MOLDINO
The Edge To Innovation

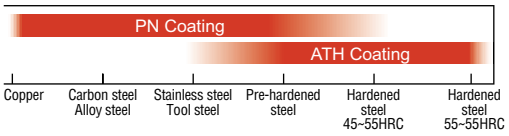
Carbide Miniature End Mill

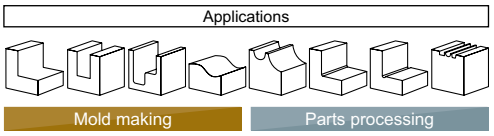
# EPDBE-PN/ATH
# EPDSE-PN/ATH

**Epoch Deep Evolution series**

MOLDINO Tool Engineering, Ltd.
New Product News | No.1110E-14 | 2026-2

## Features 01 Features of Epoch Deep Evolution




EPDBE-ATH/PN
RE0.05～RE3 [164 Items×2]

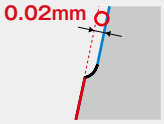
EPDSE-ATH/PN
φ0.1～φ6 [145 Items×2]

### Flute shape increases resistance to breakage.

#### Epoch Deep Ball Evolution

**High-strength flute shape with high chip removal characteristics. Stronger R flute helix angle improves cutting performance.**

Tool : EPDBE2010-10-ATH
(RE0.5 Under neck 10mm)

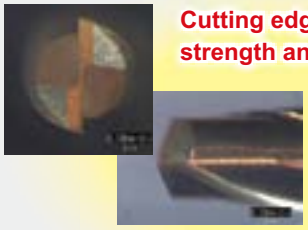



Work material: SUS420J2Ⓗ 52HRC
Holder : HSK-F63
Coolant : Air Blow
$n$=16,000min$^{-1}$($vc$=50.2m/min)
$vf$=1000mm/min
($fz$=0.03mm/t)
$ap$×$ae$=0.02mm×0.02mm
OH=18mm

New shape

Conventional


#### Epoch Deep Square Evolution

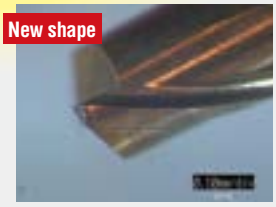


**Cutting edge with high chipping strength and high cutting performance provides improved stability.**

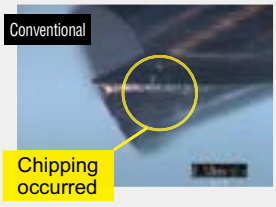
Tool : EPDSE2010-4-ATH
(φ1 Under neck 4mm)
1.5mm square island
(90° standing walls)

Work material : HPM-MAGIC 40HRC
Holder : HSK-F63
Coolant : Wet
$n$=15,000min$^{-1}$($vc$=47m/min)
$vf$=1,000mm/min
($fz$=0.03mm/t)
$ap$×$ae$=0.1mm×0.1mm

New shape



Conventional



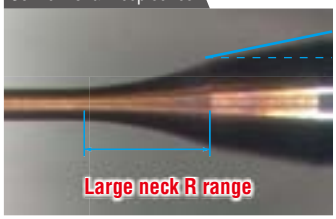

### Improved compound neck shape

- Further improves the conventional compound shape of R and taper to both resist breakage and suppress deflection.

※Since the actual effective under-neck length is shorter than the conventional Deep Series, be sure to check the interference region before use.

New shape

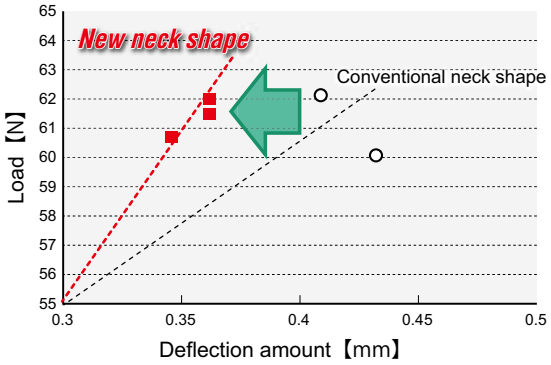

Conventional Deep series




【Caution】
The interference region has changed due to changes in the neck shape. Be sure to check for interference before starting machining.

Static load test results

Testing tool size
φ1×Under neck 6




**Deflection suppression effect is high even under the same load. Enables machining with even higher accuracy.**

### Abundant lineup

## Features 02 New coating with excellent adhesion and wear resistance — PN Coating

### Features

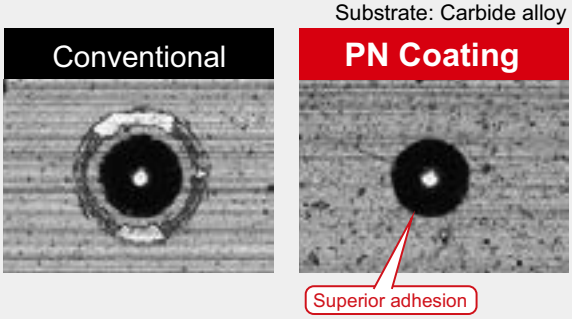
- A heat-resistant coating material with excellent adhesion to the tool substrate was achieved by optimizing the Al content.
- Exhibits with good wear resistance due to Si doping to the AlCr coating layer.
- Exhibits excellent cutting life for cutting materials such as plastic molds, etc. where tool seizure often occurs.
  (2x the cutting life compared to conventional products.)
  Provides the long life in cutting processing of materials starting with HPM-MAGIC and including prehardened steel, carbon steel, alloy steel, SUS, SKD61, SKD11, etc.
- By improving heat resistance, long life are possible for both wet cutting and dry cutting.

Note) This product obtains less electric conductivity. Therefore, Please caution of using electric transmitted measuring systems.

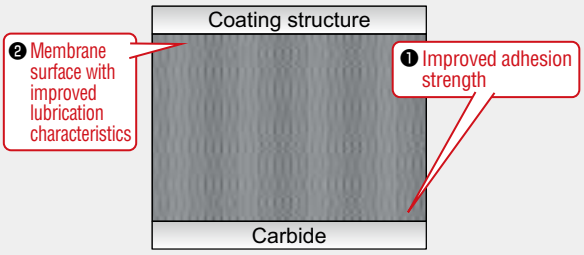
### Characteristics

#### Adhesion of PN Coating

Substrate: Carbide alloy




#### Cross-section photograph of PN Coating layer structure




## Features 02 Improved heat-resistant coating — ATH Coating

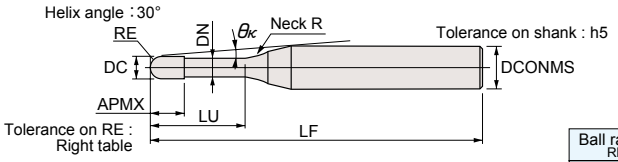
### Features

- Hardness and oxidation resistance of TH Coating is further improved. Enables longer life and higher efficient when cutting high-hardness materials.
  (Si nano composite coating with finer crystal particles)
- Exhibits amazing performance when cutting high-hardness materials (55HRC or higher)
  Cold-worked die steel, HSS, tool steel.
- Long life for both dry cutting and wet cutting

## Epoch Deep Ball Evolution EPDBE-PN

PN Coating

2 Flutes




(㎜)

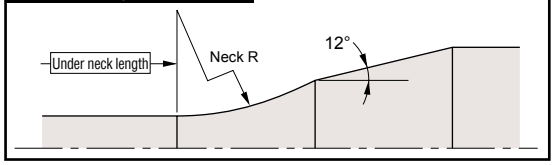
| Ball radius RE | Tolerance on RE |
|---|---|
| RE≦0.25 | ±0.003 |
| 0.25<RE | ±0.005 |

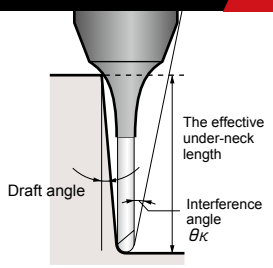
# EPDBE2○○○-○○.○○-PN

| Item code | Stock | Size (mm) | | | | | | | | | The effective under-neck length for the various draft angles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PN | Ball radius | Tool dia. | Under neck length | Flute length | Neck dia. | Overall length | Shank dia. | Neck R | Interference angle | | | | | |
| | | RE | DC | LU | APMX | DN | LF | DCONMS | | θκ | 0.5° | 1° | 1.5° | 2° | 3° |
| EPDBE2001-0.2-PN | ● | 0.05 | 0.1 | 0.2 | 0.08 | 0.08 | 45 | 4 | 1 | 11.76 | 0.35 | 0.37 | 0.39 | 0.41 | 0.44 |
| EPDBE2001-0.3-PN | ● | | | 0.3 | | | | | | 11.64 | 0.46 | 0.48 | 0.50 | 0.52 | 0.57 |
| EPDBE2001-0.5-PN | ● | | | 0.5 | | | | | | 11.40 | 0.67 | 0.70 | 0.73 | 0.76 | 0.81 |
| EPDBE2002-0.5-PN | ● | 0.1 | 0.2 | 0.5 | 0.15 | 0.17 | 50 | 4 | 1 | 11.42 | 0.70 | 0.72 | 0.75 | 0.77 | 0.82 |
| EPDBE2002-0.75-PN | ● | | | 0.75 | | | | | | 11.13 | 0.96 | 0.99 | 1.02 | 1.05 | 1.11 |
| EPDBE2002-1-PN | ● | | | 1 | | | | | | 10.86 | 1.22 | 1.26 | 1.30 | 1.33 | 1.39 |
| EPDBE2002-1.25-PN | ● | | | 1.25 | | | | | | 10.60 | 1.48 | 1.52 | 1.57 | 1.61 | 1.72 |
| EPDBE2002-1.5-PN | ● | | | 1.5 | | | | | | 10.35 | 1.74 | 1.79 | 1.84 | 1.88 | 2.05 |
| EPDBE2002-2-PN | ● | | | 2 | | | | | | 9.88 | 2.25 | 2.32 | 2.37 | 2.45 | 2.71 |
| EPDBE2002-2.5-PN | ● | | | 2.5 | | | | | | 9.46 | 2.77 | 2.84 | 2.91 | 3.05 | 3.37 |
| EPDBE2002-3-PN | ● | | | 3 | | | | | | 9.07 | 3.28 | 3.37 | 3.48 | 3.65 | 4.04 |
| EPDBE2003-0.5-PN | ● | 0.15 | 0.3 | 0.5 | 0.25 | 0.27 | 50 | 4 | 2 | 11.47 | 0.78 | 0.82 | 0.86 | 0.90 | 0.98 |
| EPDBE2003-0.75-PN | ● | | | 0.75 | | | | | | 11.17 | 1.05 | 1.10 | 1.15 | 1.20 | 1.29 |
| EPDBE2003-1-PN | ● | | | 1 | | | | | | 10.89 | 1.31 | 1.38 | 1.43 | 1.49 | 1.59 |
| EPDBE2003-1.25-PN | ● | | | 1.25 | | | | | | 10.62 | 1.58 | 1.65 | 1.72 | 1.78 | 1.89 |
| EPDBE2003-1.5-PN | ● | | | 1.5 | | | | | | 10.36 | 1.84 | 1.92 | 1.99 | 2.06 | 2.18 |
| EPDBE2003-2-PN | ● | | | 2 | | | | | | 9.88 | 2.36 | 2.46 | 2.55 | 2.62 | 2.76 |
| EPDBE2003-2.5-PN | ● | | | 2.5 | | | | | | 9.45 | 2.89 | 3.00 | 3.10 | 3.18 | 3.36 |
| EPDBE2003-3-PN | ● | | | 3 | | | | | | 9.05 | 3.41 | 3.53 | 3.64 | 3.73 | 4.02 |
| EPDBE2004-0.75-PN | ● | 0.2 | 0.4 | 0.75 | 0.3 | 0.37 | 50 | 4 | 2 | 11.21 | 1.04 | 1.09 | 1.14 | 1.19 | 1.28 |
| EPDBE2004-1-PN | ● | | | 1 | | | | | | 10.91 | 1.31 | 1.37 | 1.43 | 1.48 | 1.58 |
| EPDBE2004-1.5-PN | ● | | | 1.5 | | | | | | 10.37 | 1.84 | 1.92 | 1.99 | 2.06 | 2.17 |
| EPDBE2004-2-PN | ● | | | 2 | | | | | | 9.88 | 2.36 | 2.46 | 2.54 | 2.62 | 2.75 |
| EPDBE2004-2.5-PN | ● | | | 2.5 | | | | | | 9.43 | 2.89 | 3.00 | 3.09 | 3.18 | 3.34 |
| EPDBE2004-3-PN | ● | | | 3 | | | | | | 9.03 | 3.41 | 3.53 | 3.63 | 3.73 | 4.01 |
| EPDBE2004-3.5-PN | ● | | | 3.5 | | | | | | 8.65 | 3.93 | 4.06 | 4.18 | 4.27 | 4.67 |
| EPDBE2004-4-PN | ● | | | 4 | | | | | | 8.30 | 4.45 | 4.59 | 4.71 | 4.83 | 5.33 |
| EPDBE2004-4.5-PN | ● | | | 4.5 | | | | | | 7.99 | 4.97 | 5.12 | 5.25 | 5.43 | 6.00 |
| EPDBE2005-1-PN | ● | 0.25 | 0.5 | 1 | 0.35 | 0.47 | 50 | 4 | 2 | 10.94 | 1.31 | 1.37 | 1.42 | 1.47 | 1.57 |
| EPDBE2005-1.5-PN | ● | | | 1.5 | | | | | | 10.39 | 1.83 | 1.91 | 1.98 | 2.05 | 2.17 |
| EPDBE2005-2-PN | ● | | | 2 | | | | | | 9.88 | 2.36 | 2.45 | 2.54 | 2.61 | 2.75 |
| EPDBE2005-2.5-PN | ● | | | 2.5 | | | | | | 9.42 | 2.88 | 2.99 | 3.09 | 3.17 | 3.33 |
| EPDBE2005-3-PN | ● | | | 3 | | | | | | 9.00 | 3.41 | 3.53 | 3.63 | 3.72 | 3.99 |
| EPDBE2005-4-PN | ● | | | 4 | | | | | | 8.27 | 4.45 | 4.59 | 4.71 | 4.82 | 5.32 |
| EPDBE2005-5-PN | ● | | | 5 | | | | | | 7.64 | 5.48 | 5.65 | 5.78 | 6.01 | 6.65 |
| EPDBE2005-5.5-PN | ● | | | 5.5 | | | | | | 7.36 | 6.00 | 6.17 | 6.31 | 6.61 | 7.31 |
| EPDBE2005-6-PN | ● | | | 6 | | | | | | 7.10 | 6.52 | 6.70 | 6.88 | 7.21 | 7.97 |
| EPDBE2005-8-PN | ● | | | 8 | | | | | | 6.23 | 8.58 | 8.79 | 9.16 | 9.60 | 10.63 |
| EPDBE2006-1-PN | ● | 0.3 | 0.6 | 1 | 0.4 | 0.57 | 50 | 4 | 4 | 10.98 | 1.44 | 1.54 | 1.63 | 1.71 | 1.88 |
| EPDBE2006-2-PN | ● | | | 2 | | | | | | 9.88 | 2.52 | 2.66 | 2.79 | 2.91 | 3.13 |
| EPDBE2006-2.5-PN | ● | | | 2.5 | | | | | | 9.41 | 3.05 | 3.22 | 3.36 | 3.49 | 3.73 |
| EPDBE2006-3-PN | ● | | | 3 | | | | | | 8.98 | 3.58 | 3.77 | 3.93 | 4.07 | 4.32 |
| EPDBE2006-3.5-PN | ● | | | 3.5 | | | | | | 8.58 | 4.12 | 4.32 | 4.49 | 4.64 | 4.91 |
| EPDBE2006-4-PN | ● | | | 4 | | | | | | 8.22 | 4.64 | 4.86 | 5.04 | 5.20 | 5.48 |
| EPDBE2006-4.5-PN | ● | | | 4.5 | | | | | | 7.89 | 5.17 | 5.40 | 5.59 | 5.76 | 6.06 |
| EPDBE2006-5-PN | ● | | | 5 | | | | | | 7.59 | 5.70 | 5.94 | 6.14 | 6.32 | 6.63 |
| EPDBE2006-5.5-PN | ● | | | 5.5 | | | | | | 7.31 | 6.22 | 6.48 | 6.69 | 6.87 | 7.29 |
| EPDBE2006-6-PN | ● | | | 6 | | | | | | 7.04 | 6.75 | 7.02 | 7.23 | 7.42 | 7.96 |
| EPDBE2006-7-PN | ● | | | 7 | | | | | | 6.57 | 7.79 | 8.08 | 8.32 | 8.52 | 9.28 |
| EPDBE2006-8-PN | ● | | | 8 | | | | | | 6.16 | 8.84 | 9.15 | 9.40 | 9.61 | 10.61 |
| EPDBE2006-9-PN | ● | | | 9 | | | | | | 5.79 | 9.88 | 10.21 | 10.47 | 10.79 | 11.94 |
| EPDBE2006-10-PN | ● | | | 10 | | | | | | 5.47 | 10.92 | 11.26 | 11.54 | 11.99 | 13.27 |
| EPDBE2006-12-PN | ● | | | 12 | | | | | | 4.92 | 12.99 | 13.37 | 13.72 | 14.38 | 15.92 |

● : Stocked items.

Detailed shape below neck




# EPDBE2○○○-○○.○○-PN

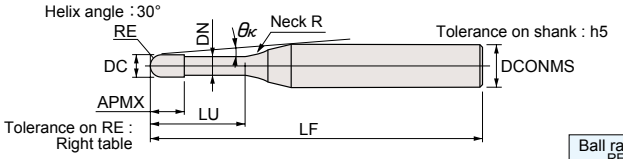
【Note】
The effective under-neck length is different from Epoch Deep Ball EPDB. Please recheck the interference region.

| Item code | Stock | Size (mm) | | | | | | | | | The effective under-neck length for the various draft angles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PN | Ball radius RE | Tool dia. DC | Under neck length LU | Flute length APMX | Neck dia. DN | Overall length LF | Shank dia. DCONMS | Neck R | Interference angle θK | 0.5° | 1° | 1.5° | 2° | 3° |
| EPDBE2007-2-PN | ● | 0.35 | 0.7 | 2 | 0.45 | 0.67 | 50 | 4 | 4 | 9.88 | 2.52 | 2.66 | 2.79 | 2.90 | 3.12 |
| EPDBE2007-4-PN | ● | | | 4 | | | | | | 8.18 | 4.64 | 4.86 | 5.04 | 5.20 | 5.48 |
| EPDBE2007-6-PN | ● | | | 6 | | | | | | 6.98 | 6.74 | 7.01 | 7.23 | 7.42 | 7.94 |
| EPDBE2007-8-PN | ● | | | 8 | | | | | | 6.09 | 8.83 | 9.14 | 9.39 | 9.61 | 10.60 |
| EPDBE2008-2-PN | ● | 0.4 | 0.8 | 2 | 0.5 | 0.77 | 50 | 4 | 4 | 9.87 | 2.51 | 2.65 | 2.78 | 2.89 | 3.11 |
| EPDBE2008-4-PN | ● | | | 4 | | | | | | 8.14 | 4.64 | 4.85 | 5.03 | 5.19 | 5.47 |
| EPDBE2008-5-PN | ● | | | 5 | | | | | | 7.48 | 5.69 | 5.93 | 6.13 | 6.31 | 6.61 |
| EPDBE2008-6-PN | ● | | | 6 | | | | | | 6.92 | 6.74 | 7.01 | 7.23 | 7.41 | 7.92 |
| EPDBE2008-8-PN | ● | | | 8 | | | | | | 6.01 | 8.83 | 9.14 | 9.39 | 9.60 | 10.58 |
| EPDBE2008-10-PN | ● | | | 10 | | | | | | 5.32 | 10.91 | 11.26 | 11.53 | 11.97 | 13.23 |
| EPDBE2009-2-PN | ● | 0.45 | 0.9 | 2 | 0.6 | 0.87 | 50 | 4 | 4 | 9.87 | 2.51 | 2.65 | 2.77 | 2.89 | 3.10 |
| EPDBE2009-4-PN | ● | | | 4 | | | | | | 8.09 | 4.64 | 4.85 | 5.03 | 5.18 | 5.46 |
| EPDBE2009-6-PN | ● | | | 6 | | | | | | 6.85 | 6.74 | 7.00 | 7.22 | 7.41 | 7.91 |
| EPDBE2009-8-PN | ● | | | 8 | | | | | | 5.94 | 8.83 | 9.14 | 9.38 | 9.60 | 10.56 |
| EPDBE2010-2-PN | ● | 0.5 | 1 | 2 | 0.8 | 0.96 | 50 | 4 | 4 | 9.84 | 2.54 | 2.67 | 2.79 | 2.90 | 3.11 |
| EPDBE2010-3-PN | ● | | | 3 | | | | | | 8.84 | 3.61 | 3.78 | 3.93 | 4.06 | 4.30 |
| EPDBE2010-4-PN | ● | | | 4 | | | | | | 8.02 | 4.66 | 4.87 | 5.04 | 5.20 | 5.47 |
| EPDBE2010-5-PN | ● | | | 5 | | | | | | 7.34 | 5.72 | 5.95 | 6.14 | 6.31 | 6.61 |
| EPDBE2010-6-PN | ● | | | 6 | | | | | | 6.77 | 6.76 | 7.02 | 7.23 | 7.42 | 7.92 |
| EPDBE2010-7-PN | ● | | | 7 | | | | | | 6.28 | 7.81 | 8.09 | 8.32 | 8.52 | 9.25 |
| EPDBE2010-8-PN | ● | | | 8 | | | | | | 5.85 | 8.85 | 9.15 | 9.40 | 9.61 | 10.58 |
| EPDBE2010-9-PN | ● | | | 9 | | | | | | 5.48 | 9.89 | 10.21 | 10.47 | 10.78 | 11.91 |
| EPDBE2010-10-PN | ● | | | 10 | | | | | | 5.15 | 10.93 | 11.27 | 11.54 | 11.98 | 13.23 |
| EPDBE2010-12-PN | ● | | | 12 | | | 55 | | | 4.60 | 13.00 | 13.37 | 13.72 | 14.37 | 15.89 |
| EPDBE2010-13-PN | ● | | | 13 | | | | | | 4.37 | 14.04 | 14.42 | 14.86 | 15.57 | 17.21 |
| EPDBE2010-14-PN | ● | | | 14 | | | | | | 4.16 | 15.07 | 15.47 | 16.00 | 16.76 | 18.54 |
| EPDBE2010-16-PN | ● | | | 16 | | | | | | 3.79 | 17.13 | 17.56 | 18.28 | 19.16 | 21.20 |
| EPDBE2010-18-PN | ● | | | 18 | | | 60 | | | 3.49 | 19.19 | 19.66 | 20.56 | 21.55 | 23.85 |
| EPDBE2010-20-PN | ● | | | 20 | | | | | | 3.23 | 21.25 | 21.84 | 22.84 | 23.94 | 26.51 |
| EPDBE2011-2-PN | ● | 0.55 | 1.1 | 2 | 1 | 1.05 | 50 | 4 | 4 | 9.81 | 2.58 | 2.70 | 2.81 | 2.92 | 3.12 |
| EPDBE2011-4-PN | ● | | | 4 | | | | | | 7.95 | 4.69 | 4.89 | 5.06 | 5.21 | 5.48 |
| EPDBE2011-6-PN | ● | | | 6 | | | | | | 6.68 | 6.79 | 7.04 | 7.25 | 7.43 | 7.94 |
| EPDBE2011-8-PN | ● | | | 8 | | | | | | 5.76 | 8.87 | 9.17 | 9.41 | 9.61 | 10.59 |
| EPDBE2011-10-PN | ● | | | 10 | | | | | | 5.06 | 10.95 | 11.28 | 11.55 | 12.00 | 13.25 |
| EPDBE2012-4-PN | ● | 0.6 | 1.2 | 4 | 1.1 | 1.15 | 50 | 4 | 4 | 7.89 | 4.69 | 4.88 | 5.05 | 5.20 | 5.47 |
| EPDBE2012-6-PN | ● | | | 6 | | | | | | 6.60 | 6.79 | 7.03 | 7.24 | 7.42 | 7.92 |
| EPDBE2012-8-PN | ● | | | 8 | | | | | | 5.67 | 8.87 | 9.16 | 9.40 | 9.61 | 10.58 |
| EPDBE2012-10-PN | ● | | | 10 | | | | | | 4.97 | 10.95 | 11.28 | 11.54 | 11.99 | 13.23 |
| EPDBE2012-12-PN | ● | | | 12 | | | 55 | | | 4.43 | 13.02 | 13.38 | 13.73 | 14.38 | 15.89 |
| EPDBE2014-8-PN | ● | 0.7 | 1.4 | 8 | 1.3 | 1.34 | 50 | 4 | 4 | 5.48 | 8.89 | 9.18 | 9.41 | 9.61 | 10.58 |
| EPDBE2014-12-PN | ● | | | 12 | | | 55 | | | 4.24 | 13.04 | 13.39 | 13.74 | 14.39 | 15.89 |
| EPDBE2014-16-PN | ● | | | 16 | | | | | | 3.46 | 17.16 | 17.57 | 18.31 | 19.17 | 21.20 |
| EPDBE2015-4-PN | ● | 0.75 | 1.5 | 4 | 1.35 | 1.44 | 50 | 4 | 4 | 7.68 | 4.71 | 4.89 | 5.06 | 5.20 | 5.46 |
| EPDBE2015-6-PN | ● | | | 6 | | | | | | 6.33 | 6.81 | 7.04 | 7.25 | 7.42 | 7.91 |
| EPDBE2015-8-PN | ● | | | 8 | | | | | | 5.39 | 8.89 | 9.17 | 9.41 | 9.61 | 10.56 |
| EPDBE2015-10-PN | ● | | | 10 | | | | | | 4.68 | 10.96 | 11.29 | 11.55 | 11.98 | 13.22 |
| EPDBE2015-12-PN | ● | | | 12 | | | 55 | | | 4.14 | 13.03 | 13.39 | 13.74 | 14.38 | 15.87 |
| EPDBE2015-14-PN | ● | | | 14 | | | | | | 3.72 | 15.10 | 15.48 | 16.02 | 16.77 | 18.52 |
| EPDBE2015-16-PN | ● | | | 16 | | | | | | 3.77 | 17.16 | 17.57 | 18.30 | 19.16 | 21.18 |
| EPDBE2015-18-PN | ● | | | 18 | | | 60 | | | 3.08 | 19.22 | 19.69 | 20.58 | 21.56 | 23.83 |
| EPDBE2015-20-PN | ● | | | 20 | | | | | | 2.84 | 21.27 | 21.87 | 22.86 | 23.95 | No interference |
| EPDBE2016-8-PN | ● | 0.8 | 1.6 | 8 | 1.4 | 1.54 | 50 | 4 | 4 | 5.28 | 8.89 | 9.17 | 9.40 | 9.60 | 10.55 |
| EPDBE2016-12-PN | ● | | | 12 | | | 55 | | | 4.05 | 13.03 | 13.39 | 13.73 | 14.37 | 15.85 |
| EPDBE2016-16-PN | ● | | | 16 | | | | | | 3.28 | 17.16 | 17.57 | 18.29 | 19.15 | 21.16 |
| EPDBE2016-20-PN | ● | | | 20 | | | 60 | | | 2.75 | 21.27 | 21.87 | 22.86 | 23.94 | No interference |
| EPDBE2018-8-PN | ● | 0.9 | 1.8 | 8 | 1.6 | 1.73 | 50 | 4 | 4 | 5.06 | 8.91 | 9.18 | 9.41 | 9.61 | 10.54 |
| EPDBE2018-12-PN | ● | | | 12 | | | 55 | | | 3.83 | 13.05 | 13.40 | 13.74 | 14.38 | 15.85 |
| EPDBE2018-16-PN | ● | | | 16 | | | | | | 3.09 | 17.17 | 17.58 | 18.31 | 19.16 | 21.16 |
| EPDBE2018-20-PN | ● | | | 20 | | | 60 | | | 2.58 | 21.28 | 21.88 | 22.87 | 23.95 | No interference |

## Epoch Deep Ball Evolution EPDBE-PN

PN Coating

2 Flutes




(㎜)

| Ball radius RE | Tolerance on RE |
|---|---|
| RE≦0.25 | ±0.003 |
| 0.25<RE | ±0.005 |

# EPDBE2○○○-○○.○○-PN

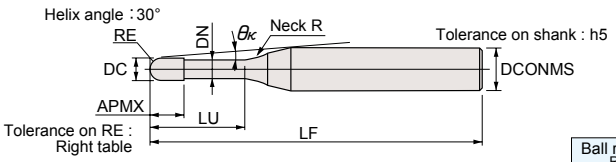
| Item code | Stock | Size (mm) | | | | | | | | | The effective under-neck length for the various draft angles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PN | Ball radius | Tool dia. | Under neck length | Flute length | Neck dia. | Overall length | Shank dia. | Neck R | Interference angle | | | | | |
| | | RE | DC | LU | APMX | DN | LF | DCONMS | | θκ | 0.5° | 1° | 1.5° | 2° | 3° |
| EPDBE2020-3-PN | ● | 1 | 2 | 3 | 1.7 | 1.92 | 50 | 4 | 4 | 8.26 | 3.71 | 3.84 | 3.96 | 4.07 | 4.29 |
| EPDBE2020-4-PN | ● | | | 4 | | | | | | 7.23 | 4.75 | 4.92 | 5.07 | 5.21 | 5.45 |
| EPDBE2020-6-PN | ● | | | 6 | | | | | | 5.78 | 6.84 | 7.07 | 7.26 | 7.43 | 7.89 |
| EPDBE2020-8-PN | ● | | | 8 | | | | | | 4.81 | 8.92 | 9.19 | 9.42 | 9.61 | 10.54 |
| EPDBE2020-10-PN | ● | | | 10 | | | | | | 4.12 | 11.00 | 11.30 | 11.56 | 11.99 | 13.20 |
| EPDBE2020-12-PN | ● | | | 12 | | | 55 | | | 3.61 | 13.06 | 13.41 | 13.76 | 14.39 | 15.85 |
| EPDBE2020-13-PN | ● | | | 13 | | | | | | 3.39 | 14.10 | 14.45 | 14.90 | 15.58 | 17.18 |
| EPDBE2020-14-PN | ● | | | 14 | | | | | | 3.20 | 15.13 | 15.50 | 16.04 | 16.78 | 18.51 |
| EPDBE2020-16-PN | ● | | | 16 | | | | | | 2.88 | 17.19 | 17.59 | 18.32 | 19.17 | No interference |
| EPDBE2020-18-PN | ● | | | 18 | | | 60 | | | 2.62 | 19.24 | 19.72 | 20.60 | 21.57 | No interference |
| EPDBE2020-20-PN | ● | | | 20 | | | | | | 2.40 | 21.30 | 21.90 | 22.88 | 23.96 | No interference |
| EPDBE2020-22-PN | ● | | | 22 | | | | | | 2.22 | 23.35 | 24.08 | 25.16 | 26.35 | No interference |
| EPDBE2020-25-PN | ● | | | 25 | | | 65 | | | 1.99 | 26.42 | 27.35 | 28.58 | No interference | No interference |
| EPDBE2020-30-PN | ● | | | 30 | | | 70 | | | 1.70 | 31.53 | 32.80 | 34.29 | No interference | No interference |
| EPDBE2020-35-PN | ● | | | 35 | | | 75 | | | 1.48 | 36.65 | 38.24 | No interference | No interference | No interference |
| EPDBE2020-40-PN | ● | | | 40 | | | 80 | | | 1.31 | 41.86 | 43.69 | No interference | No interference | No interference |
| EPDBE2025-6-PN | ● | 1.25 | 2.5 | 6 | 2 | 2.4 | 50 | 4 | 4 | 5.04 | 6.88 | 7.09 | 7.27 | 7.43 | 7.87 |
| EPDBE2025-10-PN | ● | | | 10 | | | | | | 3.43 | 11.03 | 11.32 | 11.56 | 12.00 | 13.18 |
| EPDBE2025-15-PN | ● | | | 15 | | | 55 | | | 2.46 | 16.18 | 16.56 | 17.20 | 17.98 | No interference |
| EPDBE2025-20-PN | ● | | | 20 | | | 60 | | | 1.91 | 21.32 | 21.93 | 22.90 | No interference | No interference |
| EPDBE2025-25-PN | ● | | | 25 | | | 65 | | | 1.57 | 26.44 | 27.38 | 28.60 | No interference | No interference |
| EPDBE2025-30-PN | ● | | | 30 | | | 70 | | | 1.33 | 31.55 | 32.82 | No interference | No interference | No interference |
| EPDBE2030-8-PN | ● | 1.5 | 3 | 8 | 2.5 | 2.88 | 55 | 6 | 4 | 6.19 | 8.99 | 9.23 | 9.44 | 9.62 | 10.51 |
| EPDBE2030-10-PN | ● | | | 10 | | | | | | 5.41 | 11.06 | 11.34 | 11.57 | 12.01 | 13.16 |
| EPDBE2030-13-PN | ● | | | 13 | | | 60 | | | 4.56 | 14.15 | 14.48 | 14.94 | 15.60 | 17.15 |
| EPDBE2030-16-PN | ● | | | 16 | | | | | | 3.93 | 17.24 | 17.61 | 18.36 | 19.19 | 21.13 |
| EPDBE2030-20-PN | ● | | | 20 | | | 65 | | | 3.33 | 21.34 | 21.96 | 22.92 | 23.97 | 26.44 |
| EPDBE2030-25-PN | ● | | | 25 | | | 70 | | | 2.79 | 26.46 | 27.41 | 28.62 | 29.96 | No interference |
| EPDBE2030-30-PN | ● | | | 30 | | | 75 | | | 2.40 | 31.57 | 32.85 | 34.32 | 35.94 | No interference |
| EPDBE2030-35-PN | ● | | | 35 | | | 80 | | | 2.11 | 36.72 | 38.30 | 40.03 | 41.92 | No interference |
| EPDBE2035-15-PN | ● | 1.75 | 3.5 | 15 | 2.75 | 3.35 | 60 | 6 | 4 | 3.68 | 16.25 | 16.60 | 17.26 | 18.03 | 19.81 |
| EPDBE2035-25-PN | ● | | | 25 | | | 70 | | | 2.43 | 26.49 | 27.46 | 28.67 | 29.99 | No interference |
| EPDBE2035-35-PN | ● | | | 35 | | | 80 | | | 1.82 | 36.79 | 38.36 | 40.07 | No interference | No interference |
| EPDBE2035-45-PN | ● | | | 45 | | | 90 | | | 1.45 | 47.22 | 49.25 | No interference | No interference | No interference |
| EPDBE2040-10-PN | ● | 2 | 4 | 10 | 3 | 3.85 | 55 | 6 | 4 | 4.38 | 11.10 | 11.36 | 11.58 | 12.00 | 13.10 |
| EPDBE2040-13-PN | ● | | | 13 | | | 60 | | | 3.57 | 14.19 | 14.50 | 14.95 | 15.59 | 17.08 |
| EPDBE2040-16-PN | ● | | | 16 | | | | | | 3.01 | 17.27 | 17.63 | 18.37 | 19.18 | No interference |
| EPDBE2040-20-PN | ● | | | 20 | | | 65 | | | 2.49 | 21.37 | 21.99 | 22.93 | 23.96 | No interference |
| EPDBE2040-25-PN | ● | | | 25 | | | 70 | | | 2.05 | 26.49 | 27.44 | 28.63 | 29.95 | No interference |
| EPDBE2040-30-PN | ● | | | 30 | | | 75 | | | 1.74 | 31.59 | 32.89 | 34.34 | No interference | No interference |
| EPDBE2040-35-PN | ● | | | 35 | | | 80 | | | 1.51 | 36.78 | 38.33 | 40.04 | No interference | No interference |
| EPDBE2040-40-PN | ● | | | 40 | | | | | | 1.34 | 41.99 | 43.78 | No interference | No interference | No interference |
| EPDBE2040-45-PN | ● | | | 45 | | | 90 | | | 1.20 | 47.20 | 49.23 | No interference | No interference | No interference |
| EPDBE2040-50-PN | ● | | | 50 | | | 100 | | | 1.08 | 52.42 | 54.68 | No interference | No interference | No interference |
| EPDBE2050-20-PN | ● | 2.5 | 5 | 20 | 3.5 | 4.85 | 65 | 6 | 4 | 1.42 | 21.36 | 21.95 | No interference | No interference | No interference |
| EPDBE2050-25-PN | ● | | | 25 | | | 70 | | | 1.14 | 26.48 | 27.39 | No interference | No interference | No interference |
| EPDBE2050-30-PN | ● | | | 30 | | | 75 | | | 0.95 | 31.58 | No interference | No interference | No interference | No interference |
| EPDBE2050-40-PN | ● | | | 40 | | | 80 | | | 0.72 | 41.97 | No interference | No interference | No interference | No interference |
| EPDBE2060-12-PN | ● | 3 | 6 | 12 | 6 | 5.85 | 60 | 6 | - | 0 | No interference | No interference | No interference | No interference | No interference |
| EPDBE2060-20-PN | ● | | | 20 | | | 65 | | | 0 | No interference | No interference | No interference | No interference | No interference |
| EPDBE2060-30-PN | ● | | | 30 | | | 75 | | | 0 | No interference | No interference | No interference | No interference | No interference |
| EPDBE2060-50-PN | ● | | | 50 | | | 100 | | | 0 | No interference | No interference | No interference | No interference | No interference |

● : Stocked items.

