114
			Table feed [mm/min]	312	351	388	434	476	515	551	635	719
	Titanium alloy	0.80 Dc × 0.45 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	344	387	435	468	516	556	597	677	759
	Non ferrous metal	0.85 Dc × 0.45 Dc	Revolution [min-1]	16,977	12,732	10,186	8,488	6,366	5,093	4,244	3,183	2,546
			Table feed [mm/min]	764	802	856	891	917	963	1,006	1,079	1,154
Slotting	Carbon steel	0.60 Dc × 1.00 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	385	420	420	455	473	494	508	551	593
	Stainless steel	0.50 Dc × 1.00 Dc	Revolution [min-1]	8,488	6,366	5,093	4,244	3,183	2,546	2,122	1,592	1,273
			Table feed [mm/min]	280	306	336	357	382	405	433	482	527
	Grey cast iron	0.60 Dc × 1.00 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501	2,918	2,188	1,751
			Table feed [mm/min]	385	420	420	455	473	494	508	551	593
	Ductile cast iron	0.55 Dc × 1.00 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228	1,857	1,393	1,114
			Table feed [mm/min]	156	184	201	234	251	274	295	338	381
	Titanium alloy	0.45 Dc × 1.00 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	229	258	275	306	337	361	387	440	493
	Non ferrous metal	0.65 Dc × 1.00 Dc	Revolution [min-1]	16,977	12,732	10,186	8,488	6,366	5,093	4,244	3,183	2,546
			Table feed [mm/min]	458	458	489	509	535	565	586	630	680

4QFSM-VG / 4QFRM-VGL / 4QFSM-VE / 4QFRM-VE Cutting conditions

4QFSM-VG / 4QFRM-VGL

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Carbon steel	1.15 Dc × 0.30 Dc	Revolution [min-1]	21,221	15,915	12,732	10,610	7,958	6,366	5,305	3,979	3,183
			Table feed [mm/min]	764	828	866	849	891	891	955	1,003	1,044
	Alloy steel 520 < Rm < 1200	1.00 Dc × 0.30 Dc	Revolution [min-1]	19,629	14,722	11,777	9,815	7,361	5,889	4,907	3,680	2,944
			Table feed [mm/min]	1,413	1,590	1,602	1,610	1,796	1,790	2,002	2,105	2,202
	Prehardened steel 35 ≤ HRC < 45	1.00 Dc × 0.30 Dc	Revolution [min-1]	14,854	11,141	8,913	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	1,010	980	1,105	1,099	1,248	1,248	1,396	1,549	1,649
	Stainless steel (high machinability)	1.00 Dc × 0.30 Dc	Revolution [min-1]	10,610	7,958	6,366	5,305	3,979	3,183	2,653	1,989	1,592
			Table feed [mm/min]	297	286	357	340	382	382	403	454	547
	Stainless steel (low machinability)	0.70 Dc × 0.30 Dc	Revolution [min-1]	5,305	3,979	3,183	2,653	1,989	1,592	1,326	995	796
			Table feed [mm/min]	170	159	166	170	183	178	202	219	239
	Grey cast iron	1.00 Dc × 0.30 Dc	Revolution [min-1]	16,977	12,732	10,186	8,488	6,366	5,093	4,244	3,183	2,546
			Table feed [mm/min]	1,630	1,630	1,711	1,698	1,808	1,793	1,867	1,948	2,098
	Titanium alloy	0.80 Dc × 0.30 Dc	Revolution [min-1]	27,587	20,690	16,552	13,793	10,345	8,276	6,897	5,173	4,138
			Table feed [mm/min]	993	993	1,059	1,048	1,117	1,092	1,159	1,200	1,258
Wrought aluminum Si < 9%	1.20 Dc × 0.30 Dc	Revolution [min-1]	24,404	18,303	14,642	12,202	9,151	7,321	6,101	4,576	3,661	
		Table feed [mm/min]	879	879	937	927	988	996	1,049	1,098	1,157	
Cast aluminum Si ≥ 9%	1.10 Dc × 0.30 Dc	Revolution [min-1]	8,488	6,366	5,093	4,244	3,183	2,546	2,122	1,592	1,273	
		Table feed [mm/min]	815	789	957	951	1,006	998	1,103	1,152	1,202	
Slotting	Carbon steel	0.60 Dc × 1.00 Dc	Revolution [min-1]	20,160	15,120	12,096	10,080	7,560	6,048	5,040	3,780	3,024
			Table feed [mm/min]	726	786	823	806	847	847	907	953	1,004
	Alloy steel 520 < Rm < 1200	0.50 Dc × 1.00 Dc	Revolution [min-1]	18,568	13,926	11,141	9,284	6,963	5,570	4,642	3,482	2,785
			Table feed [mm/min]	668	668	713	706	752	758	798	849	902
	Prehardened steel 35 ≤ HRC < 45	0.50 Dc × 1.00 Dc	Revolution [min-1]	12,732	9,549	7,639	6,366	4,775	3,820	3,183	2,387	1,910
			Table feed [mm/min]	560	573	611	611	649	657	700	754	802
	Stainless steel (high machinability)	0.50 Dc × 1.00 Dc	Revolution [min-1]	10,080	7,560	6,048	5,040	3,780	3,024	2,520	1,890	1,512
			Table feed [mm/min]	282	363	339	383	378	399	454	499	550
	Stainless steel (low machinability)	0.30 Dc × 1.00 Dc	Revolution [min-1]	5,305	3,979	3,183	2,653	1,989	1,592	1,326	995	796
			Table feed [mm/min]	106	95	102	95	103	108	111	151	220
	Grey cast iron	0.60 Dc × 1.00 Dc	Revolution [min-1]	14,854	11,141	8,913	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	297	312	321	297	312	321	342	357	401
	Titanium alloy	0.30 Dc × 1.00 Dc	Revolution [min-1]	26,526	19,894	15,915	13,263	9,947	7,958	6,631	4,974	3,979
			Table feed [mm/min]	955	955	1,019	1,008	1,035	1,050	1,088	1,154	1,194
Wrought aluminum Si < 9%	0.80 Dc × 1.00 Dc	Revolution [min-1]	23,343	17,507	14,006	11,671	8,754	7,003	5,836	4,377	3,501	
		Table feed [mm/min]	840	840	896	887	945	952	1,004	1,050	1,106	
Cast aluminum Si ≥ 9%	0.70 Dc × 1.00 Dc	Revolution [min-1]	6,897	5,173	4,138	3,448	2,586	2,069	1,724	1,293	1,035	
		Table feed [mm/min]	303	310	314	317	331	331	359	378	401	

4QFSM-VE / 4QFRM-VE

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Carbon steel	0.80 Dc × 0.45 Dc	Revolution [min-1]	14,854	11,141	8,913	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	1,070	1,159	1,176	1,248	1,315	1,355	1,411	1,526	1,640
	Alloy steel 520 < Rm < 1200	0.80 Dc × 0.45 Dc	Revolution [min-1]	13,793	10,345	8,276	6,897	5,173	4,138	3,448	2,586	2,069
			Table feed [mm/min]	1,214	1,283	1,324	1,379	1,448	1,506	1,559	1,666	1,779
	Prehardened steel 35 ≤ HRC < 45	0.75 Dc × 0.45 Dc	Revolution [min-1]	12,732	9,549	7,639	6,366	4,775	3,820	3,183	2,387	1,910
			Table feed [mm/min]	917	993	1,039	1,095	1,165	1,222	1,273	1,394	1,513
	Stainless steel (high machinability)	0.70 Dc × 0.45 Dc	Revolution [min-1]	10,610	7,958	6,366	5,305	3,979	3,183	2,653	1,989	1,592
			Table feed [mm/min]	764	828	891	955	1,019	1,082	1,146	1,273	1,401
	Stainless steel (low machinability)	0.65 Dc × 0.45 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	484	554	611	688	754	817	891	1,027	1,161
	Grey cast iron	0.80 Dc × 0.45 Dc	Revolution [min-1]	14,854	11,141	8,913	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	1,070	1,159	1,176	1,248	1,315	1,355	1,411	1,526	1,640
	Ductile cast iron	0.65 Dc × 0.45 Dc	Revolution [min-1]	9,549	7,162	5,730	4,775	3,581	2,865	2,387	1,790	1,432
			Table feed [mm/min]	497	573	642	726	788	859	926	1,060	1,197
Titanium alloy	0.65 Dc × 0.45 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228	1,857	1,393	1,114	
		Table feed [mm/min]	594	646	713	787	858	927	988	1,131	1,266	
Slotting	Carbon steel	0.60 Dc × 1.00 Dc	Revolution [min-1]	14,854	11,141	8,913	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	654	668	713	743	780	820	847	914	980
	Alloy steel 520 < Rm < 1200	0.60 Dc × 1.00 Dc	Revolution [min-1]	13,793	10,345	8,276	6,897	5,173	4,138	3,448	2,586	2,069
			Table feed [mm/min]	717	786	795	828	869	894	938	1,003	1,068
	Prehardened steel 35 ≤ HRC < 45	0.55 Dc × 1.00 Dc	Revolution [min-1]	12,732	9,549	7,639	6,366	4,775	3,820	3,183	2,387	1,910
			Table feed [mm/min]	560	611	642	662	707	749	777	859	924
	Stainless steel (high machinability)	0.50 Dc × 1.00 Dc	Revolution [min-1]	10,610	7,958	6,366	5,305	3,979	3,183	2,653	1,989	1,592
			Table feed [mm/min]	467	509	560	594	637	675	722	804	879
	Stainless steel (low machinability)	0.45 Dc × 1.00 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	306	363	397	446	487	535	579	668	756
	Grey cast iron	0.60 Dc × 1.00 Dc	Revolution [min-1]	14,854	11,141	8,913	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	654	668	713	743	780	820	847	914	980
	Ductile cast iron	0.45 Dc × 1.00 Dc	Revolution [min-1]	9,549	7,162	5,730	4,775	3,581	2,865	2,387	1,790	1,432
			Table feed [mm/min]	344	372	413	458	516	561	602	688	779
Titanium alloy	0.45 Dc × 1.00 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228	1,857	1,393	1,114	
		Table feed [mm/min]	386	423	463	505	557	597	646	735	820	

5QFRM-VE / 5QECL-VTL / 4QFSM-H / 4QFRM-H Cutting conditions

5QFRM-VE

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Carbon steel	0.80 Dc × 0.45 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	1,560	1,643	1,693	1,764	1,908	2,050
	Alloy steel 520 < Rm < 1200	0.80 Dc × 0.45 Dc	Revolution [min-1]	6,897	5,173	4,138	3,448	2,586	2,069
			Table feed [mm/min]	1,724	1,810	1,883	1,948	2,082	2,224
	Prehardened steel 35 ≤ HRC < 45	0.75 Dc × 0.45 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910
			Table feed [mm/min]	1,369	1,456	1,528	1,592	1,743	1,891
	Stainless steel (high machinability)	0.70 Dc × 0.45 Dc	Revolution [min-1]	5,040	3,780	3,024	2,520	1,890	1,512
			Table feed [mm/min]	1,184	1,266	1,346	1,424	1,588	1,746
	Stainless steel (low machinability)	0.65 Dc × 0.45 Dc	Revolution [min-1]	2,653	1,989	1,592	1,326	995	796
			Table feed [mm/min]	849	945	1,027	1,114	1,283	1,452
	Grey cast iron	0.80 Dc × 0.45 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	1,560	1,643	1,693	1,764	1,908	2,050
	Ductile cast iron	0.65 Dc × 0.45 Dc	Revolution [min-1]	5,305	3,979	3,183	2,653	1,989	1,592
			Table feed [mm/min]	902	975	1,066	1,154	1,323	1,496
Titanium alloy	0.65 Dc × 0.45 Dc	Revolution [min-1]	3,183	2,387	1,910	1,592	1,194	955	
		Table feed [mm/min]	987	1,074	1,155	1,241	1,409	1,580	
Trochoidal	Carbon steel	1.50 Dc × 0.12 Dc	Revolution [min-1]	13,263	9,947	7,958	6,631	4,974	3,979
			Table feed [mm/min]	3,183	3,183	3,183	3,183	3,183	3,183
	Alloy steel 520 < Rm < 1200	1.50 Dc × 0.12 Dc	Revolution [min-1]	11,671	8,754	7,003	5,836	4,377	3,501
			Table feed [mm/min]	2,451	2,451	2,451	2,451	2,451	2,451
	Prehardened steel 35 ≤ HRC < 45	1.50 Dc × 0.12 Dc	Revolution [min-1]	10,610	7,958	6,366	5,305	3,979	3,183
			Table feed [mm/min]	1,592	1,592	1,592	1,592	1,592	1,592
	Stainless steel (high machinability)	1.50 Dc × 0.12 Dc	Revolution [min-1]	5,305	3,979	3,183	2,653	1,989	1,592
			Table feed [mm/min]	637	637	637	637	637	637
	Stainless steel (low machinability)	1.50 Dc × 0.12 Dc	Revolution [min-1]	4,775	3,581	2,865	2,387	1,790	1,432
			Table feed [mm/min]	573	573	573	573	573	573
	Grey cast iron	1.50 Dc × 0.12 Dc	Revolution [min-1]	10,610	7,958	6,366	5,305	3,979	3,183
			Table feed [mm/min]	2,228	2,228	2,228	2,228	2,228	2,228
	Ductile cast iron	1.50 Dc × 0.12 Dc	Revolution [min-1]	7,427	5,570	4,456	3,714	2,785	2,228
			Table feed [mm/min]	1,114	1,114	1,114	1,114	1,114	1,114
Titanium alloy	1.50 Dc × 0.12 Dc	Revolution [min-1]	4,775	3,581	2,865	2,387	1,790	1,432	
		Table feed [mm/min]	573	573	573	573	573	573	

5QECL-VTL

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø6	ø8	ø10	ø12	ø16
Shouldering	Carbon steel	1.00 Dc × 0.25 Dc	Revolution [min-1]	15,650	11,738	9,390	7,825	5,869
			Table feed [mm/min]	3,365	3,521	3,662	3,795	3,580
	Alloy steel 520 < Rm < 1200	1.00 Dc × 0.20 Dc	Revolution [min-1]	13,263	9,947	7,958	6,631	4,974
			Table feed [mm/min]	2,454	2,536	2,666	2,752	2,611
	Stainless steel (high machinability)	1.00 Dc × 0.18 Dc	Revolution [min-1]	10,876	8,157	6,525	5,438	4,078
			Table feed [mm/min]	2,012	2,121	2,219	2,338	2,182
	Grey cast iron	1.00 Dc × 0.25 Dc	Revolution [min-1]	14,324	10,743	8,594	7,162	5,371
			Table feed [mm/min]	3,080	3,223	3,395	3,509	3,303
Titanium alloy	1.00 Dc × 0.15 Dc	Revolution [min-1]	5,570	4,178	3,342	2,785	2,089	
		Table feed [mm/min]	1,198	1,274	1,354	1,462	1,337	
Trochoidal	Carbon steel	2.00 Dc × 0.09 Dc	Revolution [min-1]	18,303	13,727	10,982	9,151	6,684
			Table feed [mm/min]	3,935	4,118	4,283	4,438	4,221
	Alloy steel 520 < Rm < 1200	2.00 Dc × 0.09 Dc	Revolution [min-1]	15,560	11,738	9,390	7,825	5,869
			Table feed [mm/min]	2,895	2,993	3,146	3,247	3,081
	Stainless steel (high machinability)	2.00 Dc × 0.09 Dc	Revolution [min-1]	12,732	9,549	7,639	6,366	4,775
			Table feed [mm/min]	2,292	2,435	2,597	2,737	2,531
	Grey cast iron	2.00 Dc × 0.09 Dc	Revolution [min-1]	16,977	12,732	10,186	8,488	6,366
			Table feed [mm/min]	3,565	3,756	3,922	4,074	3,820
	Titanium alloy	2.00 Dc × 0.09 Dc	Revolution [min-1]	6,631	4,974	3,979	3,316	2,487
			Table feed [mm/min]	1,426	1,542	1,671	1,757	1,617

