

Solid Carbide Drill for Steel and Cast Iron

**WSTAR** Drill Series

**MQS**

Employs new TRI-cooling technology.

**High performance drill series for long-life,  
high efficiency machining of steel and cast iron.**

■ Drill sizes available in 0.1mm increments from  $\phi 3.0$  to  $\phi 20.0$ .

■ L/D 3, 5 types are available as standard.

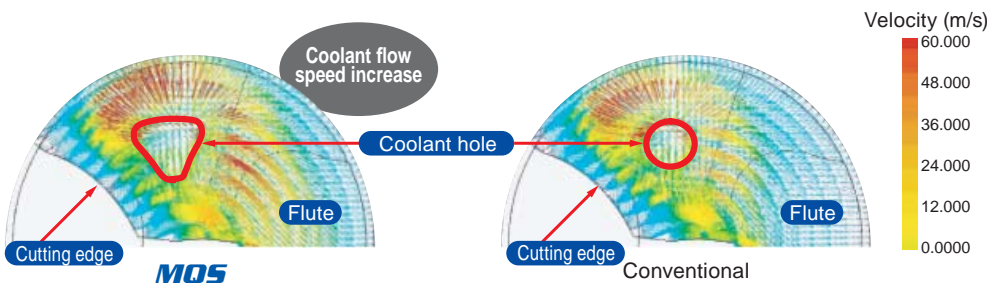


# MQS

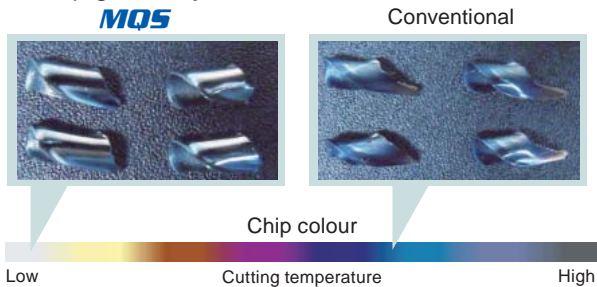
## Unique coolant hole geometry

New TRI Cooling technology increases the flow of coolant, rapidly eliminating the heat generated by cutting.  
(Coolant holes on drills larger than  $\phi 6$  mm)

- Coolant flow speed simulation (Rotation  $4700\text{min}^{-1}$ )  
More than doubles the amount of coolant discharged by conventional drills.  
Outstanding cooling efficiency for longer life.



### ■ Chip geometry



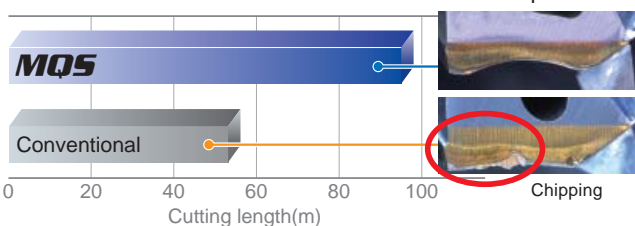
Workpiece : JIS S50C  
Drill :  $\phi 8\text{mm}$   
Hole depth :  $25\text{mm}$  (L/D=3)  
Cutting speed :  $120\text{m/min}$   
Feed :  $0.25\text{mm/rev}$   
Machine : Machining centre  
Coolant : M.Q.L.

## New tool grade DP3020

Special multilayer PVD coating for drills using proprietary crystal control technology enables double the tool life compared with earlier products.

### ■ Tool life

Achieves tool life more than 1.5 times that of earlier products.



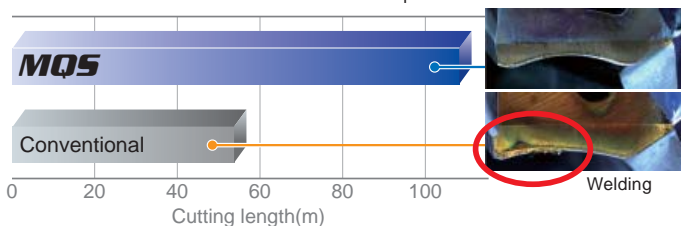
Workpiece : JIS S50C  
Drill :  $\phi 8\text{mm}$   
Hole depth :  $25\text{mm}$  (L/D=3)  
Cutting speed :  $120\text{m/min}$   
Feed :  $0.25\text{mm/rev}$   
Machine : Machining centre  
Coolant : W.S.O

### ■ Feature

	Hardness (HV)	Oxidation Temperature (°C)	Wear Coefficient*
DP3020	3300	1100	0.44
Conventional	2800	840	0.58

\*Coefficient of friction : Measured by ball-on-disk method.  
(Counter gear : AISI D2 60HRC)

Achieves tool life more than 2 times that of earlier products in M.Q.L coolant condition.



Workpiece : JIS S50C  
Drill :  $\phi 8\text{mm}$   
Hole depth :  $25\text{mm}$  (L/D=3)  
Cutting speed :  $120\text{m/min}$   
Feed :  $0.25\text{mm/rev}$   
Machine : Machining centre  
Coolant : M.Q.L.

# Empolys new TRI-cooling technology. High performance drill series for long-life, high efficiency machining of steel and cast iron.

