

HARD 1 BALL

Feature 1

Newly developed short length type solid carbide ball nose endmill that has high tool rigidity for stability and reliability.

Feature 2

Secure Radius Accuracy : $\pm 0.005\text{mm}$
For better surface finish,
improving chipping resistance during machining

Feature 3

Shank diameter tolerance : h5
Suitable for shrink fit holders

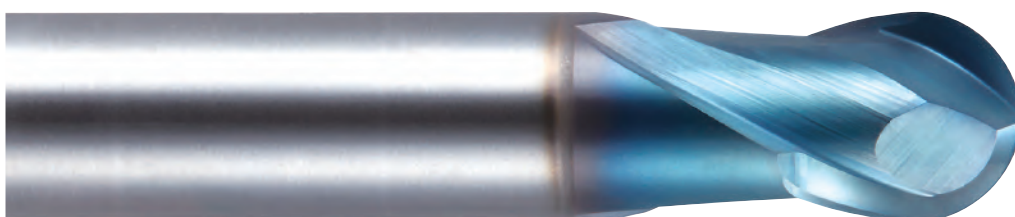
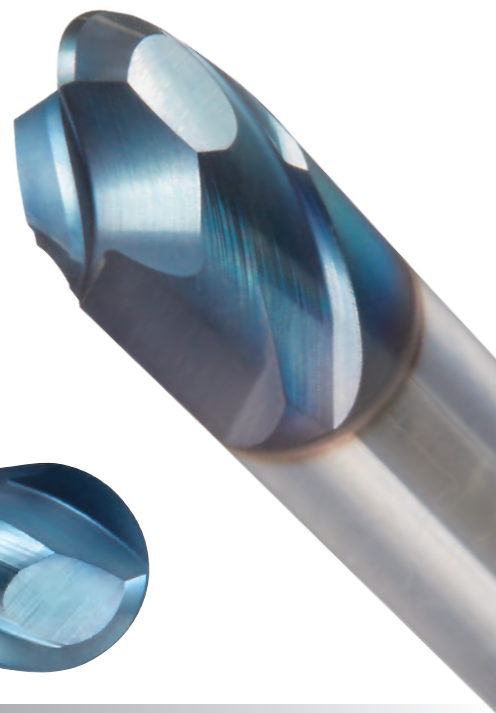


Feature 4

Excellent tool life for Hardened Materials with
Newly developed grade "DH110"



Radius Accuracy: $\pm 0.005\text{mm}$



New PVD coating <DH coating>

● Properties of DIJET PVD coating

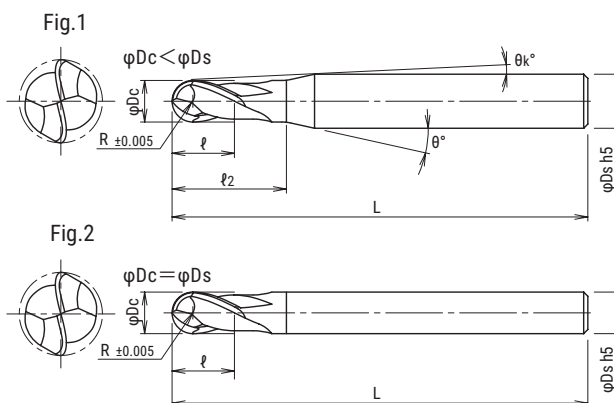
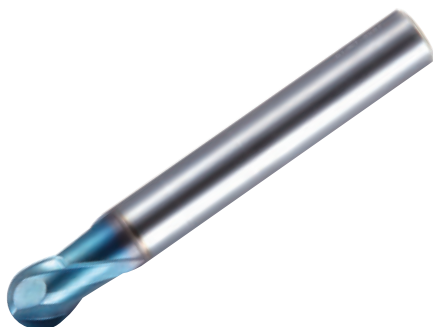
	DH coating	DV coating	DZ coating(TiAlN)
Hardness(Hv)	3,500~3,700	3,300~3,500	2,800~2,900
Oxidation temperature (°C)	1,100~1,200	1,000~1,100	700~800
Coefficient of friction	0.5	0.65	0.6

HARD 1 BALL **SFSB Type**

SFSB
TYPE

For General steel to Hardened steel

● Helix angle 30°



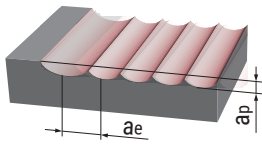
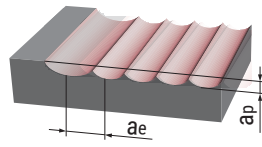
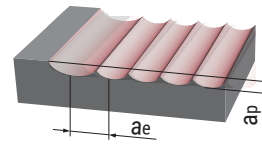
Cat.No.	Stock	Dimensions (mm)								Fig.
		R	ϕD_c	ℓ	ℓ_2	L	θ	θ_k	ϕD_s	
SFSB2010	●	0.5	1	1	1.5	40	12°	10.49°	4	1
SFSB2010-S6	●							11.04°	6	
SFSB2020	●	1	2	2	2.5		10°	7.86°	4	
SFSB2020-S6	●							8.8°	6	
SFSB2030	●	1.5	3	3	4			5.29°	4	
SFSB2030-S6	●							7.69°	6	
SFSB2040	●	2	4	4	—	—	4	2		
SFSB2040-S6	●				5	8°	5.59°	6	1	
SFSB2050	●	2.5	5	5	6	50	5°			2.79°
SFSB2060	●	3	6	6	—	60	—	—	8	2
SFSB2080	●	4	8	8					10	
SFSB2100	●	5	10	10					12	
SFSB2120	●	6	12	12						