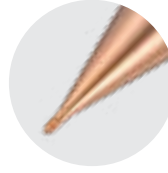
4QFSM-H / 4QFRM-H

Application	Workpiece	D. o. C. (ap×ae)(mm)	Dc (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	ø20
Shouldering	Hard material 45 ≤ HRC < 52	0.40 Dc × 0.30 Dc	Revolution [min-1]	6,366	4,775	3,820	3,183	2,387	1,910	1,592	1,194	955
			Table feed [mm/min]	993	1,165	1,115	1,159	1,060	1,001	1,063	979	1,001
	Hard material 52 ≤ HRC ≤ 68	0.30 Dc × 0.30 Dc	Revolution [min-1]	5,305	3,979	3,183	2,653	1,989	1,592	1,326	995	796
			Table feed [mm/min]	891	955	1,019	1,061	963	898	960	879	901
Slotting	Hard material 45 ≤ HRC < 52	0.12 Dc × 1.00 Dc	Revolution [min-1]	5,836	4,377	3,501	2,918	2,188	1,751	1,459	1,094	875
			Table feed [mm/min]	607	665	616	665	560	497	560	481	501
	Hard material 52 ≤ HRC ≤ 68	0.09 Dc × 1.00 Dc	Revolution [min-1]	4,775	3,581	2,865	2,387	1,790	1,432	1,194	895	716
			Table feed [mm/min]	248	244	309	344	322	258	301	251	281

Solid ball nose end mill for machining hardened material (Micro solid tools)

2KMB

Standard type
Total 15 Items
R0.05 - R2.0



Long neck type
Total 109 Items
R0.05 - R2.0



Solving new challenges in solid tool machining

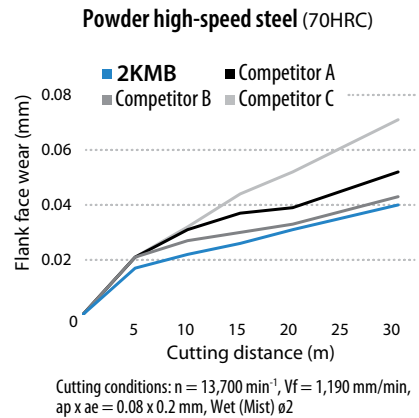
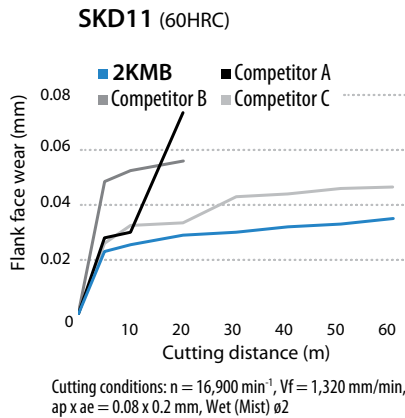
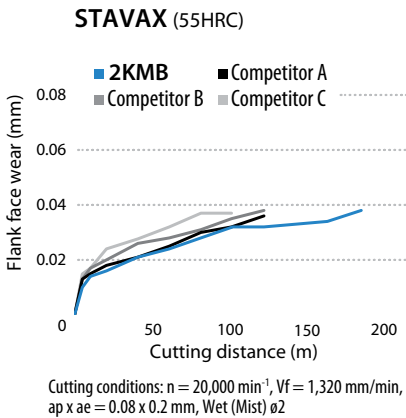
The new solid tool lineup is an optimized tool for precision parts and mold machining.

Long tool life in various hardened materials

Prehardened steel 35 - 45 HRC	Prehardened steel Hardened steel 45 - 55 HRC	Hardened steel 55 - 62 HRC	Hardened steel 62 - 66 HRC	Hardened steel 66 - 70 HRC
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Compatible with a variety of hardened materials such as stainless steel, high-speed steel, etc., as well as alloy tool steel (~ 70 HRC)

Wear resistance comparison (Internal evaluation)



Experience the excellent finish

The new MEGACOAT HARD EX coating technology and a unique shape creates a glossy and beautiful finished surface

Reduced process cycle times

Surface finish condition

(Internal evaluation)

Cutting conditions: $n = 18,000 \text{ min}^{-1}$,
 $V_f = 1,600 \text{ mm/min}$,
 $a_p \times a_e = 0.1 \times 0.15 \text{ mm}$,
Wet (Mist)
 $\phi 2.5$ (Long neck type)
Powder high-speed steel (70 HRC)



INNOVATIVE



DESIGN

Long tool life with unique coating



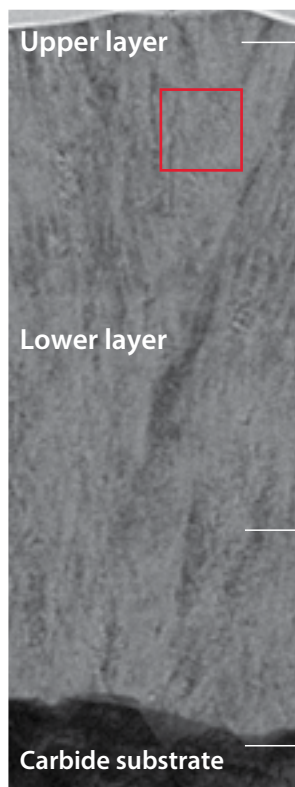
New PVD coating **NEW**

MEGACOAT HARD EX

Kyocera's original new coating MEGACOAT HARD enables long tool life for various hardened materials.

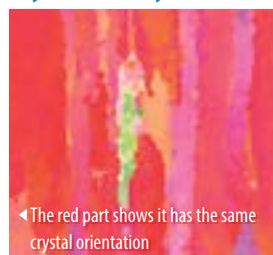
Advanced technology from Kyocera uses a special two-layer structure with both chipping resistance and abrasion resistance

Section view



Chipping suppression

High-toughness crystalline layer



◀ The red part shows it has the same crystal orientation

- Unique structure for high shock resistance
- Toughness improvement by controlling internal stress and crystal growth direction

Suppresses the progression of high-temperature wear

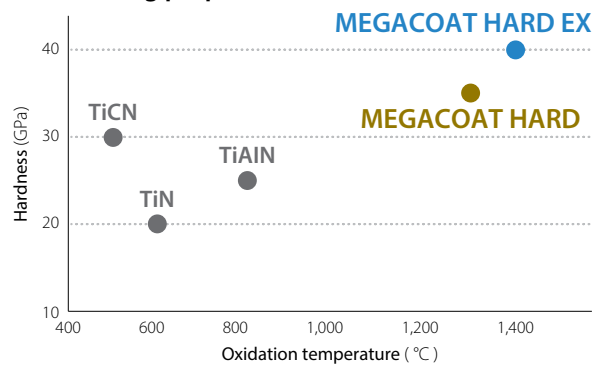
Special laminated structural layer

- High hardness
- Excellent oxidation resistance and unique composition design with high lubricity

Suppresses hard film peeling

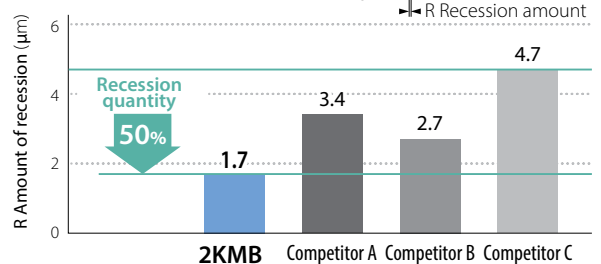
Special interface treatment

Coating properties



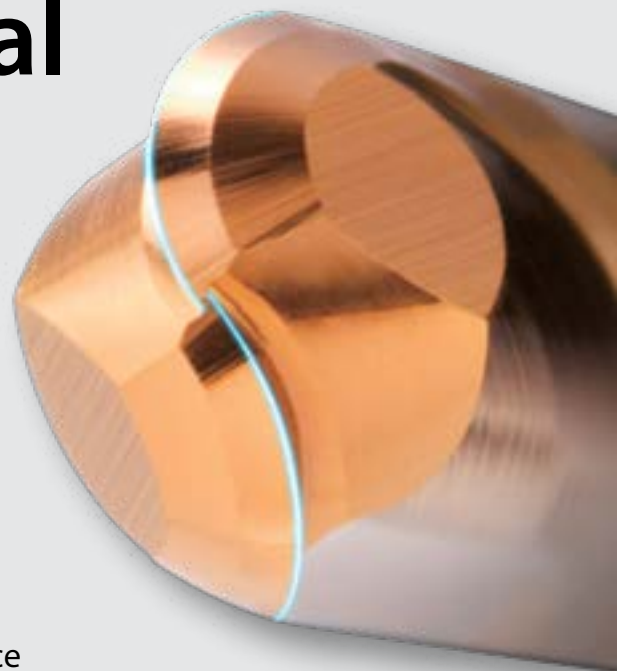
Wear resistance comparison (Internal evaluation)

R Recession after 500 mm machining



Cutting conditions: $n = 40,000 \text{ min}^{-1}$, $V_f = 70 \text{ mm/min}$, $a_p \times a_e = 0.003 \times 0.005 \text{ mm}$, Wet (Oil-based) Shouldering SKD 11 (60HRC) $\phi 0.1$ (Long neck type)

Unique shape controls hardened material



Point

01 High quality with an S-shaped flute design

Excellent sharpness

High quality finish and high abrasion resistance

Point

02

High rigidity with a large core thickness

Ensures high rigidity and stable
machining

Ball section comparison
(Internal evaluation)
Outer diameter $\phi 1$

Product cross-section

18%



2KMB

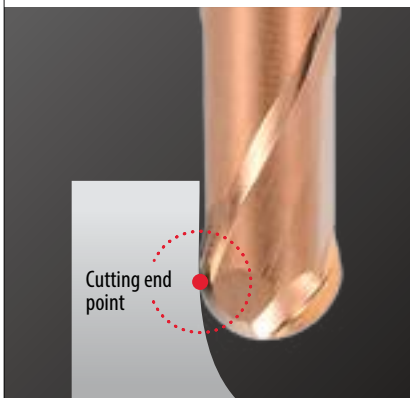
Competitor A

Point

03

Low resistance with a strong back taper

Chatter resistant point design
improves finished surface quality
and reduction of inclination



Cutting end
point

Point

04

Stable machining with a unique cutting edge shape

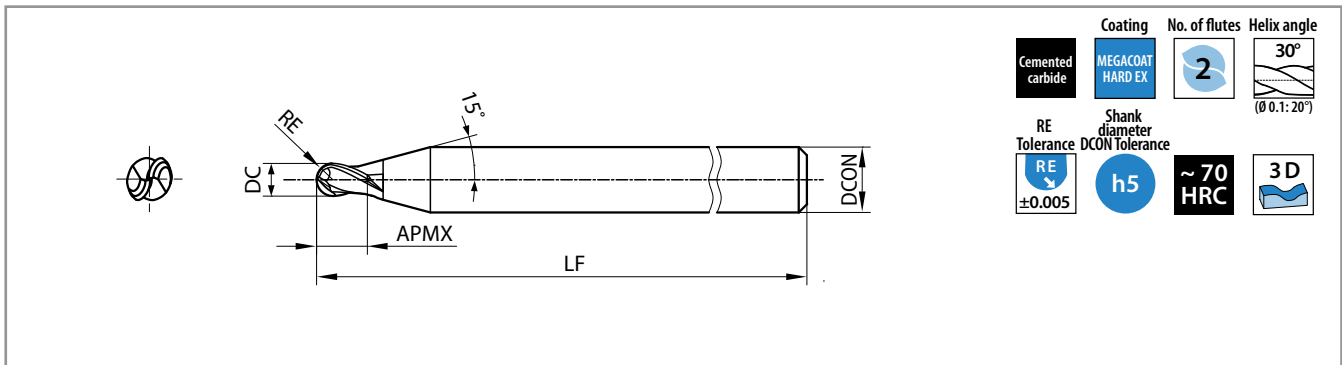
Cutting edge strength and low
resistance achieves stable
machining and high-quality
finished surfaces



Variable flank face

Variable rake face

2KMB Standard type



Description	Availability	Dimensions (mm)				
		RE	DC	APMX	DCON	LF
2KMB0010-0010-S4	●	R0.05	0.1	0.1	4	50
2KMB0015-0015-S4	●	R0.075	0.15	0.15	4	50
2KMB0020-0020-S4	●	R0.1	0.2	0.2	4	50
2KMB0030-0030-S4	●	R0.15	0.3	0.3	4	50
2KMB0040-0060-S4	●	R0.2	0.4	0.6	4	50
2KMB0050-0080-S4	●	R0.25	0.5	0.8	4	50
2KMB0060-0090-S4	●	R0.3	0.6	0.9	4	50
2KMB0080-0120-S4	●	R0.4	0.8	1.2	4	50
2KMB0100-0150-S4	●	R0.5	1	1.5	4	50
2KMB0150-0230-S4	●	R0.75	1.5	2.3	4	50
2KMB0200-0300-S4	●	R1	2	3	4	60
2KMB0250-0380-S6	●	R1.25	2.5	3.8	6	60
2KMB0300-0500-S6	●	R1.5	3	5	6	60
2KMB0400-0600-S4	●	R2	4	6	4	70
2KMB0400-0600-S6	●	R2	4	6	6	70

The ball radius is based on 1/2 of the actual outer diameter.

Neck angle is a reference value.

Standard type is not a strong back taper shape.