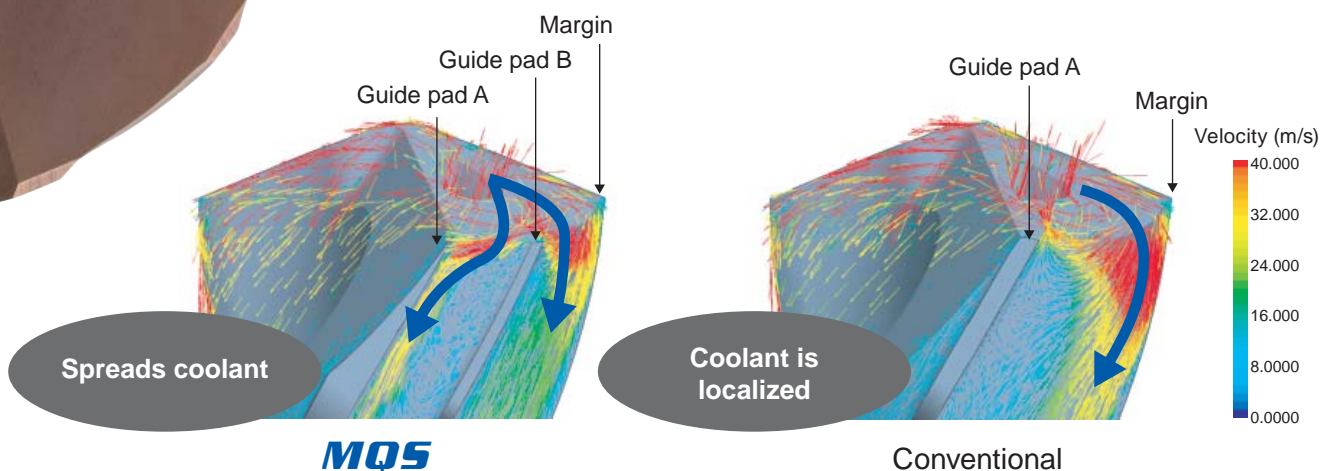
## Wavy cutting edge for steel and cast iron

The wavy cutting edge, specially designed for steel and cast iron, delivers outstanding chip control and cutting edge strength.

## Triple margin for steel and cast iron

The unique triple margin provides optimal control of the flow of coolant to the edges of the drill, reducing margin damage.

■ Coolant flow speed simulation (Rotation 4700min<sup>-1</sup>)



	Guide pad A	Guide pad B	Margin	Oversize
<b>MQS</b>				<p>Small wear</p>
<b>Conventional</b>				<p>Large wear</p>

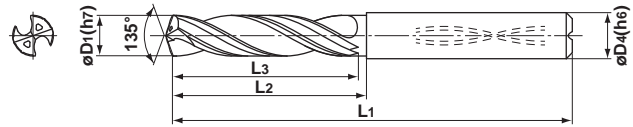
Workpiece : JIS S50C  
 Drill :  $\phi 8\text{mm}$   
 Hole depth : 25mm (L/D=3)  
 Cutting speed : 120m/min  
 Feed : 0.25mm/rev  
 Machine : Machining centre  
 Coolant : W.S.O

# Solid Carbide Drill for Steel and Cast Iron

## MQS

### WSTAR DRILLS SERIES

Carbon Steel Alloy Steel	Hardened Steel	Stainless Steel	Cast iron	Light Alloy	Heat Resistant Alloy		D1=3	3<D1≤6	6<D1≤10	10<D1≤18	18<D1≤20
◎			◎			D1 Tolerance (mm)	0 -0.012	0 -0.012	0 -0.015	0 -0.018	0 -0.021
						D4 Tolerance (mm)	0 -0.006	0 -0.008	0 -0.009	0 -0.011	0 -0.013



(Note) MQS drills are suitable for use with shrink fit holders.

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock DP3020	Order Number	Dimensions (mm)			
					Flute Length	Neck Length	Overall Length	Shank Dia.
					L3	L2	L1	D4
3.0	3	Int.	●	MQS0300X3DB	21	23	70	3
	5	Int.	●	0300X5DB	28	31	78	3
3.1	3	Int.	●	0310X3DB	21	23	70	4
	5	Int.	●	0310X5DB	28	31	78	4
3.2	3	Int.	●	0320X3DB	21	23	70	4
	5	Int.	●	0320X5DB	28	31	78	4
3.3	3	Int.	●	0330X3DB	21	23	70	4
	5	Int.	●	0330X5DB	28	31	78	4
3.4	3	Int.	●	0340X3DB	21	23	70	4
	5	Int.	●	0340X5DB	28	31	78	4
3.5	3	Int.	●	0350X3DB	21	23	70	4
	5	Int.	●	0350X5DB	28	31	78	4
3.6	3	Int.	●	0360X3DB	22	23	70	4
	5	Int.	●	0360X5DB	30	31	78	4
3.7	3	Int.	●	0370X3DB	22	23	70	4
	5	Int.	●	0370X5DB	30	31	78	4
3.8	3	Int.	●	0380X3DB	22	23	70	4
	5	Int.	●	0380X5DB	30	31	78	4
3.9	3	Int.	●	0390X3DB	22	23	70	4
	5	Int.	●	0390X5DB	30	31	78	4
4.0	3	Int.	●	0400X3DB	22	23	70	4
	5	Int.	●	0400X5DB	30	31	78	4
4.1	3	Int.	●	0410X3DB	24	26	73	5
	5	Int.	●	0410X5DB	33	35	82	5
4.2	3	Int.	●	0420X3DB	24	26	73	5
	5	Int.	●	0420X5DB	33	35	82	5
4.3	3	Int.	●	0430X3DB	24	26	73	5
	5	Int.	●	0430X5DB	33	35	82	5
4.4	3	Int.	●	0440X3DB	24	26	73	5
	5	Int.	●	0440X5DB	33	35	82	5
4.5	3	Int.	●	0450X3DB	24	26	73	5
	5	Int.	●	0450X5DB	33	35	82	5
4.6	3	Int.	●	0460X3DB	25	28	75	5
	5	Int.	●	0460X5DB	35	38	85	5
4.7	3	Int.	●	0470X3DB	25	28	75	5
	5	Int.	●	0470X5DB	35	38	85	5
4.8	3	Int.	●	0480X3DB	25	28	75	5
	5	Int.	●	0480X5DB	35	38	85	5

