MITSUBISHI
MITSUBISHI MATERIALS

TOOLS NEWS

2006.10.Update B026G

Series Expansion

MIRACLE® coated solid carbide drill

WSTAR Drill

Innovative "Wave type cutting edge & flute geometry"

Multi-purpose drill for cutting carbon and alloy steels, stainless steels, cast iron and difficult-to-cut materials.

- **Drill sizes available in 0.01mm increments from ø0.50 to ø0.99.**
- **New integral shank diameters available from ø3.0 to ø16.0 for external coolant type.**
- Drill sizes available in 0.1mm increments from ø1.0 to ø20.0.
- Sharp cutting edge performance and smooth chip discharge.
- New 8 x D type available.
- New ø1.0 - ø2.9 internal coolant type available. LB(l/d=5), XB(l/d=12)

Sharp cutting edge performance and smooth chip discharge.

MIRACLE® Coated VP15TF

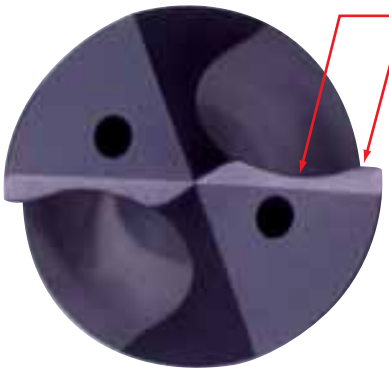
Miracle coating has high welding resistance, making it suitable for machining a wide range of workpiece materials from mild steels and carbon steels, through to stainless steels and cast iron.

Solid carbide MIRACLE® coated WSTAR Drill

Features

●Wavy cutting edge & special flute geometry to promote smooth chip evacuation

Cutting edge shape



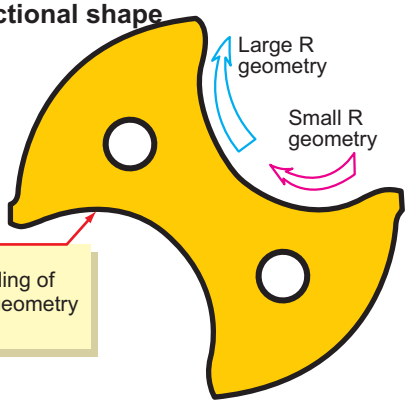
Wavy cutting edge

The wave edge design achieves a sharp peripheral edge cutting performance with a strong initial cutting point near the centre.

Flute geometry

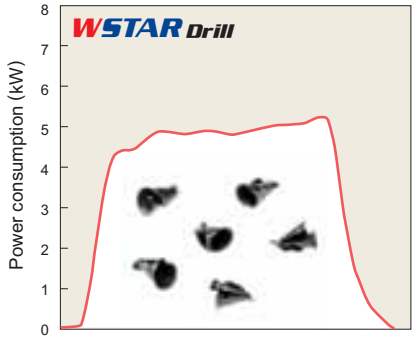
The small R geometry generates initial curling of the chips and combines with the larger R geometry to promote smooth chip evacuation.

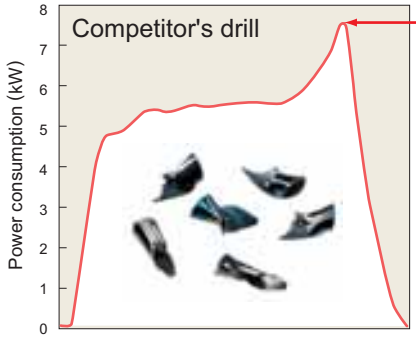
Cross sectional shape



●Cutting resistance & chip geometry

WSTAR Drill lowers the cutting resistance and power consumption.
Chips are broken into a compact shape for excellent chip disposability to prevent jamming.



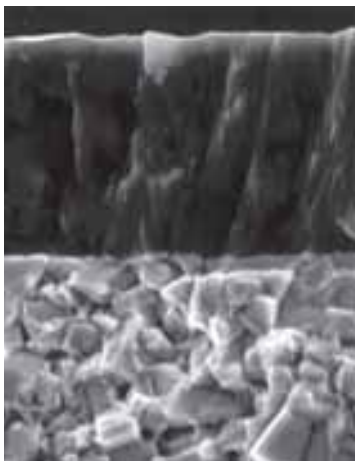


Chip packing occurred just before breaking through.

<Cutting conditions>

Workpiece	: JIS S50C (150-180HB)
Drill diameter	: ø12 (Internal coolant)
Hole depth	: 60mm
Cutting speed	: 120m/min
Feed	: 0.25mm/rev
Coolant	: W.S.O.
Oil pressure	: 0.5MPa

●Long tool life MIRACLE® coated VP15TF



MIRACLE® coating (Al,Ti)N

Cemented carbide substrate TF15

VP15TF

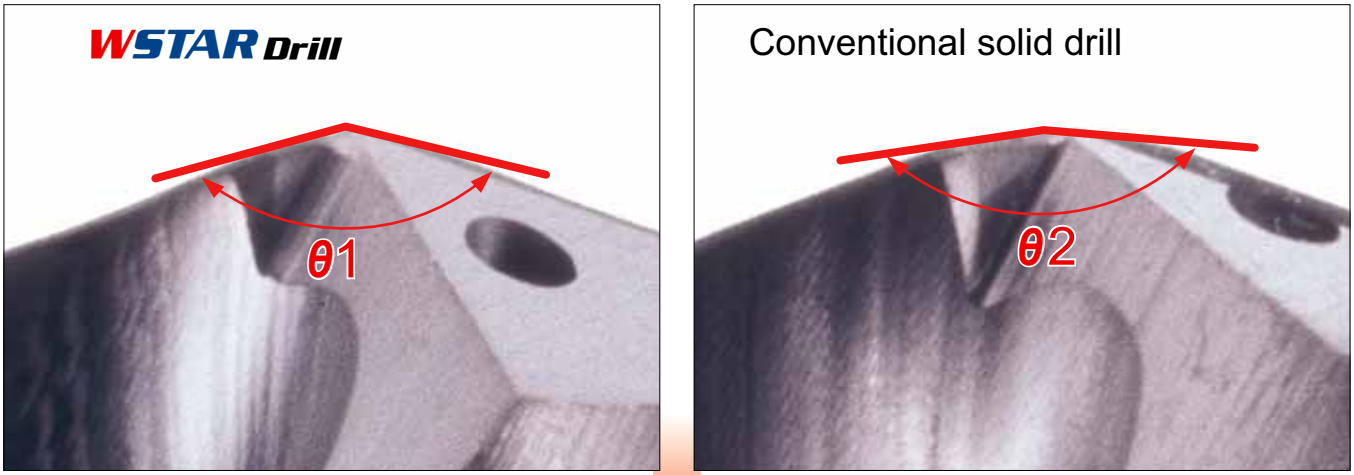
MIRACLE® Coated Features of **VP15TF**

MIRACLE® coated **VP15TF** has a high welding resistance, making it suitable for machining a wide range of workpiece materials from mild steels and carbon steels, through to stainless steels and cast iron.

●Centripetal top edge geometry

Top edge geometry

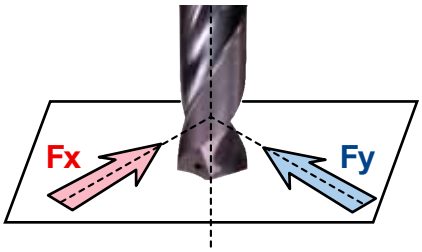
The centripetal top edge geometry with a small point angle and X-thinning promotes a self centering action for accurate hole positions! ($\theta 1 < \theta 2$)

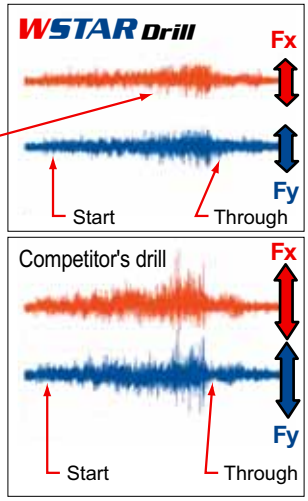


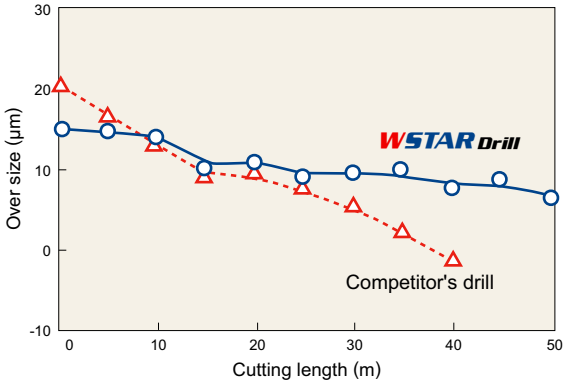
●Machining accuracy (over size)

WSTAR Drill stays on centre and is highly wear resistant, helping to maintain hole size accuracy !

During the complete drilling cycle, components of the horizontal forces, Fx and Fy, remain low and stable.





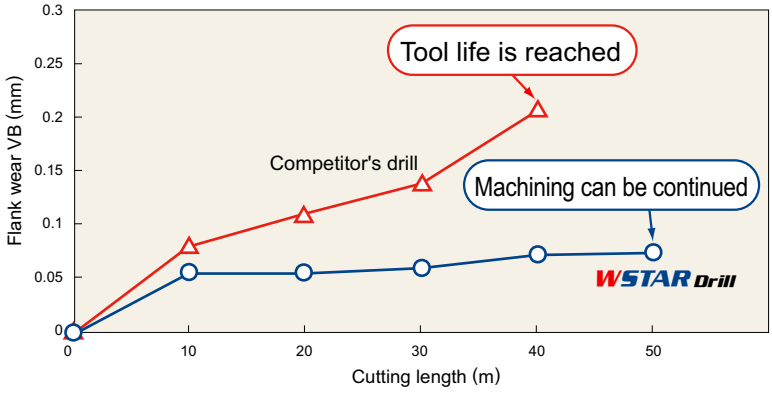


<Cutting conditions>

Workpiece	: JIS S50C (150-180HB)	Feed	: 0.2mm/rev
Drill diameter	: ø8 (External coolant)	Coolant	: Emulsion 10%
Cutting speed	: 80m/min	Oil pressure	: 0.5MPa

●Tool life

WSTAR Drill has high flank and margin wear resistance !



Enlarged picture of the margin after 40m drilling length.

Competitor's drill

Spalling of the coating

WSTAR Drill

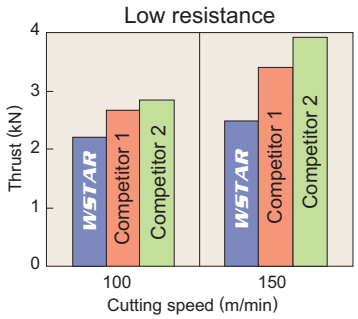
<Cutting conditions>

Workpiece	: JIS S50C (150-180HB)	Cutting speed	: 80m/min
Drill diameter	: ø8 (External coolant)	Feed	: 0.2mm/rev
Coolant	: Emulsion 10%	Hole depth	: 25mm (Through hole)

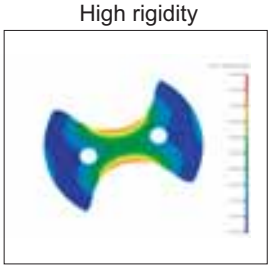
Cutting Performance

●High Efficiency Drilling

Excellent chip control, low cutting resistance and high rigidity characterise the Miracle Coated **WSTAR Drill**.

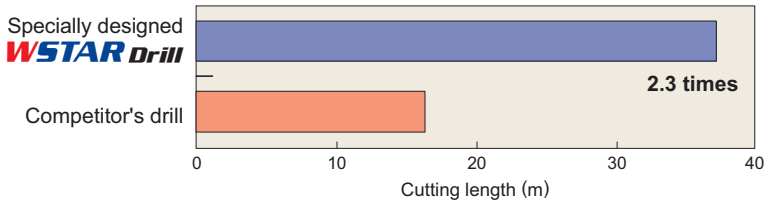


<Cutting conditions>
Workpiece : JIS S45C (180-220HB)
Drill diameter : ø9.5mm (Internal coolant)
Hole depth : 47mm (Through hole)
W.S.O. (Internal coolant)



CAE analytical result
Deflection Resistance
: 20% improvement
Run Out : 10% improvement

The **WSTAR Drill** more than doubled tool life compared to a competitor's drill at a feed rate of 0.4mm/rev.

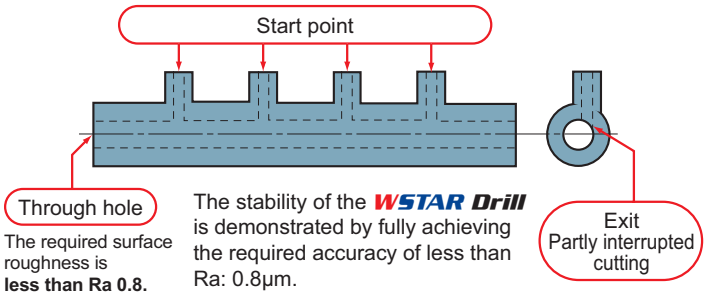


<Cutting conditions>
Workpiece : JIS SCM440 (280HB)
Drill diameter : ø12mm
Cutting speed : 120m/min
Feed : 0.4mm/rev
Hole depth : 54mm (Through hole)
W.S.O. (Internal coolant)

●Maintaining drilling accuracy (Surface roughness)

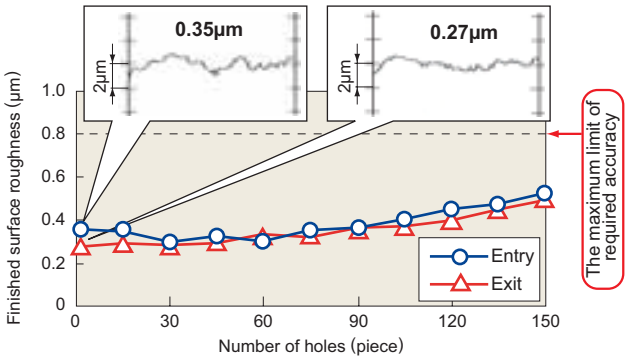
Cutting performance of the specially designed **WSTAR Drill**.

Due largely to the centripetal force exerted by the cutting edge configuration, the **WSTAR Drill** shows its ability to generate an accurate and quality machined finish.



The required surface roughness is **less than Ra 0.8.**

The stability of the **WSTAR Drill** is demonstrated by fully achieving the required accuracy of less than Ra: 0.8µm.

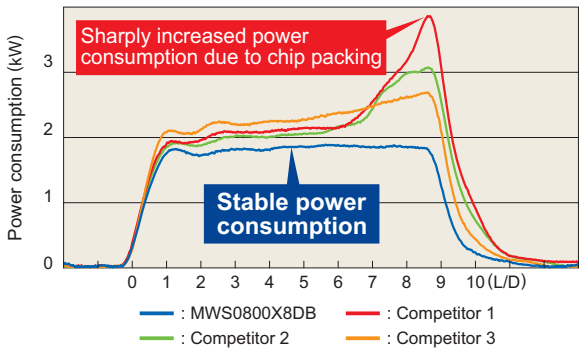


<Cutting conditions>
Workpiece : JIS SMn443 (280HB)
Drill diameter : ø4mm
Cutting speed : 75.4m/min
Feed : 0.1mm/rev
Hole depth : 33mm (Through hole)
W.S.O. (Internal coolant)

Note) Tool life of the competitor's drill after drilling 80 holes. (Surface roughness)

●Stable power consumption (for 8 x D)

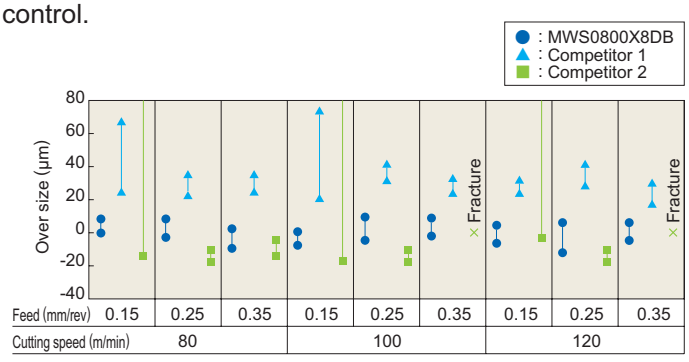
The **WSTAR Drill** enables continuous feed drilling of the 8xD deep hole.



<Cutting conditions>
Workpiece : JIS S50C (Test workpiece)
Drill diameter : ø8mm
Cutting speed : 100m/min
Feed : 0.2mm/rev
Hole depth : 64mm (Through hole)
W.S.O. (Internal coolant)

●Stable over size (for 8 x D)

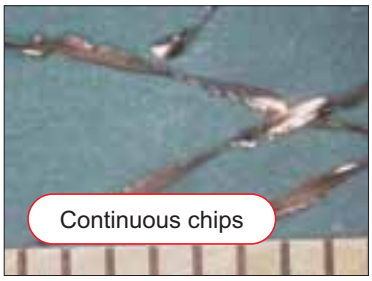
The **WSTAR Drill** delivers stable machining accuracy over a wide range of cutting conditions due to the low resistance cutting edge, high tool rigidity and good chip control.



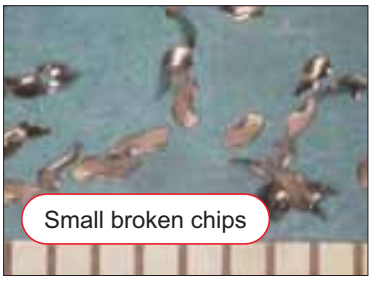
<Cutting conditions>
Workpiece : JIS S50C (Test workpiece)
Drill diameter : ø8mm
Hole depth : 64mm (Through hole)
W.S.O. (Internal coolant)

●Small diameter hole drilling

The **WSTAR Drill** gives superior chip control even for drilling of small diameter holes.



