

MIRACLE HIGH PRECISION BALL NOSE END MILLS

MIRACLE NOVA

Radius
tolerance

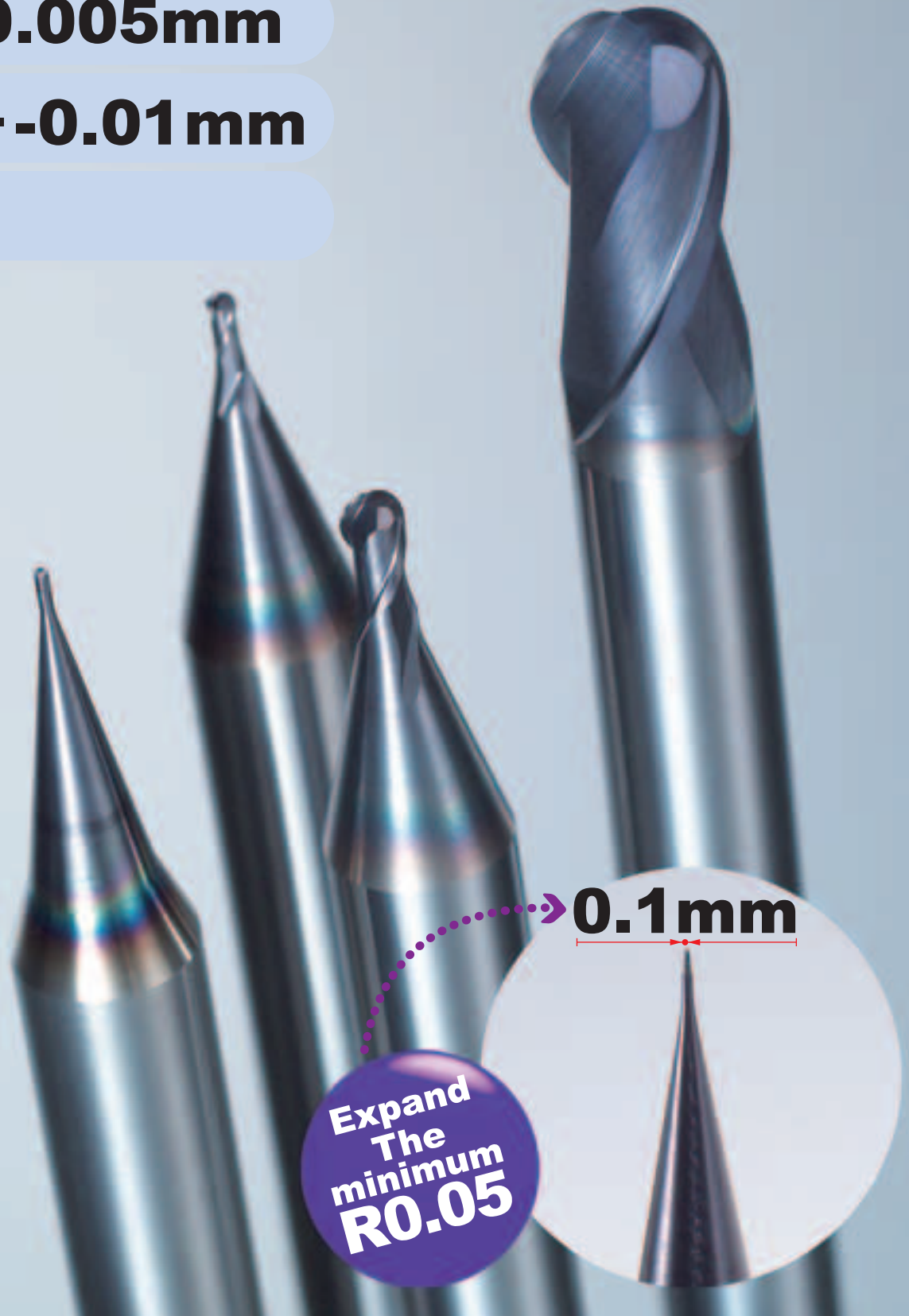
$\pm 0.005\text{mm}$

Diameter
tolerance

0 - -0.01mm

Shank
tolerance

h5



0.1mm

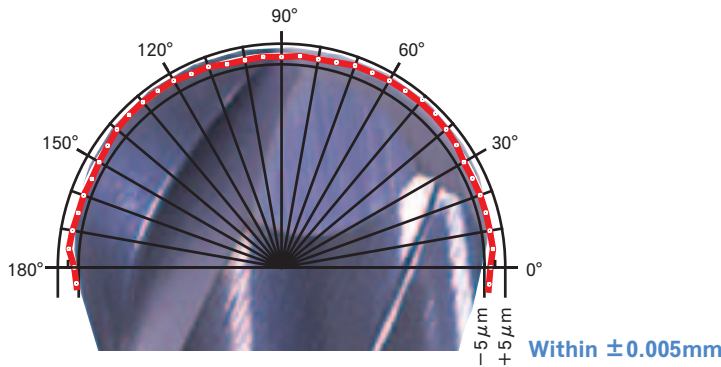
Expand
The
minimum
R0.05

MIRACLE NOVA

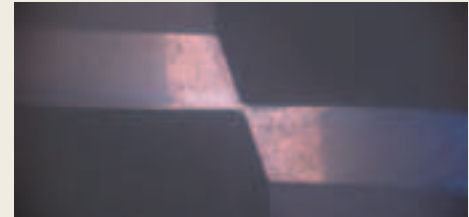
By adapting a new design for high precision combined with enhanced Miracle coating, great reductions in the finishing process of die and mold machining is realized.

High Precision

"MIRACLE NOVA" maintains the radius tolerance of $\pm 0.005\text{mm}$, the diameter tolerance of $0-0.01\text{mm}$ and the shank tolerance of h5.



End cutting edge



