High Precision Small Diameter Solid Drill

KDA Mini

Newly Developed Triple & Double Margin Designs

New Coating MEGACOAT NANO EX

High precision, long tool life, and stable machining

Introducing smaller drilling diameters from ø1.0 to ø2.9

Large lineup to solve various drilling challenges (up to 8D)

K-series
Let your potential shine

Discover Your

High Precision Small Diameter Solid Drill

KDA Mini

Small diameter drills require high stability, machining accuracy, quality of surface finish, chip control, and tool life etc. ···

KDA Mini, with its redesigned shape and coating technology, was engineered as a complete solution for a variety of drilling applications

01 New Design

Type C

Triple & Double Margin

Tip : Triple Margin / Middle : Double Margin

High precision and stable machining

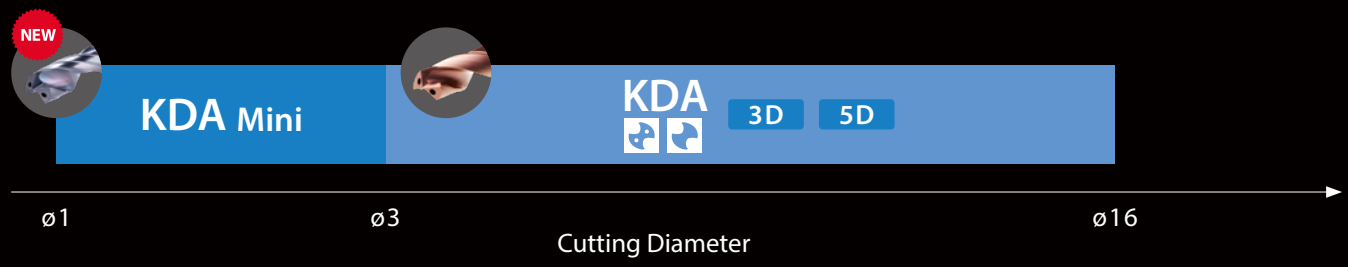
02 New Coating

MEGACOAT NANO EX

"Double Lamination Technology" : Multi-layer structure with two unique nano layers

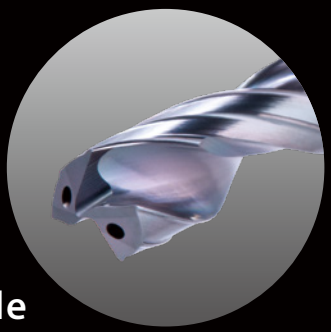
Suppresses wear, adhesion, and chipping to provide longer tool life

Lineup ø1.0 ~ ø2.9



Type C

with **C**oolant hole



With Coolant Hole

Excellent machining accuracy with triple and double margins

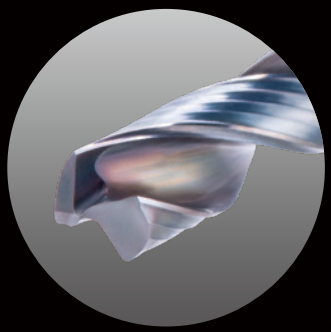
Recommended for stainless steel machining

Internal coolant available

3D 5D 8D

Type N

Normal type



No Coolant Hole

High precision machining with double margins

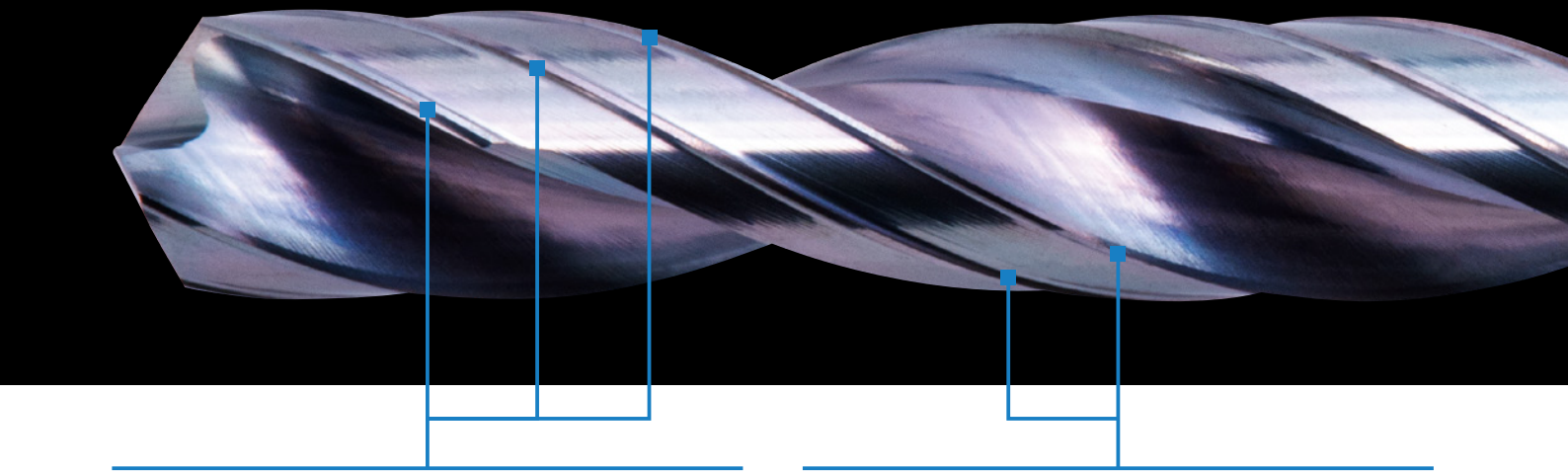
Economical style for machining with external coolant

2D 4D

Solution!