Competitor's drill

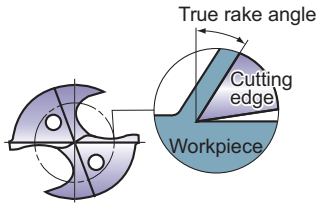


WSTAR Drill

<Cutting conditions>
Workpiece : JIS SUS304
Drill diameter : ø1mm
Cutting speed : 40m/min
Feed : 0.03mm/rev
Hole depth : 5mm (Through hole)
W.S.O. (Internal coolant)

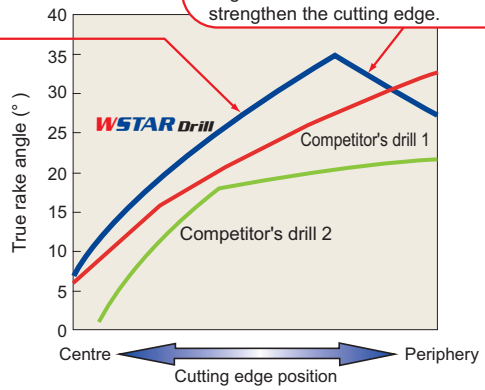
●Reliable drilling performance when machining difficult-to-cut materials

With a unique flute geometry and cutting edge rake angle, the **WSTAR Drill** improves drilling performance of difficult-to-cut materials.



A large concave angle engineered into the cutting edge improves the **WSTAR Drill** drilling performance.

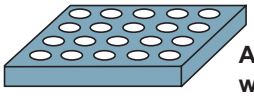
A small rake angle at the peripheral edge of the **WSTAR Drill** serves to strengthen the cutting edge.



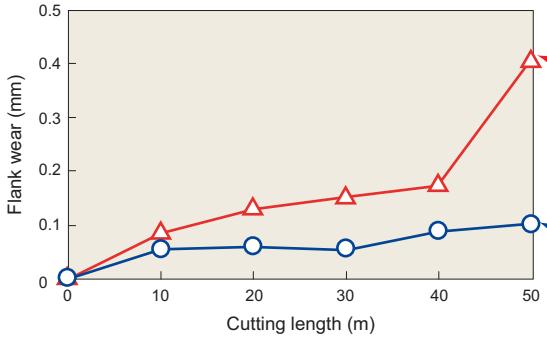
●Drilling performance in Austenitic stainless steel (JIS SUS304)

The **WSTAR Drill** resists built-up edges, a common failure mechanism when machining austenitic stainless steels, thus preventing edge chipping and drill fracture.

The **WSTAR Drill** prevents welding on the cutting edge. Further use of the drill is possible.



Application example
workpiece : Plate (JIS SUS 304)
Tool : MWS0800MB

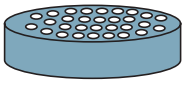


<Cutting conditions>
Workpiece : JIS SUS304 (190-210HB)
Drill diameter : ø8mm
Cutting speed : 120m/min
Feed : 0.2mm/rev
Hole depth : 25mm (Through hole)
W.S.O. (Internal coolant)

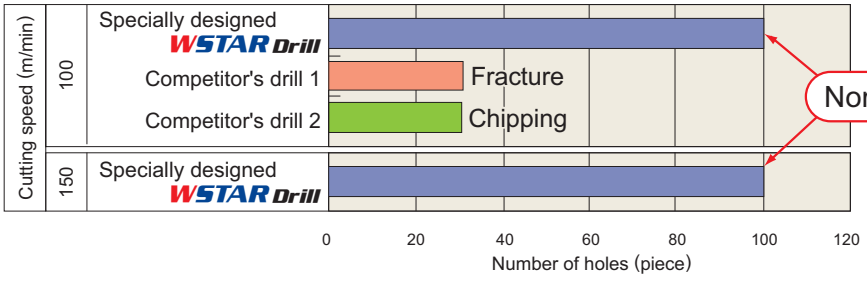
●Drilling performance in Titanium alloy (JIS Ti-6Al-4V)

The **WSTAR Drill** resists deformation of the cutting edge when high cutting temperatures are generated due to the low thermal conductivity of the workpiece.

The **WSTAR Drill** prevents fracturing and chipping. Further use of the drill is possible.



Application example
workpiece : Plate (JIS Ti-6Al-4V)
Tool : Specially designed WSTAR Drill



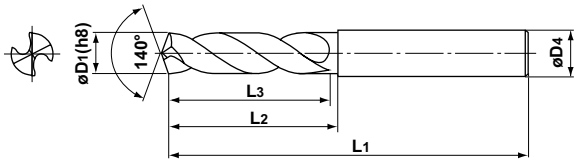
Normal wear

<Cutting conditions>
Workpiece : JIS Ti-6Al-4V (42-45HRC)
Drill diameter : ø8mm
Cutting speed : 100m/min
: 150m/min
Feed : 0.05mm/rev
Hole depth : 24mm (Blind hole)
W.S.O. (Internal coolant)

WSTAR Drill
MIRACLE® coated

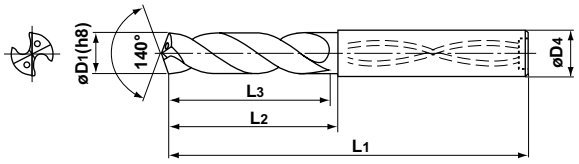
MWE (External coolant)

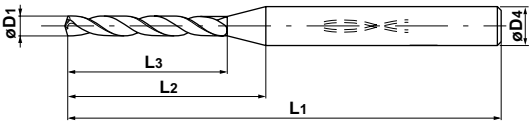
D1	0.5≤D1<1.0	1.0≤D1≤3.0	3.0<D1≤6.0	6.0<D1≤10.0	10.0<D1≤18.0	18.0<D1≤30.0
Tolerance	0 -0.009	0 -0.014	0 -0.018	0 -0.022	0 -0.027	0 -0.033



MWS (Internal coolant)

●MWS-SB/MB/LB/XB/X8DB type can be used for shrink fit holders.





*MWS type with ø5.0 or larger diameter has a recess in the end face.

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
NEW 0.50	5	Int.	●	MWS0050LB	8	13	47	3.0
	12	Int.	●	MWS0050XB	16	21	47	3.0
NEW 0.51	5	Int.	●	MWS0051LB	8	13	47	3.0
	12	Int.	●	MWS0051XB	16	21	47	3.0
NEW 0.52	5	Int.	●	MWS0052LB	8	13	47	3.0
	12	Int.	●	MWS0052XB	16	21	47	3.0
NEW 0.53	5	Int.	●	MWS0053LB	8	13	47	3.0
	12	Int.	●	MWS0053XB	16	21	47	3.0
NEW 0.54	5	Int.	●	MWS0054LB	8	13	47	3.0
	12	Int.	●	MWS0054XB	16	21	47	3.0
NEW 0.55	5	Int.	●	MWS0055LB	8	13	47	3.0
	12	Int.	●	MWS0055XB	16	21	47	3.0
NEW 0.56	5	Int.	●	MWS0056LB	8	13	47	3.0
	12	Int.	●	MWS0056XB	16	21	47	3.0
NEW 0.57	5	Int.	●	MWS0057LB	8	13	47	3.0
	12	Int.	●	MWS0057XB	16	21	47	3.0
NEW 0.58	5	Int.	●	MWS0058LB	8	13	47	3.0
	12	Int.	●	MWS0058XB	16	21	47	3.0
NEW 0.59	5	Int.	●	MWS0059LB	8	12	47	3.0
	12	Int.	●	MWS0059XB	16	20	47	3.0
NEW 0.60	5	Int.	●	MWS0060LB	8	12	47	3.0
	12	Int.	●	MWS0060XB	16	20	47	3.0
NEW 0.61	5	Int.	●	MWS0061LB	8	12	47	3.0
	12	Int.	●	MWS0061XB	16	20	47	3.0
NEW 0.62	5	Int.	●	MWS0062LB	8	12	47	3.0
	12	Int.	●	MWS0062XB	16	20	47	3.0
NEW 0.63	5	Int.	●	MWS0063LB	8	12	47	3.0
	12	Int.	●	MWS0063XB	16	20	47	3.0
NEW 0.64	5	Int.	●	MWS0064LB	8	12	47	3.0
	12	Int.	●	MWS0064XB	16	20	47	3.0

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
NEW 0.65	5	Int.	●	MWS0065LB	8	12	47	3.0
	12	Int.	●	MWS0065XB	16	20	47	3.0
NEW 0.66	5	Int.	●	MWS0066LB	8	12	47	3.0
	12	Int.	●	MWS0066XB	16	20	47	3.0
NEW 0.67	5	Int.	●	MWS0067LB	8	12	47	3.0
	12	Int.	●	MWS0067XB	16	20	47	3.0
NEW 0.68	5	Int.	●	MWS0068LB	8	12	47	3.0
	12	Int.	●	MWS0068XB	16	20	47	3.0
NEW 0.69	5	Int.	●	MWS0069LB	8	12	47	3.0
	12	Int.	●	MWS0069XB	16	20	47	3.0
NEW 0.70	5	Int.	●	MWS0070LB	8	12	47	3.0
	12	Int.	●	MWS0070XB	16	20	47	3.0
NEW 0.71	5	Int.	●	MWS0071LB	10	14	50	3.0
	12	Int.	●	MWS0071XB	20	24	50	3.0
NEW 0.72	5	Int.	●	MWS0072LB	10	14	50	3.0
	12	Int.	●	MWS0072XB	20	24	50	3.0
NEW 0.73	5	Int.	●	MWS0073LB	10	14	50	3.0
	12	Int.	●	MWS0073XB	20	24	50	3.0
NEW 0.74	5	Int.	●	MWS0074LB	10	14	50	3.0
	12	Int.	●	MWS0074XB	20	24	50	3.0
NEW 0.75	5	Int.	●	MWS0075LB	10	14	50	3.0
	12	Int.	●	MWS0075XB	20	24	50	3.0
NEW 0.76	5	Int.	●	MWS0076LB	10	14	50	3.0
	12	Int.	●	MWS0076XB	20	24	50	3.0
NEW 0.77	5	Int.	●	MWS0077LB	10	14	50	3.0
	12	Int.	●	MWS0077XB	20	24	50	3.0
NEW 0.78	5	Int.	●	MWS0078LB	10	14	50	3.0
	12	Int.	●	MWS0078XB	20	24	50	3.0
NEW 0.79	5	Int.	●	MWS0079LB	10	14	50	3.0
	12	Int.	●	MWS0079XB	20	24	50	3.0

Note) Please contact Mitsubishi Carbide for any geometry that is not in the brochure (e.g. different diameter and length).

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

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
NEW 0.80	5	Int.	●	MWS0080LB	10	14	50	3.0
	12	Int.	●	MWS0080XB	20	24	50	3.0
NEW 0.81	5	Int.	●	MWS0081LB	10	14	50	3.0
	12	Int.	●	MWS0081XB	20	24	50	3.0
NEW 0.82	5	Int.	●	MWS0082LB	10	14	50	3.0
	12	Int.	●	MWS0082XB	20	24	50	3.0
NEW 0.83	5	Int.	●	MWS0083LB	10	14	50	3.0
	12	Int.	●	MWS0083XB	20	24	50	3.0
NEW 0.84	5	Int.	●	MWS0084LB	10	14	50	3.0
	12	Int.	●	MWS0084XB	20	24	50	3.0
NEW 0.85	5	Int.	●	MWS0085LB	10	14	50	3.0
	12	Int.	●	MWS0085XB	20	24	50	3.0
NEW 0.86	5	Int.	●	MWS0086LB	10	14	50	3.0
	12	Int.	●	MWS0086XB	20	24	50	3.0
NEW 0.87	5	Int.	●	MWS0087LB	10	14	50	3.0
	12	Int.	●	MWS0087XB	20	24	50	3.0
NEW 0.88	5	Int.	●	MWS0088LB	10	14	50	3.0
	12	Int.	●	MWS0088XB	20	24	50	3.0
NEW 0.89	5	Int.	●	MWS0089LB	10	14	50	3.0
	12	Int.	●	MWS0089XB	20	24	50	3.0
NEW 0.90	5	Int.	●	MWS0090LB	10	14	50	3.0
	12	Int.	●	MWS0090XB	20	24	50	3.0
NEW 0.91	5	Int.	●	MWS0091LB	10	14	50	3.0
	12	Int.	●	MWS0091XB	20	24	50	3.0
NEW 0.92	5	Int.	●	MWS0092LB	10	14	50	3.0
	12	Int.	●	MWS0092XB	20	24	50	3.0
NEW 0.93	5	Int.	●	MWS0093LB	10	14	50	3.0
	12	Int.	●	MWS0093XB	20	24	50	3.0
NEW 0.94	5	Int.	●	MWS0094LB	10	14	50	3.0
	12	Int.	●	MWS0094XB	20	24	50	3.0
NEW 0.95	5	Int.	●	MWS0095LB	10	14	50	3.0
	12	Int.	●	MWS0095XB	20	24	50	3.0
NEW 0.96	5	Int.	●	MWS0096LB	10	14	50	3.0
	12	Int.	●	MWS0096XB	20	24	50	3.0
NEW 0.97	5	Int.	●	MWS0097LB	10	14	50	3.0
	12	Int.	●	MWS0097XB	20	24	50	3.0
NEW 0.98	5	Int.	●	MWS0098LB	10	14	50	3.0
	12	Int.	●	MWS0098XB	20	24	50	3.0
NEW 0.99	5	Int.	●	MWS0099LB	10	14	50	3.0
	12	Int.	●	MWS0099XB	20	24	50	3.0
1.0	5	Int.	●	MWS0100LB	11	15	55	3.0
	12	Int.	●	MWS0100XB	23	27	55	3.0
1.1	5	Int.	●	MWS0110LB	17	21	55	3.0
	12	Int.	●	MWS0110XB	23	27	55	3.0
1.2	5	Int.	●	MWS0120LB	17	20	55	3.0
	12	Int.	●	MWS0120XB	23	26	55	3.0
1.3	5	Int.	●	MWS0130LB	17	20	55	3.0
	12	Int.	●	MWS0130XB	23	26	55	3.0
1.4	5	Int.	●	MWS0140LB	17	20	55	3.0
	12	Int.	●	MWS0140XB	23	26	55	3.0
1.5	5	Int.	●	MWS0150LB	17	20	55	3.0
	12	Int.	●	MWS0150XB	23	26	55	3.0

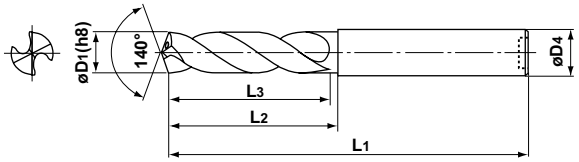
Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
1.6	5	Int.	●	MWS0160LB	22	25	68	3.0
	12	Int.	●	MWS0160XB	30	33	68	3.0
1.7	5	Int.	●	MWS0170LB	22	24	68	3.0
	12	Int.	●	MWS0170XB	30	32	68	3.0
1.8	5	Int.	●	MWS0180LB	22	24	68	3.0
	12	Int.	●	MWS0180XB	30	32	68	3.0
1.9	5	Int.	●	MWS0190LB	22	24	68	3.0
	12	Int.	●	MWS0190XB	30	32	68	3.0
2.0	5	Int.	●	MWS0200LB	22	24	68	3.0
	12	Int.	●	MWS0200XB	30	32	68	3.0
2.1	5	Int.	●	MWS0210LB	28	30	74	3.0
	12	Int.	●	MWS0210XB	38	40	74	3.0
2.2	5	Int.	●	MWS0220LB	28	29	74	3.0
	12	Int.	●	MWS0220XB	38	39	74	3.0
2.3	5	Int.	●	MWS0230LB	28	29	74	3.0
	12	Int.	●	MWS0230XB	38	39	74	3.0
2.4	5	Int.	●	MWS0240LB	28	29	74	3.0
	12	Int.	●	MWS0240XB	38	39	74	3.0
2.5	5	Int.	●	MWS0250LB	28	29	74	3.0
	12	Int.	●	MWS0250XB	38	39	74	3.0
2.6	5	Int.	●	MWS0260LB	33	33	81	3.0
	12	Int.	●	MWS0260XB	45	45	81	3.0
2.7	5	Int.	●	MWS0270LB	33	33	81	3.0
	12	Int.	●	MWS0270XB	45	45	81	3.0
2.8	5	Int.	●	MWS0280LB	33	33	81	3.0
	12	Int.	●	MWS0280XB	45	45	81	3.0
2.9	5	Int.	●	MWS0290LB	33	33	81	3.0
	12	Int.	●	MWS0290XB	45	45	81	3.0
3.0	2	Ext.	●	MWE0300SA	16	16	55	3.0
	3	Ext.	●	MWE0300MA	21	21	60	3.0
	NEW 2	Ext.	●	MWE0300SB	16	16	55	3.0
	NEW 3	Ext.	●	MWE0300MB	21	21	60	3.0
	3	Int.	●	MWS0300MB	24	24	72	3.0
	5	Int.	●	MWS0300LB	33	33	81	3.0
	8	Int.	●	MWS0300X8DB	35	35	81	3.0
3.1	2	Ext.	●	MWE0310SA	18	18	55	3.1
	3	Ext.	●	MWE0310MA	24	24	60	3.1
	NEW 2	Ext.	□	MWE0310SB	18	20	55	4.0
	NEW 3	Ext.	□	MWE0310MB	24	26	60	4.0
	3	Int.	●	MWS0310MB	28	28	76	4.0
	5	Int.	●	MWS0310LB	39	39	87	4.0
	8	Int.	●	MWS0310X8DB	41	41	87	4.0
3.2	2	Ext.	●	MWE0320SA	18	18	55	3.2
	3	Ext.	●	MWE0320MA	24	24	60	3.2
	NEW 2	Ext.	□	MWE0320SB	18	20	55	4.0
	NEW 3	Ext.	□	MWE0320MB	24	26	60	4.0
	3	Int.	●	MWS0320MB	28	28	76	4.0
	5	Int.	●	MWS0320LB	39	39	87	4.0
	8	Int.	●	MWS0320X8DB	41	41	87	4.0

WSTAR Drill

MIRACLE® coated

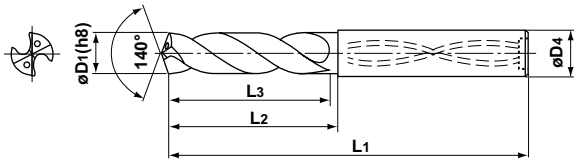
MWE (External coolant)

D1	D1≤3.0	3.0<D1≤6.0	6.0<D1≤10.0	10.0<D1≤18.0	18.0<D1≤30.0
Tolerance	0 -0.014	0 -0.018	0 -0.022	0 -0.027	0 -0.033



MWS (Internal coolant)

●MWS-SB/MB/LB/X8DB type can be used for shrink fit holders.



