MITSUBISHI MATERIALS

DLE

Leading Drill Series

SOLID CARBIDE DRILLS FOR CENTERING AND CHAMFERING



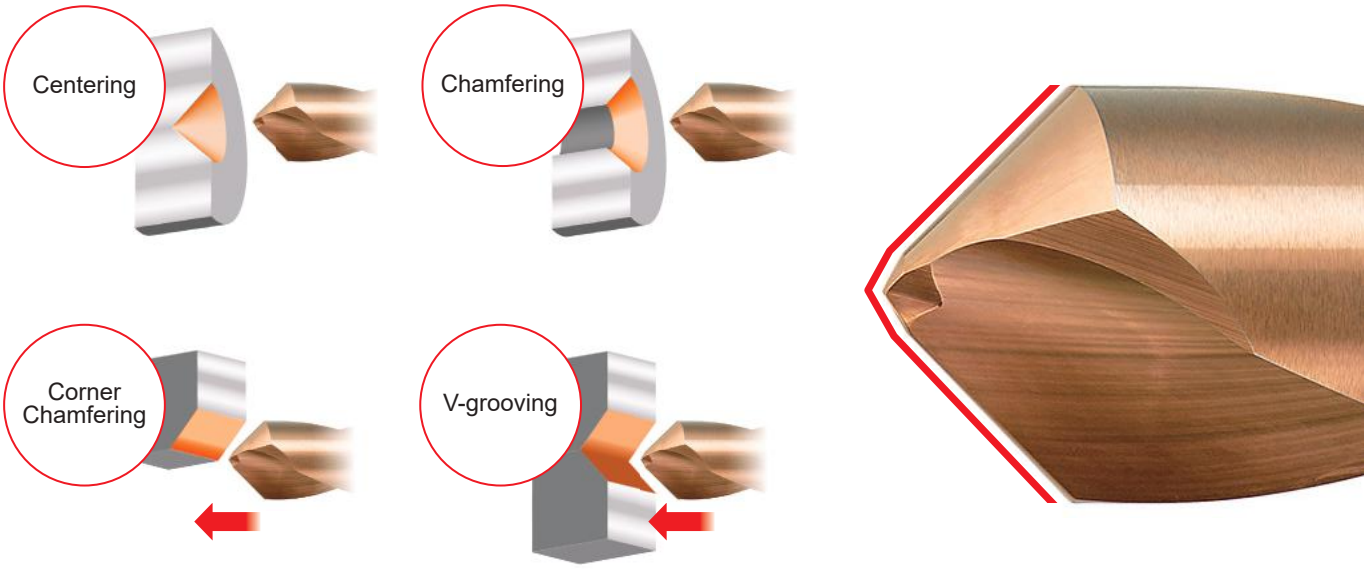


TOOL NEWS **B223A**

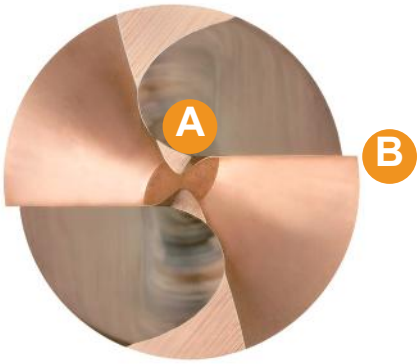
Solid Carbide Drills for Centering and Chamfering

Leading Drill Series DLE

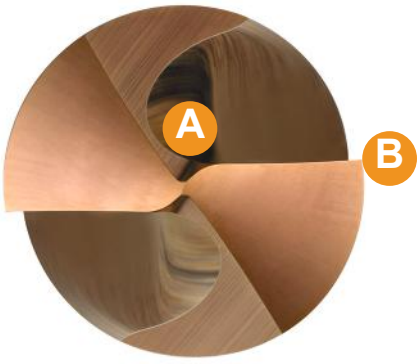
Completes strict standards for centering and chamfering.



Features



Point Angles SIG 60° 90°



Point Angles SIG 120° 145°

A Thinning Geometry

The thinning pocket promotes smooth chip evacuation and provides excellent hole position accuracy. Additionally, the negative cutting edge of the drill point offers high cutting edge strength.

B Sharp Cutting Edge and High Fracture Resistance

Sharp cutting edge and high fracture resistance provides stable cutting and burr prevention.



DLE



Conventional



Two-step Point Angles 60°, 90°

Two-step point angles ensure strength at the center and prevent sudden fracturing.

*The central area will not have a 60°, 90° bottom hole angle.

DLE | Conventional



High Strength of Center



Fractures of Center

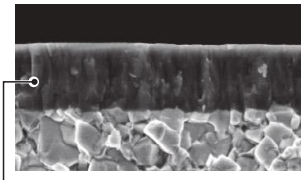
One-step Point Angles 120°, 145°

One-step point angles help high-speed steel or carbide drills to bite from the center in next processes.

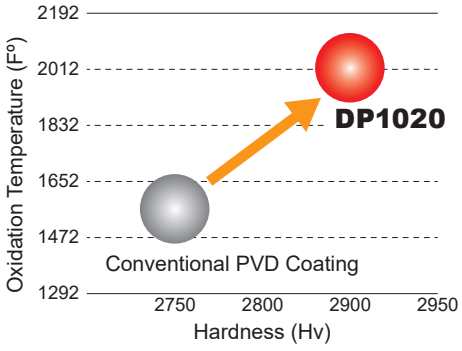


Coated Grade **DP1020**

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



With Accumulated Al-Ti-Cr-N Based PVD Coating



Extensive Support for CNC Automatic Lathes

Diverse lineup of shanks compatible with ER collets.

