OSAWA

DRILLS & END MILLS

05/2019 UPDATE

HF871

weldon shank, SC smooth cut for low cutting force, chamfer + radius

OSAWA NORM | MG PV300 | <40 HRC | VH 36°/39° | C+R | Z4 UP

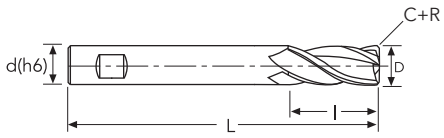
from D1 to D2.5: cylindrical shank

from D3: weldon shank

Replaces HF861 with new general dimensions

P	M	K	N	S	H
★	★	★		★	

★ 1st choice ☆ suitable



D	D Tol.	C+R	C+R Tol	d(h6)	l	l1	d1	L	z	EDP No.	Stock
1	0/-0.020	0.1	+/-0.020	4	3			50	4	HF871010	●
1.5	0/-0.020	0.1	+/-0.020	4	4.5			50	4	HF871015	●
2	0/-0.020	0.1	+/-0.020	4	6.5			50	4	HF871020	●
2.5	0/-0.020	0.1	+/-0.020	4	6.5			50	4	HF871025	●
3	0/-0.025	0.1	+/-0.020	6	9			50	4	HF871030	●
3.5	0/-0.025	0.1	+/-0.020	6	11			57	4	HF871035	●
4	0/-0.025	0.1	+/-0.020	6	11			57	4	HF871040	●
4.5	0/-0.025	0.1	+/-0.020	6	13			57	4	HF871045	●
5	0/-0.025	0.1	+/-0.020	6	13			57	4	HF871050	●
6	0/-0.025	0.1	+/-0.020	6	13			57	4	HF871060	●
7	0/-0.030	0.2	+/-0.020	8	20			64	4	HF871070	●
8	0/-0.030	0.2	+/-0.020	8	20			64	4	HF871080	●
9	0/-0.030	0.2	+/-0.020	10	22			72	4	HF871090	●
10	0/-0.030	0.2	+/-0.020	10	22			72	4	HF871100	●
11	0/-0.030	0.2	+/-0.020	12	26			83	4	HF871110	●
12	0/-0.030	0.2	+/-0.020	12	26			83	4	HF871120	●
13	0/-0.030	0.2	+/-0.020	14	26			83	4	HF871130	●
14	0/-0.030	0.2	+/-0.020	14	26			83	4	HF871140	●
15	0/-0.030	0.2	+/-0.020	16	32			92	4	HF871150	●
16	0/-0.030	0.2	+/-0.020	16	32			92	4	HF871160	●
18	0/-0.030	0.2	+/-0.020	18	32			92	4	HF871180	●
20	0/-0.030	0.2	+/-0.020	20	38			104	4	HF871200	●

● stock standard ○ non-standard stock ▽ stock exhaustion

HF871

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D X D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	30000	0.005	600	28660	0.005	520	22290	0.004	330	12740	0.004	180
	1.5	29720	0.008	890	19110	0.007	520	14860	0.006	330	8490	0.005	180
	2	22290	0.010	890	14330	0.009	520	11150	0.008	330	6370	0.007	180
	3	14860	0.014	830	9550	0.013	480	7430	0.011	310	4250	0.010	170
	4	11150	0.019	830	7170	0.017	480	5570	0.014	310	3180	0.013	160
	5	8920	0.023	820	5730	0.021	470	4460	0.017	310	2550	0.016	160
	6	7430	0.027	800	4780	0.024	460	3720	0.020	300	2120	0.019	160
	8	5570	0.035	780	3580	0.032	450	2790	0.026	290	1590	0.025	160
	10	4460	0.042	750	2870	0.038	430	2230	0.032	280	1270	0.029	150
	12	3720	0.048	710	2390	0.043	410	1860	0.036	270	1060	0.034	140
	14	3180	0.054	690	2050	0.049	400	1590	0.041	260	910	0.038	140
	16	2790	0.060	670	1790	0.054	390	1390	0.045	250	800	0.042	130
	18	2480	0.066	650	1590	0.059	380	1240	0.050	250	710	0.046	130
	20	2230	0.073	650	1430	0.066	380	1110	0.055	240	640	0.051	130

ap x ae	**D1**	0.25D x D
ap x ae	**≤ D3**	0.5D x D

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3								
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²								
	ap x ae	**1.5D x D**			**1.5D x D**								
	Vc (m/min)	**100-120**			**60-80**								
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)						
	8	4380	0.028	490	2790	0.025	280						
	10	3500	0.034	470	2230	0.030	270						
	12	2920	0.038	450	1860	0.035	260						
	14	2500	0.043	430	1590	0.039	250						
	16	2190	0.048	420	1390	0.043	240						
	18	1950	0.053	410	1240	0.048	240						
	20	1750	0.058	410	1110	0.053	230						

	Material Group ISO 513	P1 P2 M1 K1											
	Hardness/Rm	≤ 700 N/mm²											
	ap x ae	**2D x D**											
	Vc (m/min)	**75-95**											
SLOTTING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)									
	10	2710	0.025	270									
	12	2260	0.029	260									
	14	1930	0.032	250									
	16	1690	0.036	240									
	18	1500	0.040	240									
	20	1350	0.044	240									

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
FOR APPLICATION ON HIGH POWER MILLING CHUCK, PLEASE REFER TO HF840 PARAMETERS.

HF871

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**1.5D x 0.5D**			**1.5D x 0.5D**			**1.2D x 0.3D**			**1.2D x 0.3D**		
	Vc (m/min)	**160-180**			**100-120**			**70-90**			**40-60**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
SIDE MILLING	**1**	30000	0.006	720	30000	0.005	650	25480	0.005	490	15920	0.007	420
	1.5	36090	0.009	1300	23350	0.008	760	16990	0.007	490	10620	0.010	420
	2	27070	0.012	1300	17520	0.011	760	12740	0.010	490	7960	0.013	420
	3	18050	0.017	1210	11680	0.015	710	8490	0.013	460	5310	0.018	390
	4	13540	0.022	1200	8760	0.020	700	6370	0.018	450	3980	0.024	390
	5	10830	0.028	1200	7010	0.025	700	5100	0.022	450	3180	0.030	390
	6	9020	0.032	1170	5840	0.029	680	4250	0.026	440	2650	0.036	380
	8	6770	0.042	1140	4380	0.038	660	3180	0.034	430	1990	0.046	370
	10	5410	0.050	1090	3500	0.045	640	2550	0.040	410	1590	0.055	350
	12	4510	0.058	1040	2920	0.052	610	2120	0.046	390	1330	0.063	340
	14	3870	0.065	1000	2500	0.058	580	1820	0.052	380	1140	0.071	330
	16	3380	0.072	970	2190	0.065	570	1590	0.058	370	1000	0.079	320
	18	3010	0.079	950	1950	0.071	560	1420	0.063	360	880	0.087	310
	20	2710	0.088	950	1750	0.079	550	1270	0.070	360	800	0.096	310
ap x ae	**≤ D3**	1.5D x 0.1D											

