Size R0.1～R3

Short Shank Series

HSLB-S

Super MG | HARD MAX | 30° | R ±0.003 (R0.1～R2) | R ±0.005 (R3) | Shank Dia 0/-0.004 | Back Taper Geometry

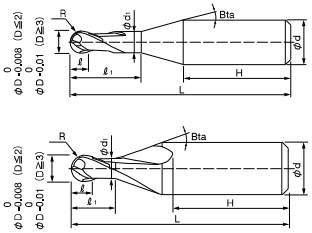
Back taper geometry does not apply to R0.4 or below, and ℓ1 / D ≦ 10.

Material Applications（★ Highly Recommended ● Recommended ○ Suggested）

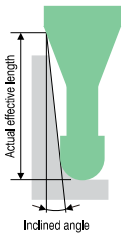
Work Material																
Carbon Steels S45C S55C	Alloy Steels SK / SCM SUS	Prehardened Steels NAK HPM	Hardened Steels ～50HRC	～55HRC	～60HRC	～65HRC	～70HRC	Cast Iron	Aluminum Alloys	Graphite	Copper	Plastics	Glass Filled Plastics	Titanium Alloys	Heat Resistant Alloys	Cemented Carbide	Hard Brittle (Non-Metallic)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

Features

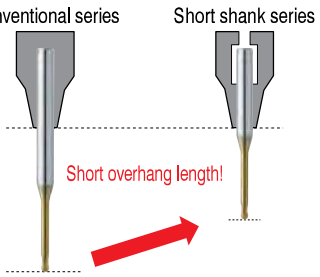
1 **Short shank for high accuracy shrink-fit holder.**
2 **Variable rake angle design** — Optimized rake angles are designed from the ball tip to the peripheral cutting edge.
3 **HARDMAX Coating** — HARDMAX coating offers heat resistance, durability and lubricity at a high level.
4 **Suitable for various coolant types.** — Every coolant offers stable milling.



The shank taper angle shown is not an exact value and to avoid contact with the work piece, we recommend the user controls the precise value of this angle. Shank taper angle should not make contact with the work piece.



Short overhang length with short shank length!



Short overhang length minimizes tool run-out

- High precision milling
- Minimizes chattering
- Longer tool life

Ideal for tool holders where the maximum insertion is short.

Tighter Tolerance Design! Diameter Tolerance, Ball Radius Accuracy, and Shank Diameter Tolerance

HSB / HSLB Tolerance

Radius of Ball Nose	Diameter Tolerance	Ball Radius Accuracy	Shank Diameter Tolerance
R0.1 ～ R3	0/-0.015	±0.005	0/-0.005 (h5)

HSB-S / HSLB-S Tolerance

Radius of Ball Nose	Diameter Tolerance	Ball Radius Accuracy	Shank Diameter Tolerance
R0.1 ～ R1	0/-0.008	±0.003	0/-0.004 (h4)
R1.5 ～ R2	0/-0.01		
R3		±0.005	

Shank diameter tolerance h4!

Total 61 models

Unit (mm)