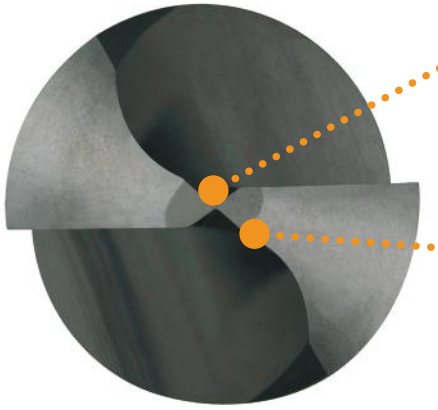
DCON(Connection Diameter)	.197 inch=ER8
DCON	.276 inch=ER11

Solid Carbide Drills for Centering and Chamfering

Leading Drill Series

DLE

SIG 90° Mini Size ø.0394"—ø.0984"



Thinning Geometry

Chip evacuation space in center part improves the bite performance, and ensure for good finished hole position accuracy.

Two-step Point Angles

Two-step point angles ensure strength at the center and prevent sudden fracturing.

*The central area will not have a 90° hole bottom.



Unique Cutting Edge Shape

Large rake angle and sharp cutting edges can minimize the generation of burrs.

AISI 304
Cutting Example



DLE



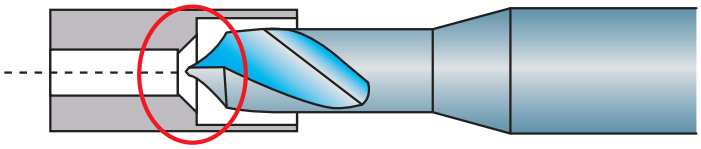
Conventional

New Grade "DP102A" Excellent Lubricity and Heat Resistance

The PVD-coated carbide grade DP102A has excellent lubricity and heat resistance, and exhibit outstanding wear resistance particularly under low-speed to medium-speed cutting speed.

Long-neck Design

Long neck length allows to use the chamfering even deep inside holes.



Memo

Solid Carbide Drills for Centering and Chamfering

DLE

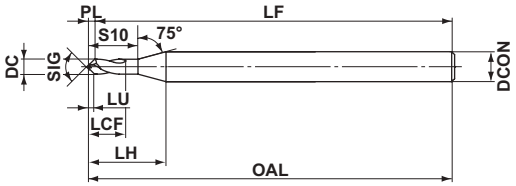
Leading Drill Series

P M K N S H

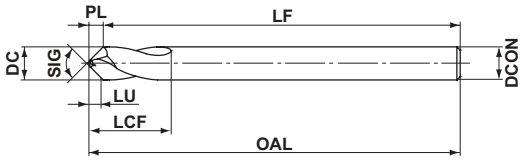
External Coolant



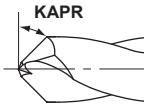




Type1



Type2



(mm)

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

(inch)

DCON=.1181	.1181 < DCON≤.2362	.2362 < DCON≤.3937	.3937 < DCON≤.6299
0 −.0004	0 −.0005	0 −.0006	0 −.0007

	DC (mm)	DC (inch)	SIG	Stock DP1020	Stock DP102A	Order Number	LU (mm)	LU (inch)	LCF (mm)	LCF (inch)	LH (mm)	LH (inch)
	3.0	.1181	60°	●		**DLE0300S030P060**	2.0	.079	9	.354	—	—
	4.0	.1575	60°	●		**DLE0400S040P060**	2.7	.106	12	.472	—	—
	5.0	.1969	60°	●		**DLE0500S050P060**	3.4	.134	14	.551	—	—
	6.0	.2362	60°	●		**DLE0600S060P060**	4.0	.157	15	.591	—	—
	7.0	.2756	60°	●		**DLE0700S070P060**	4.7	.185	18	.709	—	—
	8.0	.3150	60°	●		**DLE0800S080P060**	5.4	.213	20	.787	—	—
	10.0	.3937	60°	●		**DLE1000S100P060**	6.8	.268	24	.945	—	—
	12.0	.4724	60°	●		**DLE1200S120P060**	8.1	.319	28	1.102		—
NEW	1.0	.0394	90°		●	**DLE0100S030P090**	0.35	.014	2	.079	6.7	.264
NEW	1.5	.0591	90°		●	**DLE0150S030P090**	0.55	.022	3	.118	7.3	.287
NEW	2.0	.0787	90°		●	**DLE0200S030P090**	0.80	.031	4	.157	7.9	.311
NEW	2.5	.0984	90°		●	**DLE0250S030P090**	1.00	.039	5	.197	7.9	.311
	3.0	.1181	90°	●		**DLE0300S030P090**	1.2	.047	9	.354	—	—
	4.0	.1575	90°	●		**DLE0400S040P090**	1.6	.063	12	.472	—	—
	5.0	.1969	90°	●		**DLE0500S050P090**	2.0	.079	14	.551	—	—
	6.0	.2362	90°	●		**DLE0600S060P090**	2.4	.094	15	.591	—	—
	7.0	.2756	90°	●		**DLE0700S070P090**	2.8	.110	18	.709	—	—
	8.0	.3150	90°	●		**DLE0800S080P090**	3.2	.126	20	.787	—	—
	10.0	.3937	90°	●		**DLE1000S100P090**	4.1	.161	24	.945	—	—
	12.0	.4724	90°	●		**DLE1200S120P090**	4.9	.193	28	1.102	—	—
	16.0	.6299	90°	●		**DLE1600S160P090**	6.6	.260	35	1.378	—	—

Note 1) In the region of roughly **DC**/4, which is the region of the two-step point angles, the central area will not have a 60°, 90° bottom hole angle. Chamfering will also not be possible in this region.

Note 2) The centering diameter should be less than the drill diameter (processing diameter) **DC** and the usable length **LU** should be referred to as a guideline.