Short center edge improves precision and chip evacuation.

Newly developed

"MIRACLE NOVA" employs "newly developed MIRACLE COATING" boasting high resistance to heat and adhesion.

■ Features of new coating

	MIRACLE NOVA	(Al,Ti)N
Hardness (HV)	3,100	2,800
Oxidation temperature (°C)	1,100	800
Adhesion (N) ¹⁾	100	80
Friction coefficient ²⁾ (800°C)	0.42	0.53

1) Adhesion : Measured at the critical load of scratch test

2) Coefficient of friction : Measured at ball-on-disc method
Counter gear : H13 (52HRC)

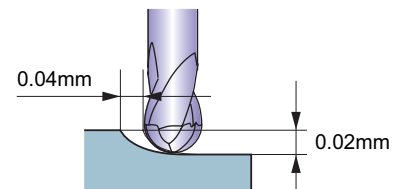
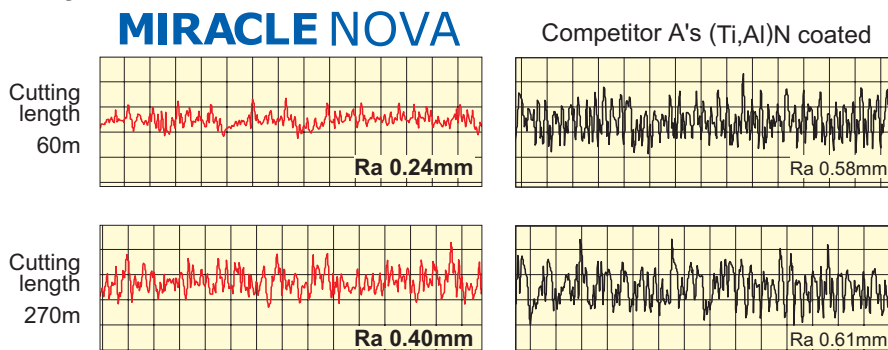
■ Smooth wear pattern

	MIRACLE NOVA	(Al,Ti)N
Wear		
Model picture		

H13 (52HRC), Cutting length 20m

Ideal surface finish !

