Size R1.5～R6

HBL

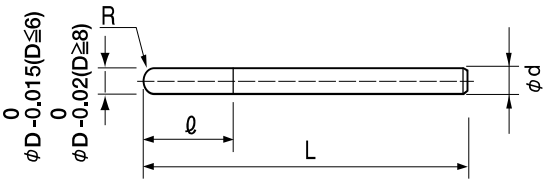
Super MG | HARD MAX | 30° | R ±0.005 (R1.5～R3) | R ±0.007 (R4～R6) | Shank Dia 0/-0.005

Material Applications（★ Highly Recommended ● Recommended ○ Suggested）

Work Material																
Carbon Steels S45C S55C	Alloy Steels SK / SCM SUS	Prehardened Steels NAK HPM	Hardened Steels ～50HRC	Hardened Steels ～55HRC	Hardened Steels ～60HRC	Hardened Steels ～65HRC	Hardened Steels ～70HRC	Cast Iron	Aluminum Alloys	Graphite	Copper	Plastics	Glass Filled Plastics	Titanium Alloys	Heat Resistant Alloys	Cemented Carbide	Hard Brittle (Non-Metallic) Materials
○	○	●	●	●	○			○			●			○	○		

Features

Long shank ball design for hard materials.
HARDMAX coating for high speed milling for Hard Materials.
Both dry and wet coolant offer stable and long tool life.
Diameter Tolerance: 0/-0.015 (D≦6), 0/-0.02 (D≧8)



Shank part should not make contact with the work piece.

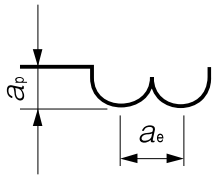
Total 6 models　　Unit（mm）

Model Number	Radius of Ball Nose R	Length of Cut ℓ	Overall Length L	Shank Diameter φd	Suggested Retail Price ¥
HBL 2030-0800	R1.5	4.5	80	3	12,200
HBL 2040-1000	R2	6	100	4	13,900
HBL 2060-1400	R3	18	140	6	21,100
HBL 2080-1600	R4	20	160	8	29,480
HBL 2100-1800	R5	25	180	10	35,700
HBL 2120-2000	R6	25	200	12	46,090

Milling Conditions for HBL

WORK MATERIAL		CARBON STEELS S45C / S50C (~225HB)				ALLOY STEELS SK / SCM / SUS (225~325HB)				PREHARDENED STEELS HARDENED STEELS NAK / SKD (30~45HRC)			
Model Number	Radius of Ball Nose (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2030-0800	**R1.5**	16,000	800	0.12	0.3	13,300	580	0.12	0.3	10,700	420	0.12	0.3
2040-1000	**R2**	12,000	840	0.16	0.4	10,000	560	0.16	0.4	8,000	400	0.16	0.4
2060-1400	**R3**	8,000	960	0.24	0.6	6,700	670	0.24	0.6	5,400	480	0.24	0.6
2080-1600	**R4**	6,000	1,050	0.32	0.8	5,000	700	0.32	0.8	4,000	520	0.32	0.8
2100-1800	**R5**	4,800	1,100	0.4	1	4,000	730	0.4	1	3,200	540	0.4	1
2120-2000	**R6**	4,000	1,130	0.48	1.2	3,400	810	0.48	1.2	2,700	590	0.48	1.2

WORK MATERIAL		HARDENED STEELS SKD61 / SKT (45~50HRC)				HARDENED STEELS SKD61 / 11 (50~60HRC)			
Model Number	Radius of Ball Nose (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)	Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p Axial Depth (mm)	a_e Radial Depth (mm)
2030-0800	**R1.5**	6,400	230	0.12	0.3	4,800	90	0.12	0.3
2040-1000	**R2**	4,800	230	0.16	0.4	3,600	100	0.16	0.4
2060-1400	**R3**	3,200	250	0.24	0.6	2,400	110	0.24	0.6
2080-1600	**R4**	2,400	260	0.32	0.8	1,800	110	0.32	0.8
2100-1800	**R5**	2,000	300	0.4	1	1,500	120	0.4	1
2120-2000	**R6**	1,600	320	0.48	1.2	1,200	140	0.48	1.2



Cutting Amount (mm)
a_p = 0.04D (Max 0.5 mm)
a_e = 0.1D
D : Outside Diameter (mm)

Note:
- Decrease both spindle speed and feed rate proportionally in case of chattering.
- Set spindle speed, feed rate, and radial depth in accordance with the required surface quality.
- Adjust milling parameters according to the operating environment when milling a work piece over 60HRC.
- Recommend air blow or oil mist.
- Recommend oil coolant for Stainless Steels and Heat Resistant Alloys.
- Recommend wet coolant for Copper.