

超硬小径深彫り用エンドミル Carbide Miniature End Mill

# エポックディープエボリューションシリーズ

Epoch Deep Evolution series

**EPDBE-PN/ATH** (ボールタイプ Ball type)

**EPDSE-PN/ATH** (スクエアタイプ Square type)



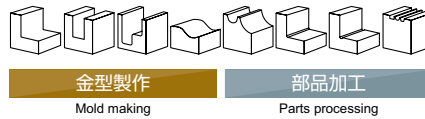
株式会社 **MOLDINO**  
MOLDINO Tool Engineering, Ltd.

New Product News No.1110-10 2022-10

## 特長 Features 01 エポックディープエボリューションの特長 Features of Epoch Deep Evolution

| PNコーティング |                          | ATHコーティング                  |                    |                         |                         |
|----------|--------------------------|----------------------------|--------------------|-------------------------|-------------------------|
| 銅        | 炭素鋼合金鋼                   | ステンレス鋼工具鋼                  | プリハードン鋼            | 焼入れ鋼                    | 焼入れ鋼                    |
| Copper   | Carbon steel Alloy steel | Stainless steel Tool steel | Pre-hardened steel | Hardened steel 45~55HRC | Hardened steel 55~65HRC |

加工用途 Applications



EPDBE-ATH/PN  
R0.05~R3 [164アイテム Items ×2]

EPDSE-ATH/PN  
φ0.1~φ6 [145アイテム Items ×2]

### ○ 耐欠損性を上げた刃形形状 Flute shape increases resistance to breakage.

#### エポックディープボールエボリューション

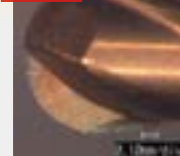
Epoch Deep Ball Evolution



高い切りくず排出性  
高強度刃形  
R刃ねじれ角を強くして  
切削性向上

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

新刃形 New shape

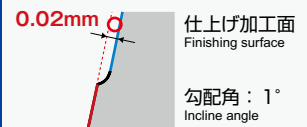


従来品 Conventional



チッピング発生  
Chipping occurred

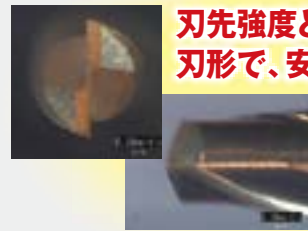
工具 Tool: EPDBE2010-10-ATH  
(R0.5 首下 Under neck 10mm)



被削材 Work material: SUS420J2② 52HRC  
使用ホルダ Holder: HSK-F63  
クーラント Coolant: エアブロー Air Blow  
 $n=16,000\text{min}^{-1}$  ( $v_c=50.2\text{m/min}$ )  
 $v_f=1,000\text{mm/min}$  ( $f_z=0.03\text{mm/t}$ )  
 $a_p \times a_e=0.02\text{mm} \times 0.02\text{mm}$   
OH=18mm

#### エポックディープスクエアエボリューション

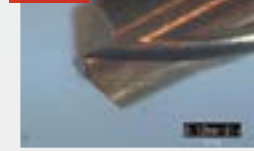
Epoch Deep Square Evolution



刃先強度と切れ味を両立させた  
刃形で、安定性が向上しました

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

新刃形 New shape



従来品 Conventional



チッピング発生  
Chipping occurred

工具 Tool: EPDSE2010-4-ATH  
(φ1 首下 Under neck 4mm)

1.5mm角の島(90°の立ち壁)  
1.5mm square island (90° standing walls)



被削材 Work material: HPM-MAGIC 40HRC  
使用ホルダ Holder: HSK-F63  
クーラント Coolant: ウェット Wet  
 $n=15,000\text{min}^{-1}$  ( $v_c=47\text{m/min}$ )  
 $v_f=1,000\text{mm/min}$  ( $f_z=0.03\text{mm/t}$ )  
 $a_p \times a_e=0.1\text{mm} \times 0.1\text{mm}$

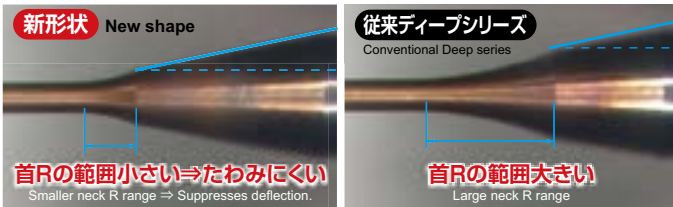
### ○ 進化した複合首形状 Improved compound neck shape

● 従来のRとテーパの複合形状をさらに進化。耐折損性とたわみ抑制を両立しました。

※従来ディープシリーズと比較すると実有効首下長さは短くなりますので干渉領域をチェックした上でご使用ください。

● 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.

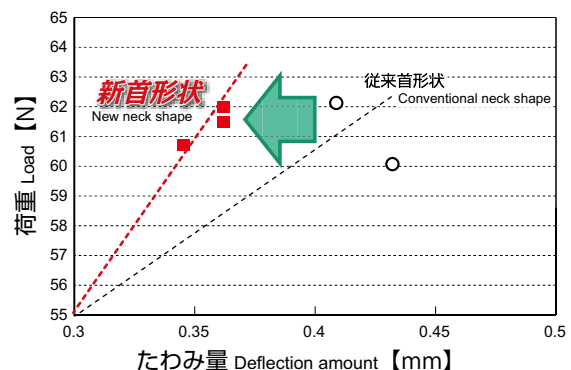


**[注意]** 首形状の変更に伴い、干渉領域が変わります。必ず加工前に干渉チェックを行ってください。

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

静荷重テスト結果  
Static load test results

テスト工具サイズ Testing tool size  
φ1×首下 Under neck 6



同じ荷重でも、たわみ抑制効果が大きい!!  
更に高精度な加工が可能。

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

### ○ 豊富なラインナップ Abundant lineup

|                              |                               |                                     |                       |                 |  |
|------------------------------|-------------------------------|-------------------------------------|-----------------------|-----------------|--|
| ボールエンドミル<br>Ball End Mill    | 164 アイテム ×2<br>PN/ATH アイテム ×2 | トータル<br>618 アイテム<br>Total 608 items | EPDBE-PN<br>EPDBE-ATH | EPDB<br>EPDB-TH | 特定代理店在庫へ<br>Stocked by specified distributor |
| スクエアエンドミル<br>Square End Mill | 145 アイテム ×2<br>PN/ATH アイテム ×2 |                                     | EPDSE-PN<br>EPDSE-ATH | EPDS<br>EPDS-TH | 特定代理店在庫へ<br>Stocked by specified distributor |

○ 特長と機能 Features and characteristics

- Al含有量の調整により、特に工具母材との**密着性に優れた耐熱コーティング**材料です。
- AlCr系コーティング皮膜へのSi添加により、良好な耐摩耗性を示します。
- プラスチック金型等の工具への溶着が起りやすい材料の切削に対して、良好な切削寿命を示します。(従来対比切削寿命2倍) HPM-MAGICをはじめとしたプリハードン鋼、炭素鋼、合金鋼、SUS系、SKD61、SKD11等の切削加工で長寿命です。
- 耐熱性の向上により、ウェット切削及び**ドライ切削**においても長寿命化が可能です。

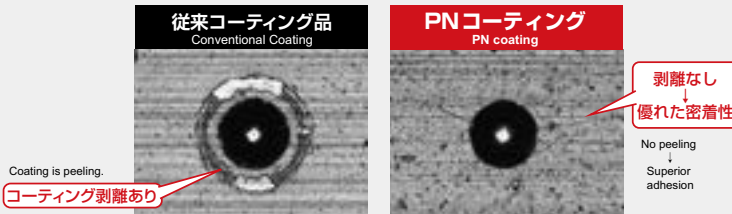
注) 本工具のPNコーティングはその性質上、通電性が微小です。従って、通電方式の工具長測定装置をご使用の際にはご注意ください。

- ・ 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.

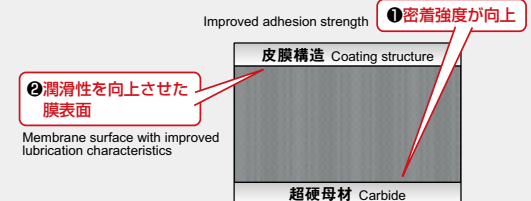
PNコーティングの密着性 Adhesion of PN coating

母材：超硬合金 Substrate: Carbide alloy



PNコーティングの皮膜断面組織と特性

Cross-sectional structure and characteristics of PN coating membrane



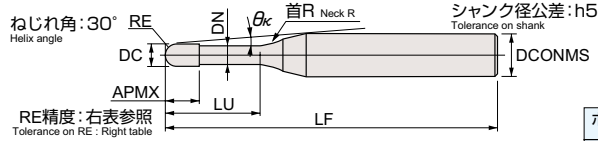
○ 特長と機能 Features and characteristics

- THコーティングの硬度と耐酸化性をさらに改善。高硬度材切削加工の長寿命化、高能率化が可能になりました。(結晶粒子がさらに微細化したSi系ナノコンポジットコーティングです)
- 高硬度材料(55HRC以上)の切削加工に良好な性能を発揮します。冷間ダイス鋼、高速度鋼、工具鋼
- ドライでもウェットでも長寿命。
- 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

# ラインナップ

Line Up

## エポックディープボールエボリューション EPDBE-PN



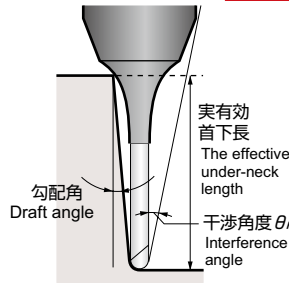
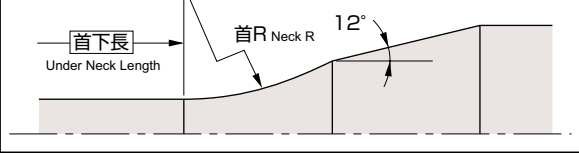
| (mm)      |                      |
|-----------|----------------------|
| ボール半径 RE  | RE精度 Tolerance on RE |
| RE ≤ 0.25 | ±0.003               |
| 0.25 < RE | ±0.005               |

## EPDBE2-0.00-0.00-PN

| 商品コード<br>Item code | 在庫<br>Stock | 寸法 Size(mm)          |                 |                          |                    |                 |                      |                     |              | 干渉角度<br>Interference angle | 勾配角に対する実有効首下長<br>Effective under neck length with respect to draft angle |       |       |       |       | 希望小売<br>価格(円)<br>Suggested retail price (¥) |        |
|--------------------|-------------|----------------------|-----------------|--------------------------|--------------------|-----------------|----------------------|---------------------|--------------|----------------------------|--|-------|-------|-------|-------|---|--------|
|                    |             | ボール半径<br>Ball radius | 外径<br>Tool dia. | 首下長<br>Under Neck length | 刃長<br>Flute length | 首径<br>Neck dia. | 全長<br>Overall length | シャンク径<br>Shank dia. | 首R<br>Neck R |                            | 勾配角  |       |       |       |       |   |        |
|                    |             |                      |                 |                          |                    |                 |                      |                     |              |                            | RE   | DC    | LU    | APMX  | DN    |   | LF     |
| EPDBE2001-0.2-PN   | ●           |                      |                 | 0.2                      |                    |                 |                      |                     |              |                            | 11.76  | 0.35  | 0.37  | 0.39  | 0.41  | 0.44  | 13,820 |
| EPDBE2001-0.3-PN   | ●           | 0.05                 | 0.1             | 0.3                      | 0.08               | 0.08            | 45                   | 4                   | 1            |                            | 11.64  | 0.46  | 0.48  | 0.50  | 0.52  | 0.57  | 14,150 |
| EPDBE2001-0.5-PN   | ●           |                      |                 | 0.5                      |                    |                 |                      |                     |              |                            | 11.40  | 0.67  | 0.70  | 0.73  | 0.76  | 0.81  | 15,320 |
| EPDBE2002-0.5-PN   | ●           |                      |                 | 0.5                      |                    |                 |                      |                     |              |                            | 11.42  | 0.70  | 0.72  | 0.75  | 0.77  | 0.82  | 9,910  |
| EPDBE2002-0.75-PN  | ●           |                      |                 | 0.75                     |                    |                 |                      |                     |              |                            | 11.13  | 0.96  | 0.99  | 1.02  | 1.05  | 1.11  | 9,910  |
| EPDBE2002-1-PN     | ●           |                      |                 | 1                        |                    |                 |                      |                     |              |                            | 10.86  | 1.22  | 1.26  | 1.30  | 1.33  | 1.39  | 9,910  |
| EPDBE2002-1.25-PN  | ●           | 0.1                  | 0.2             | 1.25                     | 0.15               | 0.17            | 50                   | 4                   | 1            |                            | 10.60  | 1.48  | 1.52  | 1.57  | 1.61  | 1.72  | 10,710 |
| EPDBE2002-1.5-PN   | ●           |                      |                 | 1.5                      |                    |                 |                      |                     |              |                            | 10.35  | 1.74  | 1.79  | 1.84  | 1.88  | 2.05  | 10,710 |
| EPDBE2002-2-PN     | ●           |                      |                 | 2                        |                    |                 |                      |                     |              |                            | 9.88   | 2.25  | 2.32  | 2.37  | 2.45  | 2.71  | 11,790 |
| EPDBE2002-2.5-PN   | ●           |                      |                 | 2.5                      |                    |                 |                      |                     |              |                            | 9.46   | 2.77  | 2.84  | 2.91  | 3.05  | 3.37  | 12,860 |
| EPDBE2002-3-PN     | ●           |                      |                 | 3                        |                    |                 |                      |                     |              |                            | 9.07   | 3.28  | 3.37  | 3.48  | 3.65  | 4.04  | 13,820 |
| EPDBE2003-0.5-PN   | ●           |                      |                 | 0.5                      |                    |                 |                      |                     |              |                            | 11.47  | 0.78  | 0.82  | 0.86  | 0.90  | 0.98  | 9,680  |
| EPDBE2003-0.75-PN  | ●           |                      |                 | 0.75                     |                    |                 |                      |                     |              |                            | 11.17  | 1.05  | 1.10  | 1.15  | 1.20  | 1.29  | 9,680  |
| EPDBE2003-1-PN     | ●           |                      |                 | 1                        |                    |                 |                      |                     |              |                            | 10.89  | 1.31  | 1.38  | 1.43  | 1.49  | 1.59  | 9,680  |
| EPDBE2003-1.25-PN  | ●           | 0.15                 | 0.3             | 1.25                     | 0.25               | 0.27            | 50                   | 4                   | 2            |                            | 10.62  | 1.58  | 1.65  | 1.72  | 1.78  | 1.89  | 10,380 |
| EPDBE2003-1.5-PN   | ●           |                      |                 | 1.5                      |                    |                 |                      |                     |              |                            | 10.36  | 1.84  | 1.92  | 1.99  | 2.06  | 2.18  | 10,380 |
| EPDBE2003-2-PN     | ●           |                      |                 | 2                        |                    |                 |                      |                     |              |                            | 9.88   | 2.36  | 2.46  | 2.55  | 2.62  | 2.76  | 10,380 |
| EPDBE2003-2.5-PN   | ●           |                      |                 | 2.5                      |                    |                 |                      |                     |              |                            | 9.45   | 2.89  | 3.00  | 3.10  | 3.18  | 3.36  | 10,710 |
| EPDBE2003-3-PN     | ●           |                      |                 | 3                        |                    |                 |                      |                     |              |                            | 9.05   | 3.41  | 3.53  | 3.64  | 3.73  | 4.02  | 10,710 |
| EPDBE2004-0.75-PN  | ●           |                      |                 | 0.75                     |                    |                 |                      |                     |              |                            | 11.21  | 1.04  | 1.09  | 1.14  | 1.19  | 1.28  | 6,610  |
| EPDBE2004-1-PN     | ●           |                      |                 | 1                        |                    |                 |                      |                     |              |                            | 10.91  | 1.31  | 1.37  | 1.43  | 1.48  | 1.58  | 6,610  |
| EPDBE2004-1.5-PN   | ●           |                      |                 | 1.5                      |                    |                 |                      |                     |              |                            | 10.37  | 1.84  | 1.92  | 1.99  | 2.06  | 2.17  | 6,720  |
| EPDBE2004-2-PN     | ●           |                      |                 | 2                        |                    |                 |                      |                     |              |                            | 9.88   | 2.36  | 2.46  | 2.54  | 2.62  | 2.75  | 6,960  |
| EPDBE2004-2.5-PN   | ●           | 0.2                  | 0.4             | 2.5                      | 0.3                | 0.37            | 50                   | 4                   | 2            |                            | 9.43   | 2.89  | 3.00  | 3.09  | 3.18  | 3.34  | 7,200  |
| EPDBE2004-3-PN     | ●           |                      |                 | 3                        |                    |                 |                      |                     |              |                            | 9.03   | 3.41  | 3.53  | 3.63  | 3.73  | 4.01  | 7,670  |
| EPDBE2004-3.5-PN   | ●           |                      |                 | 3.5                      |                    |                 |                      |                     |              |                            | 8.65   | 3.93  | 4.06  | 4.18  | 4.27  | 4.67  | 8,260  |
| EPDBE2004-4-PN     | ●           |                      |                 | 4                        |                    |                 |                      |                     |              |                            | 8.30   | 4.45  | 4.59  | 4.71  | 4.83  | 5.33  | 8,260  |
| EPDBE2004-4.5-PN   | ●           |                      |                 | 4.5                      |                    |                 |                      |                     |              |                            | 7.99   | 4.97  | 5.12  | 5.25  | 5.43  | 6.00  | 8,730  |
| EPDBE2005-1-PN     | ●           |                      |                 | 1                        |                    |                 |                      |                     |              |                            | 10.94  | 1.31  | 1.37  | 1.42  | 1.47  | 1.57  | 6,610  |
| EPDBE2005-1.5-PN   | ●           |                      |                 | 1.5                      |                    |                 |                      |                     |              |                            | 10.39  | 1.83  | 1.91  | 1.98  | 2.05  | 2.17  | 6,610  |
| EPDBE2005-2-PN     | ●           |                      |                 | 2                        |                    |                 |                      |                     |              |                            | 9.88   | 2.36  | 2.45  | 2.54  | 2.61  | 2.75  | 6,610  |
| EPDBE2005-2.5-PN   | ●           |                      |                 | 2.5                      |                    |                 |                      |                     |              |                            | 9.42   | 2.88  | 2.99  | 3.09  | 3.17  | 3.33  | 6,610  |
| EPDBE2005-3-PN     | ●           | 0.25                 | 0.5             | 3                        | 0.35               | 0.47            | 50                   | 4                   | 2            |                            | 9.00   | 3.41  | 3.53  | 3.63  | 3.72  | 3.99  | 6,610  |
| EPDBE2005-4-PN     | ●           |                      |                 | 4                        |                    |                 |                      |                     |              |                            | 8.27   | 4.45  | 4.59  | 4.71  | 4.82  | 5.32  | 6,610  |
| EPDBE2005-5-PN     | ●           |                      |                 | 5                        |                    |                 |                      |                     |              |                            | 7.64   | 5.48  | 5.65  | 5.78  | 6.01  | 6.65  | 6,720  |
| EPDBE2005-5.5-PN   | ●           |                      |                 | 5.5                      |                    |                 |                      |                     |              |                            | 7.36   | 6.00  | 6.17  | 6.31  | 6.61  | 7.31  | 6,960  |
| EPDBE2005-6-PN     | ●           |                      |                 | 6                        |                    |                 |                      |                     |              |                            | 7.10   | 6.52  | 6.70  | 6.88  | 7.21  | 7.97  | 6,960  |
| EPDBE2005-8-PN     | ●           |                      |                 | 8                        |                    |                 |                      |                     |              |                            | 6.23   | 8.58  | 8.79  | 9.16  | 9.60  | 10.63                                       | 8,260  |
| EPDBE2006-1-PN     | ●           |                      |                 | 1                        |                    |                 |                      |                     |              |                            | 10.98  | 1.44  | 1.54  | 1.63  | 1.71  | 1.88  | 5,700  |
| EPDBE2006-2-PN     | ●           |                      |                 | 2                        |                    |                 |                      |                     |              |                            | 9.88   | 2.52  | 2.66  | 2.79  | 2.91  | 3.13  | 5,080  |
| EPDBE2006-2.5-PN   | ●           |                      |                 | 2.5                      |                    |                 |                      |                     |              |                            | 9.41   | 3.05  | 3.22  | 3.36  | 3.49  | 3.73  | 5,190  |
| EPDBE2006-3-PN     | ●           |                      |                 | 3                        |                    |                 |                      |                     |              |                            | 8.98   | 3.58  | 3.77  | 3.93  | 4.07  | 4.32  | 5,190  |
| EPDBE2006-3.5-PN   | ●           |                      |                 | 3.5                      |                    |                 |                      |                     |              |                            | 8.58   | 4.12  | 4.32  | 4.49  | 4.64  | 4.91  | 5,430  |
| EPDBE2006-4-PN     | ●           |                      |                 | 4                        |                    |                 |                      |                     |              |                            | 8.22   | 4.64  | 4.86  | 5.04  | 5.20  | 5.48  | 5,430  |
| EPDBE2006-4.5-PN   | ●           |                      |                 | 4.5                      |                    |                 |                      |                     |              |                            | 7.89   | 5.17  | 5.40  | 5.59  | 5.76  | 6.06  | 5,430  |
| EPDBE2006-5-PN     | ●           | 0.3                  | 0.6             | 5                        | 0.4                | 0.57            | 50                   | 4                   | 4            |                            | 7.59   | 5.70  | 5.94  | 6.14  | 6.32  | 6.63  | 5,430  |
| EPDBE2006-5.5-PN   | ●           |                      |                 | 5.5                      |                    |                 |                      |                     |              |                            | 7.31   | 6.22  | 6.48  | 6.69  | 6.87  | 7.29  | 5,430  |
| EPDBE2006-6-PN     | ●           |                      |                 | 6                        |                    |                 |                      |                     |              |                            | 7.04   | 6.75  | 7.02  | 7.23  | 7.42  | 7.96  | 5,430  |
| EPDBE2006-7-PN     | ●           |                      |                 | 7                        |                    |                 |                      |                     |              |                            | 6.57   | 7.79  | 8.08  | 8.32  | 8.52  | 9.28  | 6,140  |
| EPDBE2006-8-PN     | ●           |                      |                 | 8                        |                    |                 |                      |                     |              |                            | 6.16   | 8.84  | 9.15  | 9.40  | 9.61  | 10.61                                       | 7,200  |
| EPDBE2006-9-PN     | ●           |                      |                 | 9                        |                    |                 |                      |                     |              |                            | 5.79   | 9.88  | 10.21 | 10.47 | 10.79 | 11.94                                       | 7,670  |
| EPDBE2006-10-PN    | ●           |                      |                 | 10                       |                    |                 |                      |                     |              |                            | 5.47   | 10.92 | 11.26 | 11.54 | 11.99 | 13.27                                       | 7,310  |
| EPDBE2006-12-PN    | ●           |                      |                 | 12                       |                    |                 |                      |                     |              |                            | 4.92   | 12.99 | 13.37 | 13.72 | 14.38 | 15.92                                       | 8,260  |

● : 標準在庫品です。 干渉なし : No interference  
● : Stocked items.