# Epoch Deep Ball Evolution EPDBE-ATH

ATHCoating

2 Flutes




(mm)

| Ball radius RE | Tolerance on RE |
|---|---|
| RE≦0.25 | ±0.003 |
| 0.25<RE | ±0.005 |

## EPDBE2○○○-○○.○○-ATH

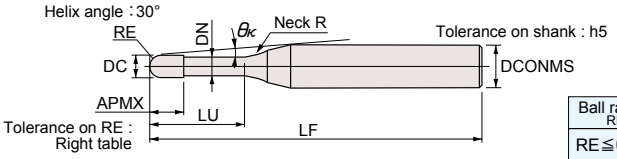
| Item code | Stock | Size (mm) | | | | | | | | | The effective under-neck length for the various draft angles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ATH | Ball radius RE | Tool dia. DC | Under neck length LU | Flute length APMX | Neck dia. DN | Overall length LF | Shank dia. DCONMS | Neck R | Interference angle θκ | 0.5° | 1° | 1.5° | 2° | 3° |
| EPDBE2001-0.2-ATH | ● | 0.05 | 0.1 | 0.2 | 0.08 | 0.08 | 45 | 4 | 1 | 11.76 | 0.35 | 0.37 | 0.39 | 0.41 | 0.44 |
| EPDBE2001-0.3-ATH | ● | | | 0.3 | | | | | | 11.64 | 0.46 | 0.48 | 0.50 | 0.52 | 0.57 |
| EPDBE2001-0.5-ATH | ● | | | 0.5 | | | | | | 11.40 | 0.67 | 0.70 | 0.73 | 0.76 | 0.81 |
| EPDBE2002-0.5-ATH | ● | 0.1 | 0.2 | 0.5 | 0.15 | 0.17 | 50 | 4 | 1 | 11.42 | 0.70 | 0.72 | 0.75 | 0.77 | 0.82 |
| EPDBE2002-0.75-ATH | ● | | | 0.75 | | | | | | 11.13 | 0.96 | 0.99 | 1.02 | 1.05 | 1.11 |
| EPDBE2002-1-ATH | ● | | | 1 | | | | | | 10.86 | 1.22 | 1.26 | 1.30 | 1.33 | 1.39 |
| EPDBE2002-1.25-ATH | ● | | | 1.25 | | | | | | 10.60 | 1.48 | 1.52 | 1.57 | 1.61 | 1.72 |
| EPDBE2002-1.5-ATH | ● | | | 1.5 | | | | | | 10.35 | 1.74 | 1.79 | 1.84 | 1.88 | 2.05 |
| EPDBE2002-2-ATH | ● | | | 2 | | | | | | 9.88 | 2.25 | 2.32 | 2.37 | 2.45 | 2.71 |
| EPDBE2002-2.5-ATH | ● | | | 2.5 | | | | | | 9.46 | 2.77 | 2.84 | 2.91 | 3.05 | 3.37 |
| EPDBE2002-3-ATH | ● | | | 3 | | | | | | 9.07 | 3.28 | 3.37 | 3.48 | 3.65 | 4.04 |
| EPDBE2003-0.5-ATH | ● | 0.15 | 0.3 | 0.5 | 0.25 | 0.27 | 50 | 4 | 2 | 11.47 | 0.78 | 0.82 | 0.86 | 0.90 | 0.98 |
| EPDBE2003-0.75-ATH | ● | | | 0.75 | | | | | | 11.17 | 1.05 | 1.10 | 1.15 | 1.20 | 1.29 |
| EPDBE2003-1-ATH | ● | | | 1 | | | | | | 10.89 | 1.31 | 1.38 | 1.43 | 1.49 | 1.59 |
| EPDBE2003-1.25-ATH | ● | | | 1.25 | | | | | | 10.62 | 1.58 | 1.65 | 1.72 | 1.78 | 1.89 |
| EPDBE2003-1.5-ATH | ● | | | 1.5 | | | | | | 10.36 | 1.84 | 1.92 | 1.99 | 2.06 | 2.18 |
| EPDBE2003-2-ATH | ● | | | 2 | | | | | | 9.88 | 2.36 | 2.46 | 2.55 | 2.62 | 2.76 |
| EPDBE2003-2.5-ATH | ● | | | 2.5 | | | | | | 9.45 | 2.89 | 3.00 | 3.10 | 3.18 | 3.36 |
| EPDBE2003-3-ATH | ● | | | 3 | | | | | | 9.05 | 3.41 | 3.53 | 3.64 | 3.73 | 4.02 |
| EPDBE2004-0.75-ATH | ● | 0.2 | 0.4 | 0.75 | 0.3 | 0.37 | 50 | 4 | 2 | 11.21 | 1.04 | 1.09 | 1.14 | 1.19 | 1.28 |
| EPDBE2004-1-ATH | ● | | | 1 | | | | | | 10.91 | 1.31 | 1.37 | 1.43 | 1.48 | 1.58 |
| EPDBE2004-1.5-ATH | ● | | | 1.5 | | | | | | 10.37 | 1.84 | 1.92 | 1.99 | 2.06 | 2.17 |
| EPDBE2004-2-ATH | ● | | | 2 | | | | | | 9.88 | 2.36 | 2.46 | 2.54 | 2.62 | 2.75 |
| EPDBE2004-2.5-ATH | ● | | | 2.5 | | | | | | 9.43 | 2.89 | 3.00 | 3.09 | 3.18 | 3.34 |
| EPDBE2004-3-ATH | ● | | | 3 | | | | | | 9.03 | 3.41 | 3.53 | 3.63 | 3.73 | 4.01 |
| EPDBE2004-3.5-ATH | ● | | | 3.5 | | | | | | 8.65 | 3.93 | 4.06 | 4.18 | 4.27 | 4.67 |
| EPDBE2004-4-ATH | ● | | | 4 | | | | | | 8.30 | 4.45 | 4.59 | 4.71 | 4.83 | 5.33 |
| EPDBE2004-4.5-ATH | ● | | | 4.5 | | | | | | 7.99 | 4.97 | 5.12 | 5.25 | 5.43 | 6.00 |
| EPDBE2005-1-ATH | ● | 0.25 | 0.5 | 1 | 0.35 | 0.47 | 50 | 4 | 2 | 10.94 | 1.31 | 1.37 | 1.42 | 1.47 | 1.57 |
| EPDBE2005-1.5-ATH | ● | | | 1.5 | | | | | | 10.39 | 1.83 | 1.91 | 1.98 | 2.05 | 2.17 |
| EPDBE2005-2-ATH | ● | | | 2 | | | | | | 9.88 | 2.36 | 2.45 | 2.54 | 2.61 | 2.75 |
| EPDBE2005-2.5-ATH | ● | | | 2.5 | | | | | | 9.42 | 2.88 | 2.99 | 3.09 | 3.17 | 3.33 |
| EPDBE2005-3-ATH | ● | | | 3 | | | | | | 9.00 | 3.41 | 3.53 | 3.63 | 3.72 | 3.99 |
| EPDBE2005-4-ATH | ● | | | 4 | | | | | | 8.27 | 4.45 | 4.59 | 4.71 | 4.82 | 5.32 |
| EPDBE2005-5-ATH | ● | | | 5 | | | | | | 7.64 | 5.48 | 5.65 | 5.78 | 6.01 | 6.65 |
| EPDBE2005-5.5-ATH | ● | | | 5.5 | | | | | | 7.36 | 6.00 | 6.17 | 6.31 | 6.61 | 7.31 |
| EPDBE2005-6-ATH | ● | | | 6 | | | | | | 7.10 | 6.52 | 6.70 | 6.88 | 7.21 | 7.97 |
| EPDBE2005-8-ATH | ● | | | 8 | | | | | | 6.23 | 8.58 | 8.79 | 9.16 | 9.60 | 10.63 |
| EPDBE2006-1-ATH | ● | 0.3 | 0.6 | 1 | 0.4 | 0.57 | 50 | 4 | 4 | 10.98 | 1.44 | 1.54 | 1.63 | 1.71 | 1.88 |
| EPDBE2006-2-ATH | ● | | | 2 | | | | | | 9.88 | 2.52 | 2.66 | 2.79 | 2.91 | 3.13 |
| EPDBE2006-2.5-ATH | ● | | | 2.5 | | | | | | 9.41 | 3.05 | 3.22 | 3.36 | 3.49 | 3.73 |
| EPDBE2006-3-ATH | ● | | | 3 | | | | | | 8.98 | 3.58 | 3.77 | 3.93 | 4.07 | 4.32 |
| EPDBE2006-3.5-ATH | ● | | | 3.5 | | | | | | 8.58 | 4.12 | 4.32 | 4.49 | 4.64 | 4.91 |
| EPDBE2006-4-ATH | ● | | | 4 | | | | | | 8.22 | 4.64 | 4.86 | 5.04 | 5.20 | 5.48 |
| EPDBE2006-4.5-ATH | ● | | | 4.5 | | | | | | 7.89 | 5.17 | 5.40 | 5.59 | 5.76 | 6.06 |
| EPDBE2006-5-ATH | ● | | | 5 | | | | | | 7.59 | 5.70 | 5.94 | 6.14 | 6.32 | 6.63 |
| EPDBE2006-5.5-ATH | ● | | | 5.5 | | | | | | 7.31 | 6.22 | 6.48 | 6.69 | 6.87 | 7.29 |
| EPDBE2006-6-ATH | ● | | | 6 | | | | | | 7.04 | 6.75 | 7.02 | 7.23 | 7.42 | 7.96 |
| EPDBE2006-7-ATH | ● | | | 7 | | | | | | 6.57 | 7.79 | 8.08 | 8.32 | 8.52 | 9.28 |
| EPDBE2006-8-ATH | ● | | | 8 | | | | | | 6.16 | 8.84 | 9.15 | 9.40 | 9.61 | 10.61 |
| EPDBE2006-9-ATH | ● | | | 9 | | | | | | 5.79 | 9.88 | 10.21 | 10.47 | 10.79 | 11.94 |
| EPDBE2006-10-ATH | ● | | | 10 | | | | | | 5.47 | 10.92 | 11.26 | 11.54 | 11.99 | 13.27 |
| EPDBE2006-12-ATH | ● | | | 12 | | | | | | 4.92 | 12.99 | 13.37 | 13.72 | 14.38 | 15.92 |

● : Stocked items.

## Epoch Deep Ball Evolution EPDBE-ATH

ATHCoating

2 Flutes



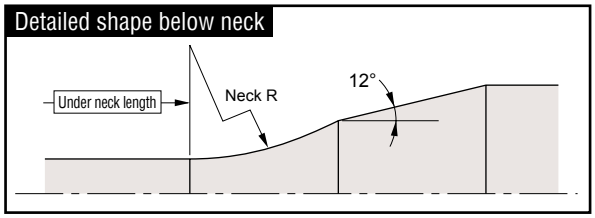

(mm)

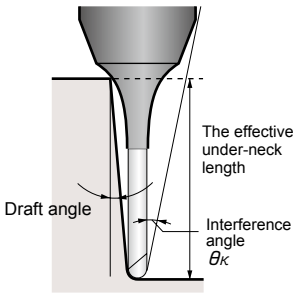
| Ball radius RE | Tolerance on RE |
|---|---|
| RE≦0.25 | ±0.003 |
| 0.25<RE | ±0.005 |

# EPDBE2○○○-○○.○○-ATH

| Item code | Stock | Size (mm) | | | | | | | | | The effective under-neck length for the various draft angles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ATH | Ball radius | Tool dia. | Under neck length | Flute length | Neck dia. | Overall length | Shank dia. | Neck R | Interference angle | | | | | |
| | | RE | DC | LU | APMX | DN | LF | DCONMS | | θκ | 0.5° | 1° | 1.5° | 2° | 3° |
| EPDBE2007-2-ATH | ● | 0.35 | 0.7 | 2 | 0.45 | 0.67 | 50 | 4 | 4 | 9.88 | 2.52 | 2.66 | 2.79 | 2.90 | 3.12 |
| EPDBE2007-4-ATH | ● | | | 4 | | | | | | 8.18 | 4.64 | 4.86 | 5.04 | 5.20 | 5.48 |
| EPDBE2007-6-ATH | ● | | | 6 | | | | | | 6.98 | 6.74 | 7.01 | 7.23 | 7.42 | 7.94 |
| EPDBE2007-8-ATH | ● | | | 8 | | | | | | 6.09 | 8.83 | 9.14 | 9.39 | 9.61 | 10.60 |
| EPDBE2008-2-ATH | ● | 0.4 | 0.8 | 2 | 0.5 | 0.77 | 50 | 4 | 4 | 9.87 | 2.51 | 2.65 | 2.78 | 2.89 | 3.11 |
| EPDBE2008-4-ATH | ● | | | 4 | | | | | | 8.14 | 4.64 | 4.85 | 5.03 | 5.19 | 5.47 |
| EPDBE2008-5-ATH | ● | | | 5 | | | | | | 7.48 | 5.69 | 5.93 | 6.13 | 6.31 | 6.61 |
| EPDBE2008-6-ATH | ● | | | 6 | | | | | | 6.92 | 6.74 | 7.01 | 7.23 | 7.41 | 7.92 |
| EPDBE2008-8-ATH | ● | | | 8 | | | | | | 6.01 | 8.83 | 9.14 | 9.39 | 9.60 | 10.58 |
| EPDBE2008-10-ATH | ● | | | 10 | | | | | | 5.32 | 10.91 | 11.26 | 11.53 | 11.97 | 13.23 |
| EPDBE2009-2-ATH | ● | 0.45 | 0.9 | 2 | 0.6 | 0.87 | 50 | 4 | 4 | 9.87 | 2.51 | 2.65 | 2.77 | 2.89 | 3.10 |
| EPDBE2009-4-ATH | ● | | | 4 | | | | | | 8.09 | 4.64 | 4.85 | 5.03 | 5.18 | 5.46 |
| EPDBE2009-6-ATH | ● | | | 6 | | | | | | 6.85 | 6.74 | 7.00 | 7.22 | 7.41 | 7.91 |
| EPDBE2009-8-ATH | ● | | | 8 | | | | | | 5.94 | 8.83 | 9.14 | 9.38 | 9.60 | 10.56 |
| EPDBE2010-2-ATH | ● | 0.5 | 1 | 2 | 0.8 | 0.96 | 50 | 4 | 4 | 9.84 | 2.54 | 2.67 | 2.79 | 2.90 | 3.11 |
| EPDBE2010-3-ATH | ● | | | 3 | | | | | | 8.84 | 3.61 | 3.78 | 3.93 | 4.06 | 4.30 |
| EPDBE2010-4-ATH | ● | | | 4 | | | | | | 8.02 | 4.66 | 4.87 | 5.04 | 5.20 | 5.47 |
| EPDBE2010-5-ATH | ● | | | 5 | | | | | | 7.34 | 5.72 | 5.95 | 6.14 | 6.31 | 6.61 |
| EPDBE2010-6-ATH | ● | | | 6 | | | | | | 6.77 | 6.76 | 7.02 | 7.23 | 7.42 | 7.92 |
| EPDBE2010-7-ATH | ● | | | 7 | | | | | | 6.28 | 7.81 | 8.09 | 8.32 | 8.52 | 9.25 |
| EPDBE2010-8-ATH | ● | | | 8 | | | | | | 5.85 | 8.85 | 9.15 | 9.40 | 9.61 | 10.58 |
| EPDBE2010-9-ATH | ● | | | 9 | | | | | | 5.48 | 9.89 | 10.21 | 10.47 | 10.78 | 11.91 |
| EPDBE2010-10-ATH | ● | | | 10 | | | | | | 5.15 | 10.93 | 11.27 | 11.54 | 11.98 | 13.23 |
| EPDBE2010-12-ATH | ● | | | 12 | | | 55 | | | 4.60 | 13.00 | 13.37 | 13.72 | 14.37 | 15.89 |
| EPDBE2010-13-ATH | ● | | | 13 | | | | | | 4.37 | 14.04 | 14.42 | 14.86 | 15.57 | 17.21 |
| EPDBE2010-14-ATH | ● | | | 14 | | | | | | 4.16 | 15.07 | 15.47 | 16.00 | 16.76 | 18.54 |
| EPDBE2010-16-ATH | ● | | | 16 | | | | | | 3.79 | 17.13 | 17.56 | 18.28 | 19.16 | 21.20 |
| EPDBE2010-18-ATH | ● | | | 18 | | | 60 | | | 3.49 | 19.19 | 19.66 | 20.56 | 21.55 | 23.85 |
| EPDBE2010-20-ATH | ● | | | 20 | | | | | | 3.23 | 21.25 | 21.84 | 22.84 | 23.94 | 26.51 |
| EPDBE2011-2-ATH | ● | 0.55 | 1.1 | 2 | 1 | 1.05 | 50 | 4 | 4 | 9.81 | 2.58 | 2.70 | 2.81 | 2.92 | 3.12 |
| EPDBE2011-4-ATH | ● | | | 4 | | | | | | 7.95 | 4.69 | 4.89 | 5.06 | 5.21 | 5.48 |
| EPDBE2011-6-ATH | ● | | | 6 | | | | | | 6.68 | 6.79 | 7.04 | 7.25 | 7.43 | 7.94 |
| EPDBE2011-8-ATH | ● | | | 8 | | | | | | 5.76 | 8.87 | 9.17 | 9.41 | 9.61 | 10.59 |
| EPDBE2011-10-ATH | ● | | | 10 | | | | | | 5.06 | 10.95 | 11.28 | 11.55 | 12.00 | 13.25 |
| EPDBE2012-4-ATH | ● | 0.6 | 1.2 | 4 | 1.1 | 1.15 | 50 | 4 | 4 | 7.89 | 4.69 | 4.88 | 5.05 | 5.20 | 5.47 |
| EPDBE2012-6-ATH | ● | | | 6 | | | | | | 6.60 | 6.79 | 7.03 | 7.24 | 7.42 | 7.92 |
| EPDBE2012-8-ATH | ● | | | 8 | | | | | | 5.67 | 8.87 | 9.16 | 9.40 | 9.61 | 10.58 |
| EPDBE2012-10-ATH | ● | | | 10 | | | | | | 4.97 | 10.95 | 11.28 | 11.54 | 11.99 | 13.23 |
| EPDBE2012-12-ATH | ● | | | 12 | | | 55 | | | 4.43 | 13.02 | 13.38 | 13.73 | 14.38 | 15.89 |
| EPDBE2014-8-ATH | ● | 0.7 | 1.4 | 8 | 1.3 | 1.34 | 50 | 4 | 4 | 5.48 | 8.89 | 9.18 | 9.41 | 9.61 | 10.58 |
| EPDBE2014-12-ATH | ● | | | 12 | | | 55 | | | 4.24 | 13.04 | 13.39 | 13.74 | 14.39 | 15.89 |
| EPDBE2014-16-ATH | ● | | | 16 | | | | | | 3.46 | 17.16 | 17.57 | 18.31 | 19.17 | 21.20 |
| EPDBE2015-4-ATH | ● | 0.75 | 1.5 | 4 | 1.35 | 1.44 | 50 | 4 | 4 | 7.68 | 4.71 | 4.89 | 5.06 | 5.20 | 5.46 |
| EPDBE2015-6-ATH | ● | | | 6 | | | | | | 6.33 | 6.81 | 7.04 | 7.25 | 7.42 | 7.91 |
| EPDBE2015-8-ATH | ● | | | 8 | | | | | | 5.39 | 8.89 | 9.17 | 9.41 | 9.61 | 10.56 |
| EPDBE2015-10-ATH | ● | | | 10 | | | | | | 4.68 | 10.96 | 11.29 | 11.55 | 11.98 | 13.22 |
| EPDBE2015-12-ATH | ● | | | 12 | | | 55 | | | 4.14 | 13.03 | 13.39 | 13.74 | 14.38 | 15.87 |
| EPDBE2015-14-ATH | ● | | | 14 | | | | | | 3.72 | 15.10 | 15.48 | 16.02 | 16.77 | 18.52 |
| EPDBE2015-16-ATH | ● | | | 16 | | | | | | 3.77 | 17.16 | 17.57 | 18.30 | 19.16 | 21.18 |
| EPDBE2015-18-ATH | ● | | | 18 | | | 60 | | | 3.08 | 19.22 | 19.69 | 20.58 | 21.56 | 23.83 |
| EPDBE2015-20-ATH | ● | | | 20 | | | | | | 2.84 | 21.27 | 21.87 | 22.86 | 23.95 | No interference |
| EPDBE2016-8-ATH | ● | 0.8 | 1.6 | 8 | 1.4 | 1.54 | 50 | 4 | 4 | 5.28 | 8.89 | 9.17 | 9.40 | 9.60 | 10.55 |
| EPDBE2016-12-ATH | ● | | | 12 | | | 55 | | | 4.05 | 13.03 | 13.39 | 13.73 | 14.37 | 15.85 |
| EPDBE2016-16-ATH | ● | | | 16 | | | | | | 3.28 | 17.16 | 17.57 | 18.29 | 19.15 | 21.16 |
| EPDBE2016-20-ATH | ● | | | 20 | | | 60 | | | 2.75 | 21.27 | 21.87 | 22.86 | 23.94 | No interference |

● : Stocked items.




# EPDBE2○○○-○○.○○-ATH

**【Note】**
The effective under-neck length is different from Epoch Deep Ball EPDB. Please recheck the interference region.

| Item code | Stock | Size (mm) | | | | | | | | | The effective under-neck length for the various draft angles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ATH | Ball radius | Tool dia. | Under neck length | Flute length | Neck dia. | Overall length | Shank dia. | Neck R | Interference angle | | | | | |
| | | RE | DC | LU | APMX | DN | LF | DCONMS | | θκ | 0.5° | 1° | 1.5° | 2° | 3° |
| EPDBE2018-8-ATH | ● | 0.9 | 1.8 | 8 | 1.6 | 1.73 | 50 | 4 | 4 | 5.06 | 8.91 | 9.18 | 9.41 | 9.61 | 10.54 |
| EPDBE2018-12-ATH | ● | | | 12 | | | 55 | | | 3.83 | 13.05 | 13.40 | 13.74 | 14.38 | 15.85 |
| EPDBE2018-16-ATH | ● | | | 16 | | | | | | 3.09 | 17.17 | 17.58 | 18.31 | 19.16 | 21.16 |
| EPDBE2018-20-ATH | ● | | | 20 | | | 60 | | | 2.58 | 21.28 | 21.88 | 22.87 | 23.95 | No interference |
| EPDBE2020-3-ATH | ● | 1 | 2 | 3 | 1.7 | 1.92 | 50 | 4 | 4 | 8.26 | 3.71 | 3.84 | 3.96 | 4.07 | 4.29 |
| EPDBE2020-4-ATH | ● | | | 4 | | | | | | 7.23 | 4.75 | 4.92 | 5.07 | 5.21 | 5.45 |
| EPDBE2020-6-ATH | ● | | | 6 | | | | | | 5.78 | 6.84 | 7.07 | 7.26 | 7.43 | 7.89 |
| EPDBE2020-8-ATH | ● | | | 8 | | | | | | 4.81 | 8.92 | 9.19 | 9.42 | 9.61 | 10.54 |
| EPDBE2020-10-ATH | ● | | | 10 | | | | | | 4.12 | 11.00 | 11.30 | 11.56 | 11.99 | 13.20 |
| EPDBE2020-12-ATH | ● | | | 12 | | | 55 | | | 3.61 | 13.06 | 13.41 | 13.76 | 14.39 | 15.85 |
| EPDBE2020-13-ATH | ● | | | 13 | | | | | | 3.39 | 14.10 | 14.45 | 14.90 | 15.58 | 17.18 |
| EPDBE2020-14-ATH | ● | | | 14 | | | | | | 3.20 | 15.13 | 15.50 | 16.04 | 16.78 | 18.51 |
| EPDBE2020-16-ATH | ● | | | 16 | | | | | | 2.88 | 17.19 | 17.59 | 18.32 | 19.17 | No interference |
| EPDBE2020-18-ATH | ● | | | 18 | | | 60 | | | 2.62 | 19.24 | 19.72 | 20.60 | 21.57 | No interference |
| EPDBE2020-20-ATH | ● | | | 20 | | | | | | 2.40 | 21.30 | 21.90 | 22.88 | 23.96 | No interference |
| EPDBE2020-22-ATH | ● | | | 22 | | | | | | 2.22 | 23.35 | 24.08 | 25.16 | 26.35 | No interference |
| EPDBE2020-25-ATH | ● | | | 25 | | | 65 | | | 1.99 | 26.42 | 27.35 | 28.58 | No interference | No interference |
| EPDBE2020-30-ATH | ● | | | 30 | | | 70 | | | 1.70 | 31.53 | 32.80 | 34.29 | No interference | No interference |
| EPDBE2020-35-ATH | ● | | | 35 | | | 75 | | | 1.48 | 36.65 | 38.24 | No interference | No interference | No interference |
| EPDBE2020-40-ATH | ● | | | 40 | | | 80 | | | 1.31 | 41.86 | 43.69 | No interference | No interference | No interference |
| EPDBE2025-6-ATH | ● | 1.25 | 2.5 | 6 | 2 | 2.4 | 50 | 4 | 4 | 5.04 | 6.88 | 7.09 | 7.27 | 7.43 | 7.87 |
| EPDBE2025-10-ATH | ● | | | 10 | | | | | | 3.43 | 11.03 | 11.32 | 11.56 | 12.00 | 13.18 |
| EPDBE2025-15-ATH | ● | | | 15 | | | 55 | | | 2.46 | 16.18 | 16.56 | 17.20 | 17.98 | No interference |
| EPDBE2025-20-ATH | ● | | | 20 | | | 60 | | | 1.91 | 21.32 | 21.93 | 22.90 | No interference | No interference |
| EPDBE2025-25-ATH | ● | | | 25 | | | 65 | | | 1.57 | 26.44 | 27.38 | 28.60 | No interference | No interference |
| EPDBE2025-30-ATH | ● | | | 30 | | | 70 | | | 1.33 | 31.55 | 32.82 | No interference | No interference | No interference |
| EPDBE2030-8-ATH | ● | 1.5 | 3 | 8 | 2.5 | 2.88 | 55 | 6 | 4 | 6.19 | 8.99 | 9.23 | 9.44 | 9.62 | 10.51 |
| EPDBE2030-10-ATH | ● | | | 10 | | | | | | 5.41 | 11.06 | 11.34 | 11.57 | 12.01 | 13.16 |
| EPDBE2030-13-ATH | ● | | | 13 | | | 60 | | | 4.56 | 14.15 | 14.48 | 14.94 | 15.60 | 17.15 |
| EPDBE2030-16-ATH | ● | | | 16 | | | | | | 3.93 | 17.24 | 17.61 | 18.36 | 19.19 | 21.13 |
| EPDBE2030-20-ATH | ● | | | 20 | | | 65 | | | 3.33 | 21.34 | 21.96 | 22.92 | 23.97 | 26.44 |
| EPDBE2030-25-ATH | ● | | | 25 | | | 70 | | | 2.79 | 26.46 | 27.41 | 28.62 | 29.96 | No interference |
| EPDBE2030-30-ATH | ● | | | 30 | | | 75 | | | 2.40 | 31.57 | 32.85 | 34.32 | 35.94 | No interference |
| EPDBE2030-35-ATH | ● | | | 35 | | | 80 | | | 2.11 | 36.72 | 38.30 | 40.03 | 41.92 | No interference |
| EPDBE2035-15-ATH | ● | 1.75 | 3.5 | 15 | 2.75 | 3.35 | 60 | 6 | 4 | 3.68 | 16.25 | 16.60 | 17.26 | 18.03 | 19.81 |
| EPDBE2035-25-ATH | ● | | | 25 | | | 70 | | | 2.43 | 26.49 | 27.46 | 28.67 | 29.99 | No interference |
| EPDBE2035-35-ATH | ● | | | 35 | | | 80 | | | 1.82 | 36.79 | 38.36 | 40.07 | No interference | No interference |
| EPDBE2035-45-ATH | ● | | | 45 | | | 90 | | | 1.45 | 47.22 | 49.25 | No interference | No interference | No interference |
| EPDBE2040-10-ATH | ● | 2 | 4 | 10 | 3 | 3.85 | 55 | 6 | 4 | 4.38 | 11.10 | 11.36 | 11.58 | 12.00 | 13.10 |
| EPDBE2040-13-ATH | ● | | | 13 | | | 60 | | | 3.57 | 14.19 | 14.50 | 14.95 | 15.59 | 17.08 |
| EPDBE2040-16-ATH | ● | | | 16 | | | | | | 3.01 | 17.27 | 17.63 | 18.37 | 19.18 | No interference |
| EPDBE2040-20-ATH | ● | | | 20 | | | 65 | | | 2.49 | 21.37 | 21.99 | 22.93 | 23.96 | No interference |
| EPDBE2040-25-ATH | ● | | | 25 | | | 70 | | | 2.05 | 26.49 | 27.44 | 28.63 | 29.95 | No interference |
| EPDBE2040-30-ATH | ● | | | 30 | | | 75 | | | 1.74 | 31.59 | 32.89 | 34.34 | No interference | No interference |
| EPDBE2040-35-ATH | ● | | | 35 | | | 80 | | | 1.51 | 36.78 | 38.33 | 40.04 | No interference | No interference |
| EPDBE2040-40-ATH | ● | | | 40 | | | | | | 1.34 | 41.99 | 43.78 | No interference | No interference | No interference |
| EPDBE2040-45-ATH | ● | | | 45 | | | 90 | | | 1.20 | 47.20 | 49.23 | No interference | No interference | No interference |
| EPDBE2040-50-ATH | ● | | | 50 | | | 100 | | | 1.08 | 52.42 | 54.68 | No interference | No interference | No interference |
| EPDBE2050-20-ATH | ● | 2.5 | 5 | 20 | 3.5 | 4.85 | 65 | 6 | 4 | 1.42 | 21.36 | 21.95 | No interference | No interference | No interference |
| EPDBE2050-25-ATH | ● | | | 25 | | | 70 | | | 1.14 | 26.48 | 27.39 | No interference | No interference | No interference |
| EPDBE2050-30-ATH | ● | | | 30 | | | 75 | | | 0.95 | 31.58 | No interference | No interference | No interference | No interference |
| EPDBE2050-40-ATH | ● | | | 40 | | | 80 | | | 0.72 | 41.97 | No interference | No interference | No interference | No interference |
| EPDBE2060-12-ATH | ● | 3 | 6 | 12 | 6 | 5.85 | 60 | 6 | - | 0 | No interference | No interference | No interference | No interference | No interference |
| EPDBE2060-20-ATH | ● | | | 20 | | | 65 | | | 0 | No interference | No interference | No interference | No interference | No interference |
| EPDBE2060-30-ATH | ● | | | 30 | | | 75 | | | 0 | No interference | No interference | No interference | No interference | No interference |
| EPDBE2060-50-ATH | ● | | | 50 | | | 100 | | | 0 | No interference | No interference | No interference | No interference | No interference |

● : Stocked items.