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**5° x 0.4D**			**4° x 0.4D**			**3° x 0.4D**			**3° x 0.4D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
HELICAL	**1**	30000	0.004	435	28660	0.003	390	22290	0.003	268	12740	0.003	143
	1.5	29720	0.005	650	19110	0.005	390	14860	0.005	268	8490	0.004	143
	2	22290	0.007	650	14330	0.007	390	11150	0.006	268	6370	0.006	143
	3	14860	0.010	605	9550	0.010	365	7430	0.008	250	4250	0.008	133
	4	11150	0.013	600	7170	0.013	360	5570	0.011	247	3180	0.010	132
	5	8920	0.017	600	5730	0.016	360	4460	0.014	246	2550	0.013	131
	6	7430	0.020	585	4780	0.018	350	3720	0.016	241	2120	0.015	128
	8	5570	0.025	570	3580	0.024	340	2790	0.021	235	1590	0.020	125
	10	4460	0.031	545	2870	0.029	325	2230	0.025	225	1270	0.024	120
	12	3720	0.035	520	2390	0.033	310	1860	0.029	214	1060	0.027	114
	14	3180	0.039	500	2050	0.037	300	1590	0.032	206	910	0.030	110
	16	2790	0.044	490	1790	0.041	290	1390	0.036	200	800	0.034	108
	18	2480	0.048	475	1590	0.045	285	1240	0.040	197	710	0.037	105
	20	2230	0.053	475	1430	0.050	285	1110	0.044	195	640	0.041	105
α° max	**≤ D3**	1°											

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
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HF871

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	α° x ae	**15° x D**			**10° x D**			**5° x D**			**5° x D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
RAMPING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	7430	0.022	640	4780	0.020	380	3720	0.019	281	2120	0.026	220
	8	5570	0.028	620	3580	0.026	370	2790	0.024	273	1590	0.034	214
	10	4460	0.034	600	2870	0.031	355	2230	0.029	262	1270	0.040	205
	12	3720	0.038	570	2390	0.035	335	1860	0.034	250	1060	0.046	196
	14	3180	0.043	550	2050	0.040	325	1590	0.038	240	910	0.052	189
	16	2790	0.048	535	1790	0.044	315	1390	0.042	233	800	0.058	185
	18	2480	0.053	520	1590	0.048	310	1240	0.046	229	710	0.063	180
	20	2230	0.058	520	1430	0.054	305	1110	0.051	227	640	0.070	180

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x 0.4D**			**D x 0.4D**			**D x 0.25D**			**D x 0.25D**		
	Vc (m/min)	**130-150**			**80-100**			**60-80**			**30-50**		
VERTICAL	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	6	7430	0.027	800	4780	0.024	460	3720	0.020	300	2120	0.019	160
	8	5570	0.035	780	3580	0.032	450	2790	0.026	290	1590	0.025	160
	10	4460	0.042	750	2870	0.038	430	2230	0.032	280	1270	0.029	150
	12	3720	0.048	710	2390	0.043	410	1860	0.036	270	1060	0.034	140
	14	3180	0.054	690	2050	0.049	400	1590	0.041	260	910	0.038	140
	16	2790	0.060	670	1790	0.054	390	1390	0.045	250	800	0.042	130
	18	2480	0.066	650	1590	0.059	380	1240	0.050	250	710	0.046	130
	20	2230	0.073	650	1430	0.066	380	1110	0.055	240	640	0.051	130

	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**D x D**			**D x D**			**0.5D x D**			**0.5D x D**		
	Vc (m/min)	**100-120**			**60-80**			**45-65**			**20-40**		
DRILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	30000	0.003	300	22290	0.002	200	17520	0.002	140	9550	0.003	110
	1.5	23350	0.004	350	14860	0.003	200	11680	0.003	140	6370	0.004	110
	2	17520	0.005	350	11150	0.005	200	8760	0.004	140	4780	0.006	110
	3	11680	0.007	330	7430	0.006	190	5840	0.006	130	3180	0.008	100
	4	8760	0.009	320	5570	0.008	190	4380	0.007	130	2390	0.010	100
	5	7010	0.012	320	4460	0.010	180	3500	0.009	130	1910	0.013	100
	6	5840	0.014	320	3720	0.012	180	2920	0.011	130	1590	0.015	90
	8	4380	0.018	310	2790	0.016	180	2190	0.014	120	1190	0.019	90
	10	3500	0.021	290	2230	0.019	170	1750	0.017	120	960	0.023	90
	12	2920	0.024	280	1860	0.022	160	1460	0.019	110	800	0.026	80
	14	2500	0.027	270	1590	0.024	150	1250	0.022	110	680	0.030	80
	16	2190	0.030	260	1390	0.027	150	1090	0.024	100	600	0.033	80
	18	1950	0.033	260	1240	0.030	150	970	0.026	100	530	0.036	80
	20	1750	0.037	260	1110	0.033	150	880	0.029	100	480	0.040	80

ap x ae	**≤ D3**	0.5D x D											

PARAMETERS SUGGESTED WITH HIGH PRECISION WELDON CHUCK AND STABLE MACHINING CONDITION.
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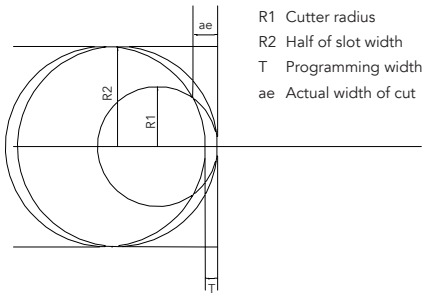
HF871

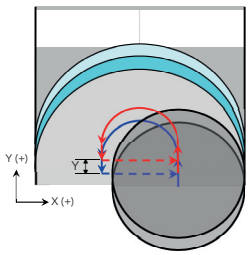
	Material Group ISO 513	P1 P2 M1 K1			P3 P4 M2 K2 K3			P5 M3 M4 K4 S1 S4			S2 S3 S5		
	Hardness/Rm	≤ 700 N/mm²			700-1000 N/mm²			≤ 35 HRC			≤ 40 HRC		
	ap x ae	**2D x 0.2D**			**2D x 0.1D**			**1.5D x 0.1D**			**1.5D x 0.1D**		
	Vc (m/min)	**190-230**			**130-150**			**100-120**			**50-70**		
	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
TROCHOIDAL	**1**	30000	0.013	1500	30000	0.011	1350	30000	0.010	1200	19110	0.014	1050
	1.5	23350	0.019	1750	29720	0.017	2010	23350	0.015	1400	12740	0.021	1050
	2	30000	0.025	3000	22290	0.023	2010	17520	0.020	1400	9550	0.028	1050
	3	22290	0.035	3120	14860	0.032	1870	11680	0.028	1310	6370	0.039	980
	4	16720	0.046	3090	11150	0.042	1860	8760	0.037	1300	4780	0.051	970
	5	13380	0.058	3080	8920	0.052	1850	7010	0.046	1290	3820	0.063	970
	6	11150	0.068	3010	7430	0.061	1810	5840	0.054	1260	3180	0.074	940
	8	8360	0.088	2930	5570	0.079	1750	4380	0.070	1230	2390	0.096	920
	10	6690	0.105	2810	4460	0.095	1690	3500	0.084	1180	1910	0.116	880
	12	5570	0.120	2670	3720	0.108	1610	2920	0.096	1120	1590	0.132	840
	14	4780	0.135	2580	3180	0.122	1550	2500	0.108	1080	1360	0.149	810
	16	4180	0.150	2510	2790	0.135	1510	2190	0.120	1050	1190	0.165	790
	18	3720	0.165	2460	2480	0.149	1470	1950	0.132	1030	1060	0.182	770
	20	3340	0.183	2440	2230	0.164	1470	1750	0.146	1020	960	0.201	770

ap x ae	**D1**	D x 0.1D			D x 0.1D			D x 0.1D			D x 0.1D		
ap x ae	**≤ D3**	1.5D x 0.1D			1.5D x 0.1D			D x 0.1D			D x 0.1D		

NOTES:
Down milling CNC programming is required.
"ae" value max 0.2xD - "T" value max 0.1xD.
The use of end mill with diameter 30-40% smaller than the width of the slot is recommended.
The cutting conditions are based on CNC programming with medium dynamic speed.
With lower CNC dynamic speed, use the same cutting conditions or reduce the cutting speed Vc.
With higher CNC dynamic speed, reduce the "T" value by approximately -30 -50% and apply the maximum available cutting speed Vc.