首下詳細形状



【注意】

エポックディープボールEPDBとは有効首下長が異なります。再度ご確認ください。

【Note】

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

EPDBE2-0000-0000-PN

| 商品コード<br>Item code | 在庫<br>Stock<br>PN | 寸法 Size(mm)          |                 |                          |                    |                 |                      |                     | 干渉角度<br>Interference angle | 勾配角に対する実有効首下長<br>Effective under neck length with respect to draft angle |       |       |       |       | 希望小売<br>価格(円)<br>Suggested retail price (¥) |       |    |
|--------------------|-------------------|----------------------|-----------------|--------------------------|--------------------|-----------------|----------------------|---------------------|----------------------------|--|-------|-------|-------|-------|---|-------|----|
|                    |                   | ボール半径<br>Ball radius | 外径<br>Tool dia. | 首下長<br>Under Neck length | 刃長<br>Flute length | 首径<br>Neck dia. | 全長<br>Overall length | シャンク径<br>Shank dia. |                            | 首R<br>Neck R   | θκ    | 0.5°  | 1°    | 1.5°  |   | 2°    | 3° |
|                    |                   | RE                   | DC              | LU                       | APMX               | DN              | LF                   | DCONMS              |                            |  |       |       |       |       |   |       |    |
| 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  | 5,080 |    |
| EPDBE2007-4-PN     | ●                 |                      |                 | 4                        |                    |                 |                      |                     |                            | 8.18   | 4.64  | 4.86  | 5.04  | 5.20  | 5.48  | 5,430 |    |
| EPDBE2007-6-PN     | ●                 |                      |                 | 6                        |                    |                 |                      |                     |                            | 6.98   | 6.74  | 7.01  | 7.23  | 7.42  | 7.94  | 5,430 |    |
| EPDBE2007-8-PN     | ●                 |                      |                 | 8                        |                    |                 |                      |                     |                            | 6.09   | 8.83  | 9.14  | 9.39  | 9.61  | 10.60                                       | 5,430 |    |
| 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  | 5,080 |    |
| EPDBE2008-4-PN     | ●                 |                      |                 | 4                        |                    |                 |                      |                     |                            | 8.14   | 4.64  | 4.85  | 5.03  | 5.19  | 5.47  | 5,430 |    |
| EPDBE2008-5-PN     | ●                 |                      |                 | 5                        |                    |                 |                      |                     |                            | 7.48   | 5.69  | 5.93  | 6.13  | 6.31  | 6.61  | 5,430 |    |
| EPDBE2008-6-PN     | ●                 |                      |                 | 6                        |                    |                 |                      |                     |                            | 6.92   | 6.74  | 7.01  | 7.23  | 7.41  | 7.92  | 5,430 |    |
| EPDBE2008-8-PN     | ●                 | 8                    | 6.01            | 8.83                     | 9.14               | 9.39            | 9.60                 | 10.58               | 5,430                      |  |       |       |       |       |   |       |    |
| EPDBE2008-10-PN    | ●                 | 10                   | 5.32            | 10.91                    | 11.26              | 11.53           | 11.97                | 13.23               | 7,200                      |  |       |       |       |       |   |       |    |
| 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  | 5,080 |    |
| EPDBE2009-4-PN     | ●                 |                      |                 | 4                        |                    |                 |                      |                     |                            | 8.09   | 4.64  | 4.85  | 5.03  | 5.18  | 5.46  | 5,430 |    |
| EPDBE2009-6-PN     | ●                 |                      |                 | 6                        |                    |                 |                      |                     |                            | 6.85   | 6.74  | 7.00  | 7.22  | 7.41  | 7.91  | 5,430 |    |
| EPDBE2009-8-PN     | ●                 |                      |                 | 8                        |                    |                 |                      |                     |                            | 5.94   | 8.83  | 9.14  | 9.38  | 9.60  | 10.56                                       | 5,430 |    |
| 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  | 4,250 |    |
| EPDBE2010-3-PN     | ●                 |                      |                 | 3                        |                    |                 |                      |                     |                            | 8.84   | 3.61  | 3.78  | 3.93  | 4.06  | 4.30  | 4,250 |    |
| EPDBE2010-4-PN     | ●                 |                      |                 | 4                        |                    |                 |                      |                     |                            | 8.02   | 4.66  | 4.87  | 5.04  | 5.20  | 5.47  | 4,850 |    |
| EPDBE2010-5-PN     | ●                 |                      |                 | 5                        |                    |                 |                      |                     |                            | 7.34   | 5.72  | 5.95  | 6.14  | 6.31  | 6.61  | 4,850 |    |
| EPDBE2010-6-PN     | ●                 |                      |                 | 6                        |                    |                 |                      |                     |                            | 6.77   | 6.76  | 7.02  | 7.23  | 7.42  | 7.92  | 5,190 |    |
| EPDBE2010-7-PN     | ●                 |                      |                 | 7                        |                    |                 |                      |                     |                            | 6.28   | 7.81  | 8.09  | 8.32  | 8.52  | 9.25  | 5,190 |    |
| EPDBE2010-8-PN     | ●                 |                      |                 | 8                        |                    |                 | 5.85                 | 8.85                | 9.15                       | 9.40   | 9.61  | 10.58 | 5,190 |       |   |       |    |
| EPDBE2010-9-PN     | ●                 |                      |                 | 9                        |                    |                 | 5.48                 | 9.89                | 10.21                      | 10.47  | 10.78 | 11.91 | 5,190 |       |   |       |    |
| EPDBE2010-10-PN    | ●                 |                      |                 | 10                       |                    |                 | 5.15                 | 10.93               | 11.27                      | 11.54  | 11.98 | 13.23 | 5,190 |       |   |       |    |
| EPDBE2010-12-PN    | ●                 |                      |                 | 12                       |                    |                 | 4.60                 | 13.00               | 13.37                      | 13.72  | 14.37 | 15.89 | 5,190 |       |   |       |    |
| EPDBE2010-13-PN    | ●                 |                      |                 | 13                       |                    |                 | 4.37                 | 14.04               | 14.42                      | 14.86  | 15.57 | 17.21 | 6,140 |       |   |       |    |
| EPDBE2010-14-PN    | ●                 |                      |                 | 14                       |                    |                 | 4.16                 | 15.07               | 15.47                      | 16.00  | 16.76 | 18.54 | 6,140 |       |   |       |    |
| EPDBE2010-16-PN    | ●                 | 16                   | 3.79            | 17.13                    | 17.56              | 18.28           | 19.16                | 21.20               | 7,200                      |  |       |       |       |       |   |       |    |
| EPDBE2010-18-PN    | ●                 | 18                   | 3.49            | 19.19                    | 19.66              | 20.56           | 21.55                | 23.85               | 7,200                      |  |       |       |       |       |   |       |    |
| EPDBE2010-20-PN    | ●                 | 20                   | 3.23            | 21.25                    | 21.84              | 22.84           | 23.94                | 26.51               | 8,730                      |  |       |       |       |       |   |       |    |
| 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  | 5,700 |    |
| EPDBE2011-4-PN     | ●                 |                      |                 | 4                        |                    |                 |                      |                     |                            | 7.95   | 4.69  | 4.89  | 5.06  | 5.21  | 5.48  | 6,490 |    |
| EPDBE2011-6-PN     | ●                 |                      |                 | 6                        |                    |                 |                      |                     |                            | 6.68   | 6.79  | 7.04  | 7.25  | 7.43  | 7.94  | 7,080 |    |
| EPDBE2011-8-PN     | ●                 |                      |                 | 8                        |                    |                 |                      |                     |                            | 5.76   | 8.87  | 9.17  | 9.41  | 9.61  | 10.59                                       | 7,080 |    |
| EPDBE2011-10-PN    | ●                 | 10                   | 5.06            | 10.95                    | 11.28              | 11.55           | 12.00                | 13.25               | 7,080                      |  |       |       |       |       |   |       |    |
| 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  | 6,490 |    |
| EPDBE2012-6-PN     | ●                 |                      |                 | 6                        |                    |                 |                      |                     |                            | 6.60   | 6.79  | 7.03  | 7.24  | 7.42  | 7.92  | 7,080 |    |
| EPDBE2012-8-PN     | ●                 |                      |                 | 8                        |                    |                 | 5.67                 | 8.87                | 9.16                       | 9.40   | 9.61  | 10.58 | 7,080 |       |   |       |    |
| EPDBE2012-10-PN    | ●                 |                      |                 | 10                       |                    |                 | 4.97                 | 10.95               | 11.28                      | 11.54  | 11.99 | 13.23 | 7,080 |       |   |       |    |
| EPDBE2012-12-PN    | ●                 | 12                   | 4.43            | 13.02                    | 13.38              | 13.73           | 14.38                | 15.89               | 7,080                      |  |       |       |       |       |   |       |    |
| 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                                       | 6,140 |    |
| EPDBE2014-12-PN    | ●                 |                      |                 | 12                       |                    |                 | 4.24                 |                     |                            | 13.04  | 13.39 | 13.74 | 14.39 | 15.89 | 6,140                                       |       |    |
| EPDBE2014-16-PN    | ●                 |                      |                 | 16                       |                    |                 | 3.46                 |                     |                            | 17.16  | 17.57 | 18.31 | 19.17 | 21.20 | 6,140                                       |       |    |
| 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  | 4,960 |    |
| EPDBE2015-6-PN     | ●                 |                      |                 | 6                        |                    |                 |                      |                     |                            | 6.33   | 6.81  | 7.04  | 7.25  | 7.42  | 7.91  | 4,960 |    |
| EPDBE2015-8-PN     | ●                 |                      |                 | 8                        |                    |                 |                      |                     |                            | 5.39   | 8.89  | 9.17  | 9.41  | 9.61  | 10.56                                       | 5,190 |    |
| EPDBE2015-10-PN    | ●                 |                      |                 | 10                       |                    |                 |                      |                     |                            | 4.68   | 10.96 | 11.29 | 11.55 | 11.98 | 13.22                                       | 5,660 |    |
| EPDBE2015-12-PN    | ●                 |                      |                 | 12                       |                    |                 | 4.14                 | 13.03               | 13.39                      | 13.74  | 14.38 | 15.87 | 6,140 |       |   |       |    |
| EPDBE2015-14-PN    | ●                 |                      |                 | 14                       |                    |                 | 3.72                 | 15.10               | 15.48                      | 16.02  | 16.77 | 18.52 | 6,140 |       |   |       |    |
| EPDBE2015-16-PN    | ●                 |                      |                 | 16                       |                    |                 | 3.77                 | 17.16               | 17.57                      | 18.30  | 19.16 | 21.18 | 6,140 |       |   |       |    |
| EPDBE2015-18-PN    | ●                 |                      |                 | 18                       |                    |                 | 3.08                 | 19.22               | 19.69                      | 20.58  | 21.56 | 23.83 | 6,140 |       |   |       |    |
| EPDBE2015-20-PN    | ●                 | 20                   | 2.84            | 21.27                    | 21.87              | 22.86           | 23.95                | 干涉なし                | 6,140                      |  |       |       |       |       |   |       |    |
| 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                                       | 7,080 |    |
| EPDBE2016-12-PN    | ●                 |                      |                 | 12                       |                    |                 | 4.05                 |                     |                            | 13.03  | 13.39 | 13.73 | 14.37 | 15.85 | 7,080                                       |       |    |
| EPDBE2016-16-PN    | ●                 |                      |                 | 16                       |                    |                 | 3.28                 |                     |                            | 17.16  | 17.57 | 18.29 | 19.15 | 21.16 | 7,080                                       |       |    |
| EPDBE2016-20-PN    | ●                 |                      |                 | 20                       |                    |                 | 2.75                 |                     |                            | 21.27  | 21.87 | 22.86 | 23.94 | 干涉なし  | 7,080                                       |       |    |
| 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                                       | 6,140 |    |
| EPDBE2018-12-PN    | ●                 |                      |                 | 12                       |                    |                 | 3.83                 |                     |                            | 13.05  | 13.40 | 13.74 | 14.38 | 15.85 | 6,140                                       |       |    |
| EPDBE2018-16-PN    | ●                 |                      |                 | 16                       |                    |                 | 3.09                 |                     |                            | 17.17  | 17.58 | 18.31 | 19.16 | 21.16 | 6,140                                       |       |    |
| EPDBE2018-20-PN    | ●                 |                      |                 | 20                       |                    |                 | 2.58                 |                     |                            | 21.28  | 21.88 | 22.87 | 23.95 | 干涉なし  | 6,140                                       |       |    |

特長

寸法ボールPN

寸法ボールATH

切削条件ボール高効率

切削条件ボール高精度

寸法スクエアPN

寸法スクエアATH

切削条件スクエア高効率

切削条件スクエア高精度

技術データ

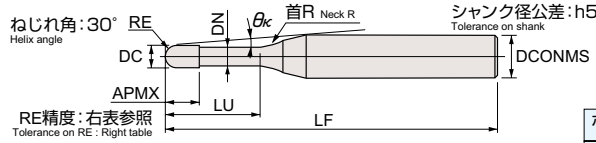
# ラインナップ

Line Up

エポックディープボールエボリューション  
Epoch Deep Ball Evolution

EPDBE-PN

PN Coating



| (mm)      |                      |
|-----------|----------------------|
| ボール半径 RE  | RE精度 Tolerance on RE |
| RE ≤ 0.25 | ±0.003               |
| 0.25 < RE | ±0.005               |

## EPDBE2-000-000-PN

| 商品コード<br>Item code | 在庫<br>Stock | 寸法 Size(mm)                |                       |                                |       |                            |                       |                            |                               | 干渉角度<br>Interference<br>angle<br>θκ | 勾配角に対する実有効首下長<br>Effective under neck length<br>with respect to draft angle |       |       |       |        | 希望小売<br>価格(円)<br>Suggested<br>retail price<br>(¥) |    |
|--------------------|-------------|----------------------------|-----------------------|--------------------------------|-------|----------------------------|-----------------------|----------------------------|-------------------------------|-------------------------------------|---|-------|-------|-------|--------|---|----|
|                    |             | ボール半径<br>Ball radius<br>RE | 外径<br>Tool dia.<br>DC | 首下長<br>Under Neck length<br>LU |       | 刃長<br>Flute length<br>APMX | 首径<br>Neck dia.<br>DN | 全長<br>Overall length<br>LF | シャンク径<br>Shank dia.<br>DCONMS |                                     | 首R<br>Neck R  | 0.5°  | 1°    | 1.5°  | 2°     |   | 3° |
|                    |             |                            |                       | 3                              | 4     |                            |                       |                            |                               |                                     |   | 5     | 6     | 7     |        |   |    |
| 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   | 4,250   |    |
| EPDBE2020-4-PN     | ●           |                            |                       | 4                              |       |                            |                       |                            |                               | 7.23                                | 4.75  | 4.92  | 5.07  | 5.21  | 5.45   | 4,250   |    |
| EPDBE2020-6-PN     | ●           |                            |                       | 6                              |       |                            |                       |                            |                               | 5.78                                | 6.84  | 7.07  | 7.26  | 7.43  | 7.89   | 4,850   |    |
| EPDBE2020-8-PN     | ●           |                            |                       | 8                              |       |                            |                       |                            |                               | 4.81                                | 8.92  | 9.19  | 9.42  | 9.61  | 10.54  | 5,190   |    |
| EPDBE2020-10-PN    | ●           |                            |                       | 10                             |       |                            |                       |                            |                               | 4.12                                | 11.00   | 11.30 | 11.56 | 11.99 | 13.20  | 5,190   |    |
| EPDBE2020-12-PN    | ●           |                            |                       | 12                             |       |                            |                       |                            |                               | 3.61                                | 13.06   | 13.41 | 13.76 | 14.39 | 15.85  | 5,190   |    |
| EPDBE2020-13-PN    | ●           |                            |                       | 13                             |       |                            |                       |                            |                               | 3.39                                | 14.10   | 14.45 | 14.90 | 15.58 | 17.18  | 5,190   |    |
| EPDBE2020-14-PN    | ●           |                            |                       | 14                             |       |                            |                       |                            |                               | 3.20                                | 15.13   | 15.50 | 16.04 | 16.78 | 18.51  | 5,190   |    |
| EPDBE2020-16-PN    | ●           |                            |                       | 16                             |       |                            |                       |                            |                               | 2.88                                | 17.19   | 17.59 | 18.32 | 19.17 | 干涉なし   | 5,190   |    |
| EPDBE2020-18-PN    | ●           |                            |                       | 18                             |       |                            |                       |                            |                               | 2.62                                | 19.24   | 19.72 | 20.60 | 21.57 | 干涉なし   | 5,190   |    |
| EPDBE2020-20-PN    | ●           |                            |                       | 20                             |       |                            |                       |                            |                               | 2.40                                | 21.30   | 21.90 | 22.88 | 23.96 | 干涉なし   | 5,190   |    |
| EPDBE2020-22-PN    | ●           |                            |                       | 22                             |       |                            |                       |                            |                               | 2.22                                | 23.35   | 24.08 | 25.16 | 26.35 | 干涉なし   | 7,200   |    |
| EPDBE2020-25-PN    | ●           |                            |                       | 25                             |       |                            |                       |                            |                               | 1.99                                | 26.42   | 27.35 | 28.58 | 干涉なし  | 干涉なし   | 7,310   |    |
| EPDBE2020-30-PN    | ●           |                            |                       | 30                             |       |                            |                       |                            |                               | 1.70                                | 31.53   | 32.80 | 34.29 | 干涉なし  | 干涉なし   | 8,370   |    |
| EPDBE2020-35-PN    | ●           | 35                         | 1.48                  | 36.65                          | 38.24 | 干涉なし                       | 干涉なし                  | 干涉なし                       | 11,370                        |                                     |   |       |       |       |        |   |    |
| EPDBE2020-40-PN    | ●           | 40                         | 1.31                  | 41.86                          | 43.69 | 干涉なし                       | 干涉なし                  | 干涉なし                       | 11,370                        |                                     |   |       |       |       |        |   |    |
| 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   | 5,660   |    |
| EPDBE2025-10-PN    | ●           |                            |                       | 10                             |       |                            | 3.43                  |                            |                               | 11.03                               | 11.32   | 11.56 | 12.00 | 13.18 | 5,970  |   |    |
| EPDBE2025-15-PN    | ●           |                            |                       | 15                             |       |                            | 2.46                  |                            |                               | 16.18                               | 16.56   | 17.20 | 17.98 | 干涉なし  | 7,080  |   |    |
| EPDBE2025-20-PN    | ●           |                            |                       | 20                             |       |                            | 1.91                  |                            |                               | 21.32                               | 21.93   | 22.90 | 干涉なし  | 干涉なし  | 8,260  |   |    |
| EPDBE2025-25-PN    | ●           |                            |                       | 25                             |       |                            | 1.57                  |                            |                               | 26.44                               | 27.38   | 28.60 | 干涉なし  | 干涉なし  | 8,850  |   |    |
| EPDBE2025-30-PN    | ●           |                            |                       | 30                             |       |                            | 1.33                  |                            |                               | 31.55                               | 32.82   | 干涉なし  | 干涉なし  | 干涉なし  | 8,850  |   |    |
| 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  | 5,310   |    |
| EPDBE2030-10-PN    | ●           |                            |                       | 10                             |       |                            | 5.41                  |                            |                               | 11.06                               | 11.34   | 11.57 | 12.01 | 13.16 | 6,020  |   |    |
| EPDBE2030-13-PN    | ●           |                            |                       | 13                             |       |                            | 4.56                  |                            |                               | 14.15                               | 14.48   | 14.94 | 15.60 | 17.15 | 7,080  |   |    |
| EPDBE2030-16-PN    | ●           |                            |                       | 16                             |       |                            | 3.93                  |                            |                               | 17.24                               | 17.61   | 18.36 | 19.19 | 21.13 | 7,080  |   |    |
| EPDBE2030-20-PN    | ●           |                            |                       | 20                             |       |                            | 3.33                  |                            |                               | 21.34                               | 21.96   | 22.92 | 23.97 | 26.44 | 6,840  |   |    |
| EPDBE2030-25-PN    | ●           |                            |                       | 25                             |       |                            | 2.79                  |                            |                               | 26.46                               | 27.41   | 28.62 | 29.96 | 干涉なし  | 6,840  |   |    |
| EPDBE2030-30-PN    | ●           |                            |                       | 30                             |       |                            | 2.40                  |                            |                               | 31.57                               | 32.85   | 34.32 | 35.94 | 干涉なし  | 7,790  |   |    |
| EPDBE2030-35-PN    | ●           |                            |                       | 35                             |       |                            | 2.11                  |                            |                               | 36.72                               | 38.30   | 40.03 | 41.92 | 干涉なし  | 9,910  |   |    |
| 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  | 7,790   |    |
| EPDBE2035-25-PN    | ●           |                            |                       | 25                             |       |                            | 2.43                  |                            |                               | 26.49                               | 27.46   | 28.67 | 29.99 | 干涉なし  | 8,260  |   |    |
| EPDBE2035-35-PN    | ●           |                            |                       | 35                             |       |                            | 1.82                  |                            |                               | 36.79                               | 38.36   | 40.07 | 干涉なし  | 干涉なし  | 10,610 |   |    |
| EPDBE2035-45-PN    | ●           |                            |                       | 45                             |       |                            | 1.45                  |                            |                               | 47.22                               | 49.25   | 干涉なし  | 干涉なし  | 干涉なし  | 12,970 |   |    |
| EPDBE2040-10-PN    | ●           | 2                          | 4                     | 10                             | 3     | 3.85                       | 55                    | 6                          | 4                             | 4.38                                | 11.10   | 11.36 | 11.58 | 12.00 | 13.10  | 5,430   |    |
| EPDBE2040-13-PN    | ●           |                            |                       | 13                             |       |                            | 3.57                  |                            |                               | 14.19                               | 14.50   | 14.95 | 15.59 | 17.08 | 7,080  |   |    |
| EPDBE2040-16-PN    | ●           |                            |                       | 16                             |       |                            | 3.01                  |                            |                               | 17.27                               | 17.63   | 18.37 | 19.18 | 干涉なし  | 7,080  |   |    |
| EPDBE2040-20-PN    | ●           |                            |                       | 20                             |       |                            | 2.49                  |                            |                               | 21.37                               | 21.99   | 22.93 | 23.96 | 干涉なし  | 7,080  |   |    |
| EPDBE2040-25-PN    | ●           |                            |                       | 25                             |       |                            | 2.05                  |                            |                               | 26.49                               | 27.44   | 28.63 | 29.95 | 干涉なし  | 7,080  |   |    |
| EPDBE2040-30-PN    | ●           |                            |                       | 30                             |       |                            | 1.74                  |                            |                               | 31.59                               | 32.89   | 34.34 | 干涉なし  | 干涉なし  | 7,080  |   |    |
| EPDBE2040-35-PN    | ●           |                            |                       | 35                             |       |                            | 1.51                  |                            |                               | 36.78                               | 38.33   | 40.04 | 干涉なし  | 干涉なし  | 8,140  |   |    |
| EPDBE2040-40-PN    | ●           |                            |                       | 40                             |       |                            | 1.34                  |                            |                               | 41.99                               | 43.78   | 干涉なし  | 干涉なし  | 干涉なし  | 9,200  |   |    |
| EPDBE2040-45-PN    | ●           |                            |                       | 45                             |       |                            | 1.20                  |                            |                               | 47.20                               | 49.23   | 干涉なし  | 干涉なし  | 干涉なし  | 11,790 |   |    |
| EPDBE2040-50-PN    | ●           |                            |                       | 50                             |       |                            | 1.08                  |                            |                               | 52.42                               | 54.68   | 干涉なし  | 干涉なし  | 干涉なし  | 12,650 |   |    |
| EPDBE2050-20-PN    | ●           | 2.5                        | 5                     | 20                             | 3.5   | 4.85                       | 65                    | 6                          | 4                             | 1.42                                | 21.36   | 21.95 | 干涉なし  | 干涉なし  | 干涉なし   | 12,350  |    |
| EPDBE2050-25-PN    | ●           |                            |                       | 25                             |       |                            | 1.14                  |                            |                               | 26.48                               | 27.39   | 干涉なし  | 干涉なし  | 干涉なし  | 12,350 |   |    |
| EPDBE2050-30-PN    | ●           |                            |                       | 30                             |       |                            | 0.95                  |                            |                               | 31.58                               | 干涉なし  | 干涉なし  | 干涉なし  | 干涉なし  | 13,250 |   |    |
| EPDBE2050-40-PN    | ●           |                            |                       | 40                             |       |                            | 0.72                  |                            |                               | 41.97                               | 干涉なし  | 干涉なし  | 干涉なし  | 干涉なし  | 16,720 |   |    |
| EPDBE2060-12-PN    | ●           | 3                          | 6                     | 12                             | 6     | 5.85                       | 60                    | 6                          | -                             | 0                                   | 干涉なし  | 干涉なし  | 干涉なし  | 干涉なし  | 干涉なし   | 9,270   |    |
| EPDBE2060-20-PN    | ●           |                            |                       | 20                             |       |                            | 0                     |                            |                               | 干涉なし                                | 干涉なし  | 干涉なし  | 干涉なし  | 干涉なし  | 9,270  |   |    |
| EPDBE2060-30-PN    | ●           |                            |                       | 30                             |       |                            | 0                     |                            |                               | 干涉なし                                | 干涉なし  | 干涉なし  | 干涉なし  | 干涉なし  | 9,510  |   |    |
| EPDBE2060-50-PN    | ●           |                            |                       | 50                             |       |                            | 0                     |                            |                               | 干涉なし                                | 干涉なし  | 干涉なし  | 干涉なし  | 干涉なし  | 11,350 |   |    |

● : 標準在庫品です。 干涉なし : No interference  
● : Stocked items.

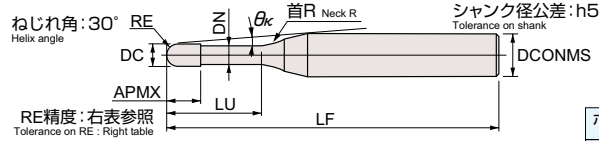
# エポックディープボールエボリューション

Epoch Deep Ball Evolution

EPDBE-ATH

ATH Coating

2枚刃  
2 Flutes



| ボール半径 RE  | RE精度 Tolerance on RE |
|-----------|----------------------|
| RE ≤ 0.25 | ±0.003               |
| 0.25 < RE | ±0.005               |

