2018.10

DLE

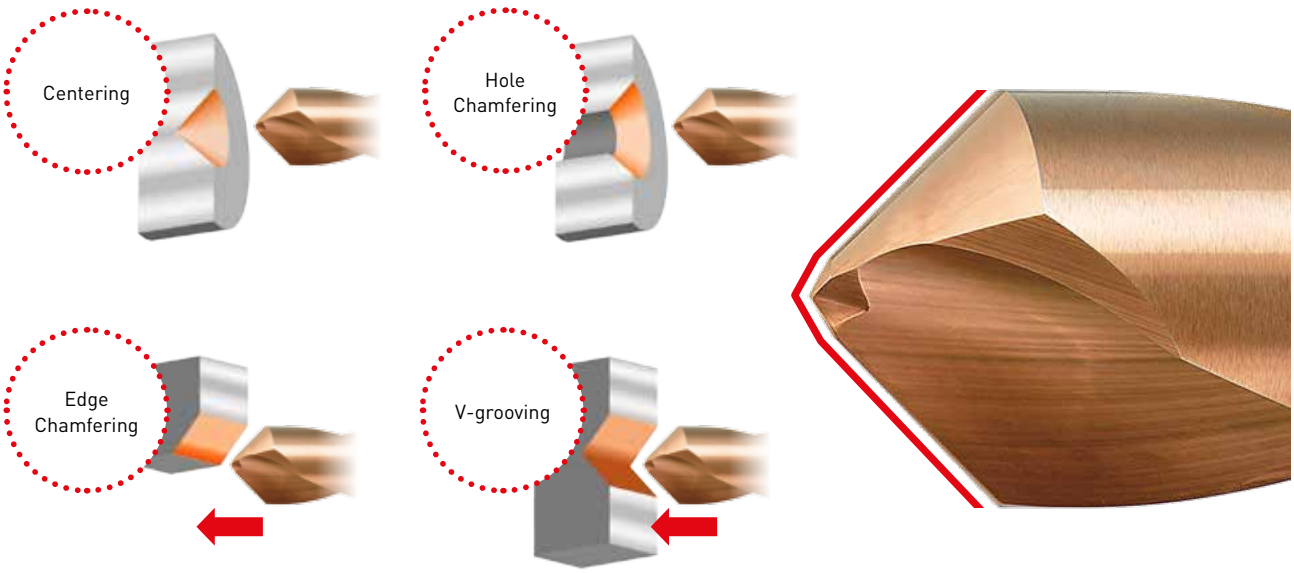
MULTI-FUNCTIONAL SPOT DRILL FOR CENTERING AND CHAMFERING

DIAEDGE

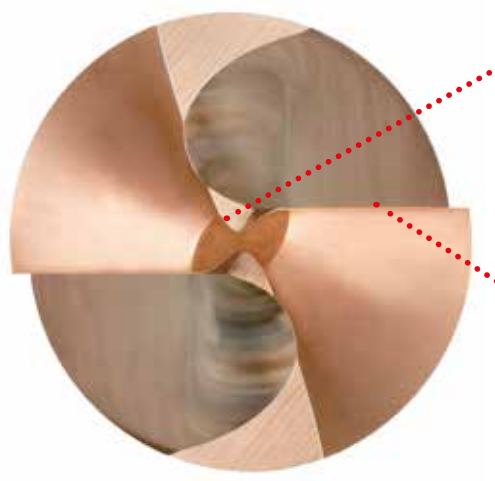
MITSUBISHI MATERIALS

DLE

MULTI-FUNCTIONAL - FOR CENTERING AND CHAMFERING



FEATURES



THINNED POINT GEOMETRY

The thinned point geometry promotes smooth chip discharge and provides excellent positional accuracy. The negative geometry of the drill point also offers high cutting edge strength.

SHARP CUTTING EDGE AND HIGH FRACTURE RESISTANCE

A cutting edge with both sharpness and high fracture resistance provides stable machining and prevents burrs.

DLE

Conventional

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EXCELLENT SHARPNESS AND FRACTURE RESISTANCE

DOUBLE ANGLE POINT

The double point angles ensure strength at the centre to prevent sudden fracturing.

*The central part of the bottom of the hole will not be 90º.