R1 Cutter radius
R2 Half of slot width
T Programming width of cut
ae Actual width of cut



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MEX400

cylindrical shank, 4 flutes unequal pitch

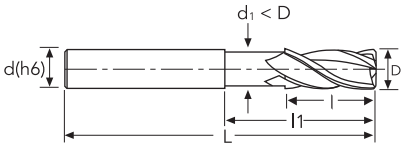
OSAWA NORM | MEX | NMG ENDLESS ORANGE | <55 HRC | 40° | SQUARE | Z4 UP

Replaces MEXCS4 with improved performances thanks to new edge design and unequal pitch (UP)

P	M	K	N	S	H
★		★			★

★ 1st choice ★ suitable

SIDE MILLING



D	D Tol.	CR	CR Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
1	0/-0.010			4	3			50	4	MEX400010	●
1.5	0/-0.015			4	4.5			50	4	MEX400015	●
2	0/-0.015			4	6			40	4	MEX400020	●
2.5	0/-0.015			4	8			40	4	MEX400025	●
3	0/-0.015			6	8			55	4	MEX400030	●
3.5	0/-0.020			6	10			55	4	MEX400035	●
4	0/-0.020			6	11			55	4	MEX400040	●
4.5	0/-0.020			6	11			45	4	MEX400045	●
5	0/-0.020			6	13			55	4	MEX400050	●
5.5	0/-0.020			6	13			55	4	MEX400055	●
6	0/-0.020			6	15			60	4	MEX400060	●
6.5	0/-0.020			8	17			65	4	MEX400065	●
7	0/-0.020			8	18			65	4	MEX400070	●
8	0/-0.020			8	20			70	4	MEX400080	●
9	0/-0.020			10	23			70	4	MEX400090	●
10	0/-0.020			10	22			75	4	MEX400100	●
11	-0.005/-0.025			12	28			75	4	MEX400110	●
12	-0.005/-0.025			12	26			80	4	MEX400120	●
14	-0.010/-0.030			14	35			90	4	MEX400140	●
16	-0.010/-0.030			16	32			100	4	MEX400160	●
20	-0.010/-0.030			20	40			100	4	MEX400200	●
25	-0.010/-0.030			25	40			100	4	MEX400250	●

● stock standard ○ non-stock standard ▽ stock exhaustion

MEX400

	Material Group ISO 513	P2 P3 P4 K1 K2			P3 P4 P5 K3			P6 K4			H1 H4 H5		
	Hardness/Rm	< 800 N/mm²			< 35 HRC			35 - 45 HRC			45 - 55 HRC		
	ap x ae	**1.2 D x 0.03 D**			**1.2 D x 0.03 D**			**1.2 D x 0.03 D**			**1.2 D x 0.03 D**		
	Vc (m/min)	**140-160**			**130-150**			**110-130**			**80-100**		
SIDE MILLING	D (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	1	47770	0.007	1340	44590	0.006	1070	38220	0.005	765	28660	0.006	690
	2	23890	0.011	1050	22290	0.011	980	19110	0.012	915	14330	0.012	690
	3	15920	0.015	960	14860	0.015	890	12740	0.016	815	9550	0.018	690
	4	11940	0.023	1100	11150	0.023	1030	9550	0.023	880	7170	0.026	745
	5	9550	0.033	1260	8920	0.033	1180	7640	0.036	1100	5730	0.040	915
	6	7960	0.040	1270	7430	0.042	1250	6370	0.045	1145	4780	0.055	1050
	8	5970	0.058	1390	5570	0.062	1380	4780	0.068	1300	3580	0.080	1145
	10	4780	0.082	1570	4460	0.086	1530	3820	0.095	1450	2870	0.120	1380
	12	3980	0.100	1590	3720	0.110	1640	3180	0.120	1525	2390	0.145	1385
	14	3410	0.120	1640	3180	0.130	1650	2730	0.145	1585	2050	0.180	1475
	16	2990	0.150	1790	2790	0.160	1790	2390	0.180	1720	1790	0.225	1610
	18	2650	0.170	1800	2480	0.180	1790	2120	0.200	1695	1590	0.250	1590
	20	2390	0.200	1910	2230	0.210	1870	1910	0.230	1755	1430	0.280	1600
	22	2170	0.220	1910	2030	0.230	1870	1740	0.240	1670	1300	0.300	1560
	25	1910	0.240	1830	1780	0.250	1780	1530	0.260	1590	1150	0.320	1470

MHMB204

cylindrical shank, 2 flutes ball nose, miniature

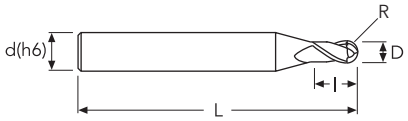
OSAWA NORM | MH | NMG MH COAT | <70 HRC | 30° | BALL NOSE | Z2 BALL

MH Series cover MEX (30-55 HRC) and UH (50-70 HRC) application range delivering higher performances thanks to improved geometry and new micrograin + coating

P	M	K	N	S	H
★		★			★

★ 1st choice ★ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
0.2	0/-0.015	0.10	0/-0.020	4	0.2			50	2	MHMB200204	●
0.3	0/-0.015	0.15	0/-0.020	4	0.3			50	2	MHMB200304	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4			50	2	MHMB200404	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4			50	2	MHMB200504	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5			50	2	MHMB200604	●
0.7	0/-0.015	0.35	0/-0.020	4	0.6			50	2	MHMB200704	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6			50	2	MHMB200804	●
0.9	0/-0.015	0.45	0/-0.020	4	0.8			50	2	MHMB200904	●
1.0	0/-0.015	0.50	0/-0.020	4	0.8			50	2	MHMB201004	●
1.5	0/-0.015	0.75	0/-0.020	4	1.35			50	2	MHMB201504	●
2	0/-0.015	1	0/-0.020	4	1.7			50	2	MHMB202004	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MHMB204

	Material Group ISO 513		P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm		< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae		**0.05D x 0.1D**			**0.05D x 0.1D**			**0.05D x 0.1D**			**0.05D x 0.1D**		
	Vc (m/min)		**80-120**			**60-100**			**50-70**			**30-50**		
	D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	**0.1**	**0.04**	40000	0.004	320	40000	0.004	290	40000	0.003	255	40000	0.003	225
	0.2	**0.09**	40000	0.006	480	40000	0.005	430	40000	0.005	385	40000	0.004	335
	0.3	**0.13**	40000	0.008	640	40000	0.007	580	40000	0.006	510	40000	0.006	450
	0.4	**0.17**	40000	0.010	800	40000	0.009	720	40000	0.008	640	31850	0.007	445
	0.5	**0.22**	40000	0.012	960	40000	0.011	860	38220	0.010	735	25480	0.008	430
	0.6	**0.26**	40000	0.015	1200	40000	0.014	1080	31850	0.012	765	21230	0.011	445
	0.7	**0.31**	40000	0.018	1440	36400	0.016	1180	27300	0.014	785	18200	0.013	460
	0.8	**0.35**	39810	0.020	1590	31850	0.018	1150	23890	0.016	765	15920	0.014	445
	0.9	**0.39**	35390	0.023	1630	28310	0.021	1170	21230	0.018	780	14150	0.016	455
	1	**0.44**	31850	0.026	1660	40000	0.023	1870	19110	0.020	745	12740	0.017	430
	1.5	**0.79**	21230	0.040	1700	16990	0.036	1220	12740	0.030	765	8490	0.026	440
	2	**1.20**	15920	0.055	1750	12740	0.050	1260	9550	0.041	790	6370	0.036	455

