

Drill Dia. D1 (mm)	Coolant (Int./Ext.)	Stock		Order Number	Dimensions (mm)				Type
		VP20MF	VP15TF		L3	L2	L1	D4	
0.78	Ext.		★	MSE0078SB	8	12.3	38	3	2
0.79	Ext.		★	0079SB	8	12.3	38	3	2
0.80	Ext.		★	0080SB	10	14.3	38	3	2
0.81	Ext.		★	0081SB	10	14.3	38	3	2
0.82	Ext.		★	0082SB	10	14.3	38	3	2
0.83	Ext.		★	0083SB	10	14.3	38	3	2
0.84	Ext.		★	0084SB	10	14.2	38	3	2
0.85	Ext.		★	0085SB	10	14.2	38	3	2
0.86	Ext.		★	0086SB	10	14.2	38	3	2
0.87	Ext.		★	0087SB	10	14.2	38	3	2
0.88	Ext.		★	0088SB	10	14.2	38	3	2

Drill Dia. D1 (mm)	Coolant (Int./Ext.)	Stock		Order Number	Dimensions (mm)				Type
		VP20MF	VP15TF		L3	L2	L1	D4	
0.89	Ext.		★	MSE0089SB	10	14.1	38	3	2
0.90	Ext.		★	0090SB	10	14.1	38	3	2
0.91	Ext.		★	0091SB	10	14.1	38	3	2
0.92	Ext.		★	0092SB	10	14.1	38	3	2
0.93	Ext.		★	0093SB	10	14.1	38	3	2
0.94	Ext.		★	0094SB	10	14.0	38	3	2
0.95	Ext.		★	0095SB	10	14.0	38	3	2
0.96	Ext.		★	0096SB	10	14.0	38	3	2
0.97	Ext.		★	0097SB	10	14.0	38	3	2
0.98	Ext.		★	0098SB	10	14.0	38	3	2
0.99	Ext.		★	0099SB	10	14.0	38	3	2

RECOMMENDED CUTTING CONDITIONS

Work Material	Mild Steel (≤180HB)					Carbon steel, Alloy steel (180—280HB)						
	Ck10					Ck45, 41CrMo4						
Drill Dia. (mm)	Cutting Speed (m/min)	Revolution (min ⁻¹)	Feed rate (Min.—Max.) (mm/rev)		Step (mm)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min ⁻¹)	Feed rate (Min.—Max.) (mm/rev)		Step (mm)	Table Feed (mm/min)
0.1	6	20000	0.002 (0.001—0.003)		0.02	40	6	20000	0.002 (0.001—0.003)		0.02	40
0.12	8	20000	0.002 (0.001—0.003)		0.02	40	8	20000	0.002 (0.001—0.003)		0.02	40
0.16	10	20000	0.002 (0.001—0.003)		0.02	40	10	20000	0.002 (0.001—0.003)		0.02	40
0.2	13	20000	0.003 (0.002—0.004)		0.04	60	13	20000	0.003 (0.002—0.004)		0.04	60
0.25	16	20000	0.003 (0.002—0.004)		0.04	60	16	20000	0.003 (0.002—0.004)		0.04	60
0.32	20	20000	0.004 (0.003—0.005)		0.05	80	20	20000	0.004 (0.003—0.005)		0.05	80
0.4	25	20000	0.004 (0.003—0.005)		0.05	80	25	20000	0.004 (0.003—0.005)		0.05	80
0.5	31	20000	0.006 (0.005—0.007)		0.1	120	31	20000	0.006 (0.005—0.007)		0.1	120
0.63	40	20000	0.008 (0.006—0.01)		0.1	160	40	20000	0.008 (0.006—0.01)		0.1	160
0.8	50	20000	0.02 (0.015—0.025)		0.3	400	50	20000	0.015 (0.012—0.018)		0.3	300
0.99	62	20000	0.04 (0.03—0.05)		0.3	800	62	20000	0.02 (0.015—0.025)		0.3	400

Work Material	Carbon steel, Alloy steel (280—350HB)					Pre-Hardened Steel (35—45HRC)						
	36CrNiMo4					X36CrMo17						
Drill Dia. (mm)	Cutting Speed (m/min)	Revolution (min ⁻¹)	Feed rate (Min.—Max.) (mm/rev)		Step (mm)	Table Feed (mm/min)	Cutting Speed (m/min)	Revolution (min ⁻¹)	Feed rate (Min.—Max.) (mm/rev)		Step (mm)	Table Feed (mm/min)
0.1	6	20000	0.002 (0.001—0.003)		0.02	40	6	20000	0.002 (0.001—0.003)		0.02	40
0.12	8	20000	0.002 (0.001—0.003)		0.02	40	8	20000	0.002 (0.001—0.003)		0.02	40
0.16	10	20000	0.002 (0.001—0.003)		0.02	40	10	20000	0.002 (0.001—0.003)		0.02	40
0.2	13	20000	0.003 (0.002—0.004)		0.04	60	13	20000	0.003 (0.002—0.004)		0.04	60
0.25	16	20000	0.003 (0.002—0.004)		0.04	60	16	20000	0.003 (0.002—0.004)		0.04	60
0.32	20	20000	0.004 (0.003—0.005)		0.05	80	20	20000	0.004 (0.003—0.005)		0.05	80
0.4	25	20000	0.004 (0.003—0.005)		0.05	80	25	20000	0.004 (0.003—0.005)		0.05	80
0.5	31	20000	0.006 (0.005—0.007)		0.1	120	31	20000	0.006 (0.005—0.007)		0.1	120
0.63	40	20000	0.008 (0.006—0.01)		0.1	160	40	20000	0.008 (0.006—0.01)		0.1	160
0.8	50	20000	0.015 (0.012—0.018)		0.3	300	50	20000	0.015 (0.012—0.018)		0.3	300
0.99	62	20000	0.02 (0.015—0.025)		0.3	400	62	20000	0.02 (0.015—0.025)		0.3	400

(Notes)

- When drilling holes up to $\phi 0.3\text{mm}$, the use of a spot drill is recommended.
- Change the cutting conditions depending on your machine and workpiece rigidity.
- When machining holes over 5D, reduce the peck distance stated above.
- The use of water-soluble fluid (diluted 20 times) is recommended for drilling using the cutting conditions above. Lower the revolutions if oil fluid or mist is used.
- Work materials marked by "—" in the tables above are difficult to drill with external coolant. The use of internal coolant type MWS or VAPDSSUS is recommended.