# Recommended Cutting Conditions

**High efficiency cuttiing condition** | High accuracy cuttiing condition

Please refer to P.13
about high accuracy cutting conditions

## Epoch Deep Ball Evolution EPDBE-PN EPDBE-ATH

| Recommended range | | | | PN series / ATH series | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work material | | | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| | | | | Coppers | | Carbon steels, Alloy steels (180～250HB) | | Stainless steels, Tool steels (25～35HRC) | | Pre-hardened steels (35～45HRC) | | Hardened steels (45～55HRC) | | Hardened steels (55～65HRC) | |
| Ratio to standard depth of cut | | | | 120% | | 100% | | 90% | | 80% | | 65% | | 60% | |
| Ball radius RE (mm) | Tool dia. DC (mm) | Under neck length LU (mm) | ap (mm) | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min |
| 0.05 | 0.1 | 0.2 | 0.008 | 50,000 | 300 | 50,000 | 250 | 50,000 | 250 | 50,000 | 225 | 50,000 | 200 | 50,000 | 188 |
| | | 0.3 | 0.006 | 50,000 | 300 | 50,000 | 250 | 50,000 | 250 | 50,000 | 225 | 50,000 | 200 | 50,000 | 188 |
| | | 0.5 | 0.004 | 50,000 | 300 | 50,000 | 250 | 50,000 | 250 | 50,000 | 225 | 50,000 | 200 | 50,000 | 188 |
| 0.1 | 0.2 | 0.5 | 0.02 | 50,000 | 420 | 50,000 | 350 | 50,000 | 350 | 50,000 | 325 | 45,500 | 273 | 42,000 | 210 |
| | | 0.75 | 0.017 | 50,000 | 420 | 50,000 | 350 | 50,000 | 350 | 50,000 | 325 | 45,500 | 273 | 42,000 | 210 |
| | | 1 | 0.014 | 50,000 | 420 | 50,000 | 350 | 50,000 | 350 | 50,000 | 325 | 45,500 | 273 | 42,000 | 210 |
| | | 1.25 | 0.011 | 50,000 | 378 | 50,000 | 315 | 48,600 | 306 | 45,900 | 269 | 40,500 | 219 | 37,800 | 170 |
| | | 1.5 | 0.008 | 50,000 | 378 | 50,000 | 315 | 48,600 | 306 | 45,900 | 269 | 40,500 | 219 | 37,800 | 170 |
| | | 2 | 0.008 | 50,000 | 378 | 50,000 | 315 | 48,600 | 306 | 45,900 | 269 | 40,500 | 219 | 37,800 | 170 |
| | | 2.5 | 0.006 | 48,000 | 323 | 48,000 | 269 | 43,200 | 242 | 40,800 | 212 | 36,000 | 173 | 33,600 | 134 |
| | | 3 | 0.004 | 48,000 | 323 | 48,000 | 269 | 43,200 | 242 | 40,800 | 212 | 36,000 | 173 | 33,600 | 134 |
| 0.15 | 0.3 | 0.5 | 0.027 | 50,000 | 600 | 50,000 | 500 | 50,000 | 500 | 50,000 | 450 | 45,000 | 383 | 42,000 | 336 |
| | | 0.75 | 0.024 | 50,000 | 600 | 50,000 | 500 | 50,000 | 500 | 50,000 | 450 | 45,000 | 383 | 42,000 | 336 |
| | | 1 | 0.021 | 50,000 | 600 | 50,000 | 500 | 50,000 | 500 | 50,000 | 450 | 45,000 | 383 | 42,000 | 336 |
| | | 1.25 | 0.019 | 50,000 | 600 | 50,000 | 500 | 50,000 | 500 | 50,000 | 450 | 45,000 | 383 | 42,000 | 336 |
| | | 1.5 | 0.016 | 50,000 | 600 | 50,000 | 500 | 50,000 | 500 | 50,000 | 450 | 45,000 | 383 | 42,000 | 336 |
| | | 2 | 0.012 | 50,000 | 540 | 50,000 | 450 | 48,600 | 437 | 45,900 | 372 | 40,500 | 310 | 37,800 | 272 |
| | | 2.5 | 0.01 | 50,000 | 540 | 50,000 | 450 | 48,600 | 437 | 45,900 | 372 | 40,500 | 310 | 37,800 | 272 |
| | | 3 | 0.008 | 50,000 | 540 | 50,000 | 450 | 48,600 | 437 | 45,900 | 372 | 40,500 | 310 | 37,800 | 272 |
| 0.2 | 0.4 | 0.75 | 0.043 | 50,000 | 967 | 50,000 | 840 | 50,000 | 839 | 50,000 | 770 | 46,800 | 655 | 43,680 | 612 |
| | | 1 | 0.04 | 50,000 | 967 | 50,000 | 840 | 50,000 | 839 | 50,000 | 770 | 46,800 | 655 | 43,680 | 612 |
| | | 1.5 | 0.034 | 50,000 | 829 | 50,000 | 720 | 50,000 | 719 | 50,000 | 660 | 46,800 | 468 | 43,680 | 437 |
| | | 2 | 0.028 | 50,000 | 691 | 50,000 | 600 | 50,000 | 600 | 50,000 | 550 | 46,800 | 468 | 43,680 | 437 |
| | | 2.5 | 0.022 | 50,000 | 560 | 43,200 | 467 | 38,880 | 420 | 36,720 | 364 | 32,400 | 292 | 36,288 | 272 |
| | | 3 | 0.016 | 50,000 | 560 | 43,200 | 467 | 38,880 | 420 | 36,720 | 364 | 32,400 | 292 | 36,288 | 272 |
| | | 3.5 | 0.012 | 50,000 | 560 | 43,200 | 467 | 38,880 | 420 | 36,720 | 364 | 32,400 | 292 | 36,288 | 272 |
| | | 4 | 0.01 | 50,000 | 560 | 43,200 | 467 | 38,880 | 420 | 36,720 | 364 | 32,400 | 292 | 36,288 | 272 |
| | | 4.5 | 0.008 | 46,080 | 470 | 38,400 | 392 | 34,560 | 353 | 32,640 | 305 | 28,800 | 245 | 26,880 | 228 |
| 0.25 | 0.5 | 1 | 0.045 | 50,000 | 1,500 | 50,000 | 1,500 | 46,800 | 1,404 | 44,200 | 1,193 | 39,000 | 1,053 | 36,400 | 743 |
| | | 1.5 | 0.04 | 50,000 | 1,500 | 50,000 | 1,500 | 46,800 | 1,404 | 44,200 | 1,193 | 39,000 | 1,053 | 36,400 | 681 |
| | | 2 | 0.035 | 50,000 | 1,200 | 50,000 | 1,200 | 46,800 | 1,123 | 44,200 | 955 | 39,000 | 842 | 36,400 | 681 |
| | | 2.5 | 0.033 | 50,000 | 1,081 | 50,000 | 1,000 | 42,120 | 758 | 39,780 | 645 | 35,100 | 568 | 32,760 | 502 |
| | | 3 | 0.03 | 50,000 | 900 | 46,800 | 842 | 42,120 | 758 | 39,780 | 645 | 35,100 | 568 | 25,200 | 386 |
| | | 4 | 0.02 | 43,200 | 778 | 36,000 | 648 | 32,400 | 583 | 30,600 | 496 | 32,400 | 524 | 25,200 | 386 |
| | | 5 | 0.018 | 43,200 | 778 | 36,000 | 648 | 32,400 | 583 | 30,600 | 496 | 32,400 | 524 | 25,200 | 386 |
| | | 5.5 | 0.015 | 38,400 | 653 | 32,000 | 544 | 28,800 | 490 | 27,200 | 416 | 24,000 | 367 | 22,400 | 324 |
| | | 6 | 0.013 | 38,400 | 653 | 32,000 | 544 | 28,800 | 490 | 27,200 | 416 | 24,000 | 367 | 22,400 | 324 |
| | | 8 | 0.008 | 38,400 | 653 | 32,000 | 544 | 28,800 | 490 | 27,200 | 416 | 24,000 | 367 | 22,400 | 324 |
| 0.3 | 0.6 | 1 | 0.075 | 50,000 | 2,250 | 50,000 | 2,250 | 50,000 | 2,250 | 50,000 | 1,950 | 48,000 | 1,728 | 44,800 | 1,344 |
| | | 2 | 0.063 | 50,000 | 2,250 | 50,000 | 2,250 | 50,000 | 2,250 | 50,000 | 1,950 | 48,000 | 1,728 | 44,800 | 1,344 |
| | | 2.5 | 0.046 | 50,000 | 1,800 | 50,000 | 1,800 | 50,000 | 1,800 | 50,000 | 1,560 | 48,000 | 1,382 | 44,800 | 986 |
| | | 3 | 0.041 | 50,000 | 1,800 | 50,000 | 1,800 | 50,000 | 1,800 | 50,000 | 1,560 | 48,000 | 1,382 | 44,800 | 986 |
| | | 3.5 | 0.035 | 50,000 | 1,710 | 50,000 | 1,710 | 50,000 | 1,709 | 48,960 | 1,452 | 43,200 | 1,183 | 40,320 | 843 |
| | | 4 | 0.026 | 50,000 | 1,710 | 50,000 | 1,710 | 50,000 | 1,709 | 48,960 | 1,452 | 43,200 | 1,183 | 40,320 | 766 |
| | | 4.5 | 0.022 | 50,000 | 1,350 | 50,000 | 1,350 | 48,600 | 1,313 | 45,900 | 1,074 | 40,500 | 875 | 37,800 | 681 |
| | | 5 | 0.02 | 50,000 | 1,350 | 46,800 | 1,264 | 42,120 | 1,138 | 39,780 | 931 | 35,100 | 758 | 32,760 | 590 |
| | | 5.5 | 0.017 | 50,000 | 1,350 | 46,800 | 1,264 | 42,120 | 1,138 | 39,780 | 931 | 35,100 | 758 | 32,760 | 590 |
| | | 6 | 0.015 | 50,000 | 1,350 | 46,800 | 1,264 | 42,120 | 1,138 | 39,780 | 931 | 35,100 | 758 | 32,760 | 590 |
| | | 7 | 0.015 | 38,400 | 979 | 32,000 | 816 | 28,800 | 881 | 27,200 | 601 | 24,000 | 490 | 22,400 | 495 |
| | | 8 | 0.015 | 38,400 | 979 | 32,000 | 816 | 28,800 | 734 | 27,200 | 601 | 24,000 | 490 | 22,400 | 381 |
| | | 9 | 0.012 | 38,400 | 979 | 32,000 | 816 | 28,800 | 734 | 27,200 | 601 | 24,000 | 490 | 22,400 | 381 |
| | | 10 | 0.009 | 33,600 | 857 | 28,000 | 714 | 25,200 | 643 | 23,800 | 526 | 21,000 | 428 | 19,600 | 333 |
| | | 12 | 0.007 | 28,800 | 691 | 24,000 | 576 | 21,600 | 518 | 20,400 | 424 | 18,000 | 346 | 16,800 | 269 |
| 0.35 | 0.7 | 2 | 0.092 | 50,000 | 2,475 | 50,000 | 2,475 | 50,000 | 2,475 | 50,000 | 2,155 | 48,000 | 1,932 | 42,000 | 1,188 |
| | | 4 | 0.041 | 50,000 | 1,880 | 50,000 | 1,880 | 50,000 | 1,880 | 48,960 | 1,603 | 43,200 | 1,321 | 37,800 | 846 |
| | | 6 | 0.027 | 50,000 | 1,485 | 46,800 | 1,390 | 42,120 | 1,251 | 39,780 | 1,028 | 35,100 | 848 | 30,240 | 641 |
| | | 8 | 0.02 | 38,400 | 1,013 | 32,000 | 844 | 28,800 | 760 | 27,200 | 625 | 24,000 | 515 | 22,400 | 422 |

【Note】 Please refer to P.12

| Recommended range | | | | PN series / ATH series | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work material | | | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| | | | | Coppers | | Carbon steels, Alloy steels (180～250HB) | | Stainless steels, Tool steels (25～35HRC) | | Pre-hardened steels (35～45HRC) | | Hardened steels (45～55HRC) | | Hardened steels (55～65HRC) | |
| Ratio to standard depth of cut | | | | 120% | | 100% | | 90% | | 80% | | 65% | | 60% | |
| Ball radius RE (mm) | Tool dia. DC (mm) | Under neck length LU (mm) | ap (mm) | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min |
| 0.4 | 0.8 | 2 | 0.12 | 50,000 | 2,700 | 50,000 | 2,700 | 50,000 | 2,700 | 50,000 | 2,400 | 48,000 | 2,592 | 44,800 | 1,882 |
| | | 4 | 0.078 | 50,000 | 2,700 | 50,000 | 2,700 | 50,000 | 2,700 | 50,000 | 2,400 | 48,000 | 2,592 | 44,800 | 1,882 |
| | | 5 | 0.059 | 50,000 | 2,431 | 50,000 | 2,429 | 50,000 | 2,431 | 48,960 | 2,114 | 43,200 | 2,123 | 40,320 | 1,524 |
| | | 6 | 0.042 | 50,000 | 2,269 | 50,000 | 2,267 | 45,360 | 2,058 | 42,840 | 1,727 | 37,800 | 1,429 | 35,280 | 1,245 |
| | | 8 | 0.02 | 49,920 | 1,617 | 41,600 | 1,348 | 37,440 | 1,213 | 35,360 | 1,018 | 31,200 | 842 | 29,120 | 733 |
| | | 10 | 0.02 | 38,400 | 1,175 | 32,000 | 979 | 28,800 | 881 | 27,200 | 740 | 24,000 | 612 | 22,400 | 533 |
| 0.45 | 0.9 | 2 | 0.135 | 50,000 | 3,197 | 50,000 | 3,197 | 50,000 | 3,197 | 50,000 | 2,821 | 45,600 | 2,411 | 42,560 | 2,138 |
| | | 4 | 0.081 | 50,000 | 2,771 | 50,000 | 2,771 | 50,000 | 2,771 | 48,450 | 2,369 | 42,750 | 1,959 | 39,900 | 1,737 |
| | | 6 | 0.05 | 50,000 | 2,302 | 47,880 | 2,020 | 43,092 | 1,818 | 40,698 | 1,515 | 35,910 | 1,253 | 33,516 | 1,111 |
| | | 8 | 0.036 | 43,776 | 1,679 | 36,480 | 1,399 | 32,832 | 1,259 | 31,008 | 1,049 | 27,360 | 868 | 25,536 | 770 |
| 0.5 | 1 | 2 | 0.2 | 50,000 | 3,750 | 50,000 | 3,750 | 48,600 | 3,645 | 45,900 | 3,098 | 43,200 | 2,722 | 37,800 | 2,268 |
| | | 3 | 0.2 | 50,000 | 3,750 | 50,000 | 3,750 | 48,600 | 3,645 | 45,900 | 3,098 | 43,200 | 2,722 | 37,800 | 2,268 |
| | | 4 | 0.14 | 50,000 | 3,750 | 50,000 | 3,750 | 48,600 | 3,645 | 45,900 | 3,098 | 43,200 | 2,722 | 37,800 | 2,268 |
| | | 5 | 0.09 | 50,000 | 3,500 | 46,800 | 3,276 | 42,120 | 2,948 | 39,780 | 2,596 | 43,200 | 2,540 | 32,760 | 1,835 |
| | | 6 | 0.06 | 50,000 | 3,151 | 42,120 | 2,654 | 40,824 | 2,558 | 38,556 | 2,319 | 38,880 | 2,353 | 29,484 | 1,379 |
| | | 7 | 0.06 | 46,656 | 2,100 | 38,880 | 1,750 | 34,992 | 1,574 | 33,048 | 1,338 | 31,590 | 1,323 | 27,216 | 1,061 |
| | | 8 | 0.06 | 46,656 | 2,100 | 38,880 | 1,750 | 34,992 | 1,574 | 33,048 | 1,338 | 31,590 | 1,323 | 27,216 | 979 |
| | | 9 | 0.045 | 46,656 | 2,100 | 38,880 | 1,750 | 34,992 | 1,574 | 33,048 | 1,338 | 31,590 | 1,323 | 27,216 | 979 |
| | | 10 | 0.038 | 46,656 | 2,100 | 38,880 | 1,750 | 34,992 | 1,574 | 33,048 | 1,338 | 31,590 | 1,323 | 27,216 | 979 |
| | | 12 | 0.025 | 34,560 | 1,469 | 28,800 | 1,224 | 25,920 | 1,102 | 24,480 | 936 | 21,600 | 771 | 20,160 | 685 |
| | | 13 | 0.023 | 34,560 | 1,469 | 28,800 | 1,224 | 25,920 | 1,102 | 24,480 | 936 | 21,600 | 771 | 20,160 | 685 |
| | | 14 | 0.02 | 34,560 | 1,469 | 28,800 | 1,224 | 25,920 | 1,102 | 24,480 | 936 | 21,600 | 771 | 20,160 | 685 |
| | | 16 | 0.015 | 34,560 | 1,469 | 28,800 | 1,224 | 25,920 | 1,102 | 24,480 | 936 | 21,600 | 771 | 20,160 | 685 |
| | | 18 | 0.012 | 30,240 | 1,210 | 25,200 | 1,008 | 22,680 | 907 | 21,420 | 771 | 18,900 | 635 | 17,640 | 564 |
| | | 20 | 0.01 | 25,920 | 1,037 | 21,600 | 864 | 19,440 | 778 | 18,360 | 661 | 16,200 | 544 | 15,120 | 484 |
| 0.55 | 1.1 | 2 | 0.2 | 50,000 | 3,924 | 50,000 | 3,924 | 45,360 | 3,560 | 42,840 | 2,927 | 37,800 | 2,452 | 35,280 | 2,176 |
| | | 4 | 0.14 | 50,000 | 3,924 | 50,000 | 3,924 | 45,360 | 3,560 | 42,840 | 2,927 | 37,800 | 2,452 | 35,280 | 2,176 |
| | | 6 | 0.06 | 47,736 | 2,767 | 39,780 | 2,306 | 35,802 | 2,075 | 33,813 | 1,706 | 29,835 | 1,430 | 27,846 | 1,268 |
| | | 8 | 0.06 | 47,736 | 2,306 | 39,780 | 2,306 | 35,802 | 1,729 | 31,212 | 1,312 | 27,540 | 1,100 | 25,704 | 975 |
| | | 10 | 0.038 | 47,736 | 2,306 | 39,780 | 1,774 | 35,802 | 1,729 | 31,212 | 1,312 | 27,540 | 1,100 | 25,704 | 975 |
| 0.6 | 1.2 | 4 | 0.16 | 50,000 | 3,924 | 46,154 | 3,743 | 41,538 | 3,260 | 39,230 | 2,717 | 36,923 | 2,555 | 32,307 | 1,860 |
| | | 6 | 0.11 | 44,928 | 2,570 | 37,440 | 2,142 | 33,696 | 2,103 | 31,824 | 2,069 | 30,240 | 2,062 | 26,208 | 1,048 |
| | | 8 | 0.06 | 44,928 | 2,570 | 37,440 | 2,142 | 33,696 | 2,103 | 31,824 | 2,069 | 30,240 | 2,062 | 26,208 | 1,048 |
| | | 10 | 0.053 | 41,472 | 1,940 | 34,560 | 1,708 | 31,104 | 1,456 | 29,376 | 1,322 | 27,000 | 1,069 | 24,192 | 871 |
| | | 12 | 0.045 | 41,472 | 1,940 | 34,560 | 1,618 | 31,104 | 1,456 | 29,376 | 1,322 | 25,920 | 1,026 | 24,192 | 871 |
| 0.7 | 1.4 | 8 | 0.11 | 39,312 | 2,830 | 32,760 | 2,359 | 29,484 | 2,123 | 27,846 | 1,805 | 24,570 | 1,533 | 22,932 | 1,376 |
| | | 12 | 0.053 | 36,288 | 1,960 | 30,240 | 1,633 | 27,216 | 1,470 | 25,704 | 1,249 | 22,680 | 1,062 | 21,168 | 953 |
| | | 16 | 0.035 | 26,880 | 1,371 | 22,400 | 1,142 | 20,160 | 1,028 | 19,040 | 874 | 16,800 | 743 | 15,680 | 666 |
| 0.75 | 1.5 | 4 | 0.2 | 50,000 | 4,951 | 42,000 | 4,158 | 37,800 | 3,742 | 35,700 | 3,213 | 31,500 | 2,552 | 29,400 | 2,205 |
| | | 6 | 0.2 | 50,000 | 4,951 | 42,000 | 4,158 | 37,800 | 3,742 | 35,700 | 3,213 | 31,500 | 2,552 | 29,400 | 2,205 |
| | | 8 | 0.09 | 39,312 | 2,802 | 32,760 | 2,627 | 29,484 | 2,101 | 27,846 | 1,805 | 24,570 | 1,434 | 22,932 | 1,239 |
| | | 10 | 0.09 | 36,288 | 2,586 | 30,240 | 2,156 | 27,216 | 1,940 | 25,704 | 1,666 | 22,680 | 1,323 | 21,168 | 1,143 |
| | | 12 | 0.09 | 36,288 | 2,155 | 30,240 | 1,796 | 27,216 | 1,616 | 25,704 | 1,388 | 22,680 | 1,103 | 21,168 | 953 |
| | | 14 | 0.075 | 32,256 | 1,810 | 30,240 | 1,796 | 24,192 | 1,357 | 22,848 | 1,165 | 20,160 | 925 | 18,816 | 799 |
| | | 16 | 0.038 | 26,880 | 1,508 | 22,400 | 1,257 | 20,160 | 1,131 | 19,040 | 971 | 16,800 | 771 | 15,680 | 666 |
| | | 18 | 0.038 | 26,880 | 1,508 | 22,400 | 1,257 | 20,160 | 1,131 | 19,040 | 971 | 16,800 | 771 | 15,680 | 666 |
| | | 20 | 0.038 | 26,880 | 1,508 | 22,400 | 1,257 | 20,160 | 1,131 | 19,040 | 971 | 16,800 | 771 | 15,680 | 666 |
| 0.8 | 1.6 | 8 | 0.22 | 43,680 | 3,669 | 36,400 | 3,058 | 32,760 | 2,752 | 30,940 | 2,493 | 27,300 | 2,129 | 23,660 | 1,590 |
| | | 12 | 0.098 | 39,312 | 3,467 | 32,760 | 2,889 | 29,484 | 2,601 | 27,846 | 2,176 | 24,570 | 1,858 | 21,294 | 1,289 |
| | | 16 | 0.06 | 33,696 | 2,123 | 28,080 | 1,769 | 25,272 | 1,592 | 23,868 | 1,332 | 21,060 | 1,138 | 19,656 | 991 |
| | | 20 | 0.04 | 24,960 | 1,485 | 20,800 | 1,238 | 18,720 | 1,114 | 17,680 | 932 | 15,600 | 796 | 14,560 | 693 |
| 0.9 | 1.8 | 8 | 0.26 | 40,560 | 3,894 | 33,800 | 3,245 | 30,420 | 2,920 | 28,730 | 2,413 | 25,350 | 2,008 | 23,660 | 1,704 |
| | | 12 | 0.105 | 33,696 | 2,426 | 28,080 | 2,022 | 25,272 | 1,819 | 23,868 | 1,504 | 21,060 | 1,250 | 19,656 | 1,062 |
| | | 16 | 0.068 | 33,696 | 2,426 | 28,080 | 2,022 | 25,272 | 1,819 | 23,868 | 1,504 | 21,060 | 1,250 | 19,656 | 1,062 |
| | | 20 | 0.045 | 24,960 | 1,697 | 20,800 | 1,414 | 18,720 | 1,273 | 17,680 | 1,052 | 15,600 | 875 | 14,560 | 743 |
| 1 | 2 | 3 | 0.4 | 37,800 | 5,670 | 31,500 | 4,725 | 28,350 | 4,253 | 26,775 | 3,616 | 23,625 | 3,049 | 22,050 | 2,646 |
| | | 4 | 0.4 | 37,800 | 5,670 | 31,500 | 4,725 | 28,350 | 4,253 | 26,775 | 3,616 | 23,625 | 3,049 | 22,050 | 2,646 |
| | | 6 | 0.4 | 37,800 | 5,103 | 31,500 | 4,253 | 28,350 | 3,827 | 26,775 | 3,213 | 23,625 | 2,693 | 22,050 | 2,381 |
| | | 8 | 0.28 | 37,800 | 5,103 | 31,500 | 4,253 | 28,350 | 3,827 | 26,775 | 3,213 | 23,625 | 2,693 | 22,050 | 2,381 |
| | | 10 | 0.21 | 35,280 | 4,234 | 29,400 | 3,528 | 26,460 | 3,175 | 24,990 | 2,699 | 22,050 | 2,249 | 19,110 | 1,468 |

【Note】 Please refer to P.12

# Recommended Cutting Conditions

**High efficiency cuttiing condition** | High accuracy cuttiing condition

Please refer to P.13
about high accuracy cutting conditions

## Epoch Deep Ball Evolution EPDBE-PN EPDBE-ATH

| Recommended range | | | | PN series / ATH series | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work material | | | | 1 Coppers | | 2 Carbon steels, Alloy steels (180～250HB) | | 3 Stainless steels, Tool steels (25～35HRC) | | 4 Pre-hardened steels (35～45HRC) | | 5 Hardened steels (45～55HRC) | | 6 Hardened steels (55～65HRC) | |
| Ratio to standard depth of cut | | | | 120% | | 100% | | 90% | | 80% | | 65% | | 60% | |
| Ball radius RE (mm) | Tool dia. DC (mm) | Under neck length LU (mm) | $a_p$ (mm) | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min |
| 1 | 2 | 12 | 0.12 | 31,752 | 3,809 | 26,460 | 3,175 | 23,814 | 2,858 | 22,491 | 2,430 | 19,845 | 2,051 | 17,199 | 1,321 |
| | | 13 | 0.12 | 31,752 | 3,809 | 26,460 | 3,175 | 23,814 | 2,858 | 22,491 | 2,430 | 19,845 | 2,024 | 15,876 | 1,016 |
| | | 14 | 0.12 | 31,752 | 3,301 | 26,460 | 2,752 | 23,814 | 2,477 | 22,491 | 2,106 | 18,428 | 1,629 | 15,876 | 1,016 |
| | | 16 | 0.12 | 29,484 | 2,123 | 24,570 | 1,769 | 22,113 | 1,593 | 20,885 | 1,353 | 18,428 | 1,467 | 15,876 | 914 |
| | | 18 | 0.09 | 27,216 | 1,960 | 22,680 | 1,633 | 20,412 | 1,470 | 19,278 | 1,249 | 18,428 | 1,354 | 15,876 | 914 |
| | | 20 | 0.075 | 27,216 | 1,960 | 22,680 | 1,633 | 20,412 | 1,470 | 19,278 | 1,249 | 18,428 | 1,128 | 15,876 | 914 |
| | | 22 | 0.05 | 21,420 | 1,457 | 17,850 | 1,214 | 16,065 | 1,092 | 15,173 | 929 | 13,388 | 774 | 14,994 | 816 |
| | | 25 | 0.05 | 20,160 | 1,371 | 16,800 | 1,142 | 15,120 | 1,028 | 14,280 | 874 | 12,600 | 728 | 14,112 | 768 |
| | | 30 | 0.03 | 20,160 | 1,371 | 16,800 | 1,142 | 15,120 | 1,028 | 14,280 | 874 | 12,600 | 728 | 14,112 | 768 |
| | | 35 | 0.025 | 17,640 | 1,129 | 14,700 | 941 | 13,230 | 847 | 12,495 | 720 | 11,025 | 600 | 10,290 | 527 |
| | | 40 | 0.022 | 15,120 | 968 | 12,600 | 806 | 11,340 | 726 | 10,710 | 617 | 9,450 | 514 | 8,820 | 452 |
| 1.25 | 2.5 | 6 | 0.5 | 33,300 | 6,075 | 27,750 | 5,063 | 24,975 | 4,556 | 23,588 | 3,797 | 20,813 | 3,088 | 19,425 | 2,531 |
| | | 10 | 0.34 | 33,300 | 6,075 | 27,750 | 5,063 | 24,975 | 4,556 | 23,588 | 3,797 | 20,813 | 3,088 | 19,425 | 2,531 |
| | | 15 | 0.15 | 25,974 | 3,411 | 21,645 | 2,842 | 19,481 | 2,558 | 18,398 | 2,132 | 16,234 | 2,023 | 15,152 | 1,421 |
| | | 20 | 0.12 | 23,976 | 2,624 | 19,980 | 2,186 | 17,982 | 1,968 | 16,983 | 1,640 | 16,234 | 1,445 | 13,986 | 1,093 |
| | | 25 | 0.098 | 23,976 | 2,360 | 19,980 | 1,967 | 17,982 | 1,770 | 16,983 | 1,475 | 14,985 | 1,200 | 13,986 | 983 |
| | | 30 | 0.055 | 17,760 | 1,836 | 14,800 | 1,530 | 13,320 | 1,377 | 12,580 | 1,148 | 11,100 | 933 | 10,360 | 765 |
| 1.5 | 3 | 8 | 0.6 | 28,800 | 6,480 | 24,000 | 5,400 | 21,600 | 4,860 | 20,400 | 4,100 | 18,000 | 3,402 | 16,800 | 3,024 |
| | | 10 | 0.42 | 28,800 | 6,480 | 24,000 | 5,400 | 21,600 | 4,860 | 20,400 | 4,100 | 18,000 | 3,402 | 16,800 | 3,024 |
| | | 13 | 0.315 | 26,880 | 4,838 | 22,400 | 4,032 | 20,160 | 3,629 | 19,040 | 3,061 | 16,800 | 2,540 | 15,680 | 2,258 |
| | | 16 | 0.315 | 26,880 | 4,355 | 22,400 | 3,629 | 20,160 | 3,266 | 19,040 | 2,755 | 16,800 | 2,286 | 14,560 | 1,888 |
| | | 20 | 0.18 | 22,464 | 3,033 | 18,720 | 2,527 | 16,848 | 2,275 | 15,912 | 1,919 | 14,040 | 1,593 | 12,096 | 1,307 |
| | | 25 | 0.12 | 22,464 | 3,033 | 18,720 | 2,527 | 16,848 | 2,275 | 15,912 | 1,919 | 14,040 | 1,593 | 12,096 | 1,307 |
| | | 30 | 0.12 | 20,736 | 2,800 | 17,280 | 2,333 | 15,552 | 2,100 | 14,688 | 1,771 | 12,960 | 1,470 | 12,096 | 1,307 |
| | | 35 | 0.08 | 15,360 | 1,958 | 12,800 | 1,632 | 11,520 | 1,469 | 10,880 | 1,239 | 9,600 | 1,028 | 10,752 | 1,097 |
| 1.75 | 3.5 | 15 | 0.36 | 21,450 | 4,399 | 17,875 | 3,666 | 16,088 | 3,299 | 15,194 | 2,750 | 13,406 | 2,236 | 12,513 | 1,833 |
| | | 25 | 0.21 | 17,820 | 2,736 | 14,850 | 2,280 | 13,365 | 2,052 | 12,623 | 1,710 | 11,138 | 1,391 | 10,395 | 1,140 |
| | | 35 | 0.09 | 17,820 | 2,736 | 14,850 | 2,280 | 13,365 | 2,052 | 12,623 | 1,710 | 11,138 | 1,391 | 10,395 | 1,140 |
| | | 45 | 0.09 | 13,200 | 1,918 | 11,000 | 1,598 | 9,900 | 1,438 | 9,350 | 1,199 | 8,250 | 975 | 7,700 | 799 |
| 2 | 4 | 10 | 0.6 | 20,700 | 6,210 | 17,250 | 5,175 | 15,525 | 4,658 | 14,663 | 3,960 | 12,938 | 3,299 | 12,075 | 2,898 |
| | | 13 | 0.48 | 20,700 | 6,210 | 17,250 | 5,175 | 15,525 | 4,658 | 14,663 | 3,960 | 12,938 | 3,299 | 12,075 | 2,898 |
| | | 16 | 0.42 | 20,700 | 6,210 | 17,250 | 5,175 | 15,525 | 4,658 | 14,663 | 3,960 | 12,938 | 3,299 | 12,075 | 2,898 |
| | | 20 | 0.42 | 17,940 | 4,306 | 14,950 | 3,588 | 13,455 | 3,229 | 12,708 | 2,746 | 11,213 | 2,287 | 10,465 | 2,009 |
| | | 25 | 0.24 | 16,146 | 3,488 | 13,455 | 2,906 | 12,110 | 2,616 | 11,437 | 2,223 | 10,092 | 2,162 | 9,419 | 1,627 |
| | | 30 | 0.16 | 14,904 | 2,683 | 12,420 | 2,236 | 11,178 | 2,012 | 10,558 | 1,710 | 9,316 | 1,426 | 8,694 | 1,252 |
| | | 35 | 0.1 | 14,904 | 2,683 | 12,420 | 2,236 | 11,178 | 2,012 | 10,558 | 1,710 | 9,316 | 1,426 | 8,694 | 1,252 |
| | | 40 | 0.1 | 14,904 | 2,683 | 12,420 | 2,236 | 11,178 | 2,012 | 10,558 | 1,710 | 9,316 | 1,426 | 8,694 | 1,252 |
| | | 45 | 0.1 | 11,040 | 1,877 | 9,200 | 1,564 | 8,280 | 1,408 | 7,820 | 1,196 | 6,900 | 997 | 6,440 | 876 |
| | | 50 | 0.1 | 11,040 | 1,877 | 9,200 | 1,564 | 8,280 | 1,408 | 7,820 | 1,196 | 6,900 | 997 | 6,440 | 876 |
| 2.5 | 5 | 20 | 0.525 | 15,120 | 5,443 | 12,600 | 4,536 | 11,340 | 4,082 | 10,710 | 3,213 | 9,450 | 2,835 | 8,820 | 2,381 |
| | | 25 | 0.525 | 14,040 | 5,054 | 11,700 | 3,650 | 10,530 | 3,791 | 9,945 | 2,984 | 8,775 | 2,633 | 8,190 | 2,211 |
| | | 30 | 0.3 | 12,636 | 4,549 | 10,530 | 2,780 | 9,477 | 3,413 | 8,951 | 2,685 | 7,898 | 2,369 | 7,371 | 1,991 |
| | | 40 | 0.2 | 11,664 | 2,520 | 9,720 | 2,100 | 8,748 | 1,890 | 8,262 | 1,487 | 7,290 | 1,313 | 6,804 | 1,103 |
| 3 | 6 | 12 | 0.6 | 16,200 | 6,804 | 13,500 | 5,670 | 12,150 | 5,103 | 11,475 | 4,253 | 10,125 | 3,459 | 9,450 | 2,835 |
| | | 20 | 0.5 | 15,300 | 5,967 | 12,750 | 4,973 | 11,475 | 4,475 | 10,838 | 3,729 | 9,563 | 3,033 | 8,925 | 2,486 |
| | | 30 | 0.42 | 12,480 | 3,594 | 10,400 | 2,995 | 9,360 | 2,696 | 8,840 | 2,122 | 7,800 | 2,028 | 7,280 | 1,572 |
| | | 50 | 0.15 | 10,368 | 2,687 | 8,640 | 2,239 | 7,776 | 2,016 | 7,344 | 1,587 | 6,480 | 1,400 | 6,048 | 1,175 |

※(1) $a_p$ is shown as the criteria for carbon steel, alloy steel. For other materials, adjust the cutting depth according to the cutting depth factors in the above table.
※(2) When performing cutting where cutting chips may cause clogging, such as for rib cutting, blind grooves, etc., the cutting depth setting should be set by multiplying $a_p$ by a cutting depth factor to calculate the cutting depth amount, and this amount should then be reduced to 80% of the calculated value.
※(3) Adjust by setting $a_e$ to (3 to 5)×($a_p$)×(cutting depth ratio). When performing finishing processing, calculate the theoretical cusp height and set accordingly.