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock DP3020	Order Number	Dimensions (mm)			
					Flute Length	Neck Length	Overall Length	Shank Dia.
					L3	L2	L1	D4
4.9	3	Int.	●	MQS0490X3DB	25	28	75	5
	5	Int.	●	0490X5DB	35	38	85	5
5.0	3	Int.	●	0500X3DB	25	28	75	5
	5	Int.	●	0500X5DB	35	38	85	5
5.1	3	Int.	●	0510X3DB	28	30	81	6
	5	Int.	●	0510X5DB	39	42	89	6
5.2	3	Int.	●	0520X3DB	28	30	81	6
	5	Int.	●	0520X5DB	39	42	89	6
5.3	3	Int.	●	0530X3DB	28	30	81	6
	5	Int.	●	0530X5DB	39	42	89	6
5.4	3	Int.	●	0540X3DB	28	30	81	6
	5	Int.	●	0540X5DB	39	42	89	6
5.5	3	Int.	●	0550X3DB	28	30	81	6
	5	Int.	●	0550X5DB	39	42	89	6
5.6	3	Int.	●	0560X3DB	30	30	81	6
	5	Int.	●	0560X5DB	42	42	89	6
5.7	3	Int.	●	0570X3DB	30	30	81	6
	5	Int.	●	0570X5DB	42	42	89	6
5.8	3	Int.	●	0580X3DB	30	30	81	6
	5	Int.	●	0580X5DB	42	42	89	6
5.9	3	Int.	●	0590X3DB	30	30	81	6
	5	Int.	●	0590X5DB	42	42	89	6
6.0	3	Int.	●	0600X3DB	30	30	81	6
	5	Int.	●	0600X5DB	42	42	89	6
6.1	3	Int.	●	0610X3DB	33	35	86	7
	5	Int.	●	0610X5DB	46	48	95	7
6.2	3	Int.	●	0620X3DB	33	35	86	7
	5	Int.	●	0620X5DB	46	48	95	7
6.3	3	Int.	●	0630X3DB	33	35	86	7
	5	Int.	●	0630X5DB	46	48	95	7
6.4	3	Int.	●	0640X3DB	33	35	86	7
	5	Int.	●	0640X5DB	46	48	95	7
6.5	3	Int.	●	0650X3DB	33	35	86	7
	5	Int.	●	0650X5DB	46	48	95	7
6.6	3	Int.	●	0660X3DB	35	37	90	7
	5	Int.	●	0660X5DB	49	51	98	7
6.7	3	Int.	●	0670X3DB	35	37	90	7
	5	Int.	●	0670X5DB	49	51	98	7

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different depth diameter and length).

● : Inventory maintained.

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock DP3020	Order NumA	Dimensions (mm)			
					Flute Length	Neck Length	Overall Length	Shank Dia.
					L3	L2	L1	D4
6.8	3	Int.	●	<b>MQS0680X3DB</b>	35	37	90	7
	5	Int.	●	<b>0680X5DB</b>	49	51	98	7
6.9	3	Int.	●	<b>0690X3DB</b>	35	37	90	7
	5	Int.	●	<b>0690X5DB</b>	49	51	98	7
7.0	3	Int.	●	<b>0700X3DB</b>	35	37	90	7
	5	Int.	●	<b>0700X5DB</b>	49	51	98	7
7.1	3	Int.	●	<b>0710X3DB</b>	38	39	90	8
	5	Int.	●	<b>0710X5DB</b>	53	56	103	8
7.2	3	Int.	●	<b>0720X3DB</b>	38	39	90	8
	5	Int.	●	<b>0720X5DB</b>	53	56	103	8
7.3	3	Int.	●	<b>0730X3DB</b>	38	39	90	8
	5	Int.	●	<b>0730X5DB</b>	53	56	103	8
7.4	3	Int.	●	<b>0740X3DB</b>	38	39	90	8
	5	Int.	●	<b>0740X5DB</b>	53	56	103	8
7.5	3	Int.	●	<b>0750X3DB</b>	38	39	90	8
	5	Int.	●	<b>0750X5DB</b>	53	56	103	8
7.6	3	Int.	●	<b>0760X3DB</b>	40	40	90	8
	5	Int.	●	<b>0760X5DB</b>	56	56	103	8
7.7	3	Int.	●	<b>0770X3DB</b>	40	40	90	8
	5	Int.	●	<b>0770X5DB</b>	56	56	103	8
7.8	3	Int.	●	<b>0780X3DB</b>	40	40	90	8
	5	Int.	●	<b>0780X5DB</b>	56	56	103	8
7.9	3	Int.	●	<b>0790X3DB</b>	40	40	90	8
	5	Int.	●	<b>0790X5DB</b>	56	56	103	8
8.0	3	Int.	●	<b>0800X3DB</b>	40	40	90	8
	5	Int.	●	<b>0800X5DB</b>	56	56	103	8
8.1	3	Int.	●	<b>0810X3DB</b>	43	45	96	9
	5	Int.	●	<b>0810X5DB</b>	60	62	113	9
8.2	3	Int.	●	<b>0820X3DB</b>	43	45	96	9
	5	Int.	●	<b>0820X5DB</b>	60	62	113	9
8.3	3	Int.	●	<b>0830X3DB</b>	43	45	96	9
	5	Int.	●	<b>0830X5DB</b>	60	62	113	9
8.4	3	Int.	●	<b>0840X3DB</b>	43	45	96	9
	5	Int.	●	<b>0840X5DB</b>	60	62	113	9
8.5	3	Int.	●	<b>0850X3DB</b>	43	45	96	9
	5	Int.	●	<b>0850X5DB</b>	60	62	113	9
8.6	3	Int.	●	<b>0860X3DB</b>	45	47	101	9
	5	Int.	●	<b>0860X5DB</b>	63	65	116	9
8.7	3	Int.	●	<b>0870X3DB</b>	45	47	101	9
	5	Int.	●	<b>0870X5DB</b>	63	65	116	9
8.8	3	Int.	●	<b>0880X3DB</b>	45	47	101	9
	5	Int.	●	<b>0880X5DB</b>	63	65	116	9
8.9	3	Int.	●	<b>0890X3DB</b>	45	47	101	9
	5	Int.	●	<b>0890X5DB</b>	63	65	116	9
9.0	3	Int.	●	<b>0900X3DB</b>	45	47	101	9
	5	Int.	●	<b>0900X5DB</b>	63	65	116	9
9.1	3	Int.	●	<b>0910X3DB</b>	48	50	101	10
	5	Int.	●	<b>0910X5DB</b>	67	70	121	10
9.2	3	Int.	●	<b>0920X3DB</b>	48	50	101	10
	5	Int.	●	<b>0920X5DB</b>	67	70	121	10