● : **USA Stock**

	S10		OAL		LF		PL		KAPR	DCON		Fig.
	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)		(mm)	(inch)	
	—	—	45	1.772	42.9	1.689	2.1	.083	60°	3	.118	2
	—	—	50	1.969	47.2	1.858	2.8	.110	60°	4	.157	2
	—	—	60	2.362	56.5	2.224	3.5	.138	60°	5	.197	2
	—	—	66	2.598	61.8	2.433	4.2	.165	60°	6	.236	2
	—	—	74	2.913	69.1	2.720	4.9	.193	60°	7	.276	2
	—	—	74	2.913	68.4	2.693	5.6	.220	60°	8	.315	2
	—	—	84	3.307	77	3.031	7.0	.276	60°	10	.394	2
	—	—	95	3.740	86.6	3.409	8.4	.331	60°	12	.472	2
	3.0	.118	45	1.772	44.6	1.756	0.4	.016	45°	3	.118	1
	4.5	.177	45	1.772	44.4	1.748	0.6	.024	45°	3	.118	1
	6.1	.240	45	1.772	44.1	1.736	0.9	.035	45°	3	.118	1
	7.1	.280	45	1.772	43.9	1.728	1.1	.043	45°	3	.118	1
	—	—	45	1.772	43.7	1.720	1.3	.051	45°	3	.118	2
	—	—	50	1.969	48.3	1.902	1.7	.067	45°	4	.157	2
	—	—	60	2.362	57.9	2.280	2.1	.083	45°	5	.197	2
	—	—	66	2.598	63.4	2.496	2.6	.102	45°	6	.236	2
	—	—	74	2.913	71.0	2.795	3.0	.118	45°	7	.276	2
	—	—	74	2.913	70.6	2.780	3.4	.134	45°	8	.315	2
	—	—	84	3.307	79.7	3.138	4.3	.169	45°	10	.394	2
	—	—	95	3.740	89.9	3.539	5.1	.201	45°	12	.472	2
	—	—	113	4.449	106.2	4.181	6.8	.268	45°	16	.630	2

DC = Cutting Diameter
LU = Usable Length
LCF = Length Chip Flute
LH = Neck Length
OAL = Overall Length
LF = Functional Length
PL = Point Length
DCON = Connection Diameter
SIG = Point Angle

Solid Carbide Drills for Centering and Chamfering

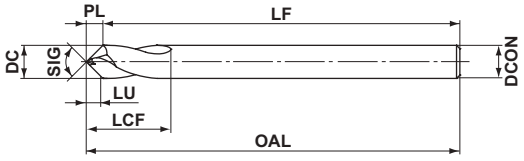
DLE

Leading Drill Series

P M K N S H

External Coolant



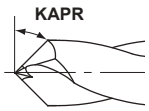


(mm)

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

(inch)

h7	DCON=.1181	.1181 < DCON≤.2362	.2362 < DCON≤.3937	.3937 < DCON≤.6299
	0 −.0004	0 −.0005	0 −.0006	0 −.0007



	DC (mm)	DC (inch)	SIG	DP1020	Order Number	LU (mm)	LU (inch)	LCF (mm)	LCF (inch)	OAL (mm)	OAL (inch)	LF (mm)	LF (inch)	PL (mm)	PL (inch)	KAPR	DCON (mm)	DCON (inch)
	3.0	.1181	120°	●	DLE0300S030P120	0.8	.031	9	.354	45	1.772	44.1	1.736	0.9	.035	30°	3	.118
	4.0	.1575	120°	●	DLE0400S040P120	1.1	.043	12	.472	50	1.969	48.8	1.921	1.2	.047	30°	4	.157
	5.0	.1969	120°	●	DLE0500S050P120	1.3	.051	14	.551	60	2.362	58.6	2.307	1.4	.055	30°	5	.197
	6.0	.2362	120°	●	DLE0600S060P120	1.6	.063	15	.591	66	2.598	64.3	2.531	1.7	.067	30°	6	.236
	7.0	.2756	120°	●	DLE0700S070P120	1.9	.075	18	.709	74	2.913	72.0	2.835	2.0	.079	30°	7	.276
	8.0	.3150	120°	●	DLE0800S080P120	2.2	.087	20	.787	74	2.913	71.7	2.823	2.3	.091	30°	8	.315
	10.0	.3937	120°	●	DLE1000S100P120	2.8	.110	24	.945	84	3.307	81.1	3.193	2.9	.114	30°	10	.394
	12.0	.4724	120°	●	DLE1200S120P120	3.3	.130	28	1.102	95	3.740	91.5	3.602	3.5	.138	30°	12	.472
	3.0	.1181	145°	●	DLE0300S030P145	0.4	.016	9	.354	45	1.772	44.5	1.752	0.5	.020	17.5°	3	.118
	4.0	.1575	145°	●	DLE0400S040P145	0.5	.020	12	.472	50	1.969	49.4	1.945	0.6	.024	17.5°	4	.157
	5.0	.1969	145°	●	DLE0500S050P145	0.7	.028	14	.551	60	2.362	59.2	2.331	0.8	.031	17.5°	5	.197
	6.0	.2362	145°	●	DLE0600S060P145	0.8	.031	15	.591	66	2.598	65.1	2.563	0.9	.035	17.5°	6	.236
	7.0	.2756	145°	●	DLE0700S070P145	1.0	.039	18	.709	74	2.913	72.9	2.870	1.1	.043	17.5°	7	.276
	8.0	.3150	145°	●	DLE0800S080P145	1.1	.043	20	.787	74	2.913	72.7	2.862	1.3	.051	17.5°	8	.315
NEW	10.0	.3937	145°	●	DLE1000S100P145	1.4	.055	24	.945	84	3.307	82.4	3.244	1.6	.063	17.5°	10	.394
NEW	12.0	.4724	145°	●	DLE1200S120P145	1.7	.067	28	1.102	95	3.740	93.1	3.665	1.9	.075	17.5°	12	.472

Note 1) The centering diameter should be less than the drill diameter (processing diameter) **DC** and the usable length **LU** should be referred to as a guideline.