	α	n (rpm)	Vf (mm/min)
	15°	x 1.1	x 1.1

MHMB206

cylindrical shank, 2 flutes ball nose, miniature, 6 mm. shank

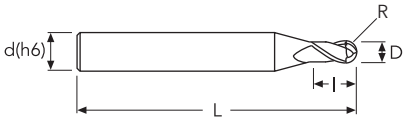
OSAWA NORM | MH | NMG MH COAT | <70 HRC | 30° | BALL NOSE | Z2 BALL

MH Series cover MEX (30-55 HRC) and UH (50-70 HRC) application range delivering higher performances thanks to improved geometry and new micrograin + coating

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

COPYING



D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	EDP No.	Stock
0.4	0/-0.0020	0.20	+/-0.005	6	0.4			50	2	MHMB200406	●
0.5	0/-0.0020	0.25	+/-0.005	6	0.5			50	2	MHMB200506	●
0.6	0/-0.0020	0.30	+/-0.005	6	0.6			50	2	MHMB200606	●
0.8	0/-0.0020	0.40	+/-0.005	6	0.8			50	2	MHMB200806	●

● stock standard ○ non-standard stock ∇ stock exhaustion

MHMB206

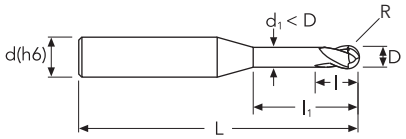
	Material Group ISO 513		P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm		< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae		**0.05D x 0.2D**			**0.05D x 0.2D**			**0.05D x 0.2D**			**0.05D x 0.2D**		
COPYING	Vc (m/min)		**80-120**			**60-100**			**50-70**			**30-50**		
	D (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	0.4	**0.17**	40000	0.010	800	40000	0.009	720	40000	0.008	640	31850	0.007	445
	0.5	**0.22**	40000	0.012	960	40000	0.011	860	38220	0.010	735	25480	0.008	430
	0.6	**0.26**	40000	0.015	1200	40000	0.014	1080	31850	0.012	765	21230	0.011	445
	0.8	**0.35**	39810	0.020	1590	31850	0.018	1150	23890	0.016	765	15920	0.014	445

α	n (rpm)	Vf (mm/min)
15°	x 1.1	x 1.1

MHLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature

OSAWA NORM | MH | NMG MH COAT | <70 HRC | 30° | BALL NOSE | Z2 BALL

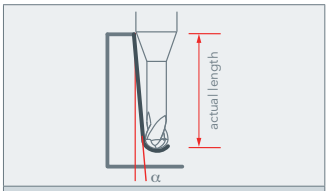


MH Series cover MEX (30-55 HRC) and UH (50-70 HRC) application range delivering higher performances thanks to improved geometry and new micrograin + coating

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

ROUND RIB



actual length according to α angle

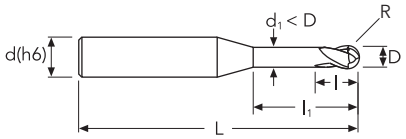
D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
0.2	0/-0.015	0.10	0/-0.020	4	0.2	0.5	0.17	50	2	0.57	0.58	0.60	0.62	0.66	MHLNB2002005	●
0.2	0/-0.015	0.10	0/-0.020	4	0.2	1	0.17	50	2	1.08	1.12	1.15	1.19	1.27	MHLNB200201	●
0.2	0/-0.015	0.10	0/-0.020	4	0.2	1.5	0.17	50	2	1.60	1.65	1.71	1.76	1.89	MHLNB2002015	●
0.3	0/-0.015	0.15	0/-0.020	4	0.3	1	0.27	50	2	1.08	1.11	1.15	1.18	1.26	MHLNB200301	●
0.3	0/-0.015	0.15	0/-0.020	4	0.3	2	0.27	50	2	2.12	2.18	2.25	2.33	2.49	MHLNB200302	●
0.3	0/-0.015	0.15	0/-0.020	4	0.3	3	0.27	50	2	3.15	3.25	3.36	3.48	3.73	MHLNB200303	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	1	0.37	50	2	1.08	1.11	1.14	1.18	1.25	MHLNB200401	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	2	0.37	50	2	2.11	2.18	2.25	2.32	2.48	MHLNB200402	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	3	0.37	50	2	3.15	3.25	3.36	3.47	3.72	MHLNB200403	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	4	0.37	50	2	4.18	4.32	4.46	4.62	4.95	MHLNB200404	●
0.4	0/-0.015	0.20	0/-0.020	4	0.4	5	0.37	50	2	5.21	5.39	5.57	5.77	6.18	MHLNB200405	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	2	0.45	50	2	2.15	2.22	2.29	2.36	2.52	MHLNB200502	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	3	0.45	50	2	3.18	3.29	3.39	3.51	3.75	MHLNB200503	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	4	0.45	50	2	4.22	4.35	4.50	4.65	4.98	MHLNB200504	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	5	0.45	50	2	5.25	5.42	5.61	5.80	6.22	MHLNB200505	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	6	0.45	50	2	6.28	6.49	6.71	6.95	7.45	MHLNB200506	●
0.5	0/-0.015	0.25	0/-0.020	4	0.4	8	0.45	50	2	8.35	8.63	8.93	9.24	9.92	MHLNB200508	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	2	0.55	50	2	2.15	2.21	2.28	2.35	2.50	MHLNB200602	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	3	0.55	50	2	3.18	3.28	3.39	3.50	3.74	MHLNB200603	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	4	0.55	50	2	4.22	4.35	4.49	4.65	4.97	MHLNB200604	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	5	0.55	50	2	5.25	5.42	5.60	5.79	6.21	MHLNB200605	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	6	0.55	50	2	6.28	6.49	6.71	6.94	7.44	MHLNB200606	●
0.6	0/-0.015	0.30	0/-0.020	4	0.5	8	0.55	50	2	8.35	8.63	8.92	9.23	9.91	MHLNB200608	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	2	0.75	50	2	2.15	2.21	2.27	2.34	2.48	MHLNB200802	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	4	0.75	50	2	4.21	4.34	4.48	4.63	4.95	MHLNB200804	●
0,8	0/-0.015	0.40	0/-0.020	4	0.6	5	0.75	50	2	5.25	5.41	5.59	5.78	6.18	MHLNB200805	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	6	0.75	50	2	6.28	6.48	6.70	6.93	7.42	MHLNB200806	●
0,8	0/-0.015	0.40	0/-0.020	4	0.6	7	0.75	50	2	7.31	7.55	7.81	8.07	8.65	MHLNB200807	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	8	0.75	50	2	8.35	8.62	8.91	9.22	9.88	MHLNB200808	●
0.8	0/-0.015	0.40	0/-0.020	4	0.6	10	0.75	50	2	10.41	10.76	11.13	11.51	12.35	MHLNB200810	●
1	0/-0.015	0.50	0/-0.020	4	0.8	3	0.9	50	2	3.27	3.37	3.47	3.57	3.80	MHLNB201003	●
1	0/-0.015	0.50	0/-0.020	4	0.8	4	0.9	50	2	4.31	4.44	4.58	4.72	5.04	MHLNB201004	●
1	0/-0.015	0.50	0/-0.020	4	0.8	5	0.9	50	2	5.34	5.51	5.68	5.87	6.27	MHLNB201005	●
1	0/-0.015	0.50	0/-0.020	4	0.8	6	0.9	50	2	6.37	6.58	6.79	7.02	7.50	MHLNB201006	●
1	0/-0.015	0.50	0/-0.020	4	0.8	7	0.9	50	2	7.41	7.64	7.90	8.16	8.74	MHLNB201007	●
1	0/-0.015	0.50	0/-0.020	4	0.8	8	0.9	50	2	8.44	8.71	9.00	9.31	9.97	MHLNB201008	●
1	0/-0.015	0.50	0/-0.020	4	0.8	9	0.9	50	2	9.47	9.78	10.11	10.46	11.21	MHLNB201009	●
1	0/-0.015	0.50	0/-0.020	4	0.8	10	0.9	50	2	10.51	10.85	11.22	11.61	12.44	MHLNB201010	●
1	0/-0.015	0.50	0/-0.020	4	0.8	12	0.9	50	2	12.57	12.99	13.43	13.90	14.91	MHLNB201012	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MHLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature