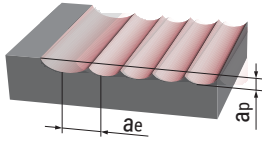
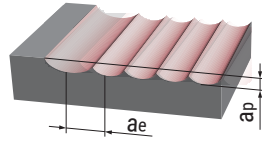
HARD 1 BALL

SFSB Type

■ SFSB type Recommended cutting conditions

● Roughing - Semi finishing

Material		Carbon steel (S50C, S55C) below 250HB		Alloy steel, Tool steel, Mold steel (SKD, SKH, NAK) below 45HRC		Hardened steel (SKD61, DAC, DHA) 42~52HRC	
Type of machining		 $a_p \leq 0.1D_c$ $a_e \leq 0.3D_c$		 $a_p \leq 0.1D_c$ $a_e \leq 0.3D_c$		 $a_p \leq 0.1D_c$ (MAX 0.5mm) $a_e \leq 0.3D_c$	
R (mm)	ϕD_c (mm)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
0.5	1	31,800	1,590	31,800	1,590	30,200	1,210
1	2	23,900	1,910	23,900	1,910	22,300	1,560
1.5	3	19,100	2,480	19,100	2,290	18,000	1,800
2	4	14,300	2,290	14,300	2,150	13,500	1,620
2.5	5	11,500	2,190	11,500	2,070	10,800	1,620
3	6	9,500	2,090	9,500	1,900	9,000	1,620
4	8	7,200	1,940	7,200	1,800	6,800	1,500
5	10	5,700	1,820	5,700	1,710	5,400	1,460
6	12	4,800	1,540	4,800	1,440	4,500	1,220

Material		Hardened steel (SKD11, SKH51, SLD) 55~62HRC		Hardened steel (SKH, HAP) 63~70HRC	
Type of machining		 $a_p \leq 0.05D_c$ (MAX 0.3mm) $a_e \leq 0.15D_c$		 $a_p \leq 0.05D_c$ (MAX 0.3mm) $a_e \leq 0.15D_c$	
R (mm)	ϕD_c (mm)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
0.5	1	28,600	1,140	27,100	810
1	2	19,100	1,150	17,500	700
1.5	3	17,000	1,360	14,900	890
2	4	12,700	1,270	11,100	890
2.5	5	10,200	1,220	8,900	890
3	6	8,500	1,280	7,400	890
4	8	6,400	1,280	5,600	840
5	10	5,100	1,280	4,500	900
6	12	4,200	1,050	3,700	740

Note

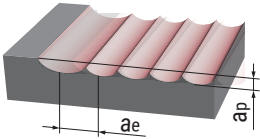
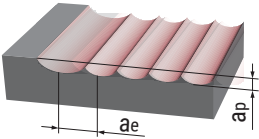
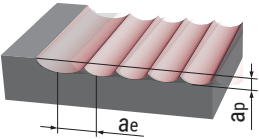
1. These cutting conditions are for general guidance. In case of ramping angle over 15° reduce cutting conditions by 70%.
2. The figures should be adjusted according to machining shape, purpose and rigidity of machine and work clamping.
3. If rpm available is lower than that recommended, reduce the feed rate proportionately.

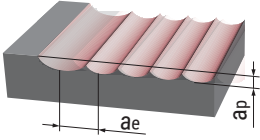
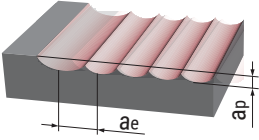
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SFSB Type

■ SFSB type Recommended cutting conditions

● Finishing

Material		Carbon steel (S50C, S55C) below 250HB		Alloy steel, Tool steel, Mold steel (SKD, SKH, NAK) below 45HRC		Hardened steel (SKD61, DAC, DHA) 42~52HRC	
Type of machining		 $a_p \leq 0.05D_c$ $a_e \leq 0.02D_c$		 $a_p \leq 0.05D_c$ $a_e \leq 0.02D_c$		 $a_p \leq 0.05D_c$ $a_e \leq 0.02D_c$	
R (mm)	ϕD_c (mm)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
0.5	1	38,200	3,440	38,200	3,440	35,000	2,450
1	2	27,100	3,250	27,100	3,250	25,500	2,550
1.5	3	21,200	3,390	21,200	3,180	20,200	2,630
2	4	15,900	3,340	15,900	3,180	15,100	2,270
2.5	5	12,700	2,670	12,700	2,540	12,100	2,420
3	6	10,600	2,860	10,600	2,650	10,100	2,530
4	8	8,000	2,560	8,000	2,400	7,600	2,280
5	10	6,400	2,370	6,400	2,240	6,000	1,920
6	12	5,300	1,960	5,300	1,860	5,000	1,600

Material		Hardened steel (SKD11, SKH51, SLD) 55~62HRC		Hardened steel (SKH, HAP) 63~70HRC	
Type of machining		 $a_p \leq 0.05D_c$ $a_e \leq 0.02D_c$		 $a_p \leq 0.03D_c$ $a_e \leq 0.02D_c$	
R (mm)	ϕD_c (mm)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
0.5	1	31,800	1,590	30,200	1,210
1	2	22,300	2,010	19,100	1,530
1.5	3	19,100	2,290	15,900	1,910
2	4	14,300	2,150	11,900	1,790
2.5	5	11,500	2,070	9,500	1,710
3	6	9,500	1,900	8,000	1,600
4	8	7,200	1,800	6,000	1,200
5	10	5,700	1,710	4,800	1,200
6	12	4,800	1,440	4,000	1,000

Note

1. These cutting conditions are for general guidance. In case of ramping angle over 15° reduce cutting conditions by 70%.
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