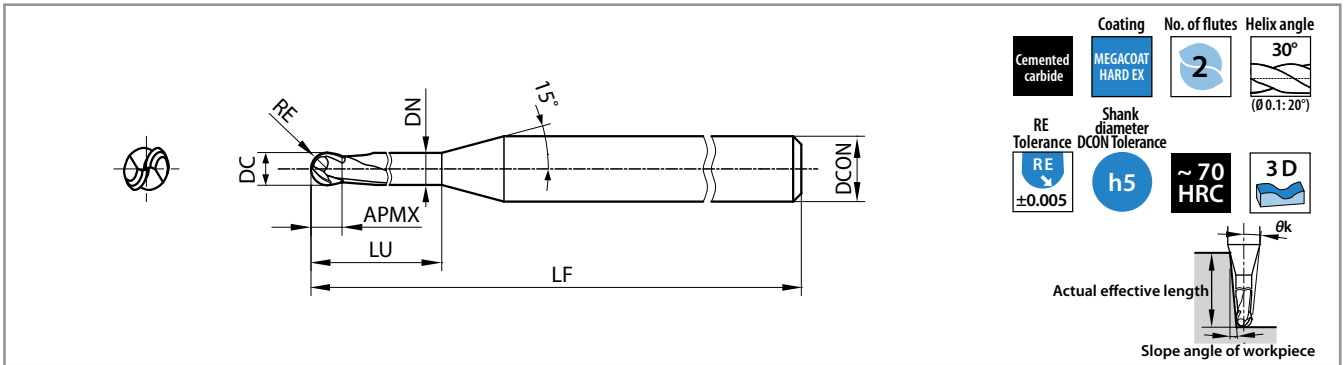
● : Available

Description's view

Example: 2KMBL0100-0500-S4

2KMB	L	0100	-	0500	-	S4
Product name For precision die (Fine machining) solid ball nose end mill 2-flute	Type None: Standard type L: Long neck type	Outer diameter DC ø1.0		Standard type: Flute length (APMX) Long neck type: Length under neck (LU) 0500 : LU 5mm		Shank diameter DCON ø 4.0

2KMB Long neck type

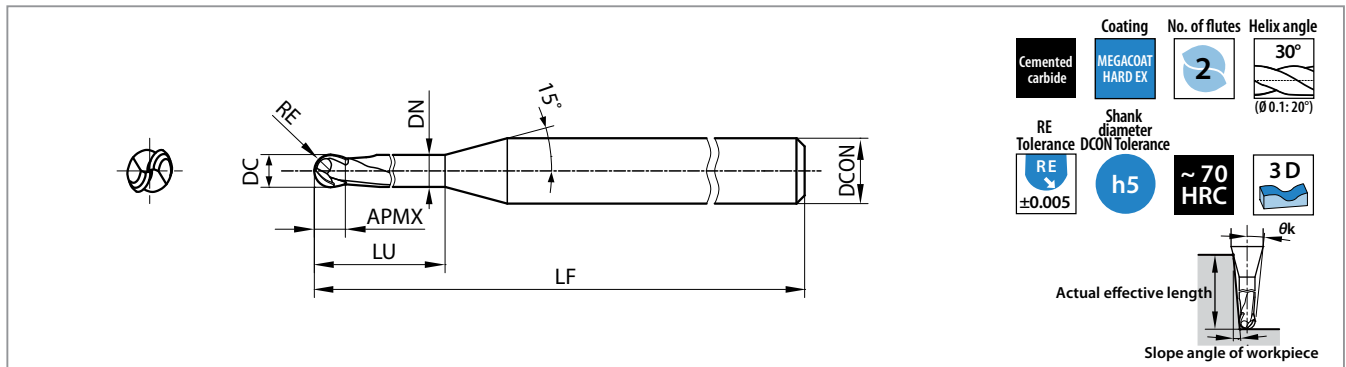


Description	Availability	Dimensions (mm)							Interference angle	Actual effective length for slope angle of workpiece				
		RE	DC	APMX	LU	DN	DCON	LF		θ_k	0.5°	1°	1.5°	2°
2KMBL0010-0020-S4	●	R0.05	0.1	0.07	0.2	0.09	4	45	14.68°	0.22	0.23	0.23	0.24	0.25
2KMBL0010-0030-S4	●				0.3				14.49°	0.32	0.33	0.34	0.35	0.38
2KMBL0010-0050-S4	●				0.5				14.13°	0.53	0.55	0.56	0.58	0.63
2KMBL0015-0030-S4	●	R0.075	0.15	0.1	0.3	0.14	4	45	14.53°	0.32	0.33	0.34	0.35	0.37
2KMBL0015-0050-S4	●				0.5				14.17°	0.53	0.54	0.56	0.58	0.62
2KMBL0015-0100-S4	●				1				13.33°	1.05	1.08	1.12	1.16	1.24
2KMBL0020-0030-S4	●	R0.1	0.2	0.15	0.3	0.19	4	45	14.58°	0.32	0.33	0.34	0.35	0.37
2KMBL0020-0050-S4	●				0.5				14.2°	0.53	0.54	0.56	0.58	0.62
2KMBL0020-0075-S4	●				0.75				13.76°	0.79	0.81	0.84	0.86	0.93
2KMBL0020-0100-S4	●				1				13.35°	1.04	1.08	1.11	1.15	1.24
2KMBL0020-0125-S4	●				1.25				12.96°	1.3	1.35	1.39	1.44	1.55
2KMBL0020-0150-S4	●	1.5	12.59°	1.56	1.61	1.67	1.73	1.86						
2KMBL0030-0050-S4	●	R0.15	0.3	0.2	0.5	0.29	4	45	14.28°	0.53	0.54	0.55	0.57	0.6
2KMBL0030-0060-S4	●				0.6				14.09°	0.63	0.65	0.66	0.68	0.73
2KMBL0030-0075-S4	●				0.75				13.82°	0.78	0.81	0.83	0.86	0.91
2KMBL0030-0100-S4	●				1				13.39°	1.04	1.07	1.11	1.14	1.22
2KMBL0030-0125-S4	●				1.25				12.99°	1.3	1.34	1.38	1.43	1.54
2KMBL0030-0150-S4	●				1.5				12.61°	1.56	1.61	1.66	1.72	1.85
2KMBL0030-0175-S4	●				1.75				12.25°	1.82	1.88	1.94	2.01	2.16
2KMBL0030-0200-S4	●				2				11.91°	2.08	2.14	2.22	2.29	2.47
2KMBL0040-0050-S4	●	R0.2	0.4	0.3	0.5	0.39	4	45	14.35°	0.52	0.54	0.55	0.56	0.59
2KMBL0040-0080-S4	●				0.8				13.79°	0.83	0.86	0.88	0.91	0.96
2KMBL0040-0100-S4	●				1				13.44°	1.04	1.07	1.1	1.14	1.21
2KMBL0040-0150-S4	●				1.5				12.63°	1.56	1.61	1.66	1.71	1.83
2KMBL0040-0200-S4	●				2				11.91°	2.07	2.14	2.21	2.29	2.46
2KMBL0040-0250-S4	●				2.5				11.27°	2.59	2.68	2.76	2.86	3.08
2KMBL0040-0300-S4	●				3				10.69°	3.11	3.21	3.32	3.44	3.7
2KMBL0050-0100-S4	●	R0.25	0.5	0.35	1	0.49	4	45	13.49°	1.04	1.07	1.1	1.13	1.2
2KMBL0050-0150-S4	●				1.5				12.65°	1.56	1.6	1.65	1.7	1.82
2KMBL0050-0200-S4	●				2				11.91°	2.07	2.14	2.21	2.28	2.44
2KMBL0050-0250-S4	●				2.5				11.25°	2.59	2.67	2.76	2.85	3.07
2KMBL0050-0300-S4	●				3				10.66°	3.11	3.21	3.31	3.43	3.69
2KMBL0050-0350-S4	●				3.5				10.13°	3.62	3.74	3.87	4	4.31
2KMBL0050-0400-S4	●				4				9.65°	4.14	4.28	4.42	4.58	4.93

The ball radius is based on 1/2 of the actual outer diameter.
 Neck angle is a reference value.
 Be careful not to interfere with the workpiece.

● : Available

2KMB Long neck type



Description	Availability	Dimensions (mm)							Interference angle	Actual effective length for slope angle of workpiece				
		RE	DC	APMX	LU	DN	DCON	LF		θ_k	0.5°	1°	1.5°	2°
2KMBL0060-0100-S4	●	R0.3	0.6	0.45	1	0.59	4	45	13.54°	1.04	1.06	1.09	1.12	1.19
2KMBL0060-0150-S4	●				1.5				12.67°	1.55	1.6	1.65	1.7	1.81
2KMBL0060-0200-S4	●				2				11.91°	2.07	2.13	2.2	2.27	2.43
2KMBL0060-0250-S4	●				2.5				11.23°	2.59	2.67	2.75	2.85	3.05
2KMBL0060-0300-S4	●				3				10.63°	3.11	3.2	3.31	3.42	3.67
2KMBL0060-0350-S4	●				3.5				10.08°	3.62	3.74	3.86	4	4.3
2KMBL0060-0400-S4	●				4				9.59°	4.14	4.27	4.42	4.57	4.92
2KMBL0060-0450-S4	●				4.5				9.15°	4.66	4.81	4.97	5.15	5.54
2KMBL0060-0500-S4	●				5				8.74°	5.17	5.34	5.52	5.72	6.16
2KMBL0070-0200-S4	●				R0.35				0.7	0.5	2	0.69	4	45
2KMBL0070-0400-S4	●	4	9.54°	4.14		4.27	4.41	4.56			4.91			
2KMBL0080-0200-S4	●	R0.4	0.8	0.6	2	0.78	4	45	11.88°	2.09	2.15	2.21	2.28	2.43
2KMBL0080-0300-S4	●				3				10.53°	3.12	3.22	3.32	3.43	3.67
2KMBL0080-0400-S4	●				4				9.46°	4.15	4.29	4.43	4.58	4.92
2KMBL0080-0500-S4	●				5				8.58°	5.19	5.36	5.53	5.73	6.16
2KMBL0080-0600-S4	●				6				7.85°	6.22	6.43	6.64	6.88	7.4
2KMBL0090-0200-S4	●	R0.45	0.9	0.65	2	0.88	4	45	11.88°	2.09	2.14	2.2	2.27	2.42
2KMBL0090-0400-S4	●				4				9.4°	4.15	4.28	4.42	4.57	4.9
2KMBL0090-0600-S4	●				6				7.77°	6.22	6.42	6.64	6.87	7.39
2KMBL0100-0200-S4	●	R0.5	1	0.75	2	0.98	4	45	11.88°	2.08	2.14	2.2	2.26	2.41
2KMBL0100-0250-S4	●				2.5				11.12°	2.6	2.67	2.75	2.84	3.03
2KMBL0100-0300-S4	●				3				10.45°	3.12	3.21	3.31	3.41	3.65
2KMBL0100-0400-S4	●				4				9.33°	4.15	4.28	4.42	4.56	4.89
2KMBL0100-0500-S4	●				5				8.42°	5.19	5.35	5.52	5.71	6.14
2KMBL0100-0600-S4	●				6				7.68°	6.22	6.42	6.63	6.86	7.38
2KMBL0100-0700-S4	●				7				7.05°	7.25	7.49	7.74	8.01	8.62
2KMBL0120-0240-S4	●	R0.6	1.2	0.9	2.4	1.18	4	45	11.22°	2.49	2.56	2.63	2.71	2.88
2KMBL0120-0400-S4	●				4				9.19°	4.15	4.27	4.4	4.55	4.87
2KMBL0120-0600-S4	●				6				7.49°	6.22	6.41	6.62	6.85	7.35
2KMBL0120-0800-S4	●				8				6.31°	8.28	8.55	8.84	9.15	9.84
2KMBL0140-0800-S4	●	R0.7	1.4	1	8	1.37	4	45	6.08°	8.3	8.56	8.85	9.15	9.84
2KMBL0140-1200-S4	●				12				4.59°	12.43	12.84	13.28	13.75	14.81

The ball radius is based on 1/2 of the actual outer diameter.
 Neck angle is a reference value.
 Be careful not to interfere with the workpiece.

● : Available

2KMB Long neck type

Description	Availability	Dimensions (mm)							Interference angle	Actual effective length for slope angle of workpiece				
		RE	DC	APMX	LU	DN	DCON	LF		0k	0.5°	1°	1.5°	2°
2KMBL0150-0300-S4	●	R0.75	1.5	1.1	3	1.47	4	45	10.17°	3.13	3.21	3.3	3.4	3.61
2KMBL0150-0400-S4	●				4				8.92°	4.16	4.28	4.41	4.55	4.85
2KMBL0150-0600-S4	●				6				7.15°	6.23	6.42	6.63	6.85	7.34
2KMBL0150-0800-S4	●				8				5.97°	8.3	8.56	8.84	9.15	9.83
2KMBL0150-1000-S4	●				10				5.12°	10.36	10.7	11.06	11.45	12.31
2KMBL0150-1200-S4	●				12				4.48°	12.43	12.84	13.28	13.75	14.8
2KMBL0160-0800-S4	●	R0.8	1.6	1.2	8	1.57	4	45	5.84°	8.3	8.56	8.84	9.14	9.82
2KMBL0160-1200-S4	●				12				4.37°	12.43	12.84	13.27	13.74	14.79
2KMBL0200-0300-S4	●	R1	2	1.5	3	1.97	4	45	9.81°	3.12	3.19	3.27	3.36	3.55
2KMBL0200-0400-S4	●				4				8.39°	4.15	4.26	4.38	4.51	4.79
2KMBL0200-0600-S4	●				6				6.5°	6.22	6.4	6.6	6.81	7.28
2KMBL0200-0800-S4	●				8				5.3°	8.29	8.54	8.82	9.11	9.77
2KMBL0200-1000-S4	●				10				4.48°	10.36	10.68	11.03	11.41	12.25
2KMBL0200-1200-S4	●				12				3.87°	12.42	12.82	13.25	13.71	14.74
2KMBL0200-1300-S4	●				13				3.63°	13.46	13.89	14.36	14.86	15.98
2KMBL0200-1400-S4	●				14				3.41°	14.49	14.96	15.47	16.01	17.23
2KMBL0200-1600-S4	●				16			3.05°	16.56	17.1	17.68	18.31	19.71	
2KMBL0250-0600-S4	●				R1.25			2.5	2.3	6	2.45	4	45	5.61°
2KMBL0250-0800-S4	●	8	4.45°	8.32		8.57	8.83			9.11				9.75
2KMBL0250-1000-S4	●	10	3.69°	10.39		10.7	11.05			11.41				12.24
2KMBL0250-1500-S4	●	15	2.59°	15.55		16.05	16.59			17.16			-	
2KMBL0250-2000-S4	●	20	1.99°	20.72		21.4	22.13			-			-	
2KMBL0300-0600-S6	●	R1.5	3	2.5	6	2.9	6	60	8.3°	6.34	6.51	6.69	6.88	7.32
2KMBL0300-0800-S6	●				8				6.97°	8.41	8.65	8.91	9.18	9.81
2KMBL0300-1000-S6	●				10				6°	10.47	10.79	11.12	11.48	12.29
2KMBL0300-1200-S6	●				12				5.27°	12.54	12.93	13.34	13.78	14.78
2KMBL0300-1400-S6	●				14				4.69°	14.61	15.07	15.56	16.08	17.27
2KMBL0300-1600-S6	●				16				4.23°	16.68	17.21	17.77	18.38	19.75
2KMBL0300-2000-S6	●				20			3.54°	20.81	21.48	22.21	22.98	24.73	
2KMBL0300-2500-S6	●				25			2.94°	25.98	26.83	27.75	28.73	-	
2KMBL0350-1500-S6	●				R1.75			3.5	2.8	15	3.4	6	60	3.96°
2KMBL0350-2000-S6	●	20	65	3.1°		20.8	21.47			22.18			22.94	24.66
2KMBL0350-2500-S6	●	25	70	2.55°		25.97	26.81			27.72			28.69	-
2KMBL0350-3000-S6	●	30	75	2.17°		31.14	32.16			33.26			34.44	-
2KMBL0400-0800-S6	●	R2	4	3	8	3.9	6	65	5.76°	8.39	8.61	8.85	9.11	9.69
2KMBL0400-1000-S6	●				10				4.8°	10.46	10.75	11.07	11.41	12.17
2KMBL0400-1200-S6	●				12				4.11°	12.52	12.89	13.28	13.71	14.66
2KMBL0400-1400-S6	●				14				3.6°	14.59	15.03	15.5	16.01	17.14
2KMBL0400-1500-S6	●				15				3.39°	15.63	16.1	16.61	17.16	18.39
2KMBL0400-2000-S6	●				20				2.62°	20.79	21.45	22.15	22.91	-
2KMBL0400-2500-S6	●				25			2.13°	25.96	26.8	27.69	28.66	-	
2KMBL0400-3000-S6	●				30			1.8°	31.13	32.15	33.23	-	-	
2KMBL0400-3500-S6	●				35			1.56°	36.3	37.49	38.78	-	-	

The ball radius is based on 1/2 of the actual outer diameter.