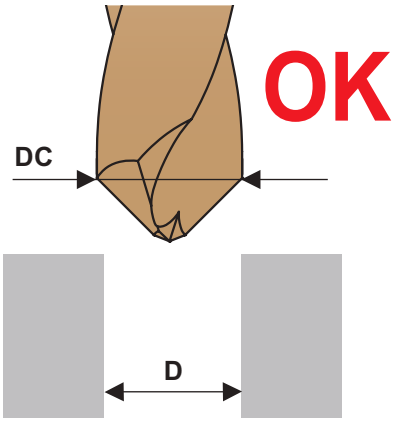
DC = Cutting Diameter
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OAL = Overall Length
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PL = Point Length
DCON = Connection Diameter
SIG = Point Angle

● : **USA Stock**

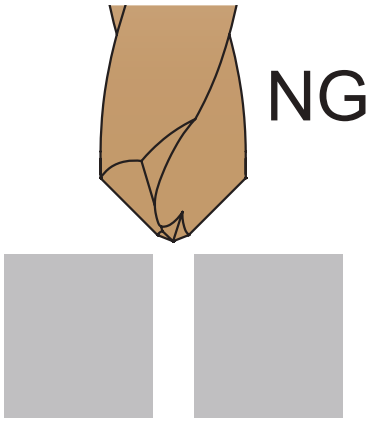
Drill Diameter Selection

When Chamfering

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

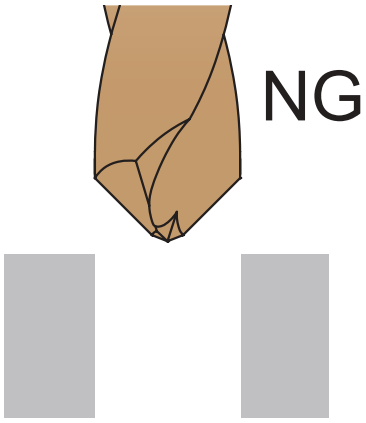


Example) If guide hole diameter **D** is .197": Drill diameter **DC** should be equal to or greater than .236" but less than .394". Select a **DC** of .236", .276", or .315".



If DC is equal to or greater than 2D:

If drill diameter **DC** is too large compared to guide hole diameter **D** (equal to or greater than 2**D**), chamfering cannot be performed.

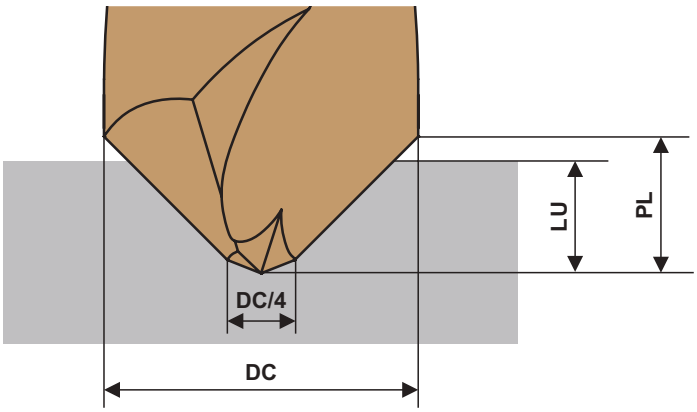


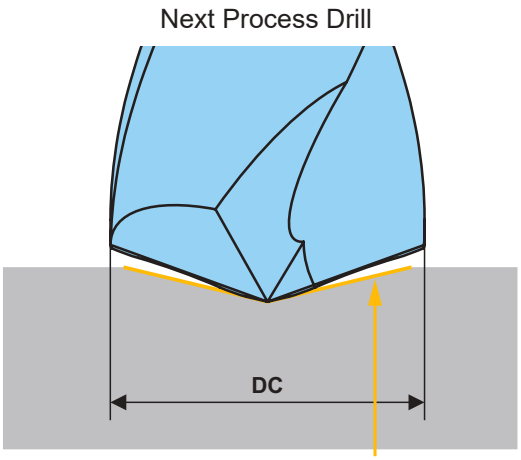
If DC is a drill diameter equal to D:

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

When Centering

The centering diameter should be less than the drill diameter (processing diameter) **DC** and the usable length **LU** should be referred to as a guideline.
The central area of holes (approx 25% of the full diameter) formed by two step point angles will not have their respective 60º and 90º angles. Chamfering is also not possible in the center areas.
Select a centering drill with a larger point angle than the final hole drill if is desired to make initial contact with the center.

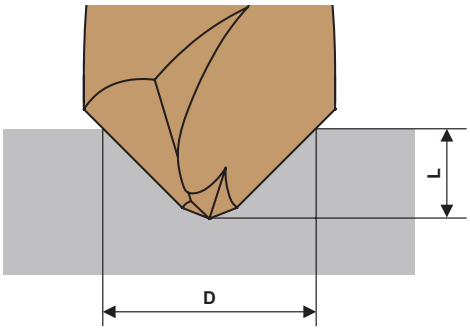




Centering of Point Angle SIG145°

DLE

Drilling Depth (L) Chart by Tool Diameter



(inch)

DC		SIG 90°			
		Min.		Max.	
(mm)	(inch)	D	L	D	L
1.0	**.0394**	.020	.007	.031	.013
1.5	**.0591**	.031	.011	.051	.021
2.0	**.0787**	.039	.014	.075	.031
2.5	**.0984**	.051	.019	.094	.039
3.0	**.1181**	.059	.020	.110	.047
4.0	**.1575**	.079	.028	.150	.063
5.0	**.1969**	.098	.035	.185	.079
6.0	**.2362**	.118	.043	.224	.094
7.0	**.2756**	.138	.047	.260	.110
8.0	**.3150**	.157	.055	.299	.126
10.0	**.3937**	.197	.071	.382	.161
12.0	**.4724**	.236	.083	.457	.193
16.0	**.6299**	.315	.110	.610	.260

DC		SIG 60°				SIG 120°				SIG 145°			
		Min.		Max.		Min.		Max.		Min.		Max.	
(mm)	(inch)	D	L	D	L	D	L	D	L	D	L	D	L
3.0	**.1181**	.059	.031	.114	.079	.059	.016	.110	.031	.059	.008	.098	.016
4.0	**.1575**	.079	.043	.154	.106	.079	.024	.150	.043	.079	.012	.126	.020
5.0	**.1969**	.098	.051	.193	.134	.098	.028	.177	.051	.098	.016	.173	.028
6.0	**.2362**	.118	.063	.228	.157	.118	.035	.217	.063	.118	.020	.201	.031
7.0	**.2756**	.138	.075	.268	.185	.138	.039	.260	.075	.138	.024	.248	.039
8.0	**.3150**	.157	.083	.307	.213	.157	.047	.299	.087	.157	.024	.276	.043
10.0	**.3937**	.197	.106	.386	.268	.197	.055	.382	.110	.197	.031	.350	.055
12.0	**.4724**	.236	.126	.457	.319	.236	.067	.449	.130	.236	.035	.425	.067