*MWS type with ø5.0 or larger diameter has a recess in the end face.

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
3.3	2	Ext.	●	MWE0330SA	18	18	55	3.3
	3	Ext.	●	MWE0330MA	24	24	60	3.3
	NEW 2	Ext.	●	MWE0330SB	18	20	55	4.0
	NEW 3	Ext.	●	MWE0330MB	24	26	60	4.0
	3	Int.	●	MWS0330MB	28	28	76	4.0
	5	Int.	●	MWS0330LB	39	39	87	4.0
	8	Int.	●	MWS0330X8DB	41	41	87	4.0
3.4	2	Ext.	●	MWE0340SA	20	20	55	3.4
	3	Ext.	●	MWE0340MA	24	24	60	3.4
	NEW 2	Ext.	●	MWE0340SB	18	20	55	4.0
	NEW 3	Ext.	●	MWE0340MB	24	26	60	4.0
	3	Int.	●	MWS0340MB	28	28	76	4.0
	5	Int.	●	MWS0340LB	39	39	87	4.0
	8	Int.	●	MWS0340X8DB	41	41	87	4.0
3.5	2	Ext.	●	MWE0350SA	20	20	55	3.5
	3	Ext.	●	MWE0350MA	24	24	60	3.5
	NEW 2	Ext.	●	MWE0350SB	18	20	55	4.0
	NEW 3	Ext.	●	MWE0350MB	24	26	60	4.0
	3	Int.	●	MWS0350MB	28	28	76	4.0
	5	Int.	●	MWS0350LB	39	39	87	4.0
	8	Int.	●	MWS0350X8DB	41	41	87	4.0
3.6	2	Ext.	●	MWE0360SA	20	20	55	3.6
	3	Ext.	●	MWE0360MA	27	27	60	3.6
	NEW 2	Ext.	□	MWE0360SB	20	20	55	4.0
	NEW 3	Ext.	□	MWE0360MB	27	27	60	4.0
	3	Int.	●	MWS0360MB	32	32	80	4.0
	5	Int.	●	MWS0360LB	44	44	92	4.0
	8	Int.	●	MWS0360X8DB	46	46	92	4.0
3.7	2	Ext.	●	MWE0370SA	20	20	55	3.7
	3	Ext.	●	MWE0370MA	27	27	60	3.7
	NEW 2	Ext.	●	MWE0370SB	20	20	55	4.0
	NEW 3	Ext.	●	MWE0370MB	27	27	60	4.0
	3	Int.	●	MWS0370MB	32	32	80	4.0
	5	Int.	●	MWS0370LB	44	44	92	4.0
	8	Int.	●	MWS0370X8DB	46	46	92	4.0

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
3.8	2	Ext.	●	MWE0380SA	22	22	55	3.8
	3	Ext.	●	MWE0380MA	27	27	60	3.8
	NEW 2	Ext.	●	MWE0380SB	20	20	55	4.0
	NEW 3	Ext.	●	MWE0380MB	27	27	60	4.0
	3	Int.	●	MWS0380MB	32	32	80	4.0
	5	Int.	●	MWS0380LB	44	44	92	4.0
	8	Int.	●	MWS0380X8DB	46	46	92	4.0
3.9	2	Ext.	●	MWE0390SA	22	22	55	3.9
	3	Ext.	●	MWE0390MA	27	27	60	3.9
	NEW 2	Ext.	●	MWE0390SB	20	20	55	4.0
	NEW 3	Ext.	●	MWE0390MB	27	27	60	4.0
	3	Int.	●	MWS0390MB	32	32	80	4.0
	5	Int.	●	MWS0390LB	44	44	92	4.0
	8	Int.	●	MWS0390X8DB	46	46	92	4.0
4.0	2	Ext.	●	MWE0400SA	22	22	55	4.0
	3	Ext.	●	MWE0400MA	27	27	60	4.0
	NEW 2	Ext.	●	MWE0400SB	20	20	55	4.0
	NEW 3	Ext.	●	MWE0400MB	27	27	60	4.0
	3	Int.	●	MWS0400MB	32	32	80	4.0
	5	Int.	●	MWS0400LB	44	44	92	4.0
	8	Int.	●	MWS0400X8DB	46	46	92	4.0
4.1	2	Ext.	●	MWE0410SA	22	22	55	4.1
	3	Ext.	●	MWE0410MA	29	29	63	4.1
	NEW 2	Ext.	□	MWE0410SB	22	24	62	5.0
	NEW 3	Ext.	□	MWE0410MB	29	31	68	5.0
	3	Int.	●	MWS0410MB	36	36	86	5.0
	5	Int.	●	MWS0410LB	50	50	100	5.0
	8	Int.	●	MWS0410X8DB	52	52	100	5.0
4.2	2	Ext.	●	MWE0420SA	22	22	55	4.2
	3	Ext.	●	MWE0420MA	29	29	63	4.2
	NEW 2	Ext.	●	MWE0420SB	22	24	62	5.0
	NEW 3	Ext.	●	MWE0420MB	29	31	68	5.0
	3	Int.	●	MWS0420MB	36	36	86	5.0
	5	Int.	●	MWS0420LB	50	50	100	5.0
	8	Int.	●	MWS0420X8DB	52	52	100	5.0

Note) Please contact Mitsubishi Carbide for any geometry that is not in the brochure (e.g. different diameter and length).

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

Drill Dia. D_1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L_3	L_2	L_1	D_4
	2	Ext.	●	**MWE0430SA**	24	24	58	4.3
	3	Ext.	●	**MWE0430MA**	29	29	63	4.3
	NEW 2	Ext.	●	**MWE0430SB**	22	24	62	5.0
4.3	NEW 3	Ext.	●	**MWE0430MB**	29	31	68	5.0
	3	Int.	●	**MWS0430MB**	36	36	86	5.0
	5	Int.	●	**MWS0430LB**	50	50	100	5.0
	8	Int.	●	**MWS0430X8DB**	52	52	100	5.0
	2	Ext.	●	**MWE0440SA**	24	24	58	4.4
	3	Ext.	●	**MWE0440MA**	29	29	63	4.4
	NEW 2	Ext.	●	**MWE0440SB**	22	24	62	5.0
4.4	NEW 3	Ext.	●	**MWE0440MB**	29	31	68	5.0
	3	Int.	●	**MWS0440MB**	36	36	86	5.0
	5	Int.	●	**MWS0440LB**	50	50	100	5.0
	8	Int.	●	**MWS0440X8DB**	52	52	100	5.0
	2	Ext.	●	**MWE0450SA**	24	24	58	4.5
	3	Ext.	●	**MWE0450MA**	29	29	63	4.5
	NEW 2	Ext.	●	**MWE0450SB**	22	24	62	5.0
4.5	NEW 3	Ext.	●	**MWE0450MB**	29	31	68	5.0
	3	Int.	●	**MWS0450MB**	36	36	86	5.0
	5	Int.	●	**MWS0450LB**	50	50	100	5.0
	8	Int.	●	**MWS0450X8DB**	52	52	100	5.0
	2	Ext.	●	**MWE0460SA**	24	24	58	4.6
	3	Ext.	●	**MWE0460MA**	32	32	68	4.6
	NEW 2	Ext.	□	**MWE0460SB**	24	24	62	5.0
4.6	NEW 3	Ext.	□	**MWE0460MB**	32	32	68	5.0
	3	Int.	●	**MWS0460MB**	40	40	90	5.0
	5	Int.	●	**MWS0460LB**	55	55	105	5.0
	8	Int.	●	**MWS0460X8DB**	57	57	105	5.0
	2	Ext.	●	**MWE0470SA**	24	24	58	4.7
	3	Ext.	●	**MWE0470MA**	32	32	68	4.7
	NEW 2	Ext.	□	**MWE0470SB**	24	24	62	5.0
4.7	NEW 3	Ext.	□	**MWE0470MB**	32	32	68	5.0
	3	Int.	●	**MWS0470MB**	40	40	90	5.0
	5	Int.	●	**MWS0470LB**	55	55	105	5.0
	8	Int.	●	**MWS0470X8DB**	57	57	105	5.0
	2	Ext.	●	**MWE0480SA**	26	26	62	4.8
	3	Ext.	●	**MWE0480MA**	32	32	68	4.8
	NEW 2	Ext.	□	**MWE0480SB**	24	24	62	5.0
4.8	NEW 3	Ext.	□	**MWE0480MB**	32	32	68	5.0
	3	Int.	●	**MWS0480MB**	40	40	90	5.0
	5	Int.	●	**MWS0480LB**	55	55	105	5.0
	8	Int.	●	**MWS0480X8DB**	57	57	105	5.0
	2	Ext.	●	**MWE0490SA**	26	26	62	4.9
	3	Ext.	●	**MWE0490MA**	32	32	68	4.9
	NEW 2	Ext.	□	**MWE0490SB**	24	24	62	5.0
4.9	NEW 3	Ext.	□	**MWE0490MB**	32	32	68	5.0
	3	Int.	●	**MWS0490MB**	40	40	90	5.0
	5	Int.	●	**MWS0490LB**	55	55	105	5.0
	8	Int.	●	**MWS0490X8DB**	57	57	105	5.0

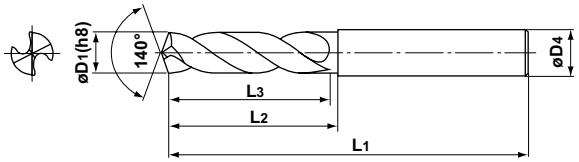
Drill Dia. D_1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L_3	L_2	L_1	D_4
	2	Ext.	●	**MWE0500SA**	26	26	62	5.0
	3	Ext.	●	**MWE0500MA**	32	32	68	5.0
	NEW 2	Ext.	●	**MWE0500SB**	24	24	62	5.0
5.0	NEW 3	Ext.	●	**MWE0500MB**	32	32	68	5.0
	3	Int.	●	**MWS0500MB**	27.5	30	82	5.0
	5	Int.	●	**MWS0500LB**	44	48	100	5.0
	8	Int.	●	**MWS0500X8DB**	57	57	105	5.0
	2	Ext.	●	**MWE0510SA**	26	26	62	5.1
	3	Ext.	●	**MWE0510MA**	34	34	72	5.1
	NEW 2	Ext.	●	**MWE0510SB**	26	28	66	6.0
5.1	NEW 3	Ext.	●	**MWE0510MB**	34	36	74	6.0
	3	Int.	●	**MWS0510MB**	27.5	30	82	6.0
	5	Int.	●	**MWS0510LB**	44	48	100	6.0
	8	Int.	●	**MWS0510X8DB**	61	66	118	6.0
	2	Ext.	●	**MWE0520SA**	26	26	62	5.2
	3	Ext.	●	**MWE0520MA**	34	34	72	5.2
	NEW 2	Ext.	●	**MWE0520SB**	26	28	66	6.0
5.2	NEW 3	Ext.	●	**MWE0520MB**	34	36	74	6.0
	3	Int.	●	**MWS0520MB**	27.5	30	82	6.0
	5	Int.	●	**MWS0520LB**	44	48	100	6.0
	8	Int.	●	**MWS0520X8DB**	61	66	118	6.0
	2	Ext.	●	**MWE0530SA**	26	26	62	5.3
	3	Ext.	●	**MWE0530MA**	34	34	72	5.3
	NEW 2	Ext.	□	**MWE0530SB**	26	28	66	6.0
5.3	NEW 3	Ext.	□	**MWE0530MB**	34	36	74	6.0
	3	Int.	●	**MWS0530MB**	27.5	30	82	6.0
	5	Int.	●	**MWS0530LB**	44	48	100	6.0
	8	Int.	●	**MWS0530X8DB**	61	66	118	6.0
	2	Ext.	●	**MWE0540SA**	28	28	66	5.4
	3	Ext.	●	**MWE0540MA**	34	34	72	5.4
	NEW 2	Ext.	□	**MWE0540SB**	26	28	66	6.0
5.4	NEW 3	Ext.	□	**MWE0540MB**	34	36	74	6.0
	3	Int.	●	**MWS0540MB**	27.5	30	82	6.0
	5	Int.	●	**MWS0540LB**	44	48	100	6.0
	8	Int.	●	**MWS0540X8DB**	61	66	118	6.0
	2	Ext.	●	**MWE0550SA**	28	28	66	5.5
	3	Ext.	●	**MWE0550MA**	34	34	72	5.5
	NEW 2	Ext.	●	**MWE0550SB**	26	28	66	6.0
5.5	NEW 3	Ext.	●	**MWE0550MB**	34	36	74	6.0
	3	Int.	●	**MWS0550MB**	27.5	30	82	6.0
	5	Int.	●	**MWS0550LB**	44	48	100	6.0
	8	Int.	●	**MWS0550X8DB**	61	66	118	6.0
	2	Ext.	●	**MWE0560SA**	28	28	66	5.6
	3	Ext.	●	**MWE0560MA**	36	36	74	5.6
	NEW 2	Ext.	□	**MWE0560SB**	28	28	66	6.0
5.6	NEW 3	Ext.	□	**MWE0560MB**	36	36	74	6.0
	3	Int.	●	**MWS0560MB**	30	30	82	6.0
	5	Int.	●	**MWS0560LB**	48	48	100	6.0
	8	Int.	●	**MWS0560X8DB**	66	66	118	6.0

WSTAR Drill

MIRACLE® coated

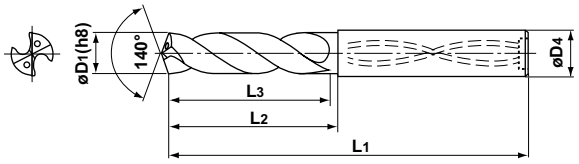
MWE (External coolant)

D1	D1≤3.0	3.0<D1≤6.0	6.0<D1≤10.0	10.0<D1≤18.0	18.0<D1≤30.0
Tolerance	0 -0.014	0 -0.018	0 -0.022	0 -0.027	0 -0.033



MWS (Internal coolant)

●MWS-SB/MB/LB/X8DB type can be used for shrink fit holders.



*MWS type with ø5.0 or larger diameter has a recess in the end face.

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
5.7	2	Ext.	●	MWE0570SA	28	28	66	5.7
	3	Ext.	●	MWE0570MA	36	36	74	5.7
	NEW 2	Ext.	□	MWE0570SB	28	28	66	6.0
	NEW 3	Ext.	□	MWE0570MB	36	36	74	6.0
	3	Int.	●	MWS0570MB	30	30	82	6.0
	5	Int.	●	MWS0570LB	48	48	100	6.0
	8	Int.	●	MWS0570X8DB	66	66	118	6.0
5.8	2	Ext.	●	MWE0580SA	28	28	66	5.8
	3	Ext.	●	MWE0580MA	36	36	74	5.8
	NEW 2	Ext.	□	MWE0580SB	28	28	66	6.0
	NEW 3	Ext.	□	MWE0580MB	36	36	74	6.0
	3	Int.	●	MWS0580MB	30	30	82	6.0
	5	Int.	●	MWS0580LB	48	48	100	6.0
	8	Int.	●	MWS0580X8DB	66	66	118	6.0
5.9	2	Ext.	●	MWE0590SA	28	28	66	5.9
	3	Ext.	●	MWE0590MA	36	36	74	5.9
	NEW 2	Ext.	□	MWE0590SB	28	28	66	6.0
	NEW 3	Ext.	□	MWE0590MB	36	36	74	6.0
	3	Int.	●	MWS0590MB	30	30	82	6.0
	5	Int.	●	MWS0590LB	48	48	100	6.0
	8	Int.	●	MWS0590X8DB	66	66	118	6.0
6.0	2	Ext.	●	MWE0600SA	28	28	66	6.0
	3	Ext.	●	MWE0600MA	41	41	81	6.0
	NEW 2	Ext.	●	MWE0600SB	28	28	66	6.0
	NEW 3	Ext.	●	MWE0600MB	36	36	74	6.0
	3	Int.	●	MWS0600MB	30	30	82	6.0
	5	Int.	●	MWS0600LB	48	48	100	6.0
	8	Int.	●	MWS0600X8DB	66	66	118	6.0
6.1	2	Ext.	●	MWE0610SA	31	31	70	6.1
	3	Ext.	●	MWE0610MA	41	41	81	6.1
	NEW 2	Ext.	●	MWE0610SB	31	34	74	7.0
	NEW 3	Ext.	●	MWE0610MB	41	44	83	7.0
	3	Int.	●	MWS0610MB	32.5	35	88	7.0
	5	Int.	●	MWS0610LB	52	56	109	7.0
	8	Int.	●	MWS0610X8DB	72	77	130	7.0
6.2	2	Ext.	●	MWE0620SA	31	31	70	6.2
	3	Ext.	●	MWE0620MA	41	41	81	6.2
	NEW 2	Ext.	●	MWE0620SB	31	34	74	7.0
	NEW 3	Ext.	●	MWE0620MB	41	44	83	7.0
	3	Int.	●	MWS0620MB	32.5	35	88	7.0
	5	Int.	●	MWS0620LB	52	56	109	7.0
	8	Int.	●	MWS0620X8DB	72	77	130	7.0
6.3	2	Ext.	●	MWE0630SA	31	31	70	6.3
	3	Ext.	●	MWE0630MA	41	41	81	6.3
	NEW 2	Ext.	□	MWE0630SB	31	34	74	7.0
	NEW 3	Ext.	□	MWE0630MB	41	44	83	7.0
	3	Int.	●	MWS0630MB	32.5	35	88	7.0
	5	Int.	●	MWS0630LB	52	56	109	7.0
	8	Int.	●	MWS0630X8DB	72	77	130	7.0
6.4	2	Ext.	●	MWE0640SA	31	31	70	6.4
	3	Ext.	●	MWE0640MA	41	41	81	6.4
	NEW 2	Ext.	□	MWE0640SB	31	34	74	7.0
	NEW 3	Ext.	□	MWE0640MB	41	44	83	7.0
	3	Int.	●	MWS0640MB	32.5	35	88	7.0
	5	Int.	●	MWS0640LB	52	56	109	7.0
	8	Int.	●	MWS0640X8DB	72	77	130	7.0
6.5	2	Ext.	●	MWE0650SA	31	31	70	6.5
	3	Ext.	●	MWE0650MA	41	41	81	6.5
	NEW 2	Ext.	●	MWE0650SB	31	34	74	7.0
	NEW 3	Ext.	●	MWE0650MB	41	44	83	7.0
	3	Int.	●	MWS0650MB	32.5	35	88	7.0
	5	Int.	●	MWS0650LB	52	56	109	7.0
	8	Int.	●	MWS0650X8DB	72	77	130	7.0
6.6	2	Ext.	●	MWE0660SA	31	31	70	6.6
	3	Ext.	●	MWE0660MA	43	43	83	6.6
	NEW 2	Ext.	□	MWE0660SB	34	34	74	7.0
	NEW 3	Ext.	□	MWE0660MB	43	43	83	7.0
	3	Int.	●	MWS0660MB	35	35	88	7.0
	5	Int.	●	MWS0660LB	56	56	109	7.0
	8	Int.	●	MWS0660X8DB	77	77	130	7.0

Note) Please contact Mitsubishi Carbide for any geometry that is not in the brochure (e.g. different diameter and length).