"MIRACLE NOVA" emphasizes greater importance to edge design producing an ideal surface finish.



End mill	VC-2PSB R0.4
Work material	H13 (52HRC)
Revolution	18,000mm ⁻¹
Feed rate	1,500mm/min
Cutting method	Climb cut, Air blow

VC2PSB MIRACLE NOVA

Ball nose, Short cut length, 2 flute, High precision



±0.005



0 - -0.01 Shank Tolerance h5



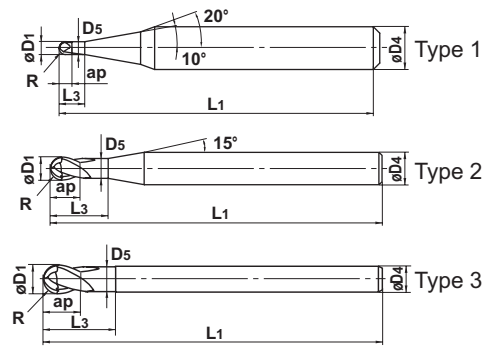
R < 0.5



0.5 ≤ R

- 2 flute ball nose end mill with high precision radial tolerance ±0.005mm.

- For high precision finishing applications exclusively.



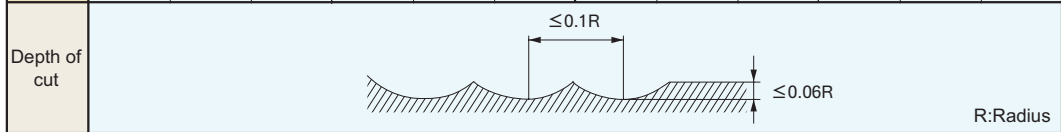
Unit : mm

Order Number	Radius of Ball Nose R	Dia. D1	Length of Cut ap	Neck Length L3	Neck Dia. D5	Overall Length L1	Shank Dia. D4	No. of Flutes N	Stock	Type
Expand VC2PSBR0005	0.05	0.1	0.2	—	—	50	6	2	●	1
R0010	0.1	0.2	0.2	0.5	0.17	50	6	2	●	1
R0015	0.15	0.3	0.3	0.8	0.27	50	6	2	●	1
R0020	0.2	0.4	0.4	1	0.36	50	6	2	●	1
R0025	0.25	0.5	0.5	1.3	0.46	50	6	2	●	1
R0030	0.3	0.6	0.6	1.5	0.56	50	6	2	●	1
R0035	0.35	0.7	0.7	1.8	0.66	50	6	2	●	1
R0040	0.4	0.8	0.8	2	0.76	50	6	2	●	1
R0045	0.45	0.9	0.9	2.3	0.86	50	6	2	●	1
R0050	0.5	1	1.5	2.5	0.94	50	6	2	●	2
R0060	0.6	1.2	1.8	3	1.14	50	6	2	★	2
R0070	0.7	1.4	2.1	3.5	1.34	50	6	2	★	2
R0075	0.75	1.5	2.3	3.8	1.44	50	6	2	●	2
R0080	0.8	1.6	2.4	4	1.54	50	6	2	★	2
R0090	0.9	1.8	2.7	4.5	1.74	50	6	2	★	2
R0100	1	2	3	5	1.90	50	6	2	●	2
R0150	1.5	3	4.5	7.5	2.90	70	6	2	●	2
R0200	2	4	6	10	3.90	70	6	2	●	2
R0250	2.5	5	7.5	12.5	4.90	80	6	2	●	2
R0300	3	6	9	15	5.85	80	6	2	●	3
R0400	4	8	12	20	7.85	90	8	2	●	3
R0500	5	10	15	25	9.70	100	10	2	●	3
R0600	6	12	18	30	11.70	110	12	2	●	3