Point Angle SIG 60°

Recommended Cutting Conditions

(inch)

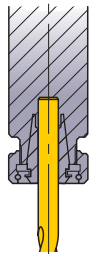
Workpiece Material		Mild Steels (≤180HB) AISI 1010 etc.		Carbon Steels, Alloy Steels (180—280HB) AISI 1045, 4140 etc.		Carbon Steels, Alloy Steels (280—350HB) AISI 4340 etc.	
DC (mm)	DC (inch)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)
3	**.1181**	245	.0020 (.0012—.0028)	210	.0020 (.0012—.0028)	195	.0016 (.0008—.0024)
4	**.1575**	245	.0020 (.0012—.0028)	210	.0020 (.0012—.0028)	195	.0016 (.0008—.0024)
5	**.1969**	260	.0024 (.0016—.0031)	230	.0024 (.0016—.0031)	210	.0020 (.0012—.0028)
6	**.2362**	260	.0024 (.0016—.0031)	230	.0024 (.0016—.0031)	210	.0020 (.0012—.0028)
7	**.2756**	260	.0028 (.0016—.0035)	230	.0028 (.0016—.0035)	210	.0020 (.0012—.0028)
8	**.3150**	260	.0028 (.0016—.0035)	230	.0028 (.0016—.0035)	210	.0020 (.0012—.0028)
10	**.3937**	280	.0031 (.0016—.0039)	245	.0031 (.0016—.0039)	230	.0024 (.0012—.0031)
12	**.4724**	280	.0031 (.0016—.0039)	245	.0031 (.0016—.0039)	230	.0024 (.0012—.0031)

Workpiece Material		Austenitic Stainless Steels (≤200HB) AISI 304, 316 etc.		Gray Cast Irons (≤350MPa) AISI No45B etc.		Ductile Cast Irons (≤450MPa) AISI 60-40-18 etc.	
DC (mm)	DC (inch)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)
3	**.1181**	50	.0012 (.0004—.0020)	245	.0020 (.0012—.0028)	180	.0020 (.0012—.0028)
4	**.1575**	50	.0012 (.0004—.0020)	245	.0020 (.0012—.0028)	180	.0020 (.0012—.0028)
5	**.1969**	65	.0016 (.0008—.0024)	260	.0024 (.0016—.0031)	195	.0024 (.0016—.0031)
6	**.2362**	65	.0016 (.0008—.0024)	260	.0024 (.0016—.0031)	195	.0024 (.0016—.0031)
7	**.2756**	65	.0016 (.0008—.0024)	260	.0028 (.0016—.0035)	195	.0024 (.0016—.0031)
8	**.3150**	65	.0016 (.0008—.0024)	260	.0028 (.0016—.0035)	195	.0024 (.0016—.0031)
10	**.3937**	65	.0016 (.0008—.0024)	280	.0031 (.0016—.0039)	195	.0028 (.0016—.0035)
12	**.4724**	65	.0016 (.0008—.0024)	280	.0031 (.0016—.0039)	195	.0028 (.0016—.0035)

Note 1) When chamfering a circumference of a guide hole, make sure that the tool diameter(**DC**) is **D** <**DC** <2**D**.
Note 2) When centering into curved or inclined surfaces, please reduce the feed rate.
Note 3) When V-grooving and chamfering, please reduce cutting conditions.
Note 4) When chatter vibration or abnormal noise is generated, please shorten the time of dwell program or lower the rotation speed.
Note 5) When centering, please do not exceed the **LU** (usable length).

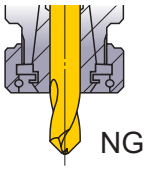
■ Operational Guidance

Drill Holding



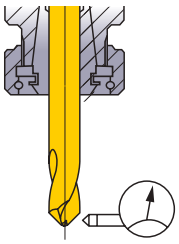
Collet chuck holds the drill securely.

Drill Installation



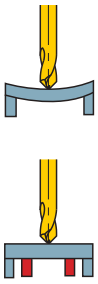
Do not clamp on the flutes.

Installation Tolerance

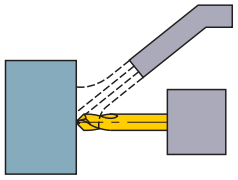


Run-out ≤ .001 inch

Thin Workpiece



Coolant Method



Coolant positions,at the end at the center are ideal.

Solid Carbide Drills for Centering and Chamfering

Point Angle SIG 90°, 120° and 145°

Recommended Cutting Conditions

(inch)

Workpiece Material		Mild Steels (≤180HB) AISI 1010 etc.		Carbon Steels, Alloy Steels (180—280HB) AISI 1045, 4140 etc.		Carbon Steels, Alloy Steels (280—350HB) AISI 4340 etc.	
DC		Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)
(mm)	(inch)						
1.0	**.0394**	100	.0008 (.0004—.0012)	65	.0008 (.0004—.0012)	15	.0008 (.0004—.0012)
1.5	**.0591**	150	.0008 (.0004—.0012)	115	.0008 (.0004—.0012)	30	.0008 (.0004—.0012)
2.0	**.0787**	195	.0016 (.0012—.0020)	165	.0016 (.0012—.0020)	45	.0016 (.0012—.0020)
2.5	**.0984**	245	.0016 (.0012—.0020)	210	.0016 (.0012—.0020)	195	.0016 (.0012—.0020)
3.0	**.1181**	245	.0024 (.0016—.0031)	210	.0024 (.0016—.0031)	195	.0020 (.0012—.0028)
4.0	**.1575**	245	.0024 (.0016—.0031)	210	.0024 (.0016—.0031)	195	.0020 (.0012—.0028)
5.0	**.1969**	260	.0028 (.0020—.0035)	230	.0028 (.0020—.0035)	210	.0024 (.0016—.0031)
6.0	**.2362**	260	.0028 (.0020—.0035)	230	.0028 (.0020—.0035)	210	.0024 (.0016—.0031)
7.0	**.2756**	260	.0031 (.0020—.0039)	230	.0031 (.0020—.0039)	210	.0024 (.0016—.0031)
8.0	**.3150**	260	.0031 (.0020—.0039)	230	.0031 (.0020—.0039)	210	.0024 (.0016—.0031)
10.0	**.3937**	280	.0035 (.0020—.0043)	245	.0035 (.0020—.0043)	230	.0028 (.0016—.0035)
12.0	**.4724**	280	.0035 (.0020—.0043)	245	.0035 (.0020—.0043)	230	.0028 (.0016—.0035)
16.0	**.6299**	295	.0047 (.0039—.0055)	260	.0047 (.0039—.0055)	245	.0031 (.0024—.0039)