OSAWA NORM | MH | NMG MH COAT | <70 HRC | 30° | BALL NOSE | Z2 BALL

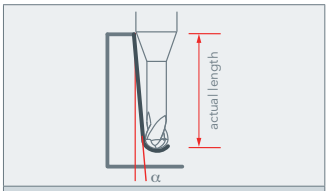


MH Series cover MEX (30-55 HRC) and UH (50-70 HRC) application range delivering higher performances thanks to improved geometry and new micrograin + coating

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

ROUND RIB



actual length according to α angle

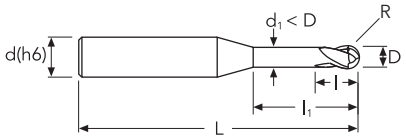
D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
1	0/-0.015	0.50	0/-0.020	4	0.8	14	0.9	50	2	14.64	15.13	15.65	16.19	17.37	MHLNB201014	●
1	0/-0.015	0.50	0/-0.020	4	0.8	16	0.9	50	2	16.71	17.27	17.86	18.49	19.84	MHLNB201016	●
1	0/-0.015	0.50	0/-0.020	4	0.8	20	0.9	60	2	20.84	21.55	22.29	23.08	24.78	MHLNB201020	●
1.2	0/-0.015	0.60	0/-0.020	4	1.0	6	1.1	50	2	6.37	6.57	6.78	7.00	7.48	MHLNB201206	●
1.2	0/-0.015	0.60	0/-0.020	4	1.0	8	1.1	50	2	8.44	8.71	8.99	9.30	9.95	MHLNB201208	●
1.2	0/-0.015	0.60	0/-0.020	4	1.0	10	1.1	50	2	10.50	10.85	11.21	11.59	12.42	MHLNB201210	●
1.2	0/-0.015	0.60	0/-0.020	4	1.0	12	1.1	50	2	12.57	12.98	13.42	13.89	14.88	MHLNB201212	●
1.4	0/-0.015	0.70	0/-0.020	4	1.1	8	1.3	50	2	8.43	8.70	8.98	9.28	9.93	MHLNB201408	●
1.4	0/-0.015	0.70	0/-0.020	4	1.1	12	1.3	50	2	12.57	12.98	13.41	13.87	14.86	MHLNB201412	●
1.4	0/-0.015	0.70	0/-0.020	4	1.1	16	1.3	50	2	16.70	17.26	17.84	18.46	19.80	MHLNB201416	●
1.5	0/-0.015	0.75	0/-0.020	4	1.2	8	1.4	50	2	8.43	8.70	8.98	9.27	9.91	MHLNB201508	●
1.5	0/-0.015	0.75	0/-0.020	4	1.2	12	1.4	50	2	12.57	12.97	13.41	13.86	14.85	MHLNB201512	●
1.5	0/-0.015	0.75	0/-0.020	4	1.2	16	1.4	50	2	16.70	17.25	17.84	18.45	19.78	MHLNB201516	●
1.5	0/-0.015	0.75	0/-0.020	4	1.2	18	1.4	60	2	18.77	19.39	20.05	20.75	22.25	MHLNB201518	●
1.5	0/-0.015	0.75	0/-0.020	6	2.4	20	1.4	50	2	20.84	21.53	22.26	23.04	24.72	MHLNB201520	●
1.6	0/-0.015	0.80	0/-0.020	4	1.3	8	1.5	50	2	8.43	8.69	8.97	9.27	9.90	MHLNB201608	●
1.6	0/-0.015	0.80	0/-0.020	4	1.3	12	1.5	50	2	12.56	12.97	13.40	13.86	14.84	MHLNB201612	●
1.6	0/-0.015	0.80	0/-0.020	4	1.3	16	1.5	50	2	16.70	17.25	17.83	18.45	19.77	MHLNB201616	●
1.6	0/-0.015	0.80	0/-0.020	4	1.3	20	1.5	60	2	20.83	21.53	22.26	23.03	-	MHLNB201620	●
1.8	0/-0.015	0.90	0/-0.020	4	1.4	8	1.7	50	2	8.43	8.69	8.96	9.25	9.88	MHLNB201808	●
1.8	0/-0.015	0.90	0/-0.020	4	1.4	12	1.7	50	2	12.56	12.96	13.39	13.84	14.81	MHLNB201812	●
1.8	0/-0.015	0.90	0/-0.020	4	1.4	16	1.7	50	2	16.70	17.24	17.82	18.43	19.75	MHLNB201816	●
1.8	0/-0.015	0.90	0/-0.020	4	1.4	20	1.7	60	2	20.83	21.52	22.25	23.02	-	MHLNB201820	●
2	0/-0.015	1.00	0/-0.020	4	1.6	4	1.9	50	2	4.29	4.40	4.52	4.65	4.92	MHLNB202004	●
2	0/-0.015	1.00	0/-0.020	4	1.6	6	1.9	50	2	6.36	6.54	6.74	6.94	7.39	MHLNB202006	●
2	0/-0.015	1.00	0/-0.020	4	1.6	8	1.9	50	2	8.42	8.68	8.95	9.24	9.86	MHLNB202008	●
2	0/-0.015	1.00	0/-0.020	4	1.6	10	1.9	50	2	10.49	10.82	11.17	11.53	12.32	MHLNB202010	●
2	0/-0.015	1.00	0/-0.020	4	1.6	12	1.9	50	2	12.56	12.96	13.38	13.83	14.79	MHLNB202012	●
2	0/-0.015	1.00	0/-0.020	4	1.6	14	1.9	50	2	14.62	15.10	15.59	16.12	17.26	MHLNB202014	●
2	0/-0.015	1.00	0/-0.020	4	1.6	16	1.9	50	2	16.69	17.23	17.81	18.42	19.73	MHLNB202016	●
2	0/-0.015	1.00	0/-0.020	4	1.6	18	1.9	60	2	18.76	19.37	20.02	20.71	-	MHLNB202018	●
2	0/-0.015	1.00	0/-0.020	4	1.6	20	1.9	60	2	20.83	21.51	22.24	23.00	-	MHLNB202020	●
2	0/-0.015	1.00	0/-0.020	4	1.6	22	1.9	60	2	22.89	23.65	24.45	25.30	-	MHLNB202022	●
2	0/-0.015	1.00	0/-0.020	4	1.6	25	1.9	75	2	25.99	26.86	27.77	28.74	-	MHLNB202025	●
2	0/-0.015	1.00	0/-0.020	4	1.6	30	1.9	75	2	31.16	32.21	33.31	-	-	MHLNB202030	●
3	0/-0.020	1.50	0/-0.020	6	2.4	8	2.8	50	2	8.60	8.84	9.10	9.37	9.96	MHLNB203008	●
3	0/-0.020	1.50	0/-0.020	6	2.4	10	2.8	50	2	10.67	10.98	11.32	11.67	12.43	MHLNB203010	●
3	0/-0.020	1.50	0/-0.020	6	2.4	12	2.8	50	2	12.73	13.12	13.53	13.96	14.90	MHLNB203012	●
3	0/-0.020	1.50	0/-0.020	6	2.4	16	2.8	60	2	16.87	17.40	17.96	18.55	19.83	MHLNB203016	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MHLNB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature

