

High precision mold manufacture solution

# *The Mirror Endmill*

PCD Endmill / cBN Endmill / H-star Endmill



# The Mirror Endmill

PCD Endmill / cBN Endmill / H-star Endmill

The Mirror

## PCD Endmill



### Polishing PCD ball Endmill

For polishing of high precision workpiece and high hardness mold

- Optimal surface finish by PCD ball Endmill with no edge
- Nano-level surface finish due to its ultra-fine Endmill
- Enhanced wear resistance from applying the optimal grade for PCD

The Mirror

## cBN Endmill



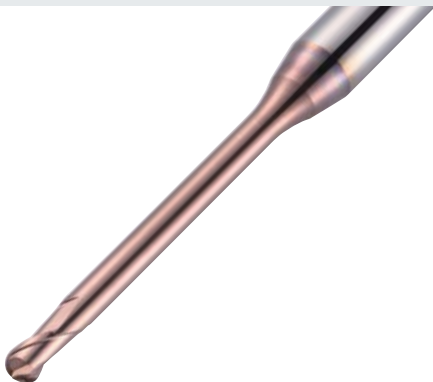
### cBN ball Endmill for high hardness cutting

For ultra-fine and mirror-like workpiece and mold with over HRC60 machining

- Higher productivity and surface finish in high speed cutting
- Enhanced wear resistance due to the optimal cBN grade
- Longer tool life by shape with strong cutting edge
- Stable tool life and surface from high precision Endmill

The Mirror

## H-star Endmill



### Suitable for high speed cutting of workpiece with HRC50~63

Proper for the various cutting processes with long neck, rib and taper neck etc.

- Stronger cutting edge strength of the tool applied ultra-fine substrate
- Enhanced high temperature heat resistance by applying new coating layer on the edge in high speed cutting
- Stable cutting performance due to the optimal cutting edge for high speed machining

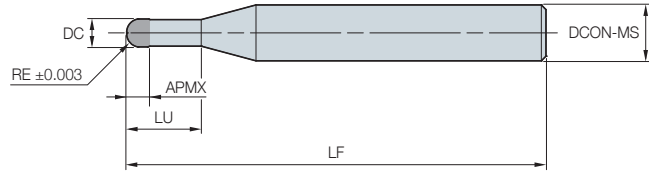
# The Mirror PCD Endmill

## PCD-MBE0000 (Ball)



h3 shank

Type	Tolerance	R tolerance
DC	0.3 ~ 2.0	0.000 ~ -0.008
RE	0.3 ~ 2.0	±0.003



(mm)

Designation	Drill dia. [DC]	R [RE]	Flute length [APMX]	Neck length [LU]	Overall length [LF]	Shank dia. [DCON-MS]
PCD-MBE 0003-048-N007S04	0.3	0.15	0.15	0.75	48	4
0004-048-N010S04	0.4	0.2	0.2	1	48	4
0006-048-N015S04	0.6	0.3	0.3	1.5	48	4
0010-048-N025S04	1	0.5	0.5	2.5	48	4
0015-048-N040S04	1.5	0.75	0.75	4	48	4
0020-048-N050S04	2	1	1	5	48	4

## Recommended cutting conditions

(mm)

Drill dia. (DC, Ø)	R	High speed steel, pre-hardened steel and heat treatment steel (~HRC65)			
		n (min <sup>-1</sup> )	vf (mm/min)	ap (mm)	ae (mm)
0.3 ~ 0.4	0.15 ~ 0.2	40,000	200	0.002	0.002
0.6	0.3	40,000	400	0.003	0.003
1	0.5	40,000	500	0.005	0.005
1.5 ~ 2	0.75 ~ 1	40,000	600	0.005	0.005

## Application Examples

### Surface finish, wear resistance

- Workpiece \_\_\_\_\_ STD11(HRC60)
- Cutting conditions \_\_\_\_\_ n (min<sup>-1</sup>) = 40,000,  
vf (mm/min) = 400, ap (mm) = 0.003,  
ae (mm) = 0.003, Mist
- Tools \_\_\_\_\_ PCD-MBE2004-048-N010S04
- Wear resistance \_\_\_\_\_ 3μm (Continuous cutting for 10h)



► After continuous cutting for 10h



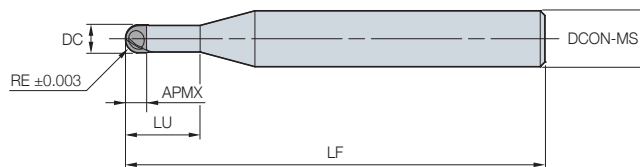
# The Mirror Endmill

## The Mirror CBN Endmill

### cBN-MBE2000 (Ball)



Type	Tolerance	R tolerance
DC	0.4 ~ 2.0	0.000 ~ -0.008
RE	0.4 ~ 2.0	±0.003



(mm)

Designation	Drill dia. [DC]	R [RE]	Flute length [APMX]	Neck length [LU]	Overall length [LF]	Shank dia. [DCON-MS]
<b>cBN-MBE</b> 2004-050-N005S04	0.4	0.2	0.33	0.5	50	4
2004-050-N010S04	0.4	0.2	0.33	1	50	4
2005-050-N010S04	0.5	0.25	0.38	1	50	4
2006-050-N015S04	0.6	0.3	0.5	1.5	50	4
2008-050-N020S04	0.8	0.4	0.6	2	50	4
2010-050-N025S04	1	0.5	0.7	2.5	50	4
2012-050-N030S04	1.2	0.6	0.8	3	50	4
2015-050-N040S04	1.5	0.75	1	4	50	4
2020-050-N050S04	2	1	1.2	5	50	4