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

Drill Dia. D_1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L_3	L_2	L_1	D_4
	2	Ext.	●	**MWE0670SA**	31	31	70	6.7
	3	Ext.	●	**MWE0670MA**	43	43	83	6.7
	NEW 2	Ext.	●	**MWE0670SB**	34	34	74	7.0
6.7	NEW 3	Ext.	●	**MWE0670MB**	43	43	83	7.0
	3	Int.	●	**MWS0670MB**	35	35	88	7.0
	5	Int.	●	**MWS0670LB**	56	56	109	7.0
	8	Int.	●	**MWS0670X8DB**	77	77	130	7.0
	2	Ext.	●	**MWE0680SA**	34	34	74	6.8
	3	Ext.	●	**MWE0680MA**	43	43	83	6.8
	NEW 2	Ext.	●	**MWE0680SB**	34	34	74	7.0
6.8	NEW 3	Ext.	●	**MWE0680MB**	43	43	83	7.0
	3	Int.	●	**MWS0680MB**	35	35	88	7.0
	5	Int.	●	**MWS0680LB**	56	56	109	7.0
	8	Int.	●	**MWS0680X8DB**	77	77	130	7.0
	2	Ext.	●	**MWE0690SA**	34	34	74	6.9
	3	Ext.	●	**MWE0690MA**	43	43	83	6.9
	NEW 2	Ext.	●	**MWE0690SB**	34	34	74	7.0
6.9	NEW 3	Ext.	●	**MWE0690MB**	43	43	83	7.0
	3	Int.	●	**MWS0690MB**	35	35	88	7.0
	5	Int.	●	**MWS0690LB**	56	56	109	7.0
	8	Int.	●	**MWS0690X8DB**	77	77	130	7.0
	2	Ext.	●	**MWE0700SA**	34	34	74	7.0
	3	Ext.	●	**MWE0700MA**	43	43	83	7.0
	NEW 2	Ext.	●	**MWE0700SB**	34	34	74	7.0
7.0	NEW 3	Ext.	●	**MWE0700MB**	43	43	83	7.0
	3	Int.	●	**MWS0700MB**	35	35	88	7.0
	5	Int.	●	**MWS0700LB**	56	56	109	7.0
	8	Int.	●	**MWS0700X8DB**	77	77	130	7.0
	2	Ext.	●	**MWE0710SA**	34	34	74	7.1
	3	Ext.	●	**MWE0710MA**	45	45	87	7.1
	NEW 2	Ext.	□	**MWE0710SB**	34	37	79	8.0
7.1	NEW 3	Ext.	□	**MWE0710MB**	45	48	90	8.0
	3	Int.	●	**MWS0710MB**	37.5	40	94	8.0
	5	Int.	●	**MWS0710LB**	60	64	118	8.0
	8	Int.	●	**MWS0710X8DB**	83	88	142	8.0
	2	Ext.	●	**MWE0720SA**	34	34	74	7.2
	3	Ext.	●	**MWE0720MA**	45	45	87	7.2
	NEW 2	Ext.	□	**MWE0720SB**	34	37	79	8.0
7.2	NEW 3	Ext.	□	**MWE0720MB**	45	48	90	8.0
	3	Int.	●	**MWS0720MB**	37.5	40	94	8.0
	5	Int.	●	**MWS0720LB**	60	64	118	8.0
	8	Int.	●	**MWS0720X8DB**	83	88	142	8.0
	2	Ext.	●	**MWE0730SA**	34	34	74	7.3
	3	Ext.	●	**MWE0730MA**	45	45	87	7.3
	NEW 2	Ext.	□	**MWE0730SB**	34	37	79	8.0
7.3	NEW 3	Ext.	□	**MWE0730MB**	45	48	90	8.0
	3	Int.	●	**MWS0730MB**	37.5	40	94	8.0
	5	Int.	●	**MWS0730LB**	60	64	118	8.0
	8	Int.	●	**MWS0730X8DB**	83	88	142	8.0

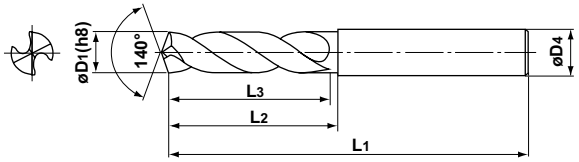
Drill Dia. D_1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L_3	L_2	L_1	D_4
	2	Ext.	●	**MWE0740SA**	34	34	74	7.4
	3	Ext.	●	**MWE0740MA**	45	45	87	7.4
	NEW 2	Ext.	□	**MWE0740SB**	34	37	79	8.0
7.4	NEW 3	Ext.	□	**MWE0740MB**	45	48	90	8.0
	3	Int.	●	**MWS0740MB**	37.5	40	94	8.0
	5	Int.	●	**MWS0740LB**	60	64	118	8.0
	8	Int.	●	**MWS0740X8DB**	83	88	142	8.0
	2	Ext.	●	**MWE0750SA**	34	34	74	7.5
	3	Ext.	●	**MWE0750MA**	45	45	87	7.5
	NEW 2	Ext.	●	**MWE0750SB**	34	37	79	8.0
7.5	NEW 3	Ext.	●	**MWE0750MB**	45	48	90	8.0
	3	Int.	●	**MWS0750MB**	37.5	40	94	8.0
	5	Int.	●	**MWS0750LB**	60	64	118	8.0
	8	Int.	●	**MWS0750X8DB**	83	88	142	8.0
	2	Ext.	●	**MWE0760SA**	37	37	79	7.6
	3	Ext.	●	**MWE0760MA**	48	48	90	7.6
	NEW 2	Ext.	□	**MWE0760SB**	37	37	79	8.0
7.6	NEW 3	Ext.	□	**MWE0760MB**	48	48	90	8.0
	3	Int.	●	**MWS0760MB**	40	40	94	8.0
	5	Int.	●	**MWS0760LB**	64	64	118	8.0
	8	Int.	●	**MWS0760X8DB**	88	88	142	8.0
	2	Ext.	●	**MWE0770SA**	37	37	79	7.7
	3	Ext.	●	**MWE0770MA**	48	48	90	7.7
	NEW 2	Ext.	●	**MWE0770SB**	37	37	79	8.0
7.7	NEW 3	Ext.	●	**MWE0770MB**	48	48	90	8.0
	3	Int.	●	**MWS0770MB**	40	40	94	8.0
	5	Int.	●	**MWS0770LB**	64	64	118	8.0
	8	Int.	●	**MWS0770X8DB**	88	88	142	8.0
	2	Ext.	●	**MWE0780SA**	37	37	79	7.8
	3	Ext.	●	**MWE0780MA**	48	48	90	7.8
	NEW 2	Ext.	●	**MWE0780SB**	37	37	79	8.0
7.8	NEW 3	Ext.	●	**MWE0780MB**	48	48	90	8.0
	3	Int.	●	**MWS0780MB**	40	40	94	8.0
	5	Int.	●	**MWS0780LB**	64	64	118	8.0
	8	Int.	●	**MWS0780X8DB**	88	88	142	8.0
	2	Ext.	●	**MWE0790SA**	37	37	79	7.9
	3	Ext.	●	**MWE0790MA**	48	48	90	7.9
	NEW 2	Ext.	●	**MWE0790SB**	37	37	79	8.0
7.9	NEW 3	Ext.	●	**MWE0790MB**	48	48	90	8.0
	3	Int.	●	**MWS0790MB**	40	40	94	8.0
	5	Int.	●	**MWS0790LB**	64	64	118	8.0
	8	Int.	●	**MWS0790X8DB**	88	88	142	8.0
	2	Ext.	●	**MWE0800SA**	37	37	79	8.0
	3	Ext.	●	**MWE0800MA**	48	48	90	8.0
	NEW 2	Ext.	●	**MWE0800SB**	37	37	79	8.0
8.0	NEW 3	Ext.	●	**MWE0800MB**	48	48	90	8.0
	3	Int.	●	**MWS0800MB**	40	40	94	8.0
	5	Int.	●	**MWS0800LB**	64	64	118	8.0
	8	Int.	●	**MWS0800X8DB**	88	88	142	8.0

WSTAR Drill

MIRACLE® coated

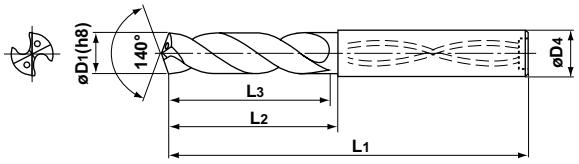
MWE (External coolant)

D1	D1≤3.0	3.0<D1≤6.0	6.0<D1≤10.0	10.0<D1≤18.0	18.0<D1≤30.0
Tolerance	0 -0.014	0 -0.018	0 -0.022	0 -0.027	0 -0.033



MWS (Internal coolant)

●MWS-SB/MB/LB/X8DB type can be used for shrink fit holders.



*MWS type with ø5.0 or larger diameter has a recess in the end face.

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
8.1	2	Ext.	●	MWE0810SA	37	37	79	8.1
	3	Ext.	●	MWE0810MA	53	53	96	8.1
	NEW 2	Ext.	□	MWE0810SB	37	40	84	9.0
	NEW 3	Ext.	□	MWE0810MB	53	56	98	9.0
	3	Int.	●	MWS0810MB	42.5	45	100	9.0
	5	Int.	●	MWS0810LB	68	72	127	9.0
	8	Int.	●	MWS0810X8DB	94	99	154	9.0
8.2	2	Ext.	●	MWE0820SA	37	37	79	8.2
	3	Ext.	●	MWE0820MA	53	53	96	8.2
	NEW 2	Ext.	□	MWE0820SB	37	40	84	9.0
	NEW 3	Ext.	□	MWE0820MB	53	56	98	9.0
	3	Int.	●	MWS0820MB	42.5	45	100	9.0
	5	Int.	●	MWS0820LB	68	72	127	9.0
	8	Int.	●	MWS0820X8DB	94	99	154	9.0
8.3	2	Ext.	●	MWE0830SA	37	37	79	8.3
	3	Ext.	●	MWE0830MA	53	53	96	8.3
	NEW 2	Ext.	□	MWE0830SB	37	40	84	9.0
	NEW 3	Ext.	□	MWE0830MB	53	56	98	9.0
	3	Int.	●	MWS0830MB	42.5	45	100	9.0
	5	Int.	●	MWS0830LB	68	72	127	9.0
	8	Int.	●	MWS0830X8DB	94	99	154	9.0
8.4	2	Ext.	●	MWE0840SA	37	37	79	8.4
	3	Ext.	●	MWE0840MA	53	53	96	8.4
	NEW 2	Ext.	●	MWE0840SB	37	40	84	9.0
	NEW 3	Ext.	●	MWE0840MB	53	56	98	9.0
	3	Int.	●	MWS0840MB	42.5	45	100	9.0
	5	Int.	●	MWS0840LB	68	72	127	9.0
	8	Int.	●	MWS0840X8DB	94	99	154	9.0
8.5	2	Ext.	●	MWE0850SA	37	37	79	8.5
	3	Ext.	●	MWE0850MA	53	53	96	8.5
	NEW 2	Ext.	●	MWE0850SB	37	40	84	9.0
	NEW 3	Ext.	●	MWE0850MB	53	56	98	9.0
	3	Int.	●	MWS0850MB	42.5	45	100	9.0
	5	Int.	●	MWS0850LB	68	72	127	9.0
	8	Int.	●	MWS0850X8DB	94	99	154	9.0
8.6	2	Ext.	●	MWE0860SA	40	40	84	8.6
	3	Ext.	●	MWE0860MA	55	55	98	8.6
	NEW 2	Ext.	●	MWE0860SB	40	40	84	9.0
	NEW 3	Ext.	●	MWE0860MB	55	55	98	9.0
	3	Int.	●	MWS0860MB	45	45	100	9.0
	5	Int.	●	MWS0860LB	72	72	127	9.0
	8	Int.	●	MWS0860X8DB	99	99	154	9.0
8.7	2	Ext.	●	MWE0870SA	40	40	84	8.7
	3	Ext.	●	MWE0870MA	55	55	98	8.7
	NEW 2	Ext.	□	MWE0870SB	40	40	84	9.0
	NEW 3	Ext.	□	MWE0870MB	55	55	98	9.0
	3	Int.	●	MWS0870MB	45	45	100	9.0
	5	Int.	●	MWS0870LB	72	72	127	9.0
	8	Int.	●	MWS0870X8DB	99	99	154	9.0
8.8	2	Ext.	●	MWE0880SA	40	40	84	8.8
	3	Ext.	●	MWE0880MA	55	55	98	8.8
	NEW 2	Ext.	□	MWE0880SB	40	40	84	9.0
	NEW 3	Ext.	□	MWE0880MB	55	55	98	9.0
	3	Int.	●	MWS0880MB	45	45	100	9.0
	5	Int.	●	MWS0880LB	72	72	127	9.0
	8	Int.	●	MWS0880X8DB	99	99	154	9.0
8.9	2	Ext.	●	MWE0890SA	40	40	84	8.9
	3	Ext.	●	MWE0890MA	55	55	98	8.9
	NEW 2	Ext.	□	MWE0890SB	40	40	84	9.0
	NEW 3	Ext.	□	MWE0890MB	55	55	98	9.0
	3	Int.	●	MWS0890MB	45	45	100	9.0
	5	Int.	●	MWS0890LB	72	72	127	9.0
	8	Int.	●	MWS0890X8DB	99	99	154	9.0
9.0	2	Ext.	●	MWE0900SA	40	40	84	9.0
	3	Ext.	●	MWE0900MA	55	55	98	9.0
	NEW 2	Ext.	●	MWE0900SB	40	40	84	9.0
	NEW 3	Ext.	●	MWE0900MB	55	55	98	9.0
	3	Int.	●	MWS0900MB	45	45	100	9.0
	5	Int.	●	MWS0900LB	72	72	127	9.0
	8	Int.	●	MWS0900X8DB	99	99	154	9.0

Note) Please contact Mitsubishi Carbide for any geometry that is not in the brochure (e.g. different diameter and length).