OSAWA NORM | MH | NMG MH COAT | <70 HRC | 30° | BALL NOSE | Z2 BALL

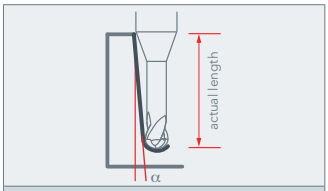


MH Series cover MEX (30-55 HRC) and UH (50-70 HRC) application range delivering higher performances thanks to improved geometry and new micrograin + coating

P	M	K	N	S	H
★		★			★

★ 1st choice ☆ suitable

ROUND RIB



actual length according to α angle

D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
3	0/-0.020	1.50	0/-0.020	6	2.4	20	2.8	60	2	21.00	21.68	22.39	23.14	24.77	MHLNB203020	●
3	0/-0.020	1.50	0/-0.020	6	2.4	25	2.8	75	2	26.17	27.02	27.93	28.88	-	MHLNB203025	●
3	0/-0.020	1.50	0/-0.020	6	2.4	30	2.8	75	2	31.34	32.37	33.46	34.62	-	MHLNB203030	●
3	0/-0.020	1.50	0/-0.020	6	2.4	35	2.8	75	2	36.51	37.72	39.00	40.35	-	MHLNB203035	●
4	0/-0.020	2.00	0/-0.020	6	3.2	10	3.7	50	2	10.84	11.15	11.47	11.81	12.54	MHLNB204010	●
4	0/-0.020	2.00	0/-0.020	6	3.2	16	3.7	60	2	17.04	17.56	18.11	18.69	19.94	MHLNB204016	●
4	0/-0.020	2.00	0/-0.020	6	3.2	20	3.7	60	2	21.18	21.84	22.54	23.28	-	MHLNB204020	●
4	0/-0.020	2.00	0/-0.020	6	3.2	25	3.7	75	2	26.35	27.19	28.08	29.02	-	MHLNB204025	●
4	0/-0.020	2.00	0/-0.020	6	3.2	30	3.7	75	2	31.51	32.53	33.61	-	-	MHLNB204030	●
4	0/-0.020	2.00	0/-0.020	6	3.2	35	3.7	75	2	36.68	37.88	39.15	-	-	MHLNB204035	●
4	0/-0.020	2.00	0/-0.020	6	3.2	40	3.7	100	2	41.85	43.23	-	-	-	MHLNB204040	●
4	0/-0.020	2.00	0/-0.020	6	3.2	45	3.7	100	2	47.02	48.57	-	-	-	MHLNB204045	●
4	0/-0.020	2.00	0/-0.020	6	3.2	50	3.7	100	2	52.19	53.92	-	-	-	MHLNB204050	●

● stock standard ○ non-standard stock ∇ stock exhaustion

MHLNB2

	Material Group ISO 513				P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm				< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae				ap x 0.2D			ap x 0.2D			ap x 0.2D			ap x 0.2D		
	Vc (m/min)				140-160			110-130			80-100			50-70		
	D (mm)	l1 (mm)	ap (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
ROUND RIB	0.2	≤ 6D	0.01	0.09	40000	0.008	640	40000	0.007	580	40000	0.006	510	40000	0.006	450
		≤ 8D	0.01	0.08	40000	0.007	580	40000	0.006	470	40000	0.005	415	40000	0.005	365
		≤ 10D	0.01	0.07	40000	0.006	510	40000	0.005	370	40000	0.004	330	40000	0.004	285
	0.3	≤ 6D	0.02	0.13	40000	0.010	800	40000	0.009	720	40000	0.008	640	40000	0.007	560
		≤ 8D	0.01	0.12	40000	0.009	720	40000	0.007	580	40000	0.006	520	40000	0.006	455
		≤ 10D	0.01	0.11	40000	0.008	640	40000	0.006	460	40000	0.005	410	40000	0.004	360
	0.4	≤ 6D	0.02	0.17	40000	0.013	1040	40000	0.012	940	40000	0.010	830	40000	0.009	730
		≤ 8D	0.02	0.16	40000	0.012	940	40000	0.009	760	40000	0.008	675	40000	0.007	590
		≤ 10D	0.01	0.15	40000	0.010	830	40000	0.007	600	40000	0.007	530	38220	0.006	445
	0.5	≤ 6D	0.03	0.22	40000	0.017	1360	40000	0.015	1220	40000	0.014	1090	38220	0.012	910
		≤ 8D	0.02	0.20	40000	0.015	1220	40000	0.012	990	40000	0.011	880	34390	0.010	665
		≤ 10D	0.02	0.18	40000	0.014	1090	40000	0.010	780	40000	0.009	695	30570	0.008	465
	0.6	≤ 6D	0.03	0.26	40000	0.021	1680	40000	0.019	1510	40000	0.017	1345	31850	0.015	935
		≤ 8D	0.03	0.24	40000	0.019	1510	40000	0.015	1220	40000	0.014	1090	28660	0.012	685
		≤ 10D	0.02	0.22	40000	0.017	1340	40000	0.012	970	38220	0.011	820	25480	0.009	480
	0.8	≤ 6D	0.04	0.35	40000	0.025	2000	40000	0.023	1800	35830	0.020	1435	23890	0.018	835
		≤ 8D	0.03	0.32	40000	0.023	1800	40000	0.018	1460	32250	0.016	1045	21500	0.014	610
		≤ 10D	0.03	0.29	40000	0.020	1600	38220	0.014	1100	28660	0.013	735	19110	0.011	430
	1	≤ 6D	0.05	0.44	40000	0.030	2400	38220	0.027	2060	28660	0.024	1375	19110	0.021	805
		≤ 8D	0.04	0.40	40000	0.027	2160	34390	0.022	1500	25800	0.019	1005	17200	0.017	585
		≤ 10D	0.04	0.37	38220	0.024	1830	30570	0.017	1060	22930	0.015	705	15290	0.013	410
		≤ 12D	0.03	0.33	33440	0.021	1400	26750	0.013	710	20060	0.012	470	13380	0.010	275
		> 12D	0.02	0.30	28660	0.018	1030	22930	0.010	450	17200	0.009	295	11460	0.008	175
	1.2	≤ 6D	0.06	0.52	39810	0.035	2790	31850	0.032	2010	23890	0.028	1340	15920	0.025	780
		≤ 8D	0.05	0.48	35830	0.032	2260	28660	0.026	1460	21500	0.023	975	14330	0.020	570
		≤ 10D	0.04	0.44	31850	0.028	1780	25480	0.020	1030	19110	0.018	685	12740	0.016	400
		≤ 12D	0.03	0.39	27870	0.025	1370	22290	0.015	690	16720	0.014	460	11150	0.012	270
		> 12D	0.03	0.36	23890	0.021	1000	19110	0.011	430	14330	0.010	290	9550	0.009	170
	1.5	≤ 6D	0.08	0.65	31850	0.045	2870	25480	0.041	2060	19110	0.036	1375	12740	0.032	805
		≤ 8D	0.06	0.61	28660	0.041	2320	22930	0.033	1500	17200	0.029	1005	11460	0.026	585
		≤ 10D	0.05	0.55	25480	0.036	1830	20380	0.026	1060	15290	0.023	705	10190	0.020	410
		≤ 12D	0.04	0.49	22290	0.032	1400	17830	0.020	710	13380	0.018	470	8920	0.015	275
		> 12D	0.03	0.44	19110	0.027	1030	15290	0.015	450	11460	0.013	295	7640	0.011	175
	2	≤ 6D	0.10	0.87	23890	0.060	2870	19110	0.054	2060	14330	0.048	1375	9550	0.042	800
		≤ 8D	0.09	0.81	21500	0.054	2320	17200	0.044	1500	12900	0.039	1005	8600	0.034	585
		≤ 10D	0.07	0.74	19110	0.048	1830	15290	0.035	1060	11460	0.031	705	7640	0.027	410
		≤ 12D	0.06	0.65	16720	0.042	1400	13380	0.026	710	10030	0.024	470	6690	0.021	275
		> 12D	0.05	0.59	14330	0.036	1030	11460	0.019	450	8600	0.017	295	5730	0.015	175
	2.5	≤ 6D	0.13	1.09	19110	0.060	2290	15290	0.054	1650	11460	0.048	1100	7640	0.042	640
		≤ 8D	0.11	1.01	17200	0.054	1860	13760	0.044	1200	10320	0.039	800	6880	0.034	470
		≤ 10D	0.09	0.92	15290	0.048	1470	12230	0.035	850	9170	0.031	565	6110	0.027	330
		≤ 12D	0.07	0.82	13380	0.042	1120	10700	0.026	570	8030	0.024	380	5350	0.021	220
		> 12D	0.06	0.74	11460	0.036	830	9170	0.019	360	6880	0.017	240	4590	0.015	140
	3	≤ 6D	0.15	1.31	15920	0.075	2390	12740	0.068	1720	9550	0.060	1145	6370	0.053	670
		≤ 8D	0.13	1.21	14330	0.068	1930	11460	0.055	1250	8600	0.049	835	5730	0.043	485
		≤ 10D	0.11	1.10	12740	0.060	1530	10190	0.043	880	7640	0.038	585	5100	0.034	345
		≤ 12D	0.08	0.98	11150	0.053	1170	8920	0.033	590	6690	0.029	395	4460	0.026	230
		> 12D	0.07	0.89	9550	0.045	860	7640	0.024	370	5730	0.022	250	3820	0.019	145