### Recommended cutting conditions

(mm)

Drill dia. (DC, Ø)	Neck length (LU)	HrC-55				HrC55-65				HrC65-68			
		n (min <sup>-1</sup> )	vf (mm/min)	ap (mm)	ae (mm)	n (min <sup>-1</sup> )	vf (mm/min)	ap (mm)	ae (mm)	n (min <sup>-1</sup> )	vf (mm/min)	ap (mm)	ae (mm)
0.4	0.5	40,000	1,500	0.005	0.010	40,000	1,200	0.005	0.010	40,000	750	0.005	0.005
0.4	1	40,000	1,200	0.005	0.010	40,000	900	0.005	0.010	40,000	600	0.005	0.005
0.5	1	40,000	1,500	0.010	0.010	40,000	1,400	0.010	0.010	40,000	900	0.010	0.010
0.6	1.5	35,000	2,000	0.020	0.030	35,000	2,000	0.020	0.030	35,000	1,000	0.010	0.020
0.8	2	35,000	2,000	0.030	0.040	35,000	2,000	0.020	0.030	35,000	1,500	0.010	0.020
1	2.5	35,000	3,000	0.040	0.050	35,000	3,000	0.030	0.040	35,000	2,000	0.020	0.030
1.2	3	35,000	3,000	0.050	0.050	35,000	2,500	0.035	0.035	35,000	2,000	0.020	0.025
1.5	4	30,000	3,000	0.060	0.060	30,000	2,500	0.040	0.040	30,000	2,000	0.020	0.025
2	5	30,000	3,000	0.080	0.080	30,000	2,500	0.050	0.050	30,000	2,000	0.020	0.050

· The cutting conditions above are for drilling with external coolant and cutting depth, under 5D.

## Application Examples

### Surface finish, wear resistance

- **Workpiece** \_\_\_\_\_ STD11(HrC60)
- **Cutting conditions**  $n$  (min-1) = 40,000,  $vf$  (mm/min) = 700,  $ap$  (mm) = 0.005,  $ae$  (mm) = 0.01, Mist
- **Tools** \_\_\_\_\_ cBN-MBE2004-050-N010S04
- **Wear resistance** \_\_\_\_\_  $5\mu m$  (Continuous cutting for 2h)

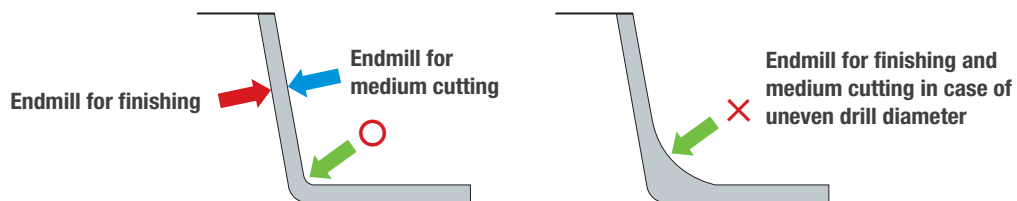


► After continuous cutting for 2h



► Maintain the shape of cutting edge even after continuous cutting for 2h

## Notice for cBN Endmill



- Please select the same drill diameter as the Endmill for finishing (cBN Endmill) considering minimizing the amount of rest cutting in selecting Endmill for medium cutting

## Order-made tool

- Please fill the data sheet and send Korloy office then, we can customize tool you want.

<b>Workpiece</b>	Workpiece material	
	HrC	
<b>Drill Dia.</b> (mm)	DC ( $\varnothing 0.4 \sim \varnothing 2$ )	
<b>Flute length</b> (mm)	APMX (0.33 ~ 1.2)	
<b>Neck length</b> (mm)	LU (0.5 ~ 5)	
<b>Overall length</b> (mm)	LF	
<b>Shank Dia.</b> (mm)	DCON-MS	



[ ] is the range of order-made

# The Mirror Endmill

The Mirror

## H-star Endmill

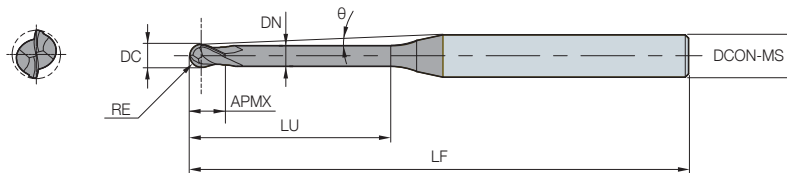
### ESLNB

Long neck Ball



ULTRA FINE
2
H-A 30°
R ±0.005 Above O6
AlTiN
h5 shank
재종 PC305H

Type	Tolerance	R tolerance
DC	All	0.000 ~ -0.015
RE	-	±0.005



(mm)