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

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
	2	Ext.	●	**MWE0910SA**	40	40	84	9.1
	3	Ext.	●	**MWE0910MA**	58	58	102	9.1
	NEW 2	Ext.	□	**MWE0910SB**	40	43	89	10.0
9.1	NEW 3	Ext.	□	**MWE0910MB**	58	61	105	10.0
	3	Int.	●	**MWS0910MB**	47.5	50	106	10.0
	5	Int.	●	**MWS0910LB**	76	80	136	10.0
	8	Int.	●	**MWS0910X8DB**	105	110	166	10.0
	2	Ext.	●	**MWE0920SA**	40	40	84	9.2
	3	Ext.	●	**MWE0920MA**	58	58	102	9.2
	NEW 2	Ext.	□	**MWE0920SB**	40	43	89	10.0
9.2	NEW 3	Ext.	□	**MWE0920MB**	58	61	105	10.0
	3	Int.	●	**MWS0920MB**	47.5	50	106	10.0
	5	Int.	●	**MWS0920LB**	76	80	136	10.0
	8	Int.	●	**MWS0920X8DB**	105	110	166	10.0
	2	Ext.	●	**MWE0930SA**	40	40	84	9.3
	3	Ext.	●	**MWE0930MA**	58	58	102	9.3
	NEW 2	Ext.	□	**MWE0930SB**	40	43	89	10.0
9.3	NEW 3	Ext.	□	**MWE0930MB**	58	61	105	10.0
	3	Int.	●	**MWS0930MB**	47.5	50	106	10.0
	5	Int.	●	**MWS0930LB**	76	80	136	10.0
	8	Int.	●	**MWS0930X8DB**	105	110	166	10.0
	2	Ext.	●	**MWE0940SA**	40	40	84	9.4
	3	Ext.	●	**MWE0940MA**	58	58	102	9.4
	NEW 2	Ext.	●	**MWE0940SB**	40	43	89	10.0
9.4	NEW 3	Ext.	●	**MWE0940MB**	58	61	105	10.0
	3	Int.	●	**MWS0940MB**	47.5	50	106	10.0
	5	Int.	●	**MWS0940LB**	76	80	136	10.0
	8	Int.	●	**MWS0940X8DB**	105	110	166	10.0
	2	Ext.	●	**MWE0950SA**	40	40	84	9.5
	3	Ext.	●	**MWE0950MA**	58	58	102	9.5
	NEW 2	Ext.	●	**MWE0950SB**	40	43	89	10.0
9.5	NEW 3	Ext.	●	**MWE0950MB**	58	61	105	10.0
	3	Int.	●	**MWS0950MB**	47.5	50	106	10.0
	5	Int.	●	**MWS0950LB**	76	80	136	10.0
	8	Int.	●	**MWS0950X8DB**	105	110	166	10.0
	2	Ext.	●	**MWE0960SA**	43	43	89	9.6
	3	Ext.	●	**MWE0960MA**	60	60	105	9.6
	NEW 2	Ext.	●	**MWE0960SB**	43	43	89	10.0
9.6	NEW 3	Ext.	●	**MWE0960MB**	60	60	105	10.0
	3	Int.	●	**MWS0960MB**	50	50	106	10.0
	5	Int.	●	**MWS0960LB**	80	80	136	10.0
	8	Int.	●	**MWS0960X8DB**	110	110	166	10.0
	2	Ext.	●	**MWE0970SA**	43	43	89	9.7
	3	Ext.	●	**MWE0970MA**	60	60	105	9.7
	NEW 2	Ext.	□	**MWE0970SB**	43	43	89	10.0
9.7	NEW 3	Ext.	□	**MWE0970MB**	60	60	105	10.0
	3	Int.	●	**MWS0970MB**	50	50	106	10.0
	5	Int.	●	**MWS0970LB**	80	80	136	10.0
	8	Int.	●	**MWS0970X8DB**	110	110	166	10.0

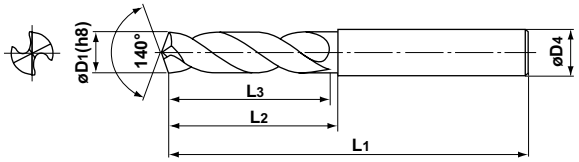
Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
	2	Ext.	●	**MWE0980SA**	43	43	89	9.8
	3	Ext.	●	**MWE0980MA**	60	60	105	9.8
	NEW 2	Ext.	□	**MWE0980SB**	43	43	89	10.0
9.8	NEW 3	Ext.	□	**MWE0980MB**	60	60	105	10.0
	3	Int.	●	**MWS0980MB**	50	50	106	10.0
	5	Int.	●	**MWS0980LB**	80	80	136	10.0
	8	Int.	●	**MWS0980X8DB**	110	110	166	10.0
	2	Ext.	●	**MWE0990SA**	43	43	89	9.9
	3	Ext.	●	**MWE0990MA**	60	60	105	9.9
	NEW 2	Ext.	□	**MWE0990SB**	43	43	89	10.0
9.9	NEW 3	Ext.	□	**MWE0990MB**	60	60	105	10.0
	3	Int.	●	**MWS0990MB**	50	50	106	10.0
	5	Int.	●	**MWS0990LB**	80	80	136	10.0
	8	Int.	●	**MWS0990X8DB**	110	110	166	10.0
	2	Ext.	●	**MWE1000SA**	43	43	89	10.0
	3	Ext.	●	**MWE1000MA**	60	60	105	10.0
	NEW 2	Ext.	●	**MWE1000SB**	43	43	89	10.0
10.0	NEW 3	Ext.	●	**MWE1000MB**	60	60	105	10.0
	3	Int.	●	**MWS1000MB**	50	50	106	10.0
	5	Int.	●	**MWS1000LB**	80	80	136	10.0
	8	Int.	●	**MWS1000X8DB**	110	110	166	10.0
	2	Ext.	●	**MWE1010SA**	43	43	89	10.1
	3	Ext.	●	**MWE1010MA**	66	66	112	10.1
	NEW 2	Ext.	□	**MWE1010SB**	43	46	95	11.0
10.1	NEW 3	Ext.	□	**MWE1010MB**	66	69	114	11.0
	3	Int.	●	**MWS1010MB**	52.5	55	116	11.0
	5	Int.	●	**MWS1010LB**	84	88	149	11.0
	8	Int.	●	**MWS1010X8DB**	116	121	182	11.0
	2	Ext.	●	**MWE1020SA**	43	43	89	10.2
	3	Ext.	●	**MWE1020MA**	66	66	112	10.2
	NEW 2	Ext.	●	**MWE1020SB**	43	46	95	11.0
10.2	NEW 3	Ext.	●	**MWE1020MB**	66	69	114	11.0
	3	Int.	●	**MWS1020MB**	52.5	55	116	11.0
	5	Int.	●	**MWS1020LB**	84	88	149	11.0
	8	Int.	●	**MWS1020X8DB**	116	121	182	11.0
	2	Ext.	●	**MWE1030SA**	43	43	89	10.3
	3	Ext.	●	**MWE1030MA**	66	66	112	10.3
	NEW 2	Ext.	●	**MWE1030SB**	43	46	95	11.0
10.3	NEW 3	Ext.	●	**MWE1030MB**	66	69	114	11.0
	3	Int.	●	**MWS1030MB**	52.5	55	116	11.0
	5	Int.	●	**MWS1030LB**	84	88	149	11.0
	8	Int.	●	**MWS1030X8DB**	116	121	182	11.0
	2	Ext.	●	**MWE1040SA**	43	43	89	10.4
	3	Ext.	●	**MWE1040MA**	66	66	112	10.4
	NEW 2	Ext.	●	**MWE1040SB**	43	46	95	11.0
10.4	NEW 3	Ext.	●	**MWE1040MB**	66	69	114	11.0
	3	Int.	●	**MWS1040MB**	52.5	55	116	11.0
	5	Int.	●	**MWS1040LB**	84	88	149	11.0
	8	Int.	●	**MWS1040X8DB**	116	121	182	11.0

WSTAR Drill

MIRACLE® coated

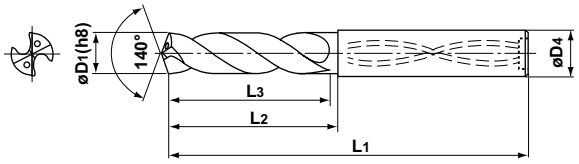
MWE (External coolant)

D1	D1≤3.0	3.0<D1≤6.0	6.0<D1≤10.0	10.0<D1≤18.0	18.0<D1≤30.0
Tolerance	0 -0.014	0 -0.018	0 -0.022	0 -0.027	0 -0.033



MWS (Internal coolant)

●MWS-SB/MB/LB/X8DB type can be used for shrink fit holders.



*MWS type with ø5.0 or larger diameter has a recess in the end face.

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
10.5	2	Ext.	●	MWE1050SA	43	43	89	10.5
	3	Ext.	●	MWE1050MA	66	66	112	10.5
	NEW 2	Ext.	●	MWE1050SB	43	46	95	11.0
	NEW 3	Ext.	●	MWE1050MB	66	69	114	11.0
	3	Int.	●	MWS1050MB	52.5	55	116	11.0
	5	Int.	●	MWS1050LB	84	88	149	11.0
	8	Int.	●	MWS1050X8DB	116	121	182	11.0
10.6	2	Ext.	●	MWE1060SA	43	43	89	10.6
	3	Ext.	●	MWE1060MA	68	68	114	10.6
	NEW 2	Ext.	□	MWE1060SB	47	47	95	11.0
	NEW 3	Ext.	□	MWE1060MB	68	68	114	11.0
	3	Int.	●	MWS1060MB	55	55	116	11.0
	5	Int.	●	MWS1060LB	88	88	149	11.0
	8	Int.	●	MWS1060X8DB	121	121	182	11.0
10.7	2	Ext.	●	MWE1070SA	47	47	95	10.7
	3	Ext.	●	MWE1070MA	68	68	114	10.7
	NEW 2	Ext.	□	MWE1070SB	47	47	95	11.0
	NEW 3	Ext.	□	MWE1070MB	68	68	114	11.0
	3	Int.	●	MWS1070MB	55	55	116	11.0
	5	Int.	●	MWS1070LB	88	88	149	11.0
	8	Int.	●	MWS1070X8DB	121	121	182	11.0
10.8	2	Ext.	●	MWE1080SA	47	47	95	10.8
	3	Ext.	●	MWE1080MA	68	68	114	10.8
	NEW 2	Ext.	□	MWE1080SB	47	47	95	11.0
	NEW 3	Ext.	□	MWE1080MB	68	68	114	11.0
	3	Int.	●	MWS1080MB	55	55	116	11.0
	5	Int.	●	MWS1080LB	88	88	149	11.0
	8	Int.	●	MWS1080X8DB	121	121	182	11.0
10.9	2	Ext.	●	MWE1090SA	47	47	95	10.9
	3	Ext.	●	MWE1090MA	68	68	114	10.9
	NEW 2	Ext.	□	MWE1090SB	47	47	95	11.0
	NEW 3	Ext.	□	MWE1090MB	68	68	114	11.0
	3	Int.	●	MWS1090MB	55	55	116	11.0
	5	Int.	●	MWS1090LB	88	88	149	11.0
	8	Int.	●	MWS1090X8DB	121	121	182	11.0

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
11.0	2	Ext.	●	MWE1100SA	47	47	95	11.0
	3	Ext.	●	MWE1100MA	68	68	114	11.0
	NEW 2	Ext.	●	MWE1100SB	47	47	95	11.0
	NEW 3	Ext.	●	MWE1100MB	68	68	114	11.0
	3	Int.	●	MWS1100MB	55	55	116	11.0
	5	Int.	●	MWS1100LB	88	88	149	11.0
	8	Int.	●	MWS1100X8DB	121	121	182	11.0
11.1	2	Ext.	●	MWE1110SA	47	47	95	11.1
	3	Ext.	●	MWE1110MA	71	71	118	11.1
	NEW 2	Ext.	□	MWE1110SB	47	50	95	12.0
	NEW 3	Ext.	□	MWE1110MB	71	74	121	12.0
	3	Int.	●	MWS1110MB	57.5	60	122	12.0
	5	Int.	●	MWS1110LB	92	96	158	12.0
	8	Int.	●	MWS1110X8DB	127	132	194	12.0
11.2	2	Ext.	●	MWE1120SA	47	47	95	11.2
	3	Ext.	●	MWE1120MA	71	71	118	11.2
	NEW 2	Ext.	□	MWE1120SB	47	50	95	12.0
	NEW 3	Ext.	□	MWE1120MB	71	74	121	12.0
	3	Int.	●	MWS1120MB	57.5	60	122	12.0
	5	Int.	●	MWS1120LB	92	96	158	12.0
	8	Int.	●	MWS1120X8DB	127	132	194	12.0
11.3	2	Ext.	●	MWE1130SA	47	47	95	11.3
	3	Ext.	●	MWE1130MA	71	71	118	11.3
	NEW 2	Ext.	□	MWE1130SB	47	50	95	12.0
	NEW 3	Ext.	□	MWE1130MB	71	74	121	12.0
	3	Int.	●	MWS1130MB	57.5	60	122	12.0
	5	Int.	●	MWS1130LB	92	96	158	12.0
	8	Int.	●	MWS1130X8DB	127	132	194	12.0
11.4	2	Ext.	●	MWE1140SA	47	47	95	11.4
	3	Ext.	●	MWE1140MA	71	71	118	11.4
	NEW 2	Ext.	□	MWE1140SB	47	50	95	12.0
	NEW 3	Ext.	□	MWE1140MB	71	74	121	12.0
	3	Int.	●	MWS1140MB	57.5	60	122	12.0
	5	Int.	●	MWS1140LB	92	96	158	12.0
	8	Int.	●	MWS1140X8DB	127	132	194	12.0

Note) Please contact Mitsubishi Carbide for any geometry that is not in the brochure (e.g. different diameter and length).

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

Drill Dia. D_1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L_3	L_2	L_1	D_4
	2	Ext.	●	**MWE1150SA**	47	47	95	11.5
	3	Ext.	●	**MWE1150MA**	71	71	118	11.5
	NEW 2	Ext.	●	**MWE1150SB**	47	50	95	12.0
11.5	NEW 3	Ext.	●	**MWE1150MB**	71	74	121	12.0
	3	Int.	●	**MWS1150MB**	57.5	60	122	12.0
	5	Int.	●	**MWS1150LB**	92	96	158	12.0
	8	Int.	●	**MWS1150X8DB**	127	132	194	12.0
	2	Ext.	●	**MWE1160SA**	47	47	95	11.6
	3	Ext.	●	**MWE1160MA**	73	73	121	11.6
	NEW 2	Ext.	□	**MWE1160SB**	47	47	95	12.0
11.6	NEW 3	Ext.	□	**MWE1160MB**	73	73	121	12.0
	3	Int.	●	**MWS1160MB**	60	60	122	12.0
	5	Int.	●	**MWS1160LB**	96	96	158	12.0
	8	Int.	●	**MWS1160X8DB**	132	132	194	12.0
	2	Ext.	●	**MWE1170SA**	47	47	95	11.7
	3	Ext.	●	**MWE1170MA**	73	73	121	11.7
	NEW 2	Ext.	□	**MWE1170SB**	47	47	95	12.0
11.7	NEW 3	Ext.	□	**MWE1170MB**	73	73	121	12.0
	3	Int.	●	**MWS1170MB**	60	60	122	12.0
	5	Int.	●	**MWS1170LB**	96	96	158	12.0
	8	Int.	●	**MWS1170X8DB**	132	132	194	12.0
	2	Ext.	●	**MWE1180SA**	47	47	95	11.8
	3	Ext.	●	**MWE1180MA**	73	73	121	11.8
	NEW 2	Ext.	□	**MWE1180SB**	47	47	95	12.0
11.8	NEW 3	Ext.	□	**MWE1180MB**	73	73	121	12.0
	3	Int.	●	**MWS1180MB**	60	60	122	12.0
	5	Int.	●	**MWS1180LB**	96	96	158	12.0
	8	Int.	●	**MWS1180X8DB**	132	132	194	12.0
	2	Ext.	●	**MWE1190SA**	51	51	102	11.9
	3	Ext.	●	**MWE1190MA**	73	73	121	11.9
	NEW 2	Ext.	●	**MWE1190SB**	47	47	95	12.0
11.9	NEW 3	Ext.	●	**MWE1190MB**	73	73	121	12.0
	3	Int.	●	**MWS1190MB**	60	60	122	12.0
	5	Int.	●	**MWS1190LB**	96	96	158	12.0
	8	Int.	●	**MWS1190X8DB**	132	132	194	12.0
	2	Ext.	●	**MWE1200SA**	51	51	102	12.0
	3	Ext.	●	**MWE1200MA**	73	73	121	12.0
	NEW 2	Ext.	●	**MWE1200SB**	47	47	95	12.0
12.0	NEW 3	Ext.	●	**MWE1200MB**	73	73	121	12.0
	3	Int.	●	**MWS1200MB**	60	60	122	12.0
	5	Int.	●	**MWS1200LB**	96	96	158	12.0
	8	Int.	●	**MWS1200X8DB**	132	132	194	12.0
	2	Ext.	●	**MWE1210SA**	51	51	102	12.1
	3	Ext.	●	**MWE1210MA**	76	76	135	12.1
	NEW 2	Ext.	●	**MWE1210SB**	51	54	102	13.0
12.1	NEW 3	Ext.	●	**MWE1210MB**	76	79	137	13.0
	3	Int.	●	**MWS1210MB**	62.5	65	128	13.0
	5	Int.	●	**MWS1210LB**	100	104	167	13.0
	8	Int.	□	**MWS1210X8DB**	138	143	206	13.0

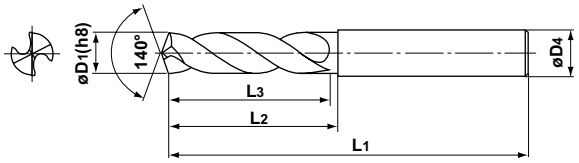
Drill Dia. D_1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L_3	L_2	L_1	D_4
	2	Ext.	●	**MWE1220SA**	51	51	102	12.2
	3	Ext.	●	**MWE1220MA**	76	76	135	12.2
	NEW 2	Ext.	□	**MWE1220SB**	51	54	102	13.0
12.2	NEW 3	Ext.	□	**MWE1220MB**	76	79	137	13.0
	3	Int.	●	**MWS1220MB**	62.5	65	128	13.0
	5	Int.	●	**MWS1220LB**	100	104	167	13.0
	8	Int.	□	**MWS1220X8DB**	138	143	206	13.0
	2	Ext.	●	**MWE1230SA**	51	51	102	12.3
	3	Ext.	●	**MWE1230MA**	76	76	135	12.3
	NEW 2	Ext.	□	**MWE1230SB**	51	54	102	13.0
12.3	NEW 3	Ext.	□	**MWE1230MB**	76	79	137	13.0
	3	Int.	●	**MWS1230MB**	62.5	65	128	13.0
	5	Int.	●	**MWS1230LB**	100	104	167	13.0
	8	Int.	□	**MWS1230X8DB**	138	143	206	13.0
	2	Ext.	●	**MWE1240SA**	51	51	102	12.4
	3	Ext.	●	**MWE1240MA**	76	76	135	12.4
	NEW 2	Ext.	□	**MWE1240SB**	51	54	102	13.0
12.4	NEW 3	Ext.	□	**MWE1240MB**	76	79	137	13.0
	3	Int.	●	**MWS1240MB**	62.5	65	128	13.0
	5	Int.	●	**MWS1240LB**	100	104	167	13.0
	8	Int.	□	**MWS1240X8DB**	138	143	206	13.0
	2	Ext.	●	**MWE1250SA**	51	51	102	12.5
	3	Ext.	●	**MWE1250MA**	76	76	135	12.5
	NEW 2	Ext.	●	**MWE1250SB**	51	54	102	13.0
12.5	NEW 3	Ext.	●	**MWE1250MB**	76	79	137	13.0
	3	Int.	●	**MWS1250MB**	62.5	65	128	13.0
	5	Int.	●	**MWS1250LB**	100	104	167	13.0
	8	Int.	●	**MWS1250X8DB**	138	143	206	13.0
	2	Ext.	●	**MWE1260SA**	51	51	102	12.6
	3	Ext.	●	**MWE1260MA**	78	78	137	12.6
	NEW 2	Ext.	□	**MWE1260SB**	51	51	102	13.0
12.6	NEW 3	Ext.	□	**MWE1260MB**	78	78	137	13.0
	3	Int.	●	**MWS1260MB**	65	65	128	13.0
	5	Int.	●	**MWS1260LB**	104	104	167	13.0
	8	Int.	□	**MWS1260X8DB**	143	143	206	13.0
	2	Ext.	●	**MWE1270SA**	51	51	102	12.7
	3	Ext.	●	**MWE1270MA**	78	78	137	12.7
	NEW 2	Ext.	□	**MWE1270SB**	51	51	102	13.0
12.7	NEW 3	Ext.	□	**MWE1270MB**	78	78	137	13.0
	3	Int.	●	**MWS1270MB**	65	65	128	13.0
	5	Int.	●	**MWS1270LB**	104	104	167	13.0
	8	Int.	□	**MWS1270X8DB**	143	143	206	13.0
	2	Ext.	●	**MWE1280SA**	51	51	102	12.8
	3	Ext.	●	**MWE1280MA**	78	78	137	12.8
	NEW 2	Ext.	□	**MWE1280SB**	51	51	102	13.0
12.8	NEW 3	Ext.	□	**MWE1280MB**	78	78	137	13.0
	3	Int.	●	**MWS1280MB**	65	65	128	13.0
	5	Int.	●	**MWS1280LB**	104	104	167	13.0
	8	Int.	□	**MWS1280X8DB**	143	143	206	13.0