K-series
Let your potential shine

01 Unique Shape for Stable Machining



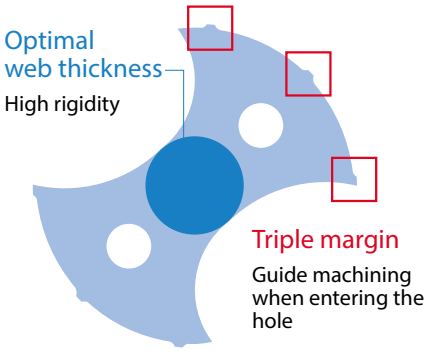
Tip

Triple margin
Excellent machining accuracy

Three sets of margins support the hole and guide machining for improved stability

High rigidity with optimal web thickness

Cross-section image

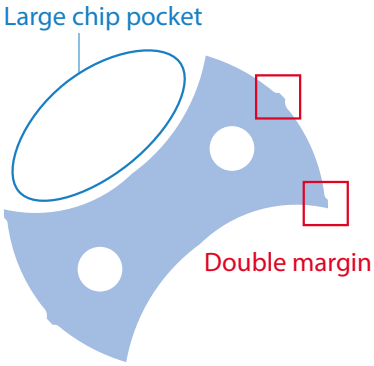


Middle

Double margin
Excellent chip control

Excellent chip evacuation with large chip pocket

Cross-section image



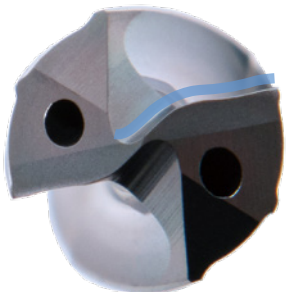
Chip shape
(Internal evaluation)

Cutting conditions :
n = 9,000 min^{-1} (Vc = 60 m/min)
Vf = 540 mm/min (f = 0.06 mm/rev)
Cutting Dia. ø2.1 Drilling Depth 5 mm
Wet (Internal coolant) Workpiece : S50C

Curved cutting edge design

Maintains both sharpness and toughness

Breaks chips into small pieces and reduces cutting pressure



Unique Triple and Double Margin Combination

Triple margin at the tip and double margin in the middle
Provides high precision and stable machining

Type C

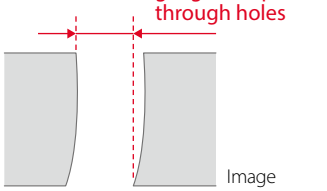
Cutting performance (Internal evaluation)

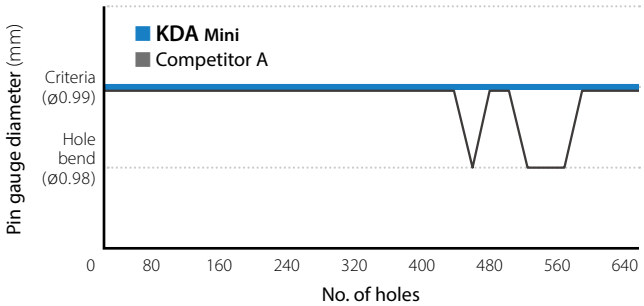
Case 1 High precision in drilling at depths of 8D with excellent hole straightness and cylindricity

S50C Drilling accuracy comparison

Straightness of the hole

Compare max diameter of pin gauge that passes through holes
Criteria : ø0.99





Hole position accuracy

Measure the hole position near the center of the workpiece

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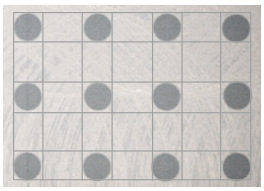
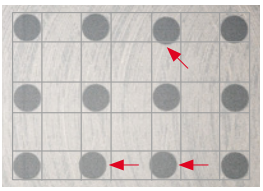


Good

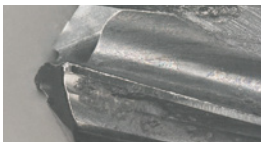
Competitor A



Hole misalignment occurred

Cutting edge condition (After drilling approx. 630 holes)

