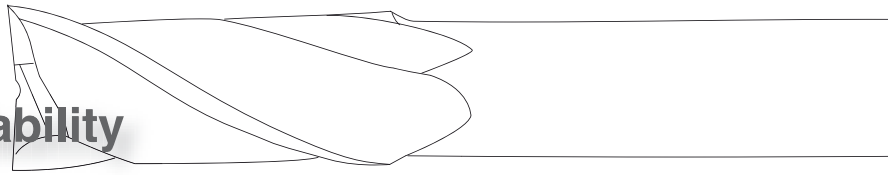
MITSUBISHI
MITSUBISHI MATERIALS

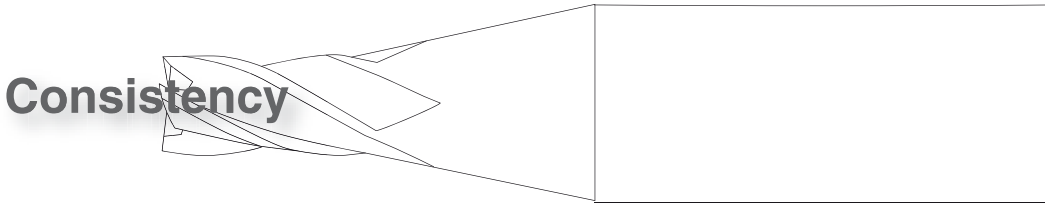
MSTAR01E

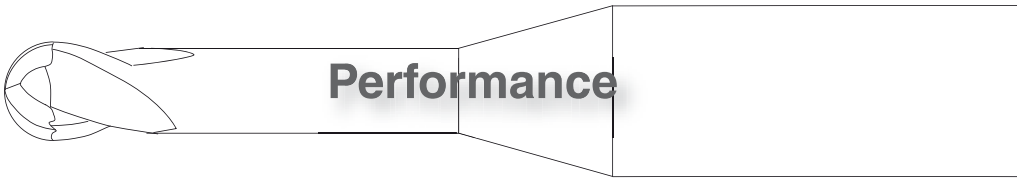
The ultimate series

MSTAR

"Miracle Technology"







MSTAR

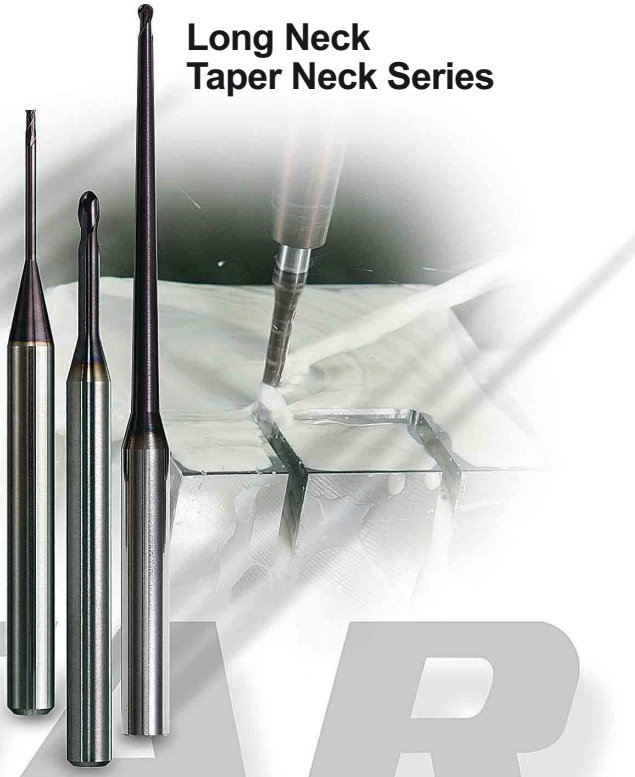
MITSUBISHI
MITSUBISHI MATERIALS

MSTAR

Highlights

General Use Series

Long Neck
Taper Neck Series



High Helix
End Mill Series

For Rib Milling

For Small
Automatic Lathes

1907

38 Series/1907 Sizes

MSTAR
INDEX

MSTAR

END MILL SELECTION CHART

Group	Type	Feature	No. of flutes	Code	Shape	Coating	Substrate	Size range	Work material									Page number	
									P		H		M	S	N			Dimensions	Cutting conditions
									Carbon steel, Alloy steel	Alloy steel(-40HRC)	Hardened steel(-55HRC)	Hardened steel(55HRC-)	Austenitic stainless steel	Titanium alloy, Heat resistant alloy	Copper alloy	Aluminium alloy	Graphite		
MSTAR	Square	General	2	MS2SS		MS	UWC	ϕ0.1 –ϕ12	++	++	+		+					p08	p11
				MS2MS		MS	UWC	ϕ0.2 –ϕ20	++	++	+		+					p09	p11
				MS2JS		MS	UWC	ϕ0.1 –ϕ12	++	++	+		+					p12	p13
				MS2LS		MS	UWC	ϕ0.2 –ϕ12	++	++	+		+					p14	p15
			4	MS4SC		MS	UWC	ϕ1 –ϕ12	++	++	+		+					p16	p19
				MS4MC		MS	UWC	ϕ1 –ϕ20	++	++	+		+					p17	p19
				MS4JC		MS	UWC	ϕ1 –ϕ12	++	++	+		+					p18	p19
		High speed geometry	2	MS2MC...E		MS	UWC	ϕ2 –ϕ12	++	++	+		+					p20	p21
			3	MS3MC...E		MS	UWC	ϕ1 –ϕ12	++	++			+					p22	p23
			4	MS4MC...E		MS	UWC	ϕ1 –ϕ16	++	++	+		+					p24	p25
				MS4JC...E		MS	UWC	ϕ1 –ϕ12	++	++	+		+					p26	p27
		Small lathe	2	MS2ES		MS	UWC	ϕ3 –ϕ12	++	++	+		+					p28	p31
			3	MS3ES		MS	UWC	ϕ3 –ϕ12	++	++	+		+					p29	p31
			4	MS4EC		MS	UWC	ϕ3 –ϕ14	++	++	+		+					p30	p31
		Long neck	2	MS2XL		MS	UWC	ϕ0.2 –ϕ6	++	++	+		+					p32	p35
				MS2XL6		MS	UWC	ϕ0.3 –ϕ2.5	++	++	+		+					p36	p38
			4	MS4XL		MS	UWC	ϕ1 –ϕ10	++	++	+		+					p40	p43
		High helix	3	MSMHZD		MS	UWC	ϕ1 –ϕ20	++	++	+		+					p44	p45
			4	MS5HD		MS	UWC	ϕ3 –ϕ20	++	++	+		+	+				p46	p47
				MSMHD		MS	UWC	ϕ2 –ϕ25	++	++	+		+	+				p48	p49

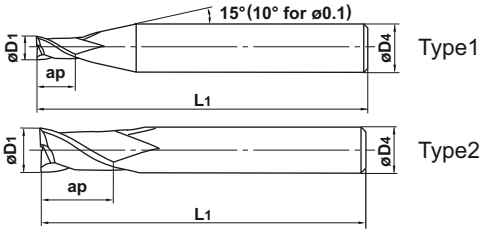
Group	Type	Feature	No. of flutes	Code	Shape	Coating	Substrate	Size range	Work material									Page number	
									P		H		M	S	N			Dimensions	Cutting conditions
									Carbon steel, Alloy steel	Alloy steel(-40HRC)	Hardened steel(-55HRC)	Hardened steel(55HRC-)	Austenitic stainless steel	Titanium alloy, Heat resistant alloy	Copper alloy	Aluminium alloy	Graphite		
MSTAR	Square	High helix	4	MSMHV....E		MS	UWC	ϕ6 –ϕ20	++	++	+		+	+				p108	p109
				MS5HV....E		MS	UWC	ϕ6 –ϕ20	++	++	+		+	+				p108	p109
				MSJHD		MS	UWC	ϕ2 –ϕ20	++	++	+		+	+				p50	p51
			6	MS6MH....E		MS	UWC	ϕ6 –ϕ16	++	++	+		+	+				p52	p53
			8	MS8MH....E		MS	UWC	ϕ20	++	++	+		+	+				p52	p53
	Ball	General	2	MS2SB		MS	UWC	R0.1 –R6	++	++	+		+					p54	p56
				MS2MB		MS	UWC	R0.25 –R6	++	++	+		+					p55	p56
				MS2SB....E		MS	UWC	R1 –R6	++	++	+		+					p58	p59
				MS2MB....E		MS	UWC	R1 –R6	++	++	+		+					p60	p61
				MS2XLB		MS	UWC	R0.1 –R3	++	++	+		+					p62	p72
				MS2XB		MS	UWC	R0.1 –R2	++	++	+		+					p70	p73
	Corner Radius			MS2MRB		MS	UWC	ϕ1 –ϕ12	++	++	+		+					p74	p76
			4	MS4MRB MS4MRB_E		MS	UWC	ϕ3 –ϕ20	++	++	+		+					p80 p88	p82 p89
		Long neck	2	MS2XLRB		MS	UWC	ϕ1 –ϕ6	++	++	+		+					p78	p79
		High helix		MSMHDRB		MS	UWC	ϕ2 –ϕ20	++	++	+		+	+				p84	p86
	Taper	General		MS2MT		MS	UWC	ϕ0.2 –ϕ10	++	++	+		+					p90	p100
		Taper ball		MS2MTB		MS	UWC	R0.2 –R1.5	++	++	+		+					p102	p103
		Rib milling	4	MS4LT		MS	UWC	ϕ0.2 –ϕ3	++	++	+		+					p94	p101
				MS4LTB		MS	UWC	R0.3 –R1	++	++	+		+					p104	p107

++ : 1st recommendation / + : 2nd recommendation

MS2SS

End mill, Short cut length, 2 flute

D1=0.1 0 — -0.01
0.1<D1 0 — -0.02



● 2 flute end mill for general use.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2SSD0010	0.1	0.15	40	4	2	●	1
D0020	0.2	0.3	40	4	2	●	1
D0030	0.3	0.45	40	4	2	●	1
D0040	0.4	0.6	40	4	2	●	1
D0050	0.5	0.75	40	4	2	●	1
D0060	0.6	0.9	40	4	2	●	1
D0070	0.7	1.1	40	4	2	●	1
D0080	0.8	1.2	40	4	2	●	1
D0090	0.9	1.4	40	4	2	●	1
D0100	1	1.5	40	4	2	●	1
D0120	1.2	1.8	40	4	2	●	1
D0150	1.5	2.3	40	4	2	●	1
D0180	1.8	2.7	40	4	2	●	1
D0200	2	3	40	4	2	●	1
D0250	2.5	3.8	40	4	2	●	1
D0300	3	4.5	45	6	2	●	1
D0400	4	6	50	6	2	●	1
D0500	5	7.5	50	6	2	●	1
D0600	6	9	50	6	2	●	2
D0700	7	10.5	60	8	2	●	1
D0800	8	12	60	8	2	●	2
D0900	9	13.5	70	10	2	●	1
D1000	10	15	70	10	2	●	2
D1100	11	16.5	75	12	2	●	1
D1200	12	18	75	12	2	●	2

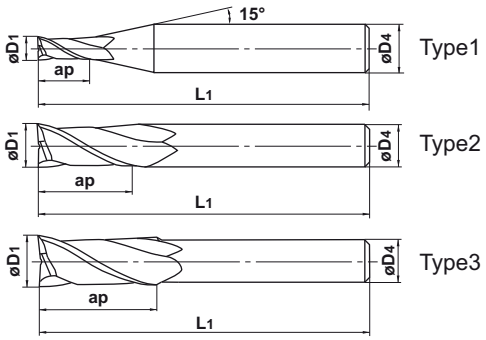
●: Stock standard

CUTTING CONDITIONS P11

MS2MS

End mill, Medium cut length, 2 flute

D1≤12 0 — -0.02
12<D1 0 — -0.03



● 2 flute end mill for general use.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2MSD0020	0.2	0.4	40	4	2	●	1
D0030	0.3	0.6	40	4	2	●	1
D0040	0.4	0.8	40	4	2	●	1
D0050	0.5	1	40	4	2	●	1
D0060	0.6	1.2	40	4	2	●	1
D0070	0.7	1.4	40	4	2	●	1
D0080	0.8	1.6	40	4	2	●	1
D0090	0.9	1.8	40	4	2	●	1
D0100	1	2	40	4	2	●	1
D0110	1.1	2.2	40	4	2	●	1
D0120	1.2	2.4	40	4	2	●	1
D0130	1.3	2.6	40	4	2	●	1
D0140	1.4	2.8	40	4	2	●	1
D0150	1.5	3	40	4	2	●	1
D0160	1.6	3.2	40	4	2	●	1
D0170	1.7	3.4	40	4	2	●	1
D0180	1.8	3.6	40	4	2	●	1
D0190	1.9	3.8	40	4	2	●	1
D0200	2	4	40	4	2	●	1
D0210	2.1	4.2	40	4	2	●	1
D0220	2.2	4.4	40	4	2	●	1
D0230	2.3	4.6	40	4	2	●	1
D0240	2.4	4.8	40	4	2	●	1
D0250	2.5	5	40	4	2	●	1
D0260	2.6	5.2	40	4	2	●	1
D0270	2.7	5.4	40	4	2	●	1
D0280	2.8	5.6	40	4	2	●	1
D0290	2.9	5.8	40	4	2	●	1
D0300	3	6	45	6	2	●	1
D0310	3.1	6.2	45	6	2	●	1
D0320	3.2	6.4	45	6	2	●	1
D0330	3.3	6.6	45	6	2	●	1
D0340	3.4	6.8	45	6	2	●	1
D0350	3.5	7	45	6	2	●	1
D0360	3.6	7.2	45	6	2	●	1
D0370	3.7	7.4	45	6	2	●	1
D0380	3.8	7.6	45	6	2	●	1
D0390	3.9	7.8	45	6	2	●	1

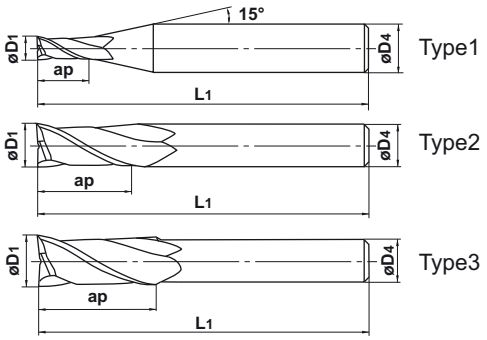
● : Stock standard

CUTTING CONDITIONS P11

MS2MS

End mill, Medium cut length, 2 flute

D1≤12 0 — -0.02
12<D1 0 — -0.03



● 2 flute end mill for general use.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2MSD0400	4	8	50	6	2	●	1
D0410	4.1	8.2	50	6	2	●	1
D0420	4.2	8.4	50	6	2	●	1
D0430	4.3	8.6	50	6	2	●	1
D0440	4.4	8.8	50	6	2	●	1
D0450	4.5	9	50	6	2	●	1
D0460	4.6	9.2	50	6	2	●	1
D0470	4.7	9.4	50	6	2	●	1
D0480	4.8	9.6	50	6	2	●	1
D0490	4.9	9.8	50	6	2	●	1
D0500	5	10	50	6	2	●	1
D0510	5.1	10.2	50	6	2	●	1
D0520	5.2	10.4	50	6	2	●	1
D0530	5.3	10.6	50	6	2	●	1
D0540	5.4	10.8	50	6	2	●	1
D0550	5.5	11	50	6	2	●	1
D0560	5.6	11.2	50	6	2	●	1
D0570	5.7	11.4	50	6	2	●	1
D0580	5.8	11.6	50	6	2	●	1
D0590	5.9	11.8	50	6	2	●	1
D0600	6	12	50	6	2	●	2
D0650	6.5	13	60	8	2	●	1
D0700	7	14	60	8	2	●	1
D0750	7.5	15	60	8	2	●	1
D0800	8	16	60	8	2	●	2
D0850	8.5	17	70	10	2	●	1
D0900	9	18	70	10	2	●	1
D0950	9.5	19	70	10	2	●	1
D1000	10	20	70	10	2	●	2
D1100	11	22	75	12	2	●	1
D1200	12	24	75	12	2	●	2
D1600	16	32	90	16	2	●	2
D1800	18	36	90	16	2	●	3
D2000	20	40	100	20	2	●	2

The diameter tolerance is only applied to items produced after July 2006.

● : Stock standard

MS2SS

End mill, Short cut length, 2 flute

MS2MS

End mill, Medium cut length, 2 flute

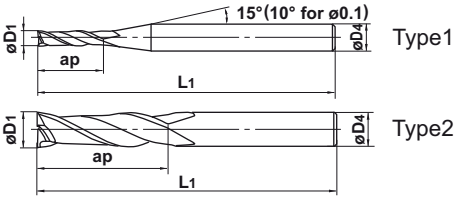
Work material	Carbon steel, Alloy steel, Tool steel Pre-hardened steel (−45HRC) Ck55, 070M55			Alloy steel, Tool steel (45−55HRC) W.Nr. 1.2344(H13), X20Cr13		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
0.1	40,000	40	0.001	40,000	40	0.001
0.2	40,000	100	0.002	40,000	100	0.002
0.3	40,000	200	0.005	40,000	200	0.005
0.4	40,000	600	0.01	40,000	600	0.01
0.5	40,000	1,000	0.015	40,000	960	0.015
0.6	40,000	1,200	0.02	40,000	1,200	0.02
0.7	40,000	1,400	0.02	40,000	1,400	0.02
0.8	40,000	1,600	0.03	40,000	1,600	0.03
0.9	40,000	1,800	0.04	40,000	1,600	0.04
1	40,000	2,000	0.06	32,000	1,600	0.06
1.5	40,000	3,000	0.12	32,000	1,900	0.08
2	30,000	3,000	0.18	24,000	1,900	0.10
2.5	24,000	2,600	0.25	19,000	1,600	0.13
3	20,000	2,300	0.30	16,000	1,400	0.15
4	15,000	2,000	0.40	12,000	1,200	0.20
5	12,000	1,600	0.50	9,000	900	0.25
6	10,000	1,400	0.60	7,000	700	0.30
8	8,000	1,000	0.80	5,600	550	0.40
10	6,400	900	1.00	4,500	500	0.50
12	5,400	820	1.00	3,800	450	0.50
16	2,400	380	≤3	1,200	100	≤0.8
20	1,900	320	≤4	1,000	80	≤1
Depth of cut	≤Please refer to the list above for depth of cut. ≤D			D ≤Please refer to the list above for depth of cut. D:Dia.		

1) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50−70% and the feed rate to 40−60%.
3) When drilling, please lower the feed rate by 70%.

MS2JS

End mill, Semi long cut length, 2 flute

D1=0.1 0 −-0.01
0.1<D1 0 −-0.02



● 2 flute end mill for general use.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2JSD0010	0.1	0.3	40	4	2	●	1
D0020	0.2	0.6	40	4	2	●	1
D0030	0.3	0.9	40	4	2	●	1
D0040	0.4	1.2	40	4	2	●	1
D0050	0.5	1.5	40	4	2	●	1
D0060	0.6	1.8	40	4	2	●	1
D0070	0.7	2.1	40	4	2	●	1
D0080	0.8	2.4	40	4	2	●	1
D0090	0.9	2.7	40	4	2	●	1
D0100	1	3	40	4	2	●	1
D0120	1.2	3.6	40	4	2	●	1
D0150	1.5	4.5	40	4	2	●	1
D0180	1.8	5.4	40	4	2	●	1
D0200	2	6	40	4	2	●	1
D0250	2.5	7.5	40	4	2	●	1
D0300	3	9	45	6	2	●	1
D0400	4	12	50	6	2	●	1
D0500	5	15	50	6	2	●	1
D0600	6	18	50	6	2	●	2
D0800	8	24	70	8	2	●	2
D1000	10	30	90	10	2	●	2
D1200	12	36	90	12	2	●	2

The diameter tolerance is only applied to items produced after July 2006.

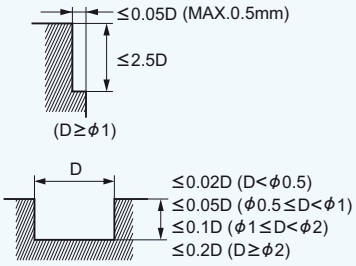
●: Stock standard

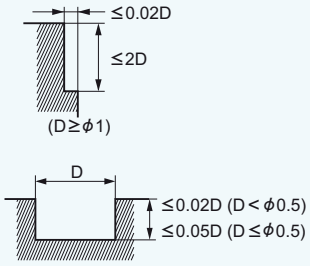
MS2JS

End mill, Semi long cut length, 2 flute

Work material	Carbon steel (－30HRC) Ck55, 070M55 Cast iron GG25		Alloy steel, Tool steel Pre-hardened steel (30－45HRC) W.Nr. 1.2344(H13)		Austenitic stainless steel X5CrNi1810 X5CrNiMo17122		Hardened steel (45－55HRC) W.Nr. 1.2344(H13)	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
0.1	40,000	－ (40)	40,000	－ (40)	40,000	－ (35)	40,000	— (25)
0.2	40,000	－ (45)	40,000	－ (45)	40,000	－ (35)	32,000	— (25)
0.3	40,000	－ (55)	32,000	－ (45)	27,000	－ (35)	21,000	— (25)
0.4	32,000	－ (60)	24,000	－ (45)	20,000	－ (35)	16,000	— (25)
0.5	25,000	－ (60)	19,000	－ (45)	16,000	－ (35)	13,000	— (25)
0.6	21,000	－ (60)	16,000	－ (45)	13,000	－ (35)	11,000	— (25)
0.7	18,000	－ (60)	14,000	－ (45)	11,000	－ (35)	9,100	— (25)
0.8	16,000	－ (60)	12,000	－ (45)	9,900	－ (35)	8,000	— (25)
0.9	14,000	－ (60)	11,000	－ (45)	8,800	－ (35)	7,100	— (25)
1	13,000	60 (60)	9,500	45 (45)	8,000	35 (35)	6,400	25 (25)
1.5	8,500	60 (60)	6,400	45 (45)	5,300	35 (35)	4,200	25 (25)
2	6,400	60 (60)	4,800	45 (45)	4,000	35 (35)	3,200	25 (25)
2.5	5,100	60 (60)	3,800	45 (45)	3,200	40 (40)	2,500	25 (25)
3	4,200	65 (60)	3,400	55 (45)	2,600	40 (40)	2,100	25 (25)
4	3,400	80 (60)	2,700	65 (45)	2,100 (1,600)	50 (30)	1,700	35 (25)
5	2,900	100 (60)	2,300	80 (45)	1,800 (1,350)	60 (30)	1,500	40 (25)
6	2,500	120 (60)	2,000	100 (50)	1,500 (1,100)	75 (30)	1,300	50 (25)
8	1,900	130 (60)	1,500	100 (50)	1,200 (900)	80 (30)	1,000	50 (25)
10	1,600	130 (60)	1,300	100 (50)	950 (710)	75 (30)	800	50 (25)
12	1,300	120 (60)	1,100	100 (50)	800 (600)	75 (30)	670	50 (25)

Depth of cut





( ) : Indicates standard revolution and feed rate for slotting.

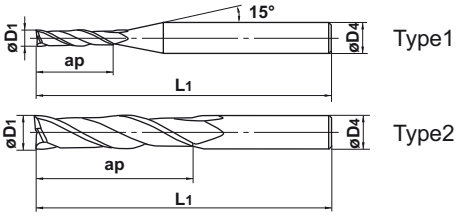
D:Dia.

1) Please use 4 fluted end mills for workpiece of 55－60HRC.
2) When cutting austenitic stainless steels and wear resistant alloys, the use of non-water-soluble cutting fluid is especially effective.
3) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
4) When drilling, please lower the feed rate by 70%.

MS2LS

End mill, long cut length, 2 flute

0 – -0.02



UWC MS D1<3 30° D1<3 3≤D1

● 2 flute end mill for general use.

Unit : mm

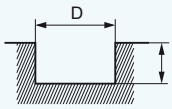
Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2LSD0020	0.2	0.8	40	4	2	★	1
D0030	0.3	1.2	40	4	2	★	1
D0040	0.4	1.6	40	4	2	★	1
D0050	0.5	2	40	4	2	★	1
D0060	0.6	2.4	40	4	2	★	1
D0070	0.7	2.8	40	4	2	★	1
D0080	0.8	3.2	40	4	2	★	1
D0090	0.9	3.6	40	4	2	★	1
D0100	1	4	40	4	2	★	1
D0150	1.5	6	40	4	2	★	1
D0200	2	8	40	4	2	★	1
D0250	2.5	10	50	4	2	★	1
D0300	3	12	50	6	2	★	1
D0400	4	16	50	6	2	★	1
D0500	5	20	60	6	2	★	1
D0600	6	24	60	6	2	★	2
D0800	8	32	70	8	2	★	2
D1000	10	40	90	10	2	★	2
D1200	12	48	110	12	2	★	2

★: Stock standard in Japan

MS2LS

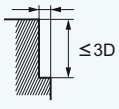
End mill, Long cut length, 2 flute

Slotting

Work material	Carbon steel (−30HRC) Ck55, 070M55 Cast iron GG25			Alloy steel, Tool steel Pre-hardened steel (30−45HRC) W.Nr. 1.2344(H13), 070M55		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
0.2	40,000	400	0.001	30,000	250	0.001
0.3	40,000	600	0.005	35,000	420	0.005
0.4	40,000	700	0.007	30,000	420	0.007
0.5	40,000	800	0.01	24,000	380	0.01
0.6	33,000	800	0.015	21,000	480	0.01
0.7	28,000	800	0.015	18,000	480	0.015
0.8	25,000	800	0.02	16,000	480	0.02
0.9	22,000	800	0.03	15,000	500	0.03
1	20,000	800	0.04	13,000	500	0.04
1.5	13,000	800	0.10	9,000	500	0.10
2	10,000	800	0.15	6,700	500	0.15
2.5	9,000	800	0.20	6,000	500	0.20
3	8,000	800	0.20	5,200	460	0.20
4	6,000	600	0.20	4,000	340	0.20
5	4,800	480	0.30	3,200	280	0.20
6	4,000	400	0.30	2,600	210	0.20
8	3,000	300	0.30	2,000	170	0.30
10	2,400	240	0.30	1,600	140	0.30
12	2,000	200	0.30	1,300	110	0.30
Depth of cut	 ≤Please refer to the list above for depth of cut.					

D:Dia.

Side milling

Work material	Carbon steel (−30HRC) Ck55, 070M55 Cast iron GG25			Alloy steel, Tool steel Pre-hardened steel (30−45HRC) W.Nr. 1.2344(H13), 070M55		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
3	3,500	370	0.05	2,600	250	0.03
4	2,800	370	0.06	2,100	200	0.03
5	2,200	330	0.06	1,700	160	0.03
6	1,800	300	0.06	1,500	140	0.03
8	1,600	270	0.08	1,100	140	0.04
10	1,400	240	0.10	900	140	0.05
12	1,200	200	0.10	750	120	0.06
Depth of cut	≤Please refer to the list above for depth of cut. 					

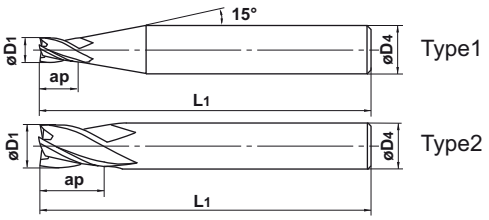
D:Dia.

1) Please use VCLD for workpiece of 45HRC.
2) Vibration is liable to occur in the initial stages of machining, but after machining 1−2m the machining becomes stable and vibration could disappear.
3) Side milling with large depth of cuts with end mills less than ϕ3 is not recommended. When side milling, divide the cutting depth into several times paths.
4) If chattering occurs, reduce the revolution and the feed rate proportionately and also reduce the depth of cut.
5) When drilling, please lower the feed rate by 70%.

MS4SC

End mill, Short cut length, 4 flute

0 — -0.02



● 4 flute end mill for general use.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4SCD0100	1	1.5	40	4	4	●	1
D0150	1.5	2.3	40	4	4	●	1
D0200	2	3	40	4	4	●	1
D0250	2.5	3.8	40	4	4	●	1
D0300	3	4.5	50	6	4	●	1
D0400	4	6	50	6	4	●	1
D0500	5	7.5	50	6	4	●	1
D0600	6	9	50	6	4	●	2
D0800	8	12	60	8	4	●	2
D1000	10	15	70	10	4	●	2
D1200	12	18	75	12	4	●	2

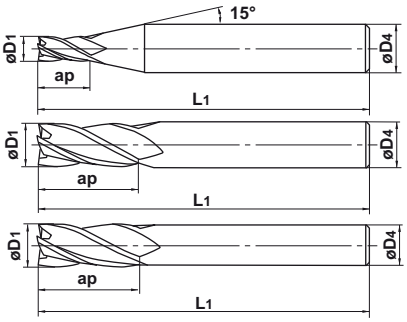
● : Stock standard

CUTTING CONDITIONS P23

MS4MC

End mill, Medium cut length, 4 flute

D1≤12 0 — -0.02
12<D1 0 — -0.03



● 4 flute end mill for general use.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4MCD0100	1	2.5	40	4	4	●	1
D0150	1.5	3.8	40	4	4	●	1
D0200	2	5	40	4	4	●	1
D0250	2.5	6.3	40	4	4	●	1
D0300	3	7.5	50	6	4	●	1
* D0350	3.5	9	50	6	4	★	1
D0400	4	10	50	6	4	●	1
* D0450	4.5	11.5	50	6	4	★	1
D0500	5	12.5	50	6	4	●	1
* D0550	5.5	14	50	6	4	★	1
D0600	6	15	50	6	4	●	2
* D0650	6.5	16.5	60	8	4	★	1
* D0700	7	17.5	60	8	4	★	1
* D0750	7.5	19	60	8	4	★	1
D0800	8	20	60	8	4	●	2
* D0850	8.5	21.5	70	10	4	★	1
* D0900	9	22.5	70	10	4	★	1
* D0950	9.5	24	70	10	4	★	1
D1000	10	25	70	10	4	●	2
* D1100	11	27.5	75	12	4	★	1
D1200	12	30	90	12	4	●	2
* D1400	14	35	90	12	4	★	3
* D1600	16	40	100	16	4	●	2
* D1800	18	45	100	16	4	●	3
* D2000	20	50	110	20	4	●	2

* Expand

The diameter tolerance is only applied to items produced after July 2006.

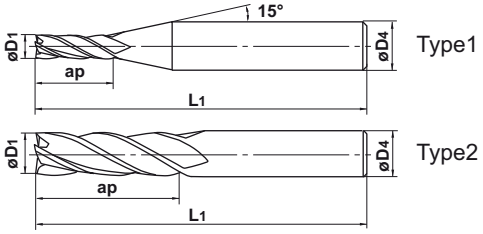
● : Stock standard
★ : Stock standard in Japan

CUTTING CONDITIONS P19

MS4JC

End mill, Semi long cut length, 4 flute

0 – -0.02



● 4 flute end mill for general use.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4JCD0100	1	4	40	4	4	●	1
D0150	1.5	6	40	4	4	●	1
D0200	2	8	40	4	4	●	1
D0250	2.5	10	50	4	4	●	1
D0300	3	12	50	6	4	●	1
D0400	4	16	50	6	4	●	1
D0500	5	20	60	6	4	●	1
D0600	6	24	60	6	4	●	2
D0800	8	32	70	8	4	●	2
D1000	10	40	90	10	4	●	2
D1200	12	48	110	12	4	●	2

The diameter tolerance is only applied to items produced after July 2006.

●: Stock standard

MS4SC

End mill, Short cut length, 4 flute

MS4MC

End mill, Medium cut length, 4 flute

Work material	Carbon steel, Alloy steel, Tool steel Pre-hardened steel (−45HRC) Ck55, 070M55			Alloy steel, Tool steel (45−55HRC) W.Nr. 1.2344(H13), X20Cr13		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
1	40,000	3,000	0.06	32,000	2,400	0.06
1.5	40,000	4,500	0.12	32,000	3,600	0.08
2	30,000	4,500	0.18	24,000	3,600	0.10
2.5	24,000	3,900	0.25	19,000	3,000	0.13
3	20,000	3,500	0.30	16,000	2,700	0.15
4	15,000	3,000	0.40	12,000	2,400	0.20
5	12,000	2,400	0.50	9,000	1,800	0.25
6	10,000	2,100	0.60	7,000	1,400	0.30
8	8,000	1,500	0.80	5,600	1,100	0.40
10	6,400	1,400	1.00	4,500	950	0.50
12	5,400	1,200	1.00	3,800	860	0.50
16	2,400	550	≤ 3	1,200	120	≤ 0.8
20	1,900	480	≤ 4	1,000	100	≤ 1
Depth of cut	≤Please refer to the list above for depth of cut. ≤ D			D ≤Please refer to the list above for depth of cut.		

D:Dia.

1) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50−70% and the feed rate to 40−60%.
2) When drilling, please lower the feed rate by 70%.

MS4JC

End mill, Medium cut length, 4 flute

Work material	Carbon steel (−30HRC) Ck55, 070M55 Cast iron GG25		Alloy steel, Tool steel Pre-hardened steel (30−45HRC) W.Nr. 1.2344(H13)		Austenitic stainless steel X5CrNi1810 X5CrNiMo17122		Hardened steel (45−55HRC) W.Nr. 1.2344(H13)	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	11,100	85	9,500	65	8,000	50	6,400	35
1.5	7,400	85	6,400	90	5,300	50	4,200	35
2	5,600	85	4,800	90	4,000	50	3,200	35
2.5	4,500	85	3,800	90	3,200	55	2,500	35
3	3,700	90	3,400	90	2,600	60	2,100	35
4	3,000	110	2,700	90	2,100	70	1,700	50
5	2,600	140	2,300	110	1,800	85	1,500	55
6	2,300	170	2,000	140	1,500	110	1,300	70
8	1,700	180	1,500	140	1,200	110	1,000	70
10	1,400	180	1,300	140	950	110	800	70
12	1,200	170	1,100	140	800	110	670	70
Depth of cut	≤0.05D (MAX. 0.5mm) ≤2.5D D ≤0.1D (D<ϕ2) ≤0.2D (D≥ϕ2)						≤0.02D ≤2D D ≤0.05D	

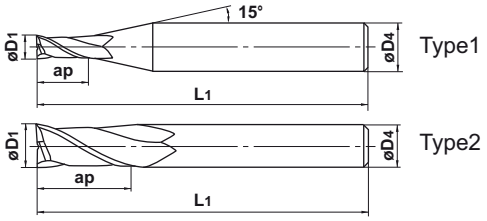
D:Dia.

1) The above table shows cutting conditions for standard side milling. For slotting, please reduce feed rate only to 50% of the table figure. Please set the revolution rate at 80% and the feed rate at 40% when slotting austenitic stainless steels.
2) When drilling, please lower the feed rate by 70%.

MS2MC...E

End mill, Medium cut length, 2 flute, Centre cutting

D1≤3	0 — -0.020
3<D1≤6	-0.015 — -0.038
6<D1≤12	-0.020 — -0.047



● End mill for a wide range of applications.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2MCD0200E	2	6	50	6	2	●	1
D0300E	3	8	50	6	2	●	1
D0400E	4	11	50	6	2	●	1
D0500E	5	13	50	6	2	●	1
D0600E	6	13	50	6	2	●	2
D0800E	8	19	60	8	2	●	2
D1000E	10	22	75	10	2	●	2
D1200E	12	26	75	12	2	●	2

●: Stock standard

MS2MC●●●E

End mill, Medium cut length, 2 flute, Centre cutting

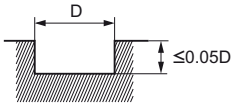
Work material	Carbon steel, Alloy steel (−30HRC) Cast iron		Alloy steel, Tool steel Pre-hardened steel (30−45HRC)		Stainless steel		Hardened steel (45−55HRC)	
Dia (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	15,000	600	10,000	400	9,100	300	8,000	120
3	10,000	600	7,000	400	6,000	300	5,000	120
4	7,500	600	5,200	400	4,500	300	4,000	120
5	6,000	600	4,200	400	3,600	300	3,200	120
6	5,000	600	3,500	400	3,000	300	2,700	120
8	4,000	520	2,800	350	2,400	260	2,000	110
10	3,200	450	2,200	300	1,900	230	1,600	100
12	2,700	410	1,900	270	1,600	210	1,300	100
Depth of cut	≤0.1D (D≤ϕ3) ≤0.2D (D>ϕ3) ≤1.5D D ≤0.2D (D≥ϕ2)				≤0.05D ≤1D D ≤0.05D (D=ϕ2) ≤0.1D (D>ϕ2)			

D:Dia.