WSTAR Drill

MIRACLE® coated

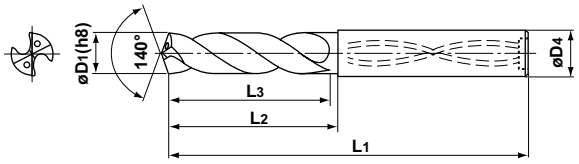
MWE (External coolant)

D1	D1≤3.0	3.0<D1≤6.0	6.0<D1≤10.0	10.0<D1≤18.0	18.0<D1≤30.0
Tolerance	0 -0.014	0 -0.018	0 -0.022	0 -0.027	0 -0.033



MWS (Internal coolant)

●MWS-SB/MB/LB/X8DB type can be used for shrink fit holders.



*MWS type with ø5.0 or larger diameter has a recess in the end face.

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
	2	Ext.	●	**MWE1290SA**	51	51	102	12.9
	3	Ext.	●	**MWE1290MA**	78	78	137	12.9
	NEW 2	Ext.	□	**MWE1290SB**	51	51	102	13.0
12.9	NEW 3	Ext.	□	**MWE1290MB**	78	78	137	13.0
	3	Int.	●	**MWS1290MB**	65	65	128	13.0
	5	Int.	●	**MWS1290LB**	104	104	167	13.0
	8	Int.	□	**MWS1290X8DB**	143	143	206	13.0
	2	Ext.	●	**MWE1300SA**	51	51	102	13.0
	3	Ext.	●	**MWE1300MA**	78	78	137	13.0
	NEW 2	Ext.	●	**MWE1300SB**	51	51	102	13.0
13.0	NEW 3	Ext.	●	**MWE1300MB**	78	78	137	13.0
	3	Int.	●	**MWS1300MB**	65	65	128	13.0
	5	Int.	●	**MWS1300LB**	104	104	167	13.0
	8	Int.	●	**MWS1300X8DB**	143	143	206	13.0
	2	Ext.	●	**MWE1310SA**	51	51	102	13.1
	3	Ext.	●	**MWE1310MA**	84	84	144	13.1
	NEW 2	Ext.	□	**MWE1310SB**	54	57	107	14.0
13.1	NEW 3	Ext.	□	**MWE1310MB**	84	87	147	14.0
	3	Int.	●	**MWS1310MB**	67.5	70	134	14.0
	5	Int.	●	**MWS1310LB**	108	112	176	14.0
	8	Int.	□	**MWS1310X8DB**	149	154	218	14.0
	2	Ext.	●	**MWE1320SA**	51	51	102	13.2
	3	Ext.	●	**MWE1320MA**	84	84	144	13.2
	NEW 2	Ext.	□	**MWE1320SB**	54	57	107	14.0
13.2	NEW 3	Ext.	□	**MWE1320MB**	84	87	147	14.0
	3	Int.	●	**MWS1320MB**	67.5	70	134	14.0
	5	Int.	●	**MWS1320LB**	108	112	176	14.0
	8	Int.	□	**MWS1320X8DB**	149	154	218	14.0
	2	Ext.	●	**MWE1330SA**	54	54	107	13.3
	3	Ext.	●	**MWE1330MA**	84	84	144	13.3
	NEW 2	Ext.	□	**MWE1330SB**	54	57	107	14.0
13.3	NEW 3	Ext.	□	**MWE1330MB**	84	87	147	14.0
	3	Int.	●	**MWS1330MB**	67.5	70	134	14.0
	5	Int.	●	**MWS1330LB**	108	112	176	14.0
	8	Int.	□	**MWS1330X8DB**	149	154	218	14.0

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
	2	Ext.	●	**MWE1340SA**	54	54	107	13.4
	3	Ext.	●	**MWE1340MA**	84	84	144	13.4
	NEW 2	Ext.	□	**MWE1340SB**	54	57	107	14.0
13.4	NEW 3	Ext.	□	**MWE1340MB**	84	87	147	14.0
	3	Int.	●	**MWS1340MB**	67.5	70	134	14.0
	5	Int.	●	**MWS1340LB**	108	112	176	14.0
	8	Int.	□	**MWS1340X8DB**	149	154	218	14.0
	2	Ext.	●	**MWE1350SA**	54	54	107	13.5
	3	Ext.	●	**MWE1350MA**	84	84	144	13.5
	NEW 2	Ext.	●	**MWE1350SB**	54	57	107	14.0
13.5	NEW 3	Ext.	●	**MWE1350MB**	84	87	147	14.0
	3	Int.	●	**MWS1350MB**	67.5	70	134	14.0
	5	Int.	●	**MWS1350LB**	108	112	176	14.0
	8	Int.	●	**MWS1350X8DB**	149	154	218	14.0
	2	Ext.	●	**MWE1360SA**	54	54	107	13.6
	3	Ext.	●	**MWE1360MA**	86	86	147	13.6
	NEW 2	Ext.	□	**MWE1360SB**	54	54	107	14.0
13.6	NEW 3	Ext.	□	**MWE1360MB**	86	86	147	14.0
	3	Int.	●	**MWS1360MB**	70	70	134	14.0
	5	Int.	●	**MWS1360LB**	112	112	176	14.0
	8	Int.	□	**MWS1360X8DB**	154	154	218	14.0
	2	Ext.	●	**MWE1370SA**	54	54	107	13.7
	3	Ext.	●	**MWE1370MA**	86	86	147	13.7
	NEW 2	Ext.	□	**MWE1370SB**	54	54	107	14.0
13.7	NEW 3	Ext.	□	**MWE1370MB**	86	86	147	14.0
	3	Int.	●	**MWS1370MB**	70	70	134	14.0
	5	Int.	●	**MWS1370LB**	112	112	176	14.0
	8	Int.	□	**MWS1370X8DB**	154	154	218	14.0
	2	Ext.	●	**MWE1380SA**	54	54	107	13.8
	3	Ext.	●	**MWE1380MA**	86	86	147	13.8
	NEW 2	Ext.	□	**MWE1380SB**	54	54	107	14.0
13.8	NEW 3	Ext.	□	**MWE1380MB**	86	86	147	14.0
	3	Int.	●	**MWS1380MB**	70	70	134	14.0
	5	Int.	●	**MWS1380LB**	112	112	176	14.0
	8	Int.	□	**MWS1380X8DB**	154	154	218	14.0

Note) Please contact Mitsubishi Carbide for any geometry that is not in the brochure (e.g. different diameter and length).

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

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
	2	Ext.	●	**MWE1390SA**	54	54	107	13.9
	3	Ext.	●	**MWE1390MA**	86	86	147	13.9
	NEW 2	Ext.	●	**MWE1390SB**	54	54	107	14.0
13.9	NEW 3	Ext.	●	**MWE1390MB**	86	86	147	14.0
	3	Int.	●	**MWS1390MB**	70	70	134	14.0
	5	Int.	●	**MWS1390LB**	112	112	176	14.0
	8	Int.	□	**MWS1390X8DB**	154	154	218	14.0
	2	Ext.	●	**MWE1400SA**	54	54	107	14.0
	3	Ext.	●	**MWE1400MA**	86	86	147	14.0
	NEW 2	Ext.	●	**MWE1400SB**	54	54	107	14.0
14.0	NEW 3	Ext.	●	**MWE1400MB**	86	86	147	14.0
	3	Int.	●	**MWS1400MB**	70	70	134	14.0
	5	Int.	●	**MWS1400LB**	112	112	176	14.0
	8	Int.	●	**MWS1400X8DB**	154	154	218	14.0
	2	Ext.	●	**MWE1410SA**	56	56	111	14.1
	3	Ext.	●	**MWE1410MA**	89	89	151	14.1
	NEW 2	Ext.	●	**MWE1410SB**	56	59	111	15.0
14.1	NEW 3	Ext.	●	**MWE1410MB**	89	92	153	15.0
	3	Int.	●	**MWS1410MB**	72.5	75	140	15.0
	5	Int.	●	**MWS1410LB**	116	120	185	15.0
	8	Int.	□	**MWS1410X8DB**	160	165	225	15.0
	2	Ext.	●	**MWE1420SA**	56	56	111	14.2
	3	Ext.	●	**MWE1420MA**	89	89	151	14.2
	NEW 2	Ext.	□	**MWE1420SB**	56	59	111	15.0
14.2	NEW 3	Ext.	□	**MWE1420MB**	89	92	153	15.0
	3	Int.	●	**MWS1420MB**	72.5	75	140	15.0
	5	Int.	●	**MWS1420LB**	116	120	185	15.0
	8	Int.	●	**MWS1420X8DB**	160	165	225	15.0
	2	Ext.	□	**MWE1430SA**	56	56	111	14.3
	3	Ext.	●	**MWE1430MA**	89	89	151	14.3
	NEW 2	Ext.	□	**MWE1430SB**	56	59	111	15.0
14.3	NEW 3	Ext.	□	**MWE1430MB**	89	92	153	15.0
	3	Int.	●	**MWS1430MB**	72.5	75	140	15.0
	5	Int.	●	**MWS1430LB**	116	120	185	15.0
	8	Int.	□	**MWS1430X8DB**	160	165	225	15.0
	2	Ext.	□	**MWE1440SA**	56	56	111	14.4
	3	Ext.	●	**MWE1440MA**	89	89	151	14.4
	NEW 2	Ext.	□	**MWE1440SB**	56	59	111	15.0
14.4	NEW 3	Ext.	□	**MWE1440MB**	89	92	153	15.0
	3	Int.	●	**MWS1440MB**	72.5	75	140	15.0
	5	Int.	●	**MWS1440LB**	116	120	185	15.0
	8	Int.	□	**MWS1440X8DB**	160	165	225	15.0
	2	Ext.	●	**MWE1450SA**	56	56	111	14.5
	3	Ext.	●	**MWE1450MA**	89	89	151	14.5
	NEW 2	Ext.	●	**MWE1450SB**	56	59	111	15.0
14.5	NEW 3	Ext.	●	**MWE1450MB**	89	92	153	15.0
	3	Int.	●	**MWS1450MB**	72.5	75	140	15.0
	5	Int.	●	**MWS1450LB**	116	120	185	15.0
	8	Int.	●	**MWS1450X8DB**	160	165	225	15.0

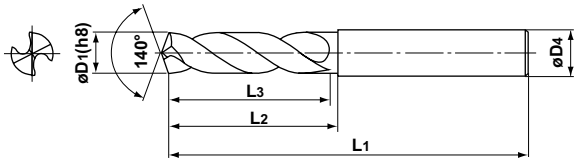
Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
	2	Ext.	□	**MWE1460SA**	56	56	111	14.6
	3	Ext.	●	**MWE1460MA**	91	91	153	14.6
	NEW 2	Ext.	□	**MWE1460SB**	56	56	111	15.0
14.6	NEW 3	Ext.	□	**MWE1460MB**	91	91	153	15.0
	3	Int.	●	**MWS1460MB**	75	75	140	15.0
	5	Int.	●	**MWS1460LB**	120	120	185	15.0
	8	Int.	●	**MWS1460X8DB**	165	165	225	15.0
	2	Ext.	□	**MWE1470SA**	56	56	111	14.7
	3	Ext.	●	**MWE1470MA**	91	91	153	14.7
	NEW 2	Ext.	□	**MWE1470SB**	56	56	111	15.0
14.7	NEW 3	Ext.	□	**MWE1470MB**	91	91	153	15.0
	3	Int.	●	**MWS1470MB**	75	75	140	15.0
	5	Int.	●	**MWS1470LB**	120	120	185	15.0
	8	Int.	□	**MWS1470X8DB**	165	165	225	15.0
	2	Ext.	□	**MWE1480SA**	56	56	111	14.8
	3	Ext.	●	**MWE1480MA**	91	91	153	14.8
	NEW 2	Ext.	□	**MWE1480SB**	56	56	111	15.0
14.8	NEW 3	Ext.	□	**MWE1480MB**	91	91	153	15.0
	3	Int.	●	**MWS1480MB**	75	75	140	15.0
	5	Int.	●	**MWS1480LB**	120	120	185	15.0
	8	Int.	□	**MWS1480X8DB**	165	165	225	15.0
	2	Ext.	□	**MWE1490SA**	56	56	111	14.9
	3	Ext.	●	**MWE1490MA**	91	91	153	14.9
	NEW 2	Ext.	□	**MWE1490SB**	56	56	111	15.0
14.9	NEW 3	Ext.	□	**MWE1490MB**	91	91	153	15.0
	3	Int.	●	**MWS1490MB**	75	75	140	15.0
	5	Int.	●	**MWS1490LB**	120	120	185	15.0
	8	Int.	□	**MWS1490X8DB**	165	165	225	15.0
	2	Ext.	●	**MWE1500SA**	56	56	111	15.0
	3	Ext.	●	**MWE1500MA**	91	91	153	15.0
	NEW 2	Ext.	●	**MWE1500SB**	56	56	111	15.0
15.0	NEW 3	Ext.	●	**MWE1500MB**	91	91	153	15.0
	3	Int.	●	**MWS1500MB**	75	75	140	15.0
	5	Int.	●	**MWS1500LB**	120	120	185	15.0
	8	Int.	●	**MWS1500X8DB**	165	165	225	15.0
	2	Ext.	□	**MWE1510SA**	58	58	115	15.1
	3	Ext.	●	**MWE1510MA**	94	94	157	15.1
	NEW 2	Ext.	□	**MWE1510SB**	58	61	115	16.0
15.1	NEW 3	Ext.	□	**MWE1510MB**	94	97	160	16.0
	3	Int.	●	**MWS1510MB**	77.5	80	145	16.0
	5	Int.	●	**MWS1510LB**	124	128	193	16.0
	8	Int.	□	**MWS1510X8DB**	171	176	241	16.0
	2	Ext.	●	**MWE1520SA**	58	58	115	15.2
	3	Ext.	●	**MWE1520MA**	94	94	157	15.2
	NEW 2	Ext.	□	**MWE1520SB**	58	61	115	16.0
15.2	NEW 3	Ext.	□	**MWE1520MB**	94	97	160	16.0
	3	Int.	●	**MWS1520MB**	77.5	80	145	16.0
	5	Int.	●	**MWS1520LB**	124	128	193	16.0
	8	Int.	□	**MWS1520X8DB**	171	176	241	16.0

WSTAR Drill

MIRACLE® coated

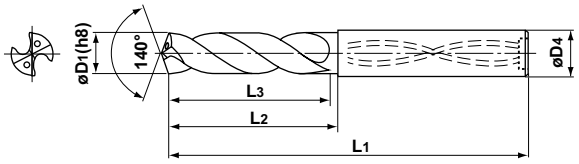
MWE (External coolant)

D1	D1≤3.0	3.0<D1≤6.0	6.0<D1≤10.0	10.0<D1≤18.0	18.0<D1≤30.0
Tolerance	0 -0.014	0 -0.018	0 -0.022	0 -0.027	0 -0.033



MWS (Internal coolant)

●MWS-SB/MB/LB/X8DB type can be used for shrink fit holders.



*MWS type with ø5.0 or larger diameter has a recess in the end face.