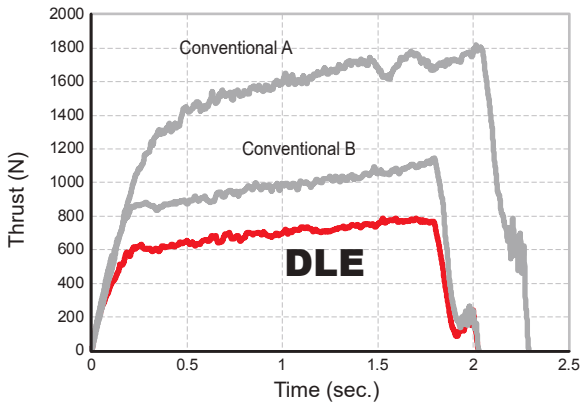
Workpiece Material		Austenitic Stainless Steels (≤200HB) AISI 304, 316 etc.		Gray Cast Irons (≤350MPa) AISI No45B etc.		Ductile Cast Irons (≤450MPa) AISI 60-40-18 etc.	
DC		Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)
(mm)	(inch)						
1.0	**.0394**	65	.0004 (.0002—.0006)	100	.0008 (.0004—.0012)	30	.0008 (.0004—.0012)
1.5	**.0591**	65	.0004 (.0002—.0006)	150	.0008 (.0004—.0012)	80	.0008 (.0004—.0012)
2.0	**.0787**	65	.0016 (.0012—.0020)	195	.0016 (.0012—.0020)	130	.0016 (.0012—.0020)
2.5	**.0984**	65	.0016 (.0012—.0020)	245	.0016 (.0012—.0020)	180	.0016 (.0012—.0020)
3.0	**.1181**	65	.0016 (.0008—.0024)	245	.0024 (.0016—.0031)	180	.0024 (.0016—.0031)
4.0	**.1575**	65	.0016 (.0008—.0024)	245	.0024 (.0016—.0031)	180	.0024 (.0016—.0031)
5.0	**.1969**	65	.0024 (.0016—.0031)	260	.0028 (.0020—.0035)	195	.0028 (.0020—.0035)
6.0	**.2362**	65	.0024 (.0016—.0031)	260	.0028 (.0020—.0035)	195	.0028 (.0020—.0035)
7.0	**.2756**	65	.0024 (.0016—.0031)	260	.0031 (.0020—.0039)	195	.0028 (.0020—.0035)
8.0	**.3150**	65	.0024 (.0016—.0031)	260	.0031 (.0020—.0039)	195	.0028 (.0020—.0035)
10.0	**.3937**	65	.0024 (.0016—.0031)	280	.0035 (.0020—.0043)	195	.0031 (.0020—.0039)
12.0	**.4724**	65	.0024 (.0016—.0031)	280	.0035 (.0020—.0043)	195	.0031 (.0020—.0039)
16.0	**.6299**	65	.0031 (.0024—.0039)	295	.0047 (.0039—.0055)	195	.0043 (.0035—.0051)

Note 1) When chamfering a circumference of a guide hole, make sure that the tool diameter(**DC**) is **D** <**DC** <2**D**.
Note 2) When centering into curved or inclined surfaces, please reduce the feed rate.
Note 3) When V-grooving and chamfering, please reduce cutting conditions.
Note 4) When chatter vibration or abnormal noise is generated, please shorten the time of dwell program or lower the rotation speed.
Note 5) When centering, please do not exceed the **LU** (usable length).

Cutting Performance

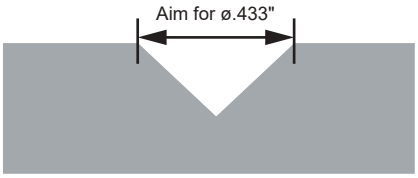
Comparison of Cutting Performance during Centering

Ideal for processing at low power, when compared to conventional products.



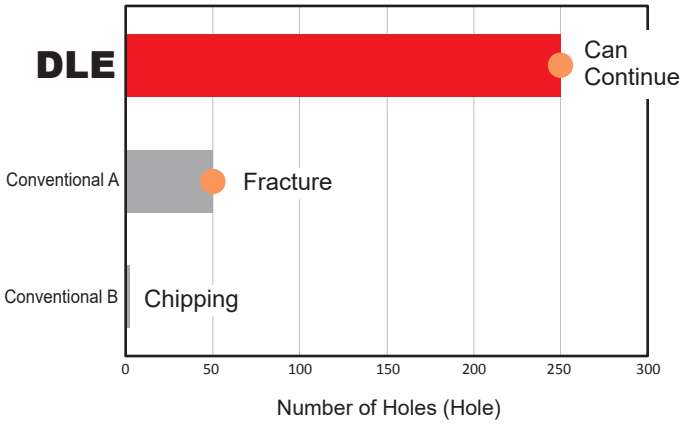
*Differences along the time axis are a result of differences in processing depth.