Neck angle is a reference value.

Be careful not to interfere with the workpiece.

● : Available

2KMB Reference cutting conditions table Standard type

Ball radius RE (mm)	Flute length APMX (mm)	Prehardened steel NAK(35-45HRC)				Prehardened steel / Hardened steel STAVAX-SKD61(45-55HRC)				Hardened steel SKD11(55-62HRC)				Hardened steel Powder high-speed steel - SKH (62-66HRC)				Hardened steel Powder high-speed steel (66-70HRC)			
		No. of revolutions n (min ⁻¹)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min ⁻¹)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min ⁻¹)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min ⁻¹)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min ⁻¹)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)
R0.05	0.1	50,000	200	0.008	0.008	40,000	170	0.006	0.006	40,000	110	0.003	0.006	40,000	70	0.002	0.006	40,000	60	0.002	0.003
R0.075	0.15	50,000	280	0.008	0.008	40,000	200	0.006	0.006	40,000	170	0.003	0.006	40,000	110	0.002	0.006	40,000	90	0.002	0.003
R0.1	0.2	50,000	330	0.015	0.031	40,000	400	0.011	0.022	40,000	350	0.011	0.011	40,000	260	0.003	0.006	40,000	170	0.003	0.003
R0.15	0.3	50,000	770	0.015	0.046	40,000	460	0.011	0.033	40,000	400	0.011	0.022	40,000	330	0.006	0.011	40,000	200	0.003	0.006
R0.2	0.6	50,000	800	0.031	0.092	40,000	1,100	0.022	0.066	40,000	900	0.022	0.055	40,000	530	0.011	0.022	35,000	460	0.01	0.022
R0.25	0.8	50,000	1,150	0.046	0.108	40,000	1,300	0.033	0.077	40,000	1,100	0.028	0.055	40,000	660	0.017	0.033	30,000	500	0.011	0.022
R0.3	0.9	50,000	1,950	0.077	0.154	40,000	1,760	0.055	0.11	40,000	1,320	0.033	0.066	30,000	790	0.022	0.055	25,000	590	0.022	0.055
R0.4	1.2	50,000	2,400	0.154	0.231	40,000	2,400	0.11	0.165	40,000	2,000	0.077	0.11	30,000	1,320	0.055	0.11	25,000	990	0.033	0.11
R0.5	1.5	45,000	3,000	0.154	0.462	40,000	2,750	0.11	0.33	30,000	2,200	0.11	0.22	25,000	1,540	0.088	0.11	20,000	1,100	0.055	0.11
R0.75	2.3	35,000	3,300	0.231	0.462	30,000	3,300	0.165	0.33	30,000	2,750	0.11	0.33	25,000	2,200	0.11	0.22	20,000	1,650	0.066	0.22
R1	3	25,000	3,600	0.308	0.77	25,000	3,300	0.22	0.55	25,000	2,750	0.22	0.55	20,000	2,200	0.165	0.33	16,000	1,650	0.11	0.33
R1.25	3.8	25,000	3,800	0.462	0.77	25,000	3,300	0.33	0.55	25,000	2,750	0.22	0.55	20,000	2,200	0.165	0.44	16,000	1,650	0.11	0.44
R1.5	5	23,590	4,100	0.308	1.232	20,000	3,300	0.22	0.88	18,000	2,750	0.22	0.66	14,000	2,200	0.22	0.55	12,000	1,650	0.132	0.55
R2	6	20,400	4,100	0.462	2.31	20,000	3,300	0.33	1.65	16,000	2,750	0.22	0.88	12,000	2,200	0.22	0.66	9,500	1,650	0.165	0.66

If chatter occurs, adjust cutting conditions as necessary.

Pay particular attention to cutting condition settings and tool passes in areas where cutting load is high, such as corners.

Adjust the number of revolutions and feed rate at the same rate.

Oil mist coolant is recommended.

If $\phi 1\text{mm}$ or L/D (aspect ratio) exceeds 8, adjust cutting conditions as needed.

2KMB Reference cutting conditions table Long neck type

Ball radius RE (mm)	Effective length LU (mm)	Prehardened steel NAK(35-45HRC)				Prehardened steel / Hardened steel STAVAX · SKD61(45-55HRC)				Hardened steel SKD11(55-62HRC)				Hardened steel Powder high-speed steel · SKH (62-66HRC)				Hardened steel Powder high-speed steel (66-70HRC)			
		No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)
R0.05	0.2	50,000	230	0.005	0.008	40,000	140	0.003	0.006	40,000	110	0.002	0.006	40,000	80	0.002	0.003	40,000	60	0.002	0.003
	0.3	50,000	230	0.005	0.008	40,000	110	0.003	0.006	40,000	80	0.002	0.006	40,000	60	0.002	0.003	40,000	40	0.002	0.003
	0.5	50,000	230	0.003	0.005	40,000	80	0.002	0.003	40,000	60	0.001	0.003	40,000	30	0.001	0.002	40,000	20	0.001	0.002
R0.075	0.3	50,000	280	0.005	0.008	40,000	200	0.003	0.006	40,000	170	0.002	0.006	40,000	110	0.002	0.003	40,000	90	0.002	0.003
	0.5	50,000	280	0.005	0.008	40,000	170	0.003	0.006	40,000	130	0.002	0.006	40,000	80	0.002	0.003	40,000	60	0.002	0.003
	1	46,000	230	0.003	0.005	40,000	80	0.002	0.003	40,000	60	0.001	0.003	40,000	30	0.001	0.002	40,000	20	0.001	0.002
R0.1	0.3	50,000	330	0.015	0.015	40,000	390	0.011	0.011	40,000	330	0.007	0.006	40,000	220	0.003	0.003	40,000	170	0.003	0.003
	0.5	50,000	330	0.012	0.015	40,000	350	0.009	0.011	40,000	310	0.006	0.006	40,000	200	0.003	0.003	40,000	140	0.003	0.003
	0.75	50,000	330	0.008	0.015	40,000	310	0.006	0.011	40,000	220	0.003	0.006	40,000	170	0.002	0.003	40,000	120	0.002	0.003
	1	50,000	330	0.005	0.008	40,000	280	0.003	0.006	40,000	180	0.002	0.003	40,000	130	0.001	0.002	40,000	100	0.001	0.002
	1.25	45,900	270	0.005	0.008	40,000	200	0.003	0.006	40,000	150	0.002	0.003	40,000	110	0.001	0.002	40,000	80	0.001	0.002
	1.5	45,900	270	0.005	0.008	40,000	170	0.003	0.006	40,000	130	0.002	0.003	40,000	90	0.001	0.002	40,000	60	0.001	0.002
R0.15	0.5	50,000	450	0.015	0.023	40,000	390	0.011	0.017	40,000	330	0.008	0.011	40,000	310	0.003	0.006	40,000	220	0.003	0.006
	0.6	50,000	450	0.011	0.015	40,000	390	0.008	0.011	40,000	330	0.006	0.008	40,000	280	0.003	0.006	40,000	200	0.003	0.006
	0.75	50,000	450	0.011	0.015	40,000	360	0.008	0.011	40,000	310	0.006	0.008	40,000	250	0.003	0.006	40,000	190	0.003	0.006
	1	50,000	450	0.011	0.015	40,000	350	0.008	0.011	40,000	280	0.006	0.008	40,000	220	0.003	0.006	40,000	170	0.003	0.006
	1.25	50,000	450	0.008	0.011	40,000	310	0.006	0.008	40,000	220	0.003	0.006	40,000	180	0.002	0.003	40,000	110	0.003	0.006
	1.5	50,000	450	0.008	0.011	40,000	250	0.006	0.008	40,000	200	0.003	0.006	40,000	130	0.002	0.003	40,000	100	0.002	0.003
	1.75	45,900	400	0.005	0.008	40,000	200	0.003	0.006	40,000	170	0.002	0.003	40,000	110	0.002	0.002	40,000	80	0.002	0.002
	2	45,900	370	0.005	0.008	40,000	170	0.003	0.006	40,000	130	0.002	0.003	40,000	100	0.002	0.002	40,000	60	0.002	0.002
R0.2	0.5	50,000	770	0.045	0.113	40,000	880	0.033	0.055	40,000	790	0.033	0.033	40,000	640	0.01	0.022	35,000	460	0.01	0.022
	0.8	50,000	770	0.045	0.113	40,000	880	0.022	0.055	40,000	790	0.022	0.033	40,000	640	0.009	0.022	35,000	460	0.009	0.022
	1	50,000	770	0.042	0.107	40,000	880	0.022	0.055	40,000	790	0.022	0.033	40,000	640	0.009	0.022	35,000	440	0.009	0.022
	1.5	50,000	660	0.035	0.09	40,000	680	0.011	0.033	40,000	550	0.011	0.022	40,000	440	0.006	0.011	35,000	310	0.006	0.011
	2	50,000	550	0.029	0.073	40,000	550	0.011	0.022	40,000	420	0.011	0.011	40,000	330	0.006	0.008	35,000	240	0.006	0.008
	2.5	36,720	360	0.024	0.06	40,000	460	0.008	0.011	40,000	330	0.006	0.008	40,000	290	0.003	0.006	35,000	210	0.003	0.006
	3	36,720	360	0.017	0.043	40,000	330	0.008	0.011	40,000	260	0.006	0.008	40,000	220	0.003	0.006	35,000	190	0.002	0.003
R0.25	1	50,000	1,190	0.046	0.077	40,000	1,100	0.033	0.055	40,000	950	0.022	0.033	40,000	720	0.011	0.022	30,000	500	0.011	0.022
	1.5	50,000	1,190	0.031	0.077	40,000	940	0.022	0.055	40,000	790	0.011	0.033	40,000	570	0.008	0.022	30,000	390	0.008	0.022
	2	50,000	960	0.031	0.046	40,000	790	0.022	0.033	40,000	720	0.011	0.022	40,000	440	0.008	0.011	30,000	300	0.008	0.011
	2.5	45,450	650	0.015	0.031	40,000	660	0.011	0.022	40,000	580	0.008	0.011	40,000	400	0.006	0.008	30,000	260	0.006	0.008
	3	45,450	650	0.015	0.031	40,000	550	0.011	0.022	40,000	460	0.008	0.011	40,000	350	0.006	0.008	30,000	240	0.006	0.008
	3.5	45,000	600	0.011	0.015	40,000	460	0.008	0.011	40,000	400	0.006	0.008	40,000	310	0.003	0.006	30,000	220	0.003	0.006
	4	34,970	500	0.011	0.015	40,000	390	0.008	0.011	40,000	330	0.006	0.008	40,000	290	0.003	0.006	30,000	200	0.003	0.006
R0.3	1	50,000	1,950	0.077	0.154	40,000	1,540	0.055	0.11	40,000	1,100	0.033	0.066	30,000	790	0.022	0.055	25,000	590	0.022	0.055
	1.5	50,000	1,950	0.077	0.154	40,000	1,540	0.055	0.11	40,000	1,100	0.033	0.066	30,000	790	0.022	0.055	25,000	590	0.022	0.055
	2	50,000	1,950	0.077	0.154	40,000	1,540	0.055	0.11	40,000	1,100	0.033	0.066	30,000	790	0.022	0.055	25,000	590	0.022	0.055
	2.5	50,000	1,560	0.046	0.077	40,000	1,320	0.033	0.055	40,000	920	0.022	0.044	30,000	700	0.022	0.033	25,000	530	0.022	0.033