KDA Mini



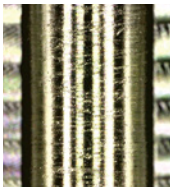
Competitor A

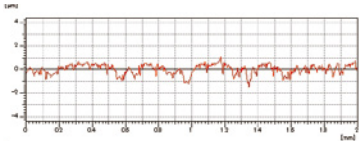
Cutting conditions : n = 12,000 min^{-1} (Vc = 38 m/min), Vf = 420 mm/min (f = 0.035 mm/rev), Cutting Dia. ø1 Drilling Depth 8 mm Wet (Internal coolant)

Case 2 Excellent surface finish in stainless steel machining

SUS304 Surface finish comparison

KDA Mini

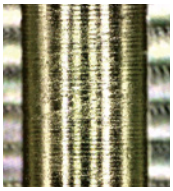


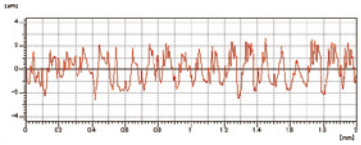


2.3 μmRz (0.3 μmRa)

Good

Competitor B



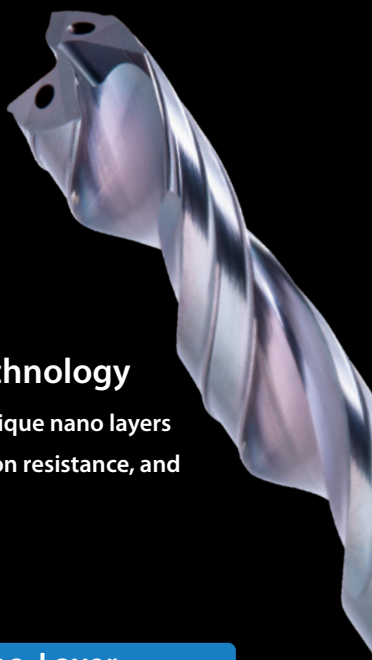


5.0 μmRz (1.0 μmRa)

Rifling & dullness occurred

Cutting conditions : n = 8,500 min^{-1} (Vc = 77 m/min), Vf = 850 mm/min (f = 0.1 mm/rev), Cutting Dia. ø2.9 Drilling Depth 23 mm Wet (Internal coolant)

02 Unique Coating for Longer Tool Life



MEGACOAT NANO EX | Solid

Double Lamination Technology

Multi-layer structure with two unique nano layers

Provides wear resistance, adhesion resistance, and chipping resistance

Special Nano Layer x Multilayer Lamination

Multi-layering of high-performance nano layers

Suppressed crack growth

Excellent chipping resistance

Film

Base material

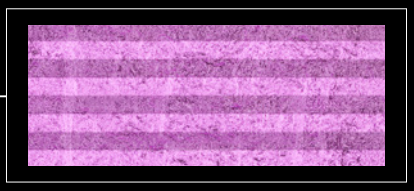
CG Image

Nano-Layer

AlCrN based coating

Optimized Cr content

Excellent lubricity and adhesion resistance



Nano-Layer

TiAlN based coating

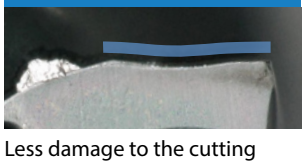
Excellent wear resistance with high hardness

Increases toughness by optimization of internal stress

Wear resistance comparison (Internal evaluation)

Cutting edge conditions (Corner)

KDA Mini (After drilling 660 holes)



Less damage to the cutting edge provides continuous drilling operations

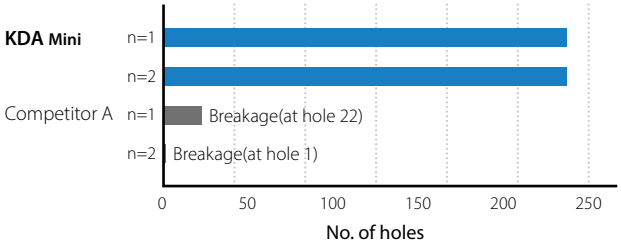
Competitor C (After drilling 455 holes)

Adhesion and wear progresses

Chip clinging occurs

Cutting conditions : n = 8,000 min^{-1} (Vc = 73 m/min), Vf = 400 mm/min (f = 0.05 mm/rev)
Cutting Dia. ø2.9 Drilling Depth 10 mm Wet (Internal coolant) Workpiece : S50C

Fracture resistance comparison (Internal evaluation)



Cutting conditions : n = 9,500 min^{-1} (Vc = 30 m/min), Vf = 285 mm/min (f = 0.03 mm/rev)
Cutting Dia ø1.0 Drilling Depth 8 mm Wet (Internal coolant) Workpiece : SUS304

Type N (without coolant hole) is also available
Provides stable machining results