## EPDBE2000-00.00-ATH

| 商品コード<br>Item code | 在庫<br>Stock<br>ATH | 寸法 Size(mm)                |                       |                                |                            |                       |                            |                               | 干渉角度<br>Interference angle<br>$\theta_K$ | 勾配角に対する実有効首下長<br>Effective under neck length with respect to draft angle |       |       |       |       | 希望小売<br>価格(円)<br>Suggested retail price (¥) |        |
|--------------------|--------------------|----------------------------|-----------------------|--------------------------------|----------------------------|-----------------------|----------------------------|-------------------------------|--|--|-------|-------|-------|-------|---|--------|
|                    |                    | ボール半径<br>Ball radius<br>RE | 外径<br>Tool dia.<br>DC | 首下長<br>Under Neck length<br>LU | 刃長<br>Flute length<br>APMX | 首径<br>Neck dia.<br>DN | 全長<br>Overall length<br>LF | シャック径<br>Shank dia.<br>DCONMS |  | 首R<br>Neck R   | 0.5°  | 1°    | 1.5°  | 2°    |   | 3°     |
|                    |                    | EPDBE2001-0.2-ATH          | ●                     |                                |                            | 0.2                   |                            |                               |  |  |       | 11.76 | 0.35  | 0.37  |   | 0.39   |
| EPDBE2001-0.3-ATH  | ●                  | 0.05                       | 0.1                   | 0.3                            | 0.08                       | 0.08                  | 45                         | 4                             | 1  | 11.64  | 0.46  | 0.48  | 0.50  | 0.52  | 0.57  | 16,720 |
| EPDBE2001-0.5-ATH  | ●                  |                            |                       | 0.5                            |                            |                       |                            |                               |  | 11.40  | 0.67  | 0.70  | 0.73  | 0.76  | 0.81  | 18,110 |
| EPDBE2002-0.5-ATH  | ●                  |                            |                       | 0.5                            |                            |                       |                            |                               |  | 11.42  | 0.70  | 0.72  | 0.75  | 0.77  | 0.82  | 11,680 |
| EPDBE2002-0.75-ATH | ●                  |                            |                       | 0.75                           |                            |                       |                            |                               |  | 11.13  | 0.96  | 0.99  | 1.02  | 1.05  | 1.11  | 11,680 |
| EPDBE2002-1-ATH    | ●                  |                            |                       | 1                              |                            |                       |                            |                               |  | 10.86  | 1.22  | 1.26  | 1.30  | 1.33  | 1.39  | 11,680 |
| EPDBE2002-1.25-ATH | ●                  |                            |                       | 1.25                           |                            |                       |                            |                               |  | 10.60  | 1.48  | 1.52  | 1.57  | 1.61  | 1.72  | 12,650 |
| EPDBE2002-1.5-ATH  | ●                  | 0.1                        | 0.2                   | 1.5                            | 0.15                       | 0.17                  | 50                         | 4                             | 1  | 10.35  | 1.74  | 1.79  | 1.84  | 1.88  | 2.05  | 12,650 |
| EPDBE2002-2-ATH    | ●                  |                            |                       | 2                              |                            |                       |                            |                               |  | 9.88   | 2.25  | 2.32  | 2.37  | 2.45  | 2.71  | 13,930 |
| EPDBE2002-2.5-ATH  | ●                  |                            |                       | 2.5                            |                            |                       |                            |                               |  | 9.46   | 2.77  | 2.84  | 2.91  | 3.05  | 3.37  | 15,220 |
| EPDBE2002-3-ATH    | ●                  |                            |                       | 3                              |                            |                       |                            |                               |  | 9.07   | 3.28  | 3.37  | 3.48  | 3.65  | 4.04  | 16,290 |
| EPDBE2003-0.5-ATH  | ●                  |                            |                       | 0.5                            |                            |                       |                            |                               |  | 11.47  | 0.78  | 0.82  | 0.86  | 0.90  | 0.98  | 11,470 |
| EPDBE2003-0.75-ATH | ●                  |                            |                       | 0.75                           |                            |                       |                            |                               |  | 11.17  | 1.05  | 1.10  | 1.15  | 1.20  | 1.29  | 11,470 |
| EPDBE2003-1-ATH    | ●                  |                            |                       | 1                              |                            |                       |                            |                               |  | 10.89  | 1.31  | 1.38  | 1.43  | 1.49  | 1.59  | 11,470 |
| EPDBE2003-1.25-ATH | ●                  |                            |                       | 1.25                           |                            |                       |                            |                               |  | 10.62  | 1.58  | 1.65  | 1.72  | 1.78  | 1.89  | 12,220 |
| EPDBE2003-1.5-ATH  | ●                  | 0.15                       | 0.3                   | 1.5                            | 0.25                       | 0.27                  | 50                         | 4                             | 2  | 10.36  | 1.84  | 1.92  | 1.99  | 2.06  | 2.18  | 12,220 |
| EPDBE2003-2-ATH    | ●                  |                            |                       | 2                              |                            |                       |                            |                               |  | 9.88   | 2.36  | 2.46  | 2.55  | 2.62  | 2.76  | 12,220 |
| EPDBE2003-2.5-ATH  | ●                  |                            |                       | 2.5                            |                            |                       |                            |                               |  | 9.45   | 2.89  | 3.00  | 3.10  | 3.18  | 3.36  | 12,650 |
| EPDBE2003-3-ATH    | ●                  |                            |                       | 3                              |                            |                       |                            |                               |  | 9.05   | 3.41  | 3.53  | 3.64  | 3.73  | 4.02  | 12,650 |
| EPDBE2004-0.75-ATH | ●                  |                            |                       | 0.75                           |                            |                       |                            |                               |  | 11.21  | 1.04  | 1.09  | 1.14  | 1.19  | 1.28  | 7,810  |
| EPDBE2004-1-ATH    | ●                  |                            |                       | 1                              |                            |                       |                            |                               |  | 10.91  | 1.31  | 1.37  | 1.43  | 1.48  | 1.58  | 7,810  |
| EPDBE2004-1.5-ATH  | ●                  |                            |                       | 1.5                            |                            |                       |                            |                               |  | 10.37  | 1.84  | 1.92  | 1.99  | 2.06  | 2.17  | 7,940  |
| EPDBE2004-2-ATH    | ●                  |                            |                       | 2                              |                            |                       |                            |                               |  | 9.88   | 2.36  | 2.46  | 2.54  | 2.62  | 2.75  | 8,230  |
| EPDBE2004-2.5-ATH  | ●                  | 0.2                        | 0.4                   | 2.5                            | 0.3                        | 0.37                  | 50                         | 4                             | 2  | 9.43   | 2.89  | 3.00  | 3.09  | 3.18  | 3.34  | 8,500  |
| EPDBE2004-3-ATH    | ●                  |                            |                       | 3                              |                            |                       |                            |                               |  | 9.03   | 3.41  | 3.53  | 3.63  | 3.73  | 4.01  | 9,060  |
| EPDBE2004-3.5-ATH  | ●                  |                            |                       | 3.5                            |                            |                       |                            |                               |  | 8.65   | 3.93  | 4.06  | 4.18  | 4.27  | 4.67  | 9,760  |
| EPDBE2004-4-ATH    | ●                  |                            |                       | 4                              |                            |                       |                            |                               |  | 8.30   | 4.45  | 4.59  | 4.71  | 4.83  | 5.33  | 9,760  |
| EPDBE2004-4.5-ATH  | ●                  |                            |                       | 4.5                            |                            |                       |                            |                               |  | 7.99   | 4.97  | 5.12  | 5.25  | 5.43  | 6.00  | 10,320 |
| EPDBE2005-1-ATH    | ●                  |                            |                       | 1                              |                            |                       |                            |                               |  | 10.94  | 1.31  | 1.37  | 1.42  | 1.47  | 1.57  | 7,810  |
| EPDBE2005-1.5-ATH  | ●                  |                            |                       | 1.5                            |                            |                       |                            |                               |  | 10.39  | 1.83  | 1.91  | 1.98  | 2.05  | 2.17  | 7,810  |
| EPDBE2005-2-ATH    | ●                  |                            |                       | 2                              |                            |                       |                            |                               |  | 9.88   | 2.36  | 2.45  | 2.54  | 2.61  | 2.75  | 7,810  |
| EPDBE2005-2.5-ATH  | ●                  |                            |                       | 2.5                            |                            |                       |                            |                               |  | 9.42   | 2.88  | 2.99  | 3.09  | 3.17  | 3.33  | 7,810  |
| EPDBE2005-3-ATH    | ●                  | 0.25                       | 0.5                   | 3                              | 0.35                       | 0.47                  | 50                         | 4                             | 2  | 9.00   | 3.41  | 3.53  | 3.63  | 3.72  | 3.99  | 7,810  |
| EPDBE2005-4-ATH    | ●                  |                            |                       | 4                              |                            |                       |                            |                               |  | 8.27   | 4.45  | 4.59  | 4.71  | 4.82  | 5.32  | 7,810  |
| EPDBE2005-5-ATH    | ●                  |                            |                       | 5                              |                            |                       |                            |                               |  | 7.64   | 5.48  | 5.65  | 5.78  | 6.01  | 6.65  | 7,940  |
| EPDBE2005-5.5-ATH  | ●                  |                            |                       | 5.5                            |                            |                       |                            |                               |  | 7.36   | 6.00  | 6.17  | 6.31  | 6.61  | 7.31  | 8,230  |
| EPDBE2005-6-ATH    | ●                  |                            |                       | 6                              |                            |                       |                            |                               |  | 7.10   | 6.52  | 6.70  | 6.88  | 7.21  | 7.97  | 8,230  |
| EPDBE2005-8-ATH    | ●                  |                            |                       | 8                              |                            |                       |                            |                               |  | 6.23   | 8.58  | 8.79  | 9.16  | 9.60  | 10.63                                       | 9,760  |
| EPDBE2006-1-ATH    | ●                  |                            |                       | 1                              |                            |                       |                            |                               |  | 10.98  | 1.44  | 1.54  | 1.63  | 1.71  | 1.88  | 6,740  |
| EPDBE2006-2-ATH    | ●                  |                            |                       | 2                              |                            |                       |                            |                               |  | 9.88   | 2.52  | 2.66  | 2.79  | 2.91  | 3.13  | 6,000  |
| EPDBE2006-2.5-ATH  | ●                  |                            |                       | 2.5                            |                            |                       |                            |                               |  | 9.41   | 3.05  | 3.22  | 3.36  | 3.49  | 3.73  | 6,140  |
| EPDBE2006-3-ATH    | ●                  |                            |                       | 3                              |                            |                       |                            |                               |  | 8.98   | 3.58  | 3.77  | 3.93  | 4.07  | 4.32  | 6,140  |
| EPDBE2006-3.5-ATH  | ●                  |                            |                       | 3.5                            |                            |                       |                            |                               |  | 8.58   | 4.12  | 4.32  | 4.49  | 4.64  | 4.91  | 6,410  |
| EPDBE2006-4-ATH    | ●                  |                            |                       | 4                              |                            |                       |                            |                               |  | 8.22   | 4.64  | 4.86  | 5.04  | 5.20  | 5.48  | 6,410  |
| EPDBE2006-4.5-ATH  | ●                  |                            |                       | 4.5                            |                            |                       |                            |                               |  | 7.89   | 5.17  | 5.40  | 5.59  | 5.76  | 6.06  | 6,410  |
| EPDBE2006-5-ATH    | ●                  | 0.3                        | 0.6                   | 5                              | 0.4                        | 0.57                  | 50                         | 4                             | 4  | 7.59   | 5.70  | 5.94  | 6.14  | 6.32  | 6.63  | 6,410  |
| EPDBE2006-5.5-ATH  | ●                  |                            |                       | 5.5                            |                            |                       |                            |                               |  | 7.31   | 6.22  | 6.48  | 6.69  | 6.87  | 7.29  | 6,410  |
| EPDBE2006-6-ATH    | ●                  |                            |                       | 6                              |                            |                       |                            |                               |  | 7.04   | 6.75  | 7.02  | 7.23  | 7.42  | 7.96  | 6,410  |
| EPDBE2006-7-ATH    | ●                  |                            |                       | 7                              |                            |                       |                            |                               |  | 6.57   | 7.79  | 8.08  | 8.32  | 8.52  | 9.28  | 7,250  |
| EPDBE2006-8-ATH    | ●                  |                            |                       | 8                              |                            |                       |                            |                               |  | 6.16   | 8.84  | 9.15  | 9.40  | 9.61  | 10.61                                       | 8,500  |
| EPDBE2006-9-ATH    | ●                  |                            |                       | 9                              |                            |                       |                            |                               |  | 5.79   | 9.88  | 10.21 | 10.47 | 10.79 | 11.94                                       | 9,060  |
| EPDBE2006-10-ATH   | ●                  |                            |                       | 10                             |                            |                       |                            |                               |  | 5.47   | 10.92 | 11.26 | 11.54 | 11.99 | 13.27                                       | 8,650  |
| EPDBE2006-12-ATH   | ●                  |                            |                       | 12                             |                            |                       |                            |                               |  | 4.92   | 12.99 | 13.37 | 13.72 | 14.38 | 15.92                                       | 9,760  |

● : 標準在庫品です。  
● : Stocked items.

特長

寸法ボール径

寸法ボール径・ATH

切削条件ボール高精度

切削条件ボール高精度

寸法スクエアP/N

寸法スクエアATH

切削条件スクエア高精度

切削条件スクエア高精度

技術データ

# ラインナップ

Line Up

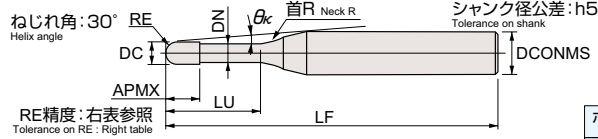
## エポックディープボールエボリューション

Epoch Deep Ball Evolution

EPDBE-ATH



2枚刃  
2 Flutes



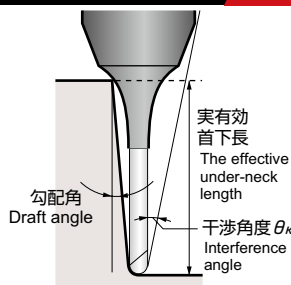
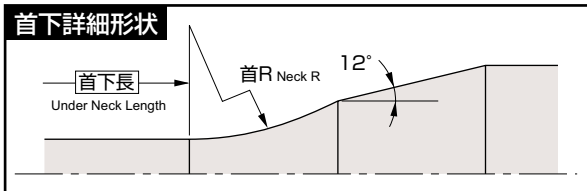
| (mm)      |                      |
|-----------|----------------------|
| ボール半径 RE  | RE精度 Tolerance on RE |
| RE ≤ 0.25 | ±0.003               |
| 0.25 < RE | ±0.005               |

## EPDBE2-ATH

| 商品コード<br>Item code | 在庫<br>Stock | 寸法 Size(mm)          |                 |                          |                    |                 |                      |                     |              |       |       | 干渉角度<br>Interference angle | 勾配角に対する実有効首下長<br>Effective under neck length with respect to draft angle |       |       |       |       | 希望小売<br>価格(円)<br>Suggested retail price (¥) |       |
|--------------------|-------------|----------------------|-----------------|--------------------------|--------------------|-----------------|----------------------|---------------------|--------------|-------|-------|----------------------------|--|-------|-------|-------|-------|---|-------|
|                    |             | ボール半径<br>Ball radius | 外径<br>Tool dia. | 首下長<br>Under Neck length | 刃長<br>Flute length | 首径<br>Neck dia. | 全長<br>Overall length | シャンク径<br>Shank dia. | 首R<br>Neck R |       |       |                            |  |       |       |       |       |   |       |
|                    |             | ATH<br>RE            | DC              | LU                       | APMX               | DN              | LF                   | DCONMS              | R            | 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  | 6,000 |
| EPDBE2007-4-ATH    | ●           |                      |                 | 4                        |                    |                 |                      |                     |              |       |       |                            | 8.18   | 4.64  | 4.86  | 5.04  | 5.20  | 5.48  | 6,410 |
| EPDBE2007-6-ATH    | ●           |                      |                 | 6                        |                    |                 |                      |                     |              |       |       |                            | 6.98   | 6.74  | 7.01  | 7.23  | 7.42  | 7.94  | 6,410 |
| EPDBE2007-8-ATH    | ●           |                      |                 | 8                        |                    |                 |                      |                     |              |       |       |                            | 6.09   | 8.83  | 9.14  | 9.39  | 9.61  | 10.60                                       | 6,410 |
| 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  | 6,000 |
| EPDBE2008-4-ATH    | ●           |                      |                 | 4                        |                    |                 |                      |                     |              |       |       |                            | 8.14   | 4.64  | 4.85  | 5.03  | 5.19  | 5.47  | 6,410 |
| EPDBE2008-5-ATH    | ●           |                      |                 | 5                        |                    |                 |                      |                     |              |       |       |                            | 7.48   | 5.69  | 5.93  | 6.13  | 6.31  | 6.61  | 6,410 |
| EPDBE2008-6-ATH    | ●           |                      |                 | 6                        |                    |                 |                      |                     |              |       |       |                            | 6.92   | 6.74  | 7.01  | 7.23  | 7.41  | 7.92  | 6,410 |
| EPDBE2008-8-ATH    | ●           |                      |                 | 8                        |                    |                 |                      |                     |              |       |       |                            | 6.01   | 8.83  | 9.14  | 9.39  | 9.60  | 10.58                                       | 6,410 |
| EPDBE2008-10-ATH   | ●           |                      |                 | 10                       |                    |                 |                      |                     |              |       |       |                            | 5.32   | 10.91 | 11.26 | 11.53 | 11.97 | 13.23                                       | 8,500 |
| 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  | 6,000 |
| EPDBE2009-4-ATH    | ●           |                      |                 | 4                        |                    |                 |                      |                     |              |       |       |                            | 8.09   | 4.64  | 4.85  | 5.03  | 5.18  | 5.46  | 6,410 |
| EPDBE2009-6-ATH    | ●           |                      |                 | 6                        |                    |                 |                      |                     |              |       |       |                            | 6.85   | 6.74  | 7.00  | 7.22  | 7.41  | 7.91  | 6,410 |
| EPDBE2009-8-ATH    | ●           |                      |                 | 8                        |                    |                 |                      |                     |              |       |       |                            | 5.94   | 8.83  | 9.14  | 9.38  | 9.60  | 10.56                                       | 6,410 |
| 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  | 5,020 |
| EPDBE2010-3-ATH    | ●           |                      |                 | 3                        |                    |                 |                      |                     |              |       |       |                            | 8.84   | 3.61  | 3.78  | 3.93  | 4.06  | 4.30  | 5,020 |
| EPDBE2010-4-ATH    | ●           |                      |                 | 4                        |                    |                 |                      |                     |              |       |       |                            | 8.02   | 4.66  | 4.87  | 5.04  | 5.20  | 5.47  | 5,720 |
| EPDBE2010-5-ATH    | ●           |                      |                 | 5                        |                    |                 |                      |                     |              |       |       |                            | 7.34   | 5.72  | 5.95  | 6.14  | 6.31  | 6.61  | 5,720 |
| EPDBE2010-6-ATH    | ●           |                      |                 | 6                        |                    |                 |                      |                     |              |       |       |                            | 6.77   | 6.76  | 7.02  | 7.23  | 7.42  | 7.92  | 6,140 |
| EPDBE2010-7-ATH    | ●           |                      |                 | 7                        |                    |                 |                      |                     |              |       |       |                            | 6.28   | 7.81  | 8.09  | 8.32  | 8.52  | 9.25  | 6,140 |
| EPDBE2010-8-ATH    | ●           |                      |                 | 8                        |                    |                 | 5.85                 |                     |              |       |       |                            | 8.85   | 9.15  | 9.40  | 9.61  | 10.58 | 6,140                                       |       |
| EPDBE2010-9-ATH    | ●           |                      |                 | 9                        |                    |                 | 5.48                 |                     |              |       |       |                            | 9.89   | 10.21 | 10.47 | 10.78 | 11.91 | 6,140                                       |       |
| EPDBE2010-10-ATH   | ●           |                      |                 | 10                       |                    |                 | 5.15                 |                     |              |       |       |                            | 10.93  | 11.27 | 11.54 | 11.98 | 13.23 | 6,140                                       |       |
| EPDBE2010-12-ATH   | ●           |                      |                 | 12                       |                    |                 | 4.60                 |                     |              |       |       |                            | 13.00  | 13.37 | 13.72 | 14.37 | 15.89 | 6,140                                       |       |
| EPDBE2010-13-ATH   | ●           |                      |                 | 13                       |                    |                 | 4.37                 |                     |              |       |       |                            | 14.04  | 14.42 | 14.86 | 15.57 | 17.21 | 7,250                                       |       |
| EPDBE2010-14-ATH   | ●           |                      |                 | 14                       |                    |                 | 4.16                 |                     |              |       |       |                            | 15.07  | 15.47 | 16.00 | 16.76 | 18.54 | 7,250                                       |       |
| EPDBE2010-16-ATH   | ●           | 16                   | 3.79            | 17.13                    | 17.56              | 18.28           | 19.16                | 21.20               | 8,500        |       |       |                            |  |       |       |       |       |   |       |
| EPDBE2010-18-ATH   | ●           | 18                   | 3.49            | 19.19                    | 19.66              | 20.56           | 21.55                | 23.85               | 8,500        |       |       |                            |  |       |       |       |       |   |       |
| EPDBE2010-20-ATH   | ●           | 20                   | 3.23            | 21.25                    | 21.84              | 22.84           | 23.94                | 26.51               | 10,320       |       |       |                            |  |       |       |       |       |   |       |
| 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  | 6,740 |
| EPDBE2011-4-ATH    | ●           |                      |                 | 4                        |                    |                 |                      |                     |              |       |       |                            | 7.95   | 4.69  | 4.89  | 5.06  | 5.21  | 5.48  | 7,670 |
| EPDBE2011-6-ATH    | ●           |                      |                 | 6                        |                    |                 |                      |                     |              |       |       |                            | 6.68   | 6.79  | 7.04  | 7.25  | 7.43  | 7.94  | 8,360 |
| EPDBE2011-8-ATH    | ●           |                      |                 | 8                        |                    |                 |                      |                     |              |       |       |                            | 5.76   | 8.87  | 9.17  | 9.41  | 9.61  | 10.59                                       | 8,360 |
| EPDBE2011-10-ATH   | ●           | 10                   | 5.06            | 10.95                    | 11.28              | 11.55           | 12.00                | 13.25               | 8,360        |       |       |                            |  |       |       |       |       |   |       |
| 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  | 7,670 |
| EPDBE2012-6-ATH    | ●           |                      |                 | 6                        |                    |                 |                      |                     |              |       |       |                            | 6.60   | 6.79  | 7.03  | 7.24  | 7.42  | 7.92  | 8,360 |
| EPDBE2012-8-ATH    | ●           |                      |                 | 8                        |                    |                 |                      |                     |              |       |       |                            | 5.67   | 8.87  | 9.16  | 9.40  | 9.61  | 10.58                                       | 8,360 |
| EPDBE2012-10-ATH   | ●           |                      |                 | 10                       |                    |                 |                      |                     |              |       |       |                            | 4.97   | 10.95 | 11.28 | 11.54 | 11.99 | 13.23                                       | 8,360 |
| EPDBE2012-12-ATH   | ●           | 12                   | 4.43            | 13.02                    | 13.38              | 13.73           | 14.38                | 15.89               | 8,360        |       |       |                            |  |       |       |       |       |   |       |
| 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                                       | 7,250 |
| EPDBE2014-12-ATH   | ●           |                      |                 | 12                       |                    |                 | 4.24                 |                     |              |       |       |                            | 13.04  | 13.39 | 13.74 | 14.39 | 15.89 | 7,250                                       |       |
| EPDBE2014-16-ATH   | ●           |                      |                 | 16                       |                    |                 | 3.46                 |                     |              |       |       |                            | 17.16  | 17.57 | 18.31 | 19.17 | 21.20 | 7,250                                       |       |
| 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  | 5,850 |
| EPDBE2015-6-ATH    | ●           |                      |                 | 6                        |                    |                 |                      |                     |              |       |       |                            | 6.33   | 6.81  | 7.04  | 7.25  | 7.42  | 7.91  | 5,850 |
| EPDBE2015-8-ATH    | ●           |                      |                 | 8                        |                    |                 |                      |                     |              |       |       |                            | 5.39   | 8.89  | 9.17  | 9.41  | 9.61  | 10.56                                       | 6,140 |
| EPDBE2015-10-ATH   | ●           |                      |                 | 10                       |                    |                 |                      |                     |              |       |       |                            | 4.68   | 10.96 | 11.29 | 11.55 | 11.98 | 13.22                                       | 6,690 |
| EPDBE2015-12-ATH   | ●           |                      |                 | 12                       |                    |                 |                      |                     |              |       |       |                            | 4.14   | 13.03 | 13.39 | 13.74 | 14.38 | 15.87                                       | 7,250 |
| EPDBE2015-14-ATH   | ●           |                      |                 | 14                       |                    |                 | 3.72                 |                     |              |       |       |                            | 15.10  | 15.48 | 16.02 | 16.77 | 18.52 | 7,250                                       |       |
| EPDBE2015-16-ATH   | ●           |                      |                 | 16                       |                    |                 | 3.77                 |                     |              |       |       |                            | 17.16  | 17.57 | 18.30 | 19.16 | 21.18 | 7,250                                       |       |
| EPDBE2015-18-ATH   | ●           |                      |                 | 18                       |                    |                 | 3.08                 |                     |              |       |       |                            | 19.22  | 19.69 | 20.58 | 21.56 | 23.83 | 7,250                                       |       |
| EPDBE2015-20-ATH   | ●           |                      |                 | 20                       |                    |                 | 2.84                 |                     |              |       |       |                            | 21.27  | 21.87 | 22.86 | 23.95 | 干渉なし  | 7,250                                       |       |
| EPDBE2016-8-ATH    | ●           |                      |                 | 0.8                      |                    |                 | 1.6                  |                     |              |       |       |                            | 8  | 1.4   | 1.54  | 50    | 4     | 4   |       |
| EPDBE2016-12-ATH   | ●           | 12                   | 4.05            |                          | 13.03              | 13.39           |                      | 13.73               | 14.37        | 15.85 | 8,360 |                            |  |       |       |       |       |   |       |
| EPDBE2016-16-ATH   | ●           | 16                   | 3.28            |                          | 17.16              | 17.57           |                      | 18.29               | 19.15        | 21.16 | 8,360 |                            |  |       |       |       |       |   |       |
| EPDBE2016-20-ATH   | ●           | 20                   | 2.75            |                          | 21.27              | 21.87           |                      | 22.86               | 23.94        | 干渉なし  | 8,360 |                            |  |       |       |       |       |   |       |

特長  
寸法ボールP/N  
寸法ボールATH  
切削条件ボール高精度  
寸法スクエアP/N  
寸法スクエアATH  
切削条件スクエア高精度  
技術データ