Cutting depth setting example: When cutting rib groove contours in hardened steel (50HRC) using an EPDBE2020-10-ATH tool:
Cutting depth = 0.21 ($a_p$) × 0.65 (cutting depth factor for hardened steel [45-55HRC])× 0.8 (for closed-area cutting) = 0.11mm

**【Note】**
① PN coating is less electro conductive. Therefore, electric transmitted measuring systems may not work.
② Use the appropriate coolant for the work material and machining shape.
③ These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
④ If the rpm of the machine is low, lower the feed rate also to put the rpm and feed rate in the same ratio.

# Epoch Deep Ball Evolution EPDBE-PN EPDBE-ATH

| Recommended range | | | | PN series / ATH series | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work material | | | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| | | | | Coppers | | Carbon steels, Alloy steels (180～250HB) | | Stainless steels, Tool steels (25～35HRC) | | Pre-hardened steels (35～45HRC) | | Hardened steels (45～55HRC) | | Hardened steels (55～65HRC) | |
| Ratio to standard depth of cut | | | | 120% | | 100% | | 90% | | 80% | | 65% | | 60% | |
| Ball radius RE (mm) | Tool dia. DC (mm) | Under neck length LU (mm) | ap (mm) | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min |
| 0.05 | 0.1 | 0.2 | 0.004 | 50,000 | 300 | 50,000 | 250 | 50,000 | 250 | 50,000 | 225 | 50,000 | 200 | 50,000 | 188 |
| | | 0.3 | 0.003 | 50,000 | 300 | 50,000 | 250 | 50,000 | 250 | 50,000 | 225 | 50,000 | 200 | 50,000 | 188 |
| | | 0.5 | 0.002 | 50,000 | 300 | 50,000 | 250 | 50,000 | 250 | 50,000 | 225 | 50,000 | 200 | 50,000 | 188 |
| 0.1 | 0.2 | 0.5 | 0.015 | 50,000 | 420 | 50,000 | 350 | 50,000 | 350 | 50,000 | 325 | 45,500 | 273 | 42,000 | 210 |
| | | 0.75 | 0.013 | 50,000 | 420 | 50,000 | 350 | 50,000 | 350 | 50,000 | 325 | 45,500 | 273 | 42,000 | 210 |
| | | 1 | 0.011 | 50,000 | 420 | 50,000 | 350 | 50,000 | 350 | 50,000 | 325 | 45,500 | 273 | 42,000 | 210 |
| | | 1.25 | 0.008 | 50,000 | 378 | 50,000 | 315 | 48,600 | 306 | 45,900 | 269 | 40,500 | 219 | 37,800 | 170 |
| | | 1.5 | 0.007 | 50,000 | 378 | 50,000 | 315 | 48,600 | 306 | 45,900 | 269 | 40,500 | 219 | 37,800 | 170 |
| | | 2 | 0.006 | 50,000 | 378 | 50,000 | 315 | 48,600 | 306 | 45,900 | 269 | 40,500 | 219 | 37,800 | 170 |
| | | 2.5 | 0.005 | 48,000 | 323 | 48,000 | 269 | 43,200 | 242 | 40,800 | 212 | 36,000 | 173 | 33,600 | 134 |
| | | 3 | 0.003 | 48,000 | 323 | 48,000 | 269 | 43,200 | 242 | 40,800 | 212 | 36,000 | 173 | 33,600 | 134 |
| 0.15 | 0.3 | 0.5 | 0.02 | 50,000 | 600 | 50,000 | 500 | 50,000 | 500 | 50,000 | 450 | 45,000 | 383 | 42,000 | 336 |
| | | 0.75 | 0.018 | 50,000 | 600 | 50,000 | 500 | 50,000 | 500 | 50,000 | 450 | 45,000 | 383 | 42,000 | 336 |
| | | 1 | 0.016 | 50,000 | 600 | 50,000 | 500 | 50,000 | 500 | 50,000 | 450 | 45,000 | 383 | 42,000 | 336 |
| | | 1.25 | 0.014 | 50,000 | 600 | 50,000 | 500 | 50,000 | 500 | 50,000 | 450 | 45,000 | 383 | 42,000 | 336 |
| | | 1.5 | 0.012 | 50,000 | 600 | 50,000 | 500 | 50,000 | 500 | 50,000 | 450 | 45,000 | 383 | 42,000 | 336 |
| | | 2 | 0.009 | 50,000 | 540 | 50,000 | 450 | 48,600 | 437 | 45,900 | 372 | 40,500 | 310 | 37,800 | 272 |
| | | 2.5 | 0.008 | 50,000 | 540 | 50,000 | 450 | 48,600 | 437 | 45,900 | 372 | 40,500 | 310 | 37,800 | 272 |
| | | 3 | 0.006 | 50,000 | 540 | 50,000 | 450 | 48,600 | 437 | 45,900 | 372 | 40,500 | 310 | 37,800 | 272 |
| 0.2 | 0.4 | 0.75 | 0.043 | 50,000 | 691 | 48,000 | 576 | 43,200 | 518 | 40,800 | 449 | 36,000 | 360 | 33,600 | 336 |
| | | 1 | 0.04 | 50,000 | 691 | 48,000 | 576 | 43,200 | 518 | 40,800 | 449 | 36,000 | 360 | 33,600 | 336 |
| | | 1.5 | 0.034 | 50,000 | 691 | 48,000 | 576 | 43,200 | 518 | 40,800 | 449 | 36,000 | 360 | 33,600 | 336 |
| | | 2 | 0.028 | 50,000 | 691 | 48,000 | 576 | 43,200 | 518 | 40,800 | 449 | 36,000 | 360 | 33,600 | 336 |
| | | 2.5 | 0.016 | 50,000 | 560 | 43,200 | 467 | 38,880 | 420 | 36,720 | 364 | 32,400 | 292 | 30,240 | 272 |
| | | 3 | 0.011 | 50,000 | 560 | 43,200 | 467 | 38,880 | 420 | 36,720 | 364 | 32,400 | 292 | 30,240 | 272 |
| | | 3.5 | 0.008 | 50,000 | 560 | 43,200 | 467 | 38,880 | 420 | 36,720 | 364 | 32,400 | 292 | 30,240 | 272 |
| | | 4 | 0.005 | 50,000 | 560 | 43,200 | 467 | 38,880 | 420 | 36,720 | 364 | 32,400 | 292 | 30,240 | 272 |
| | | 4.5 | 0.004 | 46,080 | 470 | 38,400 | 392 | 34,560 | 353 | 32,640 | 305 | 28,800 | 245 | 26,880 | 228 |
| 0.25 | 0.5 | 1 | 0.045 | 48,000 | 960 | 40,000 | 800 | 36,000 | 720 | 34,000 | 612 | 30,000 | 540 | 28,000 | 476 |
| | | 1.5 | 0.04 | 48,000 | 960 | 40,000 | 800 | 36,000 | 720 | 34,000 | 612 | 30,000 | 540 | 28,000 | 476 |
| | | 2 | 0.035 | 48,000 | 960 | 40,000 | 800 | 36,000 | 720 | 34,000 | 612 | 30,000 | 540 | 28,000 | 476 |
| | | 2.5 | 0.033 | 43,200 | 778 | 40,000 | 800 | 32,400 | 583 | 30,600 | 496 | 27,000 | 437 | 25,200 | 386 |
| | | 3 | 0.03 | 43,200 | 778 | 36,000 | 648 | 32,400 | 583 | 30,600 | 496 | 27,000 | 437 | 25,200 | 386 |
| | | 4 | 0.02 | 43,200 | 778 | 36,000 | 648 | 32,400 | 583 | 30,600 | 496 | 27,000 | 437 | 25,200 | 386 |
| | | 5 | 0.018 | 43,200 | 778 | 36,000 | 648 | 32,400 | 583 | 30,600 | 496 | 27,000 | 437 | 25,200 | 386 |
| | | 5.5 | 0.008 | 38,400 | 653 | 32,000 | 544 | 28,800 | 490 | 27,200 | 416 | 24,000 | 367 | 22,400 | 324 |
| | | 6 | 0.007 | 38,400 | 653 | 32,000 | 544 | 28,800 | 490 | 27,200 | 416 | 24,000 | 367 | 22,400 | 324 |
| | | 8 | 0.004 | 38,400 | 653 | 32,000 | 544 | 28,800 | 490 | 27,200 | 416 | 24,000 | 367 | 22,400 | 324 |
| 0.3 | 0.6 | 1 | 0.05 | 48,000 | 1,440 | 40,000 | 1,200 | 36,000 | 1,080 | 34,000 | 884 | 30,000 | 720 | 28,000 | 560 |
| | | 2 | 0.042 | 48,000 | 1,440 | 40,000 | 1,200 | 36,000 | 1,080 | 34,000 | 884 | 30,000 | 720 | 28,000 | 560 |
| | | 2.5 | 0.038 | 48,000 | 1,440 | 40,000 | 1,200 | 36,000 | 1,080 | 34,000 | 884 | 30,000 | 720 | 28,000 | 560 |
| | | 3 | 0.034 | 48,000 | 1,440 | 40,000 | 1,200 | 36,000 | 1,080 | 34,000 | 884 | 30,000 | 720 | 28,000 | 560 |
| | | 3.5 | 0.029 | 43,200 | 1,231 | 36,000 | 1,026 | 32,400 | 923 | 30,600 | 756 | 27,000 | 616 | 25,200 | 479 |
| | | 4 | 0.024 | 43,200 | 1,231 | 36,000 | 1,026 | 32,400 | 923 | 30,600 | 756 | 27,000 | 616 | 25,200 | 479 |
| | | 4.5 | 0.022 | 43,200 | 1,166 | 36,000 | 972 | 32,400 | 875 | 30,600 | 716 | 27,000 | 583 | 25,200 | 454 |
| | | 5 | 0.02 | 43,200 | 1,166 | 36,000 | 972 | 32,400 | 875 | 30,600 | 716 | 27,000 | 583 | 25,200 | 454 |
| | | 5.5 | 0.017 | 43,200 | 1,166 | 36,000 | 972 | 32,400 | 875 | 30,600 | 716 | 27,000 | 583 | 25,200 | 454 |
| | | 6 | 0.015 | 43,200 | 1,166 | 36,000 | 972 | 32,400 | 875 | 30,600 | 716 | 27,000 | 583 | 25,200 | 454 |
| | | 7 | 0.008 | 38,400 | 979 | 32,000 | 816 | 28,800 | 734 | 27,200 | 601 | 24,000 | 490 | 22,400 | 381 |
| | | 8 | 0.008 | 38,400 | 979 | 32,000 | 816 | 28,800 | 734 | 27,200 | 601 | 24,000 | 490 | 22,400 | 381 |
| | | 9 | 0.006 | 38,400 | 979 | 32,000 | 816 | 28,800 | 734 | 27,200 | 601 | 24,000 | 490 | 22,400 | 381 |
| | | 10 | 0.005 | 33,600 | 857 | 28,000 | 714 | 25,200 | 643 | 23,800 | 526 | 21,000 | 428 | 19,600 | 333 |
| | | 12 | 0.004 | 28,800 | 691 | 24,000 | 576 | 21,600 | 518 | 20,400 | 424 | 18,000 | 346 | 16,800 | 269 |
| 0.35 | 0.7 | 2 | 0.061 | 48,000 | 1,584 | 40,000 | 1,320 | 36,000 | 1,188 | 34,000 | 977 | 30,000 | 805 | 28,000 | 660 |
| | | 4 | 0.034 | 43,200 | 1,354 | 36,000 | 1,128 | 32,400 | 1,015 | 30,600 | 835 | 27,000 | 688 | 25,200 | 564 |
| | | 6 | 0.027 | 43,200 | 1,283 | 36,000 | 1,069 | 32,400 | 962 | 30,600 | 791 | 27,000 | 652 | 25,200 | 535 |
| | | 8 | 0.01 | 38,400 | 1,013 | 32,000 | 844 | 28,800 | 760 | 27,200 | 625 | 24,000 | 515 | 22,400 | 422 |

【Note】 Please refer to P.15

# Recommended Cutting Conditions

High efficiency cuttiing condition | **High accuracy cuttiing condition**

Please refer to P.10
about high efficiency cutting conditions

## Epoch Deep Ball Evolution EPDBE-PN EPDBE-ATH

| Recommended range | | | | PN series / ATH series | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work material | | | | 1 Coppers | | 2 Carbon steels, Alloy steels (180～250HB) | | 3 Stainless steels, Tool steels (25～35HRC) | | 4 Pre-hardened steels (35～45HRC) | | 5 Hardened steels (45～55HRC) | | 6 Hardened steels (55～65HRC) | |
| Ratio to standard depth of cut | | | | 120% | | 100% | | 90% | | 80% | | 65% | | 60% | |
| Ball radius RE (mm) | Tool dia. DC (mm) | Under neck length LU (mm) | ap (mm) | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min |
| 0.4 | 0.8 | 2 | 0.08 | 48,000 | 1,728 | 40,000 | 1,440 | 36,000 | 1,296 | 34,000 | 1,088 | 30,000 | 900 | 28,000 | 784 |
| | | 4 | 0.056 | 48,000 | 1,728 | 40,000 | 1,440 | 36,000 | 1,296 | 34,000 | 1,088 | 30,000 | 900 | 28,000 | 784 |
| | | 5 | 0.045 | 43,200 | 1,400 | 36,000 | 1,166 | 32,400 | 1,050 | 30,600 | 881 | 27,000 | 729 | 25,200 | 635 |
| | | 6 | 0.032 | 43,200 | 1,400 | 36,000 | 1,166 | 32,400 | 1,050 | 30,600 | 881 | 27,000 | 729 | 25,200 | 635 |
| | | 8 | 0.02 | 38,400 | 1,244 | 32,000 | 1,037 | 28,800 | 933 | 27,200 | 783 | 24,000 | 648 | 22,400 | 564 |
| | | 10 | 0.01 | 38,400 | 1,175 | 32,000 | 979 | 28,800 | 881 | 27,200 | 740 | 24,000 | 612 | 22,400 | 533 |
| 0.45 | 0.9 | 2 | 0.09 | 45,600 | 1,944 | 38,000 | 1,620 | 34,200 | 1,458 | 32,300 | 1,215 | 28,500 | 1,004 | 26,600 | 891 |
| | | 4 | 0.058 | 45,600 | 1,944 | 38,000 | 1,620 | 34,200 | 1,458 | 32,300 | 1,215 | 28,500 | 1,004 | 26,600 | 891 |
| | | 6 | 0.042 | 41,040 | 1,574 | 34,200 | 1,312 | 30,780 | 1,181 | 29,070 | 984 | 25,650 | 813 | 23,940 | 722 |
| | | 8 | 0.03 | 36,480 | 1,399 | 30,400 | 1,166 | 27,360 | 1,049 | 25,840 | 875 | 22,800 | 723 | 21,280 | 641 |
| 0.5 | 1 | 2 | 0.1 | 43,200 | 2,160 | 36,000 | 1,800 | 32,400 | 1,620 | 30,600 | 1,377 | 27,000 | 1,134 | 25,200 | 1,008 |
| | | 3 | 0.1 | 43,200 | 2,160 | 36,000 | 1,800 | 32,400 | 1,620 | 30,600 | 1,377 | 27,000 | 1,134 | 25,200 | 1,008 |
| | | 4 | 0.07 | 43,200 | 2,160 | 36,000 | 1,800 | 32,400 | 1,620 | 30,600 | 1,377 | 27,000 | 1,134 | 25,200 | 1,008 |
| | | 5 | 0.06 | 43,200 | 2,160 | 36,000 | 1,800 | 32,400 | 1,620 | 30,600 | 1,377 | 27,000 | 1,134 | 25,200 | 1,008 |
| | | 6 | 0.04 | 38,880 | 1,750 | 32,400 | 1,458 | 29,160 | 1,312 | 27,540 | 1,115 | 24,300 | 919 | 22,680 | 816 |
| | | 7 | 0.04 | 38,880 | 1,750 | 32,400 | 1,458 | 29,160 | 1,312 | 27,540 | 1,115 | 24,300 | 919 | 22,680 | 816 |
| | | 8 | 0.04 | 38,880 | 1,750 | 32,400 | 1,458 | 29,160 | 1,312 | 27,540 | 1,115 | 24,300 | 919 | 22,680 | 816 |
| | | 9 | 0.03 | 38,880 | 1,750 | 32,400 | 1,458 | 29,160 | 1,312 | 27,540 | 1,115 | 24,300 | 919 | 22,680 | 816 |
| | | 10 | 0.025 | 38,880 | 1,750 | 32,400 | 1,458 | 29,160 | 1,312 | 27,540 | 1,115 | 24,300 | 919 | 22,680 | 816 |
| | | 12 | 0.013 | 34,560 | 1,469 | 28,800 | 1,224 | 25,920 | 1,102 | 24,480 | 936 | 21,600 | 771 | 20,160 | 685 |
| | | 13 | 0.011 | 34,560 | 1,469 | 28,800 | 1,224 | 25,920 | 1,102 | 24,480 | 936 | 21,600 | 771 | 20,160 | 685 |
| | | 14 | 0.01 | 34,560 | 1,469 | 28,800 | 1,224 | 25,920 | 1,102 | 24,480 | 936 | 21,600 | 771 | 20,160 | 685 |
| | | 16 | 0.008 | 34,560 | 1,469 | 28,800 | 1,224 | 25,920 | 1,102 | 24,480 | 936 | 21,600 | 771 | 20,160 | 685 |
| | | 18 | 0.006 | 30,240 | 1,210 | 25,200 | 1,008 | 22,680 | 907 | 21,420 | 771 | 18,900 | 635 | 17,640 | 564 |
| | | 20 | 0.005 | 25,920 | 1,037 | 21,600 | 864 | 19,440 | 778 | 18,360 | 661 | 16,200 | 544 | 15,120 | 484 |
| 0.55 | 1.1 | 2 | 0.1 | 40,320 | 2,110 | 33,600 | 1,758 | 30,240 | 1,582 | 28,560 | 1,301 | 25,200 | 1,090 | 23,520 | 967 |
| | | 4 | 0.07 | 40,320 | 2,110 | 33,600 | 1,758 | 30,240 | 1,582 | 28,560 | 1,301 | 25,200 | 1,090 | 23,520 | 967 |
| | | 6 | 0.04 | 36,720 | 1,774 | 30,600 | 1,478 | 27,540 | 1,330 | 26,010 | 1,094 | 22,950 | 916 | 21,420 | 813 |
| | | 8 | 0.04 | 36,720 | 1,774 | 30,600 | 1,478 | 27,540 | 1,330 | 26,010 | 1,094 | 22,950 | 916 | 21,420 | 813 |
| | | 10 | 0.025 | 36,720 | 1,774 | 30,600 | 1,478 | 27,540 | 1,330 | 26,010 | 1,094 | 22,950 | 916 | 21,420 | 813 |
| 0.6 | 1.2 | 4 | 0.08 | 36,923 | 1,932 | 30,769 | 1,610 | 27,692 | 1,449 | 26,154 | 1,208 | 23,077 | 998 | 21,538 | 886 |
| | | 6 | 0.06 | 34,560 | 1,797 | 28,800 | 1,498 | 25,920 | 1,348 | 24,480 | 1,102 | 21,600 | 950 | 20,160 | 806 |
| | | 8 | 0.04 | 34,560 | 1,797 | 28,800 | 1,498 | 25,920 | 1,348 | 24,480 | 1,102 | 21,600 | 950 | 20,160 | 806 |
| | | 10 | 0.035 | 34,560 | 1,617 | 28,800 | 1,423 | 25,920 | 1,213 | 24,480 | 1,102 | 21,600 | 855 | 20,160 | 726 |
| | | 12 | 0.03 | 34,560 | 1,617 | 28,800 | 1,348 | 25,920 | 1,213 | 24,480 | 1,102 | 21,600 | 855 | 20,160 | 726 |
| 0.7 | 1.4 | 8 | 0.055 | 30,240 | 1,814 | 25,200 | 1,512 | 22,680 | 1,361 | 21,420 | 1,157 | 18,900 | 983 | 17,640 | 882 |
| | | 12 | 0.035 | 30,240 | 1,633 | 25,200 | 1,361 | 22,680 | 1,225 | 21,420 | 1,041 | 18,900 | 885 | 17,640 | 794 |
| | | 16 | 0.017 | 26,880 | 1,371 | 22,400 | 1,142 | 20,160 | 1,028 | 19,040 | 874 | 16,800 | 743 | 15,680 | 666 |
| 0.75 | 1.5 | 4 | 0.1 | 33,600 | 2,218 | 28,000 | 1,848 | 25,200 | 1,663 | 23,800 | 1,428 | 21,000 | 1,134 | 19,600 | 980 |
| | | 6 | 0.1 | 33,600 | 2,218 | 28,000 | 1,848 | 25,200 | 1,663 | 23,800 | 1,428 | 21,000 | 1,134 | 19,600 | 980 |
| | | 8 | 0.06 | 30,240 | 1,796 | 25,200 | 1,497 | 22,680 | 1,347 | 21,420 | 1,157 | 18,900 | 919 | 17,640 | 794 |
| | | 10 | 0.06 | 30,240 | 1,796 | 25,200 | 1,497 | 22,680 | 1,347 | 21,420 | 1,157 | 18,900 | 919 | 17,640 | 794 |
| | | 12 | 0.06 | 30,240 | 1,796 | 25,200 | 1,497 | 22,680 | 1,347 | 21,420 | 1,157 | 18,900 | 919 | 17,640 | 794 |
| | | 14 | 0.05 | 26,880 | 1,508 | 25,200 | 1,497 | 20,160 | 1,131 | 19,040 | 971 | 16,800 | 771 | 15,680 | 666 |
| | | 16 | 0.019 | 26,880 | 1,508 | 22,400 | 1,257 | 20,160 | 1,131 | 19,040 | 971 | 16,800 | 771 | 15,680 | 666 |
| | | 18 | 0.019 | 26,880 | 1,508 | 22,400 | 1,257 | 20,160 | 1,131 | 19,040 | 971 | 16,800 | 771 | 15,680 | 666 |
| | | 20 | 0.019 | 26,880 | 1,508 | 22,400 | 1,257 | 20,160 | 1,131 | 19,040 | 971 | 16,800 | 771 | 15,680 | 666 |
| 0.8 | 1.6 | 8 | 0.11 | 31,200 | 2,184 | 26,000 | 1,820 | 23,400 | 1,638 | 22,100 | 1,370 | 19,500 | 1,170 | 18,200 | 1,019 |
| | | 12 | 0.065 | 28,080 | 1,769 | 23,400 | 1,474 | 21,060 | 1,327 | 19,890 | 1,110 | 17,550 | 948 | 16,380 | 826 |
| | | 16 | 0.04 | 28,080 | 1,769 | 23,400 | 1,474 | 21,060 | 1,327 | 19,890 | 1,110 | 17,550 | 948 | 16,380 | 826 |
| | | 20 | 0.02 | 24,960 | 1,485 | 20,800 | 1,238 | 18,720 | 1,114 | 17,680 | 932 | 15,600 | 796 | 14,560 | 693 |
| 0.9 | 1.8 | 8 | 0.13 | 31,200 | 2,496 | 26,000 | 2,080 | 23,400 | 1,872 | 22,100 | 1,547 | 19,500 | 1,287 | 18,200 | 1,092 |
| | | 12 | 0.07 | 28,080 | 2,022 | 23,400 | 1,685 | 21,060 | 1,516 | 19,890 | 1,253 | 17,550 | 1,042 | 16,380 | 885 |
| | | 16 | 0.045 | 28,080 | 2,022 | 23,400 | 1,685 | 21,060 | 1,516 | 19,890 | 1,253 | 17,550 | 1,042 | 16,380 | 885 |
| | | 20 | 0.022 | 24,960 | 1,697 | 20,800 | 1,414 | 18,720 | 1,273 | 17,680 | 1,052 | 15,600 | 875 | 14,560 | 743 |
| 1 | 2 | 3 | 0.2 | 25,200 | 2,520 | 21,000 | 2,100 | 18,900 | 1,890 | 17,850 | 1,607 | 15,750 | 1,355 | 14,700 | 1,176 |
| | | 4 | 0.2 | 25,200 | 2,520 | 21,000 | 2,100 | 18,900 | 1,890 | 17,850 | 1,607 | 15,750 | 1,355 | 14,700 | 1,176 |
| | | 6 | 0.2 | 25,200 | 2,268 | 21,000 | 1,890 | 18,900 | 1,701 | 17,850 | 1,428 | 15,750 | 1,197 | 14,700 | 1,058 |
| | | 8 | 0.14 | 25,200 | 2,268 | 21,000 | 1,890 | 18,900 | 1,701 | 17,850 | 1,428 | 15,750 | 1,197 | 14,700 | 1,058 |
| | | 10 | 0.14 | 25,200 | 2,016 | 21,000 | 1,680 | 18,900 | 1,512 | 17,850 | 1,285 | 15,750 | 1,071 | 14,700 | 941 |

| Recommended range | | | | PN series / ATH series | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work material | | | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| | | | | Coppers | | Carbon steels, Alloy steels (180～250HB) | | Stainless steels, Tool steels (25～35HRC) | | Pre-hardened steels (35～45HRC) | | Hardened steels (45～55HRC) | | Hardened steels (55～65HRC) | |
| Ratio to standard depth of cut | | | | 120% | | 100% | | 90% | | 80% | | 65% | | 60% | |
| Ball radius RE (mm) | Tool dia. DC (mm) | Under neck length LU (mm) | $a_p$ (mm) | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min |
| 1 | 2 | 12 | 0.08 | 22,680 | 1,814 | 18,900 | 1,512 | 17,010 | 1,361 | 16,065 | 1,157 | 14,175 | 964 | 13,230 | 847 |
| | | 13 | 0.08 | 22,680 | 1,814 | 18,900 | 1,512 | 17,010 | 1,361 | 16,065 | 1,157 | 14,175 | 964 | 13,230 | 847 |
| | | 14 | 0.08 | 22,680 | 1,814 | 18,900 | 1,512 | 17,010 | 1,361 | 16,065 | 1,157 | 14,175 | 964 | 13,230 | 847 |
| | | 16 | 0.08 | 22,680 | 1,633 | 18,900 | 1,361 | 17,010 | 1,225 | 16,065 | 1,041 | 14,175 | 868 | 13,230 | 762 |
| | | 18 | 0.06 | 22,680 | 1,633 | 18,900 | 1,361 | 17,010 | 1,225 | 16,065 | 1,041 | 14,175 | 868 | 13,230 | 762 |
| | | 20 | 0.05 | 22,680 | 1,633 | 18,900 | 1,361 | 17,010 | 1,225 | 16,065 | 1,041 | 14,175 | 868 | 13,230 | 762 |
| | | 22 | 0.042 | 21,420 | 1,457 | 17,850 | 1,214 | 16,065 | 1,092 | 15,173 | 929 | 13,388 | 774 | 12,495 | 680 |
| | | 25 | 0.035 | 20,160 | 1,371 | 16,800 | 1,142 | 15,120 | 1,028 | 14,280 | 874 | 12,600 | 728 | 11,760 | 640 |
| | | 30 | 0.015 | 20,160 | 1,371 | 16,800 | 1,142 | 15,120 | 1,028 | 14,280 | 874 | 12,600 | 728 | 11,760 | 640 |
| | | 35 | 0.012 | 17,640 | 1,129 | 14,700 | 941 | 13,230 | 847 | 12,495 | 720 | 11,025 | 600 | 10,290 | 527 |
| | | 40 | 0.01 | 15,120 | 968 | 12,600 | 806 | 11,340 | 726 | 10,710 | 617 | 9,450 | 514 | 8,820 | 452 |
| 1.25 | 2.5 | 6 | 0.25 | 22,200 | 2,700 | 18,500 | 2,250 | 16,650 | 2,025 | 15,725 | 1,688 | 13,875 | 1,373 | 12,950 | 1,125 |
| | | 10 | 0.17 | 22,200 | 2,700 | 18,500 | 2,250 | 16,650 | 2,025 | 15,725 | 1,688 | 13,875 | 1,373 | 12,950 | 1,125 |
| | | 15 | 0.1 | 19,980 | 2,186 | 16,650 | 1,822 | 14,985 | 1,640 | 14,153 | 1,367 | 12,488 | 1,111 | 11,655 | 911 |
| | | 20 | 0.08 | 19,980 | 2,186 | 16,650 | 1,822 | 14,985 | 1,640 | 14,153 | 1,367 | 12,488 | 1,111 | 11,655 | 911 |
| | | 25 | 0.065 | 19,980 | 1,967 | 16,650 | 1,639 | 14,985 | 1,475 | 14,153 | 1,229 | 12,488 | 1,000 | 11,655 | 820 |
| | | 30 | 0.044 | 17,760 | 1,836 | 14,800 | 1,530 | 13,320 | 1,377 | 12,580 | 1,148 | 11,100 | 933 | 10,360 | 765 |
| 1.5 | 3 | 8 | 0.3 | 19,200 | 2,880 | 16,000 | 2,400 | 14,400 | 2,160 | 13,600 | 1,822 | 12,000 | 1,512 | 11,200 | 1,344 |
| | | 10 | 0.21 | 19,200 | 2,880 | 16,000 | 2,400 | 14,400 | 2,160 | 13,600 | 1,822 | 12,000 | 1,512 | 11,200 | 1,344 |
| | | 13 | 0.21 | 19,200 | 2,880 | 16,000 | 2,400 | 14,400 | 2,160 | 13,600 | 1,822 | 12,000 | 1,512 | 11,200 | 1,344 |
| | | 16 | 0.21 | 19,200 | 2,592 | 16,000 | 2,160 | 14,400 | 1,944 | 13,600 | 1,640 | 12,000 | 1,361 | 11,200 | 1,210 |
| | | 20 | 0.12 | 17,280 | 2,333 | 14,400 | 1,944 | 12,960 | 1,750 | 12,240 | 1,476 | 10,800 | 1,225 | 10,080 | 1,089 |
| | | 25 | 0.08 | 17,280 | 2,333 | 14,400 | 1,944 | 12,960 | 1,750 | 12,240 | 1,476 | 10,800 | 1,225 | 10,080 | 1,089 |
| | | 30 | 0.08 | 17,280 | 2,333 | 14,400 | 1,944 | 12,960 | 1,750 | 12,240 | 1,476 | 10,800 | 1,225 | 10,080 | 1,089 |
| | | 35 | 0.064 | 15,360 | 1,958 | 12,800 | 1,632 | 11,520 | 1,469 | 10,880 | 1,239 | 9,600 | 1,028 | 8,960 | 914 |
| 1.75 | 3.5 | 15 | 0.24 | 16,500 | 2,820 | 13,750 | 2,350 | 12,375 | 2,115 | 11,688 | 1,763 | 10,313 | 1,434 | 9,625 | 1,175 |
| | | 25 | 0.14 | 14,850 | 2,280 | 12,375 | 1,900 | 11,138 | 1,710 | 10,519 | 1,425 | 9,281 | 1,159 | 8,663 | 950 |
| | | 35 | 0.09 | 14,850 | 2,280 | 12,375 | 1,900 | 11,138 | 1,710 | 10,519 | 1,425 | 9,281 | 1,159 | 8,663 | 950 |
| | | 45 | 0.072 | 13,200 | 1,918 | 11,000 | 1,598 | 9,900 | 1,438 | 9,350 | 1,199 | 8,250 | 975 | 7,700 | 799 |
| 2 | 4 | 10 | 0.4 | 13,800 | 2,760 | 11,500 | 2,300 | 10,350 | 2,070 | 9,775 | 1,760 | 8,625 | 1,466 | 8,050 | 1,288 |
| | | 13 | 0.32 | 13,800 | 2,760 | 11,500 | 2,300 | 10,350 | 2,070 | 9,775 | 1,760 | 8,625 | 1,466 | 8,050 | 1,288 |
| | | 16 | 0.28 | 13,800 | 2,760 | 11,500 | 2,300 | 10,350 | 2,070 | 9,775 | 1,760 | 8,625 | 1,466 | 8,050 | 1,288 |
| | | 20 | 0.28 | 13,800 | 2,760 | 11,500 | 2,300 | 10,350 | 2,070 | 9,775 | 1,760 | 8,625 | 1,466 | 8,050 | 1,288 |
| | | 25 | 0.16 | 12,420 | 2,236 | 10,350 | 1,863 | 9,315 | 1,677 | 8,798 | 1,425 | 7,763 | 1,188 | 7,245 | 1,043 |
| | | 30 | 0.16 | 12,420 | 2,236 | 10,350 | 1,863 | 9,315 | 1,677 | 8,798 | 1,425 | 7,763 | 1,188 | 7,245 | 1,043 |
| | | 35 | 0.1 | 12,420 | 2,236 | 10,350 | 1,863 | 9,315 | 1,677 | 8,798 | 1,425 | 7,763 | 1,188 | 7,245 | 1,043 |
| | | 40 | 0.1 | 12,420 | 2,236 | 10,350 | 1,863 | 9,315 | 1,677 | 8,798 | 1,425 | 7,763 | 1,188 | 7,245 | 1,043 |
| | | 45 | 0.08 | 11,040 | 1,877 | 9,200 | 1,564 | 8,280 | 1,408 | 7,820 | 1,196 | 6,900 | 997 | 6,440 | 876 |
| | | 50 | 0.07 | 11,040 | 1,877 | 9,200 | 1,564 | 8,280 | 1,408 | 7,820 | 1,196 | 6,900 | 997 | 6,440 | 876 |
| 2.5 | 5 | 20 | 0.35 | 10,800 | 2,592 | 9,000 | 2,160 | 8,100 | 1,944 | 7,650 | 1,530 | 6,750 | 1,350 | 6,300 | 1,134 |
| | | 25 | 0.35 | 10,800 | 2,592 | 9,000 | 2,160 | 8,100 | 1,944 | 7,650 | 1,530 | 6,750 | 1,350 | 6,300 | 1,134 |
| | | 30 | 0.2 | 9,720 | 2,333 | 8,100 | 1,944 | 7,290 | 1,750 | 6,885 | 1,377 | 6,075 | 1,215 | 5,670 | 1,021 |
| | | 40 | 0.2 | 9,720 | 2,100 | 8,100 | 1,750 | 7,290 | 1,575 | 6,885 | 1,239 | 6,075 | 1,094 | 5,670 | 919 |
| 3 | 6 | 12 | 0.6 | 10,800 | 3,024 | 9,000 | 2,520 | 8,100 | 2,268 | 7,650 | 1,890 | 6,750 | 1,537 | 6,300 | 1,260 |
| | | 20 | 0.5 | 10,200 | 2,652 | 8,500 | 2,210 | 7,650 | 1,989 | 7,225 | 1,658 | 6,375 | 1,348 | 5,950 | 1,105 |
| | | 30 | 0.42 | 9,600 | 2,304 | 8,000 | 1,920 | 7,200 | 1,728 | 6,800 | 1,360 | 6,000 | 1,200 | 5,600 | 1,008 |
| | | 50 | 0.15 | 8,640 | 1,866 | 7,200 | 1,555 | 6,480 | 1,400 | 6,120 | 1,102 | 5,400 | 972 | 5,040 | 816 |

※(1) $a_p$ is shown as the criteria for carbon steel, alloy steel. For other materials, adjust the cutting depth according to the cutting depth factors in the above table.
※(2) When performing cutting where cutting chips may cause clogging, such as for rib cutting, blind grooves, etc., the cutting depth setting should be set by multiplying $a_p$ by a cutting depth factor to calculate the cutting depth amount, and this amount should then be reduced to 80% of the calculated value.
※(3) Adjust by setting $a_e$ to (3 to 5)×($a_p$)×(cutting depth ratio). When performing finishing processing, calculate the theoretical cusp height and set accordingly.