2KMB Reference cutting conditions table Long neck type

Ball radius RE (mm)	Effective length LU (mm)	Prehardened steel NAK(35-45HRC)				Prehardened steel / Hardened steel STAVAX · SKD61(45-55HRC)				Hardened steel SKD11(55-62HRC)				Hardened steel Powder high-speed steel · SKH (62-66HRC)				Hardened steel Powder high-speed steel (66-70HRC)			
		No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)
R0.3	3	50,000	1,560	0.046	0.077	40,000	1,320	0.033	0.055	40,000	920	0.022	0.044	30,000	700	0.022	0.033	25,000	500	0.022	0.033
	3.5	48,960	1,450	0.031	0.046	40,000	1,100	0.022	0.033	40,000	680	0.011	0.033	30,000	530	0.011	0.022	25,000	340	0.011	0.022
	4	48,960	1,450	0.031	0.046	40,000	1,100	0.022	0.033	40,000	680	0.011	0.033	30,000	530	0.011	0.022	25,000	340	0.011	0.022
	4.5	45,900	1,070	0.031	0.046	35,000	990	0.022	0.033	35,000	640	0.011	0.022	30,000	470	0.009	0.017	25,000	250	0.011	0.022
	5	39,780	930	0.015	0.031	30,000	790	0.011	0.022	30,000	550	0.008	0.017	30,000	440	0.008	0.011	25,000	220	0.011	0.022
R0.35	2	50,000	2,160	0.108	0.154	40,000	1,760	0.077	0.11	40,000	1,430	0.055	0.088	30,000	1,100	0.033	0.077	25,000	770	0.022	0.055
	4	48,960	1,600	0.062	0.092	40,000	1,430	0.044	0.066	40,000	900	0.033	0.044	30,000	660	0.017	0.022	25,000	330	0.011	0.022
R0.4	2	50,000	2,400	0.154	0.231	40,000	2,200	0.11	0.165	40,000	1,760	0.077	0.11	30,000	1,320	0.055	0.11	25,000	990	0.033	0.11
	3	50,000	2,400	0.154	0.231	40,000	2,200	0.11	0.165	40,000	1,760	0.077	0.11	30,000	1,320	0.055	0.055	25,000	990	0.033	0.055
	4	50,000	2,400	0.077	0.154	40,000	1,760	0.055	0.11	40,000	1,320	0.055	0.055	30,000	950	0.033	0.055	20,000	700	0.022	0.055
	5	48,960	2,110	0.077	0.077	40,000	1,760	0.055	0.055	40,000	1,100	0.033	0.055	30,000	680	0.022	0.033	20,000	510	0.017	0.033
	6	42,840	1,730	0.046	0.077	30,000	1,320	0.033	0.055	30,000	840	0.022	0.033	25,000	620	0.011	0.022	20,000	330	0.017	0.033
R0.45	2	50,000	2,820	0.154	0.308	40,000	2,420	0.11	0.22	30,000	1,980	0.088	0.165	30,000	1,430	0.066	0.11	25,000	990	0.033	0.055
	4	48,450	2,370	0.077	0.185	40,000	1,980	0.055	0.132	30,000	1,540	0.044	0.088	25,000	990	0.033	0.055	20,000	660	0.017	0.028
	6	40,700	1,520	0.054	0.077	30,000	1,320	0.039	0.055	25,000	880	0.028	0.039	20,000	660	0.017	0.028	20,000	330	0.011	0.022
R0.5	2	45,900	3,100	0.154	0.462	40,000	2,750	0.11	0.33	30,000	2,200	0.11	0.22	25,000	1,540	0.088	0.11	20,000	1,100	0.055	0.11
	2.5	45,900	3,100	0.154	0.462	40,000	2,750	0.11	0.33	30,000	2,200	0.11	0.22	25,000	1,540	0.088	0.11	20,000	1,100	0.055	0.11
	3	45,900	3,100	0.154	0.462	40,000	2,750	0.11	0.33	30,000	2,200	0.11	0.22	25,000	1,540	0.088	0.11	20,000	1,100	0.055	0.11
	4	45,900	3,100	0.154	0.308	40,000	2,750	0.11	0.22	30,000	1,980	0.055	0.165	25,000	1,320	0.055	0.11	20,000	990	0.033	0.11
	5	39,780	2,600	0.077	0.231	30,000	2,200	0.055	0.165	25,000	1,760	0.044	0.11	20,000	1,010	0.033	0.055	16,000	770	0.022	0.055
	6	38,560	2,320	0.077	0.154	30,000	1,980	0.055	0.11	25,000	1,320	0.044	0.055	20,000	810	0.022	0.055	16,000	610	0.017	0.055
	7	33,050	1,340	0.062	0.092	30,000	1,320	0.044	0.066	25,000	1,050	0.033	0.044	20,000	750	0.022	0.033	16,000	540	0.011	0.033
R0.6	2.4	39,230	2,720	0.154	0.462	30,000	2,750	0.11	0.33	30,000	2,200	0.11	0.22	25,000	1,760	0.055	0.11	20,000	1,320	0.055	0.11
	4	39,230	2,720	0.154	0.308	30,000	2,750	0.11	0.22	30,000	2,200	0.077	0.22	25,000	1,760	0.055	0.11	20,000	1,320	0.055	0.11
	6	39,230	2,720	0.108	0.154	30,000	2,200	0.077	0.11	25,000	1,760	0.055	0.11	20,000	1,320	0.033	0.077	16,000	830	0.022	0.077
	8	31,820	2,070	0.077	0.154	30,000	1,760	0.055	0.11	25,000	1,320	0.033	0.077	20,000	1,010	0.022	0.055	16,000	720	0.017	0.055
R0.7	8	27,850	1,810	0.185	0.308	30,000	2,750	0.132	0.22	20,000	1,980	0.088	0.165	20,000	1,100	0.033	0.088	15,000	680	0.022	0.055
	12	25,700	1,250	0.108	0.185	20,000	1,540	0.077	0.132	18,000	1,210	0.044	0.088	18,000	770	0.017	0.055	15,000	620	0.017	0.05
R0.75	3	35,700	3,210	0.231	0.462	30,000	3,300	0.165	0.33	30,000	2,750	0.11	0.33	25,000	2,200	0.11	0.22	20,000	1,650	0.066	0.22
	4	35,700	3,210	0.231	0.462	30,000	3,300	0.165	0.33	30,000	2,750	0.11	0.33	25,000	2,200	0.11	0.22	18,000	1,320	0.066	0.22
	6	35,700	3,210	0.231	0.308	30,000	3,300	0.165	0.22	30,000	2,200	0.11	0.22	25,000	1,760	0.11	0.11	16,000	1,050	0.066	0.11
	8	27,850	1,810	0.154	0.308	25,000	2,750	0.11	0.22	25,000	1,760	0.055	0.22	20,000	1,320	0.055	0.11	13,000	770	0.033	0.11
	10	25,700	1,670	0.154	0.154	25,000	2,750	0.11	0.11	25,000	1,320	0.055	0.11	20,000	950	0.055	0.055	13,000	720	0.033	0.055
	12	25,700	1,390	0.077	0.154	20,000	1,980	0.055	0.11	20,000	1,010	0.033	0.11	18,000	860	0.022	0.055	10,000	500	0.017	0.033
R0.8	8	30,940	2,490	0.154	0.308	25,000	2,750	0.11	0.22	20,000	2,200	0.077	0.165	18,000	1,760	0.055	0.11	13,000	830	0.033	0.11
	12	27,850	2,180	0.108	0.154	20,000	1,980	0.077	0.11	16,000	1,650	0.055	0.077	14,000	1,320	0.033	0.055	10,000	500	0.022	0.055

2KMB Reference cutting conditions table Long neck type

Ball radius RE (mm)	Effective length LU (mm)	Prehardened steel NAK(35-45HRC)				Prehardened steel / Hardened steel STAVAX · SKD61(45-55HRC)				Hardened steel SKD11(55-62HRC)				Hardened steel Powder high-speed steel · SKH (62-66HRC)				Hardened steel Powder high-speed steel (66-70HRC)			
		No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)	No. of revolutions n (min-1)	Feed Vf (mm/min)	Depth of cut ap (mm)	Cutting width ae (mm)
R1	3	26,780	3,620	0.308	0.77	25,000	3,300	0.22	0.55	25,000	2,750	0.22	0.55	20,000	2,200	0.165	0.33	16,000	1,650	0.11	0.33
	4	26,780	3,620	0.308	0.77	25,000	3,300	0.22	0.55	25,000	2,750	0.22	0.55	20,000	2,200	0.165	0.33	16,000	1,650	0.11	0.33
	6	26,780	3,210	0.308	0.77	25,000	2,750	0.22	0.55	25,000	2,200	0.22	0.33	20,000	1,760	0.165	0.33	16,000	1,320	0.11	0.33
	8	26,780	3,210	0.308	0.462	20,000	2,200	0.22	0.33	18,000	1,760	0.11	0.22	16,000	1,320	0.11	0.22	13,000	1,050	0.066	0.165
	10	24,990	2,700	0.154	0.462	18,000	2,200	0.11	0.33	16,000	1,760	0.11	0.22	14,000	1,320	0.11	0.11	11,000	830	0.066	0.11
	12	22,490	2,430	0.154	0.308	16,000	1,760	0.11	0.22	14,000	1,320	0.11	0.11	12,000	1,030	0.055	0.11	9,500	720	0.033	0.11
	13	22,490	2,430	0.123	0.308	16,000	1,760	0.088	0.22	14,000	1,320	0.066	0.11	12,000	1,030	0.044	0.088	9,500	610	0.033	0.055
	14	22,490	2,110	0.108	0.231	16,000	1,760	0.077	0.165	14,000	1,320	0.055	0.088	12,000	1,030	0.033	0.077	8,500	500	0.033	0.055
	16	20,890	1,350	0.108	0.231	16,000	1,760	0.077	0.165	14,000	1,320	0.055	0.088	12,000	1,030	0.033	0.077	8,000	390	0.033	0.055
R1.25	6	23,590	3,800	0.462	0.616	20,000	3,080	0.33	0.44	20,000	2,530	0.22	0.55	18,000	2,200	0.165	0.44	14,000	1,650	0.11	0.44
	8	23,590	3,800	0.385	0.462	20,000	2,860	0.275	0.33	20,000	2,310	0.165	0.33	18,000	1,980	0.132	0.275	14,000	1,430	0.11	0.33
	10	23,590	3,800	0.308	0.462	20,000	2,750	0.22	0.33	20,000	2,200	0.165	0.22	18,000	1,760	0.11	0.165	13,000	1,210	0.066	0.165
	15	18,400	2,130	0.154	0.308	18,000	2,200	0.11	0.22	16,000	1,760	0.077	0.165	14,000	1,320	0.055	0.11	9,500	770	0.033	0.11
	20	16,980	1,640	0.108	0.231	16,000	1,650	0.077	0.165	14,000	1,320	0.055	0.11	10,000	1,100	0.033	0.055	8,500	500	0.033	0.055
R1.5	6	23,590	4,100	0.308	1.232	20,000	3,300	0.22	0.88	18,000	2,750	0.22	0.66	14,000	2,200	0.22	0.55	12,000	1,650	0.132	0.55
	8	23,590	4,100	0.308	1.232	20,000	3,300	0.22	0.88	18,000	2,750	0.22	0.66	14,000	2,200	0.22	0.55	12,000	1,650	0.132	0.55
	10	23,590	4,100	0.308	0.924	20,000	2,750	0.22	0.66	18,000	2,200	0.22	0.44	14,000	1,650	0.11	0.33	12,000	1,430	0.11	0.33
	12	23,590	3,400	0.308	0.924	20,000	2,750	0.22	0.66	18,000	2,200	0.22	0.44	14,000	1,650	0.11	0.33	12,000	1,210	0.066	0.33
	14	19,040	2,700	0.154	0.616	18,000	2,200	0.11	0.44	16,000	1,760	0.11	0.33	12,000	1,320	0.11	0.22	10,000	990	0.066	0.22
	16	19,040	2,300	0.154	0.616	18,000	2,200	0.11	0.44	16,000	1,760	0.11	0.33	12,000	1,320	0.11	0.22	10,000	720	0.066	0.22
	20	15,910	1,920	0.154	0.462	18,000	1,760	0.11	0.33	16,000	1,320	0.11	0.22	12,000	1,050	0.11	0.11	9,500	500	0.066	0.11
	25	15,910	1,390	0.154	0.308	16,000	1,320	0.11	0.22	14,000	1,200	0.077	0.165	10,000	880	0.055	0.077	8,500	300	0.053	0.088
R1.75	15	23,590	2,750	0.385	1.54	20,000	3,300	0.275	1.1	16,000	2,530	0.165	0.55	14,000	1,650	0.143	0.44	12,000	990	0.143	0.422
	20	19,040	2,100	0.278	0.924	18,000	2,750	0.198	0.66	15,000	1,980	0.11	0.33	12,000	1,320	0.11	0.22	9,500	720	0.11	0.22
	25	15,910	1,710	0.186	0.539	16,000	1,980	0.132	0.385	14,000	1,760	0.11	0.22	10,000	1,100	0.066	0.132	8,500	500	0.066	0.132
	30	15,190	1,710	0.154	0.385	14,000	1,650	0.11	0.275	11,000	1,050	0.077	0.165	9,000	880	0.055	0.088	7,500	300	0.055	0.088
R2	8	20,400	4,100	0.462	2.31	20,000	3,300	0.33	1.65	16,000	2,750	0.22	0.88	12,000	2,200	0.22	0.66	9,500	1,650	0.165	0.66
	10	20,400	4,100	0.462	2.31	20,000	3,300	0.33	1.65	16,000	2,750	0.22	0.88	12,000	2,200	0.22	0.66	9,500	1,650	0.165	0.66
	12	20,400	4,100	0.462	2.31	20,000	3,300	0.33	1.65	16,000	2,750	0.22	0.88	12,000	2,200	0.22	0.66	9,500	1,650	0.165	0.66
	14	20,400	3,900	0.462	2.31	20,000	3,300	0.33	1.65	16,000	2,200	0.22	0.88	12,000	1,760	0.22	0.66	9,500	1,320	0.132	0.66
	15	20,400	3,900	0.462	2.31	20,000	3,300	0.33	1.65	16,000	2,200	0.22	0.88	12,000	1,760	0.22	0.66	9,500	1,320	0.132	0.66
	20	15,910	2,800	0.308	1.54	16,000	2,640	0.22	1.1	14,000	1,980	0.11	0.66	10,000	1,540	0.11	0.44	8,000	990	0.088	0.44
	25	15,910	1,900	0.308	1.232	16,000	1,760	0.22	0.88	14,000	1,320	0.11	0.44	10,000	1,100	0.11	0.22	8,000	720	0.088	0.22
	30	15,190	1,800	0.154	0.462	14,000	1,760	0.11	0.33	10,000	1,310	0.077	0.22	8,200	1,100	0.055	0.165	6,500	500	0.07	0.176
35	14,000	1,370	0.154	0.308	14,000	1,320	0.11	0.22	10,000	1,100	0.077	0.165	8,200	900	0.055	0.11	6,500	300	0.07	0.176	

If chatter occurs, adjust cutting conditions as necessary.

Pay particular attention to cutting condition settings and tool passes in areas where cutting load is high, such as corners.

Adjust the number of revolutions and feed rate at the same rate.

Oil mist coolant is recommended.

If $\phi 1$ mm or L/D (aspect ratio) exceeds 8, adjust cutting conditions as needed.

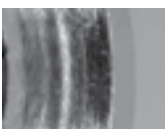
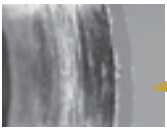
Surface finish oriented

2/ 3/ 4FESW

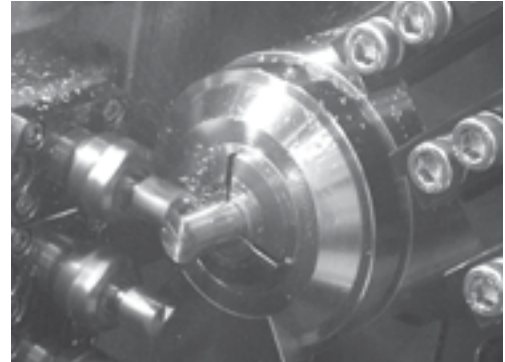
Surface finish oriented, for automatic lathes



MEGACOAT is applied

Workpiece Material: Ni-Co alloy		
<p>2FES ($\phi 3$, 2flutes) Excellent surface finish</p> 		<p>Facing of machine parts</p> <p>$\cdot n=2,150\text{min}^{-1}$ ($V_c=20\text{m/min}$) $\cdot V_f=100\text{mm/min}$ ($f_z=0.023\text{mm/t}$)</p>
<p>Competitor A ($\phi 3$, 2flutes) X Large burrs</p> 		<p>Large burrs (Internal evaluation)</p>

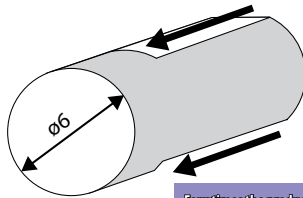
Comparison with competitor's end mill after 600 passes



Case Studies

Machine parts S45C

$n=3,980\text{min}^{-1}$
($V_c=100\text{m/min}$)
 $V_f=800\text{mm/min}$
($f_z=0.05\text{mm/t}$)
 $a_p=0.45\text{mm}$, Wet
4FESW080-080-08 ($\phi 8$, 4 flutes)



Four times the productivity!