Work material	Titanium		High Nickel Inconel	
Dia (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	6,400	210	3,200	50
3	4,200	210	2,100	50
4	3,200	210	1,600	50
5	2,500	210	1,300	50
6	2,100	210	1,000	45
8	1,600	170	800	45
10	1,300	160	600	40
12	1,000	130	530	40
Depth of cut	≤0.1D (D≤ϕ3) ≤0.2D (D>ϕ3) ≤1.5D D ≤0.2D (D≥ϕ2)			

D:Dia.

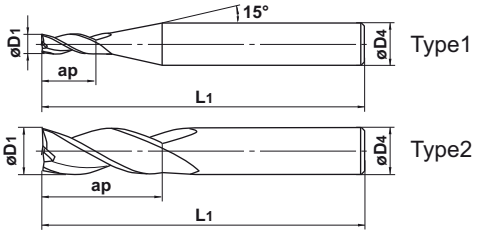
1) When using high efficiency conditions, the surface speeds/feeds can be increased by 2-3 times the above values.



MS3MC...E

End mill, Medium cut length, 3 flute, Centre cutting

D1≤3	0 — -0.020
3<D1≤6	-0.015 — -0.038
6<D1≤12	-0.020 — -0.047



- End mill for slotting and end milling applications.
- Special flute geometry for high feed rates.

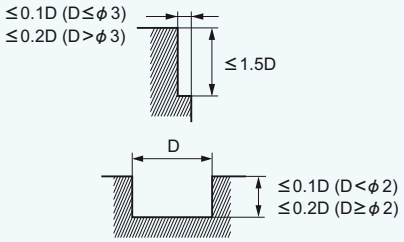
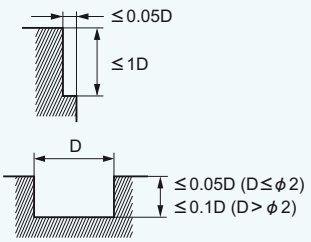
Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS3MCD0100E	1	2.5	40	4	3	●	1
D0150E	1.5	4	40	4	3	●	1
D0200E	2	6	50	6	3	●	1
D0300E	3	8	50	6	3	●	1
D0400E	4	11	50	6	3	●	1
D0500E	5	11	50	6	3	●	1
D0600E	6	13	50	6	3	●	2
D0800E	8	19	60	8	3	●	2
D1000E	10	22	75	10	3	●	2
D1200E	12	24	75	12	3	●	2

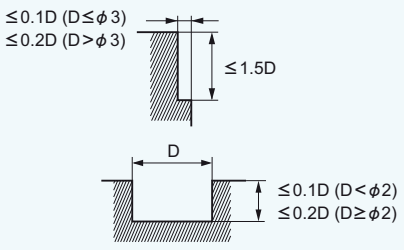
● : Stock standard

MS3MC...E

End mill, Medium cut length, 3 flute, Centre cutting

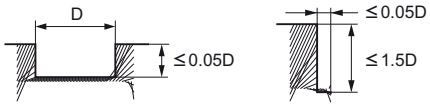
Work material	Carbon steel, Alloy steel (−30HRC) Cast iron		Alloy steel, Tool steel Pre-hardened steel (30−45HRC)		Stainless steel		Hardened steel (45−55HRC)	
Dia (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40,000	900	32,000	700	27,000	510	24,000	210
1.5	30,000	1,020	21,000	675	18,000	510	15,000	210
2	22,500	1,020	15,000	675	13,500	510	12,000	210
3	15,000	1,020	10,500	675	9,000	510	7,500	210
4	11,250	1,020	7,800	675	6,800	510	6,000	210
5	9,000	1,020	6,300	675	5,400	510	4,800	210
6	7,500	1,020	5,250	675	4,500	510	4,050	210
8	6,000	840	4,200	585	3,400	410	3,000	180
10	4,800	765	3,300	510	2,700	370	2,400	165
12	4,050	765	2,850	465	2,300	330	1,950	135
Depth of cut								

D:Dia.

Work material	Titanium		High nickel Inconel	
Dia (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	20,000	380	10,000	90
1.5	12,800	360	6,400	121
2	10,000	360	5,000	90
3	6,400	360	3,000	90
4	5,000	360	2,400	90
5	4,000	360	2,000	90
6	3,100	360	1,600	90
8	2,400	290	1,200	70
10	1,900	260	1,000	70
12	1,600	230	800	109
Depth of cut				

D:Dia.

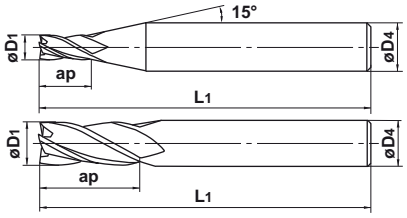
1) When using high efficiency conditions, the surface speeds/feeds can be increased by 2-3 times the above values.



MS4MC...E

End mill, Medium cut length, 4 flute, Centre cutting

$D_1 \leq 3$	0 — -0.020
$3 < D_1 \leq 6$	-0.015 — -0.038
$6 < D_1 \leq 16$	-0.020 — -0.047



- End mill for a wide range of applications.
- Suitable for high speed finish machining.

Unit : mm

Order Number	Dia. D_1	Length of Cut ap	Overall Length L_1	Shank Dia. D_4	No. of Flutes N	Stock	Type
MS4MCD0100E	1	2.5	40	4	4	●	1
D0150E	1.5	4	40	4	4	●	1
D0200E	2	6	50	6	4	●	1
D0300E	3	8	50	6	4	●	1
D0400E	4	11	50	6	4	●	1
D0500E	5	13	50	6	4	●	1
D0600E	6	13	50	6	4	●	2
D0800E	8	19	60	8	4	●	2
D1000E	10	22	75	10	4	●	2
D1200E	12	26	75	12	4	●	2
D1600E	16	32	90	16	4	●	2

● : Stock standard

MS4MC...E

End mill, Medium cut length, 4 flute, Centre cutting

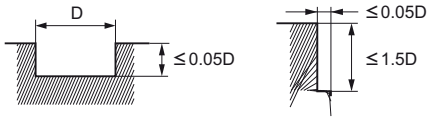
Work material	Carbon steel, Alloy steel (−30HRC) Cast iron		Alloy steel, Tool steel Pre-hardened steel (30−45HRC)		Stainless steel		Hardened steel (45−55HRC)	
Dia (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40,000	1,200	32,000	960	27,000	675	24,000	270
1.5	30,000	1,350	21,000	900	18,000	675	15,000	270
2	22,500	1,350	15,000	900	13,650	675	12,000	270
3	15,000	1,350	10,500	900	9,000	675	7,500	270
4	11,250	1,350	7,800	900	6,750	675	6,000	270
5	9,000	1,350	6,300	900	5,400	675	4,800	270
6	7,500	1,350	5,250	900	4,500	675	4,050	270
8	6,000	1,170	4,200	780	3,600	585	3,000	240
10	4,800	1,020	3,300	675	2,850	510	2,400	210
12	4,050	1,020	2,850	615	2,400	465	1,950	180
16	3,000	870	2,400	480	1,950	345	1,650	150
Depth of cut	≤0.1D (D≥ϕ3) ≤0.2D (D>ϕ3) ≤1.5D D ≤0.1D (D<ϕ2) ≤0.2D (D≥ϕ2)				≤0.05D ≤1D D ≤0.05D (D≤ϕ2) ≤0.01D (D>ϕ2)			

D:Dia.

Work material	Titanium		High Nickel Inconel	
Dia (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	20,000	500	10,000	110
1.5	12,800	400	6,400	110
2	9,500	400	4,800	110
3	6,400	400	3,100	110
4	4,800	480	2,400	110
5	4,000	400	1,900	110
6	3,100	400	1,600	110
8	2,400	300	1,200	100
10	1,900	300	900	80
12	1,600	250	800	80
16	1,200	180	600	60
Depth of cut	≤0.1D (D≤ϕ3) ≤0.2D (D>ϕ3) ≤1.5D D ≤0.1D (D<ϕ2) ≤0.2D (D≥ϕ2)			

D:Dia.

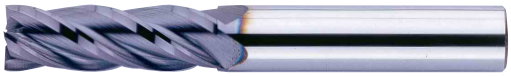
1) When using high efficiency conditions, the surface speeds/feeds can be increased by 2-3 times the above values.

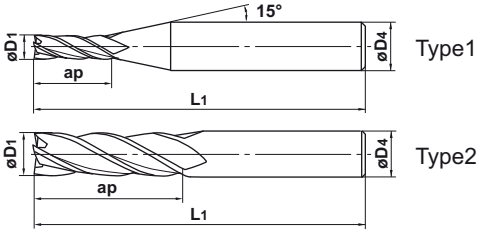


MS4JC...E

End mill, Semi long cut length, 4 flute, Centre cutting

D1≤3	0 — -0.020
3<D1≤6	-0.015 — -0.038
6<D1≤12	-0.020 — -0.047





- End mill for high efficiency longer reach machining.
- Suitable for high speed finish machining.

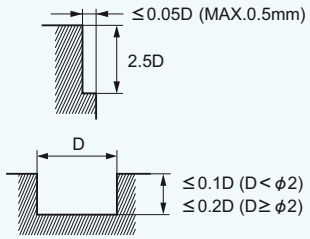
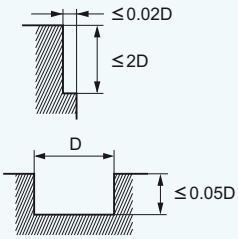
Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4JCD0100E	1	4	40	4	4	●	1
D0150E	1.5	6	40	4	4	●	1
D0200E	2	8	50	6	4	●	1
D0300E	3	12	50	6	4	●	1
D0400E	4	16	50	6	4	●	1
D0500E	5	20	60	6	4	●	1
D0600E	6	20	60	6	4	●	2
D0800E	8	25	60	8	4	●	2
D1000E	10	30	75	10	4	●	2
D1200E	12	36	83	12	4	●	2

● : Stock standard

MS4JC...E

End mill, Semi long cut length, 4 flute, Centre cutting

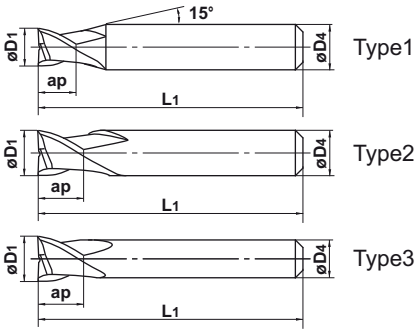
Work material	Carbon steel, Alloy steel (−30HRC) Cast iron		Alloy steel, Tool steel Pre-hardened steel (30−45HRC)		Stainless steel		Hardened steel (45−55HRC)	
Dia (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	13,000	90	9,500	70	8,000	50	6,400	40
1.5	8,500	90	6,400	70	5,300	50	4,200	40
2	6,400	90	4,800	70	4,000	50	3,200	40
3	4,200	100	3,400	80	2,600	60	2,100	40
4	3,400	120	2,700	100	2,100	75	1,700	50
5	2,900	150	2,300	120	1,800	90	1,500	60
6	2,500	180	2,000	150	1,500	110	1,300	75
8	1,900	200	1,500	150	1,200	120	1,000	75
10	1,600	200	1,300	150	950	110	800	75
12	1,300	180	1,100	150	800	110	670	75
Depth of cut								

D:Dia.

MS2ES

End mill, 2 flute, For small automatic lathe

0 — -0.02



- 2 flute end mill.

Overall length 35mm

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2ESD0300L35S04	3	3	35	4	2	★	1
D0350L35S04	3.5	3.5	35	4	2	★	1
D0400L35S04	4	4	35	4	2	★	2
D0500L35S05	5	5	35	5	2	★	2
D0500L35S06	5	5	35	6	2	★	1
D0600L35S05	6	6	35	5	2	★	3
D0600L35S06	6	6	35	6	2	★	2
D0700L35S07	7	6	35	7	2	★	2
D0800L35S07	8	6	35	7	2	★	3
D0800L35S08	8	6	35	8	2	★	2
D1000L35S07	10	6	35	7	2	★	3
D1000L35S10	10	6	35	10	2	★	2
D1200L35S10	12	6	35	10	2	★	3

Overall length 45mm

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2ESD0300L45S04	3	3	45	4	2	★	1
D0350L45S04	3.5	3.5	45	4	2	★	1
D0400L45S04	4	4	45	4	2	★	2
D0500L45S06	5	5	45	6	2	★	1
D0600L45S06	6	6	45	6	2	★	2
D0700L45S07	7	7	45	7	2	★	2
D0800L45S07	8	8	45	7	2	★	3
D0800L45S08	8	8	45	8	2	★	2
D1000L45S07	10	10	45	7	2	★	3
D1000L45S10	10	10	45	10	2	★	2
D1200L45S10	12	12	45	10	2	★	3

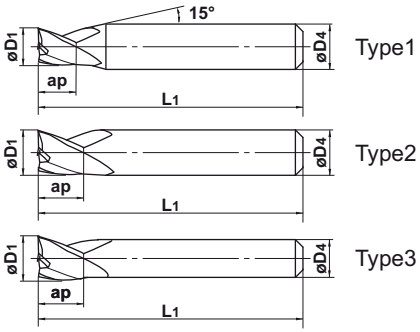
★: Stock standard in Japan

CUTTING CONDITIONS P31

MS3ES

End mill, 3 flute, For small automatic lathe

0 — -0.02



● 3 flute end mill.

Overall length 35mm

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS3ESD0300L35S04	3	3	35	4	3	★	1
D0350L35S04	3.5	3.5	35	4	3	★	1
D0400L35S04	4	4	35	4	3	★	2
D0500L35S05	5	5	35	5	3	★	2
D0500L35S06	5	5	35	6	3	★	1
D0600L35S05	6	6	35	5	3	★	3
D0600L35S06	6	6	35	6	3	★	2
D0700L35S07	7	6	35	7	3	★	2
D0800L35S07	8	6	35	7	3	★	3
D0800L35S08	8	6	35	8	3	★	2
D1000L35S07	10	6	35	7	3	★	3
D1000L35S10	10	6	35	10	3	★	2
D1200L35S10	12	6	35	10	3	★	3

Overall length 45mm

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS3ESD0300L45S04	3	3	45	4	3	★	1
D0350L45S04	3.5	3.5	45	4	3	★	1
D0400L45S04	4	4	45	4	3	★	2
D0500L45S06	5	5	45	6	3	★	1
D0600L45S06	6	6	45	6	3	★	2
D0700L45S07	7	7	45	7	3	★	2
D0800L45S07	8	8	45	7	3	★	3
D0800L45S08	8	8	45	8	3	★	2
D1000L45S07	10	10	45	7	3	★	3
D1000L45S10	10	10	45	10	3	★	2
D1200L45S10	12	12	45	10	3	★	3

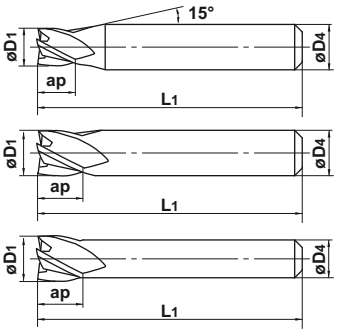
★: Stock standard in Japan

CUTTING CONDITIONS P31

MS4EC

End mill, 4 flute, For small automatic lathe

D1≤12 0 — -0.02
12<D1 0 — -0.03



- 4 flute end mill.

Overall length 35mm

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4ECD0300L35S04	3	3	35	4	4	★	1
D0350L35S04	3.5	3.5	35	4	4	★	1
D0400L35S04	4	4	35	4	4	★	2
D0500L35S05	5	5	35	5	4	★	2
D0500L35S06	5	5	35	6	4	★	1
D0600L35S05	6	6	35	5	4	★	3
D0600L35S06	6	6	35	6	4	★	2
D0700L35S07	7	6	35	7	4	★	2
D0800L35S07	8	6	35	7	4	★	3
D0800L35S08	8	6	35	8	4	★	2
D1000L35S07	10	6	35	7	4	★	3
D1000L35S10	10	6	35	10	4	★	2
D1200L35S10	12	6	35	10	4	★	3

Overall length 45mm

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4ECD0300L45S04	3	3	45	4	4	★	1
D0350L45S04	3.5	3.5	45	4	4	★	1
D0400L45S04	4	4	45	4	4	★	2
D0500L45S06	5	5	45	6	4	★	1
D0600L45S06	6	6	45	6	4	★	2
D0700L45S07	7	7	45	7	4	★	2
D0800L45S07	8	8	45	7	4	★	3
D0800L45S08	8	8	45	8	4	★	2
D1000L45S07	10	10	45	7	4	★	3
D1000L45S10	10	10	45	10	4	★	2
D1200L45S10	12	12	45	10	4	★	3
D1400L45S10	14	14	45	10	4	★	3

★: Stock standard in Japan

MS2ES

End mill, 2 flute, For small automatic lathe

MS3ES

End mill, 3 flute, For small automatic lathe

Work material	Carbon steel (−30HRC) Ck55, 070M55 Cast iron GG25, Brass		Alloy steel, Tool steel, Pre-hardened steel (30−45HRC) 070M55, W.Nr. 1.2344(H13) etc.		Austenitic stainless steel X5CrNi1810 X5CrNiMo17122		Hardened steel (45−55HRC) W.Nr. 1.2344(H13)	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	10,000	600	7,000	400	6,000	300	5,000	120
4	7,500	600	5,200	400	4,500	300	4,000	120
5	6,000	600	4,200	400	3,600	300	3,200	120
6	5,000	600	3,500	400	3,000	300	2,700	120
7	4,500	560	3,000	360	2,700	280	2,300	110
8	4,000	520	2,800	350	2,400	260	2,000	110
10	3,200	450	2,200	300	1,900	230	1,600	100
12	2,700	410	1,900	270	1,600	210	1,300	100
Depth of cut	≤0.2D, ≤1D		D, ≤0.2D		≤0.05D, ≤1D		D, ≤0.1D	

D:Dia.

1) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
2) When drilling, please lower the feed rate by 70%.

MS4EC

End mill, 4 flute, For small automatic lathe

Work material	Carbon steel (−30HRC) Ck55, 070M55 Cast iron GG25, Brass		Alloy steel, Tool steel, Pre-hardened steel (30−45HRC) 070M55, W.Nr. 1.2344(H13) etc.		Austenitic stainless steel X5CrNi1810 X5CrNiMo17122		Hardened steel (45−55HRC) W.Nr. 1.2344(H13)	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
3	10,000	900	7,000	600	6,000	450	5,000	180
4	7,500	900	5,200	600	4,500	450	4,000	180
5	6,000	900	4,200	600	3,600	450	3,200	180
6	5,000	900	3,500	600	3,000	450	2,700	180
7	4,500	840	3,000	540	2,700	420	2,300	160
8	4,000	780	2,800	520	2,400	390	2,000	160
10	3,200	680	2,200	450	1,900	340	1,600	140
12	2,700	620	1,900	410	1,600	310	1,300	120
14	2,300	550	1,600	350	1,400	280	1,200	120
Depth of cut	≤0.2D, ≤1D		D, ≤0.2D		≤0.05D, ≤1D		D, ≤0.1D	

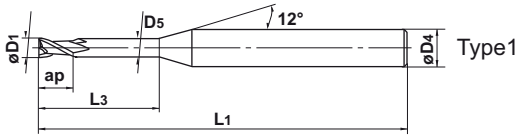
D:Dia.

1) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
2) When drilling, please lower the feed rate by 70%.

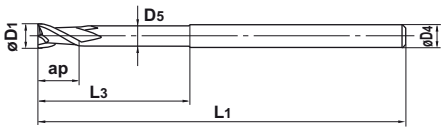
MS2XL

End mill, Short cut length, 2 flute, Long neck

D1<0.5 0 − -0.01
0.5≤D1 0 − -0.02



Type1



Type2

UWC MS 30°


D1<0.4


0.4≤D1

● 2 flute long neck end mill.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2XLD0020N005	0.2	0.3	0.5	0.18	45	4	2	●	1
D0020N010	0.2	0.3	1	0.18	45	4	2	●	1
D0020N015	0.2	0.3	1.5	0.18	45	4	2	●	1
D0030N010	0.3	0.4	1	0.28	45	4	2	●	1
D0030N020	0.3	0.4	2	0.28	45	4	2	●	1
D0030N030	0.3	0.4	3	0.28	45	4	2	●	1
D0030N060	0.3	0.4	6	0.28	45	4	2	●	1
D0030N090	0.3	0.4	9	0.28	45	4	2	●	1
D0040N020	0.4	0.6	2	0.37	45	4	2	●	1
D0040N030	0.4	0.6	3	0.37	45	4	2	●	1
D0040N040	0.4	0.6	4	0.37	45	4	2	●	1
D0040N080	0.4	0.6	8	0.37	45	4	2	●	1
D0040N120	0.4	0.6	12	0.37	45	4	2	●	1
D0050N020	0.5	0.7	2	0.46	45	4	2	●	1
D0050N040	0.5	0.7	4	0.46	45	4	2	●	1
D0050N060	0.5	0.7	6	0.46	45	4	2	●	1
D0050N080	0.5	0.7	8	0.46	50	4	2	●	1
D0050N100	0.5	0.7	10	0.46	50	4	2	●	1
D0050N150	0.5	0.7	15	0.46	50	4	2	●	1
D0060N020	0.6	0.9	2	0.56	45	4	2	●	1
D0060N040	0.6	0.9	4	0.56	45	4	2	●	1
D0060N060	0.6	0.9	6	0.56	45	4	2	●	1
D0060N080	0.6	0.9	8	0.56	50	4	2	●	1
D0060N100	0.6	0.9	10	0.56	50	4	2	●	1
D0060N120	0.6	0.9	12	0.56	50	4	2	●	1
D0060N180	0.6	0.9	18	0.56	50	4	2	●	1
D0070N020	0.7	1	2	0.66	45	4	2	●	1
D0070N040	0.7	1	4	0.66	45	4	2	●	1
D0070N060	0.7	1	6	0.66	45	4	2	●	1
D0070N080	0.7	1	8	0.66	50	4	2	●	1
D0070N100	0.7	1	10	0.66	50	4	2	●	1
D0080N040	0.8	1.2	4	0.76	45	4	2	●	1
D0080N060	0.8	1.2	6	0.76	45	4	2	●	1
D0080N080	0.8	1.2	8	0.76	50	4	2	●	1
D0080N100	0.8	1.2	10	0.76	50	4	2	●	1
D0080N120	0.8	1.2	12	0.76	50	4	2	●	1
D0080N160	0.8	1.2	16	0.76	50	4	2	●	1
D0080N240	0.8	1.2	24	0.76	60	4	2	●	1

●: Stock standard

Unit : mm

Order Number	Dia. D_1	Length of Cut ap	Neck Length L_3	Neck Dia. D_5	Overall Length L_1	Shank Dia. D_4	No. of Flutes N	Stock	Type
MS2XLD0090N060	0.9	1.4	6	0.86	45	4	2	●	1
D0090N080	0.9	1.4	8	0.86	50	4	2	●	1
D0090N100	0.9	1.4	10	0.86	50	4	2	●	1
D0090N150	0.9	1.4	15	0.86	60	4	2	●	1
D0100N040	1	1.5	4	0.95	50	4	2	●	1
D0100N060	1	1.5	6	0.95	50	4	2	●	1
D0100N080	1	1.5	8	0.95	50	4	2	●	1
D0100N100	1	1.5	10	0.95	50	4	2	●	1
D0100N120	1	1.5	12	0.95	50	4	2	●	1
D0100N160	1	1.5	16	0.95	60	4	2	●	1
D0100N200	1	1.5	20	0.95	60	4	2	●	1
D0100N250	1	1.5	25	0.95	70	4	2	●	1
D0100N300	1	1.5	30	0.95	70	4	2	●	1
D0120N060	1.2	1.8	6	1.15	50	4	2	●	1
D0120N080	1.2	1.8	8	1.15	50	4	2	●	1
D0120N100	1.2	1.8	10	1.15	50	4	2	●	1
D0120N120	1.2	1.8	12	1.15	50	4	2	●	1
D0120N160	1.2	1.8	16	1.15	60	4	2	●	1
D0120N200	1.2	1.8	20	1.15	60	4	2	●	1
D0150N060	1.5	2.3	6	1.45	50	4	2	●	1
D0150N080	1.5	2.3	8	1.45	50	4	2	●	1
D0150N100	1.5	2.3	10	1.45	50	4	2	●	1
D0150N120	1.5	2.3	12	1.45	50	4	2	●	1
D0150N140	1.5	2.3	14	1.45	60	4	2	●	1
D0150N160	1.5	2.3	16	1.45	60	4	2	●	1
D0150N180	1.5	2.3	18	1.45	60	4	2	●	1
D0150N200	1.5	2.3	20	1.45	60	4	2	●	1
D0150N250	1.5	2.3	25	1.45	70	4	2	●	1
D0150N300	1.5	2.3	30	1.45	70	4	2	●	1
D0150N380	1.5	2.3	38	1.45	80	4	2	●	1
D0150N450	1.5	2.3	45	1.45	80	4	2	●	1
D0200N060	2	3	6	1.94	50	4	2	●	1
D0200N080	2	3	8	1.94	50	4	2	●	1
D0200N100	2	3	10	1.94	50	4	2	●	1
D0200N120	2	3	12	1.94	50	4	2	●	1
D0200N140	2	3	14	1.94	60	4	2	●	1
D0200N160	2	3	16	1.94	60	4	2	●	1
D0200N180	2	3	18	1.94	60	4	2	●	1
D0200N200	2	3	20	1.94	60	4	2	●	1
D0200N250	2	3	25	1.94	70	4	2	●	1
D0200N300	2	3	30	1.94	70	4	2	●	1
D0200N350	2	3	35	1.94	80	4	2	●	1
D0200N400	2	3	40	1.94	90	4	2	●	1
D0200N500	2	3	50	1.94	100	4	2	●	1
D0200N600	2	3	60	1.94	110	4	2	●	1
D0250N080	2.5	3.7	8	2.4	50	4	2	●	1
D0250N120	2.5	3.7	12	2.4	50	4	2	●	1
D0250N160	2.5	3.7	16	2.4	60	4	2	●	1
D0250N200	2.5	3.7	20	2.4	60	4	2	●	1
D0250N250	2.5	3.7	25	2.4	70	4	2	●	1

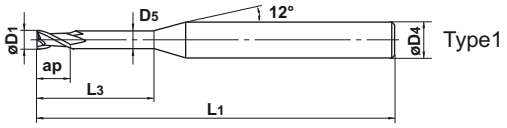
● : Stock standard

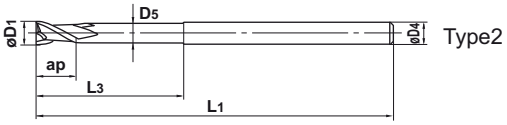
CUTTING CONDITIONS P35

MS2XL

End mill, Short cut length, 2 flute, Long neck

D1<0.5 0 − -0.01
0.5≤D1 0 − -0.02





● 2 flute long neck end mill.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2XLD0250N300	2.5	3.7	30	2.4	70	4	2	●	1
D0250N400	2.5	3.7	40	2.4	90	4	2	●	1
D0250N500	2.5	3.7	50	2.4	100	4	2	●	1
D0300N080	3	4.5	8	2.85	50	6	2	●	1
D0300N120	3	4.5	12	2.85	50	6	2	●	1
D0300N160	3	4.5	16	2.85	60	6	2	●	1
D0300N200	3	4.5	20	2.85	60	6	2	●	1
D0300N250	3	4.5	25	2.85	70	6	2	●	1
D0300N300	3	4.5	30	2.85	70	6	2	●	1
D0300N400	3	4.5	40	2.85	90	6	2	●	1
D0300N500	3	4.5	50	2.85	100	6	2	●	1
D0400N120	4	6	12	3.8	50	6	2	●	1
D0400N160	4	6	16	3.8	60	6	2	●	1
D0400N200	4	6	20	3.8	60	6	2	●	1
D0400N250	4	6	25	3.8	70	6	2	●	1
D0400N300	4	6	30	3.8	70	6	2	●	1
D0400N350	4	6	35	3.8	80	6	2	●	1
D0400N400	4	6	40	3.8	90	6	2	●	1
D0400N450	4	6	45	3.8	90	6	2	●	1
D0400N500	4	6	50	3.8	100	6	2	●	1
D0400N600	4	6	60	3.8	110	6	2	●	1
D0500N160	5	7.5	16	4.8	60	6	2	●	1
D0500N250	5	7.5	25	4.8	70	6	2	●	1
D0500N350	5	7.5	35	4.8	80	6	2	●	1
D0500N500	5	7.5	50	4.8	110	6	2	●	1
D0500N600	5	7.5	60	4.8	120	6	2	●	1
D0600N200	6	9	20	5.8	80	6	2	●	2
D0600N300	6	9	30	5.8	90	6	2	●	2
D0600N400	6	9	40	5.8	100	6	2	●	2
D0600N500	6	9	50	5.8	110	6	2	●	2
D0600N600	6	9	60	5.8	120	6	2	●	2

●: Stock standard

MS2XL

End mill, Short cut length, 2 flute, Long neck

Work material		Carbon steel Ck55 Pre-hardened steel (−45HRC) 070M55		
Dia. (mm)	Neck length (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut per pass ap (mm)
0.2	0.5	40,000	600	0.004
	1	40,000	400	0.001
0.3	1	40,000	650	0.007
	3	40,000	500	0.002
	9	22,000	150	0.001
0.4	2	40,000	800	0.007
	4	40,000	800	0.003
	12	17,000	150	0.001
0.5	2	40,000	950	0.01
	6	40,000	700	0.003
	10	25,000	400	0.002
	15	14,000	150	0.001
0.6	2	40,000	950	0.01
	6	40,000	800	0.005
	10	25,000	450	0.003
	18	12,000	150	0.001
0.7	2	40,000	1,000	0.02
	6	40,000	900	0.01
	10	11,000	300	0.005
0.8	4	40,000	1,200	0.02
	8	40,000	1,000	0.01
	12	25,000	400	0.003
	24	10,000	150	0.001
0.9	6	40,000	1,300	0.02
	10	35,000	1,000	0.01
	15	9,000	400	0.003
1	6	40,000	1,600	0.04
	8	40,000	1,600	0.03
	12	30,000	1,000	0.02
	20	15,000	400	0.005
	30	8,000	150	0.001
1.2	6	40,000	1,900	0.06
	8	40,000	1,900	0.04
	12	25,000	1,000	0.03
	20	6,500	150	0.01

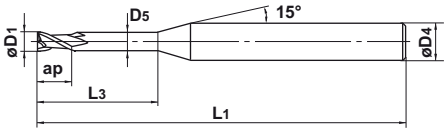
Work material		Carbon steel Ck55 Pre-hardened steel (−45HRC) 070M55		
Dia. (mm)	Neck length (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut per pass ap (mm)
1.5	6	40,000	2,400	0.10
	10	30,000	1,800	0.05
	20	15,000	600	0.02
	30	7,500	300	0.005
	45	5,000	150	0.001
1.6	6	40,000	2,400	0.12
	10	30,000	1,800	0.07
	16	20,000	1,000	0.04
2	6	40,000	2,400	0.18
	10	30,000	1,800	0.10
	16	20,000	1,000	0.06
	30	8,000	500	0.04
	40	6,000	250	0.01
	60	4,200	150	0.003
2.5	8	25,000	2,500	0.20
	16	18,000	1,700	0.10
	20	12,000	1,000	0.08
	40	8,000	400	0.03
	50	4,000	150	0.015
3	8	20,000	2,000	0.30
	16	15,000	1,400	0.15
	20	10,000	800	0.10
	40	5,000	250	0.02
	50	3,700	150	0.010
4	12	15,000	3,000	0.30
	20	11,000	2,200	0.22
	30	6,400	1,200	0.12
	40	4,500	400	0.05
	50	2,800	150	0.018
5	16	12,000	2,500	0.35
	35	5,100	750	0.15
	60	2,200	150	0.02
6	20	10,000	2,000	0.40
	40	4,200	800	0.20
	60	1,900	150	0.10

1) The above table shows the revolution and feed rate for each neck length. Please reduce the feed rate when using end mills with a longer neck length.
2) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately. Please reduce the feed rate when the surface finish is important.

MS2XL6

End mill, Short cut length, 2 flute, 6mm shank

0 – -0.02



Type1

- 2 flute long neck end mill.
- ϕ6 shank type.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2XL6D0030N008	0.3	0.8	—	—	50	6	2	●	1
D0030N015	0.3	0.5	1.5	0.27	50	6	2	●	1
D0040N010	0.4	0.6	1	0.36	50	6	2	●	1
D0040N020	0.4	0.6	2	0.36	50	6	2	●	1
D0050N013	0.5	0.8	1.3	0.46	50	6	2	●	1
D0050N025	0.5	0.8	2.5	0.46	50	6	2	●	1
D0060N015	0.6	0.9	1.5	0.56	50	6	2	●	1
D0060N030	0.6	0.9	3	0.56	50	6	2	●	1
D0070N018	0.7	1.1	1.8	0.66	50	6	2	●	1
D0070N035	0.7	1.1	3.5	0.66	50	6	2	●	1
D0080N020	0.8	1.2	2	0.76	50	6	2	●	1
D0080N040	0.8	1.2	4	0.76	50	6	2	●	1
D0090N023	0.9	1.4	2.3	0.86	50	6	2	●	1
D0090N045	0.9	1.4	4.5	0.86	50	6	2	●	1
D0100N025	1	1.5	2.5	0.94	50	6	2	●	1
D0100N050	1	1.5	5	0.94	50	6	2	●	1
D0110N028	1.1	1.7	2.8	1.04	50	6	2	●	1
D0110N055	1.1	1.7	5.5	1.04	50	6	2	●	1
D0120N030	1.2	1.8	3	1.14	50	6	2	●	1
D0120N060	1.2	1.8	6	1.14	50	6	2	●	1
D0130N033	1.3	2	3.3	1.24	50	6	2	●	1
D0130N065	1.3	2	6.5	1.24	50	6	2	●	1
D0140N035	1.4	2.1	3.5	1.34	50	6	2	●	1
D0140N070	1.4	2.1	7	1.34	50	6	2	●	1
D0150N038	1.5	2.3	3.8	1.44	50	6	2	●	1
D0150N075	1.5	2.3	7.5	1.44	50	6	2	●	1
D0160N040	1.6	2.4	4	1.54	50	6	2	●	1
D0160N080	1.6	2.4	8	1.54	50	6	2	●	1
D0170N043	1.7	2.6	4.3	1.64	50	6	2	●	1
D0170N085	1.7	2.6	8.5	1.64	50	6	2	●	1
D0180N045	1.8	2.7	4.5	1.74	50	6	2	●	1
D0180N090	1.8	2.7	9	1.74	50	6	2	●	1
D0190N048	1.9	2.9	4.8	1.84	50	6	2	●	1
D0190N095	1.9	2.9	9.5	1.84	50	6	2	●	1
D0200N050	2	3	5	1.90	50	6	2	●	1
D0200N100	2	3	10	1.90	50	6	2	●	1
D0210N053	2.1	3.2	5.3	2.00	50	6	2	●	1
D0210N105	2.1	3.2	10.5	2.00	60	6	2	●	1

●: Stock standard

Unit : mm

Order Number	Dia. D_1	Length of Cut ap	Neck Length L_3	Neck Dia. D_5	Overall Length L_1	Shank Dia. D_4	No. of Flutes N	Stock	Type
MS2XL6D0220N055	2.2	3.3	5.5	2.10	50	6	2	●	1
D0220N110	2.2	3.3	11	2.10	60	6	2	●	1
D0230N058	2.3	3.5	5.8	2.20	50	6	2	●	1
D0230N115	2.3	3.5	11.5	2.20	60	6	2	●	1
D0240N060	2.4	3.6	6	2.30	50	6	2	●	1
D0240N120	2.4	3.6	12	2.30	60	6	2	●	1
D0250N063	2.5	3.8	6.3	2.40	50	6	2	●	1
D0250N125	2.5	3.8	12.5	2.40	60	6	2	●	1

The diameter tolerance is only applied to items produced after April 2005.