Type N

Normal type

2D 4D

	Cutting Dia. DC Tolerance (mm)
2D	+0.012 +0.002
4D	0 -0.014

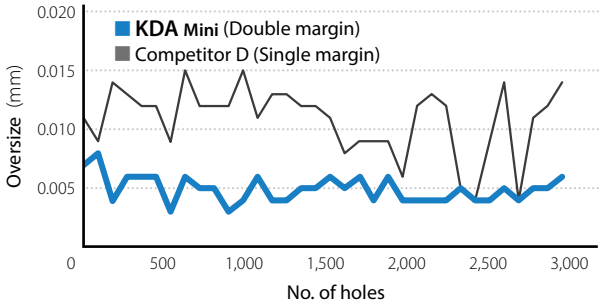
Excellent machining accuracy and quality with double margin

MEGACOAT NANO EX provides longer tool life

2D can also be used as a pilot drill

High precision — Suppresses hole diameter variation

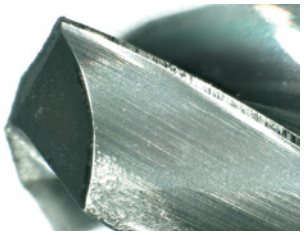
Drilling accuracy comparison (Internal evaluation)



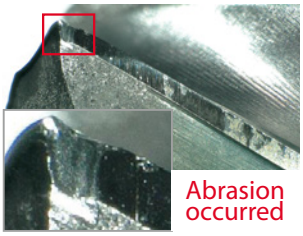
Cutting conditions : n = 6,300 min^{-1} (Vc = 57 m/min), Vf = 700 mm/min (f = 0.1 mm/rev)
Cutting Dia. ø2.9 Drilling Depth 12 mm Wet (External coolant) Workpiece : SCM440

Cutting edge condition (after drilling 2,900 holes)

KDA Mini Double margin



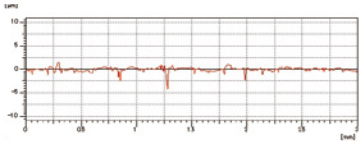
Competitor D Single margin



High quality — High quality both on the wall and bottom

Quality of surface finish comparison (Internal evaluation)

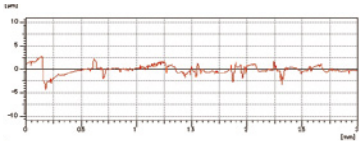
KDA Mini



3.7 μmRz (0.3 μmRa)

Good

Competitor D



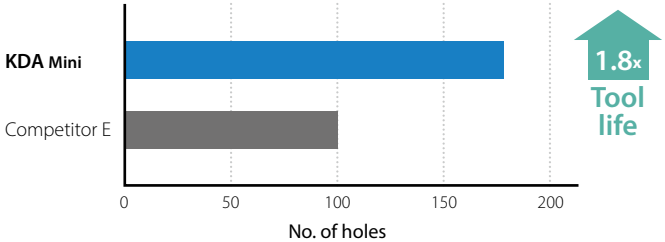
5.5 μmRz (0.7 μmRa)

Rifling & dullness occurred

Cutting conditions : n = 8,000 min^{-1} (Vc = 73 m/min), Vf = 960 mm/min (f = 0.12 mm/rev), Cutting Dia. ø2.9 Drilling Depth 12 mm Wet (External coolant) Workpiece : S50C

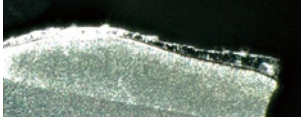
Tool longevity — Suppresses edge defects and improves tool life

Tool life comparison (Internal evaluation)



Cutting Edge (Corner)

KDA Mini
(After drilling approx. 180 holes)



Steady wear

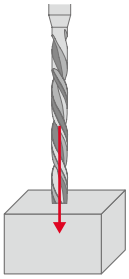
Competitor E
(After drilling approx. 100 holes)

Edge wear progresses

Cutting conditions : n = 3,200 min^{-1} (Vc = 25 m/min), Vf = 80 mm/min (f = 0.025 mm/rev), Cutting Dia. ø2.5 Drilling Depth 5 mm Wet (External coolant) Workpiece : SKD61 (Unhardened steel)

Double tool life with good chip control

Mechanical part SUS316L



Cutting conditions :
n = 3,200 min^{-1} (Vc = 28 m/min)
Vf = 65 mm/min (f = 0.02 mm/rev)
Cutting Dia. ø2.8 Drilling Depth 18 mm
Wet (Internal coolant)

Tool life

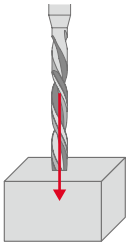
Competitor F often had a defect due to chip clinging and tool life was unstable.

KDA Mini provided stable machining without chip clinging.