<Cutting Conditions>
Workpiece
Material : AISI 1045
Drill : DLE1200S120P090 ø.472"
Cutting Speed : vc = 195 SFM
Feed per Rev. : fr = .0024 IPR
Cutting Mode : Wet Cutting External Coolant (Chlorine Free Emulsion)
Machine : Vertical MC

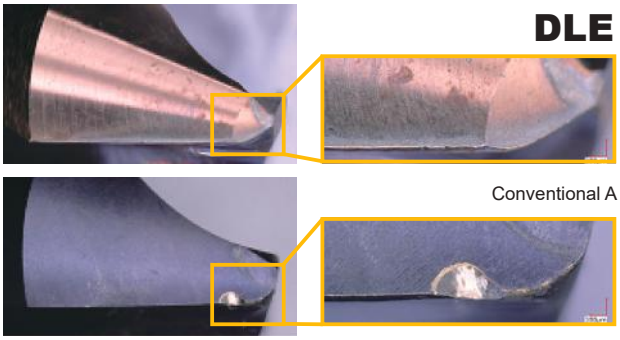


Comparison of Centering Life when Processing AISI 304

The two-step point angles, together with the negative cutting edge shape and cutting edge treatment of the thinning pocket, provide outstandings excellent with no abnormal damage.

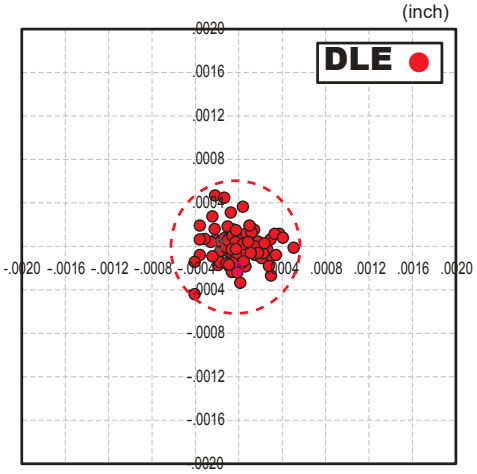


<Cutting Conditions>
Workpiece
Material : AISI 304
Drill : DLE0600S060P090
Cutting Speed : vc = 80 SFM
Feed per Rev. : fr = .0024 IPR
Hole Depth : Aim for hole dia. ø.197"
Cutting Mode : Wet Cutting External Coolant (Water-insoluble Coolants)
Machine : Small Automatic Lathes

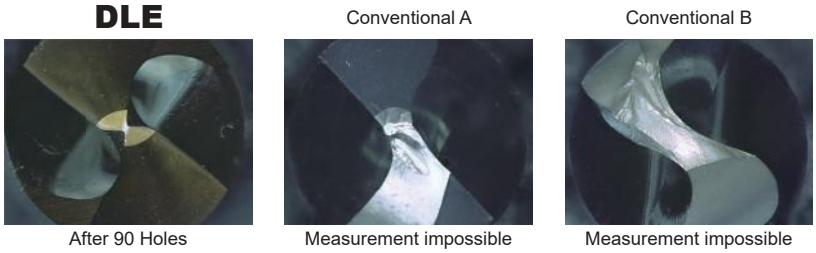


Centering Hole Position Precision for JIS SUS420J2

Stainless steels are likely to experience abnormal damage from build-up edge. Compared to conventional products which often suffered early fractures, the DLE has longer tool life.



<Cutting Conditions>
Workpiece
Material : JIS SUS420J2
Drill : DLE0600S060P090
Cutting Speed: vc = 50 SFM
Feed per Rev. : fr = .0016 IPR
Hole Depth : Aim for hole dia. ø.217"
Cutting Mode : Wet Cutting External Coolant (Chlorine Free Emulsion)
Machine : Vertical MC



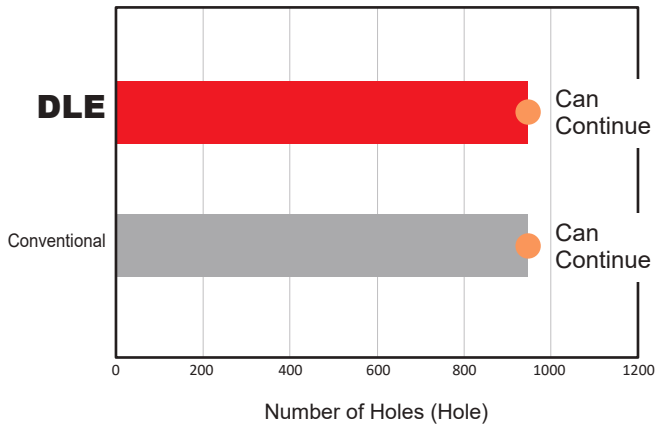
After 90 Holes

Measurement impossible due to early fracture

Measurement impossible due to early fracture

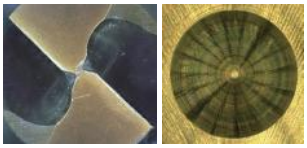
Cutting Performance

Comparison of Centering Life when Processing AISI 304 : Point Angle 120°

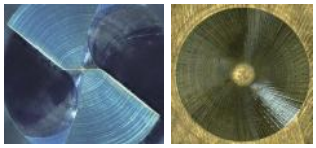


<Cutting Conditions>
Workpiece
Material : AISI 304
Drill : DLE0600S060P120
Cutting Speed : vc=65 SFM
Feed per Rev. : fr=.0024 IPR
Hole Depth : Aim for hole dia. ø.217"
Cutting Mode : Wet Cutting
External Coolant
(Water-insoluble Coolants)
Machine : Vertical MC

DLE

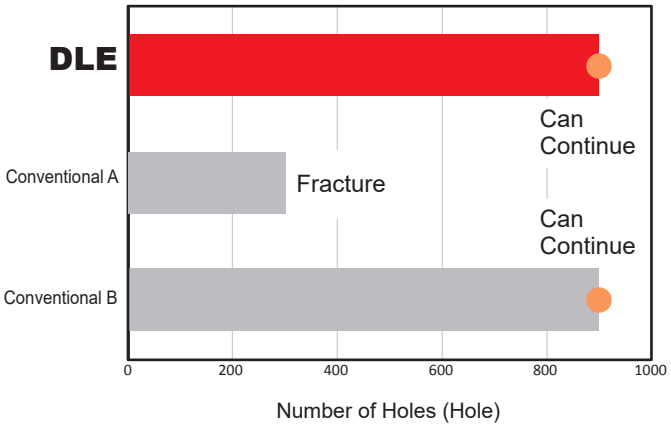


Conventional



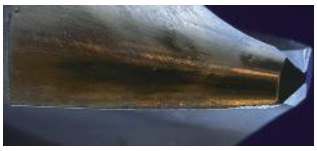
Vibration occurred.
Poor surface quality
(Rough surface).