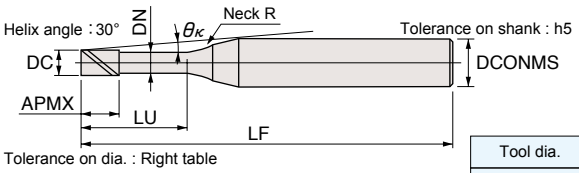
Cutting depth setting example: When cutting rib groove contours in hardened steel (50HRC) using an EPDBE2020-10-ATH tool:
Cutting depth = 0.14($a_p$) × 0.65 (cutting depth factor for hardened steel [45–55HRC]) × 0.8 (for closed-area cutting) = 0.073mm

**【Note】**
① PN coating is less electro conductive. Therefore, electric transmitted measuring systems may not work.
② Use the appropriate coolant for the work material and machining shape.
③ These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
④ If the rpm of the machine is low, lower the feed rate also to put the rpm and feed rate in the same ratio.

## Epoch Deep Square Evolution EPDSE-PN

PN Coating

2 Flutes




(mm)

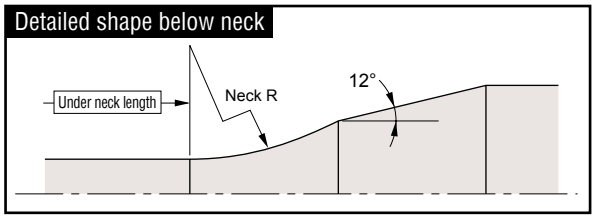
| Tool dia. | Tolerance on dia. |
|---|---|
| φ0.1～φ0.5 | 0 −0.007 |
| φ0.6～φ0.9 | 0 −0.01 |
| φ1～φ6 | 0 −0.015 |

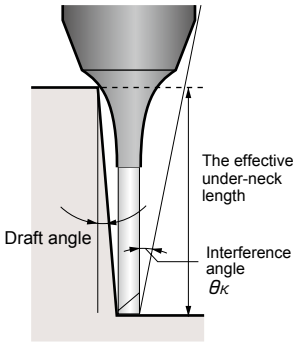
# EPDSE2○○○-○○.○-PN

| Item code | Stock | Size(mm) | | | | | | | | The effective under-neck length for the various draft angles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PN | Tool dia. | Under neck length | Flute length | Neck dia. | Overall length | Shank dia. | Neck R | Interference angle | | | | | |
| | | DC | LU | APMX | DN | LF | DCONMS | | θκ | 0.5° | 1° | 1.5° | 2° | 3° |
| EPDSE2001-0.3-PN | ● | 0.1 | 0.3 | 0.15 | 0.08 | 45 | 4 | 1 | 11.58 | 0.46 | 0.49 | 0.51 | 0.53 | 0.58 |
| EPDSE2001-0.5-PN | ● | | 0.5 | | | | | | 11.35 | 0.67 | 0.71 | 0.74 | 0.76 | 0.82 |
| EPDSE2001-1-PN | ● | | 1 | | | | | | 10.81 | 1.20 | 1.25 | 1.29 | 1.33 | 1.39 |
| EPDSE2002-0.5-PN | ● | 0.2 | 0.5 | 0.3 | 0.17 | 50 | 4 | 1 | 11.30 | 0.70 | 0.73 | 0.76 | 0.78 | 0.83 |
| EPDSE2002-1-PN | ● | | 1 | | | | | | 10.75 | 1.22 | 1.27 | 1.31 | 1.34 | 1.42 |
| EPDSE2002-1.5-PN | ● | | 1.5 | | | | | | 10.25 | 1.74 | 1.80 | 1.85 | 1.89 | 2.08 |
| EPDSE2002-2-PN | ● | | 2 | | | | | | 9.80 | 2.26 | 2.32 | 2.38 | 2.47 | 2.74 |
| EPDSE2002-3-PN | ● | | 3 | | | | | | 9.00 | 3.29 | 3.37 | 3.50 | 3.67 | 4.07 |
| EPDSE2003-1-PN | ● | 0.3 | 1 | 0.45 | 0.27 | 50 | 4 | 2 | 10.72 | 1.32 | 1.39 | 1.45 | 1.51 | 1.62 |
| EPDSE2003-1.5-PN | ● | | 1.5 | | | | | | 10.21 | 1.85 | 1.93 | 2.01 | 2.08 | 2.21 |
| EPDSE2003-2-PN | ● | | 2 | | | | | | 9.75 | 2.37 | 2.47 | 2.56 | 2.64 | 2.78 |
| EPDSE2003-2.5-PN | ● | | 2.5 | | | | | | 9.32 | 2.89 | 3.01 | 3.11 | 3.20 | 3.41 |
| EPDSE2003-3-PN | ● | | 3 | | | | | | 8.93 | 3.42 | 3.54 | 3.65 | 3.75 | 4.07 |
| EPDSE2004-1-PN | ● | 0.4 | 1 | 0.6 | 0.37 | 50 | 4 | 2 | 10.69 | 1.32 | 1.39 | 1.45 | 1.51 | 1.62 |
| EPDSE2004-1.5-PN | ● | | 1.5 | | | | | | 10.17 | 1.85 | 1.93 | 2.01 | 2.08 | 2.21 |
| EPDSE2004-2-PN | ● | | 2 | | | | | | 9.70 | 2.37 | 2.47 | 2.56 | 2.64 | 2.78 |
| EPDSE2004-2.5-PN | ● | | 2.5 | | | | | | 9.27 | 2.89 | 3.01 | 3.11 | 3.20 | 3.41 |
| EPDSE2004-3-PN | ● | | 3 | | | | | | 8.87 | 3.42 | 3.54 | 3.65 | 3.75 | 4.07 |
| EPDSE2004-3.5-PN | ● | | 3.5 | | | | | | 8.51 | 3.94 | 4.08 | 4.19 | 4.29 | 4.73 |
| EPDSE2004-4-PN | ● | | 4 | | | | | | 8.17 | 4.46 | 4.61 | 4.73 | 4.87 | 5.40 |
| EPDSE2004-5-PN | ● | | 5 | | | | | | 7.58 | 5.49 | 5.66 | 5.79 | 6.06 | 6.72 |
| EPDSE2004-6-PN | ● | | 6 | | | | | | 7.06 | 6.53 | 6.71 | 6.92 | 7.26 | 8.05 |
| EPDSE2004-8-PN | ● | | 8 | | | | | | 6.22 | 8.59 | 8.80 | 9.20 | 9.65 | 10.71 |
| EPDSE2004-10-PN | ● | | 10 | | | | | | 5.55 | 10.64 | 10.97 | 11.48 | 12.05 | 13.36 |
| EPDSE2005-1-PN | ● | 0.5 | 1 | 0.75 | 0.47 | 50 | 4 | 2 | 10.66 | 1.32 | 1.39 | 1.45 | 1.51 | 1.62 |
| EPDSE2005-1.5-PN | ● | | 1.5 | | | | | | 10.13 | 1.85 | 1.93 | 2.01 | 2.08 | 2.21 |
| EPDSE2005-2-PN | ● | | 2 | | | | | | 9.64 | 2.37 | 2.47 | 2.56 | 2.64 | 2.78 |
| EPDSE2005-2.5-PN | ● | | 2.5 | | | | | | 9.21 | 2.89 | 3.01 | 3.11 | 3.20 | 3.41 |
| EPDSE2005-3-PN | ● | | 3 | | | | | | 8.81 | 3.42 | 3.54 | 3.65 | 3.75 | 4.07 |
| EPDSE2005-4-PN | ● | | 4 | | | | | | 8.10 | 4.46 | 4.61 | 4.73 | 4.87 | 5.40 |
| EPDSE2005-5-PN | ● | | 5 | | | | | | 7.50 | 5.49 | 5.66 | 5.79 | 6.06 | 6.72 |
| EPDSE2005-6-PN | ● | | 6 | | | | | | 6.98 | 6.53 | 6.71 | 6.92 | 7.26 | 8.05 |
| EPDSE2005-8-PN | ● | | 8 | | | | | | 6.13 | 8.59 | 8.80 | 9.20 | 9.65 | 10.71 |
| EPDSE2005-10-PN | ● | | 10 | | | | | | 5.47 | 10.64 | 10.97 | 11.48 | 12.05 | 13.36 |
| EPDSE2006-2-PN | ● | 0.6 | 2 | 0.9 | 0.57 | 50 | 4 | 4 | 9.59 | 2.54 | 2.70 | 2.84 | 2.96 | 3.19 |
| EPDSE2006-3-PN | ● | | 3 | | | | | | 8.74 | 3.60 | 3.80 | 3.96 | 4.11 | 4.37 |
| EPDSE2006-4-PN | ● | | 4 | | | | | | 8.02 | 4.66 | 4.89 | 5.07 | 5.24 | 5.53 |
| EPDSE2006-5-PN | ● | | 5 | | | | | | 7.42 | 5.71 | 5.96 | 6.17 | 6.35 | 6.72 |
| EPDSE2006-6-PN | ● | | 6 | | | | | | 6.90 | 6.76 | 7.04 | 7.26 | 7.45 | 8.05 |
| EPDSE2006-7-PN | ● | | 7 | | | | | | 6.44 | 7.81 | 8.10 | 8.34 | 8.55 | 9.38 |
| EPDSE2006-8-PN | ● | | 8 | | | | | | 6.04 | 8.85 | 9.17 | 9.42 | 9.65 | 10.71 |
| EPDSE2006-9-PN | ● | | 9 | | | | | | 5.69 | 9.89 | 10.22 | 10.49 | 10.85 | 12.03 |
| EPDSE2006-10-PN | ● | | 10 | | | | | | 5.38 | 10.93 | 11.28 | 11.56 | 12.05 | 13.36 |
| EPDSE2007-2-PN | ● | 0.7 | 2 | 1.05 | 0.67 | 50 | 4 | 4 | 9.53 | 2.54 | 2.70 | 2.84 | 2.96 | 3.19 |
| EPDSE2007-4-PN | ● | | 4 | | | | | | 7.94 | 4.66 | 4.89 | 5.07 | 5.24 | 5.53 |
| EPDSE2007-6-PN | ● | | 6 | | | | | | 6.81 | 6.76 | 7.04 | 7.26 | 7.45 | 8.05 |
| EPDSE2007-8-PN | ● | | 8 | | | | | | 5.95 | 8.85 | 9.17 | 9.42 | 9.65 | 10.71 |
| EPDSE2007-10-PN | ● | | 10 | | | | | | 5.29 | 10.93 | 11.28 | 11.56 | 12.05 | 13.36 |

● : Stocked items.

Detailed shape below neck




【Note】
The effective under-neck length is different from Epoch Deep Square EPDS. Please recheck the interference region.

# EPDSE2○○○-○○.○-PN

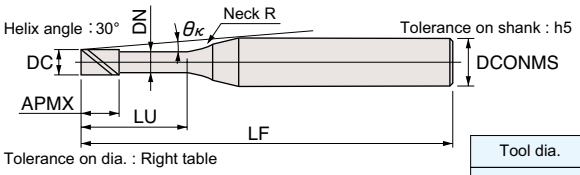
| Item code | Stock | Size(mm) | | | | | | | | The effective under-neck length for the various draft angles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PN | Tool dia. | Under neck length | Flute length | Neck dia. | Overall length | Shank dia. | Neck R | Interference angle | | | | | |
| | | DC | LU | APMX | DN | LF | DCONMS | | θκ | 0.5° | 1° | 1.5° | 2° | 3° |
| EPDSE2008-2-PN | ● | 0.8 | 2 | 1.2 | 0.77 | 50 | 4 | 4 | 9.47 | 2.54 | 2.70 | 2.84 | 2.96 | 3.19 |
| EPDSE2008-4-PN | ● | | 4 | | | | | | 7.86 | 4.66 | 4.89 | 5.07 | 5.24 | 5.53 |
| EPDSE2008-6-PN | ● | | 6 | | | | | | 6.72 | 6.76 | 7.04 | 7.26 | 7.45 | 8.05 |
| EPDSE2008-8-PN | ● | | 8 | | | | | | 5.86 | 8.85 | 9.17 | 9.42 | 9.65 | 10.71 |
| EPDSE2008-10-PN | ● | | 10 | | | | | | 5.20 | 10.93 | 11.28 | 11.56 | 12.05 | 13.36 |
| EPDSE2008-12-PN | ● | | 12 | | | 55 | | | 4.67 | 13.00 | 13.38 | 13.76 | 14.44 | 16.02 |
| EPDSE2009-2-PN | ● | 0.9 | 2 | 1.35 | 0.86 | 50 | 4 | 4 | 9.38 | 2.58 | 2.73 | 2.86 | 2.98 | 3.21 |
| EPDSE2009-4-PN | ● | | 4 | | | | | | 7.76 | 4.69 | 4.91 | 5.09 | 5.26 | 5.54 |
| EPDSE2009-6-PN | ● | | 6 | | | | | | 6.61 | 6.79 | 7.06 | 7.28 | 7.47 | 8.08 |
| EPDSE2009-8-PN | ● | | 8 | | | | | | 5.76 | 8.87 | 9.18 | 9.43 | 9.68 | 10.74 |
| EPDSE2009-10-PN | ● | | 10 | | | | | | 5.10 | 10.95 | 11.30 | 11.57 | 12.07 | 13.39 |
| EPDSE2009-12-PN | ● | | 12 | | | 55 | | | 4.58 | 13.02 | 13.40 | 13.79 | 14.47 | 16.05 |
| EPDSE2010-2-PN | ● | 1 | 2 | 1.5 | 0.96 | 50 | 4 | 4 | 9.31 | 2.58 | 2.73 | 2.86 | 2.98 | 3.21 |
| EPDSE2010-3-PN | ● | | 3 | | | | | | 8.41 | 3.64 | 3.82 | 3.99 | 4.13 | 4.39 |
| EPDSE2010-4-PN | ● | | 4 | | | | | | 7.67 | 4.69 | 4.91 | 5.09 | 5.26 | 5.54 |
| EPDSE2010-5-PN | ● | | 5 | | | | | | 7.04 | 5.74 | 5.99 | 6.19 | 6.37 | 6.76 |
| EPDSE2010-6-PN | ● | | 6 | | | | | | 6.51 | 6.79 | 7.06 | 7.28 | 7.47 | 8.08 |
| EPDSE2010-7-PN | ● | | 7 | | | | | | 6.06 | 7.83 | 8.12 | 8.36 | 8.56 | 9.41 |
| EPDSE2010-8-PN | ● | | 8 | | | | | | 5.66 | 8.87 | 9.18 | 9.43 | 9.68 | 10.74 |
| EPDSE2010-9-PN | ● | | 9 | | | | | | 5.31 | 9.91 | 10.24 | 10.50 | 10.88 | 12.07 |
| EPDSE2010-10-PN | ● | | 10 | | | | | | 5.00 | 10.95 | 11.30 | 11.57 | 12.07 | 13.39 |
| EPDSE2010-12-PN | ● | | 12 | | | 55 | | | 4.48 | 13.02 | 13.40 | 13.79 | 14.47 | 16.05 |
| EPDSE2010-14-PN | ● | | 14 | | | | | | 4.06 | 15.09 | 15.49 | 16.07 | 16.86 | 18.70 |
| EPDSE2010-16-PN | ● | | 16 | | | | | | 3.71 | 17.15 | 17.58 | 18.35 | 19.25 | 21.36 |
| EPDSE2010-20-PN | ● | | 20 | | | 60 | | | 3.17 | 21.26 | 21.89 | 22.91 | 24.04 | 26.66 |
| EPDSE2010-25-PN | ● | | 25 | | | 65 | | | 2.68 | 26.39 | 27.33 | 28.61 | 30.02 | No interference |
| EPDSE2012-4-PN | ● | 1.2 | 4 | 1.8 | 1.15 | 50 | 4 | 4 | 7.46 | 4.72 | 4.93 | 5.11 | 5.27 | 5.55 |
| EPDSE2012-6-PN | ● | | 6 | | | | | | 6.29 | 6.81 | 7.08 | 7.29 | 7.48 | 8.11 |
| EPDSE2012-8-PN | ● | | 8 | | | | | | 5.44 | 8.90 | 9.20 | 9.45 | 9.71 | 10.77 |
| EPDSE2012-10-PN | ● | | 10 | | | | | | 4.80 | 10.97 | 11.31 | 11.58 | 12.10 | 13.42 |
| EPDSE2012-12-PN | ● | | 12 | | | 55 | | | 4.29 | 13.04 | 13.41 | 13.82 | 14.49 | 16.08 |
| EPDSE2012-16-PN | ● | | 16 | | | | | | 3.53 | 17.16 | 17.59 | 18.38 | 19.28 | 21.39 |
| EPDSE2014-6-PN | ● | 1.4 | 6 | 2.1 | 1.34 | 50 | 4 | 4 | 6.06 | 6.84 | 7.09 | 7.31 | 7.50 | 8.15 |
| EPDSE2014-12-PN | ● | | 12 | | | 55 | | | 4.08 | 13.06 | 13.43 | 13.84 | 14.52 | 16.11 |
| EPDSE2015-4-PN | ● | 1.5 | 4 | 2.25 | 1.44 | 50 | 4 | 4 | 7.11 | 4.75 | 4.95 | 5.13 | 5.29 | 5.57 |
| EPDSE2015-6-PN | ● | | 6 | | | | | | 5.94 | 6.84 | 7.09 | 7.31 | 7.50 | 8.15 |
| EPDSE2015-8-PN | ● | | 8 | | | | | | 5.10 | 8.92 | 9.22 | 9.46 | 9.74 | 10.80 |
| EPDSE2015-10-PN | ● | | 10 | | | | | | 4.47 | 10.99 | 11.33 | 11.59 | 12.13 | 13.45 |
| EPDSE2015-12-PN | ● | | 12 | | | 55 | | | 3.97 | 13.06 | 13.43 | 13.84 | 14.52 | 16.11 |
| EPDSE2015-14-PN | ● | | 14 | | | | | | 3.58 | 15.12 | 15.52 | 16.12 | 16.92 | 18.76 |
| EPDSE2015-16-PN | ● | | 16 | | | | | | 3.25 | 17.18 | 17.60 | 18.40 | 19.31 | 21.42 |
| EPDSE2015-18-PN | ● | | 18 | | | 60 | | | 2.98 | 19.24 | 19.76 | 20.69 | 21.70 | No interference |
| EPDSE2015-20-PN | ● | | 20 | | | | | | 2.76 | 21.29 | 21.94 | 22.97 | 24.10 | No interference |
| EPDSE2015-25-PN | ● | | 25 | | | 65 | | | 2.31 | 26.42 | 27.39 | 28.67 | 30.08 | No interference |
| EPDSE2015-30-PN | ● | | 30 | | | 70 | | | 1.99 | 31.53 | 32.83 | 34.37 | No interference | No interference |
| EPDSE2015-35-PN | ● | | 35 | | | 75 | | | 1.75 | 36.64 | 38.28 | 40.07 | No interference | No interference |
| EPDSE2015-40-PN | ● | | 40 | | | 80 | | | 1.56 | 41.85 | 43.73 | 45.78 | No interference | No interference |
| EPDSE2016-6-PN | ● | 1.6 | 6 | 2.4 | 1.54 | 50 | 4 | 4 | 5.82 | 6.84 | 7.09 | 7.31 | 7.50 | 8.15 |
| EPDSE2016-8-PN | ● | | 8 | | | | | | 4.98 | 8.92 | 9.22 | 9.46 | 9.74 | 10.80 |
| EPDSE2018-6-PN | ● | 1.8 | 6 | 2.7 | 1.73 | 50 | 4 | 4 | 5.55 | 6.86 | 7.11 | 7.32 | 7.51 | 8.18 |
| EPDSE2018-8-PN | ● | | 8 | | | | | | 4.72 | 8.94 | 9.23 | 9.47 | 9.76 | 10.83 |

● : Stocked items.

## Epoch Deep Square Evolution EPDSE-PN

PN Coating

2 Flutes




(mm)

| Tool dia. | Tolerance on dia. |
|---|---|
| φ0.1～φ0.5 | 0 −0.007 |
| φ0.6～φ0.9 | 0 −0.01 |
| φ1～φ6 | 0 −0.015 |

# EPDSE2○○○-○○.○-PN

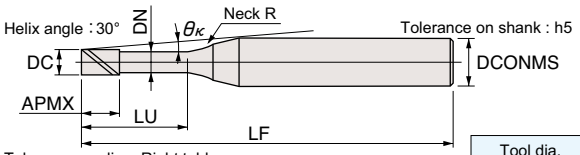
| Item code | Stock | Size(mm) | | | | | | | | The effective under-neck length for the various draft angles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PN | Tool dia. | Under neck length | Flute length | Neck dia. | Overall length | Shank dia. | Neck R | Interference angle | | | | | |
| | | DC | LU | APMX | DN | LF | DCONMS | | θκ | 0.5° | 1° | 1.5° | 2° | 3° |
| EPDSE2020-4-PN | ● | 2 | 4 | 3 | 1.92 | 50 | 4 | 4 | 6.42 | 4.80 | 5.00 | 5.17 | 5.32 | 5.59 |
| EPDSE2020-6-PN | ● | | 6 | | | | | | 5.25 | 6.88 | 7.13 | 7.34 | 7.52 | 8.21 |
| EPDSE2020-8-PN | ● | | 8 | | | | | | 4.44 | 8.96 | 9.25 | 9.49 | 9.79 | 10.86 |
| EPDSE2020-10-PN | ● | | 10 | | | | | | 3.85 | 11.03 | 11.35 | 11.62 | 12.19 | 13.52 |
| EPDSE2020-12-PN | ● | | 12 | | | 55 | | | 3.39 | 13.10 | 13.45 | 13.90 | 14.58 | 16.17 |
| EPDSE2020-14-PN | ● | | 14 | | | | | | 3.03 | 15.16 | 15.54 | 16.18 | 16.97 | 18.83 |
| EPDSE2020-16-PN | ● | | 16 | | | | | | 2.75 | 17.21 | 17.63 | 18.46 | 19.37 | No interference |
| EPDSE2020-18-PN | ● | | 18 | | | 60 | | | 2.51 | 19.27 | 19.81 | 20.74 | 21.76 | No interference |
| EPDSE2020-20-PN | ● | | 20 | | | | | | 2.31 | 21.32 | 21.99 | 23.02 | 24.15 | No interference |
| EPDSE2020-25-PN | ● | | 25 | | | 65 | | | 1.92 | 26.44 | 27.44 | 28.72 | No interference | No interference |
| EPDSE2020-30-PN | ● | | 30 | | | 70 | | | 1.65 | 31.55 | 32.88 | 34.42 | No interference | No interference |
| EPDSE2020-35-PN | ● | | 35 | | | 75 | | | 1.44 | 36.69 | 38.33 | No interference | No interference | No interference |
| EPDSE2020-40-PN | ● | | 40 | | | 80 | | | 1.28 | 41.90 | 43.78 | No interference | No interference | No interference |
| EPDSE2020-50-PN | ● | | 50 | | | 90 | | | 1.05 | 52.33 | 54.67 | No interference | No interference | No interference |
| EPDSE2025-8-PN | ● | 2.5 | 8 | 3.75 | 2.4 | 50 | 4 | 4 | 3.65 | 9.00 | 9.28 | 9.51 | 9.85 | 10.93 |
| EPDSE2025-12-PN | ● | | 12 | | | 55 | | | 2.73 | 13.13 | 13.48 | 13.95 | 14.64 | No interference |
| EPDSE2025-16-PN | ● | | 16 | | | | | | 2.18 | 17.25 | 17.68 | 18.51 | 19.42 | No interference |
| EPDSE2025-20-PN | ● | | 20 | | | 60 | | | 1.81 | 21.35 | 22.04 | 23.07 | No interference | No interference |
| EPDSE2025-30-PN | ● | | 30 | | | 70 | | | 1.28 | 31.58 | 32.94 | No interference | No interference | No interference |
| EPDSE2025-40-PN | ● | | 40 | | | 80 | | | 0.99 | 41.95 | No interference | No interference | No interference | No interference |
| EPDSE2025-50-PN | ● | | 50 | | | 90 | | | 0.80 | 52.38 | No interference | No interference | No interference | No interference |
| EPDSE2030-8-PN | ● | 3 | 8 | 4.5 | 2.88 | 55 | 6 | 4 | 5.59 | 9.04 | 9.31 | 9.54 | 9.91 | 10.99 |
| EPDSE2030-12-PN | ● | | 12 | | | 60 | | | 4.44 | 13.16 | 13.50 | 14.00 | 14.69 | 16.30 |
| EPDSE2030-16-PN | ● | | 16 | | | | | | 3.68 | 17.28 | 17.73 | 18.57 | 19.48 | 21.61 |
| EPDSE2030-20-PN | ● | | 20 | | | 65 | | | 3.15 | 21.38 | 22.09 | 23.13 | 24.26 | 26.91 |
| EPDSE2030-25-PN | ● | | 25 | | | 70 | | | 2.66 | 26.49 | 27.54 | 28.83 | 30.25 | No interference |
| EPDSE2030-30-PN | ● | | 30 | | | 75 | | | 2.31 | 31.60 | 32.99 | 34.53 | 36.23 | No interference |
| EPDSE2030-40-PN | ● | | 40 | | | 90 | | | 1.82 | 42.00 | 43.88 | 45.94 | No interference | No interference |
| EPDSE2030-50-PN | ● | | 50 | | | 100 | | | 1.50 | 52.43 | 54.78 | No interference | No interference | No interference |
| EPDSE2040-12-PN | ● | 4 | 12 | 6 | 3.85 | 60 | 6 | 4 | 3.36 | 13.21 | 13.54 | 14.08 | 14.78 | 16.39 |
| EPDSE2040-16-PN | ● | | 16 | | | | | | 2.72 | 17.32 | 17.81 | 18.65 | 19.56 | No interference |
| EPDSE2040-20-PN | ● | | 20 | | | 70 | | | 2.29 | 21.42 | 22.17 | 23.21 | 24.35 | No interference |
| EPDSE2040-25-PN | ● | | 25 | | | | | | 1.91 | 26.53 | 27.62 | 28.91 | No interference | No interference |
| EPDSE2040-30-PN | ● | | 30 | | | 80 | | | 1.64 | 31.65 | 33.06 | 34.61 | No interference | No interference |
| EPDSE2040-35-PN | ● | | 35 | | | | | | 1.44 | 36.86 | 38.51 | No interference | No interference | No interference |
| EPDSE2040-40-PN | ● | | 40 | | | 90 | | | 1.28 | 42.08 | 43.96 | No interference | No interference | No interference |
| EPDSE2040-50-PN | ● | | 50 | | | 100 | | | 1.05 | 52.50 | 54.85 | No interference | No interference | No interference |
| EPDSE2050-20-PN | ● | 5 | 20 | 7.5 | 4.85 | 70 | 6 | 4 | 1.27 | 21.42 | 22.17 | No interference | No interference | No interference |
| EPDSE2050-25-PN | ● | | 25 | | | | | | 1.04 | 26.53 | 27.62 | No interference | No interference | No interference |
| EPDSE2050-30-PN | ● | | 30 | | | 80 | | | 0.88 | 31.65 | No interference | No interference | No interference | No interference |
| EPDSE2050-40-PN | ● | | 40 | | | 90 | | | 0.68 | 42.08 | No interference | No interference | No interference | No interference |
| EPDSE2050-50-PN | ● | | 50 | | | 100 | | | 0.55 | 52.50 | No interference | No interference | No interference | No interference |
| EPDSE2060-20-PN | ● | 6 | 20 | 9 | 5.85 | 70 | 6 | - | 0 | No interference | No interference | No interference | No interference | No interference |
| EPDSE2060-30-PN | ● | | 30 | | | 80 | | | 0 | No interference | No interference | No interference | No interference | No interference |
| EPDSE2060-40-PN | ● | | 40 | | | 90 | | | 0 | No interference | No interference | No interference | No interference | No interference |
| EPDSE2060-50-PN | ● | | 50 | | | 100 | | | 0 | No interference | No interference | No interference | No interference | No interference |

● : Stocked items.