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock DP3020	Order NumA	Dimensions (mm)			
					Flute Length	Neck Length	Overall Length	Shank Dia.
					L3	L2	L1	D4
9.3	3	Int.	●	<b>MQS0930X3DB</b>	48	50	101	10
	5	Int.	●	<b>0930X5DB</b>	67	70	121	10
9.4	3	Int.	●	<b>0940X3DB</b>	48	50	101	10
	5	Int.	●	<b>0940X5DB</b>	67	70	121	10
9.5	3	Int.	●	<b>0950X3DB</b>	48	50	101	10
	5	Int.	●	<b>0950X5DB</b>	67	70	121	10
9.6	3	Int.	●	<b>0960X3DB</b>	50	50	101	10
	5	Int.	●	<b>0960X5DB</b>	70	70	121	10
9.7	3	Int.	●	<b>0970X3DB</b>	50	50	101	10
	5	Int.	●	<b>0970X5DB</b>	70	70	121	10
9.8	3	Int.	●	<b>0980X3DB</b>	50	50	101	10
	5	Int.	●	<b>0980X5DB</b>	70	70	121	10
9.9	3	Int.	●	<b>0990X3DB</b>	50	50	101	10
	5	Int.	●	<b>0990X5DB</b>	70	70	121	10
10.0	3	Int.	●	<b>1000X3DB</b>	50	50	101	10
	5	Int.	●	<b>1000X5DB</b>	70	70	121	10
10.1	3	Int.	●	<b>1010X3DB</b>	53	55	111	11
	5	Int.	●	<b>1010X5DB</b>	74	78	134	11
10.2	3	Int.	●	<b>1020X3DB</b>	53	55	111	11
	5	Int.	●	<b>1020X5DB</b>	74	78	134	11
10.3	3	Int.	●	<b>1030X3DB</b>	53	55	111	11
	5	Int.	●	<b>1030X5DB</b>	74	78	134	11
10.4	3	Int.	●	<b>1040X3DB</b>	53	55	111	11
	5	Int.	●	<b>1040X5DB</b>	74	78	134	11
10.5	3	Int.	●	<b>1050X3DB</b>	53	55	111	11
	5	Int.	●	<b>1050X5DB</b>	74	78	134	11
10.6	3	Int.	●	<b>1060X3DB</b>	55	56	116	11
	5	Int.	●	<b>1060X5DB</b>	77	78	134	11
10.7	3	Int.	●	<b>1070X3DB</b>	55	56	116	11
	5	Int.	●	<b>1070X5DB</b>	77	78	134	11
10.8	3	Int.	●	<b>1080X3DB</b>	55	56	116	11
	5	Int.	●	<b>1080X5DB</b>	77	78	134	11
10.9	3	Int.	●	<b>1090X3DB</b>	55	56	116	11
	5	Int.	●	<b>1090X5DB</b>	77	78	134	11
11.0	3	Int.	●	<b>1100X3DB</b>	55	56	116	11
	5	Int.	●	<b>1100X5DB</b>	77	78	134	11
11.1	3	Int.	●	<b>1110X3DB</b>	58	60	116	12
	5	Int.	●	<b>1110X5DB</b>	81	84	140	12
11.2	3	Int.	●	<b>1120X3DB</b>	58	60	116	12
	5	Int.	●	<b>1120X5DB</b>	81	84	140	12
11.3	3	Int.	●	<b>1130X3DB</b>	58	60	116	12
	5	Int.	●	<b>1130X5DB</b>	81	84	140	12
11.4	3	Int.	●	<b>1140X3DB</b>	58	60	116	12
	5	Int.	●	<b>1140X5DB</b>	81	84	140	12
11.5	3	Int.	●	<b>1150X3DB</b>	58	60	116	12
	5	Int.	●	<b>1150X5DB</b>	81	84	140	12
11.6	3	Int.	●	<b>1160X3DB</b>	60	60	116	12
	5	Int.	●	<b>1160X5DB</b>	84	84	140	12
11.7	3	Int.	●	<b>1170X3DB</b>	60	60	116	12
	5	Int.	●	<b>1170X5DB</b>	84	84	140	12



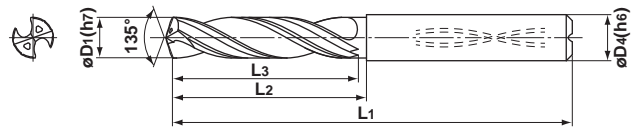
# Solid Carbide Drill for Steel and Cast Iron

## **MQS**

### WSTAR DRILLS SERIES

Carbon Steel Alloy Steel	Hardened Steel	Stainless Steel	Cast iron	Light Alloy	Heat Resistant Alloy
◎			◎		

	D1=3	3<D1≤6	6<D1≤10	10<D1≤18	18<D1≤20
D1 Tolerance (mm)	0 -0.012	0 -0.012	0 -0.015	0 -0.018	0 -0.021
D4 Tolerance (mm)	0 -0.006	0 -0.008	0 -0.009	0 -0.011	0 -0.013



(Note) MQS drills are suitable for use with shrink fit holders.