Model Number	Radius of Ball Nose R	Effective Length ℓ1	Length of Cut ℓ	Neck Diameter φd1	Shank Taper Angle Bta	Overall Length L	Shank Diameter φd	Shank Length H	Suggested Retail Price ¥	Effective Length by Inclined Angles				
										30′	1°	1°30′	2°	3°
HSLB 2002-005S	R0.1	0.5	0.16	0.19	16°	35	4	26.0	6,470	0.63	0.66	0.68	0.71	0.76
HSLB 2002-010S		1				35	4	25.5	6,470	1.15	1.20	1.24	1.28	1.37
HSLB 2003-005S	R0.15	0.5	0.24	0.29	16°	35	4	26.0	6,380	0.63	0.65	0.68	0.70	0.75
HSLB 2003-0075S		0.75				35	4	26.0	6,380	0.89	0.92	0.96	0.99	1.05
HSLB 2003-010S		1				35	4	25.5	6,380	1.15	1.19	1.23	1.27	1.36
HSLB 2003-015S		1.5				35	4	25.0	6,840	1.66	1.72	1.77	1.83	1.96
HSLB 2004-005S	R0.2	0.5	0.32	0.39	16°	35	4	26.5	4,380	0.63	0.65	0.67	0.70	0.74
HSLB 2004-010S		1				35	4	26.0	4,380	1.15	1.19	1.23	1.26	1.35
HSLB 2004-015S		1.5				35	4	25.5	4,470	1.66	1.71	1.77	1.82	1.95
HSLB 2004-020S		2				35	4	25.0	4,560	2.18	2.25	2.32	2.39	2.56
HSLB 2004-025S		2.5				35	4	24.5	4,740	2.70	2.78	2.87	2.96	3.17
HSLB 2004-030S		3				35	4	24.0	5,020	3.21	3.31	3.42	3.53	3.79
HSLB 2005-010S	R0.25	1	0.4	0.49	16°	35	4	26.0	4,380	1.15	1.19	1.22	1.26	1.34
HSLB 2005-015S		1.5				35	4	25.5	4,380	1.65	1.71	1.76	1.82	1.94
HSLB 2005-020S		2				35	4	25.0	4,380	2.18	2.24	2.31	2.39	2.55
HSLB 2005-025S		2.5				35	4	24.5	4,380	2.69	2.78	2.86	2.96	3.16
HSLB 2005-030S		3				35	4	24.0	4,380	3.21	3.31	3.41	3.53	3.77
HSLB 2006-010S	R0.3	1	0.48	0.59	16°	35	4	26.0	3,740	1.14	1.18	1.22	1.25	1.33
HSLB 2006-015S		1.5				35	4	25.5	3,380	1.65	1.71	1.76	1.81	1.93
HSLB 2006-020S		2				35	4	25.0	3,380	2.17	2.24	2.31	2.38	2.54
HSLB 2006-030S		3				35	4	24.0	3,460	3.21	3.31	3.41	3.52	3.76
HSLB 2006-040S		4				40	4	28.0	3,560	4.24	4.37	4.51	4.66	4.99
HSLB 2006-050S		5				40	4	27.0	3,560	5.27	5.44	5.61	5.80	6.21
HSLB 2006-060S		6				40	4	26.0	3,560	6.30	6.50	6.71	6.93	7.43
HSLB 2008-020S	R0.4	2	0.64	0.79	16°	35	4	25.5	3,380	2.17	2.23	2.30	2.37	2.52
HSLB 2008-030S		3				35	4	24.5	3,560	3.21	3.30	3.40	3.50	3.74
HSLB 2008-040S		4				35	4	23.5	3,560	4.24	4.36	4.50	4.64	4.97
HSLB 2008-060S		6				40	4	26.5	3,560	6.30	6.49	6.70	6.92	7.41
HSLB 2010-020S	R0.5	2	0.8	0.98	16°	35	4	25.5	2,820	2.18	2.24	2.30	2.36	2.51
HSLB 2010-025S		2.5				35	4	25.0	2,820	2.70	2.77	2.85	2.93	3.12
HSLB 2010-030S		3				35	4	24.5	2,820	3.21	3.30	3.40	3.50	3.73
HSLB 2010-040S		4				35	4	23.5	3,190	4.24	4.37	4.50	4.64	4.96
HSLB 2010-060S		6				40	4	26.5	3,460	6.31	6.50	6.70	6.92	7.40
HSLB 2010-080S		8				40	4	24.5	3,460	8.37	8.63	8.90	9.20	9.85
HSLB 2015-030S	R0.75	3	1.2	1.47	16°	35	4	25.5	3,280	3.10	3.18	3.26	3.35	3.55
HSLB 2015-040S		4				35	4	24.5	3,280	4.13	4.24	4.36	4.49	4.77
HSLB 2015-060S		6				40	4	27.5	3,280	6.19	6.37	6.56	6.76	7.22
HSLB 2015-080S		8				40	4	25.5	3,460	8.25	8.50	8.76	9.04	9.67
HSLB 2015-100S		10				40	4	23.5	3,740	10.32	10.63	10.96	11.32	12.11

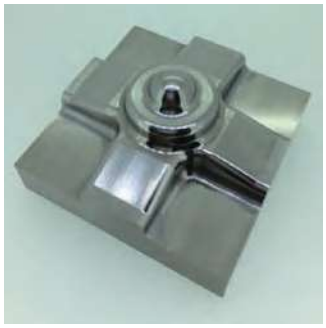
Next Page ➡

2 Flutes HARDMAX

Unit (mm)

Model Number	Radius of Ball Nose R	Effective Length ℓ1	Length of Cut ℓ	Neck Diameter φd1	Shank Taper Angle Bta	Overall Length L	Shank Diameter φd	Shank Length H	Suggested Retail Price ¥	Effective Length by Inclined Angles				
										30′	1°	1°30′	2°	3°
HSLB 2020-030S	R1	3	1.6	1.98	16°	35	4	26.5	2,820	3.07	3.14	3.21	3.29	3.47
HSLB 2020-040S		4				35	4	25.5	2,820	4.10	4.20	4.31	4.43	4.70
HSLB 2020-060S		6				35	4	23.5	3,190	6.16	6.33	6.51	6.71	7.14
HSLB 2020-080S		8				40	4	26.5	3,460	8.23	8.46	8.72	8.99	9.59
HSLB 2020-100S		10				40	4	24.5	3,460	10.29	10.59	10.92	11.26	12.04
HSLB 2020-120S		12				45	4	27.5	3,460	12.35	12.72	13.12	13.54	14.48
HSLB 2020-140S		14				45	4	25.5	3,460	14.41	14.85	15.32	15.82	16.93
HSLB 2020-160S		16				50	4	28.5	3,460	16.48	16.98	17.52	18.10	19.38
HSLB 2020-200S		20				50	4	24.5	3,460	20.60	21.24	21.92	22.65	No Interference
HSLB 2030-060-4S	R1.5	6	2.4	2.95	16°	35	4	25.0	3,460	6.20	6.35	6.52	6.69	7.09
HSLB 2030-080-4S		8				40	4	28.0	3,460	8.26	8.48	8.72	8.97	9.54
HSLB 2030-100-4S		10				40	4	26.0	4,020	10.32	10.61	10.92	11.25	No Interference
HSLB 2030-120-4S		12				40	4	24.0	4,190	12.38	12.74	13.12	13.53	No Interference
HSLB 2030-160-4S		16				45	4	25.0	4,650	16.51	17.00	17.52	No Interference	No Interference
HSLB 2030-200-4S		20				50	4	26.0	4,470	20.64	21.26	No Interference	No Interference	No Interference
HSLB 2040-080-4S	R2	8	3.2	3.95	—	35	4	24.0	3,560	No Interference	No Interference	No Interference	No Interference	No Interference
HSLB 2040-100-4S		10				40	4	28.0	3,560	No Interference	No Interference	No Interference	No Interference	No Interference
HSLB 2040-120-4S		12				40	4	26.0	4,650	No Interference	No Interference	No Interference	No Interference	No Interference
HSLB 2040-160-4S		16				45	4	27.0	4,650	No Interference	No Interference	No Interference	No Interference	No Interference
HSLB 2040-200-4S		20				50	4	28.0	4,650	No Interference	No Interference	No Interference	No Interference	No Interference
HSLB 2060-150S	R3	15	4.8	5.95	—	45	6	28.0	5,840	No Interference	No Interference	No Interference	No Interference	No Interference
HSLB 2060-200S		20				50	6	28.0	5,840	No Interference	No Interference	No Interference	No Interference	No Interference