**【注意】**  
エポックディープボールEPDBとは有効首下長が異なります。再度ご確認ください。

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

# EPDBE2○○○-○○○-ATH

| 商品コード<br>Item code | 在庫<br>Stock<br>ATH | 寸法 Size(mm)                |                       |                                |                            |                       |                            |                               |              | 干渉角度<br>Interference angle<br>$\theta\kappa$ | 勾配角に対する実有効首下長<br>Effective under neck length with respect to draft angle |       |       |       |       | 希望小売<br>価格(円)<br>Suggested retail price (¥) |       |        |       |       |        |
|--------------------|--------------------|----------------------------|-----------------------|--------------------------------|----------------------------|-----------------------|----------------------------|-------------------------------|--------------|--|--|-------|-------|-------|-------|---|-------|--------|-------|-------|--------|
|                    |                    | ボール半径<br>Ball radius<br>RE | 外径<br>Tool dia.<br>DC | 首下長<br>Under Neck length<br>LU | 刃長<br>Flute length<br>APMX | 首径<br>Neck dia.<br>DN | 全長<br>Overall length<br>LF | シャンク径<br>Shank dia.<br>DCONMS | 首R<br>Neck R |  | 0.5°   | 1°    | 1.5°  | 2°    | 3°    |   |       |        |       |       |        |
|                    |                    |                            |                       |                                |                            |                       |                            |                               |              |  |  |       |       |       |       |   |       |        |       |       |        |
| EPDBE2018-8-ATH    | ●                  |                            |                       | 8                              |                            |                       | 50                         |                               |              | 5.06   | 8.91   | 9.18  | 9.41  | 9.61  | 10.54 | 7,250                                       |       |        |       |       |        |
| EPDBE2018-12-ATH   | ●                  | 0.9                        | 1.8                   | 12                             | 1.6                        | 1.73                  | 55                         | 4                             | 4            | 3.83   | 13.05  | 13.40 | 13.74 | 14.38 | 15.85 | 7,250                                       |       |        |       |       |        |
| EPDBE2018-16-ATH   | ●                  |                            |                       | 16                             |                            |                       |                            |                               |              | 3.09   | 17.17  | 17.58 | 18.31 | 19.16 | 21.16 | 7,250                                       |       |        |       |       |        |
| EPDBE2018-20-ATH   | ●                  |                            |                       | 20                             |                            |                       |                            |                               |              | 2.58   | 21.28  | 21.88 | 22.87 | 23.95 | 干渉なし  | 7,250                                       |       |        |       |       |        |
| EPDBE2020-3-ATH    | ●                  |                            |                       |                                |                            |                       |                            |                               |              |  | 3  |       |       |       |       |   | 8.26  | 3.71   | 3.84  | 3.96  | 4.07   |
| EPDBE2020-4-ATH    | ●                  |                            |                       | 4                              |                            |                       | 50                         |                               |              | 7.23   | 4.75   | 4.92  | 5.07  | 5.21  | 5.45  | 5,020                                       |       |        |       |       |        |
| EPDBE2020-6-ATH    | ●                  |                            |                       | 6                              |                            |                       | 50                         |                               |              | 5.78   | 6.84   | 7.07  | 7.26  | 7.43  | 7.89  | 5,720                                       |       |        |       |       |        |
| EPDBE2020-8-ATH    | ●                  |                            |                       | 8                              |                            |                       |                            | 4.81                          | 8.92         | 9.19   | 9.42   | 9.61  | 10.54 | 6,140 |       |   |       |        |       |       |        |
| EPDBE2020-10-ATH   | ●                  |                            |                       | 10                             |                            |                       |                            | 4.12                          | 11.00        | 11.30  | 11.56  | 11.99 | 13.20 | 6,140 |       |   |       |        |       |       |        |
| EPDBE2020-12-ATH   | ●                  |                            |                       | 12                             |                            |                       |                            | 3.61                          | 13.06        | 13.41  | 13.76  | 14.39 | 15.85 | 6,140 |       |   |       |        |       |       |        |
| EPDBE2020-13-ATH   | ●                  |                            |                       | 13                             |                            |                       | 55                         |                               |              | 3.39   | 14.10  | 14.45 | 14.90 | 15.58 | 17.18 | 6,140                                       |       |        |       |       |        |
| EPDBE2020-14-ATH   | ●                  |                            |                       | 14                             | 1.7                        | 1.92                  |                            | 3.20                          | 15.13        | 15.50  | 16.04  | 16.78 | 18.51 | 6,140 |       |   |       |        |       |       |        |
| EPDBE2020-16-ATH   | ●                  |                            |                       | 16                             |                            |                       |                            | 2.88                          | 17.19        | 17.59  | 18.32  | 19.17 | 干渉なし  | 6,140 |       |   |       |        |       |       |        |
| EPDBE2020-18-ATH   | ●                  |                            |                       | 18                             |                            |                       |                            | 2.62                          | 19.24        | 19.72  | 20.60  | 21.57 | 干渉なし  | 6,140 |       |   |       |        |       |       |        |
| EPDBE2020-20-ATH   | ●                  |                            |                       | 20                             |                            |                       | 2.40                       | 21.30                         | 21.90        | 22.88  | 23.96  | 干渉なし  | 6,140 |       |       |   |       |        |       |       |        |
| EPDBE2020-22-ATH   | ●                  |                            |                       | 22                             |                            |                       | 60                         |                               |              | 2.22   | 23.35  | 24.08 | 25.16 | 26.35 | 干渉なし  | 8,500                                       |       |        |       |       |        |
| EPDBE2020-25-ATH   | ●                  |                            |                       | 25                             |                            |                       | 65                         |                               |              | 1.99   | 26.42  | 27.35 | 28.58 | 干渉なし  | 干渉なし  | 8,650                                       |       |        |       |       |        |
| EPDBE2020-30-ATH   | ●                  |                            |                       | 30                             |                            |                       | 70                         |                               |              | 1.70   | 31.53  | 32.80 | 34.29 | 干渉なし  | 干渉なし  | 9,900                                       |       |        |       |       |        |
| EPDBE2020-35-ATH   | ●                  |                            |                       | 35                             |                            |                       | 75                         |                               |              | 1.48   | 36.65  | 38.24 | 干渉なし  | 干渉なし  | 干渉なし  | 13,390                                      |       |        |       |       |        |
| EPDBE2020-40-ATH   | ●                  |                            |                       | 40                             |                            |                       | 80                         |                               |              | 1.31   | 41.86  | 43.69 | 干渉なし  | 干渉なし  | 干渉なし  | 13,390                                      |       |        |       |       |        |
| EPDBE2025-6-ATH    | ●                  |                            |                       | 6                              |                            |                       | 50                         |                               |              | 5.04   | 6.88   | 7.09  | 7.27  | 7.43  | 7.87  | 6,690                                       |       |        |       |       |        |
| EPDBE2025-10-ATH   | ●                  | 1.25                       | 2.5                   | 10                             | 2                          | 2.4                   | 55                         | 4                             | 4            | 3.43   | 11.03  | 11.32 | 11.56 | 12.00 | 13.18 | 7,050                                       |       |        |       |       |        |
| EPDBE2025-15-ATH   | ●                  |                            |                       | 15                             |                            |                       |                            |                               |              | 2.46   | 16.18  | 16.56 | 17.20 | 17.98 | 干渉なし  | 8,360                                       |       |        |       |       |        |
| EPDBE2025-20-ATH   | ●                  |                            |                       | 20                             |                            |                       |                            |                               |              | 1.91   | 21.32  | 21.93 | 22.90 | 干渉なし  | 干渉なし  | 9,760                                       |       |        |       |       |        |
| EPDBE2025-25-ATH   | ●                  |                            |                       | 25                             |                            |                       |                            |                               |              | 1.57   | 26.44  | 27.38 | 28.60 | 干渉なし  | 干渉なし  | 10,450                                      |       |        |       |       |        |
| EPDBE2025-30-ATH   | ●                  |                            |                       | 30                             |                            |                       | 70                         |                               |              | 1.33   | 31.55  | 32.82 | 干渉なし  | 干渉なし  | 干渉なし  | 10,450                                      |       |        |       |       |        |
| EPDBE2030-8-ATH    | ●                  |                            |                       | 8                              |                            |                       | 55                         |                               |              | 6.19   | 8.99   | 9.23  | 9.44  | 9.62  | 10.51 | 6,270                                       |       |        |       |       |        |
| EPDBE2030-10-ATH   | ●                  |                            |                       | 10                             |                            |                       | 60                         |                               |              | 5.41   | 11.06  | 11.34 | 11.57 | 12.01 | 13.16 | 7,110                                       |       |        |       |       |        |
| EPDBE2030-13-ATH   | ●                  |                            |                       | 13                             | 2.5                        | 2.88                  |                            | 4.56                          | 14.15        | 14.48  | 14.94  | 15.60 | 17.15 | 8,360 |       |   |       |        |       |       |        |
| EPDBE2030-16-ATH   | ●                  |                            |                       | 16                             |                            |                       |                            | 3.93                          | 17.24        | 17.61  | 18.36  | 19.19 | 21.13 | 8,360 |       |   |       |        |       |       |        |
| EPDBE2030-20-ATH   | ●                  |                            |                       | 20                             |                            |                       |                            | 3.33                          | 21.34        | 21.96  | 22.92  | 23.97 | 26.44 | 8,090 |       |   |       |        |       |       |        |
| EPDBE2030-25-ATH   | ●                  |                            |                       | 25                             |                            |                       | 2.79                       | 26.46                         | 27.41        | 28.62  | 29.96  | 干渉なし  | 8,090 |       |       |   |       |        |       |       |        |
| EPDBE2030-30-ATH   | ●                  |                            |                       | 30                             |                            |                       | 75                         |                               |              | 2.40   | 31.57  | 32.85 | 34.32 | 35.94 | 干渉なし  | 9,200                                       |       |        |       |       |        |
| EPDBE2030-35-ATH   | ●                  |                            |                       | 35                             |                            |                       | 80                         |                               |              | 2.11   | 36.72  | 38.30 | 40.03 | 41.92 | 干渉なし  | 11,680                                      |       |        |       |       |        |
| EPDBE2035-15-ATH   | ●                  |                            |                       | 15                             |                            |                       | 60                         |                               |              | 3.68   | 16.25  | 16.60 | 17.26 | 18.03 | 19.81 | 9,200                                       |       |        |       |       |        |
| EPDBE2035-25-ATH   | ●                  | 1.75                       | 3.5                   | 25                             | 2.75                       | 3.35                  | 70                         | 6                             | 4            | 2.43   | 26.49  | 27.46 | 28.67 | 29.99 | 干渉なし  | 9,760                                       |       |        |       |       |        |
| EPDBE2035-35-ATH   | ●                  |                            |                       | 35                             |                            |                       |                            |                               |              | 1.82   | 36.79  | 38.36 | 40.07 | 干渉なし  | 干渉なし  | 12,540                                      |       |        |       |       |        |
| EPDBE2035-45-ATH   | ●                  |                            |                       | 45                             |                            |                       |                            |                               |              | 1.45   | 47.22  | 49.25 | 干渉なし  | 干渉なし  | 干渉なし  | 15,320                                      |       |        |       |       |        |
| EPDBE2040-10-ATH   | ●                  |                            |                       |                                |                            |                       |                            |                               |              |  | 10   |       |       | 55    |       |   | 4.38  | 11.10  | 11.36 | 11.58 | 12.00  |
| EPDBE2040-13-ATH   | ●                  |                            |                       | 13                             |                            |                       | 60                         |                               |              | 3.57   | 14.19  | 14.50 | 14.95 | 15.59 | 17.08 | 8,360                                       |       |        |       |       |        |
| EPDBE2040-16-ATH   | ●                  |                            |                       | 16                             |                            |                       |                            | 3.01                          | 17.27        | 17.63  | 18.37  | 19.18 | 干渉なし  | 8,360 |       |   |       |        |       |       |        |
| EPDBE2040-20-ATH   | ●                  |                            |                       | 20                             |                            |                       |                            | 2.49                          | 21.37        | 21.99  | 22.93  | 23.96 | 干渉なし  | 8,360 |       |   |       |        |       |       |        |
| EPDBE2040-25-ATH   | ●                  |                            |                       | 25                             | 3                          | 3.85                  |                            | 70                            |              |  | 2.05   | 26.49 | 27.44 | 28.63 | 29.95 | 干渉なし  | 8,360 |        |       |       |        |
| EPDBE2040-30-ATH   | ●                  |                            |                       | 30                             |                            |                       | 75                         |                               |              |  |  | 1.74  | 31.59 | 32.89 | 34.34 | 干渉なし  | 干渉なし  | 8,360  |       |       |        |
| EPDBE2040-35-ATH   | ●                  |                            |                       | 35                             |                            |                       |                            |                               | 80           |  |  | 1.51  | 36.78 | 38.33 | 40.04 | 干渉なし  | 干渉なし  | 9,610  |       |       |        |
| EPDBE2040-40-ATH   | ●                  |                            |                       | 40                             |                            |                       |                            |                               | 90           |  |  | 1.34  | 41.99 | 43.78 | 干渉なし  | 干渉なし  | 干渉なし  | 10,830 |       |       |        |
| EPDBE2040-45-ATH   | ●                  |                            |                       | 45                             |                            |                       | 100                        |                               |              | 1.20   | 47.20  | 49.23 | 干渉なし  | 干渉なし  | 干渉なし  | 13,930                                      |       |        |       |       |        |
| EPDBE2040-50-ATH   | ●                  |                            |                       | 50                             |                            |                       | 100                        |                               |              | 1.08   | 52.42  | 54.68 | 干渉なし  | 干渉なし  | 干渉なし  | 14,890                                      |       |        |       |       |        |
| EPDBE2050-20-ATH   | ●                  |                            |                       | 20                             |                            |                       | 65                         |                               |              | 1.42   | 21.36  | 21.95 | 干渉なし  | 干渉なし  | 干渉なし  | 14,590                                      |       |        |       |       |        |
| EPDBE2050-25-ATH   | ●                  | 2.5                        | 5                     | 25                             | 3.5                        | 4.85                  | 70                         | 6                             | 4            | 1.14   | 26.48  | 27.39 | 干渉なし  | 干渉なし  | 干渉なし  | 14,590                                      |       |        |       |       |        |
| EPDBE2050-30-ATH   | ●                  |                            |                       | 30                             |                            |                       |                            |                               |              | 0.95   | 31.58  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 15,600                                      |       |        |       |       |        |
| EPDBE2050-40-ATH   | ●                  |                            |                       | 40                             |                            |                       |                            |                               |              | 0.72   | 41.97  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 19,760                                      |       |        |       |       |        |
| EPDBE2060-12-ATH   | ●                  |                            |                       |                                |                            |                       |                            |                               |              |  | 12   |       |       | 60    |       |   | 0     | 干渉なし   | 干渉なし  | 干渉なし  | 干渉なし   |
| EPDBE2060-20-ATH   | ●                  |                            |                       | 20                             | 6                          | 5.85                  | 65                         | 6                             | -            | 0  | 干渉なし   | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 10,950                                      |       |        |       |       |        |
| EPDBE2060-30-ATH   | ●                  |                            |                       | 30                             |                            |                       |                            |                               |              | 75   |  |       |       |       | 0     | 干渉なし  | 干渉なし  | 干渉なし   | 干渉なし  | 干渉なし  | 11,220 |
| EPDBE2060-50-ATH   | ●                  |                            |                       | 50                             |                            |                       |                            |                               |              | 100  |  |       |       |       | 0     | 干渉なし  | 干渉なし  | 干渉なし   | 干渉なし  | 干渉なし  | 13,470 |

● : 標準在庫品です。 干渉なし : No interference  
● : Stocked items.

特長

寸法ボールP/N  
寸法ボールATH

切削条件ボール高精度

切削条件ボール高精度

寸法スクエアP/N

寸法スクエアATH

切削条件スクエア高精度

切削条件スクエア高精度

技術データ

# 標準切削条件表

## Recommended Cutting Conditions

**高能率切削条件**  
High efficiency cutting condition

**高精度切削条件**  
High accuracy cutting condition

高精度切削条件は13ページを参照してください。  
Please refer to P.13 about high accuracy cutting conditions

### エポックディープボールエボリューション Epoch Deep Ball Evolution **EPDBE-PN EPDBE-ATH**

| 推奨領域 Recommended range               |                        |                                 |         | PNシリーズ PN series              |  |  |  |                                       |                                       |                               |                      |                               |                      |                               |                      |
|--------------------------------------|------------------------|---------------------------------|---------|-------------------------------|--|--|--|---------------------------------------|---------------------------------------|-------------------------------|----------------------|-------------------------------|----------------------|-------------------------------|----------------------|
|                                      |                        |                                 |         | ATHシリーズ ATH series            |  |  |  |                                       |                                       |                               |                      |                               |                      |                               |                      |
| 被削材 Work material                    |                        |                                 |         | 1                             | 2  | 3  | 4  | 5                                     | 6                                     |                               |                      |                               |                      |                               |                      |
|                                      |                        |                                 |         | 銅<br>Coppers                  | 炭素鋼・合金鋼<br>Carbon steels,<br>Alloy steels<br>(180~250HB) | ステンレス鋼・工具鋼<br>Stainless steels,<br>Tool steels<br>(25~35HRC) | プリハードン鋼<br>Pre-hardened steels<br>(35~45HRC) | 焼入れ鋼<br>Hardened steels<br>(45~55HRC) | 焼入れ鋼<br>Hardened steels<br>(55~65HRC) |                               |                      |                               |                      |                               |                      |
| 切込み比率 Ratio to standard depth of cut |                        |                                 |         | 120%                          | 100%   | 90%  | 80%  | 65%                                   | 60%                                   |                               |                      |                               |                      |                               |                      |
| ボール半径RE<br>Ball radius (mm)          | 外径DC<br>Tool dia. (mm) | 首下長LU<br>Under neck length (mm) | ap (mm) | 回転数<br>n<br>min <sup>-1</sup> | 送り速度<br>vf<br>mm/min                                     | 回転数<br>n<br>min <sup>-1</sup>                                | 送り速度<br>vf<br>mm/min                         | 回転数<br>n<br>min <sup>-1</sup>         | 送り速度<br>vf<br>mm/min                  | 回転数<br>n<br>min <sup>-1</sup> | 送り速度<br>vf<br>mm/min | 回転数<br>n<br>min <sup>-1</sup> | 送り速度<br>vf<br>mm/min | 回転数<br>n<br>min <sup>-1</sup> | 送り速度<br>vf<br>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                  |
| 0.25                                 | 0.5                    | 4.5                             | 0.008   | 46,080                        | 470  | 38,400   | 392  | 34,560                                | 353                                   | 32,640                        | 305                  | 28,800                        | 245                  | 26,880                        | 228                  |
|                                      |                        | 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                  |
| 0.3                                  | 0.6                    | 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                  |
|                                      |                        | 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                  |
| 0.35                                 | 0.7                    | 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                  |
|                                      |                        | 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                  |                               |                      |

**[注意]** 12ページを参照してください。 **[Note]** Please refer to P.12

| 推奨領域 Recommended range               |                           | PNシリーズ PN series                      |              |                               |  |                      |  |                               |  |                      |                                       |                               |                                       |                      |       |        |       |
|--------------------------------------|---------------------------|---------------------------------------|--------------|-------------------------------|--|----------------------|--|-------------------------------|--|----------------------|---------------------------------------|-------------------------------|---------------------------------------|----------------------|-------|--------|-------|
|                                      |                           | ATHシリーズ ATH series                    |              |                               |  |                      |  |                               |  |                      |                                       |                               |                                       |                      |       |        |       |
| 被削材 Work material                    |                           |                                       | 1            |                               | 2  |                      | 3  |                               | 4  |                      | 5                                     |                               | 6                                     |                      |       |        |       |
|                                      |                           |                                       | 銅<br>Coppers |                               | 炭素鋼・合金鋼<br>Carbon steels,<br>Alloy steels<br>(180~250HB) |                      | ステンレス鋼・工具鋼<br>Stainless steels,<br>Tool steels<br>(25~35HRC) |                               | プリハードン鋼<br>Pre-hardened steels<br>(35~45HRC) |                      | 焼入れ鋼<br>Hardened steels<br>(45~55HRC) |                               | 焼入れ鋼<br>Hardened steels<br>(55~65HRC) |                      |       |        |       |
| 切込み比率 Ratio to standard depth of cut |                           |                                       | 120%         |                               | 100%   |                      | 90%  |                               | 80%  |                      | 65%                                   |                               | 60%                                   |                      |       |        |       |
| ボール半径RE<br>Ball radius<br>(mm)       | 外径DC<br>Tool dia.<br>(mm) | 首下長LU<br>Under neck<br>length<br>(mm) | ap<br>(mm)   | 回転数<br>n<br>min <sup>-1</sup> |  | 送り速度<br>vf<br>mm/min |  | 回転数<br>n<br>min <sup>-1</sup> |  | 送り速度<br>vf<br>mm/min |                                       | 回転数<br>n<br>min <sup>-1</sup> |                                       | 送り速度<br>vf<br>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 |
|                                      |                           |                                       |              | 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   |
| 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 |

**[注意]** 12ページを参照してください。 **[Note]** Please refer to P.12

特長

寸法ボールPN

寸法ボールATH

切削条件ボール高効率

切削条件ボール高精度

寸法スクエアPN

寸法スクエアATH

切削条件スクエア高効率

切削条件スクエア高精度

技術データ

# 標準切削条件表

## Recommended Cutting Conditions

**高能率切削条件**  
High efficiency cutting condition

高精度切削条件  
High accuracy cutting condition

高精度切削条件は13ページを参照してください。  
Please refer to P.13 about high accuracy cutting conditions

### エポックディープボールエボリューション Epoch Deep Ball Evolution **EPDBE-PN** **EPDBE-ATH**

| 推奨領域 Recommended range               |                     | PNシリーズ PN series                                |         |   |                |  |                |                                 |                |                                 |                |                         |                |        |       |
|--------------------------------------|---------------------|---|---------|---|----------------|--|----------------|---------------------------------|----------------|---------------------------------|----------------|-------------------------|----------------|--------|-------|
|                                      |                     | ATHシリーズ ATH series                              |         |   |                |  |                |                                 |                |                                 |                |                         |                |        |       |
| 被削材 Work material                    |                     | 1   | 2       |   | 3              |  | 4              |                                 | 5              |                                 | 6              |                         |                |        |       |
| 銅 Coppers                            |                     | 炭素鋼・合金鋼 Carbon steels, Alloy steels (180~250HB) |         | ステンレス鋼・工具鋼 Stainless steels, Tool steels (25~35HRC) |                | プリハードン鋼 Pre-hardened steels (35~45HRC) |                | 焼入れ鋼 Hardened steels (45~55HRC) |                | 焼入れ鋼 Hardened steels (55~65HRC) |                |                         |                |        |       |
| 切込み比率 Ratio to standard depth of cut |                     | 120%  |         | 100%  |                | 90%                                    |                | 80%                             |                | 65%                             |                | 60%                     |                |        |       |
| ボール半径RE Ball radius (mm)             | 外径DC Tool dia. (mm) | 首下長LU Under neck length (mm)                    | ap (mm) | 回転数 n min <sup>-1</sup>                             | 送り速度 Vf mm/min | 回転数 n min <sup>-1</sup>                | 送り速度 Vf mm/min | 回転数 n min <sup>-1</sup>         | 送り速度 Vf mm/min | 回転数 n min <sup>-1</sup>         | 送り速度 Vf mm/min | 回転数 n min <sup>-1</sup> | 送り速度 Vf 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   |
| 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 |
| 1.75                                 | 3.5                 | 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 |
|                                      |                     | 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) apは被削材グループ2での目安を示しています。その他のグループの場合は、上表の切込み比率を目安に調整してください。  
 ※(2) リブ加工や止まり溝など、切りくすがつまりやすい切削の場合、切込み設定は基本切込みに切込み比率をかけて算出した切込み量を、さらにその80%まで小さくして使用してください。  
 ※(3) aeの設定はap×切込み比率×3~5倍を目安に調整してください。仕上げ加工を行う場合、理論カスプハイトを計算し設定してください。  
 ※(1) ap is shown as the criteria for Group 2 workpieces. For other groups, 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., cutting depth setting should be set by multiplying 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 ae to (3 to 5) × (ap) × (cutting depth ratio). When performing finishing processing, calculate the theoretical cusp height and set accordingly.

【切込み設定例】 EPDBE2020-10-ATHの工具で焼き入れ鋼(50HRC)をリブ溝等高線切削する場合、切込み=0.21(ap)×0.65(焼き入れ鋼グループ5の切込み比率)×0.8(閉鎖域の切削)=0.11mm  
 Cutting depth setting example: When cutting rib groove contours in hardened steel (50HRC) using an EPDBE2020-10-ATH tool: Cutting depth = 0.21 (ap) × 0.65 (cutting depth factor for Group 5 hardened steel) × 0.8 (for closed-area cutting) = 0.11mm

【注意】 ① PNコーティングはその性質上、通電性が微小です。従って、通電方式の工具長測定装置をご使用の際にはご注意ください。  
 ② 被削材、加工形状に合わせて、適切なクーラントを使用してください。  
 ③ この標準切削条件表は切削条件の目安を示すものです。実際の加工では加工形状、目的、使用機械等により条件を調整してください。  
 ④ 機械の回転数が足りない場合は、回転数と送り速度を同じ比率で下げてください。

【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.

特長

寸法ボールPN

寸法ボールATH

切削条件ボール高能率

切削条件ボール高精度

寸法スクエアPN

寸法スクエアATH

切削条件スクエア高能率

切削条件スクエア高精度

技術データ

高効率切削条件  
High efficiency cutting condition

高精度切削条件  
High accuracy cutting condition

高効率切削条件は10ページを参照してください。  
Please refer to P.10 about high efficiency cutting conditions

エポックディープボールエボリューション Epoch Deep Ball Evolution **EPDBE-PN** **EPDBE-ATH**

| 推奨領域 Recommended range               |                     |                              |         | PNシリーズ PN series        |                |   |                |   |                |  |                |                                 |                |                                 |                | ATHシリーズ ATH series |  |  |  |  |  |
|--------------------------------------|---------------------|------------------------------|---------|-------------------------|----------------|---|----------------|---|----------------|--|----------------|---------------------------------|----------------|---------------------------------|----------------|--------------------|--|--|--|--|--|
| 被削材 Work material                    |                     |                              |         | 1                       |                | 2   |                | 3   |                | 4                                      |                | 5                               |                | 6                               |                |                    |  |  |  |  |  |
|                                      |                     |                              |         | 銅 Coppers               |                | 炭素鋼・合金鋼 Carbon steels, Alloy steels (180~250HB) |                | ステンレス鋼・工具鋼 Stainless steels, Tool steels (25~35HRC) |                | プリハードン鋼 Pre-hardened steels (35~45HRC) |                | 焼入れ鋼 Hardened steels (45~55HRC) |                | 焼入れ鋼 Hardened steels (55~65HRC) |                |                    |  |  |  |  |  |
| 切込み比率 Ratio to standard depth of cut |                     |                              |         | 120%                    |                | 100%  |                | 90%   |                | 80%                                    |                | 65%                             |                | 60%                             |                |                    |  |  |  |  |  |
| ボール半径RE Ball radius (mm)             | 外径DC Tool dia. (mm) | 首下長LU Under neck length (mm) | ap (mm) | 回転数 n min <sup>-1</sup> | 送り速度 vf mm/min | 回転数 n min <sup>-1</sup>                         | 送り速度 vf mm/min | 回転数 n min <sup>-1</sup>                             | 送り速度 vf mm/min | 回転数 n min <sup>-1</sup>                | 送り速度 vf mm/min | 回転数 n min <sup>-1</sup>         | 送り速度 vf mm/min | 回転数 n min <sup>-1</sup>         | 送り速度 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            |                    |  |  |  |  |  |
| 0.15                                 | 0.3                 | 3                            | 0.003   | 48,000                  | 323            | 48,000  | 269            | 43,200  | 242            | 40,800                                 | 212            | 36,000                          | 173            | 33,600                          | 134            |                    |  |  |  |  |  |
|                                      |                     | 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            |                    |  |  |  |  |  |
| 0.2                                  | 0.4                 | 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            |                    |  |  |  |  |  |
|                                      |                     | 0.75                         | 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            |                    |  |  |  |  |  |
| 0.25                                 | 0.5                 | 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            |                    |  |  |  |  |  |
|                                      |                     | 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            |                    |  |  |  |  |  |
| 0.3                                  | 0.6                 | 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            |                    |  |  |  |  |  |
| 0.35                                 | 0.7                 | 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            |                    |  |  |  |  |  |
| 0.35                                 | 0.7                 | 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            |                    |  |  |  |  |  |
|                                      |                     | 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            |                                 |                |                    |  |  |  |  |  |

【注意】 15ページを参照してください。 【Note】 Please refer to P.15

特長

寸法ボールPN

寸法ボールATH

切削条件ボール高精度

切削条件ボール高精度

寸法スクエアPN

寸法スクエアATH

切削条件スクエア高精度

切削条件スクエア高精度

技術データ

# 標準切削条件表

Recommended Cutting Conditions

高能率切削条件  
High efficiency cutting condition

高精度切削条件  
High accuracy cutting condition

高能率切削条件は10ページを参照してください。  
Please refer to P.10 about high efficiency cutting conditions

**エポックディープボールエボリューション Epoch Deep Ball Evolution** **EPDBE-PN** **EPDBE-ATH**

| 推奨領域 Recommended range               |                      | PNシリーズ PN series              |         |   |                |   |                |  |                |                                 |                |                                 |                | ATHシリーズ ATH series      |                |        |     |
|--------------------------------------|----------------------|-------------------------------|---------|---|----------------|---|----------------|--|----------------|---------------------------------|----------------|---------------------------------|----------------|-------------------------|----------------|--------|-----|
|                                      |                      | 1                             |         | 2   |                | 3   |                | 4                                      |                | 5                               |                | 6                               |                |                         |                |        |     |
| 被削材 Work material                    |                      | 銅 Coppers                     |         | 炭素鋼・合金鋼 Carbon steels, Alloy steels (180~250HB) |                | ステンレス鋼・工具鋼 Stainless steels, Tool steels (25~35HRC) |                | プリハードン鋼 Pre-hardened steels (35~45HRC) |                | 焼入れ鋼 Hardened steels (45~55HRC) |                | 焼入れ鋼 Hardened steels (55~65HRC) |                |                         |                |        |     |
| 切込み比率 Ratio to standard depth of cut |                      | 120%                          |         | 100%  |                | 90%   |                | 80%                                    |                | 65%                             |                | 60%                             |                |                         |                |        |     |
| ボール半径 R Ball radius (mm)             | 外径 DC Tool dia. (mm) | 首下長 LU Under neck length (mm) | ap (mm) | 回転数 n min <sup>-1</sup>                         | 送り速度 vf mm/min | 回転数 n min <sup>-1</sup>                             | 送り速度 vf mm/min | 回転数 n min <sup>-1</sup>                | 送り速度 vf mm/min | 回転数 n min <sup>-1</sup>         | 送り速度 vf mm/min | 回転数 n min <sup>-1</sup>         | 送り速度 vf mm/min | 回転数 n min <sup>-1</sup> | 送り速度 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            |        |     |
| 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            |        |     |
|                                      |                      | 0.55                          | 1.1     | 4   | 0.01           | 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            |        |     |
| 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            |        |     |
| 0.6                                  | 1.2                  | 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            |        |     |
|                                      |                      | 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            |        |     |
| 0.7                                  | 1.4                  | 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            |        |     |
|                                      |                      | 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            |        |     |
| 0.75                                 | 1.5                  | 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            |        |     |
|                                      |                      | 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            |        |     |
| 0.8                                  | 1.6                  | 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            |        |     |
|                                      |                      | 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            |        |     |
| 0.9                                  | 1.8                  | 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            |        |     |
|                                      |                      | 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            |        |     |
| 1                                    | 2                    | 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            |        |     |
|                                      |                      | 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          |        |     |
| 1                                    | 2                    | 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            |        |     |

**[注意]** 15ページを参照してください。 **[Note]** Please refer to P.15

特長  
寸法ボールPN  
寸法ボールATH  
切削条件ボール高能率  
切削条件ボール高精度  
寸法スクエアPN  
寸法スクエアATH  
切削条件スクエア高能率  
切削条件スクエア高精度  
技術データ

| 推奨領域 Recommended range               |                           |                                       |            | PNシリーズ PN series       |              |  |              |  |              |  |              |                                       |              |                                       |              |
|--------------------------------------|---------------------------|---------------------------------------|------------|------------------------|--------------|--|--------------|--|--------------|--|--------------|---------------------------------------|--------------|---------------------------------------|--------------|
|                                      |                           |                                       |            | ATHシリーズ ATH series     |              |  |              |  |              |  |              |                                       |              |                                       |              |
| 被削材 Work material                    |                           |                                       |            | 1                      |              | 2  |              | 3  |              | 4  |              | 5                                     |              | 6                                     |              |
|                                      |                           |                                       |            | 銅<br>Coppers           |              | 炭素鋼・合金鋼<br>Carbon steels,<br>Alloy steels<br>(180~250HB) |              | ステンレス鋼・工具鋼<br>Stainless steels,<br>Tool steels<br>(25~35HRC) |              | プリハードン鋼<br>Pre-hardened steels<br>(35~45HRC) |              | 焼入れ鋼<br>Hardened steels<br>(45~55HRC) |              | 焼入れ鋼<br>Hardened steels<br>(55~65HRC) |              |
| 切込み比率 Ratio to standard depth of cut |                           |                                       |            | 120%                   |              | 100%   |              | 90%  |              | 80%  |              | 65%                                   |              | 60%                                   |              |
| ボール半径RE<br>Ball radius<br>(mm)       | 外径DC<br>Tool dia.<br>(mm) | 首下長LU<br>Under neck<br>length<br>(mm) | ap<br>(mm) | 回転数                    |              | 送り速度   |              | 回転数  |              | 送り速度   |              | 回転数                                   |              | 送り速度                                  |              |
|                                      |                           |                                       |            | n<br>min <sup>-1</sup> | Vf<br>mm/min | n<br>min <sup>-1</sup>                                   | Vf<br>mm/min | n<br>min <sup>-1</sup>                                       | Vf<br>mm/min | n<br>min <sup>-1</sup>                       | Vf<br>mm/min | n<br>min <sup>-1</sup>                | Vf<br>mm/min | n<br>min <sup>-1</sup>                | Vf<br>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) apは被削材グループ2での目安を示しています。その他のグループの場合は、上表の切込み比率を目安に調整してください。  
 ※(2) リブ加工や止まり溝など、切りくずがつまりやすい切削の場合、切込み設定は基本切込みに切込み比率をかけて算出した切込み量を、さらにその80%まで小さくして使用してください。  
 ※(3) aeの設定はap×切込み比率×3~5倍を目安に調整してください。仕上げ加工を行う場合、理論カスプハイトを計算し設定してください。  
 ※(1) ap is shown as the criteria for Group 2 workpieces. For other groups, 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., cutting depth setting should be set by multiplying 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 ae to (3 to 5) × (ap) × (cutting depth ratio). When performing finishing processing, calculate the theoretical cusp height and set accordingly.