4FESW080-080-08

$V_f=800\text{mm/min}$

Competitor Coated Carbide B

$V_f=200\text{mm/min}$

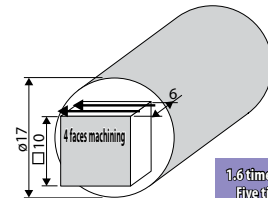
[Competitor Coated Carbide B]
 $\phi 8$, 4 flutes
 $n=2,508\text{min}^{-1}$
($V_c=63\text{m/min}$)
 $V_f=200\text{mm/min}$
($f_z=0.02\text{mm/t}$)
 $a_p=0.45\text{mm}$

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

(User Evaluation)

Machine parts SUM

$n=3,200\text{min}^{-1}$
($V_c=100\text{m/min}$)
 $V_f=640\text{mm/min}$
($f_z=0.05\text{mm/t}$)
 $a_p \times a_e=3.5 \times 3.0\text{mm}$, Wet
4FESW100-080-10 ($\phi 10$, 4 flutes)



1.6 times the productivity!
Five times the tool life!

4FESW100-080-10

$V_f=640\text{mm/min}$

Competitor Coated Carbide C

$V_f=400\text{mm/min}$

[Competitor Coated Carbide C]
 $\phi 7$, 4 flutes
 $n=2,000\text{min}^{-1}$
($V_c=44\text{m/min}$)
 $V_f=400\text{mm/min}$
($f_z=0.05\text{mm/t}$)
 $a_p \times a_e=3.5 \times 3.0\text{mm}$

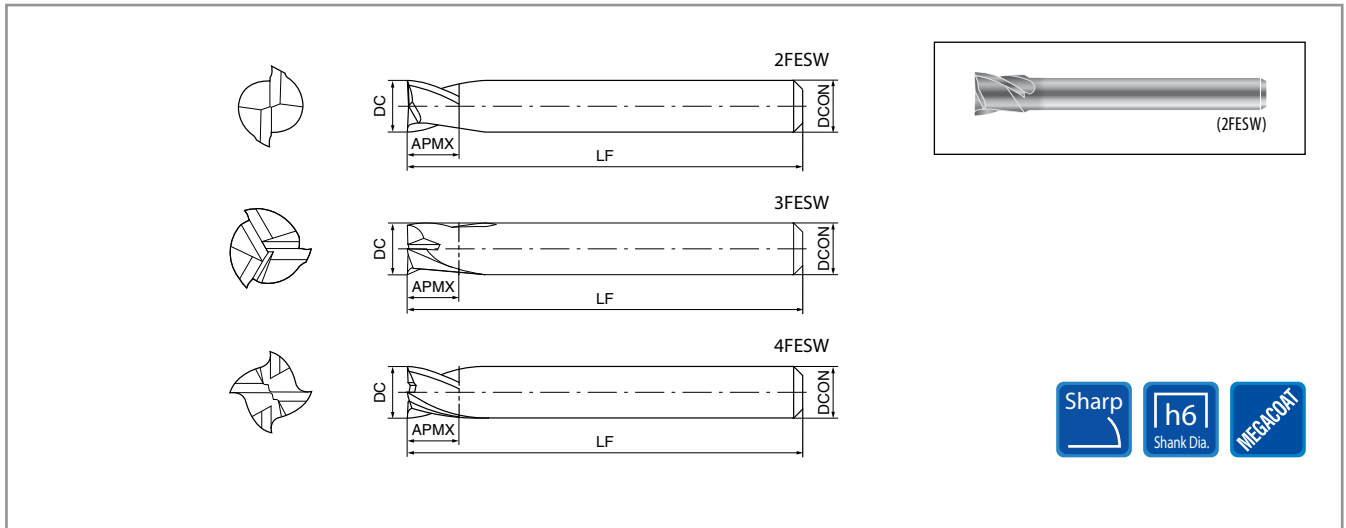
4FESW has a shorter edge length with improved rigidity, which enabled an increase from conventional $\phi 7$ to $\phi 10$, thus improving cutting conditions. Compared to conventional tools, tool life improved five times.

(User Evaluation)

Recommended Workpiece Materials

★ 1st Choice





2FESW

Shouldering Slotting
(Unit : mm)

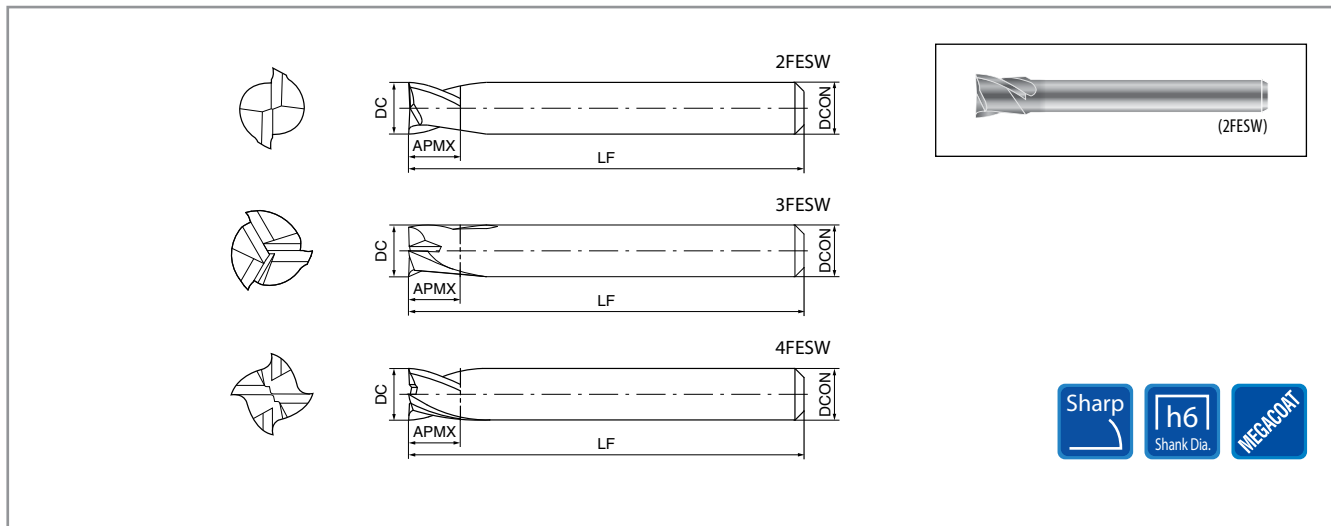
Description	Availability	DC	Mill Dia. tolerance	APMX	DCON	LF	ZEPF
2FESW050-050-05A	●	5	0 -0.020	5	5	35	2
2FESW060-060-05A	●	6	0 -0.020	6	5	35	2
2FESW030-030-04	●	3	0 -0.020	3	4	45	2
2FESW035-035-04	●	3.5	0 -0.020	3.5	4	45	2
2FESW040-040-04	●	4	0 -0.020	4	4	45	2
2FESW050-050-06	●	5	0 -0.020	5	6	45	2
2FESW060-060-06	●	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	Availability	DC	Mill Dia. tolerance	APMX	DCON	LF	ZEPF
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

● : Available



4FESW

Shouldering Slotting

(Unit : mm)

Description	Availability	DC	Mill Dia. tolerance	APMX	DCON	LF	ZEFP
4FESW030-030-04	●	3	0 -0.020	3	4	45	4
4FESW035-035-04	●	3.5	0 -0.020	3.5	4	45	4
4FESW040-040-04	●	4	0 -0.020	4	4	45	4
4FESW050-050-06	●	5	0 -0.020	5	6	45	4
4FESW060-060-06	●	6	0 -0.020	6	6	45	4
4FESW070-070-07	●	7	0 -0.025	7	7	45	4
4FESW080-080-07	●	8	0 -0.025	8	7	45	4
4FESW080-080-08	●	8	0 -0.025	8	8	45	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

● : Available

2/ 3/ 4FESW Cutting conditions

2FESW

Applications	Workpiece Material	Application	Outside Dia. DC (mm)	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø13
 <p>Shouldering</p> <p>Depth of Cut (ap x ae) (mm)</p> <p>1DC x 0.2DC</p>	Carbon Steel, Cast Iron	Shouldering	Spindle Revolution (min-1)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
			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
 <p>Shouldering</p> <p>Depth of Cut (ap x ae) (mm)</p> <p>1DC x 0.2DC</p>	Carbon Steel, Cast Iron	Shouldering	Spindle Revolution (min-1)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
			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
 <p>Shouldering</p> <p>Depth of Cut (ap x ae) (mm)</p> <p>1DC x 0.2DC</p>	Carbon Steel, Cast Iron	Shouldering	Spindle Revolution (min-1)	11,000	8,000	6,400	5,300	4,000	3,200	2,700	2,500
			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.

For superalloy machining

4JER

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



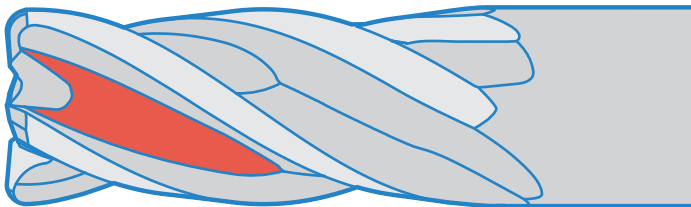
MEGACOAT is applied



1 Resistant to breakage

Stable slotting and trochoid machining with chip pocket grooves and large core thickness

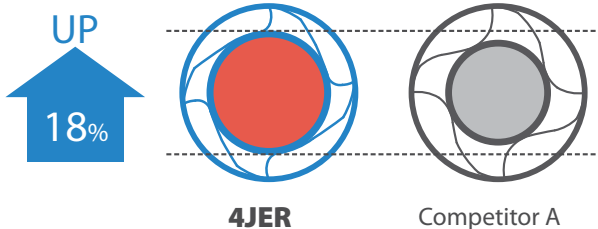
Chip pocket for smooth chip evacuation during slotting applications



Excellent chip evacuation

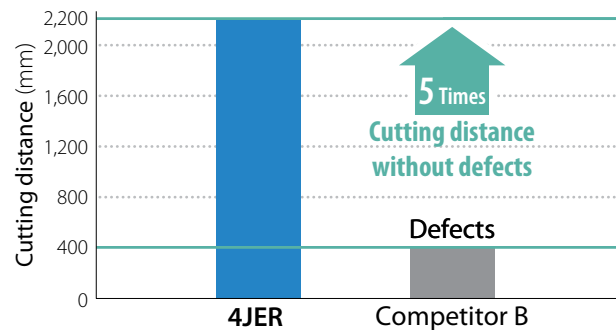
↑
2 times
Amount of
chip evacuation

Core thickness comparison



Decreases tool deflection and achieves excellent machining precision

Slotting performance comparison (Internal evaluation)



Cutting conditions : n = 1,200 min⁻¹, Vf = 140 mm/min, ap = 4 mm
 End mill dia. ø8 mm, slotting, wet
 workpiece material : Inconel®718 (Aging treatment, 40HRC)

Recommended workpiece materials

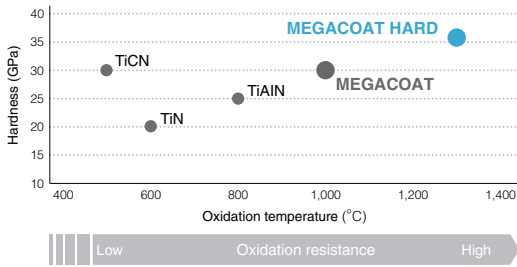
★ 1st Choice



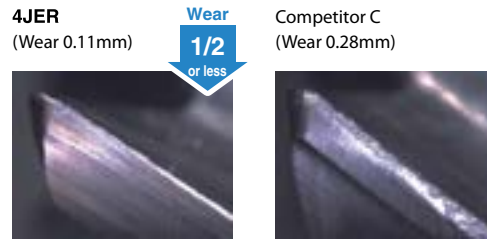
2 Achieves long tool life and stable machining

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

Properties of coating



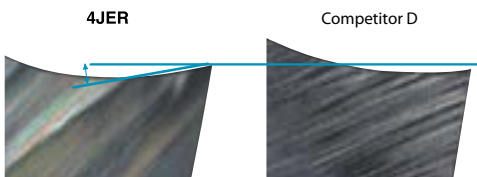
Wear resistance comparison (Cutting distance 975mm)



Cutting conditions : $n = 1,200 \text{ min}^{-1}$, $V_f = 140 \text{ mm/min}$, $a_p = 4 \text{ mm}$
 End mill dia. $\varnothing 8 \text{ mm}$, Slotting, Wet
 Workpiece material : Inconel® 718 (Aging treatment, 40HRC)

3 Decreased burr

High sharpness with a large rake angle



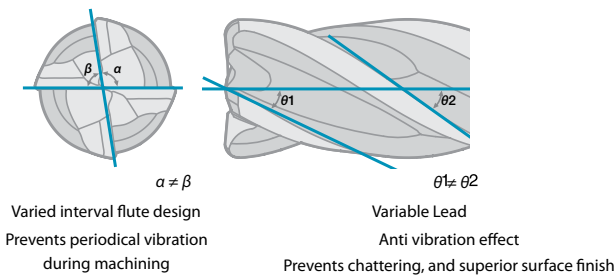
Burring during slotting (Inconel® 718)



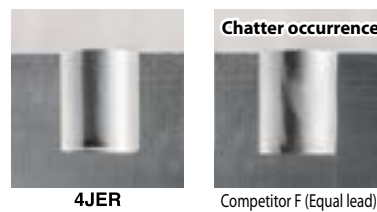
Cutting conditions : $n = 1,200 \text{ min}^{-1}$, $V_f = 140 \text{ mm/min}$, $a_p = 4 \text{ mm}$
 End mill dia. $\varnothing 8 \text{ mm}$, Wet

4 Resistance to chattering

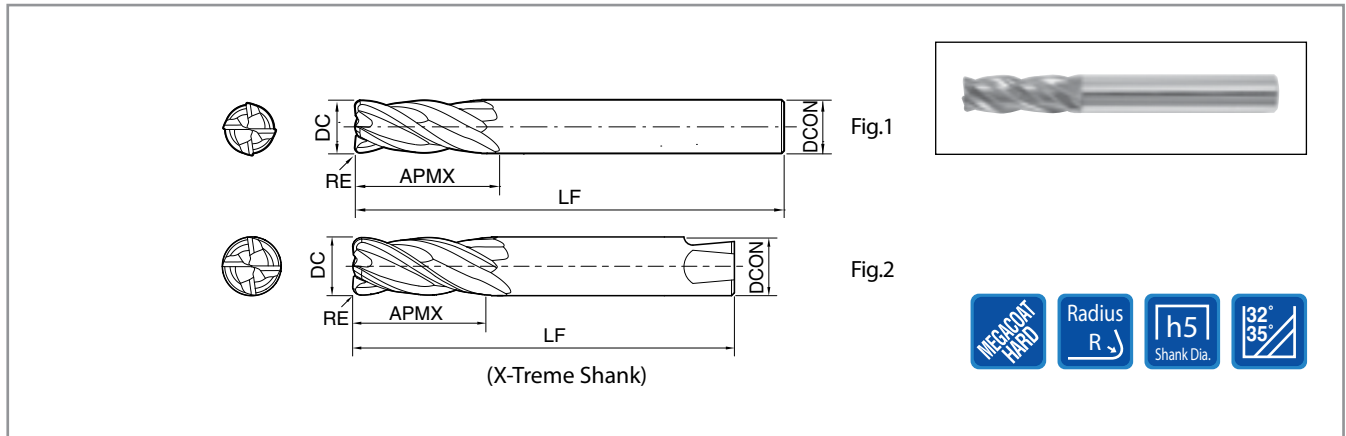
Improved chatter resistance with varied interval flute and variable lead