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
15.3	2	Ext.	□	MWE1530SA	58	58	115	15.3
	3	Ext.	●	MWE1530MA	94	94	157	15.3
	NEW 2	Ext.	□	MWE1530SB	58	61	115	16.0
	NEW 3	Ext.	□	MWE1530MB	94	97	160	16.0
	3	Int.	●	MWS1530MB	77.5	80	145	16.0
	5	Int.	●	MWS1530LB	124	128	193	16.0
	8	Int.	□	MWS1530X8DB	171	176	241	16.0
15.4	2	Ext.	□	MWE1540SA	58	58	115	15.4
	3	Ext.	●	MWE1540MA	94	94	157	15.4
	NEW 2	Ext.	●	MWE1540SB	58	61	115	16.0
	NEW 3	Ext.	●	MWE1540MB	94	97	160	16.0
	3	Int.	●	MWS1540MB	77.5	80	145	16.0
	5	Int.	●	MWS1540LB	124	128	193	16.0
	8	Int.	□	MWS1540X8DB	171	176	241	16.0
15.5	2	Ext.	●	MWE1550SA	58	58	115	15.5
	3	Ext.	●	MWE1550MA	94	94	157	15.5
	NEW 2	Ext.	●	MWE1550SB	58	61	115	16.0
	NEW 3	Ext.	●	MWE1550MB	94	97	160	16.0
	3	Int.	●	MWS1550MB	77.5	80	145	16.0
	5	Int.	●	MWS1550LB	124	128	193	16.0
	8	Int.	●	MWS1550X8DB	171	176	241	16.0
15.6	2	Ext.	□	MWE1560SA	58	58	115	5.6
	3	Ext.	●	MWE1560MA	96	96	160	15.6
	NEW 2	Ext.	●	MWE1560SB	58	58	115	16.0
	NEW 3	Ext.	●	MWE1560MB	96	96	160	16.0
	3	Int.	●	MWS1560MB	80	80	145	16.0
	5	Int.	●	MWS1560LB	128	128	193	16.0
	8	Int.	□	MWS1560X8DB	176	176	241	16.0
15.7	2	Ext.	□	MWE1570SA	58	58	115	15.7
	3	Ext.	●	MWE1570MA	96	96	160	15.7
	NEW 2	Ext.	□	MWE1570SB	58	58	115	16.0
	NEW 3	Ext.	□	MWE1570MB	96	96	160	16.0
	3	Int.	●	MWS1570MB	80	80	145	16.0
	5	Int.	●	MWS1570LB	128	128	193	16.0
	8	Int.	□	MWS1570X8DB	176	176	241	16.0

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
15.8	2	Ext.	□	MWE1580SA	58	58	115	15.8
	3	Ext.	●	MWE1580MA	96	96	160	15.8
	NEW 2	Ext.	□	MWE1580SB	58	58	115	16.0
	NEW 3	Ext.	□	MWE1580MB	96	96	160	16.0
	3	Int.	●	MWS1580MB	80	80	145	16.0
	5	Int.	●	MWS1580LB	128	128	193	16.0
	8	Int.	□	MWS1580X8DB	176	176	241	16.0
15.9	2	Ext.	□	MWE1590SA	58	58	115	15.9
	3	Ext.	●	MWE1590MA	96	96	160	15.9
	NEW 2	Ext.	□	MWE1590SB	58	58	115	16.0
	NEW 3	Ext.	□	MWE1590MB	96	96	160	16.0
	3	Int.	●	MWS1590MB	80	80	145	16.0
	5	Int.	●	MWS1590LB	128	128	193	16.0
	8	Int.	□	MWS1590X8DB	176	176	241	16.0
16.0	2	Ext.	●	MWE1600SA	58	58	115	16.0
	3	Ext.	●	MWE1600MA	96	96	160	16.0
	NEW 2	Ext.	●	MWE1600SB	58	58	115	16.0
	NEW 3	Ext.	●	MWE1600MB	96	96	160	16.0
	3	Int.	●	MWS1600MB	80	80	145	16.0
	5	Int.	●	MWS1600LB	128	128	193	16.0
	8	Int.	●	MWS1600X8DB	176	176	241	16.0
16.1	2	Ext.	●	MWE1610SA	60	60	119	16.1
	3	Ext.	□	MWE1610MA	102	102	167	16.1
	3	Int.	□	MWS1610MB	82.5	85	150	17.0
	5	Int.	□	MWS1610LB	132	136	201	17.0
16.2	2	Ext.	●	MWE1620SA	60	60	119	16.2
	3	Ext.	□	MWE1620MA	102	102	167	16.2
	3	Int.	□	MWS1620MB	82.5	85	150	17.0
	5	Int.	□	MWS1620LB	132	136	201	17.0
16.3	2	Ext.	●	MWE1630SA	60	60	119	16.3
	3	Ext.	□	MWE1630MA	102	102	167	16.3
	3	Int.	□	MWS1630MB	82.5	85	150	17.0
	5	Int.	□	MWS1630LB	132	136	201	17.0

Note) Please contact Mitsubishi Carbide for any geometry that is not in the brochure (e.g. different diameter and length).

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

Drill Dia. D_1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L_3	L_2	L_1	D_4
16.4	2	Ext.	□	**MWE1640SA**	60	60	119	16.4
	3	Ext.	□	**MWE1640MA**	102	102	167	16.4
	3	Int.	□	**MWS1640MB**	82.5	85	150	17.0
	5	Int.	□	**MWS1640LB**	132	136	201	17.0
16.5	2	Ext.	●	**MWE1650SA**	60	60	119	16.5
	3	Ext.	●	**MWE1650MA**	102	102	167	16.5
	3	Int.	●	**MWS1650MB**	82.5	85	150	17.0
	5	Int.	●	**MWS1650LB**	132	136	201	17.0
16.6	2	Ext.	□	**MWE1660SA**	60	60	119	16.6
	3	Ext.	□	**MWE1660MA**	102	102	167	16.6
	3	Int.	□	**MWS1660MB**	85	85	150	17.0
	5	Int.	□	**MWS1660LB**	136	136	201	17.0
16.7	2	Ext.	□	**MWE1670SA**	60	60	119	16.7
	3	Ext.	□	**MWE1670MA**	102	102	167	16.7
	3	Int.	□	**MWS1670MB**	85	85	150	17.0
	5	Int.	□	**MWS1670LB**	136	136	201	17.0
16.8	2	Ext.	□	**MWE1680SA**	60	60	119	16.8
	3	Ext.	□	**MWE1680MA**	102	102	167	16.8
	3	Int.	□	**MWS1680MB**	85	85	150	17.0
	5	Int.	□	**MWS1680LB**	136	136	201	17.0
16.9	2	Ext.	□	**MWE1690SA**	60	60	119	16.9
	3	Ext.	□	**MWE1690MA**	102	102	167	16.9
	3	Int.	□	**MWS1690MB**	85	85	150	17.0
	5	Int.	□	**MWS1690LB**	136	136	201	17.0
17.0	2	Ext.	●	**MWE1700SA**	60	60	119	17.0
	3	Ext.	●	**MWE1700MA**	102	102	167	17.0
	3	Int.	●	**MWS1700MB**	85	85	150	17.0
	5	Int.	●	**MWS1700LB**	136	136	201	17.0
17.1	2	Ext.	□	**MWE1710SA**	62	62	123	17.1
	3	Ext.	□	**MWE1710MA**	102	102	167	17.1
	3	Int.	□	**MWS1710MB**	87.5	90	155	18.0
	5	Int.	□	**MWS1710LB**	140	144	209	18.0
17.2	2	Ext.	□	**MWE1720SA**	62	62	123	17.2
	3	Ext.	□	**MWE1720MA**	102	102	167	17.2
	3	Int.	□	**MWS1720MB**	87.5	90	155	18.0
	5	Int.	□	**MWS1720LB**	140	144	209	18.0
17.3	2	Ext.	□	**MWE1730SA**	62	62	123	17.3
	3	Ext.	□	**MWE1730MA**	102	102	167	17.3
	3	Int.	□	**MWS1730MB**	87.5	90	155	18.0
	5	Int.	□	**MWS1730LB**	140	144	209	18.0
17.4	2	Ext.	□	**MWE1740SA**	62	62	123	17.4
	3	Ext.	□	**MWE1740MA**	102	102	167	17.4
	3	Int.	□	**MWS1740MB**	87.5	90	155	18.0
	5	Int.	□	**MWS1740LB**	140	144	209	18.0
17.5	2	Ext.	●	**MWE1750SA**	62	62	123	17.5
	3	Ext.	●	**MWE1750MA**	102	102	167	17.5
	3	Int.	●	**MWS1750MB**	87.5	90	155	18.0
	5	Int.	●	**MWS1750LB**	140	144	209	18.0

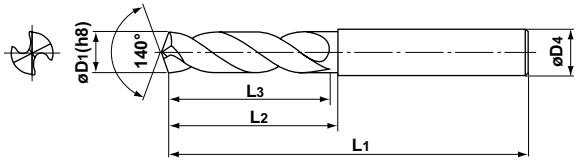
Drill Dia. D_1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L_3	L_2	L_1	D_4
17.6	2	Ext.	□	**MWE1760SA**	62	62	123	17.6
	3	Ext.	□	**MWE1760MA**	102	102	167	17.6
	3	Int.	□	**MWS1760MB**	90	90	155	18.0
	5	Int.	□	**MWS1760LB**	144	144	209	18.0
17.7	2	Ext.	□	**MWE1770SA**	62	62	123	17.7
	3	Ext.	□	**MWE1770MA**	102	102	167	17.7
	3	Int.	□	**MWS1770MB**	90	90	155	18.0
	5	Int.	□	**MWS1770LB**	144	144	209	18.0
17.8	2	Ext.	●	**MWE1780SA**	62	62	123	17.8
	3	Ext.	□	**MWE1780MA**	102	102	167	17.8
	3	Int.	□	**MWS1780MB**	90	90	155	18.0
	5	Int.	□	**MWS1780LB**	144	144	209	18.0
17.9	2	Ext.	□	**MWE1790SA**	62	62	123	17.9
	3	Ext.	□	**MWE1790MA**	102	102	167	17.9
	3	Int.	□	**MWS1790MB**	90	90	155	18.0
	5	Int.	□	**MWS1790LB**	144	144	209	18.0
18.0	2	Ext.	●	**MWE1800SA**	62	62	123	18.0
	3	Ext.	●	**MWE1800MA**	102	102	167	18.0
	3	Int.	●	**MWS1800MB**	90	90	155	18.0
	5	Int.	●	**MWS1800LB**	144	144	209	18.0
18.1	2	Ext.	□	**MWE1810SA**	64	64	127	18.1
	3	Ext.	□	**MWE1810MA**	114	114	179	18.1
	3	Int.	□	**MWS1810MB**	92.5	95	160	19.0
	5	Int.	□	**MWS1810LB**	148	152	217	19.0
18.2	2	Ext.	□	**MWE1820SA**	64	64	127	18.2
	3	Ext.	□	**MWE1820MA**	114	114	179	18.2
	3	Int.	□	**MWS1820MB**	92.5	95	160	19.0
	5	Int.	□	**MWS1820LB**	148	152	217	19.0
18.3	2	Ext.	□	**MWE1830SA**	64	64	127	18.3
	3	Ext.	□	**MWE1830MA**	114	114	179	18.3
	3	Int.	□	**MWS1830MB**	92.5	95	160	19.0
	5	Int.	□	**MWS1830LB**	148	152	217	19.0
18.4	2	Ext.	□	**MWE1840SA**	64	64	127	18.4
	3	Ext.	□	**MWE1840MA**	114	114	179	18.4
	3	Int.	□	**MWS1840MB**	92.5	95	160	19.0
	5	Int.	□	**MWS1840LB**	148	152	217	19.0
18.5	2	Ext.	●	**MWE1850SA**	64	64	127	18.5
	3	Ext.	●	**MWE1850MA**	114	114	179	18.5
	3	Int.	●	**MWS1850MB**	92.5	95	160	19.0
	5	Int.	●	**MWS1850LB**	148	152	217	19.0
18.6	2	Ext.	□	**MWE1860SA**	64	64	127	18.6
	3	Ext.	□	**MWE1860MA**	114	114	179	18.6
	3	Int.	□	**MWS1860MB**	95	95	160	19.0
	5	Int.	□	**MWS1860LB**	152	152	217	19.0
18.7	2	Ext.	□	**MWE1870SA**	64	64	127	18.7
	3	Ext.	□	**MWE1870MA**	114	114	179	18.7
	3	Int.	□	**MWS1870MB**	95	95	160	19.0
	5	Int.	□	**MWS1870LB**	152	152	217	19.0

WSTAR Drill

MIRACLE® coated

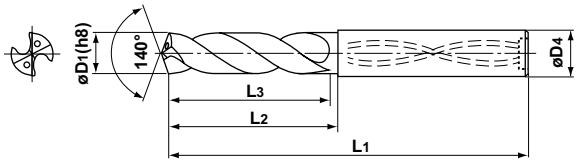
MWE (External coolant)

D1	D1≤3.0	3.0<D1≤6.0	6.0<D1≤10.0	10.0<D1≤18.0	18.0<D1≤30.0
Tolerance	0 -0.014	0 -0.018	0 -0.022	0 -0.027	0 -0.033



MWS (Internal coolant)

●MWS-SB/MB/LB/X8DB type can be used for shrink fit holders.



*MWS type with ø5.0 or larger diameter has a recess in the end face.

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
18.8	2	Ext.	□	MWE1880SA	64	64	127	18.8
	3	Ext.	□	MWE1880MA	114	114	179	18.8
	3	Int.	□	MWS1880MB	95	95	160	19.0
	5	Int.	□	MWS1880LB	152	152	217	19.0
18.9	2	Ext.	□	MWE1890SA	64	64	127	18.9
	3	Ext.	□	MWE1890MA	114	114	179	18.9
	3	Int.	□	MWS1890MB	95	95	160	19.0
	5	Int.	□	MWS1890LB	152	152	217	19.0
19.0	2	Ext.	●	MWE1900SA	64	64	127	19.0
	3	Ext.	●	MWE1900MA	114	114	179	19.0
	3	Int.	●	MWS1900MB	95	95	160	19.0
	5	Int.	●	MWS1900LB	152	152	217	19.0
19.1	2	Ext.	□	MWE1910SA	66	66	131	19.1
	3	Ext.	□	MWE1910MA	114	114	179	19.1
	3	Int.	□	MWS1910MB	97.5	100	165	20.0
	5	Int.	□	MWS1910LB	156	160	225	20.0
19.2	2	Ext.	□	MWE1920SA	66	66	131	19.2
	3	Ext.	□	MWE1920MA	114	114	179	19.2
	3	Int.	□	MWS1920MB	97.5	100	165	20.0
	5	Int.	□	MWS1920LB	156	160	225	20.0
19.3	2	Ext.	□	MWE1930SA	66	66	131	19.3
	3	Ext.	□	MWE1930MA	114	114	179	19.3
	3	Int.	□	MWS1930MB	97.5	100	165	20.0
	5	Int.	□	MWS1930LB	156	160	225	20.0
19.4	2	Ext.	□	MWE1940SA	66	66	131	19.4
	3	Ext.	□	MWE1940MA	114	114	179	19.4
	3	Int.	□	MWS1940MB	97.5	100	165	20.0
	5	Int.	□	MWS1940LB	156	160	225	20.0

Drill Dia. D1 (mm)	Hole Depth (l/d)	Coolant	Stock VP15TF	Order Number	Dimensions (mm) L3	L2	L1	D4
19.5	2	Ext.	●	MWE1950SA	66	66	131	19.5
	3	Ext.	●	MWE1950MA	114	114	179	19.5
	3	Int.	●	MWS1950MB	97.5	100	165	20.0
	5	Int.	●	MWS1950LB	156	160	225	20.0
19.6	2	Ext.	□	MWE1960SA	66	66	131	19.6
	3	Ext.	□	MWE1960MA	114	114	179	19.6
	3	Int.	□	MWS1960MB	100	100	165	20.0
	5	Int.	□	MWS1960LB	160	160	225	20.0
19.7	2	Ext.	□	MWE1970SA	66	66	131	19.7
	3	Ext.	□	MWE1970MA	114	114	179	19.7
	3	Int.	□	MWS1970MB	100	100	165	20.0
	5	Int.	□	MWS1970LB	160	160	225	20.0
19.8	2	Ext.	□	MWE1980SA	66	66	131	19.8
	3	Ext.	□	MWE1980MA	114	114	179	19.8
	3	Int.	□	MWS1980MB	100	100	165	20.0
	5	Int.	□	MWS1980LB	160	160	225	20.0
19.9	2	Ext.	□	MWE1990SA	66	66	131	19.9
	3	Ext.	□	MWE1990MA	114	114	179	19.9
	3	Int.	□	MWS1990MB	100	100	165	20.0
	5	Int.	□	MWS1990LB	160	160	225	20.0
20.0	2	Ext.	●	MWE2000SA	66	66	131	20.0
	3	Ext.	●	MWE2000MA	114	114	179	20.0
	3	Int.	●	MWS2000MB	100	100	165	20.0
	5	Int.	●	MWS2000LB	160	160	225	20.0

Note) Please contact Mitsubishi Carbide for any geometry that is not in the brochure (e.g. different diameter and length).