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock DP3020	Order Number	Dimensions (mm)			
					Flute Length	Neck Length	Overall Length	Shank Dia.
					L3	L2	L1	D4
11.8	3	Int.	●	MQS1180X3DB	60	60	116	12
	5	Int.	●	1180X5DB	84	84	140	12
11.9	3	Int.	●	1190X3DB	60	60	116	12
	5	Int.	●	1190X5DB	84	84	140	12
12.0	3	Int.	●	1200X3DB	60	60	116	12
	5	Int.	●	1200X5DB	84	84	140	12
12.1	3	Int.	●	1210X3DB	63	66	122	13
	5	Int.	●	1210X5DB	88	92	148	13
12.2	3	Int.	●	1220X3DB	63	66	122	13
	5	Int.	●	1220X5DB	88	92	148	13
12.3	3	Int.	●	1230X3DB	63	66	122	13
	5	Int.	●	1230X5DB	88	92	148	13
12.4	3	Int.	●	1240X3DB	63	66	122	13
	5	Int.	●	1240X5DB	88	92	148	13
12.5	3	Int.	●	1250X3DB	63	66	122	13
	5	Int.	●	1250X5DB	88	92	148	13
12.6	3	Int.	●	1260X3DB	65	66	122	13
	5	Int.	●	1260X5DB	91	92	148	13
12.7	3	Int.	●	1270X3DB	65	66	122	13
	5	Int.	●	1270X5DB	91	92	148	13
12.8	3	Int.	●	1280X3DB	65	66	122	13
	5	Int.	●	1280X5DB	91	92	148	13
12.9	3	Int.	●	1290X3DB	65	66	122	13
	5	Int.	●	1290X5DB	91	92	148	13
13.0	3	Int.	●	1300X3DB	65	66	122	13
	5	Int.	●	1300X5DB	91	92	148	13
13.1	3	Int.	●	1310X3DB	68	70	126	14
	5	Int.	●	1310X5DB	95	98	154	14
13.2	3	Int.	●	1320X3DB	68	70	126	14
	5	Int.	●	1320X5DB	95	98	154	14
13.3	3	Int.	●	1330X3DB	68	70	126	14
	5	Int.	●	1330X5DB	95	98	154	14
13.4	3	Int.	●	1340X3DB	68	70	126	14
	5	Int.	●	1340X5DB	95	98	154	14
13.5	3	Int.	●	1350X3DB	68	70	126	14
	5	Int.	●	1350X5DB	95	98	154	14
13.6	3	Int.	●	1360X3DB	70	70	126	14
	5	Int.	●	1360X5DB	98	98	154	14

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock DP3020	Order Number	Dimensions (mm)			
					Flute Length	Neck Length	Overall Length	Shank Dia.
					L3	L2	L1	D4
13.7	3	Int.	●	MQS1370X3DB	70	70	126	14
	5	Int.	●	1370X5DB	98	98	154	14
13.8	3	Int.	●	1380X3DB	70	70	126	14
	5	Int.	●	1380X5DB	98	98	154	14
13.9	3	Int.	●	1390X3DB	70	70	126	14
	5	Int.	●	1390X5DB	98	98	154	14
14.0	3	Int.	●	1400X3DB	70	70	126	14
	5	Int.	●	1400X5DB	98	98	154	14
14.1	3	Int.	●	1410X3DB	73	76	135	15
	5	Int.	●	1410X5DB	102	106	165	15
14.2	3	Int.	●	1420X3DB	73	76	135	15
	5	Int.	●	1420X5DB	102	106	165	15
14.3	3	Int.	●	1430X3DB	73	76	135	15
	5	Int.	●	1430X5DB	102	106	165	15
14.4	3	Int.	●	1440X3DB	73	76	135	15
	5	Int.	●	1440X5DB	102	106	165	15
14.5	3	Int.	●	1450X3DB	73	76	135	15
	5	Int.	●	1450X5DB	102	106	165	15
14.6	3	Int.	●	1460X3DB	75	76	135	15
	5	Int.	●	1460X5DB	105	106	165	15
14.7	3	Int.	●	1470X3DB	75	76	135	15
	5	Int.	●	1470X5DB	105	106	165	15
14.8	3	Int.	●	1480X3DB	75	76	135	15
	5	Int.	●	1480X5DB	105	106	165	15
14.9	3	Int.	●	1490X3DB	75	76	135	15
	5	Int.	●	1490X5DB	105	106	165	15
15.0	3	Int.	●	1500X3DB	75	76	135	15
	5	Int.	●	1500X5DB	105	106	165	15
15.1	3	Int.	●	1510X3DB	78	80	139	16
	5	Int.	●	1510X5DB	109	112	171	16
15.2	3	Int.	●	1520X3DB	78	80	139	16
	5	Int.	●	1520X5DB	109	112	171	16
15.3	3	Int.	●	1530X3DB	78	80	139	16
	5	Int.	●	1530X5DB	109	112	171	16
15.4	3	Int.	●	1540X3DB	78	80	139	16
	5	Int.	●	1540X5DB	109	112	171	16
15.5	3	Int.	●	1550X3DB	78	80	139	16
	5	Int.	●	1550X5DB	109	112	171	16

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained. □ : Non stock, produced to order only.