α	n (rpm)	Vf (mm/min)
45°	x 1.65	x 1.65
30°	x 1.30	x 1.30
15°	x 1.15	x 1.15

MHLNB2

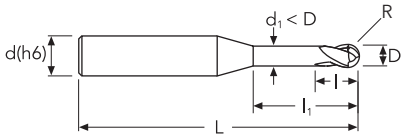
ROUND RIB	Material Group ISO 513				P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm				< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae				**ap x 0.2D**			**ap x 0.2D**			**ap x 0.2D**			**ap x 0.2D**		
	Vc				**140-160**			**110-130**			**80-100**			**50-70**		
	D (mm)	l1 (mm)	ap (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
	4	**≤ 6D**	**0.20**	**1.74**	11940	0.095	2270	9550	0.086	1630	7170	0.076	1090	4780	0.067	635
		≤ 8D	**0.17**	**1.61**	10750	0.086	1840	8600	0.069	1190	6450	0.062	795	4300	0.054	465
		≤ 10D	**0.14**	**1.47**	9550	0.076	1450	7640	0.055	840	5730	0.049	555	3820	0.043	325
		≤ 12D	**0.11**	**1.31**	8360	0.067	1110	6690	0.042	560	5020	0.037	375	3340	0.033	220
		> 12D	**0.09**	**1.19**	7170	0.057	820	5730	0.031	350	4300	0.027	235	2870	0.024	135

α	α	n (rpm)	Vf (mm/min)
	45°	x 1.65	x 1.65
	30°	x 1.30	x 1.30
	15°	x 1.15	x 1.15

MHCRB2

cylindrical shank, 2 flutes ball nose, extended and reduced neck, miniature, 6 mm. shank

OSAWA NORM | MH | NMG MH COAT | <70 HRC | 30° | BALL NOSE | Z2 BALL

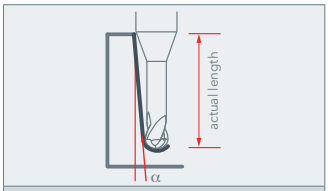


MH Series cover MEX (30-55 HRC) and UH (50-70 HRC) application range delivering higher performances thanks to improved geometry and new micrograin + coating