Slotting Surface in Trochoidal Machining (Inconel® 718)



Cutting Conditions : $n = 1,200 \text{ min}^{-1}$, $V_f = 300 \text{ mm/min}$, $a_p = 20 \text{ mm}$
 End Mill Dia. $\varnothing 16 \text{ mm}$, Width 20mm, Wet



4JER (Short)

Shouldering Slotting

(Unit : mm)

Description	Availability	DC	Mill Dia. tolerance	RE	APMX	DCON	LF	ZEPF	Shape
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	●	8.0	-0.005 -0.025	0.3	12	8	70	4	
4JER080-120-R05	●			0.5					
4JER080-120-R10	●			1.0					
4JER080-120-R15	●			1.5					
4JER100-150-R03	●	10.0	-0.005 -0.025	0.3	15	10	80	4	
4JER100-150-R05	●			0.5					
4JER100-150-R10	●			1.0					
4JER100-150-R15	●			1.5					
4JER100-150-R20	●			2.0					
4JER100-150-R30	●	3.0							
4JER120-180-R05	●	12.0	-0.010 -0.030	0.5	18	12	100	4	
4JER120-180-R10	●			1.0					
4JER120-180-R15	●			1.5					
4JER120-180-R20	●			2.0					
4JER120-180-R30	●	3.0							
4JER160-240-R10	●	16.0	-0.010 -0.030	1.0	24	16	110	4	
4JER160-240-R20	●			2.0					
4JER160-240-R30	●			3.0					
4JER200-300-R10	●	20.0	-0.010 -0.030	1.0	30	20	125	4	
4JER200-300-R20	●			2.0					
4JER200-300-R30	●			3.0					

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

4JER (Medium)

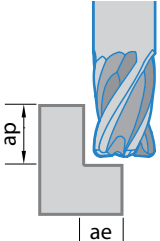
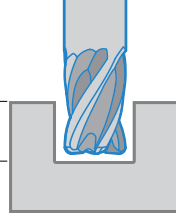
Shouldering Slotting

(Unit : mm)

Description	Availability	DC	Mill Dia. tolerance	RE	APMX	DCON	LF	ZEPF	Shape
4JER060-150-R03	●	6.0	0 -0.020	0.3	15	6	60	4	Fig.1
4JER060-150-R05	●			0.5					
4JER060-150-R10	●			1.0					
4JER080-200-R03	●	8.0	-0.005 -0.025	0.3	20	8	70	4	
4JER080-200-R05	●			0.5					
4JER080-200-R10	●			1.0					
4JER080-200-R15	●			1.5					
4JER100-250-R03	●	10.0	-0.005 -0.025	0.3	25	10	80	4	
4JER100-250-R05	●			0.5					
4JER100-250-R10	●			1.0					
4JER100-250-R15	●			1.5					
4JER100-250-R20	●			2.0					
4JER100-250-R30	●	3.0							
4JER120-260-R05	●	12.0	-0.010 -0.030	0.5	26	12	100	4	
4JER120-260-R10	●			1.0					
4JER120-260-R15	●			1.5					
4JER120-260-R20	●			2.0					
4JER120-260-R30	●	3.0							
4JER160-350-R10	●	16.0	-0.010 -0.030	1.0	35	16	110	4	
4JER160-350-R20	●			2.0					
4JER160-350-R30	●			3.0					
4JER200-450-R10	●	20.0	-0.010 -0.030	1.0	45	20	125	4	
4JER200-450-R20	●			2.0					
4JER200-450-R30	●			3.0					
4JER120-260-R10-XT	●	12.0	-0.010 -0.030	1.0	26	12	94	4	Fig.2
4JER120-260-R20-XT	●			2.0					
4JER120-260-R30-XT	●			3.0					
4JER160-350-R10-XT	●	16.0	-0.010 -0.030	1.0	35	16	116	4	
4JER160-350-R20-XT	●			2.0					
4JER160-350-R30-XT	●			3.0					
4JER200-450-R10-XT	●	20.0	-0.010 -0.030	1.0	45	20	130	4	
4JER200-450-R20-XT	●			2.0					
4JER200-450-R30-XT	●			3.0					

● : Available

4JER Cutting conditions

Machining Application	Workpiece Material	Application	Depth of Cut $a_p \times a_e$ (mm)	Outer Diameter D_c (mm)	$\phi 6$	$\phi 8$	$\phi 10$	$\phi 12$	$\phi 16$	$\phi 20$
 <p>Shouldering</p>  <p>Slotting</p>	Carbon Steel / Cast Iron S45C-FC	Shouldering	$1.5D_c \times 0.1D_c$	Number of Revolutions (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	$D_c \leq \phi 12 : a_p \leq 1.0D_c$ $D_c > \phi 12 : a_p \leq 12$	Number of Revolutions (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 SCM, SNCM	Shouldering	$1.5D_c \times 0.1D_c$	Number of Revolutions (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	$D_c \leq \phi 12 : a_p \leq 1.0D_c$ $D_c > \phi 12 : a_p \leq 12$	Number of Revolutions (min ⁻¹)	4,200	3,200	2,500	2,100	1,600	1,300
				Feed Rate (mm/min)	530	510	470	450	400	360
	Pre-hardened Steel (30~45HRC)	Shouldering	$1.5D_c \times 0.05D_c$	Number of Revolutions (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	$a_p \leq 0.5D_c$	Number of Revolutions (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 SUS304	Shouldering	$1.5D_c \times 0.05D_c$	Number of Revolutions (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	$a_p \leq 0.5D_c$	Number of Revolutions (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 Alloy	Shouldering	$1.5D_c \times 0.1D_c$	Number of Revolutions (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	$D_c \leq \phi 12 : a_p \leq 1.0D_c$ $D_c > \phi 12 : a_p \leq 12$	Number of Revolutions (min ⁻¹)	3,700	2,800	2,200	1,900	1,400	1,100	
			Feed Rate (mm/min)	320	340	370	340	260	210	
Heat Resistant Alloy (Inconel® 718, etc.)	Shouldering	$1.5D_c \times 0.05D_c$	Number of Revolutions (min ⁻¹)	2,400	1,800	1,400	1,200	900	720	
			Feed Rate (mm/min)	330	320	320	320	320	290	
	Slotting	$a_p \leq 0.5D_c$	Number of Revolutions (min ⁻¹)	1,600	1,200	950	800	600	480	
			Feed Rate (mm/min)	180	140	110	100	80	60	

Coolant is recommended for stainless steel, titanium alloy, and superalloy.

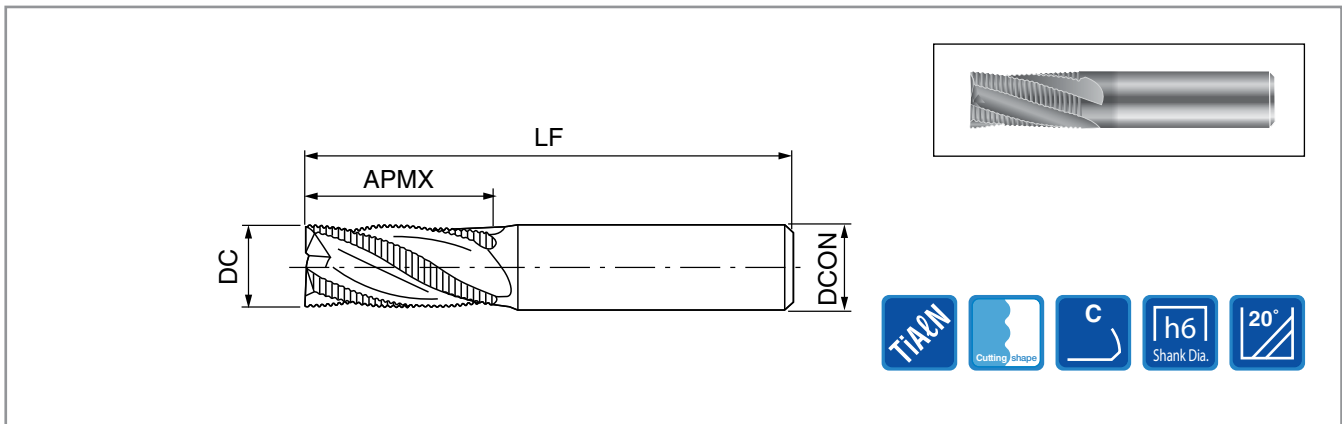
Roughing serrated edge

3/ 4/ 5RDS

RDS type is for general use with a large flat surface edge and a 20° helix angle. High efficiency chip evacuation and low cutting force due to serrated edge.



No. of Flutes : 3, 4, 5



3RDSTM, 4RDSTM, 5RDSTM (Medium)

Shouldering Slotting

(Unit : mm)

Description	Availability	DC	Mill Dia. tolerance	APMX	DCON	LF	CHW	ZEFP
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

3RDSSL, 4RDSSL, 5RDSSL (Long)

Shouldering Slotting

(Unit : mm)

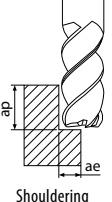
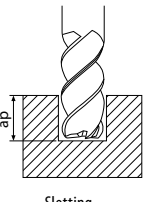
Description	Availability	DC	Mill Dia. tolerance	APMX	DCON	LF	CHW	ZEFP
3RDSSL060-240-06	●	6	-0.030 -0.105	24	6	76	0.3	3
3RDSSL080-280-08	●	8	-0.040 -0.130	28	8	76	0.3	3
4RDSSL100-340-10	●	10	-0.040 -0.130	34	10	89	0.5	4
4RDSSL120-450-12	●	12	-0.050 -0.160	45	12	100	0.5	4
4RDSSL160-560-16	●	16	-0.050 -0.160	56	16	125	0.5	4
4RDSSL200-600-20	●	20	-0.065 -0.195	60	20	125	0.5	4
5RDSSL250-800-25	●	25	-0.065 -0.195	80	25	150	0.5	5

● : Available

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

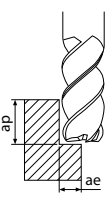
3/ 4/ 5RDSM | 3/ 4/ 5RDSL Cutting conditions

3RDSM, 4RDSM, 5RDSM

Applications	Workpiece Material	Application	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25	
 Shouldering  Slotting	Steel	< 22HRC	1.5DC x 0.5DC	Spindle Revolution (min ⁻¹)	11,100	8,400	6,700	5,600	4,200	3,300	2,700	
				Feed Rate (mm/min)	1,000	1,000	1,320	1,340	1,340	1,340	1,380	
		22 ~ 32HRC	1DC	Spindle Revolution (min ⁻¹)	9,300	6,900	5,600	4,600	3,500	2,800	2,200	
				Feed Rate (mm/min)	800	800	1,000	1,030	1,040	1,050	1,110	
		32 ~ 40HRC	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	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	
		32 ~ 40HRC	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	
		40 ~ 45HRC	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	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	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	230	220	220	
		45 ~ 50HRC	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	
		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	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	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
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	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø6	ø8	ø10	ø12	ø16	ø20	ø25		
 Shouldering	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	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	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.

Roughing special serrated edge, difficult-to-cut materials

4/ 5/ 6RFH

High efficiency and stable machining with multi-edge design and coolant hole
 Deep slotting for stainless steel and titanium alloy



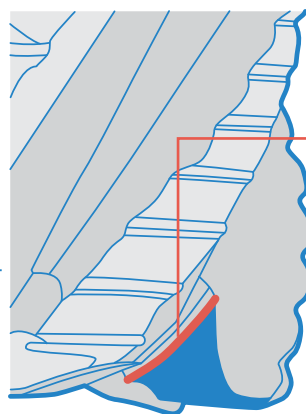
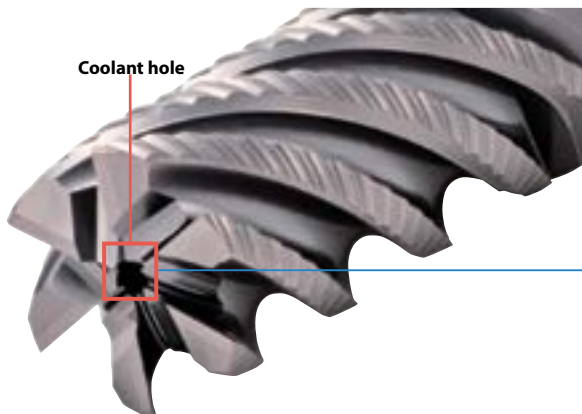
MEGACOAT HARD is applied

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

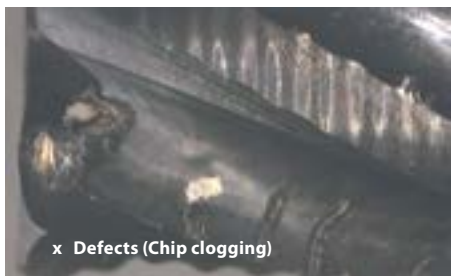
Deep slotting ($a_p = 2 \times DC$) for stainless steel and titanium alloy

Slotting performance comparison (Internal evaluation)

After machining 1 pass

5RFH (Internal and external coolant)

Competitor A (External coolant)



x Defects (Chip clogging)

Cutting conditions : $n = 2,550 \text{ min}^{-1}$, $v_f = 336 \text{ mm/min}$, $a_p = 20 \text{ mm}$
 End mill dia. Ø10, wet, slotting, workpiece material : SUS304

Competitor A

5RFH

No defects when deep slotting

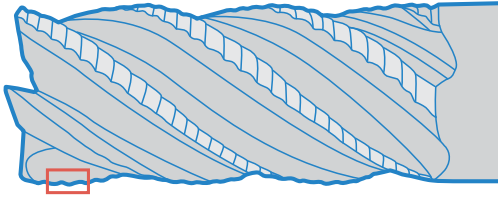
Recommended workpiece materials ★ 1st Choice

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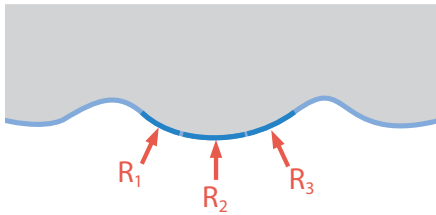
2 Defect resistant

Reduce cutting pressure with radial serrated edge

Stable machining



Special curved radius serrated edge



Serrated curved edge with different radii
(Compound radius shape)
Distributes cutting pressure and provides stress reduction

Blade edge after machining 12m (Internal Evaluation)