**【切込み設定例】** EPDBE2020-10-ATHの工具で焼き入れ鋼(50HRC)をリブ溝等高線切削する場合、  
 切込み=0.14(ap)×0.65(焼き入れ鋼グループ5の切込み比率)×0.8(閉鎖域の切削)=0.073mm  
 Cutting depth setting example: When cutting rib groove contours in hardened steel (50HRC) using an EPDBE2020-10-ATH tool:  
 Cutting depth = 0.14 (ap) × 0.65 (cutting depth factor for Group 5 hardened steel) × 0.8 (for closed-area cutting) = 0.073mm

- 【注意】** ① PNコーティングはその性質上、通電性が微小です。従って、通電方式の工具長測定装置をご使用の際にはご注意ください。  
 ② 被削材、加工形状に合わせて、適切なクーラントを使用してください。  
 ③ この標準切削条件表は切削条件の目安を示すものです。実際の加工では加工形状、目的、使用機械等により条件を調整してください。  
 ④ 機械の回転数が足りない場合は、回転数と送り速度を同じ比率で下げてください。
- 【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.

特長  
 寸法ボールコート  
 寸法ボールATH  
 切削条件ボール高精度  
 切削条件ボール高精度  
 寸法スクエアコート  
 寸法スクエアコート  
 切削条件スクエア高精度  
 切削条件スクエア高精度  
 技術データ

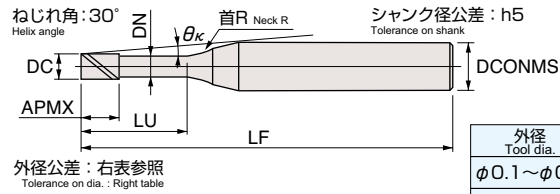
# ラインナップ

Line Up

## エポックディープスクエアエボリューション EPDSE-PN

PN Coating

2枚刃  
2 Flutes



| 外径<br>Tool dia. | 外径公差<br>Tolerance on dia. |
|-----------------|---------------------------|
| φ0.1~φ0.5       | 0<br>-0.007               |
| φ0.6~φ0.9       | 0<br>-0.01                |
| φ1~φ6           | 0<br>-0.015               |

## EPDSE2-0.0-0.0-PN

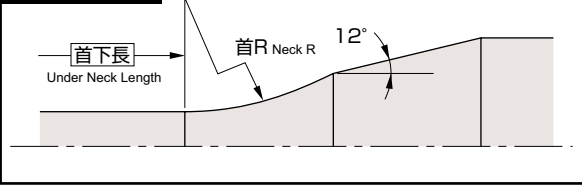
| 商品コード<br>Item code | 在庫<br>Stock | 寸法 Size(mm)     |                          |                    |                 |                      |                     |              | 干渉角度<br>Interference angle | 勾配角に対する実有効首下長<br>Effective under neck length with respect to draft angle |       |       |       |       | 希望小売<br>価格(円)<br>Suggested retail price (¥) |
|--------------------|-------------|-----------------|--------------------------|--------------------|-----------------|----------------------|---------------------|--------------|----------------------------|--|-------|-------|-------|-------|---|
|                    |             | 外径<br>Tool dia. | 首下長<br>Under Neck length | 刃長<br>Flute length | 首径<br>Neck dia. | 全長<br>Overall length | シャック径<br>Shank dia. | 首R<br>Neck R |                            | θ <sub>k</sub>   | 0.5°  | 1°    | 1.5°  | 2°    |   |
| 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  | 12,970                                      |
| EPDSE2001-0.5-PN   | ●           |                 | 0.5                      |                    |                 |                      |                     |              | 11.35                      | 0.67   | 0.71  | 0.74  | 0.76  | 0.82  | 14,150                                      |
| EPDSE2001-1-PN     | ●           |                 | 1                        |                    |                 |                      |                     |              | 10.81                      | 1.20   | 1.25  | 1.29  | 1.33  | 1.39  | 17,680                                      |
| 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  | 8,490                                       |
| EPDSE2002-1-PN     | ●           |                 | 1                        |                    |                 |                      |                     |              | 10.75                      | 1.22   | 1.27  | 1.31  | 1.34  | 1.42  | 9,200                                       |
| EPDSE2002-1.5-PN   | ●           |                 | 1.5                      |                    |                 |                      |                     |              | 10.25                      | 1.74   | 1.80  | 1.85  | 1.89  | 2.08  | 11,040                                      |
| EPDSE2002-2-PN     | ●           |                 | 2                        |                    |                 |                      |                     |              | 9.80                       | 2.26   | 2.32  | 2.38  | 2.47  | 2.74  | 12,440                                      |
| EPDSE2002-3-PN     | ●           | 3               | 9.00                     | 3.29               | 3.37            | 3.50                 | 3.67                | 4.07         | 12,860                     |  |       |       |       |       |   |
| 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  | 7,430                                       |
| EPDSE2003-1.5-PN   | ●           |                 | 1.5                      |                    |                 |                      |                     |              | 10.21                      | 1.85   | 1.93  | 2.01  | 2.08  | 2.21  | 7,430                                       |
| EPDSE2003-2-PN     | ●           |                 | 2                        |                    |                 |                      |                     |              | 9.75                       | 2.37   | 2.47  | 2.56  | 2.64  | 2.78  | 9,200                                       |
| EPDSE2003-2.5-PN   | ●           |                 | 2.5                      |                    |                 |                      |                     |              | 9.32                       | 2.89   | 3.01  | 3.11  | 3.20  | 3.41  | 9,550                                       |
| EPDSE2003-3-PN     | ●           | 3               | 8.93                     | 3.42               | 3.54            | 3.65                 | 3.75                | 4.07         | 9,550                      |  |       |       |       |       |   |
| 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  | 5,430                                       |
| EPDSE2004-1.5-PN   | ●           |                 | 1.5                      |                    |                 |                      |                     |              | 10.17                      | 1.85   | 1.93  | 2.01  | 2.08  | 2.21  | 5,430                                       |
| EPDSE2004-2-PN     | ●           |                 | 2                        |                    |                 |                      |                     |              | 9.70                       | 2.37   | 2.47  | 2.56  | 2.64  | 2.78  | 5,430                                       |
| EPDSE2004-2.5-PN   | ●           |                 | 2.5                      |                    |                 |                      |                     |              | 9.27                       | 2.89   | 3.01  | 3.11  | 3.20  | 3.41  | 5,430                                       |
| EPDSE2004-3-PN     | ●           |                 | 3                        |                    |                 |                      |                     |              | 8.87                       | 3.42   | 3.54  | 3.65  | 3.75  | 4.07  | 5,430                                       |
| EPDSE2004-3.5-PN   | ●           |                 | 3.5                      |                    |                 |                      |                     |              | 8.51                       | 3.94   | 4.08  | 4.19  | 4.29  | 4.73  | 5,430                                       |
| EPDSE2004-4-PN     | ●           |                 | 4                        |                    |                 |                      |                     |              | 8.17                       | 4.46   | 4.61  | 4.73  | 4.87  | 5.40  | 5,430                                       |
| EPDSE2004-5-PN     | ●           |                 | 5                        |                    |                 |                      |                     |              | 7.58                       | 5.49   | 5.66  | 5.79  | 6.06  | 6.72  | 5,430                                       |
| EPDSE2004-6-PN     | ●           |                 | 6                        |                    |                 |                      |                     |              | 7.06                       | 6.53   | 6.71  | 6.92  | 7.26  | 8.05  | 6,720                                       |
| EPDSE2004-8-PN     | ●           |                 | 8                        |                    |                 |                      |                     |              | 6.22                       | 8.59   | 8.80  | 9.20  | 9.65  | 10.71 | 11,790                                      |
| EPDSE2004-10-PN    | ●           | 10              | 5.55                     | 10.64              | 10.97           | 11.48                | 12.05               | 13.36        | 12,860                     |  |       |       |       |       |   |
| 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  | 3,900                                       |
| EPDSE2005-1.5-PN   | ●           |                 | 1.5                      |                    |                 |                      |                     |              | 10.13                      | 1.85   | 1.93  | 2.01  | 2.08  | 2.21  | 3,900                                       |
| EPDSE2005-2-PN     | ●           |                 | 2                        |                    |                 |                      |                     |              | 9.64                       | 2.37   | 2.47  | 2.56  | 2.64  | 2.78  | 3,900                                       |
| EPDSE2005-2.5-PN   | ●           |                 | 2.5                      |                    |                 |                      |                     |              | 9.21                       | 2.89   | 3.01  | 3.11  | 3.20  | 3.41  | 3,900                                       |
| EPDSE2005-3-PN     | ●           |                 | 3                        |                    |                 |                      |                     |              | 8.81                       | 3.42   | 3.54  | 3.65  | 3.75  | 4.07  | 3,900                                       |
| EPDSE2005-4-PN     | ●           |                 | 4                        |                    |                 |                      |                     |              | 8.10                       | 4.46   | 4.61  | 4.73  | 4.87  | 5.40  | 3,900                                       |
| EPDSE2005-5-PN     | ●           |                 | 5                        |                    |                 |                      |                     |              | 7.50                       | 5.49   | 5.66  | 5.79  | 6.06  | 6.72  | 3,900                                       |
| EPDSE2005-6-PN     | ●           |                 | 6                        |                    |                 |                      |                     |              | 6.98                       | 6.53   | 6.71  | 6.92  | 7.26  | 8.05  | 3,900                                       |
| EPDSE2005-8-PN     | ●           |                 | 8                        |                    |                 |                      |                     |              | 6.13                       | 8.59   | 8.80  | 9.20  | 9.65  | 10.71 | 6,490                                       |
| EPDSE2005-10-PN    | ●           |                 | 10                       |                    |                 |                      |                     |              | 5.47                       | 10.64  | 10.97 | 11.48 | 12.05 | 13.36 | 6,490                                       |
| 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  | 4,130                                       |
| EPDSE2006-3-PN     | ●           |                 | 3                        |                    |                 |                      |                     |              | 8.74                       | 3.60   | 3.80  | 3.96  | 4.11  | 4.37  | 4,130                                       |
| EPDSE2006-4-PN     | ●           |                 | 4                        |                    |                 |                      |                     |              | 8.02                       | 4.66   | 4.89  | 5.07  | 5.24  | 5.53  | 4,130                                       |
| EPDSE2006-5-PN     | ●           |                 | 5                        |                    |                 |                      |                     |              | 7.42                       | 5.71   | 5.96  | 6.17  | 6.35  | 6.72  | 4,130                                       |
| EPDSE2006-6-PN     | ●           |                 | 6                        |                    |                 |                      |                     |              | 6.90                       | 6.76   | 7.04  | 7.26  | 7.45  | 8.05  | 4,130                                       |
| EPDSE2006-7-PN     | ●           |                 | 7                        |                    |                 |                      |                     |              | 6.44                       | 7.81   | 8.10  | 8.34  | 8.55  | 9.38  | 5,190                                       |
| EPDSE2006-8-PN     | ●           |                 | 8                        |                    |                 |                      |                     |              | 6.04                       | 8.85   | 9.17  | 9.42  | 9.65  | 10.71 | 6,720                                       |
| EPDSE2006-9-PN     | ●           |                 | 9                        |                    |                 |                      |                     |              | 5.69                       | 9.89   | 10.22 | 10.49 | 10.85 | 12.03 | 7,790                                       |
| EPDSE2006-10-PN    | ●           |                 | 10                       |                    |                 |                      |                     |              | 5.38                       | 10.93  | 11.28 | 11.56 | 12.05 | 13.36 | 7,790                                       |
| EPDSE2007-2-PN     | ●           |                 | 0.7                      |                    |                 |                      |                     |              | 2                          | 1.05   | 0.67  | 50    | 4     | 4     | 9.53  |
| EPDSE2007-4-PN     | ●           | 4               |                          | 7.94               | 4.66            | 4.89                 | 5.07                | 5.24         | 5.53                       |  |       |       |       |       | 4,720                                       |
| EPDSE2007-6-PN     | ●           | 6               |                          | 6.81               | 6.76            | 7.04                 | 7.26                | 7.45         | 8.05                       |  |       |       |       |       | 4,720                                       |
| EPDSE2007-8-PN     | ●           | 8               |                          | 5.95               | 8.85            | 9.17                 | 9.42                | 9.65         | 10.71                      |  |       |       |       |       | 7,670                                       |
| EPDSE2007-10-PN    | ●           | 10              |                          | 5.29               | 10.93           | 11.28                | 11.56               | 12.05        | 13.36                      |  |       |       |       |       | 10,020                                      |

● : 標準在庫品です。  
● : Stocked items.

技術データ



首下詳細形状

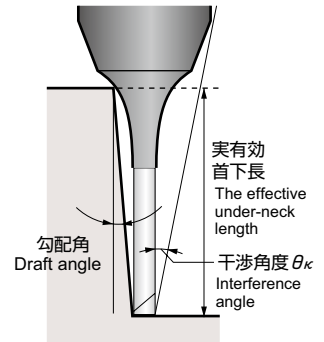


**[注意]**

エポックディープスクエアEPDSとは有効首下長が異なります。再度ご確認ください。

**[Note]**

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



EPDSE2000-00.0-PN

| 商品コード<br>Item code | 在庫<br>Stock<br>PN | 寸法 Size(mm)           |                                |                            |                       |                            |                               |              | 干渉角度<br>Interference angle<br>$\theta_k$ | 勾配角に対する実有効首下長<br>Effective under neck length with respect to draft angle |       |       |       |       | 希望小売<br>価格(円)<br>Suggested retail price<br>(¥) |
|--------------------|-------------------|-----------------------|--------------------------------|----------------------------|-----------------------|----------------------------|-------------------------------|--------------|--|--|-------|-------|-------|-------|--|
|                    |                   | 外径<br>Tool dia.<br>DC | 首下長<br>Under Neck length<br>LU | 刃長<br>Flute length<br>APMX | 首径<br>Neck dia.<br>DN | 全長<br>Overall length<br>LF | シャンク径<br>Shank dia.<br>DCONMS | 首R<br>Neck R |  | 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  | 4,600  |
| EPDSE2008-4-PN     | ●                 |                       | 4                              |                            |                       |                            |                               |              | 7.86                                     | 4.66   | 4.89  | 5.07  | 5.24  | 5.53  | 4,600  |
| EPDSE2008-6-PN     | ●                 |                       | 6                              |                            |                       |                            |                               |              | 6.72                                     | 6.76   | 7.04  | 7.26  | 7.45  | 8.05  | 4,600  |
| EPDSE2008-8-PN     | ●                 |                       | 8                              |                            |                       |                            |                               |              | 5.86                                     | 8.85   | 9.17  | 9.42  | 9.65  | 10.71 | 4,600  |
| EPDSE2008-10-PN    | ●                 |                       | 10                             |                            |                       |                            |                               |              | 5.20                                     | 10.93  | 11.28 | 11.56 | 12.05 | 13.36 | 6,720  |
| EPDSE2008-12-PN    | ●                 |                       | 12                             |                            |                       |                            |                               |              | 4.67                                     | 13.00  | 13.38 | 13.76 | 14.44 | 16.02 | 7,670  |
| 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  | 5,310  |
| EPDSE2009-4-PN     | ●                 |                       | 4                              |                            |                       |                            |                               |              | 7.76                                     | 4.69   | 4.91  | 5.09  | 5.26  | 5.54  | 5,310  |
| EPDSE2009-6-PN     | ●                 |                       | 6                              |                            |                       |                            |                               |              | 6.61                                     | 6.79   | 7.06  | 7.28  | 7.47  | 8.08  | 5,310  |
| EPDSE2009-8-PN     | ●                 |                       | 8                              |                            |                       |                            |                               |              | 5.76                                     | 8.87   | 9.18  | 9.43  | 9.68  | 10.74 | 5,310  |
| EPDSE2009-10-PN    | ●                 |                       | 10                             |                            |                       |                            |                               |              | 5.10                                     | 10.95  | 11.30 | 11.57 | 12.07 | 13.39 | 5,310  |
| EPDSE2009-12-PN    | ●                 |                       | 12                             |                            |                       |                            |                               |              | 4.58                                     | 13.02  | 13.40 | 13.79 | 14.47 | 16.05 | 6,050  |
| EPDSE2010-2-PN     | ●                 | 1                     | 2                              | 1.5                        | 0.96                  | 50                         | 4                             | 4            | 9.31                                     | 2.58   | 2.73  | 2.86  | 2.98  | 3.21  | 4,130  |
| EPDSE2010-3-PN     | ●                 |                       | 3                              |                            |                       |                            |                               |              | 8.41                                     | 3.64   | 3.82  | 3.99  | 4.13  | 4.39  | 4,130  |
| EPDSE2010-4-PN     | ●                 |                       | 4                              |                            |                       |                            |                               |              | 7.67                                     | 4.69   | 4.91  | 5.09  | 5.26  | 5.54  | 4,130  |
| EPDSE2010-5-PN     | ●                 |                       | 5                              |                            |                       |                            |                               |              | 7.04                                     | 5.74   | 5.99  | 6.19  | 6.37  | 6.76  | 4,130  |
| EPDSE2010-6-PN     | ●                 |                       | 6                              |                            |                       |                            |                               |              | 6.51                                     | 6.79   | 7.06  | 7.28  | 7.47  | 8.08  | 4,130  |
| EPDSE2010-7-PN     | ●                 |                       | 7                              |                            |                       |                            |                               |              | 6.06                                     | 7.83   | 8.12  | 8.36  | 8.56  | 9.41  | 4,130  |
| EPDSE2010-8-PN     | ●                 |                       | 8                              |                            |                       |                            |                               |              | 5.66                                     | 8.87   | 9.18  | 9.43  | 9.68  | 10.74 | 4,130  |
| EPDSE2010-9-PN     | ●                 |                       | 9                              |                            |                       | 5.31                       |                               |              | 9.91                                     | 10.24  | 10.50 | 10.88 | 12.07 | 4,130 |  |
| EPDSE2010-10-PN    | ●                 |                       | 10                             |                            |                       | 5.00                       |                               |              | 10.95                                    | 11.30  | 11.57 | 12.07 | 13.39 | 4,130 |  |
| EPDSE2010-12-PN    | ●                 |                       | 12                             |                            |                       | 4.48                       |                               |              | 13.02                                    | 13.40  | 13.79 | 14.47 | 16.05 | 4,130 |  |
| EPDSE2010-14-PN    | ●                 |                       | 14                             |                            |                       | 4.06                       |                               |              | 15.09                                    | 15.49  | 16.07 | 16.86 | 18.70 | 4,130 |  |
| EPDSE2010-16-PN    | ●                 |                       | 16                             |                            |                       | 3.71                       |                               |              | 17.15                                    | 17.58  | 18.35 | 19.25 | 21.36 | 6,720 |  |
| EPDSE2010-20-PN    | ●                 |                       | 20                             |                            |                       | 3.17                       |                               |              | 21.26                                    | 21.89  | 22.91 | 24.04 | 26.66 | 6,720 |  |
| EPDSE2010-25-PN    | ●                 |                       | 25                             |                            |                       | 2.68                       |                               |              | 26.39                                    | 27.33  | 28.61 | 30.02 | 干渉なし  | 7,790 |  |
| 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  | 4,370  |
| EPDSE2012-6-PN     | ●                 |                       | 6                              |                            |                       |                            |                               |              | 6.29                                     | 6.81   | 7.08  | 7.29  | 7.48  | 8.11  | 4,370  |
| EPDSE2012-8-PN     | ●                 |                       | 8                              |                            |                       |                            |                               |              | 5.44                                     | 8.90   | 9.20  | 9.45  | 9.71  | 10.77 | 4,370  |
| EPDSE2012-10-PN    | ●                 |                       | 10                             |                            |                       | 4.80                       |                               |              | 10.97                                    | 11.31  | 11.58 | 12.10 | 13.42 | 4,370 |  |
| EPDSE2012-12-PN    | ●                 |                       | 12                             |                            |                       | 4.29                       |                               |              | 13.04                                    | 13.41  | 13.82 | 14.49 | 16.08 | 4,370 |  |
| EPDSE2012-16-PN    | ●                 |                       | 16                             |                            |                       | 3.53                       |                               |              | 17.16                                    | 17.59  | 18.38 | 19.28 | 21.39 | 6,960 |  |
| 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  | 4,490  |
| EPDSE2014-12-PN    | ●                 |                       | 12                             |                            |                       | 4.08                       |                               |              | 13.06                                    | 13.43  | 13.84 | 14.52 | 16.11 | 4,490 |  |
| 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  | 4,370  |
| EPDSE2015-6-PN     | ●                 |                       | 6                              |                            |                       |                            |                               |              | 5.94                                     | 6.84   | 7.09  | 7.31  | 7.50  | 8.15  | 4,370  |
| EPDSE2015-8-PN     | ●                 |                       | 8                              |                            |                       |                            |                               |              | 5.10                                     | 8.92   | 9.22  | 9.46  | 9.74  | 10.80 | 4,370  |
| EPDSE2015-10-PN    | ●                 |                       | 10                             |                            |                       |                            |                               |              | 4.47                                     | 10.99  | 11.33 | 11.59 | 12.13 | 13.45 | 4,370  |
| EPDSE2015-12-PN    | ●                 |                       | 12                             |                            |                       |                            |                               |              | 3.97                                     | 13.06  | 13.43 | 13.84 | 14.52 | 16.11 | 4,370  |
| EPDSE2015-14-PN    | ●                 |                       | 14                             |                            |                       |                            |                               |              | 3.58                                     | 15.12  | 15.52 | 16.12 | 16.92 | 18.76 | 4,490  |
| EPDSE2015-16-PN    | ●                 |                       | 16                             |                            |                       |                            |                               |              | 3.25                                     | 17.18  | 17.60 | 18.40 | 19.31 | 21.42 | 4,490  |
| EPDSE2015-18-PN    | ●                 |                       | 18                             |                            |                       | 2.98                       |                               |              | 19.24                                    | 19.76  | 20.69 | 21.70 | 干渉なし  | 4,490 |  |
| EPDSE2015-20-PN    | ●                 |                       | 20                             |                            |                       | 2.76                       |                               |              | 21.29                                    | 21.94  | 22.97 | 24.10 | 干渉なし  | 4,490 |  |
| EPDSE2015-25-PN    | ●                 |                       | 25                             |                            |                       | 2.31                       |                               |              | 26.42                                    | 27.39  | 28.67 | 30.08 | 干渉なし  | 6,720 |  |
| EPDSE2015-30-PN    | ●                 |                       | 30                             |                            |                       | 1.99                       |                               |              | 31.53                                    | 32.83  | 34.37 | 干渉なし  | 干渉なし  | 6,720 |  |
| EPDSE2015-35-PN    | ●                 |                       | 35                             |                            |                       | 1.75                       |                               |              | 36.64                                    | 38.28  | 40.07 | 干渉なし  | 干渉なし  | 7,670 |  |
| EPDSE2015-40-PN    | ●                 |                       | 40                             |                            |                       | 1.56                       |                               |              | 41.85                                    | 43.73  | 45.78 | 干渉なし  | 干渉なし  | 8,610 |  |
| EPDSE2016-6-PN     | ●                 |                       | 1.6                            |                            |                       | 6                          |                               |              | 2.4                                      | 1.54   | 50    | 4     | 4     | 5.82  | 6.84   |
| EPDSE2016-8-PN     | ●                 | 8                     |                                | 4.98                       | 8.92                  | 9.22                       | 9.46                          | 9.74         |  |  |       |       |       | 10.80 | 4,490  |
| 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  | 4,490  |
| EPDSE2018-8-PN     | ●                 |                       | 8                              |                            |                       |                            |                               |              | 4.72                                     | 8.94   | 9.23  | 9.47  | 9.76  | 10.83 | 4,490  |

● : 標準在庫品です。 干渉なし : No interference  
● : Stocked items.