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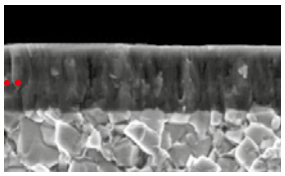
High Strength Centre

Conventional

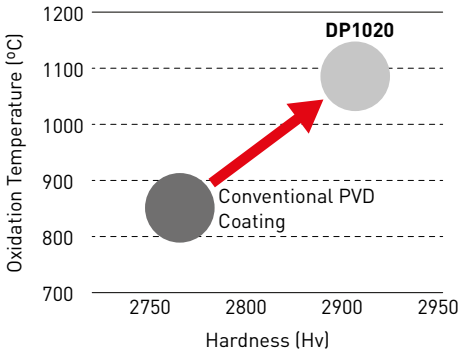
Prone to Fracturing

COATED GRADE DP1020

DP1020 grade offers excellent wear resistance and reduced friction for longer tool life and covers a wide range of applications.



With accumulated AlTiCrN based PVD coating



FOR AUTOMATIC LATHES

Shanks compatible with ER collets.

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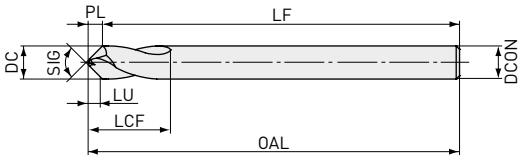
MULTI-FUNCTIONAL DRILL SERIES

P M K



h7	DCON=3	3<DCON<6	6<DCON<10	10<DCON<16
	0	0	0	0
	−0.010	−0.012	−0.015	−0.018

External Coolant

Order Number	DC	SIG	DP1020	LU	LCF	OAL	LF	PL	DCON
DLE0300S030P090	3	90°	●	1.2	9	45	43.7	1.3	3
DLE0400S040P090	4	90°	●	1.6	12	50	48.3	1.7	4
DLE0500S050P090	5	90°	★	2.0	14	60	57.9	2.1	5
DLE0600S060P090	6	90°	●	2.4	15	66	63.4	2.6	6
DLE0700S070P090	7	90°	★	2.8	18	74	71.0	3.0	7
DLE0800S080P090	8	90°	●	3.2	20	74	70.6	3.4	8
DLE1000S100P090	10	90°	●	4.1	24	84	79.7	4.3	10
DLE1200S120P090	12	90°	★	4.9	28	95	89.9	5.1	12
DLE1600S160P090	16	90°	★	6.6	35	113	106.2	6.8	16

1. Due to the double point angle (at approx DC/4), the bottom of the hole will not have a 90° angle. Edge chamfering is also not possible in this area.
2. The centering hole diameter should be less than the drill diameter DC, and the usable length LU should be used as a guideline.

● : Inventory maintained. ★ : Inventory maintained in Japan.

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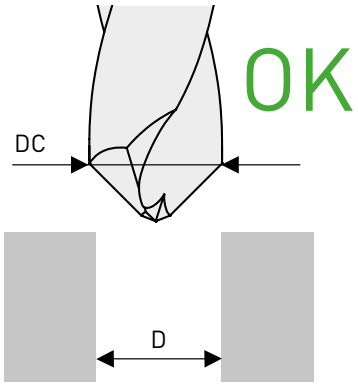
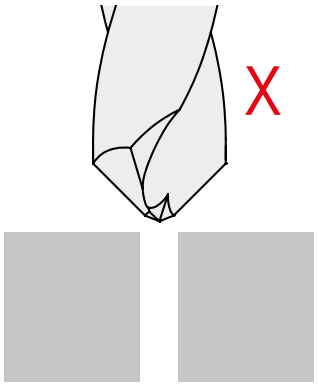
DRILL DIAMETER SELECTION

WHEN CHAMFERING

With respect to the guide hole diameter D, select the drill diameter (DC) within the range of D < DC < 2D.

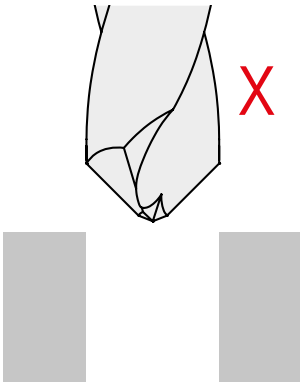


If the guide hole diameter D is 5 mm: Drill diameter DC should be larger than 6 mm but less than 10 mm.



If DC is equal to or greater than double the hole dameter (2D)

If the drill diameter DC is too large compared to the guide hole diameter D, chamfering cannot be performed.