CUTTING CONDITIONS P38

● : Stock standard

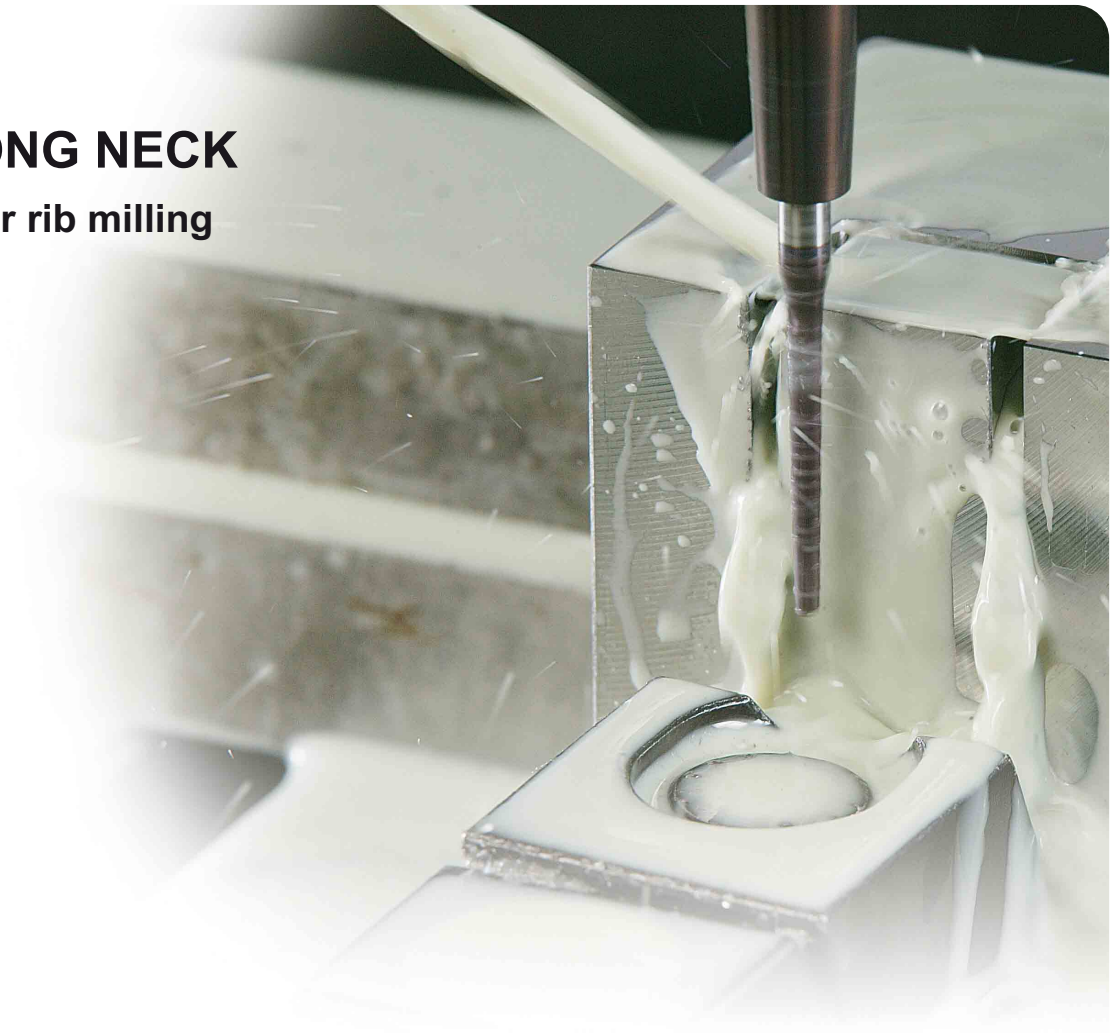
MS2XL6

End mill, Short cut length, 2 flute, 6mm shank

Work material		Structural steel, Carbon steel Ck55 Alloy steel 070M55, Tool steel SK, Pre-hardened steel			Pre-hardened steel W.Nr. 1.2344(H13), X20Cr13, Martensitic stainless steel (40－45HRC)		
Dia. (mm)	Neck length (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut per pass ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut per pass ap (mm)
0.3	**0.8**	40,000	500－1,000	0.01	30,000	300－800	0.01
	1.5			0.007			0.007
0.4	**1**	40,000	500－1,000	0.015	30,000	300－800	0.015
	2			0.01			0.01
0.5	**1.3**	40,000	500－1,000	0.02	30,000	300－800	0.02
	2.5			0.013			0.013
0.6	**1.5**	33,000	500－1,000	0.03	25,000	300－800	0.03
	3			0.018			0.018
0.7	**1.8**	29,000	500－1,000	0.04	22,000	300－800	0.04
	3.5			0.025			0.025
0.8	**2**	25,000	500－1,000	0.06	20,000	300－800	0.06
	4			0.03			0.03
0.9	**2.3**	22,000	500－1,000	0.08	18,000	300－800	0.08
	4.5			0.05			0.05
1	**2.5**	20,000	500－1,000	0.1	16,000	300－800	0.1
	5			0.07			0.07
1.1	**2.8**	18,000	500－1,000	0.12	14,000	300－800	0.12
	5.5			0.08			0.08
1.2	**3**	16,000	500－1,000	0.12	13,000	300－800	0.12
	6			0.08			0.08
1.3	**3.3**	15,000	500－1,000	0.12	12,000	300－800	0.12
	6.5			0.08			0.08
1.4	**3.5**	14,000	500－1,000	0.12	11,000	300－800	0.12
	7			0.08			0.08
1.5	**3.8**	13,000	500－1,000	0.15	10,000	300－800	0.15
	7.5			0.1			0.1
1.6	**4**	12,000	500－1,000	0.15	10,000	300－800	0.15
	8			0.1			0.1
1.7	**4.3**	12,000	500－1,000	0.17	9,500	300－800	0.17
	8.5			0.12			0.12
1.8	**4.5**	11,000	500－1,000	0.17	9,000	300－800	0.17
	9			0.12			0.12
1.9	**4.8**	10,000	500－1,000	0.17	9,000	300－800	0.17
	9.5			0.12			0.12
2	**5**	10,000	500－1,000	0.2	9,000	300－800	0.2
	10			0.15			0.15
2.1	**5.3**	9,800	500－1,000	0.2	9,000	300－800	0.2
	10.5			0.15			0.15
2.2	**5.5**	9,600	500－1,000	0.2	9,000	300－800	0.2
	11			0.15			0.15
2.3	**5.8**	9,400	500－1,000	0.2	8,800	300－800	0.2
	11.5			0.15			0.15
2.4	**6**	9,200	500－1,000	0.25	8,700	300－800	0.25
	12			0.2			0.2
2.5	**6.3**	9,000	500－1,000	0.25	8,500	300－800	0.25
	12.5			0.2			0.2

LONG NECK

For rib milling



Long neck types

4 flute for rib processing

MS4LT
4 flute MSTAR for rib processing taper neck end mill
SIZE Ø0.2 - Ø3

2 flute long neck ball nose end mills

MS2XLB
2 flute MSTAR long neck ball nose end mill
SIZE R0.1 - R3

2 flute long neck end mills

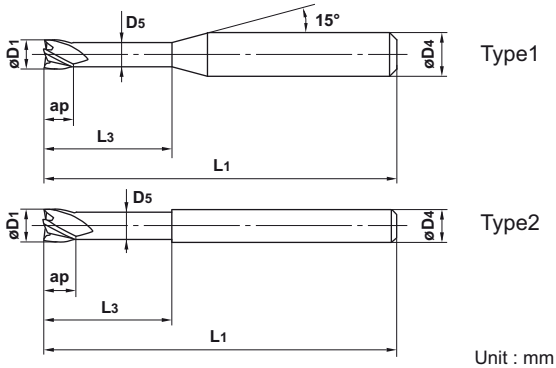
MS2XL
2 flute MSTAR long neck end mill
SIZE Ø0.2 - Ø6

MS2XL6
2 flute MSTAR long neck end mill (6mm shank)
SIZE Ø0.3 - Ø2.5

MS4XL

End mill, 4 flute, Long neck

0 — -0.02



- 4 flute long neck end mill.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4XLD0100N040	1	1	4	0.94	50	4	4	★	1
D0100N060	1	1	6	0.94	50	4	4	★	1
D0100N080	1	1	8	0.94	50	4	4	★	1
D0100N100	1	1	10	0.94	50	4	4	★	1
D0100N120	1	1	12	0.94	50	4	4	★	1
D0100N160	1	1	16	0.94	60	4	4	★	1
D0110N060	1.1	1.1	6	1.04	50	4	4	★	1
D0110N100	1.1	1.1	10	1.04	50	4	4	★	1
D0110N160	1.1	1.1	16	1.04	60	4	4	★	1
D0120N060	1.2	1.2	6	1.14	50	4	4	★	1
D0120N080	1.2	1.2	8	1.14	50	4	4	★	1
D0120N100	1.2	1.2	10	1.14	50	4	4	★	1
D0120N120	1.2	1.2	12	1.14	50	4	4	★	1
D0120N160	1.2	1.2	16	1.14	60	4	4	★	1
D0130N060	1.3	1.3	6	1.24	50	4	4	★	1
D0130N120	1.3	1.3	12	1.24	50	4	4	★	1
D0130N180	1.3	1.3	18	1.24	60	4	4	★	1
D0140N060	1.4	1.4	6	1.34	50	4	4	★	1
D0140N080	1.4	1.4	8	1.34	50	4	4	★	1
D0140N100	1.4	1.4	10	1.34	50	4	4	★	1
D0140N120	1.4	1.4	12	1.34	50	4	4	★	1
D0140N140	1.4	1.4	14	1.34	60	4	4	★	1
D0140N160	1.4	1.4	16	1.34	60	4	4	★	1
D0140N220	1.4	1.4	22	1.34	60	4	4	★	1
D0150N060	1.5	1.5	6	1.44	50	4	4	★	1
D0150N080	1.5	1.5	8	1.44	50	4	4	★	1
D0150N100	1.5	1.5	10	1.44	50	4	4	★	1
D0150N120	1.5	1.5	12	1.44	50	4	4	★	1
D0150N140	1.5	1.5	14	1.44	60	4	4	★	1
D0150N160	1.5	1.5	16	1.44	60	4	4	★	1
D0150N180	1.5	1.5	18	1.44	60	4	4	★	1
D0150N200	1.5	1.5	20	1.44	60	4	4	★	1
D0160N060	1.6	1.6	6	1.54	50	4	4	★	1
D0160N080	1.6	1.6	8	1.54	50	4	4	★	1
D0160N100	1.6	1.6	10	1.54	50	4	4	★	1
D0160N120	1.6	1.6	12	1.54	50	4	4	★	1
D0160N140	1.6	1.6	14	1.54	60	4	4	★	1
D0160N160	1.6	1.6	16	1.54	60	4	4	★	1

★: Stock standard in Japan

Unit : mm

Order Number	Dia. D_1	Length of Cut ap	Neck Length L_3	Neck Dia. D_5	Overall Length L_1	Shank Dia. D_4	No. of Flutes N	Stock	Type
MS4XLD0160N180	1.6	1.6	18	1.54	60	4	4	★	1
D0160N200	1.6	1.6	20	1.54	60	4	4	★	1
D0160N260	1.6	1.6	26	1.54	70	4	4	★	1
D0170N060	1.7	1.7	6	1.64	50	4	4	★	1
D0170N140	1.7	1.7	14	1.64	60	4	4	★	1
D0170N240	1.7	1.7	24	1.64	70	4	4	★	1
D0180N060	1.8	1.8	6	1.74	50	4	4	★	1
D0180N080	1.8	1.8	8	1.74	50	4	4	★	1
D0180N100	1.8	1.8	10	1.74	50	4	4	★	1
D0180N120	1.8	1.8	12	1.74	50	4	4	★	1
D0180N140	1.8	1.8	14	1.74	60	4	4	★	1
D0180N160	1.8	1.8	16	1.74	60	4	4	★	1
D0180N180	1.8	1.8	18	1.74	60	4	4	★	1
D0180N200	1.8	1.8	20	1.74	60	4	4	★	1
D0180N250	1.8	1.8	25	1.74	70	4	4	★	1
D0190N060	1.9	1.9	6	1.84	50	4	4	★	1
D0190N160	1.9	1.9	16	1.84	60	4	4	★	1
D0190N280	1.9	1.9	28	1.84	70	4	4	★	1
D0200N060	2	2	6	1.9	50	4	4	★	1
D0200N080	2	2	8	1.9	50	4	4	★	1
D0200N100	2	2	10	1.9	50	4	4	★	1
D0200N120	2	2	12	1.9	50	4	4	★	1
D0200N140	2	2	14	1.9	60	4	4	★	1
D0200N160	2	2	16	1.9	60	4	4	★	1
D0200N180	2	2	18	1.9	60	4	4	★	1
D0200N200	2	2	20	1.9	60	4	4	★	1
D0200N250	2	2	25	1.9	70	4	4	★	1
D0200N300	2	2	30	1.9	70	4	4	★	1
D0250N080	2.5	2.5	8	2.4	50	4	4	★	1
D0250N120	2.5	2.5	12	2.4	50	4	4	★	1
D0250N160	2.5	2.5	16	2.4	60	4	4	★	1
D0250N200	2.5	2.5	20	2.4	60	4	4	★	1
D0250N250	2.5	2.5	25	2.4	70	4	4	★	1
D0300N080	3	3	8	2.9	50	6	4	★	1
D0300N120	3	3	12	2.9	50	6	4	★	1
D0300N160	3	3	16	2.9	60	6	4	★	1
D0300N200	3	3	20	2.9	60	6	4	★	1
D0300N250	3	3	25	2.9	70	6	4	★	1
D0300N300	3	3	30	2.9	70	6	4	★	1
D0350N150	3.5	3.5	15	3.4	60	6	4	★	1
D0350N250	3.5	3.5	25	3.4	70	6	4	★	1
D0350N350	3.5	3.5	35	3.4	80	6	4	★	1
D0400N120	4	4	12	3.9	50	6	4	★	1
D0400N160	4	4	16	3.9	60	6	4	★	1
D0400N200	4	4	20	3.9	60	6	4	★	1
D0400N250	4	4	25	3.9	70	6	4	★	1
D0400N300	4	4	30	3.9	70	6	4	★	1
D0400N350	4	4	35	3.9	80	6	4	★	1

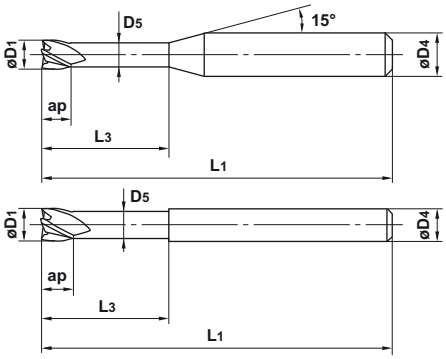
★: Stock standard in Japan

CUTTING CONDITIONS P43

MS4XL

End mill, 4 flute, Long neck

0 — -0.02



● 4 flute long neck end mill.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4XLD0400N400	4	4	40	3.9	90	6	4	★	1
D0400N450	4	4	45	3.9	90	6	4	★	1
D0400N500	4	4	50	3.9	100	6	4	★	1
D0500N160	5	5	16	4.9	60	6	4	★	1
D0500N250	5	5	25	4.9	70	6	4	★	1
D0500N350	5	5	35	4.9	80	6	4	★	1
D0500N500	5	5	50	4.9	110	6	4	★	1
D0600N200	6	6	20	5.85	80	6	4	★	2
D0600N300	6	6	30	5.85	90	6	4	★	2
D0600N400	6	6	40	5.85	100	6	4	★	2
D0600N500	6	6	50	5.85	110	6	4	★	2
D0800N300	8	8	30	7.85	90	8	4	★	2
D0800N500	8	8	50	7.85	110	8	4	★	2
D0800N700	8	8	70	7.85	130	8	4	★	2
D1000N400	10	10	40	9.7	100	10	4	★	2
D1000N600	10	10	60	9.7	120	10	4	★	2
D1000N800	10	10	80	9.7	140	10	4	★	2

★: Stock standard in Japan

CUTTING CONDITIONS P43

MS4XL

End mill, 4 flute, Long neck

Work material		Structural steel, Carbon steel Ck55 Alloy steel 070M55, Tool steel SK, Pre-hardened steel		
Dia. (mm)	Neck length (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
1	4	40,000	3,000	0.04
	8	36,000	2,400	0.03
	12	20,000	1,000	0.02
	16	10,000	500	0.005
1.2	6	40,000	3,000	0.05
	10	36,000	2,400	0.04
	12	20,000	1,200	0.03
	16	12,000	600	0.01
1.5	6	40,000	3,200	0.06
	12	32,000	2,400	0.05
	16	16,000	1,100	0.03
	20	10,000	600	0.01
1.8	6	40,000	3,600	0.08
	12	32,000	2,800	0.06
	20	12,000	1,000	0.02
	25	7,000	600	0.01
2	6	40,000	4,000	0.1
	12	32,000	3,200	0.07
	16	24,000	2,400	0.05
	20	12,000	1,200	0.03
	30	5,000	500	0.01
2.5	8	32,000	4,000	0.2
	25	9,000	1,100	0.04
	50	2,500	300	0.005
3	8	25,000	3,600	0.4
	16	18,000	2,500	0.2
	25	12,000	1,700	0.1
	30	7,000	800	0.05

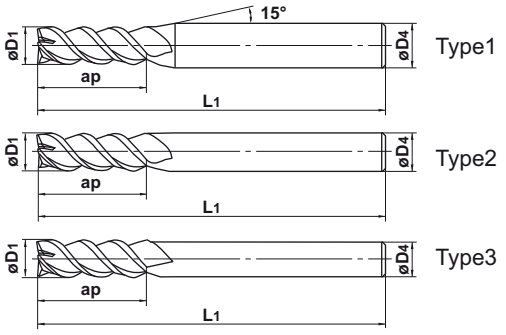
Work material		Structural steel, Carbon steel Ck55 Alloy steel 070M55, Tool steel SK, Pre-hardened steel		
Dia. (mm)	Neck length (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
3.5	15	20,000	3,000	0.6
	25	11,000	1,600	0.15
	35	5,500	800	0.06
4	12	18,000	3,000	1
	20	12,000	2,000	0.5
	30	8,000	1,300	0.2
	40	4,200	700	0.08
	50	2,400	400	0.03
5	16	14,000	2,700	1
	25	9,500	1,800	0.5
	35	6,400	1,200	0.2
	50	3,200	600	0.05
6	20	11,000	2,200	1.2
	30	8,000	1,600	0.6
	40	5,400	1,100	0.25
	50	3,200	640	0.15
8	30	8,000	1,600	1.6
	50	4,000	800	0.5
	70	2,000	400	0.2
10	40	6,400	1,300	2
	60	3,200	640	0.6
	80	1,600	320	0.3

1) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately. Please reduce the feed rate when the surface finish is important.

MSMHZD

End mill, Medium cut length, 3 flute

D1≤12 0 — -0.02
12<D1 0 — -0.03



● A single end mill for both plunging and slotting.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
* MSMHZDD0100	1	2	45	4	3	●	1
* D0150	1.5	3	45	4	3	●	1
D0200	2	4	50	6	3	●	1
D0250	2.5	5	50	6	3	●	1
D0300	3	6	50	6	3	●	1
D0350	3.5	8	50	6	3	●	1
D0400	4	8	50	6	3	●	1
D0450	4.5	10	50	6	3	●	1
D0500	5	10	50	6	3	●	1
D0550	5.5	13	50	6	3	●	1
D0600	6	13	60	6	3	●	2
D0650	6.5	16	60	8	3	●	1
D0700	7	16	60	8	3	●	1
D0750	7.5	16	60	8	3	●	1
D0800	8	19	70	8	3	●	2
D0850	8.5	19	70	10	3	●	1
D0900	9	19	70	10	3	●	1
D0950	9.5	19	70	10	3	●	1
D1000	10	22	80	10	3	●	2
D1100	11	22	80	12	3	●	1
D1200	12	26	90	12	3	●	2
D1300	13	26	90	12	3	●	3
D1400	14	26	90	12	3	●	3
D1500	15	26	110	16	3	●	1
D1600	16	30	110	16	3	●	2
D2000	20	32	140	20	3	●	2

* Expand

●: Stock standard

MSMHZD

End mill, Medium cut length, 3 flute

Side milling

Work material	Carbon steel, Alloy steel (−30HRC) Ck55, 070M55 Structural steel		Hardened steel (30−45HRC) W.Nr. 1.2344(H13)		Stainless steel X5CrNi1810 X5CrNiMo17122 Titanium alloy	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	19,000	600	13,000	310	10,000	200
1.5	14,000	600	9,000	310	7,500	210
2	11,000	600	7,200	310	6,000	210
3	8,500	770	5,300	380	4,400	220
4	7,200	850	4,400	480	3,700	250
6	5,300	940	3,200	490	2,700	270
8	4,000	1,010	2,400	560	2,000	280
10	3,200	1,000	1,900	480	1,600	300
12	2,700	950	1,600	440	1,300	300
16	2,000	720	1,200	350	1,000	260
20	1,600	600	1,000	290	800	240
Depth of cut	≤0.2D (D > ϕ3) ≤0.1D (D≤ϕ3) ≤1.5D		≤0.2D (D > ϕ3) ≤0.1D (D≤ϕ3) ≤1.5D			

D:Dia.

Slotting

Work material	Carbon steel, Alloy steel (−30HRC) Ck55, 070M55 Structural steel		Hardened steel (30−45HRC) W.Nr. 1.2344(H13)		Stainless steel X5CrNi1810 X5CrNiMo17122 Titanium alloy	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	13,000	130	10,000	80	6,000	30
1.5	12,000	250	8,000	150	6,000	60
2	11,000	500	7,200	260	6,000	130
3	8,500	640	5,300	320	4,200	130
4	7,200	650	4,400	370	3,300	140
6	5,300	720	3,200	380	2,200	140
8	4,000	780	2,400	430	1,600	140
10	3,200	770	1,900	370	1,300	150
12	2,700	730	1,600	340	1,100	150
16	2,000	600	1,200	290	800	130
20	1,600	500	1,000	240	640	120
Depth of cut	D ≤1D (D≥ϕ2) ≤0.5D (D<ϕ2)		D ≤0.5D (D≥ϕ2) ≤0.2D (D<ϕ2)			

D:Dia.

Plunging

Work material	Carbon steel, Alloy steel (−30HRC) Ck55, 070M55 Structural steel		Hardened steel (30−45HRC) W.Nr. 1.2344(H13)		Stainless steel X5CrNi1810 X5CrNiMo17122 Titanium alloy	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	13,000	80	10,000	50	6,000	10
1.5	12,000	120	8,000	80	6,000	20
2	11,000	200	7,200	140	6,000	30
3	8,500	250	5,300	180	4,200	50
4	7,200	300	4,400	210	3,300	60
6	5,300	300	3,200	210	2,200	70
8	4,000	320	2,400	220	1,600	80
10	3,200	340	1,900	240	1,300	70
12	2,700	320	1,600	220	1,100	70
16	2,000	250	1,200	180	800	55
20	1,600	200	1,000	140	640	55
Depth of cut	≤1D (D≥ϕ2) ≤0.5D (D<ϕ2)		≤0.5D (D≥ϕ2) ≤0.2D (D<ϕ2)			

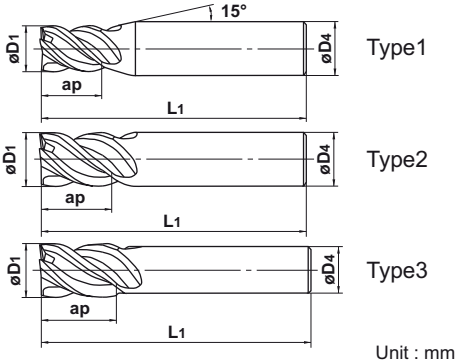
D:Dia.

1) The above table shows the standard recommended cutting conditions. Adjustments maybe needed according to the condition of the machine.
2) When slotting, plunging and cutting stainless steels, water-soluble cutting fluid is recommended.
3) When plunging of materials such as austenitic stainless steels and titanium alloys, it is recommended to peck feed. (0.1D)

MSSHD

High power, Short cut length, 4 flute

D1≤12 0 — -0.02
12<D1 0 — -0.03



● 4 flute high power end mill.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MSSHDD0300	3	4.5	45	6	4	●	1
D0350	3.5	5.3	45	6	4	●	1
D0400	4	6	45	6	4	●	1
D0450	4.5	6.8	45	6	4	●	1
D0500	5	7.5	50	6	4	●	1
D0550	5.5	8.3	50	6	4	●	1
D0600	6	9	50	6	4	●	2
D0650	6.5	9.8	60	8	4	●	1
D0700	7	10.5	60	8	4	●	1
D0750	7.5	11.3	60	8	4	●	1
D0800	8	12	60	8	4	●	2
D0850	8.5	12.8	70	10	4	●	1
D0900	9	13.5	70	10	4	●	1
D0950	9.5	14.3	70	10	4	●	1
D1000	10	15	70	10	4	●	2
D1100	11	16.5	75	12	4	●	1
D1200	12	18	75	12	4	●	2
D1300	13	19.5	75	12	4	●	3
D1400	14	21	90	16	4	●	1
D1500	15	22.5	90	16	4	●	1
D1600	16	24	90	16	4	●	2
D1700	17	25.5	100	16	4	●	3
D1800	18	27	100	16	4	●	3
D1900	19	28.5	110	20	4	●	1
D2000	20	30	110	20	4	●	2

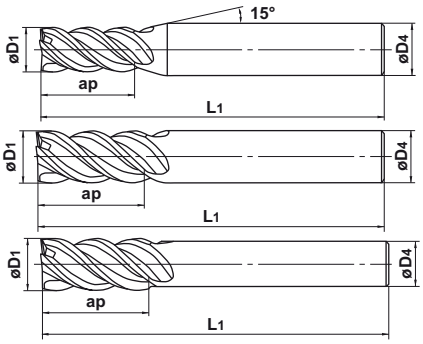
● : Stock standard

CUTTING CONDITIONS P49

MSMHD

High power, Medium cut length, 4 flute

D1≤12 0 — -0.02
12<D1 0 — -0.03



● 4 flute high power end mill.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MSMHDD0200	2	4	45	4	4	●	1
D0210	2.1	5	45	4	4	●	1
D0220	2.2	5	45	4	4	●	1
D0230	2.3	5	45	4	4	●	1
D0240	2.4	5	45	4	4	●	1
D0250	2.5	5	45	4	4	●	1
D0260	2.6	6	45	4	4	●	1
D0270	2.7	6	45	4	4	●	1
D0280	2.8	6	45	4	4	●	1
D0290	2.9	6	45	4	4	●	1
D0300	3	8	45	6	4	●	1
D0310	3.1	8	45	6	4	●	1
D0320	3.2	8	45	6	4	●	1
D0330	3.3	8	45	6	4	●	1
D0340	3.4	8	45	6	4	●	1
D0350	3.5	8	45	6	4	●	1
D0360	3.6	11	45	6	4	●	1
D0370	3.7	11	45	6	4	●	1
D0380	3.8	11	45	6	4	●	1
D0390	3.9	11	45	6	4	●	1
D0400	4	11	45	6	4	●	1
D0410	4.1	12	45	6	4	●	1
D0420	4.2	12	45	6	4	●	1
D0430	4.3	12	45	6	4	●	1
D0440	4.4	12	45	6	4	●	1
D0450	4.5	12	45	6	4	●	1
D0460	4.6	13	50	6	4	●	1
D0470	4.7	13	50	6	4	●	1
D0480	4.8	13	50	6	4	●	1
D0490	4.9	13	50	6	4	●	1
D0500	5	13	50	6	4	●	1
D0510	5.1	13	50	6	4	●	1
D0520	5.2	13	50	6	4	●	1
D0530	5.3	13	50	6	4	●	1
D0540	5.4	13	50	6	4	●	1
D0550	5.5	13	50	6	4	●	1
D0560	5.6	13	50	6	4	●	1
D0570	5.7	13	50	6	4	●	1

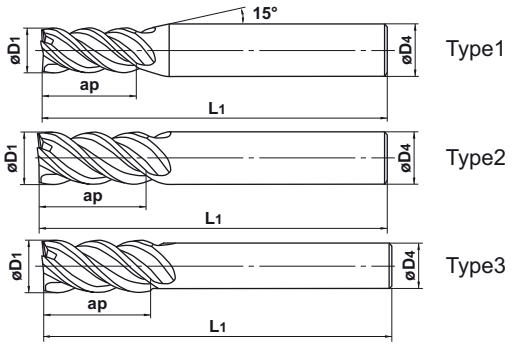
●: Stock standard

CUTTING CONDITIONS P49

MSMHD

High power, Medium cut length, 4 flute

D1≤12 0 — -0.02
12<D1 0 — -0.03



● 4 flute high power end mill.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MSMHDD0580	5.8	13	50	6	4	●	1
D0590	5.9	13	50	6	4	●	1
D0600	6	13	50	6	4	●	2
D0650	6.5	16	60	8	4	●	1
D0700	7	19	60	8	4	●	1
D0750	7.5	19	60	8	4	●	1
D0800	8	19	60	8	4	●	2
D0850	8.5	19	70	10	4	●	1
D0900	9	22	70	10	4	●	1
D0950	9.5	22	70	10	4	●	1
D1000	10	22	70	10	4	●	2
D1100	11	26	75	12	4	●	1
D1200S10	12	26	75	10	4	●	3
D1200	12	26	75	12	4	●	2
D1300	13	26	75	12	4	●	3
D1400	14	30	90	16	4	●	1
D1500	15	35	90	16	4	●	1
D1600	16	35	90	16	4	●	2
D1700	17	35	100	16	4	●	3
D1800	18	40	100	16	4	●	3
D1900	19	40	110	20	4	●	1
D2000	20	45	110	20	4	●	2
D2200	22	50	125	20	4	●	3
D2500	25	55	125	25	4	●	2

●: Stock standard

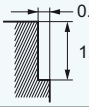
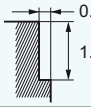
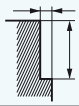
MSSHD

High power, Short cut length, 4 flute

MSMHD

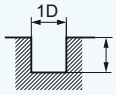
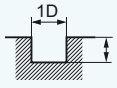
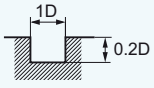
High power, Medium cut length, 4 flute

Side milling

Work material	Structural steel Carbon steel, Alloy steel (−30HRC) Ck55, 070M55 Cast iron GG25		Alloy steel, Tool steel Pre-hardened steel (30−45HRC) W.Nr. 1.2344(H13), 070M55		Austenitic stainless steel X5CrNi1810 X5CrNiMo17122		Hardened steel (45−55HRC) W.Nr. 1.2344(H13)	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	15,000	550	10,000	340	10,000	320	6,400	160
3	11,000	800	7,400	500	7,400	480	4,800	250
4	8,000	900	5,600	540	5,600	520	3,600	270
5	6,400	1,000	4,500	600	4,500	580	2,900	300
6	5,800	1,100	3,700	640	3,700	600	2,400	320
8	4,400	1,100	2,800	660	2,800	600	1,800	330
10	3,500	1,000	2,200	640	2,200	560	1,400	320
12	2,900	1,000	1,900	640	1,900	530	1,200	320
16	2,200	800	1,400	500	1,400	450	900	250
20	1,800	750	1,100	460	1,100	440	720	230
25	1,400	600	900	400	900	380	570	200
Depth of cut								

D:Dia.

Slotting

Work material	Structural steel Carbon steel, Alloy steel (−30HRC) Ck55, 070M55 Cast iron GG25		Alloy steel, Tool steel Pre-hardened steel (30−45HRC) W.Nr. 1.2344(H13), 070M55		Austenitic stainless steel X5CrNi1810 X5CrNiMo17122		Hardened steel (45−55HRC) W.Nr. 1.2344(H13)	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	12,000	400	7,000	200	7,000	100	4,200	80
3	9,000	600	5,300	300	5,300	150	3,200	130
4	7,200	720	4,000	360	4,000	180	2,400	140
5	5,800	720	3,200	360	3,200	180	1,900	150
6	5,000	800	2,700	400	2,700	200	1,600	160
8	3,700	800	2,000	400	2,000	200	1,200	170
10	3,000	720	1,600	360	1,600	180	960	160
12	2,500	720	1,300	360	1,300	180	800	160
16	2,000	600	1,000	280	1,000	150	600	130
20	1,600	540	800	250	800	130	480	120
25	1,300	480	640	220	640	120	380	100
Depth of cut								

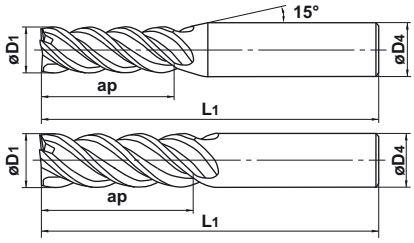
D:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and feed rate proportionately, or set the depth of cut smaller.
4) Climb cutting is recommended for side milling.

MSJHD

High power, Semi long cut length, 4 flute

D1≤12 0 — -0.02
12<D1 0 — -0.03



● 4 flute high power end mill.

Unit : mm

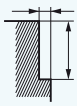
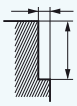
Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MSJHDD0200	2	8	60	6	4	●	1
D0250	2.5	10	60	6	4	●	1
D0300	3	12	60	6	4	●	1
D0350	3.5	14	60	6	4	●	1
D0400	4	16	60	6	4	●	1
D0450	4.5	18	60	6	4	●	1
D0500	5	20	60	6	4	●	1
D0600	6	24	60	6	4	●	2
D0700	7	25	80	8	4	●	1
D0800	8	28	80	8	4	●	2
D0900	9	32	90	10	4	●	1
D1000	10	35	90	10	4	●	2
D1100	11	35	100	12	4	●	1
D1200	12	36	100	12	4	●	2
D1400	14	42	110	16	4	●	1
D1500	15	45	110	16	4	●	1
D1600	16	48	125	16	4	●	2
D2000	20	55	140	20	4	●	2

●: Stock standard

MSJHD

High power, Semi long cut length, 4 flute

Side milling

Work material	Structural steel Carbon steel, Alloy steel (−30HRC) Ck55, 070M55 Cast iron GG25		Alloy steel, Tool steel Pre-hardened steel (30−45HRC) W.Nr. 1.2344(H13)		Austenitic stainless steel X5CrNi1810 X5CrNiMo17122		Hardened steel (45−55HRC) W.Nr. 1.2344(H13)	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	11,000	370	7,000	230	7,000	210	5,000	100
3	8,000	550	5,100	320	5,100	300	3,800	190
4	6,200	620	4,000	350	4,000	340	3,000	210
5	5,000	670	3,200	370	3,200	360	2,400	220
6	4,200	750	2,600	400	2,600	390	2,000	220
8	3,200	780	2,000	420	2,000	400	1,500	230
10	2,500	690	1,600	410	1,600	380	1,200	210
12	2,100	670	1,300	380	1,300	340	1,000	190
16	1,600	570	1,000	320	1,000	280	750	170
20	1,200	470	800	290	800	260	600	150
Depth of cut								

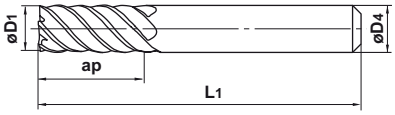
D:Dia.

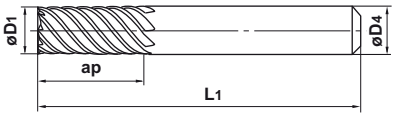
1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the rigidity of the machine or the workpiece set up is very low, or when chattering occurs, reduce the revolution and the feed rate proportionately. Note however if the quality of the workpiece surface is poor, chattering may occur even under the same cutting conditions.
3) Climb cutting is recommended.

MS6MH...E/MS8MH...E

End mill, Medium cut length, 6/8 flutes, Centre cutting

D1 = 6 -0.015 — -0.038
6 < D1 ≤ 16 -0.020 — -0.047
D1 = 20 -0.020 — -0.053





- Multi flute end mill for optimum feed rates.
- Suitable for a wide variety of materials.

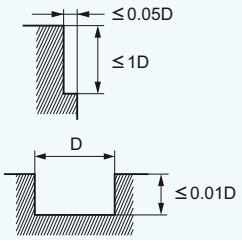
Unit : mm

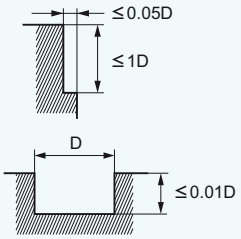
Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS6MHD0600E	6	13	60	6	6	●	1
D0800E	8	19	60	8	6	●	1
D1000E	10	22	75	10	6	●	1
D1200E	12	26	75	12	6	●	1
D1600E	16	32	90	16	6	●	1
MS8MHD2000E	20	36	100	20	8	●	2

●: Stock standard

MS6MH...E/MS8MH...E

End mill, Medium cut length, 6/8 flutes, Centre cutting

Work material	Carbon steel, Alloy steel (—30HRC) Cast iron		Alloy steel, Tool steel Pre-hardened steel (30—45HRC)		Stainless steel Hardened steel (45—55HRC) Heat resistant steel	
Dia (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	20,000	8,100	14,000	5,400	12,000	4,080
8	16,000	7,200	11,200	4,680	9,600	3,540
10	12,800	6,000	8,800	4,080	7,600	3,060
12	10,800	5,580	7,600	3,720	6,400	2,820
16	8,000	3,600	5,600	2,520	4,800	2,160
20	6,400	2,880	4,400	1,980	3,800	1,800
Depth of cut	 D:Dia.					