Designation	R [RE]	Drill dia. [DC]	Shank dia. [DCON-MS]	Flute length [APMX]	Neck length [LU]	Neck Diameter [DN]	$\theta$	Overall length [LF]	Effective length by inclination angle				
									0.5°	1°	1.5°	2°	3°
ESLNB2001-0.2	0.05	0.1	4	0.08	0.2	0.08	11.8	45	0.3	0.3	0.3	0.4	0.4
ESLNB2001-0.3	0.05	0.1	4	0.08	0.3	0.08	11.7	45	0.4	0.4	0.5	0.5	0.5
ESLNB2001-0.5	0.05	0.1	4	0.08	0.5	0.08	11.4	45	0.6	0.7	0.7	0.7	0.8
ESLNB2002-0.5	0.1	0.2	4	0.15	0.5	0.17	11.5	50	1.2	1.3	1.5	1.6	2
ESLNB2002-1	0.1	0.2	4	0.15	1	0.17	10.9	50	1.7	1.9	2.1	2.3	2.7
ESLNB2002-1.5	0.1	0.2	4	0.15	1.5	0.17	10.4	50	2.3	2.5	2.8	3	3.4
ESLNB2002-2	0.1	0.2	4	0.15	2	0.17	9.9	50	2.8	3.1	3.4	3.6	4.1
ESLNB2002-2.5	0.1	0.2	4	0.15	2.5	0.17	9.5	50	3.4	3.7	4	4.2	4.7
ESLNB2002-3.0	0.1	0.2	4	0.15	3	0.17	9.1	50	3.9	4.3	4.6	4.9	5.4
ESLNB2003-1	0.15	0.3	4	0.25	1	0.27	10.9	50	1.7	1.9	2.1	2.3	2.7
ESLNB2003-1.5	0.15	0.3	4	0.25	1.5	0.27	10.4	50	2.3	2.5	2.7	3	3.4
ESLNB2003-2	0.15	0.3	4	0.25	2	0.27	9.9	50	2.8	3.1	3.4	3.6	4
ESLNB2003-2.5	0.15	0.3	4	0.25	2.5	0.27	9.5	50	3.4	3.7	4	4.2	4.7
ESLNB2003-3	0.15	0.3	4	0.25	3	0.27	9.1	50	3.9	4.3	4.6	4.8	5.3
ESLNB2004-1	0.2	0.4	4	0.3	1	0.37	11	50	1.7	1.9	2.1	2.3	2.7
ESLNB2004-1.5	0.2	0.4	4	0.3	1.5	0.37	10.4	50	2.3	2.5	2.7	2.9	3.4
ESLNB2004-2	0.2	0.4	4	0.3	2	0.37	9.9	50	2.8	3.1	3.4	3.6	4
ESLNB2004-2.5	0.2	0.4	4	0.3	2.5	0.37	9.5	50	3.4	3.7	4	4.2	4.7
ESLNB2004-3	0.2	0.4	4	0.3	3	0.37	9.1	50	3.9	4.3	4.6	4.8	5.3
ESLNB2004-3.5	0.2	0.4	4	0.3	3.5	0.37	8.7	50	4.5	4.8	5.2	5.4	6
ESLNB2004-4	0.2	0.4	4	0.3	4	0.37	8.3	50	5	5.4	5.7	6	6.6
ESLNB2004-4.5	0.2	0.4	4	0.3	4.5	0.37	8	50	5.6	6	6.3	6.6	7.2
ESLNB2005-1	0.25	0.5	4	0.35	1	0.47	11	50	1.7	1.9	2.1	2.3	2.6
ESLNB2005-2	0.25	0.5	4	0.35	2	0.47	9.9	50	2.8	3.1	3.3	3.6	4
ESLNB2005-3	0.25	0.5	4	0.35	3	0.47	9	50	3.9	4.3	4.6	4.8	5.3
ESLNB2005-4	0.25	0.5	4	0.35	4	0.47	8.3	50	5	5.4	5.7	6	6.6
ESLNB2005-5	0.25	0.5	4	0.35	5	0.47	7.7	50	6.1	6.5	6.9	7.2	7.8
ESLNB2005-6	0.25	0.5	4	0.35	6	0.47	7.1	50	7.2	7.6	8	8.4	9
ESLNB2005-8	0.25	0.5	4	0.35	8	0.47	6.3	50	9.3	9.9	10.3	10.7	11.4

# ESLNB

Long neck Ball



ULTRA FINE



H-A 30°

R ±0.005

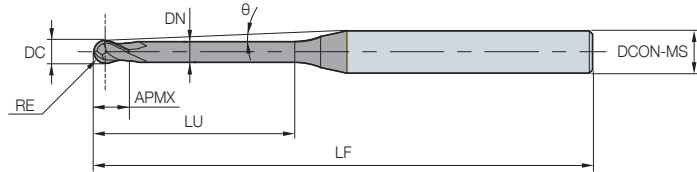
Above O6

ALTiN

h5 shank

재종 PC305H

Type	Tolerance	R tolerance
DC	All	0.000 ~ -0.015
RE	-	±0.005



(mm)