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock DP3020	Order Number	Dimensions (mm)			
					Flute Length	Neck Length	Overall Length	Shank Dia.
					L3	L2	L1	D4
15.6	3	Int.	●	<b>MQS1560X3DB</b>	80	80	139	16
	5	Int.	●	<b>1560X5DB</b>	112	112	171	16
15.7	3	Int.	●	<b>1570X3DB</b>	80	80	139	16
	5	Int.	●	<b>1570X5DB</b>	112	112	171	16
15.8	3	Int.	●	<b>1580X3DB</b>	80	80	139	16
	5	Int.	●	<b>1580X5DB</b>	112	112	171	16
15.9	3	Int.	●	<b>1590X3DB</b>	80	80	139	16
	5	Int.	●	<b>1590X5DB</b>	112	112	171	16
16.0	3	Int.	●	<b>1600X3DB</b>	80	80	139	16
	5	Int.	●	<b>1600X5DB</b>	112	112	171	16
16.1	3	Int.	□	<b>1610X3DB</b>	83	86	145	17
	5	Int.	□	<b>1610X5DB</b>	116	120	179	17
16.2	3	Int.	□	<b>1620X3DB</b>	83	86	145	17
	5	Int.	□	<b>1620X5DB</b>	116	120	179	17
16.3	3	Int.	□	<b>1630X3DB</b>	83	86	145	17
	5	Int.	□	<b>1630X5DB</b>	116	120	179	17
16.4	3	Int.	□	<b>1640X3DB</b>	83	86	145	17
	5	Int.	□	<b>1640X5DB</b>	116	120	179	17
16.5	3	Int.	●	<b>1650X3DB</b>	83	86	145	17
	5	Int.	●	<b>1650X5DB</b>	116	120	179	17
16.6	3	Int.	□	<b>1660X3DB</b>	85	86	145	17
	5	Int.	□	<b>1660X5DB</b>	119	120	179	17
16.7	3	Int.	□	<b>1670X3DB</b>	85	86	145	17
	5	Int.	□	<b>1670X5DB</b>	119	120	179	17
16.8	3	Int.	□	<b>1680X3DB</b>	85	86	145	17
	5	Int.	□	<b>1680X5DB</b>	119	120	179	17
16.9	3	Int.	□	<b>1690X3DB</b>	85	86	145	17
	5	Int.	□	<b>1690X5DB</b>	119	120	179	17
17.0	3	Int.	●	<b>1700X3DB</b>	85	86	145	17
	5	Int.	●	<b>1700X5DB</b>	119	120	179	17
17.1	3	Int.	□	<b>1710X3DB</b>	88	90	149	18
	5	Int.	□	<b>1710X5DB</b>	123	126	185	18
17.2	3	Int.	□	<b>1720X3DB</b>	88	90	149	18
	5	Int.	□	<b>1720X5DB</b>	123	126	185	18
17.3	3	Int.	□	<b>1730X3DB</b>	88	90	149	18
	5	Int.	□	<b>1730X5DB</b>	123	126	185	18
17.4	3	Int.	□	<b>1740X3DB</b>	88	90	149	18
	5	Int.	□	<b>1740X5DB</b>	123	126	185	18
17.5	3	Int.	●	<b>1750X3DB</b>	88	90	149	18
	5	Int.	●	<b>1750X5DB</b>	123	126	185	18
17.6	3	Int.	□	<b>1760X3DB</b>	90	90	149	18
	5	Int.	□	<b>1760X5DB</b>	126	126	185	18
17.7	3	Int.	□	<b>1770X3DB</b>	90	90	149	18
	5	Int.	□	<b>1770X5DB</b>	126	126	185	18
17.8	3	Int.	□	<b>1780X3DB</b>	90	90	149	18
	5	Int.	□	<b>1780X5DB</b>	126	126	185	18

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant (Int./Ext.)	Stock DP3020	Order Number	Dimensions (mm)			
					Flute Length	Neck Length	Overall Length	Shank Dia.
					L3	L2	L1	D4
17.9	3	Int.	□	<b>MQS1790X3DB</b>	90	90	149	18
	5	Int.	□	<b>1790X5DB</b>	126	126	185	18
18.0	3	Int.	●	<b>1800X3DB</b>	90	90	149	18
	5	Int.	●	<b>1800X5DB</b>	126	126	185	18
18.1	3	Int.	□	<b>1810X3DB</b>	93	96	157	19
	5	Int.	□	<b>1810X5DB</b>	130	134	195	19
18.2	3	Int.	□	<b>1820X3DB</b>	93	96	157	19
	5	Int.	□	<b>1820X5DB</b>	130	134	195	19
18.3	3	Int.	□	<b>1830X3DB</b>	93	96	157	19
	5	Int.	□	<b>1830X5DB</b>	130	134	195	19
18.4	3	Int.	□	<b>1840X3DB</b>	93	96	157	19
	5	Int.	□	<b>1840X5DB</b>	130	134	195	19
18.5	3	Int.	●	<b>1850X3DB</b>	93	96	157	19
	5	Int.	●	<b>1850X5DB</b>	130	134	195	19
18.6	3	Int.	□	<b>1860X3DB</b>	95	96	157	19
	5	Int.	□	<b>1860X5DB</b>	133	134	195	19
18.7	3	Int.	□	<b>1870X3DB</b>	95	96	157	19
	5	Int.	□	<b>1870X5DB</b>	133	134	195	19
18.8	3	Int.	□	<b>1880X3DB</b>	95	96	157	19
	5	Int.	□	<b>1880X5DB</b>	133	134	195	19
18.9	3	Int.	□	<b>1890X3DB</b>	95	96	157	19
	5	Int.	□	<b>1890X5DB</b>	133	134	195	19
19.0	3	Int.	●	<b>1900X3DB</b>	95	96	157	19
	5	Int.	●	<b>1900X5DB</b>	133	134	195	19
19.1	3	Int.	□	<b>1910X3DB</b>	98	100	161	20
	5	Int.	□	<b>1910X5DB</b>	137	140	201	20
19.2	3	Int.	□	<b>1920X3DB</b>	98	100	161	20
	5	Int.	□	<b>1920X5DB</b>	137	140	201	20
19.3	3	Int.	□	<b>1930X3DB</b>	98	100	161	20
	5	Int.	□	<b>1930X5DB</b>	137	140	201	20
19.4	3	Int.	□	<b>1940X3DB</b>	98	100	161	20
	5	Int.	□	<b>1940X5DB</b>	137	140	201	20
19.5	3	Int.	●	<b>1950X3DB</b>	98	100	161	20
	5	Int.	●	<b>1950X5DB</b>	137	140	201	20
19.6	3	Int.	□	<b>1960X3DB</b>	100	100	161	20
	5	Int.	□	<b>1960X5DB</b>	140	140	201	20
19.7	3	Int.	□	<b>1970X3DB</b>	100	100	161	20
	5	Int.	□	<b>1970X5DB</b>	140	140	201	20
19.8	3	Int.	□	<b>1980X3DB</b>	100	100	161	20
	5	Int.	□	<b>1980X5DB</b>	140	140	201	20
19.9	3	Int.	□	<b>1990X3DB</b>	100	100	161	20
	5	Int.	□	<b>1990X5DB</b>	140	140	201	20
20.0	3	Int.	●	<b>2000X3DB</b>	100	100	161	20
	5	Int.	●	<b>2000X5DB</b>	140	140	201	20