# Epoch Deep Square Evolution EPDSE-ATH

ATHCoating

2 Flutes




Tolerance on dia. : Right table

(mm)

| Tool dia. | Tolerance on dia. |
|---|---|
| φ0.1～φ0.5 | 0 −0.007 |
| φ0.6～φ0.9 | 0 −0.01 |
| φ1～φ6 | 0 −0.015 |

## EPDSE2○○○-○○.○-ATH

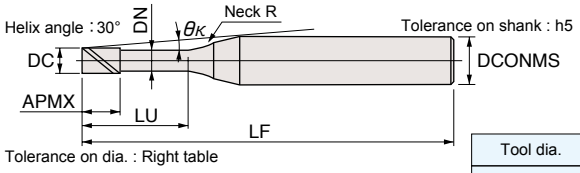
| Item code | Stock | Size(mm) | | | | | | | | The effective under-neck length for the various draft angles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ATH | Tool dia. | Under neck length | Flute length | Neck dia. | Overall length | Shank dia. | Neck R | Interference angle | | | | | |
| | | DC | LU | APMX | DN | LF | DCONMS | | θK | 0.5° | 1° | 1.5° | 2° | 3° |
| EPDSE2001-0.3-ATH | ● | 0.1 | 0.3 | 0.15 | 0.08 | 45 | 4 | 1 | 11.58 | 0.46 | 0.49 | 0.51 | 0.53 | 0.58 |
| EPDSE2001-0.5-ATH | ● | | 0.5 | | | | | | 11.35 | 0.67 | 0.71 | 0.74 | 0.76 | 0.82 |
| EPDSE2001-1-ATH | ● | | 1 | | | | | | 10.81 | 1.20 | 1.25 | 1.29 | 1.33 | 1.39 |
| EPDSE2002-0.5-ATH | ● | 0.2 | 0.5 | 0.3 | 0.17 | 50 | 4 | 1 | 11.30 | 0.70 | 0.73 | 0.76 | 0.78 | 0.83 |
| EPDSE2002-1-ATH | ● | | 1 | | | | | | 10.75 | 1.22 | 1.27 | 1.31 | 1.34 | 1.42 |
| EPDSE2002-1.5-ATH | ● | | 1.5 | | | | | | 10.25 | 1.74 | 1.80 | 1.85 | 1.89 | 2.08 |
| EPDSE2002-2-ATH | ● | | 2 | | | | | | 9.80 | 2.26 | 2.32 | 2.38 | 2.47 | 2.74 |
| EPDSE2002-3-ATH | ● | | 3 | | | | | | 9.00 | 3.29 | 3.37 | 3.50 | 3.67 | 4.07 |
| EPDSE2003-1-ATH | ● | 0.3 | 1 | 0.45 | 0.27 | 50 | 4 | 2 | 10.72 | 1.32 | 1.39 | 1.45 | 1.51 | 1.62 |
| EPDSE2003-1.5-ATH | ● | | 1.5 | | | | | | 10.21 | 1.85 | 1.93 | 2.01 | 2.08 | 2.21 |
| EPDSE2003-2-ATH | ● | | 2 | | | | | | 9.75 | 2.37 | 2.47 | 2.56 | 2.64 | 2.78 |
| EPDSE2003-2.5-ATH | ● | | 2.5 | | | | | | 9.32 | 2.89 | 3.01 | 3.11 | 3.20 | 3.41 |
| EPDSE2003-3-ATH | ● | | 3 | | | | | | 8.93 | 3.42 | 3.54 | 3.65 | 3.75 | 4.07 |
| EPDSE2004-1-ATH | ● | 0.4 | 1 | 0.6 | 0.37 | 50 | 4 | 2 | 10.69 | 1.32 | 1.39 | 1.45 | 1.51 | 1.62 |
| EPDSE2004-1.5-ATH | ● | | 1.5 | | | | | | 10.17 | 1.85 | 1.93 | 2.01 | 2.08 | 2.21 |
| EPDSE2004-2-ATH | ● | | 2 | | | | | | 9.70 | 2.37 | 2.47 | 2.56 | 2.64 | 2.78 |
| EPDSE2004-2.5-ATH | ● | | 2.5 | | | | | | 9.27 | 2.89 | 3.01 | 3.11 | 3.20 | 3.41 |
| EPDSE2004-3-ATH | ● | | 3 | | | | | | 8.87 | 3.42 | 3.54 | 3.65 | 3.75 | 4.07 |
| EPDSE2004-3.5-ATH | ● | | 3.5 | | | | | | 8.51 | 3.94 | 4.08 | 4.19 | 4.29 | 4.73 |
| EPDSE2004-4-ATH | ● | | 4 | | | | | | 8.17 | 4.46 | 4.61 | 4.73 | 4.87 | 5.40 |
| EPDSE2004-5-ATH | ● | | 5 | | | | | | 7.58 | 5.49 | 5.66 | 5.79 | 6.06 | 6.72 |
| EPDSE2004-6-ATH | ● | | 6 | | | | | | 7.06 | 6.53 | 6.71 | 6.92 | 7.26 | 8.05 |
| EPDSE2004-8-ATH | ● | | 8 | | | | | | 6.22 | 8.59 | 8.80 | 9.20 | 9.65 | 10.71 |
| EPDSE2004-10-ATH | ● | | 10 | | | | | | 5.55 | 10.64 | 10.97 | 11.48 | 12.05 | 13.36 |
| EPDSE2005-1-ATH | ● | 0.5 | 1 | 0.75 | 0.47 | 50 | 4 | 2 | 10.66 | 1.32 | 1.39 | 1.45 | 1.51 | 1.62 |
| EPDSE2005-1.5-ATH | ● | | 1.5 | | | | | | 10.13 | 1.85 | 1.93 | 2.01 | 2.08 | 2.21 |
| EPDSE2005-2-ATH | ● | | 2 | | | | | | 9.64 | 2.37 | 2.47 | 2.56 | 2.64 | 2.78 |
| EPDSE2005-2.5-ATH | ● | | 2.5 | | | | | | 9.21 | 2.89 | 3.01 | 3.11 | 3.20 | 3.41 |
| EPDSE2005-3-ATH | ● | | 3 | | | | | | 8.81 | 3.42 | 3.54 | 3.65 | 3.75 | 4.07 |
| EPDSE2005-4-ATH | ● | | 4 | | | | | | 8.10 | 4.46 | 4.61 | 4.73 | 4.87 | 5.40 |
| EPDSE2005-5-ATH | ● | | 5 | | | | | | 7.50 | 5.49 | 5.66 | 5.79 | 6.06 | 6.72 |
| EPDSE2005-6-ATH | ● | | 6 | | | | | | 6.98 | 6.53 | 6.71 | 6.92 | 7.26 | 8.05 |
| EPDSE2005-8-ATH | ● | | 8 | | | | | | 6.13 | 8.59 | 8.80 | 9.20 | 9.65 | 10.71 |
| EPDSE2005-10-ATH | ● | | 10 | | | | | | 5.47 | 10.64 | 10.97 | 11.48 | 12.05 | 13.36 |
| EPDSE2006-2-ATH | ● | 0.6 | 2 | 0.9 | 0.57 | 50 | 4 | 4 | 9.59 | 2.54 | 2.70 | 2.84 | 2.96 | 3.19 |
| EPDSE2006-3-ATH | ● | | 3 | | | | | | 8.74 | 3.60 | 3.80 | 3.96 | 4.11 | 4.37 |
| EPDSE2006-4-ATH | ● | | 4 | | | | | | 8.02 | 4.66 | 4.89 | 5.07 | 5.24 | 5.53 |
| EPDSE2006-5-ATH | ● | | 5 | | | | | | 7.42 | 5.71 | 5.96 | 6.17 | 6.35 | 6.72 |
| EPDSE2006-6-ATH | ● | | 6 | | | | | | 6.90 | 6.76 | 7.04 | 7.26 | 7.45 | 8.05 |
| EPDSE2006-7-ATH | ● | | 7 | | | | | | 6.44 | 7.81 | 8.10 | 8.34 | 8.55 | 9.38 |
| EPDSE2006-8-ATH | ● | | 8 | | | | | | 6.04 | 8.85 | 9.17 | 9.42 | 9.65 | 10.71 |
| EPDSE2006-9-ATH | ● | | 9 | | | | | | 5.69 | 9.89 | 10.22 | 10.49 | 10.85 | 12.03 |
| EPDSE2006-10-ATH | ● | | 10 | | | | | | 5.38 | 10.93 | 11.28 | 11.56 | 12.05 | 13.36 |
| EPDSE2007-2-ATH | ● | 0.7 | 2 | 1.05 | 0.67 | 50 | 4 | 4 | 9.53 | 2.54 | 2.70 | 2.84 | 2.96 | 3.19 |
| EPDSE2007-4-ATH | ● | | 4 | | | | | | 7.94 | 4.66 | 4.89 | 5.07 | 5.24 | 5.53 |
| EPDSE2007-6-ATH | ● | | 6 | | | | | | 6.81 | 6.76 | 7.04 | 7.26 | 7.45 | 8.05 |
| EPDSE2007-8-ATH | ● | | 8 | | | | | | 5.95 | 8.85 | 9.17 | 9.42 | 9.65 | 10.71 |
| EPDSE2007-10-ATH | ● | | 10 | | | | | | 5.29 | 10.93 | 11.28 | 11.56 | 12.05 | 13.36 |

● : Stocked items.

## Epoch Deep Square Evolution EPDSE-ATH

ATH Coating

2 Flutes



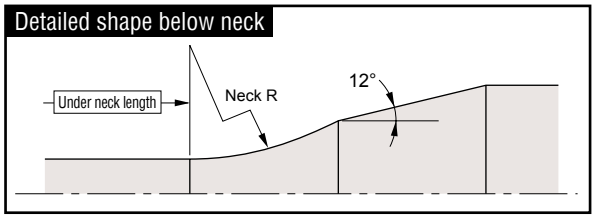

(mm)

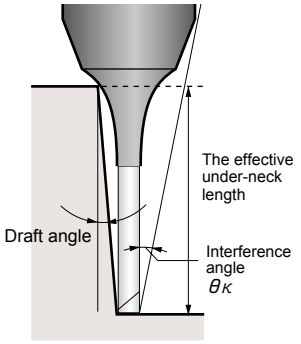
| Tool dia. | Tolerance on dia. |
|---|---|
| φ0.1～φ0.5 | 0 −0.007 |
| φ0.6～φ0.9 | 0 −0.01 |
| φ1～φ6 | 0 −0.015 |

# EPDSE2○○○-○○.○-ATH

| Item code | Stock | Size(mm) | | | | | | | | The effective under-neck length for the various draft angles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ATH | Tool dia. | Under neck length | Flute length | Neck dia. | Overall length | Shank dia. | Neck R | Interference angle | | | | | |
| | | DC | LU | APMX | DN | LF | DCONMS | | θK | 0.5° | 1° | 1.5° | 2° | 3° |
| EPDSE2008-2-ATH | ● | 0.8 | 2 | 1.2 | 0.77 | 50 | 4 | 4 | 9.47 | 2.54 | 2.70 | 2.84 | 2.96 | 3.19 |
| EPDSE2008-4-ATH | ● | | 4 | | | | | | 7.86 | 4.66 | 4.89 | 5.07 | 5.24 | 5.53 |
| EPDSE2008-6-ATH | ● | | 6 | | | | | | 6.72 | 6.76 | 7.04 | 7.26 | 7.45 | 8.05 |
| EPDSE2008-8-ATH | ● | | 8 | | | | | | 5.86 | 8.85 | 9.17 | 9.42 | 9.65 | 10.71 |
| EPDSE2008-10-ATH | ● | | 10 | | | | | | 5.20 | 10.93 | 11.28 | 11.56 | 12.05 | 13.36 |
| EPDSE2008-12-ATH | ● | | 12 | | | 55 | | | 4.67 | 13.00 | 13.38 | 13.76 | 14.44 | 16.02 |
| EPDSE2009-2-ATH | ● | 0.9 | 2 | 1.35 | 0.86 | 50 | 4 | 4 | 9.38 | 2.58 | 2.73 | 2.86 | 2.98 | 3.21 |
| EPDSE2009-4-ATH | ● | | 4 | | | | | | 7.76 | 4.69 | 4.91 | 5.09 | 5.26 | 5.54 |
| EPDSE2009-6-ATH | ● | | 6 | | | | | | 6.61 | 6.79 | 7.06 | 7.28 | 7.47 | 8.08 |
| EPDSE2009-8-ATH | ● | | 8 | | | | | | 5.76 | 8.87 | 9.18 | 9.43 | 9.68 | 10.74 |
| EPDSE2009-10-ATH | ● | | 10 | | | | | | 5.10 | 10.95 | 11.30 | 11.57 | 12.07 | 13.39 |
| EPDSE2009-12-ATH | ● | | 12 | | | 55 | | | 4.58 | 13.02 | 13.40 | 13.79 | 14.47 | 16.05 |
| EPDSE2010-2-ATH | ● | 1 | 2 | 1.5 | 0.96 | 50 | 4 | 4 | 9.31 | 2.58 | 2.73 | 2.86 | 2.98 | 3.21 |
| EPDSE2010-3-ATH | ● | | 3 | | | | | | 8.41 | 3.64 | 3.82 | 3.99 | 4.13 | 4.39 |
| EPDSE2010-4-ATH | ● | | 4 | | | | | | 7.67 | 4.69 | 4.91 | 5.09 | 5.26 | 5.54 |
| EPDSE2010-5-ATH | ● | | 5 | | | | | | 7.04 | 5.74 | 5.99 | 6.19 | 6.37 | 6.76 |
| EPDSE2010-6-ATH | ● | | 6 | | | | | | 6.51 | 6.79 | 7.06 | 7.28 | 7.47 | 8.08 |
| EPDSE2010-7-ATH | ● | | 7 | | | | | | 6.06 | 7.83 | 8.12 | 8.36 | 8.56 | 9.41 |
| EPDSE2010-8-ATH | ● | | 8 | | | | | | 5.66 | 8.87 | 9.18 | 9.43 | 9.68 | 10.74 |
| EPDSE2010-9-ATH | ● | | 9 | | | | | | 5.31 | 9.91 | 10.24 | 10.50 | 10.88 | 12.07 |
| EPDSE2010-10-ATH | ● | | 10 | | | | | | 5.00 | 10.95 | 11.30 | 11.57 | 12.07 | 13.39 |
| EPDSE2010-12-ATH | ● | | 12 | | | 55 | | | 4.48 | 13.02 | 13.40 | 13.79 | 14.47 | 16.05 |
| EPDSE2010-14-ATH | ● | | 14 | | | | | | 4.06 | 15.09 | 15.49 | 16.07 | 16.86 | 18.70 |
| EPDSE2010-16-ATH | ● | | 16 | | | | | | 3.71 | 17.15 | 17.58 | 18.35 | 19.25 | 21.36 |
| EPDSE2010-20-ATH | ● | | 20 | | | 60 | | | 3.17 | 21.26 | 21.89 | 22.91 | 24.04 | 26.66 |
| EPDSE2010-25-ATH | ● | | 25 | | | 65 | | | 2.68 | 26.39 | 27.33 | 28.61 | 30.02 | No interference |
| EPDSE2012-4-ATH | ● | 1.2 | 4 | 1.8 | 1.15 | 50 | 4 | 4 | 7.46 | 4.72 | 4.93 | 5.11 | 5.27 | 5.55 |
| EPDSE2012-6-ATH | ● | | 6 | | | | | | 6.29 | 6.81 | 7.08 | 7.29 | 7.48 | 8.11 |
| EPDSE2012-8-ATH | ● | | 8 | | | | | | 5.44 | 8.90 | 9.20 | 9.45 | 9.71 | 10.77 |
| EPDSE2012-10-ATH | ● | | 10 | | | | | | 4.80 | 10.97 | 11.31 | 11.58 | 12.10 | 13.42 |
| EPDSE2012-12-ATH | ● | | 12 | | | 55 | | | 4.29 | 13.04 | 13.41 | 13.82 | 14.49 | 16.08 |
| EPDSE2012-16-ATH | ● | | 16 | | | | | | 3.53 | 17.16 | 17.59 | 18.38 | 19.28 | 21.39 |
| EPDSE2014-6-ATH | ● | 1.4 | 6 | 2.1 | 1.34 | 50 | 4 | 4 | 6.06 | 6.84 | 7.09 | 7.31 | 7.50 | 8.15 |
| EPDSE2014-12-ATH | ● | | 12 | | | 55 | | | 4.08 | 13.06 | 13.43 | 13.84 | 14.52 | 16.11 |
| EPDSE2015-4-ATH | ● | 1.5 | 4 | 2.25 | 1.44 | 50 | 4 | 4 | 7.11 | 4.75 | 4.95 | 5.13 | 5.29 | 5.57 |
| EPDSE2015-6-ATH | ● | | 6 | | | | | | 5.94 | 6.84 | 7.09 | 7.31 | 7.50 | 8.15 |
| EPDSE2015-8-ATH | ● | | 8 | | | | | | 5.10 | 8.92 | 9.22 | 9.46 | 9.74 | 10.80 |
| EPDSE2015-10-ATH | ● | | 10 | | | | | | 4.47 | 10.99 | 11.33 | 11.59 | 12.13 | 13.45 |
| EPDSE2015-12-ATH | ● | | 12 | | | 55 | | | 3.97 | 13.06 | 13.43 | 13.84 | 14.52 | 16.11 |
| EPDSE2015-14-ATH | ● | | 14 | | | | | | 3.58 | 15.12 | 15.52 | 16.12 | 16.92 | 18.76 |
| EPDSE2015-16-ATH | ● | | 16 | | | | | | 3.25 | 17.18 | 17.60 | 18.40 | 19.31 | 21.42 |
| EPDSE2015-18-ATH | ● | | 18 | | | 60 | | | 2.98 | 19.24 | 19.76 | 20.69 | 21.70 | No interference |
| EPDSE2015-20-ATH | ● | | 20 | | | | | | 2.76 | 21.29 | 21.94 | 22.97 | 24.10 | No interference |
| EPDSE2015-25-ATH | ● | | 25 | | | 65 | | | 2.31 | 26.42 | 27.39 | 28.67 | 30.08 | No interference |
| EPDSE2015-30-ATH | ● | | 30 | | | 70 | | | 1.99 | 31.53 | 32.83 | 34.37 | No interference | No interference |
| EPDSE2015-35-ATH | ● | | 35 | | | 75 | | | 1.75 | 36.64 | 38.28 | 40.07 | No interference | No interference |
| EPDSE2015-40-ATH | ● | | 40 | | | 80 | | | 1.56 | 41.85 | 43.73 | 45.78 | No interference | No interference |
| EPDSE2016-6-ATH | ● | 1.6 | 6 | 2.4 | 1.54 | 50 | 4 | 4 | 5.82 | 6.84 | 7.09 | 7.31 | 7.50 | 8.15 |
| EPDSE2016-8-ATH | ● | | 8 | | | | | | 4.98 | 8.92 | 9.22 | 9.46 | 9.74 | 10.80 |
| EPDSE2018-6-ATH | ● | 1.8 | 6 | 2.7 | 1.73 | 50 | 4 | 4 | 5.55 | 6.86 | 7.11 | 7.32 | 7.51 | 8.18 |
| EPDSE2018-8-ATH | ● | | 8 | | | | | | 4.72 | 8.94 | 9.23 | 9.47 | 9.76 | 10.83 |

● : Stocked items.




**【Note】**
The effective under-neck length is different from Epoch Deep Square EPDS. Please recheck the interference region.

# EPDSE2○○○-○○.○-ATH

| Item code | Stock | Size(mm) | | | | | | | | The effective under-neck length for the various draft angles | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ATH | Tool dia. DC | Under neck length LU | Flute length APMX | Neck dia. DN | Overall length LF | Shank dia. DCONMS | Neck R | Interference angle θκ | 0.5° | 1° | 1.5° | 2° | 3° |
| EPDSE2020-4-ATH | ● | 2 | 4 | 3 | 1.92 | 50 | 4 | 4 | 6.42 | 4.80 | 5.00 | 5.17 | 5.32 | 5.59 |
| EPDSE2020-6-ATH | ● | | 6 | | | | | | 5.25 | 6.88 | 7.13 | 7.34 | 7.52 | 8.21 |
| EPDSE2020-8-ATH | ● | | 8 | | | | | | 4.44 | 8.96 | 9.25 | 9.49 | 9.79 | 10.86 |
| EPDSE2020-10-ATH | ● | | 10 | | | | | | 3.85 | 11.03 | 11.35 | 11.62 | 12.19 | 13.52 |
| EPDSE2020-12-ATH | ● | | 12 | | | 55 | | | 3.39 | 13.10 | 13.45 | 13.90 | 14.58 | 16.17 |
| EPDSE2020-14-ATH | ● | | 14 | | | | | | 3.03 | 15.16 | 15.54 | 16.18 | 16.97 | 18.83 |
| EPDSE2020-16-ATH | ● | | 16 | | | | | | 2.75 | 17.21 | 17.63 | 18.46 | 19.37 | No interference |
| EPDSE2020-18-ATH | ● | | 18 | | | 60 | | | 2.51 | 19.27 | 19.81 | 20.74 | 21.76 | No interference |
| EPDSE2020-20-ATH | ● | | 20 | | | | | | 2.31 | 21.32 | 21.99 | 23.02 | 24.15 | No interference |
| EPDSE2020-25-ATH | ● | | 25 | | | 65 | | | 1.92 | 26.44 | 27.44 | 28.72 | No interference | No interference |
| EPDSE2020-30-ATH | ● | | 30 | | | 70 | | | 1.65 | 31.55 | 32.88 | 34.42 | No interference | No interference |
| EPDSE2020-35-ATH | ● | | 35 | | | 75 | | | 1.44 | 36.69 | 38.33 | No interference | No interference | No interference |
| EPDSE2020-40-ATH | ● | | 40 | | | 80 | | | 1.28 | 41.90 | 43.78 | No interference | No interference | No interference |
| EPDSE2020-50-ATH | ● | | 50 | | | 90 | | | 1.05 | 52.33 | 54.67 | No interference | No interference | No interference |
| EPDSE2025-8-ATH | ● | 2.5 | 8 | 3.75 | 2.4 | 50 | 4 | 4 | 3.65 | 9.00 | 9.28 | 9.51 | 9.85 | 10.93 |
| EPDSE2025-12-ATH | ● | | 12 | | | 55 | | | 2.73 | 13.13 | 13.48 | 13.95 | 14.64 | No interference |
| EPDSE2025-16-ATH | ● | | 16 | | | | | | 2.18 | 17.25 | 17.68 | 18.51 | 19.42 | No interference |
| EPDSE2025-20-ATH | ● | | 20 | | | 60 | | | 1.81 | 21.35 | 22.04 | 23.07 | No interference | No interference |
| EPDSE2025-30-ATH | ● | | 30 | | | 70 | | | 1.28 | 31.58 | 32.94 | No interference | No interference | No interference |
| EPDSE2025-40-ATH | ● | | 40 | | | 80 | | | 0.99 | 41.95 | No interference | No interference | No interference | No interference |
| EPDSE2025-50-ATH | ● | | 50 | | | 90 | | | 0.80 | 52.38 | No interference | No interference | No interference | No interference |
| EPDSE2030-8-ATH | ● | 3 | 8 | 4.5 | 2.88 | 55 | 6 | 4 | 5.59 | 9.04 | 9.31 | 9.54 | 9.91 | 10.99 |
| EPDSE2030-12-ATH | ● | | 12 | | | 60 | | | 4.44 | 13.16 | 13.50 | 14.00 | 14.69 | 16.30 |
| EPDSE2030-16-ATH | ● | | 16 | | | | | | 3.68 | 17.28 | 17.73 | 18.57 | 19.48 | 21.61 |
| EPDSE2030-20-ATH | ● | | 20 | | | 65 | | | 3.15 | 21.38 | 22.09 | 23.13 | 24.26 | 26.91 |
| EPDSE2030-25-ATH | ● | | 25 | | | 70 | | | 2.66 | 26.49 | 27.54 | 28.83 | 30.25 | No interference |
| EPDSE2030-30-ATH | ● | | 30 | | | 75 | | | 2.31 | 31.60 | 32.99 | 34.53 | 36.23 | No interference |
| EPDSE2030-40-ATH | ● | | 40 | | | 90 | | | 1.82 | 42.00 | 43.88 | 45.94 | No interference | No interference |
| EPDSE2030-50-ATH | ● | | 50 | | | 100 | | | 1.50 | 52.43 | 54.78 | No interference | No interference | No interference |
| EPDSE2040-12-ATH | ● | 4 | 12 | 6 | 3.85 | 60 | 6 | 4 | 3.36 | 13.21 | 13.54 | 14.08 | 14.78 | 16.39 |
| EPDSE2040-16-ATH | ● | | 16 | | | | | | 2.72 | 17.32 | 17.81 | 18.65 | 19.56 | No interference |
| EPDSE2040-20-ATH | ● | | 20 | | | 70 | | | 2.29 | 21.42 | 22.17 | 23.21 | 24.35 | No interference |
| EPDSE2040-25-ATH | ● | | 25 | | | | | | 1.91 | 26.53 | 27.62 | 28.91 | No interference | No interference |
| EPDSE2040-30-ATH | ● | | 30 | | | 80 | | | 1.64 | 31.65 | 33.06 | 34.61 | No interference | No interference |
| EPDSE2040-35-ATH | ● | | 35 | | | | | | 1.44 | 36.86 | 38.51 | No interference | No interference | No interference |
| EPDSE2040-40-ATH | ● | | 40 | | | 90 | | | 1.28 | 42.08 | 43.96 | No interference | No interference | No interference |
| EPDSE2040-50-ATH | ● | | 50 | | | 100 | | | 1.05 | 52.50 | 54.85 | No interference | No interference | No interference |
| EPDSE2050-20-ATH | ● | 5 | 20 | 7.5 | 4.85 | 70 | 6 | 4 | 1.27 | 21.42 | 22.17 | No interference | No interference | No interference |
| EPDSE2050-25-ATH | ● | | 25 | | | | | | 1.04 | 26.53 | 27.62 | No interference | No interference | No interference |
| EPDSE2050-30-ATH | ● | | 30 | | | 80 | | | 0.88 | 31.65 | No interference | No interference | No interference | No interference |
| EPDSE2050-40-ATH | ● | | 40 | | | 90 | | | 0.68 | 42.08 | No interference | No interference | No interference | No interference |
| EPDSE2050-50-ATH | ● | | 50 | | | 100 | | | 0.55 | 52.50 | No interference | No interference | No interference | No interference |
| EPDSE2060-20-ATH | ● | 6 | 20 | 9 | 5.85 | 70 | 6 | - | 0 | No interference | No interference | No interference | No interference | No interference |
| EPDSE2060-30-ATH | ● | | 30 | | | 80 | | | 0 | No interference | No interference | No interference | No interference | No interference |
| EPDSE2060-40-ATH | ● | | 40 | | | 90 | | | 0 | No interference | No interference | No interference | No interference | No interference |
| EPDSE2060-50-ATH | ● | | 50 | | | 100 | | | 0 | No interference | No interference | No interference | No interference | No interference |

● : Stocked items.

# Recommended Cutting Conditions

**High efficiency cutting condition** | High accuracy cutting condition

Please refer to P.25 about high accuracy cutting conditions

## Epoch Deep Square Evolution EPDSE-PN EPDSE-ATH

| Recommended range | | | PN series | | | | | | | | | | | | ATH series |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work material | | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | |
| | | | Coppers | | Carbon steels, Alloy steels | | Stainless steels, Tool steels | | Pre-hardened steels | | Hardened steels | | Hardened steels | | |
| | | | | | (180～250HB) | | (25～35HRC) | | (35～45HRC) | | (45～55HRC) | | (55～65HRC) | | |
| Ratio to standard depth of cut | | | 120% | | 100% | | 90% | | 70% | | 50% | | 45% | | |
| Tool dia. DC (mm) | Under neck length LU (mm) | ap (mm) | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min |
| 0.1 | 0.3 | 0.006 | 50,000 | 500 | 50,000 | 500 | 50,000 | 475 | 48,600 | 348 | 42,750 | 255 | 40,050 | 208 |
| | 0.5 | 0.004 | 50,000 | 500 | 50,000 | 500 | 50,000 | 475 | 48,600 | 348 | 42,750 | 255 | 40,050 | 208 |
| | 1 | 0.003 | 50,000 | 455 | 50,000 | 455 | 48,600 | 430 | 43,700 | 315 | 38,500 | 232 | 36,050 | 187 |
| 0.2 | 0.5 | 0.02 | 50,000 | 708 | 45,000 | 638 | 40,500 | 574 | 38,250 | 403 | 33,750 | 301 | 31,500 | 242 |
| | 1 | 0.014 | 50,000 | 708 | 45,000 | 638 | 40,500 | 574 | 38,250 | 403 | 33,750 | 301 | 31,500 | 242 |
| | 1.5 | 0.008 | 48,600 | 630 | 40,500 | 525 | 36,450 | 472 | 34,425 | 362 | 30,375 | 271 | 28,350 | 218 |
| | 2 | 0.005 | 43,200 | 504 | 36,000 | 420 | 32,400 | 378 | 30,600 | 286 | 27,000 | 214 | 25,200 | 172 |
| | 3 | 0.003 | 43,200 | 454 | 36,000 | 378 | 32,400 | 340 | 30,600 | 257 | 27,000 | 193 | 25,200 | 155 |
| 0.3 | 1 | 0.021 | 48,000 | 680 | 40,000 | 567 | 36,000 | 510 | 34,000 | 358 | 30,000 | 267 | 28,000 | 216 |
| | 1.5 | 0.021 | 48,000 | 680 | 40,000 | 567 | 36,000 | 510 | 34,000 | 358 | 30,000 | 267 | 28,000 | 216 |
| | 2 | 0.012 | 43,200 | 560 | 36,000 | 467 | 32,400 | 420 | 30,600 | 322 | 27,000 | 241 | 25,200 | 194 |
| | 2.5 | 0.01 | 43,200 | 560 | 36,000 | 467 | 32,400 | 420 | 30,600 | 322 | 27,000 | 241 | 25,200 | 194 |
| | 3 | 0.008 | 43,200 | 560 | 36,000 | 467 | 32,400 | 420 | 30,600 | 322 | 27,000 | 241 | 25,200 | 194 |
| 0.4 | 1 | 0.04 | 38,400 | 847 | 32,000 | 706 | 28,800 | 635 | 27,200 | 446 | 24,000 | 333 | 22,400 | 268 |
| | 1.5 | 0.028 | 38,400 | 847 | 32,000 | 706 | 28,800 | 635 | 27,200 | 446 | 24,000 | 333 | 22,400 | 268 |
| | 2 | 0.028 | 38,400 | 847 | 32,000 | 706 | 28,800 | 635 | 27,200 | 446 | 24,000 | 333 | 22,400 | 268 |
| | 2.5 | 0.022 | 34,560 | 697 | 28,800 | 581 | 25,920 | 523 | 24,480 | 401 | 21,600 | 299 | 20,160 | 241 |
| | 3 | 0.016 | 34,560 | 697 | 28,800 | 581 | 25,920 | 523 | 24,480 | 401 | 21,600 | 299 | 20,160 | 241 |
| | 3.5 | 0.012 | 34,560 | 697 | 28,800 | 581 | 25,920 | 523 | 24,480 | 401 | 21,600 | 299 | 20,160 | 241 |
| | 4 | 0.01 | 34,560 | 697 | 28,800 | 581 | 25,920 | 523 | 24,480 | 401 | 21,600 | 299 | 20,160 | 241 |
| | 5 | 0.01 | 30,720 | 542 | 25,600 | 452 | 23,040 | 406 | 21,760 | 260 | 19,200 | 230 | 17,920 | 181 |
| | 6 | 0.006 | 30,720 | 542 | 25,600 | 452 | 23,040 | 406 | 21,760 | 260 | 19,200 | 230 | 17,920 | 181 |
| | 8 | 0.003 | 26,880 | 413 | 22,400 | 344 | 20,160 | 310 | 19,040 | 200 | 16,800 | 172 | 15,680 | 131 |
| | 10 | 0.002 | 23,040 | 304 | 19,200 | 253 | 17,280 | 228 | 16,320 | 147 | 14,400 | 127 | 13,440 | 96 |
| 0.5 | 1 | 0.05 | 38,400 | 847 | 32,000 | 706 | 28,800 | 635 | 27,200 | 535 | 24,000 | 333 | 22,400 | 268 |
| | 1.5 | 0.05 | 38,400 | 847 | 32,000 | 706 | 28,800 | 635 | 27,200 | 535 | 24,000 | 333 | 22,400 | 268 |
| | 2 | 0.035 | 38,400 | 847 | 32,000 | 706 | 28,800 | 635 | 27,200 | 535 | 24,000 | 333 | 22,400 | 268 |
| | 2.5 | 0.03 | 34,560 | 697 | 28,800 | 581 | 25,920 | 523 | 24,480 | 441 | 21,600 | 299 | 20,160 | 241 |
| | 3 | 0.02 | 34,560 | 697 | 28,800 | 581 | 25,920 | 523 | 24,480 | 441 | 21,600 | 299 | 20,160 | 241 |
| | 4 | 0.02 | 34,560 | 697 | 28,800 | 581 | 25,920 | 523 | 24,480 | 401 | 21,600 | 299 | 20,160 | 241 |
| | 5 | 0.013 | 34,560 | 697 | 28,800 | 581 | 25,920 | 523 | 24,480 | 401 | 21,600 | 299 | 20,160 | 241 |
| | 6 | 0.013 | 30,720 | 542 | 25,600 | 452 | 23,040 | 406 | 21,760 | 260 | 19,200 | 230 | 17,920 | 181 |
| | 8 | 0.008 | 30,720 | 464 | 25,600 | 387 | 23,040 | 348 | 21,760 | 247 | 19,200 | 194 | 17,920 | 147 |
| | 10 | 0.004 | 26,880 | 360 | 22,400 | 300 | 20,160 | 270 | 19,040 | 174 | 16,800 | 150 | 15,680 | 114 |
| 0.6 | 2 | 0.042 | 38,400 | 1,210 | 32,000 | 1,008 | 28,800 | 907 | 27,200 | 636 | 24,000 | 475 | 22,400 | 383 |
| | 3 | 0.035 | 34,560 | 995 | 28,800 | 829 | 25,920 | 746 | 24,480 | 573 | 21,600 | 428 | 20,160 | 345 |
| | 4 | 0.024 | 34,560 | 995 | 28,800 | 829 | 25,920 | 746 | 24,480 | 573 | 21,600 | 428 | 20,160 | 345 |
| | 5 | 0.02 | 34,560 | 995 | 28,800 | 829 | 25,920 | 746 | 24,480 | 573 | 21,600 | 428 | 20,160 | 345 |
| | 6 | 0.015 | 34,560 | 995 | 28,800 | 829 | 25,920 | 746 | 24,480 | 573 | 21,600 | 428 | 20,160 | 345 |
| | 7 | 0.015 | 30,720 | 859 | 25,600 | 716 | 23,040 | 644 | 21,760 | 494 | 19,200 | 369 | 17,920 | 298 |
| | 8 | 0.015 | 30,720 | 774 | 25,600 | 645 | 23,040 | 581 | 21,760 | 372 | 19,200 | 328 | 17,920 | 258 |
| | 9 | 0.012 | 30,720 | 774 | 25,600 | 645 | 23,040 | 581 | 21,760 | 372 | 19,200 | 328 | 17,920 | 258 |
| | 10 | 0.009 | 30,720 | 774 | 25,600 | 645 | 23,040 | 581 | 21,760 | 372 | 19,200 | 328 | 17,920 | 258 |
| 0.7 | 2 | 0.07 | 38,400 | 1,210 | 32,000 | 1,008 | 28,800 | 907 | 27,200 | 636 | 24,000 | 475 | 22,400 | 384 |
| | 4 | 0.049 | 34,560 | 995 | 28,800 | 829 | 25,920 | 746 | 24,480 | 573 | 21,600 | 428 | 20,160 | 345 |
| | 6 | 0.018 | 34,560 | 995 | 28,800 | 829 | 25,920 | 746 | 24,480 | 573 | 21,600 | 428 | 20,160 | 345 |
| | 8 | 0.018 | 30,720 | 774 | 25,600 | 645 | 23,040 | 581 | 21,760 | 372 | 19,200 | 328 | 17,920 | 258 |
| | 10 | 0.018 | 30,720 | 774 | 25,600 | 645 | 23,040 | 581 | 21,760 | 372 | 19,200 | 328 | 17,920 | 258 |