特長

寸法ボールPN

寸法ボールATH

切削条件ボール高効率

切削条件ボール高精度

寸法スクエアPN

寸法スクエアATH

切削条件スクエア高効率

切削条件スクエア高精度

技術データ

# ラインナップ

Line Up

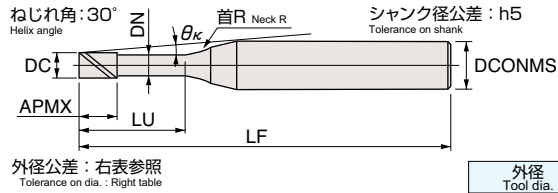
エポックディープスクエアエボリューション  
Epoch Deep Square Evolution

EPDSE-PN

PN Coating



2枚刃  
2 Flutes



外径公差：右表参照  
Tolerance on dia.: Right table

| 外径<br>Tool dia. | 外径公差<br>Tolerance on dia. |
|-----------------|---------------------------|
| φ0.1~φ0.5       | 0<br>-0.007               |
| φ0.6~φ0.9       | 0<br>-0.01                |
| φ1~φ6           | 0<br>-0.015               |

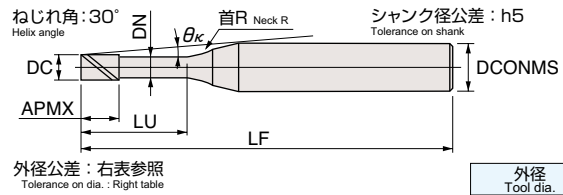
## EPDSE2-0.0-0.0-PN

| 商品コード<br>Item code | 在庫<br>Stock<br>PN | 寸法 Size(mm)           |                                |                            |                       |                            |                               | 干渉角度<br>Interference<br>angle<br>$\theta_K$ | 勾配角に対する実有効首下長<br>Effective under neck length<br>with respect to draft angle |       |       |       |       | 希望小売<br>価格(円)<br>Suggested<br>retail price<br>(¥) |        |
|--------------------|-------------------|-----------------------|--------------------------------|----------------------------|-----------------------|----------------------------|-------------------------------|---|---|-------|-------|-------|-------|---|--------|
|                    |                   | 外径<br>Tool dia.<br>DC | 首下長<br>Under Neck length<br>LU | 刃長<br>Flute length<br>APMX | 首径<br>Neck dia.<br>DN | 全長<br>Overall length<br>LF | シャンク径<br>Shank dia.<br>DCONMS |   | 首R<br>Neck<br>R   | 勾配角   |       |       |       |   |        |
|                    |                   |                       |                                |                            |                       |                            |                               |   |   | 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  | 4,370  |
| EPDSE2020-6-PN     | ●                 |                       |                                |                            |                       |                            |                               |   | 5.25  | 6.88  | 7.13  | 7.34  | 7.52  | 8.21  | 4,370  |
| EPDSE2020-8-PN     | ●                 |                       |                                |                            |                       |                            |                               |   | 4.44  | 8.96  | 9.25  | 9.49  | 9.79  | 10.86   | 4,370  |
| EPDSE2020-10-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 3.85  | 11.03 | 11.35 | 11.62 | 12.19 | 13.52   | 4,370  |
| EPDSE2020-12-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 3.39  | 13.10 | 13.45 | 13.90 | 14.58 | 16.17   | 4,370  |
| EPDSE2020-14-PN    | ●                 |                       |                                |                            |                       | 3.03                       |                               |   | 15.16   | 15.54 | 16.18 | 16.97 | 18.83 | 4,370   |        |
| EPDSE2020-16-PN    | ●                 |                       |                                |                            |                       | 2.75                       |                               |   | 17.21   | 17.63 | 18.46 | 19.37 | 干渉なし  | 4,370   |        |
| EPDSE2020-18-PN    | ●                 |                       |                                |                            |                       | 2.51                       |                               |   | 19.27   | 19.81 | 20.74 | 21.76 | 干渉なし  | 4,370   |        |
| EPDSE2020-20-PN    | ●                 |                       |                                |                            |                       | 2.31                       |                               |   | 21.32   | 21.99 | 23.02 | 24.15 | 干渉なし  | 4,370   |        |
| EPDSE2020-25-PN    | ●                 |                       |                                |                            |                       | 1.92                       |                               |   | 26.44   | 27.44 | 28.72 | 干渉なし  | 干渉なし  | 4,370   |        |
| EPDSE2020-30-PN    | ●                 | 1.65                  | 31.55                          | 32.88                      | 34.42                 | 干渉なし                       | 干渉なし                          | 5,430                                       |   |       |       |       |       |   |        |
| EPDSE2020-35-PN    | ●                 | 1.44                  | 36.69                          | 38.33                      | 干渉なし                  | 干渉なし                       | 干渉なし                          | 6,490                                       |   |       |       |       |       |   |        |
| EPDSE2020-40-PN    | ●                 | 1.28                  | 41.90                          | 43.78                      | 干渉なし                  | 干渉なし                       | 干渉なし                          | 8,140                                       |   |       |       |       |       |   |        |
| EPDSE2020-50-PN    | ●                 | 1.05                  | 52.33                          | 54.67                      | 干渉なし                  | 干渉なし                       | 干渉なし                          | 9,790                                       |   |       |       |       |       |   |        |
| 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   | 4,600  |
| EPDSE2025-12-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 2.73  | 13.13 | 13.48 | 13.95 | 14.64 | 干渉なし  | 4,600  |
| EPDSE2025-16-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 2.18  | 17.25 | 17.68 | 18.51 | 19.42 | 干渉なし  | 4,600  |
| EPDSE2025-20-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 1.81  | 21.35 | 22.04 | 23.07 | 干渉なし  | 干渉なし  | 4,600  |
| EPDSE2025-30-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 1.28  | 31.58 | 32.94 | 干渉なし  | 干渉なし  | 干渉なし  | 4,960  |
| EPDSE2025-40-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 0.99  | 41.95 | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 6,960  |
| EPDSE2025-50-PN    | ●                 | 0.80                  | 52.38                          | 干渉なし                       | 干渉なし                  | 干渉なし                       | 干渉なし                          | 8,610                                       |   |       |       |       |       |   |        |
| EPDSE2030-8-PN     | ●                 | 3                     | 8                              | 4.5                        | 2.88                  | 55                         | 6                             | 4   | 5.59  | 9.04  | 9.31  | 9.54  | 9.91  | 10.99   | 5,900  |
| EPDSE2030-12-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 4.44  | 13.16 | 13.50 | 14.00 | 14.69 | 16.30   | 5,900  |
| EPDSE2030-16-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 3.68  | 17.28 | 17.73 | 18.57 | 19.48 | 21.61   | 5,900  |
| EPDSE2030-20-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 3.15  | 21.38 | 22.09 | 23.13 | 24.26 | 26.91   | 5,900  |
| EPDSE2030-25-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 2.66  | 26.49 | 27.54 | 28.83 | 30.25 | 干渉なし  | 5,900  |
| EPDSE2030-30-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 2.31  | 31.60 | 32.99 | 34.53 | 36.23 | 干渉なし  | 7,080  |
| EPDSE2030-40-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 1.82  | 42.00 | 43.88 | 45.94 | 干渉なし  | 干渉なし  | 7,310  |
| EPDSE2030-50-PN    | ●                 | 1.50                  | 52.43                          | 54.78                      | 干渉なし                  | 干渉なし                       | 干渉なし                          | 10,260                                      |   |       |       |       |       |   |        |
| EPDSE2040-12-PN    | ●                 | 4                     | 12                             | 6                          | 3.85                  | 60                         | 6                             | 4   | 3.36  | 13.21 | 13.54 | 14.08 | 14.78 | 16.39   | 6,840  |
| EPDSE2040-16-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 2.72  | 17.32 | 17.81 | 18.65 | 19.56 | 干渉なし  | 6,840  |
| EPDSE2040-20-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 2.29  | 21.42 | 22.17 | 23.21 | 24.35 | 干渉なし  | 6,840  |
| EPDSE2040-25-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 1.91  | 26.53 | 27.62 | 28.91 | 干渉なし  | 干渉なし  | 6,840  |
| EPDSE2040-30-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 1.64  | 31.65 | 33.06 | 34.61 | 干渉なし  | 干渉なし  | 6,840  |
| EPDSE2040-35-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 1.44  | 36.86 | 38.51 | 干渉なし  | 干渉なし  | 干渉なし  | 6,840  |
| EPDSE2040-40-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 1.28  | 42.08 | 43.96 | 干渉なし  | 干渉なし  | 干渉なし  | 8,610  |
| EPDSE2040-50-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 1.05  | 52.50 | 54.85 | 干渉なし  | 干渉なし  | 干渉なし  | 12,750 |
| EPDSE2050-20-PN    | ●                 | 5                     | 20                             | 7.5                        | 4.85                  | 70                         | 6                             | 4   | 1.27  | 21.42 | 22.17 | 干渉なし  | 干渉なし  | 干渉なし  | 9,020  |
| EPDSE2050-25-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 1.04  | 26.53 | 27.62 | 干渉なし  | 干渉なし  | 干渉なし  | 9,020  |
| EPDSE2050-30-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 0.88  | 31.65 | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 9,020  |
| EPDSE2050-40-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 0.68  | 42.08 | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 9,020  |
| EPDSE2050-50-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 0.55  | 52.50 | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 14,260 |
| EPDSE2060-20-PN    | ●                 | 6                     | 20                             | 9                          | 5.85                  | 70                         | 6                             | -   | 0   | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 9,270  |
| EPDSE2060-30-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 0   | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 9,510  |
| EPDSE2060-40-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 0   | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 11,220 |
| EPDSE2060-50-PN    | ●                 |                       |                                |                            |                       |                            |                               |   | 0   | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 14,260 |

●：標準在庫品です。 干渉なし：No interference  
●：Stocked items.

特長  
寸法ボールPN  
寸法ボールATH  
切削条件ボール高効率  
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寸法スクエアPN  
寸法スクエアATH  
切削条件スクエア高効率  
切削条件スクエア高精度  
技術データ

2枚刃  
2 Flutes



外径公差: 右表参照  
Tolerance on dia.: Right table

| 外径<br>Tool dia. | 外径公差<br>Tolerance on dia. |
|-----------------|---------------------------|
| φ0.1~φ0.5       | 0<br>-0.007               |
| φ0.6~φ0.9       | 0<br>-0.01                |
| φ1~φ6           | 0<br>-0.015               |

## EPDSE2-ATH

| 商品コード<br>Item code | 在庫<br>Stock<br>ATH | 寸法 Size(mm)           |                                |                            |                       |                            |                               |              | 干渉角度<br>Interference angle<br>$\theta_k$ | 勾配角に対する実有効首下長<br>Effective under neck length<br>with respect to draft angle |       |       |       |       | 希望小売<br>価格(円)<br>Suggested<br>retail price<br>(¥) |
|--------------------|--------------------|-----------------------|--------------------------------|----------------------------|-----------------------|----------------------------|-------------------------------|--------------|--|---|-------|-------|-------|-------|---|
|                    |                    | 外径<br>Tool dia.<br>DC | 首下長<br>Under Neck length<br>LU | 刃長<br>Flute length<br>APMX | 首径<br>Neck dia.<br>DN | 全長<br>Overall length<br>LF | シャック径<br>Shank dia.<br>DCONMS | 首R<br>Neck R |  | 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  |   |
| EPDSE2001-0.5-ATH  | ●                  | 0.1                   | 0.5                            | 0.15                       | 0.08                  | 45                         | 4                             | 1            | 11.35                                    | 0.67  | 0.71  | 0.74  | 0.76  | 0.82  | 16,720  |
| EPDSE2001-1-ATH    | ●                  | 0.1                   | 1                              | 0.15                       | 0.08                  | 45                         | 4                             | 1            | 10.81                                    | 1.20  | 1.25  | 1.29  | 1.33  | 1.39  | 20,890  |
| 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  | 10,030  |
| EPDSE2002-1-ATH    | ●                  | 0.2                   | 1                              | 0.3                        | 0.17                  | 50                         | 4                             | 1            | 10.75                                    | 1.22  | 1.27  | 1.31  | 1.34  | 1.42  | 10,830  |
| EPDSE2002-1.5-ATH  | ●                  | 0.2                   | 1.5                            | 0.3                        | 0.17                  | 50                         | 4                             | 1            | 10.25                                    | 1.74  | 1.80  | 1.85  | 1.89  | 2.08  | 13,080  |
| EPDSE2002-2-ATH    | ●                  | 0.2                   | 2                              | 0.3                        | 0.17                  | 50                         | 4                             | 1            | 9.80                                     | 2.26  | 2.32  | 2.38  | 2.47  | 2.74  | 14,680  |
| EPDSE2002-3-ATH    | ●                  | 0.2                   | 3                              | 0.3                        | 0.17                  | 50                         | 4                             | 1            | 9.00                                     | 3.29  | 3.37  | 3.50  | 3.67  | 4.07  | 15,220  |
| 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  | 8,780   |
| EPDSE2003-1.5-ATH  | ●                  | 0.3                   | 1.5                            | 0.45                       | 0.27                  | 50                         | 4                             | 2            | 10.21                                    | 1.85  | 1.93  | 2.01  | 2.08  | 2.21  | 8,780   |
| EPDSE2003-2-ATH    | ●                  | 0.3                   | 2                              | 0.45                       | 0.27                  | 50                         | 4                             | 2            | 9.75                                     | 2.37  | 2.47  | 2.56  | 2.64  | 2.78  | 10,830  |
| EPDSE2003-2.5-ATH  | ●                  | 0.3                   | 2.5                            | 0.45                       | 0.27                  | 50                         | 4                             | 2            | 9.32                                     | 2.89  | 3.01  | 3.11  | 3.20  | 3.41  | 11,250  |
| EPDSE2003-3-ATH    | ●                  | 0.3                   | 3                              | 0.45                       | 0.27                  | 50                         | 4                             | 2            | 8.93                                     | 3.42  | 3.54  | 3.65  | 3.75  | 4.07  | 11,250  |
| 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  | 6,410   |
| EPDSE2004-1.5-ATH  | ●                  | 0.4                   | 1.5                            | 0.6                        | 0.37                  | 50                         | 4                             | 2            | 10.17                                    | 1.85  | 1.93  | 2.01  | 2.08  | 2.21  | 6,410   |
| EPDSE2004-2-ATH    | ●                  | 0.4                   | 2                              | 0.6                        | 0.37                  | 50                         | 4                             | 2            | 9.70                                     | 2.37  | 2.47  | 2.56  | 2.64  | 2.78  | 6,410   |
| EPDSE2004-2.5-ATH  | ●                  | 0.4                   | 2.5                            | 0.6                        | 0.37                  | 50                         | 4                             | 2            | 9.27                                     | 2.89  | 3.01  | 3.11  | 3.20  | 3.41  | 6,410   |
| EPDSE2004-3-ATH    | ●                  | 0.4                   | 3                              | 0.6                        | 0.37                  | 50                         | 4                             | 2            | 8.87                                     | 3.42  | 3.54  | 3.65  | 3.75  | 4.07  | 6,410   |
| EPDSE2004-3.5-ATH  | ●                  | 0.4                   | 3.5                            | 0.6                        | 0.37                  | 50                         | 4                             | 2            | 8.51                                     | 3.94  | 4.08  | 4.19  | 4.29  | 4.73  | 6,410   |
| EPDSE2004-4-ATH    | ●                  | 0.4                   | 4                              | 0.6                        | 0.37                  | 50                         | 4                             | 2            | 8.17                                     | 4.46  | 4.61  | 4.73  | 4.87  | 5.40  | 6,410   |
| EPDSE2004-5-ATH    | ●                  | 0.4                   | 5                              | 0.6                        | 0.37                  | 50                         | 4                             | 2            | 7.58                                     | 5.49  | 5.66  | 5.79  | 6.06  | 6.72  | 6,410   |
| EPDSE2004-6-ATH    | ●                  | 0.4                   | 6                              | 0.6                        | 0.37                  | 50                         | 4                             | 2            | 7.06                                     | 6.53  | 6.71  | 6.92  | 7.26  | 8.05  | 7,940   |
| EPDSE2004-8-ATH    | ●                  | 0.4                   | 8                              | 0.6                        | 0.37                  | 50                         | 4                             | 2            | 6.22                                     | 8.59  | 8.80  | 9.20  | 9.65  | 10.71 | 13,930  |
| EPDSE2004-10-ATH   | ●                  | 0.4                   | 10                             | 0.6                        | 0.37                  | 50                         | 4                             | 2            | 5.55                                     | 10.64   | 10.97 | 11.48 | 12.05 | 13.36 | 15,220  |
| 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  | 4,600   |
| EPDSE2005-1.5-ATH  | ●                  | 0.5                   | 1.5                            | 0.75                       | 0.47                  | 50                         | 4                             | 2            | 10.13                                    | 1.85  | 1.93  | 2.01  | 2.08  | 2.21  | 4,600   |
| EPDSE2005-2-ATH    | ●                  | 0.5                   | 2                              | 0.75                       | 0.47                  | 50                         | 4                             | 2            | 9.64                                     | 2.37  | 2.47  | 2.56  | 2.64  | 2.78  | 4,600   |
| EPDSE2005-2.5-ATH  | ●                  | 0.5                   | 2.5                            | 0.75                       | 0.47                  | 50                         | 4                             | 2            | 9.21                                     | 2.89  | 3.01  | 3.11  | 3.20  | 3.41  | 4,600   |
| EPDSE2005-3-ATH    | ●                  | 0.5                   | 3                              | 0.75                       | 0.47                  | 50                         | 4                             | 2            | 8.81                                     | 3.42  | 3.54  | 3.65  | 3.75  | 4.07  | 4,600   |
| EPDSE2005-4-ATH    | ●                  | 0.5                   | 4                              | 0.75                       | 0.47                  | 50                         | 4                             | 2            | 8.10                                     | 4.46  | 4.61  | 4.73  | 4.87  | 5.40  | 4,600   |
| EPDSE2005-5-ATH    | ●                  | 0.5                   | 5                              | 0.75                       | 0.47                  | 50                         | 4                             | 2            | 7.50                                     | 5.49  | 5.66  | 5.79  | 6.06  | 6.72  | 4,600   |
| EPDSE2005-6-ATH    | ●                  | 0.5                   | 6                              | 0.75                       | 0.47                  | 50                         | 4                             | 2            | 6.98                                     | 6.53  | 6.71  | 6.92  | 7.26  | 8.05  | 4,600   |
| EPDSE2005-8-ATH    | ●                  | 0.5                   | 8                              | 0.75                       | 0.47                  | 50                         | 4                             | 2            | 6.13                                     | 8.59  | 8.80  | 9.20  | 9.65  | 10.71 | 7,670   |
| EPDSE2005-10-ATH   | ●                  | 0.5                   | 10                             | 0.75                       | 0.47                  | 50                         | 4                             | 2            | 5.47                                     | 10.64   | 10.97 | 11.48 | 12.05 | 13.36 | 7,670   |
| 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  | 4,890   |
| EPDSE2006-3-ATH    | ●                  | 0.6                   | 3                              | 0.9                        | 0.57                  | 50                         | 4                             | 4            | 8.74                                     | 3.60  | 3.80  | 3.96  | 4.11  | 4.37  | 4,890   |
| EPDSE2006-4-ATH    | ●                  | 0.6                   | 4                              | 0.9                        | 0.57                  | 50                         | 4                             | 4            | 8.02                                     | 4.66  | 4.89  | 5.07  | 5.24  | 5.53  | 4,890   |
| EPDSE2006-5-ATH    | ●                  | 0.6                   | 5                              | 0.9                        | 0.57                  | 50                         | 4                             | 4            | 7.42                                     | 5.71  | 5.96  | 6.17  | 6.35  | 6.72  | 4,890   |
| EPDSE2006-6-ATH    | ●                  | 0.6                   | 6                              | 0.9                        | 0.57                  | 50                         | 4                             | 4            | 6.90                                     | 6.76  | 7.04  | 7.26  | 7.45  | 8.05  | 4,890   |
| EPDSE2006-7-ATH    | ●                  | 0.6                   | 7                              | 0.9                        | 0.57                  | 50                         | 4                             | 4            | 6.44                                     | 7.81  | 8.10  | 8.34  | 8.55  | 9.38  | 6,140   |
| EPDSE2006-8-ATH    | ●                  | 0.6                   | 8                              | 0.9                        | 0.57                  | 50                         | 4                             | 4            | 6.04                                     | 8.85  | 9.17  | 9.42  | 9.65  | 10.71 | 7,940   |
| EPDSE2006-9-ATH    | ●                  | 0.6                   | 9                              | 0.9                        | 0.57                  | 50                         | 4                             | 4            | 5.69                                     | 9.89  | 10.22 | 10.49 | 10.85 | 12.03 | 9,200   |
| EPDSE2006-10-ATH   | ●                  | 0.6                   | 10                             | 0.9                        | 0.57                  | 50                         | 4                             | 4            | 5.38                                     | 10.93   | 11.28 | 11.56 | 12.05 | 13.36 | 9,200   |
| 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  | 5,580   |
| EPDSE2007-4-ATH    | ●                  | 0.7                   | 4                              | 1.05                       | 0.67                  | 50                         | 4                             | 4            | 7.94                                     | 4.66  | 4.89  | 5.07  | 5.24  | 5.53  | 5,580   |
| EPDSE2007-6-ATH    | ●                  | 0.7                   | 6                              | 1.05                       | 0.67                  | 50                         | 4                             | 4            | 6.81                                     | 6.76  | 7.04  | 7.26  | 7.45  | 8.05  | 5,580   |
| EPDSE2007-8-ATH    | ●                  | 0.7                   | 8                              | 1.05                       | 0.67                  | 50                         | 4                             | 4            | 5.95                                     | 8.85  | 9.17  | 9.42  | 9.65  | 10.71 | 9,060   |
| EPDSE2007-10-ATH   | ●                  | 0.7                   | 10                             | 1.05                       | 0.67                  | 50                         | 4                             | 4            | 5.29                                     | 10.93   | 11.28 | 11.56 | 12.05 | 13.36 | 11,900  |

● : 標準在庫品です。  
● : Stocked items.

特長  
寸法ホールDN  
ATH Coating  
切削条件  
高精度  
寸法スクエアATH  
ATH Coating  
切削条件  
高精度  
寸法スクエアATH  
ATH Coating  
切削条件  
高精度  
技術データ

# ラインナップ

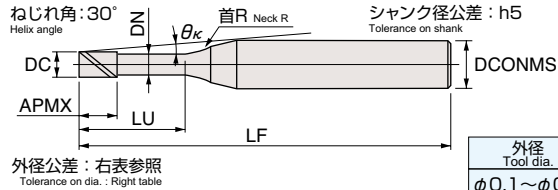
Line Up

## エポックディープスクエアエボリューション

EPDSE-ATH



2枚刃  
2 Flutes

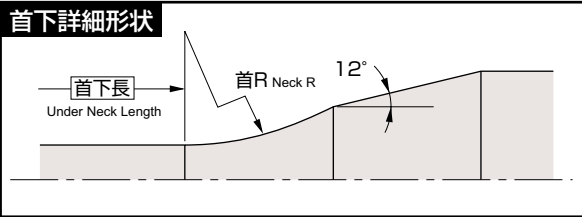


| 外径<br>Tool dia. | 外径公差<br>Tolerance on dia. |
|-----------------|---------------------------|
| φ0.1~φ0.5       | 0<br>-0.007               |
| φ0.6~φ0.9       | 0<br>-0.01                |
| φ1~φ6           | 0<br>-0.015               |

## EPDSE2-ATH

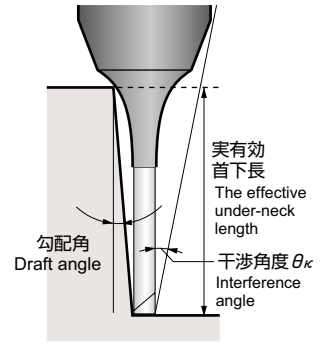
| 商品コード<br>Item code | 在庫<br>Stock<br>ATH | 寸法 Size(mm)           |                                |                            |                       |                            |                               |              | 干渉角度<br>Interference<br>angle<br>θ <sub>k</sub> | 勾配角に対する実有効首下長<br>Effective under neck length<br>with respect to draft angle |       |       |       |       | 希望小売<br>価格(円)<br>Suggested<br>retail price<br>(¥) |
|--------------------|--------------------|-----------------------|--------------------------------|----------------------------|-----------------------|----------------------------|-------------------------------|--------------|---|---|-------|-------|-------|-------|---|
|                    |                    | 外径<br>Tool dia.<br>DC | 首下長<br>Under Neck length<br>LU | 刃長<br>Flute length<br>APMX | 首径<br>Neck dia.<br>DN | 全長<br>Overall length<br>LF | シャング径<br>Shank dia.<br>DCONMS | 首R<br>Neck R |   | 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  |   |
| EPDSE2008-4-ATH    | ●                  | 4                     | 7.86                           |                            | 4.66                  |                            |                               |              | 4.89  |   |       | 5.07  | 5.24  | 5.53  | 5,440   |
| EPDSE2008-6-ATH    | ●                  | 6                     | 6.72                           |                            | 6.76                  |                            |                               |              | 7.04  |   |       | 7.26  | 7.45  | 8.05  | 5,440   |
| EPDSE2008-8-ATH    | ●                  | 8                     | 5.86                           |                            | 8.85                  |                            |                               |              | 9.17  |   |       | 9.42  | 9.65  | 10.71 | 5,440   |
| EPDSE2008-10-ATH   | ●                  | 10                    | 5.20                           |                            | 10.93                 |                            |                               |              | 11.28   |   |       | 11.56 | 12.05 | 13.36 | 7,940   |
| EPDSE2008-12-ATH   | ●                  | 12                    | 4.67                           |                            | 13.00                 |                            |                               |              | 13.38   |   |       | 13.76 | 14.44 | 16.02 | 9,060   |
| 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  | 6,270   |
| EPDSE2009-4-ATH    | ●                  |                       | 4                              |                            |                       |                            |                               |              | 7.76  | 4.69  | 4.91  | 5.09  | 5.26  | 5.54  | 6,270   |
| EPDSE2009-6-ATH    | ●                  |                       | 6                              |                            |                       |                            |                               |              | 6.61  | 6.79  | 7.06  | 7.28  | 7.47  | 8.08  | 6,270   |
| EPDSE2009-8-ATH    | ●                  |                       | 8                              |                            |                       |                            |                               |              | 5.76  | 8.87  | 9.18  | 9.43  | 9.68  | 10.74 | 6,270   |
| EPDSE2009-10-ATH   | ●                  |                       | 10                             |                            |                       |                            |                               |              | 5.10  | 10.95   | 11.30 | 11.57 | 12.07 | 13.39 | 6,270   |
| EPDSE2009-12-ATH   | ●                  |                       | 12                             |                            |                       |                            |                               |              | 4.58  | 13.02   | 13.40 | 13.79 | 14.47 | 16.05 | 7,160   |
| EPDSE2010-2-ATH    | ●                  | 1                     | 2                              | 1.5                        | 0.96                  | 50                         | 4                             | 4            | 9.31  | 2.58  | 2.73  | 2.86  | 2.98  | 3.21  | 4,890   |
| EPDSE2010-3-ATH    | ●                  |                       | 3                              |                            |                       |                            |                               |              | 8.41  | 3.64  | 3.82  | 3.99  | 4.13  | 4.39  | 4,890   |
| EPDSE2010-4-ATH    | ●                  |                       | 4                              |                            |                       |                            |                               |              | 7.67  | 4.69  | 4.91  | 5.09  | 5.26  | 5.54  | 4,890   |
| EPDSE2010-5-ATH    | ●                  |                       | 5                              |                            |                       |                            |                               |              | 7.04  | 5.74  | 5.99  | 6.19  | 6.37  | 6.76  | 4,890   |
| EPDSE2010-6-ATH    | ●                  |                       | 6                              |                            |                       |                            |                               |              | 6.51  | 6.79  | 7.06  | 7.28  | 7.47  | 8.08  | 4,890   |
| EPDSE2010-7-ATH    | ●                  |                       | 7                              |                            |                       |                            |                               |              | 6.06  | 7.83  | 8.12  | 8.36  | 8.56  | 9.41  | 4,890   |
| EPDSE2010-8-ATH    | ●                  |                       | 8                              |                            |                       |                            |                               |              | 5.66  | 8.87  | 9.18  | 9.43  | 9.68  | 10.74 | 4,890   |
| EPDSE2010-9-ATH    | ●                  |                       | 9                              |                            |                       |                            |                               |              | 5.31  | 9.91  | 10.24 | 10.50 | 10.88 | 12.07 | 4,890   |
| EPDSE2010-10-ATH   | ●                  |                       | 10                             |                            |                       |                            |                               |              | 5.00  | 10.95   | 11.30 | 11.57 | 12.07 | 13.39 | 4,890   |
| EPDSE2010-12-ATH   | ●                  |                       | 12                             |                            |                       |                            |                               |              | 4.48  | 13.02   | 13.40 | 13.79 | 14.47 | 16.05 | 4,890   |
| EPDSE2010-14-ATH   | ●                  |                       | 14                             |                            |                       |                            |                               |              | 4.06  | 15.09   | 15.49 | 16.07 | 16.86 | 18.70 | 4,890   |
| EPDSE2010-16-ATH   | ●                  |                       | 16                             |                            |                       |                            |                               |              | 3.71  | 17.15   | 17.58 | 18.35 | 19.25 | 21.36 | 7,940   |
| EPDSE2010-20-ATH   | ●                  |                       | 20                             |                            |                       |                            |                               |              | 3.17  | 21.26   | 21.89 | 22.91 | 24.04 | 26.66 | 7,940   |
| EPDSE2010-25-ATH   | ●                  |                       | 25                             |                            |                       |                            |                               |              | 2.68  | 26.39   | 27.33 | 28.61 | 30.02 | 干渉なし  | 9,200   |
| 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  | 5,160   |
| EPDSE2012-6-ATH    | ●                  |                       | 6                              |                            |                       |                            |                               |              | 6.29  | 6.81  | 7.08  | 7.29  | 7.48  | 8.11  | 5,160   |
| EPDSE2012-8-ATH    | ●                  |                       | 8                              |                            |                       |                            |                               |              | 5.44  | 8.90  | 9.20  | 9.45  | 9.71  | 10.77 | 5,160   |
| EPDSE2012-10-ATH   | ●                  |                       | 10                             |                            |                       |                            |                               |              | 4.80  | 10.97   | 11.31 | 11.58 | 12.10 | 13.42 | 5,160   |
| EPDSE2012-12-ATH   | ●                  |                       | 12                             |                            |                       |                            |                               |              | 4.29  | 13.04   | 13.41 | 13.82 | 14.49 | 16.08 | 5,160   |
| EPDSE2012-16-ATH   | ●                  |                       | 16                             |                            |                       |                            |                               |              | 3.53  | 17.16   | 17.59 | 18.38 | 19.28 | 21.39 | 8,230   |
| 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  | 5,300   |
| EPDSE2014-12-ATH   | ●                  |                       | 12                             |                            |                       |                            |                               |              | 4.08  | 13.06   | 13.43 | 13.84 | 14.52 | 16.11 | 5,300   |
| 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  | 5,160   |
| EPDSE2015-6-ATH    | ●                  |                       | 6                              |                            |                       |                            |                               |              | 5.94  | 6.84  | 7.09  | 7.31  | 7.50  | 8.15  | 5,160   |
| EPDSE2015-8-ATH    | ●                  |                       | 8                              |                            |                       |                            |                               |              | 5.10  | 8.92  | 9.22  | 9.46  | 9.74  | 10.80 | 5,160   |
| EPDSE2015-10-ATH   | ●                  |                       | 10                             |                            |                       |                            |                               |              | 4.47  | 10.99   | 11.33 | 11.59 | 12.13 | 13.45 | 5,160   |
| EPDSE2015-12-ATH   | ●                  |                       | 12                             |                            |                       |                            |                               |              | 3.97  | 13.06   | 13.43 | 13.84 | 14.52 | 16.11 | 5,160   |
| EPDSE2015-14-ATH   | ●                  |                       | 14                             |                            |                       |                            |                               |              | 3.58  | 15.12   | 15.52 | 16.12 | 16.92 | 18.76 | 5,300   |
| EPDSE2015-16-ATH   | ●                  |                       | 16                             |                            |                       |                            |                               |              | 3.25  | 17.18   | 17.60 | 18.40 | 19.31 | 21.42 | 5,300   |
| EPDSE2015-18-ATH   | ●                  |                       | 18                             |                            |                       |                            |                               |              | 2.98  | 19.24   | 19.76 | 20.69 | 21.70 | 干渉なし  | 5,300   |
| EPDSE2015-20-ATH   | ●                  |                       | 20                             |                            |                       |                            |                               |              | 2.76  | 21.29   | 21.94 | 22.97 | 24.10 | 干渉なし  | 5,300   |
| EPDSE2015-25-ATH   | ●                  |                       | 25                             |                            |                       |                            |                               |              | 2.31  | 26.42   | 27.39 | 28.67 | 30.08 | 干渉なし  | 7,940   |
| EPDSE2015-30-ATH   | ●                  |                       | 30                             |                            |                       |                            |                               |              | 1.99  | 31.53   | 32.83 | 34.37 | 干渉なし  | 干渉なし  | 7,940   |
| EPDSE2015-35-ATH   | ●                  |                       | 35                             |                            |                       |                            |                               |              | 1.75  | 36.64   | 38.28 | 40.07 | 干渉なし  | 干渉なし  | 9,060   |
| EPDSE2015-40-ATH   | ●                  |                       | 40                             |                            |                       |                            |                               |              | 1.56  | 41.85   | 43.73 | 45.78 | 干渉なし  | 干渉なし  | 10,170  |
| EPDSE2016-6-ATH    | ●                  |                       | 1.6                            |                            |                       |                            |                               |              | 6   | 2.4   | 1.54  | 50    | 4     | 4     | 5.82  |
| EPDSE2016-8-ATH    | ●                  | 8                     |                                | 4.98                       | 8.92                  | 9.22                       | 9.46                          | 9.74         | 10.80   |   |       |       |       |       | 5,300   |
| 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  | 5,300   |
| EPDSE2018-8-ATH    | ●                  |                       | 8                              |                            |                       |                            |                               |              | 4.72  | 8.94  | 9.23  | 9.47  | 9.76  | 10.83 | 5,300   |