## RECOMMENDED CUTTING CONDITIONS

### Internal Coolant

Work Material	Drill Dia. Conditions Hardness	φ3.0—φ6.0		φ6.1—φ10.0		φ10.1—φ14.0		φ14.1—φ20.0		
		Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	
P Mild Steel	≤200HB	130 (60—140)	0.20 (0.15—0.25)	140 (60—160)	0.25 (0.20—0.40)	160 (60—180)	0.30 (0.20—0.40)	180 (60—220)	0.35 (0.20—0.40)	
	>200HB	100 (50—140)	0.20 (0.15—0.30)	130 (50—160)	0.25 (0.20—0.40)	140 (50—180)	0.30 (0.20—0.40)	150 (50—180)	0.35 (0.20—0.40)	
	Alloy Steel	—30HRC	100 (50—120)	0.20 (0.15—0.30)	120 (50—140)	0.25 (0.20—0.40)	130 (50—160)	0.30 (0.20—0.40)	140 (50—160)	0.35 (0.20—0.40)
30—40HRC		70 (50—100)	0.18 (0.10—0.20)	80 (50—100)	0.20 (0.10—0.30)	100 (50—120)	0.22 (0.10—0.30)	100 (50—120)	0.25 (0.20—0.35)	
K Cast Iron	—280HB	110 (50—130)	0.28 (0.15—0.35)	120 (50—160)	0.32 (0.20—0.40)	150 (60—180)	0.38 (0.25—0.45)	160 (60—180)	0.38 (0.25—0.45)	
	Ductile Cast Iron	130—180HB	90 (40—120)	0.25 (0.15—0.32)	100 (40—120)	0.30 (0.20—0.38)	110 (50—140)	0.35 (0.25—0.40)	120 (50—140)	0.35 (0.25—0.40)
		180—350HB	75 (40—120)	0.22 (0.15—0.32)	85 (40—120)	0.28 (0.20—0.38)	95 (50—140)	0.30 (0.25—0.40)	110 (50—140)	0.30 (0.25—0.40)

### M.Q.L. (Coolant through)

Work Material	Drill Dia. Conditions Hardness	φ3.0—φ6.0		φ6.1—φ10.0		φ10.1—φ14.0		φ14.1—φ20.0		
		Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	
P Mild Steel	≤200HB	100 (60—110)	0.20 (0.15—0.25)	110 (60—130)	0.25 (0.20—0.40)	130 (60—140)	0.30 (0.20—0.40)	140 (60—180)	0.35 (0.20—0.40)	
	>200HB	80 (50—110)	0.20 (0.15—0.30)	100 (50—130)	0.25 (0.20—0.40)	110 (50—140)	0.30 (0.20—0.40)	120 (50—140)	0.35 (0.20—0.40)	
	Alloy Steel	—30HRC	80 (50—100)	0.20 (0.15—0.30)	100 (50—110)	0.25 (0.20—0.40)	100 (50—130)	0.30 (0.20—0.40)	110 (50—130)	0.35 (0.20—0.40)
30—40HRC		60 (50—80)	0.18 (0.10—0.20)	60 (50—80)	0.20 (0.10—0.30)	80 (50—100)	0.22 (0.10—0.30)	80 (50—100)	0.25 (0.20—0.35)	
K Cast Iron	—280HB	90 (50—100)	0.28 (0.15—0.35)	100 (50—130)	0.32 (0.20—0.40)	120 (60—140)	0.38 (0.25—0.45)	130 (60—140)	0.38 (0.25—0.45)	
	Ductile Cast Iron	130—180HB	70 (40—100)	0.25 (0.15—0.32)	80 (40—100)	0.30 (0.20—0.38)	90 (50—110)	0.35 (0.25—0.40)	100 (50—110)	0.35 (0.25—0.40)
		180—350HB	60 (40—100)	0.22 (0.15—0.32)	70 (40—100)	0.28 (0.20—0.38)	80 (50—110)	0.30 (0.25—0.40)	90 (50—110)	0.30 (0.25—0.40)

(Note 1) Spindle through & high pressure coolant system is recommended to make stable holes.

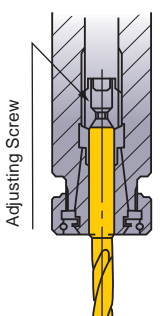
(Note 2) Emulsion type of water coolant is recommended.

(Note 3) In non water cutting fluid, reduce the rotation.



**Operation Guidance for...X3DB and...X5DB**

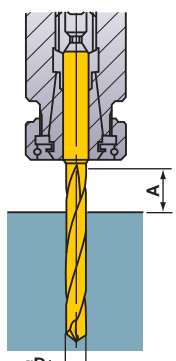
**Drill Holding**



Adjusting Screw

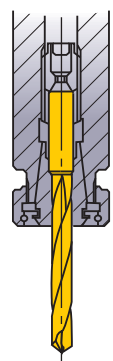
Thrust bearing type collet chuck holds the drill securely.

**Drill Length**



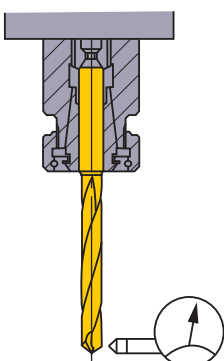
$A \geq D1 \times 1.5$

**Drill Installation**



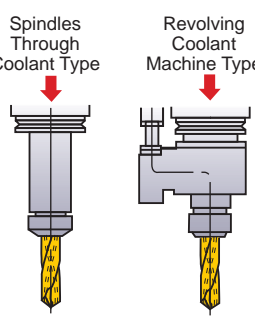
Do not clamp on the flutes.

**Installation Tolerance**



Run-out  $\leq 0.03\text{mm}$

**Through Coolant Type (MQS)**



Spindles Through Coolant Type

Revolving Coolant Machine Type

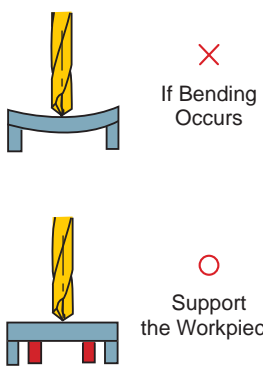
Coolant pressure is approx. 0.5MPa-7MPa

**Coolant Handling**

<MQS Type>

- 1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.
- 2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

**Thin Workpiece**



If Bending Occurs

Support the Workpiece

**Interrupted Cutting**

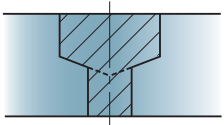
One Process  $\odot$

- ① Lower the feed when drilling the interrupted part.