【Note】 Please refer to P.24

| Recommended range | | | PN series / ATH series | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work material | | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| | | | Coppers | | Carbon steels, Alloy steels | | Stainless steels, Tool steels | | Pre-hardened steels | | Hardened steels | | Hardened steels | |
| | | | | | (180～250HB) | | (25～35HRC) | | (35～45HRC) | | (45～55HRC) | | (55～65HRC) | |
| Ratio to standard depth of cut | | | 120% | | 100% | | 90% | | 70% | | 50% | | 45% | |
| Tool dia. DC (mm) | Under neck length LU (mm) | ap (mm) | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min |
| 0.8 | 2 | 0.08 | 38,400 | 1,210 | 32,000 | 1,008 | 28,800 | 907 | 27,200 | 780 | 24,000 | 688 | 22,400 | 422 |
| | 4 | 0.056 | 38,400 | 1,210 | 32,000 | 1,008 | 28,800 | 907 | 27,200 | 780 | 24,000 | 688 | 22,400 | 422 |
| | 6 | 0.032 | 34,560 | 995 | 28,800 | 829 | 25,920 | 746 | 24,480 | 678 | 24,000 | 665 | 20,160 | 379 |
| | 8 | 0.02 | 34,560 | 995 | 28,800 | 829 | 25,920 | 746 | 24,480 | 573 | 21,600 | 428 | 20,160 | 345 |
| | 10 | 0.02 | 30,720 | 774 | 25,600 | 645 | 23,040 | 581 | 21,760 | 372 | 19,200 | 328 | 17,920 | 258 |
| | 12 | 0.012 | 30,720 | 774 | 25,600 | 645 | 23,040 | 581 | 21,760 | 372 | 19,200 | 328 | 17,920 | 258 |
| 0.9 | 2 | 0.09 | 38,400 | 1,326 | 32,000 | 1,205 | 28,800 | 1,085 | 27,200 | 833 | 24,000 | 674 | 22,400 | 502 |
| | 4 | 0.063 | 38,400 | 1,326 | 32,000 | 1,205 | 28,800 | 1,085 | 27,200 | 833 | 24,000 | 674 | 22,400 | 502 |
| | 6 | 0.036 | 34,560 | 1094 | 28,800 | 994 | 25,920 | 895 | 24,480 | 687 | 21,600 | 556 | 20,160 | 414 |
| | 8 | 0.023 | 34,560 | 1094 | 28,800 | 911 | 25,920 | 820 | 24,480 | 630 | 21,600 | 513 | 20,160 | 379 |
| | 10 | 0.023 | 30,720 | 774 | 25,600 | 645 | 23,040 | 581 | 21,760 | 372 | 19,200 | 328 | 17,920 | 258 |
| | 12 | 0.023 | 30,720 | 774 | 25,600 | 645 | 23,040 | 581 | 21,760 | 372 | 19,200 | 328 | 17,920 | 258 |
| 1 | 2 | 0.1 | 34,560 | 1,628 | 28,800 | 1,356 | 25,920 | 1,220 | 24,480 | 1,150 | 22,930 | 1,008 | 20,160 | 846 |
| | 3 | 0.085 | 34,560 | 1,628 | 28,800 | 1,356 | 25,920 | 1,220 | 24,480 | 1,150 | 22,930 | 1,008 | 20,160 | 846 |
| | 4 | 0.07 | 34,560 | 1,628 | 28,800 | 1,356 | 25,920 | 1,220 | 24,480 | 1,077 | 22,930 | 963 | 20,160 | 766 |
| | 5 | 0.055 | 34,560 | 1,628 | 28,800 | 1,356 | 25,920 | 1,220 | 24,480 | 1,028 | 22,930 | 871 | 20,160 | 685 |
| | 6 | 0.04 | 31,104 | 1,344 | 25,920 | 1,120 | 23,328 | 1,008 | 22,032 | 903 | 20,700 | 745 | 18,144 | 465 |
| | 7 | 0.04 | 31,104 | 1,344 | 25,920 | 1,120 | 23,328 | 1,008 | 22,032 | 837 | 20,700 | 703 | 18,144 | 465 |
| | 8 | 0.04 | 31,104 | 1,344 | 25,920 | 1,120 | 23,328 | 1,008 | 22,032 | 837 | 20,700 | 622 | 18,144 | 465 |
| | 9 | 0.033 | 31,104 | 1,344 | 25,920 | 1,120 | 23,328 | 1,008 | 22,032 | 773 | 19,440 | 577 | 18,144 | 465 |
| | 10 | 0.025 | 31,104 | 1,344 | 25,920 | 1,120 | 23,328 | 1,008 | 22,032 | 773 | 19,440 | 577 | 18,144 | 465 |
| | 12 | 0.025 | 27,648 | 1,045 | 23,040 | 871 | 20,736 | 784 | 19,584 | 502 | 17,280 | 443 | 16,128 | 348 |
| | 14 | 0.025 | 27,648 | 1,045 | 23,040 | 871 | 20,736 | 784 | 19,584 | 502 | 17,280 | 443 | 16,128 | 348 |
| | 16 | 0.015 | 27,648 | 896 | 23,040 | 746 | 20,736 | 672 | 19,584 | 476 | 17,280 | 373 | 16,128 | 283 |
| | 20 | 0.01 | 24,828 | 732 | 20,690 | 610 | 22,345 | 549 | 17,587 | 348 | 15,518 | 305 | 14,483 | 226 |
| | 25 | 0.005 | 21,000 | 569 | 17,500 | 474 | 18,900 | 427 | 14,875 | 270 | 13,125 | 237 | 12,250 | 175 |
| 1.2 | 4 | 0.09 | 30,720 | 1,452 | 25,600 | 1,210 | 23,040 | 1,089 | 21,760 | 870 | 19,200 | 570 | 17,920 | 460 |
| | 6 | 0.084 | 30,720 | 1,452 | 25,600 | 1,210 | 23,040 | 1,089 | 21,760 | 870 | 19,200 | 570 | 17,920 | 460 |
| | 8 | 0.048 | 27,648 | 1,194 | 23,040 | 995 | 20,736 | 896 | 19,584 | 783 | 17,280 | 513 | 16,128 | 414 |
| | 10 | 0.03 | 27,648 | 1,194 | 23,040 | 995 | 20,736 | 896 | 19,584 | 744 | 17,280 | 513 | 16,128 | 414 |
| | 12 | 0.03 | 27,648 | 1,194 | 23,040 | 995 | 20,736 | 896 | 19,584 | 687 | 17,280 | 513 | 16,128 | 414 |
| | 16 | 0.02 | 24,576 | 1,061 | 20,480 | 884 | 18,432 | 796 | 17,408 | 611 | 15,360 | 456 | 14,336 | 368 |
| 1.4 | 6 | 0.1 | 26,880 | 1,270 | 22,400 | 1,058 | 20,160 | 953 | 19,040 | 668 | 16,800 | 499 | 15,680 | 403 |
| | 12 | 0.035 | 24,192 | 1,045 | 20,160 | 871 | 18,144 | 784 | 17,136 | 601 | 15,120 | 449 | 14,112 | 362 |
| 1.5 | 4 | 0.11 | 26,880 | 1,397 | 22,400 | 1,163 | 20,160 | 1048 | 19,040 | 801 | 16,800 | 648 | 15,680 | 482 |
| | 6 | 0.11 | 26,880 | 1,397 | 22,400 | 1,163 | 20,160 | 1048 | 19,040 | 801 | 16,800 | 623 | 15,680 | 482 |
| | 8 | 0.08 | 24,192 | 1,149 | 20,160 | 958 | 18,144 | 940 | 17,136 | 721 | 15,120 | 538 | 14,112 | 416 |
| | 10 | 0.06 | 24,192 | 1,149 | 20,160 | 871 | 18,144 | 862 | 17,136 | 721 | 15,120 | 538 | 14,112 | 416 |
| | 12 | 0.06 | 24,192 | 1,045 | 20,160 | 871 | 18,144 | 784 | 17,136 | 721 | 15,120 | 449 | 14,112 | 362 |
| | 14 | 0.038 | 24,192 | 1,045 | 20,160 | 871 | 18,144 | 784 | 17,136 | 721 | 15,120 | 449 | 14,112 | 362 |
| | 16 | 0.038 | 21,504 | 813 | 17,920 | 677 | 16,128 | 610 | 15,232 | 391 | 13,440 | 345 | 12,544 | 271 |
| | 18 | 0.038 | 21,504 | 813 | 17,920 | 677 | 16,128 | 610 | 15,232 | 391 | 13,440 | 345 | 12,544 | 271 |
| | 20 | 0.038 | 21,504 | 813 | 17,920 | 677 | 16,128 | 610 | 15,232 | 391 | 13,440 | 345 | 12,544 | 271 |
| | 25 | 0.023 | 16,128 | 523 | 13,440 | 435 | 12,096 | 392 | 11,424 | 278 | 10,080 | 218 | 9,408 | 165 |
| | 30 | 0.015 | 13,440 | 355 | 11,200 | 296 | 12,096 | 266 | 9,520 | 178 | 8,400 | 139 | 7,840 | 112 |
| | 35 | 0.01 | 13,440 | 355 | 11,200 | 296 | 12,096 | 266 | 9,520 | 178 | 8,400 | 139 | 7,840 | 112 |
| | 40 | 0.005 | 10,752 | 190 | 8,960 | 158 | 8,064 | 142 | 7,616 | 95 | 6,720 | 74 | 6,272 | 60 |
| 1.6 | 6 | 0.11 | 24,960 | 1,310 | 20,800 | 1,201 | 18,720 | 1,130 | 17,680 | 759 | 15,600 | 566 | 14,560 | 456 |
| | 8 | 0.11 | 24,960 | 1,310 | 20,800 | 1,201 | 18,720 | 983 | 17,680 | 690 | 15,600 | 566 | 14,560 | 456 |
| 1.8 | 6 | 0.13 | 24,960 | 1,310 | 20,800 | 1,201 | 18,720 | 1,179 | 17,680 | 759 | 15,600 | 618 | 14,560 | 498 |
| | 8 | 0.13 | 24,960 | 1,310 | 20,800 | 1,201 | 18,720 | 1,081 | 17,680 | 690 | 15,600 | 618 | 14,560 | 498 |

【Note】 Please refer to P.24

# Recommended Cutting Conditions

**High efficiency cutting condition** | High accuracy cutting condition

Please refer to P.25 about high accuracy cutting conditions

## Epoch Deep Square Evolution EPDSE-PN EPDSE-ATH

| Recommended range | | | PN series / ATH series | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work material | | | 1 Coppers | | 2 Carbon steels, Alloy steels (180～250HB) | | 3 Stainless steels, Tool steels (25～35HRC) | | 4 Pre-hardened steels (35～45HRC) | | 5 Hardened steels (45～55HRC) | | 6 Hardened steels (55～65HRC) | |
| Ratio to standard depth of cut | | | 120% | | 100% | | 90% | | 70% | | 50% | | 45% | |
| Tool dia. DC (mm) | Under neck length LU (mm) | $a_p$ (mm) | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min |
| 2 | 4 | 0.2 | 20,160 | 1,397 | 16,800 | 1,174 | 15,120 | 1,048 | 14,280 | 734 | 12,600 | 548 | 11,760 | 443 |
| | 6 | 0.2 | 20,160 | 1,397 | 16,800 | 1,174 | 15,120 | 1,048 | 14,280 | 734 | 12,600 | 548 | 11,760 | 443 |
| | 8 | 0.14 | 20,160 | 1,397 | 16,800 | 1,174 | 15,120 | 1,048 | 14,280 | 734 | 12,600 | 548 | 11,760 | 443 |
| | 10 | 0.14 | 20,160 | 1,397 | 16,800 | 1,174 | 15,120 | 1,048 | 14,280 | 734 | 12,600 | 548 | 11,760 | 443 |
| | 12 | 0.1 | 18,144 | 1,149 | 15,120 | 958 | 13,608 | 862 | 12,852 | 661 | 11,340 | 493 | 10,584 | 398 |
| | 14 | 0.08 | 18,144 | 1,149 | 15,120 | 958 | 13,608 | 862 | 12,852 | 661 | 11,340 | 493 | 10,584 | 362 |
| | 16 | 0.08 | 18,144 | 1,045 | 15,120 | 914 | 13,608 | 862 | 12,852 | 601 | 11,340 | 449 | 10,584 | 362 |
| | 18 | 0.05 | 18,144 | 1,045 | 15,120 | 914 | 13,608 | 862 | 12,852 | 601 | 11,340 | 449 | 10,584 | 362 |
| | 20 | 0.05 | 18,144 | 1,045 | 15,120 | 871 | 13,608 | 784 | 12,852 | 601 | 11,340 | 449 | 10,584 | 362 |
| | 25 | 0.05 | 16,128 | 813 | 13,440 | 677 | 12,096 | 610 | 11,424 | 391 | 10,080 | 345 | 9,408 | 271 |
| | 30 | 0.03 | 16,128 | 813 | 13,440 | 677 | 12,096 | 610 | 11,424 | 391 | 10,080 | 345 | 9,408 | 271 |
| | 35 | 0.02 | 14,112 | 583 | 11,760 | 486 | 10,584 | 437 | 9,996 | 282 | 8,820 | 228 | 8,232 | 185 |
| | 40 | 0.01 | 14,112 | 583 | 11,760 | 486 | 10,584 | 437 | 9,996 | 282 | 8,820 | 228 | 8,232 | 185 |
| | 50 | 0.005 | 12,096 | 355 | 10,080 | 296 | 9,072 | 266 | 8,568 | 172 | 7,560 | 139 | 7,056 | 112 |
| 2.5 | 8 | 0.18 | 17,280 | 1,497 | 14,400 | 1,247 | 12,960 | 1,123 | 12,240 | 787 | 10,800 | 642 | 10,080 | 474 |
| | 12 | 0.18 | 17,280 | 1,260 | 14,400 | 1,247 | 12,960 | 1,123 | 12,240 | 716 | 10,800 | 588 | 10,080 | 431 |
| | 16 | 0.1 | 15,552 | 1,120 | 12,960 | 1,073 | 11,664 | 966 | 11,016 | 644 | 9,720 | 529 | 9,072 | 388 |
| | 20 | 0.1 | 15,552 | 1,120 | 12,960 | 933 | 11,664 | 840 | 11,016 | 644 | 9,720 | 529 | 9,072 | 388 |
| | 30 | 0.06 | 13,824 | 870 | 11,520 | 725 | 10,368 | 653 | 9,792 | 435 | 8,640 | 341 | 8,064 | 276 |
| | 40 | 0.03 | 12,096 | 625 | 10,080 | 521 | 9,072 | 469 | 8,568 | 313 | 7,560 | 245 | 7,056 | 198 |
| | 50 | 0.01 | 12,096 | 625 | 10,080 | 521 | 9,072 | 469 | 8,568 | 313 | 7,560 | 245 | 7,056 | 198 |
| 3 | 8 | 0.3 | 15,360 | 1,331 | 12,800 | 1,108 | 11,520 | 997 | 10,880 | 699 | 10,600 | 570 | 8,960 | 422 |
| | 12 | 0.21 | 15,360 | 1,331 | 12,800 | 1,108 | 11,520 | 997 | 10,880 | 699 | 10,600 | 570 | 8,960 | 422 |
| | 16 | 0.15 | 13,824 | 1,144 | 11,520 | 994 | 10,368 | 820 | 9,792 | 630 | 9,450 | 513 | 8,064 | 379 |
| | 20 | 0.12 | 13,824 | 995 | 11,520 | 911 | 10,368 | 820 | 9,792 | 630 | 9,450 | 513 | 8,064 | 379 |
| | 25 | 0.08 | 13,824 | 995 | 11,520 | 911 | 10,368 | 820 | 9,792 | 630 | 9,450 | 513 | 8,064 | 379 |
| | 30 | 0.08 | 13,824 | 995 | 11,520 | 829 | 10,368 | 746 | 9,792 | 630 | 9,450 | 513 | 8,064 | 347 |
| | 40 | 0.05 | 12,288 | 884 | 10,240 | 737 | 9,216 | 663 | 8,704 | 509 | 7,680 | 380 | 7,168 | 307 |
| | 50 | 0.02 | 10,752 | 556 | 8,960 | 463 | 8,064 | 417 | 7,616 | 278 | 6,720 | 218 | 6,272 | 176 |
| 4 | 12 | 0.4 | 11,500 | 2,300 | 9,400 | 1,880 | 8,460 | 1,524 | 7,990 | 1,358 | 7,050 | 902 | 6,580 | 728 |
| | 16 | 0.28 | 11,500 | 2,300 | 9,400 | 1,880 | 8,460 | 1,524 | 7,990 | 1,358 | 7,050 | 902 | 6,580 | 728 |
| | 20 | 0.28 | 10,350 | 2,070 | 8,460 | 1,692 | 7,614 | 1,371 | 7,191 | 1,222 | 6,345 | 812 | 5,922 | 655 |
| | 25 | 0.16 | 10,350 | 1,863 | 8,460 | 1,524 | 7,614 | 1,233 | 7,191 | 1,100 | 6,345 | 812 | 5,922 | 655 |
| | 30 | 0.16 | 10,350 | 1,863 | 8,460 | 1,524 | 7,614 | 1,233 | 7,191 | 1,100 | 6,345 | 812 | 5,922 | 655 |
| | 35 | 0.1 | 9,137 | 1,645 | 7,614 | 1,371 | 6,853 | 1,110 | 6,472 | 990 | 5,711 | 731 | 5,330 | 589 |
| | 40 | 0.1 | 9,137 | 1,645 | 7,614 | 1,371 | 6,853 | 1,110 | 6,472 | 990 | 5,711 | 731 | 5,330 | 589 |
| | 50 | 0.06 | 7,896 | 1,128 | 6,580 | 940 | 5,922 | 846 | 5,593 | 658 | 4,935 | 442 | 4,606 | 357 |
| 5 | 20 | 0.3 | 9,014 | 1,802 | 7,512 | 1,652 | 6,761 | 1,487 | 6,385 | 1,051 | 5,634 | 706 | 5,258 | 571 |
| | 25 | 0.3 | 8,112 | 1,621 | 6,760 | 1,351 | 6,084 | 1,216 | 5,746 | 946 | 5,070 | 635 | 4,732 | 513 |
| | 30 | 0.2 | 8,112 | 1,461 | 6,760 | 1,217 | 6,084 | 1,094 | 5,746 | 851 | 5,070 | 573 | 4,732 | 462 |
| | 40 | 0.15 | 7,301 | 1,315 | 6,084 | 1,096 | 5,476 | 986 | 5,171 | 767 | 4,563 | 515 | 4,259 | 416 |
| | 50 | 0.1 | 7,301 | 1,315 | 6,084 | 1,096 | 5,476 | 986 | 5,171 | 767 | 4,563 | 515 | 4,259 | 416 |
| 6 | 20 | 0.5 | 7,418 | 1,629 | 6,182 | 1,481 | 5,564 | 1,333 | 5,255 | 1,036 | 4,637 | 766 | 4,327 | 562 |
| | 30 | 0.4 | 6,744 | 1,480 | 5,620 | 1,346 | 5,058 | 1,212 | 4,777 | 942 | 4,215 | 696 | 3,934 | 511 |
| | 40 | 0.3 | 6,744 | 1,332 | 5,620 | 1,109 | 5,058 | 998 | 4,777 | 847 | 4,215 | 625 | 3,934 | 459 |
| | 50 | 0.2 | 6,000 | 1,090 | 5,000 | 986 | 4,500 | 887 | 4,250 | 690 | 3,750 | 515 | 3,500 | 379 |

※$a_p$ is shown as the criteria for carbon steel, alloy steel. For other materials, adjust the cutting depth according to the cutting depth factors in the above table.

**【Note】**
① PN coating is less electro conductive. Therefore, electric transmitted measuring systems may not work.
② Use the appropriate coolant for the work material and machining shape.
③ These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
④ If the rpm of the machine is low, lower the feed rate also to put the rpm and feed rate in the same ratio.

High efficiency cutting condition | **High accuracy cutting condition**

Please refer to P.22 about high efficiency cutting conditions

## Epoch Deep Square Evolution EPDSE-PN EPDSE-ATH

| Recommended range | | | PN series / ATH series | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work material | | | 1 Coppers | | 2 Carbon steels, Alloy steels (180～250HB) | | 3 Stainless steels, Tool steels (25～35HRC) | | 4 Pre-hardened steels (35～45HRC) | | 5 Hardened steels (45～55HRC) | | 6 Hardened steels (55～65HRC) | |
| Ratio to standard depth of cut | | | 120% | | 100% | | 90% | | 70% | | 50% | | 45% | |
| Tool dia. DC (mm) | Under neck length LU (mm) | ap (mm) | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min |
| 0.1 | 0.3 | 0.006 | 50,000 | 350 | 50,000 | 350 | 50,000 | 332 | 48,600 | 242 | 42,750 | 178 | 40,050 | 144 |
| | 0.5 | 0.004 | 50,000 | 350 | 50,000 | 350 | 50,000 | 332 | 48,600 | 242 | 42,750 | 178 | 40,050 | 144 |
| | 1 | 0.003 | 50,000 | 318 | 50,000 | 318 | 48,600 | 301 | 43,700 | 220 | 38,500 | 162 | 36,050 | 129 |
| 0.2 | 0.5 | 0.015 | 50,000 | 495 | 45,000 | 446 | 40,500 | 401 | 38,250 | 282 | 33,750 | 210 | 31,500 | 169 |
| | 1 | 0.011 | 50,000 | 495 | 45,000 | 446 | 40,500 | 401 | 38,250 | 282 | 33,750 | 210 | 31,500 | 169 |
| | 1.5 | 0.006 | 48,600 | 441 | 40,500 | 367 | 36,450 | 330 | 34,425 | 253 | 30,375 | 189 | 28,350 | 152 |
| | 2 | 0.004 | 43,200 | 352 | 36,000 | 294 | 32,400 | 264 | 30,600 | 200 | 27,000 | 165 | 25,200 | 147 |
| | 3 | 0.002 | 43,200 | 317 | 36,000 | 264 | 32,400 | 238 | 30,600 | 179 | 27,000 | 165 | 25,200 | 133 |
| 0.3 | 1 | 0.021 | 48,000 | 544 | 40,000 | 453 | 36,000 | 408 | 34,000 | 286 | 30,000 | 240 | 28,000 | 193 |
| | 1.5 | 0.021 | 48,000 | 544 | 40,000 | 453 | 36,000 | 408 | 34,000 | 286 | 30,000 | 240 | 28,000 | 193 |
| | 2 | 0.012 | 43,200 | 448 | 36,000 | 373 | 32,400 | 336 | 30,600 | 257 | 27,000 | 192 | 25,200 | 155 |
| | 2.5 | 0.01 | 43,200 | 448 | 36,000 | 373 | 32,400 | 336 | 30,600 | 257 | 27,000 | 192 | 25,200 | 155 |
| | 3 | 0.008 | 43,200 | 448 | 36,000 | 373 | 32,400 | 336 | 30,600 | 257 | 27,000 | 180 | 25,200 | 145 |
| 0.4 | 1 | 0.04 | 38,400 | 762 | 32,000 | 635 | 28,800 | 571 | 27,200 | 401 | 24,000 | 297 | 22,400 | 241 |
| | 1.5 | 0.028 | 38,400 | 762 | 32,000 | 635 | 28,800 | 571 | 27,200 | 401 | 24,000 | 297 | 22,400 | 241 |
| | 2 | 0.028 | 38,400 | 762 | 32,000 | 635 | 28,800 | 571 | 27,200 | 401 | 24,000 | 297 | 22,400 | 241 |
| | 2.5 | 0.022 | 34,560 | 557 | 28,800 | 464 | 25,920 | 418 | 24,480 | 320 | 21,600 | 239 | 20,160 | 192 |
| | 3 | 0.016 | 34,560 | 557 | 28,800 | 464 | 25,920 | 418 | 24,480 | 320 | 21,600 | 239 | 20,160 | 192 |
| | 3.5 | 0.012 | 34,560 | 557 | 28,800 | 464 | 25,920 | 418 | 24,480 | 320 | 21,600 | 239 | 20,160 | 192 |
| | 4 | 0.01 | 34,560 | 557 | 28,800 | 464 | 25,920 | 418 | 24,480 | 320 | 21,600 | 239 | 20,160 | 192 |
| | 5 | 0.01 | 30,720 | 406 | 25,600 | 316 | 23,040 | 284 | 21,760 | 208 | 19,200 | 184 | 17,920 | 144 |
| | 6 | 0.006 | 30,720 | 406 | 25,600 | 316 | 23,040 | 284 | 21,760 | 208 | 19,200 | 184 | 17,920 | 144 |
| | 8 | 0.003 | 26,880 | 289 | 22,400 | 240 | 20,160 | 217 | 19,040 | 160 | 16,800 | 141 | 15,680 | 128 |
| | 10 | 0.002 | 23,040 | 212 | 19,200 | 177 | 17,280 | 159 | 16,320 | 117 | 14,400 | 103 | 13,440 | 94 |
| 0.5 | 1 | 0.05 | 38,400 | 762 | 32,000 | 635 | 28,800 | 571 | 27,200 | 446 | 24,000 | 299 | 22,400 | 241 |
| | 1.5 | 0.05 | 38,400 | 762 | 32,000 | 635 | 28,800 | 571 | 27,200 | 446 | 24,000 | 299 | 22,400 | 241 |
| | 2 | 0.035 | 38,400 | 762 | 32,000 | 635 | 28,800 | 571 | 27,200 | 446 | 24,000 | 299 | 22,400 | 241 |
| | 2.5 | 0.03 | 34,560 | 557 | 28,800 | 464 | 25,920 | 418 | 24,480 | 354 | 21,600 | 239 | 20,160 | 192 |
| | 3 | 0.02 | 34,560 | 557 | 28,800 | 464 | 25,920 | 418 | 24,480 | 354 | 21,600 | 239 | 20,160 | 192 |
| | 4 | 0.02 | 34,560 | 557 | 28,800 | 464 | 25,920 | 418 | 24,480 | 320 | 21,600 | 239 | 20,160 | 192 |
| | 5 | 0.013 | 34,560 | 557 | 28,800 | 464 | 25,920 | 418 | 24,480 | 320 | 21,600 | 239 | 20,160 | 192 |
| | 6 | 0.013 | 30,720 | 433 | 25,600 | 361 | 23,040 | 324 | 21,760 | 208 | 19,200 | 184 | 17,920 | 144 |
| | 8 | 0.008 | 30,720 | 371 | 25,600 | 309 | 23,040 | 278 | 21,760 | 172 | 19,200 | 155 | 17,920 | 117 |
| | 10 | 0.004 | 26,880 | 288 | 22,400 | 240 | 20,160 | 216 | 19,040 | 121 | 16,800 | 105 | 15,680 | 79 |
| 0.6 | 2 | 0.042 | 38,400 | 1,089 | 32,000 | 907 | 28,800 | 816 | 27,200 | 572 | 24,000 | 427 | 22,400 | 344 |
| | 3 | 0.035 | 34,560 | 895 | 28,800 | 746 | 25,920 | 671 | 24,480 | 515 | 21,600 | 385 | 20,160 | 310 |
| | 4 | 0.024 | 34,560 | 895 | 28,800 | 746 | 25,920 | 671 | 24,480 | 515 | 21,600 | 385 | 20,160 | 310 |
| | 5 | 0.02 | 34,560 | 796 | 28,800 | 663 | 25,920 | 596 | 24,480 | 458 | 21,600 | 342 | 20,160 | 276 |
| | 6 | 0.015 | 34,560 | 796 | 28,800 | 663 | 25,920 | 596 | 24,480 | 458 | 21,600 | 342 | 20,160 | 276 |
| | 7 | 0.015 | 30,720 | 687 | 25,600 | 572 | 23,040 | 515 | 21,760 | 395 | 19,200 | 295 | 17,920 | 238 |
| | 8 | 0.015 | 30,720 | 595 | 25,600 | 516 | 23,040 | 464 | 21,760 | 297 | 19,200 | 262 | 17,920 | 206 |
| | 9 | 0.012 | 30,720 | 595 | 25,600 | 516 | 23,040 | 464 | 21,760 | 297 | 19,200 | 262 | 17,920 | 206 |
| | 10 | 0.009 | 30,720 | 595 | 25,600 | 516 | 23,040 | 464 | 21,760 | 297 | 19,200 | 262 | 17,920 | 206 |
| 0.7 | 2 | 0.07 | 38,400 | 1,089 | 32,000 | 907 | 28,800 | 816 | 27,200 | 572 | 24,000 | 427 | 22,400 | 344 |
| | 4 | 0.049 | 34,560 | 796 | 28,800 | 663 | 25,920 | 596 | 24,480 | 458 | 21,600 | 342 | 20,160 | 276 |
| | 6 | 0.018 | 34,560 | 796 | 28,800 | 663 | 25,920 | 596 | 24,480 | 458 | 21,600 | 342 | 20,160 | 276 |
| | 8 | 0.018 | 30,720 | 541 | 25,600 | 451 | 23,040 | 406 | 21,760 | 260 | 19,200 | 229 | 17,920 | 180 |
| | 10 | 0.018 | 30,720 | 541 | 25,600 | 451 | 23,040 | 406 | 21,760 | 260 | 19,200 | 229 | 17,920 | 180 |

【Note】 Please refer to P.27

# Recommended Cutting Conditions

High efficiency cutting condition | **High accuracy cutting condition**

Please refer to P.22 about high efficiency cutting conditions

## Epoch Deep Square Evolution EPDSE-PN EPDSE-ATH

| Recommended range | | | PN series | | | | | | | | ATH series | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work material | | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| | | | Coppers | | Carbon steels, Alloy steels | | Stainless steels, Tool steels | | Pre-hardened steels | | Hardened steels | | Hardened steels | |
| | | | | | (180～250HB) | | (25～35HRC) | | (35～45HRC) | | (45～55HRC) | | (55～65HRC) | |
| Ratio to standard depth of cut | | | 120% | | 100% | | 90% | | 70% | | 50% | | 45% | |
| Tool dia. DC (mm) | Under neck length LU (mm) | ap (mm) | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min | Revolution n min-1 | Feed rate vf mm/min |
| 0.8 | 2 | 0.08 | 38,400 | 1,089 | 32,000 | 907 | 28,800 | 816 | 27,200 | 636 | 24,000 | 475 | 22,400 | 383 |
| | 4 | 0.056 | 38,400 | 1,089 | 32,000 | 907 | 28,800 | 816 | 27,200 | 636 | 24,000 | 475 | 22,400 | 383 |
| | 6 | 0.032 | 34,560 | 796 | 28,800 | 663 | 25,920 | 596 | 24,480 | 573 | 21,600 | 428 | 20,160 | 345 |
| | 8 | 0.02 | 34,560 | 796 | 28,800 | 663 | 25,920 | 596 | 24,480 | 458 | 21,600 | 342 | 20,160 | 276 |
| | 10 | 0.02 | 30,720 | 541 | 25,600 | 451 | 23,040 | 406 | 21,760 | 260 | 19,200 | 229 | 17,920 | 180 |
| | 12 | 0.012 | 30,720 | 541 | 25,600 | 451 | 23,040 | 406 | 21,760 | 260 | 19,200 | 229 | 17,920 | 180 |
| 0.9 | 2 | 0.09 | 38,400 | 1,206 | 32,000 | 1,005 | 28,800 | 904 | 27,200 | 695 | 24,000 | 519 | 22,400 | 418 |
| | 4 | 0.063 | 38,400 | 1,206 | 32,000 | 1,005 | 28,800 | 904 | 27,200 | 695 | 24,000 | 519 | 22,400 | 418 |
| | 6 | 0.036 | 34,560 | 995 | 28,800 | 829 | 25,920 | 746 | 24,480 | 573 | 21,600 | 428 | 20,160 | 345 |
| | 8 | 0.023 | 34,560 | 995 | 28,800 | 746 | 25,920 | 746 | 24,480 | 573 | 21,600 | 428 | 20,160 | 345 |
| | 10 | 0.023 | 30,720 | 619 | 25,600 | 516 | 23,040 | 464 | 21,760 | 297 | 19,200 | 262 | 17,920 | 206 |
| | 12 | 0.023 | 30,720 | 541 | 25,600 | 451 | 23,040 | 414 | 21,760 | 297 | 19,200 | 262 | 17,920 | 206 |
| 1 | 2 | 0.09 | 34,560 | 1,465 | 28,800 | 1,220 | 25,920 | 1,098 | 24,480 | 936 | 21,600 | 699 | 20,160 | 563 |
| | 3 | 0.07 | 34,560 | 1,465 | 28,800 | 1,220 | 25,920 | 1,098 | 24,480 | 936 | 21,600 | 699 | 20,160 | 563 |
| | 4 | 0.065 | 34,560 | 1,465 | 28,800 | 1,220 | 25,920 | 1,098 | 24,480 | 936 | 21,600 | 699 | 20,160 | 563 |
| | 5 | 0.05 | 34,560 | 1,465 | 28,800 | 1,220 | 25,920 | 1,098 | 24,480 | 936 | 21,600 | 699 | 20,160 | 563 |
| | 6 | 0.035 | 31,104 | 1,276 | 25,920 | 1,008 | 23,328 | 907 | 22,032 | 773 | 19,440 | 577 | 18,144 | 418 |
| | 7 | 0.035 | 31,104 | 1,276 | 25,920 | 1,008 | 23,328 | 907 | 22,032 | 773 | 19,440 | 577 | 18,144 | 418 |
| | 8 | 0.035 | 31,104 | 1,209 | 25,920 | 1,008 | 23,328 | 907 | 22,032 | 773 | 19,440 | 577 | 18,144 | 418 |
| | 9 | 0.03 | 31,104 | 1,209 | 25,920 | 1,008 | 23,328 | 907 | 22,032 | 695 | 19,440 | 461 | 18,144 | 372 |
| | 10 | 0.022 | 31,104 | 1,209 | 25,920 | 896 | 23,328 | 816 | 22,032 | 695 | 19,440 | 461 | 18,144 | 372 |
| | 12 | 0.022 | 27,648 | 836 | 23,040 | 696 | 20,736 | 627 | 19,584 | 401 | 17,280 | 354 | 16,128 | 278 |
| | 14 | 0.022 | 27,648 | 836 | 23,040 | 696 | 20,736 | 627 | 19,584 | 401 | 17,280 | 354 | 16,128 | 278 |
| | 16 | 0.012 | 27,648 | 716 | 23,040 | 596 | 20,736 | 537 | 19,584 | 380 | 17,280 | 298 | 16,128 | 226 |
| | 20 | 0.008 | 24,828 | 586 | 20,690 | 488 | 18,621 | 439 | 17,587 | 278 | 15,518 | 213 | 14,483 | 158 |
| | 25 | 0.005 | 21,000 | 455 | 17,500 | 379 | 15,750 | 341 | 14,875 | 216 | 13,125 | 165 | 12,250 | 122 |
| 1.2 | 4 | 0.09 | 30,720 | 1,306 | 25,600 | 1,089 | 23,040 | 980 | 21,760 | 760 | 19,200 | 513 | 17,920 | 414 |
| | 6 | 0.084 | 30,720 | 1,306 | 25,600 | 1,089 | 23,040 | 980 | 21,760 | 760 | 19,200 | 513 | 17,920 | 414 |
| | 8 | 0.048 | 27,648 | 1,074 | 23,040 | 895 | 20,736 | 806 | 19,584 | 684 | 17,280 | 461 | 16,128 | 372 |
| | 10 | 0.03 | 27,648 | 1,074 | 23,040 | 895 | 20,736 | 806 | 19,584 | 684 | 17,280 | 461 | 16,128 | 372 |
| | 12 | 0.03 | 27,648 | 955 | 23,040 | 716 | 20,736 | 642 | 19,584 | 549 | 17,280 | 410 | 16,128 | 331 |
| | 16 | 0.02 | 24,576 | 848 | 20,480 | 707 | 18,432 | 557 | 17,408 | 488 | 15,360 | 364 | 14,336 | 294 |
| 1.4 | 6 | 0.1 | 26,880 | 1,143 | 22,400 | 952 | 20,160 | 857 | 19,040 | 601 | 16,800 | 449 | 15,680 | 361 |
| | 12 | 0.035 | 24,192 | 940 | 20,160 | 783 | 18,144 | 705 | 17,136 | 540 | 15,120 | 404 | 14,112 | 325 |
| 1.5 | 4 | 0.11 | 26,880 | 1,270 | 22,400 | 1,058 | 20,160 | 953 | 19,040 | 668 | 16,800 | 499 | 15,680 | 402 |
| | 6 | 0.11 | 26,880 | 1,143 | 22,400 | 952 | 20,160 | 866 | 19,040 | 668 | 16,800 | 499 | 15,680 | 402 |
| | 8 | 0.06 | 24,192 | 1,045 | 20,160 | 871 | 18,144 | 784 | 17,136 | 601 | 15,120 | 449 | 14,112 | 362 |
| | 10 | 0.06 | 24,192 | 1,045 | 20,160 | 783 | 18,144 | 705 | 17,136 | 601 | 15,120 | 449 | 14,112 | 362 |
| | 12 | 0.06 | 24,192 | 940 | 20,160 | 783 | 18,144 | 705 | 17,136 | 601 | 15,120 | 404 | 14,112 | 325 |
| | 14 | 0.038 | 24,192 | 940 | 20,160 | 783 | 18,144 | 705 | 17,136 | 601 | 15,120 | 404 | 14,112 | 325 |
| | 16 | 0.038 | 21,504 | 731 | 17,920 | 609 | 16,128 | 549 | 15,232 | 351 | 13,440 | 310 | 12,544 | 243 |
| | 18 | 0.038 | 21,504 | 731 | 17,920 | 609 | 16,128 | 549 | 15,232 | 351 | 13,440 | 310 | 12,544 | 243 |
| | 20 | 0.038 | 21,504 | 731 | 17,920 | 609 | 16,128 | 488 | 15,232 | 312 | 13,440 | 276 | 12,544 | 216 |
| | 25 | 0.023 | 16,128 | 470 | 13,440 | 391 | 12,096 | 313 | 11,424 | 222 | 10,080 | 174 | 9,408 | 132 |
| | 30 | 0.015 | 13,440 | 319 | 11,200 | 266 | 12,096 | 212 | 9,520 | 149 | 8,400 | 111 | 7,840 | 89 |
| | 35 | 0.01 | 13,440 | 284 | 11,200 | 236 | 12,096 | 186 | 9,520 | 149 | 8,400 | 111 | 7,840 | 89 |
| | 40 | 0.005 | 10,752 | 152 | 8,960 | 126 | 8,064 | 113 | 7,616 | 76 | 6,720 | 59 | 6,272 | 48 |
| 1.6 | 6 | 0.11 | 24,960 | 1,179 | 20,800 | 977 | 18,720 | 884 | 17,680 | 690 | 15,600 | 515 | 14,560 | 415 |
| | 8 | 0.11 | 24,960 | 1,179 | 20,800 | 977 | 18,720 | 884 | 17,680 | 621 | 15,600 | 515 | 14,560 | 415 |
| 1.8 | 6 | 0.13 | 24,960 | 1,179 | 20,800 | 997 | 18,720 | 884 | 17,680 | 690 | 15,600 | 515 | 14,560 | 415 |
| | 8 | 0.13 | 24,960 | 1,179 | 20,800 | 997 | 18,720 | 884 | 17,680 | 621 | 15,600 | 515 | 14,560 | 415 |