Milling examples SKH51 (63HRC)



Size : 50 x 50 x 30 mm

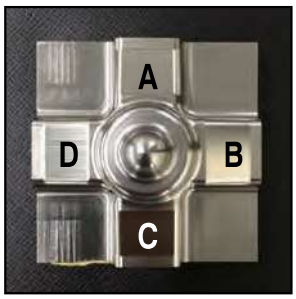
No.	Process	Tool		Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p (mm)	a_e (mm)	Cycle Time (h:m:s)
1	Roughing	**HMS**	ϕ 10 × L22	2,000	1,000	17.5	0.2	0:59:48
2	Semi-roughing	**HSB**	R3	5,700	2,200	0.2	0.3	0:37:55
3	Semi-roughing	**HSLB**	R2 × EL8	7,900	2,000	0.15	0.3	0:05:44
4	Finishing	**HLRS**	ϕ 6 × CR0.1 × EL12	4,000	1,080	—	1.35	1:38:31
5	Semi-finishing	**HSLB**	R2 × EL8	7,900	1,000	0.04	0.04	0:04:08
6	Finishing	**HSLB**	R1.75 × EL10	16,800	920	0.04	0.04	2:26:27
7	Finishing	**HSLB**	R1 × EL3	12,250	900	0.03	0.03	0:11:17
							Total	6:03:50

Size : 50 x 50 x 30 mm

No.	Process	Tool		Spindle Speed (min^{-1})	Feed Rate (mm/min)	a_p (mm)	a_e (mm)	Cycle Time (h:m:s)
1	Roughing	**HSB**	R5	3,750	1,750	0.3	1.7	0:35:28
2	Semi-roughing	**HSB**	R3	5,700	2,200	0.2	0.3	0:29:29
3	Semi-roughing	**HSLB**	R2 × EL8	7,900	2,000	0.15	0.3	0:20:42
4	Semi-finishing	**HSLB**	R2 × EL8	7,900	1,000	0.04	0.04	1:30:26
5	Semi-finishing	**HSLB**	R1.75 × EL10	8,400	920	—	—	0:34:04
6	Finishing	**HSLB**	R1.75 × EL10	16,800	920	0.04	0.04	2:17:59
7	Finishing	**HSLB**	R1 × EL3	12,250	900	0.03	0.03	0:08:02
							Total	5:56:10

・Coolant : Air blow, Oil Mist
・R1.75 Surface roughness : Ra 0.10 ~ 0.24μm (Ave 0.17μm)

Surface condition by different milling conditions R1.75 × EL10



	Milling condition A	Milling condition B	Milling condition C	Milling condition D	Milling condition E
Spindle Speed (min^{-1})	**8,400**				**16,800**
Feed Rate (mm/min)	**1,900**	**1,390**	**1,230**	**920**	**920**
a_p, a_e (mm)	**0.04**	**0.04**	**0.04**	**0.04**	**0.04**
Feed per tooth (mm/t)	0.11	0.083	0.073	0.055	0.027
Feed rate ratio	100%	75%	66%	50%	50%

※ A is based on the catalog milling conditions.

Milling condition A	Milling condition B	Milling condition C	Milling condition D Good	Milling condition E Excellent
				

Test A ~ D) Compared milling surfaces with 4 different feed rates and the spindle speed of 8,400 min^{-1}.
Result ・・・The milling surface improved **with reduced feed per tooth.**
Test E) Tested with the double spindle speed of 16,800 min^{-1}.
Result ・・・The milling surface improved even more (Ra 0.17μm) **with increased spindle speed.**

Milling condition E was applied to another work.