Designation	R [RE]	Drill dia. [DC]	Shank dia. [DCON-MS]	Flute length [APMX]	Neck length [LU]	Neck Diameter [DN]	θ	Overall length [LF]	Effective length by inclination angle				
									0.5°	1°	1.5°	2°	3°
ESLNB2006-1	0.3	0.6	4	0.4	1	0.57	11	50	1.7	1.9	2.1	2.3	2.6
ESLNB2006-2	0.3	0.6	4	0.4	2	0.57	9.9	50	2.8	3.1	3.3	3.6	4
ESLNB2006-3	0.3	0.6	4	0.4	3	0.57	9	50	3.9	4.3	4.5	4.8	5.3
ESLNB2006-4	0.3	0.6	4	0.4	4	0.57	8.3	50	5	5.4	5.7	6	6.6
ESLNB2006-5	0.3	0.6	4	0.4	5	0.57	7.6	50	6.1	6.5	6.9	7.2	7.8
ESLNB2006-6	0.3	0.6	4	0.4	6	0.57	7.1	50	7.2	7.6	8	8.4	9
ESLNB2006-7	0.3	0.6	4	0.4	7	0.57	6.6	50	8.3	8.8	9.2	9.5	10.2
ESLNB2006-8	0.3	0.6	4	0.4	8	0.57	6.2	50	9.3	9.9	10.3	10.7	11.4
ESLNB2006-9	0.3	0.6	4	0.4	9	0.57	5.8	50	10.4	10.9	11.4	11.8	12.5
ESLNB2006-10	0.3	0.6	4	0.4	10	0.57	5.5	50	11.4	12	12.5	12.9	13.7
ESLNB2006-12	0.3	0.6	4	0.4	12	0.57	5	50	13.6	14.2	14.7	15.2	16
ESLNB2008-2	0.4	0.8	4	0.5	2	0.77	9.9	50	2.8	3.1	3.3	3.5	4
ESLNB2008-4	0.4	0.8	4	0.5	4	0.77	8.2	50	5	5.4	5.7	6	6.5
ESLNB2008-5	0.4	0.8	4	0.5	5	0.77	7.5	50	6.1	6.5	6.9	7.2	7.8
ESLNB2008-6	0.4	0.8	4	0.5	6	0.77	7	50	7.2	7.6	8	8.4	9
ESLNB2008-8	0.4	0.8	4	0.5	8	0.77	6.1	50	9.3	9.8	10.3	10.7	11.3
ESLNB2008-10	0.4	0.8	4	0.5	10	0.77	5.4	50	11.4	12	12.5	12.9	13.7
ESLNB2010-2	0.5	1	4	0.8	2	0.96	9.9	50	2.9	3.1	3.3	3.5	4
ESLNB2010-3	0.5	1	4	0.8	3	0.96	8.9	50	4	4.3	4.5	4.8	5.3
ESLNB2010-4	0.5	1	4	0.8	4	0.96	8.1	50	5	5.4	5.7	6	6.5
ESLNB2010-5	0.5	1	4	0.8	5	0.96	7.4	50	6.1	6.5	6.9	7.2	7.8
ESLNB2010-6	0.5	1	4	0.8	6	0.96	6.8	50	7.2	7.7	8	8.4	9
ESLNB2010-7	0.5	1	4	0.8	7	0.96	6.3	50	8.3	8.8	9.2	9.5	10.2
ESLNB2010-8	0.5	1	4	0.8	8	0.96	5.9	50	9.3	9.9	10.3	10.7	11.3
ESLNB2010-9	0.5	1	4	0.8	9	0.96	5.5	50	10.4	11	11.4	11.8	12.5
ESLNB2010-10	0.5	1	4	0.8	10	0.96	5.2	50	11.5	12	12.5	12.9	13.7
ESLNB2010-12	0.5	1	4	0.8	12	0.96	4.6	55	13.6	14.2	14.7	15.2	15.9
ESLNB2010-14	0.5	1	4	0.8	14	0.96	4.2	55	15.7	16.4	16.9	17.4	18.5
ESLNB2010-16	0.5	1	4	0.8	16	0.96	3.8	55	17.8	18.5	19.1	19.6	21.2



# The Mirror Endmill

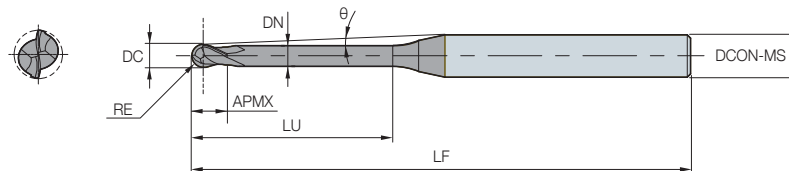
## H-star Endmill

### ESLNB

Long neck Ball



Type	Tolerance	R tolerance
DC	All	0.000 ~ -0.015
RE	-	±0.005



(mm)