(User evaluation)

Achieved 2.8 times machining efficiency. Tool life can be extended

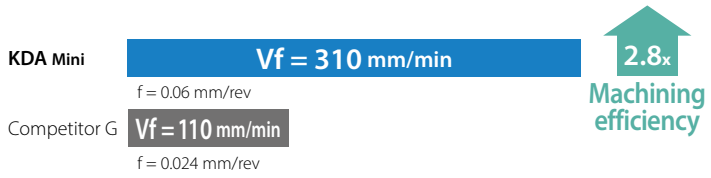
Mechanical part SUS304



Cutting conditions (KDA Mini) :
n = 5,100 min^{-1} (Vc = 42 m/min)
Cutting Dia. ø2.6 Drilling Depth 13 mm
Wet (Internal coolant) Without pecking

Cutting conditions (Competitor G) :
n = 4,500 min^{-1} (Vc = 37 m/min)
Cutting Dia. ø2.6 Drilling Depth 13 mm
Wet (External coolant) With pecking

Machining efficiency



Tool life

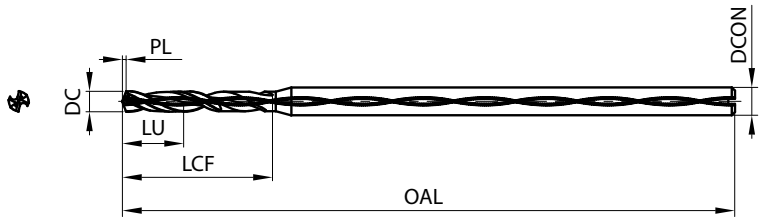
Achieved 2.8 times machining efficiency by replacing competitor G (no coolant hole).

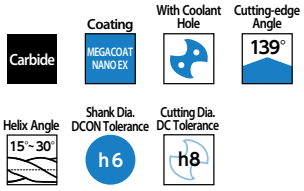
Cutting edge condition was excellent even after drilling 360 holes. Further machining was possible.

(User evaluation)

Type C With Coolant Hole 3D

3D





Cutting Dia. DC	Tolerance h8 (mm)
ø1.0 ~ ø2.9	0 -0.014

Description	Stock	Dimensions (mm)					
		DC	DCON	OAL	LU	LCF	PL
KDA0100X03S030C	●	1.0	3	54	3.0	8.0	0.19
KDA0110X03S030C	●	1.1			3.3	8.7	0.21
KDA0120X03S030C	●	1.2			3.6	9.4	0.22
KDA0130X03S030C	●	1.3			3.9	10.0	0.24
KDA0140X03S030C	●	1.4			4.2	10.6	0.26
KDA0150X03S030C	●	1.5			4.5	11.3	0.28
KDA0160X03S030C	●	1.6			4.8	11.8	0.30
KDA0170X03S030C	●	1.7			5.1	12.4	0.32
KDA0180X03S030C	●	1.8			5.4	13.0	0.34
KDA0190X03S030C	●	1.9			5.7	13.5	0.36
KDA0200X03S030C	●	2.0	3	60	6.0	14.0	0.37
KDA0210X03S030C	●	2.1			6.3	14.5	0.39
KDA0220X03S030C	●	2.2			6.6	15.0	0.41
KDA0230X03S030C	●	2.3			6.9	15.4	0.43
KDA0240X03S030C	●	2.4			7.2	15.8	0.45
KDA0250X03S030C	●	2.5			7.5	16.3	0.47
KDA0260X03S030C	●	2.6	3	65	7.8	16.6	0.49
KDA0270X03S030C	●	2.7			8.1	17.0	0.50
KDA0280X03S030C	●	2.8			8.4	17.4	0.52
KDA0290X03S030C	●	2.9			8.7	17.7	0.54

● : Standard Stock

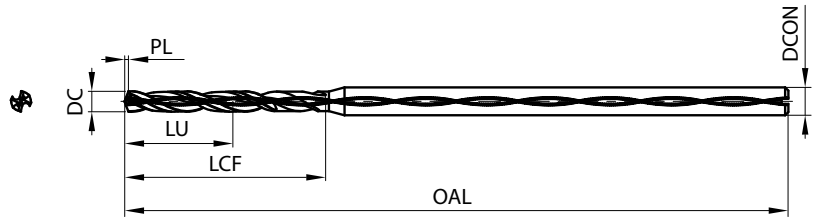
Identification system

KDA0120X03S030C

KDA	0120	X	03	S030	C
	Cutting Dia. DC ø1.2		Drilling Depth (L/D) 3D	Shank Dia. DCON ø3.0	Type C : With Coolant Hole N : No Coolant Hole