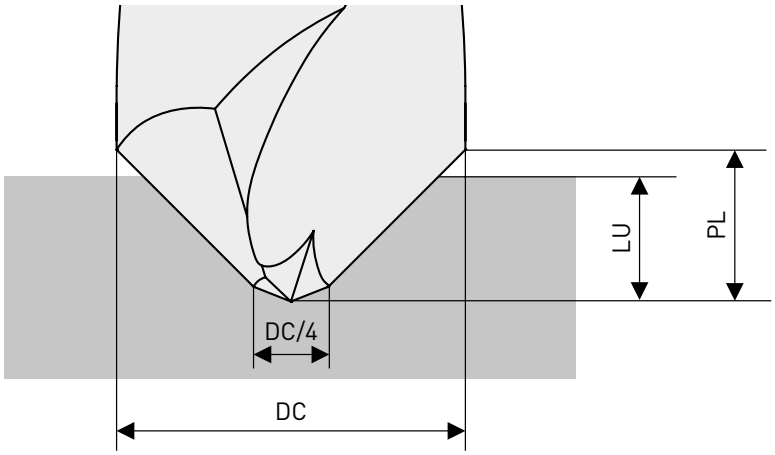


If drill diameter DC equal to or smaller than D

Chamfering cannot be performed if the drill diameter DC is the same as the guide hole diameter D.

WHEN CENTRE DRILLING

Centering should not be performed if the drill diameter DC is the same as the guide hole diameter D.
Refer to the usable length LU (page 4) as a guideline.
Due to the double point angle (at approx DC/4), the bottom of the hole will not have a 90° angle.



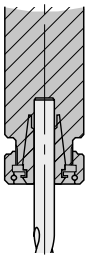
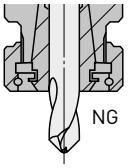
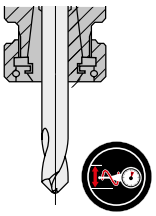
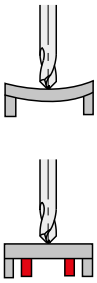
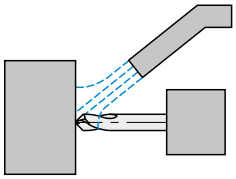
RECOMMENDED CUTTING CONDITIONS

	P		P		P	
Material	**Mild Steels (<180HB) DIN C10E etc.**		**Carbon Steels, Alloy Steels (180–280HB) DIN Ck45, 41CrMo4 etc.**		**Carbon Steels, Alloy Steels (280–350HB) DIN 40CrNiMoA etc.**	
DC	**n (min^{-1})**	**fr (mm/rev)**	**n (min^{-1})**	**fr (mm/rev)**	**n (min^{-1})**	**fr (mm/rev)**
3	7900	0.06 (0.04–0.08)	6800	0.06 (0.04–0.08)	6300	0.05 (0.03–0.07)
4	5900	0.06 (0.04–0.08)	5100	0.06 (0.04–0.08)	4700	0.05 (0.03–0.07)
5	5000	0.07 (0.05–0.09)	4400	0.07 (0.05–0.09)	4100	0.06 (0.04–0.08)
6	4200	0.07 (0.05–0.09)	3700	0.07 (0.05–0.09)	3400	0.06 (0.04–0.08)
7	3600	0.08 (0.05–0.10)	3100	0.08 (0.05–0.10)	2900	0.06 (0.04–0.08)
8	3100	0.08 (0.05–0.10)	2700	0.08 (0.05–0.10)	2500	0.06 (0.04–0.08)
10	2700	0.09 (0.05–0.11)	2300	0.09 (0.05–0.11)	2200	0.07 (0.04–0.09)
12	2200	0.09 (0.05–0.11)	1900	0.09 (0.05–0.11)	1800	0.07 (0.04–0.09)
16	1700	0.12 (0.10–0.14)	1500	0.12 (0.10–0.14)	1400	0.08 (0.06–0.10)

	M		K		K	
Material	**Austenitic Stainless Steels (<200HB) DIN X5CrNi189, X5CrNiMo1810 etc.**		**Gray Cast Irons (<350MPa) DIN GG30 etc.**		**Ductile Cast Irons (<450MPa) DIN GGG40.3 etc.**	
DC	**n (min^{-1})**	**fr (mm/rev)**	**n (min^{-1})**	**fr (mm/rev)**	**n (min^{-1})**	**fr (mm/rev)**
3	1500	0.04 (0.02–0.06)	7900	0.06 (0.04–0.08)	5800	0.06 (0.04–0.08)
4	1100	0.04 (0.02–0.06)	5900	0.06 (0.04–0.08)	4300	0.06 (0.04–0.08)
5	1200	0.06 (0.04–0.08)	5000	0.07 (0.05–0.09)	3800	0.07 (0.05–0.09)
6	1000	0.06 (0.04–0.08)	4200	0.07 (0.05–0.09)	3100	0.07 (0.05–0.09)
7	900	0.06 (0.04–0.08)	3600	0.08 (0.05–0.10)	2700	0.07 (0.05–0.09)
8	790	0.06 (0.04–0.08)	3100	0.08 (0.05–0.10)	2300	0.07 (0.05–0.09)
10	630	0.06 (0.04–0.08)	2700	0.09 (0.05–0.11)	1900	0.08 (0.05–0.10)
12	530	0.06 (0.04–0.08)	2200	0.09 (0.05–0.11)	1500	0.08 (0.05–0.10)
16	390	0.08 (0.06–0.10)	1700	0.12 (0.10–0.14)	1100	0.11 (0.09–0.13)