Comparison of Centering Life when Processing AISI 304 : Point Angle 60°



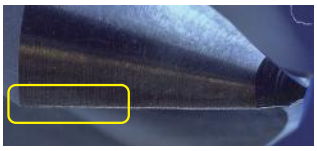
<Cutting Conditions>
Workpiece
Material : AISI 304
Drill : DLE0600S060P060
Cutting Speed : vc=50 SFM
Feed per Rev. : fr=.0008 IPR
Hole Depth : Aim for hole dia. ø.217"
Cutting Mode : Wet Cutting
External Coolant
(Chlorine Free Emulsion)
Machine : Vertical MC

DLE



Initial Wear

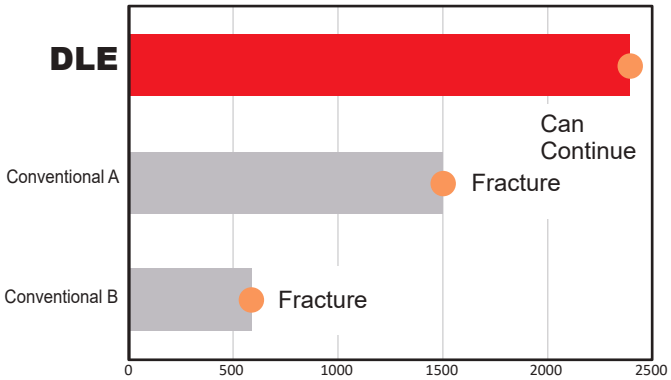
Conventional B



Fine chipping on the outer cutting edge.

Comparison of Centering Life when Processing AISI 304 : Point Angle 90° (small-diameter ø.0787")

When processing stainless steel, DLE drills can realize longer tool life with outstanding heat resistance, and wear resistance for boundary wear.

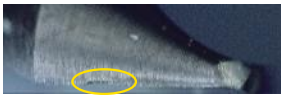


<Cutting Conditions>
Work Material : AISI 304
Drill : DLE0200S030P090
Cutting Speed : vc=100 SFM
Feed per Rev. : fr=.0018 IPR
Cutting Mode : Wet Cutting
External Coolant
(Water-soluble Coolants)
Machine : Vertical MC

DLE
After 2400 holes machining



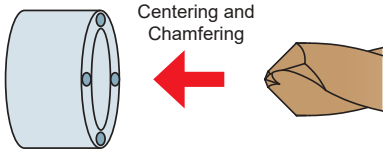
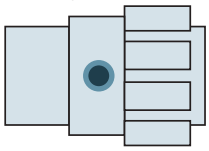
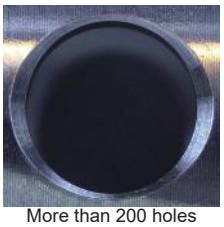
Conventional A
After 1500 holes drilling

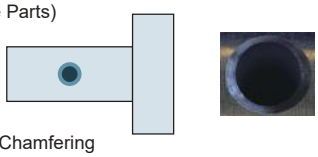
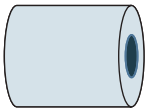
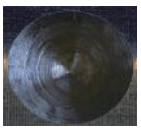


Conventional B
After 600 holes drilling



Application Example

Drill		DLE0400S040P090	DLE0600S060P090
Workpiece		AISI 1010 (Equipment Parts)  	AISI 304 (Machine Parts)  Centering and Chamfering
Cutting Conditions	Cutting Speed **vc**(SFM)	100	80
	Feed per Rev. **fr**(IPR)	.0018	.0020
	Guide Hole Dia. (inch)	ø.118	ø.197
Cutting Mode		Wet Cutting Extarnal Coolant (Chlorine Free Emulsion)	Wet Cutting Extarnal Coolant (Water-insoluble)
Machine		NC Lathe, Tool Rotation	CNC Automatic Lathe
Results		 Burrs are suppressed Compared to conventional product, the DLE has smaller burrs and a longer expected life.	 More than 200 holes Good surface finishes and no tool damage While conventional product often caused chipping to occur, the DLE is more stable and has been used to complete drilling of 200 holes with no damage on the cutting edge.

Drill		DLE0300S030P090	DLE0200S030P090
Workpiece		AISI 303 (Engine Parts)  Centerring and Chamfering	AISI 303 (Engine Parts)  Centering of ø.024" hole
Cutting Conditions	Cutting Speed **vc**(SFM)	80	125
	Feed per Rev. **fr**(IPR)	.0016	.0008
	Guide Hole Dia. (inch)	ø.079	ø.024
Cutting Mode		Wet Cutting Extarnal Coolant (Water-insoluble) Curved Surface	Wet Cutting Extarnal Coolant (Water-insoluble)
Machine		CNC Automatic Lathe	CNC Automatic Lathe
Results		**DLE**  Conventional  After 60 Holes After 1 Hole While the conventional product generated burrs after drilling 1 hole, DLE achieve good surface quality with no sudden fractures even after drilling 60 holes.	Comparison of Rake Faces after centering **DLE** Conventional   60000 holes 30000 holes DLE had a tool life twice as long as the conventional product, and was able to carry out cutting with no fractures.

The above application examples are customer's applications, so it can be different from the recommended conditions.

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Fax: 248.308.2627

FOR YOUR SAFETY

- Don't handle inserts and chips without gloves.
- Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage.
- Please use safety covers and wear safety glasses.
- When using compounded cutting oils, please take fire precautions.
- When attaching inserts or spare parts, please use only the correct wrench or driver.
- When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

www.mmc-carbide.com/us

Tools specifications subject to change without notice.

B223A-US-2021.4