Type C With Coolant Hole 5D

5D



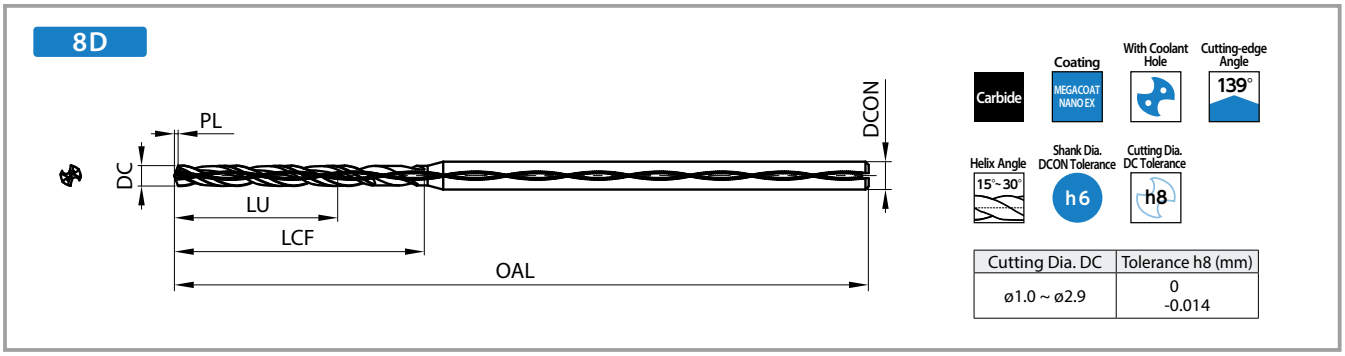
Carbide | Coating: MEGACOAT NANO EX | With Coolant Hole | Cutting-edge Angle: 139° | Helix Angle: 15°~30° | Shank Dia. DCON Tolerance: h6 | Cutting Dia. DC Tolerance: h8

Cutting Dia. DC	Tolerance h8 (mm)
ø1.0 ~ ø2.9	0 -0.014

Description	Stock	Dimensions (mm)					
		DC	DCON	OAL	LU	LCF	PL
KDA0100X05S030C	●	1.0	3	54	5.0	10.0	0.19
KDA0110X05S030C	●	1.1			5.5	10.9	0.21
KDA0120X05S030C	●	1.2			6.0	11.9	0.22
KDA0130X05S030C	●	1.3			6.5	12.8	0.24
KDA0140X05S030C	●	1.4			7.0	13.7	0.26
KDA0150X05S030C	●	1.5			7.5	14.6	0.28
KDA0160X05S030C	●	1.6			8.0	15.5	0.30
KDA0170X05S030C	●	1.7			8.5	16.4	0.32
KDA0180X05S030C	●	1.8			9.0	17.3	0.34
KDA0190X05S030C	●	1.9			9.5	18.1	0.36
KDA0200X05S030C	●	2.0	3	65	10.0	19.0	0.37
KDA0210X05S030C	●	2.1			10.5	19.8	0.39
KDA0220X05S030C	●	2.2			11.0	20.7	0.41
KDA0230X05S030C	●	2.3			11.5	21.5	0.43
KDA0240X05S030C	●	2.4			12.0	22.3	0.45
KDA0250X05S030C	●	2.5			12.5	23.1	0.47
KDA0260X05S030C	●	2.6	3	80	13.0	23.9	0.49
KDA0270X05S030C	●	2.7			13.5	24.7	0.50
KDA0280X05S030C	●	2.8			14.0	25.5	0.52
KDA0290X05S030C	●	2.9			14.5	26.2	0.54

● : Standard Stock

Type C With Coolant Hole 8D



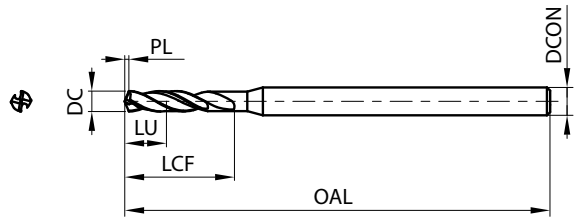
Cutting Dia. DC	Tolerance h8 (mm)
ø1.0 ~ ø2.9	0 -0.014

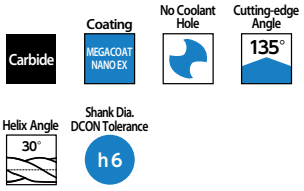
Description	Stock	Dimensions (mm)					
		DC	DCON	OAL	LU	LCF	PL
KDA0100X08S030C	●	1.0	3	65	8.0	12.8	0.19
KDA0110X08S030C	●	1.1			8.8	13.9	0.21
KDA0120X08S030C	●	1.2			9.6	15.2	0.22
KDA0130X08S030C	●	1.3			10.4	16.3	0.24
KDA0140X08S030C	●	1.4			11.2	17.4	0.26
KDA0150X08S030C	●	1.5			12.0	18.6	0.28
KDA0160X08S030C	●	1.6			12.8	19.6	0.30
KDA0170X08S030C	●	1.7			13.6	20.8	0.32
KDA0180X08S030C	●	1.8			14.4	21.8	0.34
KDA0190X08S030C	●	1.9			15.2	22.8	0.36
KDA0200X08S030C	●	2.0	3	68	16.0	23.8	0.37
KDA0210X08S030C	●	2.1			16.8	24.5	0.39
KDA0220X08S030C	●	2.2			17.6	25.5	0.41
KDA0230X08S030C	●	2.3			18.4	26.4	0.43
KDA0240X08S030C	●	2.4			19.2	27.3	0.45
KDA0250X08S030C	●	2.5			20.0	28.3	0.47
KDA0260X08S030C	●	2.6	3	81	20.8	29.1	0.49
KDA0270X08S030C	●	2.7			21.6	30.0	0.50
KDA0280X08S030C	●	2.8			22.4	30.9	0.52
KDA0290X08S030C	●	2.9			23.2	31.7	0.54