1. When chamfering, ensure that the tool diameter(DC) is D <DC <2D.
2. When V-grooving and edge chamfering, please reduce the cutting conditions.

OPERATIONAL GUIDANCE FOR DLE DRILLS

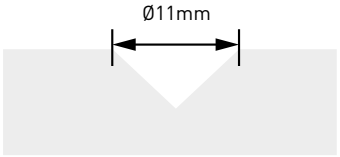
Drill Holding	Drill Length	Installation Tolerance	Thin Workpiece	Coolant Method
				
Collet chucks hold the drill securely.	Do not clamp on the flutes.	Run-out < 0.03mm		Coolant supply at the end and the centre is ideal.

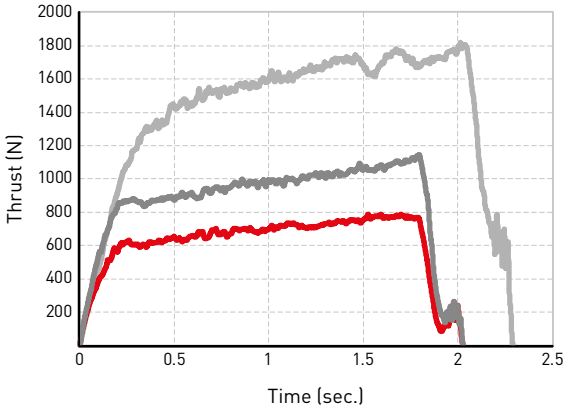
CUTTING PERFORMANCE

COMPARISON DURING CENTRE DRILLING

Lower thrust force required compared to conventional products.

Material	DIN Ck45
Drill	DLE1200S120P090 Ø12
Cutting Speed Vc (m/mm)	60
Feed per Rev. fr (mm/rev)	0.06
Cutting Mode	Wet Cutting External Coolant (Chlorine Free Emulsion)
Machine	Vertical MC



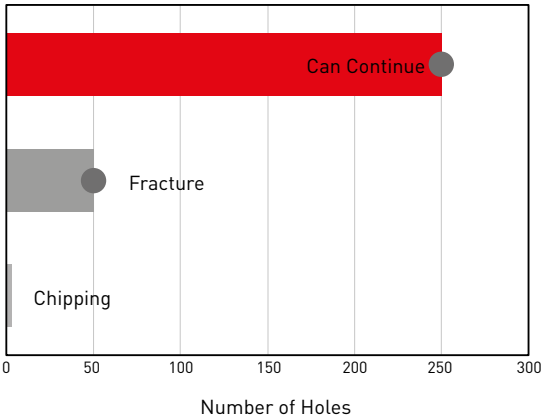


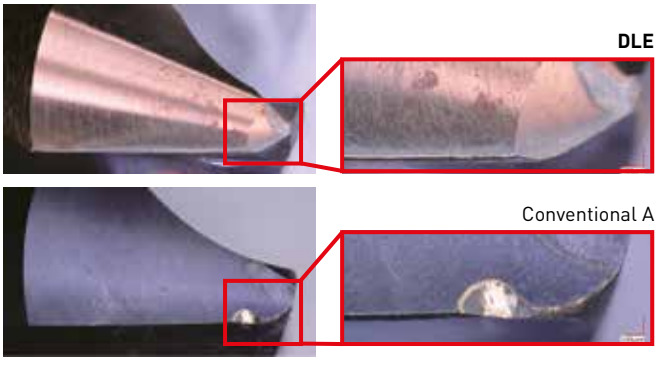
DLE
Conventional A
Conventional B

COMPARISON WHEN CENTRE DRILLING STAINLESS STEEL

The double point angles, together with the negative cutting edge shape and cutting edge treatment of the thinned pocket provide outstanding durability with no abnormal damage.

