

END MILL

ดอกเอ็นมิลล์

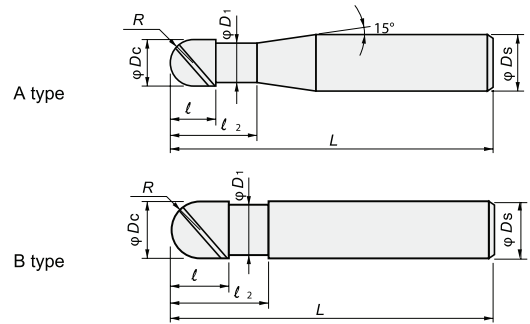
END MILL
เอ็นมิลล์



ดอกเอ็นมิลล์ EPOCH QUATTRO HIGH HARD BALL EHHB4 (-S)-ATH



4Flutes



								P (Steel)	H (High hardened)	CARBIDE	ATH COATED	72 HRC		
	R0.5 ~ R1.75 : ±0.005 R2 ~ R3 : ±0.007 R4 ~ R6 : ±0.010		R0.5 ~ R1.75 : ±0.010 R2 ~ R3 : ±0.014 R4 ~ R6 : ±0.020		Ds ≤ 6 : 0 ~ -0.005 6 < Ds ≤ 10 : 0 ~ -0.006 10 < Ds : 0 ~ -0.008	(mm)								

4 flutes provide cutting with even higher performance. New flute shape shows its power on hardened steels.

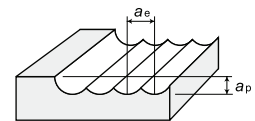
Item Code	Stock	Size (mm)							No. of flutes	Type
		R Ball radius	Dc Tool Dia.	ℓ Flute Length	ℓ ₂ Under Neck Dia.	D1 Neck dia.	Overall length	Ds Shank Dia.		
EHHB4010-S4-ATH	●	0.5	1	1.5	3	0.95	50	4	4	A
EHHB4010-S6-ATH	●							6		
EHHB4015-S4-ATH	●	0.75	1.5	2.5	4.5	1.43	50	4	4	A
EHHB4015-S6-ATH	●							6		
EHHB4020-S4-ATH	●	1	2	3	6	1.9	50	4	4	A
EHHB4020-S6-ATH	●							6		
EHHB4025-S4-ATH	●	1.25	2.5	4	7.5	2.38	50	4	4	A
EHHB4025-S6-ATH	●							6		
EHHB4030-S4-ATH	●	1.5	3	4.5	9	2.9	70	4	4	A
EHHB4030-S6-ATH	●							6		
EHHB4040-S4-ATH	●	2	4	6	12	3.9	70	4	4	B
EHHB4040-S6-ATH	●							6		
EHHB4050-ATH	●	2.5	5	7.5	15	4.7	80	6	4	A
EHHB4060-ATH	●	3	6	9	18	5.7	90	6	4	B
EHHB4080-ATH	●	4	8	12	24	7.6	100	8	4	B
EHHB4100-ATH	●	5	10	15	30	9.5	100	10	4	B
EHHB4120-ATH	●	6	12	18	36	11.5	110	12	4	B

● : Stocked Items.

Recommended cutting conditions

EHHB-ATH

Roughing



R Ball radius	Dc Mill dia.	Hardened Steels (55 ~ 62HRC) SKD11, YXR3				Hardened Steels (62 ~ 66HRC) HAP40, YXR7, SKH51				Hardened Steels (66 ~ 72HRC) HAP70, HAP72			
		Vc=110m/min				Vc=90m/min				Vc=70m/min			
		n min ⁻¹	Vf mm/min	ap mm	ae mm	n min ⁻¹	Vf mm/min	ap mm	ae mm	n min ⁻¹	Vf mm/min	ap mm	ae mm
0.5	1	35,000	1,930	0.08	0.23	28,700	1,340	0.06	0.18	22,300	860	0.05	0.14
0.75	1.5	23,400	1,760	0.11	0.34	19,100	1,220	0.09	0.27	14,900	780	0.07	0.20
1	2	17,500	1,750	0.15	0.45	14,300	1,220	0.12	0.36	11,100	780	0.09	0.27
1.25	2.5	14,000	1,650	0.19	0.56	11,500	1,150	0.15	0.45	8,900	730	0.11	0.34
1.5	3	11,700	1,650	0.23	0.68	9,600	1,150	0.18	0.54	7,400	730	0.14	0.41
2	4	8,800	1,670	0.30	0.90	7,200	1,160	0.24	0.72	5,600	740	0.18	0.54
2.5	5	7,000	1,700	0.38	1.13	5,700	1,170	0.30	0.90	4,500	760	0.23	0.68
3	6	5,800	1,690	0.45	1.35	4,800	1,190	0.36	1.08	3,700	750	0.27	0.81
4	8	4,400	1,760	0.60	1.80	3,600	1,220	0.48	1.44	2,800	780	0.36	1.08
5	10	3,500	1,750	0.75	2.25	2,900	1,230	0.60	1.80	2,200	770	0.45	1.35
6	12	2,900	1,650	0.90	2.70	2,400	1,160	0.72	2.16	1,900	760	0.54	1.62