Designation	R [RE]	Drill dia. [DC]	Shank dia. [DCON-MS]	Flute length [APMX]	Neck length [LU]	Neck Diameter [DN]	θ	Overall length [LF]	Effective length by inclination angle				
									0.5°	1°	1.5°	2°	3°
ESLNB2010-18	0.5	1	4	0.8	18	0.96	3.5	60	19.9	20.7	21.3	21.8	23.8
ESLNB2010-20	0.5	1	4	0.8	20	0.96	3.3	60	22	22.8	23.4	24	26.5
ESLNB2012-4	0.6	1.2	4	1.1	4	1.15	7.9	50	5.1	5.4	5.7	6	6.5
ESLNB2012-6	0.6	1.2	4	1.1	6	1.15	6.6	50	7.2	7.7	8	8.4	9
ESLNB2012-8	0.6	1.2	4	1.1	8	1.15	5.7	50	9.4	9.9	10.3	10.7	11.3
ESLNB2012-10	0.6	1.2	4	1.1	10	1.15	5	50	11.5	12.1	12.5	12.9	13.7
ESLNB2012-12	0.6	1.2	4	1.1	12	1.15	4.5	55	13.6	14.2	14.7	15.2	15.9
ESLNB2014-8	0.7	1.4	4	1.3	8	1.34	5.5	50	9.4	9.9	10.3	10.7	11.3
ESLNB2014-12	0.7	1.4	4	1.3	12	1.34	4.3	55	13.6	14.2	14.7	15.2	15.9
ESLNB2014-16	0.7	1.4	4	1.3	16	1.34	3.5	55	17.8	18.5	19.1	19.6	21.2
ESLNB2015-4	0.75	1.5	4	1.35	4	1.44	7.7	50	5.1	5.4	5.7	6	6.5
ESLNB2015-6	0.75	1.5	4	1.35	6	1.44	6.4	50	7.3	7.7	8	8.4	9
ESLNB2015-8	0.75	1.5	4	1.35	8	1.44	5.4	50	9.4	9.9	10.3	10.7	11.3
ESLNB2015-10	0.75	1.5	4	1.35	10	1.44	4.7	50	11.5	12.1	12.5	12.9	13.7
ESLNB2015-12	0.75	1.5	4	1.35	12	1.44	4.2	55	13.6	14.2	14.7	15.2	15.9
ESLNB2015-14	0.75	1.5	4	1.35	14	1.44	3.8	55	15.7	16.4	16.9	17.4	18.5
ESLNB2015-16	0.75	1.5	4	1.35	16	1.44	3.4	55	17.8	18.5	19.1	19.6	21.1
ESLNB2015-20	0.75	1.5	4	1.35	20	1.44	2.9	60	22	22.8	23.4	24	-
ESLNB2016-8	0.8	1.6	4	1.4	8	1.54	5.3	50	9.4	9.9	10.3	10.7	11.3
ESLNB2016-10	0.8	1.6	4	1.4	10	1.54	4.6	55	11.5	12.1	12.5	12.9	13.7
ESLNB2016-12	0.8	1.6	4	1.4	12	1.54	4.1	55	13.6	14.2	14.7	15.2	15.9
ESLNB2016-16	0.8	1.6	4	1.4	16	1.54	3.3	55	17.8	18.5	19.1	19.6	21.1
ESLNB2016-20	0.8	1.6	4	1.4	20	1.54	2.8	60	22	22.8	23.4	24	-
ESLNB2018-8	0.9	1.8	4	1.6	8	1.73	5.1	50	9.4	9.9	10.3	10.7	11.3
ESLNB2018-12	0.9	1.8	4	1.6	12	1.73	3.9	55	13.7	14.3	14.7	15.2	15.9
ESLNB2018-16	0.9	1.8	4	1.6	16	1.73	3.1	55	17.9	18.6	19.1	19.6	21.1
ESLNB2018-20	0.9	1.8	4	1.6	20	1.73	2.6	60	22	22.8	23.4	24	-
ESLNB2020-3	1	2	4	1.7	3	1.92	8.3	50	4.1	4.4	4.6	4.8	5.2
ESLNB2020-4	1	2	4	3	4	1.92	7.3	50	5.2	5.5	5.8	6	6.5



# ESLNB

Long neck Ball

ULTRA  
FINE

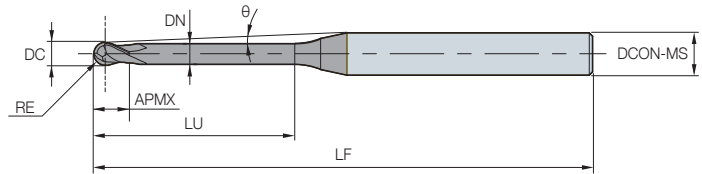
2

H-A  
30°R  
±0.005

ALTiN

h5  
shank재종  
PC305H

Type	Tolerance	R tolerance
DC	All	0.000 ~ -0.015
RE	-	±0.005



(mm)