● : 標準在庫品です。 干渉なし : No interference  
 ● : Stocked items.



**【注意】**  
 エポックディープスクエアEPDSとは有効首下長が異なります。再度ご確認ください。

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



# EPDSE2○○○-○○○-ATH

| 商品コード<br>Item code | 在庫<br>Stock<br>ATH | 寸法 Size(mm)           |                                |                            |                       |                            |                               | 干渉角度<br>Interference angle<br>θκ | 勾配角に対する実有効首下長<br>Effective under neck length with respect to draft angle |       |       |       |       | 希望小売<br>価格(円)<br>Suggested retail price (¥) |        |
|--------------------|--------------------|-----------------------|--------------------------------|----------------------------|-----------------------|----------------------------|-------------------------------|----------------------------------|--|-------|-------|-------|-------|---|--------|
|                    |                    | 外径<br>Tool dia.<br>DC | 首下長<br>Under Neck length<br>LU | 刃長<br>Flute length<br>APMX | 首径<br>Neck dia.<br>DN | 全長<br>Overall length<br>LF | シャンク径<br>Shank dia.<br>DCONMS |                                  | 首R<br>Neck R   | 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  | 5,160  |
| EPDSE2020-6-ATH    | ●                  |                       | 6                              |                            |                       |                            |                               |                                  | 5.25   | 6.88  | 7.13  | 7.34  | 7.52  | 8.21  | 5,160  |
| EPDSE2020-8-ATH    | ●                  |                       | 8                              |                            |                       |                            |                               |                                  | 4.44   | 8.96  | 9.25  | 9.49  | 9.79  | 10.86                                       | 5,160  |
| EPDSE2020-10-ATH   | ●                  |                       | 10                             |                            |                       |                            |                               |                                  | 3.85   | 11.03 | 11.35 | 11.62 | 12.19 | 13.52                                       | 5,160  |
| EPDSE2020-12-ATH   | ●                  |                       | 12                             |                            |                       |                            |                               |                                  | 3.39   | 13.10 | 13.45 | 13.90 | 14.58 | 16.17                                       | 5,160  |
| EPDSE2020-14-ATH   | ●                  |                       | 14                             |                            |                       | 3.03                       |                               |                                  | 15.16  | 15.54 | 16.18 | 16.97 | 18.83 | 5,160                                       |        |
| EPDSE2020-16-ATH   | ●                  |                       | 16                             |                            |                       | 2.75                       |                               |                                  | 17.21  | 17.63 | 18.46 | 19.37 | 干渉なし  | 5,160                                       |        |
| EPDSE2020-18-ATH   | ●                  |                       | 18                             |                            |                       | 2.51                       |                               |                                  | 19.27  | 19.81 | 20.74 | 21.76 | 干渉なし  | 5,160                                       |        |
| EPDSE2020-20-ATH   | ●                  |                       | 20                             |                            |                       | 2.31                       |                               |                                  | 21.32  | 21.99 | 23.02 | 24.15 | 干渉なし  | 5,160                                       |        |
| EPDSE2020-25-ATH   | ●                  |                       | 25                             |                            |                       | 1.92                       |                               |                                  | 26.44  | 27.44 | 28.72 | 干渉なし  | 干渉なし  | 5,160                                       |        |
| EPDSE2020-30-ATH   | ●                  |                       | 30                             |                            |                       | 1.65                       |                               |                                  | 31.55  | 32.88 | 34.42 | 干渉なし  | 干渉なし  | 6,410                                       |        |
| EPDSE2020-35-ATH   | ●                  |                       | 35                             |                            |                       | 1.44                       |                               |                                  | 36.69  | 38.33 | 干渉なし  | 干渉なし  | 干渉なし  | 7,670                                       |        |
| EPDSE2020-40-ATH   | ●                  |                       | 40                             |                            |                       | 1.28                       |                               |                                  | 41.90  | 43.78 | 干渉なし  | 干渉なし  | 干渉なし  | 9,610                                       |        |
| EPDSE2020-50-ATH   | ●                  |                       | 50                             |                            |                       | 1.05                       |                               |                                  | 52.33  | 54.67 | 干渉なし  | 干渉なし  | 干渉なし  | 11,580                                      |        |
| EPDSE2025-8-ATH    | ●                  |                       | 2.5                            |                            |                       | 8                          |                               |                                  | 3.75   | 2.4   | 50    | 4     | 4     | 3.65  | 9.00   |
| EPDSE2025-12-ATH   | ●                  | 12                    |                                | 2.73                       | 13.13                 | 13.48                      | 13.95                         | 14.64                            |  |       |       |       |       | 干渉なし  | 5,440  |
| EPDSE2025-16-ATH   | ●                  | 16                    |                                | 2.18                       | 17.25                 | 17.68                      | 18.51                         | 19.42                            |  |       |       |       |       | 干渉なし  | 5,440  |
| EPDSE2025-20-ATH   | ●                  | 20                    |                                | 1.81                       | 21.35                 | 22.04                      | 23.07                         | 干渉なし                             |  |       |       |       |       | 干渉なし  | 5,440  |
| EPDSE2025-30-ATH   | ●                  | 30                    |                                | 1.28                       | 31.58                 | 32.94                      | 干渉なし                          | 干渉なし                             |  |       |       |       |       | 干渉なし  | 5,850  |
| EPDSE2025-40-ATH   | ●                  | 40                    |                                | 0.99                       | 41.95                 | 干渉なし                       | 干渉なし                          | 干渉なし                             |  |       |       |       |       | 干渉なし  | 8,230  |
| EPDSE2025-50-ATH   | ●                  | 50                    | 0.80                           | 52.38                      | 干渉なし                  | 干渉なし                       | 干渉なし                          | 干渉なし                             | 10,170   |       |       |       |       |   |        |
| EPDSE2030-8-ATH    | ●                  | 3                     | 8                              | 4.5                        | 2.88                  | 55                         | 6                             | 4                                | 5.59   | 9.04  | 9.31  | 9.54  | 9.91  | 10.99                                       | 6,970  |
| EPDSE2030-12-ATH   | ●                  |                       | 12                             |                            |                       |                            |                               |                                  | 4.44   | 13.16 | 13.50 | 14.00 | 14.69 | 16.30                                       | 6,970  |
| EPDSE2030-16-ATH   | ●                  |                       | 16                             |                            |                       |                            |                               |                                  | 3.68   | 17.28 | 17.73 | 18.57 | 19.48 | 21.61                                       | 6,970  |
| EPDSE2030-20-ATH   | ●                  |                       | 20                             |                            |                       |                            |                               |                                  | 3.15   | 21.38 | 22.09 | 23.13 | 24.26 | 26.91                                       | 6,970  |
| EPDSE2030-25-ATH   | ●                  |                       | 25                             |                            |                       |                            |                               |                                  | 2.66   | 26.49 | 27.54 | 28.83 | 30.25 | 干渉なし  | 6,970  |
| EPDSE2030-30-ATH   | ●                  |                       | 30                             |                            |                       |                            |                               |                                  | 2.31   | 31.60 | 32.99 | 34.53 | 36.23 | 干渉なし  | 8,360  |
| EPDSE2030-40-ATH   | ●                  |                       | 40                             |                            |                       |                            |                               |                                  | 1.82   | 42.00 | 43.88 | 45.94 | 干渉なし  | 干渉なし  | 8,650  |
| EPDSE2030-50-ATH   | ●                  |                       | 50                             |                            |                       |                            |                               |                                  | 1.50   | 52.43 | 54.78 | 干渉なし  | 干渉なし  | 干渉なし  | 12,110 |
| EPDSE2040-12-ATH   | ●                  | 4                     | 12                             | 6                          | 3.85                  | 60                         | 6                             | 4                                | 3.36   | 13.21 | 13.54 | 14.08 | 14.78 | 16.39                                       | 8,090  |
| EPDSE2040-16-ATH   | ●                  |                       | 16                             |                            |                       |                            |                               |                                  | 2.72   | 17.32 | 17.81 | 18.65 | 19.56 | 干渉なし  | 8,090  |
| EPDSE2040-20-ATH   | ●                  |                       | 20                             |                            |                       |                            |                               |                                  | 2.29   | 21.42 | 22.17 | 23.21 | 24.35 | 干渉なし  | 8,090  |
| EPDSE2040-25-ATH   | ●                  |                       | 25                             |                            |                       |                            |                               |                                  | 1.91   | 26.53 | 27.62 | 28.91 | 干渉なし  | 干渉なし  | 8,090  |
| EPDSE2040-30-ATH   | ●                  |                       | 30                             |                            |                       |                            |                               |                                  | 1.64   | 31.65 | 33.06 | 34.61 | 干渉なし  | 干渉なし  | 8,090  |
| EPDSE2040-35-ATH   | ●                  |                       | 35                             |                            |                       |                            |                               |                                  | 1.44   | 36.86 | 38.51 | 干渉なし  | 干渉なし  | 干渉なし  | 8,090  |
| EPDSE2040-40-ATH   | ●                  |                       | 40                             |                            |                       |                            |                               |                                  | 1.28   | 42.08 | 43.96 | 干渉なし  | 干渉なし  | 干渉なし  | 10,170 |
| EPDSE2040-50-ATH   | ●                  |                       | 50                             |                            |                       |                            |                               |                                  | 1.05   | 52.50 | 54.85 | 干渉なし  | 干渉なし  | 干渉なし  | 15,000 |
| EPDSE2050-20-ATH   | ●                  | 5                     | 20                             | 7.5                        | 4.85                  | 70                         | 6                             | 4                                | 1.27   | 21.42 | 22.17 | 干渉なし  | 干渉なし  | 干渉なし  | 10,650 |
| EPDSE2050-25-ATH   | ●                  |                       | 25                             |                            |                       |                            |                               |                                  | 1.04   | 26.53 | 27.62 | 干渉なし  | 干渉なし  | 干渉なし  | 10,650 |
| EPDSE2050-30-ATH   | ●                  |                       | 30                             |                            |                       |                            |                               |                                  | 0.88   | 31.65 | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 10,650 |
| EPDSE2050-40-ATH   | ●                  |                       | 40                             |                            |                       |                            |                               |                                  | 0.68   | 42.08 | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 10,650 |
| EPDSE2050-50-ATH   | ●                  |                       | 50                             |                            |                       |                            |                               |                                  | 0.55   | 52.50 | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 16,830 |
| EPDSE2060-20-ATH   | ●                  | 6                     | 20                             | 9                          | 5.85                  | 70                         | 6                             | -                                | 0  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 10,950 |
| EPDSE2060-30-ATH   | ●                  |                       | 30                             |                            |                       |                            |                               |                                  | 0  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 11,220 |
| EPDSE2060-40-ATH   | ●                  |                       | 40                             |                            |                       |                            |                               |                                  | 0  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 13,250 |
| EPDSE2060-50-ATH   | ●                  |                       | 50                             |                            |                       |                            |                               |                                  | 0  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 干渉なし  | 16,830 |

●：標準在庫品です。 干渉なし：No interference  
 ●：Stocked items.

特長

寸法ボールPN

寸法ボールATH

切削条件ボール高精度

切削条件ボール高精度

寸法スクエアPN

寸法スクエアATH

切削条件スクエア高精度

切削条件スクエア高精度

技術データ

# 標準切削条件表

Recommended Cutting Conditions

**高能率切削条件**  
High efficiency cutting condition

高精度切削条件  
High accuracy cutting condition

高精度切削条件は25ページを参照してください。  
Please refer to P.25 about high accuracy cutting conditions

## エポックディープスクエアエボリューション Epoch Deep Square Evolution

EPDSE-PN

EPDSE-ATH

| 推奨領域<br>Recommended range                  |                                       |            |                               | PNシリーズ PN series     |                               |  |                               |  |                               |  |                               |                                       |                               |                                       |  |
|--|---------------------------------------|------------|-------------------------------|----------------------|-------------------------------|--|-------------------------------|--|-------------------------------|--|-------------------------------|---------------------------------------|-------------------------------|---------------------------------------|--|
|  |                                       |            |                               | ATHシリーズ ATH series   |                               |  |                               |  |                               |  |                               |                                       |                               |                                       |  |
| 被削材<br>Work material                       |                                       |            |                               | 1                    |                               | 2  |                               | 3  |                               | 4  |                               | 5                                     |                               | 6                                     |  |
|  |                                       |            |                               | 銅<br>Coppers         |                               | 炭素鋼・合金鋼<br>Carbon steels,<br>Alloy steels<br>(180~250HB) |                               | ステンレス鋼・工具鋼<br>Stainless steels,<br>Tool steels<br>(25~35HRC) |                               | プリハードン鋼<br>Pre-hardened steels<br>(35~45HRC) |                               | 焼入れ鋼<br>Hardened steels<br>(45~55HRC) |                               | 焼入れ鋼<br>Hardened steels<br>(55~65HRC) |  |
| 切込み比率<br>Ratio to standard<br>depth of cut |                                       |            |                               | 120%                 |                               | 100%   |                               | 90%  |                               | 70%  |                               | 50%                                   |                               | 45%                                   |  |
| 外径DC<br>Tool dia.<br>(mm)                  | 首下長LU<br>Under neck<br>length<br>(mm) | ap<br>(mm) | 回転数<br>n<br>min <sup>-1</sup> | 送り速度<br>vf<br>mm/min | 回転数<br>n<br>min <sup>-1</sup> | 送り速度<br>vf<br>mm/min                                     | 回転数<br>n<br>min <sup>-1</sup> | 送り速度<br>vf<br>mm/min   | 回転数<br>n<br>min <sup>-1</sup> | 送り速度<br>vf<br>mm/min                         | 回転数<br>n<br>min <sup>-1</sup> | 送り速度<br>vf<br>mm/min                  | 回転数<br>n<br>min <sup>-1</sup> | 送り速度<br>vf<br>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                                   |  |
| 0.3  | 3                                     | 0.003      | 43,200                        | 454                  | 36,000                        | 378  | 32,400                        | 340  | 30,600                        | 257  | 27,000                        | 193                                   | 25,200                        | 155                                   |  |
|  | 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                                   |  |
| 0.4  | 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                                   |  |
|  | 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                                   |  |
| 0.5  | 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                                    |  |
|  | 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                                   |  |
| 0.6  | 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                                   |  |
|  | 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                                   |  |
| 0.7  | 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                                   |  |
|  | 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                           |                                       |  |

**[注意]** 24ページを参照してください。 **[Note]** Please refer to P.24

| 推奨領域<br>Recommended range                  |                                       |            | PNシリーズ PN series              |        |  |        |  |        |  |        |                                       |        |                                       |        |        |
|--|---------------------------------------|------------|-------------------------------|--------|--|--------|--|--------|--|--------|---------------------------------------|--------|---------------------------------------|--------|--------|
|  |                                       |            | ATHシリーズ ATH series            |        |  |        |  |        |  |        |                                       |        |                                       |        |        |
| 被削材<br>Work material                       |                                       |            | 1                             |        | 2  |        | 3  |        | 4  |        | 5                                     |        | 6                                     |        |        |
|  |                                       |            | 銅<br>Coppers                  |        | 炭素鋼・合金鋼<br>Carbon steels,<br>Alloy steels<br>(180~250HB) |        | ステンレス鋼・工具鋼<br>Stainless steels,<br>Tool steels<br>(25~35HRC) |        | プリハードン鋼<br>Pre-hardened steels<br>(35~45HRC) |        | 焼入れ鋼<br>Hardened steels<br>(45~55HRC) |        | 焼入れ鋼<br>Hardened steels<br>(55~65HRC) |        |        |
| 切込み比率<br>Ratio to standard<br>depth of cut |                                       |            | 120%                          |        | 100%   |        | 90%  |        | 70%  |        | 50%                                   |        | 45%                                   |        |        |
| 外径DC<br>Tool dia.<br>(mm)                  | 首下長LU<br>Under neck<br>length<br>(mm) | ap<br>(mm) | 回転数<br>n<br>min <sup>-1</sup> |        | 送り速度<br>vf<br>mm/min                                     |        | 回転数<br>n<br>min <sup>-1</sup>                                |        | 送り速度<br>vf<br>mm/min                         |        | 回転数<br>n<br>min <sup>-1</sup>         |        | 送り速度<br>vf<br>mm/min                  |        |        |
|  |                                       |            | 0.8                           |        | 2  | 0.08   | 38,400   | 1,210  | 32,000                                       | 1,008  | 28,800                                | 907    | 27,200                                | 780    | 24,000 |
|  |                                       | 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 | 1,094  | 28,800 | 994  | 25,920 | 895  | 24,480 | 687                                   | 21,600 | 556                                   | 20,160 | 414    |
|  |                                       | 8          | 0.023                         | 34,560 | 1,094  | 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 | 1,048  | 19,040 | 801                                   | 16,800 | 648                                   | 15,680 | 482    |
|  |                                       | 6          | 0.11                          | 26,880 | 1,397  | 22,400 | 1,163  | 20,160 | 1,048  | 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    |

**[注意]** 24ページを参照してください。 **[Note]** Please refer to P.24

特長

寸法ボールPN

寸法ボールATH

切削条件ボール高効率

切削条件ボール高精度

寸法スクエアPN

寸法スクエアATH

切削条件スクエア高効率

切削条件スクエア高精度

技術データ

# 標準切削条件表

## Recommended Cutting Conditions

**高能率切削条件**  
High efficiency cutting condition

高精度切削条件  
High accuracy cutting condition

高精度切削条件は25ページを参照してください。  
Please refer to P.25 about high accuracy cutting conditions

### エポックディープスクエアエボリューション Epoch Deep Square Evolution

**EPDSE-PN** **EPDSE-ATH**

| 推奨領域<br>Recommended range                  |                                       | PNシリーズ PN series   |  |                      |  |                      |  |                      |                                       |                      |                                       |                      |        |     |
|--|---------------------------------------|--------------------|--|----------------------|--|----------------------|--|----------------------|---------------------------------------|----------------------|---------------------------------------|----------------------|--------|-----|
|  |                                       | ATHシリーズ ATH series |  |                      |  |                      |  |                      |                                       |                      |                                       |                      |        |     |
| 被削材<br>Work material                       | 1                                     |                    | 2  |                      | 3  |                      | 4  |                      | 5                                     |                      | 6                                     |                      |        |     |
|  | 銅<br>Coppers                          |                    | 炭素鋼・合金鋼<br>Carbon steels,<br>Alloy steels<br>(180~250HB) |                      | ステンレス鋼・工具鋼<br>Stainless steels,<br>Tool steels<br>(25~35HRC) |                      | プリハードン鋼<br>Pre-hardened steels<br>(35~45HRC) |                      | 焼入れ鋼<br>Hardened steels<br>(45~55HRC) |                      | 焼入れ鋼<br>Hardened steels<br>(55~65HRC) |                      |        |     |
| 切込み比率<br>Ratio to standard<br>depth of cut | 120%                                  |                    | 100%   |                      | 90%  |                      | 70%  |                      | 50%                                   |                      | 45%                                   |                      |        |     |
| 外径DC<br>Tool dia.<br>(mm)                  | 首下長LU<br>Under neck<br>length<br>(mm) | ap<br>(mm)         | 回転数<br>n<br>min <sup>-1</sup>                            | 送り速度<br>vf<br>mm/min | 回転数<br>n<br>min <sup>-1</sup>                                | 送り速度<br>vf<br>mm/min | 回転数<br>n<br>min <sup>-1</sup>                | 送り速度<br>vf<br>mm/min | 回転数<br>n<br>min <sup>-1</sup>         | 送り速度<br>vf<br>mm/min | 回転数<br>n<br>min <sup>-1</sup>         | 送り速度<br>vf<br>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 |
| 3  | 50                                    | 0.01               | 12,096   | 625                  | 10,080   | 521                  | 9,072  | 469                  | 8,568                                 | 313                  | 7,560                                 | 245                  | 7,056  | 198 |
|  | 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 |
| 4  | 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 |
|  | 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 |
| 5  | 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 |
|  | 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 |
| 6  | 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 |
|  | 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    |     |

※apは被削材グループ2での目安を示しています。その他のグループの場合は、上表の切込み比率を目安に調整してください。

※ap is shown as the criteria for Group 2 workpieces. For other groups, adjust the cutting depth according to the cutting depth factors in the above table.

- 【注意】**
- ①PNコーティングはその性質上、通電性が微小です。従って、通電方式の工具長測定装置をご使用の際にはご注意ください。
  - ②被削材、加工形状に合わせて、適切なクーラントを使用してください。
  - ③この標準切削条件表は切削条件の目安を示すものです。実際の加工では加工形状、目的、使用機械等により条件を調整してください。
  - ④機械の回転数が足りない場合は、回転数と送り速度を同じ比率で下げてください。
- 【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.