5RFH



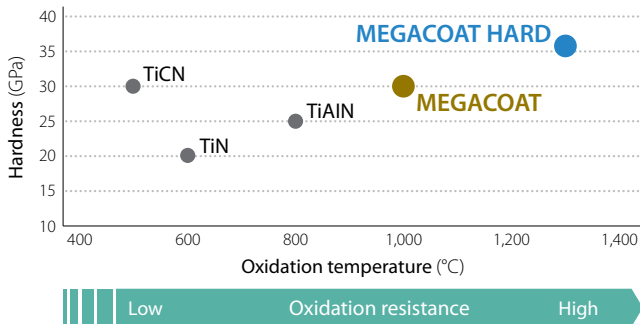
Competitor B

Cutting conditions: $n = 2,900 \text{ min}^{-1}$, $v_f = 712 \text{ mm/min}$, $a_p \times a_e = 5 \times 3 \text{ mm}$
End mill dia. $\varnothing 10$, wet, shouldering workpiece: ti-6al-4v

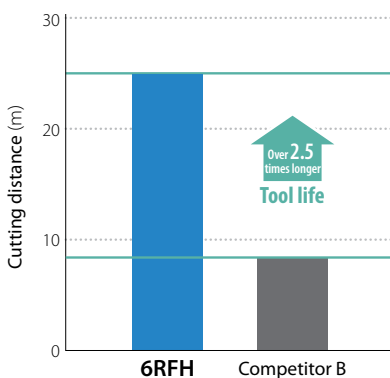
3 Achieves long tool life and stable machining

The MEGACOAT HARD coating technology delivers the highest hardness and thermal resistance of Kyocera's PVD coating

Coating properties



Tool life comparison (Internal Evaluation)



Blade edge after machining 8.4m



6RFH



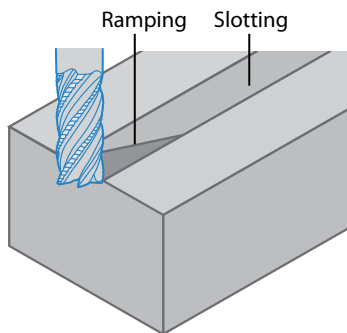
Competitor B

Cutting conditions: $n = 3,500 \text{ min}^{-1}$, $v_f = 840 \text{ mm/min}$, $a_p \times a_e = 5 \times 4.8 \text{ Mm}$
End mill dia. $\varnothing 16$, shouldering, wet workpiece: SUS304

4/ 5/ 6RFH Machining information

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

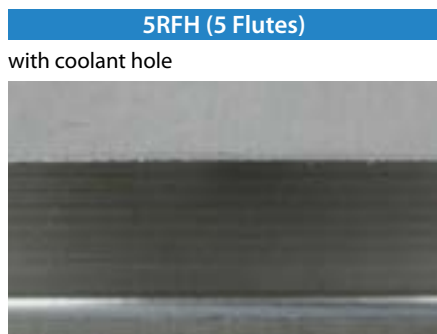
Case studies



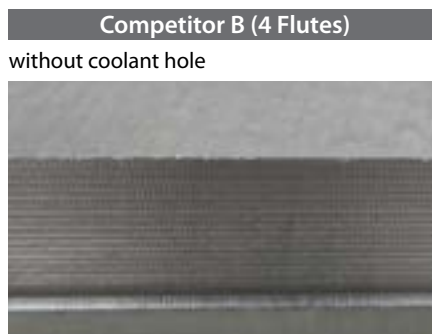
RFH is internal coolant support

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

Side surface finish comparison (Internal evaluation)



Surface finish: 0.20 Mmra



Surface finish: 1.66 Mmra

Cutting conditions: $n = 3,200 \text{ min}^{-1}$
 $V_f = 310 \text{ mm/min}$, $a_p = 10 \text{ mm}$
 End mill dia. $\varnothing 10$, wet
 Ramping (ramping angle 5°) · slotting
 Workpiece: SUS304

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

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

Great for difficult-to-cut materials and heavy machining
For more information, please contact your kyocera sales representative

Case studies

Test piece SUS304

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

Load on the main spindle

5RFH
100-250

20%

↓ 10%
Load on the main spindle

Competitor C

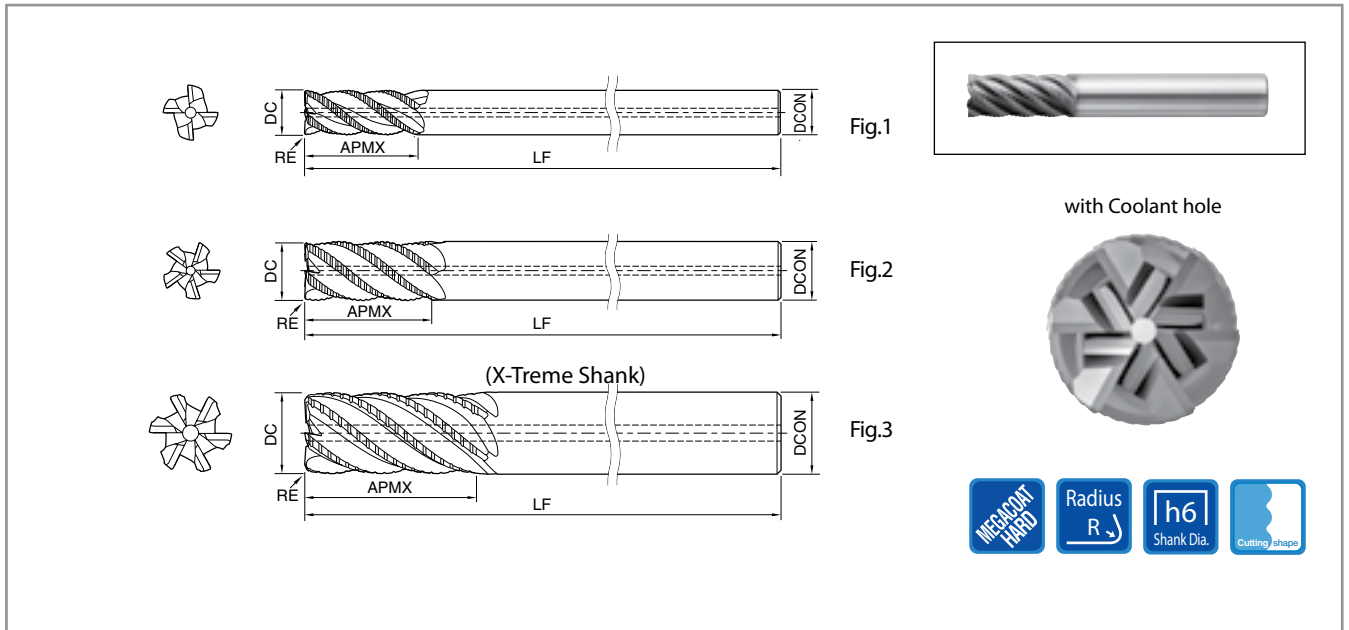
30%

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

(User evaluation)

4/ 5/ 6RFH Medium & Long

No. of Flutes : 4



4 / 5 / 6RFH (Medium)

Shouldering Slotting

(Unit : mm)

Description	Availability	DC	Mill Dia. tolerance	*RE	APMX	DCON	LF	ZEFP	Shape
4RFH060-150	●	6.0	0 -0.050	0.3	15	6	60	4	Fig.1
4RFH080-200	●	8.0	0 -0.050	0.3	20	8	70	4	
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)

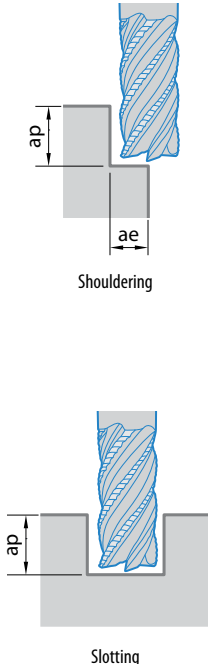
Description	Stock	DC	Mill Dia. tolerance	*RE	APMX	DCON	LF	ZEFP	Shape
4RFH060-300	●	6.0	0 -0.050	0.3	30	6	80	4	Fig.1
4RFH080-400	●	8.0	0 -0.050	0.3	40	8	100	4	
5RFH100-500	●	10.0	0 -0.050	0.5	50	10	110	5	Fig.2
5RFH120-600	●	12.0	0 -0.050	0.5	60	12	130	5	
6RFH160-800	●	16.0	0 -0.060	0.5	80	16	160	6	Fig.3
6RFH200-1000	●	20.0	0 -0.060	0.5	100	20	180	6	

* Corner-R dimension is reference only

● : Available

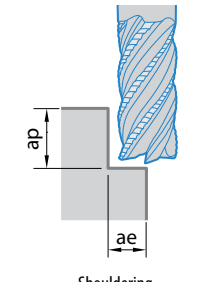
4/ 5/ 6RFH Cutting conditions Medium & Long type

4/5/6RFH (Medium Type)

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

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

4/5/6RFH (Long Type)

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

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

High performance ball-nose end mill

2SEB

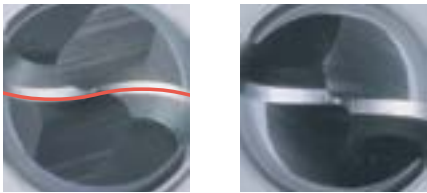
Special cutting edge concept and nano layer coating realizes high precision machining



MEGACOAT NANO is applied

1 Sharp cutting with special nose geometry

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

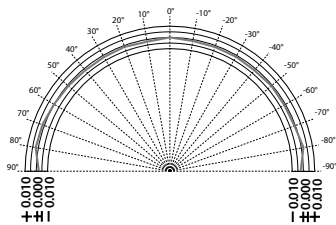


2SEB

Conventional (Internal evaluation)

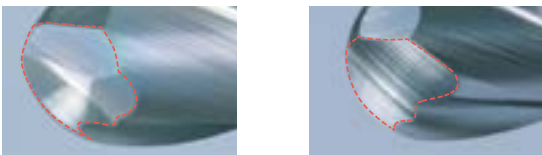
2 R-0.005 mm close tolerance edge diameter (R8.0 excluded)

Excellent surface finish quality when using entire cutting edge

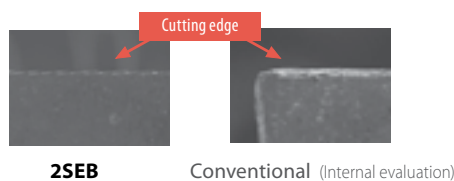
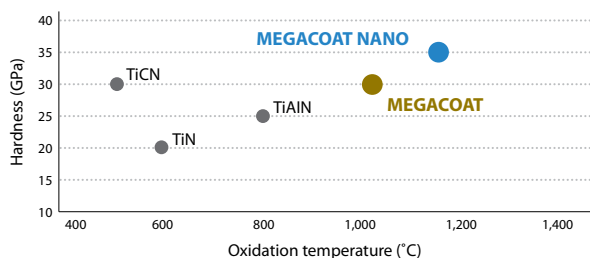


3 Large chip pocket

Stable chip evacuation at large depth of cut machining



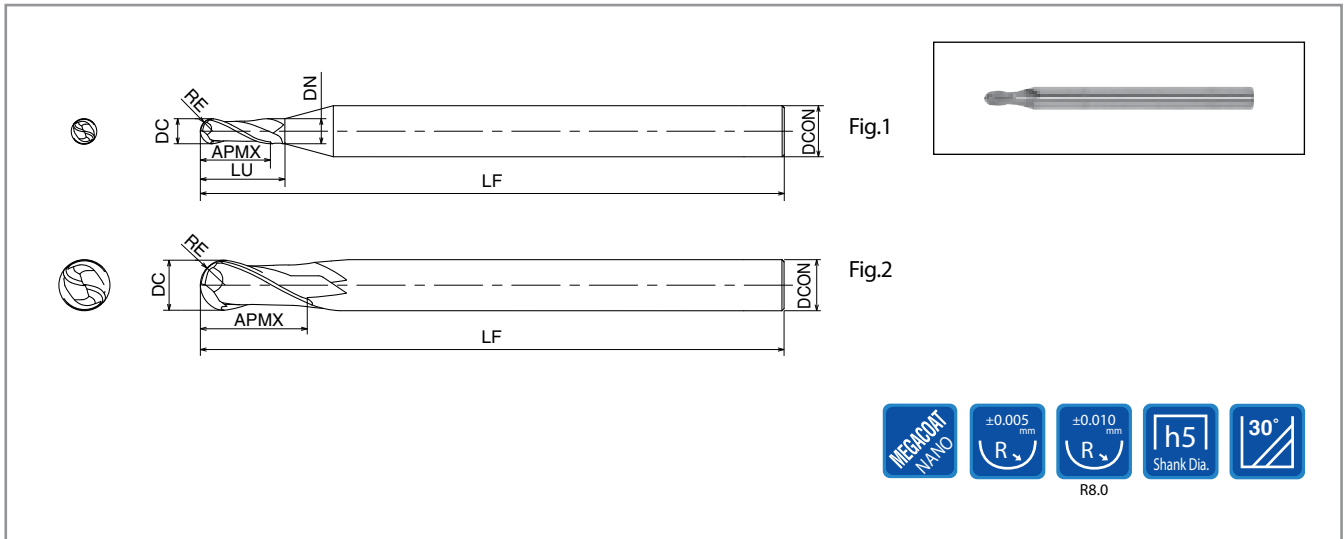
4 Achieves long tool life and stable machining



2SEB

Conventional (Internal evaluation)

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



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

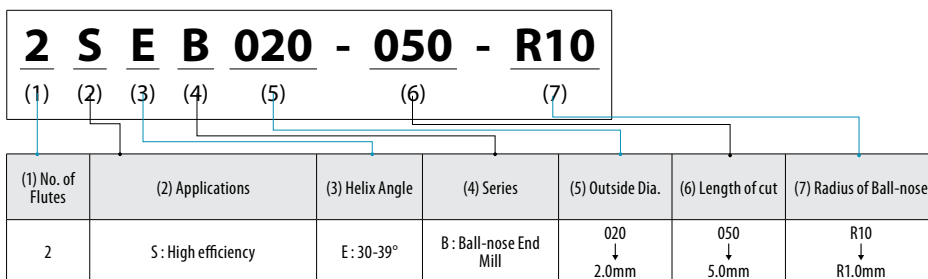
Copying

(Unit : mm)

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

● : Available

Solid End Mill Identification System



Recommended workpiece materials ★ 1st Choice

★
P
~30HRC

★
P
30~40HRC

★
H
~55HRC

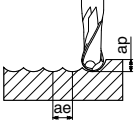
H
~68HRC

M
Stainless steel

K
Cast Iron

2SEB Cutting conditions

2SEB

Applications	Workpiece Material	Depth of Cut (ap x ae) (mm)	Outside Dia. DC (mm)	ø2	ø3	ø4	ø5	ø6	ø8	ø10	ø12	ø16	
 <p>Copying</p>	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
				Feed Rate (mm/min)	3,150	2,880	2,660	2,500	2,370	2,190	2,060	1,970	1,920
		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.



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