P	M	K	N	S	H
★		★			★

★ 1st choice ★ suitable

ROUND RIB



actual length according to α angle

D	D Tol.	R	R Tol.	d(h6)	l	l1	d1	L	z	30′	1°	1°30′	2°	3°	EDP No.	Stock
0.5	0/-0.012	0.25	+/-0.005	6	0.5	2	0.45	50	2	2.15	2.22	2.29	2.36	2.52	MHCRB20050206	●
0.5	0/-0.012	0.25	+/-0.005	6	0.5	4	0.45	50	2	4.22	4.35	4.50	4.65	4.98	MHCRB20050406	●
0.6	0/-0.012	0.30	+/-0.005	6	0.5	2	0.55	50	2	2.15	2.21	2.28	2.35	2.50	MHCRB20060206	●
0.6	0/-0.012	0.30	+/-0.005	6	0.5	4	0.55	50	2	4.22	4.35	4.49	4.65	4.97	MHCRB20060406	●
0.6	0/-0.012	0.30	+/-0.005	6	0.5	6	0.55	50	2	6.28	6.49	6.71	6.94	7.44	MHCRB20060606	●
0.8	0/-0.012	0.40	+/-0.005	6	0.8	2	0.75	50	2	2.15	2.21	2.27	2.34	2.48	MHCRB20080206	●
0.8	0/-0.012	0.40	+/-0.005	6	0.8	4	0.75	50	2	4.21	4.34	4.48	4.63	4.95	MHCRB20080406	●
0.8	0/-0.012	0.40	+/-0.005	6	0.8	6	0.75	50	2	6.28	6.48	6.70	6.93	7.42	MHCRB20080606	●
1	0/-0.012	0.50	+/-0.005	6	1	3	0.90	50	2	3.27	3.37	3.47	3.57	3.80	MHCRB20100306	●
1	0/-0.012	0.50	+/-0.005	6	1	6	0.90	50	2	6.37	6.58	6.79	7.02	7.50	MHCRB20100606	●
1	0/-0.012	0.50	+/-0.005	6	1	8	0.90	50	2	8.44	8.71	9.00	9.31	9.97	MHCRB20100806	●
1	0/-0.012	0.50	+/-0.005	6	1	10	0.90	50	2	10.51	10.85	11.22	11.61	12.44	MHCRB20101006	●
1.2	0/-0.012	0.60	+/-0.005	6	1.2	6	1.10	50	2	6.37	6.57	6.78	7.00	7.48	MHCRB20120606	●
1.2	0/-0.012	0.60	+/-0.005	6	1.2	8	1.10	50	2	8.44	8.71	8.99	9.30	9.95	MHCRB20120806	●
1.2	0/-0.012	0.60	+/-0.005	6	1.2	10	1.10	50	2	10.50	10.85	11.21	11.59	12.42	MHCRB20121006	●
1.5	0/-0.012	0.75	+/-0.005	6	1.5	4	1.40	50	2	4.30	4.42	4.55	4.68	4.98	MHCRB20150406	●
1.5	0/-0.012	0.75	+/-0.005	6	1.5	8	1.40	50	2	8.43	8.70	8.98	9.27	9.91	MHCRB20150806	●
1.5	0/-0.012	0.75	+/-0.005	6	1.5	10	1.40	50	2	10.50	10.84	11.19	11.57	12.38	MHCRB20151006	●
1.5	0/-0.012	0.75	+/-0.005	6	1.5	12	1.40	50	2	12.57	12.97	13.41	13.86	14.85	MHCRB20151206	●
1.5	0/-0.012	0.75	+/-0.005	6	1.5	16	1.40	50	2	16.70	17.25	17.84	18.45	19.78	MHCRB20151606	●
2	0/-0.012	1.00	+/-0.005	6	3	6	1.90	50	2	6.36	6.54	6.74	6.94	7.39	MHCRB20200606	●
2	0/-0.012	1.00	+/-0.005	6	3	8	1.90	50	2	8.42	8.68	8.95	9.24	9.86	MHCRB20200806	●
2	0/-0.012	1.00	+/-0.005	6	3	10	1.90	50	2	10.49	10.82	11.17	11.53	12.32	MHCRB20201006	●
2	0/-0.012	1.00	+/-0.005	6	3	12	1.90	50	2	12.56	12.96	13.38	13.83	14.79	MHCRB20201206	●
2	0/-0.012	1.00	+/-0.005	6	3	16	1.90	50	2	16.69	17.23	17.81	18.42	19.73	MHCRB20201606	●
2	0/-0.012	1.00	+/-0.005	6	3	20	1.90	50	2	20.83	21.51	22.24	23.00	24.66	MHCRB20202006	●

● stock standard ○ non-standard stock ▽ stock exhaustion

MHCRB2

	Material Group ISO 513				P3 P4 P5 K2 K3			P6 K4 H1 H4 H5			H2			H3		
	Hardness/Rm				< 45 HRC			45 - 55 HRC			55 - 60 HRC			60 - 65 HRC		
	ap x ae				**ap x 0.2D**			**ap x 0.2D**			**ap x 0.2D**			**ap x 0.2D**		
	Vc (m/min)				**140-160**			**110-130**			**80-100**			**50-70**		
	D (mm)	l1 (mm)	ap (mm)	D (eff.) (mm)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)	n (rpm)	fz (mm/z)	Vf (mm/min)
ROUND RIB	**0.5**	**≤ 6D**	**0.03**	**0.22**	40000	0.020	1600	40000	0.018	1440	40000	0.016	1280	38220	0.014	1070
		≤ 8D	**0.02**	**0.20**	40000	0.018	1440	40000	0.015	1170	40000	0.013	1035	34390	0.011	780
		≤ 10D	**0.02**	**0.18**	40000	0.016	1280	40000	0.012	920	40000	0.010	820	30570	0.009	550
	0.6	**≤ 6D**	**0.03**	**0.26**	40000	0.022	1760	40000	0.020	1580	40000	0.018	1410	31850	0.015	980
		≤ 8D	**0.03**	**0.24**	40000	0.020	1580	40000	0.016	1280	40000	0.014	1140	28660	0.012	715
		≤ 10D	**0.02**	**0.22**	40000	0.018	1410	40000	0.013	1010	38220	0.011	860	25480	0.010	500
	0.8	**≤ 6D**	**0.04**	**0.35**	40000	0.025	2000	40000	0.023	1800	35830	0.020	1435	23890	0.018	835
		≤ 8D	**0.03**	**0.32**	40000	0.023	1800	40000	0.018	1460	32250	0.016	1045	21500	0.014	610
		≤ 10D	**0.03**	**0.29**	40000	0.020	1600	38220	0.014	1100	28660	0.013	735	19110	0.011	430
	1	**≤ 6D**	**0.05**	**0.44**	40000	0.030	2400	38220	0.027	2060	28660	0.024	1375	19110	0.021	805
		≤ 8D	**0.04**	**0.40**	40000	0.027	2160	34390	0.022	1500	25800	0.019	1005	17200	0.017	585
		≤ 10D	**0.04**	**0.37**	38220	0.024	1830	30570	0.017	1060	19110	0.015	585	15290	0.013	410
		≤ 12D	**0.03**	**0.33**	33440	0.021	1400	26750	0.013	710	16720	0.012	395	13380	0.010	275
		> 12D	**0.02**	**0.30**	28660	0.018	1030	22930	0.010	450	14330	0.009	250	11460	0.008	175
	1.2	**≤ 6D**	**0.06**	**0.52**	39810	0.035	2790	31850	0.032	2010	23890	0.028	1340	15920	0.025	780
		≤ 8D	**0.05**	**0.48**	35830	0.032	2260	28660	0.026	1460	21500	0.023	975	14330	0.020	570
		≤ 10D	**0.04**	**0.44**	31850	0.028	1780	25480	0.020	1030	19110	0.018	685	12740	0.016	400
		≤ 12D	**0.03**	**0.39**	27870	0.025	1370	22290	0.015	690	16720	0.014	460	11150	0.012	270
		> 12D	**0.03**	**0.36**	23890	0.021	1000	19110	0.011	430	14330	0.010	290	9550	0.009	170
	1.5	**≤ 6D**	**0.08**	**0.65**	31850	0.045	2870	25480	0.041	2060	19110	0.036	1375	12740	0.032	805
		≤ 8D	**0.06**	**0.61**	28660	0.041	2320	22930	0.033	1500	17200	0.029	1005	11460	0.026	585
		≤ 10D	**0.05**	**0.55**	25480	0.036	1830	20380	0.026	1060	15290	0.023	705	10190	0.020	410
		≤ 12D	**0.04**	**0.49**	22290	0.032	1400	17830	0.020	710	13380	0.018	470	8920	0.015	275
		> 12D	**0.03**	**0.44**	19110	0.027	1030	15290	0.015	450	11460	0.013	295	7640	0.011	175
	2	**≤ 6D**	**0.10**	**0.87**	23890	0.060	2870	19110	0.054	2060	14330	0.048	1375	9550	0.042	800
		≤ 8D	**0.09**	**0.81**	21500	0.054	2320	17200	0.044	1500	12900	0.039	1005	8600	0.034	585
		≤ 10D	**0.07**	**0.74**	19110	0.048	1830	15290	0.035	1060	11460	0.031	705	7640	0.027	410
		≤ 12D	**0.06**	**0.65**	16720	0.042	1400	13380	0.026	710	10030	0.024	470	6690	0.021	275
		> 12D	**0.05**	**0.59**	14330	0.036	1030	11460	0.019	450	8600	0.017	295	5730	0.015	175

α	n (rpm)	Vf (mm/min)
45°	x 1.65	x 1.65
30°	x 1.30	x 1.30
15°	x 1.15	x 1.15

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