VC2PSB MIRACLE NOVA

Ball nose, Short cut length, 2 flute, High precision

Work material	Alloy steel, Tool steel, Pre-hardened steel (-45HRC) AISI H13, D2, Hardened stainless steel						Hardened steel (45-55HRC) AISI H13					
	$\alpha \leq 15^\circ$			$\alpha > 15^\circ$			$\alpha \leq 15^\circ$			$\alpha > 15^\circ$		
	Revolution (min ⁻¹)	Feed rate (mm/min)	Table feed (IPM)	Revolution (min ⁻¹)	Feed rate (mm/min)	Table feed (IPM)	Revolution (min ⁻¹)	Feed rate (mm/min)	Table feed (IPM)	Revolution (min ⁻¹)	Feed rate (mm/min)	Table feed (IPM)
R0.05	40,000	200	7.9	—	—	—	40,000	170	6.7	—	—	—
R0.1	40,000	600	23.6	40,000	400	15.7	40,000	600	23.6	40,000	400	15.7
R0.15	40,000	900	35.4	40,000	600	23.6	40,000	900	35.4	40,000	600	23.6
R0.2	40,000	1,000	39.4	40,000	700	27.6	40,000	1,000	39.4	40,000	700	27.6
R0.25	40,000	1,500	59.1	40,000	1,000	39.4	40,000	1,500	59.1	40,000	1,000	39.4
R0.3	40,000	2,000	78.7	40,000	1,500	59.1	40,000	2,000	78.7	40,000	1,500	59.1
R0.35	40,000	2,800	110.2	40,000	2,100	82.7	40,000	2,800	110.2	37,000	1,800	70.9
R0.4	40,000	2,800	110.2	40,000	2,100	82.7	40,000	2,800	110.2	35,000	1,800	70.9
R0.45	40,000	3,200	126.0	38,000	2,200	86.6	38,000	3,000	118.1	32,000	1,800	70.9
R0.5	40,000	3,200	126.0	35,000	2,200	86.6	35,000	3,000	118.1	30,000	1,800	70.9
R0.75	40,000	3,600	141.7	30,000	2,300	90.6	32,000	3,000	118.1	25,000	1,800	70.9
R1	35,000	3,500	137.8	25,000	2,200	86.6	28,000	2,800	110.2	20,000	1,700	66.9
R1.5	30,000	3,400	133.9	23,000	2,200	86.6	24,000	2,600	102.4	16,000	1,500	59.1
R2	25,000	3,400	133.9	20,000	2,200	86.6	20,000	2,600	102.4	14,000	1,500	59.1
R2.5	23,000	3,400	133.9	17,000	2,200	86.6	18,000	2,600	102.4	12,000	1,500	59.1
R3	20,000	3,400	133.9	15,000	2,200	86.6	16,000	2,600	102.4	10,000	1,400	55.1
R4	15,000	3,000	118.1	12,500	2,000	78.7	10,000	2,000	78.7	7,500	1,200	47.2
R5	12,000	3,000	118.1	10,000	2,000	78.7	8,000	2,000	78.7	6,000	1,200	47.2
R6	10,000	2,600	102.4	8,300	1,800	70.9	6,600	1,700	66.9	5,000	1,100	43.3



- 1) α is the inclination of machining surface.
- 2) Please use VF2SB for workpieces of 55HRC or above.
- 3) If the rigidity of the machine or the workpiece installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately. When high machining accuracy is needed, we recommend lowering the feed rate.
- 4) Cutting conditions may differ considerably due to the overhang (milling depth and neck length), depth of cut, and machine tool condition. Please use the above table as a standard starting point.
- 5) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 6) When machining with a very small diameter end mill, the use of oil mist or non-water-soluble cutting fluid is recommended.

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 (Tools specifications subject to change without notice.)