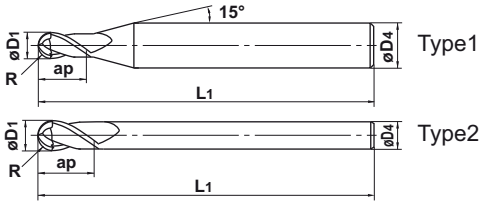
Work material	Titanium TiAl6V4		Nickel (Heat resistant alloys) Inconel 718	
Dia (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
6	8,000	2,700	2,100	710
8	6,000	2,200	1,600	590
10	5,000	2,000	1,200	480
12	4,000	1,760	1,000	440
16	3,000	1,350	800	360
20	2,400	1,150	640	300
Depth of cut	 D:Dia.			

MS2SB

Ball nose, Short cut length, 2 flute

R ±0.01

0 — -0.02



● 2 flute ball nose end mill for general use.

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2SBR0010S04	0.1	0.2	0.3	45	4	2	●	1
R0010S06	0.1	0.2	0.3	50	6	2	●	1
R0015S04	0.15	0.3	0.5	45	4	2	●	1
R0015S06	0.15	0.3	0.5	50	6	2	●	1
R0020S04	0.2	0.4	0.6	45	4	2	●	1
R0020S06	0.2	0.4	0.6	50	6	2	●	1
R0025S04	0.25	0.5	0.8	45	4	2	●	1
R0025S06	0.25	0.5	0.8	50	6	2	●	1
R0030S04	0.3	0.6	0.9	45	4	2	●	1
R0030S06	0.3	0.6	0.9	50	6	2	●	1
R0035S04	0.35	0.7	1.1	45	4	2	●	1
R0040S04	0.4	0.8	1.2	45	4	2	●	1
R0040S06	0.4	0.8	1.2	50	6	2	●	1
R0045S04	0.45	0.9	1.4	45	4	2	●	1
R0050S04	0.5	1	1.5	45	4	2	●	1
R0050S06	0.5	1	1.5	50	6	2	●	1
R0060S04	0.6	1.2	1.8	45	4	2	●	1
R0060S06	0.6	1.2	1.8	50	6	2	●	1
R0070S04	0.7	1.4	2.1	45	4	2	●	1
R0070S06	0.7	1.4	2.1	50	6	2	●	1
R0075S04	0.75	1.5	2.3	45	4	2	●	1
R0075S06	0.75	1.5	2.3	50	6	2	●	1
R0080S04	0.8	1.6	2.4	45	4	2	●	1
R0080S06	0.8	1.6	2.4	50	6	2	●	1
R0090S04	0.9	1.8	2.7	45	4	2	●	1
R0090S06	0.9	1.8	2.7	50	6	2	●	1
R0100S04	1	2	3	50	4	2	●	1
R0100S06	1	2	3	50	6	2	●	1
R0125S04	1.25	2.5	3.8	50	4	2	●	1
R0125S06	1.25	2.5	3.8	50	6	2	●	1
R0150S06	1.5	3	4.5	70	6	2	●	1
R0200S06	2	4	6	70	6	2	●	1
R0250S06	2.5	5	7.5	80	6	2	●	1
R0300S06	3	6	9	80	6	2	●	2
R0400S08	4	8	12	90	8	2	●	2
R0500S10	5	10	15	100	10	2	●	2
R0600S12	6	12	18	110	12	2	●	2

The diameter tolerance is only applied to items produced after July 2006.

● : Stock standard

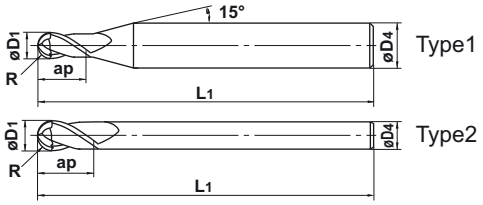
CUTTING CONDITIONS P56

MS2MB

Ball nose, Medium cut length, 2 flute

R ±0.01

0 – -0.02



● 2 flute ball nose end mill for general use.

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2MBR0025	0.25	0.5	1	45	4	2	●	1
R0030	0.3	0.6	1.2	45	4	2	●	1
R0040	0.4	0.8	1.6	45	4	2	●	1
R0050	0.5	1	2.5	45	4	2	●	1
R0060	0.6	1.2	2.5	45	4	2	●	1
R0070	0.7	1.4	3	45	4	2	●	1
R0075	0.75	1.5	4	45	4	2	●	1
R0080	0.8	1.6	4	45	4	2	●	1
R0090	0.9	1.8	5	45	4	2	●	1
R0100	1	2	6	50	4	2	●	1
R0125	1.25	2.5	6	50	4	2	●	1
R0150S03	1.5	3	8	70	3	2	●	2
R0150	1.5	3	8	70	6	2	●	1
R0175	1.75	3.5	8	70	6	2	●	1
R0200S04	2	4	8	70	4	2	●	2
R0200	2	4	8	70	6	2	●	1
R0250	2.5	5	12	80	6	2	●	1
R0300	3	6	12	80	6	2	●	2
R0400	4	8	14	90	8	2	●	2
R0500	5	10	18	100	10	2	●	2
R0600	6	12	22	110	12	2	●	2

The diameter tolerance is only applied to items produced after July 2006.

● : Stock standard

CUTTING CONDITIONS P56

MS2SB

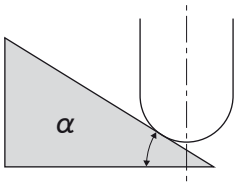
■ Ball nose, Short cut length, 2 flute

MS2MB

■ Ball nose, Medium cut length, 2 flute

Work material	Alloy steel, Tool steel, Pre-hardened steel (−45HRC) 070M55, W.Nr. 1.2344(H13), X210Cr12					Hardened steel (45−55HRC) W.Nr. 1.2344(H13)				
R (mm)	α≤15°		α>15°		Depth of cut ap (mm)	α≤15°		α>15°		Depth of cut ap (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R 0.1	40,000	300	40,000	250	0.003	40,000	300	40,000	250	0.003
R 0.15	40,000	500	40,000	350	0.007	40,000	500	40,000	350	0.007
R 0.2	40,000	1,600	40,000	1,200	0.02	40,000	1,300	40,000	950	0.015
R 0.25	40,000	2,400	40,000	1,400	0.025	40,000	1,900	40,000	1,100	0.020
R 0.3	40,000	3,200	40,000	1,600	0.03	40,000	2,500	40,000	1,300	0.025
R 0.4	40,000	4,800	40,000	2,400	0.05	40,000	4,000	40,000	1,900	0.04
R 0.5	40,000	5,600	40,000	3,200	0.06	40,000	5,600	40,000	3,000	0.05
R 0.75	40,000	6,500	40,000	4,000	0.09	40,000	6,500	32,000	3,200	0.08
R 1	40,000	6,500	39,000	4,700	0.11	40,000	6,500	31,000	3,500	0.11
R 1.25	40,000	7,000	33,000	4,500	0.12	36,000	6,500	26,000	3,500	0.12
R 1.5	40,000	7,500	27,000	4,300	0.13	32,000	6,000	22,000	3,400	0.13
R 2	32,000	7,500	20,000	3,600	0.15	25,000	6,000	16,000	2,700	0.15
R 2.5	25,000	6,000	16,000	2,900	0.20	20,000	5,400	13,000	2,300	0.20
R 3	21,000	5,800	13,000	2,600	0.25	17,000	4,700	10,000	2,000	0.25
R 4	16,000	4,500	10,000	2,000	0.30	13,000	3,600	8,000	1,500	0.30
R 5	13,000	3,600	8,000	1,700	0.50	10,000	2,900	6,400	1,200	0.50
R 6	9,000	2,500	6,000	1,300	0.50	7,200	2,000	4,800	1,000	0.50
Depth of cut	Please select a pick feed based on the required surface finishes in reference to “Pitch Selection of Pick Feed” on page G023. ≤0.2R ≤Please refer to the list above for depth of cut. R:Radius									

1) α is the inclination of machining surface.
2) If the rigidity of the machine or the workpiece installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately. When high machining accuracy is needed, we recommend lowering the feed rate.
3) Cutting conditions may differ considerably due to the overhang (milling depth and neck length), depth of cut, and machine tool condition. Please use the above table as a standard starting point.
4) If the depth of cut is shallow, the revolution and feed rate can be increased.



2 flute

MS2MS
2 flute MSTAR end mill (M)
SIZE Ø0.2 - Ø12

MS2JS
2 flute MSTAR end mill (J)
SIZE Ø0.1 - Ø12

MS2SB/MS2SB...E
2 flute MSTAR
ball nose end mill (S)
SIZE R0.1 - R6

MS2MB/MS2MB...E
2 flute MSTAR
ball nose end mill (M)
SIZE R0.25R6

MS2MTB
2 flute MSTAR
taper ball nose end mill
SIZE R0.2－R1.5

MS2MC...E
2 flute MSTAR
slotting end mill (M)
SIZE Ø2 - Ø12

3 flute

MS3MC...E
3 flute MSTAR end mill (M)
SIZE Ø1 - Ø12

END MILLS
For general-use

4 flute

MS4MC/MS4MC...E
4 flute MSTAR end mill (M)
SIZE Ø1 - Ø16

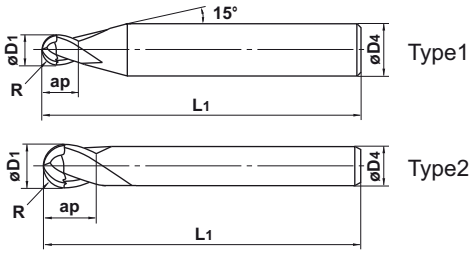
MS4JC/MS4JC...E
4 flute MSTAR end mill (J)
SIZE Ø1 - Ø12

MS4MRB...E
4 flute MSTAR end mill (M)
SIZE Ø6 - Ø16

MS2SB...E

Ball nose, Short cut length, 2 flute, Short shank

D1<2 0 — -0.020
2≤ D1<6 0 — -0.028
6≤ D1 0 — -0.038



- Ball nose for rigid milling applications.
- Suitable for shrink fit and mould chuck applications.

Unit : mm

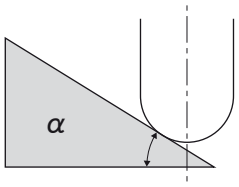
Order Number	Radius R	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2SBR0100E	1	2	3	45	6	2	●	1
R0150E	1.5	3	4.5	45	6	2	●	1
R0200E	2	4	6	45	6	2	●	1
R0250E	2.5	5	7.5	50	6	2	●	1
R0300E	3	6	9	50	6	2	●	2
R0400E	4	8	12	60	8	2	●	2
R0500E	5	10	14	75	10	2	●	2
R0600E	6	12	16	75	12	2	●	2

●: Stock standard

MS2SB...E

Ball nose, Short cut length, 2 flute, Short shank

Work material	Alloy steel, Tool steel, Pre-hardened steel (−45HRC)				Hardened steel (45−58HRC)			
R (mm)	α≤15°		α>15°		α≤15°		α>15°	
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R1	35,000	2,400	25,000	1,400	25,000	1,500	20,000	900
R1.5	30,000	2,500	23,000	1,400	20,000	1,500	15,000	900
R2	25,000	2,600	20,000	1,500	17,000	1,500	13,000	900
R2.5	23,000	2,600	17,000	1,500	15,000	1,500	11,000	900
R3	20,000	2,600	15,000	1,500	13,000	1,500	10,000	900
R4	15,000	2,700	11,000	1,500	10,000	1,500	7,500	900
R5	12,000	2,700	9,000	1,500	8,000	1,500	6,000	900
R6	10,000	2,500	7,500	1,400	6,600	1,400	5,000	800
Depth of cut	(MS2SB...E) ≤0.2R (R=1) ≤0.4R (R>1) ≤0.1R (MS2MB...E) ≤0.1R ≤0.06R R:Radius							



Work material	Titanium		High Nickel (Inconel)	
R (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R1	24,000	1,600	7,300	500
R1.5	16,000	1,300	5,000	420
R2	12,000	1,300	3,600	370
R2.5	10,000	1,100	3,000	340
R3	8,000	1,000	2,500	330
R4	6,000	1,100	1,900	340
R5	5,000	1,100	1,500	340
R6	4,000	1,000	1,200	300
Depth of cut	(MS2SB...E) ≤0.2R (R=1) ≤0.4R (R>1) ≤0.1R (MS2MB...E) ≤0.1R ≤0.06R R:Radius			

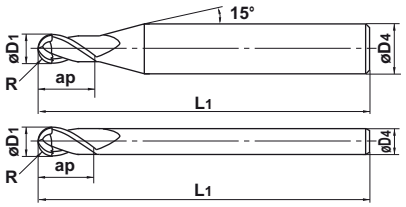
MS2MB...E

Ball nose, Medium cut length, 2 flute, Long shank

R ±0.015

D1<2	0 — -0.020
2≤ D1<6	0 — -0.028
6≤ D1	0 — -0.038

UWC MS 35° D1≥2 30° D1<2



- Ball nose end mill for a wide range of materials.
- Suitable for high speed applications.

Unit : mm

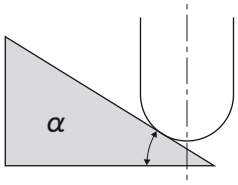
Order Number	Radius R	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2MBR0100E	1	2	5	50	6	2	●	1
R0150E	1.5	3	8	60	6	2	●	1
R0200E	2	4	8	70	6	2	●	1
R0250E	2.5	5	10	90	6	2	●	1
R0300E	3	6	12	90	6	2	●	2
R0400E	4	8	14	100	8	2	●	2
R0500E	5	10	18	100	10	2	●	2
R0600E	6	12	22	110	12	2	●	2

●: Stock standard

MS2MB...E

Ball nose, Medium cut length, 2 flute, Long shank

Work material	Alloy steel, Tool steel, Pre-hardened steel (−45HRC)				Hardened steel (45−58HRC)			
R (mm)	α≤15°		α>15°		α≤15°		α>15°	
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R1	35,000	2,400	25,000	1,400	25,000	1,500	20,000	900
R1.5	30,000	2,500	23,000	1,400	20,000	1,500	15,000	900
R2	25,000	2,600	20,000	1,500	17,000	1,500	13,000	900
R2.5	23,000	2,600	17,000	1,500	15,000	1,500	11,000	900
R3	20,000	2,600	15,000	1,500	13,000	1,500	10,000	900
R4	15,000	2,700	11,000	1,500	10,000	1,500	7,500	900
R5	12,000	2,700	9,000	1,500	8,000	1,500	6,000	900
R6	10,000	2,500	7,500	1,400	6,600	1,400	5,000	800
Depth of cut	(MS2SB...E) ≤0.2R (R=1) ≤0.4R (R>1) ≤0.1R (MS2MB...E) ≤0.1R ≤0.06R R:Radius							



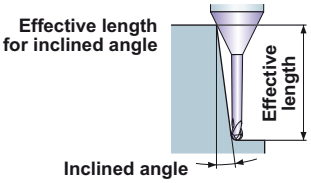
Work material	Titanium		High Nickel (Inconel)	
R (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
R1	24,000	1,600	7,300	500
R1.5	16,000	1,300	5,000	420
R2	12,000	1,300	3,600	370
R2.5	10,000	1,100	3,000	340
R3	8,000	1,000	2,500	330
R4	6,000	1,100	1,900	340
R5	5,000	1,100	1,500	340
R6	4,000	1,000	1,200	300
Depth of cut	(MS2SB...E) ≤0.2R (R=1) ≤0.4R (R>1) ≤0.1R (MS2MB...E) ≤0.1R ≤0.06R R:Radius			

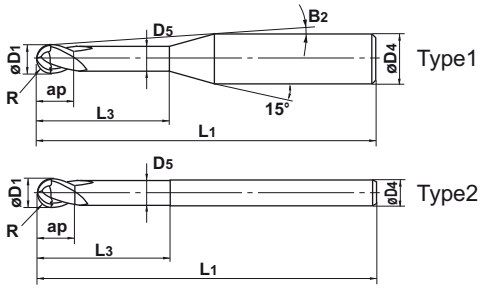
MS2XLB

Ball nose, Short cut length, 2 flute, Long neck

R ±0.01

0 — -0.02





● 2 flute long neck ball nose end mill.

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Cutting Edge to Shank Angle B2	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
MS2XLBR0010N005	0.1	0.2	0.2	0.5	0.17	13.7°	50	4	2	●	1	0.7	0.8	0.9	0.9
* R0010N005S06	0.1	0.2	0.2	0.5	0.17	14.1°	50	6	2	●	1	0.7	0.8	0.9	0.9
* R0010N008S06	0.1	0.2	0.2	0.8	0.17	13.8°	50	6	2	●	1	1.1	1.1	1.2	1.3
R0010N010	0.1	0.2	0.2	1	0.17	12.9°	50	4	2	●	1	1.3	1.3	1.5	1.6
* R0010N010S06	0.1	0.2	0.2	1	0.17	13.6°	50	6	2	●	1	1.3	1.3	1.5	1.6
* R0010N013	0.1	0.2	0.2	1.25	0.17	12.5°	50	4	2	●	1	1.5	1.6	1.7	1.9
* R0010N013S06	0.1	0.2	0.2	1.25	0.17	13.3°	50	6	2	●	1	1.5	1.6	1.7	1.9
R0010N015	0.1	0.2	0.2	1.5	0.17	12.2°	50	4	2	●	1	1.8	1.9	2	2.2
* R0010N015S06	0.1	0.2	0.2	1.5	0.17	13.1°	50	6	2	●	1	1.8	1.9	2	2.2
* R0010N018	0.1	0.2	0.2	1.75	0.17	11.9°	50	4	2	●	1	2.1	2.2	2.3	2.5
* R0010N018S06	0.1	0.2	0.2	1.75	0.17	12.8°	50	6	2	●	1	2.1	2.2	2.3	2.5
* R0010N020	0.1	0.2	0.2	2	0.17	11.6°	50	4	2	●	1	2.3	2.4	2.6	2.8
* R0010N020S06	0.1	0.2	0.2	2	0.17	12.6°	50	6	2	●	1	2.3	2.4	2.6	2.8
* R0010N025	0.1	0.2	0.2	2.5	0.17	11°	50	4	2	●	1	2.8	3	3.2	3.4
* R0010N030	0.1	0.2	0.2	3	0.17	10.5°	50	4	2	●	1	3.4	3.5	3.8	4.1
* R0015N008S06	0.15	0.3	0.3	0.8	0.27	13.8°	50	6	2	●	1	1.1	1.1	1.2	1.3
R0015N010	0.15	0.3	0.3	1	0.27	12.9°	50	4	2	●	1	1.3	1.3	1.4	1.6
* R0015N010S06	0.15	0.3	0.3	1	0.27	13.6°	50	6	2	●	1	1.3	1.3	1.4	1.6
* R0015N012S06	0.15	0.3	0.3	1.2	0.27	13.4°	50	6	2	●	1	1.5	1.5	1.7	1.8
* R0015N015	0.15	0.3	0.3	1.5	0.27	12.2°	50	4	2	●	1	1.8	1.9	2	2.2
* R0015N015S06	0.15	0.3	0.3	1.5	0.27	13.1°	50	6	2	●	1	1.8	1.9	2	2.2
R0015N020	0.15	0.3	0.3	2	0.27	11.5°	50	4	2	●	1	2.3	2.4	2.6	2.8
* R0015N020S06	0.15	0.3	0.3	2	0.27	12.6°	50	6	2	●	1	2.3	2.4	2.6	2.8
* R0015N025	0.15	0.3	0.3	2.5	0.27	11°	50	4	2	●	1	2.8	3	3.2	3.4
* R0015N030	0.15	0.3	0.3	3	0.27	10.4°	50	4	2	●	1	3.4	3.5	3.7	4
* R0015N040	0.15	0.3	0.3	4	0.27	9.5°	50	4	2	●	1	4.4	4.6	4.9	5.3
R0020N010	0.2	0.4	0.4	1	0.36	12.9°	50	4	2	●	1	1.3	1.4	1.5	1.6
* R0020N010S06	0.2	0.4	0.4	1	0.36	13.6°	50	6	2	●	1	1.3	1.4	1.5	1.6
* R0020N012S06	0.2	0.4	0.4	1.2	0.36	13.4°	50	6	2	●	1	1.5	1.6	1.7	1.8
* R0020N015	0.2	0.4	0.4	1.5	0.36	12.2°	50	4	2	●	1	1.8	1.9	2	2.2
* R0020N015S06	0.2	0.4	0.4	1.5	0.36	13.1°	50	6	2	●	1	1.8	1.9	2	2.2
R0020N020	0.2	0.4	0.4	2	0.36	11.5°	50	4	2	●	1	2.3	2.4	2.6	2.8
* R0020N020S06	0.2	0.4	0.4	2	0.36	12.6°	50	6	2	●	1	2.3	2.4	2.6	2.8
* R0020N025	0.2	0.4	0.4	2.5	0.36	10.9°	50	4	2	●	1	2.9	3	3.2	3.4
* R0020N025S06	0.2	0.4	0.4	2.5	0.36	12.1°	50	6	2	●	1	2.9	3	3.2	3.4
R0020N030	0.2	0.4	0.4	3	0.36	10.4°	50	4	2	●	1	3.4	3.5	3.8	4.1
* R0020N030S06	0.2	0.4	0.4	3	0.36	11.7°	50	6	2	●	1	3.4	3.5	3.8	4.1
* R0020N035	0.2	0.4	0.4	3.5	0.36	9.9°	50	4	2	●	1	3.9	4	4.3	4.7

* Expand

●: Stock standard

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Cutting Edge to Shank Angle B2	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
MS2XLB R0020N040	0.2	0.4	0.4	4	0.36	9.5°	50	4	2	●	1	4.4	4.6	4.9	5.3
R0020N045	0.2	0.4	0.4	4.5	0.36	9°	50	4	2	●	1	4.9	5.1	5.5	5.9
R0020N050	0.2	0.4	0.4	5	0.36	8.7°	50	4	2	●	1	5.5	5.6	6.1	6.5
R0020N055	0.2	0.4	0.4	5.5	0.36	8.3°	50	4	2	●	1	6	6.2	6.6	7.2
R0020N060	0.2	0.4	0.4	6	0.36	8°	50	4	2	●	1	6.5	6.7	7.2	7.8
R0025N015	0.25	0.5	0.5	1.5	0.46	12.2°	50	4	2	●	1	1.8	1.9	2	2.2
R0025N015S06	0.25	0.5	0.5	1.5	0.46	13.1°	50	6	2	●	1	1.8	1.9	2	2.2
R0025N020	0.25	0.5	0.5	2	0.46	11.5°	50	4	2	●	1	2.3	2.4	2.6	2.8
R0025N020S06	0.25	0.5	0.5	2	0.46	12.6°	50	6	2	●	1	2.3	2.4	2.6	2.8
R0025N025	0.25	0.5	0.5	2.5	0.46	10.9°	50	4	2	●	1	2.9	3	3.2	3.4
R0025N025S06	0.25	0.5	0.5	2.5	0.46	12.1°	50	6	2	●	1	2.9	3	3.2	3.4
R0025N030	0.25	0.5	0.5	3	0.46	10.3°	50	4	2	●	1	3.4	3.5	3.8	4
R0025N030S06	0.25	0.5	0.5	3	0.46	11.7°	50	6	2	●	1	3.4	3.5	3.8	4
R0025N035	0.25	0.5	0.5	3.5	0.46	9.8°	50	4	2	●	1	3.9	4	4.3	4.7
R0025N035S06	0.25	0.5	0.5	3.5	0.46	11.3°	50	6	2	●	1	3.9	4	4.3	4.7
R0025N040	0.25	0.5	0.5	4	0.46	9.4°	50	4	2	●	1	4.4	4.6	4.9	5.3
R0025N040S06	0.25	0.5	0.5	4	0.46	10.9°	50	6	2	●	1	4.4	4.6	4.9	5.3
R0025N045	0.25	0.5	0.5	4.5	0.46	9°	50	4	2	●	1	4.9	5.1	5.5	5.9
R0025N045S06	0.25	0.5	0.5	4.5	0.46	10.5°	50	6	2	●	1	4.9	5.1	5.5	5.9
R0025N050	0.25	0.5	0.5	5	0.46	8.6°	50	4	2	●	1	5.5	5.6	6.1	6.5
R0025N050S06	0.25	0.5	0.5	5	0.46	10.2°	50	6	2	●	1	5.5	5.6	6.1	6.5
R0025N055	0.25	0.5	0.5	5.5	0.46	8.3°	50	4	2	●	1	6	6.2	6.6	7.1
R0025N055S06	0.25	0.5	0.5	5.5	0.46	9.9°	50	6	2	●	1	6	6.2	6.6	7.1
R0025N060	0.25	0.5	0.5	6	0.46	7.9°	50	4	2	●	1	6.5	6.7	7.2	7.8
R0025N060S06	0.25	0.5	0.5	6	0.46	9.6°	50	6	2	●	1	6.5	6.7	7.2	7.8
R0025N070	0.25	0.5	0.5	7	0.46	7.4°	50	4	2	●	1	7.5	7.8	8.4	9
R0025N070S06	0.25	0.5	0.5	7	0.46	9°	50	6	2	●	1	7.5	7.8	8.4	9
R0025N080	0.25	0.5	0.5	8	0.46	6.9°	50	4	2	●	1	8.6	8.9	9.5	10.3
R0025N080S06	0.25	0.5	0.5	8	0.46	8.6°	50	6	2	●	1	8.6	8.9	9.5	10.3
R0025N100	0.25	0.5	0.5	10	0.46	6.1°	50	4	2	●	1	10.6	11	11.8	12.7
R0025N100S06	0.25	0.5	0.5	10	0.46	7.7°	50	6	2	●	1	10.6	11	11.8	12.7
R0030N018S06	0.3	0.6	0.6	1.8	0.56	12.8°	50	6	2	●	1	2.1	2.2	2.4	2.5
R0030N020	0.3	0.6	0.6	2	0.56	11.5°	50	4	2	●	1	2.3	2.4	2.6	2.8
R0030N020S06	0.3	0.6	0.6	2	0.56	12.6°	50	6	2	●	1	2.3	2.4	2.6	2.8
R0030N025	0.3	0.6	0.6	2.5	0.56	10.9°	50	4	2	●	1	2.9	3	3.2	3.4
R0030N025S06	0.3	0.6	0.6	2.5	0.56	12.1°	50	6	2	●	1	2.9	3	3.2	3.4
R0030N030	0.3	0.6	0.6	3	0.56	10.3°	50	4	2	●	1	3.4	3.5	3.7	4
R0030N030S06	0.3	0.6	0.6	3	0.56	11.7°	50	6	2	●	1	3.4	3.5	3.7	4
R0030N035	0.3	0.6	0.6	3.5	0.56	9.8°	50	4	2	●	1	3.9	4	4.3	4.7
R0030N035S06	0.3	0.6	0.6	3.5	0.56	11.2°	50	6	2	●	1	3.9	4	4.3	4.7
R0030N040	0.3	0.6	0.6	4	0.56	9.3°	50	4	2	●	1	4.4	4.6	4.9	5.3
R0030N040S06	0.3	0.6	0.6	4	0.56	10.9°	50	6	2	●	1	4.4	4.6	4.9	5.3
R0030N045	0.3	0.6	0.6	4.5	0.56	8.9°	50	4	2	●	1	4.9	5.1	5.5	5.9
R0030N045S06	0.3	0.6	0.6	4.5	0.56	10.5°	50	6	2	●	1	4.9	5.1	5.5	5.9
R0030N050	0.3	0.6	0.6	5	0.56	8.5°	50	4	2	●	1	5.5	5.6	6	6.5
R0030N050S06	0.3	0.6	0.6	5	0.56	10.2°	50	6	2	●	1	5.5	5.6	6	6.5
R0030N060	0.3	0.6	0.6	6	0.56	7.9°	50	4	2	●	1	6.5	6.7	7.2	7.8
R0030N060S06	0.3	0.6	0.6	6	0.56	9.5°	50	6	2	●	1	6.5	6.7	7.2	7.8

CUTTING CONDITIONS P72

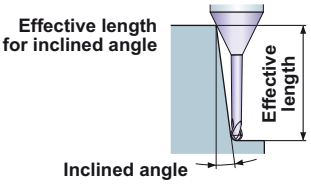
● : Stock standard

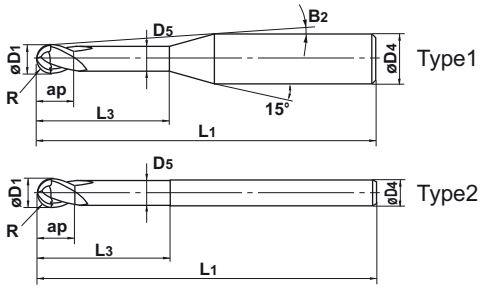
MS2XLB

Ball nose, Short cut length, 2 flute, Long neck

R ±0.01

0 — -0.02





● 2 flute long neck ball nose end mill.

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Cutting Edge to Shank Angle B2	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
MS2XLB R0030N070	0.3	0.6	0.6	7	0.56	7.3°	50	4	2	●	1	7.5	7.8	8.3	9
R0030N080	0.3	0.6	0.6	8	0.56	6.8°	50	4	2	●	1	8.6	8.8	9.5	10.2
R0030N080S06	0.3	0.6	0.6	8	0.56	8.5°	50	6	2	●	1	8.6	8.8	9.5	10.2
R0030N090	0.3	0.6	0.6	9	0.56	6.3°	50	4	2	●	1	9.6	9.9	10.6	11.5
R0030N100	0.3	0.6	0.6	10	0.56	6°	50	4	2	●	1	10.6	11	11.8	12.7
R0030N100S06	0.3	0.6	0.6	10	0.56	7.7°	50	6	2	●	1	10.6	11	11.8	12.7
R0030N110	0.3	0.6	0.6	11	0.56	5.6°	50	4	2	●	1	11.7	12.1	12.9	14
R0030N120	0.3	0.6	0.6	12	0.56	5.3°	50	4	2	●	1	12.7	13.1	14.1	15.2
R0040N020	0.4	0.8	0.8	2	0.76	11.4°	50	4	2	●	1	2.3	2.4	2.6	2.8
R0040N020S06	0.4	0.8	0.8	2	0.76	12.6°	50	6	2	●	1	2.3	2.4	2.6	2.8
R0040N024S06	0.4	0.8	0.8	2.4	0.76	12.2°	50	6	2	●	1	2.8	2.9	3	3.3
R0040N030	0.4	0.8	0.8	3	0.76	10.2°	50	4	2	●	1	3.4	3.5	3.7	4
R0040N030S06	0.4	0.8	0.8	3	0.76	11.6°	50	6	2	●	1	3.4	3.5	3.7	4
R0040N040	0.4	0.8	0.8	4	0.76	9.2°	50	4	2	●	1	4.4	4.6	4.9	5.2
R0040N040S06	0.4	0.8	0.8	4	0.76	10.8°	50	6	2	●	1	4.4	4.6	4.9	5.2
R0040N050	0.4	0.8	0.8	5	0.76	8.4°	50	4	2	●	1	5.5	5.6	6	6.5
R0040N060	0.4	0.8	0.8	6	0.76	7.7°	50	4	2	●	1	6.5	6.7	7.2	7.7
R0040N060S06	0.4	0.8	0.8	6	0.76	9.5°	50	6	2	●	1	6.5	6.7	7.2	7.7
R0040N070	0.4	0.8	0.8	7	0.76	7.1°	50	4	2	●	1	7.5	7.8	8.3	9
R0040N080	0.4	0.8	0.8	8	0.76	6.6°	50	4	2	●	1	8.6	8.8	9.5	10.2
R0040N080S06	0.4	0.8	0.8	8	0.76	8.4°	50	6	2	●	1	8.6	8.8	9.5	10.2
R0040N100	0.4	0.8	0.8	10	0.76	5.8°	50	4	2	●	1	10.6	11	11.8	12.7
R0040N100S06	0.4	0.8	0.8	10	0.76	7.6°	50	6	2	●	1	10.6	11	11.8	12.7
R0040N120	0.4	0.8	0.8	12	0.76	5.2°	50	4	2	●	1	12.7	13.1	14.1	15.2
R0050N030	0.5	1	1	3	0.94	9.9°	50	4	2	●	1	3.5	3.7	3.9	4.2
R0050N030S06	0.5	1	1	3	0.94	11.5°	50	6	2	●	1	3.5	3.7	3.9	4.2
R0050N040	0.5	1	1	4	0.94	8.9°	50	4	2	●	1	4.6	4.7	5.1	5.4
R0050N040S06	0.5	1	1	4	0.94	10.6°	50	6	2	●	1	4.6	4.7	5.1	5.4
R0050N050	0.5	1	1	5	0.94	8.1°	50	4	2	●	1	5.6	5.8	6.2	6.7
R0050N050S06	0.5	1	1	5	0.94	9.9°	50	6	2	●	1	5.6	5.8	6.2	6.7
R0050N060	0.5	1	1	6	0.94	7.4°	50	4	2	●	1	6.7	6.9	7.4	7.9
R0050N060S06	0.5	1	1	6	0.94	9.3°	50	6	2	●	1	6.7	6.9	7.4	7.9
R0050N070	0.5	1	1	7	0.94	6.8°	50	4	2	●	1	7.7	7.9	8.5	9.2
R0050N080	0.5	1	1	8	0.94	6.3°	50	4	2	●	1	8.7	9	9.7	10.4
R0050N080S06	0.5	1	1	8	0.94	8.2°	50	6	2	●	1	8.7	9	9.7	10.4
R0050N090	0.5	1	1	9	0.94	5.9°	50	4	2	●	1	9.8	10.1	10.8	11.7
R0050N100	0.5	1	1	10	0.94	5.5°	50	4	2	●	1	10.8	11.2	12	12.9
R0050N100S06	0.5	1	1	10	0.94	7.4°	50	6	2	●	1	10.8	11.2	12	12.9

●: Stock standard

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D_1	Length of Cut ap	Neck Length L_3	Neck Dia. D_5	Cutting Edge to Shank Angle B_2	Overall Length L_1	Shank Dia. D_4	No. of Flutes N	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
MS2XLBR0050N120	0.5	1	1	12	0.94	4.9°	50	4	2	●	1	12.9	13.3	14.3	15.4
R0050N120S06	0.5	1	1	12	0.94	6.7°	55	6	2	●	1	12.9	13.3	14.3	15.4
R0050N140	0.5	1	1	14	0.94	4.4°	50	4	2	●	1	14.9	15.4	16.6	17.9
R0050N160	0.5	1	1	16	0.94	4°	55	4	2	●	1	17	17.6	18.9	20.4
R0050N160S06	0.5	1	1	16	0.94	5.7°	60	6	2	●	1	17	17.6	18.9	20.4
R0050N180	0.5	1	1	18	0.94	3.7°	55	4	2	●	1	19.1	19.7	21.2	22.8
R0050N200	0.5	1	1	20	0.94	3.4°	55	4	2	●	1	21.1	21.9	23.5	25.3
R0050N200S06	0.5	1	1	20	0.94	4.9°	60	6	2	●	1	21.1	21.9	23.5	25.3
R0060N036S06	0.6	1.2	1.2	3.6	1.14	10.9°	50	6	2	●	1	4.2	4.3	4.6	4.9
R0060N060	0.6	1.2	1.2	6	1.14	7.2°	50	4	2	●	1	6.7	6.9	7.3	7.9
R0060N060S06	0.6	1.2	1.2	6	1.14	9.2°	50	6	2	●	1	6.7	6.9	7.3	7.9
R0060N080	0.6	1.2	1.2	8	1.14	6.1°	50	4	2	●	1	8.7	9	9.6	10.4
R0060N080S06	0.6	1.2	1.2	8	1.14	8.1°	50	6	2	●	1	8.7	9	9.6	10.4
R0060N100	0.6	1.2	1.2	10	1.14	5.3°	50	4	2	●	1	10.8	11.1	11.9	12.9
R0060N100S06	0.6	1.2	1.2	10	1.14	7.3°	50	6	2	●	1	10.8	11.1	11.9	12.9
R0060N120	0.6	1.2	1.2	12	1.14	4.7°	50	4	2	●	1	12.9	13.3	14.2	15.4
R0060N120S06	0.6	1.2	1.2	12	1.14	6.6°	55	6	2	●	1	12.9	13.3	14.2	15.4
R0060N140	0.6	1.2	1.2	14	1.14	4.2°	50	4	2	●	1	14.9	15.4	16.5	17.8
R0060N160	0.6	1.2	1.2	16	1.14	3.8°	55	4	2	●	1	17	17.6	18.8	20.3
R0060N160S06	0.6	1.2	1.2	16	1.14	5.6°	60	6	2	●	1	17	17.6	18.8	20.3
R0060N180	0.6	1.2	1.2	18	1.14	3.5°	55	4	2	●	1	19.1	19.7	21.1	22.8
R0060N240	0.6	1.2	1.2	24	1.14	2.8°	65	4	2	●	1	25.3	26.1	28	No interference
R0070N080	0.7	1.4	1.4	8	1.34	5.9°	50	4	2	●	1	8.7	9	9.6	10.4
R0070N120	0.7	1.4	1.4	12	1.34	4.5°	50	4	2	●	1	12.9	13.3	14.2	15.3
R0070N160	0.7	1.4	1.4	16	1.34	3.6°	55	4	2	●	1	17	17.6	18.8	20.3
R0075N045S06	0.75	1.5	1.5	4.5	1.44	10.1°	50	6	2	●	1	5.1	5.3	5.6	6
R0075N060	0.75	1.5	1.5	6	1.44	6.9°	50	4	2	●	1	6.6	6.9	7.3	7.9
R0075N060S06	0.75	1.5	1.5	6	1.44	9°	50	6	2	●	1	6.6	6.9	7.3	7.9
R0075N075S06	0.75	1.5	1.5	7.5	1.44	8.2°	50	6	2	●	1	8.2	8.5	9	9.7
R0075N080	0.75	1.5	1.5	8	1.44	5.8°	50	4	2	●	1	8.7	9	9.6	10.3
R0075N080S06	0.75	1.5	1.5	8	1.44	8°	50	6	2	●	1	8.7	9	9.6	10.3
R0075N100	0.75	1.5	1.5	10	1.44	5°	50	4	2	●	1	10.8	11.1	11.9	12.8
R0075N100S06	0.75	1.5	1.5	10	1.44	7.1°	50	6	2	●	1	10.8	11.1	11.9	12.8
R0075N120	0.75	1.5	1.5	12	1.44	4.4°	50	4	2	●	1	12.9	13.3	14.2	15.3
R0075N120S06	0.75	1.5	1.5	12	1.44	6.4°	55	6	2	●	1	12.9	13.3	14.2	15.3
R0075N140	0.75	1.5	1.5	14	1.44	3.9°	50	4	2	●	1	14.9	15.4	16.5	17.8
R0075N140S06	0.75	1.5	1.5	14	1.44	5.8°	55	6	2	●	1	14.9	15.4	16.5	17.8
R0075N160	0.75	1.5	1.5	16	1.44	3.5°	55	4	2	●	1	17	17.6	18.8	20.3
R0075N160S06	0.75	1.5	1.5	16	1.44	5.4°	60	6	2	●	1	17	17.6	18.8	20.3
R0075N180	0.75	1.5	1.5	18	1.44	3.2°	55	4	2	●	1	19.1	19.7	21.1	22.8
R0075N200	0.75	1.5	1.5	20	1.44	3°	55	4	2	●	1	21.1	21.8	23.4	No interference
R0075N200S06	0.75	1.5	1.5	20	1.44	4.6°	60	6	2	●	1	21.1	21.8	23.4	25.3
R0075N220	0.75	1.5	1.5	22	1.44	2.8°	60	4	2	●	1	23.2	24	25.7	No interference
R0075N300	0.75	1.5	1.5	30	1.44	2.1°	70	4	2	●	1	31.5	32.5	34.9	No interference
R0080N080	0.8	1.6	1.6	8	1.54	5.7°	50	4	2	●	1	8.7	9	9.6	10.3
R0080N120	0.8	1.6	1.6	12	1.54	4.3°	50	4	2	●	1	12.9	13.3	14.2	15.3
R0080N160	0.8	1.6	1.6	16	1.54	3.4°	55	4	2	●	1	17	17.6	18.8	20.3
R0080N200	0.8	1.6	1.6	20	1.54	2.9°	55	4	2	●	1	21.1	21.8	23.4	No interference

CUTTING CONDITIONS P72

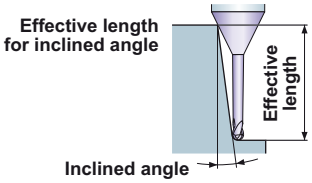
● : Stock standard

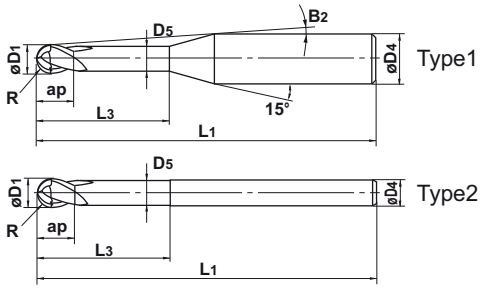
MS2XLB

Ball nose, Short cut length, 2 flute, Long neck

R ±0.01

0 – -0.02





● 2 flute long neck ball nose end mill.