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

Recommended Cutting Conditions

MWE (External coolant)

Work Material		Drill Diameter / Conditions / Hardness	ϕ3.0—ϕ6.0		ϕ6.0—ϕ10.0		ϕ10.0—ϕ14.0		ϕ14.0—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	≤180HB	85 (35—100)	0.20 (0.15—0.30)	85 (45—120)	0.25 (0.15—0.35)	90 (55—120)	0.30 (0.20—0.35)	100 (60—130)	0.35 (0.20—0.40)
P	Carbon Steel Alloy Steel	180—280HB	80 (40—95)	0.20 (0.15—0.30)	90 (50—120)	0.25 (0.15—0.35)	90 (60—130)	0.30 (0.15—0.35)	90 (60—130)	0.35 (0.20—0.40)
P	Carbon Steel Alloy Steel	280—350HB	75 (35—80)	0.15 (0.15—0.20)	80 (45—115)	0.20 (0.15—0.25)	85 (55—115)	0.25 (0.15—0.30)	85 (55—115)	0.30 (0.20—0.35)
M	Stainless Steel	≤200HB	20 (15—30)	0.10 (0.05—0.15)	25 (15—30)	0.12 (0.05—0.15)	25 (15—30)	0.15 (0.10—0.20)	25 (15—30)	0.20 (0.10—0.25)
K	Cast Iron	Tensile Strength ≤350MPa	70 (40—85)	0.25 (0.15—0.30)	75 (50—90)	0.30 (0.20—0.35)	80 (50—95)	0.35 (0.20—0.40)	85 (55—95)	0.40 (0.30—0.45)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	65 (35—80)	0.20 (0.15—0.25)	70 (45—85)	0.25 (0.15—0.30)	75 (45—90)	0.30 (0.20—0.35)	80 (50—90)	0.35 (0.20—0.40)
N	Aluminum Alloy	—	80 (70—90)	0.20 (0.10—0.25)	90 (80—100)	0.25 (0.15—0.30)	100 (90—110)	0.30 (0.20—0.35)	110 (100—120)	0.35 (0.20—0.40)
S	Heat Resistant Alloy	—	20 (10—25)	0.10 (0.05—0.15)	25 (15—30)	0.12 (0.05—0.15)	25 (15—30)	0.15 (0.10—0.20)	30 (25—35)	0.20 (0.10—0.25)
H	Hardened Material	40—60HRC	20 (15—25)	0.10 (0.05—0.15)	25 (15—30)	0.12 (0.05—0.15)	25 (15—30)	0.15 (0.10—0.20)	30 (15—35)	0.20 (0.10—0.25)

MWS (Internal coolant)

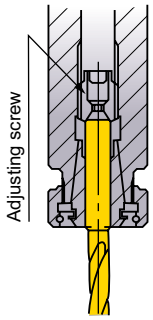
Work Material		Drill Diameter / Conditions / Hardness	ϕ0.50—ϕ0.70		ϕ0.70—ϕ0.85		ϕ0.86—ϕ0.99		ϕ1.0—ϕ3.0	
			Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)	Cutting Speed (m/min)	Feed (mm/rev)
P	Mild Steel	≤180HB	50 (40—60)	0.010 (0.005—0.015)	50 (40—60)	0.02 (0.01—0.03)	50 (40—60)	0.03 (0.02—0.05)	50 (40—60)	0.08 (0.04—0.12)
P	Carbon Steel Alloy Steel	180—280HB	50 (40—60)	0.010 (0.005—0.015)	50 (40—60)	0.02 (0.01—0.03)	50 (40—60)	0.03 (0.02—0.05)	50 (40—60)	0.08 (0.04—0.12)
P	Carbon Steel Alloy Steel	280—350HB	50 (40—60)	0.010 (0.005—0.015)	50 (40—60)	0.02 (0.01—0.03)	50 (40—60)	0.03 (0.02—0.05)	50 (40—60)	0.08 (0.04—0.12)
M	Stainless Steel	≤200HB	30 (20—40)	0.008 (0.005—0.01)	30 (20—40)	0.015 (0.008—0.02)	30 (20—40)	0.02 (0.01—0.03)	30 (20—40)	0.05 (0.02—0.10)
K	Cast Iron	Tensile Strength ≤350MPa	50 (40—60)	0.015 (0.008—0.02)	50 (40—60)	0.02 (0.01—0.03)	50 (40—60)	0.04 (0.02—0.06)	50 (40—60)	0.08 (0.04—0.12)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	30 (20—40)	0.010 (0.005—0.015)	30 (20—40)	0.02 (0.01—0.03)	30 (20—40)	0.03 (0.02—0.05)	30 (20—40)	0.06 (0.02—0.10)
N	Aluminum Alloy	—	60 (50—80)	0.03 (0.02—0.05)	60 (50—80)	0.04 (0.03—0.06)	60 (50—80)	0.06 (0.04—0.08)	60 (50—80)	0.10 (0.05—0.15)
S	Heat Resistant Alloy	—	10 (5—15)	0.006 (0.004—0.008)	10 (5—15)	0.01 (0.005—0.02)	10 (5—15)	0.01 (0.005—0.02)	10 (5—15)	0.03 (0.01—0.05)

Work Material		Drill Diameter / Conditions / Hardness	ϕ3.0—ϕ6.0		ϕ6.0—ϕ10.0		ϕ10.0—ϕ14.0		ϕ14.0—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	≤180HB	110 (50—120)	0.20 (0.15—0.25)	130 (80—140)	0.25 (0.20—0.35)	150 (90—170)	0.30 (0.20—0.40)	160 (100—180)	0.35 (0.20—0.40)
P	Carbon Steel Alloy Steel	180—280HB	90 (50—100)	0.20 (0.15—0.25)	110 (70—120)	0.25 (0.20—0.35)	130 (80—140)	0.25 (0.20—0.40)	140 (100—150)	0.30 (0.20—0.40)
P	Carbon Steel Alloy Steel	280—350HB	80 (40—90)	0.20 (0.15—0.30)	90 (60—110)	0.25 (0.15—0.30)	110 (70—130)	0.25 (0.15—0.40)	120 (90—140)	0.30 (0.20—0.40)
M	Stainless Steel	≤200HB	60 (20—100)	0.10 (0.05—0.15)	80 (40—120)	0.20 (0.10—0.25)	90 (50—120)	0.25 (0.15—0.30)	100 (60—120)	0.25 (0.15—0.30)
K	Cast Iron	Tensile Strength ≤350MPa	100 (70—120)	0.25 (0.15—0.30)	130 (100—140)	0.30 (0.20—0.35)	150 (110—160)	0.35 (0.25—0.40)	160 (120—170)	0.35 (0.25—0.40)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	60 (30—80)	0.20 (0.15—0.25)	70 (40—90)	0.20 (0.15—0.30)	90 (50—110)	0.25 (0.20—0.40)	100 (60—110)	0.30 (0.20—0.40)
N	Aluminum Alloy	—	120 (80—150)	0.25 (0.20—0.35)	150 (100—170)	0.30 (0.20—0.50)	160 (100—170)	0.40 (0.20—0.80)	170 (100—180)	0.50 (0.20—1.00)
S	Heat Resistant Alloy	—	20 (10—25)	0.10 (0.05—0.15)	25 (15—30)	0.12 (0.05—0.15)	25 (15—30)	0.15 (0.10—0.20)	30 (25—35)	0.20 (0.10—0.25)

Notes 1. For drill diameter up to ø2, peck feed drilling is recommended according to cutting modes and conditions.
2. Peck guide: 1 x D_1 (drill diameter)
3. Please refer to the next page for further information about the effective use of WSTAR drills.

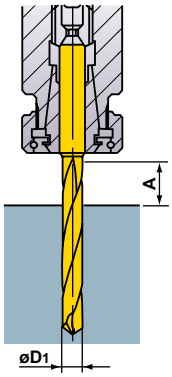
Operational Guidance

Drill holding



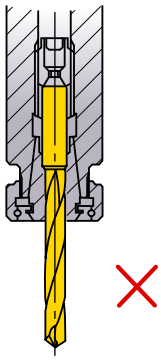
Thrust bearing type collet chuck holds the drill securely.

Drill length



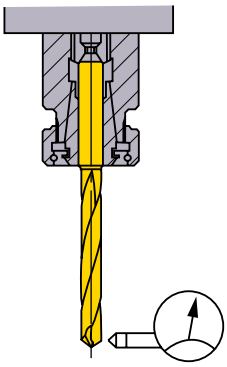
A : ≥ D x 1.5

Drill installation



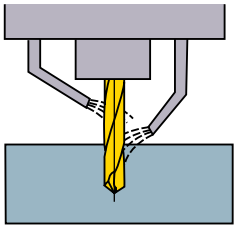
Do not clamp on the flutes.

Installation tolerance



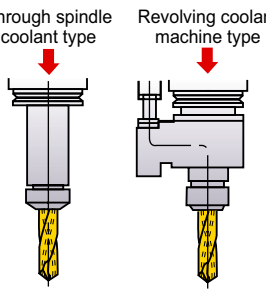
Runout ≤ 0.03mm

Coolant method (MWE)



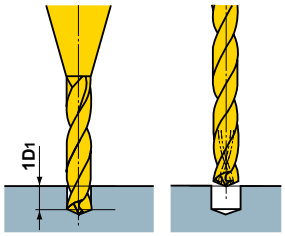
Two coolant positions, at the end and at the centre are ideal.

Coolant method (MWS)



Coolant pressure is approx. 0.5-1MPa (≤ø5 : 2-3MPa).
Coolant volume is 1.5-4.0 l/min.

Small diameter drill application



①When machining a prepared hole with the MZB-SB or other centre drills, set the depth to 1D1 (D1 = drill Diameter).

②Use the prepared hole as a guide. Depending on the cutting conditions, peck feed drilling is recommended.

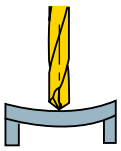
Coolant handling

< MWS type >

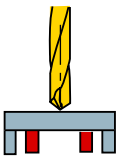
1) Dirt and dust particles in old coolant can clog the oil hole and prevent effective flow. Regular coolant exchange is recommended.

2) Small particles of swarf will jam in the oil hole. Use a filter as a preventative measure. When using small diameter drills, use a fine mesh filter.

Thin workpieces

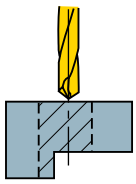


If bending occures ×



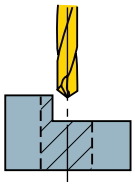
Support the workpiece ○

Interrupted cutting



One process ○

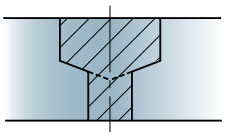
①Lower the feed when drilling the interrupted part.



Requires prior machining △

①Spot face with an end mill prior to drilling.

Stepped holes

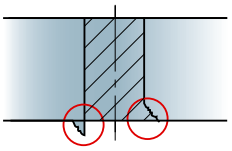


①Divide the machining into two processes.

②Drill the larger hole first.

*Tools for chamfering and spot facing can be produced to order.

Burring and workpiece chipping



①Lower the feed rate when breaking through.

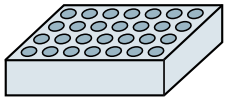
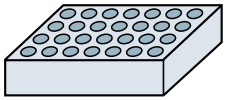
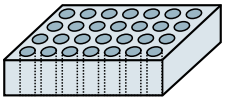
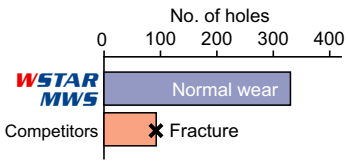
②Add a chamfer.

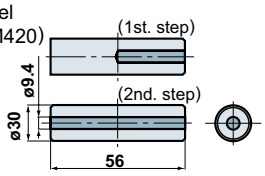
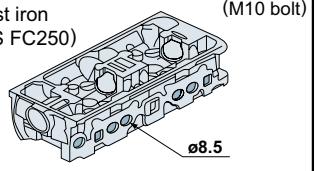
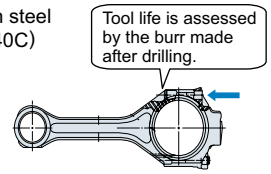
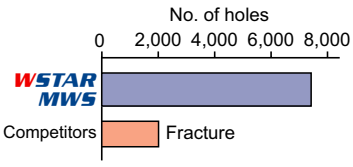
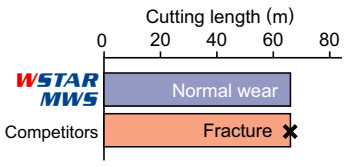
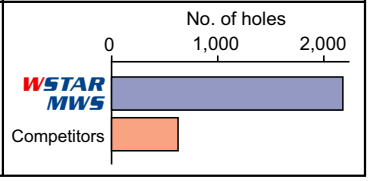
③Change the point angle.

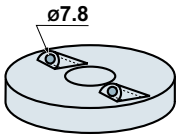
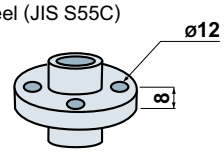
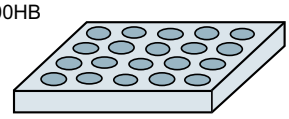
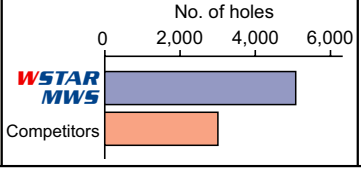
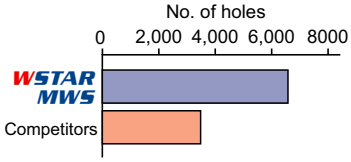
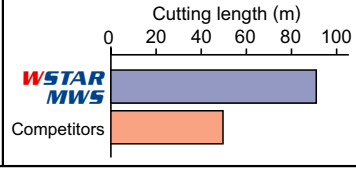
Caution in using the MWS (Drill diameter ≤ ø3)

- Please use a fine mesh filter (mesh ≤ 3μm) for coolant to prevent jamming in the oil hole.
- For deep drilling (l/d > 3), machining guiding hole is recommended. (Use MZE○○○○SB type for guiding hole.)

Application Examples

Drill			MWS0080LB	MWS0150LB	MWS0250XB
Workpiece			Cast iron (JIS FC300) Cutting depth: 4mm (Blind hole) 	Stainless steel (JIS SUS304) Cutting depth: 7.5mm (Blind hole) 	Stainless steel (JIS SUS630) Cutting depth: 30mm (Through hole) 
Component			Test workpiece	Test workpiece	Mould parts
Cutting Conditions	Cutting Speed	(m/min)	50	40	40
	Feed	(mm/rev)	0.025	0.05	0.06
	Revolution	(min^{-1})	19,904	8493	5096
	Table Feed	(mm/min)	498	425	306
Coolant			W.S.O. : 3MPa	W.S.O. : 3MPa	W.S.O. : 3MPa
Machine			Machining centre	Machining centre	Machining centre
Result			Excellent machining with no chipping on the cutting edge even after drilling 100 holes.		Excellent machining with no wandering even after drilling 50 holes.

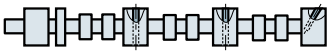
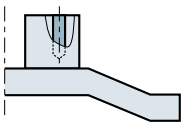
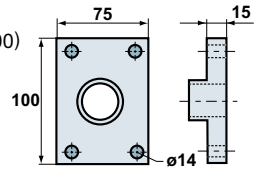
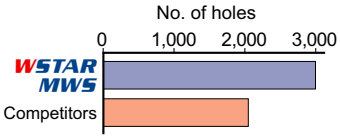
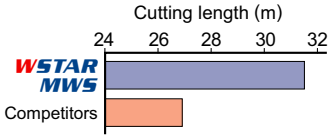
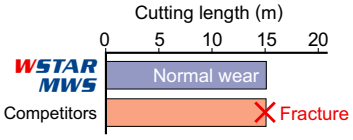
Drill			MWS0940MB	MWS0850MB	MWS1590LB
Workpiece			Alloy steel (JIS SCM420) 180HB 	Cast iron (JIS FC250) 	Carbon steel (JIS S40C) 280HB 
Component			Crank pin	Auto parts	Con rod
Cutting Conditions	Cutting Speed	(m/min)	54	150	115
	Feed	(mm/rev)	0.2	0.3	0.25
	Revolution	(min^{-1})	1,829	5,617	2,302
	Table Feed	(mm/min)	366	1,685	576
Coolant			W.S.O.	W.S.O.	Mist
Machine			NC lathe	Machining centre	Machining centre
Result					

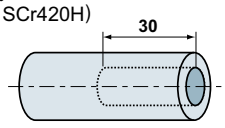
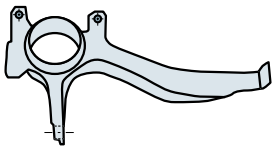
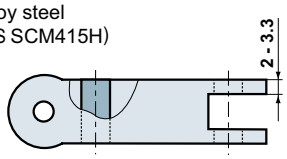
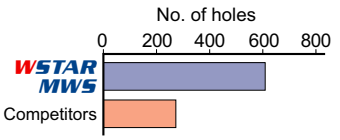
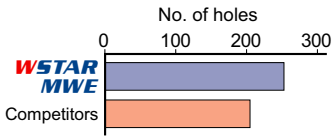
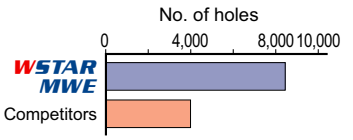
Drill			MWE0780MA	MWE1200SA	MWS0800MB
Workpiece			Ductile cast iron (JIS FCD700) 200HB 	Carbon steel (JIS S55C) 255HB 	Stainless steel (JIS SUS304) 200HB  25mm through
Component			Compressor parts	Auto parts	Machine parts
Cutting Conditions	Cutting Speed	(m/min)	48	70	60
	Feed	(mm/rev)	0.15	0.2	0.2
	Revolution	(min^{-1})	1,958	1,602	2,387
	Table Feed	(mm/min)	294	320	477
Coolant			W.S.O.	W.S.O.	W.S.O.
Machine			Machining centre	Machining centre	Machining centre
Result					

Solid Carbide Drill

WSTAR Drill
MIRACLE® coated

Application Examples

Drill		MWS0400LB	MWS1040LB	MWS1400MB
Workpiece		Carbon steel (JIS S48C) 	Mild steel (JIS SS400) 	Mild steel (JIS SS400) 
Component		Cam shaft	Machine parts	Flange
Cutting Conditions	Cutting Speed (m/min)	80	62	125
	Feed (mm/rev)	0.18	0.3	0.25
	Revolution (min^{-1})	6,366	1,898	2,842
	Table Feed (mm/min)	1,145	569.4	710
Coolant		W.S.O.	Mist	W.S.O.
Machine		Machining centre	Machining centre	Turn / mill centre
Result				

Drill		MWS1200MB	MWE1510SA	MWE1120SA
Workpiece		Alloy steel (JIS SCr420H) 	Carbon steel (JIS S43C) 	Alloy steel (JIS SCM415H) 
Component		Transmission parts	Automobile parts	Automobile parts
Cutting Conditions	Cutting Speed (m/min)	60	60	88
	Feed (mm/rev)	0.2	0.16	0.12
	Revolution (min^{-1})	1,200	1,265	2,500
	Table Feed (mm/min)	240	202	300
Coolant		W.S.O.	W.S.O.	W.S.O.
Machine		NC lathe	Machining centre	Machining centre
Result				

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 using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc. ●Grinding or heating of cutting tools produces dust and mist. Inhaling large amount of dust or contacting with eyes and skins may harm your body.

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(Tools specifications subject to change without notice.)

2006.11.E(-)