Designation	R [RE]	Drill dia. [DC]	Shank dia. [DCON-MS]	Flute length [APMX]	Neck length [LU]	Neck Diameter [DN]	$\theta$	Overall length [LF]	Effective length by inclination angle				
									0.5°	1°	1.5°	2°	3°
ESLNB2020-6	1	2	4	3	6	1.92	5.8	50	7.3	7.7	8.1	8.4	9
ESLNB2020-8	1	2	4	3	8	1.92	4.9	50	9.5	9.9	10.3	10.7	11.3
ESLNB2020-10	1	2	4	3	10	1.92	4.2	50	11.6	12.1	12.6	12.9	13.6
ESLNB2020-12	1	2	4	3	12	1.92	3.7	55	13.7	14.3	14.8	15.2	15.9
ESLNB2020-14	1	2	4	3	14	1.92	3.2	55	15.8	16.4	16.9	17.4	18.5
ESLNB2020-16	1	2	4	3	16	1.92	2.9	55	17.9	18.6	19.1	19.6	-
ESLNB2020-18	1	2	4	3	18	1.92	2.7	60	20	20.7	21.3	21.8	-
ESLNB2020-20	1	2	4	3	20	1.92	2.4	60	22.1	22.8	23.4	24	-
ESLNB2020-22	1	2	4	3	22	1.92	2.3	60	24.1	24.9	25.6	26.3	-
ESLNB2020-25	1	2	4	3	25	1.92	2	65	27.3	28.1	28.8	-	-
ESLNB2020-30	1	2	4	3	30	1.92	1.7	70	32.4	33.4	34.2	-	-
ESLNB2020-35	1	2	4	3	35	1.92	1.5	75	37.6	38.6	-	-	-
ESLNB2020-40	1	2	4	3	40	1.92	1.4	80	42.8	43.8	-	-	-
ESLNB2025-10	1.25	2.5	4	4	10	2.4	3.4	50	11.6	12.1	12.6	13	13.6
ESLNB2025-16	1.25	2.5	4	4	16	2.4	2.3	55	17.9	18.6	19.1	19.6	-
ESLNB2025-20	1.25	2.5	4	4	20	2.4	1.9	60	22.1	22.8	23.5	-	-
ESLNB2030-8	1.5	3	6	4	8	2.88	6.2	55	9.6	10	10.4	10.7	11.3
ESLNB2030-10	1.5	3	6	4	10	2.88	5.5	55	11.7	12.2	12.6	13	13.6
ESLNB2030-13	1.5	3	6	4	13	2.88	4.6	60	14.8	15.4	15.9	16.3	17.1
ESLNB2030-16	1.5	3	6	4	16	2.88	4	60	18	18.6	19.1	19.6	21.1
ESLNB2030-18	1.5	3	6	4	18	2.88	3.6	60	20	20.7	21.3	21.8	23.7
ESLNB2030-20	1.5	3	6	4	20	2.88	3.4	65	22.1	22.9	23.5	24	26.4
ESLNB2030-25	1.5	3	6	4	25	2.88	2.8	70	27.3	28.2	28.8	29.9	-
ESLNB2030-30	1.5	3	6	4	30	2.88	2.2	75	37.7	38.7	40	41.9	-
ESLNB2030-35	1.5	3	6	4	35	2.88	4.5	80	11.6	12.1	12.5	12.9	13.5
ESLNB2040-10	2	4	6	5	10	3.9	3.6	55	14.7	15.3	15.8	16.2	17
ESLNB2040-13	2	4	6	5	13	3.9	3.1	60	17.9	18.5	19.1	19.5	20.9
ESLNB2040-16	2	4	6	5	16	3.9	2.5	60	22.1	22.8	23.4	23.9	-
ESLNB2040-20	2	4	6	5	20	3.9	2.1	65	27.3	28.1	28.8	29.8	-

# The Mirror Endmill

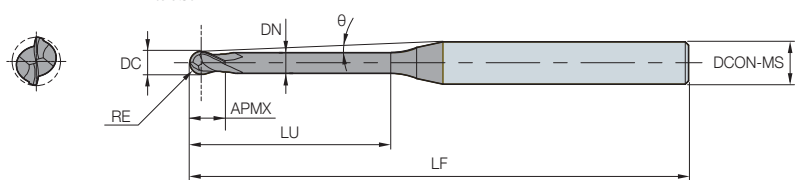
## H-star Endmill

### ESLNB Long neck Ball



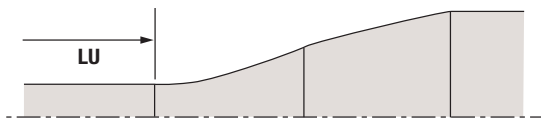
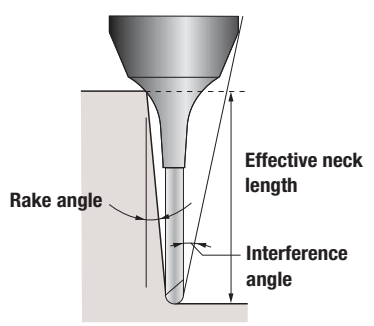
ULTRA FINE
2
H-A 30°
R ±0.005 Above O6
ALTiN
h5 shank
재종 PC305H

Type	Tolerance	R tolerance
DC	All	0.000 ~ -0.015
RE	-	±0.005



Designation	R [RE]	Drill dia. [DC]	Shank dia. [DCON-MS]	Flute length [APMX]	Neck length [LU]	Neck Diameter [DN]	$\theta$	Overall length [LF]	Effective length by inclination angle				
									0.5°	1°	1.5°	2°	3°
ESLNB2040-25	2	4	6	5	25	3.9	1.8	70	32.4	33.4	34.2	-	-
ESLNB2040-30	2	4	6	5	30	3.9	1.6	75	37.6	38.6	39.9	-	-
ESLNB2040-35	2	4	6	5	35	3.9	1.4	80	42.8	43.8	-	-	-
ESLNB2040-40	2	4	6	5	40	3.9	1.2	80	47.9	49.1	-	-	-
ESLNB2040-45	2	4	6	5	45	3.9	1.1	90	53.1	54.5	-	-	-
ESLNB2040-50	2	4	6	5	50	3.9	1.4	100	22	22.8	-	-	-
ESLNB2050-20	2.5	5	6	6	20	4.9	1.2	65	27.2	28.1	-	-	-
ESLNB2050-25	2.5	5	6	6	25	4.9	1	70	32.4	-	-	-	-
ESLNB2050-30	2.5	5	6	6	30	4.9	0.8	75	42.8	-	-	-	-
ESLNB2050-35	2.5	5	6	6	35	4.9	0.7	80	42.8	-	-	-	-
ESLNB2050-40	2.5	5	6	6	40	4.9		90					

\* The above specifications are subject to change without prior notice for product quality improvement.