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Cutting Edge to Shank Angle B2	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
MS2XLB R0090N080	0.9	1.8	1.8	8	1.74	5.4°	50	4	2	●	1	8.7	9	9.6	10.3
R0090N120	0.9	1.8	1.8	12	1.74	4°	50	4	2	●	1	12.8	13.3	14.2	15.3
R0090N160	0.9	1.8	1.8	16	1.74	3.2°	55	4	2	●	1	17	17.5	18.8	20.3
R0090N200	0.9	1.8	1.8	20	1.74	2.7°	55	4	2	●	1	21.1	21.8	23.4	No interference
R0100N040	1	2	2	4	1.9	7.8°	50	4	2	●	1	4.6	4.8	5.1	5.4
R0100N040S06	1	2	2	4	1.9	10.2°	50	6	2	●	1	4.6	4.8	5.1	5.4
R0100N060	1	2	2	6	1.9	6.1°	50	4	2	●	1	6.7	6.9	7.4	7.9
R0100N060S06	1	2	2	6	1.9	8.7°	50	6	2	●	1	6.7	6.9	7.4	7.9
R0100N080	1	2	2	8	1.9	5.1°	50	4	2	●	1	8.8	9.1	9.7	10.4
R0100N080S06	1	2	2	8	1.9	7.6°	50	6	2	●	1	8.8	9.1	9.7	10.4
R0100N100	1	2	2	10	1.9	4.3°	50	4	2	●	1	10.9	11.2	12.0	12.9
R0100N100S06	1	2	2	10	1.9	6.7°	50	6	2	●	1	10.9	11.2	12.0	12.9
R0100N120	1	2	2	12	1.9	3.8°	50	4	2	●	1	12.9	13.3	14.3	15.4
R0100N120S06	1	2	2	12	1.9	6°	55	6	2	●	1	12.9	13.3	14.3	15.4
R0100N140	1	2	2	14	1.9	3.4°	50	4	2	●	1	15	15.5	16.6	17.8
R0100N140S06	1	2	2	14	1.9	5.5°	55	6	2	●	1	15	15.5	16.6	17.8
R0100N160	1	2	2	16	1.9	3°	55	4	2	●	1	17.1	17.6	18.9	No interference
R0100N160S06	1	2	2	16	1.9	5°	60	6	2	●	1	17.1	17.6	18.9	20.3
R0100N180	1	2	2	18	1.9	2.7°	55	4	2	●	1	19.1	19.8	21.2	No interference
R0100N180S06	1	2	2	18	1.9	4.6°	60	6	2	●	1	19.1	19.8	21.2	22.8
R0100N200	1	2	2	20	1.9	2.5°	60	4	2	●	1	21.2	21.9	23.5	No interference
R0100N200S06	1	2	2	20	1.9	4.3°	60	6	2	●	1	21.2	21.9	23.5	25.3
R0100N220	1	2	2	22	1.9	2.3°	60	4	2	●	1	23.3	24	25.8	No interference
R0100N250	1	2	2	25	1.9	2.1°	65	4	2	●	1	26.4	27.2	29.3	No interference
R0100N250S06	1	2	2	25	1.9	3.6°	65	6	2	●	1	26.4	27.2	29.2	31.5
R0100N300	1	2	2	30	1.9	1.8°	70	4	2	●	1	31.5	32.6	No interference	No interference
R0100N300S06	1	2	2	30	1.9	3.1°	70	6	2	●	1	31.5	32.6	35.0	37.7
R0100N350	1	2	2	35	1.9	1.5°	70	4	2	●	1	36.7	37.9	No interference	No interference
R0100N350S06	1	2	2	35	1.9	2.8°	80	6	2	●	1	36.7	37.9	40.7	No interference
R0125N060S06	1.25	2.5	2.5	6	2.4	8.4°	50	6	2	●	1	6.7	6.9	7.3	7.8
R0125N075S06	1.25	2.5	2.5	7.5	2.4	7.5°	50	6	2	●	1	8.3	8.5	9.1	9.7
R0125N100S06	1.25	2.5	2.5	10	2.4	6.3°	50	6	2	●	1	10.8	11.2	11.9	12.8
R0125N125S06	1.25	2.5	2.5	12.5	2.4	5.5°	50	6	2	●	1	13.4	13.9	14.8	15.9
R0125N160S06	1.25	2.5	2.5	16	2.4	4.6°	60	6	2	●	1	17	17.6	18.8	20.3
R0125N200S06	1.25	2.5	2.5	20	2.4	3.9°	60	6	2	●	1	21.2	21.9	23.4	25.2
R0125N250S06	1.25	2.5	2.5	25	2.4	3.3°	65	6	2	●	1	26.4	27.2	29.2	31.5
R0125N300S06	1.25	2.5	2.5	30	2.4	2.8°	70	6	2	●	1	31.5	32.6	34.9	No interference
R0125N350S06	1.25	2.5	2.5	35	2.4	2.5°	80	6	2	●	1	36.7	37.9	40.7	No interference

●: Stock standard
★: Stock standard in Japan
□: Non stock, produce to order only

CUTTING CONDITIONS P72

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Cutting Edge to Shank Angle B2	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
MS2XLBR0150N080	1.5	3	3	8	2.9	6.8°	60	6	2	●	1	8.8	9	9.6	10.3
R0150N100	1.5	3	3	10	2.9	5.9°	60	6	2	●	1	10.8	11.2	11.9	12.7
R0150N120	1.5	3	3	12	2.9	5.2°	60	6	2	●	1	12.9	13.3	14.2	15.2
R0150N140	1.5	3	3	14	2.9	4.6°	60	6	2	●	1	15	15.4	16.5	17.7
R0150N160	1.5	3	3	16	2.9	4.2°	60	6	2	●	1	17	17.6	18.8	20.2
R0150N200	1.5	3	3	20	2.9	3.5°	70	6	2	●	1	21.2	21.9	23.4	25.2
R0150N250	1.5	3	3	25	2.9	2.9°	70	6	2	●	1	26.3	27.2	29.1	No interference
R0150N300	1.5	3	3	30	2.9	2.5°	70	6	2	●	1	31.5	32.6	34.9	No interference
R0150N350	1.5	3	3	35	2.9	2.2°	80	6	2	●	1	36.7	37.9	40.6	No interference
R0150N400	1.5	3	3	40	2.9	2°	90	6	2	●	1	41.8	43.3	No interference	No interference
R0200N100	2	4	4	10	3.9	4.7°	70	6	2	●	1	10.8	11.1	11.8	12.6
R0200N120	2	4	4	12	3.9	4°	70	6	2	●	1	12.9	13.3	14.1	15.1
R0200N140	2	4	4	14	3.9	3.5°	70	6	2	●	1	15	15.4	16.4	17.6
R0200N160	2	4	4	16	3.9	3.2°	70	6	2	●	1	17	17.5	18.7	20.1
R0200N200	2	4	4	20	3.9	2.6°	70	6	2	●	1	21.2	21.8	23.3	No interference
R0200N250	2	4	4	25	3.9	2.1°	70	6	2	●	1	26.3	27.2	29.1	No interference
R0200N300	2	4	4	30	3.9	1.8°	70	6	2	●	1	31.5	32.5	No interference	No interference
R0200N350	2	4	4	35	3.9	1.6°	80	6	2	●	1	36.7	37.9	No interference	No interference
R0200N400	2	4	4	40	3.9	1.4°	90	6	2	●	1	41.8	43.2	No interference	No interference
R0200N450	2	4	4	45	3.9	1.3°	90	6	2	●	1	47	48.6	No interference	No interference
R0200N500	2	4	4	50	3.9	1.1°	100	6	2	●	1	52.2	53.9	No interference	No interference
R0250N200	2.5	5	5	20	4.9	1.5°	70	6	2	●	1	21.1	21.8	No interference	No interference
R0250N250	2.5	5	5	25	4.9	1.2°	70	6	2	●	1	26.3	27.1	No interference	No interference
R0250N300	2.5	5	5	30	4.9	1°	80	6	2	●	1	31.5	No interference	No interference	No interference
R0250N350	2.5	5	5	35	4.9	0.9°	80	6	2	●	1	36.6	No interference	No interference	No interference
R0300N300	3	6	6	30	5.85	—	80	6	2	●	2	No interference	No interference	No interference	No interference
R0300N500	3	6	6	50	5.85	—	120	6	2	●	2	No interference	No interference	No interference	No interference

The diameter tolerance is only applied to items produced after July 2006.

●: Stock standard
★: Stock standard in Japan
□: Non stock, produce to order only

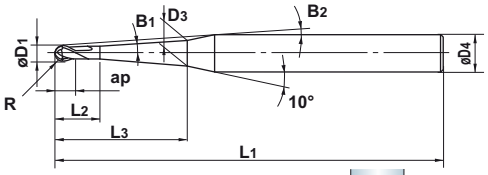
CUTTING CONDITIONS P72

MS2XB

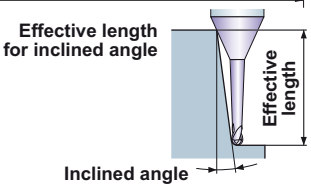
Ball nose, 2 flute, Taper neck

R ±0.01

0 – -0.02



Type1



● 2 flute taper neck ball nose end mill.

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D1	Taper Angle One Side B1	Length of Cut ap	Neck Length L3	Length of Straight Neck L2	Cutting Edge to Shank Angle B2	Neck Dia. D3	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
MS2XBR0010T0030L015	0.1	0.2	30'	0.2	1.5	0.6	8.8°	0.19	50	4	2	●	1	1.7	1.8	2.0	2.3
R0010T0030L020	0.1	0.2	30'	0.2	2	0.6	8.5°	0.20	50	4	2	●	1	2.2	2.4	2.6	3.0
R0010T0100L015	0.1	0.2	1°	0.2	1.5	0.6	8.8°	0.21	50	4	2	●	1	–	1.8	2.0	2.2
R0010T0100L020	0.1	0.2	1°	0.2	2	0.6	8.5°	0.22	50	4	2	●	1	–	2.3	2.5	2.9
R0010T0130L015	0.1	0.2	1°30'	0.2	1.5	0.6	8.9°	0.22	50	4	2	●	1	–	–	1.9	2.2
R0010T0130L020	0.1	0.2	1°30'	0.2	2	0.6	8.6°	0.25	50	4	2	●	1	–	–	2.4	2.8
R0010T0200L015	0.1	0.2	2°	0.2	1.5	0.6	8.9°	0.24	50	4	2	●	1	–	–	1.8	2.1
R0010T0200L020	0.1	0.2	2°	0.2	2	0.6	8.6°	0.27	50	4	2	●	1	–	–	2.3	2.6
R0010T0300L015	0.1	0.2	3°	0.2	1.5	0.6	9.0°	0.27	50	4	2	●	1	–	–	–	1.9
R0010T0300L020	0.1	0.2	3°	0.2	2	0.6	8.7°	0.32	50	4	2	●	1	–	–	–	2.4
R0010T0500L020	0.1	0.2	5°	0.2	2	0.6	9.0°	0.42	50	4	2	●	1	–	–	–	–
R0015T0030L030	0.15	0.3	30'	0.3	3	0.7	7.9°	0.32	50	4	2	●	1	3.2	3.4	3.8	4.3
R0015T0100L030	0.15	0.3	1°	0.3	3	0.7	7.9°	0.36	50	4	2	●	1	–	3.3	3.7	4.2
R0015T0130L030	0.15	0.3	1°30'	0.3	3	0.7	8.0°	0.40	50	4	2	●	1	–	–	3.5	4.0
R0015T0200L030	0.15	0.3	2°	0.3	3	0.7	8.1°	0.44	50	4	2	●	1	–	–	3.3	3.8
R0015T0300L030	0.15	0.3	3°	0.3	3	0.7	8.2°	0.52	50	4	2	●	1	–	–	–	3.4
R0015T0500L030	0.15	0.3	5°	0.3	3	0.7	8.6°	0.68	50	4	2	●	1	–	–	–	–
R0020T0030L020	0.2	0.4	30'	0.4	2	1.2	8.4°	0.38	50	4	2	●	1	2.3	2.4	2.7	3.0
R0020T0030L030	0.2	0.4	30'	0.4	3	1.2	7.8°	0.40	50	4	2	●	1	3.3	3.5	3.9	4.4
R0020T0030L040	0.2	0.4	30'	0.4	4	1.2	7.3°	0.41	50	4	2	●	1	4.3	4.5	5.1	5.7
R0020T0030L050	0.2	0.4	30'	0.4	5	1.2	6.8°	0.43	50	4	2	●	1	5.3	5.6	6.2	7.1
R0020T0100L020	0.2	0.4	1°	0.4	2	1.2	8.4°	0.39	50	4	2	●	1	–	2.3	2.6	3.0
R0020T0100L030	0.2	0.4	1°	0.4	3	1.2	7.9°	0.43	50	4	2	●	1	–	3.3	3.7	4.2
R0020T0100L040	0.2	0.4	1°	0.4	4	1.2	7.4°	0.46	50	4	2	●	1	–	4.3	4.9	5.5
R0020T0100L050	0.2	0.4	1°	0.4	5	1.2	6.9°	0.50	50	4	2	●	1	–	5.3	6.0	6.8
R0020T0130L020	0.2	0.4	1°30'	0.4	2	1.2	8.5°	0.41	50	4	2	●	1	–	–	2.5	2.9
R0020T0130L030	0.2	0.4	1°30'	0.4	3	1.2	7.9°	0.46	50	4	2	●	1	–	–	3.6	4.1
R0020T0130L040	0.2	0.4	1°30'	0.4	4	1.2	7.5°	0.51	50	4	2	●	1	–	–	4.7	5.3
R0020T0130L050	0.2	0.4	1°30'	0.4	5	1.2	7.0°	0.56	50	4	2	●	1	–	–	5.7	6.5
R0020T0200L020	0.2	0.4	2°	0.4	2	1.2	8.5°	0.42	50	4	2	●	1	–	–	2.5	2.8
R0020T0200L030	0.2	0.4	2°	0.4	3	1.2	8.0°	0.49	50	4	2	●	1	–	–	3.5	4.0
R0020T0200L040	0.2	0.4	2°	0.4	4	1.2	7.5°	0.56	50	4	2	●	1	–	–	4.5	5.1
R0020T0200L050	0.2	0.4	2°	0.4	5	1.2	7.1°	0.63	50	4	2	●	1	–	–	5.5	6.2
R0025T0030L030	0.25	0.5	30'	0.5	3	1.5	7.8°	0.49	50	4	2	●	1	3.3	3.5	3.9	4.4
R0025T0030L050	0.25	0.5	30'	0.5	5	1.5	6.8°	0.53	50	4	2	●	1	5.3	5.6	6.2	7.1
R0025T0100L030	0.25	0.5	1°	0.5	3	1.5	7.8°	0.52	50	4	2	●	1	–	3.4	3.8	4.3
R0025T0100L050	0.25	0.5	1°	0.5	5	1.5	6.9°	0.59	50	4	2	●	1	–	5.4	6.0	6.8
R0025T0130L030	0.25	0.5	1°30'	0.5	3	1.5	7.9°	0.54	50	4	2	●	1	–	–	3.7	4.1

●: Stock standard

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D1	Taper Angle One Side B1	Length of Cut ap	Neck Length L3	Length of Straight Neck L2	Cutting Edge to Shank Angle B2	Neck Dia. D3	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
MS2XBR0025T0130L050	0.25	0.5	1°30'	0.5	5	1.5	7.0°	0.65	50	4	2	●	1	—	—	5.8	6.6
R0025T0200L030	0.25	0.5	2°	0.5	3	1.5	7.9°	0.57	50	4	2	●	1	—	—	3.5	4.0
R0025T0200L050	0.25	0.5	2°	0.5	5	1.5	7.1°	0.71	50	4	2	●	1	—	—	5.5	6.3
R0030T0030L050	0.3	0.6	30'	0.6	5	1.6	6.8°	0.62	50	4	2	●	1	5.3	5.6	6.2	7.1
R0030T0030L080	0.3	0.6	30'	0.6	8	1.6	5.7°	0.68	50	4	2	●	1	8.3	8.7	9.8	11.1
R0030T0100L050	0.3	0.6	1°	0.6	5	1.6	6.8°	0.68	50	4	2	●	1	—	5.4	6.0	6.8
R0030T0100L080	0.3	0.6	1°	0.6	8	1.6	5.8°	0.79	50	4	2	●	1	—	8.4	9.4	10.7
R0030T0100L100	0.3	0.6	1°	0.6	10	1.6	5.2°	0.86	50	4	2	●	1	—	10.4	11.6	13.2
R0030T0100L120	0.3	0.6	1°	0.6	12	1.6	4.8°	0.93	50	4	2	●	1	—	12.4	13.9	15.8
R0030T0100L150	0.3	0.6	1°	0.6	15	1.6	4.2°	1.03	50	4	2	●	1	—	15.4	17.2	19.6
R0030T0130L050	0.3	0.6	1°30'	0.6	5	1.6	6.9°	0.74	50	4	2	●	1	—	—	5.8	6.6
R0030T0130L080	0.3	0.6	1°30'	0.6	8	1.6	5.9°	0.90	50	4	2	●	1	—	—	9.0	10.2
R0030T0200L060	0.3	0.6	2°	0.6	6	1.6	6.6°	0.87	50	4	2	●	1	—	—	6.6	7.4
R0030T0200L080	0.3	0.6	2°	0.6	8	1.6	6.0°	1.01	50	4	2	●	1	—	—	8.6	9.7
R0040T0030L080	0.4	0.8	30'	0.8	8	1.8	5.5°	0.87	50	4	2	●	1	8.3	8.7	9.8	11.1
R0040T0030L120	0.4	0.8	30'	0.8	12	1.8	4.5°	0.94	60	4	2	●	1	12.3	13.0	14.5	16.5
R0040T0100L080	0.4	0.8	1°	0.8	8	1.8	5.6°	0.98	50	4	2	●	1	—	8.4	9.4	10.7
R0040T0100L120	0.4	0.8	1°	0.8	12	1.8	4.6°	1.12	60	4	2	●	1	—	12.4	13.9	15.8
R0040T0130L080	0.4	0.8	1°30'	0.8	8	1.8	5.8°	1.09	50	4	2	●	1	—	—	9.0	10.2
R0040T0130L120	0.4	0.8	1°30'	0.8	12	1.8	4.8°	1.30	60	4	2	●	1	—	—	13.2	15.0
R0040T0200L080	0.4	0.8	2°	0.8	8	1.8	5.9°	1.20	60	4	2	●	1	—	—	8.6	9.7
R0040T0300L120	0.4	0.8	3°	0.8	12	1.8	5.2°	1.83	60	4	2	●	1	—	—	—	12.8
R0050T0030L100	0.5	1	30'	1	10	2.5	6.1°	1.08	60	6	2	●	1	10.4	10.9	12.2	13.9
R0050T0030L150	0.5	1	30'	1	15	2.5	5.1°	1.16	60	6	2	●	1	15.4	16.2	18.2	20.7
R0050T0030L200	0.5	1	30'	1	20	2.5	4.4°	1.25	70	6	2	●	1	20.4	21.5	24.1	27.4
R0050T0030L250	0.5	1	30'	1	25	2.5	3.8°	1.34	70	6	2	●	1	25.4	26.8	30.0	34.2
R0050T0030L300	0.5	1	30'	1	30	2.5	3.4°	1.42	70	6	2	●	1	30.4	32.0	35.9	41.0
R0050T0100L100	0.5	1	1°	1	10	2.5	6.2°	1.21	60	6	2	●	1	—	10.5	11.8	13.4
R0050T0100L150	0.5	1	1°	1	15	2.5	5.2°	1.38	60	6	2	●	1	—	15.5	17.4	19.8
R0050T0100L200	0.5	1	1°	1	20	2.5	4.5°	1.56	70	6	2	●	1	—	20.5	23.0	26.2
R0050T0100L250	0.5	1	1°	1	25	2.5	3.9°	1.73	70	6	2	●	1	—	25.5	28.6	32.6
R0050T0100L300	0.5	1	1°	1	30	2.5	3.5°	1.91	70	6	2	●	1	—	30.5	34.2	39.0
R0050T0100L350	0.5	1	1°	1	35	2.5	3.2°	2.08	80	6	2	●	1	—	35.5	39.8	45.4
R0050T0130L100	0.5	1	1°30'	1	10	2.5	6.3°	1.34	60	6	2	●	1	—	—	11.3	12.8
R0050T0130L150	0.5	1	1°30'	1	15	2.5	5.3°	1.60	60	6	2	●	1	—	—	16.6	18.9
R0050T0130L200	0.5	1	1°30'	1	20	2.5	4.6°	1.86	70	6	2	●	1	—	—	21.9	24.9
R0050T0200L150	0.5	1	2°	1	15	2.5	5.4°	1.82	60	6	2	●	1	—	—	15.8	18.0
R0050T0200L200	0.5	1	2°	1	20	2.5	4.7°	2.17	70	6	2	●	1	—	—	20.8	23.7
R0050T0300L200	0.5	1	3°	1	20	2.5	5.0°	2.78	70	6	2	●	1	—	—	—	21.2
R0050T0300L400	0.5	1	3°	1	40	2.5	3.4°	4.88	80	6	2	●	1	—	—	—	41.2
R0050T0500L200	0.5	1	5°	1	20	2.5	5.7°	4.01	70	6	2	●	1	—	—	—	—
R0060T0030L120	0.6	1.2	30'	1.2	12	2.7	5.6°	1.31	60	6	2	●	1	12.4	13.1	14.6	16.6
R0060T0030L240	0.6	1.2	30'	1.2	24	2.7	3.8°	1.52	70	6	2	●	1	24.4	25.7	28.8	32.8
R0060T0100L120	0.6	1.2	1°	1.2	12	2.7	5.7°	1.47	60	6	2	●	1	—	12.5	14.0	15.9
R0060T0100L240	0.6	1.2	1°	1.2	24	2.7	3.9°	1.89	70	6	2	●	1	—	24.5	27.5	31.3
R0060T0130L120	0.6	1.2	1°30'	1.2	12	2.7	5.8°	1.63	60	6	2	●	1	—	—	13.4	15.2
R0060T0130L240	0.6	1.2	1°30'	1.2	24	2.7	4.1°	2.26	70	6	2	●	1	—	—	26.2	29.8
R0060T0200L120	0.6	1.2	2°	1.2	12	2.7	5.9°	1.79	60	6	2	●	1	—	—	12.8	14.6

CUTTING CONDITIONS P73

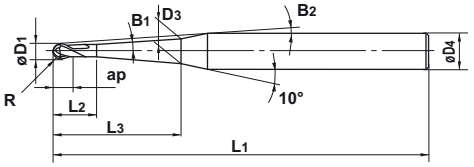
●: Stock standard

MS2XB

Ball nose, 2 flute, Taper neck

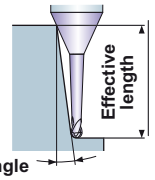
R ± 0.01

0 — -0.02



Type1

UWC MS 30°



● 2 flute taper neck ball nose end mill.

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D1	Taper Angle One Side B1	Length of Cut ap	Neck Length L3	Length of Straight Neck L2	Cutting Edge to Shank Angle B2	Neck Dia. D3	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
MS2XB R0060T0200L240	0.6	1.2	2°	1.2	24	2.7	4.2°	2.63	70	6	2	●	1	—	—	24.8	28.3
R0075T0030L100	0.75	1.5	30'	1.5	10	3	5.9°	1.57	60	6	2	●	1	10.4	10.9	12.2	13.8
R0075T0030L150	0.75	1.5	30'	1.5	15	3	4.9°	1.65	60	6	2	●	1	15.4	16.2	18.1	20.6
R0075T0030L300	0.75	1.5	30'	1.5	30	3	3.2°	1.92	70	6	2	●	1	30.4	32.0	35.9	40.9
R0075T0100L100	0.75	1.5	1°	1.5	10	3	6.0°	1.69	60	6	2	●	1	—	10.5	11.8	13.3
R0075T0100L150	0.75	1.5	1°	1.5	15	3	5.0°	1.86	60	6	2	●	1	—	15.5	17.4	19.7
R0075T0100L200	0.75	1.5	1°	1.5	20	3	4.2°	2.04	70	6	2	●	1	—	20.5	23.0	26.1
R0075T0100L300	0.75	1.5	1°	1.5	30	3	3.3°	2.39	70	6	2	●	1	—	30.5	34.2	39.0
R0075T0130L100	0.75	1.5	1°30'	1.5	10	3	6.1°	1.81	60	6	2	●	1	—	—	11.3	12.8
R0075T0130L150	0.75	1.5	1°30'	1.5	15	3	5.1°	2.07	60	6	2	●	1	—	—	16.6	18.9
R0075T0130L300	0.75	1.5	1°30'	1.5	30	3	3.4°	2.86	70	6	2	●	1	—	—	32.5	37.0
R0075T0200L100	0.75	1.5	2°	1.5	10	3	6.2°	1.93	60	6	2	●	1	—	—	10.9	12.3
R0075T0200L150	0.75	1.5	2°	1.5	15	3	5.2°	2.28	60	6	2	●	1	—	—	15.9	18.0
R0075T0200L300	0.75	1.5	2°	1.5	30	3	3.5°	3.33	70	6	2	●	1	—	—	30.9	35.1
R0100T0030L200	1	2	30'	2	20	4	3.9°	2.18	60	6	2	●	1	20.7	21.7	24.3	27.6
R0100T0030L300	1	2	30'	2	30	4	2.9°	2.36	70	6	2	●	1	30.7	32.3	36.2	No interference
R0100T0030L400	1	2	30'	2	40	4	2.4°	2.53	80	6	2	●	1	40.7	42.8	48.0	No interference
R0100T0100L200	1	2	1°	2	20	4	4.0°	2.46	60	6	2	●	1	—	20.8	23.3	26.4
R0100T0100L250	1	2	1°	2	25	4	3.4°	2.64	60	6	2	●	1	—	25.8	28.9	32.9
R0100T0100L300	1	2	1°	2	30	4	3.0°	2.81	70	6	2	●	1	—	30.8	34.5	39.3
R0100T0100L350	1	2	1°	2	35	4	2.7°	2.99	80	6	2	●	1	—	35.8	40.1	No interference
R0100T0100L400	1	2	1°	2	40	4	2.5°	3.16	80	6	2	●	1	—	40.8	45.8	No interference
R0100T0100L500	1	2	1°	2	50	4	2.1°	3.51	90	6	2	●	1	—	50.8	57.0	No interference
R0100T0130L200	1	2	1°30'	2	20	4	4.1°	2.74	60	6	2	●	1	—	—	22.3	25.3
R0100T0130L300	1	2	1°30'	2	30	4	3.1°	3.27	70	6	2	●	1	—	—	32.9	37.4
R0100T0130L400	1	2	1°30'	2	40	4	2.6°	3.79	80	6	2	●	1	—	—	43.5	No interference
R0100T0200L300	1	2	2°	2	30	4	3.3°	3.72	70	6	2	●	1	—	—	31.3	35.5
R0100T0200L400	1	2	2°	2	40	4	2.7°	4.42	80	6	2	●	1	—	—	41.3	No interference
R0100T0300L300	1	2	3°	2	30	4	3.5°	4.63	70	6	2	●	1	—	—	—	31.8
R0100T0300L400	1	2	3°	2	40	4	2.9°	5.68	80	6	2	●	1	—	—	—	No interference
R0100T0500L200	1	2	5°	2	20	4	5.1°	4.70	60	6	2	●	1	—	—	—	—
R0100T0500L380	1	2	5°	2	38	4	4.6°	7.85	80	8	2	●	1	—	—	—	—
R0150T0030L300	1.5	3	30'	3	30	6	2.4°	3.32	70	6	2	●	1	30.7	32.3	36.2	No interference
R0150T0030L400	1.5	3	30'	3	40	6	1.9°	3.50	80	6	2	●	1	40.7	42.9	No interference	No interference
R0150T0030L500	1.5	3	30'	3	50	6	1.6°	3.67	90	6	2	●	1	50.7	53.4	No interference	No interference
R0150T0100L300	1.5	3	1°	3	30	6	2.5°	3.74	70	6	2	●	1	—	31.0	34.7	No interference
R0150T0100L400	1.5	3	1°	3	40	6	2.0°	4.09	80	6	2	●	1	—	41.0	45.9	No interference
R0150T0100L500	1.5	3	1°	3	50	6	1.7°	4.44	90	6	2	●	1	—	51.0	No interference	No interference

●: Stock standard

Unit : mm

Order Number	Radius of Ball Nose R	Dia. D_1	Taper Angle One Side B_1	Length of Cut ap	Neck Length L_3	Length of Straight Neck L_2	Cutting Edge to Shank Angle B_2	Neck Dia. D_3	Overall Length L_1	Shank Dia. D_4	No. of Flutes N	Stock	Type	Effective length for inclined angle			
														30'	1°	2°	3°
MS2XBR0150T0130L300	1.5	3	1°30'	3	30	6	2.6°	4.16	70	6	2	●	1	—	—	33.1	No interference
R0150T0130L400	1.5	3	1°30'	3	40	6	2.1°	4.69	80	6	2	●	1	—	—	43.8	No interference
R0150T0130L500	1.5	3	1°30'	3	50	6	1.7°	5.21	90	6	2	●	1	—	—	No interference	No interference
R0150T0200L300	1.5	3	2°	3	30	6	2.7°	4.58	70	6	2	●	1	—	—	31.6	No interference
R0150T0200L480	1.5	3	2°	3	48	6	1.9°	5.84	90	6	2	●	1	—	—	No interference	No interference
R0150T0300L300	1.5	3	3°	3	30	6	2.9°	5.42	70	6	2	●	1	—	—	—	No interference
R0150T0300L500	1.5	3	3°	3	50	6	2.9°	7.52	90	8	2	●	1	—	—	—	No interference
R0200T0030L600	2	4	30'	4	60	7	1.0°	4.83	110	6	2	●	1	60.8	64.0	No interference	No interference
R0200T0100L600	2	4	1°	4	60	7	1.0°	5.76	110	6	2	●	1	—	61.1	No interference	No interference

CUTTING CONDITIONS P73

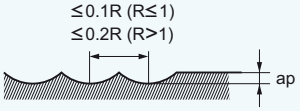
● : Stock standard

MS2XLB

■ Ball nose, Short cut length, 2 flute, Long neck

Work material		Carbon steel Ck55 Pre-hardened steel 070M55 (−45HRC)			Hardened steel W.Nr. 1.2344(H13), X20Cr13 (−52HRC)		
R (mm)	Neck length (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
R 0.1	0.5	50,000	400	0.003	50,000	320	0.003
	1	50,000	400	0.002	50,000	320	0.002
	1.5	40,000	300	0.001	40,000	240	0.001
	2	40,000	200	0.001	40,000	160	0.001
	2.5	40,000	100	0.001	40,000	80	0.001
	3	30,000	50	0.001	30,000	40	0.001
R 0.15	1	50,000	600	0.007	50,000	480	0.007
	1.5	50,000	600	0.005	50,000	480	0.005
	2	50,000	600	0.003	50,000	480	0.003
	2.5	40,000	400	0.003	40,000	320	0.003
	3	40,000	300	0.002	40,000	240	0.002
	4	30,000	200	0.002	30,000	160	0.002
R 0.2	1	50,000	1,800	0.015	50,000	1,400	0.015
	2	50,000	1,300	0.01	50,000	1,000	0.01
	3	50,000	900	0.005	50,000	700	0.005
	4	40,000	600	0.004	40,000	480	0.004
	5	40,000	400	0.003	40,000	320	0.003
	6	30,000	200	0.002	30,000	160	0.002
R 0.25	2	50,000	2,500	0.02	50,000	2,000	0.02
	3	50,000	1,500	0.015	50,000	1,200	0.015
	4	45,000	1,200	0.01	45,000	950	0.01
	5	45,000	900	0.007	45,000	700	0.007
	6	36,000	600	0.006	36,000	480	0.006
	7	32,000	400	0.005	32,000	320	0.005
	8	32,000	300	0.003	32,000	240	0.003
	10	26,000	200	0.002	26,000	160	0.002
R 0.3	2	50,000	3,500	0.03	50,000	2,800	0.03
	3	50,000	3,500	0.03	50,000	2,800	0.03
	4	44,000	2,500	0.02	44,000	2,000	0.02
	5	37,000	1,200	0.01	37,000	950	0.01
	6	37,000	1,000	0.008	37,000	800	0.008
	7	35,000	750	0.008	35,000	600	0.008
	8	35,000	600	0.006	35,000	480	0.006
	9	30,000	500	0.004	30,000	400	0.004
	10	30,000	500	0.003	30,000	400	0.003
	11	22,000	300	0.002	22,000	240	0.002
	12	22,000	200	0.002	22,000	160	0.002
R 0.4	2	50,000	4,400	0.04	50,000	3,500	0.04
	3	50,000	4,000	0.04	50,000	3,200	0.04
	4	50,000	4,000	0.02	50,000	3,200	0.02
	5	35,000	2,400	0.02	35,000	1,900	0.02
	6	35,000	2,400	0.02	35,000	1,900	0.02
	7	30,000	1,500	0.015	30,000	1,200	0.015
	8	30,000	1,500	0.01	30,000	1,200	0.01
	10	30,000	700	0.008	30,000	560	0.008
	12	22,000	500	0.006	22,000	400	0.006
R 0.5	3	40,000	4,000	0.05	40,000	3,200	0.05
	4	40,000	4,000	0.05	40,000	3,200	0.05
	6	35,000	3,000	0.03	35,000	2,400	0.03
	8	30,000	2,000	0.02	30,000	1,600	0.02
R 0.5	10	20,000	1,000	0.01	20,000	800	0.01
	12	20,000	1,000	0.01	20,000	800	0.01
	14	18,000	600	0.008	18,000	480	0.008
	16	18,000	500	0.008	18,000	400	0.008
	18	13,000	300	0.005	13,000	240	0.005
	20	13,000	250	0.005	13,000	200	0.005
R 0.6	3.6	40,000	4,400	0.06	40,000	3,500	0.06
	6	40,000	4,400	0.04	40,000	3,500	0.04
	8	40,000	4,000	0.04	40,000	3,200	0.04
	10	27,000	1,900	0.02	27,000	1,500	0.02
	12	16,000	1,400	0.02	16,000	1,100	0.02
	18	15,000	700	0.008	15,000	560	0.008
	24	11,000	300	0.006	11,000	240	0.006
R 0.75	6	40,000	6,000	0.07	36,000	4,300	0.07
	8	40,000	6,000	0.07	36,000	4,300	0.07
	10	40,000	5,000	0.06	36,000	3,600	0.06
	12	32,000	3,400	0.04	29,000	2,400	0.04
	16	15,000	1,400	0.03	15,000	1,100	0.03
	20	12,000	900	0.02	12,000	720	0.02
	30	9,000	400	0.01	9,000	320	0.01
R 1	4	40,000	8,000	0.1	32,000	5,000	0.1
	6	40,000	8,000	0.1	32,000	5,000	0.1
	8	40,000	6,000	0.1	32,000	3,800	0.1
	10	40,000	5,000	0.08	32,000	3,200	0.08
	12	40,000	5,000	0.08	32,000	3,200	0.08
	16	32,000	3,500	0.05	26,000	2,200	0.05
	20	10,000	1,000	0.04	10,000	800	0.04
	25	10,000	1,000	0.04	10,000	800	0.04
	30	10,000	800	0.02	10,000	640	0.02
	35	10,000	600	0.02	10,000	480	0.02
R 1.5	8	32,000	7,000	0.15	26,000	4,500	0.15
	10	32,000	7,000	0.15	26,000	4,500	0.15
	16	32,000	5,000	0.1	26,000	3,200	0.1
	20	27,000	3,800	0.1	22,000	2,400	0.1
	25	21,000	2,700	0.08	17,000	1,700	0.08
	30	6,000	700	0.08	6,000	560	0.08
	35	6,000	700	0.06	6,000	560	0.06
	40	6,000	600	0.04	6,000	480	0.04
R 2	10	24,000	6,000	0.2	19,000	3,800	0.2
	20	24,000	3,800	0.15	19,000	2,400	0.15
	30	20,000	3,000	0.1	16,000	1,900	0.1
	40	12,000	1,700	0.1	12,000	1,400	0.1
	50	8,000	1,000	0.05	8,000	800	0.05
R 2.5	20	22,000	6,000	0.2	18,000	3,800	0.2
	25	22,000	4,400	0.2	18,000	2,800	0.2
	30	22,000	3,800	0.15	18,000	2,400	0.15
	35	22,000	3,600	0.1	18,000	2,300	0.1
R 3	30	20,000	6,000	0.2	16,000	3,800	0.2
	50	20,000	3,000	0.15	16,000	1,900	0.15

Depth of cut



R:Radius

1) If the inclination of machining surface, cutting load is big, please reduce the revolution and feed rate proportionately.
2) When using the minimum diameter, we recommend coolant mist.
3) If the depth of cut is shallow, the feed rate can be increased.
4) Please use VF2XLB for work materials of 55 HRC or above.