Requires Prior Machining  $\triangle$

- ① Spot face with an end mill prior to drilling.

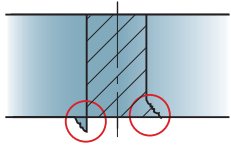
**Stepped Holes**



- ① Divide the two processes.
- ② Drill the larger hole first.

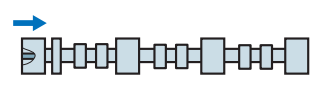
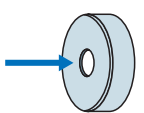
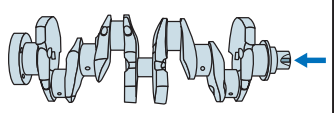
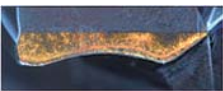

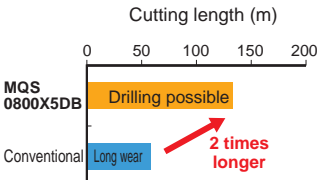
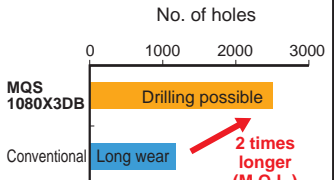
\*A tool for machining both chamfer and spot face can be produced to order.

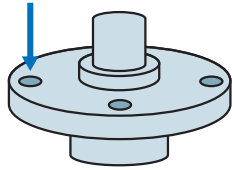
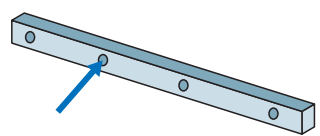
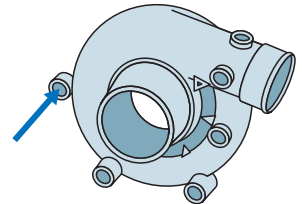
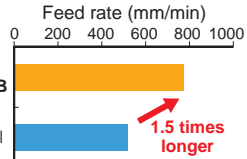
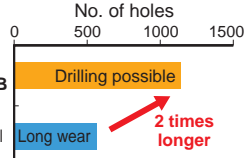
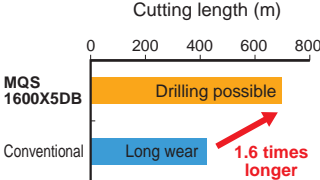
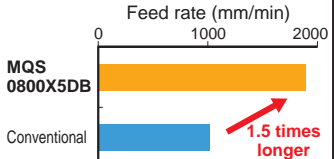
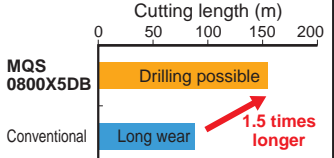
**Burring and Workpiece Chipping**



- ① Lower the feed rate by 50% at the end of through cutting.
- ② Add a 45° chamfer.
- ③ Change the point angle.

#### APPLICATION EXAMPLE

Drill		MQS0510X3DB	MQS0800X5DB	MQS1080X3DB	
Workpiece		JIS SCM420 Hole depth : 15.4mm	JIS S35C Hole depth : 6mm	JIS S48C Hole depth : 50mm	
					
Component		Shaft		Plate	
Cutting Conditions	Drill	MQS0510X3DB	Conventional	MQS0800X5DB	
	Conventional			Conventional	
	Revolution (mm <sup>-1</sup> )	4993		3501	
	Cutting Speed (m/min)	80		88	
	Feed (mm/rev)	0.15		0.3	
Feed Rate (mm/min)	749		1050		
Coolant		W.S.O		M.Q.L.	
Machine		Machining centre		Machining centre	
Result		<p>●3000 Holes</p> <p>MQS 0510X3DB Drilling possible</p>  <p>Conventional Chipping</p> 	<p>Cutting length (m)</p>  <p>MQS 0800X5DB Drilling possible</p> <p>Conventional Long wear</p> <p>2 times longer</p>	<p>No. of holes</p>  <p>MQS 1080X3DB Drilling possible</p> <p>Conventional Long wear</p> <p>2 times longer (M.Q.L.)</p>	

Drill		MQS1400X5DB	MQS1600X5DB	MQS0800X5DB	
Workpiece		JIS S45C Hole depth : 40mm	JIS S45C Hole depth : 55mm	JIS FC200 Hole depth : 27mm	
					
Component		Flange		Guide rail	
Cutting Conditions	Drill	MQS1400X5DB	Conventional	MQS0800X5DB	
	Conventional			Conventional	
	Revolution (mm <sup>-1</sup> )	2614		2387	
	Cutting Speed (m/min)	115		105	
	Feed (mm/rev)	0.3		0.22	
Feed Rate (mm/min)	784		525		
Coolant		W.S.O		W.S.O	
Machine		Machining centre		Machining centre	
Result		<p>Feed rate (mm/min)</p>  <p>MQS 1400X5DB Drilling possible</p> <p>Conventional Long wear</p> <p>1.5 times longer</p> <p>No. of holes</p>  <p>MQS 1400X5DB Drilling possible</p> <p>Conventional Long wear</p> <p>2 times longer</p>	<p>Cutting length (m)</p>  <p>MQS 1600X5DB Drilling possible</p> <p>Conventional Long wear</p> <p>1.6 times longer</p>	<p>Feed rate (mm/min)</p>  <p>MQS 0800X5DB Drilling possible</p> <p>Conventional Long wear</p> <p>1.5 times longer</p> <p>Cutting length (m)</p>  <p>MQS 0800X5DB Drilling possible</p> <p>Conventional Long wear</p> <p>1.5 times longer</p>	



## Memo

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A series of horizontal dashed lines for writing, spanning the width of the page.



Solid Carbide Drill for Steel and Cast Iron  
**WSTAR** Drill Series

**MQS**

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 spanner. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

**MITSUBISHI MATERIALS CORPORATION**

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(Tools specifications subject to change without notice.)

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