\* The marked effective neck length is the default value to prevent interference with the workpiece. Proper control of the processing environment is required.

### • Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HrC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HrC55	SKD11 HrC55~63					
		○	◎	◎	○				

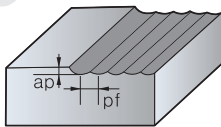
◎: Excellent ○: Good

## Recommended cutting conditions

Long neck ball

Workpiece	Alloy steel, HRSA			Heat treated steel			High hardness steel			Copper, copper alloy		
	HRC30~45			HRC45~55			HRC55~65			(Copper Alloys)		
Hardness												
Cutting conditions	n	vf	ae	n	vf	ae	n	vf	ae	n	vf	ae
Flute Dia. (mm)	(min <sup>-1</sup> )	(mm/min)	(mm)	(min <sup>-1</sup> )	(mm/min)	(mm)	(min <sup>-1</sup> )	(mm/min)	(mm)	(min <sup>-1</sup> )	(mm/min)	(mm)
0.1	50,000	250	0.003~0.006	50000	225	0.002~0.005	50,000	188	0.002~0.004	50000	300	0.005~0.009
0.2	40,800~50,000	212~325	0.003~0.016	36,000~45,500	173~273	0.002~0.013	33,600~42,000	134~210	0.002~0.012	48,000~50,000	232~420	0.005~0.024
0.3	45,900~50,000	372~450	0.006~0.021	40,500~45,000	310~383	0.005~0.017	37,800~42,000	272~336	0.004~0.016	47,000~50,000	540~600	0.009~0.032
0.4	32,640~50,000	305~770	0.006~0.034	28,800~46,800	245~655	0.005~0.027	26,880~43,680	228~612	0.004~0.025	46,080~50,000	470~967	0.010~0.051
0.5	27,200~44,200	416~1,193	0.006~0.036	24,000~39,000	367~1,053	0.005~0.029	22,400~36,400	324~743	0.004~0.027	38,400~50,000	653~1,500	0.009~0.054
0.6	20,400~50,000	424~1,950	0.005~0.060	18,000~48,000	346~1,728	0.004~0.048	16,800~44,800	269~1,344	0.004~0.045	28,800~50,000	691~2,250	0.008~0.090
0.8	27,200~50,000	740~2,400	0.033~0.096	24,000~48,000	612~2,592	0.027~0.078	22,400~44,800	533~1,882	0.025~0.072	38,400~50,000	1,175~2,700	0.050~0.144
1	18,360~45,900	661~3,098	0.008~0.160	16,200~43,200	544~2,722	0.006~0.130	15,120~37,800	484~2,268	0.006~0.120	25,920~50,000	1,037~3,750	0.012~0.240
1.2	29,376~39,230	1,322~2,717	0.030~0.160	25,920~36,923	1,026~2,555	0.024~0.130	24,192~32,307	871~1,860	0.022~0.120	41,472~50,000	1,940~3,924	0.045~0.240
1.5	19,040~35,700	971~3,213	0.030~0.160	16,800~31,500	771~2,552	0.024~0.130	15,680~29,400	666~2,205	0.022~0.120	26,880~50,000	1,508~4,951	0.045~0.240
2	10,710~26,775	617~3,616	0.017~0.320	9,450~23,625	514~3,049	0.014~0.260	8,820~22,050	452~2,646	0.013~0.240	15,120~37,800	968~5,670	0.026~0.480
3	10,880~20,400	1,239~4,100	0.064~0.480	9,600~18,000	1,028~3,402	0.052~0.0390	10,752~16,800	1,097~3,024	0.048~0.360	15,360~28,800	1,958~6,480	0.096~0.720
4	7,820~14,663	1,196~3,960	0.080~0.480	6,900~12,938	997~3,299	0.065~0.390	6,440~12,075	876~2,898	0.060~0.360	11,040~20,700	1,877~6,210	0.120~0.720
5	8,262~10,710	1,487~3,213	0.160~0.420	7,290~9,450	1,313~2,835	0.130~0.341	6,804~8,820	1,103~2,381	0.12~0.315	11,664~15,120	2,520~5,443	0.240~0.630

### Depth of cut



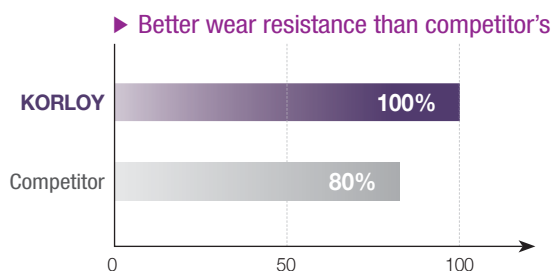
- $a_p = 0.02D$
- $p_f = 0.05D$

※ Please reduce the RPM and feed rate in the chart above with equal proportions in clamping workpiece with chattering and low rigidity.