MS2XB

■ Ball nose, 2 flute, Taper neck

Work material				Alloy steel, Tool steel, Pre-hardened steel (−45HRC) W.Nr. 1.2344(H13), X210Cr12	
R (mm)	Taper angle one side	Neck length (mm)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)
R0.1	30'	1.5	0.005	30,000	300
	30'	2	0.005		
	1°	1.5	0.005		
	1°	2	0.005		
	2°	1.5	0.01		
	2°	2	0.01		
	3°	1.5	0.01		
	3°	2	0.01		
	5°	2	0.01		
R0.15	30'	3	0.005	30,000	300
	1°	3	0.005		
	2°	3	0.01		
	3°	3	0.01		
	5°	3	0.01		
R0.2	30'	2	0.02	30,000	300
	30'	5	0.01		
	1°	2	0.02		
	1°	5	0.01		
	1°	2	0.02		
	2°	5	0.01		
R0.25	30'	3	0.03	30,000	300
	30'	5	0.02		
	1°	3	0.03		
	1°	5	0.02		
	2°	3	0.03		
	2°	5	0.02		
R0.3	30'	5	0.03	30,000	400
	30'	8	0.02		
	1°	5	0.03		
	1°	10	0.02		
	1°	15	0.01		
	2°	6	0.03		
	2°	8	0.02		
R0.4	30'	8	0.05	30,000	500
	30'	12	0.04		
	1°	8	0.05		
	1°	12	0.04		
	2°	8	0.08		
	3°	12	0.06		

Work material				Alloy steel, Tool steel, Pre-hardened steel (−45HRC) W.Nr. 1.2344(H13), X210Cr12	
R (mm)	Taper angle one side	Neck length (mm)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)
R0.5	30'	10	0.05	22,000	530
	30'	20	0.02		
	30'	30	0.005		
	1°	10	0.05		
	1°	20	0.02		
	1°	35	0.005		
	2°	20	0.03		
	3°	40	0.05		
	5°	20	0.05		
R0.6	30'	12	0.05	22,000	600
	30'	24	0.02		
	1°	12	0.05		
	1°	24	0.02		
	2°	12	0.06		
	2°	24	0.03		
R0.75	30'	10	0.1	20,000	700
	30'	30	0.02		
	1°	10	0.1		
	1°	30	0.05		
	2°	30	0.1		
R1	30'	20	0.05	18,000	1,000
	30'	30	0.03		
	30'	40	0.02		
	1°	20	0.05		
	1°	40	0.03		
	1°	50	0.02		
	2°	40	0.1		
	3°	40	0.1		
	5°	38.2	0.1		
R1.5	30'	30	0.1	16,000	1,300
	30'	50	0.03		
	1°	30	0.1		
	1°	50	0.03		
	2°	48.9	0.1		
	3°	50	0.1		
R2	30'	60	0.1	14,000	1,100
	1°	60	0.1		

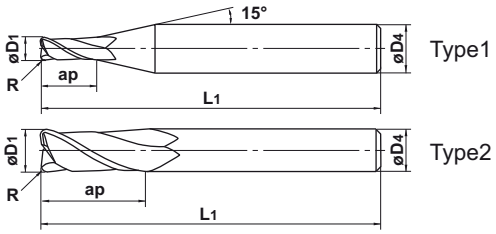
Depth of cut	
	≤0.1R (R>0.5) ≤0.2R (R≥0.5) ap R:Radius

1) Please reduce the cutting depth (especially ap) if chattering and noise are generated, and reduce the feed rate proportionately.
2) When high machining accuracy is needed, we recommend reducing the feed rate.

MS2MRB

Corner radius end mill, Medium cut length, 2 flute

0 – -0.02



UWC MS 30°


D1<3


3≤D1

● 2 flute corner radius end mill for general use.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	Corner R R	No. of Flutes N	Stock	Type
MS2MRBD0100R010	1	2	40	4	0.1	2	●	1
D0100R020	1	2	40	4	0.2	2	●	1
D0100R030	1	2	40	4	0.3	2	●	1
D0150R010	1.5	3	40	4	0.1	2	●	1
D0150R020	1.5	3	40	4	0.2	2	●	1
D0150R030	1.5	3	40	4	0.3	2	●	1
D0150R050	1.5	3	40	4	0.5	2	●	1
D0200R010	2	4	40	4	0.1	2	●	1
D0200R020	2	4	40	4	0.2	2	●	1
D0200R030	2	4	40	4	0.3	2	●	1
D0200R050	2	4	40	4	0.5	2	●	1
D0250R010	2.5	5	40	4	0.1	2	●	1
D0250R020	2.5	5	40	4	0.2	2	●	1
D0250R030	2.5	5	40	4	0.3	2	●	1
D0250R050	2.5	5	40	4	0.5	2	●	1
D0300R010	3	6	50	6	0.1	2	●	1
D0300R020	3	6	50	6	0.2	2	●	1
D0300R030	3	6	50	6	0.3	2	●	1
D0300R050	3	6	50	6	0.5	2	●	1
D0300R100	3	6	50	6	1	2	●	1
D0400R010	4	8	50	6	0.1	2	●	1
D0400R020	4	8	50	6	0.2	2	●	1
D0400R030	4	8	50	6	0.3	2	●	1
D0400R050	4	8	50	6	0.5	2	●	1
D0400R100	4	8	50	6	1	2	●	1
D0500R010	5	10	50	6	0.1	2	●	1
D0500R020	5	10	50	6	0.2	2	●	1
D0500R030	5	10	50	6	0.3	2	●	1
D0500R050	5	10	50	6	0.5	2	●	1
D0500R100	5	10	50	6	1	2	●	1
D0600R010	6	12	50	6	0.1	2	●	2
D0600R020	6	12	50	6	0.2	2	●	2
D0600R030	6	12	50	6	0.3	2	●	2
D0600R050	6	12	50	6	0.5	2	●	2
D0600R100	6	12	50	6	1	2	●	2
D0600R150	6	12	50	6	1.5	2	●	2
D0600R200	6	12	50	6	2	2	●	2
D0800R020	8	16	60	8	0.2	2	●	2

●: Stock standard

Unit : mm

Order Number	Dia. D_1	Length of Cut ap	Overall Length L_1	Shank Dia. D_4	Corner R R	No. of Flutes N	Stock	Type
MS2MRBD0800R030	8	16	60	8	0.3	2	●	2
D0800R050	8	16	60	8	0.5	2	●	2
D0800R100	8	16	60	8	1	2	●	2
D0800R150	8	16	60	8	1.5	2	●	2
D0800R200	8	16	60	8	2	2	●	2
D0800R250	8	16	60	8	2.5	2	●	2
D0800R300	8	16	60	8	3	2	●	2
D1000R020	10	20	70	10	0.2	2	●	2
D1000R030	10	20	70	10	0.3	2	●	2
D1000R050	10	20	70	10	0.5	2	●	2
D1000R100	10	20	70	10	1	2	●	2
D1000R150	10	20	70	10	1.5	2	●	2
D1000R200	10	20	70	10	2	2	●	2
D1000R250	10	20	70	10	2.5	2	●	2
D1000R300	10	20	70	10	3	2	●	2
D1200R020	12	24	75	12	0.2	2	●	2
D1200R030	12	24	75	12	0.3	2	●	2
D1200R050	12	24	75	12	0.5	2	●	2
D1200R100	12	24	75	12	1	2	●	2
D1200R150	12	24	75	12	1.5	2	●	2
D1200R200	12	24	75	12	2	2	●	2
D1200R250	12	24	75	12	2.5	2	●	2
D1200R300	12	24	75	12	3	2	●	2

The diameter tolerance is only applied to items produced after July 2006.

CUTTING CONDITIONS P76

● : Stock standard

MS2MRB

Corner radius end mill, Medium cut length, 2 flute

Work material	Carbon steel, Alloy steel, Tool steel Pre-hardened steel (−45HRC) Ck55, 070M55			Alloy steel, Tool steel (45−55HRC) W.Nr. 1.2344(H13), X20Cr13		
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut ap (mm)
0.1	40,000	40	0.001	40,000	40	0.001
0.2	40,000	100	0.002	40,000	100	0.002
0.3	40,000	200	0.005	40,000	200	0.005
0.4	40,000	600	0.01	40,000	600	0.01
0.5	40,000	1,000	0.015	40,000	960	0.015
0.6	40,000	1,200	0.02	40,000	1,200	0.02
0.7	40,000	1,400	0.02	40,000	1,400	0.02
0.8	40,000	1,600	0.03	40,000	1,600	0.03
0.9	40,000	1,800	0.04	40,000	1,600	0.04
1	40,000	2,000	0.06	32,000	1,600	0.06
1.5	40,000	3,000	0.12	32,000	1,900	0.08
2	30,000	3,000	0.18	24,000	1,900	0.10
2.5	24,000	2,600	0.25	19,000	1,600	0.13
3	20,000	2,300	0.30	16,000	1,400	0.15
4	15,000	2,000	0.40	12,000	1,200	0.20
5	12,000	1,600	0.50	9,000	900	0.25
6	10,000	1,400	0.60	7,000	700	0.30
8	8,000	1,000	0.80	5,600	550	0.40
10	6,400	900	1.00	4,500	500	0.50
12	5,400	820	1.00	3,800	450	0.50
16	2,400	380	≤3	1,200	100	≤0.8
20	1,900	320	≤4	1,000	80	≤1
Depth of cut	≤Please refer to the list above for depth of cut. ≤D			D ≤Please refer to the list above for depth of cut.		

D:Dia.

1) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
2) When slotting with end mills with ϕ3 or larger, reduce the revolution to 50−70% and the feed rate to 40−60%.
3) When drilling, please lower the feed rate by 70%.

Corner radius types

4 flute corner radius end mills

MS4MRB

4 flute MSTAR corner radius end mill

SIZE Ø3 - Ø20

2 flute corner radius end mills

MS2MRB

2 flute MSTAR radius end mill

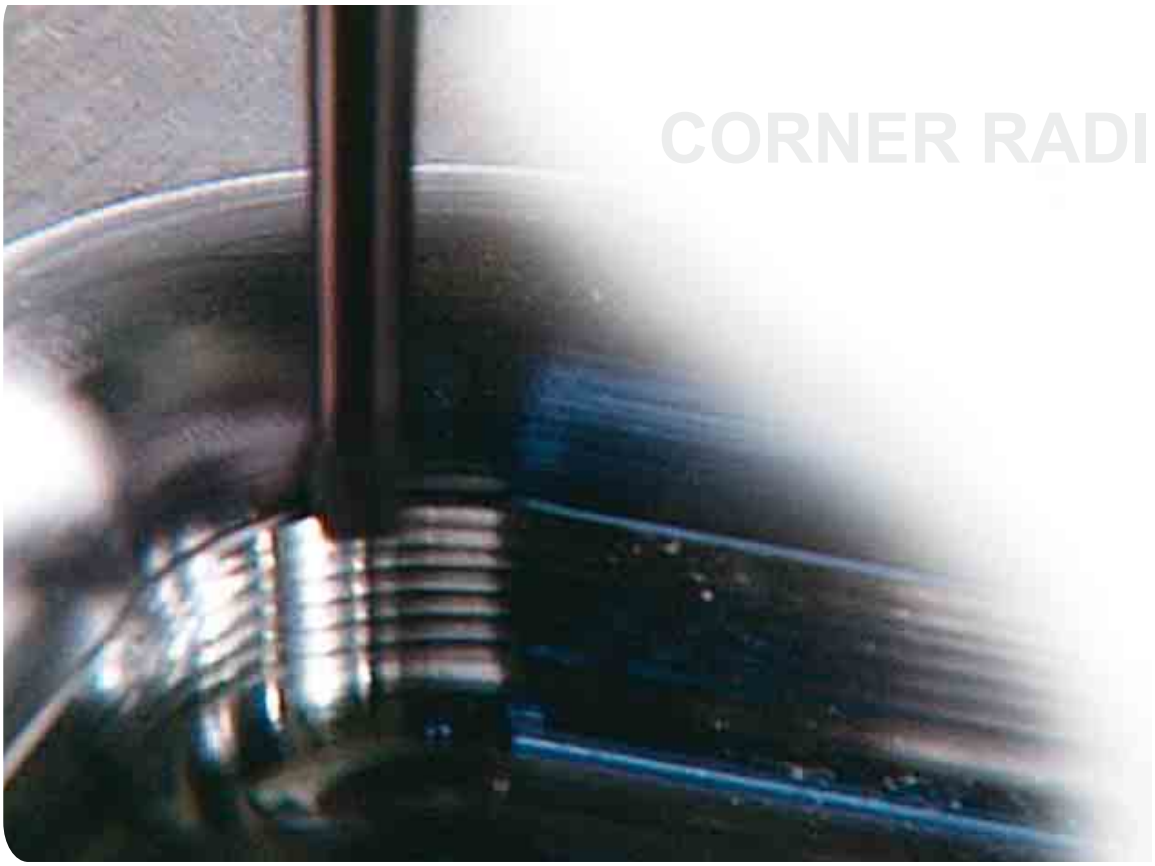
SIZE Ø1 - Ø6

2 flute long neck radius end mill

MS2XLRB

2 flute MSTAR long neck radius end mill

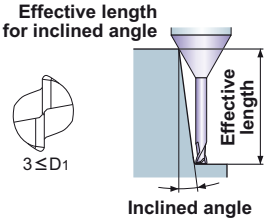
SIZE Ø1 - Ø6

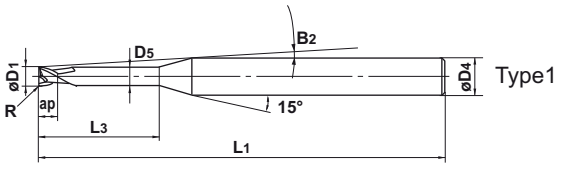


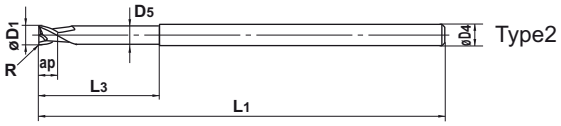
MS2XLRB

Corner radius end mill, Short cut length, 2 flute, Long neck

0 — -0.02







● 2 flute long neck corner radius end mill.

Unit : mm

Order Number	Dia. D1	Corner R R	Length of Cut ap	Neck Length L3	Neck Dia. D5	Cutting Edge to Shank Angle B2	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type	Effective length for inclined angle 30'	1°	2°	3°
MS2XLRBD0100R010N020	1	0.1	1	2	0.94	12.1	60	6	2	●	1	2.5	2.6	2.8	3
D0100R010N050	1	0.1	1	5	0.94	9.7	60	6	2	●	1	5.6	5.8	6.3	6.8
D0200R010N040	2	0.1	2	4	1.9	9.5	60	6	2	●	1	4.7	4.8	5.2	5.6
D0200R010N100	2	0.1	2	10	1.9	6.4	60	6	2	●	1	10.9	11.3	12.1	13.1
D0200R030N040	2	0.3	2	4	1.9	9.7	60	6	2	●	1	4.7	4.8	5.2	5.6
D0200R030N100	2	0.3	2	10	1.9	6.5	60	6	2	●	1	10.9	11.2	12.1	13
D0300R010N060	3	0.1	3	6	2.9	7.1	50	6	2	●	1	6.7	7	7.5	8.1
D0300R010N150	3	0.1	3	15	2.9	4.1	60	6	2	●	1	16.1	16.6	17.9	19.3
D0300R030N060	3	0.3	3	6	2.9	7.2	50	6	2	●	1	6.7	7	7.5	8.1
D0300R030N150	3	0.3	3	15	2.9	4.2	60	6	2	●	1	16	16.6	17.8	19.2
D0400R010N080	4	0.1	4	8	3.9	4.7	50	6	2	●	1	8.8	9.1	9.8	10.6
D0400R010N200	4	0.1	4	20	3.9	2.4	60	6	2	●	1	21.2	22	23.6	No interference
D0400R030N080	4	0.3	4	8	3.9	4.8	50	6	2	●	1	8.8	9.1	9.8	10.5
D0400R030N200	4	0.3	4	20	3.9	2.4	60	6	2	●	1	21.2	21.9	23.6	No interference
D0400R050N080	4	0.5	4	8	3.9	4.9	50	6	2	●	1	8.8	9.1	9.7	10.5
D0400R050N200	4	0.5	4	20	3.9	2.5	60	6	2	●	1	21.2	21.9	23.5	No interference
D0600R010N120	6	0.1	6	12	5.85	—	50	6	2	●	1	No interference	No interference	No interference	No interference
D0600R010N300	6	0.1	6	30	5.85	—	70	6	2	●	1	No interference	No interference	No interference	No interference
D0600R030N120	6	0.3	6	12	5.85	—	50	6	2	●	1	No interference	No interference	No interference	No interference
D0600R030N300	6	0.3	6	30	5.85	—	70	6	2	●	1	No interference	No interference	No interference	No interference
D0600R050N120	6	0.5	6	12	5.85	—	50	6	2	●	2	No interference	No interference	No interference	No interference
D0600R050N300	6	0.5	6	30	5.85	—	70	6	2	●	2	No interference	No interference	No interference	No interference

The diameter tolerance is only applied to items produced after July 2006.

●: Stock standard

MS2XLRB

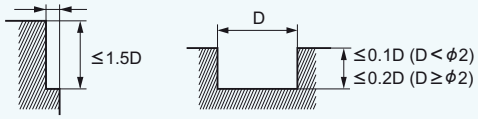
Corner radius end mill, Short cut length, 2 flute, Long neck

Work material			Carbon steel (－30HRC) Ck55, 070M55 Cast iron GG25		Alloy steel, Tool steel Pre-hardened steel (30－45HRC) W.Nr. 1.2344(H13)		Austenitic stainless steel X5CrNi1810 X5CrNiMo17122		Hardened steel (45－55HRC) W.Nr. 1.2344(H13)	
Dia. (mm)	Neck length (mm)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	**2**	(**2D**)	30,000	600	20,000	400	18,000	300	15,000	120
2	**4**		15,000	600	10,000	400	9,100	300	8,000	120
3	**6**		10,000	600	7,000	400	6,000	300	5,000	120
4	**8**		7,500	600	5,200	400	4,500	300	4,000	120
6	**12**		5,000	600	3,500	400	3,000	300	2,700	120
1	**5**	(**5D**)	22,000	350	17,000	280	14,000	200	12,000	100
2	**10**		11,000	350	8,800	280	7,200	200	6,400	100
3	**15**		7,400	350	5,800	280	4,800	200	4,200	100
4	**20**		5,600	350	4,400	280	3,600	200	3,200	100
6	**30**		3,700	350	2,900	280	2,400	200	2,100	100

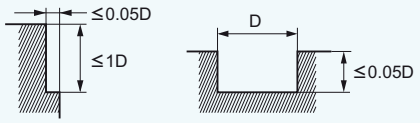
Depth of cut

(Neck length=2D)

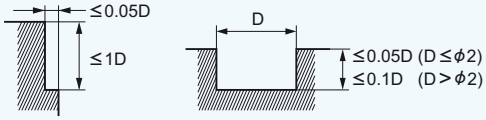
≤0.1D (D≤φ3)
≤0.2D (D＞φ3)



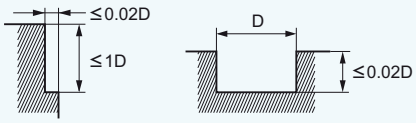
(Neck length=5D)



(Neck length=2D)



(Neck length=5D)



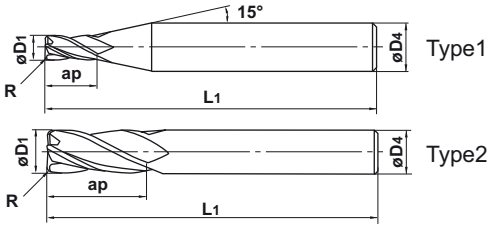
D:Dia.

1) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
2) Please reduce the feed rate when precision is important.
3) Cutting conditions may differ considerably due to the overhang (milling depth), depth of cut, and machine tools. Please use the above table as a start reference point.
4) If the depth of cut is shallow, the revolution and feed rate can be increased.

MS4MRB

Corner radius end mill, Medium cut length, 4 flute

D1≤12 0 − 0.02
12<D1 0 − 0.03



● 4 flute corner radius end mill for general use.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	Corner R R	No. of Flutes N	Stock	Type
MS4MRBD0300R010	3	8	45	6	0.1	4	●	1
D0300R020	3	8	45	6	0.2	4	●	1
D0300R030	3	8	45	6	0.3	4	●	1
D0300R050	3	8	45	6	0.5	4	●	1
D0300R100	3	8	45	6	1	4	●	1
D0400R010	4	11	45	6	0.1	4	●	1
D0400R020	4	11	45	6	0.2	4	●	1
D0400R030	4	11	45	6	0.3	4	●	1
D0400R050	4	11	45	6	0.5	4	●	1
D0400R100	4	11	45	6	1	4	●	1
D0500R010	5	13	50	6	0.1	4	●	1
D0500R020	5	13	50	6	0.2	4	●	1
D0500R030	5	13	50	6	0.3	4	●	1
D0500R050	5	13	50	6	0.5	4	●	1
D0500R100	5	13	50	6	1	4	●	1
D0600R010	6	13	50	6	0.1	4	●	2
D0600R020	6	13	50	6	0.2	4	●	2
D0600R030	6	13	50	6	0.3	4	●	2
D0600R050	6	13	50	6	0.5	4	●	2
D0600R100	6	13	50	6	1	4	●	2
D0600R150	6	13	50	6	1.5	4	●	2
D0600R200	6	13	50	6	2	4	●	2
D0800R020	8	19	60	8	0.2	4	●	2
D0800R030	8	19	60	8	0.3	4	●	2
D0800R050	8	19	60	8	0.5	4	●	2
D0800R100	8	19	60	8	1	4	●	2
D0800R150	8	19	60	8	1.5	4	●	2
D0800R200	8	19	60	8	2	4	●	2
D0800R250	8	19	60	8	2.5	4	●	2
D0800R300	8	19	60	8	3	4	●	2
D1000R020	10	22	70	10	0.2	4	●	2
D1000R030	10	22	70	10	0.3	4	●	2
D1000R050	10	22	70	10	0.5	4	●	2
D1000R100	10	22	70	10	1	4	●	2
D1000R150	10	22	70	10	1.5	4	●	2
D1000R200	10	22	70	10	2	4	●	2
D1000R250	10	22	70	10	2.5	4	●	2
D1000R300	10	22	70	10	3	4	●	2

●: Stock standard

Unit : mm

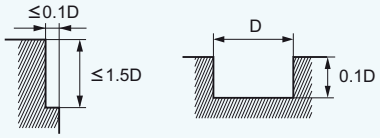
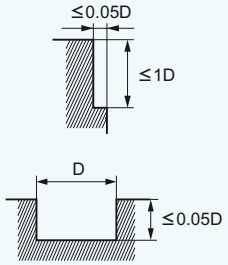
Order Number	Dia. D_1	Length of Cut ap	Overall Length L_1	Shank Dia. D_4	Corner R R	No. of Flutes N	Stock	Type
MS4MRBD1200R020	12	26	75	12	0.2	4	●	2
D1200R030	12	26	75	12	0.3	4	●	2
D1200R050	12	26	75	12	0.5	4	●	2
D1200R100	12	26	75	12	1	4	●	2
D1200R150	12	26	75	12	1.5	4	●	2
D1200R200	12	26	75	12	2	4	●	2
D1200R250	12	26	75	12	2.5	4	●	2
D1200R300	12	26	75	12	3	4	●	2
D1600R050	16	32	90	16	0.5	4	●	2
D1600R100	16	32	90	16	1	4	●	2
D1600R150	16	32	90	16	1.5	4	●	2
D1600R200	16	32	90	16	2	4	●	2
D1600R250	16	32	90	16	2.5	4	●	2
D1600R300	16	32	90	16	3	4	●	2
D2000R050	20	38	100	20	0.5	4	●	2
D2000R100	20	38	100	20	1	4	●	2
D2000R150	20	38	100	20	1.5	4	●	2
D2000R200	20	38	100	20	2	4	●	2
D2000R250	20	38	100	20	2.5	4	●	2
D2000R300	20	38	100	20	3	4	●	2

CUTTING CONDITIONS P82

● : Stock standard

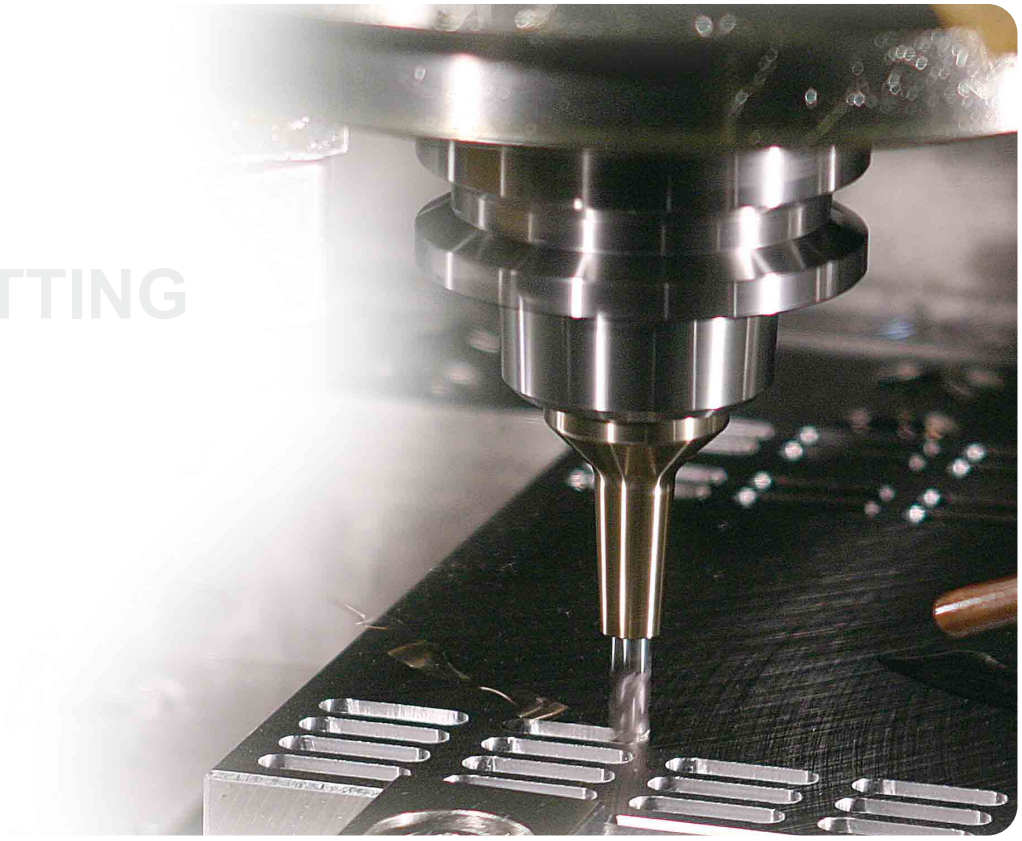
MS4MRB

Corner radius end mill, Medium cut length, 4 flute

Work material	Carbon steel (−30HRC) Ck55, 070M55 Cast iron GG25		Alloy steel, Tool steel Pre-hardened steel (30−45HRC) W.Nr. 1.2344(H13)		Austenitic stainless steel X5CrNi1810 X5CrNiMo17122		Hardened steel (45−55HRC) W.Nr. 1.2344(H13)	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40,000	1,500	30,000	800	22,000	480	24,000	240
1.5	32,000	1,500	20,000	800	15,000	480	16,000	240
2	24,000	1,500	15,000	800	11,000	480	12,000	240
2.5	19,000	1,500	12,000	800	8,800	480	9,600	240
3	16,000	1,500	10,000	800	7,400	480	8,000	240
4	12,000	1,800	8,000	1,000	5,600	600	6,000	240
5	9,600	1,800	6,400	1,000	4,400	600	4,800	240
6	8,000	1,800	5,300	1,000	3,700	600	4,000	240
8	6,000	1,600	4,000	900	2,800	560	3,000	240
10	4,800	1,400	3,200	800	2,200	500	2,400	240
12	4,000	1,200	2,700	700	1,800	430	2,000	230
16	3,000	960	2,000	560	1,400	360	1,500	190
20	2,400	800	1,600	480	1,100	300	1,200	170
Depth of cut								

D:Dia.

1) The above table shows cutting conditions for standard side milling. For slotting, please reduce the feed rate only to 80% of the table figure. Please set the revolution rate at 70% and the feed rate at 60% when slotting austenitic stainless steels.
2) When cutting austenitic stainless steels and wear resistant alloys, the use of non-water-soluble cutting fluid is especially effective.
3) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
4) When drilling, please lower the feed rate by 70%.



Plunging and Slotting

3 flute slotting end mills

MSMHZD

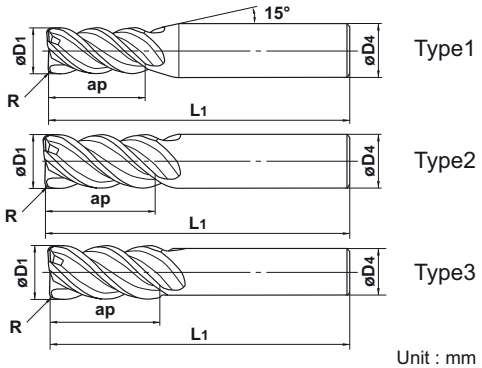
3 flute MSTAR
slotting end mill (M)

SIZE Ø2 - Ø20

MSMHDRB

Corner radius end mill, High power, Medium cut length, 4 flute

D1≤12 0 −-0.02
12<D1 0 −-0.03



● 4 flute high power corner radius end mill.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	Corner R R	No. of Flutes N	Stock	Type
MSMHDRBD0200R020	2	4	45	4	0.2	4	●	1
D0200R030	2	4	45	4	0.3	4	●	1
D0300R020	3	8	45	6	0.2	4	●	1
D0300R030	3	8	45	6	0.3	4	●	1
D0300R050	3	8	45	6	0.5	4	●	1
D0400R020	4	11	45	6	0.2	4	●	1
D0400R030	4	11	45	6	0.3	4	●	1
D0400R050	4	11	45	6	0.5	4	●	1
D0500R020	5	13	50	6	0.2	4	●	1
D0500R030	5	13	50	6	0.3	4	●	1
D0500R050	5	13	50	6	0.5	4	●	1
D0500R100	5	13	50	6	1	4	●	1
D0600R030	6	13	50	6	0.3	4	●	2
D0600R050	6	13	50	6	0.5	4	●	2
D0600R100	6	13	50	6	1	4	●	2
D0800R030	8	19	60	8	0.3	4	●	2
D0800R050	8	19	60	8	0.5	4	●	2
D0800R100	8	19	60	8	1	4	●	2
D0800R150	8	19	60	8	1.5	4	●	2
D1000R030	10	22	70	10	0.3	4	●	2
D1000R050	10	22	70	10	0.5	4	●	2
D1000R100	10	22	70	10	1	4	●	2
D1000R150	10	22	70	10	1.5	4	●	2
D1000R200	10	22	70	10	2	4	●	2
D1200R050S10	12	26	75	10	0.5	4	●	3
D1200R100S10	12	26	75	10	1	4	●	3
D1200R150S10	12	26	75	10	1.5	4	●	3
D1200R200S10	12	26	75	10	2	4	●	3
D1200R300S10	12	26	75	10	3	4	●	3
D1200R050	12	26	75	12	0.5	4	●	2
D1200R100	12	26	75	12	1	4	●	2
D1200R150	12	26	75	12	1.5	4	●	2
D1200R200	12	26	75	12	2	4	●	2
D1200R300	12	26	75	12	3	4	●	2
D1600R100	16	35	90	16	1	4	●	2
D1600R150	16	35	90	16	1.5	4	●	2
D1600R200	16	35	90	16	2	4	●	2
D1600R300	16	35	90	16	3	4	●	2

●: Stock standard

Unit : mm

Order Number	Dia. D_1	Length of Cut ap	Overall Length L_1	Shank Dia. D_4	Corner R R	No. of Flutes N	Stock	Type
MSMHDRBD1800R100	18	40	100	16	1	4	●	3
D1800R150	18	40	100	16	1.5	4	●	3
D1800R200	18	40	100	16	2	4	●	3
D1800R300	18	40	100	16	3	4	●	3
D2000R100	20	45	110	20	1	4	●	2
D2000R150	20	45	110	20	1.5	4	●	2
D2000R200	20	45	110	20	2	4	●	2
D2000R300	20	45	110	20	3	4	●	2

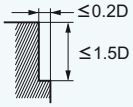
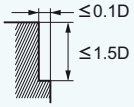
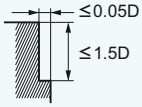
CUTTING CONDITIONS P86

● : Stock standard

MSMHDRB

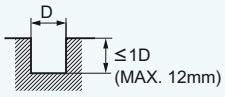
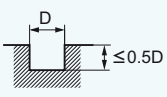
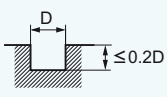
Corner radius end mill, High power, Medium cut length, 4 flute

Side milling

Work material	Structural steel Carbon steel, Alloy steel (−30HRC) Ck55, 070M55 Cast iron GG25		Alloy steel, Tool steel Pre-hardened steel (30−45HRC) W.Nr. 1.2344(H13)		Austenitic stainless steel X5CrNi1810 X5CrNiMo17122		Hardened steel (45−55HRC) W.Nr. 1.2344(H13)	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	15,000	550	10,000	340	10,000	320	6,400	160
3	11,000	800	7,400	500	7,400	480	4,800	250
4	8,000	900	5,600	540	5,600	520	3,600	270
5	6,400	1,000	4,500	600	4,500	580	2,900	300
6	5,900	1,100	3,700	640	3,700	600	2,400	320
8	4,400	1,100	2,800	660	2,800	600	1,800	330
10	3,500	1,000	2,300	640	2,300	560	1,400	320
12	2,900	1,000	1,900	640	1,900	530	1,200	320
16	2,200	800	1,400	500	1,400	450	900	250
18	2,000	800	1,250	480	1,250	450	800	240
20	1,800	750	1,100	460	1,100	440	720	230
Depth of cut								

D:Dia.