Material	DIN X5CrNi189
Drill	DLE0600S060P090
Cutting Speed Vc (m/mm)	25
Feed per Rev. fr (mm/rev)	0.06
Hole Depth Aim for hole dia. (mm)	Ø5
Cutting Mode	Wet Cutting External Coolant (Water-insoluble Coolants)
Machine	Small Automatic Lathe





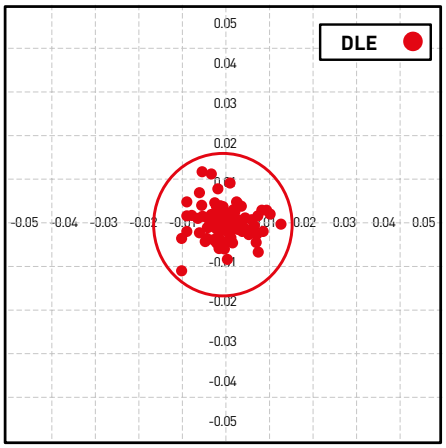
DLE
Conventional A
Conventional B

CUTTING PERFORMANCE

CENTRE HOLE POSITIONING ACCURACY

When drilling stainless steels, tools are likely to experience abnormal damage from built-up edge. Compared to conventional products which often suffer early fracturing, DLE gave a long tool life.

Material	DIN X46Cr13
Drill	DLE0600S060P090
Cutting Speed Vc (m/mm)	15
Feed per Rev. fr (mm/rev)	0.04
Hole Depth Aim for hole dia. (mm)	Ø5.5
Cutting Mode	Wet Cutting External Coolant (Chlorine Free Emulsion)
Machine	Vertical MC



(mm)

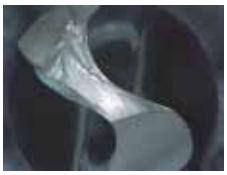
DLE

After 90 Holes

Conventional A

Measurement impossible due to early fracturing

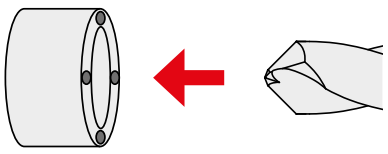
Conventional B



Measurement impossible due to early fracturing

APPLICATION EXAMPLE

Insert	DLE0400S040P090
Workpiece (Machine Parts)	DIN C10E
Cutting Speed Vc (m/min)	30
Feed per Rev. fr (mm/rev)	0.045
Guide Hole Dia (mm)	Ø3
Cutting Mode	Wet Cutting External Coolant (Chlorine Free Emulsion)
Machine	NC Lathe, Tool Rotation
Results	Compared to conventional products, DLE produces a longer tool life and much smaller burrs.

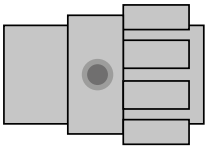


Centering and Chamfering

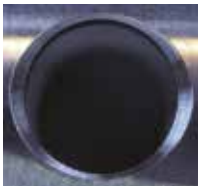
Burrs are suppressed

APPLICATION EXAMPLE

Insert	DLE0600S060P090
Workpiece (Machine Parts)	DIN X5CrNi189
Cutting Speed Vc (m/min)	25
Feed per Rev. fr (mm/rev)	0.05
Guide Hole Dia (mm)	Ø5
Cutting Mode	Wet Cutting External Coolant (Water-insoluble)
Machine	CNC Automatic Lathe
Results	Conventional products often suffered from edge chipping. DLE was more stable and completed 200 holes with no damage to the cutting edge.

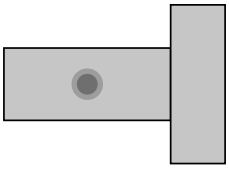


Centering and Chamfering



More than 200 holes
Good surface finish and
no tool damage

Insert	DLE0300S030P090
Workpiece (Engine Parts)	DIN X12CrNiS188
Cutting Speed Vc (m/min)	25
Feed per Rev. fr (mm/rev)	0.04
Guide Hole Dia (mm)	Ø2.0
Cutting Mode	Wet Cutting External Coolant (Water-insoluble) Curved Surface
Machine	CNC Automatic Lathe
Results	Conventional products generated burrs during drilling of the the first hole. DLE machined 60 holes without notable damage or burr generation and gave an outstanding surface finish.



Centering and Chamfering

DLE

After 60 Holes

Conventional

After 1 Hole

The above examples are customer's applications, therefore can differ from the recommended conditions.

MEMO

MEMO

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