【Note】 Please refer to P.27

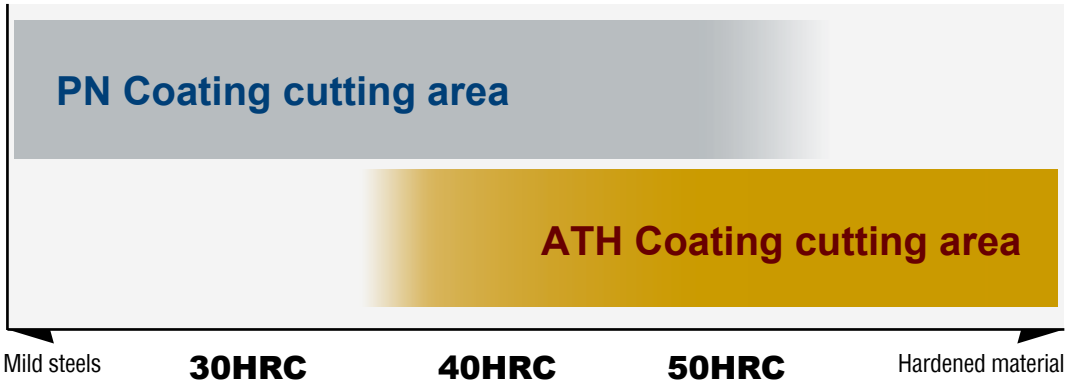
| Recommended range | | | PN series / ATH series | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Work material | | | 1 Coppers | | 2 Carbon steels, Alloy steels (180～250HB) | | 3 Stainless steels, Tool steels (25～35HRC) | | 4 Pre-hardened steels (35～45HRC) | | 5 Hardened steels (45～55HRC) | | 6 Hardened steels (55～65HRC) | |
| Ratio to standard depth of cut | | | 120% | | 100% | | 90% | | 70% | | 50% | | 45% | |
| Tool dia. DC (mm) | Under neck length LU (mm) | $a_p$ (mm) | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min | Revolution $n$ min$^{-1}$ | Feed rate $v_f$ mm/min |
| 2 | 4 | 0.2 | 20,160 | 1,270 | 16,800 | 952 | 15,120 | 861 | 14,280 | 655 | 12,600 | 499 | 11,760 | 402 |
| | 6 | 0.2 | 20,160 | 1,270 | 16,800 | 952 | 15,120 | 861 | 14,280 | 655 | 12,600 | 499 | 11,760 | 402 |
| | 8 | 0.14 | 20,160 | 1,270 | 16,800 | 952 | 15,120 | 861 | 14,280 | 655 | 12,600 | 499 | 11,760 | 402 |
| | 10 | 0.14 | 20,160 | 1,270 | 16,800 | 952 | 15,120 | 861 | 14,280 | 655 | 12,600 | 499 | 11,760 | 402 |
| | 12 | 0.08 | 18,144 | 1,045 | 15,120 | 871 | 13,608 | 784 | 12,852 | 590 | 11,340 | 449 | 10,584 | 362 |
| | 14 | 0.08 | 18,144 | 1,045 | 15,120 | 871 | 13,608 | 784 | 12,852 | 590 | 11,340 | 449 | 10,584 | 325 |
| | 16 | 0.08 | 18,144 | 940 | 15,120 | 783 | 13,608 | 707 | 12,852 | 540 | 11,340 | 426 | 10,584 | 325 |
| | 18 | 0.05 | 18,144 | 940 | 15,120 | 783 | 13,608 | 707 | 12,852 | 540 | 11,340 | 404 | 10,584 | 289 |
| | 20 | 0.05 | 18,144 | 888 | 15,120 | 696 | 13,608 | 627 | 12,852 | 480 | 11,340 | 359 | 10,584 | 289 |
| | 25 | 0.05 | 16,128 | 731 | 13,440 | 609 | 12,096 | 549 | 11,424 | 312 | 10,080 | 310 | 9,408 | 232 |
| | 30 | 0.03 | 16,128 | 650 | 13,440 | 541 | 12,096 | 488 | 11,424 | 273 | 10,080 | 276 | 9,408 | 216 |
| | 35 | 0.02 | 14,112 | 466 | 11,760 | 388 | 10,584 | 349 | 9,996 | 225 | 8,820 | 182 | 8,232 | 148 |
| | 40 | 0.01 | 14,112 | 408 | 11,760 | 340 | 10,586 | 306 | 9,996 | 197 | 8,820 | 159 | 8,232 | 129 |
| | 50 | 0.005 | 12,096 | 284 | 10,080 | 236 | 9,072 | 186 | 8,568 | 120 | 7,560 | 97 | 7,056 | 78 |
| 2.5 | 8 | 0.18 | 17,280 | 1,361 | 14,400 | 1,134 | 12,960 | 1,021 | 12,240 | 716 | 10,800 | 535 | 10,080 | 431 |
| | 12 | 0.18 | 17,280 | 1,134 | 14,400 | 1,020 | 12,960 | 933 | 12,240 | 644 | 10,800 | 520 | 10,080 | 387 |
| | 16 | 0.1 | 15,552 | 1,008 | 12,960 | 839 | 11,664 | 758 | 11,016 | 579 | 9,720 | 450 | 9,072 | 349 |
| | 20 | 0.1 | 15,552 | 840 | 12,960 | 794 | 11,664 | 711 | 11,016 | 515 | 9,720 | 450 | 9,072 | 310 |
| | 30 | 0.06 | 13,824 | 696 | 11,520 | 580 | 10,368 | 457 | 9,792 | 348 | 8,640 | 272 | 8,064 | 220 |
| | 40 | 0.03 | 12,096 | 437 | 10,080 | 364 | 9,072 | 328 | 8,568 | 250 | 7,560 | 196 | 7,056 | 158 |
| | 50 | 0.01 | 12,096 | 375 | 10,080 | 338 | 9,072 | 304 | 8,568 | 203 | 7,560 | 171 | 7,056 | 138 |
| 3 | 8 | 0.3 | 15,360 | 1,210 | 12,800 | 1,008 | 11,520 | 907 | 10,880 | 636 | 9,600 | 475 | 8,960 | 383 |
| | 12 | 0.21 | 15,360 | 1,210 | 12,800 | 1,008 | 11,520 | 907 | 10,880 | 636 | 9,600 | 475 | 8,960 | 383 |
| | 16 | 0.12 | 13,824 | 995 | 11,520 | 829 | 10,368 | 746 | 9,792 | 573 | 8,640 | 428 | 8,064 | 344 |
| | 20 | 0.12 | 13,824 | 895 | 11,520 | 787 | 10,368 | 705 | 9,792 | 573 | 8,640 | 428 | 8,064 | 344 |
| | 25 | 0.08 | 13,824 | 895 | 11,520 | 787 | 10,368 | 705 | 9,792 | 573 | 8,640 | 428 | 8,064 | 344 |
| | 30 | 0.08 | 13,824 | 796 | 11,520 | 663 | 10,368 | 601 | 9,792 | 573 | 8,640 | 428 | 8,064 | 310 |
| | 40 | 0.05 | 12,288 | 618 | 10,240 | 515 | 9,216 | 464 | 8,704 | 356 | 7,680 | 304 | 7,168 | 245 |
| | 50 | 0.02 | 10,752 | 389 | 8,960 | 347 | 8,064 | 291 | 7,616 | 194 | 6,720 | 152 | 6,272 | 123 |
| 4 | 12 | 0.4 | 11,500 | 2,070 | 9,400 | 1,692 | 8,460 | 1,370 | 7,990 | 1,222 | 7,050 | 811 | 6,580 | 654 |
| | 16 | 0.28 | 11,500 | 2,070 | 9,400 | 1,692 | 8,460 | 1,370 | 7,990 | 1,222 | 7,050 | 811 | 6,580 | 654 |
| | 20 | 0.28 | 10,350 | 1,863 | 8,460 | 1,522 | 7,614 | 1,233 | 7,191 | 1,099 | 6,345 | 730 | 5,922 | 588 |
| | 25 | 0.16 | 10,350 | 1,676 | 8,460 | 1,370 | 7,614 | 1,109 | 7,191 | 990 | 6,345 | 730 | 5,922 | 588 |
| | 30 | 0.16 | 10,350 | 1,676 | 8,460 | 1,370 | 7,614 | 1,109 | 7,191 | 880 | 6,345 | 649 | 5,922 | 588 |
| | 35 | 0.1 | 9,137 | 1,316 | 7,614 | 1,096 | 6,853 | 888 | 6,472 | 792 | 5,711 | 584 | 5,330 | 471 |
| | 40 | 0.1 | 9,137 | 1,151 | 7,614 | 959 | 6,853 | 777 | 6,472 | 693 | 5,711 | 511 | 5,330 | 412 |
| | 50 | 0.06 | 7,896 | 789 | 6,580 | 658 | 7,106 | 592 | 5,593 | 460 | 4,935 | 309 | 4,606 | 249 |
| 5 | 20 | 0.3 | 9,014 | 1,621 | 7,512 | 1,351 | 6,761 | 1,216 | 6,385 | 945 | 5,634 | 635 | 5,258 | 513 |
| | 25 | 0.3 | 8,112 | 1,458 | 6,760 | 1,215 | 6,084 | 1,094 | 5,746 | 850 | 5,070 | 571 | 4,732 | 461 |
| | 30 | 0.2 | 8,112 | 1,313 | 6,760 | 1,094 | 6,084 | 984 | 5,746 | 765 | 5,070 | 514 | 4,732 | 415 |
| | 40 | 0.15 | 7,301 | 1,052 | 6,084 | 876 | 5,476 | 788 | 5,171 | 613 | 4,563 | 412 | 4,259 | 332 |
| | 50 | 0.1 | 7,301 | 986 | 6,084 | 876 | 5,476 | 690 | 5,171 | 575 | 4,563 | 360 | 4,259 | 291 |
| 6 | 20 | 0.5 | 7,418 | 1,481 | 6,182 | 1,234 | 5,564 | 1,111 | 5,255 | 864 | 4,637 | 580 | 4,327 | 469 |
| | 30 | 0.4 | 6,744 | 1,346 | 5,620 | 1,122 | 5,058 | 1,010 | 4,777 | 785 | 4,215 | 527 | 3,934 | 426 |
| | 40 | 0.3 | 6,744 | 1,211 | 5,620 | 1,009 | 5,058 | 908 | 4,777 | 706 | 4,215 | 474 | 3,934 | 383 |
| | 50 | 0.2 | 6,000 | 981 | 5,000 | 817 | 4,500 | 735 | 4,250 | 636 | 3,750 | 427 | 3,500 | 345 |

※$a_p$ is shown as the criteria for carbon steel, alloy steel. For other materials, adjust the cutting depth according to the cutting depth factors in the above table.

**【Note】**
① PN coating is less electro conductive. Therefore, electric transmitted measuring systems may not work.
② Use the appropriate coolant for the work material and machining shape.
③ These Recommended Cutting Conditions indicate only the rule of a thumb for the cutting conditions. In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
④ If the rpm of the machine is low, lower the feed rate also to put the rpm and feed rate in the same ratio.

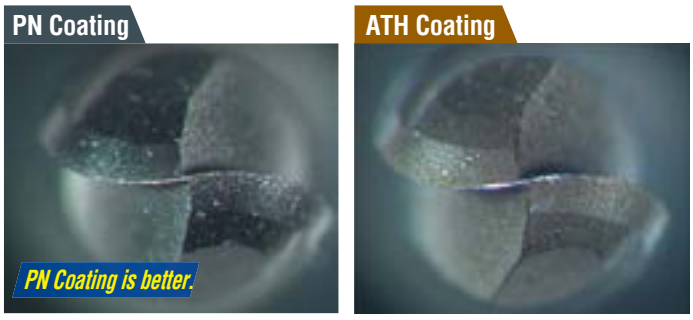
## 2 types of coatings to handle a variety of work materials.

### Recommended machining areas for each coating



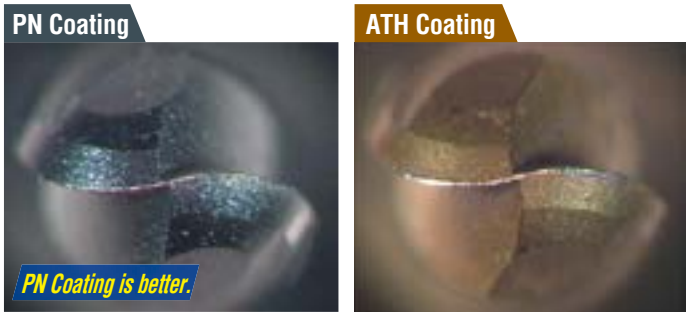

**Cutting Data 1**

Work material : **SCM440Ⓗ 30HRC**
Holder : HSK-F63
Tool dia. : RE0.5×Under neck 6㎜
Coolant : Air-blow
$n$=28,000min$^{-1}$ ($v_c$=88m/min)
$v_f$=1,200mm/min ($f_z$=0.02mm/t)
$a_p$=0.036mm $a_e$=0.108mm OH=18mm
Cutting length 10m



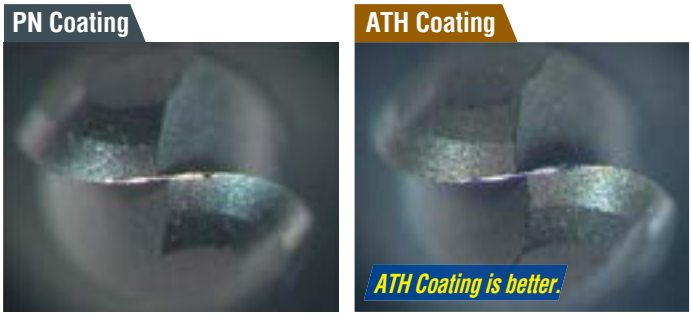

**Cutting Data 2**

Work material : **HPM-MAGIC 40HRC**
Holder : HSK-F63
Tool dia. : RE0.5×Under neck10㎜
Coolant : Air-blow
$n$=24,300min$^{-1}$ ($v_c$=76m/min)
$v_f$=900mm/min ($f_z$=0.018mm/t)
$a_p$=0.04mm Cutting reciprocating slot.
OH=18mm



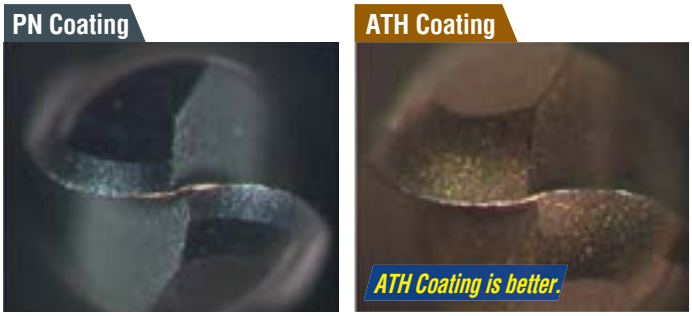

**Cutting Data 3**

Work material : **DACⒽ 45HRC**
Holder : HSK-F63
Tool dia. : RE0.5×Under neck 6㎜
Coolant : Air-blow
$n$=27,540min$^{-1}$ ($v_c$=86m/min)
$v_f$=1,115mm/min ($f_z$=0.02mm/t)
$a_p$=0.032mm $a_e$=0.096mm OH=18mm
Cutting length 10m




**Cutting Data 4**

Work material : **HPM38 52HRC**
Holder : HSK-F63
Tool dia. : RE0.5×Under neck10㎜
Coolant : Air-blow
$n$=24,300min$^{-1}$ ($v_c$=76m/min)
$v_f$=919mm/min ($f_z$=0.018mm/t)
$a_p$=0.016mm OH=18mm
Cutting length 20m



## Enables high-accuracy stable machining with excellent surface quality.

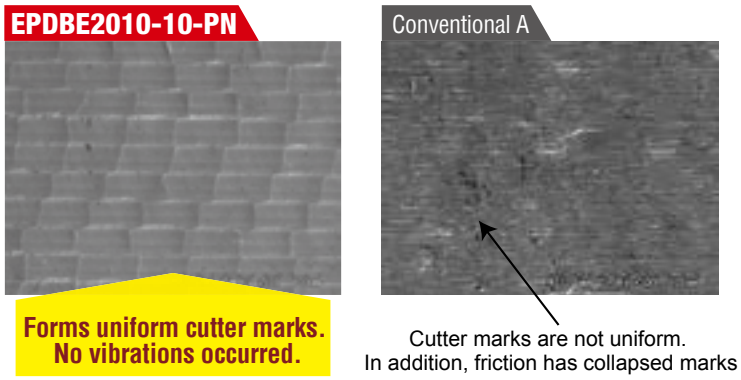
**EPDBE-PN**

PN Coating

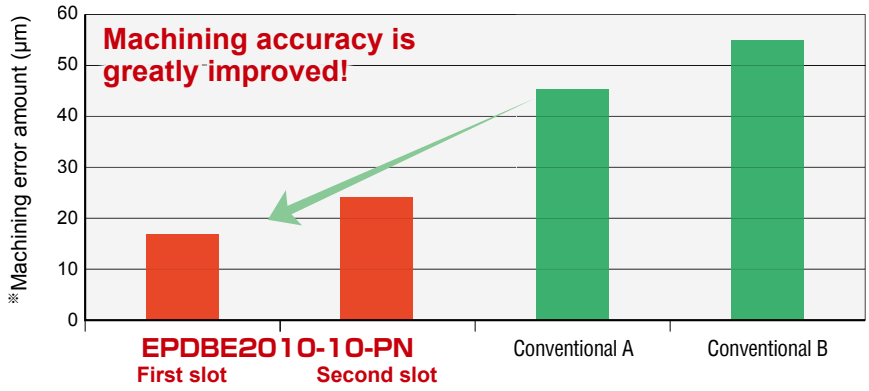
### Technical Data SCM440Ⓗ 33HRC rib slot evaluation

Tool : EPDBE2010-10-PN (RE0.5 Under neck10mm)

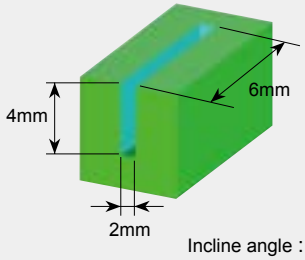
#### ★This is amazing! Point 1 Uniformity of machined surface



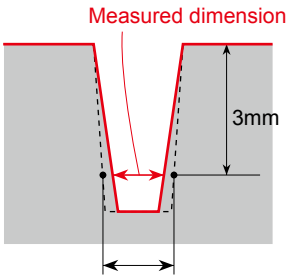

#### ★This is amazing! Point 2 Low deflection provides improved machining accuracy!




#### Rib slot evaluation

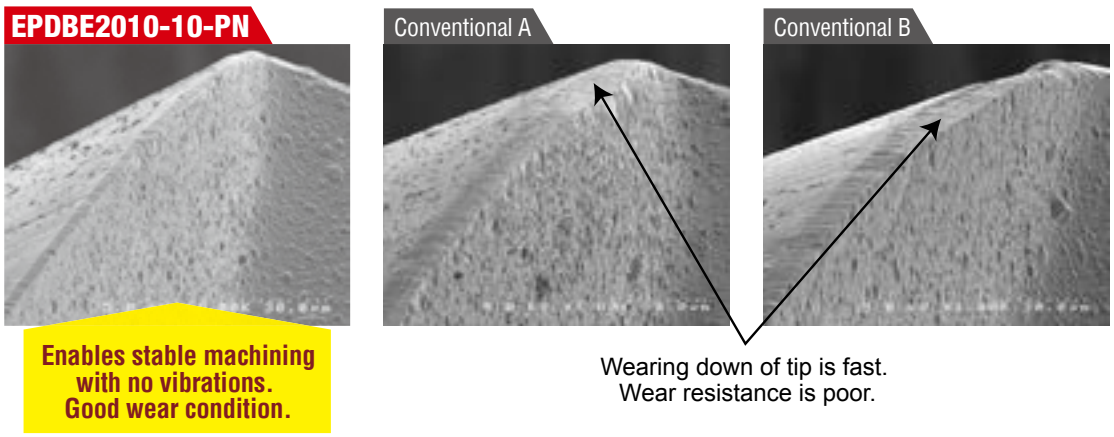



Work material : SCM440Ⓗ 33HRC
Holder : HSK-F63
Coolant : Wet
$n$=16,000min$^{-1}$ ($v_c$=50m/min)
$v_f$=1,000mm/min ($f_z$=0.03mm/t)
$a_p \times a_e$=0.02mm×0.04mm




※Machining error amount::
(Ideal dimension)-(Measured dimension after cutting)

#### ★This is amazing! Point 3 Long life: Wear resistance plus good chipping resistance



## Rely on ATH Coating for stable machining of even high-hardness materials!

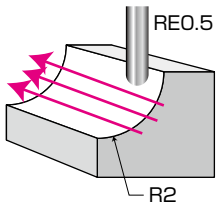
**EPDBE-ATH**

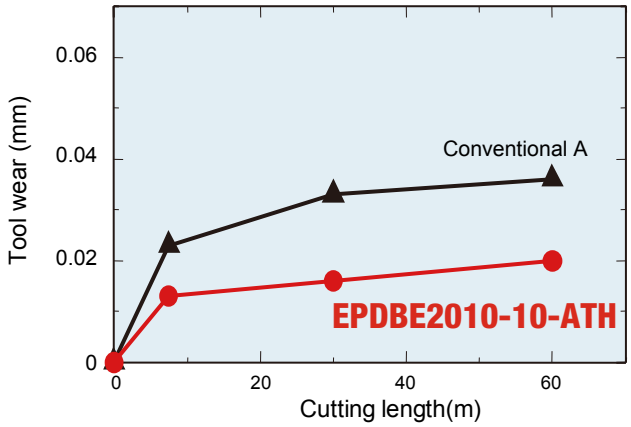
ATHCoating

### Technical Data

**Tool：EPDBE2010-10-ATH (RE0.5 Under neck10mm)**

**★This is amazing! Point 1** **Wear condition is stable. No chipping even on high-hardness materials.**

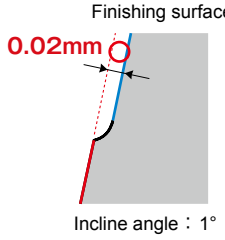
| Machining shape | Cutting condition | EPDBE2010-10-ATH | Conventional |
|---|---|---|---|
|  | Work material :<br>**SLDⒽ 60HRC**<br>Holder : HSK-F63<br>Coolant：Air Blow<br>$n$=10,000min$^{-1}$<br>($v_c$=31.4m/min)<br>$v_f$=800mm/min<br>($f_z$=0.04mm/t)<br>$a_p$×$a_e$=0.02mm×0.02mm |  <br>Stable wear condition from chisel to outer perimeter |  <br>Chipping occurred |

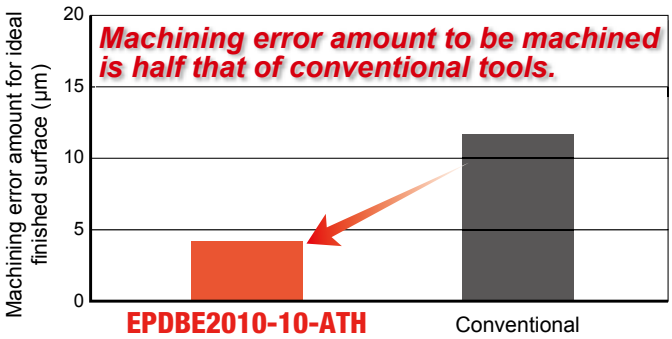



### Technical Data

**Tool：EPDBE2010-10-ATH (RE0.5 Under neck10mm)**

**★This is amazing! Point 2** **High accuracy achieved due to little deflection.**

| Machining shape | Cutting condition |
|---|---|
|  | Work material :<br>**SUS420J2Ⓗ 52HRC**<br>Holder: HSK-F63<br>Coolant：Air Blow<br>$n$=16,000min$^{-1}$<br>($v_c$=50m/min)<br>$v_f$=1,000mm/min<br>($f_z$=0.03mm/t)<br>$a_p$×$a_e$=0.02mm×0.02mm |

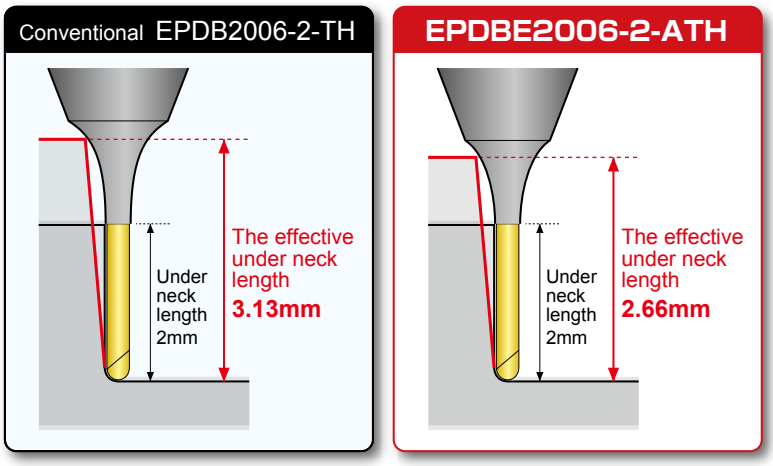



***Periphery helix angle is strong, improving cutting performance.***

# Tool interference check, Re-grinding

## Example of difference in neck interference area

**Difference in interference area for RE=0.3 x Under neck length=2mm**
(Figures show a slope angle of 1°.)




When a conventional product and new product with RE=0.3 x Under neck length=2mm are compared for a surface with a 1° slope angle, the conventional EPDB2006-2-TH has an effective under neck length of 3.13mm, but for the new EPDBE2006-2-ATH, the effective under neck length is 2.66mm.

The improved neck shape used in these new products results in a different interference area than the EPDB and EPDS conventional models.

## For checking interference:


## Re-grinding compatibility range table

| Item code | Product name | Tool dia. (mm) | Shape | Re-grinding compatibility range (mm) | |
|---|---|---|---|---|---|
| | | | | Outer dia. | End |
| EPDBE-PN | Epoch Deep Ball Evolution (PN Coating) | 0.1～6 | | N/A | 1～6 |
| EPDBE-ATH | Epoch Deep Ball Evolution (ATH Coating) | 0.1～6 | | N/A | 1～6 |
| EPDSE-PN | Epoch Deep Square Evolution (PN Coating) | 0.1～6 | | 6 | 2～6 |
| EPDSE-ATH | Epoch Deep Square Evolution (ATH Coating) | 0.1～6 | | 6 | 2～6 |

【Note】Contact our sales office regarding whether or not regrinding is possible for tools where Under neck length/Tool diameter is 10 or greater.

MOLDINO

The Edge To Innovation

The diagrams and table data are examples of test results, and are not guaranteed values.
"MOLDINO" is a registered trademark of MOLDINO Tool Engineering, Ltd.

## ⚠ Attentions on Safety

### 1. Cautions regarding handling

(1) When removing the tool from its case (packaging), be careful that the tool does not pop out or is dropped. Be particularly careful regarding contact with the tool flutes.
(2) When handling tools with sharp cutting flutes, be careful not to touch the cutting flutes directly with your bare hands.

### 2. Cautions regarding mounting

(1) Before use, check the outside appearance of the tool for scratches, cracks, etc. and that it is firmly mounted in the collet chuck, etc.
(2) If abnormal chattering, etc. occurs during use, stop the machine immediately and remove the cause of the chattering.

### 3. Cautions during use

(1) Before use, confirm the dimensions and direction of rotation of the tool and milling work material.
(2) The numerical values in the standard cutting conditions table should be used as criteria when starting new work. The cutting conditions should be adjusted as appropriate when the cutting depth is large, the rigidity of the machine being used is low, or according to the conditions of the work material.
(3) Cutting tools are made of a hard material. During use, they may break and fly off. In addition, cutting chips may also fly off. Since there is a danger of injury to workers, fire, or eye damage from such flying pieces, a safety cover should be attached when work is performed and safety equip ment such as safety goggles should be worn to create a safe environment for work.
(4) There is a risk of fire or inflammation due to sparks, heat due to breakage, and cutting chips. Do not use where there is a risk of fire or explosion. **Please caution of fire while using oil base coolant, fire prevention is necessary.**
(5) Do not use the tool for any purpose other than that for which it is intended.

### 4. Cautions regarding regrinding

(1) If regrinding is not performed at the proper time, there is a risk of the tool breaking. Replace the tool with one in good condition, or perform regrinding.
(2) Grinding dust will be created when regrinding a tool. When regrinding, be sure to attach a safety cover over the work area and wear safety clothes such as safety goggles, etc.
(3) This product contains the specified chemical substance cobalt and its inorganic compounds. When performing regrinding or similar processing, be sure to handle the processing in accordance with the local laws and regulations regarding prevention of hazards due to specified chemical substances.


## MOLDINO Tool Engineering, Ltd.

Head Office
Hulic Ryogoku Bldg. 8F, 4-31-11, Ryogoku, Sumida-ku, Tokyo, Japan 130-0026
International Sales Dept. : TEL +81-3-6890-5103 FAX +81-3-6890-5128


Official Web Site
**https://www.moldino.com/en/**
Database for selection Cutting Tool Products【TOOL SEARCH】
TOOLSEARCH Search Web


Europe **MOLDINO Tool Engineering Europe GmbH**
Itterpark 12, 40724 Hilden,Germany.
Tel +49-(0)2103-24820 Fax +49-(0)2103-248230

America **MITSUBISHI MATERIALS U.S.A. CORPORATION**
**Detroit office c/o RFM Inc. Customer service**
2001 Orndorf Drive, Brighton, MI 48116 U.S.A.
Tel +1(248) 308-2620 Fax +1(248) 308-2627

Mexico **MITSUBISHI MATERIALS MÉXICO S.A. DE C.V.**
Av. La Cañada No.16, Parque Industrial Bernardo Quintana, El Marques, Querétaro, CP 76246, México
Tel +52-442-1926800

Brazil **MITSUBISHI MATERIALS BRASIL LTDA.**
Rua Cincinato Braga, 340 13° andar.Bela Vista – CEP 01333-010 São Paulo – SP ., Brasil
Tel +55(11)3506-5600 Fax +55(11)3506-5677

Thailand **MITSUBISHI MATERIALS (THAILAND) CO., LTD.**
139/3 Moo 2, Tambon Khlong Chik, Amphoe Bang Pa-in,
Phra Nakhon Si Ayutthaya 13160, Thailand
Tel +66-3525-8024

India **Mitsubishi Materials India Private Limited**
H.O.: Prasad Enclave, #118/119, 1st Floor, 2nd Stage, 5th main, BBMP Ward #11, (New #38),
Industrial Suburb, Yeshwanthpura, Bengaluru, 560 022, Karnataka, India.
Tel +91-80-2204-3600


DISTRIBUTED BY:




Printed in JAPAN

2026-2(K)
2012-8:FP