Slotting

Work material			Alloy steel, Tool steel Pre-hardened steel (30−45HRC) W.Nr. 1.2344(H13)		Austenitic stainless steel X5CrNi1810 X5CrNiMo17122		Hardened steel (45−55HRC) W.Nr. 1.2344(H13)	
Dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	12,000	400	7,000	200	7,000	100	4,200	80
3	9,000	600	5,300	300	5,300	150	3,200	130
4	7,200	720	4,000	360	4,000	180	2,400	140
5	5,800	720	3,200	360	3,200	180	1,900	150
6	5,000	800	2,700	400	2,700	200	1,600	160
8	3,700	800	2,000	400	2,000	200	1,200	170
10	3,000	720	1,600	360	1,600	180	960	160
12	2,500	600	1,300	290	1,300	150	800	140
16	2,000	480	1,000	230	1,000	120	600	110
18	1,800	460	900	210	900	110	550	110
20	1,600	430	800	200	800	100	480	100
Depth of cut								

D:Dia.

1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
2) If the depth of cut is shallow, the revolution and feed rate can be increased.
3) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and feed rate proportionately, or set the depth of cut smaller.
4) Climb cutting is recommended for side milling.

●: Stock standard

High performance geometry

MULTI FLUTE

● 4/6 flute

MSMHD

4/6 flute MSTAR end mill (M)

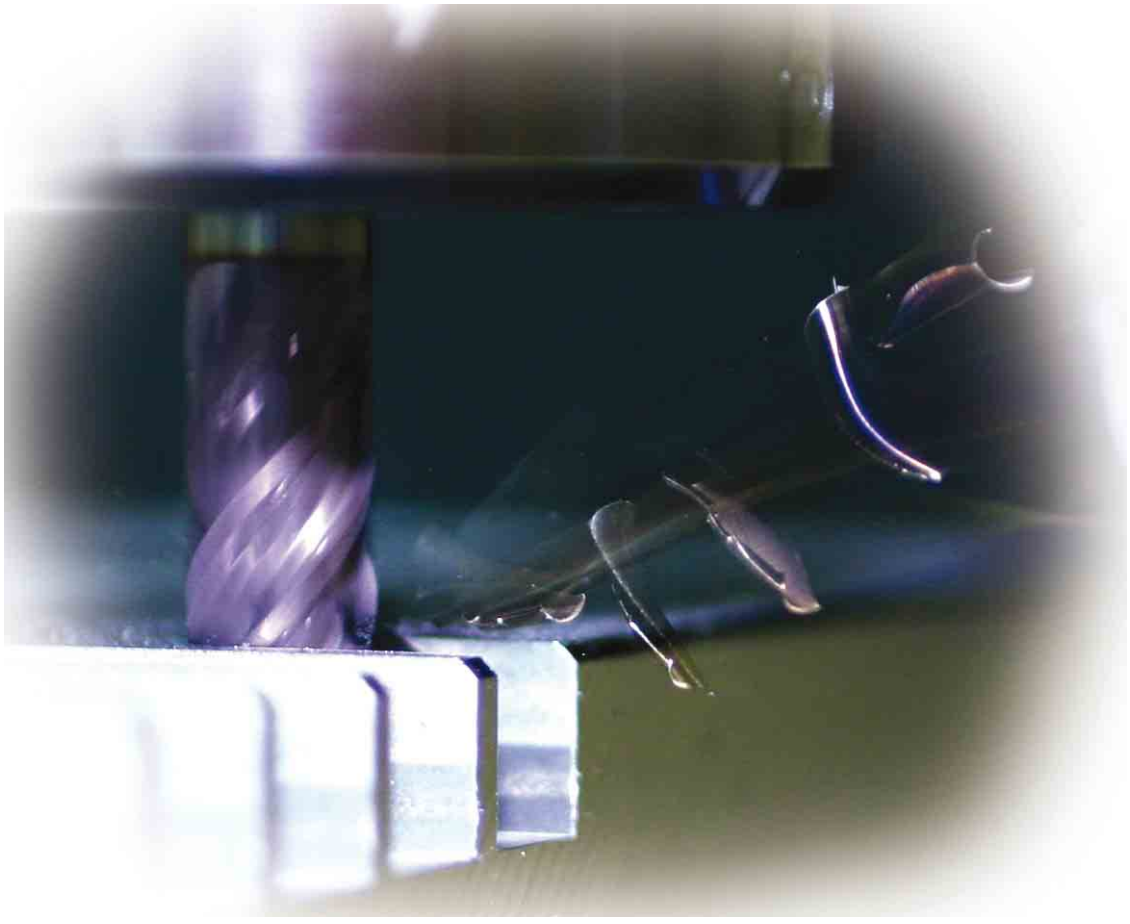
SIZE Ø2 - Ø25

● 6/8 flute

MS6MH...E/MS8MH...E

6/8 flute MSTAR end mill (M)

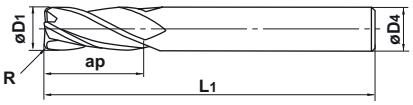
SIZE Ø6 - Ø20



MS4MRB...E

End mill, Medium cut length, 4 flute, Corner radius

D1 = 6 -0.015 — -0.038
6 < D1 ≤ 16 -0.020 — -0.047



- End mill for conventional and high speed milling.
- With corner radius, suitable for 3D profiling.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	Corner R R	No. of Flutes N	Stock	Type
MS4MRBD0600R0025E	6	13	50	6	0.25	4	●	1
D0600R0050E	6	13	50	6	0.5	4	●	1
D0600R0100E	6	13	50	6	1.0	4	●	1
D0800R0025E	8	19	60	8	0.25	4	●	1
D0800R0050E	8	19	60	8	0.5	4	●	1
D0800R0100E	8	19	60	8	1.0	4	●	1
D1000R0025E	10	22	75	10	0.25	4	●	1
D1000R0050E	10	22	75	10	0.5	4	●	1
D1000R0100E	10	22	75	10	1.0	4	●	1
D1200R0100E	12	26	75	12	1.0	4	●	1
D1200R0150E	12	26	75	12	1.5	4	●	1
D1200R0200E	12	26	75	12	2.0	4	●	1
D1600R0150E	16	32	90	16	1.5	4	●	1
D1600R0200E	16	32	90	16	2.0	4	●	1
D1600R0300E	16	32	90	16	3.0	4	●	1

●: Stock standard

MS4MRB...E

End mill, Medium cut length, 4 flute, Corner radius

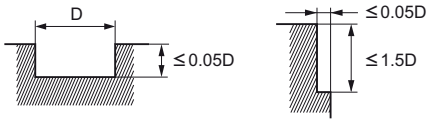
Work material	Carbon steel, Alloy steel (−30HRC) Cast iron		Alloy steel, Tool steel Pre-hardened steel (30−45HRC)		Stainless steel		Hardened steel (45−55HRC)	
Dia (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	40,000	1,200	32,000	960	27,000	675	24,000	270
1.5	30,000	1,350	21,000	900	18,000	675	15,000	270
2	22,500	1,350	15,000	900	13,650	675	12,000	270
3	15,000	1,350	10,500	900	9,000	675	7,500	270
4	11,250	1,350	7,800	900	6,750	675	6,000	270
5	9,000	1,350	6,300	900	5,400	675	4,800	270
6	7,500	1,350	5,250	900	4,500	675	4,050	270
8	6,000	1,170	4,200	780	3,600	585	3,000	240
10	4,800	1,020	3,300	675	2,850	510	2,400	210
12	4,050	1,020	2,850	615	2,400	465	1,950	180
16	3,000	870	2,400	480	1,950	345	1,650	150
Depth of cut	≤0.1D (D≥ϕ3) ≤0.2D (D>ϕ3) ≤1.5D D ≤0.1D (D<ϕ2) ≤0.2D (D≥ϕ2)				≤0.05D ≤1D D ≤0.05D (D≤ϕ2) ≤0.01D (D>ϕ2)			

D:Dia.

Work material	Titanium		High Nickel Inconel	
Dia (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
1	20,000	500	10,000	110
1.5	12,800	400	6,400	110
2	9,500	400	4,800	110
3	6,400	400	3,100	110
4	4,800	480	2,400	110
5	4,000	400	1,900	110
6	3,100	400	1,600	110
8	2,400	300	1,200	100
10	1,900	300	900	80
12	1,600	250	800	80
16	1,200	180	600	60
Depth of cut	≤0.1D (D≤ϕ3) ≤0.2D (D>ϕ3) ≤1.5D D ≤0.1D (D<ϕ2) ≤0.2D (D≥ϕ2)			

D:Dia.

1) When using high efficiency conditions, the surface speeds/feeds can be increased by 2-3 times the above values.



MS2MT

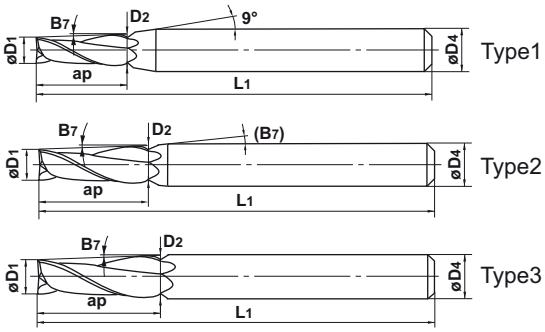
Taper end mill, 2 flute, Medium cut length

D1<0.5 0 − -0.02
0.5≤D1 0 − -0.03

±5'


D1<0.4


0.4≤D1



● 2 flute taper end mill for general use.

Unit : mm

Order Number	Small Mill Dia. D1	Taper Angle One Side B7	Large Mill Dia. D2	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2MTD0020T0030	0.2	30'	0.21	0.8	45	4	2	★	1
D0020T0100	0.2	1°	0.23	0.8	45	4	2	★	1
D0020T0130	0.2	1°30'	0.24	0.8	45	4	2	★	1
D0020T0200	0.2	2°	0.26	0.8	45	4	2	★	1
D0020T0300	0.2	3°	0.28	0.8	45	4	2	★	1
D0020T0400	0.2	4°	0.31	0.8	45	4	2	★	1
D0020T0500	0.2	5°	0.34	0.8	45	4	2	★	1
D0020T0700	0.2	7°	0.4	0.8	45	4	2	★	1
D0020T1000	0.2	10°	0.48	0.8	45	4	2	★	2
D0030T0030	0.3	30'	0.32	1.2	45	4	2	★	1
D0030T0100	0.3	1°	0.34	1.2	45	4	2	★	1
D0030T0130	0.3	1°30'	0.36	1.2	45	4	2	★	1
D0030T0200	0.3	2°	0.38	1.2	45	4	2	★	1
D0030T0300	0.3	3°	0.43	1.2	45	4	2	★	1
D0030T0400	0.3	4°	0.47	1.2	45	4	2	★	1
D0030T0500	0.3	5°	0.51	1.2	45	4	2	★	1
D0030T0700	0.3	7°	0.59	1.2	45	4	2	★	1
D0030T1000	0.3	10°	0.72	1.2	45	4	2	★	2
D0040T0030	0.4	30'	0.43	1.6	45	4	2	★	1
D0040T0100	0.4	1°	0.46	1.6	45	4	2	★	1
D0040T0130	0.4	1°30'	0.48	1.6	45	4	2	★	1
D0040T0200	0.4	2°	0.51	1.6	45	4	2	★	1
D0040T0300	0.4	3°	0.57	1.6	45	4	2	★	1
D0040T0400	0.4	4°	0.62	1.6	45	4	2	★	1
D0040T0500	0.4	5°	0.68	1.6	45	4	2	★	1
D0040T0700	0.4	7°	0.79	1.6	45	4	2	★	1
D0040T1000	0.4	10°	0.96	1.6	45	4	2	★	2
D0050T0030	0.5	30'	0.53	2	45	4	2	★	1
D0050T0100	0.5	1°	0.57	2	45	4	2	★	1
D0050T0130	0.5	1°30'	0.6	2	45	4	2	★	1
D0050T0200	0.5	2°	0.64	2	45	4	2	★	1
D0050T0300	0.5	3°	0.71	2	45	4	2	★	1
D0050T0400	0.5	4°	0.78	2	45	4	2	★	1
D0050T0500	0.5	5°	0.85	2	45	4	2	★	1
D0050T0700	0.5	7°	0.99	2	45	4	2	★	1
D0050T1000	0.5	10°	1.21	2	45	4	2	★	2
D0060T0030	0.6	30'	0.63	2	45	4	2	★	1
D0060T0100	0.6	1°	0.67	2	45	4	2	★	1

★: Stock standard in Japan

Order Number	Small Mill Dia. D_1	Taper Angle One Side B_7	Large Mill Dia. D_2	Length of Cut ap	Overall Length L_1	Shank Dia. D_4	No. of Flutes N	Stock	Type
MS2MTD0060T0130	0.6	1°30'	0.7	2	45	4	2	★	1
D0060T0200	0.6	2°	0.74	2	45	4	2	★	1
D0060T0230	0.6	2°30'	0.77	2	45	4	2	★	1
D0060T0300	0.6	3°	0.81	2	45	4	2	★	1
D0060T0400	0.6	4°	0.88	2	45	4	2	★	1
D0060T0500	0.6	5°	0.95	2	45	4	2	★	1
D0060T0700	0.6	7°	1.09	2	45	4	2	★	1
D0060T1000	0.6	10°	1.31	2	45	4	2	★	2
D0070T0030	0.7	30'	0.73	2	45	4	2	★	1
D0070T0100	0.7	1°	0.77	2	45	4	2	★	1
D0070T0130	0.7	1°30'	0.8	2	45	4	2	★	1
D0070T0200	0.7	2°	0.84	2	45	4	2	★	1
D0070T0300	0.7	3°	0.91	2	45	4	2	★	1
D0070T0400	0.7	4°	0.98	2	45	4	2	★	1
D0070T0500	0.7	5°	1.05	2	45	4	2	★	1
D0070T0700	0.7	7°	1.19	2	45	4	2	★	1
D0070T1000	0.7	10°	1.41	2	45	4	2	★	2
D0080T0030	0.8	30'	0.85	3	45	4	2	★	1
D0080T0100	0.8	1°	0.9	3	45	4	2	★	1
D0080T0130	0.8	1°30'	0.96	3	45	4	2	★	1
D0080T0200	0.8	2°	1.01	3	45	4	2	★	1
D0080T0230	0.8	2°30'	1.06	3	45	4	2	★	1
D0080T0300	0.8	3°	1.11	3	45	4	2	★	1
D0080T0400	0.8	4°	1.22	3	45	4	2	★	1
D0080T0500	0.8	5°	1.32	3	45	4	2	★	1
D0080T0700	0.8	7°	1.54	3	45	4	2	★	1
D0080T1000	0.8	10°	1.86	3	45	4	2	★	2
D0090T0030	0.9	30'	0.95	3	45	4	2	★	1
D0090T0100	0.9	1°	1	3	45	4	2	★	1
D0090T0130	0.9	1°30'	1.06	3	45	4	2	★	1
D0090T0200	0.9	2°	1.11	3	45	4	2	★	1
D0090T0300	0.9	3°	1.21	3	45	4	2	★	1
D0090T0400	0.9	4°	1.32	3	45	4	2	★	1
D0090T0500	0.9	5°	1.42	3	45	4	2	★	1
D0090T0700	0.9	7°	1.64	3	45	4	2	★	1
D0090T1000	0.9	10°	1.96	3	45	4	2	★	2
D0100T0030	1	30'	1.07	4	45	4	2	★	1
D0100T0100	1	1°	1.14	4	45	4	2	★	1
D0100T0130	1	1°30'	1.21	4	45	4	2	★	1
D0100T0200	1	2°	1.28	4	45	4	2	★	1
D0100T0230	1	2°30'	1.35	4	45	4	2	★	1
D0100T0300	1	3°	1.42	4	45	4	2	★	1
D0100T0400	1	4°	1.56	4	45	4	2	★	1
D0100T0500	1	5°	1.7	4	45	4	2	★	1
D0100T0700	1	7°	1.98	4	45	4	2	★	1
D0100T1000	1	10°	2.41	4	45	4	2	★	2
D0150T0030	1.5	30'	1.59	5	45	4	2	★	1
D0150T0100	1.5	1°	1.67	5	45	4	2	★	1
D0150T0130	1.5	1°30'	1.76	5	45	4	2	★	1

★: Stock standard in Japan

CUTTING CONDITIONS P100

MS2MT

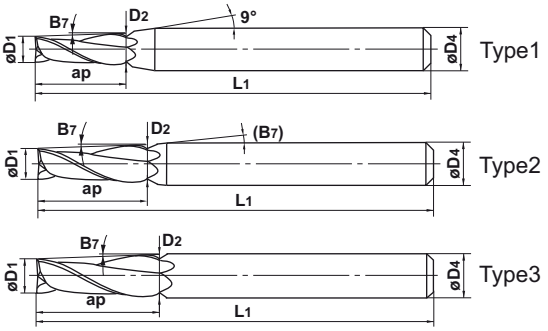
Taper end mill, 2 flute, Medium cut length

D1<0.5 0 — -0.02
0.5≤D1 0 — -0.03

±5'

D1<0.4

0.4≤D1



2 flute taper end mill for general use.

Unit : mm

Order Number	Small Mill Dia. D1	Taper Angle One Side B7	Large Mill Dia. D2	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2MTD0150T0200	1.5	2°	1.85	5	45	4	2	★	1
D0150T0230	1.5	2°30'	1.94	5	45	4	2	★	1
D0150T0300	1.5	3°	2.02	5	45	4	2	★	1
D0150T0400	1.5	4°	2.2	5	45	4	2	★	1
D0150T0500	1.5	5°	2.37	5	45	4	2	★	1
D0150T0700	1.5	7°	2.73	5	45	4	2	★	1
D0150T1000	1.5	10°	3.26	5	45	4	2	★	2
D0200T0030	2	30'	2.1	6	45	4	2	★	1
D0200T0100	2	1°	2.21	6	45	4	2	★	1
D0200T0130	2	1°30'	2.31	6	45	4	2	★	1
D0200T0200	2	2°	2.42	6	45	4	2	★	1
D0200T0230	2	2°30'	2.52	6	45	4	2	★	1
D0200T0300	2	3°	2.63	6	45	4	2	★	1
D0200T0400	2	4°	2.84	6	45	4	2	★	1
D0200T0500	2	5°	3.05	6	45	4	2	★	1
D0200T0700	2	7°	3.47	6	45	4	2	★	2
D0200T1000	2	10°	4.12	6	50	6	2	★	2
D0250T0030	2.5	30'	2.64	8	45	4	2	★	1
D0250T0100	2.5	1°	2.78	8	45	4	2	★	1
D0250T0130	2.5	1°30'	2.92	8	45	4	2	★	1
D0250T0200	2.5	2°	3.06	8	45	4	2	★	1
D0250T0230	2.5	2°30'	3.2	8	45	4	2	★	1
D0250T0300	2.5	3°	3.34	8	45	4	2	★	1
D0250T0400	2.5	4°	3.62	8	45	4	2	★	2
D0250T0500	2.5	5°	3.9	8	45	4	2	★	2
D0250T0700	2.5	7°	4.46	8	50	4	2	★	3
D0250T1000	2.5	10°	5.32	8	50	6	2	★	2
D0300T0030	3	30'	3.17	10	50	6	2	★	1
D0300T0100	3	1°	3.35	10	50	6	2	★	1
D0300T0130	3	1°30'	3.52	10	50	6	2	★	1
D0300T0200	3	2°	3.7	10	50	6	2	★	1
D0300T0300	3	3°	4.05	10	50	6	2	★	1
D0300T0400	3	4°	4.4	10	50	6	2	★	1
D0300T0500	3	5°	4.75	10	50	6	2	★	1
D0300T0700	3	7°	5.46	10	50	6	2	★	2
D0300T1000	3	10°	6.53	10	50	6	2	★	3
D0400T0030	4	30'	4.26	15	50	6	2	★	1

★: Stock standard in Japan

Order Number	Small Mill Dia. D_1	Taper Angle One Side B_7	Large Mill Dia. D_2	Length of Cut ap	Overall Length L_1	Shank Dia. D_4	No. of Flutes N	Stock	Type
MS2MTD0400T0100	4	1°	4.52	15	50	6	2	★	1
D0400T0130	4	1°30'	4.79	15	50	6	2	★	1
D0400T0200	4	2°	5.05	15	50	6	2	★	1
D0400T0300	4	3°	5.57	15	50	6	2	★	1
D0400T0400	4	4°	6.1	15	55	6	2	★	3
D0400T0500	4	5°	6.62	15	55	6	2	★	3
D0400T0700	4	7°	7.68	15	55	6	2	★	3
D0400T1000	4	10°	9.29	15	60	8	2	★	3
D0500T0030	5	30'	5.35	20	55	6	2	★	1
D0500T0100	5	1°	5.7	20	55	6	2	★	1
D0500T0130	5	1°30'	6.05	20	55	6	2	★	3
D0500T0200	5	2°	6.4	20	55	6	2	★	3
D0500T0300	5	3°	7.1	20	55	6	2	★	3
D0500T0400	5	4°	7.8	20	60	6	2	★	3
D0500T0500	5	5°	8.5	20	60	8	2	★	3
D0500T0700	5	7°	9.91	20	70	10	2	★	2
D0500T1000	5	10°	12.05	20	80	12	2	★	3
D0600T0030	6	30'	6.35	20	60	6	2	★	3
D0600T0100	6	1°	6.7	20	60	6	2	★	3
D0600T0130	6	1°30'	7.05	20	60	6	2	★	3
D0600T0200	6	2°	7.4	20	60	6	2	★	3
D0600T0300	6	3°	8.1	20	65	8	2	★	3
D0600T0500	6	5°	9.5	20	70	8	2	★	3
D0800T0030	8	30'	8.44	25	70	8	2	★	3
D0800T0100	8	1°	8.87	25	70	8	2	★	3
D0800T0130	8	1°30'	9.31	25	70	8	2	★	3
D0800T0200	8	2°	9.75	25	70	8	2	★	3
D0800T0300	8	3°	10.62	25	75	10	2	★	3
D0800T0500	8	5°	12.37	25	95	12	2	★	3
D1000T0030	10	30'	10.61	35	90	10	2	★	3
D1000T0100	10	1°	11.22	35	90	10	2	★	3
D1000T0130	10	1°30'	11.83	35	90	10	2	★	3
D1000T0200	10	2°	12.44	35	95	12	2	★	3
D1000T0300	10	3°	13.67	35	95	12	2	★	3
D1000T0500	10	5°	16.12	35	95	16	2	★	3

★: Stock standard in Japan

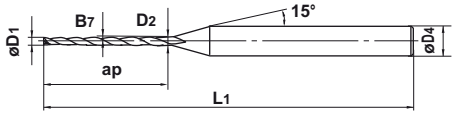
CUTTING CONDITIONS P100

MS4LT

Taper end mill, Long cut length, 4 flute

D1<0.5 0 − -0.02
0.5≤D1 0 − -0.04

±5'



Type1

● 4 flute taper end mill for rib milling.

Unit : mm

Order Number	Small Mill Dia. D1	Taper Angle One Side B7	Large Mill Dia. D2	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4LTD0020T0030L02	0.2	30'	0.23	2	40	3	4	★	1
D0020T0100L02	0.2	1°	0.27	2	40	3	4	★	1
D0020T0130L02	0.2	1°30'	0.3	2	40	3	4	★	1
D0020T0200L02	0.2	2°	0.34	2	40	3	4	★	1
D0030T0030L03	0.3	30'	0.35	3	40	3	4	★	1
D0030T0100L03	0.3	1°	0.4	3	40	3	4	★	1
D0030T0130L03	0.3	1°30'	0.46	3	40	3	4	★	1
D0030T0200L03	0.3	2°	0.51	3	40	3	4	★	1
D0040T0030L04	0.4	30'	0.47	4	40	3	4	★	1
D0040T0100L04	0.4	1°	0.54	4	40	3	4	★	1
D0040T0130L04	0.4	1°30'	0.61	4	40	3	4	★	1
D0040T0200L04	0.4	2°	0.68	4	40	3	4	★	1
D0050T0030L04	0.5	30'	0.57	4	40	3	4	★	1
D0050T0030L06	0.5	30'	0.6	6	40	3	4	★	1
D0050T0100L04	0.5	1°	0.64	4	40	3	4	★	1
D0050T0100L06	0.5	1°	0.71	6	40	3	4	★	1
D0050T0130L04	0.5	1°30'	0.71	4	40	3	4	★	1
D0050T0130L06	0.5	1°30'	0.81	6	40	3	4	★	1
D0050T0200L04	0.5	2°	0.78	4	40	3	4	★	1
D0050T0200L06	0.5	2°	0.92	6	40	3	4	★	1
D0060T0030L04	0.6	30'	0.67	4	40	3	4	★	1
D0060T0030L06	0.6	30'	0.7	6	40	3	4	★	1
D0060T0100L04	0.6	1°	0.74	4	40	3	4	★	1
D0060T0100L06	0.6	1°	0.81	6	40	3	4	★	1
D0060T0130L04	0.6	1°30'	0.81	4	40	3	4	★	1
D0060T0130L06	0.6	1°30'	0.91	6	40	3	4	★	1
D0060T0200L04	0.6	2°	0.88	4	40	3	4	★	1
D0060T0200L06	0.6	2°	1.02	6	40	3	4	★	1
D0070T0030L06	0.7	30'	0.8	6	40	3	4	★	1
D0070T0030L08	0.7	30'	0.84	8	45	3	4	★	1
D0070T0100L06	0.7	1°	0.91	6	40	3	4	★	1
D0070T0100L08	0.7	1°	0.98	8	45	3	4	★	1
D0070T0130L06	0.7	1°30'	1.01	6	40	3	4	★	1
D0070T0130L08	0.7	1°30'	1.12	8	45	3	4	★	1
D0070T0200L06	0.7	2°	1.12	6	40	3	4	★	1
D0070T0200L08	0.7	2°	1.26	8	45	3	4	★	1
D0080T0015L04	0.8	15'	0.83	4	45	4	4	★	1
D0080T0015L06	0.8	15'	0.85	6	45	4	4	★	1

★: Stock standard in Japan

Order Number	Small Mill Dia. D_1	Taper Angle One Side B_7	Large Mill Dia. D_2	Length of Cut ap	Overall Length L_1	Shank Dia. D_4	No. of Flutes N	Stock	Type
MS4LTD0080T0015L08	0.8	15'	0.87	8	45	4	4	★	1
D0080T0015L10	0.8	15'	0.89	10	45	4	4	★	1
D0080T0030L04	0.8	30'	0.87	4	45	4	4	★	1
D0080T0030L06	0.8	30'	0.9	6	45	4	4	★	1
D0080T0030L08	0.8	30'	0.94	8	45	4	4	★	1
D0080T0030L10	0.8	30'	0.97	10	45	4	4	★	1
D0080T0030L12	0.8	30'	1.01	12	50	4	4	★	1
D0080T0100L04	0.8	1°	0.94	4	45	4	4	★	1
D0080T0100L06	0.8	1°	1.01	6	45	4	4	★	1
D0080T0100L08	0.8	1°	1.08	8	45	4	4	★	1
D0080T0100L10	0.8	1°	1.15	10	45	4	4	★	1
D0080T0100L12	0.8	1°	1.22	12	50	4	4	★	1
D0080T0130L04	0.8	1°30'	1.01	4	45	4	4	★	1
D0080T0130L06	0.8	1°30'	1.11	6	45	4	4	★	1
D0080T0130L08	0.8	1°30'	1.22	8	45	4	4	★	1
D0080T0130L10	0.8	1°30'	1.32	10	45	4	4	★	1
D0080T0130L12	0.8	1°30'	1.43	12	50	4	4	★	1
D0080T0200L04	0.8	2°	1.08	4	45	4	4	★	1
D0080T0200L06	0.8	2°	1.22	6	45	4	4	★	1
D0080T0200L08	0.8	2°	1.36	8	45	4	4	★	1
D0080T0200L10	0.8	2°	1.5	10	45	4	4	★	1
D0080T0200L12	0.8	2°	1.64	12	50	4	4	★	1
D0100T0015L06	1	15'	1.05	6	45	4	4	★	1
D0100T0015L08	1	15'	1.07	8	45	4	4	★	1
D0100T0015L10	1	15'	1.09	10	45	4	4	★	1
D0100T0015L12	1	15'	1.1	12	50	4	4	★	1
D0100T0030L06	1	30'	1.1	6	45	4	4	★	1
D0100T0030L08	1	30'	1.14	8	45	4	4	★	1
D0100T0030L10	1	30'	1.17	10	45	4	4	★	1
D0100T0030L12	1	30'	1.21	12	50	4	4	★	1
D0100T0100L06	1	1°	1.21	6	45	4	4	★	1
D0100T0100L08	1	1°	1.28	8	45	4	4	★	1
D0100T0100L10	1	1°	1.35	10	45	4	4	★	1
D0100T0100L12	1	1°	1.42	12	50	4	4	★	1
D0100T0100L16	1	1°	1.56	16	55	4	4	★	1
D0100T0130L06	1	1°30'	1.31	6	45	4	4	★	1
D0100T0130L08	1	1°30'	1.42	8	45	4	4	★	1
D0100T0130L10	1	1°30'	1.52	10	45	4	4	★	1
D0100T0130L12	1	1°30'	1.63	12	50	4	4	★	1
D0100T0130L16	1	1°30'	1.84	16	55	4	4	★	1
D0100T0200L06	1	2°	1.42	6	45	4	4	★	1
D0100T0200L08	1	2°	1.56	8	45	4	4	★	1
D0100T0200L10	1	2°	1.7	10	45	4	4	★	1
D0100T0200L12	1	2°	1.84	12	50	4	4	★	1
D0100T0200L16	1	2°	2.12	16	55	4	4	★	1
D0120T0015L06	1.2	15'	1.25	6	45	4	4	★	1
D0120T0015L10	1.2	15'	1.29	10	45	4	4	★	1
D0120T0015L12	1.2	15'	1.3	12	50	4	4	★	1
D0120T0015L16	1.2	15'	1.34	16	55	4	4	★	1
D0120T0030L06	1.2	30'	1.3	6	45	4	4	★	1

★: Stock standard in Japan

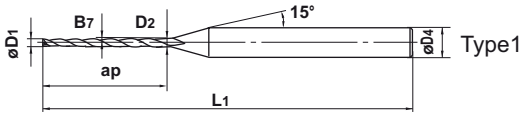
CUTTING CONDITIONS P101

MS4LT

Taper end mill, Long cut length, 4 flute

D1<0.5 0 — -0.02
0.5≤D1 0 — -0.04

±5'



UWC MS 25°


D1<3


3≤D1

● 4 flute taper end mill for rib milling.

Unit : mm

Order Number	Small Mill Dia. D1	Taper Angle One Side B7	Large Mill Dia. D2	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4LTD0120T0030L10	1.2	30'	1.37	10	45	4	4	★	1
D0120T0030L12	1.2	30'	1.41	12	50	4	4	★	1
D0120T0030L16	1.2	30'	1.48	16	55	4	4	★	1
D0120T0100L06	1.2	1°	1.41	6	45	4	4	★	1
D0120T0100L10	1.2	1°	1.55	10	45	4	4	★	1
D0120T0100L12	1.2	1°	1.62	12	50	4	4	★	1
D0120T0100L16	1.2	1°	1.76	16	55	4	4	★	1
D0120T0100L20	1.2	1°	1.9	20	55	4	4	★	1
D0120T0130L06	1.2	1°30'	1.51	6	45	4	4	★	1
D0120T0130L10	1.2	1°30'	1.72	10	45	4	4	★	1
D0120T0130L12	1.2	1°30'	1.83	12	50	4	4	★	1
D0120T0130L16	1.2	1°30'	2.04	16	55	4	4	★	1
D0120T0130L20	1.2	1°30'	2.25	20	55	4	4	★	1
D0120T0200L06	1.2	2°	1.62	6	45	4	4	★	1
D0120T0200L10	1.2	2°	1.9	10	45	4	4	★	1
D0120T0200L12	1.2	2°	2.04	12	50	4	4	★	1
D0120T0200L16	1.2	2°	2.32	16	55	4	4	★	1
D0120T0200L20	1.2	2°	2.6	20	55	4	4	★	1
D0130T0030L12	1.3	30'	1.51	12	50	4	4	★	1
D0130T0100L12	1.3	1°	1.72	12	50	4	4	★	1
D0130T0130L12	1.3	1°30'	1.93	12	50	4	4	★	1
D0130T0200L12	1.3	2°	2.14	12	50	4	4	★	1
D0140T0030L12	1.4	30'	1.61	12	50	4	4	★	1
D0140T0100L12	1.4	1°	1.82	12	50	4	4	★	1
D0140T0130L12	1.4	1°30'	2.03	12	50	4	4	★	1
D0140T0200L12	1.4	2°	2.24	12	50	4	4	★	1
D0150T0015L06	1.5	15'	1.55	6	45	4	4	★	1
D0150T0015L08	1.5	15'	1.57	8	45	4	4	★	1
D0150T0015L10	1.5	15'	1.59	10	45	4	4	★	1
D0150T0015L12	1.5	15'	1.6	12	50	4	4	★	1
D0150T0015L16	1.5	15'	1.64	16	55	4	4	★	1
D0150T0015L20	1.5	15'	1.67	20	55	4	4	★	1
D0150T0030L06	1.5	30'	1.6	6	45	4	4	★	1
D0150T0030L08	1.5	30'	1.64	8	45	4	4	★	1
D0150T0030L10	1.5	30'	1.67	10	45	4	4	★	1
D0150T0030L12	1.5	30'	1.71	12	50	4	4	★	1

★: Stock standard in Japan

Unit : mm

Order Number	Small Mill Dia. D_1	Taper Angle One Side B_7	Large Mill Dia. D_2	Length of Cut ap	Overall Length L_1	Shank Dia. D_4	No. of Flutes N	Stock	Type
MS4LTD0150T0030L16	1.5	30'	1.78	16	55	4	4	★	1
D0150T0030L20	1.5	30'	1.85	20	55	4	4	★	1
D0150T0100L06	1.5	1°	1.71	6	45	4	4	★	1
D0150T0100L08	1.5	1°	1.78	8	45	4	4	★	1
D0150T0100L10	1.5	1°	1.85	10	45	4	4	★	1
D0150T0100L12	1.5	1°	1.92	12	50	4	4	★	1
D0150T0100L16	1.5	1°	2.06	16	55	4	4	★	1
D0150T0100L20	1.5	1°	2.2	20	55	4	4	★	1
D0150T0100L25	1.5	1°	2.37	25	60	4	4	★	1
D0150T0130L06	1.5	1°30'	1.81	6	45	4	4	★	1
D0150T0130L08	1.5	1°30'	1.92	8	45	4	4	★	1
D0150T0130L10	1.5	1°30'	2.02	10	45	4	4	★	1
D0150T0130L12	1.5	1°30'	2.13	12	50	4	4	★	1
D0150T0130L16	1.5	1°30'	2.34	16	55	4	4	★	1
D0150T0130L20	1.5	1°30'	2.55	20	55	4	4	★	1
D0150T0130L25	1.5	1°30'	2.81	25	60	4	4	★	1
D0150T0200L06	1.5	2°	1.92	6	45	4	4	★	1
D0150T0200L08	1.5	2°	2.06	8	45	4	4	★	1
D0150T0200L10	1.5	2°	2.2	10	45	4	4	★	1
D0150T0200L12	1.5	2°	2.34	12	50	4	4	★	1
D0150T0200L16	1.5	2°	2.62	16	55	4	4	★	1
D0150T0200L20	1.5	2°	2.9	20	55	4	4	★	1
D0150T0200L25	1.5	2°	3.25	25	60	4	4	★	1
D0160T0030L08	1.6	30'	1.74	8	45	4	4	★	1
D0160T0030L12	1.6	30'	1.81	12	50	4	4	★	1
D0160T0030L16	1.6	30'	1.88	16	55	4	4	★	1
D0160T0030L20	1.6	30'	1.95	20	55	4	4	★	1
D0160T0100L08	1.6	1°	1.88	8	45	4	4	★	1
D0160T0100L12	1.6	1°	2.02	12	50	4	4	★	1
D0160T0100L16	1.6	1°	2.16	16	55	4	4	★	1
D0160T0100L20	1.6	1°	2.3	20	55	4	4	★	1
D0160T0130L08	1.6	1°30'	2.02	8	45	4	4	★	1
D0160T0130L12	1.6	1°30'	2.23	12	50	4	4	★	1
D0160T0130L16	1.6	1°30'	2.44	16	55	4	4	★	1
D0160T0130L20	1.6	1°30'	2.65	20	55	4	4	★	1
D0160T0200L08	1.6	2°	2.16	8	45	4	4	★	1
D0160T0200L12	1.6	2°	2.44	12	50	4	4	★	1
D0160T0200L16	1.6	2°	2.72	16	55	4	4	★	1
D0160T0200L20	1.6	2°	3	20	55	4	4	★	1
D0180T0015L08	1.8	15'	1.87	8	45	4	4	★	1
D0180T0015L16	1.8	15'	1.94	16	55	4	4	★	1
D0180T0015L24	1.8	15'	2.01	24	60	4	4	★	1
D0180T0030L08	1.8	30'	1.94	8	45	4	4	★	1
D0180T0030L16	1.8	30'	2.08	16	55	4	4	★	1
D0180T0030L24	1.8	30'	2.22	24	60	4	4	★	1
D0180T0100L08	1.8	1°	2.08	8	45	4	4	★	1
D0180T0100L16	1.8	1°	2.36	16	55	4	4	★	1
D0180T0100L24	1.8	1°	2.64	24	60	4	4	★	1
D0180T0130L08	1.8	1°30'	2.22	8	45	4	4	★	1

★: Stock standard in Japan

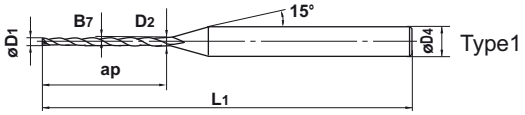
CUTTING CONDITIONS P101

MS4LT

Taper end mill, Long cut length, 4 flute

D1<0.5 0 − -0.02
0.5≤D1 0 − -0.04

±5'



Type1

● 4 flute taper end mill for rib milling.