Side Cutting

R Ball radius	Dc Mill dia.	Hardened Steels (55 ~ 62HRC) SKD11, YXR3				Hardened Steels (62 ~ 66HRC) HAP40, YXR7, SKH51				Hardened Steels (66 ~ 72HRC) HAP72			
		Vc=150m/min				Vc=125m/min				Vc=100m/min			
		n min ⁻¹	Vf mm/min	ap mm	ae mm	n min ⁻¹	Vf mm/min	ap mm	ae mm	n min ⁻¹	Vf mm/min	ap mm	ae mm
0.5	1	47,800	2,630	1.00	0.02	39,800	1,750	1.00	0.02	31,800	1,050	1.00	0.01
0.75	1.5	31,800	2,390	1.50	0.03	26,500	1,590	1.50	0.02	21,200	950	1.50	0.02
1	2	23,900	2,390	2.00	0.04	19,900	1,590	2.00	0.03	15,900	950	2.00	0.02
1.25	2.5	19,100	2,240	2.50	0.05	15,900	1,490	2.50	0.04	12,700	900	2.50	0.03
1.5	3	15,900	2,240	3.00	0.06	13,300	1,500	3.00	0.05	10,600	900	3.00	0.03
2	4	11,900	2,260	4.00	0.08	10,000	1,520	4.00	0.06	8,000	910	4.00	0.04
2.5	5	9,600	2,330	5.00	0.10	8,000	1,550	5.00	0.08	6,400	930	5.00	0.05
3	6	8,000	2,330	6.00	0.12	6,600	1,540	6.00	0.09	5,300	930	6.00	0.06
4	8	6,000	2,400	8.00	0.16	5,000	1,600	8.00	0.12	4,000	960	8.00	0.08
5	10	4,800	2,400	10.00	0.20	4,000	1,600	10.00	0.15	3,200	960	10.00	0.10
6	12	4,000	2,280	12.00	0.24	3,300	1,500	12.00	0.18	2,700	920	12.00	0.12

	55 - 62 HRC	62 - 66 HRC	66 - 72 HRC
Slant angle for helical boring	1°	0.5°	0.2°
Feed rate for helical boring	70% of side cutting conditions		

※Set the hole diameter for helical boring to between 1.6 and 2.0 times the tool diameter.
 ※Set the maximum depth for helical boring to the tool diameter or smaller (≤1D).

- [Note]**
- ① Use the appropriate coolant for the work material and machining shape.
 - ② Use a highly rigid and accurate machine as possible.
 - ③ These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
 - ④ If the rpm available is lower than that recommended please reduce the feed rate to the same ratio.