高能率切削条件  
High efficiency cutting condition

高精度切削条件  
High accuracy cutting condition

高能率切削条件は22ページを参照してください。  
Please refer to P.22 about high efficiency cutting conditions

エポックディープスクエアエボリューション Epoch Deep Square Evolution

EPDSE-PN

EPDSE-ATH

| 推奨領域<br>Recommended range                  |                                       |            | PNシリーズ PN series         |  |                          |  |                          |  |                          |                                       |                          |                                       |                          |                 |
|--|---------------------------------------|------------|--------------------------|--|--------------------------|--|--------------------------|--|--------------------------|---------------------------------------|--------------------------|---------------------------------------|--------------------------|-----------------|
|  |                                       |            | ATHシリーズ ATH series       |  |                          |  |                          |  |                          |                                       |                          |                                       |                          |                 |
| 被削材<br>Work material                       |                                       |            | 1                        | 2  |                          | 3  |                          | 4  |                          | 5                                     |                          | 6                                     |                          |                 |
|  |                                       |            | 銅<br>Coppers             | 炭素鋼・合金鋼<br>Carbon steels,<br>Alloy steels<br>(180~250HB) |                          | ステンレス鋼・工具鋼<br>Stainless steels,<br>Tool steels<br>(25~35HRC) |                          | プリハードン鋼<br>Pre-hardened steels<br>(35~45HRC) |                          | 焼入れ鋼<br>Hardened steels<br>(45~55HRC) |                          | 焼入れ鋼<br>Hardened steels<br>(55~65HRC) |                          |                 |
| 切込み比率<br>Ratio to standard<br>depth of cut |                                       |            | 120%                     |  | 100%                     |  | 90%                      |  | 70%                      |                                       | 50%                      |                                       | 45%                      |                 |
| 外径DC<br>Tool dia.<br>(mm)                  | 首下長LU<br>Under neck<br>length<br>(mm) | ap<br>(mm) | 回転数                      | 送り速度   | 回転数                      | 送り速度   | 回転数                      | 送り速度   | 回転数                      | 送り速度                                  | 回転数                      | 送り速度                                  | 回転数                      | 送り速度            |
|  |                                       |            | $n$<br>min <sup>-1</sup> | $v_f$<br>mm/min  | $n$<br>min <sup>-1</sup> | $v_f$<br>mm/min  | $n$<br>min <sup>-1</sup> | $v_f$<br>mm/min                              | $n$<br>min <sup>-1</sup> | $v_f$<br>mm/min                       | $n$<br>min <sup>-1</sup> | $v_f$<br>mm/min                       | $n$<br>min <sup>-1</sup> | $v_f$<br>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             |
| 0.3  | 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             |
|  | 1                                     | 0.021      | 48,000                   | 544  | 40,000                   | 453  | 36,000                   | 408  | 34,000                   | 286                                   | 30,000                   | 240                                   | 28,000                   | 193             |
| 0.4  | 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             |
| 0.5  | 3                                     | 0.008      | 43,200                   | 448  | 36,000                   | 373  | 32,400                   | 336  | 30,600                   | 257                                   | 27,000                   | 180                                   | 25,200                   | 145             |
|  | 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             |
| 0.6  | 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              |
|  | 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             |
| 0.7  | 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              |
|  | 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             |
| 0.8  | 10                                    | 0.009      | 30,720                   | 595  | 25,600                   | 516  | 23,040                   | 464  | 21,760                   | 297                                   | 19,200                   | 262                                   | 17,920                   | 206             |
|  | 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             |
| 0.9  | 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             |

【注意】 27ページを参照してください。 【Note】 Please refer to P.27

特長

寸法ボールPN

寸法ボールATH

切削条件ボール高効率

切削条件ボール高精度

寸法スクエアPN

寸法スクエアATH

切削条件スクエア高効率

切削条件スクエア高精度

技術データ

# 標準切削条件表

Recommended Cutting Conditions

高能率切削条件

High efficiency cutting condition

高精度切削条件

High accuracy cutting condition

高能率切削条件は22ページを参照してください。  
Please refer to P.22 about high efficiency cutting conditions

## エポックディープスクエアエボリューション Epoch Deep Square Evolution

EPDSE-PN

EPDSE-ATH

| 推奨領域<br>Recommended range                  |                                       | PNシリーズ PN series   |                               |                      |  |                      |  |                      |  |                      |                                       |                      |                                       |                      |
|--|---------------------------------------|--------------------|-------------------------------|----------------------|--|----------------------|--|----------------------|--|----------------------|---------------------------------------|----------------------|---------------------------------------|----------------------|
|  |                                       | ATHシリーズ ATH series |                               |                      |  |                      |  |                      |  |                      |                                       |                      |                                       |                      |
| 被削材<br>Work material                       |                                       |                    | 1                             |                      | 2  |                      | 3  |                      | 4  |                      | 5                                     |                      | 6                                     |                      |
|  |                                       |                    | 銅<br>Coppers                  |                      | 炭素鋼・合金鋼<br>Carbon steels,<br>Alloy steels<br>(180~250HB) |                      | ステンレス鋼・工具鋼<br>Stainless steels,<br>Tool steels<br>(25~35HRC) |                      | プリハードン鋼<br>Pre-hardened steels<br>(35~45HRC) |                      | 焼入れ鋼<br>Hardened steels<br>(45~55HRC) |                      | 焼入れ鋼<br>Hardened steels<br>(55~65HRC) |                      |
| 切込み比率<br>Ratio to standard<br>depth of cut |                                       | 120%               |                               | 100%                 |  | 90%                  |  | 70%                  |  | 50%                  |                                       | 45%                  |                                       |                      |
| 外径DC<br>Tool dia.<br>(mm)                  | 首下長LU<br>Under neck<br>length<br>(mm) | ap<br>(mm)         | 回転数<br>n<br>min <sup>-1</sup> | 送り速度<br>vf<br>mm/min | 回転数<br>n<br>min <sup>-1</sup>                            | 送り速度<br>vf<br>mm/min | 回転数<br>n<br>min <sup>-1</sup>                                | 送り速度<br>vf<br>mm/min | 回転数<br>n<br>min <sup>-1</sup>                | 送り速度<br>vf<br>mm/min | 回転数<br>n<br>min <sup>-1</sup>         | 送り速度<br>vf<br>mm/min | 回転数<br>n<br>min <sup>-1</sup>         | 送り速度<br>vf<br>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                  |
| 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                  |
| 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                  |
| 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                  |
|  | 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                  |
| 1.4  | 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                  |
| 1.5  | 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                   |
|  | 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                  |
|  | 6                                     | 0.13               | 24,960                        | 1,179                | 20,800   | 997                  | 18,720   | 884                  | 17,680                                       | 690                  | 15,600                                | 515                  | 14,560                                | 415                  |
| 1.8  | 8                                     | 0.13               | 24,960                        | 1,179                | 20,800   | 997                  | 18,720   | 884                  | 17,680                                       | 621                  | 15,600                                | 515                  | 14,560                                | 415                  |

**[注意]** 27ページを参照してください。 **[Note]** Please refer to P.27

| 推奨領域<br>Recommended range                  |                                       |            | PNシリーズ PN series              |        |  |        |  |        |  |        |                                       |        |                                       |        |        |        |
|--|---------------------------------------|------------|-------------------------------|--------|--|--------|--|--------|--|--------|---------------------------------------|--------|---------------------------------------|--------|--------|--------|
|  |                                       |            | ATHシリーズ ATH series            |        |  |        |  |        |  |        |                                       |        |                                       |        |        |        |
| 被削材<br>Work material                       |                                       |            | 1                             |        | 2  |        | 3  |        | 4  |        | 5                                     |        | 6                                     |        |        |        |
|  |                                       |            | 銅<br>Coppers                  |        | 炭素鋼・合金鋼<br>Carbon steels,<br>Alloy steels<br>(180~250HB) |        | ステンレス鋼・工具鋼<br>Stainless steels,<br>Tool steels<br>(25~35HRC) |        | プリハードン鋼<br>Pre-hardened steels<br>(35~45HRC) |        | 焼入れ鋼<br>Hardened steels<br>(45~55HRC) |        | 焼入れ鋼<br>Hardened steels<br>(55~65HRC) |        |        |        |
| 切込み比率<br>Ratio to standard<br>depth of cut |                                       |            | 120%                          |        | 100%   |        | 90%  |        | 70%  |        | 50%                                   |        | 45%                                   |        |        |        |
| 外径DC<br>Tool dia.<br>(mm)                  | 首下長LU<br>Under neck<br>length<br>(mm) | ap<br>(mm) | 回転数<br>n<br>min <sup>-1</sup> |        | 送り速度<br>vf<br>mm/min                                     |        | 回転数<br>n<br>min <sup>-1</sup>                                |        | 送り速度<br>vf<br>mm/min                         |        | 回転数<br>n<br>min <sup>-1</sup>         |        | 送り速度<br>vf<br>mm/min                  |        |        |        |
|  |                                       |            | 2                             |        |  | 4      | 0.2  | 20,160 | 1,270  | 16,800 | 952                                   | 15,120 | 861                                   | 14,280 | 655    | 12,600 |
| 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    |
| 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    |
| 5  |                                       |            | 50                            | 0.06   | 7,896  | 789    | 6,580  | 658    | 7,106  | 592    | 5,593                                 | 460    | 4,935                                 | 309    | 4,606  | 249    |
|  |                                       |            | 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    |
| 6  |                                       |            | 50                            | 0.1    | 7,301  | 986    | 6,084  | 876    | 5,476  | 690    | 5,171                                 | 575    | 4,563                                 | 360    | 4,259  | 291    |
|  |                                       |            | 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    |

※apは被削材グループ2での目安を示しています。その他のグループの場合は、上表の切込み比率を目安に調整してください。

※ap is shown as the criteria for Group 2 workpieces. For other groups, adjust the cutting depth according to the cutting depth factors in the above table.

- [注意]**
- ①PNコーティングはその性質上、導電性が微小です。従って、通電方式の工具長測定装置をご使用の際にはご注意ください。
  - ②被削材、加工形状に合わせて、適切なクーラントを使用してください。
  - ③この標準切削条件表は切削条件の目安を示すものです。実際の加工では加工形状、目的、使用機械等により条件を調整してください。
  - ④機械の回転数が足りない場合は、回転数と送り速度を同じ比率で下げてください。

- [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.

特長

寸法  
ボールPN

寸法  
ボールATH

切削条件  
ボール高効率

切削条件  
ボール高精度

寸法  
スクエアPN

寸法  
スクエアATH

切削条件  
スクエア高効率

切削条件  
スクエア高精度

技術データ



### 2種類のコーティングで様々な被削材に対応

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

#### ■ 各コーティングの推奨加工領域 Recommended machining areas for each coating

#### PNコーティング加工領域

PN Coating cutting area

#### ATHコーティング加工領域

ATH Coating cutting area

軟鋼材  
Mild steels

30HRC

40HRC

50HRC

高硬度材  
Hardened material

#### 切削事例① Cutting Data 1

被削材 Work material : **SCM440<sup>Ⓜ</sup> 30HRC**

使用ホルダ Holder : HSK-F63

工具径 Tool dia. : R0.5× 首下 Under neck 6mm

クーラント Coolant : エアブロー Air-blow

$n=28,000\text{min}^{-1}$  ( $v_c=88\text{m/min}$ )

$v_f=1,200\text{mm/min}$  ( $f_z=0.02\text{mm/t}$ )

$a_p=0.036\text{mm}$ ,  $a_e=0.108\text{mm}$ , OH=18mm

切削距離 Cutting length 10m

#### PNコーティング PN Coating



PNコーティング良好

PN Coating is better.

#### ATHコーティング ATH Coating



#### 切削事例② Cutting Data 2

被削材 Work material : **HPM-MAGIC 40HRC**

使用ホルダ Holder : HSK-F63

工具径 Tool dia. : R0.5× 首下 Under neck 10mm

クーラント Coolant : エアブロー Air-blow

$n=24,300\text{min}^{-1}$  ( $v_c=76\text{m/min}$ )

$v_f=900\text{mm/min}$  ( $f_z=0.018\text{mm/t}$ )

$a_p=0.04\text{mm}$ , 往復溝切削 Cutting reciprocating slot, OH=18mm

OH=18mm

#### PNコーティング PN Coating



PNコーティング良好

PN Coating is better.

#### ATHコーティング ATH Coating



#### 切削事例③ Cutting Data 3

被削材 Work material : **DAC<sup>Ⓜ</sup> 45HRC**

使用ホルダ Holder : HSK-F63

工具径 Tool dia. : R0.5× 首下 Under neck 6mm

クーラント Coolant : エアブロー Air-blow

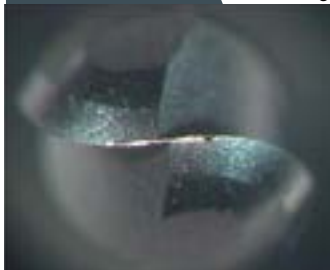
$n=27,540\text{min}^{-1}$  ( $v_c=86\text{m/min}$ )

$v_f=1,115\text{mm/min}$  ( $f_z=0.02\text{mm/t}$ )

$a_p=0.032\text{mm}$ ,  $a_e=0.096\text{mm}$ , OH=18mm

切削距離 Cutting length 10m

#### PNコーティング PN Coating



#### ATHコーティング ATH Coating



ATHコーティング良好

ATH Coating is better.

#### 切削事例④ Cutting Data 4

被削材 Work material : **HPM38 52HRC**

使用ホルダ Holder : HSK-F63,

工具径 Tool dia. : R0.5× 首下 Under neck 10mm

クーラント Coolant : エアブロー Air-blow

$n=24,300\text{min}^{-1}$  ( $v_c=76\text{m/min}$ ),

$v_f=919\text{mm/min}$  ( $f_z=0.018\text{mm/t}$ )

$a_p=0.016\text{mm}$ , OH=18mm,

切削距離 Cutting length 20m

#### PNコーティング PN Coating



#### ATHコーティング ATH Coating



ATHコーティング良好

ATH Coating is better.

特長

寸法ボールPN

寸法ボールATH

切削条件ボール高効率

切削条件ボール高精度

寸法スクエアPN

寸法スクエアATH

切削条件スクエア高効率

切削条件スクエア高精度

技術データ



## 面品位に優れた高精度安定加工が可能です!!

Enables high-accuracy stable machining with excellent surface quality.

**EPDBE-PN**

**PN Coating**

### 技術データ **SCM440<sup>®</sup> 33HRC リブ溝評価**

Technical Data : SCM440<sup>®</sup> 33HRC rib slot evaluation

使用工具 Tool : EPDBE2010-10-PN (R0.5 首下 Under neck 10mm)

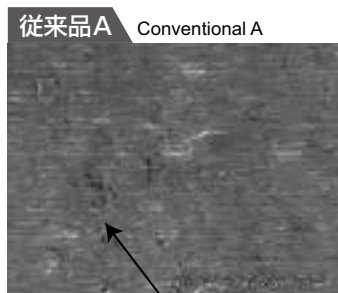
#### ★ここがすごい! その① 加工面の均一性!!

This is amazing! Point 1: Uniformity of machined surface



**均一なカッターマークを形成  
振動が起こっていない**

Forms uniform cutter marks.  
No vibrations occurred.

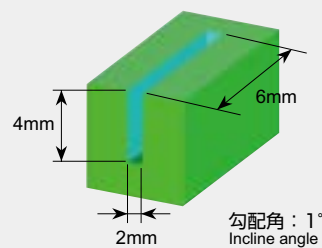


**カッターマークが不均一で、  
且つ擦れてマークが潰れている。**

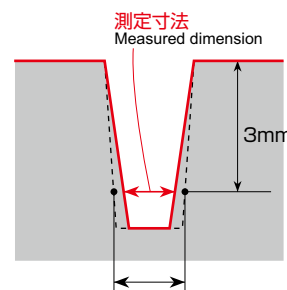
Cutter marks are not uniform.  
In addition, friction has collapsed marks

#### リブ溝評価

Rib slot evaluation



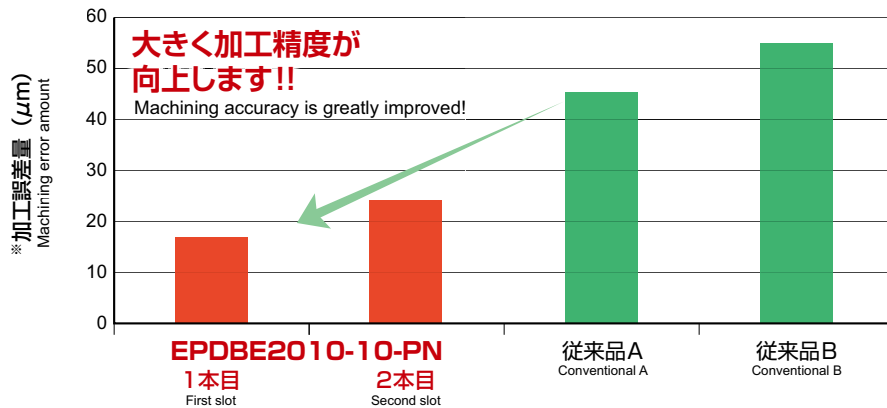
被削材 Work material :  
SCM440<sup>®</sup> 33HRC  
使用ホルダ Holder : HSK-F63  
クーラント Coolant : ウェット Wet  
 $n=16,000\text{min}^{-1}$  ( $v_c=50\text{m/min}$ )  
 $v_r=1,000\text{mm/min}$   
( $f_z=0.03\text{mm/t}$ )  
 $a_p \times a_e=0.02\text{mm} \times 0.04\text{mm}$



※加工誤差量 :  
(理論寸法)-(加工後の測定寸法)  
Machining error amount:  
(Ideal dimension)-(Measured dimension after cutting)

#### ★ここがすごい! その② たわみが少ないので加工精度が向上!!

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



**大きく加工精度が  
向上します!!**  
Machining accuracy is greatly improved!

深さ3mmでの理論寸法  
Ideal dimension at 3mm depth

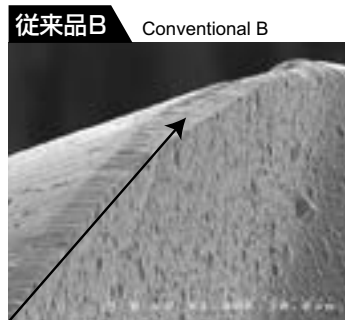
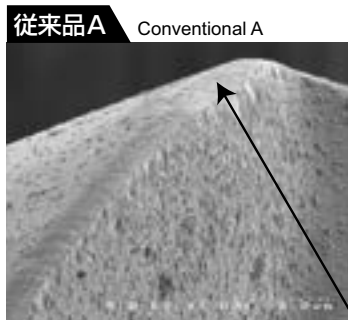
#### ★ここがすごい! その③ 耐摩耗性と耐チッピング性良好・・つまり長寿命!!

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



**振動なく安定して加工可能  
摩耗状態も良好**

Enables stable machining with no vibrations.  
Good wear condition.



**先端部の摩滅進行が早い…  
耐摩耗性が不十分**  
Wearing down of tip is fast.  
Wear resistance is poor.

特長

寸法ボールPN

寸法ボールATH

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切削条件ボール高精度

寸法スクエアPN

寸法スクエアATH

切削条件スクエア高効率

切削条件スクエア高精度

技術データ



**高硬度材も安定加工ならATHコーティングにお任せ!!**

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

**EPDBE-ATH**

**ATHCoating**

**技術データ**

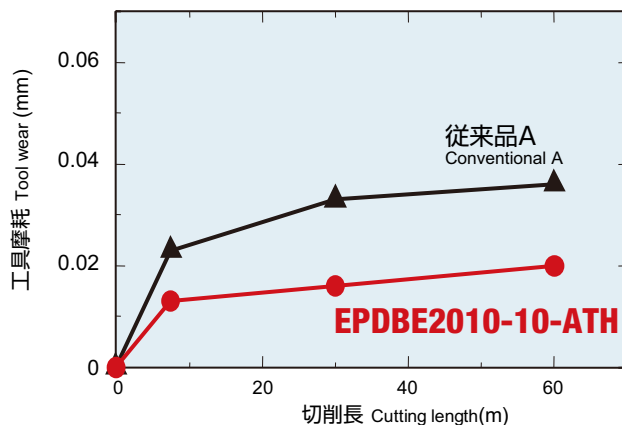
Technical Data

**使用工具 Tool : EPDBE2010-10-ATH (R0.5 首下 Under neck 10mm)**

**★ここがすごい! その① 摩耗形態が安定!! 高硬度でもチッピングなし**

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

| 加工形状<br>Machining shape | 切削条件<br>Cutting condition   | EPDBE2010-10-ATH  | 従来品<br>Conventional                  |
|-------------------------|---|---|--------------------------------------|
|                         | 被削材 Work material :<br><b>SLD® 60HRC</b><br>使用ホルダ Holder :<br>HSK-F63<br>クーラント Coolant :<br>エアブロー Air Blow<br>$n=10,000\text{min}^{-1}$<br>$(v_c=31.4\text{m/min})$<br>$v_f=800\text{mm/min}$<br>$(f_z=0.04\text{mm/t})$<br>$a_p \times a_e=0.02\text{mm} \times 0.02\text{mm}$ | <p>チゼルから外周まで安定した摩耗形態<br/>Stable wear condition from chisel to outer perimeter</p> | <p>チッピング発生<br/>Chipping occurred</p> |



**技術データ**

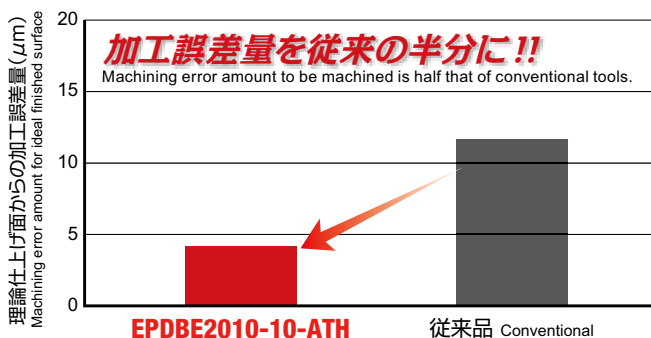
Technical Data

**使用工具 Tool : EPDBE2010-10-ATH (R0.5 首下 Under neck 10mm)**

**★ここがすごい! その② 少ないたわみで高精度を実現!!**

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

| 加工形状<br>Machining shape | 切削条件<br>Cutting condition   |
|-------------------------|---|
|                         | 被削材 Work material :<br>SUS420J2® 52HRC<br>使用ホルダ Holder :<br>HSK-F63<br>クーラント Coolant :<br>エアブロー Air Blow<br>$n=16,000\text{min}^{-1}$<br>$(v_c=50\text{m/min})$<br>$v_f=1,000\text{mm/min}$<br>$(f_z=0.03\text{mm/t})$<br>$a_p \times a_e=0.02\text{mm} \times 0.02\text{mm}$ |



**加工誤差量を従来の半分に!!**  
Machining error amount to be machined is half that of conventional tools.

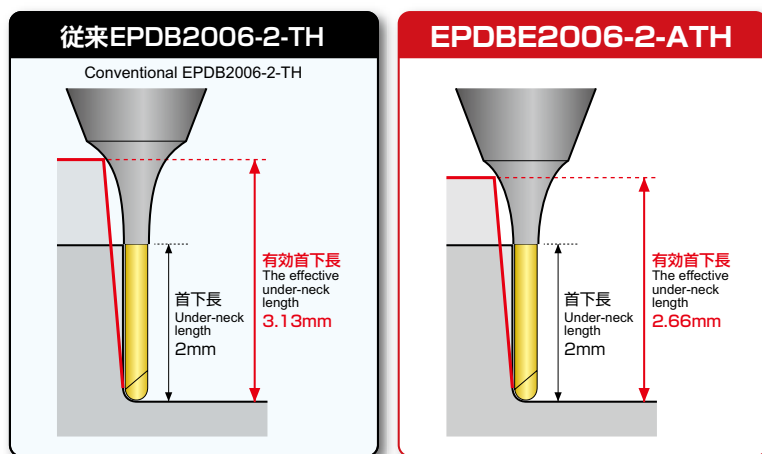
**外周ねじれ角が強く、切削性が向上!!**  
Periphery helix angle is strong, improving cutting performance.

# 工具干渉チェック・再研磨

## Tool interference check, Re-grinding

### ○ 首干渉領域の違い例 Example of difference in neck interference area

**R0.3×首下2mmの場合の干渉領域の違い** (図中に示すのは勾配角1°とする。)  
 Difference in interference area for R=0.3 x Under-neck length=2mm (Figures show a slope angle of 1°.)



従来と新商品で同じR0.3×首下2mmを使って勾配角1°の面を比較すると、従来EPDB2006-2-THは有効首下長が3.13mmであるのに対して、EPDBE2006-2-ATHは2.66mmになります。

When a conventional product and new product with R=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.

今回の新商品に適用した首形状の改善により、干渉領域が従来のEPDB、EPDSと異なります。有効首下長を確認した上で、ご使用ください。

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

### ○ 干渉チェックには・・・ For checking interference:

## CAD/CAM サポートデータパック

### CAD/CAM Support Data Pack

CAD/CAM サポートデータパックが最新エポックディープエボリューションシリーズも追加してバージョンアップしました! 当社の最新エンドミルを検索して、干渉角度の計算ができます。詳しくは弊社ホームページをご覧ください。

The CAD/CAM Support Data Pack has been updated to include the Epoch Deep Evolution Series. You can search for the latest end mil. Please visit our company's home page for details.



### ○ 再研磨対応範囲一覧表 Re-grinding compatibility range table

| 商品コード<br>Item code | 商品名称<br>Product name   | 外径(mm)<br>Tool dia. | 形状<br>Shape | 再研磨対応範囲(mm)<br>Re-grinding compatibility range |         |
|--------------------|--|---------------------|-------------|--|---------|
|                    |  |                     |             | 外径 Outer dia.                                  | エンド End |
| EPDBE-PN           | エポックディープボールエボリューション(PNコーティング)<br>Epoch Deep Ball Evolution (PN Coating)      | 0.1~6               |             | X (N/A)  | 1~6     |
| EPDBE-ATH          | エポックディープボールエボリューション(ATHコーティング)<br>Epoch Deep Ball Evolution (ATH Coating)    | 0.1~6               |             | X (N/A)  | 1~6     |
| EPDSE-PN           | エポックディープスクエアエボリューション(PNコーティング)<br>Epoch Deep Square Evolution (PN Coating)   | 0.1~6               |             | 6  | 2~6     |
| EPDSE-ATH          | エポックディープスクエアエボリューション(ATHコーティング)<br>Epoch Deep Square Evolution (ATH Coating) | 0.1~6               |             | 6  | 2~6     |

**[注意]** 首下長/外径が10以上の工具の再研磨可否については、弊社営業にお問い合わせください。

**[Note]** Contact our sales office regarding whether or not re-grinding is possible for tools where Under neck length/Mill diameter is 10 or greater.

特長

寸法ボールPN

寸法ボールATH

切削条件ボール高効率

切削条件ボール高精度

寸法スクエアPN

寸法スクエアATH

切削条件スクエア高効率

切削条件スクエア高精度

技術データ



図、表等のデータは試験結果の一例であり、保証値ではありません。  
「MOLDINO」は株式会社MOLDINOの登録商標です。

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.

**安全上のご注意** Attention on Safety

**1. 取扱上のご注意**

- (1) 工具をケース(梱包)から取り出す際は、工具の飛び出し、落下にご注意ください。特に工具刃部との接触には十分ご注意ください。
- (2) 鋭利な切れ刃を有する工具を取扱う際は、切れ刃を素手で直接触れないように注意してください。

**2. 取付け時のご注意**

- (1) ご使用前に、工具の傷・割れ等の外観確認を行っていただき、コレットチャック等への取付けは確実に行ってください。
- (2) ご使用中に、異常な振動等が発生した場合は、直ちに機械を停止させて、その振動の原因を取り除いてください。

**3. 使用上のご注意**

- (1) 切削工具あるいは被削材の寸法・回転の方向は、あらかじめ確認しておいてください。
- (2) 標準切削条件表の数値は、新しい作業の立上げの目安としてご利用ください。切込みが大きい場合、使用機械の剛性が小さい場合あるいは被加工物の性状に応じて切削条件を適正に調整してご使用ください。
- (3) 切削工具材料は硬質の材料です。ご使用中に破損して飛散する場合があります。また、切りくずが飛散することがあります。これらの飛散物等は作業者を切傷させ、火傷あるいは目に入って負傷させる恐れがありますので、工具をご使用中はその周囲に安全カバーを取付け、保護めがね等の保護具を着用して安全な環境下での作業をお願いいたします。
- (4) 切削中に発生する火花や、破損による発熱や、切りくずによる引火・火災の危険があります。引火や爆発の危険のあるところでは使用しないでください。不水溶性切削液をご使用される場合は防火対策を必ず行なってください。
- (5) 工具を本来の目的以外にはご使用にならないでください。

**4. 再研削時のご注意**

- (1) 再研削時期が不適当であると工具が破損する恐れがあります。適正な工具と交換するか、再研削を行ってください。
- (2) 工具を再研削しますと粉塵が発生します。再研削時にはその周囲に安全カバーを取付け、保護めがね等の保護具を着用してください。
- (3) 本製品には特定化学物質に指定された コバルト及びその無機化合物が含まれています。再研削等の加工を加える場合は特定化学物質障害予防規則(特化則)に従った取扱いをしてください。

5. 工具に関して、安全上の問題点・不明の点・その他相談がありましたら [フリーダイヤル技術相談](#) へご相談ください。

**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 equipment 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 when one is 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.

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工具選定データベース【TOOL SEARCH】

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