● : Standard Stock

Type N No Coolant Hole 2D

2D





Cutting Dia. DC	Tolerance (mm)
ø1.0 ~ ø2.9	+0.012 +0.002

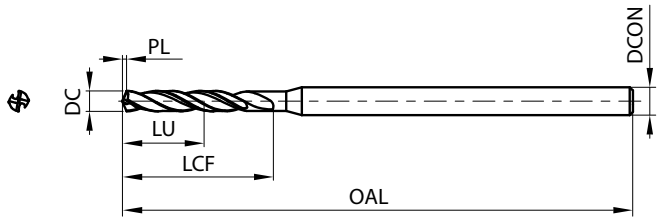
Description	Stock	Dimensions (mm)					
		DC	DCON	OAL	LU	LCF	PL
KDA0100X02S030N	●	1.0	3	45	2.0	6.5	0.21
KDA0110X02S030N	●	1.1			2.2	7.0	0.23
KDA0120X02S030N	●	1.2			2.4	7.6	0.25
KDA0130X02S030N	●	1.3			2.6	8.1	0.27
KDA0140X02S030N	●	1.4			2.8	8.5	0.29
KDA0150X02S030N	●	1.5			3.0	9.0	0.31
KDA0160X02S030N	●	1.6			3.2	9.4	0.33
KDA0170X02S030N	●	1.7			3.4	9.9	0.35
KDA0180X02S030N	●	1.8			3.6	10.3	0.37
KDA0190X02S030N	●	1.9			3.8	10.6	0.39
KDA0200X02S030N	●	2.0			4.0	11.0	0.41
KDA0210X02S030N	●	2.1			4.2	11.3	0.43
KDA0220X02S030N	●	2.2			4.4	11.7	0.46
KDA0230X02S030N	●	2.3			4.6	12.0	0.48
KDA0240X02S030N	●	2.4			4.8	12.2	0.50
KDA0250X02S030N	●	2.5			5.0	12.5	0.52
KDA0260X02S030N	●	2.6			5.2	12.7	0.54
KDA0270X02S030N	●	2.7			5.4	13.0	0.56
KDA0280X02S030N	●	2.8			5.6	13.2	0.58
KDA0290X02S030N	●	2.9			5.8	13.3	0.60

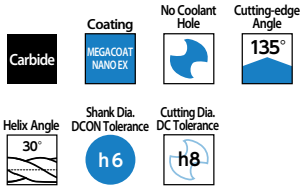
Cutting Dia. DC is a plus tolerance specification. Can be used as a pilot drill.

● : Standard Stock

Type N No Coolant Hole 4D

4D





Cutting Dia. DC	Tolerance h8 (mm)
ø1.0 ~ ø2.9	0 -0.014

Description	Stock	Dimensions (mm)					
		DC	DCON	OAL	LU	LCF	PL
KDA0100X04S030N	●	1.0	3	50	4.0	8.0	0.21
KDA0110X04S030N	●	1.1			4.4	8.8	0.23
KDA0120X04S030N	●	1.2			4.8	9.5	0.25
KDA0130X04S030N	●	1.3			5.2	10.3	0.27
KDA0140X04S030N	●	1.4			5.6	10.9	0.29
KDA0150X04S030N	●	1.5			6.0	11.7	0.31
KDA0160X04S030N	●	1.6			6.4	12.3	0.33
KDA0170X04S030N	●	1.7			6.8	12.9	0.35
KDA0180X04S030N	●	1.8			7.2	13.7	0.37
KDA0190X04S030N	●	1.9			7.6	14.3	0.39
KDA0200X04S030N	●	2.0			8.0	15.0	0.41
KDA0210X04S030N	●	2.1			8.4	15.5	0.43
KDA0220X04S030N	●	2.2			8.8	16.3	0.46
KDA0230X04S030N	●	2.3			9.2	16.8	0.48
KDA0240X04S030N	●	2.4			9.6	17.5	0.50
KDA0250X04S030N	●	2.5			10.0	18.0	0.52
KDA0260X04S030N	●	2.6			10.4	18.7	0.54
KDA0270X04S030N	●	2.7			10.8	19.2	0.56
KDA0280X04S030N	●	2.8			11.2	19.3	0.58
KDA0290X04S030N	●	2.9			11.6	19.3	0.60