Finishing

R Ball radius	Dc Tool dia.	Tool Steels (25 ~ 35HRC) HPM7, SCM440				Pre-Hardened Steels (35 ~ 45HRC) HPM-MAGIC, CENA1				Hardened Steels (45 ~ 55HRC) SKD61, HPM38, DAC-MAGIC			
		Vc=280m/min				Vc=250m/min				Vc=210m/min			
		n min ⁻¹	Vf mm/min	ap mm	ae mm	n min ⁻¹	Vf mm/min	ap mm	ae mm	n min ⁻¹	Vf mm/min	ap mm	ae mm
0.5	1	60,000	3,240	0.02 ~ 0.05	0.02	60,000	2,970	0.02 ~ 0.05	0.02	60,000	2,700	0.02 ~ 0.05	0.02
0.75	1.5	60,000	4,860	0.02 ~ 0.07	0.03	53,100	3,940	0.02 ~ 0.07	0.03	44,600	3,010	0.02 ~ 0.07	0.03
1	2	44,600	4,820	0.02 ~ 0.10	0.04	39,800	3,940	0.02 ~ 0.10	0.04	33,400	3,010	0.02 ~ 0.10	0.04
1.25	2.5	35,700	5,030	0.05 ~ 0.12	0.05	31,800	4,110	0.05 ~ 0.12	0.05	26,800	3,150	0.05 ~ 0.12	0.05
1.5	3	29,700	5,030	0.05 ~ 0.15	0.06	26,500	4,110	0.05 ~ 0.15	0.06	22,300	3,140	0.05 ~ 0.15	0.06
2	4	22,300	5,080	0.05 ~ 0.20	0.08	19,900	4,160	0.05 ~ 0.20	0.08	16,700	3,170	0.05 ~ 0.20	0.08
2.5	5	17,800	5,180	0.05 ~ 0.25	0.1	15,900	4,240	0.05 ~ 0.25	0.1	13,400	3,250	0.05 ~ 0.25	0.10
3	6	14,900	5,200	0.05 ~ 0.3	0.12	13,300	4,260	0.05 ~ 0.3	0.12	11,100	3,230	0.05 ~ 0.3	0.12
4	8	11,100	5,330	0.05 ~ 0.4	0.16	10,000	4,400	0.05 ~ 0.4	0.16	8,400	3,360	0.05 ~ 0.4	0.16
5	10	8,900	5,340	0.05 ~ 0.5	0.2	8,000	4,400	0.05 ~ 0.5	0.2	6,700	3,350	0.05 ~ 0.5	0.20
6	12	7,400	5,060	0.05 ~ 0.6	0.24	6,600	4,140	0.05 ~ 0.6	0.24	5,600	3,190	0.05 ~ 0.6	0.24

R Ball radius	Dc Tool dia.	Hardened Steels (55 ~ 62HRC) SKD11, YXR3				Hardened Steels (62 ~ 66HRC) HAP40, YXR7, SKH51				Hardened Steels (66 ~ 72HRC) HAP70, HAP72			
		Vc=160m/min				Vc=140m/min				Vc=120m/min			
		n min ⁻¹	Vf mm/min	ap mm	ae mm	n min ⁻¹	Vf mm/min	ap mm	ae mm	n min ⁻¹	Vf mm/min	ap mm	ae mm
0.5	1	51,000	1,840	0.02 ~ 0.05	0.02	44,600	1,300	0.02 ~ 0.05	0.02	38,200	950	0.02 ~ 0.05	0.02
0.75	1.5	34,000	1,840	0.02 ~ 0.07	0.03	29,700	1,300	0.02 ~ 0.07	0.03	25,500	950	0.02 ~ 0.07	0.03
1	2	25,500	1,840	0.02 ~ 0.10	0.04	22,300	1,300	0.02 ~ 0.10	0.04	19,100	950	0.02 ~ 0.10	0.04
1.25	2.5	20,400	1,920	0.05 ~ 0.12	0.05	17,800	1,360	0.05 ~ 0.12	0.05	15,300	990	0.05 ~ 0.12	0.05
1.5	3	17,000	1,920	0.05 ~ 0.15	0.06	14,900	1,370	0.05 ~ 0.15	0.06	12,700	980	0.05 ~ 0.15	0.06
2	4	12,700	1,930	0.05 ~ 0.20	0.08	11,100	1,370	0.05 ~ 0.20	0.08	9,600	1,000	0.05 ~ 0.20	0.08
2.5	5	10,200	1,980	0.05 ~ 0.25	0.10	8,900	1,400	0.05 ~ 0.25	0.10	7,600	1,010	0.05 ~ 0.25	0.10
3	6	8,500	1,980	0.05 ~ 0.3	0.12	7,400	1,400	0.05 ~ 0.3	0.12	6,400	1,020	0.05 ~ 0.3	0.12
4	8	6,400	2,050	0.05 ~ 0.4	0.16	5,600	1,460	0.05 ~ 0.4	0.16	4,800	1,060	0.05 ~ 0.4	0.16
5	10	5,100	2,040	0.05 ~ 0.5	0.20	4,500	1,460	0.05 ~ 0.5	0.20	3,800	1,050	0.05 ~ 0.5	0.20
6	12	4,200	1,920	0.05 ~ 0.6	0.24	3,700	1,370	0.05 ~ 0.6	0.24	3,200	1,000	0.05 ~ 0.6	0.24

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