## Application Examples

### Wear resistance, chipping resistance

- **Workpiece** \_\_\_\_\_ STD11Heat treatment (HRC55~60)
- **Cutting conditions** \_  $n$  (min<sup>-1</sup>) = 40,000,  $vf$  (mm/min) = 400,  
 $a_p$  (mm) = 0.03,  $ae$  (mm) = 0.03, Mist
- **Tools** \_\_\_\_\_ ESLNB2006-2
- **Machining** \_\_\_\_\_ Pocket














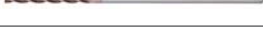







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Competitor

# The Mirror Endmill

## H-star Endmill Line up

Type	Designation	Shape	Coated	No. of flute	Drill dia.( $\varnothing$ )		Workpiece					
					Min	Max	P	M	K	N	S	H
							Steel	Stainless steel	Cast iron	Non-ferrous metal	Heat resistant alloy/ Titanium alloy	Hardened steel
ball	ESB702		AlTiN	2	0.1	12.0	⊙	⊙	⊙	○	○	⊙
	ESB712			2	1.0	12.0	⊙	⊙	⊙	○	○	⊙
	ESB703			3	2.0	12.0	⊙	⊙	⊙	○	○	⊙
	ESB734			4	2.0	10.0	⊙	⊙	⊙	○	○	⊙
Flat	ESE702		AlTiN	2	0.1	20.0	⊙	⊙	⊙	○	○	⊙
	ESE712			2	1.0	6.0	⊙	⊙	⊙	○	○	⊙
	ESE704			4	1.0	20.0	⊙	⊙	⊙	○	○	⊙
	ESE714			4	1.0	12.0	⊙	⊙	⊙	○	○	⊙
	ESE724(6)			4/6	1.0	12.0	⊙	⊙	⊙	○	○	⊙
	ESE744			4	1.0	12.0	⊙	⊙	⊙	○	○	⊙
	ESE716			6	6.0	20.0	⊙	⊙	⊙	○	○	⊙
Radius	ESR702		AlTiN	2	1.0	12.0	⊙	⊙	⊙	○	○	⊙
	ESR732			2	1.0	12.0	⊙	⊙	⊙	○	○	⊙
	ESR704			4	1.0	12.0	⊙	⊙	⊙	○	○	⊙
	ESR714			4	3.0	12.0	⊙	⊙	⊙	○	○	⊙
	ESR724			4	6.0	12.0	⊙	⊙	⊙	○	○	⊙
	ESR734			4	1.0	12.0	⊙	⊙	⊙	○	○	⊙
	ESR706			6	6.0	12.0	⊙	⊙	⊙	○	○	⊙
	ESR736			6	6.0	12.0	⊙	⊙	⊙	○	○	⊙

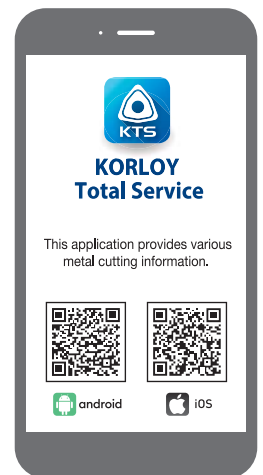
Type	Designation	Shape	Coated	No. of flute	Drill dia.( $\varnothing$ )		Workpiece					
					Min	Max	P	M	K	N	S	H
							Steel	Stainless steel	Cast iron	Non-ferrous metal	Heat resistant alloy/ Titanium alloy	Hardened steel
Rib ball	ESRB712		AlTiN	2	0.1	12.0	○	○	○	○	○	○
Rib flat	ESRE712		AlTiN	2	0.1	12.0	○	○	○	○	○	○
	ESRE714			4	0.5	12.0	○	○	○	○	○	○
Rib radius	ESRR712		AlTiN	2	0.2	16.0	○	○	○	○	○	○
	ESRR714			4	0.5	20.0	○	○	○	○	○	○
Flat	ESXE704		AlTiN	4	1.0	12.0	○	○	○	○	○	○
	ESXE714			4	2.0	12.0	○	○	○	○	○	○
Radius	ESXR704		AlTiN	4	2.0	12.0	○	○	○	○	○	○
Rib ball	ESLNB		AlTiN	2	0.1	5.0	○	○	○	○	○	○
	ESTNB20			2	0.2	10.0	○	○	○	○	○	○
	ESTNB30			3	2.0	5.0	○	○	○	○	○	○
Rib flat	ESLNS20		AlTiN	2	0.1	5.0	○	○	○	○	○	○
	ESLNS40			4	1.0	5.0	○	○	○	○	○	○
Rib radius	ESLNR		AlTiN	2	0.2	3.0	○	○	○	○	○	○
	ESTNR			2	0.2	3.0	○	○	○	○	○	○
High feed	ESPM4		AlTiN	4	3.0	12.0	○	○	○	○	○	○

### ⚠ For the safe metalcutting

- Use safety supplies such as protective gloves to prevent possible injury while touching the edge of tools.
- Use safety glasses or safety cover to hedge possible dangers. Inappropriate usage or excessive cutting condition may lead tool's breakage or even the fragment's scattering.
- Clamp the workpiece tightly enough to prevent its movement while its machining.
- Properly manage the tool change phase because the inordinately used tool can be easily broken under the excessive cutting load or severe wear, and it may threat the operator's safety.
- Use safety cover because chips evacuated during cutting are hot and sharp and may cause burns and cuts. To remove chips safely, stop machining, put on protective gloves, and use a hook or other tools.
- Prepare for fire prevention measures as the use of the non-water soluble cutting oil may cause fire.
- Use safety cover and other safety supplies because the spare parts or the inserts can be pulled out due to centrifugal force while high speed machining.



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