Unit : mm

Order Number	Small Mill Dia. D1	Taper Angle One Side B7	Large Mill Dia. D2	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4LTD0180T0130L16	1.8	1°30'	2.64	16	55	4	4	★	1
D0180T0130L24	1.8	1°30'	3.06	24	60	4	4	★	1
D0180T0200L08	1.8	2°	2.36	8	45	4	4	★	1
D0180T0200L16	1.8	2°	2.92	16	55	4	4	★	1
D0180T0200L24	1.8	2°	3.48	24	60	4	4	★	1
D0200T0015L08	2	15'	2.07	8	45	4	4	★	1
D0200T0015L10	2	15'	2.09	10	45	4	4	★	1
D0200T0015L12	2	15'	2.1	12	50	4	4	★	1
D0200T0015L16	2	15'	2.14	16	55	4	4	★	1
D0200T0015L20	2	15'	2.17	20	55	4	4	★	1
D0200T0015L25	2	15'	2.22	25	60	4	4	★	1
D0200T0030L08	2	30'	2.14	8	45	4	4	★	1
D0200T0030L10	2	30'	2.17	10	45	4	4	★	1
D0200T0030L12	2	30'	2.21	12	50	4	4	★	1
D0200T0030L16	2	30'	2.28	16	55	4	4	★	1
D0200T0030L20	2	30'	2.35	20	55	4	4	★	1
D0200T0030L25	2	30'	2.44	25	60	4	4	★	1
D0200T0030L30	2	30'	2.52	30	65	4	4	★	1
D0200T0100L08	2	1°	2.28	8	45	4	4	★	1
D0200T0100L10	2	1°	2.35	10	45	4	4	★	1
D0200T0100L12	2	1°	2.42	12	50	4	4	★	1
D0200T0100L16	2	1°	2.56	16	55	4	4	★	1
D0200T0100L20	2	1°	2.7	20	55	4	4	★	1
D0200T0100L25	2	1°	2.87	25	60	4	4	★	1
D0200T0100L30	2	1°	3.05	30	65	4	4	★	1
D0200T0130L08	2	1°30'	2.42	8	45	4	4	★	1
D0200T0130L10	2	1°30'	2.52	10	45	4	4	★	1
D0200T0130L12	2	1°30'	2.63	12	50	4	4	★	1
D0200T0130L16	2	1°30'	2.84	16	55	4	4	★	1
D0200T0130L20	2	1°30'	3.05	20	55	4	4	★	1
D0200T0130L25	2	1°30'	3.31	25	60	4	4	★	1
D0200T0130L30	2	1°30'	3.57	30	65	4	4	★	1
D0200T0200L08	2	2°	2.56	8	45	4	4	★	1
D0200T0200L10	2	2°	2.7	10	45	4	4	★	1
D0200T0200L12	2	2°	2.84	12	50	4	4	★	1
D0200T0200L16	2	2°	3.12	16	55	4	4	★	1
D0200T0200L20	2	2°	3.4	20	55	4	4	★	1

★: Stock standard in Japan

Order Number	Small Mill Dia. D_1	Taper Angle One Side B_7	Large Mill Dia. D_2	Length of Cut ap	Overall Length L_1	Shank Dia. D_4	No. of Flutes N	Stock	Type
MS4LTD0200T0200L25	2	2°	3.75	25	60	4	4	★	1
D0200T0200L30	2	2°	4.1	30	65	6	4	★	1
D0200T0300L12	2	3°	3.26	12	50	4	4	★	1
D0200T0300L16	2	3°	3.68	16	55	4	4	★	1
D0200T0300L20	2	3°	4.1	20	55	6	4	★	1
D0200T0300L25	2	3°	4.62	25	60	6	4	★	1
D0200T0300L30	2	3°	5.14	30	65	6	4	★	1
D0250T0030L10	2.5	30'	2.67	10	45	4	4	★	1
D0250T0030L16	2.5	30'	2.78	16	50	4	4	★	1
D0250T0030L20	2.5	30'	2.85	20	55	4	4	★	1
D0250T0030L25	2.5	30'	2.94	25	60	4	4	★	1
D0250T0030L30	2.5	30'	3.02	30	65	4	4	★	1
D0250T0100L10	2.5	1°	2.85	10	45	4	4	★	1
D0250T0100L16	2.5	1°	3.06	16	50	4	4	★	1
D0250T0100L20	2.5	1°	3.2	20	55	4	4	★	1
D0250T0100L25	2.5	1°	3.37	25	60	4	4	★	1
D0250T0100L30	2.5	1°	3.55	30	65	4	4	★	1
D0250T0130L10	2.5	1°30'	3.02	10	45	4	4	★	1
D0250T0130L16	2.5	1°30'	3.34	16	50	4	4	★	1
D0250T0130L20	2.5	1°30'	3.55	20	55	4	4	★	1
D0250T0130L25	2.5	1°30'	3.81	25	60	4	4	★	1
D0250T0130L30	2.5	1°30'	4.07	30	65	6	4	★	1
D0250T0200L10	2.5	2°	3.2	10	45	4	4	★	1
D0250T0200L16	2.5	2°	3.62	16	50	4	4	★	1
D0250T0200L20	2.5	2°	3.9	20	55	4	4	★	1
D0250T0200L25	2.5	2°	4.25	25	60	6	4	★	1
D0250T0200L30	2.5	2°	4.6	30	65	6	4	★	1
D0300T0030L25	3	30'	3.44	25	65	6	4	★	1
D0300T0030L40	3	30'	3.7	40	80	6	4	★	1
D0300T0100L25	3	1°	3.87	25	65	6	4	★	1
D0300T0100L40	3	1°	4.4	40	80	6	4	★	1
D0300T0130L25	3	1°30'	4.31	25	65	6	4	★	1
D0300T0130L40	3	1°30'	5.09	40	80	6	4	★	1
D0300T0200L25	3	2°	4.75	25	65	6	4	★	1
D0300T0200L40	3	2°	5.79	40	80	6	4	★	1

●: Stock standard
★: Stock standard in Japan
☐: Non stock, produce to order only

CUTTING CONDITIONS P101

MS2MT

Taper end mill, 2 flute, Medium cut length

Slotting

Work material	Carbon steel (−30HRC) Ck55, 070M55 Cast iron GG25			Alloy steel, Tool steel Pre-hardened steel (30−45HRC) W.Nr. 1.2344(H13)			Hardened steel (45−55HRC) W.Nr. 1.2344(H13)		
Small mill dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut (mm)
0.2	40,000	320	0.005	40,000	180	0.004	40,000	100	0.002
0.3	40,000	400	0.006	40,000	220	0.005	35,000	130	0.003
0.4	40,000	450	0.008	40,000	270	0.006	31,000	150	0.004
0.5	37,000	500	0.010	32,000	320	0.008	25,000	160	0.005
0.6	32,000	530	0.013	26,000	340	0.010	21,000	170	0.006
0.7	27,000	560	0.015	23,000	380	0.011	18,000	180	0.007
0.8	24,000	610	0.018	20,000	410	0.013	16,000	210	0.008
0.9	21,000	610	0.020	18,000	450	0.015	14,000	210	0.009
1	19,000	610	0.025	16,000	450	0.020	13,000	210	0.010
1.5	13,000	720	0.040	11,000	540	0.030	8,500	270	0.015
Depth of cut	 Pease refer to the list.								

Side milling

Work material	Carbon steel (−30HRC) Ck55, 070M55 Cast iron GG25		Alloy steel, Tool steel Pre-hardened steel (30−45HRC) W.Nr. 1.2344(H13)		Hardened steel (45−55HRC) W.Nr. 1.2344(H13)	
Small mill dia. (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
2	9,500	720	8,000	540	6,400	300
2.5	7,800	800	6,300	540	5,000	300
3	6,400	800	5,300	540	4,200	300
4	4,800	800	4,000	540	3,200	300
5	3,800	800	3,200	540	2,500	300
6	3,200	800	2,600	540	2,100	300
8	2,400	700	2,000	480	1,600	270
10	1,900	600	1,600	410	1,300	240
Depth of cut	≤0.05D  ≤2.5D				≤0.03D  ≤2.5D D:End point diameter	

1) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately. Please reduce the feed rate when the surface finish is important.
2) Cutting conditions may differ considerably due to the taper angle, depth of cut and machine tool condition. Please use the above table as a start reference point.
3) When slotting, please use cutting fluid.

MS4LT

Taper end mill, Long cut length, 4 flute

Work material		Carbon steel, Alloy steel, Pre-hardened steel Ck55, 070M55, SK, W.Nr. 1.2344(H13), X20Cr13 (−45HRC)			Hardened steel X20Cr13, W.Nr. 1.2344(H13) (45−52HRC)		
Small mill dia. (mm)	Length of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut per pass ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut per pass ap (mm)
0.2	**2**	20,000−40,000	200−500	0.001	20,000−40,000	150−300	0.001
0.3	**3**	20,000−40,000	200−500	0.002	20,000−40,000	150−300	0.001
0.4	**4**	20,000−40,000	200−500	0.003	20,000−36,000	150−300	0.002
0.5	**4**	20,000−38,000	200−500	0.01	16,000−29,000	200−400	0.005
	6			0.005			0.003
0.6	**4**	18,000−32,000	250−600	0.01	13,000−24,000	200−400	0.005
	6			0.007			0.004
0.7	**6**	16,000−27,000	250−600	0.015	11,000−20,000	200−400	0.008
	8			0.01			0.005
0.8	**4**	14,000−24,000	250−600	0.03	10,000−18,000	200−400	0.015
	8			0.02			0.01
	12			0.013			0.007
1.0	**6**	11,000−19,000	300−800	0.03	8,000−14,000	200−500	0.015
	10			0.02			0.01
	16			0.015			0.008
1.2	**6**	9,200−16,000	300−800	0.04	6,600−12,000	200−500	0.02
	10			0.03			0.015
	16			0.02			0.01
	20			0.01			0.007
1.3	**12**	8,500−15,000	300−800	0.03	6,100−11,000	200−500	0.015
1.4	**12**	8,000−14,000	300−800	0.035	5,700−10,000	200−500	0.018
1.5	**6**	7,500−13,000	300−800	0.06	5,300−9,500	200−500	0.03
	10			0.04			0.02
	16			0.03			0.015
	25			0.015			0.008
1.6	**8**	7,000−12,000	300−800	0.06	5,000−9,000	200−500	0.03
	12			0.045			0.025
	16			0.035			0.02
	20			0.025			0.015
1.8	**8**	6,200−11,000	300−800	0.08	4,400−8,000	200−500	0.04
	16			0.05			0.03
	24			0.03			0.015
2.0	**8**	5,500−9,500	300−800	0.1	4,000−7,200	200−500	0.05
	12			0.07			0.04
	20			0.04			0.02
	30			0.02			0.01
2.5	**10**	4,400−7,600	300−800	0.1	3,200−5,700	200−500	0.05
	20			0.06			0.03
	30			0.03			0.015
3.0	**25**	3,700−6,400	300−800	0.08	2,700−4,800	200−500	0.04
	40			0.04			0.02

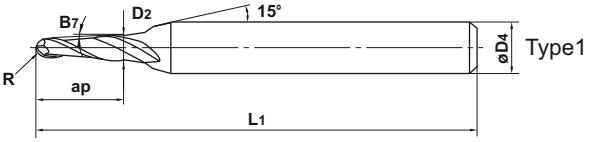
1) The above table shows the revolution and feed rate for each neck length. Please reduce the feed rate when using end mills with a longer neck length.
2) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately. Please reduce the feed rate when the surface finish is important.

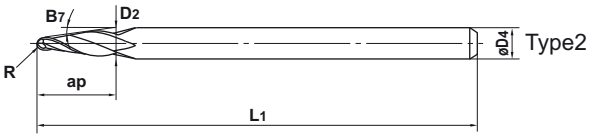
MS2MTB

Ball nose taper, Long cut length, 2 flute

R ±0.01

±5'





UWC MS 30°

● 2 flute taper ball nose end mill.

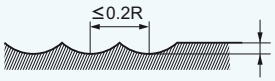
Unit : mm

Order Number	Radius of Ball Nose R	Taper Angle One Side B7	Large Mill Dia. D2	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS2MTBR0020T0300	0.2	3°	0.69	3	40	4	2	★	1
R0020T0500	0.2	5°	0.89	3	40	4	2	★	1
R0020T0700	0.2	7°	1.09	3	40	4	2	★	1
R0020T1000	0.2	10°	1.39	3	40	4	2	★	1
R0030T0300	0.3	3°	0.88	3	40	4	2	★	1
R0030T0500	0.3	5°	1.07	3	40	4	2	★	1
R0030T0700	0.3	7°	1.27	3	40	4	2	★	1
R0030T1000	0.3	10°	1.56	3	40	4	2	★	1
R0050T0030	0.5	30'	1.04	3	40	4	2	★	1
R0050T0100	0.5	1°	1.09	3	40	4	2	★	1
R0050T0130	0.5	1°30'	1.13	3	40	4	2	★	1
R0050T0200	0.5	2°	1.18	3	40	4	2	★	1
R0050T0300	0.5	3°	1.26	3	40	4	2	★	1
R0050T0500	0.5	5°	1.44	3	40	4	2	★	1
R0050T0700	0.5	7°	2.36	6	45	4	2	★	1
R0075T0030	0.75	30'	1.59	6	40	4	2	★	1
R0075T0100	0.75	1°	1.68	6	40	4	2	★	1
R0075T0130	0.75	1°30'	1.78	6	40	4	2	★	1
R0075T0200	0.75	2°	1.87	6	40	4	2	★	1
R0075T0300	0.75	3°	2.05	6	40	4	2	★	1
R0075T0700	0.75	7°	2.8	6	40	4	2	★	1
R0100T0030	1	30'	2.12	8	45	4	2	★	1
R0100T0100	1	1°	2.24	8	45	4	2	★	1
R0100T0130	1	1°30'	2.37	8	45	4	2	★	1
R0100T0200	1	2°	2.49	8	45	4	2	★	1
R0100T0300	1	3°	2.74	8	45	4	2	★	1
R0100T0400	1	4°	2.98	8	45	4	2	★	1
R0100T0500	1	5°	3.23	8	45	4	2	★	1
R0100T0700	1	7°	3.73	8	50	6	2	★	1
R0125T0030	1.25	30'	2.65	10	45	4	2	★	1
R0125T0100	1.25	1°	2.81	10	45	4	2	★	1
R0125T0130	1.25	1°30'	2.96	10	45	4	2	★	1
R0125T0200	1.25	2°	3.11	10	45	4	2	★	1
R0125T0300	1.25	3°	3.42	10	45	4	2	★	1
R0125T0400	1.25	4°	3.73	10	50	6	2	★	1
R0125T0500	1.25	5°	4.04	10	50	6	2	★	1
R0125T0700	1.25	7°	5.77	14.5	60	6	2	★	2
R0150T0700	1.5	7°	5.72	12.5	60	6	2	★	2

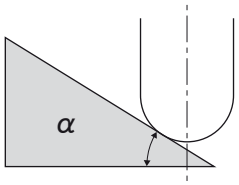
★: Stock standard in Japan

MS2MTB

Ball nose taper, Long cut length, 2 flute

Work material	Alloy steel, Tool steel, Pre-hardened steel (−45HRC) 070M55, W.Nr. 1.2344(H13), X210Cr12					Hardened steel (45−55HRC) W.Nr. 1.2344(H13)				
R (mm)	α≤15°		α>15°		Depth of cut ap (mm)	α≤15°		α>15°		Depth of cut ap (mm)
	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	
R 0.1	40,000	300	40,000	250	0.003	40,000	300	40,000	250	0.003
R 0.15	40,000	500	40,000	350	0.007	40,000	500	40,000	350	0.007
R 0.2	40,000	1,600	40,000	1,200	0.02	40,000	1,300	40,000	950	0.015
R 0.25	40,000	2,400	40,000	1,400	0.025	40,000	1,900	40,000	1,100	0.020
R 0.3	40,000	3,200	40,000	1,600	0.03	40,000	2,500	40,000	1,300	0.025
R 0.4	40,000	4,800	40,000	2,400	0.05	40,000	4,000	40,000	1,900	0.04
R 0.5	40,000	5,600	40,000	3,200	0.06	40,000	5,600	40,000	3,000	0.05
R 0.75	40,000	6,500	40,000	4,000	0.09	40,000	6,500	32,000	3,200	0.08
R 1	40,000	6,500	39,000	4,700	0.11	40,000	6,500	31,000	3,500	0.11
R 1.25	40,000	7,000	33,000	4,500	0.12	36,000	6,500	26,000	3,500	0.12
R 1.5	40,000	7,500	27,000	4,300	0.13	32,000	6,000	22,000	3,400	0.13
R 2	32,000	7,500	20,000	3,600	0.15	25,000	6,000	16,000	2,700	0.15
R 2.5	25,000	6,000	16,000	2,900	0.20	20,000	5,400	13,000	2,300	0.20
R 3	21,000	5,800	13,000	2,600	0.25	17,000	4,700	10,000	2,000	0.25
R 4	16,000	4,500	10,000	2,000	0.30	13,000	3,600	8,000	1,500	0.30
R 5	13,000	3,600	8,000	1,700	0.50	10,000	2,900	6,400	1,200	0.50
R 6	9,000	2,500	6,000	1,300	0.50	7,200	2,000	4,800	1,000	0.50
Depth of cut	Please select a pick feed based on the required surface finishes in reference to “Pitch Selection of Pick Feed” on page G023.  ≤Please refer to the list above for depth of cut. R:Radius									

1) α is the inclination of machining surface.
2) If the rigidity of the machine or the workpiece installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately. When high machining accuracy is needed, we recommend lowering the feed rate.
3) Cutting conditions may differ considerably due to the overhang (milling depth and neck length), depth of cut, and machine tool condition. Please use the above table as a standard starting point.
4) If the depth of cut is shallow, the revolution and feed rate can be increased.

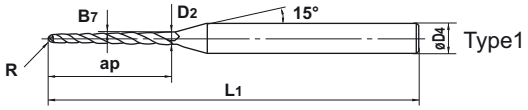


MS4LTB

Ball nose, 4 flute, Taper, For rib milling

R ±0.03

±5'



UWC MS 20°

● 4 flute taper ball nose end mill for rib milling.

Unit : mm

Order Number	Radius of Ball Nose R	Taper Angle One Side B7	Large Mill Dia. D2	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4LTBR0030T0030L04	0.3	30'	0.66	4	45	4	4	★	1
R0030T0030L06	0.3	30'	0.70	6	45	4	4	★	1
R0030T0100L04	0.3	1°	0.73	4	45	4	4	★	1
R0030T0100L06	0.3	1°	0.80	6	45	4	4	★	1
R0030T0130L04	0.3	1°30'	0.79	4	45	4	4	★	1
R0030T0130L06	0.3	1°30'	0.90	6	45	4	4	★	1
R0030T0200L04	0.3	2°	0.86	4	45	4	4	★	1
R0030T0200L06	0.3	2°	1.00	6	45	4	4	★	1
R0040T0030L06	0.4	30'	0.90	6	50	4	4	★	1
R0040T0030L08	0.4	30'	0.93	8	50	4	4	★	1
R0040T0030L10	0.4	30'	0.97	10	50	4	4	★	1
R0040T0100L06	0.4	1°	1.00	6	50	4	4	★	1
R0040T0100L08	0.4	1°	1.07	8	50	4	4	★	1
R0040T0100L10	0.4	1°	1.14	10	50	4	4	★	1
R0040T0130L06	0.4	1°30'	1.09	6	50	4	4	★	1
R0040T0130L08	0.4	1°30'	1.20	8	50	4	4	★	1
R0040T0130L10	0.4	1°30'	1.30	10	50	4	4	★	1
R0040T0200L06	0.4	2°	1.19	6	50	4	4	★	1
R0040T0200L08	0.4	2°	1.33	8	50	4	4	★	1
R0040T0200L10	0.4	2°	1.47	10	50	4	4	★	1
R0050T0030L08	0.5	30'	1.13	8	50	4	4	★	1
R0050T0030L10	0.5	30'	1.17	10	50	4	4	★	1
R0050T0030L12	0.5	30'	1.20	12	50	4	4	★	1
R0050T0030L16	0.5	30'	1.27	16	55	4	4	★	1
R0050T0100L08	0.5	1°	1.26	8	50	4	4	★	1
R0050T0100L10	0.5	1°	1.33	10	50	4	4	★	1
R0050T0100L12	0.5	1°	1.40	12	50	4	4	★	1
R0050T0100L16	0.5	1°	1.54	16	55	4	4	★	1
R0050T0130L08	0.5	1°30'	1.39	8	50	4	4	★	1
R0050T0130L10	0.5	1°30'	1.50	10	50	4	4	★	1
R0050T0130L12	0.5	1°30'	1.60	12	50	4	4	★	1
R0050T0130L16	0.5	1°30'	1.81	16	55	4	4	★	1
R0050T0200L08	0.5	2°	1.52	8	50	4	4	★	1
R0050T0200L10	0.5	2°	1.66	10	50	4	4	★	1
R0050T0200L12	0.5	2°	1.80	12	50	4	4	★	1
R0050T0200L16	0.5	2°	2.08	16	55	4	4	★	1
R0060T0030L08	0.6	30'	1.33	8	50	4	4	★	1
R0060T0030L10	0.6	30'	1.36	10	50	4	4	★	1

★: Stock standard in Japan

Order Number	Radius of Ball Nose R	Taper Angle One Side B_7	Large Mill Dia. D_2	Length of Cut ap	Overall Length L_1	Shank Dia. D_4	No. of Flutes N	Stock	Type
MS4LTBR0060T0030L12	0.6	30'	1.40	12	50	4	4	★	1
R0060T0030L16	0.6	30'	1.47	16	55	4	4	★	1
R0060T0100L08	0.6	1°	1.46	8	50	4	4	★	1
R0060T0100L10	0.6	1°	1.53	10	50	4	4	★	1
R0060T0100L12	0.6	1°	1.60	12	50	4	4	★	1
R0060T0100L16	0.6	1°	1.74	16	55	4	4	★	1
R0060T0130L08	0.6	1°30'	1.59	8	50	4	4	★	1
R0060T0130L10	0.6	1°30'	1.69	10	50	4	4	★	1
R0060T0130L12	0.6	1°30'	1.80	12	50	4	4	★	1
R0060T0130L16	0.6	1°30'	2.01	16	55	4	4	★	1
R0060T0200L08	0.6	2°	1.72	8	50	4	4	★	1
R0060T0200L10	0.6	2°	1.86	10	50	4	4	★	1
R0060T0200L12	0.6	2°	2.00	12	50	4	4	★	1
R0060T0200L16	0.6	2°	2.28	16	55	4	4	★	1
R0075T0030L08	0.75	30'	1.63	8	50	4	4	★	1
R0075T0030L10	0.75	30'	1.66	10	50	4	4	★	1
R0075T0030L12	0.75	30'	1.70	12	50	4	4	★	1
R0075T0030L16	0.75	30'	1.77	16	55	4	4	★	1
R0075T0030L20	0.75	30'	1.84	20	60	4	4	★	1
R0075T0100L08	0.75	1°	1.75	8	50	4	4	★	1
R0075T0100L10	0.75	1°	1.82	10	50	4	4	★	1
R0075T0100L12	0.75	1°	1.89	12	50	4	4	★	1
R0075T0100L16	0.75	1°	2.03	16	55	4	4	★	1
R0075T0100L20	0.75	1°	2.17	20	60	4	4	★	1
R0075T0130L08	0.75	1°30'	1.88	8	50	4	4	★	1
R0075T0130L10	0.75	1°30'	1.98	10	50	4	4	★	1
R0075T0130L12	0.75	1°30'	2.09	12	50	4	4	★	1
R0075T0130L16	0.75	1°30'	2.30	16	55	4	4	★	1
R0075T0130L20	0.75	1°30'	2.51	20	60	4	4	★	1
R0075T0200L08	0.75	2°	2.01	8	50	4	4	★	1
R0075T0200L10	0.75	2°	2.15	10	50	4	4	★	1
R0075T0200L12	0.75	2°	2.29	12	50	4	4	★	1
R0075T0200L16	0.75	2°	2.57	16	55	4	4	★	1
R0075T0200L20	0.75	2°	2.84	20	60	4	4	★	1
R0090T0030L08	0.9	30'	1.92	8	50	4	4	★	1
R0090T0030L10	0.9	30'	1.96	10	50	4	4	★	1
R0090T0030L12	0.9	30'	1.99	12	50	4	4	★	1
R0090T0030L16	0.9	30'	2.06	16	55	4	4	★	1

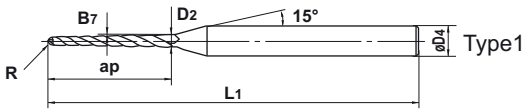
★: Stock standard in Japan

CUTTING CONDITIONS P107

MS4LTB

Ball nose, 4 flute, Taper, For rib milling

±0.03 ±5'



UWC MS 20°

● 4 flute taper ball nose end mill for rib milling.

Unit : mm

Order Number	Radius of Ball Nose R	Taper Angle One Side B7	Large Mill Dia. D2	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MS4LTBR0090T0030L20	0.9	30'	2.13	20	60	4	4	★	1
R0090T0100L08	0.9	1°	2.05	8	50	4	4	★	1
R0090T0100L10	0.9	1°	2.12	10	50	4	4	★	1
R0090T0100L12	0.9	1°	2.19	12	50	4	4	★	1
R0090T0100L16	0.9	1°	2.33	16	55	4	4	★	1
R0090T0100L20	0.9	1°	2.47	20	60	4	4	★	1
R0090T0130L08	0.9	1°30'	2.17	8	50	4	4	★	1
R0090T0130L10	0.9	1°30'	2.28	10	50	4	4	★	1
R0090T0130L12	0.9	1°30'	2.38	12	50	4	4	★	1
R0090T0130L16	0.9	1°30'	2.59	16	55	4	4	★	1
R0090T0130L20	0.9	1°30'	2.80	20	60	4	4	★	1
R0090T0200L08	0.9	2°	2.30	8	50	4	4	★	1
R0090T0200L10	0.9	2°	2.44	10	50	4	4	★	1
R0090T0200L12	0.9	2°	2.58	12	50	4	4	★	1
R0090T0200L16	0.9	2°	2.86	16	55	4	4	★	1
R0090T0200L20	0.9	2°	3.13	20	60	4	4	★	1
R0100T0030L10	1	30'	2.16	10	50	4	4	★	1
R0100T0030L12	1	30'	2.19	12	50	4	4	★	1
R0100T0030L16	1	30'	2.26	16	55	4	4	★	1
R0100T0030L20	1	30'	2.33	20	60	4	4	★	1
R0100T0030L25	1	30'	2.42	25	65	4	4	★	1
R0100T0030L30	1	30'	2.51	30	65	4	4	★	1
R0100T0100L10	1	1°	2.31	10	50	4	4	★	1
R0100T0100L12	1	1°	2.38	12	50	4	4	★	1
R0100T0100L16	1	1°	2.52	16	55	4	4	★	1
R0100T0100L20	1	1°	2.66	20	60	4	4	★	1
R0100T0100L25	1	1°	2.84	25	65	4	4	★	1
R0100T0100L30	1	1°	3.01	30	65	4	4	★	1
R0100T0130L10	1	1°30'	2.47	10	50	4	4	★	1
R0100T0130L12	1	1°30'	2.58	12	50	4	4	★	1
R0100T0130L16	1	1°30'	2.79	16	55	4	4	★	1
R0100T0130L20	1	1°30'	3.00	20	60	4	4	★	1
R0100T0130L25	1	1°30'	3.26	25	65	6	4	★	1
R0100T0130L30	1	1°30'	3.52	30	65	6	4	★	1
R0100T0200L10	1	2°	2.63	10	50	4	4	★	1
R0100T0200L12	1	2°	2.77	12	50	4	4	★	1
R0100T0200L16	1	2°	3.05	16	55	4	4	★	1
R0100T0200L20	1	2°	3.33	20	60	4	4	★	1
R0100T0200L25	1	2°	3.68	25	65	6	4	★	1
R0100T0200L30	1	2°	4.03	30	65	6	4	★	1

MS4LTB

Ball nose, 4 flute, Taper, For rib milling

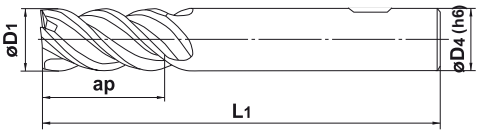
Work material		Carbon steel, Alloy steel, Pre-hardened steel Ck55, 070M55, SK, W.Nr. 1.2344(H13), X20Cr13 (−45HRC)			Hardened steel X20Cr13, W.Nr. 1.2344(H13) (45−52HRC)		
R (mm)	Length of cut (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut per pass ap (mm)	Revolution (min^{-1})	Feed rate (mm/min)	Depth of cut per pass ap (mm)
R0.3	**4**	18,000−32,000	250−600	0.01	13,000−24,000	200−400	0.005
	6			0.007			0.004
R0.4	**6**	14,000−24,000	250−600	0.025	10,000−18,000	200−400	0.013
	8			0.02			0.01
	10			0.015			0.008
R0.5	**8**	11,000−19,000	300−800	0.025	8,000−14,000	200−500	0.013
	10			0.02			0.01
	12			0.018			0.009
	16			0.015			0.008
R0.6	**8**	9,200−16,000	300−800	0.035	6,600−12,000	200−500	0.018
	10			0.03			0.015
	12			0.027			0.013
	16			0.02			0.01
R0.75	**8**	7,500−13,000	300−800	0.05	5,300−9,500	200−500	0.025
	10			0.04			0.02
	12			0.035			0.018
	16			0.03			0.015
	20			0.02			0.01
R0.9	**8**	6,200−11,000	300−800	0.08	4,400−8,000	200−500	0.04
	10			0.07			0.035
	12			0.06			0.035
	16			0.05			0.03
	20			0.04			0.02
R1	**10**	5,500−9,500	300−800	0.08	4,000−7,200	200−500	0.045
	12			0.07			0.04
	16			0.05			0.03
	20			0.04			0.02
	25			0.03			0.015
	30			0.02			0.01

1) The above table shows the revolution and feed rate for each neck length. Please reduce the feed rate when using end mills with a longer neck length.
2) If the rigidity of the machine or the workpiece installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately. Please reduce the feed rate when the surface finish is important.

MSMHV...E

4 flute, Variable Helix, Medium length, Weldon shank

D1≤12	0 −-0.02	4≤D4≤6	0 −-0.008
D1>12	0 −-0.03	8≤D4≤10	0 −-0.009
		12≤D4≤16	0 −-0.011
		20≤D4≤25	0 −-0.013



Type1

UWC MS 42° 45°

● 4 flute variable helix end mill

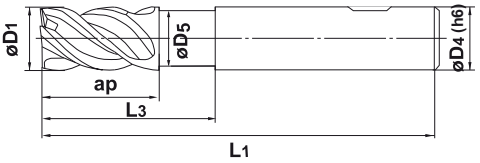
Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MSMHVD0600WE	6	13	50	6	4	●	1
MSMHVD0800WE	8	19	60	8	4	●	1
MSMHVD1000WE	10	22	70	10	4	●	1
MSMHVD1200WE	12	26	75	12	4	●	1
MSMHVD1600WE	16	35	90	16	4	●	1
MSMHVD2000WE	20	45	110	20	4	●	1

MSSHV...E

4 flute, Variable Helix, Short length, Weldon shank

D1≤12	0 −-0.02	4≤D4≤6	0 −-0.008
D1>12	0 −-0.03	8≤D4≤10	0 −-0.009
		12≤D4≤16	0 −-0.011
		20≤D4≤25	0 −-0.013



Type 1

UWC MS 42° 45°

● 4 flute variable helix end mill

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Neck Length L3	Neck Length D5	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
MSSHVD0600WE	6	9	14	5.85	50	6	4	●	1
MSSHVD0800WE	8	12	20	7.85	60	8	4	●	1
MSSHVD1000WE	10	15	25	9.7	70	10	4	●	1
MSSHVD1200WE	12	18	30	11.7	75	12	4	●	1
MSSHVD1600WE	16	24	40	15.5	90	16	4	●	1
MSSHVD2000WE	20	30	50	19.5	110	20	4	●	1

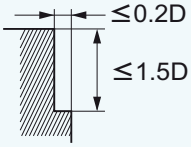
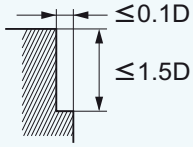
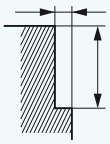
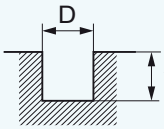
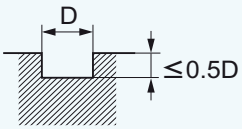
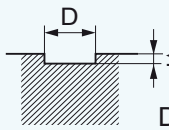
● : Stock standard in Japan

MSMHVD

4 flute, Medium length, Weldon shank

MSSHVD

4 flute, Short length, Weldon shank

Work Material		Carbon Steel, Alloy Steel, Cast Iron (−30 HRC)		Pre-hardened Steel, Tool Steel (30−45 HRC)		Stainless Steel Titanium Alloy		Hardened Steel (45−55 HRC)	
Diameter (mm)		Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)	Revolution (min^{-1})	Feed rate (mm/min)
Side Milling	**6**	8000	2240	8000	2240	5300	1060	3700	440
	8	6000	1680	6000	1680	4000	960	2800	450
	10	4800	1440	4800	1440	3200	770	2200	440
	12	4000	1200	4000	1200	2700	760	1900	380
	16	3000	1140	3000	1140	2000	560	1400	340
	20	2400	860	2400	860	1600	510	1100	350
	Depth of cut	 ≤0.2D ≤1.5D				 ≤0.1D ≤1.5D		 ≤0.05D ≤1.5D D: Dia.	
Slotting	**6**	6400	1280	3700	740	3700	440	1600	190
	8	4800	1150	2800	670	2800	340	1200	190
	10	3800	910	2200	530	2200	350	1000	160
	12	3200	900	1900	530	1900	300	800	160
	16	2400	670	1400	390	1400	280	600	120
	20	1900	610	1100	350	1100	260	500	120
	Depth of cut	 D ≤1D (Max. 12mm)				 D ≤0.5D		 D ≤0.2D D: Dia.	