● : Standard Stock

Recommended Cutting Conditions

Type C With Coolant Hole

Workpiece	Cutting speed Vc (m/min)	Cutting Dia. DC (mm)	ø1	ø1.5	ø2	ø2.5	ø2.9
Mild Steel (~180HB) Low Carbon Steel (~160HB) SS400, S10C	40 - 80	Spindle Revolution n (min^{-1})	12,700	10,600	9,500	7,600	6,600
		Feed Rate f (mm/rev)	0.03-0.05	0.04-0.08	0.04-0.10	0.05-0.11	0.06-0.12
Carbon Steel / Alloy Steel S50C, SCM, SCr (20~30HRC)	40 - 80	Spindle Revolution n (min^{-1})	12,700	10,600	9,500	7,600	6,600
		Feed Rate f (mm/rev)	0.02-0.05	0.03-0.06	0.04-0.08	0.05-0.09	0.06-0.11
Alloy Steel SCM, SCr (30~38HRC)	30 - 60	Spindle Revolution n (min^{-1})	9,500	9,500	8,000	7,000	6,600
		Feed Rate f (mm/rev)	0.02-0.04	0.03-0.06	0.05-0.08	0.06-0.10	0.06-0.12
Special Steel / Pre-hardened Steel SKS2, SKD61 (30~38HRC)	25 - 50	Spindle Revolution n (min^{-1})	8,000	8,500	7,200	6,400	5,500
		Feed Rate f (mm/rev)	0.02-0.03	0.03-0.05	0.03-0.06	0.03-0.06	0.05-0.10
Stainless Steel SUS304, SUS410(~200HB)	30 - 60	Spindle Revolution n (min^{-1})	9,500	9,500	8,000	7,000	6,600
		Feed Rate f (mm/rev)	0.02-0.03	0.03-0.05	0.03-0.06	0.03-0.08	0.04-0.10
Gray Cast Iron FC250 (~29HRC)	40 - 80	Spindle Revolution n (min^{-1})	12,700	10,600	9,500	7,600	6,600
		Feed Rate f (mm/rev)	0.02-0.04	0.03-0.06	0.04-0.08	0.05-0.10	0.07-0.12
Nodular Cast Iron FCD450, FCD600 (~28HRC)	30 - 60	Spindle Revolution n (min^{-1})	9,500	9,500	8,000	7,000	6,600
		Feed Rate f (mm/rev)	0.02-0.04	0.03-0.06	0.04-0.08	0.05-0.09	0.06-0.11

Precautions

1. This table shows general starting conditions. Adjust cutting conditions according to the actual workpiece shape and machine used.
2. Above cutting conditions is when water-soluble coolant is applied.
3. If the above revolution exceeds the machine specification, lower the revolution.
4. Use a drill with a run-out of less than 0.02 mm when mounting
5. Be careful not to allow the grooves to enter the holder when installing the drill.

Recommended Cutting Conditions

Type N No Coolant Hole

Workpiece	Cutting speed Vc (m/min)	Cutting Dia. DC (mm)	ø1	ø1.5	ø2	ø2.5	ø2.9
Mild Steel (~180HB) Low Carbon Steel (~160HB) SS400, S10C	30 - 80	Spindle Revolution n (min^{-1})	10,200	8,900	9,500	9,500	8,500
		Feed Rate f (mm/rev)	0.03-0.05	0.04-0.08	0.04-0.10	0.05-0.11	0.06-0.12
Carbon Steel / Alloy Steel S50C, SCM, SCr (20~30HRC)	30 - 80	Spindle Revolution n (min^{-1})	10,200	8,900	8,700	8,900	7,900
		Feed Rate f (mm/rev)	0.02-0.05	0.03-0.06	0.04-0.08	0.05-0.09	0.06-0.11
Alloy Steel SCM, SCr (30~38HRC)	30 - 80	Spindle Revolution n (min^{-1})	10,200	8,900	8,700	8,900	7,900
		Feed Rate f (mm/rev)	0.02-0.04	0.03-0.06	0.05-0.08	0.06-0.10	0.06-0.12
Special Steel / Pre-hardened Steel SKS2, SKD61 (30~38HRC)	30 - 60	Spindle Revolution n (min^{-1})	10,200	8,900	7,900	6,400	5,800
		Feed Rate f (mm/rev)	0.02-0.03	0.03-0.05	0.03-0.06	0.03-0.06	0.05-0.10
Gray Cast Iron FC250 (~29HRC)	30 - 80	Spindle Revolution n (min^{-1})	10,200	8,900	8,700	9,500	8,500
		Feed Rate f (mm/rev)	0.02-0.04	0.03-0.06	0.04-0.08	0.05-0.10	0.07-0.12
Nodular Cast Iron FCD450, FCD600 (~28HRC)	30 - 80	Spindle Revolution n (min^{-1})	10,200	8,900	8,700	8,900	8,000
		Feed Rate f (mm/rev)	0.02-0.04	0.03-0.06	0.04-0.08	0.05-0.09	0.06-0.11

Precautions

1. This table shows general starting conditions. Adjust cutting conditions according to the actual workpiece shape and machine used.
2. Above cutting conditions is when water-soluble coolant is applied.
3. If the above revolution exceeds the machine specification, lower the revolution.
4. Use a drill with a run-out of less than 0.02 mm when mounting
5. Be careful not to allow the grooves to enter the holder when installing the drill.

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